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MANAGEMENT AND
MEDICAL TREATMENT
OF
CHILDREN IN INDIA

BIRCH'S
MANAGEMENT AND
MEDICAL TREATMENT
OF
CHILDREN IN INDIA

SEVENTH EDITION

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HISTORICAL NOTE.

This work, which is probably the oldest professional book still in publication in India, was originally written by Surgeon Henry Hurry Goodeve of the Bengal Medical Service, and published on March 15, 1844, as a very small volume, privately printed, under the title, **Hints for the General Management of Children in India in the absence of Professional Advice.** It is of interest, perhaps, here to quote the original Preface to this first edition as it has been the keynote of all the subsequent ones.

* * * * *

ORIGINAL PREFACE.

“ In offering these few pages to my patients, I do not, for a moment, pretend to give them a complete treatise on children’s diseases. Nor do I wish, in any way, to prevent their taking medical advice, where it can be obtained. On the contrary, I would earnestly caution them never to trust to their own judgment, when they can procure professional assistance. The observations and advice contained in this little pamphlet are intended merely to aid those (a large class in India) who are placed at a distance from the advice of medical practitioners: and if this work prove beneficial in a single case, I shall be amply repaid for the time I have bestowed upon the subject.”

* * * * *

A second edition was called for in less than six months and issued on September 1, 1844. A third

followed in October 1852, and a fourth in 1856. Even this fourth edition was only a very small book of 138 pages. The fifth edition was edited by S. C. G. Chuckerbutty; the sixth by Joseph Ewart in 1872. The seventh edition was entirely re-written by Birch and was the first with which his name was associated, as little of Goodeve's original work remained. A second edition was published in 1886, a third in 1895, and a fourth in 1902.

Brigade-Surgeon Edward Birch was born in 1840 and died on 27th November 1912. He entered the I. M. S. in 1866, and spent nearly the whole of his service in Bengal. He was Civil Surgeon of Hazaribagh, later Superintendent of the Presidency General Hospital, and later still Principal of the Medical College, Calcutta.

PREFACE TO SEVENTH EDITION.

The science of the care of children in health and disease has received so much attention and made so much advance of late years that the authors, in approaching the preparation of the seventh edition, felt justified, not only in making considerable additions and expansions, but in entering into more scientific detail and explanation. Such alterations are encouraged by the desire of many modern mothers to study carefully and scientifically the care of their own children.

The universal establishment of Welfare Centres has done much to stimulate among all classes an interest in all matters pertaining to the child, and no one who has visited a Model Welfare Centre can come away unaffected by enthusiasm or unimpressed with the value of the methods there practised. Certain chapters have been devoted to the feeding of children and many of the tables therein are based on those in use at the Highgate Mothercraft Training Institute, modified as our experience has taught us, to suit local conditions.

The authors hope that in expanding the scope of this book, its value as a work of ready reference may not be impaired, and that the omission of certain chapters to make room for more necessary matter, will not detract from its utility.

Full details of the treatment of disease, as far as the size of the volume permits, have been given for the benefit of students, junior practitioners and those

whose practice does not, as a rule, embrace the treatment of children.

The book has been wholly rewritten and reconstructed. New chapters have been added on *B. coli* infection, Fevers of obscure origin, Acidosis and Infantile Liver; while the chapters on Rickets, the management of children in health and other important subjects have been enlarged.

In the course of this book the names of many authorities are mentioned, whose opinion and experiences contribute, it is felt, in no small measure to the value of the text.

The authors would like to take this opportunity to acknowledge gratefully the kindness and inspiring teaching they have received over many months at the hands of the staff of the London hospitals.

Finally, our thanks are due to Dr. N. J. Judah, F.R.C.S. (Eng.), Surgeon to the Nose and Throat Department, Medical College Hospital, Calcutta, for his contribution of special chapters on the diseases of the Ear, Nose and Throat, to Lieut.-Col. R. Knowles, I.M.S., Director of the School of Tropical Medicine, Calcutta, for his section on the treatment of Snake-bite and to Dr. Profulla Das Gupta, Medical Registrar, Medical College Hospital, for collecting from the material at the Medical College Hospital the average effective doses of certain drugs.

V. B. G.-A.

E. H. V. H.

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THE Management of Children in India.

PART I.

On the Management of the European Child in India, while in Health.

CHAPTER I.

INFANT MORTALITY IN INDIA

As influenced by the Kind of Management to which the Child is subjected.

It being quite impossible to obtain an intelligent appreciation of the subjects discussed in this book without the possession of clear ideas as to the effects of good, bad, and indifferent management upon European child-life in India, it becomes a necessary preliminary to investigate these points. In doing so it would not be difficult to demonstrate the terrible results of bad management on the one hand, and the extremely favourable results of good management on the other, for there is a vague impression abroad that the climate of India is extremely fatal to European child-life. Paradoxical though it appear, it may be stated that such a belief is at once true and untrue; the mortality has been enormously in excess of that which prevails in Europe, and it may be lower than, or as low as, that of Europe.

**Prevalent
belief
mistaken.**

Older children are not so intensely influenced as infants by indifferent management. They soon regain health and strength in the hills, and are probably then better off than the English child of the same class in England.

In support of this opinion, we consider that up to 6 or 8 years of age European children thrive, if anything, better than in England.

Whether your child is to live or to die in your far-off home is therefore a matter which lies largely in your own hands. "The treatment of the child in the

**Individual
responsibility.**

Investigations as regards Europe.

first twelve months either destroys his life or leaves indelible traces on his future existence," wrote Farr, who procured detailed accounts from several countries in Europe of the treatment of their babies, and found it to be very different, and in many instances very sad. "Here they are bound up like mummies; there they are not nursed by their own mothers, and as they advance in age are fed on improper food"; and to the difference in management the difference in mortality is shown to be due.

The squalor, dirt and confinement of parts of all large towns exert their influence in a very perceptible way among the children of the poor, just as they do in the native portions of Calcutta.

As regards Calcutta.

That a high rate of infant mortality should prevail in native Calcutta will appear natural to those who know the effect of filth and foul air on infant life, but the full measure of this needless destruction of life can only be understood by consideration of its special causes, of the singular exemption of European infants, and of certain saving influences which are in existence here, but are neutralized. But though dirt in Calcutta plays its usual part in enhancing the mortality, in the more filthy localities the actual death-rate is but slightly in excess of that of the cleaner places; and the proportion of deaths among the various races is maintained without variation in all localities, proving that the terrible result is really due to the domestic treatment of the infants, and not primarily or principally to dirt.

Advantages of the tropics.

It has often been remarked that there ought to be a low rate of infant mortality in India, seeing that tuberculosis is far less likely to be developed in a tropical than in a temperate climate, and that scarlatina, whooping-cough, and other affections peculiar to childhood are either uncommon, or run such mild courses as virtually not to affect the death-rate. "Calcutta, among its resources for the destruction of infant life, does not include those less avoidable causes of death which work elsewhere, but owes to qualities, or habits, of its own, the pre-eminence which must be assigned to it among deadly places. That European infants die in small numbers means simply that they are not subjected to the same fatal treatment; and that the mixed races hold an intermediate place is due to the

Causes of illness preventable.

admixture of native habits among the poorer classes. Death, where it abounds, does not arise from climate, or any cause that is out of reach, but from that which the people have created and perpetuated for themselves." (Payne.)

CHAPTER II.

GENERAL EFFECT OF THE CLIMATE

Upon the Child's Constitution.

**The danger
of careless-**

From the previous chapter we see that there is really a very hopeful—indeed, we may say a satisfactory—side to the question, in that the climate is deadly only as we make it so. But is the climate of the plains of India in no way inimical to the European child's constitution? No well-informed person will reply to this question in the negative. Unfortunately, it cannot be said that no hurt is to be apprehended greater than might occur in its natural climate. On the contrary, it may be laid down as an axiom that **an amount of carelessness which in England will give but an ordinary English death-rate will in India yield a frightful mortality.** Neglect, in India, will render the chances of survival much less than those in Europe,—in a word, to preserve our children to us in normal proportion we must adopt precautions more stringent than are called for in England.

**With care,
climate not
a danger.**

There is a general medical opinion that the Indian climate does not in any way injure the health of the European infant during the first year of its life; further than this, the conviction is prevalent that with proper precautions up to the age of 5 or 6 years the child may be reared nearly as satisfactorily in the plains of India as in Europe; but beyond these ages all are agreed that physical and moral degeneration occur. The child then exhibits the necessity for change of climate by emaciating and outgrowing its strength.

**When to
send the
child to
Europe.**

So profoundly does the climate, after the period of immediate childhood, influence the constitution, that the effect of a more prolonged residence is rendered permanent throughout life. It has long been known to the English in India that children may be kept in that country up to five, six, or seven years of age without any deterioration, physical or moral, and in the higher classes of life with probably as little, if not less, danger to life than in England; for most assuredly

in some respects—as, for example, scarlatina, measles, whooping-cough, thoracic complaints, and even dentition—they suffer less in India than in England. But after that age the child must be sent to England, or it will deteriorate physically and morally,—physically because it will grow up slight, weedy, and delicate, over-precocious it may be, and with a general feebleness not perhaps so easily defined as recognised, a something expressed not only in appearance, but in the very intonation of the voice; morally, because he learns from his surroundings much that is undesirable, and has a tendency to become deceitful and vain, indisposed to study, and to a great extent unfitted to do so,—in short, with a general tendency to deterioration which is much to be deprecated, and can only be avoided by removal to the more bracing and healthy (moral and physical) atmosphere of Europe. Circumstances, however, combine to prevent some persons sending their children to Europe. For such there ought at least to be immense comfort in the knowledge, that, with properly directed care, the pernicious effects of climate, which carelessness will render disastrous, may be assuredly warded off to a great extent.

**Advantages
of European
climate.**

This is the proper place to inquire—what are the peculiarities in the infant constitution which render the climate of India obnoxious to its vitality and maturity? The several parts which compose the body of the infant in any climate are softer, they contain more blood, and are more fluid than those of the adult. The skin is exceedingly delicate, and the microscopical blood-vessels which pervade the whole body are at this early period of life exceptionally active. The same may be said of the glands. The brain is large, and it is less solid than in the adult. The whole nervous system is developed out of all proportion in advance of the muscular system, wherefore the excitability is greater by far than at any subsequent period of life, and it is to be recollected that all the functions of the body are immediately under nervous control. In short, the vital powers are intensely, though delicately, active, the nervous susceptibility is extreme, and so an infant may succumb to an illness before there has been time for it to affect any organ obviously. Now it may be laid down as an axiom that the higher the external tem-

**How does
climate
affect the
child.**

Constitutional.

perature, the more susceptible is the system to nervous influences. A hot climate at first stimulates the nervous system (even in the newly-arrived adult), which being, so to speak, in excess in infancy, is in greater proportion thus affected if unduly exposed. Hence we have in hot climates convulsions, fever and death during teething, and an abundance of nervous affections where there is bad management. But a hot climate has a secondary or depressing effect, producing a feeble circulation and lessened muscular power, with consequent congestion of the liver, spleen, and bowels, which are peculiarly soft and vascular in infancy. The minute muscles which ensheath the innumerable blood-vessels of these softer organs being relaxed, their veins and arteries expand, the result being that a certain amount of blood, which is thus wrongly stored, is lost temporarily to the general circulation and to the nutriment of the body. The balance between the circulation and nervous influence is, in fact, disturbed, and a chill may easily drive a large quantity of the blood, which is on the congested surface, into the deeper and warmer organs, the little blood-vessels of which have lost the contractile power to return it, and thus internal congestion and a lowered resistance to the invasion of the body by the germs of disease may be established. Moreover, the diseases conveyed by flies, mosquitoes, and other biting insects or by impure water, are an ever-present, though preventable, danger in hot climates.

This knowledge not only coincides with all the facts stated in the first Chapter, but it explains them. The infant under ten or twelve months of age, with care, thrives, we have seen, as well if not better in India than in Europe, because the large amount of heat which is natural to it and which then is one of its greatest requirements it has in abundance, and at the same time means are taken not to expose it to excessive heat. It possesses freely the blessing of fresh air, more so than in Europe, and its food being everywhere uniformly simple, the vital functions enumerated are not called upon unduly.

But when the term of infancy is over, the child participates more and more, as its life advances, in the disadvantages under which the adult exists in India,

till, after a few years, they are exceeded. The elder children therefore languish, or to some extent degenerate. What are these disadvantages? Categorically, they may be enumerated thus:—(a) a digestion slower than in the European's natural climate, consequently (b) a lessened appetite, and therefore (c) slower nutrition; (d) a generally relaxed state of the system; (e) a tendency to poverty of blood; (f) and finally, lessened mental and bodily vigour, because the wear and tear (waste) incidental to climate are more considerable, while the supply (nutrition) does not replace the loss so rapidly as in a colder climate.

Disadvantages after the age of five.

These are the more plainly marked deleterious effects; but there are others which it is desirable to mention briefly. Heat or climate very materially affects the quality as well as the quantity of the food appropriated for nutrition, and not infrequently creates a morbid appetite for a class of food which may, sooner or later, prove injurious. It is now known that the summer infantile diarrhoea of England is chiefly due to an alteration effected in the quality of the food, through the growth of germs, favoured by the sudden accessions of heat. With such accessions, the infant bills of mortality rise in England, as certainly as does the thermometer. Every parent in India is aware also of the trouble there is to restrict children to their appropriate food; how the light pudding is carefully eschewed, and highly flavoured meats clamoured for—a petition too frequently entertained. Another effect of the Indian climate is the predisposition to chill. By this is meant that very rapidly by evaporation and radiation the surface temperature of the body may fall with the result that some congestion of the internal organs—the liver or intestines—may occur, producing symptoms which may be slight or alarming, but all of which point to derangement of the function of the body. Hence we see how essential it is to adopt simplicity of diet, and to attend to the state of the bowels, these being the most potent, though the easiest, means of preserving the healthy action of the liver the derangements of which cause ill-health and disease.

Other effects.

Finally, here we would make a plea for those children of Europeans who cannot at the age of 5 or 6 be sent home to Europe, that at least they should

Plea for Anglo-Indian children.

be sent to the hill schools, and should remain there till well over the age of puberty, if they would escape that mental and bodily deterioration of which mention has been made. For there is no doubt that those children who have been brought up properly and **entirely** in the hills of India are in no way inferior in mental or physical stamina to those reared in Europe.

CHAPTER III.

THE MOTHER'S HEALTH DURING PREGNANCY

And its effects upon the Child's Constitution subsequently.

The mother's system yields nourishment to the infant before its birth. By bearing in mind the extreme rapidity of that child's development while still within the womb, and that no other material than the maternal blood is supplied to meet the whole burthen of growth, it becomes easy enough to understand the great influence thus exerted upon the constitution of the child; but the extent to which it may suffer is either unknown, or is generally but very ill appreciated. Possibly it may be that while the influence of the quality of the blood is admitted, there is a difficulty in believing the readiness with which it becomes changed in response to the surrounding circumstances of the individual, for, as no mother would wittingly malnourish her child after its birth, it is hardly to be supposed she would commit a similar crime before it had been called into independent existence.

Subject not generally appreciated.

In any circumstances, the health of the pregnant European woman is, in India, liable to sufficient deterioration to cause it to be a matter of importance that she should adopt precautions more strict than are demanded in Europe.

Its importance.

The diet of the pregnant woman should be amply sufficient, but always simple.

Hygiene of pregnancy.

THE DIET RECOMMENDED.

The following diet for all pregnant mothers is recommended, with the addition, if need be, of Cod-liver oil and Parrish's Food for anæmia or diminished calcium content.

Cereals.—Oatmeal porridge or any of the breakfast foods, with milk. Brown or wholemeal bread, toast, rusks, cream cracker biscuits.

Vegetables.—Any vegetable in any form except fried.

Fruits.—Any fruit, either fresh or stewed.

Meat.—Beef, lamb, mutton, veal, not at all; or only very occasionally. Pork never.

Curry never.

Chicken, (avoid duck, goose, or game).

Croquettes or rissoles, if not fried in deep fat.

Eggs.

Fish.—Any fish, except salmon, mackerel and hilsa.

Soups.—Any soup, thick or clear, but free from fat.

Sweets.—Any jam or jelly, marmalade or honey, but pure honey is best of all. Milk puddings. Boiled puddings occasionally. No pastry, no rich cakes.

Salads.—Any salad, but sparingly of salad dressing.

Fluids.—Water, aerated water, home-made lemonade, orangeade, weak tea, coffee, milk, as desired.

No alcohol of any kind. Butter may be taken if desired, but not in large amounts. Cream, fat meats, and any fish fried in deep fat should be avoided. Fruits and vegetables must be taken at least twice a day, and meat, if at all, not more than once every other day. Mild cheese, such as St. Ivel's is permissible.

It must be remembered that when there is deficiency of vitamins in the food, there is also a shortage of calcium, potassium, sodium, phosphorus, iron, and iodine, etc.

There is good reason to believe that a considerable part of the formidable array of disease, including lack of growth and vitality, that beset the child and adult in the East is caused by food deficiencies and there can be no doubt that there is widespread shortage of vitamins in the diet of the poorer classes, caused by ignorance, poverty and the refinement of food, over which they have no control. For instance, the deficiency in vitamin B is mostly due to the refinement of cereals, that is the refinement of flour. The bread made of such flour forms 70 per cent. of the diet of the poor. Wholemeal bread contains seven times as much vitamin B as white bread, therefore it behoves everybody

in India to eat wholemeal bread and to supplement the deficiency in vitamine B with dāl or eggs or ata.

Fresh milk and cheese are the foods richest in calcium, and when these are taken in any quantity there will be sufficient calcium in the diet, but it must be remembered that large numbers of poor children get very little milk. The body needs 9 to 15 grains of calcium per diem. A pint of good cow's milk contains 10 grains.

There is very little iodine in the food or soil of Bengal, the lack of which is frequently responsible for lowered and disordered metabolism. This can be made good by taking iodised salt, known as Iodosal, instead of ordinary salt at meal times.

An unusual use of wine or beer is not only unnecessary, but positively injurious. The capricious appetite, which attaches to the condition of pregnancy, must not be yielded to. Moderate exercise, short of fatigue, should be indulged in. Riding, dancing, and all violent exercises of a straining nature, such as lawn tennis, badminton, driving at golf, etc., should be avoided after the fourth month and at the times each month that the patient would be menstruating if she were non-pregnant. Walking is beneficial. The legs may be used, but the arms should be spared. Late hours are to be eschewed. Rest in the horizontal position should be more freely indulged in than formerly. The bowels should be kept regular by means of diet, or, if necessary, by cascara or rhubarb. Such aperients as aloes and seidlitz-powders, as well as all patent medicines of unknown composition, are to be avoided as dangerous. The dress should be loose, so as to allow space for the growth of the child and to give a freedom to the mother's lungs sufficient to compensate for the increased upward pressure of the womb on her chest. It is not desirable that she should forego any of her usual house occupations; and, from a very large experience, one would advise, so soon as conception is deemed probable or certain, that a proficient medical opinion and examination be obtained, in order to obviate errors in conduct, for there is no doubt that in a tropical climate miscarriage more frequently occurs than in Europe,—and in many cases this is preventable. Such examination and advice is of the utmost importance,

Dress.

if there has been previous trouble or "mishap." The greatest care should be taken to carry out the above precautions and avoid all over-exercise, or fatigue, or jolting at and about those times when menstruation would have been due, if it were not for the fact that conception had occurred, for at such times, more particularly up to the fourth month, miscarriage is most likely to follow any error or indiscretion; and this must be remembered in planning a voyage or fatiguing railway journey and applied also to marital intercourse.

Surroundings.

The perfect mother is placid and equable in temper, happy, good-natured and active. Her life must be quiet, but her surroundings should be cheerful and bright. The dismal in thought and action must at all times be banned, for there is more than popular belief in the fact that mental impressions have an effect on the child's development.

The breasts.

The breasts must also be cared for. As they increase in size and weight, a suitably arranged bandage or silk handkerchief will reduce the dragging sensation. The nipple for three months before birth of the child should be daily cleaned with Eau-de-Cologne or spirits of wine and then rubbed with lanoline, or if they are retracted they must be drawn out daily with finger and thumb.

Eclampsia or fits during pregnancy is very common in the tropics. This very severe condition can be guarded against by the doctor testing the urine every two weeks during the last three months and careful dieting.

It is all-important that every pregnant woman should be properly examined as regards the position and size of the mother and baby in her 36|37 week. No false modesty can ever justify negligence in the matter, for the life of both may depend upon efficient examination.

Quinine.

Finally, I would advise every mother in the plains of Assam or other malarious districts to take daily a 3-gr. tablet of quinine at dinner time during the last six months of her pregnancy: for by so doing the anxiety and danger of malarial fever is prevented. She need have no fear whatever of any untoward effect of the drug occurring when taken daily in such a small dose.

Moreover, it may be here noted that we have seen many cases where malignant or benign malarial infections have attacked a pregnant woman and have treated them with the usual large doses of quinine—even in many cases giving the quinine intravenously—and no ill-effects have followed, whereas one has seen several cases where from fear of disaster, quinine has been refused or not given and miscarriage, premature labour or foetal death has occurred as a result of exhaustion or pyrexia.

It is important to recognise that not all fevers during the carrying period are malarial. A very common type of fever often associated to rigors greatly resembling malaria is frequently seen in the tropics and is due to a *Bacillus coli* infection of the kidney. This fever is accompanied by pain in the loins most often in the right, and can be readily and easily treated if borne in mind (vide *B. coli* infection).

Death of the foetus, and intestinal parasites are often causes of fever during pregnancy.

CHAPTER IV.

MANAGEMENT OF THE INFANT

At and immediately after Birth.

SECTION I.—THE FIRST DAY OF LIFE.

An infant, let us assume, has been born without accident, and separated from its mother. The essential points demanding immediate attention are, care of the cord, warmth, and rest.

Warmth.

The cord having been inspected carefully to see that there is no oozing from it, the infant is to be rolled in flannel, which has been well warmed, and allowed to rest in the arms of an ayah or other warm place, while the necessary attention is being bestowed upon its mother. Warmth is at this moment of the greatest consequence, for the temperature of the newly-born infant falls several degrees below that which, during the rest of its life, will be natural to it, or which would subsequently be compatible with its vitality.

The bath.

Rest, for these few minutes after the comparatively violent exercise of struggling and handling, is a good thing, though hardly essential so far as it concerns delaying the next operation, namely, the bath, which should be warm and be given with "gentleness and rapidity."

If there is not a thermometer at hand, the elbow of the nurse immersed in the water will afford a fair test as to the appropriateness of the temperature. The hand should not be trusted to; it is not so sensitive as the thinner-skinned and habitually protected elbow.

Sometimes there is a large quantity of white sticky substance adhering to the child's skin; sometimes there is but a little; almost always some. The complete removal of this substance is usually easily effected by anointing, with a little friction, those portions of the skin upon which it is seen, with warmed oil, lard, or butter. An emulsion is thus formed, which admits of ready removal with the sponge, soap, and water, while the child lies upon the nurse's lap, before immersion in the bath. Should it happen that all the white substance

is not thus completely removed, no delay, or picking or rubbing, is justifiable in further attempts. Rapidity and gentleness are the really important points, and it is of no great consequence whether thorough dislodgment be effected; but it is of moment that neither chill nor exhaustion be imposed upon the delicate organism. A word of caution as regards the eyes, during this first bathing, is necessary. **The eyes.** Scrupulous care should be observed that none of the soiled water be permitted to enter them, otherwise the infant may commence its life with an attack of ophthalmia. Indeed it is doubtful whether it is not best in every case to follow the advice of Cr  d   and place a few drops of a 1 per cent. solution of Silver Nitrate into the eyes immediately after birth, and then gently and carefully to cleanse the parted lids with some Boric Lotion. The process of drying and the application of dusting-powder are now to be proceeded with.

The arrangement of the navel-string next claims **The cord.** attention. The first thing to be done is to re-examine it attentively for a moment, and if there is any appearance of blood oozing from it, to apply a fresh ligature close to that which is already upon it.

Great care must be taken that the cord be not jerked or pulled through carelessness. From the centre of a piece of soft, clean rag, a portion is cut sufficient to allow the cord to be passed through it, and this having been placed in position, a strip of similar rag which has been sprinkled with the dusting-powder (55), to which a sixth part or so of Boracic Acid Powder had better be added, is to be gently wound round the cord, which should now be loosely coiled upon the flat piece which lies upon the abdomen. Over all a flannel binder is to be sewn with a wool-needle and cotton (pin should never be employed), and the process of dressing is to be completed. Then the infant should be wrapped in a soft woollen shawl and placed in its mother's arms, in close proximity to her body. Usually the baby will at this time fall asleep, and so remain for some hours. From such a slumber an officious nurse must not be permitted to awake it on the plea of giving it nourishment, or upon any other pretence. Should, however, there not be an inclination to sleep, the mother may at once apply the child to her breast, an act which will

prove beneficial to herself and to her infant—to the former, by contributing to the contraction of the womb and stopping any tendency to bleeding; to the latter, by communicating warmth.

Another reason why the infant should be in proximity to its mother at this time is that it enables the ventilation of the room to be thoroughly carried out, a matter of the greatest importance to both mother and child. So long as the infant lies in contact with its mother's warm body, there need be no fear of its catching cold. The windows and doors may be thrown open with impunity, if only draughts be excluded and the cold is not excessive. As a rule, the lying-in chamber is kept much too warm, either for comfort or safety.

The mode of dress must be left to the previous ideas of the mother, but a protest cannot be out of place against the "fashion" which prescribes innumerable garments and which, to say the least, entails delay, unnecessary exposure, and fatigue at a moment when each and all of these should be avoided.

It is seldom, if ever, necessary to have recourse to any artificial means of nourishing the newly-born infant, though prejudice on the part of nurses often eventuates in an opposite course. "Seeing is believing," say they, and till the white fluid can be squeezed from the breast in quantity, it is concluded no nourishment is secreted. Thus has originated the popular belief that till the third day there is no sustenance for the child to be had from the mother. This is altogether an error, and a serious error. Nature has fully supplied all that is necessary for the wants of the child. Small in quantity and comparatively poor in quality as this provision admittedly is during the first two or three days after delivery, it is nevertheless amply sufficient for the purposes of nutrition. Not only is this so, but the early secreted fluid (for milk in appearance it then is not) is almost invariably sufficient to effect the removal of the black contents of the bowels, about which nurses usually express so much anxiety that they are unhappy if not permitted to drench the unfortunate infant, within a few hours of its birth, with purgatives.

The secretion which is at first abstracted from the breast by the infant meets all requirements of

Breast secretion is sufficient.

nourishment and purgation; sleep, warmth, and cleanliness being its only other necessities.

The castor oil which is sometimes administered to the newly-born infant is actually injurious, in that it acts as too rapid and too powerful a purge. It at once removes the whole contents of the intestine, part of which, it is intended by nature, should be absorbed into the blood, to contribute nourishment and heat to the body, pending the full secretion of milk and during that period of rest which is so much needed by mother and child. When castor oil has been wrongly administered, it is almost a necessity that some artificial food be given, because a premature appetite has been created by the removal of nature's provision. Restlessness follows as a matter of course, instead of that complete tranquillity which should be enjoyed. The infant is needlessly subjected to the risks and disadvantages of artificial food at the very moment when it is least fitted for an ordeal by which indigestion, flatulence, and perhaps bowel irritation may be induced. In short, the balance between nutrition and digestion is overthrown by interference, while the probable necessity for the further use of aperients is increased.

Aperients are injurious.

During the first twenty-four hours it is not necessary to put the child to the breast more than two or three times.

SECTION II.—ACCIDENTS AND UNNATURAL CONDITIONS.

All may not go smoothly with the child. There are some accidents which may happen at or immediately after birth, and some unnatural conditions which, with their remedies, we now proceed to consider briefly.

I. A child may be apparently stillborn, or it may apparently cease to live very soon after its birth. Not a moment should be lost. A human life is in the balance, and let it be remembered that in seemingly the most hopeless cases proper and instant treatment is frequently rewarded with success. Proceed as follows:—

Treatment of stillborn child.

(a) Wipe out the back of the mouth, gently but effectually, by a deep sweep of the little finger round which a fold of a moistened soft handkerchief has been passed.

**Rapid ac-
tion neces-
sary.**

(b) If the child is still attached to its mother, ascertain by grasping the cord lightly between the fore-finger and thumb whether there is any pulsation in it. If there is pulsation, do not divide the cord until the child has cried vigorously; for so long as the cord beats, there is some circulation through the child's body, which may serve to maintain life till respiration becomes well established. At the same time dash a little cold water upon the face and chest of the infant, administer a few light but smart slaps, and with the fingers placed upon the lower part of the chest where the ribs separate, give an occasional jerk inwards, removing the hand suddenly each time. Should there be any delay in the commencing of breathing while the child still remains attached to the mother, begin artificial respiration as below described.

**Feeble pul-
sation.**

(c) If the pulsation in the cord be so feeble as to make it almost doubtful that any exists, and if there are no signs of returning animation, without hesitation put a double ligature upon the cord, divide it between the ligatures, and proceed as directed in the following paragraph:—

**If no pul-
sation.**

(d) If there is no pulsation, quickly ligature and divide the cord. Dash a little cold water on the face and chest of the infant, and smartly slap the chest and the buttocks. Plunge the infant for about half a minute into a warm bath (temperature 110 degrees or so); rapidly remove it from the water, and holding it by a finger hooked into each armpit, expose it to a current of air, by swinging it backwards and forwards two or three times, or plunge it straight from the hot water into a basin of cold water. It is important that it should only be in the cold water for a moment.

(e) If success does not attend these efforts, proceed at once to perform artificial respiration.

(f) If the after-birth has been expelled with the child, or if the separation has already been effected by the attendant, at once adopt the measures described in the foregoing paragraphs (d) and (e).

**Sylvester's
method of
artificial
respiration.**

Artificial respiration is conducted as follows:— Having cleansed the child's face rapidly and wiped out the back of the mouth, place the infant on its back on the bed, the head being thrown well back, and the chest elevated by a couple of folded napkins beneath

the shoulders. An assistant should now draw forward the tongue with his fingers and so retain it between the gums. Standing behind the head, grasp each forearm, which should be well everted, i.e., turned outwards, the palms looking upwards, and extend the arms upwards till they meet directly above the top of the head, thus causing an indraught of air by increasing the capacity of the chest (inspiration). Then bring the elbows steadily down to the sides again, bending them as they travel, and gently press them against the chest, which will be felt to bend in a little, thus expelling the air (expiration). Repeat these motions with about the rapidity of a child's ordinary breathing, until there is a natural attempt at respiration. As far as practicable, regulate the further movements in concert with the natural efforts which are being made, and do not desist till the respiratory function is properly established, and the child cries lustily and persistently. The feet should be steadied. See also that you do not perform the movements too quickly or let the babe's body get chilled. This is prevented by frequently immersing it in warm water. This is called "Sylvester's method," and as it is easily described and easily practised, it is mentioned to the exclusion of other methods, especially as some of the highest authorities confirm the writer's experience that it is the preferable and a very successful plan.

How long should these efforts at resuscitation be persevered in? The reply is—not only so long as there is a sign of spark of life, but for at least half an hour, even though there be no sign of success.

When vitality has returned, wrap the infant carefully up and place it upon the *right* side with the head and shoulders raised, and if it can swallow, administer five drops of brandy with water.

II. **Swellings of the scalp** are not infrequently observed in the newly-born infant, and may occasion alarm. They are soft and puffy, and are caused by the pressure endured at birth. No treatment is required as a rule. These swellings are unimportant, and will generally subside of their own accord in a few days.

III. **Bleeding from the naval-string** is to be treated by the application of an additional stout ligature placed a little nearer to the body than the first one.

Inability to suck.

IV. Should an infant appear to be **unable to suck**, it may be that the infant is too weak, or premature, or that it has a cleft palate or tongue tie. Should there be no immediate possibility of obtaining medical aid, the infant must be fed by means of a spoon with its mother's milk, or, if this be not obtainable, with fresh cow's milk (1/3) and warm water (2/3) to which a little sugar has been added.

Tongue-tied.

Very few children are really tongue-tied. Do not therefore too quickly jump to the conclusion that such is the case, simply because an infant does not readily suck.

It may be concluded that the tongue is tied down when that organ cannot be raised from the floor of the mouth by passing the little finger underneath it; when the string is seen to extend nearly to the tip of the tongue; and when, the infant attempting to suck, the milk flows down the breast without entering the throat.

It may so happen that in an out-of-the-way district medical aid cannot be obtained. Only under such circumstances of urgent necessity is it justifiable for unskilled hands to undertake the surgically simple operation for its relief.

To operate, place the child in a good light in the sitting posture, its head being firmly held; then take a pair of scissors, the points of which have been carefully ground off, and having lifted the tip of the tongue sufficiently to stretch the string, nip the latter slightly, the point of the scissors being held downwards away from the tongue. With the end of the finger gently tear through the remaining obstruction, and the operation is complete.

Non-action of bowels.

V. Should the **bowels not be moved** within the first twelve hours of life, examine the fundament and gently introduce a piece of soap about the thickness of a slate pencil and 1 inch long. Should it be that the skin extends over the anus, and that no opening can be found, from surgical aid alone is relief to be obtained.

Cleft palate.

VI. An infant may be born with a **cleft palate**; that is, the roof of the mouth is split from behind forwards. This condition requires great attention in the matter of feeding; there is not the slightest use in giving

the child the nipple, or in attempting to use the feeding-bottle in the ordinary way. The child cannot suck; if it attempts to do so, the milk will get into the nostrils instead of passing into the stomach. Artificial feeding (Chap. VII) must of necessity be adopted, using a feeding-bottle, a piece being cut from the side of the nipple sufficient to make a circular opening about so large (O); the child should then be placed in the semi-erect posture, the bottle, about half full of the food, being at hand. The nipple should now be placed in the mouth, and the end of the bottle suddenly tilted up. Of course, the result will be a gush of milk down the throat. Almost instantly the end of the bottle is to be again lowered, and after a few moments' interval re-elevated, and so on. The feeding is to be conducted by a series of jerks. A spoon may be used, but it is troublesome and not nearly so effectual. The normal leech-bite at the top of the nipple should be closed with Rubber Tyre solution.

An ingenious contrivance, which may be obtained from an instrument-maker or easily made from a portion of a rubber glove consists in attaching to the stalk of the ordinary nipple of the feeding-bottle an elastic flap cut to fit the palate. During suction this is forced back and forms an artificial palate, which prevents the fluid from entering the nose and enables the infant to suck.

By such means an infant with a cleft palate may be thoroughly nourished and kept in good health till babyhood has passed. Afterwards, there will be no difficulty, and at two years of age the surgeon will be able, in the majority of instances, to remedy the defect, and even the age of six months is not too early for operation in some cases.

VII. Purging and vomiting blood.—These formidable symptoms unless urgently treated are frequently a cause of death. The blood may be bright red or dark red in colour, and in the course of a very few hours the infant may become blanched from loss of blood. No cause for this hæmorrhagic diathesis has yet been established for it may occur in a perfectly healthy baby within a few hours of birth. We have seen many of these cases in the children of all nationalities in Bengal. In very severe cases there are hæmorrhages under the skin. To-day the old "watch and pray" treatments

Passage of
blood.

have been discarded as a large proportion of these children die within a few days or hours if treated by Gallic acid or other astringents. Whatever town or village the baby is born in, a doctor exists to-day who can carry out the following method which will save the baby's life in 90% cases and relieve the mother's anxiety within a few hours. All the apparatus that is needed is a Record syringe with a sharp needle, and a healthy father or relative who would be willing to give perhaps an ounce of his blood at a moment's notice.

Personally, we prefer the father. He is laid upon a bed and a tourniquet is applied in the upper arm so as to engorge the vein in the front of the elbow. The needle and record syringe having been sterilised in boiling liquid paraffin is then inserted into one of the prominent veins, the tourniquet is relieved and 10 c.c. of blood are sucked up. The baby has been placed beside the father with buttock exposed and iodined. Without a moment's delay, the needle of the blood containing syringe is plunged deep into the gluteal region and the blood injected slowly, the part is then vigorously massaged with the fingers. If the case is a severe one, the process may be repeated in the other buttock with another syringe full of blood. This procedure is a life-saving one and gives only momentary pain to the infant and no obtuse sentimentality should allow of delay. It will probably be necessary to repeat the procedure in 24 or 48 hours; needless to say, this small operation should not be done in the presence of the mother. One of us has done this on a great number of occasions, and has never lost a baby, whereas before this treatment was known, 60% of the babies died within a few hours.

SECTION III.—AFTER THE FIRST DAY.

The first day of the child's life having been conducted in the way described, and the mother having assumed her natural office, the subsequent general management of the infant should be as follows:—

Care of
navel-cord.

It has been said that the first washing may be hastily performed, but this is not admissible with any subsequent ablution, which must be thorough and daily repeated. The word "ablution" is used advisedly in contradistinction to bathing, for the child ought not again to be plunged into the bath till the navel-string has become detached, the object being to preserve the

string from contact with moisture, which in India will cause it to smell abominably; besides which, moisture has the effect of prolonging its retention for some days. If the string be perfectly protected from water, it will soon become hard, dark-brown coloured, as dry as a chip, without the faintest odour, and it will usually fall off on the third day. It is a good plan to sprinkle the dry and shrivelled cord with a little Zinc and Boric Acid dusting powder, or wrap it in Boracic gauze or wool. It is most important to keep the cord sweet and dry. Dangerous illness not unfrequently arises from an offensive (septic) cord, such as suppurative Cholangitis, Jaundice, Coma endangering life.

The infant should be suckled three or four times on the first day and at intervals of four hours on the second day, after which it should be nursed regularly every third hour during the day; and once during the night for the first month; and no accessory or artificial food should be given whatever.

We append a Table of Breast Feeding which should be scrupulously adhered to both for the sake of the mother as well as for the child's health; though it must be admitted that **many children thrive excellently from the first on four hourly feeds given at 6, 10 and 2 p.m.; 6 and 10 p.m.**

Habits of regularity must be established early and a plentiful amount of sleep for the infant ensured, with rest and quietness for the mother.

When once the infant has learned to take the breast well and is nursing vigorously and gaining in weight, anxiety will cease. If it cries after a feed, give a dessert-spoonful of plain boiled water. But do not add sugar to it.

The bowels will probably be relieved three or four times each day. On the second day, the evacuations will become of a yellowish colour, the black matter having been for the most part purged off by the first milk; but whether this be completely so or not is a matter of no importance, though it may be urged by the nurse as a reason why the castor oil, which previously had been objected to, should be now administered. In very exceptional cases, where the mother's milk does not possess the requisite aperient properties, it may be

advisable on the third day to allow half a small egg-spoonful of castor oil mixed with warm water, to which a couple of grains of Bicarbonate of Soda have been added. By this time the conditions which before rendered a purgative directly injurious will have passed away.

BREAST-FEED TABLE.

Age.	Number of feeds in 24 hours.	Interval.	During night.
1 month	6	3 hours	1
2-3 months	6	3 "	0
4-5 "	5	4 "	0
6-9 "	4 or 5	4 "	0

It may here be reiterated that during the whole course of a human life there is no period at which thorough ventilation is so much needed, and is of so great importance to vitality (both of mother and child), as it is during these early lying-in days.

Cleanliness. The early removal of all fouled linen and evacuations of both mother and child is a matter of much importance, and one which, if neglected, is calculated to effect very injuriously the health and life of the child, more especially in small apartments. There are certain diseases to which the infant is liable under insanitary conditions, particularly in a hot climate, during the first ten or twelve days of its existence, which are known to be the direct effects of foul air and dirt; for instance, the native infants of Calcutta die largely from lock-jaw (tetanus), an almost hopeless condition, which is all but unknown among the European infants of the city, and which is the direct product of dirt, foul air, and insufficient ventilation.

Ventilation. Warmth is still very essential to the infant's well-being; it must not be the warmth of foul air, but the imparted heat of the mother. Foul air will not impart heat, nor will fresh air cause colds or chills. Foul air is at this time a most effectual poison; fresh air conveys life and health, and by increasing the

vitality, greatly helps to augment the production of natural internal heat.

Very frequently an infant's skin becomes of a yellowish colour about the third or fourth day of its life. The colouration may deepen for a day or two, and then it will as gradually subside. This condition is not one of real jaundice, but is due to the changes which the blood is undergoing in the over-congested skin and is of trivial importance, requiring no treatment. There are, however, forms of jaundice of serious import which occur within a few days of birth.

Jaundice.

Sometimes the breasts of the infant enlarge four or five days after birth. A small quantity of milk is secreted, and can be squeezed from the nipple. The occurrence is as frequent in males as females, and may continue for some weeks. In almost all cases, if left alone, subsidence will take place gradually, without giving any trouble; but if squeezed or pulled about by an ignorant person, inflammation and even abscess may be caused.

Breasts of infants.

A slight bloody discharge from the vagina of a newborn female infant is generally of no importance, and will very soon cease.

Vaginal discharge.

A hard swelling in the neck about the size of a cherry, is occasionally met with and noticed a couple of weeks after birth. It may cause the infant to bend the head to one side, and has probably been caused by stretching or even tearing of the muscle which goes from the top of the breast-bone to behind the ear. In the great majority of cases it disappears with time.

Neck swelling.

An arm is found to hang loosely at or soon after birth in a small number of cases. This is known as Erb's paralysis. Many recover completely in a few months, but occasionally more or less paralysis may remain, and the full development of the limb be retarded.

Paralysis.

Sometimes infants are born with a club foot which is observed by the heel being drawn up, the foot extended and the sole markedly inverted. If so, it is imperative that the mother should realise that on her patience and regular perseverance depends the future of her child, and that the treatment should begin from birth.

Club foot.

Flexion and eversion of the foot or feet for five minutes, three times daily, followed by gentle massage, is the treatment for her to master; the question of malleable metal splints and the possibilities of operations, before the child commences to walk, must be left to expert surgical advice. In our opinion, the majority of these cases require at some time or another, operative interference of major or minor degree, and the earlier performed, the better the ultimate result.

After the cord has separated, bleeding may occur from its stump, generally only an oozing, but it may be more profuse. Astringents should be applied locally (tannic acid, matico, etc.), and gentle pressure. Should the bleeding be more than the merest oozing, surgical aid should be summoned.

Circumcision.

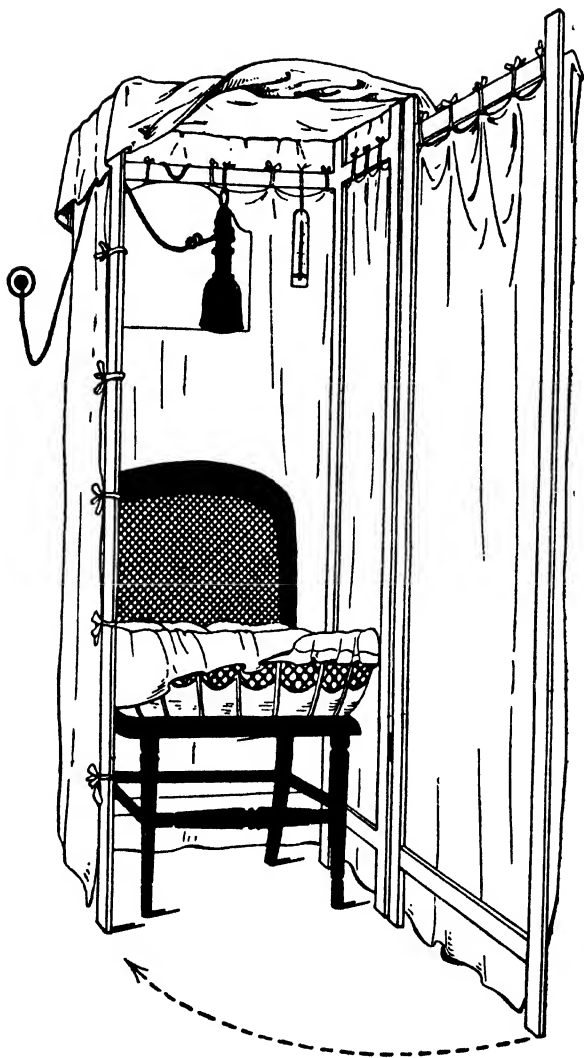
The genital organs will require careful scrutiny. In male infants, the foreskin may be so tight as to impede urination, and this may be the cause of screaming and restlessness, and it may be stated without fear of contradiction that about one in five infants requires some operative treatment. We think it wisest to do this within the first few weeks. In some, stretching the orifice of the foreskin and then forcibly retracting the skin and bathing the parts is sufficient, but it must be borne in mind that this daily attention after a while becomes not unpleasant, and hence, later, may set up the habit of self-abuse or manipulation of the part. In others, circumcision or some modification of this operation is an absolute necessity.

Undescended Testicle.

Again, it is not uncommon to find one or sometimes both testicles undescended. In most cases, nature rectifies this within the first year. But if this does not occur or one fails to descend, surgical advice should be sought.

Hernia and Hydrocele.

Occasionally, shortly after birth, a hydrocele or hernia may appear. A hydrocele frequently disappears spontaneously, whereas a hernia, if correctly treated with a truss carefully fitted, usually is cured, in our experience, within six months. If after a year's trial of a truss which has been renewed frequently with the growth of the child no cure has come about, then surgical skill must intervene.



PREMATURITY.

The premature infant requires very special skill. The most important problems in the management of these cases are: first, to maintain the animal heat; second, to provide nourishment; third, to prevent infection.

Our experience is that, infants born with a weight less than three pounds rarely survive. These children are particularly liable to suffer from vomiting, diarrhoea, abdominal distension, attacks of a cyanosis and lung complications. The effective **treatment** of the premature infant depends on preventing undue loss of body heat, on the avoidance of cyanosis and asphyxia, on gentle handling, on the provision of adequate fluid supply and on the provision of a food proper in quality and quantity. Breast feeding.

The maintenance of the body temperature.—Loss of heat must be avoided as far as possible. It is well therefore not to bathe the baby, but to smear the body with warm olive oil and wrap the baby in cotton-wool instead of in ordinary clothes. In feeble infants it is best not to remove the vernix and the oiling should only be done every two or three days. Unnecessary handling should be avoided. Warmth should be maintained by hot-water bottles or suspended electric lamps, the temperature of the air around the child should be 85 to 90 degrees F. The diagram will show the easiest and most efficient way of maintaining a constant temperature.

Feeding.—The premature child needs an amount of fluid equal to one-fifth of its body weight. If the intake falls to a quantity less than one-seventh of its body weight, it will die. Very few premature babies in the earlier weeks of life will take such an amount of breast milk, therefore the difference must be made up with water. Without mother's milk feeding, the mortality is enormous, therefore every effort must be made to provide human milk from other sources before the mother's milk is established, for these infants require to be fed with milk from the day of birth. To commence with, there should be three to five daily feedings by a catheter or pipette, the total quantity per diem being equivalent to one ounce of milk per pound weight, this amount should be increased at the rate of one drachm

per day until an optimum feeding of two and a half ounces per pound weight is reached.

The writers prefer a whey and cream mixture prepared as follows:—Take $1\frac{1}{2}$ ounces of top milk and add one ounce of skim milk, five ounces of whey, $2\frac{1}{2}$ ounces of water and $\frac{1}{4}$ a level tablespoon of milk sugar. For the first 24 hours give one teaspoon of this mixture every hour, and every day gradually increase until at the end of the first week a half ounce is taken every two hours. Others prefer to give one in three peptonised milk in very small quantity at a time.

If the infant is progressing favourably after one week or so of the above, provided the mother is unable to feed it, a cow's milk mixture of a strength of one in four, will be tolerated. To such a mixture sodium citrate in the proportion of one grain to the ounce of milk must be added. Throughout the early days of its life the utmost care and perseverance is necessary, whey or whey and cream are valuable alternatives for a few days at a time should the child suffer from green stools or vomiting.

CHAPTER V.

NURSING AND TOPICS RELATIVE THERETO.

As during the next six or seven months of its life, the infant should depend wholly upon its mother's milk for its nutriment, this is the proper place to say a few words concerning "nursing."

We have never known injury to be inflicted upon a mother's breast by the application of her infant before the white milk was to be seen; or as soon after birth as possible. The mother should not partake of much fluid till the sense of distention of the breasts has passed off, but when the infant has been sufficiently early applied, there is seldom any trouble on this score. The relief of her bowels daily, by the assistance of simple warm water injections, will materially tend to lessen the likelihood of such an occurrence; it may, however, be sometimes necessary to employ fomentations and gentle frictions, aided by oil, to relieve a painful hard breast. The frictions should be very lightly performed, the hand barely touching the skin when passing from the nipple towards the edge of the breast, but being pressed with gentle firmness when travelling in the opposite direction.

Care of
mother.

Regularity in following out the Breast-feed Table given on page 24 will do much to keep mother and child in good health; for the continual application of the child to the breast weakens the mother by the abstraction of more than nature intended to yield, and deprives her of rest. It does the child no good; on the contrary, it brings on indigestion, rejection of milk, flatulence, and diarrhoea from over-feeding. The mother should try to teach her infant not to feed so frequently at night as during the daytime, wherefore, if for no other reason, it should sleep in a separate cot.

Regularity
in breast-
feeding.

"The more crying the more feeding, and the more feeding the more the infant cries, and what between crying and sucking the day and night are spent in misery," as Goodhart quaintly puts it. "These are the cases which form the great majority of the thin,

pinning, pitiable mites who are brought to hospital for 'consumption of the bowels,' but with bad feeding only to blame."

An infant should not receive its nourishment lying down. The semi-erect posture is the proper one to adopt; exactly that position in which a mother naturally places her child when she sits in a chair, nursing. The muscular power of swallowing is, in the infant, very feeble, but by the semi-erect position we avail ourselves of gravitation; the child, when so placed, actually obtains more nourishment, and the apparently causeless rejection of milk is then less frequent.

**Diet of
mother.**

As to the food the mother should use during nursing; she should abstain from very few things, and be careful to use a variety. Of course, during the lying-in period, the usual simple diet should be employed. Subsequently, she should eschew hot curries and highly seasoned dishes of all kinds, radishes and uncooked vegetables generally, lobsters, tinned provisions generally, and an excess of solid meat.

**The import-
ance of suit-
able diet.**

She should be particular to partake of a sufficiency of vegetables and good fresh meat. There is a prejudice on the part of nurses against vegetables, particularly potatoes. Such folly is based upon ignorance—indeed, we may term it dangerous ignorance. A nursing mother differs not from the rest of humanity as to the laws which govern the physiological process of nourishment, and these declare that if fresh vegetables be excluded, or even very sparingly partaken of, a scorbutic taint of the blood is engendered, which impairs, more or less, the general health, unfitting the mother for suckling and rendering her milk unwholesome for her infant. Many times by following this advice, a mother who never before had done so, because she had previously held fast to the theory of the necessity for excluding vegetables, has been enabled to nurse her child, with perfect health to herself and infant. With such an unfortunate conviction is allied another, namely, that it is essential during nursing to consume a considerable proportion of beer or wine. It is alleged that milk is thus created, and the drain of nursing upon the system is urged as a reason for the necessity of

“support.” Spirituous liquids do not lead to the formation of milk in any degree whatever, and their use in no way compensates for the lack of a proper admixture of food in the diet; nor is it true, that nursing is a drain upon the health of any moderately healthy woman—on the contrary, it is known to be beneficial, and that women generally improve in health during its progress. A nursing mother requires, it is true, more fluid than others. She is frequently thirsty. To relieve this thirst, she should drink gruel or barley-water, or milk and water, which, besides being drinks, are really nutritious, and therefore milk-forming. Thorough nourishment of the system is certainly demanded, but she does not need extra stimulation, which may render her feverish and deteriorate her milk. The usual glass of wine, ale, or stout need not be denied at dinner-time and also at tiffin if desired, but such an allowance is ample; more is injurious.

**Fluid
necessary.**

Should a mother happen to menstruate during the suckling period, it is an unfortunate occurrence; but it is not one which should prevent her continuing to nurse, unless the ordinary period of weaning be at hand. Usually, the infant, during the days the function continues, will show some signs of indisposition, generally slight, but which, if at all severe and recurring, proclaim the mother unfit to continue her office; otherwise it is unnecessary that she desist.

**Menstrua-
tion during
suckling
period.**

The European mother in India is usually able to nurse for about six or eight months, if she takes care of her health; but a robust native nurse may often be permitted to continue her duties for a full year.

Sometimes it happens that a mother is unfit to suckle her infant. (1) Severe constitutional debility, such as severe anæmia, tuberculosis, or prolonged malarial fever are justifiable causes for non-compliance with the dictates of nature. Because there have been occasional attacks of ague, or because the system is a little below par, is no sufficient reason that nursing should not be continued; but the debility may be such, that the quality of the milk is much deteriorated and unfit for the child; or there may not be sufficient glandular activity to supply enough fluid; or, being supplied, there may not be sufficient general inherent

**When unfit
to suckle.**

vitality in the mother to compensate for the loss. Except where the debility is considerable and of long duration, the effort is not only justifiable, but it is a duty. A trial should at least be made. (2) A mother who is subject to epilepsy or other violent paroxysmal nervous disorders should not nurse, both for her own sake and that of her child. (3) Abscesses of the breast, if severe, compel non-nursing. (4) The continual recurrence of intermittent fever is also a fair cause for desisting. (5) The occurrence of pregnancy is opposed to good nursing. The quality of the milk then greatly deteriorates, the mother's system not being able to nourish both the babe at her breast and that in the womb at the same time. (6) If after a fair trial it be proved that the secretion of milk is too scanty to be practically of any use, there is no object in continuing it, but unless the mother be prepared to obtain the services of a wet nurse, it is her duty to continue to give what nourishment she possesses, provided her own health does not suffer. Even such very partial feeding increases the chances of the child's life. (7) The nipples may be so retracted as to present a serious difficulty. This point should have been attended to before confinement, otherwise the obstacle may be great; but suction, or the use of a nipple shield will usually remedy the defect, if properly employed. Very seldom should this cause be permitted to conquer and to drive the child from its mother.

**Retracted
nipples.**

Assuming it to be decided that the mother, from one or other of the foregoing causes, is unable to suckle her infant, there remains but the choice between a wet nurse and artificial feeding. That the advantages of the former are incomparably greater will presently (Chap. VIII) be shown. We are therefore led to consider the question of the selection of a wet nurse. It is a matter for congratulation that in India, the much-discussed disadvantages connected with this class of servants are reduced to a minimum, as compared with England. A wet nurse should be (1) young but not youthful,—never under 20, seldom over 30. (2) In good health; well nourished, with a sleek skin, free from all eruptions or appearance of former eruptions; free from enlargement of the spleen; possessing a good set of teeth; a clean tongue; red, not pallid gums; sweet breath, and freedom from enlarged glands in her neck. (3) The date

Wet nurse.

**How to
choose.**

of her confinement should approximate with that of the age of the child she undertakes to nurse.

This is of importance, for the milk varies in nutritive properties in definite proportion to the age of the child. The milk of a woman whose child is 6 months old, even though she have plenty of it, is not fit nourishment for a baby of 3 or 4 weeks of age. It contains too much of some constituents and too little of others.

(4) The breasts of the candidate should be firm and plump, not hanging loosely down, and should contain a good supply of milk of a bluish colour, and which on standing should yield a cream.

(5) If the woman be menstruating, she should be rejected. (6) She should be of a patient and cheerful disposition.

Enquiries should be made (1) into her previous history, concerning any illnesses she may have had, whether she ever suffered from any sickness which involved prolonged sore throat, eruptions of the skin, or ulcers. If such be the case, she should be rejected.

Enquiries
be made.

(2) Concerning her husband and his health, present and past, the enquiries last named should be instituted.

(3) Inspect the woman's infant, assure yourself that it is hers and not a borrowed one, consider its age with regard to her statement upon the point, observe whether it presents a healthy appearance generally, and be particular to notice whether there are any sores between the buttocks or at the corners of the mouth. The presence of such sores would call for immediate rejection of the candidate. (4) Let particular enquiry be made as to whether the woman is in the habit of smoking 'ganja' or opium; should either be the case, she should be rejected. (5) Under inspection, the breasts should be emptied by her own child, or artificially, and the woman directed to present herself again after the lapse of a few hours, in order to ascertain whether she really possesses a sufficient supply of nourishment, and that she has not attempted fraud by having permitted a large accumulation.

With due attention to all these points, a wet nurse having been selected, her future management becomes of importance. In the first place, she should have a warm bath and wash thoroughly all over, after which, and when clad in clean, warm clothing, she may commence her duties. The next thing is to be careful not

Care of wet
nurse.

to over-feed her, or even to place her too quickly on a liberal diet, but to have due regard to her previous diet and mode of life. By sudden over-feeding, the milk may very greatly diminish, or become of such a character as to be injurious. Let her be employed as much as possible in general household duties to ensure a proper amount of exercise, and cause her to move about occasionally with the infant in her arms to provide for its exercise. A wet nurse is too frequently allowed to moon away her time in idleness. She is then apt to lose her milk, indigestion will set in, she will become feverish, and her milk unwholesome and irritating. To violent exertion she should never be subjected. Do not allow the child to sleep with the nurse at night. See that regularity as to its meal is observed, and that it be not continually hanging on to the breast. Hot curries, chutnies, or too much meat must not be allowed to the nurse. Be very particular that vegetables constitute a due proportion of her diet. Allow her plenty of sleep. Be sure that the woman's own child be kept at a distance, lest she devote part of her nourishment to it. The cost of a wet nurse is not much greater than artificial feeding. The Civil Surgeon of Agra has a list of a large number of wet nurses, and one will be supplied in a few days after telegraphic application has been made to him. When it is necessary to "teach the bottle" to an infant, because intermittent fever or other derangements are likely to unfit a mother, or nurse, the following method should be adopted for suckling. A dessert-spoonful of milk with 4 or 5 of warm water and a minute portion of sugar, given through the bottle once or twice a day, will effect the needful education, which, if not commenced gradually, will be accomplished subsequently only with great trouble and delay. The modern "feeding-bottle" without tubes of any kind is to be preferred, because it can with great facility be thoroughly cleaned, any particle of old food adhering to it being readily seen, except if concealed in the nipple, which should always stand, after careful washing, when not in use, in a solution of boracic acid 3 grains to the ounce of water, and the bottle itself should be rinsed out with the same solution.

In exceptional cases the mother's or nurse's milk does not seem to suit. The infant becomes fretful

and griped, and its rest is very disturbed, while at the same time there may be either vomiting, diarrhoea, or constipation. In such a case the milk may be too heavy for the child's digestion. It will not be sufficient merely to diminish the quantity by alternating meals or by giving other forms of food, for the pure milk has still to be disposed of. A good plan is to give half a meal of barley-water (*see* "Receipts") from the bottle immediately before putting the child to the breast, with the object of diluting the milk when it reaches the stomach, or a few grains of bicarbonate of soda may be given after each meal in a dessert-spoonful of plain boiled water. If the child be a "bolter," the simple expedient of supporting the breast with the hand, and compressing the base of the nipple between the fingers, will retard the flow. On the other hand, the mother's milk may be too poor and watery, though abundant. Then the child constantly demands the breast, because he is always hungry, and generally cross, uttering an angry cry when put to the breast, where he finds only disappointment, and rejects the nipple in a few moments, no matter how frequently offered. It will then be necessary to alter the mother's habits, by placing her on a more liberal diet, ensuring her more perfect rest and administering malt extract or other food tonic; or by changing the nurse, or supplementing the breast milk by some other form of suitable diet (Chap. VII). It is said, and apparently with truth, that when an infant, who is not thriving, sleeps much with the nipple in his mouth, and only then, it is a sign of watery milk. The reader is referred to Chapter VII for further information upon the subject of milk disagreeing with the infant.

But here, we wish to insist on the fact **that weighing affords the only means of ascertaining whether a breast-fed baby is getting the right quantity of food.** The weighing must be done in good grocer's scales, accurate to $\frac{1}{4}$ or $\frac{1}{2}$ an ounce. It is not necessary to undress the baby. Weigh him as he is, just before and just after successive nursings, noting the difference each time; at the end of the day the mother knows exactly what quantity of milk has been withdrawn from her breasts; and hence, if need be, the necessary supplementary bottle allowance. Of course, if health and growth are normal, the milk-supply cannot be far wrong; but

if there is indigestion, putting up of food, restlessness, disturbed sleep, or any other sign of ill-health or discomfort—especially if a baby is not growing properly—the first thing to do is to weigh before and after feeding. **THIS RULE IS ABSOLUTE.** Without such weighing any attempt at treatment is mere guess-work and empiricism. The most enlightened specialists of the day admit their inability to form any idea as to the sufficiency or otherwise of the maternal supply, without resorting to what is obviously the only means of finding out. They insist on weighing. **A trial of the simple expedient of weighing the baby before and after suckling and adjusting the feeding accordingly, proves conclusively that many mothers give up breast-feeding quite unnecessarily. By weighing, any mother can find out for herself just what is needed.** In the vast majority of such cases the breast-supply is merely inadequate, and when the shortage has been ascertained and rectified, everything goes well—the sole need being to **make up the deficiency of breast-milk at each feeding**, by giving baby just the proper quantity of humanised milk—neither over-feeding nor under-feeding. (Truby King.)

Green Diarrhoea and Indigestion in the Breast-Fed Infant.

The proper treatment of this condition is very important, for it is one of the most frequent causes of infantile mortality and disease. We therefore didactically submit a treatment which we have found successful in hundreds of cases, and one which we trust will be useful in the hot months, for the proper understanding of this condition will save perhaps a score of lives.

We have been investigating these cases for many years, and find, that the analysis of the breast milk, and infants' stools and urine, prove, that in **70 per cent. of cases excess of carbohydrates or fat** is the cause; and of the remaining 30 per cent. of cases, in 25 per cent. excess of protein is at the root of the trouble.

We lay stress on this subject, because experience convinces us that, since its pathology is not understood by practitioners and **many of these infants die**, others are ill for weeks whilst **others are rapidly and unwisely taken off nurses' and mothers' milk** and put on to some proprietary milk food, with the result in some,

of **Acute Gastro-Enteritis, Acidosis, and death**, in others, eventually the whole gamut of symptoms of **Rickets** or **Chronic Gastro-Intestinal Catarrh** supervene.

Experience has taught us that **any drug**, and especially grey powder and castor-oil emulsion, is **BAD medicine and worse practice**. What must be done is:—

- (1) See that the **nipples** are kept scrupulously **clean** before and after each feed and that the baby's mouth is kept clean.
- (2) Have the baby fed at **BOTH** breasts for 7 minutes three-hourly, and **BEFORE** it is put to the breast give 1 oz. of boiled water in which 5 grains of bicarbonate or citrate of soda have been dissolved.
- (3) **Between the feeds** give a solution of $\frac{1}{4}\%$ sodium bicarbonate and $\frac{1}{4}\%$ saline, as much as desired, making it palatable with a fractional quantity of saccharine. We may remind you that $\frac{1}{4}\%$ is roughly $\frac{1}{4}$ of a teaspoon to the pint. If any oedema occurs, stop the saline but go on with the soda bicarb.
- (4) **The mother** is to avoid constipation, and regularly drink a whole tumbler of **WATER BEFORE each breast-feed** is due.
- (5) She should **NOT** worry or take in excess those things beloved of nurses, i.e., cotton seed, vast quantities of milk, sago, and the like, which only cause distention and constipation; for **remember that the best galactagogue is the hungry infant fed at regular three-hourly intervals**.
- (6) **Each breast** should be hot and cold **sponged** for a quarter of an hour twice daily, and gently **massaged** from the periphery to the nipple twice daily. The mother should **rest** on her bed from 12 noon to 3 p.m. daily.
- (7) **Weigh the baby regularly before and after each breast feed** at 6 a.m., 9 a.m., and 12 noon, and at 3, 6, and 9 p.m. **for a few days**, and check on a chart the gain in weight per feed. You will frequently find that the infant is taking less, or more, at one, or

more feeds per day than at others. If less than it should be, you must supplement that feed to the correct quantity it should normally take with whey, or skimmed milk and water. For the first month dilute the milk 1 in 2, for the second month 1 in $1\frac{1}{2}$, and for the third month 1 in 1. The best diluent is boiled water, but if the infant is debilitated clear whey is better than water, sugar of milk $\frac{1}{2}$ teaspoonful to 3 ozs., and 4 grains sodium citrate being added.

If the gain is more than it should be at one feed, all that is necessary is to lessen the time at the breast.

On these lines you will rarely find it necessary to take the baby off the breast.

(8) **If the case is an advanced one**, you may do as above, or you may supplant one or two breast-feeds with whey or skimmed milk, **remembering that the stomach of an infant under 6 months will not hold a greater quantity than 1 oz. over its age in months**, e.g., if the baby is 4 months old, 5 ozs. should be its feed.

(9) For the frequent small, green, slimy, stools, a warm water enema is often most useful, given with a soft catheter and funnel.

If the buttocks are scalded, equal parts of zinc oxide and castor oil applied will allay the soreness.

(10) If the condition is a Green Lienteria, that is, if the infant's bowels are moved immediately following its feed, 2 to 5 drops of Tinct. Camph. Co. before each feed will be found useful.

(11) **Remember** that a reliable pair of scales is the most important thing in prognosis and treatment.

(12) Comprehension of the pathology and treatment by the doctor, or nurse, combined with confident co-operation on the part of the mother is essential to success.

- (13) **Remember breast-feeding is Nature's provision. Next best to this is cow's or goat's milk.**

To take any infant off the breast is, in nine cases out of ten, **not only a grave error and responsibility**, but an insult to Nature and an aspersion on the knowledge of the practitioner or nurse.

CHAPTER VI.

THE PRINCIPLES OF DIET

As Applicable to Childhood.

Every article legitimately considered as food may be said to consist of two parts, one which can be so altered by the digestive juices of the body as to become available for absorption into the body, and the other, more or less untouched by digestion, but having its uses in stimulating the bowel and serving as a medium to carry away substances formed during the elaborate chemical processes of the body, which, if retained, would act as poisons. The digestible portion of the food consists firstly of three main groups of chemical bodies, each group having different chemical formation and different function, though the functions are to a certain extent interchangeable. Each common article of diet contains one or more of these fundamental groups in varying proportions thus.

	Protein.	Carbohydrate.	Fat.
Cow's milk	.. 3.5	4.5	4
White bread	.. 7.2	41.8	0.2
Egg white	.. 10.7	0.0	0.1
Egg yolk	.. 15.5	0.0	33.3

No human being can live on one prime constituent only and it is desirable that the diet should be so built up, that the sum of the primary elements is in due proportion and amount to the needs of the body at any particular age and varied to some degree in accordance with occupation.

Protein Functions.

Growth—repair of tissues and elaboration of secretions. Proteins may also be converted into energy, but this is an extravagant and undesirable process as poisonous waste products are formed which will throw an extra strain on the liver and kidneys. It is desirable that a protein balance be established, the body taking in the full amount required, but no great excess.

Fats.

Source of heat and energy, and are necessary for the provision of certain more obscure chemical bodies essential to function.

A source of heat and energy are easily burnt up to simple innocuous bodies throwing no strain on the excretory organs. In order to render the combustion of fats complete, the presence of carbohydrates in a proportion of at least 1.5 carbohydrates to 1 of fats is necessary. Carbo-
hydrates.

It follows therefore that these three elements should be supplied in the quantities in which they can best be utilised, and that an excess will lead to clogging of the machinery, and that a deficiency will lead to arrest of progress and growth.

A well-balanced diet is an acceptable palatable diet, which, on analysis, is found to contain the different essential constituents in just such proportions as they are required by the individual.

A consideration of these functions will lead to the just deduction that, having regard to the varying activities of the human race, one standard of diet will not do for all, the infant is engaged in growing, at an enormous proportionate rate, while the adult, having ceased to grow, requires nutriment for repair and the production of energy, and so the balance cannot be the same.

It has been estimated that for the infant the correct balance of proteid to non-proteid is 1 to 7, altering slowly with advancing age till for the adult it is 1 to 6 or 5.5.

The fat proportion differs even more markedly.

			Fat.	Carbohydrate.
Infant	..	..	1	2
2nd year	..	..	1	3.3
Adult	..	..	1	10

These proportions are frequently neglected, particularly in regard to the diet of young children, whose diet includes such a large proportion of cow's milk that the protein—non-protein ratio is often 1 to 3.

In addition to the prime principles, there are other constituents minute in quantities, but no less essential to health and growth. Mineral salts are required, not only for bone building, but play an essential part in all the complicated chemical processes of the body in life. A deficiency of one or other may cause striking effects, a want of iron will cause anæmia, a deficiency

of calcium may lead to convulsions, and a deficiency of iodine may bring in its train a series of severe symptoms.

Vitamins.

These bodies are known by the effect of their presence or absence. They may be considered as the spark that ignites the food fuel. Of late years, a substance considered identical with Vitamin A has been produced by the action of Ultra-Violet Rays on Cod-liver oil, but beyond this we know them by their habitat, their virtues and the means by which they may be destroyed. One fact we are sure of, that these vitamins, intangible though they may be, are essential to health and we associate a definite train of symptoms with the absence or deficiency of one or other of the groups into which they are divided.

At present, five divisions are made, but it is probable that, as knowledge accumulates, other divisions will be made.

Fat-soluble A and D.

Growth promoting and therefore essential in the young. It is usually associated with Fat-soluble D, the antirachitic. The absence of these two in the diet of a child will lead to the development of Rickets and the stunting of growth.

Water-soluble B.

Is regarded as capable of maintaining resistance against infection. Promotes the action of the bowel. It is considered to be the important vitamin for adults.

Water-soluble C.

Water-soluble C. Antiscorbutic. In the absence of Vitamin C. Scurvy with bleeding from the gums, and in infants a severe form, with bleeding under the membranes of the bones, will occur.

Vitamin E. re-productive. Of importance in later life.

These bodies, so essential, are unfortunately delicate. By prolonged cooking, during the process of the preservation of food, in tinned foods, much of the vitamin value is lost.

"Good" Foods for Supplying Vitamins. Dr. R. H. A. Plimmer.

Vitamin A.	
Cod-liver oil	+ + +.
Butter	+ +.
Egg yolk	+ +.
Liver	+ +.
Beef fat	+ +.
Heart	+.
Mutton fat	+.
Milk	+.
Herring Mackerel	+.
Green vegetables	+ +.

Vitamin B.		Raspberry, blackberry + +.	
Wholemeal cereal products + +	+	Peach + +.	
Dried peas, beans, lentils + +.		Other fruits +.	
Egg yolk + +.		Raw green vegetables + + +.	
Liver, Heart, Brain, Kidney + +.		Cooked green vegetables +.	
Nuts + +.		(If cooked for a short time only).	
Yeast + + +.		Potatoes +.	
Yeast extract, marmite + + +.			
Fruits and vegetables +.			

Vitamin C.		Vitamin D.	
Fresh fruits especially orange, lemon, grapefruit.		Cod-liver oil + + +.	
Tomato + + +.		Raw milk + +.	
		Very good + + +.	
		Good + +.	
		Fairly good +.	

Bad Food for Supplying Vitamins.

Fats.	Carbohydrates.	Protein.
Vegetable oils and fats do not contain Vitamin A.	Highly milled cereals such as white rice, white wheaten flour, cornflour, Pearl barley, sago, tapioca, treacle, custard powders.	Flesh of animals are poor in Vitamin B and C.
Margarine made entirely from vegetable fats is therefore poor in this vitamin.		Pork and White fish also lack Vitamin A.
Most margarines contain some animal fat.		
Lard.		
Bacon fat.		
Pork fat.		

Water. The human being can live for many days on water only, a fact which has not only been proved by the historic feats of professional fasters, but is a matter for daily observation when dealing with the sick. The converse does not hold good, and particularly in infancy, does the deprivation of water or excessive loss of fluid produce early menace to life.

There is a constant exchange of water in the system, it is a component of all living tissues, it supplies the necessary fluidity of the blood and it dissolves and carries away waste products from the body.

The child, in proportion to its size, requires more water than the adult. The requirements of the average infant are calculated at $2\frac{1}{2}$ oz. for each pound of weight. It is a cruel and hurtful thing to deny the free use of water to children. The error of taking too much is not likely to be committed. Some children indeed, do acquire the habit of drinking water more frequently than is necessary and require guidance. A child should be discouraged from taking large draughts at the beginning

of a meal though a draught taken an hour or half an hour before does no harm.

It is to be remembered that in hot dry climates, both through respiration and perspiration, the amount of fluid lost from the body is vastly increased and that this loss must be replaced.

In illness, particularly in diarrhoea, when the loss of water from the body reduces the available fluid to dangerously low levels, the first aim and the essential treatment is to replace this fluid by some means or other before the serious symptoms of water deprivation show themselves.

CHAPTER VII.

ARTIFICIAL FEEDING OF INFANTS.

There is danger that this chapter, containing as it does, minute description of the artificial feeding of infants from the earliest age, may be misconstrued into an advocacy for the abandonment of natural methods. Such is not the intention, artificial feeding in the early months is sometimes inevitable but **if the mother is able to feed the child naturally until it is time for him to abandon the breast for other foods, he has the inestimable advantage that his digestion has never been tampered with and he has been supplied with the ideal materials for building up the body. The child fed to the full natural term has a five times greater chance of surviving the first year of life, and in the case of a delicate child, the balance is even more heavily weighed.**

Advantages
of Breast-
feeding.

There is no perfect substitute for breast milk. There is no other method of feeding which will do as well and, though the results of careful artificial feeding are usually satisfactory, it cannot be fairly stated that the baby is not handicapped. The story of a sick child, heard only too frequently, is that so long as the child was breast-fed, progress was satisfactory, but that as soon as bottle-feeding was started, the child showed its delicacy.

The younger the child, the greater the difficulty; the digestive powers, like the other functions of the infant are in an embryonic state at birth, they develop slowly and allow little margin for error, especially during the first few months.

The digestion of the infant is attuned to one form of food, the requirements are accurately provided for by nature and it follows that if the infant is called to digest food of a different form and build up the body from materials in different proportions and quality, he is starting at a disadvantage. For the substitute food, we depend on cow's milk in some form. Other forms of food, save in exceptional circumstances, are absolutely inadmissible before the age of nine months.

The relative proportions of human and cow's milk are as follows:—

	Caseinogen.	Protein Whey protein.	Fats.	Carbohy- drates milk sugar.
Human average per- centage	.5	1	4	7
Cow average per- centage	3	.5	4	4.5
	Mineral content.	Cholesterol.	Lecithin.	
Human	.18—.28	.476	.058	
Cow	.6—1	.351	.048	

The importance of these differences is now for consideration.

Protein.—There are two main varieties of protein in milk, whey protein which is soluble and easily digested, and caseinogen which forms a tough clot under the influence of gastric juice and is, in consequence, less easily digested. A certain proportion of whey protein is essential to growth and one of the great difficulties of artificial feeding is to dilute the caseinogen without reducing the whey protein below the minimum required. The whey protein, like all other proteins, is split up into bodies of smaller molecular weight, the amino acids; each type of proteid produces its own amino acids, and there is reason to suppose that a certain proportion of the whey proteid derivative is essential to the building up of human tissues and cannot be replaced by derivatives of other proteids. There is, in fact, a certain specificity and each variety of proteid in milk is specially suited to the young of the animal which produces it.

If cow's milk be given whole, the content of the whey protein is sufficient, but the coagulating proteins are greatly in excess, not only do they tax the digestion to the utmost, but in the process of splitting a number of poisonous bodies are formed, which have to be dealt with by the liver and kidneys with a risk of strain to these organs.

Fats.—There is little difference in quantity between the fat content of average human and cow's milk, but there is some difference in the form of the fats and in

the fineness of the emulsion, which may account for the fact that many infants are unable to tolerate the same percentage when fed on cow's milk and **that fat indigestion is the commonest form of infantile dyspepsia.**

The **carbohydrates** of cow's milk are low in quantity, but the deficiency can be corrected and sugar of identical composition added.

The mineral salts are in sufficient quantity even in dilution, but the iron content is low.

Lecithin.—The lecithin content is low, but though present in minute quantities in either, it is an important constituent of brain tissue, and the fact that human milk contains a much higher proportion, suggests that it is there for some good purpose.

Cholesterol.—The function is as yet not clear, but there is evidence that cholesterol is intimately connected with vitamin retention.

Vitamines are present in adequate quantities in the milk of the pasture fed cow, but it is to be remembered that they are vulnerable and likely to be reduced or destroyed by measures usually employed in the preparation of milk and depend to a considerable degree on the diet and hygiene of the cow.

Immune bodies.—There is little question that the mother is capable of imparting some of her acquired immunity to disease to her child through her milk. These immune bodies form a valuable safeguard to the child which is forfeited if the child be fed on other food.

Protection
against
disease.

It will be seen therefore that cow's milk has a number of marked differences from human milk, and that the task of feeding a baby artificially is by no means easy. However, in spite of all these objections, which have been stressed advisedly for the benefit of the more delicate infants, thousands of children have been brought up with every appearance of success by artificial means, though it must not be forgotten that thousands have suffered, some from their inherent inability to cope with substitutes, and many from want of care in the substitution.

Before embarking on the delicate task of changing from natural to artificial feeding, the mother or attendant

must have a clear plan outlined and the following matters are for decision.

1. The choice of food.
2. The method of preparation.
3. The amount of food required in the twenty-four hours.
4. The capacity of the child's stomach, that is to say, the size of each feed.
5. The optimum interval between each feed.

**Standard of
Cow's Milk.**

Choice of food.—The best substitute is fresh cow's milk, modified or diluted according to the digestive capacities and needs of the infant. Cow's milk must conform to certain standards. It must be clean, for there are many sources of contamination, the milker's hands, dirty vessels, vessels washed with polluted water, dirty udders of the cow. The danger of transmitting Tuberculosis from an infected cow to the infant is a real danger and it must be remembered that a high proportion of the Tuberculosis of infancy is bovine and may be attributed to milk-borne infection. Dirty milk, even if boiled, is still dirty, and the swarms of dead bacteria may set up intestinal irritation.

Of the physical properties, that most liable to variation is the fat content; certain breeds of cattle, especially Alderney cows, are noted for the richness in cream of their milk but poor feeding may result in poor milk. It is desirable, therefore, that the fat content of the milk chosen should be known.

The milk must have a good vitamin content. This will depend on the surroundings and feeding of the cow. The investigations of Dr. E. M. Luce into the effect of feeding and sunlight on the vitamin content, that is to say, the **antirachitic and growth promoting factors in milk, have peculiar application and importance in India.** Both are poor when the cow is fed on dried fodder so that it is inconceivable that milk from the cow of the plains in the hot weather can be efficient in these properties. Two sources of supply are available in India. In large centres there are well run dairies under careful supervision, supplying milk of standard quality. There are those who prefer to keep a private cow, in which case the welfare of the animal must be carefully guarded. The cow should be inspected periodically by a veterinary officer.

GOAT'S MILK.

In many parts of India, the milk of goats is used with success as a substitute for cow's milk. The goat is easily kept in the compound, and milked under supervision, but special care must be taken to frustrate its natural tendency to promiscuous feeding. The animal being less subject to Tuberculosis than the cow, the milk may be given unboiled should circumstances demand.

The milk has approximately the same proportionate contents as cow's milk and is used in the same way, modified or diluted to suit the individual.

It will, of course, not be used where there is any suspicion of the existence of Mediterranean Fever.

METHODS OF TESTING MILK.

The litmus test.—Cow's milk, absolutely fresh is amphoteric, that is to say, the test paper does not change colour when dipped. After a short while, the milk is rendered slightly acid by the action of certain harmless bacteria, constantly present in milk. This will cause a blue litmus paper to turn red, but is no contra-indication to use. **Alkalinity, that is to say, the turning blue of a red litmus paper is a sign of disease of the cow, or deliberate adulteration with drugs.**

Cream test.—Into a six ounce medicine bottle marked off into half ounces, milk to the quantity of five ounces is introduced. This is allowed to stand on ice for 24 hours. At the end of the time the cream has risen to the top and should occupy at least three-quarter of the top division.

It is hardly necessary to add that, where available, an accurate laboratory analysis of the milk and estimation of the cream content, is preferable.

Dirt.—Into a conical white vessel or funnel, ten ounces of milk are introduced and allowed to stand on ice for a few hours. After pouring off the milk there should be no evidence of dirt in the sediment left at the bottom.

The specific gravity test.—This test is carried out by means of a hydrometer. The milk to be tested should be at a temperature of about 60 degrees Fahrenheit.

Pure milk will mark about 30

Milk diluted with 15 per cent. water 26

" " " 20 " " 23

" " " 35 " " 18

At the same time milk rich in cream gives a lower figure, so that, if by the cream test, it is found that the cream content is high, a lower figure on the hydrometer is no indication of dilution. The converse, a milk poor in cream or skimmed milk will give a high figure and may do so even in the presence of added water.

The question now arises as to the form in which the milk is to be administered. **For the healthy child there are three methods of feeding with cow's milk, the whole milk method, the method of adding water in gradually decreasing proportions** according to the supposed digestive capacity of the child, **and finally, the method of physiological feeding** advocated by Dr. Eric Pritchard, the proportions in the feed being brought as near to that of human milk as is possible.

Whole Milk Feeding.

There are still advocates of the whole milk method, their advocacy is based on two not very convincing grounds, the first, that it is impossible, by any form of modification to produce a substitute really comparable to human milk, and the second, that the majority of infants do well, and that those who do not, must be placed in the category of delicate or difficult infants. It is true that many infants rise to the occasion and manage to thrive in spite of this rather drastic method, but in India the infant has much to contend with, and we cannot afford to add to his burden for we do not really know how far the seeds of disease in later life may be sown in early infancy by incorrect feeding. The graver defects will produce immediate results such as rickets and indigestion, but, of the more remote effects, it is not possible to speak definitely. This being the case, **we are not in a position to take liberties with the nutrition and digestion, and a food cannot be pronounced absolutely satisfactory merely because there is no immediate protest.**

There is much to be said for taking the hint offered by nature and endeavouring to so **modify cow's milk, that it may approximate in composition as nearly as possible to human milk, and not only in theory, but**

also in practice, this method has been found to be the most satisfactory.

At first sight this is simple, by diluting the milk till the proportion of proteid is that of human milk and then adding cream and sugar, we have what is known as humanised milk. Humanising is a comfortable term, but it must not be forgotten that, as has been explained at some length in the earlier parts of this chapter, humanised milk is not identical with human milk.

To prepare "humanised milk."

Cow's milk 10 oz. of good average quantity.

Cream 33 per cent. 1 oz. This is the average cream obtained by centrifugalisation.

Sugar 1 oz.

Water to 20 oz.

The composition of this mixture is as follows:—

Protein, 1.75 per cent., Carbohydrate, 7 per cent., Fats, 3.5.

The addition of sugar.—For the young infant, milk sugar which may be obtained from any chemist, is desirable, it is identical with the sugar of human milk and is less likely to give rise to fermentative dyspepsia. With the increasing demands of older infants, the amount of sugar required to maintain the balance amounts to two ounces. Many infants will not tolerate so large a quantity, which gives rise to intestinal fermentation, but half may with advantage be replaced by a malted cereal, such as Mellin's food.

Addition of other factors.—Lecithin powder grain 1 daily in one bottle until such time as the child is old enough to take egg-yolk (Pritchard).

Vitamin content.—As the sterilisation of milk will have an adverse effect on the vitamin content, we should guard against any possible deficiency. Cod-liver oil contains an ample supply of vitamins A and D and may be administered in the form of an emulsion daily.

To replace the antiscorbutic vitamin, orange juice, grape or tomato juice, two to four teaspoonfuls daily may be given.

Vegetable soup.—The accessory food factors are required in minute quantities only, but are nevertheless essential to perfect nutrition. In order to ensure that

there is no shortage of extractives or mineral salts in absorbable form, a soup made from vegetables and bone may with advantage be added to the diet, even as early as the fifth month. Such an addition will be found of particular value at the time of the appearance of the first teeth. Details of the method of preparation will be found in the appendix.

Table of average requirements of humanised milk.

Table I.

Weight of infant.	Total amount 24 hours.	Number of feeds 24 hours.
lbs.	oz.	
10	25	6
11	27½	6
12	30	6
13	32	6
14	34	6
15	36	5
16	38	5
17	40	5

Precautions.—1. It will be noted that no figures are given in the above table for very small infants. The **mixture is likely to be too rich in fat for very young babies** and recourse must be had either to a more dilute diet, or the mixture must be predigested.

2. The **fat content is too high for the hot weather**—the necessary reduction in calories should be made through the fat content.

3. Artificial feeding should never start with full strength humanised milk, it is difficult for the infant to digest fat in whatever form in the same quantity and proportions as in human milk.

The milk should be gradually strengthened as the child shows tolerance on the lines of the Table IV below adapted unchanged from Sir F. Truby King.

4. The Feeding Tables are laid down for the average healthy baby, but it is impossible to provide one form of diet suitable for all babies. **Modifications will be necessary to suit the individual, and the diet must be made to agree with the child and not the child with the diet.**

The following figures will be found of use.

1. Every five ounces of milk added to a pint of the humanised mixture raises the protein content by 1 per cent., e.g.,

Milk 10 oz., water 10 oz.

Composition	protein	Fat	Carbohydrate
	1.75	2	2.25

Milk 15 oz., water 5 oz.

	2.75	3	3.4
--	------	---	-----

2. Every ounce of 33 per cent. cream added to one pint of milk mixture raises the fat content by 1.5 per cent.

3. Every ounce of sugar added to the mixture raises the percentage by 5 per cent.

Top-Milk Method.—The term top-milk is applied to the upper layers of milk which has stood for some time and into which the main cream content has risen. Top-milk, by suitable dilution can be converted into a food of balance closely approximating that of breast milk. One pint or one quart of fresh milk is placed in a glass douche can surrounded by ice, or, if preferred, a convenient apparatus (Maw's Milk Humaniser), may be obtained.

The amount of cream which will rise to the upper layers will depend on the length of time of standing.

Taking a good average milk with fat percentage of 3.4 to 3.8, after four hours the composition of the top quarter will be:—Fat 7 per cent., protein 4 per cent., sugar 4 per cent. The top quarter only is used, the lower three-quarters being syphoned off. This is diluted to half, with the result composition of protein 2 per cent., fat 3.5 per cent. and sugar 2 per cent.

Sugar at the rate of 1 oz. to one pint of the mixture is finally added.

The resulting mixture may thus be compared to human milk:—

	Protein	Fat.	Sugar.
The Mixture	2 per cent.	3.5 per cent.	7 per cent.
Human milk	1.5	3.9—4	7

It is essential that the milk be stood on ice or kept in a refrigerator during separation.

The slightly lower fat content and higher protein content of the top-milk mixture are to be regarded as desirable.

A METHOD OF DILUTION TO SUIT THE DIGESTION OF VERY YOUNG OR DELICATE INFANTS.

In the case of very young babies, i.e., those under four months, it is likely that a mixture made up to human standard will be too rich in cream. As said above, although the main constituents are proportionately the same, physically and chemically there is a difference which may give rise to indigestion. In such case either recourse must be had to artificial predigestion, or the milk must be diluted or modified to suit the child's digestion. In carrying out these dilutions, it is important that, out of consideration for the digestion, the child should not be under-fed by over-dilution of the necessary elements, though **at first it will be necessary to under-feed till tolerance is acquired.** See Tables II, III and IV.

Table II. A High Protein content method.

Table III is suitable for infants showing intolerance to fat.

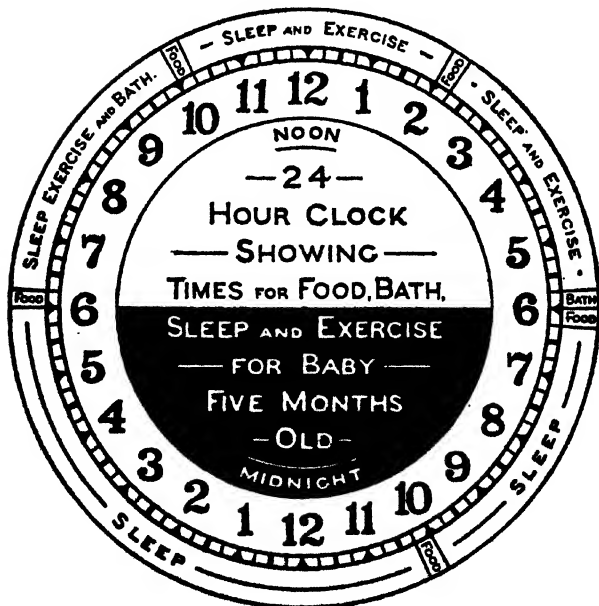
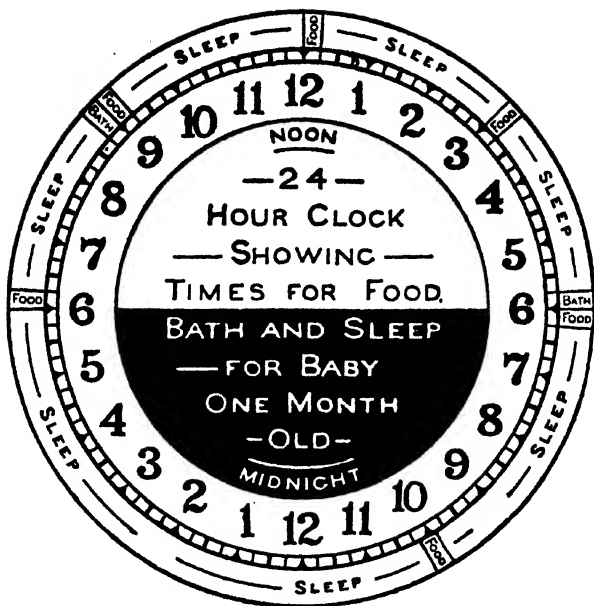
Table IV shows the gradual introduction of full strength humanised milk and is perhaps the most desirable plan, as it entails no drastic changes.

TIMING THE FEEDING.

The question of the frequency of feeding is a matter which has excited much attention of recent years and there seems little reason to doubt that, with the introduction of more modern methods with longer intervals, there has been an improvement in the health of naturally and artificially fed infants. Above all **regularity is essential**, the child becomes trained to expect the meal at definite times and the stomach is fully emptied between each meal. The practice of feeding the child whenever he cries can only lead to ill-health.

Regularity. **Night feeds are not necessary** unless the habit is contracted in early life, they disturb the rest of both mother and baby. The majority of babies thrive well on four-hourly feeds from the first, that is, five meals a day; though there are some who require more frequent feeding in the earlier months.

The attached diagram adapted from Sir F. Truby King gives an admirable summary of the daily routine.



Reproduced by kind permission from Sir F. Truby King's
 "Feeding and Care of Baby."

TABLE II.

Age.	Dilution.	Number of feed in 24 hours.	Quantity per feed.	Average quantity of diluted milk in 24 hours	Quantity of sugar to be added to each feed.	Quantity of cream to be added.	Hours of feeding.
2-7 days ..	1-3	8	Oz. 1-2	Oz. 10	Teaspoon. $\frac{1}{4}$	Teaspoon. ..	a.m. .. p.m.
1 Month ..	1-2	6	2-4	20	$\frac{1}{2}$	$\frac{1}{2}$	6. 9. 12 3. 6. 10
2 Months ..	1-1 $\frac{1}{2}$	6	3-4	27	$\frac{3}{4}$	$\frac{3}{4}$	do do
3 " ..	1-1	6	4-5	32	1	$\frac{3}{4}$	do do
4-5 " ..	1- $\frac{1}{2}$	6	5-6	35	1 $\frac{1}{2}$	1	do do
6-7 " ..	1- $\frac{1}{2}$	5	6-7	38	1 $\frac{1}{2}$	1	do do
8-9 " ..	pure	5	7-8	40	1 $\frac{1}{2}$	1	6. 10 2. 6. 10 do do

High protein content method, starting with milk at high dilution and with gradual increase of concentration.

TABLE III.
Alternative (Patterson).

Weight of Infant in pounds.	Ounces of Cow's milk.	Ounces of water.	Teaspoons of sugar.	Number of feed.
5	7	6	5	6
6	8½	6	6	6
7	11½	6	7	6
8	13	7	8	6
9	15	8	9	6
10	17	8	10	5
11	19	9	11	5
12	21	9	12	5
13	22	9	13	5
14	23	10	14	5
15	24	10	15	5

Low fat; high proteid method, suitable for children showing intolerance to fat. The amounts given are for the twenty-four hours.

The choice of the diluent to milk.—There are three substances commonly added to milk with a view to preventing the formation of a heavy curd in the stomach, which is such a serious obstacle to digestion.

Lime water.—One teaspoonful or so to each feed does undoubtedly prevent the formation of curd, but unfortunately causes constipation, and may, after prolonged use, set up intestinal irritation. The administration of lime water with a view to promoting bone formation is unnecessary and probably useless.

Sodium citrate added to milk in the proportion of two grains to each ounce of milk is of great service in tiding a delicate child over a period of indigestion, but it is not to be recommended as a permanent constituent of the diet. The action of sodium citrate is to inhibit the gastric digestion by neutralising the hydrochloric acid of the gastric juice. Digestion is either postponed till the food has passed the stomach or the intestinal juices are enabled to regurgitate and act in the artificially alkaline medium in the stomach. This will reproduce one of four effects. 1. The Acid barrier, always weak in infants, will be broken down and the way laid

open to invading microbes. 2. The production of acid may be overstimulated and so the habit of overproduction with acid dyspepsia established. 3. The stomach misses the educational exercise of early infancy. 4. The initial stimulus to digestion throughout the alimentary canal is lost. Further, in certain susceptible children, the administration of citrate gives rise to oedema.

Barley water acts mechanically and prevents the formation of a dense clot. At the same time, the introduction of unaltered starchy food into the dietary at this period is not altogether desirable and the cereal action, to be discussed later, must not be overlooked.

Taken in all, **the best diluent is boiled water.** If the water be first boiled, and while still hot, the milk be added and well stirred, the heavy clots will not form.

THE AMOUNT OF FOOD REQUIRED.

The amount of food required by an infant may be calculated in one of two ways. The first, the calorimetric method, the second by multiplying the weight of the child in pounds by 2, the resulting figure in ounces being the total required of breast-milk, full cream cow's milk or its equivalent. This method is satisfactory so long as standard methods of feeding can be used, but when modifications are required to suit individuals, the calorimetric method will be found to be the only reliable guide. At the same time, figures based on calculations cannot be taken as rigid. Just as in the quality of food so in the quantity allowance must be made for individuality. Requirements will depend to a large extent on the uses to which the food is put. It may be burnt up to produce heat, the child will require only $\frac{2}{3}$ or $\frac{3}{4}$ of the cold weather allowance when it is hot. **Want of attention of this point is responsible for many cases of digestive disturbance on the voyage out to India and on transfer from the hills to the plains.**

Note.—Important: The weight of the child in pounds is multiplied by 2 to obtain the average daily requirements of milk in ounces for an infant in hot climates. This does not represent the total amount of fluid required nor does it represent the figure for temperate or cold climates which approximates $2\frac{1}{2}$ for young and $2\frac{1}{4}$ for older infants.

The food value may be expended as energy, a vigorous kicking baby will require more than a

TABLE IV.
TABLE FOR ARTIFICIAL FEEDING. (Truby King.)

Average Weight of Baby.	Age of Baby.	Number of feedings.	Ounces at each feeding.	Total oz. in 24 hours.	Composition of food.		Intervals in Hours.	Hours of feedings.
					Ounces Human-Milk.	Ounces of Boiled Water.		
7 lb.	3rd day	6	1 1/2	6	1 1/2	4 1/2	3	6, 9, 12 noon, 3, 6, 10 p.m.
7 1/2 lb.	4th day	6	1 1/2	9	2	7	3	do do do do do do
7 1/2 lb.	5th day	6	2 1/2	12	2 1/2	7 1/2	3	do do do do do do
	10th day	6	3 1/2	18	11	7	3	do do do do do do
	Beginning of 3rd week.	6	3 1/2	21	14	7	3	do do do do do do
8 1/2 lb.	Beginning of 4th week.	6	4	24	18	6	3	do do do do do do
	Beginning of 2nd month.	6	4 1/2	25 1/2	21 1/2	4	3	do do do do do do
10 1/2 lb.	Middle of 2nd month.	6	4 1/2	25 1/2	25 1/2	..	3	do do do do do do
	Beginning of 3rd month.	6	4 1/2	27	27	..	3	do do do do do do
12 1/2 lb.	Beginning of 3rd month.	5	5 1/2	27 1/2	27 1/2	..	4	6, 10 a.m., 2, 6, 10 p.m.
	Beginning of 4th month.	5	6	30	30	..	4	do do do do do do
13 1/2 lb.	Beginning of 4th month.	5	6 1/2	32 1/2	32 1/2	..	4	do do do do do do
15 lb.	Beginning of 5th month.	5	7	35	35	..	4	do do do do do do
16 lb.	Beginning of 6th month.	5	7 1/2	37 1/2	37 1/2	..	4	do do do do do do
	Beginning of 7th month.	5	7 1/2	37 1/2	37 1/2	..	4	do do do do do do
	8th and 9th months	5	8	40	40	..	4	do do do do do do

N.B.—Four-hourly feeding suits most babies from the start; a few do better with three-hourly feeding for the first few months, and occasionally this may be the case up to five months. The strength of food best suited for a given baby. For a time especially in the early months, breast milk is usually better than any other milk. If the baby is not getting enough milk from the breast, diluted water being added to dilute and make up quantity. Occasionally a young or delicate baby cannot take or retain enough diluted Humanised Milk, yet will do well if a smaller allowance be given of full strength. In such cases a little boiled water may be given between feedings to make up fluid. For very young or delicate babies, we sometimes shorten the period of settling for top-milk. A baby who has previously been fed otherwise, is put on to Humanised Milk, the food must be diluted more than shown above, for a week or longer. Prematures should be begun with food more diluted than for those at full term, and the advance must be cautious. All the recipes for Humanised Milk have been purposely made from a fifth to a sixth of the weight (in months), this is equivalent to about 3 1/2 ounces of milk in the feeding-bottle, etc. and for the fact that mothers' milk is more perfectly and completely absorbed and used up in the system than any artificial preparation. A breast-fed baby rarely needs more than 35 ounces of his mother's milk at 9 months, and he may thrive best with several ounces less.

lethargic one. The first experiments in sitting, walking and standing will make especial demands on the energy.

The food value may be expended in growth more rapid than normal. A small rapidly growing baby will require more proportionately than a larger more slow growing one and an infant building up after a wasting disease may require as much as 25 per cent. above the average requirements for its age and weight.

The average size of the child's stomach is as follows:—

(Pritchard)

Age.	1 day.	2 weeks.	4 wks.	8 wks.	12 wks.	5-6 months.	10-11 months.
Weight	7 lb.	7½ lb.	8	9	10	13-14	18-21
Capacity in ounces	1-2	1·5	2	3·37	4·5	5·75	8·14

The stomach is, however, to a certain extent an adaptable organ and the actual size will depend, within limits, on the usual size of the feeds. The normal stomach will easily accommodate one-sixth of the total requirements of food in the twenty-four hours, except in very young children.

In the maze of instructions and calculations, **the real test of successful feeding must not be missed. The aim is to produce a happy healthy baby with a good digestion and showing a steady rate of progress.** The successful feeding consists, not only in administering food suitable in quality, quantity and cleanliness, but a careful appreciation of the results and, if necessary, a judicious modification to suit the individual requirements.

Calorimetric methods of estimating the food requirements of infants.—The individual needs a certain quantity of food. 1. To maintain the nutrition and heat of the body. 2. To provide energy for the muscular movements of the body including the beats of the heart and respiration. 3. The building up of tissue in growth and repair.

The expenditure of food-stuffs in the human body is comparable to the consumption of fuel in an engine and each article of food has a combustion value which can

be measured and is commensurate with its value to supply the necessary fuel for the processes connected with life.

A calorie is a unit of heat and is the amount required to heat one litre of water through one degree. A ton of coal by burning produces a definite number of calories and, in the same way, an ounce of milk or other food has a definite caloric value in the human body and may be expended either in the production of heat or its equivalent in energy or growth.

The caloric values of various food-stuffs have been estimated experimentally and the results of such experiments give a numerical indication of their food value. At the same time, by observation, the number of calories required at different ages and weights is known, so that by combining this knowledge with our knowledge of the caloric values of foods appropriate to the age, we are able to express the requirements of the infant in terms of some particular article of food.

The caloric value of human milk is 20 per ounce and from the amounts of milk taken by average healthy babies that we are able to fix the caloric requirements of infants. Thus a child of 10 pounds weight requires 50 calories to each pound of bodyweight and a child of 20 lbs. 45-5.

The following table compiled by Dr. Eric Pritchard will make clear this point.

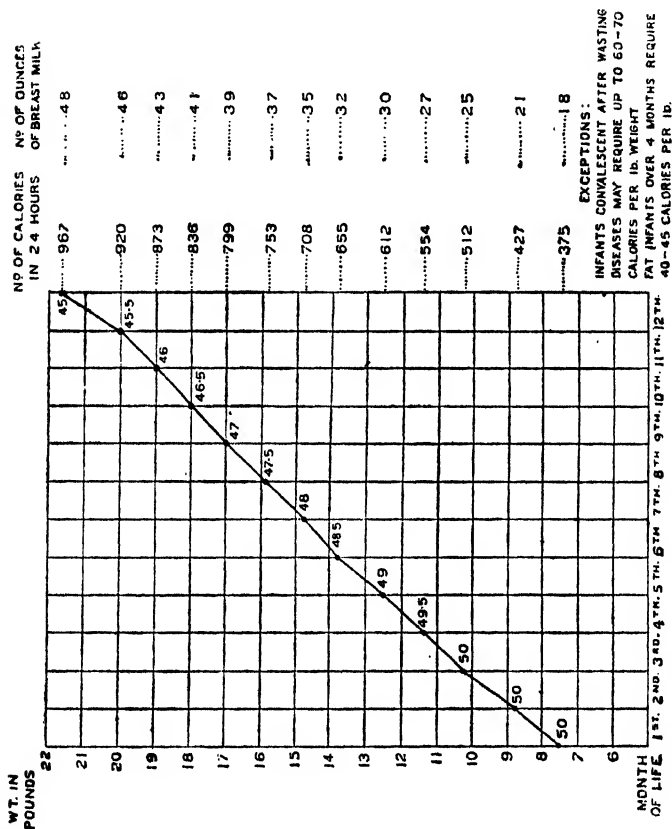
Food to be reduced in the hot weather.

The above figures are applicable to the temperature of hill climates, but must be reduced by $\frac{1}{4}$ or $1\frac{1}{3}$ in the hot weather.

This method of calculation is of great value in the feeding of those infants whose digestion demand a divergence from routine lines. For instance, a child shows signs of intolerance of fat, and the fat of the diet must be reduced. By the calorimetric method, it is easy to estimate the amount of reduction and replace the deficit by other food of equivalent caloric value. It is not wise to apply the method too closely in the case of delicate infants, but, at the same time, a careful count of the caloric value should be taken daily, so that should the child, of necessity, be underfed, the fact does not escape notice and early efforts may be made to bring the diet up to the required standard.

Caloric method and delicate infants.

Example.—It is decided to feed a child which is convalescent from a digestive disturbance on milk and water half and half.



Reproduced by permission from Dr. Eric Pritchard's "Physiological Feeding of Infants" (Kimpton).

The child is 10 lbs. in weight and should normally take 25 ounces in the course of the day.

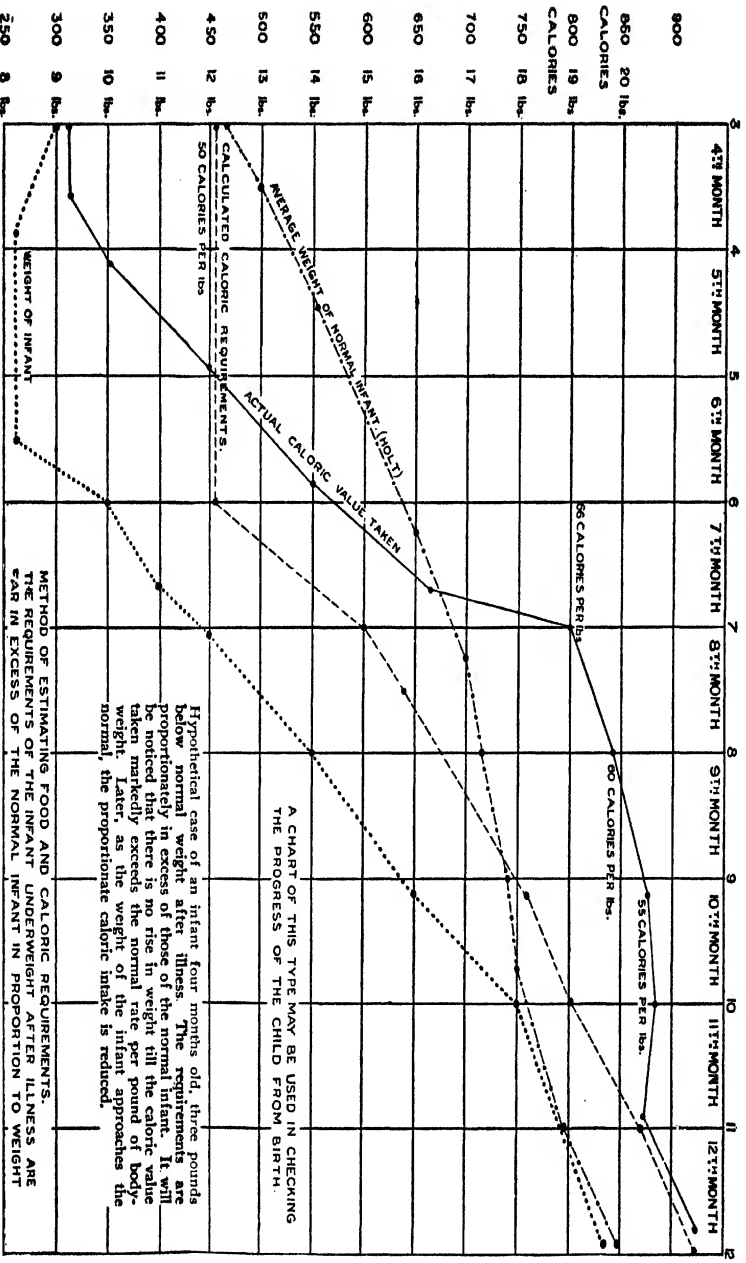
Twenty-five ounces of the above mixture at 10 calories per ounce, is 250 calories.

A child of 10 lbs. weight at ten, multiplied by fifty, requires 500 calories. The child is, therefore, though receiving the correct bulk of fluid, underfed. The fact is appreciated and as the digestion settles, efforts are made to make up the deficit. Each ounce of milk added to the mixture raises the value by 20 calories, the addition of one teaspoonful of sugar or malted starch by about 14.5 and one teaspoonful of medium cream by about 10.

Cautions and Exceptions.—The chart should be used not only with reference to the weight, but also to the age of the baby. **Infants below the average weight will require more proportionately even up to 70 to 75 calories per lb. Conversely, fat children above the average weight will require less per pound.**

Calorific calculation is not admissible till the child is established on a diet. At the commencement of weaning or in the first few weeks of life, the child must be underfed in terms of calories. Similarly, when it is found, for any reason, necessary to change the type of feeding, the full caloric requirements must be approached gradually.

After the ninth month, there is a period of gradual advance from the purely infant diet to that of childhood. This is not a matter merely of additions, but also of replacements. It will be necessary to make reductions in certain items of the diet, notably milk, butter may take the place of cream and bread of baked wheat or sugar. It is necessary to know the food value of each article added and the proportional value of those to be replaced. The only way in which change can be satisfactorily carried out is by reducing the food values of all foods to a common denominator, in other words, by expressing them in terms of calories.



A CHART OF THIS TYPE MAY BE USED IN CHECKING THE PROGRESS OF THE CHILD FROM BIRTH.

Hypothetical case of an infant four months old, three pounds below normal weight after illness. The requirements are proportionately in excess of those of the normal infant. It will be noticed that there is no rise in weight till the caloric value taken markedly exceeds the normal rate per pound of body-weight. Later, as the weight of the infant approaches the normal, the proportionate caloric intake is reduced.

METHOD OF ESTIMATING FOOD AND CALORIC REQUIREMENTS. THE REQUIREMENTS OF THE INFANT UNDERWEIGHT AFTER ILLNESS ARE FAR IN EXCESS OF THE NORMAL INFANT IN PROPORTION TO WEIGHT

Table of caloric values of common articles of diet in infancy and childhood. (Pritchard.)

Milk, human	Calories	20	per ounce.
Milk, cow's	"	20	"
Whey	"	8	"
Buttermilk	"	10	"
Cream, rich	"	138	"
" medium	"	70	"
" poor	"	56	"
Butter	"	219	"
Sugar	"	112	"
Egg, white	"	14	"
" yolk	"	108	"
Soup	"	3	"
Honey	"	80.6	"
Jam, average	"	81	"
Bread, brown	"	60	"
" white	"	64.8	"
Biscuits	"	120	"

Special

Dried milks	Calories		
Full cream	"	141	per ounce
Half "	"	122	dry powder
Skim "	"	100	"
Allenbury No. 1	"	134	"
" No. 3	"	110	"
Benger	"	107	"
Mellins	"	105	"
Prepared barley	"	103	"

Sterilisation.—Owing to the changes and chances to which milk is subject, the occasions on which it is possible to advise the giving of raw milk are rare. Generally speaking, it is desirable to undertake some process of sterilisation. Strictly speaking, sterilisation implies the destruction of all germs and the rendering of milk absolutely free from all living organisms. In practice this is not feasible, as some organisms, the spore-bearing groups, are so resistant that the amount of heat required to kill them would so materially alter the character of the milk as to render it unfit for consumption. The majority of disease-bearing organisms are, however, killed at lower temperatures.

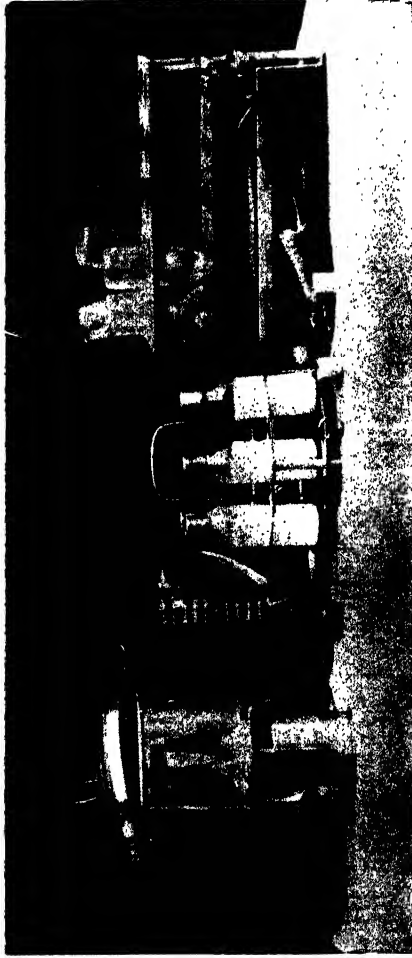
	Centigrade.	Fahrenheit.
Bacillus Diphtheriæ	.. 55	136
„ Typhosus	.. 56	138
„ Staphylococcus	.. 62	144
„ Tuberculosis	.. 80	170

in ten minutes.

It will be seen, therefore, that **if milk be raised to the temperature of boiling water 212 Fahrenheit and kept at that temperature for three minutes, it will be rendered free from the common disease-bearing germs.**

The milk will not have been boiled, as milk boils at a higher temperature than water, so there will be little alteration in taste. How far the process affects the vitamins is uncertain, but it is well to regard them as at a low level and replace by the daily administration of Cod-liver oil and orange juice. Apart from this, there is no evidence that the nutritional value of milk subjected to this treatment, has been impaired.

For convenience and efficiency some form of the **Soxhlet steriliser is recommended.** The apparatus



SOXHLET APPARATUS.

1. Oak rack-stand for bottles.
2. Boiler to hold six or eight bottles.
3. Spirit Lamp.
4. Heater for one bottle.
5. Set of bottles.
6. Rubber discs and caps.
7. Large graduated measure.
8. 6-oz. conical glass measure.
9. Glass funnel.
10. Special cleaning brush.

consists essentially of a series of bottles, each to hold one feed for sterilisation, a rack to hold them and a vessel in which the bottles are heated.

The advantages are that the milk mixture for the half or whole day can be prepared at one time, separated into feeds of appropriate size and sterilised at one time.

On cooling, the bottles are automatically sealed.

There is thus a considerable saving of time and the risk of contamination is reduced to a minimum.

For use, the food supply for the half or whole day is calculated, divided into the number of feeds, and each feed is put into a separate bottle. The water in the boiler is brought up to boiling point and kept there for three or four minutes. The bottles are then removed and cooled as quickly as possible and then stored on ice.

When a feed is required, it is warmed to 100 Fahrenheit, the rubber cap removed and replaced by a nipple.

THE FEEDING OF INFANTS ON DRIED OR CONDENSED MILK.

The indications for the use of some form of preserved milk are broadly—

Indications
for use of
dried milk.

1. When the milk supply does not come up to the necessary high standard for infant-feeding.

2. When the infant is placed on artificial feeding at a time when there is reason to expect that the necessity for further change will arise in the near future.

3. In times of epidemics.

4. Certain delicate infants, unable to digest fresh cow's milk, however modified, may be found to thrive on some form of milk powder.

In the matter of the potentialities of preserved milks the following extract from the well-known textbook "The Physiological Feeding of Infants and Children" by Dr. Eric Pritchard will be found reassuring.

"If a group of independent observers would take a series of infants and would feed them on dried milk modified to breast standard and would comply with all other physiological conditions, I am perfectly certain

that they would come to the same general conclusion that I have come to after fifteen years' experience in the management of nearly 3,000 infants fed exclusively on dried milk, namely, that if this method does not give as good results as any other method, it is not the fault of the milk, but of the manner in which it is used."

There can be no question that proprietary foods are more often misused than not. Full directions are usually issued by the makers and one is inclined to think that they do their products injustice by claiming too much for them. The common recommendation is that the baby, from birth, shall be fed on what is really the equivalent of whole cow's milk.

A criticism, after careful scrutiny of the diets laid down in the instructions for the use of two of the best known full cream milk powders would include the remarks:—

1. The diet in the early months is insufficient both in fluid content and in nourishment.
2. It is low in fat and sugar.
3. It is high in proteid.
4. It is, in fact, approximately whole milk feeding.

Dried milk requires the same careful modification that fresh milk does. It is now held that in dried milk, the vitamins A and B are present in sufficient quantities and that vitamin C is absent. At the same time, it is well to safeguard against any shortage by adding a small quantity of Cod-liver oil as well as fruit juice to the diet. Failing these, as some infants seem incapable of digesting either, Metagen (Parke Davis) will be found an efficient substitute.

Vitamins
in dried
milk.

Pure milk
powder
only.

The choice of food will fall on some form of milk preserved by either partial or complete drying, with no added preservatives, and no additions other than sugar up to the standard of breast milk and cream. It is only in exceptional conditions and, if possible, under skilled advice, that foods departing from this rule should be admitted.

Laboratory experiments and experience have shown that some form of **dry milk** powder manufactured by the roller process is the most suitable for normal children. Of these Ambrosia, Cow-and-Gate, Glaxo, and Trumilk may be mentioned.

Condensed milks are not to be recommended as a routine, the sweetened form contains a sugar content far in excess of requirements, and the unsweetened form has a high proteid and low fat content. At the same time such milks have their value in times of trouble.

Suitably diluted, they may be found valuable in the case of a wasting baby, but the sugar content is excessively high; vitamins are deficient or absent, and prolonged use will lead to the development of rickets.

Ideal milk diluted 1 to 8 is half and half cow's milk and water. As the basis of a mixture it may be useful, as the fat content appears to be more easily digested than that of dried milk.

It cannot be too strongly emphasised that **the selection of a food should be based on a full knowledge of the contents and the requirements of the individual** and that a change should not be made without reason and without plan in selecting the substitute. The trial of one food after another, with no knowledge of the contents and no appreciation of the requirements of the infant is, unfortunately a common practice. The advantages of dried milk are—

1. It is of known and uniform consistence.
2. It is easy to manage in the hot weather. If preferred, each feed can be prepared separately and there is no danger of it going sour.
3. It is, as a rule, easily digested.

Advantage
of dried
milk.

The following table shows the composition of the more commonly used proprietary milk preparations.

	Water.	Protein.	Fat.	Sugar.	
Glaxo full cream	2·4	22·9	25·5	42·5	Milk sugar and cream added.
diluted 1—8 ..	..	2·8	3·2	5·3	..
Cow-and-Gate full cream ..	4·3	25·2	26·2	37	Pure dried milk.
diluted 1—8 ..	..	3·15	3·3	4·6	..
Trufood ..	1·1	26·3	29·2	37·3	Pure dried milk.
diluted 1—8 ..	..	3·3	3·65	4·7	..
Ambrosia ..	1·6	28·71	29·29	35·2	Pure dried milk.
diluted 1—8 ..	..	3·9	3·65	4·4	..

Dried milk of low fat content, suitable for temporary use in fat dyspepsias.

	Water.	Protein.	Fat.	Sugar.	
Glaxo $\frac{1}{4}$ cream ..	2.4	25.7	19.9	45.5	9.5 per cent. cane-sugar added.
diluted 1-8 ..	..	3.2	2.4	5.7	..
Glaxo $\frac{1}{2}$ cream ..	2.5	27.6	13.8	49.2	..
diluted 1-8 ..	..	3.45	1.7	5	..
Cow-and-Gate $\frac{1}{2}$ cream.	4.3	30.9	16.7	40.5	No added sugar.
diluted 1-8 ..	..	3.8	2.1	5	..
Cow-and Gate skimmed.	4	36	1	49	No added sugar.
diluted 1-8 ..	..	4.5	0.12	5.1	..
Trufood skimmed.	4	36	1	49	No added sugar.
diluted 1-8 ..	..	4.5	.12	5.1	..

Special.

	Water.	Protein.	Fat.	Sugar.	
Allenbury's No. 1.	5.7	9.7	18.5	62.3	
diluted 1-8	..	1.2	2.3	7.8	

(Casein partly removed; is one of the most easily digested of all milk foods and will be found of great value as a temporary measure in many cases of dyspepsia. Sugar added in the form of Lactose.)

	Water.	Protein.	Fat.	Sugar.	
Allenbury's No. 2.	3.9	9.2	17.6	66.8	Malted flour added.
diluted ..	..	1.7	2.2	8.35	..
Horlick's Malted Milk ..	3.7	13.8	9	70.8	..

Humanised Milk.

	Water.	Protein.	Fat.	Sugar.	
Prescription Glaxo.	2.3	13.7	24.9	55.2	
diluted 1-8 ..	..	1.7	3.1	7	
Humanised Trufood.	1.4	11.8	28.9	52.3	
diluted ..	..	1.45	3.6	6.5	

In practice it is found that better results are obtained by using the full cream milk and modifying by dilution and the addition of cream and sugar to the required standard.

A good cream supply is more difficult to obtain than a good milk supply, the fat value of the cream is inconstant and often unknown. Yet it is essential to the welfare of the infant that the proportion of fat in the food be adequate. Cream supply

A great deal of research has been devoted to the **preparation of an artificial cream** which will present not only all the essential characters of **natural cream**, but some advance in the matter of digestibility. **Such creams are prepared from animal and vegetable oils reduced to a fine degree of emulsification, so that the fat is presented in the form of minute droplets easily attacked by the digestive juices.** Some of these creams are designed not only to supplement the fat contents but also to ensure against any deficiency in the milk or milk powder to which they are added. For this purpose, fresh butter from cow's milk or Cod-liver oil form a proportion of the ingredient, as both are rich in the fat-soluble A and D. Such creams must not be expected to replace any deficiency of vitamin C, for which fresh fruit juice must be given. The advantages of such creams are manifest, and they may be used in conjunction either with fresh or dried milks.

One of the great difficulties of artificial feeding of infants is to keep the fat content at an adequately high level, as the infant is apt to be intolerant of fat from other sources in the same proportion as in breast milk. An artificial cream with the type of fats well balanced and the fat globules finely divided, has been found in practice to be more easily digested than fresh cream. Further, it is of known and uniform strength, sterile and always available. Of such a type is the **New Zealand cream** after the prescription of Sir F. Truby King.

NEW ZEALAND CREAM.

Contains 50 per cent. fats of which $\frac{2}{3}$ is animal fat. butter fat and Cod-liver oil, $\frac{1}{3}$ vegetable fat, mainly

derived from pea-nut oil, and 40 per cent. sugar mainly dextrose—a little lactose. The Caloric value is 200 per oz.

The cream is prepared at various centres and may be obtained from the Mothercraft Training Centre, Cromwell House, Highgate Hill. It is hoped that shortly depôts will be arranged in India.

In use it is found most satisfactory to measure out the quantity for the day, and give the appropriate amount in a teaspoon immediately before each meal.

The prescription for humanised milk made with New Zealand Cream is as follows:—

Cow's Milk fresh	15 oz.
or Full Cream Dried Milk	15 drachms
Sugar	1 oz.
N. Z. Cream	1 oz used as advised in the immediately preceding paragraph.
Water	30 oz.

If Glaxo is used, the amount of sugar added will be 3 drachms.

The percentage constituents of the above mixture are:—

Protein 1·6, Fat 3·4, Sugar 7·1, Caloric Value 19·1.

It is not necessary to prepare the food in bulk, the necessary quantities for the preparation of smaller quantities may be derived from the above prescription by a simple process of arithmetic.

For estimating the total requirements, one ounce of the mixture may be taken to represent one ounce of human milk and the requirements arrived at from Table I or Chart I.

During the introduction of this type of feeding, the cream should be added cautiously, some ten days being allowed before the full strength is reached.

Other forms of emulsified oil may be used to supplement the fat content of a mixture, but it is doubtful if they can be used in such bulk as to bring the fat

content of a diluted milk up to that of breast milk. The following may be prepared by any chemist:—

R|	(Great Ormond St)
Emulsio Ol. Nucis	
Ol. Nucis	m 15
Liquor Calcis Saccharat	m 4
Pulv Acaciæ	grs 3
Glucose Liq	m 30
Ol. Cassiæ	m 1|40
Ol. Caryoph.	m 1|40
Aq. Chloroform. Duplex to	1 drachm

One teaspoonful to be added to each bottle.

The above oil contains no vitamins, so must be supplemented by a Cod-liver oil emulsion as follows:—

R|	(Great Ormond St)
Cod-liver oil	m 30
Mucilage acaciæ	m 5
Ol. Amygdali dulc	m 1|16
Ol. Cinnamon	m 1|40
Elixir Glusidi	m 5
Chloroform	m 1|16
Benzoic acid	grs 1|16
Decoction of Irish Moss to	1 drachm.

One teaspoonful two or three times a day in the feed.

Cod-liver oil alone, even in emulsion form, cannot be used entirely to replace the fat of cream, as such a large quantity would cause diarrhœa.

ADDITIONAL FACTORS.

Fruit juice at least two teaspoonfuls daily should be added. Lecithin and Broth, as for cow's milk feeding.

SPECIAL METHODS OF FEEDING.

Predigestion of milk or milk mixtures.

Predigestion will be found of great value not only to delicate infants but also in the feeding of older children during the acute stage of illness. In order that the full benefit may be obtained, the ferments must be given ample time to act, the common method of allowing ten minutes or a quarter of an hour is of very slight value.

After a period of feeding on predigested food, it is desirable to allow the digestion of the patient to assume its functions gradually, for this purpose the time of predigestion should be shortened by stages.

METHOD.

Take one pint of Milk or Milk mixture prepared to the correct formula, bring quickly to the boil and cool down to about 117 Fahr. Add two teaspoonfuls of Liquor Pancreaticus (Benger) or other suitable digestive powder. The temperature of the mixture is maintained at about 117 by placing the vessel in a container of water at 120. Stir occasionally.

The digestion is allowed to proceed for from one to three hours, at the end of which time the mixture is brought rapidly to the boil and cooled in the ice-chest.

BOILED MILK.

To improve digestibility; as practised by the Mothercraft Training Centre, Cromwell House, Highgate.

The humanised milk mixture, with sodium citrate grs. 2 to 1 oz. is boiled for 20 minutes. **If stirred frequently during the process of bringing to the boil, skin will not form.** After the boiling point is reached, the milk is allowed to simmer gently for twenty minutes.

SPLIT PROTEIN METHOD.

This method, by which the bulk of the coagulating protein, the "curd-forming" portion, is removed, is devised for the benefit of those infants who, by vomiting and the passage of protein curds, declare themselves incapable of digesting the full protein content of cow's milk.

Method of preparation:—Take 16 ounces of whey prepared by curdling milk with rennet (See appendix). To this add three ounces of 20 per cent. cream. The resulting mixture will have approximately the composition of:—Caseinogen (coagulating protein) 0.5 per cent.; Whey protein 1 per cent.; Fat 3.5 per cent.; Sugar 4 per cent.

FRESH BUTTER MILK OR SKIMMED MILK.

This is a form of food to which frequent recourse will be had during the hot weather, when the full fat

content of milk may cause digestive disturbance; it is also of value in fevers, when full-cream milk is distasteful and unsuitable and it is used for those infants who show evidence of weak fat digestion. It may be prepared on the same principle as Top-Milk, using the lower three-quarters instead of the top quarter. The percentage composition is approximately:—

Protein 3 per cent.; Sugar 4·8 per cent.; Fat 0·5 per cent.; Caloric value 10 per ounce.

ARTIFICIALLY ACIDIFIED MILK.

The physiological reasons on which this form of feeding is based are that the normal hydrochloric acid content of the gastric juice of infants is low; is easily abolished in illness or conditions of exhaustion and that the mineral salt content of cow's milk is proportionately so high that the available acid is fixed and none is left for digestive purposes.

The consequence is that not only is the gastric digestion incomplete or inert, but that the stimulus to digestion lower in the alimentary tract is wanting.

The writers have found this method invaluable in that state of exhaustion following a prolonged digestive disturbance, when it is difficult to stimulate the digestion to any signs of activity.

The acid added may be either organic or inorganic, lactic acid or hydrochloric.

The preparation of lactic acid milk is as follows:— **Preparation.**

One pint of milk is boiled, cooled and the skin removed. To this is added one drachm of lactic acid (British Pharmacopœia) drop by drop, stirring four times between each drop.

The milk must not be heated after the addition of the acid or it will curdle.

This method may be used also with milk prepared from a dry milk powder.

Dilute hydrochloric acid 2 to 4 minims to each feed may be used with advantage in conjunction with predigested milk.

SUPPLEMENTARY FEEDING.

If, after careful observation of the child's weight before and after meals, there is evidence that the breast-

Insufficient breast-milk. milk taken is insufficient for the needs of the infant, and if this is further confirmed by the demeanour of the child and a failure to gain weight, two lines of action are indicated. The first is to raise, by all means in our power, the amount of breast-milk, and it may be stated with confidence that such an object may be accomplished in the majority of cases without great difficulty. The second, to make up the deficit, by means of addition to such feeds as are not adequate.

Baby weighed before and after feeds. The method used should be such as to continue the stimulus to the secretion of breast-milk, so that no reduction should be made in the number of breast-feeds. In practice it will be found that it is usually the last two feeds of the day which show a marked deficiency. By subtracting the amount taken, ascertained by weighing the baby before and after meals from the calculated requirements, the amount to be replaced is found. The most suitable substitute is humanised cow's milk, but it is not wise to make use of full strength humanised milk at one step. The standard must be approached gradually, starting with milk and water in equal proportions, with sugar of milk added in the correct proportion. The cream content will be added gradually and with caution, at least a week elapsing before the full proportion is reached. By this time it is hoped that the breast-milk will have been amplified, so that the amount of the supplementary feed will become proportionately less. Special care should be taken that the nipple of the feeding bottle offers resistance to sucking. If the infant experiences an easy response to his suction, there is danger that he may refuse to make the necessary effort when put to the breast.

CHAPTER VIII. DENTITION AND ITS MANAGEMENT.

Growth.

The period of teething is apt to be regarded as one of restless nights and a time of anxiety. Let it be said that in the case of the normal healthy and properly fed baby, **teething is a period possibly of fretfulness but not one of illness or danger. At the same time the child is more susceptible to digestion or nervous disturbances and any deviation from normal health or any inherent weakness is likely to be accentuated.**

There are two periods of teething, the first in infancy, the second in childhood. The germs of the first (milk or temporary) set have existed within the jaw for several months before birth, but they are at no time covered with true bone. As ossification advances, the tooth rises, and pressing upwards, causes absorption of its capsule and the gum, till by their removal the tooth makes its appearance. This upward progress, in its later stages, is what we mean when we talk of "teething." The temporary teeth usually appear in the following order:—

The order of appearance of first set.



1. The two middle cutting teeth of the lower jaw, at about the seventh or eighth month.

2. The corresponding teeth of the upper jaw, at about seven and a half or eight months.

3. The two upper lateral cutting teeth, at about the ninth month.

4. The corresponding teeth of the lower jaw, at the tenth month.



5. The two front grinders or molars of the lower jaw, from 12 to 13 months.

6. The corresponding teeth of the upper jaw, at about 14 months.



7. The four eye-teeth or canine teeth in the vacant spaces, between the sixteenth and twentieth months.

8. The second grinders, between the twentieth and thirtieth months.

The appearance of second set.

With the appearance of these 20 teeth, the first dentition is completed. Strange as it may appear, the germs of the second set also existed in the jaw before birth, more deeply seated than those of the milk teeth. At about the sixth or seventh year, a grinder appears behind each of those already existing, making a total of 24 teeth, and soon after their appearance the central front teeth fall out, their roots having been absorbed by the advance of the young permanent set. About a year is occupied in shedding the four central cutting teeth (fig. 2), and another year by the four outer cutting teeth (fig. 4). During a third year the front grinders (fig. 6) are similarly replaced. Next, the second temporary grinders, and lastly, the eye-teeth are shed at any time from $9\frac{1}{2}$ to $12\frac{1}{2}$ years, while a little later, four new grinders show themselves, making 28 teeth. Between 17 and 21 years, the last four grinders, or the "wisdom teeth," complete the full set of 32.

The order above related is not invariably followed. On the contrary, deviations are numerous. Children have, rarely it is true, been born with teeth, and children have reached the age of $1\frac{1}{2}$ years without a tooth showing, but the above description is the general rule. Very frequently the side cutters of the upper appear before those of the lower jaw, and often the temporary eye-teeth fall out before any of the grinders.

Indication of delay.

As a rule, a healthy child teethes with a close approach to regularity. Delay in the appearance of the teeth usually argues want of development, consequent upon some constitutional fault, e.g., Rickets.

In England, it is an observed fact that the first dentition is passed through with less trouble during the summer than the winter, in the country than in large towns, and, as might be anticipated, by healthy than by delicate children.

Most of those who are best entitled to give an opinion as regards India hold that teething is a process which *per se*, proceeds with moderation. It may be said that under ordinary care in diet and clothing the operation of teething proceeds kindly in the climate of India; and speaking from personal experience, we should say that severe teething irritation is seldom a primary affection, but that, on the contrary, it generally follows upon previously existing gastric, intestinal, or febrile disorder; and it is not too much to say that in 18 cases out of 20 these last are but the result of mismanagement and weakness, more common to the most civilised than to the most barbarous communities. Every affection, whether it be a trivial skin eruption, or a fatal diarrhœa, is usually attributed to teething, if such complications happen to occur during its progress. An unfortunate infant, who is poisoned with some variety of cornflour, dies of diarrhœa; or, during the course of this affection, a convulsion ends the brief life, whereupon, death is without hesitation attributed to teething. Another, carelessly exposed to malarial influences, is attacked with fever, and similarly perishes in a convulsive fit,—again teething is blamed; while down the throat of a third are thrust lumps of meat and highly seasoned curries, and the usual bloody bowel evacuations, which of course succeed, are, the parent thinks, due to teething.

Teething
mild in
India.

Popular fal-
lacies.

It is not for a moment intended to be affirmed that teething has no influence on the constitution. It has this influence, that the nervous system, already possessing high susceptibility, is then still further exalted in its sensibility, but it is not true that nature has subverted one of the natural processes of growth into a mode for slaying an indefinite number of infants. **No doubt through carelessness and bad management, the mortality is higher during teething than if there were no such process in nature; possibly, even with all due care, a few of the more delicate might be cut off in consequence of the additional state of nervous tension,**

The real
effect.

but teething never did kill anything like the number of infants whose deaths are attributed to it.

The symptoms attributed generally by mothers and often by doctors to painful dentition are legion. There may be alarmingly high fever, with vomiting and loose green or offensive motions, or there may be pharyngeal, tracheal or bronchial catarrh. There may be eye, ear and nervous affections. There may be every kind of pulmonary disease. In short, there is no disease for which dentition has not been held responsible. But one asks, would it not be strange if teething did not often co-exist with every illness of infants between six months and two years of age? **In the vast majority of cases, teething is a mere coincidence.** Indeed, one can hardly recall a case where gastro-intestinal disturbance did not precede the painful state of the gums, and the probabilities are that due to improper food or faulty milk, the whole intestinal tract becomes congested and inflamed. It was Abernethy who said that the "Legion phenomena of teething were dependant on alimentary upset, associated with a common cold, and that castor-oil emulsion and careful dieting would obviate trouble and anxiety in most cases,"

**Diarrhoea
always a
bad sign.**

And here, one would enter an earnest protest against the popular idea that diarrhoea during dentition is a natural and a good thing. So far as India is concerned, it cannot be too clearly understood that **diarrhoea is never a good thing**, that under any circumstances there is always a very considerable element of danger in it, and that the convulsions which it is supposed to ward off during teething are a common mode of death from purging without any dentition at all. And, as a matter of fact, convulsions are far more common in infants before, than during the teething age. Many an infant has been sacrificed to this prejudice by anxious mothers, who would willingly lay down their lives for their children's sake. The purging, it is argued, is not to be checked because the child is teething. The infant becomes weaker and weaker, more flabby and more pallid. At last a doctor is consulted, who, seeing through the case, endeavours to check the progress of the diarrhoea (an effort in which he may be thwarted if an ignorant nurse or parent has any voice in the matter), but possibly too late,—a convulsion may end life, and,

according to the popular theory, the purging having been checked or attempted to be checked, "it went to the head." What "it" represents is as difficult to conceive as to explain.

The dribbling and crossness of the child, the swollen state of its gums, and its desire to bite at things—when these signs exist, which is by no means always the case—show that the coming of the teeth is felt by it. Indeed, Hippocrates was probably right in assuming that the "gums itched." When such is the case, we should naturally be particularly careful as to simplicity of food, avoidance of exposure to chills and of overheated verandahs. We should keep the bowels regular, seek the open air, not permit diarrhoea or constipation, be careful to have the clothing adapted to the season, and be very particular that sleep, which the warm bath will facilitate, be obtained in abundance; and very occasionally the gums may be lanced, especially if there be muscular irritability and irregularity of sleep, when a few doses of bromide of potassium (40) should be given, and any feverishness met by seclusion, fever mixture (33) and a gentle aperient.

**General
manage-
ment.**

As to scarifying the gums, there is a singular prejudice against it on the part of some. We think it is essential and very useful when there is feverishness and a swollen state of the gum, but that otherwise it is unnecessary. It is, however, as nearly painless as can be, and no harm can result from it, unless there be ignorant and cruel hacking, which will increase the irritation fourfold. It is a mistake to imagine that a gum which has been once lanced, and which has closed over a tooth, is more resisting than formerly. On the contrary, although the gum may appear to have healed, the probabilities are, it never has actually united, but only approximately closed.

Management in the main then consists in scrupulous attention to cleanliness, diet and the gastro-intestinal tract. Castor-oil emulsion to which 5 drops of tincture of rhubarb is added with the same quantity of paregoric is always useful.

1. Management.

Local to relieve irritation. Gentle rubbing of the gums with the finger and glycerine. Boiled bone ring to chew.

2. General.

At time of eruptions cut down food by one quarter and replace by water.

Grey powder grs. $\frac{1}{2}$ b.d.

Take special precautions against constipation.

Prescribe Bromides if restless—never to be given if child is drowsy.

3. Teething is the time of development of the jaws, faults in the first dentition will lead to faults in the second. Failure of jaw expansion will lead to narrowing of nasal airway and persistence of adenoids. Premature decay of first teeth is a common cause of illness, dyspepsia and failure to gain weight in children.

To promote good jaw development, give a hard crust to chew at eight months or at appearance of four teeth.

4. The appearance of first teeth is a sign of approaching time for alteration in diet, but alteration should never coincide with the eruption.

5. Delay in cutting of teeth.

(a) Careful scrutiny of diet.

(b) Careful scrutiny of child's health.

(c) Careful scrutiny for signs of rickets.

6. Early stopping of cavities in first teeth should be undertaken.

For restlessness, bromide mixture may be given.

For catarrh, one grain of grey powder with a quarter of a grain of Dover's powder at six months.

For tender swollen gums great relief will be obtained by rubbing them gently twice daily with a slice of lemon or painting with a solution of glycerine of borax, to which may be added 10 grains of potassium chlorate and 15 grains of resorcin to the ounce.

All comforters, rings, etc., should be boiled and then the infant kept quietly on a diluted diet.

Carious teeth.

As the child grows older he may suffer from toothache consequent upon decay. It should be recollected that it is a serious thing to extract teeth from a jaw that is rapidly developing, because the jaw is then apt to contract, not allowing room for the coming teeth, which will be huddled together irregularly.

Moreover, toothache often causes a child to bolt his food and thus disorder health. Dentists now stop teeth, even of the temporary set, very early in life.

CARE OF THE TEETH.

The care of the teeth is of supreme importance, and the following rules should be strictly attended to:—

1. Do everything to maintain good health. Teeth are built out of blood.

2. To ensure good, sound, well-enamelled, lasting teeth, the food and means of feeding must be such as to compel ample exercise for the mouth and jaws throughout babyhood and childhood. "Bring up a child in the way he should go, and when he is old he will not depart from it." The habit of slow chewing once firmly established will tend to be maintained for life.

3. The composition of the food must be suitable—that is, adapted to the perfect building up of the structures of the body.

4. Avoid the use of long-tube feeder and dummy, and make sure that baby "works for his living."

5. After nine months give tough crusts, toast, etc. In the second year and onwards a fair proportion of the food should be dry, firm, hard, or tough—e.g., crusts, crisped bread, toast, and raw, ripe apple. Later (when the child has been trained to masticate thoroughly), oatcake, etc., may be given. The exercise develops the jaws and teeth, and thus tends to prevent decay, overcrowding, and irregularity.

6. Teach baby to chew his food vigorously and thoroughly, taking sufficient time over his meals. Don't allow him to bolt any of his food, whether solid or liquid, but, on the other hand, don't encourage mere dawdling. At the end of a well-chewed meal the jaws should be comfortably tired, the flow of saliva should be ceasing, and there should be a feeling of healthy satisfaction. This constitutes the normal check against over-eating and ensures the highest nutritive results from the food taken, while at the same time developing jaws and teeth for future work.

7. Hard or tough food, if well chewed, helps to make good teeth and to keep them sound; it also helps to cleanse them. This applies especially to raw, ripe apple and to all kinds of firm, fibrous fruits and vegetables.

8. Soft food clinging to the teeth and tend to cause decay; therefore cakes, sweets, ordinary biscuits, chocolates, etc., should be avoided habitually and should on no account be given at bedtime. All decay commences on the outside of the teeth, never from within; it starts in crevices in the crowns, or between two teeth.

9. The tongue is not primarily for "talking," but is a "masticatory organ," and should do a large proportion of the work in eating—squeezing the moistened food out between the teeth and forcibly crushing it against the hard, roughened roof of the mouth.

Further, it is practically a kind of tooth-brush which, if properly developed, does much to cleanse the mouth. A clean mouth ensures sweetness of breath.

10. The teeth should always be brushed night and morning, all the surfaces being carefully cleaned. The first or temporary teeth, as well as the permanent ones, should be brushed and carefully watched for signs of decay. In any case, the child should be taken to the dentist periodically if possible.

If the first teeth decay early there is a poor chance for the second ones, but they may be saved by unremitting care and attention.

Cleaning the Teeth—Practical Instruction.

It is not enough for the mother to know that her child's mouth and teeth should be regularly cleansed—she must know also how to set about it.

First use a soft "Tom Thumb" baby's brush of the correct form. Later, a brush with somewhat stiffer bristles may be used, but great care should be exercised, both in brushing and "silking," not to injure the delicate gums. The handiest and one of the best all-round substances is soda. Unlike soap, it is not unpleasant; on the other hand, the taste is not attractive and the child tends to spit it out. Some dentists prefer a mild acid, as tending to cause a free flow of saliva. It is better not to use a sweet aromatic dentifrice for an infant, because children tend in any case to suck the tooth-brush and swallow the water and "brushing." Do not allow this bad habit to be formed.

Healthy growth.

The weighing machine is an essential part of the equipment of the careful mother, for by no other means can a satisfactory record of the child's progress be kept. A regular gain is more to be desired than close approximation to averages and a fitful gain or a failure to gain in weight should prompt immediate investigation.

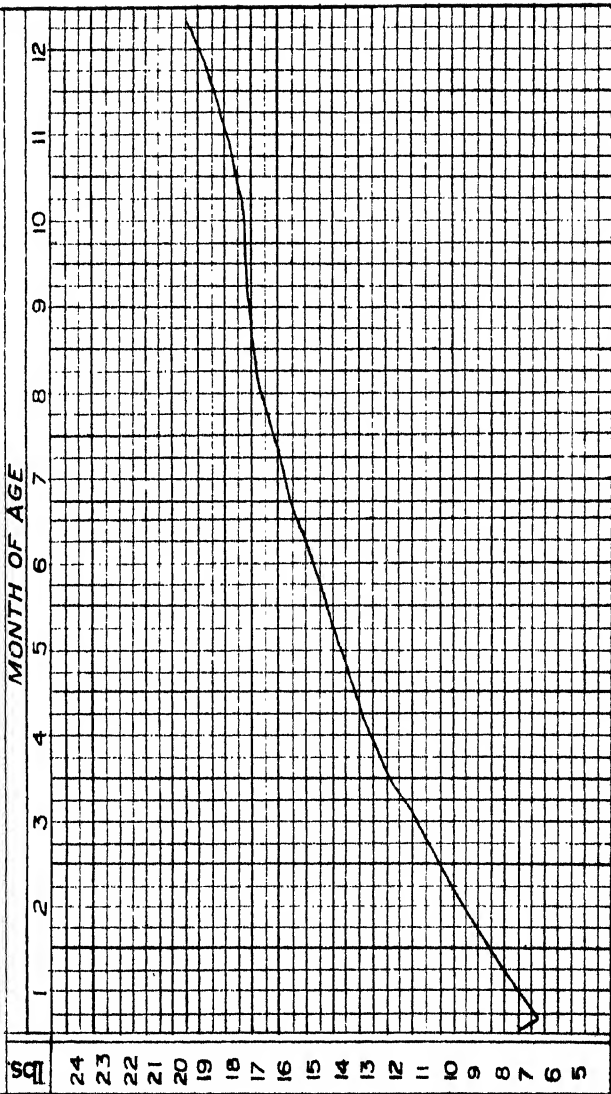
The average weight at birth is 7 lb., and the length 19 or 19½ inches. At five months the weight is doubled, and at a year is nearly trebled. The following is a table of average heights and weights for ages:—

Age at birth.	Height	Weight.
.. 1 month	.. 19½ inches	7 lbs. 8 ozs
.. 2 months	.. 20½ "	8 " 5½ "
.. 3 "	.. 21 "	10 " 4 "
.. 4 "	.. 22 "	11 " 5 "
.. 5 "	.. 23 "	13 " 9½ "
.. 6 "	.. 23½ "	14 " 14½ "
.. 7 "	.. 24 "	16 " 3½ "
.. 8 "	.. 24½ "	17 " 5 "
.. 9 "	.. 25 "	18 " 10 "
.. 10 "	.. 25½ "	20 " 1 oz.
.. 11 "	.. 26 "	20 " 5½ ozs.
.. 12 "	.. 26½ "	21 " 2 "
.. 12 "	.. 27 "	22 " 7 "

WEIGHT CHART.

Name _____

Date of birth _____



The weight - curve of the first year (Holt)

"During the second year the increase in height is from three to five inches; in the third, from two to three and a half inches; in the fourth, from two to three inches." (Dr. Louis Starr.)

Dr. Angel Money's investigations led him to the conclusions that "a child in health generally gains twenty pounds in weight and ten inches in height in the first two years of life; in the third year four pounds and four inches are about the usual additions to weight and stature. During the next six years the body increases by annual increments of four pounds in weight and two or three inches in height. After ten years the body puts on flesh at the rate of eight pounds a year."

Dr. G. W. Stephenson has recorded the average heights and weights of the English-speaking races as follows:—

**Average
Heights and
Weights.**

Age.	Boys.		Girls.	
	Height (inches).	Weight (pounds.)	Height (inches).	Weight (pounds).
5 years ..	41'30	40'49	41'05	39'63
6 " ..	43'88	44'79	42'99	42'84
7 " ..	45'86	49'39	44'98	47'08
8 " ..	47'41	54'41	47'09	52'12
9 " ..	49'69	59'82	49'05	56'28
10 " ..	51'76	66'40	51'19	62'17
11 " ..	53'47	71'09	53'26	68'47
12 " ..	55'05	76'18	55'77	77'35
13 " ..	57'06	83'72	57'96	87'82
14 " ..	59'60	93'46	59'87	97'56
15 " ..	62'27	104'90	61'01	105'44
16 " ..	64'66	120'00	61'67	112'36
17 " ..	66'20	129'19	62'22	115'21
18 " ..	66'81	134'97	62'19	116'43

Budin ("Rev. Gen. des Sciences," No. 21) insists upon the value of constantly weighing infants as the best means of testing the condition of nutrition and the relative value of the different modes of feeding. There is always a little loss of weight for the first few days. This is natural, consequent upon the delay in the secretion of the milk. Contrasting the increase of weight in infants (1) suckled, (2) only partly suckled,

and (3) artificially fed, during the first 10 or 12 days of life, the average gain was approximately twice as great in the first class as in the third, while with the mixed diet the rate was intermediate. The quantity of milk should be so adjusted as to lead to such a steady increase as will double the weight in five months, and treble it in the first year. There should be a gain of four ounces weekly during the first six months; later, the gain is not so much. "Failure in the mother's milk will be shown by arrest in the increment of weight," but it should be pointed out that loss of weight accompanied by vomiting may possibly be a mere indication that the quantity of milk is too large.

It is very important that weekly weighments should be made and recorded upon a chart, such as is here shown.

The following facts and figures will be of use to those concerned in the care of children.

LANDMARKS RECORDING NORMAL PROGRESS.

6th Week.—Posterior fontanelle closes.

4th Month.—The infant is able to maintain the head erect without difficulty.

6th Month.—Associates names with objects.

8th Month.—First teeth appear.

9th Month.—Sit up unaided.

10th Month.—Speaks one or two words.

12th Month.—Stands or walks with slight help.

14th Month.—Speaks several words.

18th Month.—Gains day control of the bladder. The anterior fontanelle closes.

24th Month.—Gains night control of the bladder. The first teething completed.

Rate of pulse

At birth	130 to 140
1st year	120 to 100
5 years	100
10 years	boys 80, girls 90

Respiration

at birth	32 to 50
1st year	25 to 35
2 to 4 yrs	25
5 to 14 yrs	20 to 25

DIET AFTER THE APPEARANCE OF THE FIRST TEETH.

Although it is customary to regard the age of nine months as that at which the diet of the infant should be changed, or rather, other forms of nourishment included

in the dietary, it may be laid down as an axiom that the change should be made, not rigidly according to age, but according to the maturity of the system as indicated by the appearance of the teeth. In the case of a backward or delicate child we should naturally incline to delay and allow the child to have the benefit of the easily digested breast milk for some weeks longer. On the other hand, exceptionally vigorous and advanced infants may demand more concentrated food at an earlier age than is usual. Till the appearance of the first teeth, however, no change is made. Before this, the digestive functions have not matured sufficiently to deal with diet other than breast milk or its artificial equivalent.

At the same time, though the appearance of the first teeth is the signal for advance, no change should be made during the actual eruption, a time when the digestive system is particularly sensitive to strain.

The secret of success in the transition to mixed diet lies in the gradual education of the digestive system and the consolidation of each step before a further advance is made. The commonest errors made are:—

(1) The first additions are made too suddenly. The bottle feeds are thickened to a degree incompatible with digestion.

(2) No provision is made for the development of the jaws by the supply of solid food, baked crusts or rusks. This should be the first addition as soon as there is any sign of the onset of dentition.

(3) The maintenance in the later stages of too large a quantity of milk in the diet, so that the child has no appetite for other forms of food and the balance (*see* Chapter V) is incorrect.

(4) The addition of more than one new article at a time, so that, in the event of disagreement, it is difficult to know the precise article on which blame should be laid.

(5) Insufficient attention to the vitamin content (*see* Chapter VI).

WEANING.

The first step is the change from the breast to the bottle. Amongst European mothers, it is usual to accus-

tom the baby to artificial feeding before proceeding to mixed feeding. This is not essential, but, in the interests of the mother, she may be considered to have done all that she safely can, if she has fed the baby till the arrival of the first teeth. Considerable practical difficulties in nursing arise when the teeth are in the process of eruption and the baby is biting hard at anything which is placed within the mouth.

The process of weaning should be gradual, one meal at a time being changed, the whole process being accomplished in from three to five weeks. For this reason, weaning may be commenced towards the end of the eighth month, so that the baby is ready to make further advances as the system demands.

There is still the same necessity for maintaining the physiological balance, so the substitute may, with advantage, take the form of humanised milk, though at first the fat content should be kept at a definitely lower standard than that of breast milk. The balance is at this time gradually altering, with an increased demand for carbohydrate (farinaceous) food. At two years the proportion of carbohydrate to fat is 3.3 to 1 instead of 2 to 1 as in infancy. The proportion of proteid in the diet is also very slightly raised.

During the process of weaning the child will, if fed on humanised milk, have become accustomed to some form of malted starch, so that the next step may be in the form of an unchanged carbohydrate; rusks, groats, baked flour or oatmeal jelly, such food being added in a tentative manner and the result observed. Of all these articles, the first to be added will be the rusk or baked crust, which will teach the child to chew, develop the jaws and assist in the cutting of the teeth.

If, on the contrary, the baby has been accustomed to whole milk feeding, or some approximate dilution, the first step will be to add some intermediate food, such as Mellin's, to the diet and then proceed to the introduction of the unaltered farinaceous food.

MIXED DIET.

Though considerable advances will be made within the next three months, milk will be the basis of the diet, and if the child has been fed on humanised milk mixture, the milk content in this will be gradually

increased, while the added cream will be correspondingly diminished, till at the end of the year the child is taking pure cow's milk.

At the same time, with the addition of the farinaceous food to the bottle, the sugar will gradually be reduced.

The number of meals in the day is reduced by the gradual cutting down of the ten o'clock feed, till ultimately the meals are four in the day with the addition of an early morning drink of fruit juice, sugar and water. This must, of course, be subject to circumstance; when the children take their airing in the early morning, something more substantial must be given. As to timing, in India, the time-table for the child is fixed according to atmospheric conditions and the most suitable hours for outdoor air and exercise.

The tenth month of life, therefore, is spent in weaning, the only addition being at first rusks, one given a quarter of an hour before two or three meals. Later, a small amount of baked flour, groats or oatmeal jelly may be added.

If vegetable broth has not been given at an earlier age, it should now be introduced, from four to five ounces being used as a substitute for water in one of the bottles.

The amount of milk or milk mixture at this age will be from thirty-eight to forty ounces in the day.

Age: 10 months, 11th month of life.

Additions: Groats or baked flour; milk pudding, made from rice or sago, starting with two teaspoonfuls; egg yolk on alternate days, starting with one teaspoonful; gravy and beef tea.

The milk mixture: Milk 20 ozs., sugar 6 to 8 drachms, cream 5 to 7 drachms, water 12 ozs. It will be seen that the proportion of milk has been raised.

Water will be necessary between meals.

Age: 11 months, 12th month of life.

Additions: Gravy and potato; egg or steamed custard; bread and butter.

The milk mixture: Milk 20 ozs., sugar 4 drachms, cream 4 drachms, water 6 ozs.

The diet from the 13th to the 18th month:—

Early Mornings—A cup of milk.

Breakfast:—Toast and butter or dripping one slice; barley jelly or strained oatmeal; milk.

Lunch. Gravy and potatoes or boiled egg and breadcrumbs; milk pudding; bread one small slice.

Tea:—Milk rusk; bread and butter; sponge-cake.

Cocoatina may be added to the milk.

The milk may now be given pure or, in the hot weather, with one-quarter of its bulk in water added.

After the fifteenth month, steamed fish, beginning with one tablespoonful may be added and two tablespoonfuls of suet pudding as an alternative to the milk pudding.

Diet 18 months to 2 years. (Based on Dr. E. Pritchard's Tables.)

Breakfast.	Dinner.	Tea-time.	Supper.
Milk 6 to 8 ozs.	Fish 1 to 1½ oz., or mutton, chicken, beef ½ to 1 oz. or egg or steamed custard.	Milk 6 ozs.	Broth or vegetable soup or jelly and biscuit or milk and biscuit.
Sugar ½ oz.	Potatoes 1 to 1½ oz.	Sugar ½ oz.	....
Cocoa ½ oz.	Green vegetables 1 oz.	Cocoa ½ oz.	....
Bread, rusk or toast, 1 to 1½ oz.	Rice pudding or suet pudding, treacle, bread.	Rusk, bread, cake.	....
Butter ½ oz., or Dripping Fruit jelly or treacle ½ to ½ oz.	Bread.	Butter ½ oz. Fruit jelly ½ to ½ oz.	....

A small piece of raw apple may be given after each meal. Some fresh fruit should be provided daily.

Diet Sheet 2 to 5. (Based on Dr. E. Pritchard's Tables.)

Breakfast.	Dinner.	Tea-time.	Supper.
Milk 8 to 12 ozs.	Fish 1 to 2 ozs. or meat 1 to 2 ozs. or stew pish-pash. potatoes, vegetables.	Milk 8 to 12 oz.	Milk 6 ozs. or Horlick's malted milk or Benger's food or jelly and biscuit.
Sugar $\frac{1}{2}$ oz.	Milk pudding with stewed fruit or baked apple or suet pudding with treacle or jam or shortbread.	Sugar $\frac{1}{2}$ oz. Cocoa or ovaltine. bread, toast, biscuit, shortbread, butter.	....
Cocoa or ovaltine $\frac{1}{2}$ oz.	Bread.	Fruit jelly, treacle or honey.	....
Bread, butter, jam treacle or honey.			
Egg 1.			
Fresh fruit daily.			

The following vegetables are suitable for young children: Peas, vegetable marrow, boiled cucumber, Jerusalem artichokes, cauliflower, young cabbage or carrots well mashed, onions. Before 18 months, they are best given in the form of strained vegetable broth.

GENERAL PRINCIPLES.

The advance to mixed feeding is one of education, each step must be taken cautiously with due observation of the results. In must be borne in mind that if the child is upset by the too rapid addition of new forms of food, his progress may be delayed for months.

Above all, the child must be instructed in that most important preliminary to digestion, the proper mastication of food. Without this, the teeth cannot be properly cut, the jaw will not develop, and the shape of the face remain immature. Further, there will not be due expansion of the nasal airway, so that any tendency to adenoids may be perpetuated.

Rest after a meal, for a short time, is always desirable, as all the nervous force is required for digestion.

Salt should be added in moderation to all meals, but children should not be allowed to partake immoderately, as many will if permitted.

Eating between meals must never be permitted though water may be allowed and should always be available.

Sugar is perfectly harmless in moderation, but in excess it causes acidity and fermentation, and perverts the appetite. A moderate amount of ripe fruit may always be given with safety to a child over two years of age, but nuts—bananas—dried or preserved fruits (except when stewed) should never be allowed. Tea should not be allowed before the age of five, though the merest drop in the milk can do no harm and will please the child. Alcoholic liquors in any form, except when prescribed as a medicine, should never pass the child's lips.

Among other articles to be avoided may be mentioned: Jams with pips or seeds—coarse oatmeal and fruit having hard fibre, such as pine-apple.

Most children dislike fat and it should not be forced on them as the necessary content of the food is already provided.

Chocolates and sweets in moderation may be allowed immediately after meals, but they should not be given between meals.

CHAPTER IX.

RICKETS.

Rickets is one of the commonest diseases of childhood. In the minds of many mothers it is looked upon as a disease of the bony skeleton, but, it is most necessary for them to understand that its manifestations are manifold and that these manifestations are the outward and visible sign of an inward and invisible disturbance of the general nutrition. It occurs in the children of the rich as well as the poor and may manifest itself as early as the sixth month, but as a rule the child is not brought to the doctor until it is about one year old. Age.

Symptoms.—The first symptom which the mother notices is excessive perspiration, which as a rule is most severe when the child is sleeping. The mother may complain of the child's great restlessness during sleep, and the constant habit of throwing off the bed clothes. The child shows a disinclination to use his limbs and when it is left lying on the bed, or sitting on the floor, it keeps quite still instead of moving about as a normal child should do. When its feet are put to the ground he raises them up and cries instead of trying to stand like a healthy child; the mother may complain of attacks of recurrent diarrhoea with slimy and offensive motions alternating with constipation and a much distended belly. Bronchitis or severe cold attend the eruption of each set of teeth. Occasionally attacks of stridor or blueness associated with spasm of the larynx occur, in other cases there may be a history of twitching or actual convulsions without any definite reasons for their onset.

Physical Signs.—The most striking point about the ricketty child especially that one fed on patent food, is that he is flabby although often fat. The muscles are soft and the skin frequently waxy, the head of the child is square shaped and the fontanelle, that is the aperture at the top of the skull, is larger than normal and may not have closed as it should have done by the eighteenth month. There may be bossing of the forehead and beading of the ribs, the lower jaw may become

angular with the result that the upper and lower sets of teeth at a later date may not oppose. Dentition is almost always delayed and the teeth are apt to come in the wrong order and to appear one by one instead of in pairs as usual, the chest may be deformed and even become pigeon-breasted. Enlargement of tonsils and adenoids is practically always present in a rickety child and these growths as they interfere with the free entrance of air into the bases of the lungs, tend to cause the typical chest deformity so frequently seen in children after the age of three, moreover; as a secondary result of these growths and chest deformity, **colds, bronchitis, anæmia and gastro-intestinal catarrh are extraordinarily frequent.**

The spleen and liver are frequently palpable in these anæmic infants and should the cause of this enlargement not be recognised or understood, it is by no means uncommon to find that they have been treated as cases of malaria or hepatitis on the false assumption that they have a tropical disease. The changes in the bones as a rule consist of enlargement of the epiphyseal ends, most frequently at the end of the radius. Bending of the back (kyphosis) or later, lateral curvature may occur; on the other hand, bow legs or knock knee or flat foot are much more frequently seen.

Marked flat foot is possibly the commonest stigma in the rickety European child; this is due to laxity of the foot ligaments and weakness of the leg muscles. Rickets in one or more of its manifestations, is extremely frequent in the European and Anglo-Indian community and with the spread of patent food feeding instead of natural or cow and goat feeding, is tending to become more and more common amongst Indian communities in the big cities, **for unintelligent use of patent and proprietary milk food is the most prevalent cause of rickets.**

It must be borne in mind that although rickets itself is not a fatal malady, its presence may prove a dangerous complication in cases of respiratory disease. In the tropics any disease which undermines the general constitution is a matter of great seriousness; for an attack of malaria or dysentery which might be easily thrown off in a healthy child, may prove fatal in an infant anæmic, flat-chested and pot-bellied.

Causation of Rickets.—The factors which govern the onset of rickets are (1) Ill-health of the mother during pregnancy. In the tropics anæmia, fever or inability to digest and assimilate that food which is necessary for her own vitality and that of the foetus within her, are frequent causes. (2) Unfavourable home conditions such as want of sunshine and fresh air. Such a statement as this might appear absurd in India, but it is no uncommon thing for the children of the wealthier classes of every community in India to be kept indoors with all the light and heat shut out for the greater part of the day. **Sunlight is essential to the healthy nutrition of growing animals**, deficiency of it is the most important element in the causation of rickets. (3) Defective diet or dietetic errors and as a result digestive derangement are all important. Experience shows that the defects in the diet most often associated with rickets are a lack of animal fat, too little protein and an excessive amount of farinaceous food together with a shortage of fat-soluble vitamin A and D. Fat-soluble A is now known to influence the growth of a developing animal and D to prevent rickets. The latter is referred to as the anti-rachitic vitamin and is present in Cod-liver oil. Cod-liver oil has the power of increasing the retention values of calcium and phosphorus in the human body.

The influence of sunlight and ultra-violet rays is of great importance, they cause deposition of lime salts in bone and restore the normal phosphorus. This is done by stimulation of the cholesterol which is contained in the epidermal layers of the skin.

Prophylactic Treatment.—(1) Maintenance of the mother's health and efficiency during pregnancy and lactation. The diet for the pregnant mother with or without the addition of Parrish's food and Cod-liver oil, has already been given in Chapter III. (2) The encouragement of breast-feeding, and if this is not possible, of natural cow's or goat's milk. (3) The improvement of hygienic conditions; in India, the room should be airy and clean and the child should be permitted to be out of doors till 9 or 10 a.m. and after 3 till sunset. (4) The prevention and cure of chest and bowel troubles. For instance, tonsils and adenoids should be enucleated; dyspeptic conditions due to faulty

diet should be eliminated; especial care should be taken to ensure rapid and complete convalescence after such diseases as whooping cough and measles or acute dysentery. (5) Regulation of the diet so that the child may receive those elements which as we have stated above are essential to the prevention of rickets. In India all milk has to be boiled with a result that some of the vitamin A and D are destroyed. For this reason Cod-liver oil in a 50 per cent. emulsion is an absolute necessity if the child cannot be breast-fed for six to nine months.

(1) **Curative Treatment.** Fresh air and sunshine are an absolute necessity.

(2) *Attention to the digestion.* **Before making any great change in the diet, or giving tonics, it is most advisable to consider the state of the digestion, the tongue, the stools and abdomen.** A mistake is made by mothers and doctors by giving Cod-liver oil, or iron in the form of Parrish's food or altering the diet **when the tongue is furred and the stools are wrong.** A short course of soda with rhubarb or nux vomica and gentian such as the old-fashioned red mixture, will often so strengthen the digestive power as greatly to enhance the efficiency of the dietetic treatment. A few doses of grey powder half to one grain, with bicarbonate of soda five grains at bed time for a week, will often facilitate the assimilation of the increased fat in the food.

Under no circumstances should Cod-liver oil or cream or the yolk of egg be given if there is a tendency to diarrhoea or vomiting. One of the difficulties in the tropics of treating the European child with rickets is that in the plains during the hot months, it is impossible to give Cod-liver oil, and oftentimes yolk of egg, without setting up digestive complications. In such a case, if rickets is severe, these children must be sent to a hill station in a cold climate over 5,000 feet, where there will be none of these difficulties, provided the child is able to be out of doors most of the day.

(3) **The Diet.** The mother should see that the meals are reasonable in amount and digestibility and that they

contain an adequate proportion of fat and animal protein in easily assimilable form and no excess of carbohydrate. **Goat's milk is easily procurable and if two of these animals can be kept in the compound and fed properly, this is an ideal way of feeding these children when the cow's milk supply is indifferent** or open to criticism, for it should be remembered that the milk of cows grazing on dried stubble of the fields in the plains of India contains far less vitamins A and D than those fed on green grass. **A useful rule** to remember is that a child requires up to the age of 18 months a minimum of one and three-fourth ounces of milk per pound weight per day and a maximum of two and a half ounces per pound weight. When a child is unable to digest the full amount of cow's or goat's milk, the addition of raw meat juice either alone or to a bottle is often useful. To make this raw meat juice is not difficult or risky. Take half a pound of rump steak or mutton chop and over a stove, brown each side, then with a sharp knife cut off the brown outer coverings, the meat inside will be reddish blue, slice with a sharp knife and then with fork or spoon, squeeze the meat juice on a warm plate. To this meat juice add a pinch of salt or fine bread crumb,—children take it readily. When the child is old enough, butter and mutton dripping may be given, yolk of egg either beaten up with milk or given with bread crumbs is an excellent addition to the food. Cream, if obtainable, is useful, one teaspoonful of 50 per cent. Cod-liver oil emulsion such as the Crookes' Collosol form should be given two or three times a day if possible. The mother should be warned against giving excessive amounts of bread, potatoes or other starchy foods as they upset the digestion and cause fermentation with distension of the belly. Oat flour or well boiled oatmeal porridge and whole meal dry or baked brown bread are probably the best forms of farinaceous food. Remember that proprietary infant food despite all advertisement propaganda have the great disadvantage that during their mode of preparation the vitamins A and D are to a very great extent destroyed.

Tonics in the form of iron are not as a rule well tolerated, organic iron, calcium and iodine are present in many fruits and vegetables, and therefore, it is well that the mother should recognise this fact. Apples, apricots, pears, prunes and pomegranates, carrots, cabbage, celery,

tomatoes, spinach, mangoes, oranges and grapes all contain these mineral salts and all are obtainable in India at no great cost.

(4) Treatment of Symptoms and Complications.

The mother should understand that those symptoms which may be causing her anxiety such as sweating, sleeplessness, restlessness, digestive symptoms, loss of appetite, constipation, bronchial catarrh and convulsions, are all rapidly and permanently improved directly, thorough anti-rachitic treatment is carried out, though of course special measures may be necessary for the respiratory, bowel and cerebral disorders which she will find under their respective sections in this book.

(5) Prevention and Relief of Deformities.

Cold douching and daily massage to the muscles of the back and the limbs is most beneficial, sun-baths or ultra-violet ray baths under medical direction are excellent. If the back is weak, do not allow the child to sit up for long nor permit the nurse to carry him always on the same arm; if the legs are knock kneed, tender, or the bone soft, do not permit him to stand supported or unsupported for long, and if the condition is severe, it is best to apply lateral splints reaching from the pelvis to four inches below the sole in order to prevent standing altogether. Ricketty deformities of the chest tend to lessen as the child grows older and stronger but, should tonsils and adenoids be present, it is imperative that they should be removed. Breathing and physical exercises are important for correcting chest deformities. If there is a tendency to flat foot, it is best to wear "crooked" boots, that is the whole inner side of the boot including the heel, is raised a quarter to one third of an inch tapering gradually to the middle of the sole. Tip toe exercises and skipping are also useful.

SCURVY RICKETS.

Scurvy Rickets is a deficiency disease due to want of the water soluble Vitamin C in the diet, and is characterised by tenderness of the bones, blood effusions into the gums or palate or joints or under the periosteum of the long bones. Sometimes, there is a tendency to bleeding from various organs, most commonly the kidneys. A common history in scurvy is that the mother

Symptoms.

was unable to suckle her baby and cow's milk was substituted but did not agree. A patent food or condensed milk was tried and on this the child thrived for eight or ten months, when the characteristic symptoms of the disease appeared. **Fully sterilised milk if given over a lengthy period may cause infantile scurvy, but the continuous use of patent food without the addition of fresh fruit juice to the diet, is a far more potent factor.** We have seen a considerable number of these cases brought from outlying stations, where fresh vegetables and fruit juices have not been procurable or had not been given either from prejudice or ignorance. These cases have all been seen in the hot months but for them there is little excuse, for mangoes are always procurable during those months in every station in India, and the juice of a mango is a most excellent anti-scorbutic. In some of these cases the gums are swollen, soft, purple or hæmorrhagic; in others, the mother has complained that **her child screamed when lifted** due to hæmorrhage under the bones or into the muscles. In some, the mother has told us that her baby bruised at the least touch; in others, that the child was passing blood in the urine; in some, there has been a history of profuse nose bleeding; in one or two cases, the mother has thought that her child had suddenly developed paralysis owing to the inability from pain, to raise its arm or leg; in all, the children have been anæmic with a sallow earthy complexion. **There should be no difficulty in making a diagnosis** in these cases and it is all important to recognise them for, if the correct treatment is adopted, a cure may be expected within a few days. If possible, fresh raw milk should be given and half an ounce of orange, or grape or lemon juice given three times a day or a teaspoonful of mango juice every two hours. If these are not procurable, a potato should be baked in its skin and the mealy portion on the surface rubbed up thoroughly with enough milk to give it the consistency of cream, two teaspoonfuls given three times a day. Another method is to grate a fresh turnip, the pulp is then folded in muslin and the juice squeezed out with the fingers into an egg cup, is given in the quantity of one teaspoonful every three hours. **Once the symptoms have disappeared, it will be necessary to correct the diet as stated above in the case of rickets, in order to render the child healthy.**

SYMPTOMS AND TREATMENT OF SOME COMMON FORMS OF VITAMIN DEFICIENCY.

Shortage of Vitamin A causes:—	Shortage of Vitamin B causes:—	Shortage of Vitamin C causes:—
<p>(1) Cessation of growth, or wasting.</p> <p>(2) Reduced resistance to infectious diseases, especially lung or gland infections.</p> <p>(3) Failure in the development of bone and teeth, e.g., rickets.</p> <p>(4) Anæmia.</p> <p>(5) Corneal affections. Delayed puberty.</p>	<p>(1) Loss of appetite or depraved appetite.</p> <p>(2) Gastro-intestinal derangements, indigestion, constipation, colitis and worms.</p> <p>(3) Loss of weight, weakness and lack of vigour.</p> <p>(4) Headache, anæmia and unhealthy skin.</p> <p>(5) Nervous and cardio - vascular depression.</p> <p>(6) Œdema.</p> <p>(7) Marasmus.</p>	<p>(1) Sallowiness.</p> <p>(2) Loss of energy.</p> <p>(3) Fleeting pain in the limbs and joints in adults.</p> <p>(4) Growing pains in children.</p> <p>(5) Scurvy rickets.</p>
<p>Shortage of Vitamin A may be guarded against by partaking of the following substances:—</p>	<p>Shortage of Vitamin B may be guarded against by partaking of the following substances:—</p>	<p>Shortage of Vitamin C may be guarded against by partaking of the following substances:—</p>
<p>Mother's milk.</p>	<p>Whole-meal or brown bread.</p>	<p>Fresh fruit such as oranges, grapes, lemons, tomatoes, etc.</p>
<p>Home-made butter.</p>	<p>Peas, beans, brinjal, ladies fingers, etc.</p>	<p>Raw green vegetables, specially salads, celery, radish, onions.</p>
<p>Fresh egg yolk.</p>	<p>Fresh egg yolk.</p>	<p>Cooked green vegetables, especially spinach, cabbage, potatoes, turnips, etc. (if they are not cooked more than 15 minutes and no alkaline is added.)</p>

Shortage of Vitamin A may be guarded against by partaking of the following substances :—

Green vegetables.
Underdone meat.
Fresh (fat), fish, e.g.,
hilsa.
Cheese.

Sweetbread, kidney,
liver and heart.
Beef and mutton fat.
Fresh cow's or goat's
milk.
Cod-liver oil.
Fish, game, snipe,
pigeon, duck.
Fish, roe
Oysters
Shrimps

Shortage of Vitamin B may be guarded against by partaking of the following substances :—

Liver, heart, kidney.
Sweetbread, brains.
Nuts and fresh fruits.
Yeast (remember yeast
extract which we call
marmite.)
Porridge.
Maize.
Chapati.
Corn cobs
Bemax.

CHAPTER X. ON VACCINATION.

Centuries ago, small-pox had become a "naturalised plague" in England. In 1796 (the year of the introduction of vaccination), the deaths by small-pox exceeded 18 per cent. of the total deaths; about 1 to 4 of those attacked died, and more than half the blind people owed their privation to small-pox.

Inoculation has been practised by the Hindoos from a remote period. About 1717, Lady Wortley Montague, the wife of the British Ambassador at Constantinople, had her son inoculated, and through her instrumentality the operation was introduced into England. "Then followed, under the sanction of the Royal Society, six condemned criminals; next five pauper children of St. James's; then the children of a few families of distinction; and to crown all, their Majesties, acting on the cautious advice of Sir Hans Sloane, had all the royal children submitted to the operation." (Guy.) A greatly lessened mortality followed the introduction of inoculation.

On May 17th, 1749, the immortal Jenner was born, and it was he who in 1796 discovered vaccination, which is an operation whereby "the matter which forms on the udder and teats of the milch cow is introduced into the human body; only local effects ensue, with slight feverishness; the trifling affection is not infectious; it prevents the occurrence of small-pox in the great majority of cases, and when it does not prevent an attack, it mitigates its severity as certainly as does a previous attack of small-pox." (Guy.)

For the 10 years ending 1770, small-pox caused 108 deaths out of 1,000 deaths from all causes, and for 10 years ending 1860, it caused 11 per 1,000. In Berlin, before vaccination was introduced, 3,422 per million of the population died of small-pox; since vaccination 176 so die. "Recent facts at Leicester," says the *Lancet* "are appalling in their simplicity." Of 281 cases of small-pox, 126 were unvaccinated; of these 126 no less

than 83 were under 10 years of age, and in 9 of these the disease was fatal, whereas there was no instance of small-pox occurring in a vaccinated child under 10 years of age, and of the cases occurring in vaccinated persons there were no deaths.

The powers of vaccination, like those of a previous attack of small-pox, are not absolutely unlimited. A second attack after the lapse of years is possible, though improbable; and when it does come, it is usually "modified" or comparatively trivial, seldom bringing danger. **If a person be vaccinated or revaccinated within three days after exposure to the infection of small-pox, the protective power of the vaccination will be exerted,** and the person so exposed will most probably escape the disease entirely, because the incubation period of small-pox being twelve days, and that of vaccinia being only eight days, the latter is in time to anticipate the former.

Vaccination, however, like everything else, requires to be done well to be efficient. An operation may be performed which conveys no immunity from small-pox and a parent may rest in a false hope that his child is safe. Again, an operation may convey only partial protection. It therefore becomes us to enquire into the proper mode of operating and the means by which we can judge of success or failure.

Until within recent years, it was a common practice in districts for inoculation to be carried out from child to child. This is now, however, a method to be deprecated, as though the chances of inoculating a child with a severe constitutional disease are rare, it is in no wise justifiable when lymph can be so easily procured from any district hospital; indeed, all that is necessary is that application should be made to the civil surgeon or vaccination officer of the district, who will send by post a few hermetically sealed tubes containing lymph. The skin should be first cleansed by rubbing it for a few minutes with a perfectly clean piece of linen or lint soaked in "only" boiled water. The site usually chosen for inoculation is either the upper arm or the inner side of the calf of the leg, if the infant be a girl. When required, the ends are to be broken off with a fold of lint and 3 drops of the contents urged out upon the stretched,

skin in 3 places. Then, with a clean, new sterilised needle scratch the skin through the fluid thus



and repeat the process in two other neighbouring places. If possible, avoid drawing actual blood, allow the site of scarification to dry and cover lightly with gauze with tape at the corners.

Glycerinated calf lymph is now preferred, because it is free from the very small risk of conveying any infection that may attach to the arm-to-arm method, through carelessness; and the writers recommend its adoption when possible.

**When to
vaccinate.**

A child should be vaccinated within the first six months of its life, if it be in good health—delay represents unjustifiable risk; in fact, it may be performed when three days old with advantage. There is, however, one important point for the mother and doctor to bear in mind, and that is, **do not vaccinate if there is any rash or if there are boils on the skin.** The weather in India presents a difficulty at times, but not nearly so great as is imagined; the operation may be done at all seasons. **If small-pox prevails in the neighbourhood, no age is too early and no state of health, except of a very serious or acute character, nor of weather, should prevent vaccination.**

The number of punctures made is a matter of great importance. Let all mothers bear in mind these two facts:—First, that in proportion to the number of vesicles which appear in response to the operation, is the general feverishness and disturbance less; and secondly, that in the same proportion is the amount of protection gained. The Medical Officer to the Privy Council reported as follows:—

Case of Small-pox	Deaths in every 100 cases which occurred.
Unvaccinated	35
Said to have been vaccinated—no marks	23·57
Having one mark	7·73
" two marks	4·70
" three "	1·95
" four "	0·55

How are we to know that the vaccination has *Vaccinia* "taken," that is, that it is successful? By the character of the vesicle. On the second or third day there will be seen a slightly red elevation over each puncture, which is so distinct as to enable us to say that the case is a successful one. On the fifth day there will be a raised round bleb, with a depressed centre; on the eighth day it is much larger, of a whitish pearl-colour, and distended with lymph,—around the whole, an inflamed blush. After this period the vesicle scab becomes brown and hard; and about the twentieth day the scab falls off, leaving behind the vaccine "mark," which remains more or less permanent throughout life.

As the protective influence of vaccination gradually wears out in time—earlier in some individuals than in others—revaccination should be performed at puberty or better at about 10 years of age. Revaccination should be performed if it has not been successful previously on any particular exposure to infection. .

If there is no sign of a vesicle in 10 or 12 days after the first vaccination, the small operation should be repeated.

There is a certain amount of constitutional disturbance in every case of successful vaccination, but **the younger the baby, usually the less it is.** Symptoms are rarely severe for more than 3 days, unless there is great or unusual inflammation of the arm.

A constant wet dressing of boric acid or the application of equal parts of zinc and sterile castor-oil will be found most soothing, if there is great irritation or swelling.

CHAPTER XI.

GENERAL HYGIENE AND CERTAIN MORBID HABITS.

The general care and upbringing of the child presents more difficulties in India than in England; not only is the child surrounded by conditions of atmosphere, feeding and temperature which diverge largely from those natural to him by inheritance, but also he has to be guarded against diseases which, owing to poor sanitation, climate and the prevalence of insect pests, present a more constant menace than can be experienced in more temperate climes.

Clothing.

The problem of suitable clothing for infants and young children in the tropics is by no means easily solved; on the one hand, there is the risk of overburdening the child to its consequent discomfort and lack of vigour; on the other, there is, in the climate of India, with its constant changes, the danger of chill. In temperate climates all measures are taken with the object of keeping the body warm, and for this purpose woollen materials, being the worst conductors of heat, are chosen for the more important garments. In India, however, during the greater part of the year, opposite conditions prevail, the object becomes therefore rather to discourage the retention of heat and to offer no obstruction to the evaporation of perspiration, the process by which the excess of heat in the body is dissipated. In the choice of materials for the hot weather, we shall avoid those which take up perspiration and in doing so become sodden, notably woollen garments and make use of lighter materials, linen or cotton, which are less irritating to the moist skin and are capable of taking up the perspiration quickly and at the same time, allowing it to evaporate. Perhaps the most suitable garments are those woven in cellular form, which are absorbent and allow free ventilation. Such clothes must be loose, particularly round the neck.

Danger of Chill.

At the same time, there is the danger of chill; the sun goes down, an evening breeze rises, or the child is exposed to the draught of the punkah, which causes a rapid evaporation of perspiration-soaked garments and

an excessive chilling of the skin. The overloading of the child with heavy garments during the heat of the day or during active exercise will not guard against this danger, rather will it be increased; the safe course lies in the provision of **loose light clothes which can be supplemented by additional garments of warmer material, as the alterations of temperature demand or the activities of the child are lessened.** Small babies perhaps more than older children suffer from over-clothing in the heat; long clothing is not to be recommended after the first few days, rather should the legs be left free to move, while the feet are kept warm by socks.

At night, allowance must be made for the abrupt drop of temperature which is almost invariable in the early hours of the morning, **night clothes** are best made in one piece of light flannel or silk and wool, and if the child sleeps under the electric fan, a soft woollen body belt, reaching from the nipple to the hip bone, should be worn in addition.

During the rains, special care is needed, the atmosphere is so saturated with moisture that perspiration remains undried, and the garments become sodden. It is to be remembered that it is in the hot moist atmosphere, when there is little or no cooling by evaporation, that heatstroke occurs.

The climate of India is not, however, invariably hot. In the North in winter, the cold is far more intense than that felt in England. In this connection a word about the so-called process of hardening a child is not out of season. Children who are somewhat debilitated after the rigours of the hot weather will be more sensitive to the cold and require greater protection, and yet, how often one sees children on the coldest days, or in the chill breeze after sundown, with the greater part of the legs and thighs exposed. The practice is often rendered more unreasonable by swathing the body in heavy garments, that is to say, at rough estimate, some three-fifths of the skin surface is overloaded while two-fifths is bare. **Bare-legs.**

The methods of the Indian dhobi are not those of a **Dhobi** sanitary laundry, clothes are not disinfected by boiling, they are washed in open pools or streams, often of doubtful cleanliness. They are stored in unsanitary surroundings, clean and dirty clothes together, often in the hut used as a living place by the dhobi and his family, and are in fact liable to any form of contamination. Mothers should therefore

arrange to have all washing for the children carried out under household supervision.

Exercise.

From birth, the baby requires minor degrees of exercise to enable him to acquire control and use of the muscles and to stimulate respiration, circulation of the blood and all the vital processes of the body. In early days, such exercise is obtained by crying, during the bath and during the handling incidental to nursing and attendance. Later, the baby makes more constant movements of the arms, legs and body, and, after some months, gains control of the limbs to the degree that he can grasp such objects as come within his reach and attract his attention. Such movements should not be hampered by long clothing and after the third month a bright woollen toy or rattle may be suspended within the child's reach, taking care that it is not close enough to the eyes to cause squint, so that he may make efforts to grasp it and so acquire control of the arms and the ability to locate objects.

During the earliest days, it is customary to refrain from lifting the child from the cot except for purposes of feeding and attention or for the relief of discomfort, lest he acquire bad habits and refuse to lie quietly, though even at this stage periodic change from side to side is desirable and the cot is moved about from place to place or the baby is put to sleep in the perambulator out of doors.

Later, at 3 to 4 months, the baby is carried about at regular intervals, so that, by change of position and gentle movements, the circulation of the internal organs and the general muscular development is promoted. The child is held in a sitting position on the nurse's arm, with the back supported by the hand, and frequently changed from side to side, so that there may be no risk of curvature of the spine.

During the stage of crawling, some sort of enclosure or pen is desirable, so that the baby may be confined to that part of the floor which is specially prepared for his reception with clean rugs or mats. Some form of composition rubber flooring is admirably adapted to the baby's use, as, during the early efforts of walking, he will be saved from painful and discouraging falls. **When this stage arrives, the child should not be taught or unduly encouraged;** such exercise before nature has fitted the bones to bear the weight, will do harm and may even produce deformities, particularly in the case of a heavy child; the child will develop the gift for himself as his confidence and desire for exploration grow.

At a later stage, boisterous play is essential to the health, by such play all the muscles are brought into action, the chest is expanded and the body becomes well-shaped. Children who are prevented from making any noise in the house, whose exercise is restricted to routine dreary walks, suffer in health and spirits. They are unable to develop the initiative and joyous outlook on life which is their birthright.

Fatigue in children comes on abruptly and with overwhelming force. The daily walk, up to the age of six years, should always be accompanied by the perambulator.

The daily lessons are commenced at the age of six or seven. Like all new introductions into the child's life, the effect should be watched carefully; there is a tendency to overburden the child in the fear that he may be backward and in the desire to prove an exceptional intelligence, with the result that the child develops a marked distaste for mental exercise. The nervous balance at this age is unstable and must not be overstrained, otherwise permanent impairment of the mental equipment may ensue. Restlessness during the sleeping hours, the development of irritability, or of lack of zest for play, should be taken as indications for the curtailment of lesson hours. Early lessons.

Special care should be taken that **the eyes are not overstrained.**

During the first few weeks of life, the baby should sleep most of the time, that is from 19 to 22 hours out of the 24. After this, the hours of sleep gradually shorten so that towards the age of three months the baby remains contentedly awake for an hour or so at a time. A little later, some part of the 24 hours will be spent in self-education and amusement, but such waking hours must not be prolonged unduly by active entertainment on the part of the nurse or visitors. Sleep.

The following table (Professor Still) shows the average amount of sleep required by the normal healthy child:—

At birth	21 hours.
3 months	19 "
6 "	16 "
1 to 5 years	14 "
5 to 7 "	12 "
7 to 10 "	11 "
rest of childhood	10 "

All children up to the age of seven should sleep for one or two hours during the day, but not immediately before or after a meal. When the climate demands rising and exercise at an early hour, this rule must be extended to older children and provision made for adequate hours of sleep during the day so that the sum total may not fall short of that given in the table. During an Indian hot weather the hours of sleep should be so arranged as not to interfere with the daily outing during the cooler part of the day. All children should be sent to bed early so that they may be up and out betimes in the fresh morning air, but before going out they should take a light breakfast. In the case of delicate children or those disinclined to feed at such an early hour, discretion must be used, as exercise on an empty stomach may prove exhausting.

During the evening outing especially, care should be **taken to prevent chill**, and a woollen wrap be added to the clothing as soon as play is finished or when a cool breeze springs up at sundown.

When possible, children should sleep in upper rooms, these rooms must be well ventilated and the child guarded against mosquitoes or flies, not only at night, **but in the daytime**. The close fitting mosquito-net prevents adequate ventilation, the child is apt to lie with the limbs up against the net and so get bitten. Some form of frame net or miniature mosquito room is to be preferred.

The arrangement of the fan or punkah calls for consideration. While it is undesirable to shield the child from all currents of air which make life tolerable during the hot weather, he should not be exposed in light, probably damp clothing, to the full force of the blast. On the one side, there is the risk of chill; on the other, restlessness, lack of sleep and prickly heat.

Sunlight.

In the hot weather, the European child is, of necessity, confined to the house during the greater part of the day, but when temperature permits, the waking hours should be spent as far as possible on the verandah. There are many parts of India where this is not feasible, the house is shut up, to some extent darkened, and the child is in danger of suffering from want of sunlight and fresh air. **Sunlight is essential to the well being of the child, to the promotion of growth and the prevention of rickets, especially in India where the food is apt to be deficient in growth promoting and antirachitic properties.** At the same

time, exposure to direct sunlight is safe only in the early hours of the morning and in the evening, but much value may be derived from reflected light on the verandah. When exposed to the sun, the child's head and particularly the eyes must be well shaded. Of late years, there has developed an increasing appreciation of the value of open air to even the youngest infants. It has been realised that a slight current of air on the face of the young baby is a direct and essential stimulus to the vital processes. The average healthy infant spends, when weather permits, the day out of doors in some sheltered spot in the perambulator.

The inspection of the open air ward of any institution for infants will convince the doubtful as to the value of this form of management.

The care of the skin is not the least important item in the management of children. The skin in tropical climates is more active in the elimination of waste products and such products must be removed by bathing. Owing to its inevitable moisture, it is apt to become sodden, especially in folds and the continued perspiration gives rise to **prickly heat**, which in its turn may be seriously infected by scratching. Care of Skin.

In hot weather, the child should be bathed twice a day in warm or tepid water, and, if there is much irritation of the skin, sodium bicarbonate in the proportion of one large teaspoonful to a gallon of water may be added to one bath daily. In sickness, it may not be desirable to bathe the child, but the whole body should be thoroughly cleansed by sponging at least once a day.

After the bath, the water should be mopped rather than rubbed off with an absorbent towel and the process of drying be completed by the application of talc powder of a standard brand. Special care should be exercised in the case of fat infants that the skin in the folds or in the napkin area does not become sodden or irritated. As has been said above, **when there is prickly heat, the skin is likely to be infected by scratching**, for this reason it is advised that the tips of the fingers be disinfected with tincture of iodine at bedtime and the nails be kept short.

The causes of sleeplessness in infancy and childhood may be inherent, that is to say, connected with the nervous constitution of the child and in some cases can only be explained by stating that the child is highly strung or that it is Sleeplessness.

the result of a nervous inheritance. Such tendency to disturbed sleep may become manifest very early in life and will be followed later by other signs that the nervous system is delicately balanced. On the other hand, the majority of cases of disturbed sleep will reveal some cause, it may be external, or it may lie in some deviation from the normal state of health.

The majority of young babies will sleep for from six to seven hours consecutively at night, unless disturbed by some accidental cause, such as a wet napkin or flatulence. **If the baby wakes frequently, we first think of the possibility of hunger** and a careful estimate is made of the food taken against the amount required. It is undesirable to encourage the habit of night-feeding, some babies may be pacified by a drink of sweetened water, but it is to be remembered that **rules for the management of infants are made to suit the infants and not the infants to suit the rules.**

Restlessness and sleeplessness of infants again may be the result of incorrect early training, of picking up when the child cries or irregular hours of feeding. There may be digestive or other source of discomfort militating against undisturbed sleep.

Sleeplessness in older children may be induced by discomfort, too many or too few bedclothes, lack of ventilation, excess of heat in the room, or noises slight possibly and insufficient to disturb the average child, but enough to wake the susceptible.

On enquiry there may be found to be errors in the day's routine, commonly there is overfatigue and sleeplessness, only noted after the lessons have begun. Again the child may spend the last waking hours of the day in occupations of too exciting a nature, so that at bedtime he is thoroughly "worked up" and cannot drop off to sleep. The evening meal, if given too late, will cause disturbed sleep and again, the child may sleep so long in the daytime that he becomes wakeful at night.

The child should not go to bed hungry, but be given a light meal unstimulating to the digestion, such as jelly and biscuit or Benger's food. Finally, the cause of sleeplessness may be found in some deviation from health. During teething, partly from discomfort, partly from the increased nervous excitability at that time, sleep is apt to be broken. Indigestion is a potent cause, and

may give rise not only to lack of sleep but to disorders such as night terrors or somnambulism. Other causes are to be found in enlarged tonsils and adenoids which prevent adequate oxygenation of the blood during sleep and force the child to sleep with the mouth open. Prickly heat or other source of irritation, decayed teeth, earache, cough or intestinal worms may also cause the same trouble.

In all acute illness the sleep is broken and it will be necessary to take steps to secure rest by measures promoting the comfort of the child, warm sponging, cool applications to the head and possibly sedative drugs.

In general, the use of **sedative drugs should be confined to those cases in which there is definite evidence of undue nervous excitement**, as in the period of teething, in acute illness or pain. In such cases, a mild sedative such as the following:—Phenazone grs. 1, Sodium bromide grs. 2, Glycerine minims 10, Camphor water to one drachm, one drachm to be given at bedtime will be found useful. In more obstinate cases a combination of chloral and bromide may be effective (*see* prescription No. 39).

Opiates should be reserved for those cases in which there is definite pain, and then given with the greatest caution and **only under expert advice**.

Children not infrequently suffer from nightmare and wake up screaming with fright. The attack generally starts an hour or so after the child has fallen asleep; he starts up apparently half awake, screaming with terror, speaking of imaginary objects or persons and is with difficulty roused to recognise those around him. The attack lasts from a few minutes to one hour and the child then drop off to sleep, waking next morning without any recollection of the occurrence. Night terrors.

Of a somewhat similar nature is the habit of **sleep-walking** or somnambulism, management and treatment are similar in both cases.

Such disorders are encountered in children of nervous tendency or inheritance and will be induced by a variety of causes, many of which, in the less sensitive subject, would not produce such effects.

Of the immediate causes to be investigated, the most prominent are:—**digestive disturbances, intestinal worms, the irritation of undigested matter in the intestine,**

such as may be induced by a diet containing coarse porridge, jams with pips or other substances holding a harsh indigestible remnant, **school strain or nursery strain**. Fortunately, all wise parents have now realised the danger of allowing children to be frightened by injudicious threats, but few of an older generation cannot remember nightmares founded on some terror suggested by the nurse.

Sir James Goodhart has pointed out the frequent association between night terrors and rheumatic pains, a point not to be overlooked in the investigation of the case.

The outlook is good if proper care be taken and the treatment may be summed up as follows:—

1. Strict attention to the diet, the correction of dietetic errors or of indigestion. The last full meal is taken not later than 5 p.m., and only a light supper on the lines suggested on a previous page is taken at bedtime.

2. Thorough ventilation of the bed-room, the provision of a night light, and the nurse sleeping in adjacent room within call.

3. Avoidance of physical and mental strain, or late hours.

Nervous children should be protected from those things which are likely to upset them, unpleasant sights or sounds, dark rooms, alarming stories.

In some cases a few nightly doses of bromides will be of value.

Bedwetting.

In connection with the disorders of sleep, the subject of bedwetting or nocturnal enuresis is not out of place, as the habit is frequently associated with other nervous disorders of sleep, night terrors or somnambulism.

The habit of bedwetting may be a failure to gain that control which should normally be established between the ages of 18 to 24 months, or it may be a loss of control after complete establishment, usually supervening between the ages of five and eight, in the nervous child, as the result of some mental overstrain, or some intestinal irritation, particularly owing to the presence of threadworms. Other cases may be due to increase in acidity of the urine, or from excessive amount of urine, such as may occur from too fluid a diet or the drinking of large quantities of water.

When the urine is perceptibly increased in amount, special investigation should be made as to the presence of Diabetes. Again, rarely bedwetting may be the nocturnal manifestation of an epileptic fit.

The habit is, in many cases, with difficulty controlled, and the response to treatment not uniform, but few cases persist beyond puberty.

It is first and foremost to be remembered that the **condition is associated with the nervous temperament** and that measures of tactful encouragement rather than punishment or repression are necessary. The child should take no fluid late before bedtime and should be taken out of bed once or twice during the night to pass water. On each occasion he should be thoroughly roused so that the act may be wholly voluntary.

If some local cause, such as high acidity of the urine, be found, the effect of doses of sodium bicarbonate, sufficient to render the urine alkaline as tested by litmus paper, may be tried. Threadworms are treated as detailed in Chapter XLII.

Of medicinal treatment, Belladonna has proved most generally useful, but the treatment must be carried out over long periods and the doses required are so high that they can only be administered under expert advice. Children are naturally tolerant to Belladonna, but the tolerance varies with the individual and in India there appears to be a special tendency to the development of a rash. It is therefore advisable, after the age of two, to start with three minims three times a day and increase until some 10 minims of the tincture are taken thrice daily or till some signs of intolerance become manifest.

Good results have been obtained from Ergot, for a child of five years minims 20 of the liquid extract in water thrice daily. For highly nervous children, Bromides as in prescription 9 may be given with advantage.

At the same time, the general health of the child must not be neglected, fresh air, freedom from the strain of lessons, school or overfatigue and a suitable tonic, are indicated.

For those rare cases in which the quantity of urine voided is habitually excessive, tincture of valerian 10 to 15 drops in water thrice daily for a child of four, is likely to prove serviceable.

Masturbation.

Masturbation is a habit not infrequently encountered in early childhood. Before the fifth year the habit is seen more frequently in girls; after that age it is more common in boys. The method usually employed by girls is leg rubbing or friction is made against the edge of a chair, toy, or pillow. Manipulation of the genitals is more common in boys. Such habits are often involuntarily set up in the attempt at relief of some local irritation, in girls vulvitis, in boys a prolonged or adherent foreskin.

It is desirable that parents should be aware of this habit and take prompt steps to check it. Early recognition will save much difficulty in treatment as, once the habit has become well established, it is with difficulty broken.

Treatment consists primarily in removing the exciting cause, be it vulval irritation or adherent foreskin. The question of circumcision must be approached with caution; the total operation exposes the sensitive glans to irritation and may only serve to make matters worse. It is better, when possible to break down adhesions, and should the foreskin be too long or the opening too narrow, a partial removal is performed whereby daily retraction is rendered possible and, at the same time, the sensitive glans is not deprived of its natural protection.

Of medical treatment, Bromide and Belladonna mixture (38) is of value. **Much will depend on the tactful handling of the child by parents or nurses, punishment is of no avail, rather it is a case for reasoning and encouragement; particularly must the idea be discarded that this habit is an indication of moral depravity.** In older children suggestional treatment is likely to be of most value. The child should be assured that if he abstains he will suffer no ills from the past habit and will grow up strong and well. Early rising, exercise with entertainment and companionship are essential. The bowels must be regulated and an iron tonic given if anæmic. The attitude of the parents and nurse must at all costs be firm, instant and unemotional, the least attempt at the act being stopped at once and treated as a breach of good manners. As the act is performed more often in the day, mechanical restraint is not likely to be of great value. When necessary, take great care that any appliance, tapes, belts, etc., do not endanger the life from strangulation.

CHAPTER XII.

THE SPREAD OF DISEASE.

Sanitation and Disinfection.

The contrast between ordered urban life in England and life in India is nowhere more striking than in the matter of sanitation. In England, the health authorities carry out their duties in so precise and automatic a manner that the process is almost imperceptible; not only is there prompt disposal of refuse, there is legislation to secure pure food, the water supply is above reproach and infectious disease is checked and isolated. Every member is compelled to abide by certain laws safeguarding the health of the community. The mother of children will only appreciate such benefits when she arrives in India. It is true that here also there are sanitary laws and gallant efforts to stamp out disease, but these efforts are to some degree frustrated by the ignorance and apathy of a large portion of the community; even in the household there may be servants who cannot or will not understand the ordinary rules of cleanliness and health and who may jeopardise the safety of those whom they otherwise devotedly serve. The housewife, therefore, if she is to guard her children against the diseases which threaten them in India, must constitute herself household sanitary inspector and must be aware of the manner in which disease is carried and of the points at which the surroundings of the child are most open to attack.

The common infectious diseases of children of the order of measles, mumps and chicken-pox appear to be less common in the plains of India during the hot weather, but in the cold weather or in the hills, where children congregate in numbers or in schools, widespread epidemics are by no means an unusual experience and, as is the case in England, an epidemic of one kind of disease is often closely followed by that of another. Scarlet fever stands out as a notable exception, the

disease is so rare in India as to constitute a curiosity when it does occur, but with increased facilities and rapidity of communication between India and Europe, it is possible that epidemics may arise.

In addition, there are other communicable diseases, not necessarily all peculiar to the tropics, but more prevalent and often more severe, which are classed as preventable, a somewhat sanguine term but implying that the diseases are of known origin, cause, and methods of transmission, and that if one of these diseases should occur, it is due to some breakdown of the sanitary precautions which should constitute a safeguard.

All communicable diseases are transmitted by germs, a term sufficiently vague to cover all varieties of organisms immediately instrumental in the production of disease.

Transmission of diseases.

The paths by which these germs leave the body of the sick person and are conveyed to the body of the fresh subject are varied and depend partly on the nature and situation of the disease and partly on the nature of the germ.

The germ leaves the body of the infected person either by some discharge, it may be mucus from the nose, throat or lungs, expelled by breathing, coughing or sneezing; it may be the discharge from an open wound, or it may be in particles shed from a skin eruption as in small-pox and chicken-pox. Again, in those diseases affecting the bowels, germs will be discharged from the body with the fæces and often with the urine; particularly is this the case with water-borne diseases of which cholera, typhoid fever and dysentery may be taken as examples. Yet again, the germ may be circulating in the blood and be removed therefrom by biting insects.

The portal of entry into the new subject varies according to the species of the disease. Germs may be inspired and find lodgment in the nose, throat, or air passages; they may be swallowed with food or they may be conveyed to the broken surface of the skin by soiled fingers, flies or in dust. Lastly, germs may be introduced into the circulation by biting insects.

The paths by which each disease is conveyed from the sick to the healthy are described in detail in the appropriate chapters; it will therefore suffice to give some general account of the chief methods of infection, so that measures of sanitation and protection may be directed with a clear understanding of the objects in view.

AIR-BORNE DISEASES.

Examples of this group are seen in those diseases which are contracted through close association with the sick. The common infectious diseases of children are, without exception, carried in this way, though, as said above, there may be other paths. The dust-laden atmosphere of large towns is particularly liable to contain the germs of disease, of which especially to be mentioned is tuberculosis.

WATER-BORNE DISEASES.

This group, especially important in the tropics where the water-supply is frequently contaminated, includes such diseases as **cholera, dysentery and typhoid fever**. Water, therefore, not only for drinking purposes, but also that used for washing all food vessels, should be the subject of the closest scrutiny. **Water should invariably be boiled**, filtering only may prove an added source of danger, as the filter, if not properly cared for and frequently sterilised, may prove a fertile breeding ground for germs. During times of epidemics, all water used for washing dishes and preferably that for the bath, should have added to it potassium permanganate sufficient to turn it a faint pink.

A few words may be added as to the care of the **Wells**. water-supply if it is obtained from wells and not from stand-pipes. The well should have a sound protecting wall and concrete platform; no animals should be allowed in the vicinity and servants should be forbidden to mount or do any washing on the plinth.

The well cover should be mosquito-proof and all unused wells in the compound should be filled in or sealed so that they may not become breeding places for mosquitoes.

The well, from which the household supply is drawn, will require periodic cleaning and care should be taken that the lining is sound enough to exclude surface water.

FOOD-BORNE DISEASES.

The food may become infected in several ways, by handling with dirty fingers, by flies, by exposure to dust and dirt, by washing in impure water or the food itself may be actually diseased. Food, sterilised by cooking, may become reinfected by exposure to dirt, dust and flies.

The management of certain foods demands special mention.

Milk.

Milk, owing to its properties as a culture medium for the majority of germs, possesses the undesirable quality of transforming what may originally be a low bacterial contamination into a very high one in the course of a few hours. Further, in the course of collection it is liable to contamination at many points, all of which will require special attention if the milk is to be kept up to the necessary standard of purity. The udders of the cow may be diseased or dirty, contamination may come from the hands of the milkman, from hair or particles of dirt falling into the pail from the coat of the cow, from the ill-kept cow-house and from unscoured pails. All vessels used in transport should be scoured with boiling water immediately before and after use, and should be provided with an air-tight lid and lock. **All milk must be sterilised**, bazaar milk is inadmissible for the nursery. Where there is no dairy under responsible supervision, we must rely on the home-fed cow, kept under strictly hygienic conditions (*see* also Chapter VII).

Meat.

Three points are of special importance, firstly, that meat must be guarded against contamination by flies which alight indiscriminately on filth and food; secondly, that even cooked meat is liable to rapid putrefaction, and that the products of such putrefaction may produce ptomaine poisoning; and thirdly, that meat, especially pork and beef, may contain the living larval form of tapeworm.

Vegetables.

Uncooked vegetables are unsafe unless grown on the premises and under supervision. Often they are

watered with sewage water or the soil is fertilised with animal manure. Further, they may be soiled with the excreta of domestic animals and so convey intestinal worms.

Certain fruits such as oranges and bananas are **Fruits.** supplied by nature with an impenetrable envelope, so that the contents remain sterile. The envelope should be thoroughly washed before removal. Thin-skinned fruits from an unknown source are best avoided.

No article of food, intended for use uncooked, which has been exposed for sale in the bazaar, should be admitted to the nursery. Such articles as sugar should be purchased in sealed bags.

A brief inspection of the average bazaar will convince the purchaser of the desirability of this precaution.

INSECT-BORNE DISEASES.

The two insects which we regard specially as natural enemies are the **fly and the mosquito**; the former is, perhaps, responsible for more disease than any other agent in that it **establishes direct communication between every form of filth and disease and the body or food of the healthy.** Particularly active is the fly in the propagation of such diseases as **typhoid fever, dysentery, summer diarrhoea or cholera.**

The mosquito is familiar to all as conveying malaria and dengue and may be responsible for certain forms of blood-poisoning.

The study of tropical disease has revealed the part **Carriers.** played by insects in the conveyance of many other forms of disease. Infectious disease may be carried by inanimate objects which have been used by the sick, in the clothing of the attendant or by carriers, that is, healthy persons, themselves immune or recently recovered, who still harbour active disease germs. Special reference to carriers is made in the chapters on Diphtheria, Typhoid and Dysentery. The practical application lies in the examination of all persons who have suffered recently from diseases of the typhoid group, from diphtheria or from dysentery, to ensure that they are free from infection.

A special word on the subject of tuberculosis, to **Tuber-** which children after the age of one year are especially **culosis.**

susceptible. The susceptibility is increased by unhygienic surroundings, overcrowding, lack of air and sunlight, and impaired health from any cause, but particularly if induced by measles or whooping-cough.

The child is open to infection by bacilli either from cattle tuberculosis, which being discharged from the diseased udder into the milk, are swallowed, or from human tuberculosis, by contact with those infected, by inspiring dust containing the bacilli or by swallowing food similarly contaminated. The campaign against spitting in public places, instituted at Home, should do much to reduce the incidence of this disease.

In view of the susceptibility of young children, they **must be safeguarded against infection**, cattle must be the subject of frequent inspection for signs of disease, milk must be sterilised and the child rigidly excluded from contact with persons known to be the subject of tuberculosis.

Though the disease is rife among the Indian population of large towns, it is rare in European children, owing to better sanitary conditions and an appreciation of the necessity for free ventilation and light.

It now remains to mention a few special points in connection with the sanitation of the house.

Kitchen.

The kitchen should be near the house, it should be well ventilated and provided with fly-proof doors and windows. The floor, of sound cement, is washed down daily. The walls should be whitewashed at intervals, the shelves scrubbed and, if paper covered, the paper should be renewed every few days. The cooking pots must, of course, be clean and free from grease; aluminium utensils are to be preferred to brass, which require retinning at frequent intervals. The kitchen table must be scoured daily with boiling water and special attention should be paid to the chopping board, which requires replaning as soon as it becomes cut up.

The cook's clothing must be clean and a cupboard for the reception of his outdoor clothes supplied. A basin and soap should be supplied for his hands and there should be no lack of clean dusters. The surroundings of the kitchen will also call for inspection. The sullage water drain must be accurately placed so that

it leads into a suitable receptacle without soiling the ground, this receptacle being cleared regularly and no overflow allowed. Flies tend to swarm round these receptacles unless they are well tarred and supplied with a properly fitting lid.

Finally, the cook should be discouraged from accumulating old tins and receptacles on the shelf and from keeping flavouring essences or other condiments in bottles of doubtful cleanliness and with ill-fitting corks.

Verandahs should be kept clear of vegetation, and creepers should not be allowed to overgrow and shut out light and air or form a refuge for mosquitoes. **Vegetation.**

The bath-room floor should be well cemented; the drainage vent, guarded with fine wire net, should communicate with a well-constructed drain and not pour into a soakage pit, which will soon be rendered foul and impermeable to drainage by soap-suds. The ceiling is often dark, with many crannies affording harbour to mosquitoes. If this is so, the roof may, with advantage, be sprayed daily with some such preparation as Flit. Every bath-room should be furnished with a bottle of cresol or similar disinfectant. **Bath-room.**

The servants' quarters should not be too near the house. They not infrequently constitute the one menace in the otherwise perfectly ordered household. They are dirty within and the surrounding ground is littered with refuse. A strict watch should be kept on the number of the inhabitants of the godowns. It is desirable that house servants should reside within the compound, and they must be allowed to keep their families with them, but it is not necessary to accommodate all their relations. This point becomes of especial importance during the time of epidemic or the householder may find herself acting host to refugees from a stricken area. No servant or member of his family should be allowed to lie sick in the quarters; he should be sent to hospital and, if suffering from an infectious disease, not permitted to return till certified as free from infection. **Servants' quarters.**

Reference has been made to the dhobi, in the previous chapter, in connection with the clothing of children. A well-constructed dhobi ghat is a valuable adjunct to the compound.

In the early and late rains, the compound should be inspected with regard to the drainage of rain-water. No standing water should be allowed to form a breeding place for mosquitoes.

DISINFECTION.

During the progress and at the termination of an infectious case, measures must be taken firstly, to ensure that living germs of the disease do not leave the sick-room and secondly, that all trace of infection is removed from the room, clothing, books and utensils employed by the patient.

Sick-room.

1. The preparation of the room and contents for disinfection (Bentley). All openings should be closed, excepting the door. If there are any cracks, open spaces, key-holes, etc., they should be pasted over with strips of paper. Clothing, bed-covers, etc., should be removed from the bed and hung on ropes stretched across the room; mattresses and pillows should be opened up and the contents exposed. All chests, trunks, drawers and almirahs should be opened and the contents spread about the floor. As soon as the disinfectant is placed in the room, the door should be closed and any cracks or openings round it, promptly sealed.

Disinfectant to be used: sulphur or formalin.

After fumigation, the woodwork should be washed down with soap and water, walls rewhitewashed and the room aired for several days.

Clothing.

2. The disinfection of clothing. Clothing may be boiled having been first steeped in solution of perchloride of mercury 1-1,000, lysol or formalin, or may be subjected to dry heat in an apparatus specially constructed for that purpose.

Plates, cups, spoons and other feeding utensils are best treated by boiling for 15 minutes.

Bedding, pillows and mattresses are best treated in a dry heat disinfector, but failing this should be opened up and soaked for some hours in a disinfectant solution, or thoroughly fumigated.

Disinfection of Excreta.

All excreta of the patient or stuffs soiled by excreta should be treated with raw phenyle or cresol for one

hour before leaving the sick-room or being thrown down the water closet.

DISINFECTANTS.

1. Carbolic acid, cresol, phenyle and lysol. Used in strong solution for the disinfection of excreta, bed-pans, etc. In weaker solution for disinfection of linen and other articles. Carbolic acid 1-100 or lysol 1 drachm to the pint may be used for washing the hands.

2. Chloride of lime (Bleaching powder). Powerful disinfectant but loses its virtues if allowed to get damp. May be used in solution of 3 ozs. to a gallon for utensils, sinks, etc. Is best not used for delicate fabrics.

3. Permanganate of potash. Enough of the crystals should be used to turn the water a deep pink, the solution is only of use so long as this colour remains. It may be used for soaking feeding utensils in the sick-room.

4. Sulphur. For the fumigation of unoccupied **Fumigation.** rooms, bedding, the contents of mattresses and pillows and heavy woollen goods. The fumes will damage any metal.

The room is prepared as stated above. Sulphur may be obtained in specially prepared candles ready for use or it may be used as follows:—Place the sulphur in a tin or iron dish large enough to hold it all when melted; place the dish on a brick or other support in an iron pail or common earthenware pan. Pour some water into the bottom of the pan to receive any melted sulphur which may run over. The sulphur is then ignited by adding a little glowing charcoal, the door closed and the room left for some eight hours. Care must be taken to employ sufficient sulphur (1 lb. to each 1,000 cubic feet of space).

5. Formalin. The 40 per cent. solution may be employed over a vaporizing lamp or the solution sprayed on sheets hung across the room.

The 10 per cent. solution may be employed for soaking infected linen, etc. This solution will damage leather, furs or skins.

6. Perchloride of mercury.

As disinfectant for clothes and utensils, 1-500 or 1-1000. As hand lotion or for bathing the patient at the end of infectious disease, 1-10,000. Highly poisonous.

N. B.—Carbolic acid and sulphurous acid gas may be used together, but neither should be used with potassium permanganate, chlorine gas or the chlorides (as chloride of lime). **All disinfectants should be regarded as poisonous.**

CHAPTER XIII.

EXAMINATION OF SICK CHILDREN.

The infant or young child is incapable of rendering any voluntary aid to those concerned in the maintenance of his health or in the investigation of his illness, but will nevertheless present a fairly clear picture, if all changes from the normal habits, progress and demeanour are closely and accurately observed. The habits of the infant are so simple and regular that any deviation from the normal should not pass unnoticed. On the contrary, by the correct conduct of these habits, functions and by the steady maintenance of progress, he announces the fact that he is healthy.

Of prime importance is it that the minor departures from health should be noted early; that such conditions as indigestion should not be allowed to go on until the attention is forcibly fixed by a sudden climax, the onset of diarrhoea, vomiting and fever, which is wrongly attributed to some souring of the milk or some illness contracted within the last day or two. The commoner digestive and nutritional disorders of infants and children are of insidious onset, and though they give rise to definite signs, such signs are not infrequently overlooked.

The signs to be noted may be termed negative and positive, the negative being the cessation or interruption of progress, function or habit, that is to say, failure to gain weight, to maintain the ordinary standard of progress, loss of appetite, irregularity of the action of the bowels and sleeplessness. The positive signs are numerous, the appearance is altered, the face changes colour, is pale, flushed, there are dark rings under the eyes or round the mouth; crying may be more frequent or changed in character, the child may be restless or somnolent or some special symptom or group of symptoms such as cough, breathlessness, fever or vomiting, may lead the mother to realise that all is not well.

Once this fact is suspected or established, the most minute examination and enquiry is instituted. Much information must be received from the mother, on the accuracy of whose observation much depends; the mother has the full confidence of the child and his demeanour will not be altered by shyness or fear as it may be in the unaccustomed presence of the physician. It may be that some symptom or group of symptoms has attracted attention or it may be that the normal functions are interrupted: whatever the manner in which the child has revealed his illness, a full investigation is essential. **The child must be considered as a whole, functionally and physically,** lest the attention is unduly fixed on some more prominent symptom and the underlying cause overlooked. In young children, the effect is often curiously unsuggestive of the cause, as for example, bronchitis may be due to gastro-intestinal disorder; gastro-intestinal disorder due to nasal catarrh; headache and abdominal pain to rheumatism. Information about the child from birth is necessary, firstly, whether it was born at full time, if the labour was difficult and if breathing was readily established after birth. Next follows a history of previous illnesses, the dates at which the milestones of infancy, such as sitting up, the appearance of the first tooth and of standing, were passed, with full details as to the manner of feeding from the first day of life. This leads up to the illness under investigation, when information will be sought as to the first departure from the normal, or the first appearance of symptoms.

Early history.

Inherited disease.

Some knowledge of the constitution of the parents is desirable, particularly with reference to family tendencies to such diseases as asthma, rheumatism, tuberculosis or instability of the nervous system.

From such enquiries, much information is gained as to the constitution of the child and the presence of any special tendency to disease.

Finally, guidance as to the nature of the disorder may be obtained by enquiry into possible causes, such as injudicious feeding, exposure to infection, mosquito bites or chill.

The physical examination of the sick child can only be conducted successfully by those who are prepared

to employ patience and to study the idiosyncrasies of childhood. Once the child is disturbed or frightened, the examination becomes more difficult, the pulse and respiration rate is increased, the temperature may rise, the abdomen becomes resistant to palpation, in fact, the value of all clinical data is vitiated. The child should not be subjected immediately to close scrutiny; rather must he first grow accustomed to the doctor's presence. Young children dislike silence and a gentle flow of conversation may do much to alleviate fear. Finally, if there is any question of a painful part, the examining hand should approach by way of a healthy limb, lest the natural cry of alarm on first being handled be mistaken for evidence of pain or tenderness. It is hardly necessary to mention also that a gentle examination is in the interests of the patient. Should the child be asleep, the first observations should be made as far as possible without waking him.

The demeanour of the child in sickness **Demeanour.** undergoes marked changes, babies become restless, fretful or worst of all, apathetic; older children listless, irritable and disinclined to play, the appetite is capricious or lost and the customary vigorous movements are stilled. The natural placid expression changes, the brow is puckered from headache or the face bears an expression of pain, anxiety or weariness.

The cry of the healthy child, loud, vigorous and **Cry.** strong, cannot be mistaken; it is heard at appropriate moments, when the baby is hungry, when he requires changing or suffers discomfort from lying too long in one position. The cry ceases when feeding time arrives or when suitable attention has been given.

The cry becomes abnormal when it is too long or is heard too often. The cause may be found in deficiency in the food, too prolonged intervals between the feeds, some source of discomfort, or the baby may have learnt that prompt attention and petting is forthcoming in response to his efforts.

The cry of sickness is usually altered in tone, it may become the sharp scream of acute pain, the low whining or moaning of long continued discomfort, the repeated faint emotionless cry of exhaustion or the husky whispering cry of laryngitis. It is not difficult,

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on listening to the cry, to realise when the child is in pain, and though he is incapable of expressing in words what is the matter, his actions, expression and position will almost always reveal the site.

Colic.

The commonest cause of gusts of screaming and crying in young infants is colic. The attitude of the child is characteristic, the lower lip is drawn in, the hands clenched, the legs drawn up, the body stiffened and bowed forwards. Earache, also common, is often mistaken for colic, but the child will rub or pluck at the ear, burrow the head in the pillow, and when the pain is severe, arch the body backwards, an attitude never assumed in colic.

Ear-ache.

The site of the pain may be revealed by the immobility of a limb such as is seen in scurvy or one of the acute joint or bone affections of infancy. When there is acute tenderness of this sort, the expression of even a young baby becomes anxious when the bed is approached, as if he feared any jar or touch.

Sleep.

Disturbance of sleep is one of the earliest and most constant signs of illness. Certain types of disturbance are characteristic, for instance, the restlessness and teeth-grinding associated with gastro-intestinal disturbance. Unquiet sleep with sudden wakings, snorings and startings is often associated with enlarged tonsils and adenoids.

The subject is more fully discussed in Chapter XI.

Temperature.

The temperature of infants and young children is subject to variations from causes which, as age advances, cease to have any influence, and suspicion of serious illness may be aroused when the cause is, in itself, trivial. The consequence is that a rise of temperature even so high as 102 or 103 may be of grave significance, or it may be due to some comparatively trivial cause. Particularly noticeable is the effect of digestive disturbances, the normal daily variation is exaggerated, the temperature may remain subnormal, or the fever may be so prolonged as to lead to the suspicion of some infective disorder. Even simple constipation, especially if aided by excitement or over-fatigue, may cause the temperature to rise to an alarming degree.

A subnormal temperature must always be regarded as serious, as it is the indication of some want of vitality,

a feeble circulation, insufficient nourishment or exhaustion (*see* also Chapter XIV).

PULSE AND FONTANELLE.

The normal pulse rate of the infant and child is approximately as follows:—At birth, 140 to 130; 1st year, 120 to 100; 5th year, 100; 10th year, boys 80, girls 90.

The rate in fever rises with the temperature, but the proportionate rise is slight compared with that of adults, being four beats for every degree of temperature, while in adults the rise is ten beats, provided that there is no special cause to accelerate or retard the rate.

Before the age of six months it is often a matter of difficulty to count the pulse accurately at the wrist, in which case it may be counted at the anterior fontanelle, the soft space between the bones at the top of the head. Information of considerable clinical importance may be gained by examination of the fontanelle. In addition to the rate of the pulse, the strength may be gauged by inference, as, in all conditions of exhaustion leading to feeble pulse, the fontanelle will be depressed.

Bulging at the fontanelle, on the contrary, is suggestive of intense congestion of the brain, excess of fluid or meningitis. In such conditions, other symptoms of pressure within the skull, slow irregular pulse, irregular respiration, stupor and possibly convulsions, will be noted.

The fontanelle usually closes at 18 months, delay in closure points to faulty formation of bone and should lead to examination for other signs of rickets (*see* Chapter IX).

Other conditions leading to delay in closing are Cretinism (Chapter XXX) and Hydrocephalus, in which last case, the opening may actually increase in size.

Too early closure of the fontanelle is undesirable, as the space within the skull is thereby restricted, and the development of the brain arrested.

The first inspection of the sick child may reveal **Inspection.** some signs which afford a clue, if not to exact diagnosis, at least to the general condition. With high fever, the child is restless and flushed; in collapse, the face is grey.

the child is apathetic and lies on the back; with severe inflammation of the lungs, the lips are blue, the face dusky and the nostrils dilated widely with each indrawn breath. The appearance of the child suffering from severe gastro-intestinal disease of longstanding, is characteristic; the colour is earthy with the sunken cheeks and eyes of old age, the expression is weary, the face lined by deep wrinkles and the head seems disproportionately large.

Particular note must be taken of any signs of extreme nervous irritability or of impending convulsions, rolling of the eyes, squint, twitching or rigidity of the limbs, the clenching of the hands with the thumbs inside (*see* Chapter XXVII).

For the rest, the following points must not escape notice:—

Retraction of the head as indicative of inflammation of the brain. It should, however, be mentioned that many babies, especially those weakened by severe intestinal disorders, tend to sleep with the head drawn back, but there is no resistance to forward movement.

Immobility of a limb, indicating paralysis or acute tenderness or injury.

Twitchings or jerkings of the limbs such as occur in chorea or habit spasm.

The drawing up of the legs on the abdomen pointing to abdominal pain or inflammation. If one leg only is persistently flexed, the presumption is of abdominal inflammation on the same side, or of disease in the hip-joint.

The presence of **œdema** if most marked on the face, suggestive of kidney disease; if on the extremities, of extreme weakness, weakness of the action of the heart or malnutrition. The presence of skin eruptions, especially in the napkin area, scalding from diarrhœa, bruising such as may be seen in scurvy, the yellow tinge of jaundice or the brown staining at the folds of the skin, well marked over the axillæ, abdomen and groin; in older children suffering from chronic constipation.

Skin.

Discharge.

The presence and nature of any discharge from the nose, eyes or ear; in the latter case, the area around the ear is carefully examined for any tenderness which may reveal deep-seated inflammation.

The presence of any **glandular swelling**, particularly behind the angle of the jaw as suggestive of some form of infection of the tonsils.

THE CHEST AND RESPIRATION.

The respiration of the young child is considerably more rapid than that of the adult and is liable to variations from trivial causes. The average rate is as follows: Birth 30 to 50, 1st year 25 to 35, slowing gradually to 20 to 25 at five years.

The normal ratio to the pulse is 1 to 4 or 1 to 5, but in severe lung disease, the rate becomes 1 to 3 and the respiration rate tends to increase out of all proportion to that of the pulse. The respiration in sickness not only alters in rate, but also in rhythm. In severe **broncho-pneumonia** there are all the signs of deficient æration of the blood and of the efforts to relieve it. The chest is distended, all the muscles of the chest and even of the neck contract forcibly in the effort to fill the chest, the soft spaces between the ribs are sucked in, the nostrils dilate widely with each indrawn breath, but in spite of this, the urgency remains unrelieved, for the face and lips remain blue. The respiratory efforts are so violent that suspicion may be excited in the mind of the observer that there is some obstruction in the throat, but there will be no stridor or crowing. At the same time, the rhythm becomes characteristic. The normal rhythm of:—inspiration—expiration—pause—is reversed to:—inspiration—pause—expiration, and this pause is often made evident by an audible catch or grunt.

In **bronchitis**, the breathing is also laboured, but not to so great a degree; by placing the flat of the hand on the chest a sensation of rattling is felt. Should the expiration (out-breathing) be unduly prolonged and accomplished with visible effort in contrast to the short easy inspiration, the possibility of **asthma**, a disease to which the young are by no means immune, must be considered.

Rapid deep breathing, sometimes irregular, with no signs in the lungs or blueness of the lips is often a sign of acidosis.

In less acute cases, the chest should be examined for any characteristic change of shape, the beading of the ribs and deep grooving of rickets, the prominent breast-bone with flattening on both sides of chronic partial obstruction to respiration, as with enlarged tonsils and adenoids, or the everted lower ribs and distended abdomen of older children, the subjects of chronic intestinal dyspepsia.

The force and area of the visible heart-beat is noted. Where there is severe heart disease of old standing, the chest wall over the heart area may be seen to bulge.

ABDOMEN.

From what has been said above, it will be clear that the condition of the abdomen must be read in conjunction with that of the chest, and not only of the chest, but also of the lower limbs. In acute disease within the abdomen, the legs are drawn up to relieve tension and any attempt at straightening is resented. The normal abdomen moves freely with each indrawn breath, but such movement is limited or stilled if there is any inflammatory or painful condition within. The movement will be also limited by over-distension, such as will occur when there is fermentation with the production of much gas in the intestines. Such limitations, even from so simple a cause as over-distension of the stomach, may lead to respiratory embarrassment and blueness of the lips.

On palpation by the hand, the abdomen should feel soft, and, provided that the child is not alarmed, there should be no resistance to gentle pressure. Localised areas of resistance or rigidity are of grave import; above the right groin it may indicate appendicitis or dysentery, on the left side at the same level, dysentery or inflammation of the lower bowel.

Visible peristaltic movements of the stomach, that is, squirming movements seen on the surface of the abdomen, should be sought in all cases of projectile vomiting, and of the bowel, when there has been prolonged or obstinate constipation. Such movements indicate that there is partial obstruction to the onward flow of the contents.

The liver may be felt about one finger-breadth below the lower rib margin on the right side in young children; in most forms of fever there is engorgement and consequent advancement of the edge. Marked enlargements will call for minute and skilled investigation. The spleen, on the opposite side, also enlarges in all forms of fever; in chronic malaria, the enlargement may be so enormous as to cause the whole abdomen to bulge, and in kala-azar, the same degree of enlargement is observed, but developing at a more rapid rate.

Finally, in investigating acute abdominal pain, it should be remembered that, owing to the distribution of the nerves, pain arising from inflammation in the chest may give rise to severe pain in the abdomen and may even simulate appendicitis. See also Chapter XL.

The limbs should be examined for any flabbiness of the muscles or laxity of ligaments, which may lead to the early diagnosis of rickets. Before any bony deformity is noticeable, by grasping the lower leg and moving it from side to side, the upper end of the shin bone may be made to tap perceptibly against the lower end of the thigh bone. **Limbs.**

In older children, when the condition permits, observation of the gait, as revealing any slight paralysis, lack of control, giddiness or disease of a joint, is valuable and the **examination of the spine** for any evidence of curvature should not be omitted. **Gait.**

The examination of the **tongue, mouth and teeth** is best left till the end as it is likely to disturb the child and provoke resistance. The tongue in health is clean. A whitish tongue indicates derangement of some sort such as approaching fever or indigestion. Dark brown furring is significant of more grave disorder and when, in addition, it is dry and the teeth, if present, are covered with dry scraps, the condition may be regarded as intensely toxic. **Rashes in the mouth.**

Examination of the mouth early in sickness is of value, as many of the rashes of acute fevers tend to appear here some hours or days in advance of the appearance on the skin. In addition, in measles there are certain characteristic eruptions which will aid early diagnosis.

The **examination of the throat must not be omitted**, otherwise some important condition such as diphtheria may be overlooked.

VOMITING.

The act of vomiting is so easily provoked in young children that it is apt to be regarded as almost natural; indeed, as a rule it arises from some trivial cause, but this cause must be ascertained, particularly if the vomiting persists over more than a very short period.

An acute attack of vomiting, though commonly in response to some derangement of the stomach and often following rapidly on the obvious cause, is by no means always an indication of simple digestive disturbances; it is frequently the first manifestation of the onset of acute infectious diseases; of malaria; it may be provoked by some disorder remote from the stomach, as for example, inflammation of the ear or appendicitis, or in some children it is set up by slight emotional stress; it may even be pleasurable excitement. In fact, vomiting may be provoked by any disease and it may occur in the absence of any disease whatever. On the other hand, the nature of certain more persistent forms of vomiting is characteristic.

Possetting.

A common form of vomiting in early infancy is known as possetting, that is, the return of a small quantity of food after each meal. If the baby is held upright after feeding, to facilitate the expulsion of gas or any air that may have been swallowed, this is lessened. In some infants, it is an indication of excess in the size of the feed, but in others, it would appear to be due to want of control over the stomach.

Apart from this, persistent vomiting in young children must be regarded as of serious import, till the contrary be proved. Persistent vomiting with obstinate constipation is an unusual combination of symptoms which gives rise to the suspicion of one of two disorders. The first, usually appearing at the age of three weeks, is congenital **pyloric stenosis**. The vomiting also is characteristic, having a projectile quality, so that the contents of the stomach are suddenly and forcibly thrown out. Examination will reveal violent movements

of the stomach, visible through the abdominal wall (*see* Chapter XL).

The second condition, more common about the age of two years, is **tuberculous meningitis**. The vomiting is here characterised by its irregularity, the liability is increased by movement and it may be independent of food. It will of course be associated with other signs of the disease (*see* Chapter XXVII).

The nature and amount of the vomited matter will sometimes throw some light on the underlying condition. If the infant vomits immediately after a feed and ejects sour-smelling matter in quantity greater than that of the meal, it is clear that food is not passing on from the stomach at the normal rate, and that there is dilatation, want of muscular tone and digestive power. In older children, it may be possible to identify in the vomit some article of diet which has been eaten twenty-four or more hours before, thus proving a marked dilatation of the stomach.

**Dilated
Stomach.**

Alkaline vomit, as tested by the litmus paper, returned very soon after ingestion, suggests that the food has never reached the stomach, that there is, in fact, some obstruction at the entry.

The appearance of streaks of blood during the course of violent vomiting is not unusual and need cause no serious alarm. Some children have acquired the unpleasant accomplishment of returning food from the stomach at will. This may take the form of rumination, when a small quantity at a time is ejected into the mouth and chewed, or it may take the form of deliberate and intentional vomiting after taking under persuasion, some unrelished article of diet.

Rumination.

Recurrent attacks of vomiting at fairly regular intervals, especially if accompanied by lethargy, fever, rapid pulse and deep respiration, will excite suspicion of acidosis, and the urine will be examined for acetone bodies. *See* Chapter XLIII.

Acidosis.

Vomiting after paroxysmal coughing, with no disturbance of the appetite, is an exceedingly common manifestation in whooping cough; indeed, the diagnosis is more often made in the early stages on this combination of symptoms than on the inspiratory crow or whoop, which may not develop for some weeks if at all.

**Whooping
cough.**

STOOLS.

The stools of infancy and childhood are an index as to the state of the digestive functions. During the first two days the stools are blackish in colour, but after this, if the child is breast-fed, become pale yellow and soft in consistency. The stool of the infant fed on cow's milk is more pale, putty-like in consistence and colour. In health, the stools are passed from two to four times a day.

Normal stools.

The normal stools are passed quietly into the napkin or when the baby is "held out," in contrast to the stools of digestive disturbance which are passed with evidences of pain, violent effort and the expulsion of gas.

Green stools.

Acute diarrhoea, if to any degree severe, is likely to result in the passage of green stools. The typical green stool consists of whitish pieces often mistaken for curds, but in truth, soaps derived from the fat content of the food, and green fluid which stains the napkins. Such stools are highly acid and evidence of this acidity will be found in the reddening or excoriation of the child's buttocks. This type of stool is to be found in any form of digestive disturbance of sufficient intensity to cause rapid passage of the food through the bowel. Consequently, from the appearance of the stool alone, an exact diagnosis cannot be made. If dyspeptic in origin, the nature of the dyspepsia will be arrived at by enquiry into errors of diet and the subsequent behaviour of the child after suitable dieting.

The assumption is often made that a case of green diarrhoea is of infective origin on the grounds that it started suddenly with high fever; this is an unjustifiable deduction, as the manifestations of non-infective indigestion are also commonly of sudden origin, though the cause may have been at work for some time and minor evidences have passed unnoticed.

The distinction between infective enteritis and non-infective diarrhoea is not always easy; both may be of sudden origin, in both forms there is fever, but in infective enteritis there is more evidence of the toxic nature of the disease, the prostration is greater, there is often blood in the stools, while the fever, which, in

non-infective diarrhoea, as a rule reacts rapidly to starvation, remains unaffected or even rises.

In cases of green diarrhoea manifesting severe toxic symptoms, the possibility of **parental infections**, that is, disease elsewhere, such as suppuration of the middle ear, influenza or pyelitis, must not be forgotten.

Stools which turn green on standing are of no importance. In lesser disturbances, the presence in the stool of an excess of one constituent of the diet may lead to the deduction that this item is being given in too large a quantity or that the digestion of the child is not competent to deal with it in the amount given. Commonly in this country are seen the stools indicative of **excess of fat** in the diet, whether absolute or relative to the digestive capacity of the child. Such stools may appear in one of two forms, the first, fatty diarrhoea, the stools are loose yellow and acid and appear greasy. In the second, more attempt has been made to digest the fats and they are seen in the form of soaps, the stools being bulky pale and soft.

The stools indicative of proteid indigestion are brownish in colour and sometimes exhibit the tough yellowish proteid curds. The odour of putrefaction is present.

The stool pointing to excess of carbohydrate in the diet is copious, frothy and light in colour.

Mucous slime is present in almost all abnormal **Mucus.** stools; the secretion of mucus is the first reaction of the membrane lining the lower bowel. It will be seen in almost every case of diarrhoea, in constipation, when the hard fæces have irritated the delicate lining and in response to violent purgation. When, however, the mucus is blood-stained, the matter is of more serious import, especially if the passage of blood-stained mucus is unaccompanied by that of fæces. Such mucus, passed by a previously healthy child, with evidence of severe colic and in the absence of fever, will excite suspicion as to the development of an intussusception and urgent surgical advice will be sought. In dysentery, blood, mucus and a mixture of both are passed at distressingly frequent intervals, with evident signs of pain and straining. In severe cases, the motions appear to contain large quantities of pus.

Streaks or flakes of blood on, but not mixed with the motion, are usually due to some slight local cause in the neighbourhood of the anus; it may be slight fissure or ulceration. Such slight bleeding may even be caused by the passage of an abnormally hard motion and need cause no anxiety.

URINE.

The normal amount of urine in childhood is, according to Professor Still, as follows:—

1st year, 12 oz. per day, 2nd year, 10 oz. per day. After four years, the average figure is reached by multiplying the age of the child in years by $2\frac{1}{2}$, the daily amount, however, being subject to extreme variations.

In the hot weather, the amount will naturally be reduced, though the extra amount of fluid taken should keep the figures somewhere near the above.

The urine of the new-born is copious and clear, though, after the first three days, there may appear a brick-red deposit of urates which stains the napkin but has no significance.

In fever and diarrhoea the urine becomes scanty. In the latter, the amount must be carefully noted as **serious diminution indicates a depletion of the fluid reserve of the body**, which must be restored as rapidly as possible by the administration of water by the mouth, normal saline by the rectum, and, in extreme cases, by hypodermic transfusion. At the same time, not infrequently, if the abdomen of a child who has failed to pass water for some hours be examined, the distended bladder may be felt; the child being unwilling to make the necessary effort for its emptying.

In all forms of sickness it is desirable that a specimen of urine be collected and, after inspection in a clear glass vessel for the presence of any abnormal sediment, pus or blood, it will be examined chemically for the presence of albumen, sugar and acetone. The urine is not only an index of the condition of the kidney, but will furnish information of the presence of more general disease; thus, blood in the urine, almost invariably

present in all cases of acute inflammation of the kidney, is also a valuable diagnostic point in scurvy.

Acetone is present in many cases of acute infectious disease and in all prolonged illness when there has of necessity been some degree of starvation. When found in any quantity, and especially if in association with diacetic acid, it is an indication for special treatment (*see* Chapter XLIII).

CHAPTER XIV.

ON FEVER.

The general term fever implies a raising of the body temperature above the normal with certain symptoms which become more marked as the temperature rises. These are a dry skin, flushed face, thirst, restlessness, quickened pulse and usually an increase in the size of the pupils.

The normal temperature is somewhat higher in the child than in the adult, but a temperature of above 99°F. should be regarded as slight fever. There is a slight daily variation, the evening temperature in health being slightly higher than that of the morning.

The temperature of the infant may be taken in the groin or the rectum, the rectal temperature will be at least half a degree higher than the groin temperature.

It is well to remember that temperatures persistently or markedly below normal, subnormal temperatures, call for investigation just as much as do high temperatures.

The causes of fever are manifold and it is the almost universal first reaction to disease, especially in children. At the same time it should be borne in mind that the temperature in infancy is extremely unstable and that comparatively small matters, nervousness, over-excitement, a slight cold, or constipation may give rise to quite marked, but usually transient fever.

In the first stages of many diseases, fever and its attendant symptoms may be the only manifestations, and there is nothing to enable us to make an exact diagnosis. Though a diagnosis cannot be made, without awaiting the course of events, much can be done to alleviate discomfort and influence the subsequent course of the disease. This being so, it is desirable to formulate some principles on which treatment should be conducted.

During fever, there is an unnaturally rapid breaking down of the body material, with a wasteful

Incubation and Quarantine Periods of Infectious Fevers.

	Incubation period.	Rash appears.	Rash fades.	Quarantine from latest exposure.	Period of infectivity.
Measles ..	7-18 days, usually 14 days.	4th day ..	5th — 7th day.	From 7th—16th day ..	Three weeks from appearance of rash.
German measles	7-20 days, very variable	2nd — 4th day, often earliest symptom.	4th — 7th day	7th—22nd day ..	Not less than 7 days from appearance of rash.
Mumps ..	10-22 days ..	....	....	22 days ..	Minimum 3 weeks, 1 week from disappearance of swelling.
Whooping cough	7-14 days	.... following 3 days.	....	16 days ..	4 weeks from onset.
Chicken-pox	Average 12-14 days	1st and following 3 days.	About 4th day.	18 days ..	Until every scab has fallen.
Small-pox ..	Do.	3rd — 4th day.	9th — 10th	16 days or successful vaccination.	Until every scab has fallen.
Diphtheria	2-10 days, usually 2-4 days.	....	....	Depends on bacterial examination.	Depends on presence of organism.
Influenza ..	1-4 days ..	....	....	5 days ..	During persistence of morbid discharges.
Typhoid group	5-23 days, usually 12 days.	8th — 9th day.	21st day ..	....	Indefinite (according to persistence of bacteria).
Typhus ..	5-20 days, usually 14 days.	5th day ..	14th day ..	16 days ..	During febrile period.

production of heat. While the destructive processes are accelerated, the building-up processes, which should normally more than balance the loss, are to a great extent suspended. The appetite is impaired and the digestion less active than in health.

While it is not desirable to enter here too deeply into the chemical processes of the body during fever, certain facts should be appreciated as they form a foundation on which rational treatment can be based.

Firstly, the exaggerated breaking down of body substance leads to an extra accumulation of waste products, which must be disposed of by the kidneys, liver and bowels.

Secondly, there is an alteration of the normal chemical processes and these processes are of special importance in relation to diet.

The body calls on its reserves and they are burnt up at a more rapid rate than they can be replaced. Firstly, the store of sugar within the body is reduced, then follows the breaking down of fat at a rapid rate, but this process is incomplete in the absence of sufficient sugar, and poisonous bodies are formed. With an accumulation of the **poisonous bodies**, known as Ketones, in the blood, there is an extra call on the mineral salts of the body for their neutralisation, so that there follows a shortage leading to signs of an unbalanced nervous system, restlessness, twitchings, convulsions and possible delirium. The logical deductions from these facts are, firstly, that **the sugar reserve must be built up, secondly, that the fat in the diet must be kept low, and thirdly, that the mineral salts must be replaced.** At the same time, these chemical changes are not the only ones at work. The brain and spinal cord are particularly susceptible to the action of heat, a fact which is borne out by the tendency to delirium, sleeplessness or convulsions in high fever, so that the actual temperature itself, if excessive, constitutes a danger and calls for control.

**Poisonous
Bodies.**

Finally, there is to be considered the effect on the body of the poison produced by the particular disease, which may require special treatment.

Whatever the cause of the fever, the above statement of the case holds good and according to such principles, treatment must be conducted.

Fever, hyperpyrexia and subnormal temperatures.

Some degree of fever is inseparable from most diseases and, except as part of the disease, constitutes no danger. At the same time if **the temperature rises above a certain point, the degree of heat in itself becomes a danger.** The danger depends to a great extent on the duration of the illness. In Typhoid fever, for example, we attempt to keep the temperature not higher than 103, because it may persist for days or weeks at that height, but in more transient fevers, such as Malaria, such a temperature calls for watchfulness, but not active interference; the danger point would here be 104 except in infants or when there are warnings of nervous irritability. **The temperature of the atmosphere materially affects the temperature of the febrile patient** once it is over 102, so that in hot weather, the point for interference should be taken as at a point lower than in cold weather and a rising temperature of 103 would call for sponging.

A condition in which the temperature rises over 104 is spoken of as **Hyperpyrexia.**

Subnormal temperatures 97 or lower are the natural sequence of high temperatures; in the case of transient fevers, the condition may last for a few hours only, but after a prolonged fever, the temperature may remain subnormal for days and is a sign of lowered vitality. The pulse should be of normal rate or lower; if accelerated, it is a sign of weakness of the heart.

Subnormal temperature.

Temperatures of 96 or below should suggest collapse and call for stimulants, warmth, absolute rest and the most careful feeding.

Low temperatures in infants without previous illness should prompt a thorough investigation of the health, diet and general hygiene.

A distinction must be made between temperatures dangerous on account of their duration and those dangerous on account of their height. Periodically, high fever of sudden onset of 105° or over, is met with; for such cases naturally, more energetic measures

Hyperpyrexia.

are required than for cases in which we are dealing with a moderately high temperature in the **course** of a long illness.

Various methods are at our disposal, the most effective having for their principle the removal of heat by the application of cold.

Sponging.

Tepid or cold sponging is the treatment of election when the rising temperature is encountered early and has not reached a degree such as to constitute a menace; thus in the course of typhoid, if the temperature is not more than 103, but is rising, tepid sponging will reduce the temperature and if skilfully carried out, will prove soothing. Sponging may be employed to soothe a restless patient and often induces sleep.

**Tepid or
Cold bath.**

There are, however, cases which resist such mild measures and there are those, with a temperature of 105° and over, which demand treatment which is likely to produce a more immediate effect and in which it is only increasing the danger to delay. For such cases **it is absolutely necessary to resort to the bath** and in the case of infants and young children, this should, if possible, be given by the mother or someone else with whom the child is familiar. The child is to be immersed in tepid or cold water and this is to be done in such a manner as to avoid all unnecessary shock or fright. For this reason it is better that the cold bath, if judged by the height of the fever to be necessary, should start as a tepid bath and cold water gradually added.

The younger the child the warmer should be the starting point and infants should not be subjected to the completely cold bath. It is often desirable to start the bath at a temperature of about 95°F.

After about ten minutes, the child is removed, placed on a sheet or large towel and gently dried without rubbing. The skin should be left a little moist. He should then be replaced in bed covered by a light sheet.

During the time in the bath, the most careful watch should be kept for shivering, change of colour either pallor or blueness. Such signs call for immediate removal from the bath and the taking of the patient's temperature by the rectum. Pallor or blueness should be treated with stimulants.

During and after the bath, the temperature taken under the arm or in the groin is valueless as a guide, the groin temperature may be 100 when the true temperature as taken by the rectum is 105.

It is **not desirable to attempt to bring the temperature below 102**; if the impression is gained that the child is cooling rapidly, he should be removed from the bath and the temperature taken. A rapid drop from a high temperature is a sign that the bath should be discontinued.

After the bath, the child's temperature should be taken every twenty minutes for the next hour so that we may be forewarned against another rise or too rapid a drop. The first will call for a repetition of the bath, the second for stimulants and warmth. Of course, if the child is sleeping peacefully, he may be left alone.

Sir William Broadbent writes: "Of the special measure for the reduction of febrile heat that is becoming dangerous either from its intensity or duration, the first to be mentioned is the cold bath. This should be resorted to in all cases of pyrexia, from whatever cause, its efficiency, first established in the high temperature of acute rheumatism and enteric fever, has been proved also in cases of septic hyperpyrexia and even in injuries to the brain. Here the water may be positively cold. When the bath is used to control temperatures not dangerous from its height, but from its duration, as in enteric fever, the temperature of the bath need not be lower than from 65 to 70°F."

The cold wet pack has, for the child patient, no **Cold Pack.** advantage over the bath, but may be used in continuation of the bath when the temperature obstinately rises after immersion. The method of administration is simple; a sheet wrung out in cold or tepid water is spread over the patient stripped of all clothing and replaced by another as soon as it gets dry or hot.

This is a method rather of prevention than treatment and will be found particularly useful in the hot weather.

A large fracture cradle is placed over the patient, **Cold Cradle.** inside is suspended a bag of ice and the whole is covered by a sheet. This process entails very little discomfort or disturbance.

Cold to the head.

It is undesirable to keep an ice-bag continuously in contact with the head of a young child or infant as the intense cold may depress the nervous system. The ice-bag should be moved over the head gently at intervals and thus it may be applied for five minutes or so, and repeated after an interval. Perhaps the most satisfactory way is to suspend the ice-bag near enough to the head to exert a cooling effect.

The thickly folded wet cloth, which is so commonly applied, is really an additional source of heat, it soon becomes warm and acts like a poultice. A single piece of muslin, wetted at intervals with an evaporating lotion, should be used. A convenient ice-bag can be obtained from the chemist.

Drugs.

There are certain drugs which have the property of reducing the temperature in many cases, but their action is not always desirable and their use should be subject to the advice of a medical adviser. One of the methods detailed above is safer and often effective where drugs fail.

While the body of a fever patient is dry and burning hot, it is courting disaster to heap on the bed clothes in the hope of inducing perspiration and it is possible to convert a mild fever into a dangerous fever by such methods. Once the shivering stage has passed, the clothing should be light. When perspiration begins naturally about the roots of the hair, the forehead and at the bends of the joints, additional clothing may be drawn over the patient.

Cold Drinks.

The fevered child craves for cold drinks and this craving may be gratified provided that the quantities at any one time are not too great. Cold or iced drinks are valuable in more ways than one, the heat of the body is to a certain extent neutralised, the thirst is quenched and the child is encouraged to drink the large quantities of fluid so essential in the fevered state. Plain water, orange or lemon water and barley water may be given.

Rest.

Rest is the opposite of energy; **energy** entails the expenditure of body substance, therefore rest means the sparing of body substance and represents indirectly nourishment. The child, in a severe illness, may require every ounce of strength to survive and none of this

strength must be wasted by unnecessary exertion either of the body or mind, neither must the patient be subjected to the fatigue of too rigorous nursing. The most complete rest is, of course, sleep and sleep must be encouraged by such simple methods as warm sponging and it may be necessary to have recourse to sedative drugs of which the most suitable are potassium bromide or chloral.

The thorough ventilation of the sick-room is **Ventilation.** essential because (a) the body is kept cooler, (b) an ample supply of fresh air is necessary to supply oxygen to the disordered blood, (c) fresh air diminishes the liability to complications affecting the lungs.

The management of diet during the period of sickness and in convalescence calls for the greatest care and judgment on the part of all concerned in the welfare of the child and much depends on the skill with which the appetite is tempted by dainty and varied preparation of the necessarily limited articles. The diet must be simple, it must be acceptable **and above all, it must be sufficient.** **Diet.**

The tradition still persists, unfortunately, that milk is the only diet for the sick child, yet the child with the instinctive dislike which sick children have for fatty foods, comes to loathe it. Milk, however, does form a sound basis for the diet, but for the reasons explained above should be skimmed and well balanced by easily digested carbohydrate food.

There is a natural tendency to fear any form of solid food, but it may be remembered that light solid food, such as biscuits or well prepared invalid puddings, become, in the stomach, as least as fluid as does milk.

Unless definitely indicated by the minute quantities the child is able to take, food should not be given more than three-hourly; too frequent feeding allows no time for the digestion to recuperate, and is irksome to the patient and so may react unfavourably on the appetite.

It is quite impossible to lay down a system of diet which will cover every illness and every degree of illness, individual circumstances must dictate, but the following lists may be taken as a general guide.

For the very gravely ill child.

Butter or skimmed milk, predigested if necessary.
Whey.

White of egg in the form of Albumen Water.

Malted foods. Mellin's food. Horlick's Malted Milk. Benger's food made with skimmed milk.

Brand's essence. Chicken or Beef tea. These contain very little nourishment, but are of value as mild stimulants and appetisers.

Liquid Glucose (Grape Sugar) perhaps the most easily absorbed form of nourishment or Raisin tea.

Jellies.

For the less gravely ill child.

Other articles or other treatment of the same articles is permissible.

Toast, plain biscuits or rusks (will assist in keeping the mouth clean.)

Soufflés variously flavoured.

Junket or milk jelly.

Sago—cornflour or oatmeal jelly.

Vegetable soup.

Fruit jellies.

Pounded fish.

Stimulants.

Stimulants are often necessary in the course of a prolonged fever when there is evidence of great weakness or prostration. A condition of extreme prostration, known as the "typhoid state" presents a picture somewhat as follows. The patient lies semi-conscious and indifferent to his surroundings, there is low muttering delirium, the tongue is brown and dry, the lips and teeth are dry and covered with dried brown secretion, the pulse is weak and rapid, there is pallor or grey-ness of the sunken face, and the hands wander aimlessly and pluck at the bed clothes. This condition is extreme and we should aim at prevention by the timely administration of suitable stimulants before such a state is reached.

First among stimulants must be mentioned **Glucose**. It is not a stimulant in the ordinary sense, but it is a food which is absorbed rapidly and increases the power of the heart. Glucose should be included in the diet of all patients suffering from severe fever.

Of the stimulants in the accepted sense of the term, the most valuable is alcohol, in the form of good and preferably old, brandy. For an infant 5 to 10 drops in a teaspoonful of water is a suitable dose. An infant of 1 year old may take up to $\frac{1}{4}$ ounce in the twenty-four hours, diluted 1 to 20 and a child of four, double that amount.

How far such stimulation is to be continued will be decided by the effect, a clearer intellect, a stronger pulse and greater tranquillity will be taken as signs of improvement.

In the case of young children, the use of alcohol should be discontinued as soon as possible, as there is a risk of seriously damaging the liver by prolonged use.

There are other forms of stimulants, pure drug stimulants with no food value, as for example, strychnine, adrenalin, and camphor (the last named is somewhat uncertain in its action owing to slow absorption, and no infant should ever be allowed to inhale camphor). Such drugs are likely to be necessary in the course of certain diseases, but they will be administered only under medical advice.

Other symptoms.

Headache.

Cold to the head.

Bromide draught.

Aspirin (caution is necessary in the case of young children).

Attention to the action of the bowels.

Vomiting.

Sucking ice.

Sodium Bicarbonate grs. 10 to 60.

Chloretone.

Mustard plaster for from 5 to 10 minutes over the stomach.

Reduction or abstinence from diet for some hours, water only given.

Diarrhoea is a symptom which should always be **Diarrhoea.** regarded as serious. For treatment, the reader is referred to the special chapter on the subject.

Delirium.

Delirium in the early stages of an illness is usually due to high fever and calls for treatment as detailed under hyperpyrexia. In the absence of high fever, delirium indicates exhaustion and calls for stimulation.

When the nature of a fever has been recognised, we endeavour "to neutralise its special poison" and to meet its peculiarities by the various means which will be described later.

When a case of fever arises, the first thing to be done is to act on the principles laid down above, and the next is to watch carefully the course pursued by the fever as indicated by the thermometer and the general symptoms. By this means we discover the nature of the fever—whether it be due to disease affecting the whole body or some part or organ.

CHAPTER XV.

OBSCURE FEVER IN CHILDREN.

Young children are more prone than adults to pyrexia from slight causes, and any cause generally produces in them a high degree of fever. A rapid rise of temperature from trivial causes, e.g., emotion or exercise, is so common in childhood that fever alone is not a sufficient reason for anxiety. Generally speaking, it is only when fever continues for some time, or is accompanied by other disturbances that a high temperature becomes a serious symptom.

Sudden Rises of Temperature.—When the temperature of a healthy child rises suddenly and keeps up, the onset of one of the infectious fevers or of influenza may be suspected. In such a case, **inspection of the throat** should never be omitted; at the same time, examination and listening to the **lung** may detect the cause, sometimes inflammation of the **middle ear** or pain behind the ear may give the clue.

In **India**, it is a common error to put malaria down as the cause of every sudden rise of temperature, and the child is inconsequentially dosed with quinine, when in reality the cause is a **disordered digestion** which is readily cured by a simple aperient. The irritation of **teething** is often a cause of high rise in temperature. Fever in itself need cause no anxiety, but if accompanied by **stiffness of the neck**, then the nearest medical aid should be secured, for although such stiffness of the neck with or without delirium may be caused by apical pneumonia or by worms in the intestines, it may be caused by inflammation of the coverings of the brain and be a precursor of death.

From a practical point of view the obscure fevers of childhood in India may be classified into three main groups: **Group (1) those cases of acute fever lasting more than a week, Group (2) cases of fever occurring in bouts, and Group (3) cases of prolonged but slight fever continuing over a period of months and even years.**

Group 1. The child is acutely ill and although there are no physical signs to localise the disease, there will naturally be great anxiety. In such a case influenza or apical pneumonia should as a rule be first discounted and unless the temperature is remittent, it is very improbable that malaria is the cause. Before the fifth or seventh day it will not be possible for any doctor to definitely state that typhoid or para-typhoid is causing the fever, because before that period the agglutination tests will be negative. In our experience **if there is nothing in the throat or ear to excite suspicion, by far the most common cause of such fever in the tropics is *B. coli* pyelitis especially if the patient be a girl.** Positive proof may not be possible because a catheter specimen and culture examination cannot be made, but a high swinging temperature with little constitutional disturbance, a reluctance to being handled and the microscopic discovery of pus cells in the urine collected in a mackintosh sheet or basin, make diagnosis certain, *vide* Chapter XVII.

Exceptionally, tuberculosis and blood diseases such as leukæmia or kala-azar are causes of acute fever without symptoms. A full blood examination will detect the cause in such cases.

Group 2. Recurrent bouts of fever in a child in India are particularly prone to be considered as malaria, but we are sure that the **majority of these cases are of alimentary origin**, and what used to be described as mucous disease, that is, chronic gastro-intestinal catarrh associated with clogging of the liver functions. These cases are extremely common in India and are often cyclical, the mother narrating that her child every four to six weeks has an attack of fever with bilious vomiting, constipation, or slimy offensive stools, *vide* Chapter XXXVI. Another cause of recurrent fever is **tonsillar sepsis**, crypts and enlarged infected tonsils becoming blocked. If a child has once had a *B. coli* infection, it is not uncommon, subsequent to constipation or intestinal upset, for a relapse of the pyelitis to occur.

Group 3. Prolonged fever of low degree, usually at night time or in the afternoon of 99 to 100 degrees, is not at all uncommon in the East and may cause great anxiety to a parent. In our experience, when no obvious

cause is present, the **commonest site of infection is the tonsil**. We have notes of cases of low fever for over two years where eventual removal of the tonsils, though apparently small, proved them to contain many loculi of pus with streptococci and staphylococci. Of course, in such a case of prolonged fever, every examination of blood, urine, fæces, including X-rays should be done. In some cases, however, even after the removal of the tonsils, fever has not subsided; in such cases it is probable that the fever is due to instability of the heat regulating mechanism of the brain. **There is no cause for anxiety provided the child is growing and his health is not deteriorating.** Latent tuberculosis may be the cause of such a fever, but as a rule this latent type is a benign disease out of which the child grows. It may not be out of place here to remark that despite so-called negative examinations of the fæces as to the presence of **intestinal parasites**, that we have frequently found that a three or four days course of santonin and calomel, of each grain one, has eradicated parasites and stopped the so-called obscure fever.

CHAPTER XVI.

TYPHOID OR ENTERIC FEVER.

Typhoid fever is a continued fever of some three weeks' duration, manifesting a wide variation both in severity and duration. The symptoms and manifestations of the disease are due primarily to the invasion of the bowel by the typhoid bacilli and the production there of extensive ulceration. In infancy and early childhood, this ulceration is not produced to any great extent, consequently the symptoms tend to be rather those of a blood infection. As the age increases, the disease in type gradually approaches that of the adult. Up to the age of two, the disease is in no way characteristic and can only be diagnosed with certainty with the aid of laboratory tests. The symptoms at this period are a high irregular temperature with diarrhoea, and often vomiting.

From the ages of two to six the more typical typhoid of children is seen. After the age of ten, there is a tendency to the adult type with all its severity and with the danger of perforation of the bowel and hæmorrhage.

The bacillus of typhoid fever is introduced by the mouth. **The discharges of the patient, urine and motions are swarming with bacilli. The infection is conveyed by food and water** which has in some way become contaminated with germs discharged from a patient, sometimes borne on the feet of flies. **Typhoid is therefore, in well regulated establishments, a preventable disease.**

The dejecta of the patient may remain infective, that is, they may contain living bacilli for many months or even years after recovery, though happily this is unusual.

This is a matter of importance as carriers, that is, **persons recovered from the disease, but still passing living bacilli, may be responsible for the spread of infection.** One attack usually confers a lasting immunity.

The period of invasion is from 1 to 3 weeks; during **Incubation.** the latter part of the incubation period the patient may exhibit some lassitude and loss of appetite.

The onset is, as a rule, insidious, the child is slightly **Onset.** feverish, complains of headache and is apathetic. There is a gradual increase in the intensity of the symptoms and a step-like progress upwards of the temperature with slight morning remissions, reaching 103 to 104 about the end of a week. On the contrary, the onset may be abrupt and the true "typhoid condition" reached rapidly.

At the end of the first week the temperature has reached a high level which is likely to be maintained for ten days or more. This stage is sometimes called the stage of eruption owing to the common but not invariable appearance of a rash.

The rash consists of a few small slightly elevated **Height or** rose pink spots, disappearing on pressure, commonly **attack.** seen on the abdomen, less commonly on the chest and back. These spots tend to appear in crops, and last 3 to 4 days.

The signs and symptoms are now fully developed:—

The tongue is thickly furred white with a tendency to brown, red at the tip and sides.

There is a cough and slight bronchitis.

The abdomen is somewhat puffy (in the adult it is known as the expressionless abdomen, owing to the loss of the outlines of the muscles and general shape), there is gurgling and some tenderness in the lower right quadrant.

The bowels are seldom regular, there is either constipation or diarrhœa with greenish yellow offensive motions.

Nervous system. The child is apathetic and drowsy. There is a tendency to delirium of a low type at night.

The pulse tends to be slow in proportion to the temperature, particularly in the early stages.

Emaciation and weakness advance apace.

After a varying period from 14 to 20 days from the **Deferves-** beginning the fever starts falling gradually towards **cence.** normal though there is not infrequently a disappointing tendency to a persistent evening rise for some days. The cause of this is not always clear, but in many cases it is due to a **mild urinary infection.** In those cases in which the temperature persists for a longer period,

there is often a change in type on the temperature chart, suggesting that some secondary infection is at work.

As said above, there is a marked variation in the severity of the disease, the very young usually escape the more severe form. There is not the same liability to the two dread complications, hæmorrhage from and perforation of the bowel, though the tendency to such mishaps increases as age advances. In the more severe form all symptoms are exaggerated, the tongue is brown and dry, the pulse is feeble, the child is virtually unconscious, and mutters feebly to himself. Deafness is common, **bronchitis is severe, so severe that it may obscure the other features of the disease, and pneumonia may develop.**

Fever.

The typical typhoid chart is the most characteristic feature of the disease. In the first week it is ladder-like, gradually rising with daily remissions till at the end of a week the fever reaches a high level from 103 to 105, which level is maintained for a variable period, during which there is only a slight diurnal variation. As the case progresses the remission becomes more and more marked until, with gradual descent, the temperature reaches normal. The evening temperature reaches the normal some two or three days later (*see* Chart).

Diagnosis.

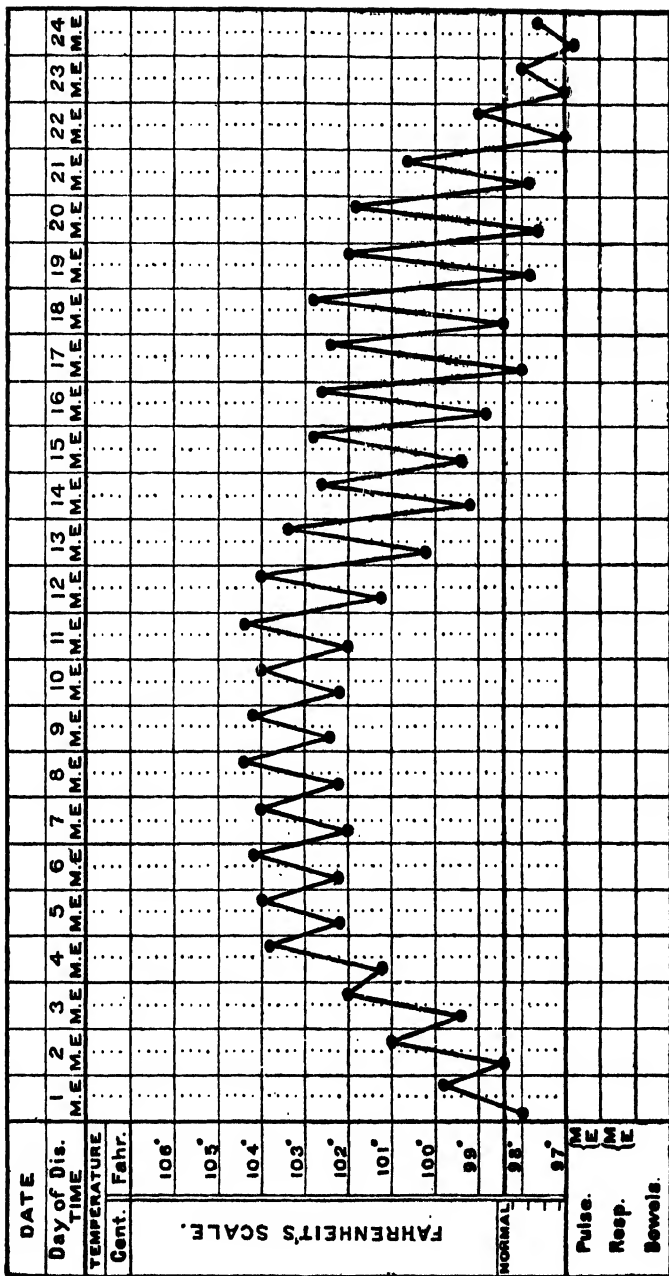
The diagnosis is, as a rule, not difficult after the lapse of a few days. Commencing in the same way as other fevers, immediate recognition is not possible, but certain distinguishing characteristics will develop. **The early languor and drowsiness, the steadily rising temperature, the abdominal distension, diarrhoea, headache, nose bleeding and occasionally the rash.**

The diagnosis may be hastened by recourse to laboratory assistance. In the first week the bacteria may be cultivated from the blood and stools. After this the agglutination test on the blood will afford enlightenment. The amount of blood required is small and may be taken without causing distress to the child.

The disease with which typhoid fever is most likely to be confounded are:—

- (1) Bacterial infection of the urinary tract. Pyelitis.
- (2) Persistent diarrhoea of intestinal dyspepsia with fever.

The Temperature Chart of a case of Typhoid Fever.



- (3) Miliary tuberculosis.
- (4) Kala-azar in the early stages.

THE TREATMENT OF TYPHOID FEVER.

In this disease **nursing is all important, at least as Nursing.**
important as medical treatment. The aim of the nurse should be to ensure absolute tranquillity, to guard the child against all exertion, bodily or mental, to encourage sleep, and to see that adequate diet is taken. Special attention must be paid to the prevention of bed-sores and the care of the mouth, though all unnecessary movement in the performance of the toilet must be avoided.

The proper adjustment of the diet presents diffi- **Diet.**
 culties. The patient **must not be starved and left defenceless to the attack.** The middle way must be found, on the one hand there is an increased destruction of body material to be compensated and on the other, the bowels are in a state of irritation or even ulceration, so that the choice of food and the quantity must be limited. Only small quantities are permissible at one time as any degree of distension of the stomach will set up sympathetic movements of the bowel, which movements will react adversely on the inflamed areas.

Feeding should be three-hourly except during sleep. It is quite out of the question to lay down hard and fast rules as to diet, each case must be judged on its merits, special points to be noted being the presence or absence of **distension of the abdomen, diarrhoea or discomfort.** The basis of the diet should be milk, or, if diarrhoea is present, skimmed milk or whey, but the diet need not, indeed should not, be limited to this. The milk should be well balanced by easily digested carbohydrate food such as Mellin's food, baked flour. Cereals such as oatmeal with husk, will be studiously avoided.

Glucose is a valuable addition to the diet, and may be given either by the mouth or as a rectal feed.

Under medical advice the diet may at times be expanded and such articles as eggs, soufflés, jelly, custard, bread and butter, toast and mashed potatoes be given. Provided that the articles are administered in such quantities as can be thoroughly digested, they will reach the intestine in no less liquid form than will milk diet.

Beef tea and chicken soup make pleasant addition to the diet and stimulate the appetite, but contain little

nourishment and are best avoided if there is diarrhoea.

When there is much gurgling, abdominal distension or diarrhoea, fully predigested skimmed milk should be used.

Water or barley water may be allowed as desired, cold or even iced, but in moderate quantities at one time.

An estimation of the daily caloric value taken will be of assistance in keeping the diet up to the standard required. The daily requirements, allowing for tissue waste, will be little less than that of the normal child of the same age.

MEDICINES.

There is no specific remedy for typhoid fever, the aid of drugs must be sought as the symptoms indicate.

In general, an alkaline fever mixture will be of value, but the more potent antifebrile drugs should be avoided.

Various antiseptic drugs have been used in the hope of disinfecting the bowel, but their value is doubtful, Carbolic, Iodine or Dimol.

Fever.

In typhoid fever, the **prolonged high temperature leads to exhaustion.** The fever is more likely to constitute a danger from its duration rather than its intensity at one time. Accordingly, in order to reduce the exhaustion to a minimum, efforts should be made, by means of the bath or sponging, to keep the temperature at or below 103. Full details of the methods at our disposal will be found in Chapter XIV. Hæmorrhage from the bowel or abdominal distension is to be regarded as a definite contra-indication to the bath.

Diarrhoea.

Diarrhoea of moderate severity should be left unchecked, though it is an indication for care and readjustment of the diet, especially for the reduction of the fat content. A severe diarrhoea entails the constant exaggeration of the normal movements of the bowels. Just as in any other inflamed area rest is of the greatest importance, because such movements are prone to increase or prevent the subsidence of the inflammation. Such diarrhoea therefore needs checking. A bismuth mixture with small doses of tincture of opium one minim for every year of the child's age in the 24 hours, with the same quantity of belladonna should be given.

Constipation.

Constipation is a troublesome feature in many cases, though it is usually a sign of a mild attack.

Purgatives must never be given, but medicinal liquid paraffin, which acts merely as a lubricant, may be administered without fear. Attempts should be made to ensure at least one action on alternate days by means of a saline washout or an enema of soap and water to which an ounce of olive oil has been added.

Restlessness may often be allayed by tepid sponging, the temperature of the water being about 98°F.

An adequate amount of sleep must be ensured, if necessary, with the aid of sedative drugs, Bromides, Chloral or Chloramid. **Sleep.**

Stimulants may be demanded by the prostration, the feeble tongue, the apathy or low delirium. For the routine stimulant, brandy will be found the most satisfactory (*see* Chapter XIV). Hæmorrhage from the bowel calls for special and prompt treatment. The following are the main principles: **Stimulants.** **Hæmorrhage.**

- (a) Absolute rest. No movement of any kind.
- (b) Morphia injection. Dose according to age.
See appendix.
- (c) Ice-bag suspended from a cradle over the abdomen.
- (d) Calcium Chloride Injection, Intramuscular, Gr. 1 in 1-100 solution.
- (e) Do not give stimulants.
- (f) Ice or iced water to drink as necessary, but the less that is taken the better.

The signs of this catastrophe, fortunately uncommon in the very young are:—sudden pain, collapse with a fall in temperature and accelerated pulse-rate and increasing rigidity of the abdomen. The only hope of saving the patient lies in prompt surgical operation. **Perforation of the Bowel.**

Since the use of **antityphoid inoculation**, the incidence and intensity of the disease has been much reduced. The vaccine commonly used carries protection against Typhoid, Paratyphoid A and B. **Prevention.**

It is unusual to inoculate subjects under four years of age. The dose for a child over four is about 1/6th that of the adult and for a child of eight 1/3rd.

In the sick room, special precautions are desirable to prevent the spread of the disease.

(1) All excreta of the patient should be treated with strong Lysol.

(2) The vessels and utensils used by the patient should be kept separate and not allowed to leave the

sick room. They should be washed in water to which sufficient potassium permanganate has been added to turn the water bright pink.

(3) All bed clothing after use by the patient should be steeped in disinfectant, carbolic or perchloride of mercury.

(4) Flies must be rigidly excluded from the room.

(5) The attendants should exercise special care after handling the patient. In the sick room they should wear a long coat or gown which must be changed before they sit down to a meal. The hands should be thoroughly washed in some such disinfectant as perchloride of mercury.

(6) In the interests of others it is desirable that the stools and urine of the patient after convalescence, be examined bacteriologically for the presence of living bacteria. As has been said above, these organisms occasionally persist for a long time, and in their presence, special precautions must be observed.

PARATYPHOID A AND B.

These two fevers of the same group usually in the young patient run the same course as that of typhoid and are indistinguishable from it save by laboratory tests. The treatment is on the same lines.

CHAPTER XVII.

B. COLI INFECTIONS IN INFANTS AND CHILDREN.

Children in the tropics suffer more frequently from affections of the genito-urinary system than they do in the west. For instance, it is by no means uncommon for a mother to bring her child to the doctor with the tale that it is passing **gravel**, or that the napkins are mahogany coloured, or that there is a marked deposit **Gravel.** in the vessel. Such signs or symptoms as these are as a rule seen in a child whose liver and stomach are out of order and of whom the mother will tell you that the child has been languid, irritable and off its food for weeks. Occasionally, the clinical picture is that of primary gastro-intestinal catarrh (*vide* Chapter XXXVI), and the treatment for that condition will dismiss the urinary symptoms altogether. On the other hand, the mother may say that the child **screams when passing urine**, and even actually vomits. In such a case if the urine be properly examined, oxalate or uric acid crystals can be usually detected. These symptoms can as a rule be cured by temporary starvation and regulation of the diet together with fresh lemon squash and 10 to 20 grains of potassium citrate in an ounce of water every two hours.

Rarely, an infant or child may actually develop a **stone in the kidney** which may descend via the ureter to the bladder and set up intense spasm of the bladder, and even at times block the urethra. Such a case will need expert opinion and care.

As we have said in Chapter XV, **B. coli in the urine may be one of the causes of obscure fever in children**, and it is well to remember that this bacilluria may be **chronic**, associated with only a low degree of daily fever, such as 99 to 100 degrees. This type of case we have found is nearly invariably a part and parcel of chronic gastro-intestinal disturbance and one can only suppose that due to the catarrh and possible fretting of the mucous membrane, some of the teeming millions of **Chronio B. coli.**

germs in the bowel pass directly to the kidneys. For when treatment is adopted for the primary trouble with the addition of potassium citrate to a mixture, the fever quickly subsides.

Acute
B. coli.

A very different matter, however, is the **acute *B. coli* infection** of the bladder and pelvis of the kidney which is so dangerous, and alarming to all concerned.

These cases are particularly common in the tropics and far more prone to attack female children under the age of two, than male. We have seen a great number of these cases, the youngest being two and a half months old.

Symptoms.

The onset is as a rule sudden with a rigor or very high fever, sometimes a convulsion ushers in the illness. Oftentimes there are no localising symptoms, but it will be observed that the child is extremely irritable and cries out when it is touched. It may refuse all food and vomit everything it is given. When not being attended to, it is drowsy, and it may be noticed that the eyes tend to squint; frequently the abdomen is distended and the mother may state that the stools have been constipated or have contained greenish slime during the last few days.

The child is obviously very ill and if a correct diagnosis be not made, the fever with intermittent rigors, vomiting and attacks of sudden collapse may continue for days or may be weeks until a fatal issue terminates the case.

It is all important to bear in mind that although this disease is primarily one of the genito-urinary system, **there may be no symptoms whatever of bladder disturbance.** But if in such a case of unaccountable high fever a sample of the urine can be obtained in a clean mackintosh for a baby, or a vessel in the case of an older child, it will be found that the **urine is highly acid and contains pus cells**, and if this urine be placed in a test-tube and boiled, a distinct trace of albumen is demonstrable.

The presence of pus cells, ten or twenty to the field, in a non-catheter specimen is, we consider, pathognomonic evidence of *B. coli*. This fact is of great importance for it is almost impossible to procure a catheter. Specimen from a very sick baby which can be utilised for the culture of the actual organism.

Diagnosis.

It is all important constantly to bear in mind the possibility of *B. coli* pyelitis in an infant or child with high fever, rigors, vomiting and collapse, for in the tropics the natural error is to presume that the child has malaria and since in early severe malaria there are no early localising symptoms such as an enlarged spleen, and there are frequently convulsions and cerebral complications due to blocking of the cortical capillaries, the mistake is perhaps excusable in the mofussil where microscopic blood examination is not possible, **but the error is one which may cost the baby its life**; for in our opinion, *B. coli* pyelitis in infants is far more common than malaria and the treatment of such a case by quinine, which is an acid salt, is the exact antithesis of that for *B. coli* infection.

Some of these cases we have seen diagnosed as **tuberculous meningitis** because of the squinting, the irritability, the vomiting and abdominal symptoms. Others have been labelled **typhoid fever** because of the long-continued remittent fever with loose, slimy stools and great prostration. Diagnosis.

At other times we have heard that the fever was due to **teething**, particularly the eruption of the eye teeth.

Sometimes, because a blood film has been taken and sent to a distant laboratory and marked leucocytosis is present, in the absence of malaria parasites, we have known these cases diagnosed as **acute hepatitis** because there was tenderness in the upper abdomen.

Very occasionally, the diagnosis has been made tentatively of **kala-azar** because of the remittent fever with some enlargement of the spleen which of course is not uncommon either in rickets or some purely tropical intercurrent disease.

A mother or doctor should remember the frequency of this disease particularly in young female children in the tropics. Because there are convulsions or rigors or collapse, they should not leap to the conclusion that malaria is the cause. **Every endeavour should be made to procure at the earliest moment a specimen of the urine for examination as to the presence of pus cells and a trace of albumen. A blood film should be taken and if possible, examined by an expert for the presence of malarial parasites or excess of leucocytes. *B. coli***

infections are always associated with a high degree of leucocytosis and increase of the polymorphonuclear cells, whereas in malaria there is perhaps only an excess of mononuclear cells.

Differential diagnosis.

The very abrupt onset of this serious disease is unlike **typhoid fever**, moreover, by the seventh day a Widal reaction will be obtainable from the blood.

Tuberculous meningitis is as a rule a rapidly fatal disease and the child becomes comatose and dies despite all treatment, the urine and blood findings being negative.

Dentition fever is in a sense a half truth in that in many cases due to injudicious feeding, the health of the child suffers and hence at the teething time has less resistance to attacks by organisms which may invade the blood and kidneys either from without, or from the bowel.

Prognosis.

The importance of making a correct diagnosis by every means available is made most obvious when one considers the prognosis, for if the **treatment is efficient** and continued intensively for a few days, **recovery in these cases is as a rule rapid and complete**, but if such symptoms as these children suffer from are wrongly diagnosed, and assumed to be malarial and treated as such, the mortality is rapid and great, for quinine apparently acts as a renal irritant and cerebral excitant—convulsions and anuria terminating the case.

Treatment.

The essential treatment of *B. coli* pyelitis is that of saturating the child with potassium citrate with or without the addition of bicarbonate of soda. Our experience leads us to consider that a minimum dose of 10 grains of potassium citrate together with 10 grains of dextrose (pure powder) every two hours, night and day in water is the best means of **rapid alkalisation of the urine**, and not until the urine is thoroughly alkalisied (by testing it with litmus paper immediately after it is passed) are these doses reduced to four-hourly and then three times a day.

It will be found that the temperature tends to subside as a rule after 48 hours, but the drug must be continued for at least a week or ten days for relapses are common. Sometimes potassium citrate and

dextrose set up diarrhoea or vomiting; if this is so, no alarm need be felt, but bicarbonate of soda alone in place of the potassium citrate may be substituted.

If the urine be examined during or after such lines of treatment, the pus cells and albumen will be found to have disappeared.

During the early stages of treatment, it is essential that the child should drink as much fluid as possible, both with the alkaline medicine and between times. Alkalini-
sation.
We think it is best for the first 48 hours that the child should take nothing but barley water or rice water which has been sweetened with fractional doses of saccharine. *Dhab* water or fruit juice is, however, permissible.

If there is distension, the alkaline should be given alone without any dextrose.

Occasionally, these children have **foetid, green, slimy, stools when first seen.** As castor-oil will not be tolerated, the wisest course is to give one-tenth of a grain of calomel (Burroughs and Welcome tabloids), one tabloid every half hour for five hours, and follow this up with a bowel wash.

In the majority of cases, it is remarkable to see how quickly symptoms of the most desperate nature will clear. The temperature drops, irritability and photophobia cease and the urine becomes abundant and clear. There are, however, some cases which for a reason not as yet understood, do not so readily react to this alkaline treatment. Therefore, if in any case you are sure of your diagnosis and there has been no response to a conscientious and systematic two-hourly alkaline dosage as above, for 48 hours, we would advise that trial should be made of urotropin in 2-grain doses with acid sodium phosphate 6 grains every four hours in water, and if the stools are offensive 2 grains of salol may be given in powder form four-hourly also.

After many years of experience we have found that it is no uncommon thing for practitioners to alternate the above alkaline and acid treatment at the same time and on the same day. **This is an error of judgment** and we would earnestly conjure them to commence treatment in every case with the alkaline dosage as directed, and only if after 72 hours there is no benefit, would we counsel giving urotropin, for experience has proven that,

while there is fever the alkaline treatment is the ideal one in the tropics.

We would remind them that potassium citrate alone, or with dextrose, mixed with water, is as a rule more palatable and less often rejected than when given in a prescription combining the usual diaphoretics.

If there is **collapse**, brandy is perhaps the best of all stimulants. Should convulsions occur or threaten, with the high temperature, we give a powder of Dovers powder and aspirin of each one to two grains.

Some authorities are in favour of giving five to ten million doses of an autogenous **vaccine**, that is, a vaccine prepared from the germs grown from the child's own urine, but our experience of these cases does not make us enthusiastic on this line of treatment, and although we have used this treatment in acute as well as chronic cases, we are of opinion that little, if any, good has ever resulted from it; moreover, the needling excites anathema in the infant.

When the child has completely recovered, it is well that the mother should realise that sporadic attacks of high or low fever, possibly **due to recurrent *B. coli* infection**, are not uncommon in the tropics; therefore an alkaline course of treatment on Saturdays and Sundays for a few months is a wise procedure. We would remind mothers and practitioners of what we have stated at the beginning of this chapter, namely, that ***B. coli* infections of the kidney and bladder are most often part and parcel of chronic constipation or dietetic errors which have given rise to chronic gastro-intestinal catarrh** (*vide* Chapter XXXVI) and that in the tropics, worms and tonsils and adenoids are fecund causes of gastro-intestinal trouble, and hence when the general resistance of the child has been lowered, *B. coli* infections are not uncommon from the age of six months to six years.

CHAPTER XVIII.

DIPHTHERIA.

Diphtheria is a disease characterised firstly by the production by bacteria of local inflammation and a membrane, usually in the throat, and secondly by severe constitutional symptoms resulting from absorption of poisons produced by the bacteria.

The disease is highly contagious, though not all persons are susceptible; it is not infrequent to find one child in a family affected, while the others escape. Though usually contracted by direct infection, not a small proportion of cases are due to infected milk. The disease can also be carried by inanimate objects such as clothes, toys and books. In certain cases, domestic animals have been suspected as the agent of infection. Owing to the peculiar nature of the bacillus, the source of infection is sometimes hard to trace and the disease to control. There are persons called carriers, who are either (1) Those who have recovered from the disease, but still harbour the virulent bacillus in the nose or throat. (2) Certain immune subjects, in whose throats the bacilli flourish without producing the symptoms of the disease. Yet a third type of disseminator, not strictly speaking a carrier, must be considered; the subject of a mild attack, most commonly nasal in situation, but capable of transmitting the disease in a virulent form to others.

Method of
trans-
mission.

The incubation period is usually from 2 to 4 days.

Diphtheria is more commonly a disease of childhood, the highest proportion of cases occurring between the first and fifth years, though infants up to one year of age tend to escape owing to a natural immunity. The disease, unlike most infectious diseases, does not prevent a second attack, though there is immunity for one or two years.

Period of Infectivity. The subject of Diphtheria is capable of transmitting the disease to others as soon as becomes manifest or even earlier, as the bacteria may be harboured in the throat for days before symptoms develop. Usually the bacteria disappear from the

throat within 2 to 4 weeks and the patient ceases to be infectious. Occasionally, however, though all traces of illness may have passed, the bacteria persist in active form for weeks or even months. It follows that the **period at which the patient may be considered free from infection depends not so much on time as on the result of bacteriological examination.**

If procurable, a Bacteriological report of a throat swab is essential. But if it is not obtainable and the clinical picture is that of Diphtheria, there should be no hesitation in treating the case at once as Diphtheria, for to do so may cut short a virulent infection whereas to delay may spell disaster or tracheotomy. The immediate injection of Antitoxin has reduced the mortality of this disease to 5 per cent. Delayed or non use means a mortality of 20 per cent. in Bengal.

Onset.

The period of onset is marked by the symptoms common to most fevers, there is headache, lassitude, loss of appetite and possibly vomiting, in the very young there may be convulsions. Though the patient may not complain of sore throat, the tonsils and the back of the throat are injected and may present a curious sneary or gelatinous appearance. The glands in the neck are enlarged. Within twenty-four hours, the

Course.

general symptoms have increased, the temperature is 101 to 102, with a rapid, often feeble pulse and considerable prostration. **The degree of prostration and the rapidity of the pulse are out of proportion to the height of the temperature,** an important characteristic of the disease. The child lies pallid and save for involuntary restlessness, makes no effort to move. On one or both tonsils may be seen yellowish or greyish white patches which quickly spread and coalesce forming the false membrane. This membrane is with difficulty detached and if detached leaves a raw bleeding surface which is quickly covered once more. The membrane if starting on one tonsil, may spread across the posterior edge of the soft palate and uvula to invade the other tonsil. The surrounding tissues in the throat are red and swollen, the enlargement of the glands in the neck becomes more marked.

At this point, the further development of the disease will depend to a great extent on treatment: **if antitoxic serum is given early and in adequate doses, improvement may be expected within 24 hours or even**

in 12 hours. The membrane instead of spreading may shrivel and begin to separate, leaving an **ulcerated** surface, and the general symptoms abate. Failing adequate treatment, the disease may manifest two of the dread conditions of diphtheria, heart failure and laryngeal diphtheria.

The poison of diphtheria has a special affinity for the nerves and muscles of the heart, and it may be taken as an axiom that in **every case the heart is affected to some degree and it is to be remembered that the majority of deaths are due to heart failure.**

Heart failure may supervene at all times; it may occur during the height of the disease or it may occur during convalescence. It may be of gradual onset, ushered in by vomiting or abdominal pain, the child becomes pallid or grey, the pulse become more rapid and weak, or there may be that alarming symptom of the slowing of the heart rate to below the normal.

Heart failure may be of sudden onset, perhaps during some slight effort of the child, the raising of the head or the passing of a motion. At a later stage, even up to the third or fourth week, there is liability to failure under undue exertion. Cases of sudden death in the supposedly convalescent have been recorded and such records should serve as a warning and a guide.

Laryngeal Diphtheria in the majority of cases, is secondary to faucial diphtheria, and results from the direct extension of the membrane into the larynx or even lower. Such an extension usually takes place on the 4th or 5th day of the disease and is heralded by a **change in the voice or cry and a persistent husky cough.** Happily, with the introduction of antidiphtheritic serum, this dangerous and highly distressing condition can, in the majority of cases, be averted. Laryngeal diphtheria is dangerous for two reasons: firstly, by extension of the membrane and multiplication of the bacteria, more poisons are formed; secondly, the airway is obstructed, not only by the membrane, but by oedema and swelling of the larynx, leading to the danger of suffocation. Such danger quickly becomes apparent, the face of the patient is anxious and dusky, there is noisy inspiration and expiration, and the movements of breathing are violent and forced with retraction of the space between the ribs. **At this stage, the only treatment is tracheotomy, not only to avert suffocation, but**

Laryngeal
Diphtheria.

to relieve the already overtaxed heart from the effects of partial strangulation.

Complications.

The most frequent complication is Broncho-pneumonia which may arise at any stage of the disease.

Nephritis is also not uncommon, but is usually of a mild character and leads to no permanent damage.

Diphtherial Paralysis.

During the 3rd or 4th week or earlier in the course of a severe case, or one which has come under treatment late, it may be noticed that there is an alteration in the voice, the patient "speaks through the nose" and some part of liquid swallowed flows back through the nose. If the palate is observed while the patient says AH, it will be seen that there is no movement, in other words, paralysis has set in. The knee-jerks are absent, otherwise there may be no other signs. Paralysis may extend to the muscles of the eyes causing squint, to the muscles of the throat so that speaking and swallowing become difficult. In more severe cases the muscles of the limbs, or even of respiration, are affected.

Diagnosis.

From Tonsilitis. In diphtheria, the illness and the rapidity of the pulse are extreme compared with the degree of fever.

The patches on the throat are not confined to the tonsil but tend to spread across to the other side.

The knee-jerks are absent.

There is usually albumen in the urine.

From Croup.

In croup, there is no membrane in the throat and the obstruction to respiration is paroxysmal rather than constant.

Nasal diphtheria.

Nasal diphtheria demands special mention as a condition liable to pass undiagnosed, so that the patient is a potential source of danger to others. Unless associated with faucial diphtheria, the general and constitutional symptoms are mild but the disease tends to run a prolonged course.

A persistent, irritating purulent discharge from the nose, especially if accompanied by bleeding or the passage of clots, should arouse suspicion. Examination may reveal the presence of a membrane in the forepart of the nasal cavity.

Diphtherial membranes are occasionally from elsewhere, on the conjunctiva of the eye, the vulva or on the surface of wounds.

Treatment is directed firstly to the neutralisation of the toxin by antitoxin, and secondly to the maintenance of strength, the protection of the heart and to dealing with such symptoms and complications as may arise. Treatment.

The power of the antitoxin to avert a fatal issue is some ten times greater if administered on the first day of the disease than if administered on the fifth day or later. Delay even of a few hours is of importance as the antitoxin can neutralise the toxin as it is formed, but cannot undo its effects once it has acted on the cells of the body. The dose of antitoxin does not depend on the age or size of the patient, but on the amount of toxin which is to be neutralised, that is to say on the severity of the attack and the day of the disease on which it is administered. For a mild case of nasal diphtheria 8,000 units will probably suffice, for the average case from 20,000 to 30,000 units. In cases of great severity or when there has been delay, as much as 50,000 units may be required. At the outset eight to ten thousand units are administered hypodermically or intramuscularly; if there is no improvement, or if the disease is progressing, this is followed by an injection of 8,000 units after twelve hours and if necessary a third or more after a similar interval. Diphtheria
Antitoxin.

The dose of serum used as a protective measure for those exposed to infection is for a child under one year of age 500 units, for those over one 1,000 units.

The patient after heavy doses of serum, not infrequently develops skin rashes, either of the measles or nettlerash type. A second form of reaction is the development of Arthritis, the joints become swollen and painful. Such reactions need not call for alarm and are indeed regarded by some authorities as of favourable import. Serum
Reactions.

The Prevention of Heart Failure.

The patient must be kept carefully at rest, he must be allowed to do nothing for himself and must not raise the head from the pillow in the acute stage.

Stimulants will be indicated early, of which the most valuable are brandy, strychnine, adrenalin and caffeine. **Digitalis** may be required if there is extreme rapidity of the heart, but must, of course, on no account

be used if the pulse-rate is slowed. In view of the fact that the danger of heart failure is still present in the 3rd or 4th week, convalescence must be gradual and, except in the mildest cases, there must be no question of leaving the bed till this period has elapsed. Progress must be permitted entirely according to the observations on the pulse and blood pressure and, until it is clear that some slight advance has been made without signs of unfavourable reaction on the heart, no further advance should be made. The average mild case may be propped up in bed after three weeks and sit up after four; more severe cases must remain in bed for from 6 to 8 weeks.

Local Treatment.

Local treatment must be carried out with caution and without undue disturbance of the patient; on no account must there be struggling or active resistance. Perhaps the most satisfactory application is in the form of a watery spray, 25 per cent. Magnesium Sulphate, used 2 to 4 hourly according to conditions.

The mouth also should be cleansed with some pleasant tasting wash such as Glycothymoline, Lysterine or Potassium Chlorate solution disguised with Tincture of Myrrh.

The glands in the neck may be protected with cotton-wool, but should not be fomented unless there is difficulty in breathing.

The steam kettle, employed for ten minutes at a time, will give comfort, especially in hot dry weather. Carbolic acid, twenty minims to the pint of hot water, should be added.

Diet.

Food must be administered with great caution; on the one hand the strength must be maintained, on the other, there is a particular tendency to dilatation of the stomach. Food must therefore be small in quantity at each feed, preferably not more than four ounces, easily digested. During the acute stage, peptonised milk to which a malted food such as Mellin's has been added, will be found the most suitable.

For general directions as to diet, the reader is referred to Chapter XIV.

During convalescence, iron tonics and Cod-liver oil should be given, and the child guarded for some months against undue fatigue.

Strychnine is regarded as having peculiar value in this condition. It may, with advantage, be combined with Hexamine as follows:—

**Treatment
of Para-
lysis.**

Hexamine grs. $\frac{1}{2}$
Tinct. Nucis Vom. m 2.
Aq. ad 1 drachm

three times a day for a child of two.

Feeding, in the case of paralysis of the throat muscles, must be carried out by means of the nasal or stomach tube.

Some doubt has been thrown as to the value of serum when administered for the first time to the subject of diphtheritic paralysis. The consensus of opinion is in favour of its use and the authors have seen some very remarkable recoveries attributable to its influence.

**Antitoxic
Serum.**

This may present a serious problem as it is obviously undesirable to allow the convalescent patient, if there are still active bacteria in the throat, to mix with others. As mentioned above, the bacteria usually disappear quickly from the throat, but occasionally persist. In such cases the throat should be painted four times a day with resorcin or iodine paint and, if the tonsils are ragged or pitted they should be removed after a period of not less than three months' convalescence.

**Treatment
of Carriers.**

In the case of nasal diphtheria, strong antiseptics cannot be applied, but a nose wash of sodium chloride one drachm to the pint of water, will assist in clearing up the condition.

Except in the case of grave emergency, an operation should not be performed on a child who has recovered from diphtheria, until at least three months have elapsed.

**Operations
and Diph-
theria.**

The Schick test was devised with the object of determining the susceptibility of the individual to Diphtheria. The test has considerable practical value in detecting those, in a community exposed to infection, who should be immunised and in selecting attendants for diphtheria patients.

**Schick
Test.**

The test consists of injecting the layers of the skin a small quantity of two solutions, the one a standardised fresh solution of diphtheria toxin, and the second, a control solution, for purposes of comparison: the same solution, but the toxicity destroyed by heat.

The positive reaction appears after some 24 to 36 hours and indicates that the subject is susceptible and, if recently exposed to infection, requires temporary immunisation by the injection of a prophylactic dose of antidiphtheria serum.

The tests carried out in a large number of subjects show that the numbers of those immune are as follows:—

Before the age of three months, 85%. During the 1st year, 40%.
2nd year, 30%. Adults, 80%.

The test is also of importance if virulent bacilli are found in the throat of an apparently healthy subject. A positive Schick test indicates that clinical diphtheria is about to develop and that the early administration of antidiphtheria serum is necessary. A full description of the technique is to be found in Beaumont and Dodds' "Recent Advances in Medicine"

CHAPTER XIX.

WHOOPIING COUGH.

Whooping cough is an infectious disease, appearing in epidemic form, characterised by periodic, spasmodic attacks of coughing often culminating in vomiting.

The disease spreads by direct transmission by the patient, the incubation period being 7 to 14 days. One attack, with few exceptions confers permanent immunity. Incubation.

Strict isolation should be enforced from the beginning, particularly should young infants and delicate children be guarded against the possibility of infection. To risk the spread of this disease by careless isolation is little short of criminal, as it is, not as is commonly supposed, a mild disease inevitable to childhood, but on the contrary, one of the most fatal diseases of early childhood. If serious disease.

The date at which the patient becomes free from infection is difficult to fix, as the characteristic manifestation of the disease, the whoop, sometimes persists irregularly for months, but it is generally considered that **not less than six weeks from the commencement of the illness should be allowed for the infection to die out.**

Whooping cough is most common before the age of three, even **the youngest infants are susceptible:** after the age of six the frequency diminishes, till, after twelve an attack is unusual. Age incidence.

The course of the disease may be divided into four stages:

(a) The period of incubation during which there are no manifestations.

(b) The stage of catarrhal invasion during which the symptoms are those of a common cold with sneezing, running of the nose and eyes, cough and some fever. The transition from this stage to the spasmodic stage, in which the cough assumes the character which gives the disease its name, is of variable duration, from two days to 3 to 4 weeks, the period being shortest in the very young. **In some cases the true "whoop" is never**

heard, but the periodic attacks of apparently causeless coughing, leading to breathlessness, blueness and vomiting, will render the diagnosis clear.

Whooping.

The catarrhal symptoms abate but the cough becomes intensified, especially at night or under stress of excitement, till the true attacks of "whooping" become manifest. Each attack consists of a series of short explosive barks, so rapid that no breath can be drawn till the final crowing inspiration, the whoop, affords relief. During the attack, which may last from half a minute to 2 or 3 minutes, the face becomes purplish, the eyes red and the veins of the head and neck stand out. Vomiting, especially if the attack takes place soon after a meal, is likely to follow and a quantity of sticky mucus is ejected. This vomiting is purely mechanical, is not accompanied by nausea, and does not affect the appetite; indeed, the child may ask for more food to take the place of that lost.

After a severe paroxysm the child is confused and exhausted, but quickly regains his normal state and returns to his play.

From the time the first whoop is heard, or the first paroxysmal attack takes place, aggravation may be expected for about a week, after which the disease may continue in varying severity for from 3 to 6 weeks, when the stage of decline begins. As said above, the actual crowing or whoop is not invariable and indeed, in very young children, is unusual.

Stage of decline.

The stage of decline is marked by a diminution in frequency and severity of the paroxysms. During this stage there is commonly some degree of bronchitis which need cause no alarm, though should this develop early in the disease, or at this stage develop to any marked degree, it should be regarded as a complication calling for careful treatment. **Of all complications broncho-pneumonia is perhaps the most serious,** not only on account of the immediate danger, but also on account of the more remote risk of permanent damage to the lung in the form of chronic inflammation leading to fibrosis.

In the very young, the partial asphyxiation incidental to the paroxysm is liable to provoke convulsions. Subjects of this age are further liable to actual asphyxiation.

The occasional bleeding from the nose, the crimson spots on the white of the eye, due to rupture of a small vessel or the occurrence of a "black eye" need cause no alarm.

Apart from complications, the disease, except in the very young or delicate, runs a regular, though possibly distressing course, ending in complete recovery. The child may be considerably pulled down and emaciated after a severe attack, partly from interrupted sleep with nerve exhaustion and partly owing to the interference of adequate nourishment by repeated vomiting.

Many forms of treatment have been tried, but so far nothing has been discovered which will definitely cut short the attack. It remains, therefore, for us to alleviate as far as possible the distress of the paroxysms and avert complications.

Treatment.

During the first stage (stage of catarrhal invasion) a careful watch must be kept on the condition of the lungs, and if there is a tendency to bronchitis, this must be treated energetically. Opportunity should be taken to build up the system against the time when nutrition may be impaired by vomiting.

Unless there is fever, exhaustion or some complication, the child need not be kept in bed, and after the catarrhal stage, should take gentle exercise in the open air, provided weather conditions permit. Abundant fresh air is all-important, not only during the acute stage, but also during the stage of decline and convalescence. Experience has taught us that it is among the children in towns that the disease is most severe, runs the longest course and it is among such children, who have not the advantage of dust-free air, that permanent lung damage arises.

Importance of fresh air.

During convalescence a visit to the seaside or to a dry hill climate is desirable, especially if there have been lung complications.

During the paroxysmal stage, efforts are made to reduce the condition of nervous instability by which the attacks are exaggerated. Undue excitement, over-fatigue and heavy meals are studiously avoided. Sedative drugs are administered with the object of moderating the attacks, of lessening the tendency to vomiting and of securing adequate hours of sleep. Antipyrin with which sodium bromide may with advantage, be combined, has a deserved reputation. For a child of eight

Sedatives.

months, antipyrin grains $\frac{1}{2}$; sodium bromide grains 2 in a teaspoonful of dill-water every two hours, or 6 doses in the twenty-four hours. For a child of 18 months, antipyrin grains 1 to $1\frac{1}{2}$ with three grains of sodium bromide and so on, the dose being cautiously increased according to age.

Tincture of belladonna may be substituted for antipyrin; children as a rule tolerate this drug well, but as the doses required are somewhat large, administration, to be safe, must be under medical guidance. Under the same guidance the more powerful drugs, such as chloral, may be given.

Some authorities advocate the use of quinine in doses of grain 1 for every year of the child's age up to three grains four-hourly.

Chest rubbing.

The chest is rubbed daily with mustard oil or liniment of camphor or turpentine. This measure should not be omitted as it has an undoubted effect in controlling bronchitis.

Feeding.

The regularity of the meals should be kept as far as possible, but it may be necessary to anticipate the next meal time or supplement the last, when it has been lost by vomiting.

Vaccine.

Of late years, a vaccine has been introduced for the prevention and treatment of whooping cough. This vaccine consists of dead bacilli of the group considered responsible for the disease together with those producing the greater proportion of the complications. This line of treatment holds out great hopes, but so far, evidence as to its true value is conflicting.

CHAPTER XX.

MEASLES AND GERMAN MEASLES.

Measles.

Measles is an acute infectious and contagious disorder characterised by high fever, a well marked rash and symptoms of catarrh of the upper air passages.

The infection spreads direct from the sick person, though rarely it may be carried from the patient to a third person by an intermediary.

The patient is considered to be most infectious during the stage of catarrh, before the rash appears and may be infectious even before that stage. After the rash fades the infectivity gradually decreases.

Second attacks of measles are extremely rare, though authentic cases do occur.

No age is immune, though up to the age of nine months the natural immunity of the infant affords some protection. **The younger the patient, the more severe the attack is likely to prove.**

The stage of invasion is marked by a sense of chilliness, headache, nausea, furred tongue and gradually rising fever. In young children the attack may be heralded by convulsions. The child appears to be suffering from a severe cold in the head, the eyes are pink and watery, there is running from the nose and sneezing, the face is characteristically puffy and the glands in the neck may be slightly enlarged. Onset.

Two forms of eruption are to be seen within the mouth, both are of importance as in some 6/7 of all cases they appear before the skin rash and enable the diagnosis to be made early and thereby to limit the spread of infection. (a) Koplik's spots are small white or bluish-white spots on a reddened base, situated in the mucous membrane of the inside of the mouth at the level of the lower milk molars. They appear some three days before the skin rash and disappear before the rash is at its height. Koplik's spots.

(b) Measles rash on the hard and soft palates. Rash.
The spots resemble those which appear later on the

skin but precede them by some 24 to 48 hours and persist for three or four days. In some cases there is a preliminary rash, in the form of mottling or roughening of the skin, preceding the true rash by some 24 hours. The **true rash appears on the face and neck** whence it spread in a slow wave over the body, along the limbs till finally after 2 to 3 days both hands and feet, including the palms and soles, are involved.

The spots are at first minute, red and not raised above the surface. Soon they become enlarged, raised, so that they can be felt as well as seen, darker in colour and gathered into crescent-like groups. The whole body may be smothered with such groups, showing a marked lack of uniformity in colour, some bright pink, some almost purple, but with clear areas of white, unaffected skin between them. At times the itching is severe, especially at the height of the rash and during the early stage of desquamation.

On the second day of the appearance of the rash there is a noticeable enlargement of the glands of the neck and of the superficial glands of the whole body.

All traces of the eruption, save for a yellowish staining, have disappeared by the fourth or fifth day after its appearance, the fading beginning at the site in which the rash first made its appearance, and sometimes fading on the face, while not yet fully out on the limbs. There follows a period of desquamation up to one week, during which the skin is shed in bran-like flakes.

The total length of the disease, exclusive of desquamation and convalescence, is from 8 to 10 days.

Measles is by no means a trivial disease and there is reason to suppose that, of late years, epidemics have increased in severity. Not only in the acute stage is there the liability to the development of grave symptoms or complications, but the disease appears, in many cases, to undermine the constitution, and may either lay open the road to tuberculous infection, or light up some latent infection already present. **The very young are the most susceptible to the disease, so should be guarded as far as possible from infection.**

Signs of serious significance.

Signs of severity.

(a) **Recession of the rash.** In former years this sign was regarded as evidence of "measles striking inwards" and to this cause was attributed the serious

condition of the patient. The disappearance of the rash is, however, effect and not cause, and is due to circulatory failure and is therefore an indication for active stimulation.

(b) Great prostration with furred tongue and a tendency to delirium.

(c) Duskiess of the rash with a tendency to hæmorrhagic spots.

(d) The persistence of fever after the disappearance of the rash indicating the supervention of some complication.

(1) Convulsions, in the very young, usually occur at the commencement of the disease, they take the place of a shivering attack in older children and are not of such serious import as when occurring later in the course of the disease. Complications.

(2) Lung complications. Some degree of mild bronchitis is almost invariably present during the acute stage of the disease and is to be looked on as an inevitable part of the disease. Not infrequently, however, especially in cold climates or when the patient has been exposed to chill the bronchitis becomes more grave, the breathing becomes hurried and grunting and broncho-pneumonia develop.

(3) Inflammation of the ear. The frequency of this complication varies in different epidemics, and the liability is increased by exposure to draughts. The condition may pass on to serious suppurative disease.

(4) Sore throat, laryngitis not infrequently with croupous symptoms.

(5) Inflammation of the kidney is an unusual but none the less possible complication.

The diagnosis of measles is not difficult bearing in mind the typical puffy face with watery pink eyes, the sneezing and feverishness, **the Koplik's spots and the long stage, four days between the first signs of illness and the appearance of the rash, which passes like a wave over the body.** Diagnosis.

Unlike the early stages of small-pox, there is no abatement of the fever with the appearance of the rash.

The general treatment of measles lies mainly in the **prevention of complications**, particularly lung complications, which, in the average case, constitute the only menace. Treatment.

The child should be confined strictly to bed in a well ventilated room free from draughts; in cold weather the temperature of the room should be kept at about 65 degrees Fahr. Bed clothing should be adequate, but not excessive to a degree to cause increase of the fever. The ears may, with advantage, be protected by a loose woollen cap and the eyes, if sensitive, shaded from the light by a shade.

Diet.

The diet should be adequate and simple, any starvation system should be avoided. The bowels are regulated with the aid of mild saline aperients. The simple fever mixture will help to promote the efficient action of the skin and kidneys.

Should **bronchitis** be a prominent symptom, an expectorant mixture containing creosote is recommended as the mixture may be effective in the prevention of more severe affection of the lung. If, however, in spite of all precautions, **Broncho-pneumonia** does arise, the case will be treated as such on the principles laid down in Chapter XXXIV.

The patient suffering from Broncho-pneumonia should not occupy the same room as other children suffering from uncomplicated measles.

For **laryngitis**, the steam kettle for ten minutes at a time containing Friars Balsam, one teaspoonful to a pint of water, will give relief. For troublesome **cough**, a simple mixture of glycerine, honey and lemon juice, in equal parts, one teaspoonful at a time, will be appreciated by the patient and recourse may be had to a Linctus. (See Appendix.)

Examination of the throat should never be omitted, and should there be a suggestion of a false membrane, it should be examined for the presence of diphtheria bacilli.

Pain in the ear may be treated by a fomentation and warm drops instilled (appendix), but, should the pain persist and the fever rise, expert advice should be invited.

The **eyes** may require attention, they should be bathed twice daily with boracic or saline lotion and, should the lids be stuck together by the dried discharge, they should be smeared along the margins with yellow ointment.

The convalescent child requires special attention. **Convalescence.** As has been said above, measles has a particular tendency to undermine the constitution and parents should not be satisfied till a complete restoration of health, vigour and progress is re-established. The child should, as far as possible, spend the day in the open air, carefully guarded from chills and over-fatigue. The diet should be generous; Cod-liver oil and Iron should be given as tonics.

As measles is so common, infectious and may be so dangerous a disease, any school child with a cough, sneezing, and redness of the eyes should be isolated. **Any child who has been in contact should be examined daily for Koplik's spots** and, should the first case prove to be measles, placed in quarantine for 16 days.

No child, who has recently suffered from measles, should be allowed to mix with others until a month after the onset of the illness.

There is no necessity to destroy books, clothing, etc., which have been used by the patient, but the sick-room should be thoroughly aired and left unoccupied for a week. **Disinfection.**

German Measles.

German Measles is a mild infectious disease, epidemic in outbreak, commonest at the ages of from 5 to 15, though no age is immune.

The importance of German Measles lies in its liability to be confused with true measles, from which disease it affords no protection.

The distinguishing points are:—

(1) The sudden appearance of the rash without or with only the slightest previous illness or catarrh.

(2) The character of the rash. The rash develops rapidly; within twelve hours of appearance, the face, body, limbs, down to the palms and soles are covered. The total duration is from two to four days, sometimes less.

The spots are pale rose in colour, do not form groups, but sometimes run together on the face or on parts exposed to pressure. There may be spots within the mouth appearing at the same time as the rash, but persisting for half a day only.

(3) The temperature usually falls abruptly when the rash is at its height. At the highest, the thermometer seldom registers more than 101 to 102.

(4) The glands at the back of the neck are enlarged and this has been regarded as a distinguishing feature. Too much reliance, however, should not be placed on this sign, as, at the height of the eruption of true measles, the same glands are enlarged.

Recovery is usually complete in 6 to 8 days. Many authorities regard isolation, in view of the mildness of the disease, as unnecessary within the household, unless there are delicate or very young children within the house. Isolation from others, however, must be enforced, as not every one will be found to share these views.

CHAPTER XXI.

SCARLET FEVER.

Scarlet fever is a disease of rarity in India, but periodically limited outbreaks are recorded. In view of the increasing facilities for transport between Europe and India, it is possible that the disease may become more common.

Scarlet fever or scarlatina is a highly infectious disease characterised by a red rash, high fever and inflammation of the tonsils. The disease is commonly conveyed direct from the sick to the healthy, but the infection may be carried by inanimate objects, such as clothes and books, while many epidemics in England are recorded as disseminated by milk. **Infectivity.**

The seat of infection is now regarded as being in the mucopurulent discharge from the nose, throat or ears rather than in the shed scales of skin. The period of incubation is from one to four days, most commonly from three to five.

The symptoms vary greatly according to the intensity of the attack; they may consist merely of indisposition accompanied by the characteristic rash or there may be an onset of such severity that prostration with delirium, and acute septic inflammation of the throat rapidly set in. **Onset.**

In a typical case, the onset is sudden with sensations of chilliness and vomiting. In infants, convulsions may usher in the attack.

The temperature rises rapidly to 103 or 104, with a pulse rate rapid in proportion. Attention is soon called to the throat by complaints of pain or difficulty in swallowing. The tonsils are red and inflamed and sometimes exhibit yellowish patches. At this period, a rash more or less identical with that which develops later on the skin, is to be seen on the palate and throat, spreading to the inner lining of the cheeks.

The tongue at first coated, sheds the fur and presents the appearance known as "Strawberry

Tongue" a red tongue with numerous lighter raised spots on the surface.

Rash. Within twelve to twenty-four hours the rash appears on the neck and upper part of the chest. This consists of a number of minute red spots so closely packed together as to suggest an uniform red blush. The rash spreads over the trunk to the arms and later to the legs. The face shows a comparative immunity, the forehead and area round the mouth stand out white in marked contrast to the blush overlying the rest of the face. The rash itches and there is often swelling of the skin especially over the hands and feet. The duration of the rash is short; reaching its height at the end of the third or the beginning of the fourth day of the illness, it totally disappears by the sixth or seventh day.

Throat. The inflammation of the throat reaches its height at the same time as does the rash. The condition here is of the greatest importance as, **on the degree of the inflammation of the throat would appear to depend the general outlook of the case** and the tendency to the more grave complications. The inflammation is of all grades from simple redness to acute ulceration with the formation of a false membrane resembling that of diphtheria. This inflammation may spread to the nose, resulting in a purulent discharge.

Fever. The temperature remains high till the rash begins to fade and, providing that the inflammation of the throat is not severe, falls and reaches normal by the ninth or tenth day.

Peeling. After the fading of the rash, desquamation or shedding of the skin sets in, the skin being shed in minute flakes on the head and neck, but tending to come off in strips elsewhere especially from the hands and feet. The process of desquamation lasts from ten to twenty-four days or even longer, and its termination is taken as a sign that infection is at an end, though from seven to eight full weeks should be allowed before the child is allowed to join his fellows.

Complications. As said above, the occurrence of complications seems to depend in a large measure on the intensity of the throat infection. As the result of direct spread along the Eustachian tube, suppuration sets up in the

middle ear with perforation of the drum and some- **Ear.**
times permanent deafness.

In scarlet fever, there is a particular tendency to the development of inflammatory conditions of the kidneys. In the early stages, there is albumen and sometimes casts in the urine, but in a degree not more intense than accompanies other acute fevers. About the third or fourth week the more typical **nephritis** is liable to develop. There is an interesting connection between the septic inflammation of the throat and that of the kidneys. This has a clear parallel in other septic infections of the tonsils, which lead to infections of the kidneys far more often than is commonly supposed. **Kidneys.**

However mild a course the disease may run, it should be borne in mind that the kidneys suffer to some degree in all cases and that grave disease may be excited by exposure to cold and errors in diet.

The onset of nephritis is commonest in the third or fourth week. The amount of urine passed is suddenly diminished, and is smoky in colour from an admixture of blood, the face is puffy and symptoms of uræmia, headache, vomiting or even convulsions may follow. In the majority, the onset of nephritis is insidious, and there is a tendency to relapse after apparent recovery. Scarlatinal nephritis is of especial gravity as there is danger that the acute form may pass into the chronic with permanent damage to the kidneys. **Nephritis.**

Scarlatinal arthritis occasionally develops, the joints usually affected are those of the fingers, wrists and elbows. The occurrence of post-scarlatinal heart disease is commonly associated with the development of joint inflammation, and in some cases, is probably due to a superadded rheumatic infection. **Arthritis.**

In contrast to measles, the development of respiratory complications is not usual.

The diagnosis is not as a rule difficult, though when the rash appear in atypical form, there may be some difficulty in distinguishing from measles. The absence of the marked catarrh of measles and the day of the illness on which the rash appear will assist in forming an opinion. In scarlet fever, the diagnostic points are the inflammation of the throat, the early appearance of the rash, the circumoral pallor and the rapid pulse. **Diagnosis.**

Treatment.

The patient is rigidly isolated for at least seven weeks and confined to bed for not less than three weeks. While ventilation should be adequate, draughts or chill should be carefully avoided.

In the early stages, the simple alkaline fever mixture is useful. The diet is modified to throw no unnecessary strain on the kidneys. During the febrile stage, milk and easily digested farinaceous food is given, while foods such as eggs, meat and fish, containing a high protein content, are reserved till convalescence is established. For the control of fever, warm sponging may be employed, with special caution against chills. Antipyrin in small doses may be used when there is restlessness or a tendency to delirium.

The condition of the throat demands active attention. In all cases, a mild throat spray of boracic acid or saline should be used, and children sufficiently old should gargle with the following:—

Sodi Bicarbonate—Grains X.

Glycerine of Borax—Two drachms. Water to one ounce.

When there is evidence of ulceration or yellowish patches appear upon the tonsils, stronger antiseptic applications should be used; the throat paint No. 52 or 53 or the throat be swabbed with hydrogen peroxide diluted 1 to 4. No. 52 is reserved for older children and should not be used more than three times a day.

Poultices or fomentations applied to the outside of the throat will do much to relieve the acute discomfort.

The urine should be tested frequently for the presence of albumen, casts and blood, and on no account should the patient be allowed to leave his bed or any advance of diet made so long as these substances are detected. Should dropsy or other serious signs of involvement of the kidneys supervene, the case is treated as detailed in Chapter XLVI.

The skin is anointed daily with olive oil, in which Thymol 1 % is dissolved or with Eucalyptus oil. Carbolic oil should not be used for young children. During the acute stage, stimulants (*vide* Chapter XIV) may be required.

Inflammation of the joints is treated with salicylates on the grounds that there may be some rheumatic taint (Chapter XXVI).

Inflammation of the ear is treated on general lines (*vide* Chapter L).

The conduct of convalescence must be influenced by the consideration that the kidneys are in a susceptible condition. Violent exercise, chill and cold bathing are to be avoided and a periodic inspection of the urine is advisable.

For the generally debilitated condition, iron tonics are indicated.

Finally, the patient must be considered infectious not only till peeling is completed, but so long as there are purulent discharges from the ear, nose or broken down glands.

CHAPTER XXII.

MUMPS.

Description. Mumps is a disease of childhood and adolescence appearing in epidemic form and characterised by inflammation and swelling of the salivary glands at the angle of the jaw.

Spread. The disease is spread only by direct infection from the sick person, who is infectious in the very early stages of the disease and remains capable of transmitting the disease, though in diminishing degree, up to some 21 days from the onset. One attack almost invariably confers life-long immunity.

Incubation. The period of incubation, from the time of exposure to infection to the appearance of the disease is, most commonly between 14 and 21 days. Adults as well as children are susceptible, though the commonest age is between 5 and 15. Under the age of two, the disease is rare.

Early signs. A feverish cold and stiffness of the jaw are the earliest signs. Following this stiffness there appears, usually at first on one side only, a hard painful swelling immediately in front of the ear, extending, as it increases, behind the angle of the jaw, pushing the ear forward and limiting the movements of the jaw. The situation of the inflammation in the early stages is characteristic, and is that of the parotid gland. As the inflammation increases, the outline of the gland is lost and the swelling may extend even up to the eye and down on to the chest. The second side is usually affected some two days after the first.

With the swelling there is fever, not as a rule above 102, with its attendant symptoms, lasting for two or three days. The pulse rate may rise, but in some cases there is marked slowing.

**Inflam-
mation.**

The swelling reaches its maximum about the third or fourth day, after which there is gradual subsidence, with complete recession of symptoms on the eighth or ninth day, though enlarged and hardened lymphatic glands may persist for some time. In certain cases, the swelling, after subsidence in the jaw, reappears in the testicle of the male and in the breast or ovary of the female. This complication

is rare in children under the age of 12. Some patients complain of pain in the upper abdomen, of varying severity and necessitating careful dieting and hot fomentations.

The treatment of mumps is simple and consists, during the acute stage of (*a*) rest in bed, (*b*) saline aperients as necessary, (*c*) the simple fever mixture, (*d*) fomentations to the painful swellings, (*e*) the regular use of a mouth-wash. Later, the painting of the swellings with iodine may hasten the subsidence. The patient may be considered free from infection four weeks after the first appearance of the disease. **Treatment.**

CHAPTER XXIII.

CHICKEN-POX.

Chicken-pox is a mild infectious disease characterised by the presence of vesicular spots and slight constitutional disturbance. The disease is transmitted by direct contact to a second person or may be carried by a third person, by clothing, books or toys. The patient is infectious in the earliest stages of the disease and remains so long as the scabs persist.

Spread.

Incubation.

The period of incubation is most commonly 14 days from the time of exposure to infection. One attack, except in instances of extreme rarity, confers immunity.

Rash.

The earliest sign of the disease is commonly the appearance of the rash, though, there may be slight general symptoms for 24 hours before this. The rash usually appears on the back and face; at first the number of spots may be so small as to escape observation. The spots may be situated on all parts of the body including the scalp, palms and soles and inside the mouth; they are more numerous on the body than on the limbs. The first appearance is that of little red pimples; at the end of 24 hours many of these have developed into small blisters or vesicles, retaining a narrow red margin. Drying up begins almost as soon as the vesicle has attained full size and in three to four days a yellowish crust is completely formed. After some five days the crusts begin to fall off, though some may remain adherent for from two to three weeks. A slight reddening of the skin is left on the site of the fallen crust. The majority of the spots stop short at the pimple stage and subside without developing into the vesicle.

An important characteristic of the lesions of chicken-pox is the tendency to appear in successive crops. The appearance of these crops differs materially from the progressive eruption of small-pox in that a new crop is not confined to one situation, but is spread impartially over the body so that spots of all ages are found side by side. The lesions do not extend so deeply into the skin as do those of small-pox and consequently do not lead to

scarring unless infected. It is, therefore, important to prevent children from tampering with the spots.

In the tropics the lesions of chicken-pox are sometimes so large that a suspicion of small-pox is aroused. The main points of distinction are detailed in the chapter on small-pox.

Complications or any ill-effects from the disease are rare and the treatment is that of any mild infantile disorder. The child should rest in bed during the early stages, be kept indoors for a few days, and be guarded against chill. Isolation is necessary till all crusts or scabs have fallen.

CHAPTER XXIV.

SMALL-POX.

A highly contagious eruptive fever, attacking persons of all ages. Children are especially susceptible, even the newborn babe is attacked if the mother is suffering from the disease.

Spread. Small-pox is the most infectious of all diseases, it is transmitted by direct contact, carried by clothing, letters, etc., by insects, by healthy people, and the infection lies in the crusts or scabs and may possibly pass through the surrounding air. The virus or poison retains its vitality for a long time and may live in inanimate objects, clothes, curtains, etc., for months. The patient is infectious from the first day of illness, it not before, and ceases to be so only when the last scab has fallen.

Incubation. About 12 days elapse between the exposure to infection and the appearance of symptoms. As a rule the recovered patient is immune to further attacks and even should he be attacked, the second attack is of extreme mildness.

Varieties. The disease is described in four varieties:

(1) **Modified small-pox** in the subject partially protected by vaccination: usually mild with few spots and comparatively slight general symptoms.

(2) **Discrete small-pox**, and (3), **confluent small-pox**. In the former the pustules are distinct, in the latter they run together and form large patches so that the face and body are almost entirely covered. These two varieties are in reality only differences of degree, the severity being proportionate to the intensity of the eruption.

The fourth variety, **hæmorrhagic small-pox**, is of such virulence that death takes place before the typical eruption has appeared.

Stages. The course of the disease is marked by definite stages. The first, the stage of invasion, the second, the stage of eruption, the third, the stage of secondary or suppurative fever and the fourth, the stage of desquamation.

The **stage of invasion** is ushered in by violent shivering, or in the very young, by convulsions. Vomiting and diarrhoea are usual, whilst the severe headache

and pain in the back are characteristic. The tongue is furred, the urine scanty, the temperature rises rapidly to 103 to 104, and the patient becomes drowsy, apathetic or even delirious.

On the second day, the symptoms are unabated and there may be a **preliminary rash**, resembling measles, though this is less common in children than in adults. The symptoms and the fever show no signs of remission till the third or fourth day, when the true rash appears.

The rash first makes its appearance on the face and wrists, then on the head, hands and arms, and in 24 hours spreads to the lower limbs and body, requiring some three days to develop to its fullest extent. It is distributed more profusely over the upper half than the lower half of the body, the flanks tend to remain clear, and over those parts of the body which are habitually exposed to the air, the eruption is most intense.

Rash in 3rd day.

Before becoming plainly visible the eruption can be felt, especially on the forehead, as hard papules like shot beneath the skin.

The eruption passes through four stages (1) papule (pimple), (2) vesicle (small blister), (3) pustule, and (4) crust. At first the rash consists of a number of red elevated papules which come up through the skin and do not merely lie on the surface. They are solid and hard, but at the end of 48 hours, a minute vesicle has appeared in the centre which grows till it occupies the greater part of the surface of the macule. At the end of the fifth day, the lesion presents the appearance of a small blister filled with greyish whey-like fluid, more or less oval in outline, depressed in the centre and with a red margin. The surrounding skin is raised and puffy.

Description of Eruption.

Within 48 hours after full development, the pock becomes yellow, the clear fluid contents having become converted into pus (matter) and the red margin as well as the surrounding inflammation, is increased.

During the process of ripening, that is, while the vesicles are changing to pustules, the surrounding skin swells, so much so that eyes become closed and the whole face swollen out of recognition.

At the same time, lesions similar in character may develop at the back of the throat, in the nose and in the conjunctiva of the eye. Here the lesions run the same course, but tend to rupture early leaving an ulcerated surface.

Pocks in the mouth.

Secondary fever.

The development of pus in the pocks marks the inception of the third stage of the disease. The fever and constitutional symptoms, which have moderated during the development of the eruption, now become accentuated. The temperature rises steadily to 103 to 104, there is marked prostration with weakness of the heart, mental depression or delirium. There is severe pain over the eruptive areas, which, if discharging, emit a foul odour, the throat is sore, there is diarrhoea, and often severe cough. This stage lasts for five or six days, at the end of which time, in favourable cases, the lesions begin to dry up and the temperature falls slowly to normal.

Fourth stage.

The drying up or stage of desquamation, the fourth stage of the disease is well in progress by the fourteenth or fifteenth day and some of the crusts begin to fall. The more acute symptoms have abated, but the patient is extremely weak, often mentally as well as physically.

Following the shedding of the crusts, brownish pigmented areas are left which persist for weeks. The skin is shed in a bran-like desquamation.

Though most of the crusts separate readily, some remain adherent even up to the fourth week, particularly on the hands and feet, a point of importance in the examination of the patient as to freedom from infectivity.

The general symptoms and stages of confluent small-pox differ in degree only from those described above.

Complications.

The most frequent complications are those attacking the air passages and lungs. Laryngitis may be severe, the larynx having been invaded by the eruption.

Bronchitis is present in almost all cases and the development of pneumonia renders the outlook extremely grave.

Diagnosis.

After the development of the eruption, the case should, as a rule present no difficulties, though, in tropical countries, chicken-pox, if seen at its height, may cause some doubt. Severe chicken-pox may be taken for small-pox and, on the other hand, mild small-pox may be mistaken for chicken-pox.

The main points of distinction are:—

Small-pox.	Chicken-pox.
Severe illness before eruption.	Stage of invasion 24 hours or less.
Rash distribution:—Face, extremities most intense. Marked papular stage, vesicles develop slowly. Spots in one locality all at one stage of development.	Rash may be the first sign of the disease. Rash distribution:—Trunk, especially back. Vesicles develop rapidly. Spots in all stages of development side by side, many spots do not mature.

In the early stages the preliminary rash may be mistaken for measles, but appears earlier in the disease and is not accompanied by catarrhal symptoms. In small-pox the severe pain in the head and back are suggestive.

The prospects of a case depend (1) chiefly on whether the subject has been previously vaccinated or not. Even imperfect vaccination will, in all probability, modify the attack and render it less dangerous (Chapter X). (2) A mild introductory fever or first stage indicates a mild attack. (3) A scanty eruption is evidence to the same effect. (4) The most favourable age of the subject is between the tenth and fifteenth year and (5) a previously strong constitution will materially assist in resisting the exhausting suppurative stage.

Prospects.

The objects of treatment are—

Objects of Treatment.

1. To maintain the strength of the patient.
2. To prevent as far as possible prostration and collapse.
3. To mitigate the intense discomfort of the disease.
4. To limit as far as possible suppuration in the lesions and subsequent scarring.

The diet should at first consist of skimmed or diluted milk, strong soups or beef tea, bread and milk and easily digested cereals. This diet may be increased with discretion according to the lines laid down for the general treatment of fevers. It should be remembered, in the early stages of the disease, that the exhausting suppurative stage has yet to be encountered, so that the vital powers should never be allowed to flag for want of proper nourishment.

Diet.

Against the danger of prostration, which may supervene with suddenness, the greatest care and watchfulness are necessary. If at any time the pulse becomes quicker and more feeble, the surface pallid, and the pustules assume a flabby half empty appearance, if, at the same time, there be increased restlessness or delirium, then we must push alcoholic stimulants with increased vigour.

The eyes should be carefully tended. Ablution with an eye lotion (59) and the application of a simple ointment to the edges of the lids if they stick together, will generally be effective in preventing serious damage. The hair should be cut short.

Case of eyes.

Violent purgation should be avoided though the bowels should be regulated with moderation. The ordinary fever mixture (33) may be given during the primary fever, but need not be continued during the second stage, when the

temperature is not high. In the third stage, benefit will be derived from a stimulant mixture—(41).

The prevention of irritability of the bowels and diarrhœa will call for attention. Prescription No. 20 will be found useful for such purposes, and will be found of double benefit if there is, at the same time, delirium. When the condition is not severe, simple astringents, without the addition of opium, may be employed—(21).

The prevention of pitting.

It is important to bear in mind that the lesions of small-pox tend to be most numerous where there is or has been most irritation. For this reason, frequent ablutions with soap and water, or the application of strong antiseptic lotions should be avoided before the rash is fully developed. On these grounds the practice of excluding all actinic rays and treating the patient in a red light has been instituted. This method has not proved of great value. The covering of the face with equal parts of olive oil and lime water, well shaken into an emulsion, twice daily, certainly proves of some benefit and excludes the air. The application should be made gently with a camel-hair brush.

When the face is swollen and painful, relief may be obtained by the application of wet dressings steeped in some simple lotion. After the full establishment of the rash, a more active antiseptic preparation may be used, of which a soft ointment to which is added Ichthol 5 to 10 per cent. has proved to be the most satisfactory.

Crusts should be kept moist with carbolic oil and frequent warm bathing will facilitate an early fall.

Prevention by vaccination.

The prevention of small-pox is simple: it is by vaccination and revaccination. It is lamentable that in India, even among the European community, lives are still lost by neglect of this simple precaution. Certain classes of Indians entirely disregard the dangers of infection, and the householder may discover that the house servants are going freely backwards and forwards to and from an infected house or person. The infection is so pervasive that there is no avoidance except by vaccination.

Scheme of precautions to be taken when a case of small-pox occurs in a house:—

1. Every person to be vaccinated or revaccinated.
2. The patient to be isolated or if possible sent to a suitable isolation hospital.
3. Carbolised sheets to cut off the sick room from the rest of the house.

4. All clothing, bedding and utensils used by the patient, to be thoroughly disinfected immediately on leaving the sick room. Clothing should on no account be sent to the wash without previous disinfection.

5. All dejecta to be treated with strong antiseptics.

6. The attendants to wear special gowns when in the sick room and not to mix with others.

7. On recovery the body to be searched for crusts. The fall is usually complete in from four to six weeks, and the patient should then be given one or more baths in corrosive sublimate solution one in ten thousand. This solution is highly poisonous and should not enter the mouth or eyes. It should be washed off with clean water before drying.

8. The fullest disinfection of the room and of anything which may have been in contact with the patient should be carried out. Books and toys should be destroyed.

CHAPTER XXV.

INFLUENZA.

Influenza is an infectious epidemic disease, attacking subjects of all ages, characterised by severe febrile symptoms, catarrh and prostration with a tendency to a prolonged period of debility after the attack.

The incubation is from one to three days and the patient is infectious so long as catarrhal symptoms persist.

Variations.

The form of the attack, as well as the tendency to some particular complication, varies markedly not only in the epidemic but in the individual, though as a rule the cases of one epidemic run true to type.

The typical attack sets in abruptly with shivering, a feeling of prostration, and pains in the head, limbs and back. The limbs, though painful, are free from tenderness. Catarrh, with running of the eyes and nose, is usual, and there may be some cough and bronchitis. The fever rises rapidly, but runs an irregular course, the pulse rate is increased in proportion to the temperature (*vide* Chapter XIII). Most characteristic is the sensation and appearance of extreme weakness out of all proportion to other signs of illness.

The appetite is lost, vomiting and diarrhoea are not infrequent. The usual duration of the disease is from one to five days, though the fever may persist for longer periods or the disease be prolonged by complications.

One attack does not convey immunity, rather does the attack appear to predispose to a second or more severe attack some weeks or months later. Relapses are not uncommon.

As a rule, it may be stated that the disease is less severe in children than in adults, though there are exceptions.

According to the prevalence of certain types or groups of symptoms, three distinct forms of the disease are described, viz.—(a) the catarrhal, with predominance of nasal catarrh, bronchitis and a tendency to lung complications. This type is more common in older children in contrast to the other two types, (b) the nervous type, and (c) the gastro-intestinal type, which are to be seen more often in the very young.

The nervous type is characterised by the presence of high fever, marked impression on the nervous system, stupor, apathy, delirium, convulsions, or even signs of meningitis.

Nervous Type.

The gastro-intestinal type, in which the symptoms of vomiting, diarrhoea and severe abdominal pain are prominent, may give rise to some difficulty in diagnosis. The attack may closely resemble the severe gastro-enteritis of early childhood, or the marked pain and vomiting may suggest the presence of some surgical condition within the abdomen. Not infrequently the diarrhoeic stools show the presence of blood and mucus. The duration of such attacks is usually from three to four days, but may be considerably longer.

Gastro-intestinal Type.

The diagnosis of difficult cases will be assisted by an enquiry into the occurrence of more typical cases.

It would appear that during an attack of influenza the resistance is so lowered that infection, often other than that of the original disease, tends to attack the weakest spot; consequently each child is liable to complications as his constitution dictates; for example, the child subject to recurring attacks of bronchitis will, in all probability, develop severe bronchitis during or after the attack.

Complications.

Apart from this, each epidemic appears to carry with it a special tendency to some particular form of complication, it may be bronchitis, pneumonia or inflammation and suppuration of the middle ear. In the epidemic of 1918, lung complications were common and responsible for a high percentage of the mortality. In a recent epidemic in England, suppuration of the middle ear was recorded in many cases.

In children, swelling of the glands in the neck commonly appears. The heart is sometimes found to be dilated and irritable after the disease, leading to breathlessness on exertion with a disproportionate acceleration of the pulse rate. Such a condition will usually pass off with returning health, leaving no trace.

Finally, the weakness engendered by the attack, may lay open the path to infection by the bacillus of tuberculosis.

There is no specific treatment for influenza. In general, the coal-tar derivative drugs, especially aspirin and phenalgin are of value in relieving the pain in the limbs, the headache and in moderating the fever. Such drugs

Treatment.

must be administered with caution in young children. The salicylates may be used in a mixture as follows:—

Sodium salicylate 2 grs. Sodium citrate 4 grs.
Glycerine 10 min. Aq. Anethi to one drachm every four hours for a child of one year old (A. E. Garrod).

Beyond this the most prominent symptoms will indicate the line of treatment; should there be cough and bronchitis, an expectorant mixture containing creosote (No. 32) will be of value. Should nervous symptoms prevail, bromides will be given.

For severe vomiting, small doses of chloretone, 2 grs. for a child of five, and a small mustard plaster may be applied to the upper part of the abdomen for about five minutes, care being taken that the skin is slightly reddened only, not blistered. For a child the strength of the plaster should be one part of mustard to five of flour, made into a paste and spread on a piece of brown paper cut to size.

For diarrhoea the mixture No. 19 or in case of greater severity with much griping No. 20.

The time-honoured remedy, Ammoniated tincture of quinine should not be omitted during the stage of onset.

The patient must be confined to bed for at least three days after even a mild attack and convalescence must be guarded. Iron tonics, Cod-liver oil and Malt are given and a change of air, preferably to the seaside will hasten the restoration to health.

Prevention.

Authorities are not agreed upon the value of protective inoculation against influenza. The immunity conferred is of short duration only, about three months, so that, for practical purposes the use of protective vaccine will be limited to times of epidemic and administered especially to those children, who, by reason of some constitutional weakness, are regarded as specially liable to develop complications in the event of their contracting the disease.

The dose of vaccine for children is as follows:—

Age from 10 to 16	2/3 adult dose.
7 to 10	1/2 " "
2 to 7	1/3 " "

CHAPTER XXVI.

RHEUMATIC FEVER AND RHEUMATIC INFECTION IN CHILDREN.

The grave importance of rheumatic fever or infection lies in the tendency of the disease to produce serious, permanent or even fatal disease of the heart.

Rheumatic fever is a disease characterised by fever, swelling, pain and tenderness of the joints, with a tendency for the swelling to flit from one joint to another, profuse acid sweats, a sore throat and symptoms of heart disease in varying degrees. This disease, of abrupt onset and marked symptoms, is the disease of older children and young adults, but rarely attacks young children.

In children under twelve years of age rheumatic infection is insidious, the symptoms which would suggest rheumatism are often slight, but yet, unchecked these **apparently trivial and disconnected symptoms may culminate in heart disease** as surely as if the child had been stricken with the most virulent form of rheumatic fever. Indeed, rheumatic disease of the heart may develop without any other appreciable signs of the disease.

In childhood, acute swelling and tenderness of the joints is a rarity, rather is the tenderness in the muscles of the limbs. There are aching pains which are often regarded carelessly and called growing pains, or there may be stiff neck, pain in the hip or at the back of the knee. Such pains should not lightly be disregarded, they should prompt a careful consideration of the child's state of health, examination of the heart and an enquiry into the existence of other signs and symptoms which would suggest the disease.

The child subject to rheumatic infection loses weight, there is often wasting of the muscles, he is anæmic and often manifests extreme fatigue after moderate exercise, indeed the last-named symptom is one of considerable diagnostic value.

Sore throat will almost certainly be a sign at some time or other of the illness and is apt to be recurrent.

Rheumatic Nodules.

Every child who complains of pains in the limbs and recurrent sore throat or shows signs of failure of health should be examined carefully for nodules. These are small raised lumps beneath the skin, most commonly found on the back of the forearm just below the elbow, but often in other situations where bone or tendon is near the skin; at the back of the head, round the knee and over the skin and ankle. In size, the nodules vary from that of a pea to a walnut, the skin is not inflamed and there is a remarkable absence of tenderness. A smaller variety, sometimes known as granules, may be felt deep in the muscles on either side of the spine.

Though nodules are not present in every case, **when present they are of extreme importance** both in the assessment of the gravity of the case and in determining whether active rheumatism is present. A number of nodules, or the appearance of a succession of crops is to be regarded not merely as an indication of active rheumatism, but of severe infection.

Apart from sweat rashes, to which the rheumatic child is particularly prone, the most characteristic rash is a pink raised eruption, tending to form overlapping rings. The rash does not itch, fades and recurs at intervals.

Other symptoms of the rheumatic child are:—Headache, often associated with sore throat, pain in the side, sometimes pain in the stomach.

Chorea.

This disease, fortunately uncommon in India, may be discussed in connection with rheumatism. The frequency with which signs of rheumatism are associated, either concurrently or consecutively, the common appearance of rheumatic nodules in chorea, and the identical result on the heart, lead to **the conclusion that rheumatism and chorea are indeed different manifestations of the same disease.**

The onset of chorea is often attributed to some fright or shock and it is probable that this is merely the final deciding factor to the already susceptible child.

The earliest symptoms are attributable to weakness and want of control of the muscles, the child drops things, falls about, there is mental deterioration, he makes no progress at school, is inattentive and forgetful.

Later, purposeless fidgeting movements and grimaces are noted which may become violent and continuous, the gait is affected and the speech may become

irregular and jerky. The movements involve all muscles, face, limbs and body, no two successive movements are alike, respiration may become uneven owing to sudden contractions of the trunk muscles. The movements are exaggerated under stress of excitement or observation, but except in the most severe cases, cease absolutely during sleep.

In the more severe cases there is loss of power in the limbs amounting to paralysis, and there may even be complete, though temporary, loss of speech.

Associated with the above-mentioned symptoms, there is change in the mental state, the child becomes first inattentive and forgetful, later, emotional and excitable.

On examination, after a general survey, two signs are looked for, the patient is asked to put out his tongue and hold out his hands in front of him. The tongue and limbs show the jerky movements common to the other muscles, but the diagnostic points are firstly, that the tongue is jerked suddenly and violently in, and secondly, that the hands assume a characteristic position with the wrists slightly bent and the fingers over-extended, a position which cannot be imitated by the hand of a normal person.

Diagnosis of rheumatic infections is often difficult, particularly when the more characteristic symptoms are absent; at the same time it is important that the condition should not pass unrecognised and that preventive treatment for the protection of the heart should be instituted early.

Careful enquiry should be made into the family history, as **rheumatism runs in families** and the tendency is inherited. The child with red hair and unexplained symptoms should always be suspect, for it is a curious fact that children with red hair are peculiarly susceptible.

The age incidence will be of some assistance to form a conclusion; rheumatic infection is almost unknown in the first year of life, is very rare in the second year, and as has been said above, the joint symptoms are slight or absent in young children. The diagnosis of rheumatism in a case of acutely swollen joints in a young child must be made with caution, bearing in mind the other more common causes of acute joint

Diagnosis
of Rheumatism.

signs, infantile scurvy, acute epiphysitis or acute osteomyelitis.

With regard to the signs that the heart is affected, the general symptoms may afford a hint, anæmia and wasting, exhaustion after slight exertion and the appearance of many nodules. The pulse is quickened, the first sound of the heart is altered and there is evidence of slight dilatation.

Cardiac murmurs belong to a more advanced stage of the disease and a diagnosis should have been made, before their appearance.

The treatment of rheumatic infections must be thorough and prolonged.

Treatment
of Rheuma-
tic fever.

The child is kept in bed between blankets wearing a flannel nightgown. The swollen joints are protected with cotton-wool and light bandaging.

In **salicylate of soda** we have a drug with a specific action on the joint symptoms and fever of rheumatism. How far this drug is a value in rheumatic heart disease is uncertain, but it is probable that even if it has no curative value, it may control the infection and so prevent further damage.

During an acute attack it is desirable to administer this drug in doses of a size which would, unguarded, produce symptoms of poisoning, but in the presence of sodium bicarbonate, these doses may be given without fear of toxic effects. It should be the rule **that every dose of sodium salicylate should be given with at least double its quantity of sodium bicarbonate.** Dr. Lees has shown that if sufficient sodium bicarbonate be administered to keep the urine alkaline, there is no danger of symptoms of poisoning even with large doses of salicylate. For a child of ten, after a preliminary mild aperient, grs. 20 may be given two to three-hourly up to five doses and then at longer intervals. If there is depression and nausea, the doses should be lessened.

After the subsidence of fever and joint swellings, ten grains should be given three times a day for two or three weeks. Aspirin, grs. 3 to 5 three times a day to a child of 6 to 10 has been given instead of the salicylates, but has the disadvantage that it cannot be combined with the bicarbonate. **During treatment constant watch should be kept for signs of heart affection.** Should such signs become apparent, the need for prolonged rest in bed, it may be for months, is imperative.

In the presence of less acute manifestations, there is not the same need for such large doses of salicylates, but the drug should be continued over long periods.

Special attention should be paid to hygiene and prevention, the child should be warmly clad, should avoid damp and, if possible, removed to a warm dry climate. He should be carefully guarded from over-fatigue, and mental excitement or worry. Iron tonics and Cod-liver oil should be given in the convalescent periods. Convalescence.

If the tonsils are the seat of recurrent inflammation, or if they are large or irregular, they should be removed. For the child who has developed heart disease, the most prolonged and careful treatment is necessary, necessitating even in the mildest cases, sedulous watching throughout childhood: All important is rest **in bed, which must be continued so long as there is any sign in the heart's action that the disease is active**, and the recurrence of other signs of rheumatism, such as a fresh crop of nodules, a sore throat or limb pains, must be taken as an indication for further prolongation of the treatment.

Rest in bed is the first essential, until the more violent movements have ceased. The child must be prevented from hurting himself by the violent movements and it may be necessary to protect the joints with padding. In an uncomplicated case, the duration of this rest will be from three to four weeks, but in the presence of signs of rheumatism, or if heart disease develops, the child must be confined to bed for two to three months or more. During this time, the diet must be simple but adequate, as the constant movements are a tax on the reserve and the strength must be built up. Treatment of Chorea.

Of the drugs employed in the treatment of chorea, Arsenic is of proved value. Starting with a dose of 2 minims of Liquor Arsenicalis in a wineglassful of water three times a day after meals, the amount is increased drop by drop up to five minims. Watch is kept for signs of intolerance, sore eyes, nausea and vomiting, diarrhoea and skin rashes. After ten days the drug is discontinued for a week and then a further course given.

In the presence of signs of rheumatism, salicylates are given as detailed above.

When the movements are violent or the child is excitable or sleepless, some form of sedative, of which Chloretone has proved most effective, is given. The dose is grs. 3, 6-hourly for a child of eight.

During convalescence, Iron especially is indicated as a tonic. At the same time much judgment is required in the regulation of the child's activities. On the one hand, over-excitement or fatigue may provoke a recurrence, on the other, some process of re-education will be required for the child to regain complete control of the limbs and acquire emotional balance.

CHAPTER XXVII.

FEVERS PECULIAR TO THE TROPICS.

Malaria.

Malaria is a non-contagious fever of tropical and semi-tropical countries caused by a blood parasite which is injected into the human system during the process of biting by the *Anopheles* mosquito. The disease is most prevalent in those localities in which the mosquito breeds freely, that is, swampy or broken ground in which pools or stagnant water collect. The immediate cause of the disease, the parasite, has two separate life-cycles, one in the body of man and the other in the mosquito. In the human body the parasites live and multiply in the red corpuscles of the blood and also in certain internal organs, notably the spleen and bone-marrow. On attaining maturity within the red corpuscle, the parasite divides into a number of segments forming the new generation. These segments or spores are discharged from the corpuscle and synchronous with their discharge, is the first stage or chill of the attack of fever. Definition.

The young forms again enter fresh corpuscles and grow to maturity. In an untreated case the cycle is repeated indefinitely till the parasite is no longer able to reproduce itself in this manner. The attacks of fever will recur at more or less regular intervals according to the length of time required for the spore of the particular type of malaria to reach maturity. The life-cycle of the parasite of tertian fever is 48 hours and the same interval holds between the onset of each attack; that of quartan fever is 72 hours, while that of sub-tertian fever (malignant malaria) is from 24 to 48 hours.

Should the infection be single, the attacks will recur at regular intervals if the case is untreated, but it may be multiple, successive crops of parasites may mature daily so that the rigor recurs daily, the infection may be of more than one type, further affecting the regularity of the temperature chart; in sub-tertian fever, the regular intermissions may be absent or even an attack may mature before the complete defervescence of that preceding it.

The part played by the *Anopheles* mosquito is that of intermediate host. The mosquito, in sucking the blood of the infected person, takes up also the parasites. These, after a series of changes, are re-injected into the fresh subject bitten by the mosquito. It is therefore against the *Anopheles* mosquito that the first antimalarial measures should be taken.

Prevention.

The principles of prophylaxis against malaria may be summarised as follows:—

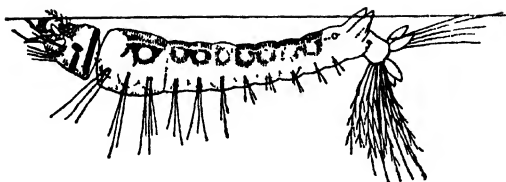
1. The destruction of breeding-places.

The *Anopheles* mosquito lays its eggs in water, preferring slow-moving or standing water, sheltered from the wind, in which vegetation is growing. Other breeding-places are formed by any receptacle in which rain-water can collect and stand. Fire-buckets, unless the water is changed freely, form a fertile breeding ground. The eggs grow into free-swimming larvæ, minute active creatures that may be discovered in any standing water. Their appearance, as well as that of the mature insect, is shown in the attached diagram. The distinctive position of both the larvæ and insect from that of the *Culex* or comparatively harmless mosquito should be noted. Pools, ponds, or streams should be cleared of surrounding vegetation and, if possible, drained. Failing this, they should be treated with kerosene oil, which forms a thin film on the surface whereby the larvæ are suffocated.

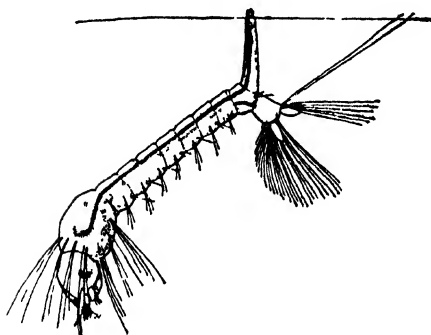
2. The destruction of mature insects.

The mosquito is an insect of dark places and will haunt close vegetation round the house or rooms into which light is not admitted. Such haunts should not be permitted. The spraying of inevitably dark places, with an insecticide such as Flit, or the burning of *loban* will do much to drive the pest from the house. Low sofas and chairs should be moved and cleared daily. It is curious that the mosquito-proof room, which adds so much to the amenities of life, should be of such rarity in India.

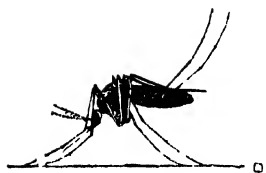
3. The mosquito cannot convey infection unless it has previously taken in the parasites from an infected person. All persons, therefore, whether in the house or servants' quarters, who are subjects of malaria should be energetically treated and screened by nets from mosquito bites.



LARVA OF ANOPHELES MOSQUITO AT SURFACE OF WATER.



LARVA OF CULEX MOSQUITO AT SURFACE OF WATER.



RESTING POSITION OF CULEX MOSQUITO.



RESTING POSITION OF ANOPHELES MOSQUITO.

4. All persons in a malarious locality should sleep under mosquito nets. Infants should be carefully guarded at dusk and if the room is darkened during the day, the net should again be used. It is convenient to have some form of mosquito-proof cage, sufficiently large to admit the cot and to permit the nurse to enter and attend to the child. Care must, of course, be taken that mosquitoes are not included in the net when it is put down.

For older children, there is a period of danger at dusk before bed-time, at such times the legs should be protected and, in highly malarious localities, the only real safeguard is a mosquito-proof room.

5. In many districts it is the custom to issue regular doses of quinine as a preventative. The authors are unable to recommend this measure as a routine; it must be emphasized that quinine is a poisonous drug, it destroys the digestive ferments, it is absorbed into the liver to the detriment of that organ, and, in general, acts adversely on the health of the child.

In the typical attack three stages succeed each other. In the first, the cold stage, there is violent shivering, in the second or hot stage, the temperature rises rapidly and in the third stage, there is profuse perspiration with a decline of the temperature to normal. Such attacks, in the untreated subject, tend to recur at regular intervals. **Symptoms.**

The symptoms are less regular in the young child, the shivering stage may be absent, indeed in children under five it is unusual, but is not infrequently replaced by convulsions. Occasionally, but rarely, the attack subsides without sweating. The stages, generally, are of shorter duration than in the case of adults, though the hot stage is always well marked. The premonitory symptoms are slight, often insufficient to attract attention; the child does not seem really ill, but is apathetic, yawns and refuses food.

In most cases it will be observed that the attack is preceded by an unusually copious flow of urine, though, after the fever is established, the urine is red and scanty. The attack or ague fit begins with a feeling of cold, the skin becomes pale, shrivelled and rough (goose-skin); the finger nails bluish. The skin feels cold, though even at this stage the thermometer

may reveal a rise in temperature. Violent shivering may ensue, but it is rare in young children. The pulse-rate is accelerated, sometimes before the temperature begins to rise.

Vomiting at this stage is often violent and may persist after the temperature has risen. This stage may last from a quarter of an hour to three hours to be replaced by the hot stage. Some two hours after the onset of fever, the temperature may rise to 104 to 105 to 106° persisting for two hours or more. The decline down to normal or even below is rapid; according to the amount of perspiration, so will be the rate of cooling.

Malarial fever, if untreated, usually observes periodicity, subject to exceptions as explained above, returning at the same hour every day or every other day. In the variety known as sub-tertian fever there is sometimes no complete intermission of temperature for some days.

Two types of malarial attack, which are induced by the sub-tertian type of infection, deserve special mention. In the first, known as the algid form, there is vomiting, profuse watery diarrhoea, often with "rice-water" stools resembling cholera and intense prostration. The temperature is but slightly raised. In the second, or comatose form, the temperature is high, the headache severe, and the patient gradually sinks into a profound state of coma. Such conditions demand the most active treatment if disaster is to be avoided.

Prospects.

An attack of ague is not, as a rule, dangerous, but it is an indication of an infection which, if unchecked, will recur, and by recurrence will undermine the health. The effects of ague are responsible for a high percentage of the ill-health and deaths of the children in India, indeed the remote results are actually more fatal numerically than cholera, but because an attack is not immediately dangerous and passes off quickly, the necessity for treatment till the infection is eradicated, is apt to be overlooked.

Treatment.

At the onset of the cold stage, the child is well wrapped up and hot-water bottles are applied. As the fever rises, the coverings are gradually removed, so that they may not accentuate the rise. During the sweating stage, a blanket should be kept over the patient.

Special attention should be paid to the height of the temperature in hot weather, and sponging or rapid bathing be employed if the fever rises above 104° (see Chapter XIV). On no account should a child with fever be left unattended at night. Water, barley water, orange or lemonade is given without stint.

From the onset of the hot stage an alkaline fever mixture be given; at this juncture the administration of quinine is likely to increase the discomfort and cause vomiting. As soon as free perspiration is established, the time for specific treatment, that is, the administration of quinine, arrives. The old rule of waiting till an hour or so before the next attack is due, is a bad rule. The quinine then increases the nervous irritability and discomfort, while it reacts but slightly on the disease. Again, it is not good practice to withhold the quinine till the normal temperature is reached, indeed, in serious cases, the temperature will not fall till quinine in adequate doses has been administered, and it may be necessary to give it even at the height of fever or, when vomiting prevents retention, to have recourse to injection.

Quinine taken does not necessarily mean quinine acting; it must be absorbed and to facilitate absorption the bowels must be well opened. The purgative which is found the most efficient is calomel. The child of four years may receive $\frac{1}{4}$ grain every hour to four doses, starting as early as possible in the attack and supplementing with a saline aperient, should action not be obtained. Quinine.

The standard dosage of quinine is one grain four-hourly for every year of the child's age, but children as a rule tolerate the drug well, and circumstances may direct that the amount may be increased to double or more.

The researches of Cols. Acton and Knowles have shown that the action of quinine is augmented if large doses of alkali, sodium citrate or sodium bicarbonate are given some twenty minutes earlier (grains 5, to a child of 1 to 4, grains 10 for 4 to 7), and that the optimum timing for administration is $2\frac{1}{2}$ hours, not immediately after meals. In addition to intensifying the action, such timing has the advantage that the quinine does not inhibit the stomach digestion.

The same authorities advise that, in cases diagnosed by the microscope as simple tertian fever, cinchona

febrifuge is more effective than quinine in extirpating the parasite, and may be used in smaller doses.

After some days of intensive quinine medication, and earlier if giddiness, deafness or buzzing of the ears is complained of, if the temperature has subsided, the doses may be reduced to three daily.

The dose should be continued thrice daily for a fortnight and then twice daily for another week. A course of iron and arsenic should follow this starting with minim $\frac{1}{2}$ of Fowler's solution, well diluted, three times a day and increasing with caution.

A repetition of the attack should be treated in the same way and great care should be taken to guard the subject against chills, over-excitement or over-fatigue, all of which are liable to provoke an attack.

Quinine injections may be found necessary when persistent vomiting prevents the retention of quinine by the mouth, when the alimentary canal refuses to absorb and when the urgency of the case as in the algid or comatose form, demands a more immediate exhibition of quinine in the system.

The intravenous is to be preferred to the intramuscular route, except in the case of young children when practical difficulties constitute an objection to the first method. The hydrochloride or hydrobromide salt is used and in the case of intravenous injection the dilution is not less than grain 1 of the salt to 2 c.c. of normal saline.

Subsequent effects.

Because these fevers are not attended with consequences immediately serious, they frequently meet with but little attention. Attack succeeds attack at more or less long intervals. Each attack is cured, but no attempt made to extirpate the infection. In the meantime the health is seriously undermined, and almost every organ is involved. The spleen becomes enlarged, the liver congested with perversion of function and possibly jaundice; the blood is poor and attacks of diarrhoea and dysentery are common.

In short, a persistent deleterious influence everywhere pervades the body, resulting in a steady deterioration of health, of which anæmia is the chief visible sign. Up to a point, this condition is remediable, but beyond that point remedies are of no avail; a stage of blood destruction is reached which cannot be passed with hopes of recovery. Many such untreated patients die and

their deaths are attributed to diarrhœa, debility, atrophy, or whatever condition has most attracted attention towards the end. When possible, confirmation of the diagnosis should be obtained by microscopic methods. There is no difficulty in extracting the necessary drop of blood from the lobe of the ear or the finger and the discomfort to the patient is negligible. The blood should, if possible, be taken early in the fever and before quinine is taken. Valuable information may be obtained, not only as to diagnosis, but also in regard to the intensity of infection.

If after full administration of quinine for three days the fever fails to yield, doubts should be entertained as to the diagnosis of malaria and further diagnostic assistance obtained from the laboratory.

A child subject to recurrent attacks should be removed from the locality, if possible to the seaside or, failing this, a hill station at low elevation. Sudden transfer to a cold climate may precipitate a further crisis. It should be remembered that the patient is less tolerant to large doses of quinine in a cold than in a hot climate.

Persistent malarial infection in the European child constitutes an urgent demand for transfer to Europe.

DENGUE.

Dengue is a disease appearing in extensive outbreaks during the hot weather and the rains. The disease is most prevalent in the large seaport towns of the East, but has spread inland. It is transmitted by the bite of the small black and white "Tiger" mosquito. **Definition.**

The disease is characterised by acute pains in and around the joints, severe headache and backache with high fever, and the appearance at some stage of the disease, of a rose pink rash.

The onset is usually of startling abruptness, with acute pain in the head, back and joints, shivering followed by the development of high fever (104° to 105°). The younger the child the more abrupt is the onset, and in many cases the accession of high fever is the first symptom. **Onset.**

The fever is accompanied often, but not invariably, by a mottled red rash on the face, neck, palms and soles, extending on to the trunk. There is some soreness of the throat, the eyes are injected and red, while the face appears swollen.

The child is apathetic and somnolent, but unable to sleep properly owing to the impossibility of finding a comfortable position. The pulse is often markedly slowed.

This state of affairs, with high fever and pain, persists for two or three days, when a somewhat abrupt alleviation takes place, the temperature drops, the pains diminish or disappear and recovery appears to be imminent. The disease has, however, not yet run its course. After an interval of 12 to 36 hours, the temperature again rises, there is a recurrence of symptoms, though not with the first intensity.

**Second rise
of tempera-
ture.**

A second eruption, resembling measles in appearance, but not in distribution, now appears. The rash is as a rule scanty on the face and body, but intense on the wrists and backs of the hands.

The rash persists for some twenty-four hours, after which recovery takes place. The joint pains, which, in the adult patient, may persist for weeks after recovery, seldom do so in young children.

Examination of the site of severe pain may reveal some swelling of the structures round the joint, particularly in relation to the tendon sheaths, but there is no evidence of fluid within the joint. Tenderness also is rather of the tendons and muscles surrounding the joint, than of the joint itself.

One characteristic sign is the extreme tenderness of the muscles of the eye so that any movement causes pain.

The rash, though a common, is not a constant feature of the disease: in some cases it fails to appear; in others, especially mild cases, it may appear after all other symptoms have abated, while yet in others it may be superseded by urticaria (nettle-rash).

Diagnosis.

In spite of variations, the disease is not, as a rule difficult of recognition. The seasonal incidence, the pain and tenderness of the limbs and eyes, the absence of catarrhal symptoms, the slow pulse, are features which point to a diagnosis, which is confirmed if the typical rash appears.

Outlook.

The prospects are almost invariably favourable. The only danger is from the high fever, which may induce convulsions. Subsequent prostration, with persistent pains and stiffness in the joints, so often marked in adults, is not common.

Treatment.

The patient is confined to bed and rendered as comfortable as possible by the judicious arrangement of pillows. Special attention should be paid to the temperature of young children and efforts should be made to keep it within safe

limits by recourse to the measures described in Chapter XIV. The bowels are regulated by saline aperients, the diet is light and ample fluid is allowed.

For the relief of pain, Aspirin, given cautiously, combined with tincture of opium, $\frac{1}{4}$ to $\frac{1}{2}$ minim for every year of the child's age, at six-hourly intervals, will afford some relief. **Drugs.**

During convalescence a tonic such as No. 46 or 47 is desirable.

SEVEN-DAY FEVER.

This variety of fever, prevalent during the hot weather in Calcutta and other seaport towns, resembles to some degree Dengue; indeed by some authorities, the two are considered identical. The distinction, when made, is based on certain minor differences, the comparatively mild pains in the joints, the rarity of the rash and the saddle-back type of the temperature chart, which is considered characteristic of seven-day fever. Until more exact information is forthcoming as to the exact nature of the organism immediately responsible for the production of these two diseases, their identity or otherwise must remain a matter of opinion.

The attack is ushered in by a rigor and pains in the head, back and limbs. In a typical case the temperature rises abruptly to 104° to 105° , declines on the second day and, on the third day, reaches a level of about 100, at which it remains till the fifth day, when the terminal rise to about 103° takes place. On the sixth day the temperature again declines reaching normal about the seventh day. The pulse is as a rule slowed.

Convalescence is short.

The treatment is symptomatic and follows the lines as laid down for Dengue.

SAND-FLY FEVER.

Sand-fly fever is a disease of hot dry climates, prevalent in the Punjab, the North-West Frontier and other parts of India. The transmitting agent is the Sand-fly, *Phlebotomus*, a difficult pest with which to contend, as owing to its small size, it passes freely through the mosquito net of ordinary mesh. The duration of the disease is from three to seven days. The onset is sudden with severe frontal headache, pains in the eyes, back and limbs. There is prostration and drowsiness. In addition there is frequently severe pain in

the upper part of the abdomen with a marked distaste for food. The tongue, clean at the edges and tip, is coated with a thin white fur.

The temperature reaches the maximum within twelve hours of onset, remains at the level, 102° to 103° for some twenty-four hours and then gradually descends to normal.

Convalescence is apt to be prolonged by persistent debility, mental depression and dyspepsia.

The treatment is symptomatic and consists in attempts to alleviate the discomfort by the exhibition of salicylates, aspirin and, if necessary, opium.

KALA-AZAR.

Kala-azar is a prolonged fever of an irregular remittent type, common in certain parts of India, notably Bengal and Assam.

The disease attacks persons of all ages and works considerable havoc where it is prevalent, but so far, the number of cases among Europeans is comparatively small.

With improved diagnostic methods, it has been shown that many cases, hitherto regarded as Chronic Malaria, or Malarial Cachexia, are, in reality, Kala-azar.

The disease is transmitted by the bite of a species of sand-fly and is caused by the presence of a parasite, the Lishman-Donovan body in the blood and internal organs, particularly the spleen.

The chief characteristics are:—

1. Prolonged fever, often of months' duration, with periods of intermission.

Symptoms.

The fever is at first persistent, the chart resembling that of typhoid fever, for which this disease may be mistaken in the early stages. After two or three weeks the chart assumes a more characteristic form. There are daily remissions, seldom as low as the normal line and the apex of the daily rise is toothed, that is to say, there is a double rise in the twenty-four hours. After some weeks there may be a period of apyrexia lasting two to three weeks, followed again by further periods of fever. The condition, if untreated, drags on for months, till the subject dies of exhaustion, anæmia, ascites or debility opens the door to some more acute infection.

2. The spleen enlarges early and rapidly, more rapidly than in any other febrile condition, and attains such a size

that the outline is almost visible on the surface, and the abdomen protrudes in marked contrast to the general emaciation of the patient.

3. The liver enlarges also, but in a later stage of the disease and there may be marked enlargement of the spleen before any enlargement of the liver is perceptible.

4. The darkening or pigmentation of the face, from which the disease derives its name, "Black Fever." The pigmentation is most marked on the cheeks and forehead.

5. Progressive anæmia, emaciation and exhaustion. The lips, the under side of the eyelids and the sides of the tongue lose their normal colour and finally become almost white. The patient is listless, weak and there is extreme loss of flesh.

6. In the late stages of the disease dropsy, fluid in the abdomen (ascites) or jaundice may develop, or extensive sloughing within the mouth (cancrum oris).

During the first ten days or so after onset, the picture presented may be that of a mild attack of typhoid, but the slow development of symptoms, the rapid advance of the spleen and the absence of the typhoid reaction in the blood will assist in the diagnosis.

Diagnosis.

At a later stage kala-azar must be distinguished from chronic malaria. In both the conditions the spleen and liver are enlarged, there are periods of irregular fever, there is profound emaciation and anæmia. The distinction depends on two classes of tests. 1. The laboratory tests. 2. The therapeutic tests.

Tests.

The laboratory tests are two in number, the first, the formaldehyde test, depending on a reaction of the blood serum, is constant only when the disease has been established for some time. The second test consists of the laboratory cultivation of the parasites in the blood.

The old test of the examination of the results of a spleen puncture is not to be recommended on account of its danger. The therapeutic test consists in the administration of the specific remedy, marked improvement being taken to indicate a positive result. In districts where the disease is prevalent, it may be recommended that, in all cases of prolonged remittent and intermittent fever of children, after the exclusion of the enteric group and urinary infection, this therapeutic test be applied.

The treatment of kala-azar has been further developed by the substitution of certain organic compounds for the

Treatment.

simple antimony salts. These compounds, Urea-stibamine, Novo-stiburea and others, are less toxic than the simpler salts, consequently larger doses can be given with less danger of reaction.

The dose of Novo-stiburea as recommended by the Health Department of the Government of Bengal is as follows:—

Infants of 12 months, .02 up to .05 grammes or less; older children, .05 grammes gradually increasing up to .20. The powder is dissolved in hot water and sterilised by boiling. .10 grammes requires 2 c.c. of water, .20 grammes requires 4 c.c. of water.

This preparation has the advantage that it may be administered intramuscularly and hypodermically as well as by the intravenous route:

The course of injections is from eight to eighteen according to the resistance of the fever. An interval of three or four days is usually allowed between each injection.

ALTERNATIVE TREATMENT.

Urea-stibamine. Intravenous.

Age 7 to 12, 1st dose .025 grammes; 2nd dose .05; 3rd dose .1, maximum dose to be repeated.

Age 5 to 7, 1st dose .025 grammes; 2nd dose .05, no increase on second dose.

Age 1 to 4, 1st dose .0125 grammes; 2nd dose .025; 3rd .05, second or 3rd dose repeated according to susceptibility.

Age 6 months to 1 year, 1st dose .0125, repeat three times, then .025.

Injections given bi-weekly, at least 10 required.

CAUTIONS.

1. No advance in dosage is made if there is severe reaction as evidenced by Hyperpyrexia, Vomiting, Nausea or Diarrhoea.

2. If there is severe bronchitis or dysentery, the dosage must be regulated with the greatest caution.

SUNSTROKE AND HEAT-STROKE.

True sunstroke, as distinct from heat-stroke is, in the opinion of the authors, a rare accident, due rather to excessive action of sunlight on the eyes than to any excessive heat. The symptoms comprise of fever about 103° to 104°, of variable duration, from two to ten days, with its attendant discomfort, and a most striking intolerance of light. The condition resembles somewhat that of cerebral irritation

following head injury. The patient lies curled up, with head and eyes away from any source of light and is resentful of disturbance. Recovery is protracted and it may be weeks before the patient is able to tolerate the full light of day. It is to be remembered that such symptoms can be produced even in a cool atmosphere when the sun is strong and the head and eyes insufficiently shaded.

Heat-stroke, on the contrary, is a condition induced by excessive external heat independently of the sun's rays; it may occur at night or in well sheltered rooms.

The sudden and intense fever is induced by a failure of the mechanism of heat exchange, whereby the body temperature is normally kept at a constant level.

In hot weather the body is maintained at normal temperature, often below that of the surrounding air by sweat evaporation. If such evaporation is prevented or if the heat production of the body is increased beyond compensatory limits by over indulgence in food, alcoholic drink or excessive muscular movements, the balance is upset, heat accumulates within the body and the temperature rises to a degree incompatible with life.

The immediate causes of heat-stroke are:—

1. High atmospheric temperature if the air contains moisture to a degree to prevent evaporation of sweat.
2. Excessive or tight clothing preventing evaporation and inducing heat retention.
3. Impairment of the mechanism, by cessation or diminution of sweating, such as occurs in most fevers.

In practice it is found that **many cases of heat-stroke have their origin in other fevers, especially malaria**. At a certain degree of fever, the heat control of the body is lost and if the temperature of the surrounding atmosphere is high, the body heat will tend to approach that temperature.

The premonitory symptoms, which should be taken as a sign for active treatment:—A rapidly rising temperature, a flushed or even purplish face, acute thirst, giddiness, faintness or confusion, suppression of perspiration and urine.

If this stage is passed the patient lapses into unconsciousness, the eyes are fixed and red, the pupils contracted, the breathing rapid and deep, becoming after a time stertorous, that is to say, noisy and snoring. The heart

may be observed to beat violently against the chest, the pulse is rapid and weak, the skin is dry and burning hot. Convulsions may or may not occur.

The temperature, taken with the bulb of the thermometer one inch in the rectum, may register 107° to 108° or more.

Treatment.

The onset of the premonitory symptoms, still more, of the "stroke" itself, calls for prompt and energetic measures. Not a moment must be lost, lest that narrow margin beyond which recovery is impossible, be passed. The object of treatment is to reduce the temperature to within safe limits and to support the action of the heart against failure. **Cold is applied in such form as is available**, the cold bath, cold water poured continuously over the naked body, or the ice-pack. The management of the ice-pack is as follows:—The body is rubbed over with lumps of ice, crushed ice is packed round the patient, in the arm-pits, between the thighs, along the flanks and against the nape of the neck. An ice-bag is kept near the head and brought into actual contact for five minutes at a time. The body is covered with a sheet wrung in ice-cold water.

During this process, the thermometer should be brought into constant requisition, and should the temperature fall below 102° , the ice may be removed and a light dry sheet substituted for the wet one, without attempting to dry the patient. Constant watch must still be kept on the temperature and it should be remembered that the temperature of the skin after the ice bath is no guide to the internal temperature. Should the temperature again show signs of rising, the cold applications will be repeated. When the temperature of the surrounding air is very high, the use of the ice-cradle as described in (Chapter XIV) may prevent a repetition of the rise.

Cold or ice-water enemata are a valuable adjunct to treatment, but have the disadvantage that further observations on the rectal temperature are thereby vitiated.

Bearing in mind the frequency with which such cases are associated with malaria, a dose of quinine is given as soon as the patient can swallow, and better still, an injection.

At the stage of decline there is liability to severe collapse calling for stimulants in the form of alcohol, adrenalin, strychnine or caffeine. After the crisis is passed, the patient rests undisturbed in a cool place and is allowed to sleep.

Great care should be taken that the gradual approach of insensibility is not mistaken for sleep, but constant observations of the rectal temperature will prevent this error and at the same time, not disturb sleep. Any disposition to restlessness and excitability at this stage should be met by a dose of chloral followed by potassium bromide and cold to the head. As soon as possible a purgative should be administered, none being better than epsom salts and senna, and the patient ordered moderate doses of quinine for a few days.

CHAPTER XXVIII.

CERTAIN DISEASES OF THE NERVOUS SYSTEM.

Convulsions.

Many allusions have been made to convulsions on previous pages.

The phenomena of an attack are well known. Sometimes, but not always, there are "warnings" of the approach of a fit, such as convulsive twitchings of the face, startings during sleep, inward bending of the thumbs upon the palms of the hands, the fingers being doubled over them; a somewhat similar condition of the toes and squinting. When a fit occurs the child becomes deadly pale, the features are distorted, the eyes stare and are rolled about, the breathing is irregular and catching, the body becomes rigid, and the hands are clenched. All this may happen in a minute or less, or it may occupy five minutes, a quarter of an hour, or even more. The more violent the convulsion, the shorter the attack usually is, and "vice versa." When the fit is over, the child comparatively resumes the appearance of health, a perspiration succeeds, and he falls into a sound sleep.

A child seldom dies in a fit, but of such a catastrophe there is danger when spasmodic closure of the air passages takes place. In that event the face becomes purple, the head is bent backwards, violent efforts are made to breathe, a crowing noise like that of croup is made as the air tries to pass through the narrow chink, but it becomes fainter and fainter till it eventually ceases altogether or a louder and prolonged sound proclaims relief.

Varieties.

Convulsions, however, do not always take the typical form of a single generalised fit with twitching and unconsciousness; there may be what is known to mothers as "inward convulsions." In this condition there is sudden pallor, momentary loss of consciousness, upward movement of the eyes, slight twitching or jerking and a catch in the breathing. Such attacks should not be disregarded, at best they are an indication of a

dangerous degree of nervous excitability and they may be a prelude to more marked and general convulsions.

Rapidly recurring convulsions. In this condition the fits follow one another with such rapidity that the child barely recovers consciousness between the attacks. Unless active measures are taken, there is considerable danger of death from exhaustion.

One-sided convulsions. The rigidity and twitching start in the limbs on one side of the body only, in the course of the attack the twitching may pass to the other side of the body and the convulsion become general. Sometimes, however, the condition remains confined to the side on which it started. Such unilateral conditions are suggestive of actual organic brain disease, but in many cases the condition passes off leaving no trace.

Convulsions occur most commonly within the first **Age.** two years of life. There is little doubt that some infants are more prone than others, that is, the condition which will excite convulsions in one child, will fail to do so in another. In other words, the nervous instability which is a feature of early childhood, is more marked in some children than others. This instability may be inherent in the child and in many cases is no doubt hereditary, while in others the instability may be induced by some generalised constitutional disorder, notably rickets, or temporarily by the eruption of the teeth.

The causes of convulsions are:—

(1) **The onset of an acute disease**, especially of one **Cause** of the infective fevers or malaria. In young children, the rigor or shivering attack which as a rule ushers in an acute fever in the adult, is unusual, its place being taken by a convulsion. A notable exception is seen during the onset of the acute pyelitis of infancy in which the shivering attack is sufficiently characteristic to suggest a diagnosis.

(2) **Reflex irritation.** By far the largest number of cases in early infancy and childhood are due to causes which come under this heading and conspicuous among them are those due to irritation within the bowel, whether it be **constipation, colic, gross errors of diet or worms.**

Eurache also is a frequent and often overlooked cause.

Teething.—It must be accepted that during the period of teething, the liability to convulsions is increased, but whether this can be ascribed to actual irritation of the gums is doubtful. It must be remembered that during the eruption of the teeth, the nervous system is in an exaggerated state of excitability and causes which are insufficient at other times, will now be rendered active. Fright has been known to cause convulsions, and there are those cases in which the child literally cries itself into a fit, though such cases should be more properly ascribed to congestion of the brain.

(3) **High fever.**—Here again the occurrence of convulsions would seem to be dependent, not so much on the height of the fever as on the particular predisposition of the child, otherwise, we should be able to state definitely at what degree of fever the convulsions will supervene.

(4) **Toxic.**—A condition of poisoning, whether from substances produced within the body by the action of bacteria or through some morbid change of the body chemistry. As an example of the first class, the convulsions associated with acute infective enteritis may be mentioned and of the second, convulsions in acidosis (*see* Chapter XLIII). It is to be remembered that in the last-named condition the convulsions may be due to the exhaustion of the blood-sugar, as indeed, may be the case in other exhausting diseases.

Finally, under this heading must be mentioned the convulsions of uræmia, when the blood is flooded with poisonous bodies which the diseased kidney is unable to remove.

(5) **Anæmia of the brain.**—Attributable to this cause are those cases arising during the course of a prolonged exhausting disease.

(6) **Congestion of the brain.**—Most important in this class are the convulsions induced during the violent paroxysms of whooping-cough, for rupture of a vessel and hæmorrhage may ensue.

Congestion of the brain may also arise in the course of certain acute diseases, notably pneumonia, leading to the condition of meningismus, which, though closely resembling meningitis, has but slight physical basis, and, as a rule, passes off.

(7) **Actual brain disease.**—In the first few days or weeks of birth the occurrence of convulsions will suggest some injury of the brain or hæmorrhage during birth. Such cases, though alarming, are not necessarily fatal and may leave no permanent results. Later, the chief organic brain disease is meningitis in any form. In such cases, there will have been definite signs of the disease before the supervision of convulsions.

(8) **Epilepsy.**

(9) There are lastly those cases in which no cause of any sort can be found.

It is clearly of the utmost importance to discover the cause, because, though our immediate treatment will be directed towards the relief of the convulsive state, this treatment may be rendered of no avail by the onset of further convulsions induced by the still active cause. Secondly, though the general line of treatment is the same, some special line will also be indicated by the underlying cause. Distinction.

Standing out as demanding special immediate treatment are those cases arising from a high temperature. Here the first efforts will be directed to the reduction of the temperature to within safe limits by immersion of the patient in the tepid or cold bath (*see* Chapter XIV). The condition can hardly be overlooked; the mere handling of the child will bring enlightenment as to the state of affairs.

This cause having been excluded, the next step is to distinguish between those convulsions which have arisen when the child is in apparently good health and those which have occurred in the course of an illness of which a diagnosis has in all probability been made.

When the seizure is sudden without previous illness, we must consider three points:—

(1) Is there any condition such as rickets or teething to induce a predisposition ?

(2) Are we dealing with the onset of an acute disease or malaria ?

(3) Has there been any gross error in diet or any slight departure from the normal habits, such as a failure of the regular evacuation of the bowels ? (Constipation, though apparently a trivial cause, may give rise to the most severe or recurrent convulsions.) Are there any other sources of reflex irritation, earache or swollen gums ?

When there has been previous illness, we should know whether there has been a sudden rise of temperature or exhaustion.

One special word on the point of diagnosis is desirable, that is, that efforts at exact diagnosis should not be pushed to such a degree as to risk provoking further seizures. The immediate necessity is the control of the convulsive state, and until this has passed, the child should not be disturbed by a too rigorous examination, but should be allowed to sleep if it will, and the examination postponed till a more favourable moment.

Treatment. The treatment may be divided under three headings:—

- (a) Treatment of the attack.
- (b) Prevention of convulsions in those threatened.
- (c) Treatment of the underlying cause.

Unless there is high fever (*see* above) the child is immersed quietly in a hot bath (temperature 100° to 105° Fahr.). To this may be added mustard (one table spoonful to a gallon of water). The child is kept in the bath for about five minutes, hot dry towels being made ready to receive him. He should be handled with the greatest care, and should not be rubbed down after the bath, but wrapped in the towels and blankets added if necessary. A cold compress may be applied to the head.

As soon as the child can swallow, a dose of chloral and bromides should be given (for doses *see* below).

A simple attack will now be over and the child should be allowed to sleep undisturbed.

Should the case have been induced by exhaustion, stimulant in the form of a few drops of brandy should be given, with five to ten drops of sal volatile added.

If the fits are very severe and fail to yield to the foregoing treatment, or the child is unable to swallow, the bowel will be washed out with saline solution (one teaspoonful of salt to a pint of water) and after this, a dose of chloral and bromide given by the rectum (for dosage *see* below).

During this process and until the chloral has had time to act, the convulsions may be controlled by inhalations of chloroform. In the worst cases morphia injection grains 1/100 to 1/50th to a child of one year old, may be given.

Professor Still has recommended the use of urethane grains one three times a day to a child of one year of age and from three to eight grains to a child of six, when the fits succeed one another with great rapidity and are persistent.

Dosage of chloral and bromides:—

Age.	Chloral.		Pot. Bromide.	
	By mouth.	By rectum.	By mouth.	By rectum.
Few days	grains $\frac{1}{2}$	grains 1	grains 1	grains 2
Six months	„ 1	„ 2	„ 2	„ 4
One year	„ 2	„ 4	„ 4	„ 8

Repeat in an hour if necessary.

May be repeated three-hourly.

Older children, dosage in proportion.

The repetition of the dose is a matter which calls for judgment; so long as there is any sign of irritability or sleeplessness, the sedative must be used actively, but if the child is drowsy or sleeping, it should be cut down or temporarily omitted.

Great pains should be taken to encourage the sleep which usually succeeds convulsions. By means of the potassium bromide, rest may be always assured in cases where restlessness succeeds the fit, and a grain of chloral for each year of life may be added to the first dose. Till sleep is procured, there is always danger of a recurrence of the seizure. The most perfect quiet should be observed. No attempts should be made to play with the child or to amuse him after he has recovered his senses. Subsequently for a few days he should be put on a spare diet, and a **free evacuation of the bowels ensured.**

After-treatment.

If the cause of the seizure has not been apparent, every effort should now be made to discover it, for, however well the patient may seem after the fit, the cause may still be there and potent to produce a repetition. It may have been improper food, indigestion, worms, flatulence, or other cause against which, when the accusation has once been established, precautions should be taken during the whole of childhood.

In the list of causes we have an outline of the preventive treatment. We know that in certain conditions there is a peculiar liability, we first take steps to avert these conditions by such means as the reduction of high temperatures, the giving of stimulants in exhaustion or the active treatment of rickets, and we

The prevention of convulsions.

endeavour to forestall any seizure by the administration of such drugs as bromides or phenazone (grain one daily to a child of one year) in such cases as, by premonitory symptoms, we are warned. These "warnings" have been mentioned in the opening section of this section, but may be repeated; twitchings of the face or limbs, starting during sleep, clenching of the hands, a somewhat similar condition of the toes, and lastly, persistent sleeplessness.

Outlook.

The single simple convulsion is seldom fatal, but in making a forecast we shall be governed by three considerations; the type of the seizure, whether short, prolonged or recurrent, the underlying cause and the exhaustion following the attack. Of serious import are:—

(a) Convulsions during the first few days of life as suggesting some injury or hæmorrhage of the brain during birth. Also are they grave if there have been preceding signs of disease of the brain.

(b) Rapidly recurring fits, especially if there is cyanosis (Blueness).

(c) Convulsions in the course of a serious illness, as they are the indication of a profound state of exhaustion or poisoning and may, indeed, be the terminal event.

It is rare that convulsions, save those actually associated with disease of, or injury to the brain, lead to permanent impairment of the mental faculties.

Convulsions and Epilepsy.

There is also no evidence that convulsions in early childhood will induce a tendency to epilepsy, but it must be remembered that fits without any apparent exciting cause may be epileptic in origin and will declare themselves as such in later years.

SPASMOPHILIA.

Reference has been made in the previous section to an acquired excitability of the nervous system induced by some disturbance of the body chemistry, such as occurs in rickets. Such a condition is known as spasmophilia and may become manifest in general convulsions, local spasm in the form of tetany or in the form of croup known as child-crowing or laryngismus stridulus. Again no such signs may be present, but their imminence may be demonstrated by certain signs of nervous irritability to be described later.

The varying manifestations are, as has been said above, most commonly associated with active rickets, but do not appear to depend on the gravity of the outward signs of this disease. Chronic digestive disturbance is the second most important cause, especially that condition known as coeliac disease.

Tetany is a cramp-like condition which attacks the arms and legs of the child. The position of the hands is characteristic; the fingers are straight, close together, but half bent towards the palm, the thumb is drawn inwards, the hand and fingers together are cone-shaped, in fact the hand assumes the attitude as if endeavouring to pass through a small bangle. The wrists and elbows are bent and a similar condition affects the feet. The condition is apparently painless except at the onset and lasts a varying time from a few hours to days.

The symptoms of child-crawling have been described in Chapter XXXIII. Here the spasm attacks the muscles of the larynx, sometimes to such a degree as to cause death from suffocation.

It is clear, therefore, that it is of the utmost importance that the state of spasmophilia be recognised early.

There are two simple tests of muscular irritability: **Signs.** The first, Chvostek's sign, consists of a twitching of the muscles on the same side of the face in response to a gentle tapping immediately in front of the ear, that is, over the facial nerve. Trousseau's sign. The arm is compressed about midway between the shoulder and elbow by the thumb and forefinger of the examiner. After a short while the hand assumes the characteristic attitude of tetany.

Such signs are an indication that the child is on the verge of some convulsive manifestation and call for immediate treatment with bromides or phenazone.

Authorities are agreed that in the majority of cases, though not all, the condition is due to want of calcium salts in the blood. This deficit, unfortunately cannot be made up by the simple administration of calcium, as the power of absorption and retention of calcium is lost, but, in the case of rickets, active treatment with Cod-liver oil and irradiation will rapidly restore this lost power.

Those cases due to gastro-intestinal disorder present a more difficult problem, as some are due to

toxins absorbed from the bowel, others to alkalosis, while others, as in rickets, are due to a disturbance of the calcium balance. In general, the treatment is directed to the underlying causes, with a careful control of any tendency to hyper-excitability.

CEREBRO-SPINAL FEVER.

Definition. Cerebro-spinal fever or the infantile variety, posterior basic meningitis is an infectious disease often appearing in epidemic form, characterised by headache, fever and pain in the neck rapidly passing to a state of muscular rigidity and unconsciousness.

The mode of transmission is uncertain, but our experience in Africa was that, by careful avoidance of overcrowding of infected communities, the incidence of the disease was curtailed. The symptoms of the disease are due to an intense purulent inflammation of the membranes of the brain, chiefly at the base, and over the spinal cord.

Onset. The onset is, as a rule sudden, with fever, pain in the head, at the back of the neck and over the whole body and limbs.

There is vomiting, frequent and often persistent throughout the disease, and convulsions.

**Symptoms
or course.** Stiffness at the back of the neck develops rapidly, any attempt to move the head forward induces severe pain which will cause even the semi-conscious patient to cry out. Gradually the head is drawn back, the limbs and trunk become rigid and in the most pronounced cases the head and spine arch so far backwards that the back of the head almost touches the spine. When the head retraction is not well marked, the general rigidity of the body may be elicited by drawing the head gently forward, when the thighs will be flexed on the abdomen (Brudzinski's sign).

A second sign, Kernig's sign, is of diagnostic value in meningitis of all types. This sign consists of the inability to straighten the leg at the knee, when the thigh is flexed at right angles to the body.

The pupils in the early stages are affected, usually contracted, but in the later stages may become unequal. Squint also develops.

The pulse, at first increased in rate, will become slower as signs of pressure within the skull become

more marked. The temperature is variable and exceedingly irregular, at times rising abruptly to 104 or 105. The respiration is sighing and irregular.

If the anterior fontanelle has not yet closed, it will be found to be bulging, a sign of increased pressure within the skull. Even during the state of apparent insensibility, the child cries out in pain. Convulsions not only usher in the attack, but may arise at any time in the course. Delirium may be violent and alternate with periods of loss of consciousness.

The commonest skin eruption in this disease is **Rash.** herpes, usually on the face, but there may also be a petechial rash on the neck and limbs.

Provided that the patient survives, the disease may **Outlook.** last from two to four weeks in the active stage, to be followed by a prolonged period of convalescence. The prospect of recovery however, in infants, is not hopeful, though, since the introduction of the serum treatment, the rate of mortality has been much reduced.

The liability to complications in this disease is **Complications.** high, as the causative organism, the meningococcus, flourishes in other tissues with the production of inflammation, especially in the lungs leading to pneumonia and the joints, leading to arthritis.

The after effects are severe, permanent deafness, **After effects.** blindness, disordered mental state and paralysis of muscle groups, especially of those around the spine. The inflammation at the base of the brain may result in the production of hydrocephalus (water on the brain).

The treatment falls under three heads:— **Treatment.**

(1) The control of spasms, convulsions, delirium and pain by sedatives and hypnotics, bromides and morphia.

(2) The maintenance of nutrition. This may prove difficult as the patient will be unable to swallow. Recourse will be had to nasal feeding or the stomach tube.

(3) Alcoholic stimulants will be necessary, but strychnine, which will increase the tendency to spasm, will be avoided.

Since the introduction of the anti-meningococcic **Specific treatment.** serum not only the mortality, but the severity and duration of the disease have been markedly reduced, particularly in infancy. The dosage of the serum is from 10

to 15 c.c. for infants, up to 35 c.c. for older children. The serum is introduced intrathecally after the removal by lumbar puncture of some 5 c.c. more fluid than it is intended to introduce. The injection is repeated daily for three or four days.

Lumbar puncture alone, with the withdrawal of the excess of fluid will prove of great value in lessening the intensity of the coma, the violence of convulsions or delirium, and the severity of the headache.

Where it is found that the fluid will not flow owing to some inflammatory block in the thecal space, a cisterna puncture may be possible.

Finally, it is important to realise that the disease is infectious and that the case should be isolated while those in attendance should wear gauze masks upon which are sprinkled a few drops of equal parts of eucalyptus oil and creosote, for the germ of the disease enters the body through the mucous membrane of the nose.

MENINGISMUS.

Meningismus is a condition in which the signs and symptoms strongly suggest the onset of meningitis. However, the organic basis of such symptoms is but slight, being of the nature of congestion rather than of inflammation, and the outlook, apart from the gravity of the general condition, is good. Such a condition may arise in the course of an acute febrile disease, especially pneumonia, and as true meningitis is not a very rare complication in that disease, confusion is likely to occur.

Meningism is also seen in the severe wasting diseases of children and in this country may be due to the poisons produced by worms within the bowel.

Provided that the general condition improves, the symptoms are likely to pass off leaving no trace.

TUBERCULOUS MENINGITIS.

Tuberculous meningitis is one of those disasters which occasionally befall young children. Its occurrence is exceptional before the age of six months but after that age till the age of five there appears a tendency for tuberculous infection to take this form. Consequently, the young child must be most carefully guarded against infection, for once this form of the

disease is contracted, there is but little hope of recovery. Not infrequently there is a history of previous debilitating disease, especially measles or whooping-cough, or of a fall.

There are two sources of infection, the first direct from a human subject of tuberculosis, the second, the unboiled milk of tuberculous cattle. Source of infection.

The disease occurs either alone, arises in the course of a generalised infection or follows the infection of glands elsewhere.

The course of the disease may be divided into three stages:— Stages.

- (a) The stage of onset.
- (b) Of brain irritation.
- (c) Of paralysis.

The onset is gradual, the child shows signs of being unwell, has no desire to play, is peevish and fretful, complains of headache or puts the hand to the head. In young children the headache will be indicated by a continuous puckering of the forehead and a strained look in the face. The temperature may be raised to 101 to 102, the pulse rate accelerated. Onset.

Within a few days the symptoms become more marked, the child is drowsy, prefers to be left alone and the headache becomes more persistent. To the other symptoms vomiting is now added and is of the cranial type, that is to say, has no relation to meals, is of sudden occurrence and is not preceded by nausea or warning. The child may vomit two, three or more times a day. **With the vomiting is associated obstinate constipation**, a combination of symptoms so unusual as to be suggestive.

After some ten days the intracranial pressure (pressure within the skull) is raised to such a degree that the stage of irritation is produced. The fontanelle, if open, will be found to be bulging. The drowsiness increases, the child lies on the side, curled up and turned away from the light. He shows active dislike to any light or to interference. The pain in the head is intense and there is apt to be a monotonous toneless cry, the "meningeal cry." Convulsions are not infrequent. At this stage the pupils are dilated and unequal, and the abdomen, having lost the natural rounded outline of childhood, is retracted and hollow. The neck is stiff and resistant to movement, but rarely shows the Stage of irritation.

retraction so characteristic of posterior basic meningitis. There may now be signs of paralysis, drooping of the eyelids or squint.

With the increasing intracranial pressure, the pulse becomes slower, more irregular and the respiration also is irregular.

Paralytic stage.

The child is now completely unconscious; instead of lying curled up on the side, he now lies flat on the back, indifferent to his surroundings. One or more limbs may be rigid or show convulsive movements which may become general; the face is dusky, the respiration irregular with perceptible pauses and the pulse becomes more rapid and weak till finally it fails.

The total duration of the disease is about three weeks.

Diagnosis.

During the first few days diagnosis will be difficult, but later certain signs of grave intracranial mischief will develop. These are:—The severe and persistent headache, with “meningeal cry,” unnatural drowsiness, slowing pulse and vomiting of the cranial type associated with constipation. Brudzinski and Kernig’s sign as described under the section on cerebro-spinal fever, may be present, but these signs often appear at a late stage, when the diagnosis has become obvious.

Cerebro-spinal fever will be distinguished by the more rapid onset, the more pronounced stiffness of the neck and head retraction and possibly by the presence of a rash. Tuberculous enlargement of glands, most commonly those of the peritoneum, will point to the nature of the infection.

When arising in the course of a generalised tuberculous infection, it is likely that the cerebral symptoms will be masked by others, pneumonic or typhoidal.

Meningitis may develop during the course of an acute disease most commonly pneumonia, and is caused by the organism of the primary disease. The nature of the infection will then be suggested by the nature of the primary disease.

Lastly, it should be mentioned that symptoms strongly suggestive of tuberculous meningitis may be seen during a severe gastro-intestinal disorder. Such symptoms may be more properly ascribed to meningism (described in the previous section).

Treatment.

Though attempts are made to retard the progress of the disease by the administration of hexamine, which

we know has an antiseptic action in the cerebro-spinal fluid, treatment in general is directed to the mitigation of the distressing condition to which the disease leads.

The patient is kept in a quiet darkened room, with ice bags or evaporating lotion applied to the head.

Phenacetin grains two to four according to age, with caffeine in the proportion of a quarter grain to each grain of phenacetin, is given for the relief of headache. When there is restlessness, spasms or convulsions, chloral and bromides are given in doses as for convulsions.

Constipation which is obstinate is treated with calomel and enemata.

The drawing off of the excess of the cerebro-spinal fluid by means of a lumbar puncture will be effective in quietening the spasms and relieving to some degree the headache. The process may be repeated as often as necessary.

Lumbar puncture.

Lumbar puncture may also be performed for diagnostic purposes, the fluid being characteristic both microscopically and in certain chemical reactions.

Treatment by tuberculin has proved of no value.

ENCEPHALITIS LETHARGICA.

Encephalitis lethargica is a febrile disease of the brain leading to widespread derangement of the motor, sensory and mental functions.

The symptoms are so varied both in character and combination that space does not permit of more than in a brief outline.

Description.

Isolated cases have been seen in India and it is possible that, in view of the attention which the disease has attracted in recent years, more cases will be identified. In Europe, the disease as a rule appears in limited outbreaks, and is considered to be infectious though to a minor degree. Though the number of cases recorded is increasing, there is reason to believe that the virulence is diminishing. Some authorities consider, in view of the tendency of the disease to appear during influenza epidemics, that there is some relationship between the two.

The initial stage is subject to wide variation; it may be of such severity as to produce a fatal issue, or it may be so slight that the disease is taken for a mild

attack of influenza and the diagnosis is only made some months after, when the residual symptoms have developed. The initial stage, therefore, may be:—

- Initial stage.** (a) Acute with pronounced mental and constitutional disturbance,
 (b) Sub-acute with or without distinctive symptoms, or
 (c) Transient with a period of apparently normal health before further symptoms develop.

The common initial symptoms are:—Fever 101 to 102°, profound weakness, lethargy, paralysis of one or more muscles of the eye leading to squint and double vision. Other symptoms of importance are hiccough, sometimes persisting for days, vomiting, giddiness and muscular pains.

With the acute onset the fever is higher; 103° or more, prostration is profound and there are signs pointing to a general involvement of the nervous system. These are grouped as follows:—

- | | |
|---------|--|
| General | Convulsions—mania—delirium.
Lethargy or profound impenetrable stupor. |
| Local | Twitching—spasm—rigidity of the limbs.
Severe muscular pains.
Paralysis, most commonly of the muscles of the face or eyes. |

Residual symptoms.

Though the mortality in the more acute cases is high, from ten to twenty per cent., the importance of the disease lies equally in the residual symptoms. These symptoms can hardly be called after effects as they may either continue, having developed during the acute stage, or they may arise some time after the disease has apparently passed off and continue to increase in gravity for an almost indefinite period. However mild the initial stage may be, there is always a danger that sooner or later some of the more formidable residual symptoms will develop.

Age appears to play an important part in the nature of the residua: in children the commoner manifestations are:—

- (a) Nocturnal restlessness, the child will not sleep at night, moves about, sings and talks. There is no actual shortage of sleep as the due amount is made up during the day.

(b) Alteration of mental and moral character. The child becomes acutely restless, impulsive and impatient of control. He may commit criminal acts of violence or thieving, but is aware of the nature of such offences and will, if suitably handled, express regret. On the other hand, if roughly handled or scolded, he may respond with uncontrollable temper or violence. The condition, in fact, resembles some degree of mania.

(c) Motor symptoms. These consist of tremors, there may be movements of the face, trunk and limbs resembling chorea or more pronounced slow weaving movements. Finally, one limb may be affected by regular jerking movements. Such movements may affect the muscles of respiration. Technically these movements are termed choreiform, athetoid and myoclonic. In older children and adults a common development is the Parkinsonian syndrome.

The outstanding features of this condition are:—The mask-like expressionless face, the constant tremor of the limbs, the sloth of all movements, the toneless voice, the bowed shoulders and forward carriage of the body. Not infrequently combined with this there is some degree of hemiplegia (paralysis of the limbs on one side).

After the acute stage is passed, the outlook is **Outlook.** briefly as follows:—A certain proportion of cases, especially those with mild initial symptoms, do not develop residual symptoms, but recover completely.

Of those developing residual symptoms, a certain number will gradually recover. The outlook is better in those cases showing motor symptoms than in those showing mental change or Parkinsonianism. The latter have shown definite improvement under large doses of belladonna and hyoscyamus.

The treatment in the acute stage is mainly that of **Treatment.** any acute febrile disease. High feeding is very necessary on account of the restlessness and activity of many patients. Warm baths or hot packs may do much to control this restlessness.

Prolonged rest, bodily and mental, is necessary after the mildest case and will do much to influence favourably the ultimate outlook.

The later treatment is mainly re-educational.

INFANTILE PARALYSIS, ACUTE POLIO-ENCEPHALITIS.

This disease has been brought into undesirable prominence during the last few years, by the occurrence of a number of widespread epidemics in Europe, America and Australia. Fortunately, the disease is as yet uncommon in India.

Infections. Infantile paralysis which appears either in epidemic form or as isolated cases, is definitely infectious, though a high proportion of the population appears to be immune. Infection takes place by direct transmission though the disease may be carried and passed on by healthy or immune persons. The highest proportion of cases occur during the second year of life (still) though children of all ages are affected and adults do not escape. The incubation period is from four to seven days and the patient is regarded as infectious for fourteen days after the onset of the attack.

Paralysis. The characteristic feature of the disease is the development of paralysis, which may be the first sign, or which may be noticed in the early days of the feverish onset. The onset is abrupt, with fever, vomiting, possibly convulsions and catarrh of the nasal and bronchial passages. There is a pain at the back of the neck and the onset of paralysis is signalled by marked tenderness of the limbs affected. At once or after a variable period, it is noticed that one or more limbs lie slack and useless. Such paralysis are not due to any condition in the limbs or muscles themselves, but are produced by change, temporary or permanent, in the nerve centres in the spinal cord which control and activate the muscles. The paralysis, which may at first be extensive, involving the whole of one or more limbs, is not commonly symmetrical, and does not, as a rule, affect the muscles of the trunk.

Quiescent stage. The fever and general symptoms last for a short period up to seven or ten days, followed by a quiescent stage of some weeks during which there is no advance of paralysis; on the contrary, many of the muscles, at first paralysed, regain their power, but those in which the paralysis has become fixed, show marked wasting.

Final stage. The third or final stage is marked only by changes in the paralysed muscles, improvement in some cases, deterioration in others, leading to deformities of which

some form of club-foot is the most common, or there may be marked re-acquisition of power not so much by the recovery of muscles as by a process of compensation by which the child learns to use the sound muscles to the best advantage.

A more serious variety of the disease, in which the nerve centres of the brain are affected, is seen more commonly in epidemic rather than sporadic cases. In this form, evidence of damage to these nerve centres is seen in the development of paralysis of the muscles of the face, of respiration, of swallowing and in a rapidity of the pulse-rate due to loss of the nerve control of the heart.

The prospects are far brighter than would at first appear, whole limbs, apparently completely paralysed, may recover their power or the residual paralysis gradually fine down to one group of muscles; indeed, cases have been recorded where complete recovery has taken place. **Outlook.**

In the acute stage, large doses of hexamine are given with the object of limiting the infection. **Treatment.** Owing to variations in individual toleration the dose cannot be fixed definitely, but, in view of the urgency, a toxic reaction must be risked. It is advisable to start with five grains four-hourly, decreasing if necessary, but increasing to two-hourly doses if the drug is well borne.

During the quiescent stage, iodides have been given with advantage and recently X-ray treatment to the spine has been advocated. This stage must be regarded as a conservative stage, the nerves and muscles must be given time to rest and recover, but their nutrition must be maintained and the development of deformity prevented by the use of gentle massage and, if necessary, splinting.

The treatment of the last stage, which may be continued up to three years with hope of improvement, consists of more vigorous massage, preferably twice daily and if available, electric treatment. The child is encouraged to use the weakened limb, but care should be taken that the unopposed sound muscles do not damage the weakened ones or increase deformity by over-action. It must be remembered, at this stage, that such paralysis as remains is due to damage to nerve centres and that no treatment to the muscles will restore the power,

but contraction or stretching of muscles leading to deformity will be prevented, border-line or partially paralysed muscles will be improved and the growth of the limb, which tends to be less than that on the sound side, will be encouraged.

The following directions to mothers for the care of paralysed limbs are issued at the Hospital for Sick Children, Great Ormond Street.

LOWER LIMBS—CLOTHING.—They must be kept warm day and night. Knitted woollen stockings to come up above the knees. If these do not keep the limbs warm, woollen overalls to be worn outside the stockings. The overalls to come up the thighs. If these are not sufficient to keep the limbs warm, the overalls must be lined with cotton wadding, which is to be quilted so as to hold fast to the overalls. For the night a flannel sack, made in the shape of the leg and coming up to the top of the thigh, is the best. This sock should be lined with cotton wadding.

RUBBING.—For a quarter of an hour twice daily. Set the child on a chair, or lay it on the bed, or let it sit on somebody's knee.

1. Rub the paralysed leg from the foot to the top of the thigh. Rub upwards only. Put the broad part of your hand on the back of the child's leg. In rubbing the thigh, you may put your hands, first on the back of the child's thigh, and afterwards on the front of its thigh. But always rub upwards, and be sure to go as high as the child's loins. Whilst rubbing with your right hand, hold the child's foot with your left. Use for rubbing any kind of oil.

2. Take hold of the child's leg just above the ankle, with your two hands. Rub round the leg with your two hands in the opposite direction, as though you were wringing out sheets. Work up the leg and thigh, from the foot up to the top of the thigh, in the manner described.

3. Take the child's calf with your two hands. Put your fingers to the back of the leg and your thumbs to the front, squeeze the soft parts out between your fingers and thumbs, so as to flatten the leg and make it as wide as possible. Work right up the leg and thigh in this manner.

4. Put your right hand over the front of the child's knee. Put your left hand against the child's foot. Push up the child's foot, and holding your right hand in front of the child's knee you will prevent yourself doing any harm. You want, if possible, by pushing the child's foot, to make the child push against your left hand with all its might. *This is the most important of all the exercises.*

5. Flip every part of the leg and thigh with your fingers, so as to make the whole of the limb quite red and warm.

6. Gently rub up and down all over. This will take the stinging away which was left by the last movement.

BATHS.—Once a day let a large jugful of hot water, containing two handfuls of salt, be poured down the leg and thigh. Then pour half the quantity of cold water over the leg and thigh. Then rub thoroughly dry with a towel, and continue to rub until the limb is perfectly warm. *Mutatis mutandis*, the directions apply equally of course to the upper limb when that is paralysed.

FALSE PARALYSIS.

Such a condition of true paralysis must not be confounded with those cases of false paralysis not infrequently seen, in which the limb is immobile and apparently powerless not from inability but from inhibition from movement owing to the pain it entails. The following are the commonest cause of such false or pseudo-paralysis :—

(1) Congenital constitutional disease in very young children in whom there is inflammation at the ends of the bones of the limbs. Such cases react rapidly to mercurial treatment.

(2) Infantile scurvy; a disease of babies up to the age of two, rarely in older children, whose diet has been deficient in the antiscorbutic vitamine C, that is, babies fed entirely on patent foods and tinned milks without the addition of fresh fruit juice. In such cases, the limb or limbs are excessively tender, the child screams if handled and develops a somewhat characteristic anxious look when approached. The lesions of scurvy are produced by hæmorrhage, under the membranes of long bones, at the rib ends, from the gums, under the skin, so that bruises are formed without injury (Chapter IX), and from the kidneys, so that the urine is tinged red. Fresh fruit juice, potato cream flour and possibly some preparation such as metagen will bring about a rapid improvement of this condition.

(3) In older children one to three years, rickets, rheumatism, mental deficiency may be causes, and it is well not to forget that surgical conditions such as congenital dislocation of the hip may be responsible for the inability to walk. In the event of any such disability, professional advice should be sought early.

CHAPTER XXIX.

TETANUS.

This disease, though rare among Europeans, merits a short description on account of the alarm and sense of helplessness which its occurrence will occasion. Among the children of Indians the disease is, unfortunately, very common and it is one of the many causes of the terrible infant mortality of Calcutta.

The disease commonly occurs between the third and tenth days of life, being at this time due to infection of the raw surface of the navel string by the tetanus bacillus, which flourishes in the dirt and dust of crowded cities and especially where there is much litter of horse-dung.

Tetanus, however, is not confined to early infancy, as the records of any big Indian hospital will show. The disease attacks all ages and the writer has seen victims aged from five days to sixty years.

Among children a common site of infection is the ear, superadded to an older infection such as is seen in the common discharge from the ear. The site may also be in any wound or cut into which dirt or dust has been introduced.

Premonitory Symptoms.

Though the disease runs a rapid course, there are always premonitory symptoms. In the infant, these will take the form of restlessness, whimpering, broken sleep, yawning and hasty snatches at the mother's breast, which, however, the infant soon relinquishes. Probably the first matter to attract the attention of the mother will be the inability on the part of the infant to take the breast, an inability which the mother may attribute to some fault of her nipple, unless she happens to examine the child's jaws which will be found to be stiff and opened with difficulty.

Course of disease.

After a few hours the jaws become fixed and the features undergo a characteristic alteration; the lips are drawn tightly over the gums, the corners of the mouth are pulled down and the eyes are half shut. This stiffness extends rapidly to the limbs and trunk, the hands

are clenched and the head and spine are arched backwards. Swallowing is difficult or impossible. At intervals, the length of which vary with the severity of the case, waves of contraction or spasm pass through the whole body. During such attacks the pain is intense, respiration is interrupted by reason of the spasm of the respiratory muscles and suffocation appears imminent. The spasms are induced by the slightest cause, such as a draught of air or a movement of the bed-clothes, but also arise independently of external stimuli.

In older children, the features of the attack are in no way different; with the onset the child complains of stiffness of the neck, jaws and difficulty in swallowing.

Fever is present from the onset and, in the more severe cases, will remain at 103° to 104°F.

The outlook in all cases of tetanus is bad, especially so in the very young. Among older children good results have been obtained with a line of treatment to be described. Treatment must be both general and local, at the site of the infection. Wounds must be opened up if necessary and treated antiseptically to prevent the production of more poison. The infected navel must be carefully cleansed and dressed with antiseptics.

Prospects.

The aim of general treatment will be threefold:

- (a) To ward off spasms and ensure rest.
- (b) To maintain nutrition and combat exhaustion.
- (c) To neutralise the poison with anti-tetanic serum.

The patient must be kept in a darkened quiet room, and handled as little as possible in order to avoid exciting the spasms.

The following is the routine of the Medical College Hospital, Calcutta:—

Morphia at once. To children over five years of age, grain 1|6th; under five, grain 1|8th; under three years, proportionately less.

Potassium bromide and chloral. Over five, of each grains 10; under five, of each grains 5; given in solution by the rectum two-hourly; under three years, proportionately less.

Intravenous 3,000 units or intrathecal 1,500 units, followed by a daily dose by the intravenous route of 1,500 units till the spasms cease.

Antitoxin.

Magnesium sulphate 25 to 50 per cent. 1 c.c. hypodermically or intravenously daily; or

Acid Carbolie 2 per cent. 1 c.c. as above.

Magnesium sulphate is also given in big doses by the mouth and in enemata.

Feeding will present great difficulties and recourse must be had to the nasal tube. It may be necessary to administer chloroform in order to make this manoeuvre possible. Hope of recovery depends largely on the day of the disease at which treatment is commenced.

Prevention.

In tropical countries where the disease is prevalent, special care must be directed to the cleansing and treatment of all wounds however trivial. When abrasions to any extent or depth have been sustained by such accidents as involve the soiling of the wound by the dirt of frequented roads, in addition to thorough cleansing with some such antiseptic as iodine, a preventive inoculation of the anti-tetanic serum is desirable. For the adult the doses is 1,500 units, for children proportionately less.

The tetanus of infancy is preventable if due care and cleanliness is exercised in the dressing of the navel string.

CHAPTER XXX.

MENTAL DEFICIENCY.

In former chapters we have referred briefly to mental conditions that may result from organic diseases of the brain, such as meningitis, hydrocephalus, hæmorrhage, convulsions, and so on. But in this section we wish to call attention to **primary mental deficiency**, which is a state interfering with the intelligence and adaptability of a child to its environment. The causes of mental deficiency cannot in all cases be determined. But undoubtedly, heredity is a large factor, more especially if there be superadded a history of chronic alcoholism, or syphilis, or epilepsy in either parent. In some cases there is a tale of brain injury at birth, or ante-natal shock, in others consanguineous marriage is spoken of. Mentally defective children are sometimes classified into:—

- (1) Backward and feeble-minded.
- (2) Idiots who never develop beyond the mental age of an average child of two years old.
- (3) Imbeciles who never develop beyond the mental age of a child of seven.

It demands a certain amount of skill and familiarity with the physical and mental development of children in order to appreciate the slight abnormalities that may first raise suspicion in the parents' minds. Remember, that the **normal child** first grasps objects about the third month, recognises people at the fourth, holds his head up by the fifth, reaches for and holds things presented to him at the sixth month, laughs and sits up about the seventh to the ninth month, and may stand by the twelfth, and even walk, and say single words.

The **mentally defective child is backward in, or incapable of any of these**. He does not recognise people or things. He is placid or restless and often screams out for no cause, his expression is vacant. There is a protruding tongue and aimless movement of the hands.

It is **sometimes very difficult to determine whether a child is merely backward or mentally deficient**. For a child may be congenitally backward and from disease not able to walk or talk until two years old. But such

a child is usually bright in expression and understands what is said and done for him, and the outlook is good even though the development be slow. Whereas, in the mentally defective, improvement, even with all the affectionate patience of a mother, may be but very small. The Montessorri system of teaching has, in our experience, been of most assistance. But where there is no improvement, the greatest fairness to the child and greatest ultimate kindness to the parents is to place the child in a Home or under special guardianship. For those especially interested in this subject, we would refer them to the excellent translation by Dr. Drummond of the work by Binet and Simon on mentally defective children. However, should the doctor in attendance suggest a blood examination, this should always be permitted. For under certain *positive* conditions early treatment may markedly improve the mental state.

CRETINS AND MONGOLS.

It is necessary briefly to refer to these two conditions (which are not uncommonly seen in India), because they both are classified by some as instances of mental deficiency. But there is this great difference,—**the cretin if recognised early is curable, the mongol is incurable.**

In **cretinism**, the complexion is like parchment, the hair is dry and scanty, the skin is dry and rough, the lips are broad and thick, the neck is short and boggy, the tissues are doughy, the fingers and toes short and thick, the stature is small, dentition is delayed, the temperature is subnormal, there is marked constipation and mental impairment is obvious.

Such a case if diagnosed and seen before the ninth month, can, by efficient treatment, be rendered and maintained a normal individual. But the later the diagnosis, the less the chances of normal development. The treatment is life-long medication with thyroid extract.

Mongolism is, we think, more commonly seen in India than cretinism, and unfortunately, we have seen several cases where diagnostic error has been made, and thereby a mother's hopes and expectations annihilated by the complete failure of promises of a complete cure by thyroid extracts.

This mistake should not be made, for in **mongolism** the skin is smooth and fair, the hair is fine and abundant, the eyes are wide apart and are placed obliquely, the tongue is large and protrudes; they are not lethargic, the head is short and round, the finger tips are rounded, and there is a curious incurving of the little fingers. These children mercifully rarely live till puberty; for they are particularly prone to develop intestinal troubles. There is no known cause of mongolism, hence there is no medical treatment. They remain imbeciles.

CHAPTER XXXI.

THRUSH AND INFLAMMATION OF THE MOUTH THRUSH.

Definition. Thrush is one of those affections of early infancy (rare after the third month, except during the first dentition) which **ought never to occur, and which will not occur in a well-managed infant.** It is a disease of mismanagement, which is characterised by little white patches within the mouth. In itself it is a trivial complaint, though it is indicative of a deranged state of the digestive organs, unfavourable to assimilation.

Causes and Nature. The chief cause of thrush is an unsuitable diet, which, producing a disordered state of the system, originates an unhealthy condition of the mucous membrane of the mouth, and renders it a fitting soil for the lodgment and growth of a peculiar vegetable parasite. This parasite belongs to the yeast group, and is closely allied to, or identical with, that which exists in sour milk. The parasite thus suitably planted, there develops and causes spots of inflammation which present the appearances known as "thrush."

Symptoms. A dirty, sour state of the feeding-bottle or its nipple will also nourish the parasite, which may thus become lodged in the child's mouth. The contagion may also be conveyed from one child to another by means of bottle nipples, comforters (chusni), spoons and such articles unless care be taken to keep them scrupulously clean.

The affection is particularly common in the hot weather, which favours the growth of the fungus.

At first there is merely redness and some tenderness inside the mouth, which, if carefully examined, will show numerous very minute transparent blebs. These (spots of lodgment of the parasite) inflame, burst, and form white specks, each perhaps only the size of the head of a pin. The interior of the mouth now becomes angry-looking. It is at this stage that the affection, usually for the first time, attracts the attention of the mother or nurse. The size of the patches next slightly increases, presenting an appearance as

though minute portions of curd adhered to the inside of the cheek or lips; but it will be found that they cannot be moved about as could mere particles of food; nor can they be dislodged without some slight force, and if removed, they leave behind little ulcers, which bleed slightly.

Near the corners of the mouth, the inside of the lips, and the under surface of the tongue are the most frequent situations; but the spots may extend over the roof and back of the mouth, even to the tonsils and throat.

The condition is usually accompanied by acid diarrhoea leading to considerable irritation of the buttocks. The reaction of the saliva is acid, favouring the growth of the fungus. Thrush seldom occurs in the healthy infant, as the normal mucous membrane inhibits its growth.

Thorough cleanliness is the first essential. After each meal the mouth should be washed out with a little warm water to which is added bicarbonate of soda grains ten to the ounce. The bowels should be regulated by a few doses of the red mixture or castor-oil emulsion; but if there is much diarrhoea it may be necessary to give bismuth. To the milk, lime water should be liberally added. Many cases only require a little addition of cream to the diet and the application of boracic acid and glycerine to cure the disease. **A minimum of sugar should be allowed.** The child must be fed frequently, because the efforts at sucking may be so painful as to interfere with nutrition, and after each meal his mouth should be swabbed out with a piece of soft rag moistened with warm water.

Treatment.
General.

The next thing to be done is to destroy the parasite. This is easily accomplished by the application of borax and glycerine within the mouth after each swabbing. Another capital application is the hyposulphite of soda (one drachm to one ounce of water), which very quickly destroys the vegetation.

Local.
Destroy the parasite.

When the mouth is extensively affected, particularly if the throat be involved, it will be desirable to give a mixture of chlorate of potash grains 3 to the teaspoonful of dill water or prescription No. 49.

When the throat is involved.

Good hygienic surroundings and a carefully regulated diet are essential.

Mother's nipples.

A mother who is suckling an infant affected with thrush is apt to suffer from sore nipples. She should, therefore, carefully wash her nipples with borax and water after each nursing, and then paint them with equal parts of Eau de Cologne and Glycerine.

The application for thrush:

Take	Borax	..	$\frac{1}{2}$ drachm
	Glycerine	..	1 drachm
	Water to	..	1 oz.

apply after each swabbing of the mouth.

INFLAMMATION OF THE MOUTH.

Inflammation of the mouth is of three kinds—simple, severe and dangerous.

1. Simple. Nature, etc.

1. **Simple Inflammation of the Mouth.**—This is a trivial affection, engaging only the mucous membrane, and it in many respects resembles thrush in appearance; but it is a different disease, and does not depend upon the presence of a parasite. While thrush is exclusively an affection of early infancy, this inflammation never occurs at that period of life. It is most common between the ages of one and five years.

Different from Thrush.

Its cause lies in a state of constitutional debility accompanied by disorder of the stomach. Sometimes it follows measles, when it not infrequently assumes some of the characters of diphtheria, and then of course it becomes a serious affair.

Cause.**Symptoms.**

The child is out of sorts; he is peevish, and he suffers from offensive diarrhoea for two or three days. The mouth then becomes sore, red, and hot. On inspection, numerous spots of a dirty white colour surrounded by a red margin are observed within the cheek, upon the tip and edges of the tongue, the lower lip, and even upon the throat. These spots soon burst and form ulcers. Feeding is painful. Saliva dribbles freely from the mouth. As one crop of ulcers heals, another comes on, and thus, if unchecked by remedies, the affection may run a prolonged course.

Treatment.

Attention to the cleanliness of the mouth, regulation of the diet and of the bowels, by the red mixture, and the use of an alum gargle (half a drachm to six ounces of water) will usually effect a ready cure; or, better still, potassium chlorate grains ten to one ounce of water may be used instead. Should any ulcer become large, it is well to touch it rapidly and gently with

tincture of iodine or 2 per cent. silver nitrate solution, but this should not be repeated within an interval of two or three days. For internal administration potassium chlorate and cinchona (49) is employed, to be followed, in convalescence, by iron tonics.

2. Severe Inflammation of the Mouth with Ulcerative Stomatitis.—Attacks chiefly the gums. It usually occurs in children over two years who are debilitated, and who, at the same time, occupy close, unhealthy rooms, and obtain inappropriate, bad or insufficient food. Among the Indian poor it is common enough and sometimes it is seen in neglected European children—not that the occurrence is absolute proof of neglect, though certainly strongly presumptive of it.

On examining the mouth the affected portion of gum is seen to be swollen and of a dark violet-red colour. It is covered with a soft greyish deposit, which admits of easy removal, and the part bleeds easily. The amount of constitutional derangement which precedes this state of the gum is very variable, but as a rule it is not proportionate to the gravity of the case, or greater than that which ushers in the simple variety of mouth inflammation. Indeed, not infrequently the first thing that attracts attention is the offensively smelling breath and some swelling of the upper lip, which leads to the discovery of the state of the gum. At the same time the glands under the jaw at the affected side are apt to become sore and enlarged. The cheek next swells and becomes boggy to the feel; the impression of the teeth on the inside being retained. Soon afterwards ulceration of the gum commences at the base of the teeth, from which point it proceeds with variable rapidity. Very foetid saliva, streaked with blood, flows from the mouth. Those portions of the cheek which come into contact with the diseased gum may ulcerate to some extent. If the ulceration of the gum is extensive, the teeth will loosen and even fall out. When the ulceration has ceased to spread, recovery is initiated; the swelling diminishes, the surface of the sore becomes clean, the flow of saliva diminishes and the deposit on the gum lessens till it finally disappears.

This disease, though liable to attain an alarming degree of severity and distressing on account of the difficulty in taking food, responds as a rule rapidly to adequate treatment.

2. Attack the gums.

Symptoms.

The cheek and gums.

Prognosis.

**Treatment.
Local.
Diet.**

The utmost cleanliness of the parts must be observed. The mouth should be frequently washed out with a weak solution of Condy's fluid (one drachm to eight ounces of water) with potassium chlorate grains ten to one ounce of water or with hydrogen peroxide one part to four parts of cold water. The diet should consist of beef-tea, milk, raw egg and milk, pounded meat and such nutritious articles as the child can be induced to take, avoiding sweets and much farinaceous food. The brandy and egg mixture (*see* receipt 6) is a valuable nutritive stimulant, on occasion. All food is best given iced or cold. The bowels should be carefully regulated, neither constipation nor diarrhoea being permitted. Fresh fruit juice should always be given.

From the outset the potassium chlorate (mixture No. 49) should be administered and continued till convalescence is established. Potassium chlorate is to be regarded as a specific both for local and general use in all inflammatory or ulcerative conditions of the mouth.

During convalescence a tonic (45 or 47) should be given till the strength is completely recovered. The occurrence of acute stomatitis should prompt an enquiry as to the presence of some severe constitutional disease such as leukæmia.

**3. Dangerous
ulcer or
"Gangrenum
oris."**

3. Dangerous Inflammation of the Mouth.—The most formidable form of inflammation and mortification of the cheek is known under the name of cancrum oris. The disease attacks those who are reduced to a profound state of exhaustion by severe illness such as measles or typhoid fever; among the poorer and possibly ill-fed classes of Indian children it is a comparatively common sequel to kala-azar or malaria. The onset is undoubtedly influenced by unhygienic surroundings.

The condition arises abruptly with little or no local pain. The first thing observed will probably be a swollen, shiny cheek; "it looks as if the surface had been besmeared with oil, and in the centre of the swollen part there is generally a spot of a brighter red colour than that around" (West). The cheek feels hard. The breath is very fetid, offensive saliva flows profusely, the glands under the jaw swell, the gums become spongy and perhaps the teeth may loosen.

The ulcer.

Inside the mouth, opposite the red external spot, an ulcer will be detected—a dirty, ash-coloured, irregular sore. This ulcer increases in size, the red spot on the

cheek becomes black and the fœtor is great. High fever, much general disturbance and prostration accompany the progress of the mortification, but there is no considerable local pain.

Great constitutional disturbance.

Beyond the blackness a ring of bright redness will be observed. The black portion now begins to separate at the edges, till finally becoming detached, it leaves a hole through the cheek, opening into the cavity of the mouth—if the child has lived so long.

The disease is almost invariably fatal. Apart from the local trouble, there is the danger of the lung becoming infected from the mouth secretions or through the breath; or a general blood-poisoning may ensue. Should the patient survive the ordeal, painful deformity will result; but after the complete restoration of the general health, much may be remedied by plastic surgery.

Prospects.

All means must be employed to support the strength of the patient. From the earliest moment jugged soups, the juice of raw meat (receipt 23), egg beaten up with brandy and such highly-concentrated nutriment must be given with a liberal hand and at short intervals. One of the preparations of fluid beef will prove a valuable auxiliary. Night and day nutrition and stimulation are to be administered at intervals of an hour, except during actual sleep, which unfortunately is of rare occurrence. Emphatically life cannot be saved without energy and perseverance in this matter.

Treatment.

The passage of foul material into the air-passages may be partially prevented by keeping the child on its stomach, inclined to the affected side, with the head hanging over a pillow. The foul discharges tend thus to run outwards rather than backwards.

The parts should be repeatedly syringed with some non-poisonous fluid, such as salt and water, hydrogen peroxide or Condy's fluid properly diluted. The potassium chlorate (mixture No. 49) is administered as for ulcerative stomatitis. Swabbing the stinking slough with pure carbolic acid is calculated to prevent spreading and blood-poisoning, but this should be done cautiously, and only once or at most twice. Injections of iodine have been used with success. Sixty grains of iodine are dissolved in an ounce of water (with enough of potassium iodide to allow solution of the iodine) and about 8 min. of this are injected at intervals of about

Local.

half an inch so as to encircle the necrotic area into which also an injection is made. A small light poultice made of pounded charcoal and linseed, applied after smearing the surrounding parts with eucalyptus oil will help to mitigate the fœtor.

Opium.

When there is a tendency to delirium, total inability to sleep and great restlessness, much benefit will be derived from a timely dose of opium (one drop of laudanum in twenty-four hours for every year of age completed); but caution must be observed not to produce depression by the use of this drug.

After recovery.

Should recovery eventuate, a tonic of steel and quinine (44) will prove valuable. Considerable deformity is sure to be left; but when the child's health has been entirely re-established, after the lapse of some months the surgeon may be able to do much to remedy it.

CHAPTER XXXII.

THE THROAT.

The portion of the throat which comes into view when the mouth is opened is the pharynx. Hanging down from the centre of the soft palate is the uvula, on each side of this two folds curve downwards to be attached to the base of the tongue. These folds are the pillars of the fauces. Tucked in between the pillars of the fauces are situated the tonsils. On the back wall of the pharynx will also be noticed small isolated pinkish elevations. These are small collections of lymphoid tissue. Behind the tongue is the entrance to the larynx or voice box, a complicated cartilaginous structure in the interior of which are stretched the two vocal cords which are concerned with the production of the voice. The larynx as it proceeds downwards becomes continuous with the trachea or windpipe and the branches of the trachea are known as the bronchi. These passages conduct air into the lungs. At the back of the larynx, the throat narrows into a tube which is continued downwards into the stomach. The tube is the œsophagus or gullet and serves for the passage of food into the stomach.

**Anatomical
Features.**

If the tongue is pressed firmly down with a spatula or the handle of a spoon, the pharynx comes into view, the soft palate, the uvula and on either side the tonsils are seen. If it is necessary to see the larynx, the tongue is gently drawn out with a tongue cloth, a small mirror is inserted into the mouth, the back of this kept firmly in contact with the uvula, a beam of reflected light is projected on to the surface of the mirror when the image of the interior of the larynx is seen. It is not always possible to perform this examination in a child owing to its nervousness, it then becomes necessary under a short anæsthetic to examine the larynx through a spatula with a light at the end of it. The œsophagus, the trachea and the bronchi may all be examined by direct vision through lighted tubes called œsophagoscopes and bronchoscopes. It is occasionally difficult to

**Methods of
Examina-
tion.**

examine the throat, nose and ear of a refractory child and it becomes necessary to use some means of restraint. The following method is a good one. The child is seated on the lap of an attendant who imprisons the patient's legs in his. One arm of the attendant is then encircled around the child's body controlling both his arms. The other hand of the attendant steadies the patient's forehead firmly on his shoulder. If the child refuses to open his mouth, compressing the nostrils will soon make him open the mouth for air, when a spatula is quickly inserted into the mouth.

THE TONSILS.

**General
Considerations.**

The tonsils are collections of lymphoid tissue situated on either side of the throat. The surface of each tonsil is pitted, these pits are the mouths of the crypts. These are narrow blind tubes which extend through the entire thickness of the tonsil, their blind extremities resting on the capsule of the tonsil. There is one very large crypt situated at the upper end of the tonsil. The tonsil is supplied with one artery which enters it above and two veins which leave it and it rests in a bed surrounded by the muscles of the throat. The function of the tonsil is protective, it is the first line of defence against the onslaught of micro-organisms, but this function is such a very weak one that it is easily disturbed in favour of the organism. When this happens the tonsil instead of being a protection becomes a point of entry of germs of disease and their poisons into the system. The first and earliest sign which gives us an indication of the failure of the tonsil is an enlargement of the glands on either side of the neck. The tonsil, however, makes a fight to regain its function and does this by becoming enlarged or hypertrophied. The effect is not usually successful, for the glands in the neck do not subside and in many instances grow larger and sometimes break down. An enlarged tonsil is therefore nearly always a diseased tonsil. The tonsil does not always enlarge when it is diseased, frequently a small tonsil is found on examination to have its crypts particularly the large one at the top full of very foul pus. The absorption of this pus into the system is responsible not only for the general ill health it produces in many individuals, but also distant diseases in many parts of the body.

The tonsils may be the seat of an acute or a chronic inflammation.

**Inflam-
matory dis-
eases of the
tonsil.**

**Acute Ton-
sillitis.**

In a child the period of election for sore throats is during the first dentition and particularly when the milk teeth are beginning to decay and to be shed. These carious teeth form an admirable source of infection. The infection of the tonsil, apart from those cases in which a tonsillitis is part of an acute fever such as scarlet fever or measles—is a surface infection. A scratch or abrasion from a crusty mouthful may provide the portal of admission of the numerous germs of which the mouth is full. This may not however be sufficient cause for an acute inflammation, the determining factor always is the virulence of the germ together with the presence of those obscure conditions which produce a lowered resistance in the patient. The commonest organism responsible for acute tonsillitis is the streptococcus pyogenes. The infection is spread by individual to individual, in this way is to be explained outbreaks of this disease in schools and institutions. Acute tonsillitis also occurs during the acute fevers such as measles, scarlet fever and diphtheria. The attacks are usually recurrent and it is common for the healthy tonsil to be infected as soon as the infection begins to subside in its fellow.

When the brunt of the inflammation falls upon the crypts, the products of inflammation appear at the mouths of these crypts and are seen as whitish spots or patches. Such a tonsillitis is known as acute lacunar or follicular tonsillitis. When the severity of the inflammation falls upon the substance of the gland without particularly affecting the crypts, the condition is called an acute parenchymatous tonsillitis, the tonsil is here seen to be very swollen, red and angry. When the infection is a deep one and the micro-organisms penetrate through the crypts and reach beyond the capsule of the tonsil, we have the condition known as peritonsillitis (inflammation around the tonsil). Such an inflammation often goes on to abscess formation, the pus collecting between the capsule of the tonsil and its muscular bed. The abscess is called a peritonsillar abscess or quinsy. When the throat of a patient suffering from quinsy is examined, there is seen to be present a great swelling or bulging of the soft palate above and to the outer side of the

**Appear-
ances and
Types.**

tonsil which is often pushed down completely out of sight.

The Symptoms are well known, two or three days before the onset of the attack there may be feelings of malaise, there is then a sudden rise of temperature which may be very high in children. There is agonising pain in the throat on swallowing, the mouth cannot be opened, the tongue is furred and the breath offensive. The glands in the neck below the angle of the jaw are enlarged. The appearances of the throat have been described above. An acute attack usually subsides under treatment in four or five days. Suspicion should always be aroused as to the formation of a quinsy if an attack lasts much beyond this period.

Treatment. A free purge should be given, a fever mixture containing salicylate of soda is very useful. Hot applications to the side of the neck and frequent hot gargles with a solution of permanganate of potash or glycothymolene are very useful in allaying the pain. Children as a rule are unable to gargle and in those that cannot the throat can be **gently** syringed out with the solutions mentioned above. Among the numerous paints in use none is so comforting as one containing carbolic acid which in addition to being an efficient antiseptic has also got the properties of a local anæsthetic. The following formula is a good one:—

Resorscin	..	gr. xl
Acid Carbol.	..	m. viii
Spt. Menthæ Pip.	..	m. xxv
Glycerine to the ounce.		

In some instances the pain of an acute tonsillitis is so great that it is difficult to get much nourishment into the patient. It is often found that semi-solids such as custards, thick arrowroot or white of egg are more easily managed than liquids, and a good novelty and one that nearly always succeeds in a child, is to make it suck its food through a straw. When the acute attack subsides, the child should be well nourished and tonics given. The syrup ferri iodide or the compound syrup of the phosphates of iron are particularly beneficial.

Peritonsillar Abscess or Quinsy.

In every case where the acute attack does not show signs of subsiding in four or five days and the pain and difficulty in swallowing go on unabated in spite of

treatment, the presence of a quinsy should be thought of. On examination, the appearances described above are seen. No time should be lost in incising the abscess for fear of complications of a grave nature. The abscess should be palpated gently and it should be incised over its most prominent and fluctuating portion. This is the best rule to follow in selecting the site for incision. It is stated that the most useful guide in finding the abscess is to make an incision in the upper and outer angle formed by the intersection of a horizontal line passing outwards from the base of the uvula and one passing vertically over the inner surface of the tonsil. It sometimes happens that pus is not struck in this area and it will be found in practice that the first rule is the more useful one. The small operation should be carried out in children without an anæsthetic, cocaine being absolutely contra-indicated in a child and a general anæsthetic positively dangerous. The incision over the selected area having been made with bistoury, a narrow long bladed sinus forceps is deeply inserted into the wound and the blades separated gently. A gush of pus escapes giving instantaneous relief to all the symptoms.

An acute attack of tonsillitis is usually followed by another acute attack and these, whether they may be single or multiple, **usually** lead to tonsillar hypertrophy with an accompanying enlargement of the glands in the neck. It is not always necessary for hypertrophy to be preceded by an acute attack of tonsillitis. The presence of sources of infection such as decayed teeth, adenoids, etc., are quite sufficient in themselves to produce an hypertrophy.

**Types of
Chronic
Tonsillitis.
Hyper-
trophy.**

Often the tonsils do not enlarge appreciably; yet they are on careful examination seen to be infected and the crypts being full of foul-smelling septic material.

**Chronic
Septic Ton-
sillitis.**

Chronic Fibrotic Tonsils are not often seen in children. These are small pale firm tonsils, repeated attacks of inflammation having produced much fibrous tissue, the contraction of which leads to cystic dilations of the crypts, with the retention of pus in these cysts.

- I. The tonsil may be so large as to cause a mechanical obstruction to respiration and deglutition.

**Symptoms
of Chronic
Tonsillitis.**

- II. Being diseased, they make the patient more liable to repeated attacks of sore throats.

- III. They may in children especially cause an obscure pyrexia and general ill health from the absorption of toxins into the system.
- IV. They may affect the ears.
- V. They may act as the gateway of infection and give rise to such conditions as tuberculosis (especially of the glands of the neck), rheumatic fever, rheumatism, endo-carditis, peri-carditis, pleurisy, nephritis, chorea, etc.

Treatment of Chronic Tonsillitis.

The treatment of this condition by paints and surface applications is most unsuccessful, the reason being that the tonsil is riddled right down to its capsule with crypts and an application therefore made to its surface seldom reaches to the bottom of the crypts in which infection lies hidden. The radical treatment is the removal of the tonsil by operation.

Indications for removal. Operation for the removal of Tonsils.

Every symptom enumerated above is an indication for the removal of tonsils.

The object of the operation is the **total** removal of the whole of the tonsil with its capsule. As the crypts go right through the entire substance of the tonsil to the capsule, it is essential that no portion of these should be left behind. Otherwise the operation will be a failure. A simple snipping off the projecting portion of the tonsil is therefore of no avail, because it leaves behind the deeper portions of the infected crypts. At the present day there are two ways of performing the operation—

- I. Enucleation by the guillotine.
- II. Enucleation by dissection.

Each of these methods has its advocates. The particular method is only a detail and a matter of choice and habit of the surgeon. Generally speaking, dissections are reserved for adults in whom often the tonsil is adherent and difficult to remove by the guillotine. The operation in children is done under a general anæsthetic and it is customary to remove adenoids at the same time, both operations—apart from the anæsthetic time—should not take more than 2 or 3 minutes.

Objections to Tonsillectomy.

Parents often object to the operation on the grounds firstly that the tonsils will grow again and secondly that post-operative hæmorrhage is in every case alarm-

ing. They are sometimes also heard to say that the tonsils have a function and that therefore they should not be removed. As regards the first, it may be said that they will not grow again if the modern operation of enucleation is carried out. As regards the second, the improvements in technique and in methods of control of bleeding are so perfect nowadays that no case need ever be lost from hæmorrhage unless the operating surgeon is so unfortunate as to strike a bleeder. The risks of troublesome but not uncontrollable hæmorrhage are present in an adult with fibrotic adherent tonsils, but such risks are almost nil in a child. As regards the third objection, the defensive function of tonsil is a weak one and easily lost by disease; when this happens, the tonsils become a source of septic absorption and for this reason have to be removed.

A word should be said about the diagnosis of this common affection in children. It has been said before that in acute follicular tonsillitis the products of inflammation appear as white spots or patches on the surface of the tonsil. **Diphtheria.** Diphtheria is characterised by the appearance of white, yellow or grey patches also, and it sometimes is difficult to be certain by a naked eye examination which of the two conditions is present. In diphtheria the patches, or membrane as it is called, are so adherent to the subjacent tonsil that bleeding is caused on their removal. In acute tonsillitis they come away easily and do not leave a raw surface behind. The safest method of diagnosis and one that is advocated is a bacteriological examination of a swab. This completely settles all doubt. Diphtheria is a condition which frequently spreads with the formation of a membrane in the larynx and trachea. Such a condition causes an alarming obstruction to respiration and necessitates a temporary opening into the trachea—tracheotomy—for the relief of respiratory distress.

Some very important points should be discussed with regard to this operation. No anæsthetic should ever be administered to a dyspnœic child. The reason of this is that when a child has an obstruction to respiration due to diphtheria, it uses all its accessory muscles of respiration to overcome the obstruction and to get all the oxygen it requires into its lungs. A general anæsthetic puts all the accessory muscles out of court **Tracheo-**
tomy.

and the child is left to breathe with the ordinary muscles of respiration, and as these are not sufficient the child may die. The high operation is preferable to the low one. It is easier to perform. However great the urgency of the operation, the cricoid cartilage should on every occasion be recognised and the incision into the trachea made well below it. If the isthmus of the thyroid gland cannot be retracted downwards, there should be no hesitation in cutting it and the incision into the windpipe should be made over the second and third and even the fourth tracheal ring. It is an unpardonable offence to cut the cricoid cartilage in performing a tracheotomy as this always leads to stenosis of the larynx necessitating the permanent use of the tube. The head should be extended and held perfectly straight and the incision made strictly in the midline.

THE LARYNX.

**Acute
Laryngitis
of Children.
Causes.**

Colds in the head and all causes predisposing to this condition such as obstructions to nasal respiration, adenoids, etc., are the commonest causes of acute laryngitis. The infection starting in the nose or nasopharynx spreads downwards and attacks the larynx. All the infective fevers such as measles, whooping cough, influenza, scarlet fever, etc., being associated with infections of the upper respiratory tract are particularly prone to lead to the condition. There are other causes such as injuries, inhalation of irritant vapours, etc., but the above are the commonest causes in children. Acute inflammation of the larynx is always a serious condition in children. Because of its small size, the larynx is very easily obstructed by small amounts of inflammatory effusion producing difficulty in breathing and spasm.

The symptoms are very characteristic. The child is quite fit during the day, perhaps has a slight cough, but suddenly at night or in the evening develops an alarming spasm of the vocal cords with great obstruction to breathing. In children the condition is usually known as spasmodic laryngitis.

**The Treat-
ment.**

The child should be treated in bed. A smart calomel purge is given. Warm moist air impregnated with Friar's balsam should be inhaled. An emetic such as vini ipecac. in $\frac{1}{2}$ to 1 teaspoonful doses is very useful in getting rid of mucus. Hot applications to the throat

and hot mustard baths often act like a charm during the spasm. A mixture such as the following is a good one:—

Vini Ipecac.	.. m. ii ss
Tinct. Scillæ	.. m. ii ss
Spt. Ammon Aromat.	.. m. ii
Glycerine	.. m. v
Aquam to the drachm.	

As soon as the child is well, tonsils and adenoids should be removed.

This name is applied to a sudden spasm of the vocal cords for which no satisfactory explanation is given. The condition is not of inflammatory origin as acute laryngitis above described. It occurs in ill-fed and badly nourished children, especially those that have rickets. The illness usually starts suddenly at night with great difficulty of breathing, the child using all its accessory muscles of respiration in order to obtain air and giving the appearance of great anxiety and terror. The inspirations are characterised by a crowing stridor. Expiration is not interfered with. The immediate treatment should be stimulating. Cold water should be applied to the face, chest and neck, smelling salts should be applied to the nose, all constricting clothing should be abandoned. If asphyxia threatens, a tracheotomy may have to be performed. Attention to diet, clothing and exercise should be given and rickets, which is nearly always present, should be treated energetically.

Laryngismus Stridulus.

Congenital laryngeal stridor is a rare condition unexplained until recent advances in the direct method of examining the larynx have enabled one to inspect the larynx during attacks. There is a stridor which varies in the character of its sound, it has been described as a croaking or grunting or purring sometimes ending in a high pitched note. The condition appears at or soon after birth and disappears at about the second or third year of life. There is a folding backwards of the epiglottis which forms a narrow cylinder admitting only a small amount of air and the suction of this on the neighbouring soft parts causes the stridor.

Foreign Bodies in the Air and Food Passages.

It is impossible to give a detailed list of the varieties of foreign bodies met with in these regions. In children the commonest foreign bodies met with are

pieces of meat, fish bones, seeds, fruit stones, nuts, needles, pins and coins and beads. All these varieties of foreign bodies may pass into the food and air passages and become impacted. If they are not removed, the consequences are often serious.

**Foreign
Bodies in
the Air
Passages.**

A very large foreign body such as a piece of meat may lodge at the entrance to the larynx and cause a sudden obstruction to the airway. In such circumstances, in view of the urgency of the condition, a finger may be placed inside the throat and an attempt made to dislodge the foreign body. A smaller foreign body may be impacted above the vocal cords. In such a case an attempt should be made to remove it by means of a laryngeal mirror and suitable forceps. If the foreign body is impacted in any part of the bronchial tree and there is partial or complete obstruction to the airway beyond, the distal part of the lung collapses, micro-organisms invade this portion of the lung and an abscess results. In the bronchial tree the symptoms seem to depend more on the kind of foreign body; for instance, vegetable substances such as seeds, etc., cause an intense inflammation and produce a septic broncho-pneumonia. The right bronchus, owing to its larger size and its being in an almost direct line with the trachea, is the one in which foreign bodies most often lodge. Foreign bodies lodged in the air passages are very dangerous. Methods of removal nowadays and the instruments for the purpose are so perfect that no time should be lost in coming to a centre where the intruder can be removed. The instruments for removing foreign bodies in the trachea or bronchi are known as bronchoscopes. They are tubes with a small electric lamp at the extremity. The tubes are passed into the air passages which are thus lighted up. Any foreign body present is thus seen and extracted with suitable forceps.

**Foreign
Bodies in
the Oesophagus.**

There are many varieties of foreign bodies which are passed through the whole length of the alimentary canal without causing trouble. If a foreign body is impacted, the usual situations are behind the larynx at the commencement of the gullet and at the opening of the oesophagus into the stomach. An impacted foreign body in the gullet, if left untreated, sooner or later is fatal. The object ulcerates through the wall of the gullet and forms an abscess in the chest which

ends in death. The chief symptoms are difficulty in swallowing, and if the body is large enough to press upon the trachea, there will also be difficulty in breathing and cough. No attempt should be made to remove these foreign bodies by the old-fashioned instruments, the probang and the coin catcher, for fear of injuring the walls of the gullet. The instrument used should be an œsophagoscope which is very similar to the bronchoscope described above, and the foreign body removed by sight. Purgatives, particularly in the case of sharp pointed bodies, should be avoided. If the object has passed into the stomach, nature is to be left to itself to expel it. An X-ray photograph is essential to locate a foreign body and should in every case be taken.

CHAPTER XXXIII.

CROUP.

Definition.

The term croup signifies a temporary obstruction in the upper airway leading to difficulty in breathing. The obstruction is situated in the larynx and may be inflammatory, induced by laryngitis; it may be due to spasm of the muscles of the larynx with closure of the passage, or it may be due to a combination of the two.

The characteristic feature of the attack is the loud crowing noise which accompanies each indrawn breath and the signs of increasing suffocation which pass off as soon as the obstruction is relieved.

Varieties.

The varieties of croup may therefore be separated into two groups—nervous and inflammatory—and classified as follows:—

(1) Nervous.

(a) **Spasmodic laryngitis** (*Laryngitis stridulosa*), a condition of childhood, starting usually about the third year but to be encountered from the ages of one to ten.

This disease is characterised by the occurrence of periodic attacks without warning at intervals, it may be of months.

The liability to this disorder appears to be inherent. There is no previous illness, there is no discoverable alteration in the general health which might cause a predisposition and the immediate exciting cause is slight, exposure to a cold wind, an over-loaded stomach or over-excitement.

The attack usually starts in the night with a dry cough passing on to an increasing difficulty in breathing. The attention is called to the throat as to site of the obstruction by the loud crowing or inspiratory stridor. The child struggles for breath, is bathed in perspiration and the face grows more and more livid. After some time, it may be from one to two hours the condition passes off, the child falls asleep and on the following day there is no trace save possibly the evidence of a disturbed and exhausting night. This

disorder is therefore markedly different from the second variety.

(b) **Child-crowing** (*Laryngismus stridulus*). Child-crowing is but one manifestation of a general convulsive tendency (see Spasmophilia, Chapter XXXVIII) and indeed may be accompanied by other convulsive signs. It is induced by the same conditions which produce convulsions; rickets, teething in the sickly child, severe digestive disturbance or gross errors of diet. Child-crowing is more frequently met with in the earlier months of the child's life, between six months and two years. The incidence is relatively high among children artificially fed on account of the increased tendency to digestive disturbances or rickets. The paroxysm starts with a crowing sound or the child holds its breath and grows black in the face. After a few seconds, the spasm is released, air is drawn through the still narrow chink in the glottis with a shrill crowing sound and the attack is over for the moment though others may follow in quick succession. The child gradually regains the normal colour and drops off to sleep. Such attacks may be provoked in the susceptible child by violent crying or coughing.

Such conditions must be always regarded as serious as they are an indication of a general convulsive tendency. It is, however, but rare that the spasm continues for such a time that the child succumbs to suffocation.

(2) **Inflammatory.**

(a) **Acute laryngitis.** Affections of the air-passages are in early childhood apt to take a more severe form than in adults. In catarrhal inflammation of the larynx not only are there high fever, 102 to 103° F. and severe constitutional disturbances, but there is also a tendency to the development of a dangerous form of laryngeal spasm.

At first there are all the symptoms of a common cold, with fever, thirst, drowsiness and running from the nose. The child complains of or snatches at the throat and the voice is husky. The cough is troublesome and painful. The fever increases and all symptoms continue for at 24 to 36 hours. At night an attack of difficulty of breathing causes the child to wake in fright, gasping for breath. The paroxysm passes, but during the rest of the night the cough, crowing and impeded

respiration continue to some degree leaving the child exhausted in the morning.

A slight improvement succeeds and a little sleep may be obtained, but the relief is only temporary and other attacks may follow. During the attacks the face becomes livid, and the natural colour is not restored even between the paroxysms; that is to say, the condition is now one of continuous obstruction to breathing with periodic exacerbations. The amount of obstruction may be measured by the visible efforts to fill the lungs with air, the muscles of the upper part of the body and of the neck are at work and the skin between the ribs is sucked in showing that there is very little entry of air into the lungs.

(b) **Diphtheria** (formerly known as true croup) (for full description *see* Chapter XVIII).

The obstruction is here caused by three factors: The formation of a false membrane, the inflammation accompanying this and the spasm inseparable from all inflammatory affections of the larynx.

DISTINCTION AND TREATMENT.

The first essential to successful treatment is the distinction of the variety with which we have to deal.

The decision as to whether we are dealing with croup due to nervous or inflammatory causes should not be difficult.

With inflammatory croup there will have been previous signs, hoarseness, cough and fever. During the intervals between the acute paroxysms the difficulty in breathing does not altogether pass off. With croup—due to nervous origin—there will, on the contrary, be no preceding local signs, and with the relief of the spasm all signs of obstructed breathing will pass off. In child-croup the attack is short, though it may be oft repeated and it is probable that there will be other symptoms pointing to the convulsive state, such as twitching or rolling of the eyes. Further, it may be that constitutionally there is some predisposing cause. The croup of older children will be distinguished by the length of the attack, the tendency to recur at longer intervals, the age of the child and the absence in the general condition of the child of any apparent exciting cause. When suspicion is aroused that we are dealing with a case of inflammatory croup, the greatest

care will be exercised to distinguish between that due to laryngitis and that due to diphtheria. Diphtheria of the larynx seldom occurs without a primary invasion of the tonsils, so that we shall, in all probability, be aware of the diagnosis before any urgent suffocative symptoms arise. In cases of doubt, a bacteriological examination is essential and, should there be the least hesitation in diagnosis, it is better to allow immediate serum treatment rather than incur the perils of the toxæmia of diphtheria (*see* Diphtheria, Chapter XVIII).

Not infrequently the extreme lividity and breathlessness of broncho-pneumonia are mistaken for croup, but these mistakes should not arise, as there is no stridor pointing to obstruction in the larynx. **Stridor** is the **one essential sign of croup** which distinguishes it from all other causes of breathlessness in children. Finally a form of laryngeal stridor, congenital laryngeal stridor, should be mentioned on account of the alarm it may occasion till explained. This is not a paroxysmal disorder, but is due to a congenital formation of larynx whereby with each inspiration a crowing noise is made. At the same time the child is quite undistressed and the crowing is continuous. The only importance of the condition is that with the slight narrowing of the larynx the child is more subject to respiratory disorders and more likely to suffer should they be contracted. The condition usually passes off before the child is two years old.

The treatment of the various types of croup is for easy reference summarised as under:— **Treatment.**

SPASMODIC LARYNGITIS.

Avoidance of existing causes, cold winds, over-excitement, over-distension of stomach at night.

Arsenic in the form of liquor arsenicalis 1 minim three times daily for a child of 3, 2 minims three times daily for a child of 6. Course of a fortnight; followed by interval of a fortnight. If there is any sign of intolerance, sore eyes, nausea or skin rash, the drug should be stopped at once.

During the Attack.

Hot bath; hot sponge to the neck. If the child can swallow, Chloral and Bromide mixture No. 38.

CHILD-CROWING.

Underlying causes such as rickets or intestinal disturbance to be treated actively.

If there is any evidence of irritability of the nervous system, the following will be found useful:—

Phenazone (Antipyrin)	..	gr. i.
Sodium Bromide	..	grs. ii.
Vin. Ipecacuanha	..	minims iii.
Caraway water ..	..	to one drachm.

Eight doses in 24 hours for child of 2; 4 doses in 24 hours (i.e., 6-hourly) for a child of one.

During the attack or immediately after:—

Hot bath: hot sponge or foment: to the neck—

Chloral and Bromide mixture prescription No. 38.

ACUTE LARYNGITIS.

From the outset, the aim of treatment will be the prevention of attacks of croup. The child is put to bed in a warm room; poultices are applied to the neck and the mixture No. 31 or 32 will be given.

In cold weather, a blanket tent with one side open may be constructed over the bed with the spout of a steam kettle playing into it, but it is a matter of great importance that the child should not be half suffocated in a confined humid atmosphere. A teaspoonful of turpentine may with advantage be added to the water. An emetic is of special value if the symptoms are urgent (No. 24). The bowels which are usually costive should be opened after the emetic by means of some such aperient as No. 12.

It is to be remembered that the more acute paroxysms are caused by spasm, superadded to the already existent inflammation. For this reason, the sedation mixture No. 38 or 36 may be given. Acute laryngitis is sometimes fatal and at all times may **give rise to the most urgent symptoms necessitating tracheotomy.**

Full details of treatment of diphtheria will be found in Chapter XVIII.

CHAPTER XXXIV.

CERTAIN DISEASES OF THE CHEST.

The subject of respiratory diseases may be opened appropriately with some few words on the subject of the "cold in the head." Though not unnaturally regarded as trivial, such colds when affecting the nursing are liable to give trouble for three reasons: (a) The blocking of the nose renders sucking difficult, (b) the child is forced to breathe through the mouth and there is consequently a liability for the condition to extend to the bronchial tubes, (c) the infant is unable to get rid of the semi-purulent mucus which is swallowed and gives rise to intestinal catarrh. It is remarkable how often the common nasal catarrh is, in the infant, followed by gastro-intestinal disturbance of greater or less degree. For these reasons the obstruction should be relieved by instilling warm nasal drops every two or three hours. Such drops loosen the mucus and cause sneezing, whereby it is expelled.

Cold in the Head.

The nasal drops.

R

White sugar ..	..	4 grs.
Sodium chloride ..	..	2 grs.
Sodium bicarbonate ..	..	2 grs.
Water ..	..	1 oz.

The drops to be instilled warm with a medicine dropper.

In addition to this local remedy a small dose of Grey powder grains $\frac{1}{4}$ to $\frac{1}{2}$ may be given twice daily and the chest is rubbed daily with a stimulating liniment made up of equal parts of turpentine liniment and olive oil, with the object of preventing the catarrh from spreading to the bronchial tubes.

Colds of this nature are often associated with a slight sore throat which, in older children, may with advantage be treated with the throat paint No. 52A and the following mixture:—Creosote minim $\frac{1}{2}$, tincture of garlic minims 5, chloroform water 1 drachm, glycerine

2 drachms. Two teaspoonfuls twice daily to a child of two.

Cough.

One of the most common complaints which, in the infant and young child calls for investigation, is the cough. The cough may be associated with other symptoms pointing to some disorder of the respiratory system, but on the other hand, cough is a symptom or accompaniment of troubles so diverse that it is difficult to exhaust the possible causes.

The causes of cough may be divided into two main groups:—(a) Those connected and (b) those unconnected with respiratory disease. Of the first group we may make further subdivision:—

(1) The cough excited by the presence of excess of mucus within the bronchial tubes. When the mucus is fluid and easily movable such cough is spoken of as the loose cough and is serving the useful purpose of expelling the mucus, though in infants and young children much of the benefit is lost as there is no power of expectoration, so the mucus is merely swallowed or drawn back into the bronchial tubes.

(2) The dry or unavailing cough, excited, not by the presence of movable mucus in the air-passages, but by inflammation or irritation in any part of the respiratory system. Such a cough is to be heard in the early stages of bronchitis or inflammation of the lungs in pleurisy, or when pressure is exerted on the main bronchial tubes by enlarged glands due to whooping-cough or tuberculosis.

When consulted as to the cause of a cough, our first step is naturally to search for any disease of the lungs or bronchi. Such disease may be made manifest by shortness of breath, wheezing or rattling of the chest, or in older children by expectoration, but a more thorough examination may be necessary before the cause is revealed. Failing to discover cause within the chest, we shall pass on to consider the next, by no means small group of causes, not connected with actual disease of the lungs or air-passages.

Examination of the throat may reveal **enlarged tonsils** or **adenoids** leading to mouth breathing and so to irritation of the throat, relaxed uvula—post-nasal catarrh and chronic laryngitis or pharyngitis.

One of the most common causes of persistent and troublesome cough especially at night when the child

lies on the back, is the remnant of a cold in the head. There is still some discharge from the back of the nasal cavity which trickles down and irritates the back of the throat. Treatment will be directed to clearing this catarrh with the nose wash mentioned above, and the cough may be allayed by a hot drink or the administration of a simple linctus made by mixing honey, glycerine and lemon juice in equal quantities and giving one to two teaspoonfuls as required.

Abdominal conditions.—The old household term “stomach cough” still holds good, though we need not be quite so precise as to the exact location of the source of irritation. Almost any form of intestinal irritation, flatulence, worms or even congestion of the liver will provide the necessary stimulus.

A cause frequently overlooked and yet exceedingly common is **wax in the ear**.

Finally, the cough may be of nervous origin or the result of habit.

A short description of the actual processes of the various diseases to be discussed will render the subsequent section more intelligible. In bronchitis, the lining of the air-tubes is inflamed and the amount of mucus naturally secreted is greatly increased. Such mucus may cause embarrassment to respiration by its quantity or by its viscosity, it may cling to the walls of the tubes and seriously obstruct the passage of air. The air passing up and down the tubes, by displacing the mucus, gives rise to the rattling and wheezing heard or felt. The inflammation may be confined to the larger tubes, when it is not of great importance, or it may invade the finer tubes, a more serious matter giving rise to symptoms sometimes with difficulty distinguished from pneumonia. **Pathology.**

In pneumonia the inflammation is of the lung, rendering portions solid and functionless.

Lastly, the inflammation may be of or spread to the lining membrane between the lungs and the chest wall resulting in pleurisy.

Bronchitis is perhaps the most common of all diseases in children and, in childhood, has certain peculiarities. The outstanding feature of the disorder is that it arises in connection with so many diseases, as if the bronchial tubes were, in the very young, the most sensitive part of the body. Not only does bronchitis **Bronchitis.**

become manifest as an early sign in many of the acute fevers, especially measles, whooping-cough and typhoid or as a serious complication later in the disease, but there appears to be a definite sympathy between the bronchi and the intestinal tract, so that in gastro-intestinal disorder of any gravity there will almost always be bronchitis. *Per contra*, where there is severe bronchitis there will be digestive disturbance, in fact it is by no means always easy to decide which of the two is the primary disease.

Again, bronchitis is peculiarly liable to arise during teething and here also is frequently associated with digestive disturbance.

The connection between **bronchitis** and **rickets** must be stressed as frequent recurrence of this disease should prompt an enquiry as to the possibility of rickets in an unobtrusive form. Finally, bronchitis may spread from catarrh of the upper air-passages, nose or throat.

It may be regarded as an axiom that once the child has suffered from severe inflammation of the respiratory tract, he has become more susceptible to further attacks and must be treated accordingly.

Symptoms.

The symptoms of bronchitis may be of all degrees of severity, either so mild that the only manifestations are loose cough, slight wheezing and some small rise of temperature and of the rate of breathing or they may be of extreme severity. In the more severe type of case the fever is high, 102° to 104°, the respiration is rapid, the lips are blue and there is every sign of distress. The child is restless, sleep is broken by breathlessness and cough. Repeated efforts to get rid of the sticky mucus may consummate in vomiting, which brings relief. In the most severe cases, when the inflammation has invaded the finer tubes, the symptoms may resemble broncho-pneumonia, which will be described later.

Treatment.

The child is put to bed in a warm room. For this, as for all diseases of the chest, a plentiful supply of fresh air is essential, though the child should not be exposed to draughts. In the early stages, or when the cough is hard and the sputum sticky, recourse may be had to the steam kettle containing Friar's balsam one teaspoonful to one pint of boiling water. The kettle should be employed for about ten minutes at a

time and should not be used when the air is already saturated with moisture as in the rainy season.

An expectorant mixture containing creosote is given, such as No. 32, or when the sputum is very sticky, No. 31 will help to loosen it.

One of the **most potent remedial measures is external**, that is, the rubbing of the chest night and morning with a stimulating liniment such as the mixture of olive oil and turpentine liniment or No. 56. For older children, mustard oil may be used. Occasionally it may happen that the breathing becomes laboured and the lividity increases from the difficulty of dislodging the sticky mucus from the upper air-passages. In such cases the administration of an emetic (No. 24) will afford prompt relief. Some discrimination is required in the use of emetics, the action is markedly depressant and they should therefore not be used without good cause or when there is already any severe degree of prostration.

Special attention must be paid to the digestive system. As has been said above, the exciting cause of the bronchitis may lie in the digestive tract and no medication will avail unless the digestive disorder is corrected. Any distension of the stomach or flatulence is likely to cause further embarrassment to the breathing; the diet, therefore, must be light and nourishing while the regularity of the action of the bowels is ensured.

Chronic bronchitis is, in children, commonly secondary to some general constitutional weakness or disorder such as rickets. There are those children with a particular predisposition who suffer from bronchitis every winter. In other cases, the factor responsible is enlargement of the tonsils and adenoids leading to mouth-breathing. Other cases follow an acute attack, but rarely persist for long. Others again depend on digestive disturbance or overfeeding, particularly with carbohydrate overfeeding; the fat bronchitic baby is often cured by the reduction and readjustment of the diet. Others again, with the abdomen distended with flatus and the face blue with bronchitis, may be relieved within a few hours by the dispersal of the distension.

**Chronic
bronchitis.**

Causes.

Chronic bronchitis is not infrequently persistent and obstinate after whooping-cough and measles.

Remembering the susceptibility to tuberculosis after these diseases, the greatest care must be taken.

Though the symptoms are often trivial, consisting it may be only of a tendency to wheeziness, cough and shortness of breath on exertion, **the disease is a matter of importance for two reasons:**—The first, that if the disease persists, there is grave liability to serious and permanent damage to the air-tubes and lungs; the second, that it may be the sign of some important underlying cause, notably rickets.

Treatment. The treatment of chronic bronchitis is directed as much to the general health as to the local condition. Tonics especially cod-liver oil are indicated and for those children who are attacked each winter, a change of climate during the period of susceptibility is desirable.

Pleurisy. The most valuable local treatment is counter-irritation by rubbing the chest with stimulating liniments. The tonsils and adenoids, if enlarged are removed, and any constitutional disease, such as rickets, is treated actively.

Pleurisy is a not uncommon disease in infancy and childhood. It is commonly secondary to inflammatory disease of the lung, pneumonia or tuberculosis or it may follow an attack of measles or scarlet fever. Again, the disease may be part of some general infection, rheumatism or blood-poisoning or may arise as the result of chill or injury to the chest.

In the first stage, known as dry pleurisy, the surfaces of the membrane are roughened and give rise to pain and limitation of the movements of the chest wall. In the second stage, there is pleural effusion, fluid is poured out which separates the roughened inflamed surfaces and the pain is lessened, though there may be increasing difficulty in breathing. There is, in childhood, an increased tendency for pleural effusion to become purulent, especially if arising in the course of or after acute pneumonia. Such cases will call for prompt surgical intervention.

Pneumonia. There are two main forms of pneumonia known respectively as broncho-pneumonia and lobar pneumonia of which the former is the more common in infancy and early childhood. For the sake of simplicity and brevity the two types will, after a short explanation of the main differences, be described together.

Lobar pneumonia has commonly an abrupt onset, the fever rises to 103° or more within a few hours and has no remissions; the course of the disease is from four to nine days. The degree of dyspnoea in relation to the prostration is not so great as in broncho-pneumonia. The disease usually arises independently of other disease and there is a greater tendency to certain grave complications—empyema—pericarditis and meningitis. Broncho-pneumonia, the familiar form in infancy, is more commonly insidious in onset, either as an ingravescence of acute bronchitis; in the course of some debilitating disease, particularly severe bowel infection or as a complication of one of the acute infectious diseases of childhood, especially measles or whooping-cough.

When the onset is abrupt, the disease may be ushered in by vomiting or convulsions; when more insidious, these symptoms are absent, but there is evidence of gradually increasing want of oxygenation of the blood, that is to say, the lips and face become blue (cyanosis), the child is anxious and sleepless, and the breathing becomes panting (dyspnoea). Symptoms.

As may be expected, it is from the character of the breathing that we get our first pointer as to the diagnosis; the rate is increased to a striking degree, to 60 or 70 a minute or even higher, there is a perceptible pause at the height of inspiration followed by a grunt as expiration begins and the nostrils are widely dilated with each indrawn breath. The breathing is essentially laboured, all those muscles which normally take no part in the process of breathing are called into play. The pulse-rate is approximately double that of the respiration. There should be no difficulty in distinguishing the difficult breathing of pneumonia from that of croup. the grunting expiration of the former bears no resemblance to the crowing inspiratory stridor of the latter.

Cough is an inconstant symptom, it may be slight or racking and painful. The sputum of infants and young children is not expelled, except by vomiting. Cough.

Prostration is progressive; in favourable cases the pulse is strong and bounding, but as the disease advances, the pressure falls and dangerous collapse becomes imminent.

The tongue is furred and in the more severe cases becomes dry and brown as also do the teeth. The

**Abdominal
Symptoms.**

condition of the mouth is a valuable guide as to the general condition; so long as the tongue and teeth remain moist, the outlook is favourable. Most important are the abdominal symptoms, in the early stages persistent and severe abdominal pain may lead to an error of diagnosis. In all severe cases there is evidence of interruption of the digestive functions; it may take the form of tympanites still further adding to the respiratory embarrassment, or there may be vomiting and diarrhoea.

The fever is high, 103° to 105°F. In typical lobar pneumonia the temperature falls by crisis, that is, an abrupt descent to normal or below normal within a few hours, with amelioration of the general symptoms, though examination of the chest would reveal no change in the condition of the lungs.

In broncho-pneumonia the temperature does not remain at the same high level, it is subject to variations and remissions and descends to normal gradually.

The course of lobar pneumonia is from four to nine days, that of broncho-pneumonia longer, from two to three weeks. Both may be prolonged by the development of what is termed creeping pneumonia, in which a fresh patch of inflammation develops as soon as the earlier ones subside. Should the course of the disease be prolonged over a month, suspicion will be aroused that we are dealing with a case of tuberculous broncho-pneumonia.

Treatment.

The two main essentials of treatment are **good nursing and fresh air**. The child must be subjected to no undue fatigue, physical or mental, as every ounce of strength may be required to fight the disease to a successful issue. Bedding and pillows will be arranged so that the child is as comfortable as possible, the nurse may find that breathing is easier when the child lies on one particular side and this side should be favoured. Young children should not be left in the same position for long lest the lung become congested or collapsed.

An abundant supply of fresh air is obviously necessary when the child is already struggling for breath and experience has taught us the importance of this point. The room, however, should be warm and the bed placed secure from draughts. Poultices or the application of antiphlogistine to the chest will be of value when there

is pain and will doubtless help to loosen the phlegm, but the chest should not be swathed in thick heavy layers which hinder respiration and may drive up the temperature.

The diet is a matter of the greatest importance as the digestion is impaired and there is a tendency to dilatation of the stomach. For the very young, or for the severe case, peptonised milk to which some malted food has been added, according to the age of the child, is suitable. Meat jellies or beef tea make an appetising interlude, but their nutritive value is low. When the patient is still at the breast and unable to suck owing to shortness of breath, the breast milk is drawn off, diluted with about one-third its volume of boiled water and given with a spoon. It need hardly be said that adequate nourishment is all-important, but feeding must not be pushed to the degree to cause dilatation of the stomach. All meals should be small and given three-hourly. Medicines should be given immediately before or after food so that the child is not continually disturbed.

Diet.

Some form of daily aperient, preferably Calomel, grains $\frac{1}{4}$ to $\frac{1}{2}$ for a child of one year, will be necessary.

Of medicines, the stimulant expectorant No. 29 or the following mixture is given:—Potassium Iodide grains $\frac{1}{2}$; Ammonium Carbonate grains $\frac{1}{2}$; Ipecacuanha Wine minims $2\frac{1}{2}$; Creosote minims $\frac{1}{4}$; Gum of Acaciæ to make emulsion; Syrup of Tolu minims 10; Water to one drachm. Dose one drachm, four-hourly, to a child of one year old; $1\frac{1}{2}$ drachms at two years. Oxygen is of the greatest assistance when the child is blue and distressed, and will do much to prevent the exhaustion consequent on the struggle for breath. The gas should be led from the cylinder through a flask of warm water and administered for ten or fifteen minutes at a time.

Medicines.**Oxygen.**

For the pain in the early stages Dover's powder grains $\frac{1}{2}$ may be given every six hours to a child of one year, but as the powder contains opium, the effect must be watched.

The treatment of sleeplessness presents something of a problem. On the one hand, all hypnotics are depressant to some degree and on the other, the continued sleeplessness will produce rapid prostration. Efforts are first made to encourage sleep by simple means, warm sponging, the use of the steam kettle

Sleeplessness.

when cough is troublesome, hot drinks, oxygen or a little brandy. Failing this, we must have recourse to hypnotics, of which the most constant in its effect is some form of opium, preferably in the form of Dover's powder one-quarter to one-half grain. **On no account should opium be used when the child is prostrate or there is marked difficulty in breathing.**

The use of an emetic should be regarded rather as an emergency and be reserved for those occasions when it is clear that the child is in grave difficulties owing to the accumulation of mucus in the air-tubes.

Stimulants.

Stimulants will, in the more severe cases, be called for early. Digitalis, on account of its slow action, may be added to the mixture in the early stages, the dose is from 1 to 2 minims four-hourly for a child of one year.

When there are premonitory symptoms of collapse, great rapidity or irregularity of the pulse with loss of strength in the beat, alcohol may be given. (For dosage, *see* Prescription No. 43.)

In such cases hypodermic medication is of value and the following drugs are at our disposal:—Strophanthin grain $1\frac{1}{500}$; Digitalin grain $1\frac{1}{500}$; Strychnine grains $1\frac{1}{400}$; Camphor 1 grain dissolved in olive oil or adrenalin 2 to 4 minims. Any of these may be given six-hourly or more frequently if the urgency of the case demands, to a child of one year.

Hyper-pyrexia.

If the temperature rises above 104° or persists at that level for long, it should be controlled by sponging and cold to the head (*see* Chapter XIV).

During convalescence a liberal diet is allowed, tonics administered and, if possible, the child sent to the sea-side. Care must be taken that every vestige of the lung disease has cleared up.

CHAPTER XXXV.

BREATHLESSNESS.

In the previous two chapters we have discussed certain acute diseases of which shortness of breath is a prominent feature. It now remains to deal with certain of the more chronic or recurrent causes of this condition.

A distinction may be made between habitual breathlessness, persistent or provoked only by exertion and recurrent or intermittent forms.

The condition is commonly due to some **chronic disease of the lungs**, it may be simple chronic bronchitis, a comparatively trivial matter, or it may be due to some more serious and less remediable disease. Unfortunately, the respiratory apparatus of children is susceptible to severe and permanent damage, left either as a legacy by some acute disease, or produced by some less acute disorder acting over a prolonged period. The bronchial tubes may be dilated (bronchiectasis), the lung itself may be overstretched resulting in a loss of functioning tissue (emphysema) or inflammation of a chronic type may surround the tubes and spread into the lung (interstitial pneumonia). This last type of inflammation is prone to start from the glands at the root of the lung, especially after whooping-cough, if recovery is partial or prolonged. The above possibilities are stressed to respiratory disease till all traces are eradicated.

Habitual
shortness of
breath.

The second class of case depends on some **disability of the heart**, either inborn or acquired.

The term, **congenital heart disease**, is applied to those cases of developmental error, whereby the heart fails to acquire the power of maintaining an adequate circulation of blood throughout the body. Such cases are of all degree ranging from a slight disability, it may be unnoticed till the child reaches the age of active exercise, to those which are incompatible with life. The outstanding signs of the disease are the constant blueness of the lips or face and the breathlessness. Such signs, especially if associated with a failure to thrive, should arouse suspicion and call for skilled investigation.

Of **acquired heart disease**, that due to rheumatic infection, is by far the most common. This disease, which plays havoc among the children of the poor in the larger English towns, and is by no means rare in India, may develop at any time in childhood after the third year. As has been explained in Chapter XXVI, the onset of rheumatic infection is often stealthy and the symptoms are misinterpreted. The diagnosis will lie with the physician, but the mother should realise that when the child is unduly breathless and especially if pallid after mild exertion, the fault may possibly lie with the heart.

Special mention has been made of the heart as affected by diphtheria (Chapter XVIII), but it may be stated that **after fevers, especially, perhaps after influenza, there is a tendency to temporary weakness of the heart muscle**. Such weakness will be made manifest by languor, pallor, breathlessness and exhaustion after exercise, signs that indicate the necessity for prolonged rest.

As a matter of fact, these warnings are to a certain extent unnecessary, as the mother will seldom fail to notice such adverse signs. On the contrary, the tendency is to suspect heart disease where none is, and in particular, two abnormalities are liable to give rise to this fear.

The first is sinus arhythimice. In this condition the pulse is irregular, but the irregularity has no significance, and there are certain points by which it can be distinguished from irregularity due to heart disease. The irregularity is regular, the pulse-rate is quickened during inspiration and slowed during expiration. The child is no way hampered, and the pulse becomes regular after exercise, to reassume the irregularity after rest.

The second type is that of the young rapidly-growing boy or girl who becomes breathless on exertion, is subject to fainting fits in moments of stress and complains of palpitation. Such a condition naturally gives rise to fear of heart disease, but on examination, the heart is found to be normal. The condition is one of want of tone, partly nervous and partly of the heart muscle. Tonics, a change of air and the relief of any overstrain will bring about a cure.

Finally, it must not be forgotten that **breathlessness may be due to anemia**.

Of this type, often of such extreme degree as to cause anxiety or danger, we may mention:—

Obstruction in the throat Foreign Body (*see* Chap. XXXII) Croup (*see* Chap. XXXIII)

Obstruction in the chest Asthma

Abdominal distension

Paroxysmal
breathless-
ness.

Asthma is essentially a disease of childhood. About a third of all cases arise before the subject has reached the age of ten and in many, the disease may be traced back to infancy.

"Like all the diseases of childhood, in which nervous influences play a large part, it is more frequently met with amongst boys than amongst girls (Hutchinson).

The subject of the causation of asthma is a complex one. It would appear that there is a definite predisposition in which heredity or familial tendency plays a large part. Not infrequently more than one member of a family, including the parents and their relations, suffer from asthma or from some other disease, notably migraine which has a basic nervous foundation.

Causation.

Added to the predisposition there is the immediate stimulus; it may be purely nervous, over-excitement or over-fatigue, it may be the over-distension of the stomach, or the child may be what is known as sensitive to some substance, either swallowed, inhaled or produced by bacterial infection within the body. The particular substance or substances to which the child is sensitive will, on being introduced into the body, give rise to a train of symptoms, which may take the form of asthma, hay fever, gastro-intestinal disorder, urticaria or even eczema, according to the reaction of the child.

The range of variety of such substances is wide, they may be protein food-stuffs, animal or vegetable, such as milk, white of egg, fish, oats or barley. Of those inhaled, the most common are the emanations of animals, horses, dogs or cats, feathers or pollen. Bacterial toxins are usually produced by some chronic infection of the bronchial tubes or post-nasal space.

The sensitiveness may be inborn or it may be acquired, the child being sensitized by some acute illness.

An attack of asthma in the young child is frequently mistaken for acute bronchitis and the true identity of

the disease is not suspected till the attacks have recurred many times. The catarrhal symptoms are intense, but the asthmatic nature of the attack will be suggested by the following points:—

The sudden onset, the development of bronchitic symptoms during but not before the attack, the markedly laboured and prolonged expiration and the persistence of signs of bronchitis for some days after the paroxysm has subsided.

Attack.

The attack usually begins at night, the child wakes with a dry cough which is quickly followed by increasing difficulty in breathing. He is unable to lie down, his sensations are those of suffocation and he is positively fighting for breath. The face becomes blue or dusky, the eyes starting, but there is none of the stridor or crowing associated with croup. The attack lasts for an hour or more, and passes off leaving the child exhausted and with signs of bronchitis which persist for a day or two. Sometimes the attack is more severe and the suffocative state with increasing bronchitis persists for two or three days.

The outlook.

There can be no denying the fact that to be born with an asthmatic tendency is a great misfortune, though many children grow out of it. There is not as a rule any immediate danger from the attack, though in the very young convulsions may be excited, and cases of heart failure have been recorded. The gravity of the disease in childhood lies rather in the tendency to lead to permanent damage to the bronchial tubes and lung tissue.

Treatment.

The first desideratum is the relief of the attack. Of all immediate remedies, perhaps the most effective is the injection of adrenalin 1—1,000 solution hypodermically, minims 1 to 4 according to the age of the child.

Inhalations of fumes from burning powders containing stramonium are much in vogue, but they have the disadvantage that they are prone to increase the tendency to bronchitis. Inhalations of steam medicated with Friar's balsam or turpentine have not this disadvantage and will suit some children. In other cases, applications to the chest, poultices, fomentations or a rapid turpentine stupe, will bring relief.

A dose of brandy or chloral by the mouth or rectum may be tried.

A paroxysm induced by distension of the stomach may be relieved by an emetic (No. 24).

When the spasm is prolonged and unrelieved, a small dose of morphia is justified, but, bearing in mind the tendency to frequent recurrence of the paroxysm, the remedy will be reserved for cases of absolute necessity.

Treatment also will be directed energetically towards the prevention of the attacks. Prevention. It will be borne in mind that there are two factors in the production of asthma, the predisposing and the exciting cause, each of which must be investigated and each of which demands a separate line of treatment.

The predisposition being nervous in origin and its manifestation being an easily excited spasm of the bronchial tubes, anti-spasmodics will be employed. Of these a mixture as follows will be the most generally useful:—Potassium iodide, grains 1 to 4. Tincture of stramonium, minims $1\frac{1}{2}$ to 10. Aromatic spirit of ammonia, minims $2\frac{1}{2}$ to 10. Syrup, minims 20. Anise water to 2 drachms. The dose to be taken three times a day, the smallest doses given being suitable for children of one year old (Still). To this a sedative mixture containing phenazone (as No. 37) may be added as an auxiliary at bed-time. The stramonium mixture must be given over a long period, starting with low doses till individual tolerance is ascertained. After some three weeks, the course may be interrupted in favour of a course of arsenic for two weeks, to be resumed after the interval.

The general hygiene of the patient must be carefully adjusted, special care being taken that he is not unduly "coddled" and converted into a chronic invalid. Except during the period of paroxysms or bronchitis, the routine should conform as nearly as possible to that of the normal child. Heavy meals at night and over-fatigue should be avoided, constipation corrected, the diet carefully adjusted to requirements and digestive powers. Ample ventilation of the bed-room should be ensured. Enquiry should be made into the existence of any source of intestinal irritation, flatulence, dyspepsia or worms.

The question of the removal of enlarged tonsils and adenoids may arise, and while their removal may be

recommended on grounds of general health, the result as regards the asthma is apt to be disappointing.

A change of climate may be sought, but it is difficult to foretell what locality will suit the individual. Speaking generally, a dry climate at a somewhat high altitude is likely to prove beneficial.

Investigation of cause.

With regard to food and other protein sensitiveness, investigation may be made in one of two ways. The commoner articles may be excluded from the diet in turn, the effect on the asthmatic attacks being observed, till, by a gradual process of elimination, the actual substance to which the child is sensitive is discovered.

Skin tests have been devised for the same purpose. These depend on the local reaction of the sensitive subject when the offending substance is inoculated on the scarified skin. Preparations of various substances, proteins and bacterial toxins are put up in groups, ready for making the test. The group is first detected and finally the individual protein responsible.

Not infrequently assistance may be obtained from enquiry into the child's surroundings in relation to the attacks; it may be found that contact with horses, dogs or cats induces an attack, that removal of feather pillows from the bed may have a beneficial effect or that the attacks are seasonal, synchronising with the ripening of grasses and the production of pollen; in fact, when it is realised, what a wide range of substances may furnish the exciting cause, it will be clear that considerable ingenuity may be exercised in tracing the actual offender.

It is always advisable to make a bacteriological examination of the sputum, and to prepare from it, if heavily infected, a vaccine.

Abdominal distension.

Acute breathlessness with cyanosis of the face is not infrequently seen in young children the subject of flatulent distension and constipation. The movement of the diaphragm is so hampered by the pressure within the abdomen, that a large part of the respiratory apparatus is thrown out of action. The following case will serve as an illustration.

A child of two months old artificially fed with excessive carbohydrate diet was brought to the hospital on account of cough. The cough was persistent and almost continuous, the breathing rapid and shallow, the

face blue. On examination, it was found that there was a severe bronchitis with no air-entry into the lower part of the lungs, the action of the diaphragm was reversed, and the abdomen was distended and tense. The child was given an emetic followed by a dose of castor-oil with the result that next day all urgent symptoms had subsided and the bronchitis had, to a large extent, cleared.

CHAPTER XXXVI.

CONSTIPATION.

Frequent in India.

Constipation is one of the minor ailments of infants and older children which is very frequently met with; it is in most cases **due either to lack of tone in the bowels or to dietetic errors**, that is, the nourishment may be of defective quality or of unsuitable composition. For instance, if the milk be too watery, it may be fully digested, but the motions will be small and infrequent. Similarly, if the quantity be deficient, there is little likelihood of a motion at regular periods. **But discounting the above, the commonest causes in this country are a deficiency of fat in the nourishment or a too frequent use of the starchy foods which we have before spoken of.**

Significance.

The first fact which it is very desirable to bear in mind is this, that whereas diarrhoea always represents a danger, constipation is a condition which gives rise to many remote evils.

General symptoms.

The symptoms associated with any degree of chronic constipation are many. **The child may be brought to the doctor for flatulence, colic, restlessness or wasting; there may be occasional vomiting and the abdomen may be distended, sometimes there is a tendency to prolapse of the rectum or hernia from the straining efforts at stool.** If the condition occurs later, for instance, **after the age of three, the symptoms are usually well marked**, the child is languid, his complexion muddy, his breath and tongue foul and the stools hard and scanty. The bowels do not act with regularity. The motions are almost always too light in colour, because the solidity of the mass has not permitted the penetration of the bile. Sometimes the motions may be partially fluid, that is, we may have hard lumps ejected forcibly in the midst of coloured water; the lumps having then acted as an irritant, and caused increased exudation from the intestine. Not infrequently a few drops of blood may be passed at the end of a hard

motion, but this need not occasion any alarm. It is due to the forcing having ruptured one of the very minute and delicate veins near the orifice, and it is not of the slightest consequence, being very different in significance from a dysenteric stool.

It is only by understanding the cause of a case of constipation that we can hope to treat it successfully.

Treatment.

1. In infants at the breast constipation is common. The child is in good health, there is simply infrequency and hardness of the motions. During the first two months of life constipation is as common as diarrhoea is rare. The stools are more than usually white in colour: the mother, by reforming her ways, taking more exercise and eating more vegetables, may generally effectually cure her child. To ask the mother to take an occasional Seidlitz powder or a dose of Epsom salt, with the aim of curing her baby's constipation, is rarely sufficient.

1. Infants at breast.

One teaspoon of milk of magnesia and one teaspoon of paraffin is an excellent corrective in mild cases in breast-fed infants.

There is however a condition of severe constipation rarely thought of by mother, nurse or doctor, which resists all ordinary treatment. This degree of constipation is due to **spasm of the sphincter and muscle** which closes and refuses to allow anything to pass from above, and exactly resembles spasm of the pyloric end of the stomach. It can be diagnosed (if remembered) in a moment, by the passage of the middle finger into the anus. The finger should be vaselined or a finger stall worn, the tight sphincter is felt to give and if the finger be passed into the anus each day for a week at a fixed hour, the habit to open the bowel at such an hour will become established and the constipation cease. Jacobi recommends that a piece of loaf sugar should be dissolved in tepid or oatmeal water and given before each nursing, this often proves effectual in a mild case with the child at the breast where cream and oil have failed.

If bottle-fed in the early stage, adding five drops of cod-liver oil to each feed or giving a teaspoonful of cream in addition may be enough, but if this is insufficient it is well to prescribe 5 grains of sodium sulph. or sodium phosphate, or mag. carb.; or manna half a teaspoonful in dill water twice a day, or to add 1 grain of

sulphur in alternate bottle feeds and with this the movements of the bowel should be stimulated by thorough massaging the abdomen from right to left along the course of the colon for a few minutes 2 or 3 times daily.

The **prolonged use of suppositories or enemata is not to be encouraged.** With the above treatment if the habit of evacuation be taught, the child will soon become regular at stool.

**2. After
6 months.**

2. Occasionally after the age of six months the condition becomes chronic and troublesome, then other purgatives may be tried in order to induce a regular habit. Five drops of tincture of aloes or liquid extract of cascara may be combined with 20 drops of the syrup of senna in dill water, or if the motions are putty-like, 2 drops of tincture of podophyllin may be added to the above. If there is any flatulence or heartburn, a useful combination is magnesium sulphate 5 grains, sod. bicarb. 5 grains, sp. ether nitrosi 2 drops and syrup of senna 15 drops, fluid magnesia and dill water of each one teaspoonful. Dose one or two teaspoonful three times daily, as necessary.

3. For older children it must be distinctly understood that the only merit in laxatives or purgatives is that they are given with the one idea of setting up a regular habit; if need be, they may be continued for a month until the tone of the bowel is restored and a habit established. A child should be taught to go to the closet regularly at a fixed time daily and this routine, if persisted in, will be of life-long benefit. There are many useful laxatives for this purpose.

One half to one teaspoonful of confection of sulphur at night, or sodium sulphate on rising; or cascara sagrada or nux vomica in combination with belladonna and aloin are amongst the best.

A useful prescription being for a child, 2 years old:—

Sodium Sulphate	..	..	10 grains.
Tinct. Aloes	..	..	5 drops.
Tinct. Belladonna	..	..	1 drop.
Tinct. Nux Vomica	..	..	$\frac{1}{2}$ "
Syrup of Senna	..	..	20 drops.
Syrup of Ginger	..	..	20 "
Peppermint Water	..	..	2 teaspoonful.
			Send 2 oz.

One to two teaspoonful two or three times a day as necessary.

A useful home remedy for constipation is the following Recipe:—

Take 1 lb. of French Plums.
 1 lb. of Demerara Sugar.
 1½ ounces of pounded senna and ½ ounce of ground ginger.

Stew the plums in a little water until tender, remove the stones and then add the rest, mix and beat into a paste. One teaspoonful at night for a child of four.

In this country one of the most effectual remedies, in that it is procurable in the bazaar, is to obtain some senna pods, soak two or three in a half tumbler of water overnight and drink the infusion on rising, or after soaking for 6 to 8 hours, it may be drunk at bed-time. We have dealt with this subject at length partly because of its importance later to the child's welfare and partly because of its frequency in this country, but before concluding, it is most necessary to remind the parent that laxatives are but a small portion of the treatment. A regular habit must be aided by a regular and proper diet. In the tropics, fluid readily leaves the body by the sweat glands. The child therefore should drink copiously and if possible between meals; the diet should be simple with the avoidance of seasoned or hot dishes; pastry and sweets should be allowed only in moderation, but certain vegetables and fruit may be allowed; oranges and papya are usually readily procurable at any time and may be given, *vide* Mucus Disease. **Oatmeal porridge and bananas should be avoided.**

In our experience, **those cases which are sufficiently severe to be brought to a doctor are never cured by a so-called "Suitable Diet" alone;** there is always some fault, either in the intestinal musculature, or the secretory function of the bowels, which needs correction. Indeed, some of these cases complicated by wasting and lack of appetite abundantly prove the recent researches of McCarrison on the importance of the endocrinous glands; for, we have seen cases persisting despite drug, diet and massage treatment, which have rapidly been cured by giving small doses of thyroid extract.

In this country, a not uncommon type of constipation met with is that following dysentery. We think

these cases are best treated by the lubricant, liquid paraffin in teaspoonful doses, and if this fails, 5 to 10 drops of the cascara evacuant prepared by Parke, Davis & Co. may be added to the paraffin.

MUCUS DISEASE.

It is well to describe here a condition of **chronic Gastro-Intestinal Catarrh** which would appear to be almost an intermediate state between morbid constipation and diarrhoea in childhood. We refer to Mucus Disease which was first described by Dr. Eustace Smith and which is **very frequently seen in this country**. In this disease, the mother will relate that her child is constipated or has attacks of diarrhoea, accompanied by what she may call a bilious attack of vomiting and abdominal pain, and in both conditions the stools are smeared with slimy mucus. She will probably say that the child is languid and peevish, and that she has suspected and treated her for worms. The appetite she will tell you is perhaps poor, or it may be voracious and yet the child does not gain flesh, and is ailing. Very often you will get a history of cough and wasting and you will suspect phthisis, but the cough is due to gastric irritation and the wasting to the condition of the mucous membrane which is unable to assimilate food. In other cases there may be a history of passing undigested stools shortly after food (Lienteria), or of incontinence of urine, or of a liking for abnormal articles of food. In most cases the tongue is a guide, for you will find that it is pale and flabby and has a glazed appearance as if it had been painted over with gum or is "mapped." The face may be puffy or there may be dark rings under the eyes. Sudden attacks of faintness or pallor are very commonly complained of. The children are bright and intelligent as a rule.

Symptoms.

Wasting is the symptom which most distresses the mother and this combining with the loss of appetite and pain in the stomach often encourages friends and relatives to suggest tuberculosis or appendicitis.

It is very necessary for the mother to remember that until such time as an efficient medical opinion can be obtained she can do a very great deal for her child on the following lines and Rules of Diet, for if all the

symptoms are due to chronic gastro-intestinal catarrh, she can expect a cure within a short period.

The commonest error is for the mother and doctor to stuff these children with Cod-liver oil, Parrish's food or other Patent Medicine without making a correct diagnosis or testing the urine, for if a doctor is in doubt he can test the urine (*vide* acidosis) and if he finds acetone, diacetic acid or much indican he should at once suspect and treat the intestinal tract. A "Stomach Rash" is often present to guide one.

Treatment consists in:—

1. Attention to the teeth and **moderately starve for the first 3 days.**
2. Exclude the presence of worms; also tonsils and adenoids.
3. Make the child chew and not bolt its food.
4. Give water *ad lib.* But allow no food or sweets between meals.
5. Allow nothing to eat after 6-30 p.m. except a cup of milk and a rusk.
6. Wake the child from sleep $\frac{1}{2}$ hour before meals and allow it to run about.
7. Postpone drinking till after meals or 1 hour before meals.
8. Do not give too much milk in addition to a substantial dietary.
9. Do not give Cod-liver oil. But give malt alone one teaspoonful after meals.
10. Do not give iron or any iron tonic such as Parrish's food, etc., **until** the child has been on a Stomach Alkaline Mixture, e.g., Red Mixture, for 2 to 3 weeks with a Grey Powder at night, and **his tongue is clean.**
11. Prevent constipation. But **never give raw fruit** for costiveness, especially bananas.
12. Provide a hard mattress and light bed clothes. Plenty of sun and air are essential.

As regards diet in chronic intestinal indigestion or Mucus Disease the following may and may not be taken:—

DIET.

May not be Taken.

Ordinary white bread, buttered toast, biscuits, farinacious puddings (sago, rice, tapioca, arrowroot, etc.), porridge, pastry, sweets, chocolates, cheese, potato, much butter, any jam, thick or vegetable soups, fried or salted meats, vegetables (except as opposite), raw fruit, fruit cake, plain milk, tea and coffee and bananas.

Scones, fish, smoked fish.

Most children are better without eggs for the first 10 to 15 days.

May be Taken.

Bread baked hard, dry hard toast, rusks, Veda bread, grape-nuts, Force, lemon sponge, malted infant foods (Horlick's), calf's foot jelly, Madeira cake, a little butter, little honey or treacle, clear soup, beef tea, chicken tea, underdone meat, fish, chicken, sweet bread, mutton (eggs), boiled brains, minced bacon fat, spinach, flower of cauliflower, Brussels sprouts (mashed), vegetable marrow, very little mashed potato, fruit juice, diluted milk, whey, malted milk, condensed milk, Bulgarian milk or little cocoa, barley, sugar, cane.

And in order to make the diet scheme easier we append a sample day's dietary.

Breakfast.—Grape-nuts, boiled egg (or poached), hard bread, hard toast or rusk with treacle, orange juice. (No food in between meals.)

Tiffin.—Chicken soup or clear soup or beef tea, chicken quenelle, boiled fish, minced chicken, sweet bread, boiled brains, underdone grilled mutton, or minced bacon.

Vegetable.—Spinach, flower of cauliflower, Brussels sprouts, vegetable marrow, very little mashed potato.

Pudding.—Lemon sponge, calf's foot jelly, Madeira cake, prunes, fruit juice, baked custard.

Tea.—Milk, toast and treacle, Madeira cake.

5-30 p.m.—Milk and a breakfast food. **6-30 p.m.** bed.

This condition of gastro-intestinal catarrh called Mucus Disease is exceedingly common in all grades of society in India, and is entirely due to dietetic errors:—Starchy and sugared food preponderating in the child's diet. Nothing is more striking than the results of

treatment, if carried out strictly on the lines we have indicated. **The cure therefore is in the hands of every mother**, when once the presence of worms has been excluded. Finally, let it be noted that this condition and its symptoms are not to be confused with dysentery.

Many of these cases have been diagnosed as tuberculosis, or even appendicitis; and yet there is nothing more remarkable than to watch their improvement if a correct diagnosis is made, and there is nothing more convincing in practice than to demonstrate the urinary fault; but let us warn you at once that improvement will not be obtained by giving Cod-liver oil, or Parrish's chemical food, or other emulsions; indeed, we find that the majority of cases have had these so-called remedies and most of them have had treatment for worms, but have not improved.

If you recognise the condition, a cure is certain; if you do not, chronic ill-health and possibly the super-vention of some more serious disease may carry the child off. It is this disease in India which, remaining undiagnosed, follows measles and whooping-cough and lays the trail for tuberculosis. How many times has one not heard a mother say that her child's health was splendid until he had measles or whooping-cough, but the child has never picked up since?

We feel that if only practitioners would make it a habit to test the urine for acetone and indican, much child-suffering would be saved, and here we would like to say that if a child has contracted measles or whooping-cough in the hills and fails rapidly to recuperate, it would be far better to send him to a sea-side resort, for undoubtedly the hills do not suit these cases when their gastro-intestinal tract is out of order.

Constipation is frequently a source of trouble; for this, senna pods or paraffin and milk of magnesia or "Cascara Evacuant" are useful. These children are often anæmic; and we warn you that no iron or tonic emulsion should be given for the first 2 or 3 weeks and not until the tongue is perfectly clean; after this period any mild iron preparation is useful. As the health improves, the diet can gradually become more liberal, but if there is a return of any of the symptoms, the forbidden article of food should be stopped at once. As a rule it takes from 4 to 6 weeks before the child regains health.

CHAPTER XXXVII.

DIARRHŒA.

Frequently
misman-
aged.

We now come to speak of an affection the existence of which is at once recognised even by the most unskilled, but which nevertheless is in great number of cases popularly mismanaged. That there is an unnatural flux is self-evident, and it is the frequency and watery consistency of the evacuations which is the chief characteristic of diarrhœa; and with this knowledge occurs but the single prevailing idea—the use of astringents. Now, it cannot be too clearly understood that this notion may often prove to be a disastrous one. **Astringents exclusively will, oftener than not, aggravate the complaint, or very possibly convert an easily managed diarrhœa into a severe inflammatory affection.**

A state of diarrhœa is one the existence of which we should never ignore; **it always represents danger.** The disease is very common and is often the scourge of infant life. It is the most fatal of all the diseases with which the young child has to contend in India. Even in England, diarrhœa ranks third as a cause of the deaths of children under five years of age.

Let it be a maxim that children's diarrhœa in India should always be treated whatever be its nature or whenever it occurs. Heed not the advice to allow diarrhœa to progress while teething is going on. Firmly take your stand, and act upon the opposite principle; more particularly in the case of chronic diarrhœa, that form of the disorder in which temporising is popularly most common. It is not desirable to induce actual constipation when dentition is in progress; but do not for a moment believe that constipation, even during teething, is the fatal thing it is represented to be, or that it is a state fraught with all the dangers of convulsions. It is through diarrhœa rather than constipation that we court convulsions when the child is teething.

Diarrhœa may be produced by almost innumerable causes—bacterial or otherwise. No doubt (1) **errors in diet** are by far the most frequent. Diarrhœa in the

breast-fed infant has already been dealt with, *vide* Chapter V. (2) **Dentition** is popularly supposed to be a very prolific cause, but we believe the assertion to be far from the fact. No doubt diarrhœa is most common between the ages of six months and two years, that is, within the period of active dentition and when faults in dietary are most rife; but the intestines are, at the same time, undergoing a stage of development, which renders them peculiarly intolerant of irritation. The susceptibility is, it is true, greater; and in delicate children, dentition may accelerate a diarrhœa, but it is a natural process, which does not give rise to disease in the healthy. (3) **Atmospheric conditions**, such as the damp and cold of the rains and sudden climatic changes, may affect the child itself directly or indirectly through its food.

Given a certain percentage of infants in a town who receive other nourishment than breast milk, the annual state of the town being the same, the mortality from diarrhœa will be entirely ruled by meteorological conditions. It is not so much the effect of the temperature on the infant itself which influences the mortality—indeed, it is **very rarely fatal to the child nourished upon human milk**; but it is the influence of the temperature on the child's food which determines, in the highest degree, the number of deaths.

(4) **A polluted air**, such as may be caused by want of drainage, foul surfaces, or water-closets, is another indirect cause. (5) **Worms** are an occasional cause; and (6) **Fermentation set up in food and milk by germs**, (which are frequently conveyed on the legs of flies) causes it.

The causes of diarrhœa indicate the proper measures for prevention; but so far as treatment is concerned, it is rather by the nature of the stools and symptoms that we must be guided. Even if it were otherwise, the cause is often difficult of discovery. It is all very well to talk of "removing the cause," but it is often very impracticable advice. **Always bear in mind that children do not require heroic and energetic treatment with drugs.** For little ailments let Nature take its course. Never dose a child with medicine for trivial complaints. A dose of castor-oil will brighten up a **Treatment.**

languid and listless child, whereas any indiscriminate administration of strong medicine will only upset it.

Classification.

Various classifications have been suggested, but from a **clinical point of view** it may be divided into:—

- I. (a) Simple diarrhoea.
- (b) Severe diarrhoea.
- (c) Febrile or inflammatory diarrhoea.
- II. Chronic diarrhoea.
- III. White diarrhoea.

SIMPLE DIARRHOEA.

Dietetic Errors.—Overfeeding and improper feeding are perhaps the main causes of simple diarrhoea. In the majority of cases it is due to bacterial infection. Diarrhoea is more common in hand-fed than breast-fed infants. The infection may be conveyed by milk which is anything but a germ-free fluid; in breast-fed infants the infection may be carried through unclean nipples. Chills and dentition may also be the exciting causes of simple diarrhoea in many cases.

The stools are offensive, frothy, of a greenish colour and mixed with curds of undigested food and mucus. Sometimes the evacuations are bright yellow, at times pale and they may contain blood. Vomiting may or may not be present, occasionally milk is vomited undigested in curds. There is no fever (unless the diarrhoea be a mere symptom of a fever), the motions are not scanty, nor are they like curd or pap thrown into discoloured water.

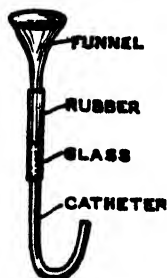
Treatment.

Treatment of Simple Diarrhoea.—**Starvation and elimination should be the watchwords in the treatment of simple diarrhoea.** “You must starve the child, because you do not wish to furnish any further pabulum for the growth of micro-organisms; and milk in particular you must withhold, for there is reason to believe that milk in such cases is actually poisonous. With regard to elimination, your idea should be, in the first place, to remove as far as you can those organisms which are still growing in the alimentary canal, and in the second place, to get rid of their poisons.” In the treatment of diarrhoea **astringents are not only useless but positively harmful.** **Castor-oil emulsion every two or three hours, until the stools become healthy, is a most valuable prescription.** Milk and barley water would only supply

a suitable medium where micro-organisms may thrive. Whey and albumen water not only supply nourishment but also stop vomiting. In mild cases castor-oil followed by bismuth, and aromatic chalk powder or small doses of grey powder will effect a cure.

Personally we prefer in this country to use sulphates; 10 grains of sodium sulphate and 5 grains of sodium citrate being given in a teaspoonful of carraway water every two hours, until the stools are fæcal or free of mucus, then giving a powder such as bismuth carbonate grains 10, pulv. ipecac. co. grain $\frac{1}{4}$, every four hours in water; or

In the acute stages much benefit results from giving a **hot mustard bath** and then applying a hot stupe to the abdomen, and there is no question, in our experience, that great good is done **by washing out the lower bowel once or twice a day** with warm normal saline solution. **This simple and cheap apparatus should be in the possession of every mother**, and can be obtained from any chemist; it only consists of a glass funnel connected by tubing to a No. 12 soft Jacques catheter. If the irrigation causes great straining and pain, it should be stopped or used only once daily.



For the first one or two days, we insist that the child shall have nothing but plain barley or boiled water or albumen water; and sugar in any form whatever is disallowed; at the end of that time for 1 to 3 days, the child is given barley water every two hours, but still no sugar or milk is added whatever. By now the motions will have begun to mend, and we commence by giving whey or $\frac{1}{3}$ milk and $\frac{2}{3}$ water mixture (the water is first boiled and while boiling the milk is added and well stirred for 3 minutes). No sugar is given for the first 3 days, and then gradually it is added again.

Should there be any recrudescence, again stop all sugar and return to barley water for 48 hours. (Cf. Appendix.) When all symptoms have ceased, the strength of the milk may be progressively increased.

Among these cases of acute diarrhœa, it is by no means uncommon in both hospital and private practice to meet with two distinct types. In the one the stools

are foamy, very frequent, sour smelling, acid, and often actually scald the buttock. This is the fermentative type of diarrhoea and is found in infants who have received large amounts of sugar and other carbohydrates before developing any symptoms.

In the other, or putrefactive type of diarrhoea, the stools are firmer, less frequent, foul smelling, alkaline and non-irritating to the skin, and we see this type in children who have had little sugar or carbohydrate and almost a pure protein diet before the diarrhoea began.

ACUTE DIARRHOEA AND ACUTE DYSENTERY.

Acute summer diarrhoea, cholera infantum, or acute gastro-enteritis, or acute bacillary dysentery, are all terms denoting one of the greatest tragedies of life in the East. It may, therefore, help if we put before you some personal experiences of treatment and prognosis.

In the early days of the hot weather many of these cases are due to the fact that mothers and doctors do not realise that **when the temperature in the plains rises a child does not want so many calories of food as it does in the cold weather**; therefore, if this be forgotten, it may be that the child's digestion becomes very severely taxed and diarrhoea and vomiting occur. The first attack may be so severe as to kill the child, but more often Nature's warning of some error in the diet is kinder, and the first or second attacks are of mild degree. Should the mother then not take heed, a greater tragedy may occur. Our own experience in Bengal points to the fact that the worst cases occur in June, July, August and September, when the climate is moist and very hot.

First of all, let us impress upon you the fact that these cases are always of bacillary origin whether Shiga's, Flexner's, or Gaertner's bacillus matters not one iota in the treatment, for the condition is so fulminant in the majority of cases that no form of auto-vaccine treatment is of avail in time. The next point to emphasise is that **Entamoeba histolytica is practically never the cause.**

**Acute
Bacillary
Dysentery
not to be
treated as
Amoebic
Dysentery.**

Working in conjunction with Sir Leonard Rogers before the war, the stools of 100 consecutive cases of fulminant acute gastro-enteritis were sent to his laboratory. In only 2 per cent. were amoebæ discovered; and since the war in not one single case seen in consultation

have amœbæ or Charcot-Leyden crystals been demonstrated in any case of acute diarrhœa where mucus and blood have been present in the stools. We wish to lay particular stress on the above facts, because experience has shown that the drug most beloved of the practitioner in cases of diarrhœa with blood and mucus is **emetine**. **This drug is not only useless but is dangerous, for, apart from the fact that it bolsters up false hope in mother and doctor, it prejudices the life of the child by loss of valuable time and by causing great cardiac depression in these cases of Bacillary Dysentery.**

The onset is sudden, and often accompanied with symptoms of vomiting. Frequent copious motion, which seems to consist almost altogether of greenish coloured or almost colourless water, are voided. The hands and feet become cold, the face pale, shrunken, and wizened, and the lips thin. In a few hours the child will have all the appearance of an aged person. A most important symptom is its inability to sleep or even to rest,—the child moans, frequently shrieks—is never quiet a moment. The exhaustion is so rapid by draining away of the fluids that convulsions are likely to ensue if treatment be not strenuously adopted. **There is not one moment to lose.**

The high temperature is evidence of bacterial invasion, and if the infection be very virulent, a sub-normal temperature suddenly shooting to 106°F. with a convulsion is not at all uncommon. Moreover, remember that diarrhœa and vomiting, associated with its consequent starvation, is an absolute cause of **acidosis**, and that this acidosis is frequently the forerunner of death. Therefore, particularly observe the deep gasping air hunger associated with the white-grey sunken face and cherry-red lips of these children, which are the obvious signs of acetonemia.

Another point to observe is the condition of the buttocks; for, if **the infection be one by the putrefactive group of organisms, the buttocks are usually not sore or red**, the stools are alkaline and of extreme offensiveness in the early stages. This will give you an indication as to the fluid diet that you should give, e.g., barley gruel, or rice water, since putrefactive organisms do not thrive on a carbohydrate pabulum. **If the buttocks are scalded and red**, and the stools sour and acid, this is evidence that gas-forming bacilli are in the ascendant;

Symptoms.

Putrefactive Type.

Dermatative Type.

and these organisms do not thrive on a protein pabulum such as albumen water.

In the cases which we are describing the infection is so severe that, whatever the cause, you must have at your fingers' ends the details of treatment; and these details **you must put in writing** and see that they are carried out to the letter if you would preserve the life of the child.

Treatment. **The essential principles of treatment are:—**

1. To get rid of the poison (bacteria or toxin), and to allow the inflamed intestine an opportunity of recovering.

2. To counteract the acidosis.

3. To supply the loss of fluid from bowel and stomach, for it is this dehydration factor which so often kills the child after the intoxication factor has been dealt with.

4. To give that fluid diet which will least provide a pabulum for the organisms which have caused the disease.

Elimination. **As regards No. 1,** put the child at once on half or one-hourly doses of sodium sulphate grs. 20; sodium bicarbonate grs. 5; sodium citrate grs. 5; glycerine 15 minims; aqua anisi 1 drachm; until the stools become watery and brown. If there is vomiting, wash out the stomach with 1 per cent. sodium bicarbonate solution, using a catheter and funnel; the same solution can be used to wash out the rectum. If the **vomiting** is severe, give 1/10 or 1/6 gr. of calomel (B. & W. Tabloid) every hour. Sometimes one-drop doses of chlorodyne are useful every ½ to 1 hour.

If it is obtainable, one teaspoonful doses of Kaolin in water or Collosol Kaolin (Crookes) should be given after every dose of the Saline Mixture for the first 48 hours. This is a wonderful remedy for it absorbs the toxins of the bacilli.

Acidosis. **As regards No. 2** (which it is so essential to remember), add ¼ teaspoonful of bicarbonate of soda and ¼ teaspoonful of salt to a pint of boiled water, with ½ a grain of saccharine to make it palatable, and give the child as much as it can possibly drink of this solution for it acts in two ways, not only does it supply the loss of body fluid but the salt makes the child thirsty and therefore automatically it is inclined to drink more and more of the solution. There is just one point about

this treatment which you must remember, and that is that sometimes **acute œdema** may occur as a result of the sodium chloride; if so, this commodity can be cut out.

In addition to the medicine quoted under heading No. 1, another useful means and home remedy for combating the acidosis is the glucoside-containing **raisin tea**. This is made by adding one tablespoonful of white raisins (kismis) to one pint of boiling water, crushing and straining. Infants and children take this readily, one ounce or more every hour.

As regards No. 3, the shrunken muscles, loose skin and sunken eyes cry out to you that the tissues have been drained of fluid, and if you do not counteract this loss, the infant will die of **dehydration**. The methods of supplying this loss of fluid can be by the mouth, under the skin, or into the peritoneal cavity. **Saline given per rectum is useless** in these cases, for it is constantly evacuated and the child lies in a green slimy swamp. Dehydration.

In less severe cases, or better still, early cases, giving the salt and bicarbonate solution mentioned under heading No. 2 is the ideal method; it is no uncommon thing to find that an infant will take 2 pints of this solution in 24 hours; **we advise the parent to put it in a bottle with an easy teat and give it almost continuously**. However, **in late cases** urgent measures are necessary, and we advise you not to hesitate but inject 4 to 6 ounces of saline (made up from B. & W.'s Soloids), under the skin of the axilla every 5 hours, and if the case is an extreme one, not to hesitate to give the saline intraperitoneally. This is a perfectly easy and safe procedure; all that is necessary is to attach a large "Record" syringe needle to a rubber tube and funnel previously boiled, then, choosing a point in the middle line, just below the umbilicus, pick up the abdominal wall between your finger and thumb and drive in the needle at right-angles $1\frac{1}{2}$ inches, then release your hold upon the abdomen. Ten to 20 ounces of saline can rapidly be run in and there is only an infinitesimal risk of injuring the bowel. Scores of infant lives have been saved by this means, as have the lives of adults in cholera.

As regards No. 4, feeding: to begin with, nothing Feeding. is given except **rice-water**, which is the least irritating of all the cereal waters. This is made by adding one tablespoonful of rice to $1\frac{1}{2}$ pints of water, boiling,

straining, and adding a pinch of salt and one teaspoonful of brandy. Children like this, and in the great majority of cases it is far better to start with this than with albumen water, for 90 per cent. of these cases are infectious with putrefactive organisms. The Germans do not use rice-water or albumen water, but pin their faith on **weak tea** made by adding one teaspoonful of tea leaves to a pint of boiling water, standing three minutes and decanting, adding $\frac{1}{2}$ a grain of saccharine to make it palatable. This solution is given with or without a minute portion of milk. It is thought to be diuretic and stimulant, and certainly in our hands has proved very useful.

Method of
making
Skim Milk.

After 48 hours some additional food must be given, though it should be remembered there is some food value in rice-water and in the raisin tea mentioned under heading 2. German authorities are great believers in protein milk, but this is difficult to prepare. We prefer to rely on whey, or **skimmed milk, given alternately to start with, with rice-water.** The easiest way to make skimmed milk—which may we remind you is of extreme use in cases of indigestion in infants, and especially in that disease almost peculiar to India, infantile enlargement of the liver with wasting and œdema—is to take a small enamel douche can, insert a cork in the tube outlet, and simmer therein fresh milk for half an hour, then remove and place on ice for 2 hours. The fat of the milk will by then have all risen to the top, and the lower two-thirds in the vessel can then be obtained by removing the cork from the outlet and letting the milk run into a clean jug. This milk is to all intents fat-free, and should be given diluted 1 in 3 to start with, gradually increasing its strength.

Here let us warn you that **under no condition whatever**, and despite all protestations of the mother or child **must you give any form of sugar or any, fat-containing food in the early stages of your treatment.** As the child improves, the strength of its feeds can gradually be increased, Mellin's food or Dextrimaltose (Mead's) is the easiest way of beginning to add sugar.

Where the organisms have been definitely reported upon as belonging to the putrefactive group, the Finkelstein method of giving, as the only food, one teaspoonful of sugar of milk to a pint of water, is an

eminently satisfactory and successful one in the early stages.

Drugs, beyond those mentioned under heading 1, have no place in the treatment of this condition, and **most particularly we warn you against the use of astringents, either in the form of acids, bismuth or opium.** All that these things do is to cause distention and fever, due to the accumulation or non-evacuation of intestinal intoxication products. You will see, therefore, that the treatment of acute diarrhoea in infants is exactly on the same lines as the treatment of acute bacillary dysentery in adults.

There are certain complications and symptoms which may demand additional urgent treatment. For instance:—

1. **Vomiting.** This is best dealt with by washing out the stomach with one teaspoonful of bicarbonate of soda to the pint, using a No. 10 or 12 soft Jacquet's catheter. Remember that **vomiting is an expression of the gravity of the case,** and should give you warning to be ready to give saline into the peritoneal cavity if need be.

2. **Hyperpyrexia** is a grave symptom and frequently ushers in convulsions. Cold packs or a cold bath, or ice-cold enemata may have to be given and repeated. We have sometimes thought that one-grain doses each of Dover's powder and aspirin saved some of these cases.

3. **Collapse or cold clamminess** are frequently the precursors of death. A hot mustard bath, brandy by the mouth with an injection of camphor in oil are useful, but usually the condition indicates the immediate necessity for intraperitoneal saline with or without minims 5 of adrenalin to each pint.

4. **Rectal tenesmus** is often the cause of shock and continual whining. We advise you to apply round the anus a mixture of equal parts of zinc oxide and castor-oil, and then place hot bread or linseed poultices over the anus. **We do not think that in the really bad cases washing out the rectum with saline is any good,** but it is useful in those cases where there are four or five motions only per day with great straining and blistering of the perineum. If there is a great deal of mucus in the stools, we have often thought that this mucus has some mechanical protective capacity and therefore it is

**Rectal
gripping.**

a mistake to order saline bowel washes. However, if bowel washes are given, remember that it is not necessary or wise to pass the catheter more than 4 inches, for if the buttocks be raised on a pillow the saline will with ease reach the transverse colon before peristalsis ejects the debris.

Convulsions.

5. **Convulsions** frequently initiate and sometimes terminate acute diarrhœa. In the early stages, a warm bath and a preliminary dose of castor-oil are useful, but convulsions in the late stages rarely react to any treatment, although, of course, treatment with chloroform, chloral, or Dover's powder may tide the child over the danger period, provided the other lines of treatment are being carried out.

We have records of many small patients who developed convulsions on the third day, due to fulminant gastro-enteritis. They were treated with anti-dysenteric serum 20 c.c. subcutaneously and recovered.

Anæmia.

6. **Anæmia** is always a concomitant or sequel of this condition and needs dietetic rather than medicinal treatment, for it would appear that these bacillary infections to a large extent paralyse the endocrine system of the child, and since this system is, to a large extent, responsible for the growth and metabolism of children, it is obvious that any method of treatment for the anæmia which does not take into account dietetics is going to fail, for we would remind you that "the vitamins are to the endocrines what the endocrines are to the economy." Therefore, when the child's digestion can manage it, fresh milk, eggs, green vegetables and fruit must form the principal articles of diet. If further corroboration of the above facts is wanted, we have only to remind you how often children who have been wrongly fed and badly dosed after acute gastro-enteritis suffer from skin affections, boils and loss of hair. The only drug which we have any faith in is cod-liver oil, and whether given pure or as emulsion or as Kepler's, we think, matters little. **A visit to the sea-side or the hills, provided the food principles are carried out as above, is, of course, invaluable.** Recently, many authorities have been advising fractional doses of thyroid gland, combined with a full vitamine A B C D diet, *vide* Chapter VII.

Constipation is frequently an after-complication and is best treated with milk of magnesia and paraffin.

Perhaps we have not done sufficient justice to that old sheet-anchor of mothers and practitioners—**castor-oil emulsion**. It is not that we do not at times employ it, but because we wish you to realise that **this fulminant disease requires and reacts better to the saline and alkaline treatment referred to**. Castor-oil emulsion, that is not more than 5 minims of the oil to the drachm of mixture, is, however, useful in mild infective cases, and in some convalescent cases where the more urgent symptoms have subsided.

Castor-oil emulsion.

Administration of opium to children.—Never give opium at the onset of the illness. It is always advisable to remove the source of irritation by aperients. Calomel and Dover's powder 1|8 gr. of each may be given with advantage. Opium is indicated to stop the excessive peristalsis. Food is sometimes hurried on before it can be properly digested and absorbed. One drop of tinct. of opium may be given in such cases if necessary. But always remember that children are very susceptible to opium. **"Never wake up a child to give a dose of opium.** The child will sleep off a mild overdose of opium if you will let him."

Admini-
stration of
opium.

CHAPTER XXXVIII.

CHRONIC DIARRHŒA.

Very serious in young children.

When chronic diarrhœa becomes firmly established during the first two years of life, it is difficult of arrest. Even when checked, a long time is required to restore the intestines to proper working order. In older children it is less serious and more easily managed.

Causes.

Dr. Still, writing on this subject, says that chronic diarrhœa occurs for the most part in infants whose mothers are probably out at work all day, and who are consequently fed indiscriminately. It is found in the unwashed and ill-clothed, in fact, in all who breathe bad air, are fed on bad food and who live under conditions hygienically faulty. In the children of the well-to-do it **usually results from improper feeding**—not necessarily from food intrinsically bad, but rather from such as is ill-adapted to the particular case; in many of the children in this class of society, the greatest care and forethought have been exercised; still there is something wrong in the food or its administration.

Symptoms.

The case may have commenced in many ways: when firmly established, the child becomes thin and pale, but he is tolerably lively, and he takes his food fairly well. The motions, of a pale colour and a putty-like consistence, are voided four or five times a day or oftener, with pain and straining. As time passes, the child's condition will vary; sometimes he is much better for a day or so, sometimes he is worse. On the whole, things do not go on satisfactorily, and the motions gradually become more frequent; at times they may be like mere dirty water, and then again they may change to a mud-like substance. The child wastes, he becomes paler, and the skin assumes an earthy tint. He lolls about, lying down frequently, and he soon wears the aspect of an old man if things continue to go on badly. The motions may now become like chopped spinach and contain much slime, and sometimes a few drops of blood, due to the straining. If recovery is to take

the motions.

place, **the first intimation of improvement will be the appearance of bile in the motions**, which, as the bile increases, will become less offensive.

In the chronic diarrhœa of children the **temperature should be accurately measured by the thermometer for a few days**. If the temperature be above that of health, and it remain so day after day, we may fear some fixed disease has become established. If the contrary is the case, the temperature being at or a little below the standard of health, a more hopeful view is justified.

Chronic diarrhœa is always serious, and the more so the younger the child. When it occurs as a sequel to other affections, such as measles, scarlatina, etc., it is an anxious matter. The thicker the stools the more hopeful the case, no matter how offensive the motions may be. It is always a favourable sign if dentition continue to proceed naturally; if a great impression has been made upon the constitution, teething will be suspended.

In the treatment of this affection scrupulous attention to hygienic conditions is a matter of the greatest importance, beside which drug-giving is quite a secondary consideration. An equable temperature, free ventilation night and day, warm flannel clothing, especially around the abdomen, and very careful regulation of the diet, all of which matters have been previously discussed, are to be carefully attended to; moreover, the sucking of comforters, teething rings, etc., should be absolutely prevented. If the child be very young, the **quantity of milk should either be greatly restricted or milk should be altogether excluded from the dietary for 24 to 72 hours**, and in its place non-fermentable foods substituted, such as chicken broth, whey with cream, albumen water or barley water for 24 to 48 hours. Our own views are that **these children do best of all on a course of skimmed milk, that is a fat-free food of easy digestibility**. For clinical experience leads one to think that **these cases of chronic diarrhœa are always associated with disordered function of the liver and pancreas**. The system of feeding we have adopted is, therefore, that tabulated in the chapter on "the Infantile Liver" Chapter XLV, and we feel sure if mothers and practitioners would give this method of feeding a prolonged trial, many cases that hitherto appeared hopeless, will rapidly recover. Medicinal treatment is of secondary importance and we believe that these cases do

Treatment.

The food.

best if treated initially with small doses of saline for the first few days, e.g., sodi. sulph., pulv. carlsbadi, of each grains 15, sodi. bicarb. and sodi. cit., of each grains 5, glycerine minims 15, aqua carui one teaspoon, give every 2, 4 or 6 hours for the first two or three days. Each dose being immediately followed by one teaspoon of Crookes' Collosol Kaolin in half a wineglass of water. Large quantities of food should never be given at once; the more severe the purging, the smaller and more frequent should be the amount of fluid given. Copious drinks should be forbidden. Even for older children, only very small quantities of farinaceous foods are allowable and the administration of patent foods should be stopped, or if adhered to, they should only be very sparingly allowed with the addition of whey or albumen water.

On these lines of treatment it is remarkable how the character of the stools alters and the general bienêtre of the child improves. Fruit juice, either pomegranate or orange or the milk of green cocoanut should always be given despite the prejudice of mothers for doing so. Children who are still older should not be allowed to touch such easily fermentable articles as potatoes, sweet biscuits, and farinaceous matter generally, sugar, jams, etc., but toasted bread with milk, fresh broths, a little fresh shredded meat, and custard pudding may be allowed. White wine whey is useful where there is exhaustion, or for older children we may use the brandy and egg mixture (Eustace Smith). **Raw meat juice is another very useful article of diet in these cases,** or we may use the raw meat itself (*see* Appendix—Recipes).

Peptonised milk.

In peptonised milk and Benger's food we have a valuable and safe means of nourishing these cases. An endeavour should always be made to induce the child to accept it.

Lime water.

Marked improvement sometimes follows the omission of lime water from the food of infants, and the substitution for it of the gelatine solution (Appendix). The lime water occasionally seems to irritate the mucous membrane.

Baths.

Great benefit will always be derived from the daily, or more frequent, use of the hot bath, followed by an inunction of oil; or the mustard bath may be employed when dealing with the exhaustion of older children.

Abdominal griping and tenderness will be greatly relieved by poultices to which mustard has been added, or by turpentine fomentations. In every case enormous benefit results from giving once or twice daily a **rectal wash**. Only a soft small tube should be employed and the amount injected at a time be not more than two or three ounces warm plain water or salt solution, one teaspoon of common salt to the pint is very efficient; after the wash two ounces should be injected and be retained by elevating and squeezing the buttocks together.

**Mustard
poultices.**

Many drugs have been used for this condition but their efficacy is doubtful. Probably ipecacuanha in the form of Dover's powder 1 to 2 grains is the most useful, others prefer castor-oil emulsion or fractional doses or calomel, $1\frac{1}{12}$ of a grain for six doses. In some of these cases microscopic examination of the stool may indicate a worm or amœbic infection, in such a case one-grain doses of santonin at bed-time or a quarter of a grain of emetine given hypodermically under the skin for three or four days will be useful. Indigenous herbs such as bael, koorchi and ispaghul are of undoubted value in some cases. To make bael, take of the soft gummy fluid from the interior of the freshly-gathered half ripe fruit, two ounces, mix this with four ounces of water and give one ounce every four hours. If the fresh fruit cannot be obtained, Messrs. Bathgate & Co., chemists of Calcutta, have an excellent preparation of a fluid extract of the dried bael. Koorchi—take an ounce of the bark and add a pint of boiling water. Infuse for six hours and strain; dose one ounce three times per day. Ispaghul—take one teaspoonful of the seeds and add six ounces of boiling water. Stir and allow it to stand; when cold, give one ounce three times a day. These herbs can be obtained of any chemist or bazaar vendor in India.

In cases which resist all treatment, occasionally benefit will arise from making an autogenous vaccine from the stool. Colonels Acton and Knowles have shown that a streptococcus is at times responsible for the symptoms and have had success with vaccine treatment. Some of these cases are complicated by joint symptoms and enlargement of the liver and spleen.

When the motions are large, fermented and putty-like, a bismuth (5 grains) and salicin (2 grains) powder

**Fermented
motions.**

after every meal will be found most useful; while, at the same time, an occasional dose of red mixture may with advantage be given.

**Medicine in
convales-
cence.**

A cure having been effected, the greatest precautions as to diet, clothing, exercise, etc., must be adopted for some time, a relapse being very easily induced (*vide* Appendix—Recipes).

During the period of convalescence, iron in the form of Parrish's food from the druggist, in doses of half to one teaspoon, three times a day, in half a wineglassful of water, after food is a valuable medicine for older children.

**Recovery
gradual.**

A sudden improvement should not be expected to follow treatment. That any degree of amendment is daily observable ought to satisfy the most sanguine. The mischief which weeks of disease has accomplished cannot be remedied without time.

INFLAMMATION WITHIN THE ABDOMEN.

Description.

By this it is intended to signify the inflammations known as peritonitis, appendicitis, etc. There is pain, tenderness and swelling (either local or general) of the abdomen, with constipation and vomiting, and usually, but not always, at an early stage, fever. The painful condition of the abdomen is the predominant symptom; it cannot fail to attract early attention, and give a clue to the nature of the case. If the pain and swelling be localised, they will probably be discovered just above the right groin, and the child will lie on his back with the leg of that side drawn up: any attempt to straighten it is attended with severe pain.

**Manage-
ment.**

These cases are mentioned here chiefly with the object of preventing the parent mistaking them for instances of constipation (under which heading allusion has been made to this point), and committing the error of treating them accordingly. Purgatives should not be administered; they would do harm. **Professional aid should be summoned.** The parent herself can only adopt a treatment of absolute rest, a scanty fluid diet of strong soups and diluted milk, with perhaps the yolk of a raw egg beaten up with the latter, poulticing the abdomen with turpentine stupes, and the administration of small doses of opium (*see* Opium), either as Dover's powder or laudanum, just sufficient to create a slight

degree of drowsiness and relieve the pain. If, however, all these measures be carried out, it means that a great deal has been done. Very frequently it will be found that some accident, such as a fall or a blow, has been the cause of the inflammation.

An inversion of a portion of intestine within itself is another very serious condition which requires an exactly similar management and early professional aid. It is best that the parent should attempt no more. The symptoms are so similar that it is needless to attempt their description, but it may be mentioned that straining with the ejection of bloody mucous is a prominent sign. **For diagnosis and treatment of acute abdominal pain in children, refer Chapter XL.**

Inversion
of intestine.

WHITE DIARRHŒA.

Under this heading, it is necessary to briefly describe two separate diseases, both of which are not infrequently seen in children in India. The one is **sprue**, the other a condition known as **celiac disease**.

Sprue is most commonly a disease of adults, but occasionally is met with in the damp, hot climate of Bengal and Madras among children. It may occur in the plains but more often in the child who has been for a period in the hills. The history frequently given is that the trouble began with morning diarrhœa. The stools are liquid, frothy, inoffensive and light grey in colour, the appetite is poor and flatulent dyspepsia becomes a marked feature. Gradually anæmia and emaciation occur, and the tongue shows pathognomonic signs of sprue, becoming smooth and glossy, with small ulcers at the edges. The **semi-formed, porridge-like, frothy, bulky, inodorous stool of sprue is characteristic.**

These cases are of urgent importance, and if the condition is early diagnosed and treated, the prospect of cure is hopeful. But if allowed to make headway, these cases frequently terminate fatally.

In the early stages a diet entirely of milk, preferably peptonised, should be given for several days; for a child of three and four, five grains of Dover's powder at bed-time, and five grains of pepsin three or four times a day with 15 drops of liquor hydrarg. perchloride, 15 minutes before meals should be given. The abdomen

Treatment.

should be protected by a flannel binder. If the disease is more advanced, medical aid should be sought, for much harm may be done by promiscuous drugging. Many medicines have been tried but none unfortunately is a panacea. Iron and arsenic for the anæmia are badly borne and should not be given. Yellow santonin two or three grains in $\frac{1}{2}$ teaspoonful of olive oil twice a day for a week is perhaps the most helpful of the many drugs that have been tried. Vaccines prepared from the stools have given promising results in expert hands.

The dietary may be entirely of milk, peptonised or citrated; but some cases do badly on milk; in these a meat diet, beef, mutton or chicken, with very little fat is sometimes successful. Others do better on a diet of milk and fruit, such as pears, grapes, bananas, lichees, mangoes, papayas and strawberries, according as obtainable.

However, it must be borne in mind by the parent that sprue is a very serious disease, and undoubtedly **if possible the child should leave this country and not return.**

Celiac disease is not uncommon, but differs from sprue in that the **motions are, besides being porridge-like and bulky, excessively offensive.** The abdomen becomes greatly distended, there is usually some swelling or weakness of the legs, and a peculiar spasm of the hands and feet, known as tetany, may develop. The treatment is almost entirely a matter of diet. **First and foremost** it must be grasped that these children will not tolerate plain milk or carbohydrate food, therefore you must substitute dextrinised foods for the carbohydrate element and pure proteins for the milk.

The former can be given in the shape of Mellin's food biscuits, grape-nuts, rusks. The latter are given in the form of raw meat juice, shredded meat, gelatine, calf's-foot jelly, buttermilk or whey, and some of these cases tolerate well peptonised milk.

Drugs are not of much avail, Dover's powder, emetine in small doses, and the intestinal ferment preparations, secretogen or pankreon, may be tried.

The clinical resemblance between celiac disease and sprue has been noted by several observers. A suggested diet for such a case is as follows:—

DIET.

5 a.m.—Cup of weak tea, 1 round of dry toast.

8 a.m.—1 oz. casein, $\frac{1}{4}$ to $\frac{1}{2}$ pint machine-skimmed milk, and $\frac{1}{4}$ pint of tea (without sugar), 4 rounds of dry toast and 1 oz. cheese.

11 a.m.— $\frac{1}{4}$ pint machine-skimmed milk, $\frac{1}{4}$ oz. casein.

11-30 a.m.—Juice of one orange.

12 noon.— $\frac{1}{4}$ to $\frac{1}{2}$ pint liver soup, $\frac{1}{2}$ oz. minced chicken, 1 round dry toast, $\frac{1}{4}$ oz. junket, 1 oz. calf's-foot jelly.

(*Note.*—The junket is made with skimmed milk. Liver soup is made by simmering 1 lb. of fresh liver with two pints of water for two hours, and then grating the liver into the liquid.)

4 p.m.— $\frac{1}{4}$ oz. casein, $\frac{1}{4}$ pint skimmed milk (machine), $\frac{1}{4}$ pint of weak tea (without sugar), 1 oz. cheese, 2 cream crackers.

8 p.m.— $\frac{1}{4}$ to $\frac{1}{2}$ pint machine-skimmed milk, 1 oz. casein, $\frac{1}{4}$ oz. junket, 1 oz. calf's-foot jelly.

10 p.m.—Juice of one orange.

CHAPTER XXXIX.

CHOLERA.

This terrible disease is very unusual among children under one year of age, but as the child grows older the liability to cholera gradually increases.

Concerning the mode of origin of cholera, the means of prevention and disinfection, the reader is referred to a previous chapter.

There may be some premonitory diarrhœa. Soon, vomiting and purging of a material closely resembling rice water in appearance, supervenes. The vomiting varies greatly in its intensity in different cases, but the purging always sets in and continues with great intensity. Shortly afterwards occur coldness of the limbs, cramps of the muscles, a feeble pulse, coldness and lividity of the lips, cold tongue and breath. The eyes are sunken, the breathing becomes difficult and oppressed, restlessness is intense, and thirst unquenchable. No urine is secreted. A cold, clammy perspiration covers the body. The whole appearance is appalling, the voice is lost altogether, and the pulse ceases to be perceptible at the wrist.

The only affection which at all resembles cholera is the violent watery diarrhœa, which has been already described (Chapter XXXIV). The resemblance may sometimes be close between the two, but the stools of the latter do not resemble rice water; they are greenish. The clammy perspiration of collapse does not often occur. Vomiting is not persistent, and the pulse is never wholly absent, as it is in cholera, nor is the urine wholly suppressed. The breathing is oppressed in cholera, but free in diarrhœa. The lividity of cholera is supplanted by pallor in diarrhœa. Watery diarrhœa is well known in England, whereas cholera is unknown there except at long intervals and in brief epidemics. We have cramps in cholera, none in diarrhœa. Convulsions seldom terminate a cholera case, whereas when watery diarrhœa ends fatally it is usually by convulsions. The issue is hopeful in diarrhœa, whereas the contrary holds of cholera. **But if in the early stage there is confusion between the two, as may be, no harm is done, the treatment of one condition being applicable to the other.**

Happily the treatment of cholera is far more satisfactory now than it has ever hitherto been. In the earliest stages, and also as a preventative to other members of the family, there is no question that the essential oil treatment of Dr. Tombs is of great value. His prescription is as follows:—

Treatment.

Oil of aniseed, oil of cajaput, oil of juniper, of each 5 minims, aromatic sulphuric acid 15 minims, spirit of ether 30 minims.

A child's dose is $\frac{1}{4}$ to $\frac{1}{2}$ teaspoon given every $\frac{1}{2}$ hour **in water** until half an ounce has been taken, and then $\frac{1}{2}$ teaspoon every hour until complete recovery has taken place. Tessol is the trade for this prescription and can be bought of any chemist.

For contacts, one teaspoonful in water once or twice daily while risk of infection exists. Those in actual attendance on patients should take the mixture three times daily.

Should a doctor be available, there can be no question that the treatment discovered and advocated by Sir Leonard Rogers, F.R.S., I.M.S., should be adopted. This method has reduced mortality from 80 per cent. to 30 per cent. The medical reader must be referred to his book for full details. Here we may epitomise the scheme of treatment, which is applicable in any case. If there is restlessness, cyanosis, or cramps, or if the pulse be very small and feeble, at once give an intravenous injection of sodium bicarbonate solution 160 grains to the pint, and of a hypertonic saline solution. This solution consists of the chlorides of sodium, potassium, and calcium in water and can be obtained in tabloids by Burroughs and Wellcome of such strength that four tabloids to the pint of plain water make a correct solution. The quantity injected should be from one to two pints which may be repeated later if necessary. The temperature of the solution should be about 90° Fahr. If this solution be not obtainable, use boiled water to which two teaspoon of common salt are added to the pint. The vein should be chosen at the bend of the elbow, or on the inner side of the foot. If apparatus be not available, do not delay but inject either under the skin into the rectum or into the peritoneal cavity, *see page 296, Chapter XXXIV, but none of these latter ways compare with the intravenous method.*

The child should be allowed to drink copiously but in small quantities by the mouth. In cholera an enormous quantity of fluid is leaving the body, therefore it is essential that this loss should be met as far as possible by the child drinking or absorbing by bowel or vein. Weak lemonade, coffee, or plain water should be given frequently in small quantities despite vomiting.

As regards medicines, it must be thoroughly understood that **opium in any form must never be given**. Sir L. Rogers has conclusively proved that morphine or opium is absolutely injurious in cholera once the typical evacuations have set in; morphine should never be given for the cramps. Saline given as above will relieve them. To give morphia or opium is to imperil the life of a patient old or young.

As regards drugs in cholera, Rogers has proved that the only drug that is of imperative value is potassium or calcium permanganate. The child should be given a solution of one of these drugs one, two or three grains to the pint of water and be allowed to drink an ounce every half hour or hour in the acute stages until the motions become greenish in colour. Or if they are procurable in pill form, a pill of one grain of potas. permanganate may be given for a similar period. The value of these drugs lies in the fact that they destroy by oxidation the poisons of the cholera germ. The pills are best procured ready made up by Burroughs and Wellcome. The great value of this remedy in cholera is that it is readily administered by the parent as potas. permanganate can be always procured. During the treatment by pill or solution only barley water should be given, milk and soups are to be stopped. On the second day, the drug should be again given either four-hourly or every half hour for four hours only.

In a severe case it may be necessary on the third day also.

Should the child by the above measures show signs of recovery, the stage of reaction must be carefully watched. The temperature very often becomes very high and will need control by the means we have already mentioned in a previous chapter. The heart will perhaps need stimulation with small doses of sal volatile, digitalis or nux vomica, and the diet will have to be carefully scrutinised; **nothing in the shape of animal food, milk, jellies or soups should be given**. Whey,

arrowroot, barley water, and cornflour are best continued for three or four days after symptoms have become less.

We have seen then that this treatment of salines and permanganate which has so revolutionised the results in cholera can be readily and rapidly carried out at an extremely small cost. The apparatus for intravenous transfusion may be obtained from Bathgate & Co. or Smith, Stanistreet, Calcutta, for Rs. 15.

Note.—(1) If all the precautions previously mentioned regarding the disinfection of the stools, the room, the bedding, etc., be adopted, and other matters which have been also alluded to attended to, no fear need be entertained that the disease will spread from the patient either to the attendants or others.

Prevention
of spread-
ing.

“So-called ‘cholera pills’ and ‘cholera mixtures’ are sold very generally. They should never be given to children, as they all contain an amount of opium which would be very dangerous and harmful.”

(2) The Table attached to Chapter XXXVII will render assistance in the differentiation of the various types of diarrhoea.

CHAPTER XL.

ABDOMINAL PAIN AND THE ACUTE ABDOMEN IN CHILDHOOD.

Abdominal pain in a child should never be regarded lightly, for though in some cases it may be due to a passing attack of indigestion, in others the cause may be one of great seriousness, jeopardising its life. The investigation of abdominal pain should be made with warm hands, noting carefully the area of tenderness and whether there is wincing on deep pressure. It must be remembered that an infant or child as a rule is unable to give that exact information as regards location of the pain which is so important in the adult, therefore your diagnosis usually has to be made by the method of exclusion; by this we mean that there are many well-known causes of acute abdominal pain, each of which has to be separately thought of and excluded before a definite diagnosis can be reached. The practitioner or mother may be able to elicit whether the pain is deep or superficial on pressure, whether there is any guarding of the muscles or whether there is any pain when gently pinching up the skin of the abdomen between the forefinger and thumb, the so-called viscerosensory reflex.

Abdominal pain may be due to causes outside the abdomen as well as inside the abdomen.

EXTRA-ABDOMINAL CAUSES.

1. **Basal pneumonia or diaphragmatic pleurisy.**—This condition must always be thought of, for children have been operated on for acute appendicitis when all the time the inflammation of the lung or its coverings has been the cause of the referred pain in the abdomen, therefore in every case the lung should be carefully listened to and the pulse respiration ratio noted. Moreover, the abdominal tenderness will be superficial and not deep on pressure.

2. **Spinal caries.**—In the early stages of tuberculosis of the spine, it is not uncommon for the pain to be referred to the front of the abdomen, rather than to the back.

3. **Torsion of an undescended testicle, or the sudden appearance of a hernia due to straining at stool, screaming**

or a tight foreskin may cause symptoms referred to in or around the umbilicus.

INTRA-ABDOMINAL CAUSES.

1. **Colic and flatulence.**—These are the commonest causes and are due to indiscretions or undigested portions in the diet such as curds or seeds or worms. In other cases, fermentation of food results in acute distension of the intestines with gas, giving rise to attacks of screaming with the legs drawn up. As a rule the attacks are spasmodic and there is no fever: firm pressure with the hand relieves the pain rather than augments it. The treatment of this condition will be found in Chapter XLI.

2. **The onset of acute bacillary dysentery.**—Owing to fretting or actual ulceration of the colon, there may be acute abdominal pain, before mucus and blood occur in the stools. In such cases there is usually high fever and the abdomen is rigid. In a few hours or after giving a warm water enema, the cause of the symptoms will become manifest. For treatment, *vide* Chapter XXXVII.

3. **Chronic intestinal catarrh** (*mucus disease*) is a frequent cause of cyclical or recurrent abdominal pains. In such cases the presence of worms or cyclical attacks of vomiting with acidosis should be borne in mind. Many of these cases in the initial attack of pain and vomiting with or without collapse resemble appendicitis, but rectal examination is negative, and the pulse and temperature is rarely raised. Moreover, the viscerosensory reflex is absent. For treatment of these conditions, *vide* Chapters XXXVI and XLIII.

4. **Appendicitis.**—In our experience appendicular colic or chronic appendicitis is *not common among children in India*, but if there is a history of attacks of pain, fever and vomiting sufficiently severe to keep a child in bed and the pain is more or less always in the right iliac fossa, then we think it is the wisest course to submit to operation, for an acute attack of appendicitis in the tropics, perhaps far from proper surgical assistance, is a very serious matter, for oftentimes owing to the fact that demarcating adhesions localising an abscess are the exception rather than the rule in children, a gangrenous or perforating appendix may rapidly cause general peritonitis and death.

We have not found that X-ray barium meals have given us any assistance in the diagnosis of chronic appendicitis, but before making such a diagnosis it is important to eliminate intestinal worms and chronic intestinal catarrh as causes of the attacks of pain. A careful dietary as given under Chapter XXXVI may clear up all symptoms. It must be remembered that in some children with a history of right-sided pain, careful palpation may feel a lump or thickening. Such thickening, if not due to old inflammation of the cæcum (amœbiasis) or appendix, may be due to tubercular glands.

5. **Intussusception.**—This, indeed, is one of the abdominal emergencies of childhood. We have seen it in children at the breast and up to five years old; it is by no means uncommon. The onset is catastrophic with acute abdominal pain which occurs in such severe bouts every few minutes that the child cries out with a peculiar scream which in itself is almost pathognomonic:—A whine crescendoing into a scream of agony and then silence until the next spasm a few minutes later. The cause may or may not be obvious, e.g., an error in diet, but the diagnosis can be made with certainty in almost all cases by seeing jelly-like blood in the stool and feeling a soft sausage-shaped tumour in the abdomen which tends to migrate slowly from right to left of the belly.

The commonest site in the first few hours is in or below the liver region, later it may be felt above the umbilicus and later still in the left iliac fossa. As an intussusception is merely the invagination of a loop of intestine into itself (as a rule the large intestine) like the finger of a glove, a time may come when the invaginated portion can be felt with the finger in the rectum, but if the doctor waits till then before making a diagnosis it may be too late.

Intussusception is only one of the many forms of intestinal obstruction, and demands immediate diagnosis and surgical treatment if life is to be saved. The peculiar cry, the blood in the stool, the intense vomiting and collapse, and the abdominal tumour should make diagnosis easy. One of us has done a great number of these operations and if the case has been seen, diagnosed and treated within 24 hours, he has rarely lost one. The operation is an easy one when done early. The anæsthetic should be open ether, and shock and acidosis should be guarded against with glucose and saline.

6. **Intestinal obstruction** due to bands, kinks or Meckel's diverticulum may occur in childhood. The symptoms of constant vomiting, perhaps going on to stercoraceous vomiting with distension of the belly and the passage of neither stool nor flatus despite enemata, should make diagnosis certain. Only immediate surgical intervention can obviate death.

7. **Stone or gravel in the kidney or urinary tract.**—Curiously enough, this condition is not uncommon in the East. Profuse sweating, an injudicious dietary or non-absorption of sufficient fluids, in a tropical climate may all be causes. If a stone is in the pelvis of the kidney, the pain may be intense and be referred to the front of the abdomen, there may be vomiting and cold sweating. We have seen many of these cases and at first the diagnosis may be difficult because the cause is not thought of, but if there is no pain on deep pressure, fever or intestinal error, a diagnosis may be formed by eliciting the fact that the pain radiates towards the genitals and is associated with screaming and an intense desire to pass urine frequently.

Blood may be seen in the urine, and if microscopic examination is possible, blood cells or crystals of oxalates or uric acid may be found. An X-ray photograph sometimes may show a tiny stone in the kidney, ureter bladder or urethra. Sometimes we have been able to feel the stones with a small silver sound or probe in the urethra or bladder. **The passage of a small stone or storm of crystals down the ureter closely resembles an attack of appendicitis**, but there is rarely any fever, increased pulse-rate or guarding of the peritoneum by rigid muscles.

If expert opinion is not possible at the moment of attack, the baby or child should be kept on water and barley water only for 48 hours and given 20 grs. of potassium citrate in a dessertspoonful of water every two hours during that time. By these means the urinary tract will be flushed out and possibly the crystals dissolved or a small stone passed. If such should occur, the diet should be looked to in the future and gastric fermentation prevented. All sugars should be inhibited from the diet and no rhubarb, spinach, strawberries, figs, potatoes, beetroot, French beans, tomatoes, plums, tea or coffee (all of which contain oxalates) should be permitted. Fresh lemon squash is perhaps the best of all fluids for these children to drink.

If a stone be present and is not passed despite treatment, surgical intervention will be necessary.

8. **Inflammation of the pelvis of the kidney** due to *B. coli* (pyelitis) is not an uncommon cause of sub-acute pain in the loin or abdomen of children, most often female children. In this condition there are frequently rigors and delirium with a temperature remitting from 104 to 99 degrees. For diagnosis and treatment of this condition, *vide* Chapter XVII.

9. **Enlargement of the liver or spleen** associated with acute hepatitis, infantile cirrhosis or malaria and kala-azar, or leukaemia are conditions which may give rise to abdominal pain and distension.

10. **Tubercular peritonitis.**—Curiously enough, although the bovine type of tuberculosis is the common form, in 20 years we have seen very few cases of tubercular peritonitis among any of the many communities of India.

In children, those cases that we have seen, have been of the **dry variety**, that is they had matted glands or caseating masses in the mesentery or omentum which could be localised. The child is wasted but the abdomen is tumid, there is abdominal pain with or without colitis and a constant low grade type of fever. The prognosis in these cases is not good, in some cases a change of climate and cod-liver oil may do good.

In the **wet variety** the whole abdomen is distended with fluid and the peritoneum and intestines are studded with tubercles. The diagnosis is easy and if the fluid is evacuated for microscopic examination, and possibly, injection into a guinea-pig, diagnosis can be made certain.

The prognosis of these cases is not so severe provided the best climatic and hygienic conditions are obtainable. Evacuation of the fluid by a puncture or laparotomy is undoubtedly good treatment.

11. **Pneumococcal peritonitis** is a very rare condition in the tropics. As a rule it occurs after an attack of pneumonia or middle ear disease but it may be a primary infection. The symptoms are those of sub-acute peritonitis and within a few days the abdomen fills up with thick greenish pus like that of an empyema. The child is seriously ill, and as often as not, there is diarrhoea. Operation is the only cure, although in a few cases the pus may be discharged at the umbilicus or into the bowel or vagina.

12. **Genococcal peritonitis.**—A rare disease in the West, but by no means uncommon in the tropics. We have seen seven of these cases during the last five years, all of them associated with gonococcal vulvo-vaginitis, which is a condition quite common and frequently neglected in India; therefore, in the presence of vulvitis, and acute abdominal pains, with fever and distension usually below the umbilicus in a female child, suspicion should be roused that the symptoms are due to the spread of gonococci from the vagina via the uterus and tubes to the peritoneal cavity. For it should be remembered that in childhood the uterus is an abdominal and not a pelvic organ.

Fortunately, if the diagnosis is correct and the child **is not operated upon for acute appendicitis, the prognosis in these cases is excellent**, within ten days all symptoms subsiding, but of course, the original cause of the peritonitis, the vulvo-vaginitis, should be efficiently treated afterwards. The actual peritonitis should be treated by hot stupes, hot rectal douching and saline, with rest in bed in the Fowler position.

13. There are a **few very rare conditions** which occasionally occur, but which demand the greatest clinical acumen on the part of mother or doctor. We refer to such rare diseases in the tropics as **pericarditis**, the early stages of **hip disease** or **sacro-iliac** disease and **Henoch's purpura**.

During 20 years we have never seen the first three associated with abdominal pain, but have seen three typical cases of the last-named disease.

Henoch's purpura in its onset almost exactly resembles intussusception or acute appendicitis. That is acute abdominal pain, vomiting and collapse. In one of our cases, blood was passed with the stool and in another with the urine, but in each case when the whole surface of the body was examined, 12 hours after the attack began, here and there were seen minute hæmorrhages into the skin varying in size from a pin's head to a 4-anna piece, and there was some pain and swelling in the big joints. The abdomen was hollowed and tender, but there was very little fever; in one case, the mother gave a history of precisely similar attack six months previously. The cause of this curious disease is probably some toxin in the blood originating from the intestinal tract. The condition is a grave one and, if the hæmorrhages be severe, may be rapidly fatal.

Treatment.

The real danger in these cases is that if a precipitate diagnosis of an abdominal catastrophe may be made and operation performed, such treatment will invariably be fatal. Hæmorrhage into the skin should be looked for and then the diagnosis differentiated from scurvy or possibly cerebro-spinal meningitis. It should be remembered that purpura associated with abdominal pains in children is Henoch's disease and that the treatment is entirely symptomatic with absolute rest in bed.

CHAPTER XLI.

PROTRUSION OF THE BOWEL.

Colic and Flatulence.

In long-continued bowel complaints, and indeed sometimes without such disease, in delicate children, the bowel may protrude from the fundament at each evacuation. **Habitual constipation** in weakly children, who are allowed to strain much at stool and the irritation of **worms** are not infrequently associated with prolapse. Also the **need for circumcision** in male children is often a cause.

The condition cannot be mistaken when observed, and it is not likely to remain long concealed, in consequence of the pain occasioned by it. The inverted gut will be seen to protrude, as a purplish-red, thick ring, from the fundament.

There exists no cause for alarm. Reduction may be readily effected, and complete relief thus given. On the other hand, to allow the protrusion to remain unreduced for any length of time would be to incur a risk, because the pressure of the edge of the fundament might strangle it and cause gangrene of the prolapsed part.

Having thoroughly lubricated the surface with sweet oil, the protrusion, protected by a handkerchief, should be grasped with the points of the fingers, steadily squeezed for about half a minute to empty it of blood, and then pressed towards the body. After a few moments of such pressure, the prolapse will slip out of sight. The child should be kept lying down on its side for some time subsequently and should there be a tendency to strain, or there be recurrence, the buttocks after the reposition should be strapped together with a piece of firm sticking plaster as Meads and an injection as below given twice a day.

Prevention is the proper treatment. The constipation, the diarrhoea, or the debility being removed, and the general health re-established, the accident will cease to happen. But to accomplish this end, time is required. **Prevention.**

In the meanwhile the child should not be permitted to sit long at stool; indeed, it may be necessary to prohibit the sitting posture wholly, the patient being taught to evacuate his motions upon a napkin or sheet placed under him.

Other measures.

In addition to the above measures, in a case of persistent protrusion, a couple of ounces of infusion of quassia or of cold water, in which six or eight grains of sulphate of iron (obtainable in the bazaar as Heera-Kusees) have been dissolved, should be injected into the bowel, twice a day; and a solution of perchloride of iron or prescription (44) administered internally.

COLIC AND FLATULENCE.

Really a symptom.

This condition is more of the nature of a symptom than a sickness. It consists of a spasmodic pain or griping of the intestine. When an infant screams and draws up its legs, and is free from fever, the hands and feet being rather cold than otherwise, it is probably griped or affected with colic. The stomach is usually distended and hard—possibly there may be vomiting, and a greenish motion or two may be passed.

Causes.

Flatulence with or without colic is one of the commonest accompaniments of indigestion, due to excess of food or errors in the diet of the infant, or to some indiscretion on the part of a nursing mother. The gases evolved from the undigested food distend the intestine and produce pain. **If the child be at the breast**, the symptoms may be entirely due to poorness or insufficiency of the mother's milk; if this is so or there is even suspicion of such, it is best to let the mother only feed the child by night and to rear the child by day according to the plans given earlier in the book (Chapter V). Indeed, it is often best early to accept the inevitable and to start hand feeding altogether, if there is reason to think from examination of the child and the breasts of the mother that her milk is poor in quality and quantity. **If the child is being hand-fed** and the symptoms arise, and from an examination of the stools undigestibility of the food is suspected, the flatulent colic can be prevented by further diluting the milk for a short time, or by paying scrupulous attention to its preparation, or by adding an alkali such as lime water, bicarbonate of soda,

or sodium citrate or perhaps by peptonizing the milk for a short time.

The **first thing to be done in a case is** to administer **Treatment.** ten drops of the sweet spirits of nitre in a teaspoonful of caraway or aniseed water or to give a dose of prescription 17. In a few minutes an eructation of wind will follow this draught, the flow of urine after a short time will be increased, and the distress will cease temporarily. A dose of castor oil (6), or perhaps better a teaspoonful of salad oil, should then be given. Either of these had better be aided in their action by an asafœtida enema or by the simple injection of three ounces of warm water. The warm bath, followed by bran poultices to the stomach, or rubbing the abdomen with warm oil, will much aid in hastening relief. The hands and feet of the child must be kept warm and wrapped up, and if the colic is severe, placing the infant in a mustard bath, until the arms of the holder tingle, often greatly benefits the child. Should these means not give complete relief, a mixture composed of forty grains of bicarbonate of soda, half a drachm of sal volatile and two ounces of caraway water should be made, and two teaspoonful of it given every second hour.

So much having been accomplished, we should set Diet. **about rectifying the diet,** which, in any case, for a few days, should be of the simplest nature.

CHAPTER XLII.

WORMS.

There are three kinds of worms which commonly infest the intestines of children, namely, the **thread-worm**, the **round-worm** and the **tape-worm**, all of which are depicted in the plate.

Description of thread-worm.

The "**thread-worm**" varies in size from one-sixth to one-third of an inch, or even more, in length, the male being smaller than the female. They appear as represented in Fig. 3, upon the surface of the child's motion, where they move briskly about.

Habitat.

They reside in the lower end of the bowel: they are never found in the sucking infant, but among older children they are the most common of all kinds.

Description of round-worm.

The "**round-worm**" (Fig. 2) varies in length from four inches to a foot, the male being shorter than the female. It is smooth, of a white or pinkish colour, and its body tapers off gradually to a point at either end. These worms inhabit the commencement of the intestine. Sometimes they make their way into the stomach, and they may even be vomited from the mouth. They are most common in children between the ages of three and ten years. Perhaps only two or three may be present at the same time in the body; it is seldom that their number exceeds twenty, but sometimes many more are found.

Habitat.

Description of tape-worm.

The "**tape-worm**" (Fig. 1) varies in length from about ten to thirty feet, and its breadth is about one-third of an inch at its widest part. The round head, which is only about the size of the head of a pin, is provided with a proboscis, armed with a double row of hooklets. The neck, narrow and only half an inch in length, is joined to the larger part of the body by a long portion as thin as the neck itself. All this intermediate length is marked with transverse lines and the whole of the broader part of the body is divided into plainly marked segments. Each segment (being bisexual, when detached from the rest of the worm) has the power of producing fresh lengths of the parasite.

**Wonderful reproductive powers
Habitat.**

A fully developed tape-worm numbers "about 1,100 of these joints" (Cobbold). This worm inhabits the small intestine or that end which is nearest to the stomach.

The mode by which the various worms gain access to the body, and the precautions to be adopted to avoid their occurrence, have been already described (*see* Chapter XII).

The symptoms are unsatisfactory, in that **there is no sign or set of symptoms which renders it certain that worms are present.** We may be led to believe by symptoms that probably these pests are in the body of a child, but ocular demonstration is the only means of certainty. **One of the most constant signs is the passage of a quantity of jelly-like mucus with the motions, while at the same time the bowels are disordered and the general health is unsatisfactory.** The child usually becomes pale and flabby, there are dark marks under the eyes, the breath is offensive, and nervous disturbance is manifested by restlessness at night, grinding the teeth, and startings during sleep; and by drowsiness during the daytime. There is frequently a short, dry cough: the belly is usually tumid and the appetite capricious, sometimes voracious, at others, the reverse. Picking at the nose and itching of the fundament are usual. Such are the general symptoms, which are, however, by no means positively distinctive of worms.

General symptoms.

Not positive.

When there are **thread-worms** in the bowel, itching of the anus, picking at the nose and straining at stool are the most frequent symptoms. The **round-worm** causes abdominal pain, vomiting, and nervous symptoms, which may terminate in convulsions.

Symptoms special to each kind.

The **tape-worm** gives rise to a sensation of "gnawing" in the belly, and to attacks of colic, a ravenous appetite and progressive emaciation.

When there is good reason to suspect the presence of worms, the stools should be carefully examined, after the employment of an aperient medicine. If the suspicion be verified, the no less important information as to the kind of worm is also obtained by the inspection.

Examine the stools.

The public have an unfortunate habit of concluding that worms must be present when a child continues to fall off unaccountably, especially if his bowels be irregular and he be detected in the trivial action of picking his nose: the result being that the unhappy patient is dosed with quack nostrums, quite irrespectively of the

The folly of patent worm-medicines.

nature of the worm, if any exist, perhaps to the great injury of health.

Must know the kind to attack.

Before we can properly treat a case, it is essential to know the kind of worm we are to deal with: armed with this information, the treatment becomes both simple and efficient.

Objects of treatment.

The objects of treatment are (1) **to kill the worms, (2) to expel them, and (3) to remedy the bowel and general derangement which their presence has caused.**

Treatment of thread-worms.

For the "**thread-worm,**" a brisk purgative (11 or 12) should be given early in the morning, or if there be much bowel irritation, a dose of castor oil (6) will suffice. Throughout the day the diet should be of the lightest description, and in the evening a large enema (up to half a pint) of soap and warm water should be injected so as to wash the bowel thoroughly out. This having been accomplished, we should at once inject and retain for a few minutes two to four ounces of infusion of quassia, or garlic, to which 15 to 30 drops of the tincture of steel or 8 to 15 grains of sulphate of iron have been added; or, in the absence of these medicines, a teaspoonful of common salt dissolved in three or four ounces of warm water will answer the purpose. It may be necessary to repeat this treatment for two or three days running, either with or without the previous use of the purgative, as circumstances may indicate; following it up with a tonic, such as Parrish's food. In persistent cases in which this treatment fails, good results are obtained by injecting every other night for three nights, a warm solution made up by adding two grains of santonin and two teaspoon of turpentine oil to four ounces of mucilage of starch. The itching around the fundament may be relieved by the application of a small quantity of a mixture of mercurial ("blue") ointment and glycerine of carbolic acid (1 of the acid to 4 parts of glycerine).

In our experience, **few cases of thread-worms can be pronounced cured under one month.**

Treatment of round-worm.

The "**round-worm**" is destroyed as follows: A dose of castor oil is to be given very early in the morning, and nothing but a scanty quantity of simple semi-liquid food allowed throughout the day. In the evening another dose of oil is to be administered. By this means the worm is laid naked and exposed to the action of one to three grains of santonin powder, which should

be given with sugar early next morning, on an empty stomach; or the powdered santonin may be sprinkled on a small slice of bread and honey, in doses of one grain, twice or three times a day. A cure is frequently effected by a single dose of this drug, but the treatment may be repeated twice or three times at intervals of a few days if the presence of more worms is suspected. The oil may be dispensed with and prescription No. 1 given in the early morning, if there has been no marked constipation and if the diet has been regulated for twenty-four hours previously.

Santonin causes the urine to become oily-looking and of a saffron colour, and it may occasion the patient to see objects as though they were of a yellowish tint. These peculiarities of the drug are, however, of no great consequence and they vanish when the medicine is stopped.

Peculiar effects of Santonin.

The "**tape-worm**" is, in the natural course of events, frequently expelled in portions, but as each segment which remains behind is capable of reproducing itself, it is obvious a cure is not effected till the whole worm has been expelled. The segments are always detached from the tail end, wherefore it is a good rule not to rest satisfied till the head has been voided. The head and neck are so very small (*see* Fig. 1), that unless carefully looked for, they may elude observation. Many yards may be expelled, but **a case is not cured until the head has left the intestine.**

Treatment of tape-worm.

Not cured till head has been expelled.

But the head is exceedingly tenacious and being so small, and the intestines in these cases usually containing much mucus which protects the minute head from direct assault, it is necessary, for a few days previously to the administration of the worm-destroyer, that the patient be put upon non-farinaceous diet, from which potatoes, vegetables, pastry and cakes should also be excluded; meat, eggs and milk in moderate quantities constituting almost the sole food; very little bread and that little toasted, being allowed. After two or three days of this food, a dose of castor oil is to be given at night; and on the following morning, as soon as the bowels have been relieved, thirty drops of the fresh liquid extract of male fern (3) should be administered to a child of five or six years old. Four hours subsequently a second dose of castor oil is to be given. A

But the head is well protected.

Must be exposed by special diet.

And castor-oil.

Then the
male fern is
given.
Oil repeat-
ed.

No food
given.

Use pome-
granate if
no male
fern.

very essential point is that very little, if any, food be allowed from the time the first dose of the oil has been given till the worm has been expelled, which will usually be about the middle of the following day.

In the absence of the male fern extract, **pomegranate** may be used in the manner directed (2). The objection to its use is the large quantity of fluid required to be drunk and the fact that griping sometimes follows its administration; still it is well to have a tolerably efficient bazaar substitute at hand.

Fig. 1.

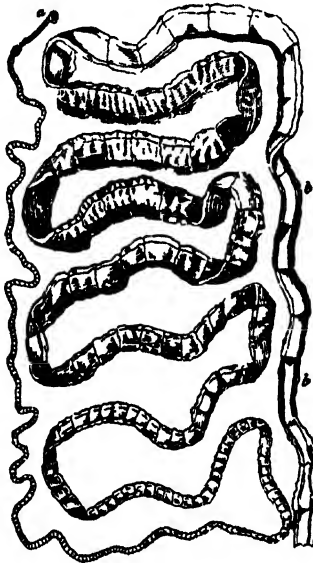


Fig 2.



Fig 3

In order to make sure of the evacuation of the head of the tape-worm, we strongly recommend that

after treatment, every stool be voided into a chamber and the contents then strained through a piece of black muslin. The white head of the worm (a mere speck) can be then readily detected.

Turpentine is an excellent remedy for older children. Turpentine.
The dose should be large, two drachms for a child of six, shaken up with a little mucilage and aromatic water, and followed four hours later by half an ounce of castor oil. Small doses of turpentine are apt to give trouble.

To remedy the bowel and general derangement, we must exclude, as far as possible, starchy food for a time from the diet, especially plantains and potatoes; Subsequent management.
but the diet should be nourishing. Infusion of chiretta with a couple of grains of bicarbonate of soda in each dose will check the excessive secretion of mucus. If irritability of the bowels still remain, the castor-oil emulsion (9) or the red mixture (7) may be used for a few days till regularity has become established. Tonics (such as 44, 45) may be given after all the local symptoms have subsided, with a view to the restoration of the general tone and the diet should be that indicated under the heading of Mucus Disease or chronic intestinal indigestion (*vide* p. 296).

CHAPTER XLIII.

VOMITING.

Vomiting in infants is a very common occurrence: it may be of very little significance, or it may be of most serious import. The habitual so-called **vomiting of young infants soon after they have taken the breast is really not vomiting at all, but a simple emission of superfluous quantity.**

There is no doubt that vomiting is easier to the child than the adult; for it is accomplished with less effort, less distress and less depression, probably because of the straighter position of the stomach.

However, **all vomiting in infants should be carefully watched.** So long as it comes on early after taking food, while the quantity rejected forms but a small proportion of that taken, and the child does not suffer in any way in health, no anxiety need be felt. Should it become, however, increasingly frequent or seem to be in any way in excess, it must be taken in hand and it will be found usually amenable to treatment; if, on the other hand, it be neglected, it recurs at intervals which tend to become shorter and shorter and the child gets into a condition of grave danger.

Slight and temporary attacks of vomiting, lasting seldom beyond a few hours, are not uncommon in young infants. More severe attacks, lasting for twelve or twenty-four hours, accompanied with feverishness and disordered bowels are also well known results of irritation; but they yield to emetics, gentle purgation and a carefully regulated diet, the only result being that the muscles become a little flabby.

After a few days the full strength is regained.

The **vomiting of indigestion** is associated with a quick regular pulse and a full abdomen and diarrhoea is often present; it has, too, a distinct relation to feeding times. The vomiting of brain affections has no relation to food; there is an irregular pulse, a retracted belly and constipation. **Vomiting ushering in an eruptive fever is common,** and the cause will soon declare itself. The **vomiting of peritonitis** or an inverted intestine is

clearly secondary to the serious local condition which attracts all attention.

But when vomiting is persistent, when, in fact, it becomes a chronic state, accompanied by wasting and prostration, the case is to be regarded as serious in its nature.

At first nothing but curdled, sour-smelling milk, mixed with bile, is ejected; but after a time only clear water is voided; the little patient's belly becomes tumid, the bowels are constipated, or alternately constipated and relaxed, the looser motions being very offensive. Fetid wind is eructated from the mouth and the belly gurgles. All food is rejected shortly after being swallowed; even the water which is so greatly craved for is vomited. The child emaciates, he becomes pinched, pale and clay coloured, and he is cross and irritable. The skin is dry but cool, and the mouth is parched or clammy.

A child may go on in this way for weeks if not attended to. He is, of course, but a shadow of his former self, but the decline may not have been so rapid as to have attracted great attention. Should the fontanelle become depressed and the symptoms of bloodlessness appear, the danger is great and immediate.

The signs of approaching recovery are lessened frequency of vomiting and restoration of the natural functions of the bowels.

The causes of this distressing and dangerous condition are to be found in departure from the laws which should govern diet and general hygiene. Premature weaning is also a cause; over-crowding of sleeping apartments and insufficient and irritating food are others.

It is very important in infants a few weeks old to determine whether such persistent vomiting is not due to **hypertrophic pyloric stenosis**—a rare but dangerous condition. In such a case, the vomited matter is belched out and the rhythmic movements of the stomach can be clearly seen through the abdominal wall. Sometimes a tumour is felt just to the right and above the umbilicus formed by the pylorus. Careful medical treatment under expert supervision may cause the symptom to cease. But it is as important to realise that an **operation (Rammstedts), if undertaken before**

too great emaciation occurs, will cure in a few days or weeks what otherwise is very frequently a fatal disease.

Value of the thermometer.

It is very important to ascertain the temperature with the thermometer, because persistent vomiting is sometimes a symptom of the approach of inflammatory diseases of the chest or brain, or of one of the eruptive fevers. In chronic vomiting, as a condition in itself, the temperature is always low, generally about 97°, whereas in inflammatory affections of course there will be some fever present.

Treatment of simpler cases.

In the simpler cases a cure may be effected by withdrawing all fermentable articles of food from the dietary. But should the case prove obstinate, the stools and breath continuing to smell sour and the vomiting persisting, we must adopt more active measures. When the child is being artificially fed, a wet nurse should be immediately procured. Very frequently a cure will be thus effected. But if this cannot be done, or if the child be too old to allow the idea to be put into practice, the first thing to do is to regulate the feeding; the child is in ill-health, its stomach is irritable, perhaps inflamed, therefore before commencing any treatment it is absolutely necessary to realise that it is only by the exercise of the greatest patience and perseverance that benefit will accrue, and it is well also to remember that medicines have a subsidiary place in the treatment. **In a case of chronic vomiting** we advise that for the first twenty-four hours or more nothing be given by mouth but plain boiled water to which one teaspoonful of bicarbonate of soda to the pint have been added or albumen water made by adding the whites of three eggs to a pint of warm water, stirring well and adding a pinch of salt and a teaspoonful of brandy. This may be given in very small quantities at a time. Two or more teaspoonful every half hour perhaps, so long as it is retained. If albumen water is rejected, rice water or sherry whey may be tried. Extreme patience will be necessary for success. During the first twenty hours, the only medicine that need be given is one-sixth of a grain of calomel with one grain of soda bicarbonate every hour. After this period or a few days longer, if necessary, a start must be made on the simplest of foods, diluted and alkalinised, if necessary. Whatever be chosen, be it milk and barley, condensed, citrated or peptonised milk, it will often be found that

Treatment of obstinate cases.

the vomiting to some extent continues; but, in judging of this, regard must be taken of the relation of the amount taken to that rejected, and also, it must be borne in mind that the stomach will not sometimes retain more than a teaspoonful at a time; therefore, with a good nurse, better results may be obtained to start with by feeding by the teaspoon every half hour than by the bottle every two hours. Indeed, in these cases, a bottle is rarely tolerated or wise. In such cases the old saying, a teaspoonful retained is worth a table-spoonful vomited, is very acceptable and true. Medicines are of use to allay the irritability and a good prescription is the following:—Dilute acid hydrocyanic four drops, bismuth carbonate one drachm, soda bicarb. one drachm. Mucilage and dill water two ounces, one teaspoonful every four hours.

Treatment.

If the vomiting continues despite the above, we firmly recommend that the **stomach be washed out every day with sterile water.** This often gives instant and marked relief and may be repeated two or three times daily.

Thirst is sometimes a marked symptom in the condition; for this, half-hourly sips of water or the injection of two or three ounces of saline solution slowly into the rectum six-hourly is of value. Should the infant be very ill, or the disease protracted, the body should be rubbed twice a day thoroughly with cod-liver oil. If there is **collapse**, a mustard bath followed by ten drops of sal volatile and brandy every four hours should be given.

ACIDOSIS.

An excess of acid in the blood is sometimes called acidosis, acetonæmia, or acid intoxication and is not at all uncommon in children in the East as a result of **dietetic errors or as a part of other diseases.** The presence in the circulation of an abnormal amount of substances of the acetone group, depends upon an increased fat metabolism along with defective or slow elimination of these products by the liver and kidneys. Increased fat metabolism may of course be due to an excess of fatty matter in the food, but it is equally due to an abnormal diminution of the carbohydrates or interference with their digestion. **Constipation and starvation, vomiting and any form of sepsis are constant**

Stomach Lavage.

causes. One of the dangers of **chloroform** and ether in children is acidosis. It is because children are far more liable than adults to acidosis and acid intoxication that we are drawing attention to the matter, for we have seen many a child's life endangered by neglect or lack of recognition of this fact; but, with the intelligent co-operation of mother or nurse, we have seen an equally large number of children in whom the condition has been anticipated and the attack aborted.

SYMPTOMS OF ACID INTOXICATION.

For a few days the child will have been off his food, irritable and capricious, tongue dirty, stools offensive, restless at night, occasionally vomiting. Such a state of affairs may give sufficient warning to the mother, and if she or her doctor will test the urine they will have definite warning that in a few hours or days, if not heeding, the child may pass into a stage of definite drowsiness with or without delirium and uncontrollable vomiting, the vomiting being so urgent that blood may be brought up. In a severe case the abdomen may be hollowed out and there may be pain and tenderness, the tongue is dry and coated and the pulse rapid and soft. The breath smells of sweet almonds and if the breathing be watched, it will be seen that it is peculiarly deep and laboured, the so-called sighing-breathing or air hunger of acid intoxication which may precede coma and death.

TEST FOR ACETONE OR DIACETIC ACID.

The Rothera test is the best and is as follows:— Take one quarter of a test-tube of urine and add an equal quantity of saturated solution of ammonia sulphate, add a little strong ammonia (liq. ammon. fort.) and then add a few crystals of, or a few drops of, a five per cent. solution of sodium nitro-prusside. If acetone or diacetic acid is present, the liquid acquires a rich purple colour, and the length of interval before the colour appears and its intensity afford some indication of the quantity of the acids present.

THE SIGNIFICANCE OF ACETONE IN THE URINE.

1. It may arise in some children merely from a temporary inadequacy of the metabolic processes. For instance, it may be set up by the child taking too little

food or by the food-stuffs being given in unusual form or unwise proportions, so that the chemistry of his intestines, liver, kidneys and pancreas is deranged.

2. It may occur as a complication of some other disease, and by so doing **render that disease much more serious**. For instance, in pneumonia, convulsions, malaria, appendicitis or acute diarrhoea and vomiting or dysentery. It is **almost constantly present in children with worms, mucus disease or chronic gastro-intestinal catarrh**. It may come on after an anæsthetic for some simple condition such as circumcision or tonsils and adenoids.

3. It occurs in diabetes and after taking aspirin and sodium salicylate.

When an attack threatens, the child must be kept in bed and the bowel emptied by a purgative, and if that is vomited, by an enema containing four teaspoonful of bicarbonate of soda in eight ounces of water. Five to ten grains of bicarbonate of soda in half an ounce of water are to be given every half hour by mouth until twelve to twenty doses have been taken.

Treatment.

If the case is a severe one, saline nine ounces, glucose one, should be given slowly per rectum, and in desperate cases ten to twenty per cent. solution of glucose in double distilled water may be given by a doctor into a vein.

In India acidosis or acid intoxication is most commonly seen as a result of dietetic error or secondary to gastro-intestinal catarrh. In such a case a great deal can be done to prevent these attacks of acid intoxication by a careful regulation of the diet and the prevention of over-feeding. Butter, cream, fried food, foods cooked in oil or ghee, cod-liver oil, roboline, virol and the like, should be cut out of the diet. Eggs are rarely tolerated and the milk should be skimmed or diluted. Full or half cream patent milk should not be allowed, but Horlicks, which is practically fat-free, milk, may be given. We have found that a cup full of fresh orange juice or hot water first thing in the morning is beneficial. A stick of raw sugar-cane to chew is equally good, followed by a cup of water. Dr. Thompson of Edinburgh was a great believer in the

prolonged use of a powder containing two to three grains of salol and five to ten grains bicarbonate of soda given thrice daily an hour before meals in plenty of water for many weeks.

On account of the danger of acidosis, it is particularly important that all children who are to undergo operations under chloroform should be given for the period of three or four days a course of alkalis.

CYCLIC OR BILIOUS VOMITING.

It is necessary here to refer shortly to a catarrhal condition of the gastro-intestinal tract, which gives rise to what parents frequently describe as a "**Bilious Attack**," which periodically prostrates the child. In these cases, the nausea and vomiting may be extreme, the child becomes pale, the eyes are sunken, and there is rapid loss of weight; constipation may or may not be a marked feature, but in some there is diarrhoea; there is rarely fever and no pain. Usually the breath has a peculiar sweet odour readily noticeable and the urine if tested gives a reaction to two acids which signify the **whole cause of the attack as due to what we speak of as acidosis.**

It is important to bear in mind the condition of acidosis, for we have seen cases which have been allowed to sink into coma and death from non-application of the almost specific home remedy, bicarbonate of soda.

Directly the first symptoms appear, give five to ten grains, half of soda bicarb. in one ounce half of hot water every half hour. If it is vomited, give one teaspoonful at a time or first wash the stomach out, and then give a rectal injection of eight ounces of water in which two teaspoonful each of soda bicarb. and glucose are dissolved, and repeat in six to eight hours. As regards diet, milk, fat, sugar and yolk of egg are forbidden during the attack, and are to be but very sparingly given in the intervals in such cases; buttermilk, dry baked bread or toast and soups are permissible. There should be no eating between meals; in between or after the first attack if diagnosed rightly, the child should take only three meals a day, lead a quiet regular open-air life and avoid all strains. The bowels must be kept open. A few grains of soda bicarb. every day in water will do much to obviate an attack.

CHAPTER XLIV.

JAUNDICE.

Malarial Liver Affections—Constitutional Liver Diseases —Enlargement Peculiar to Race—Disordered Liver Affecting the Urine.

Jaundice.—Allusion has already been made to the **spurious jaundice which sometimes accompanies or immediately follows birth** (p. 25); we have also seen how chills may affect the liver (pp. 5, 6) and that a sluggish liver is sometimes the cause of a form of constipation which may be attended with a little jaundice.

Previous allusions.

In the common jaundice which occurs at birth the white parts of the eyes are not tinged, nor is the urine discoloured, the bowel motions retain their natural colour and there is no fever. The liver and bile are in no way concerned.

Spurious jaundice.

A **true jaundice** is sometimes seen **soon after birth**. The urine has a yellow tinge or distinct yellow colour, the eyes are similarly discoloured and the bowel evacuations are clay-coloured or white. The infant is restless and distinctly ill. Often this condition is connected with some wasting affection such as diarrhoea and vomiting, or inflammation of the mouth, indicating mal-nutrition. Occurring **in older children** it is more likely to be due to chill, which has caused a catarrh (swelling and weeping) of the little duct which should lead away the bile, which then, not being able to escape through the duct, is forced back into the circulation.

Ordinary simple jaundice. Due to debility.

Catarrh of duct.

The management of these cases is usually simple and satisfactory. **In the first class**, any diarrhoea or vomiting must be checked chiefly by regulation of the diet in the ways described under those headings, or a sore mouth must be cured (*see* "Mouth, affections of"). These measures, combined with ordinary care and nursing, and the administration of the red mixture or fluid magnesia in small doses for a few days, will usually effect a cure. In either class, warmth over the abdomen, with mustard-oil frictions over the liver, and rest in bed are essential. For the cases which occur **in older**

Treatment.

children, commence by giving a powder consisting of one grain of calomel and three or four of rhubarb. This is not to be repeated, but the action of the bowels which has been thus secured is to be maintained either by rhubarb (7), podophyllin (12 A), aloes (12 B), or Epsom salts (12) twice a day, so that two or three motions will be the daily result. When the bowels are easily affected, it is best to employ the rhubarb. If the evacuations are hard and white, either the aloes or podophyllin may be alternated with the magnesia mixture or give one-sixth grain calomel and half grain hydrarg. cum creta, three times a day for two or three days.

**Malforma-
tions.**

A child is fortunately very rarely born with such a congenital defect as absence of the bile duct, but when it is so, it will, of course, give rise to jaundice in a few days. A fatal issue is inevitable, nor can it be long delayed.

**Malarial
liver
affections.**

Children who have suffered much from malaria, or who have been kept too long in a hot country, occasionally suffer from chronic liver diseases of slow growth, not easily recognised at an early stage. The child is probably liable to fever, he wastes, becomes pinched and yellow, loses his appetite, and the bowels are irregular, generally constipated. At first the liver enlarges slowly without pain, and some small amount of abdominal dropsy may then occur. Jaundice is usually only very slight. The spleen is also found to be enlarged. This no doubt is only a phase of the general condition described at p. 208, *et seq.*, with this difference, that the force of the influences is expended mainly upon the liver. We therefore devote our attention chiefly to the organ attacked. But in any such case, it is all-important that a competent medical opinion should be first obtained and the blood microscopically examined. As this condition may be one of very great seriousness, the sooner such a child is sent out of India the better. The long sea voyage and residence in Europe are the proper remedies. If this cannot be done, removal to a healthy dry district in the plains, with perhaps a change to one of the lower and drier hill-stations during the months of exhausting weather, are to be earnestly recommended. An abrupt change from the plains to the higher hills is not desirable. Even a short sea voyage is calculated to help the initiation of

Treatment.

improvement. Chloride of ammonium and arsenic are the medicinal remedies from which we may hope most in the first instance. But we must never forget that we can control the functions of the liver by regulating the food supply. We, therefore, study to devise a diet which is at once simple and nutritious; naturally, we look to milk (peptonised or otherwise) as an ally to be relied upon, and we may use with it Mellin's or Savory and Moore's food for younger children, or if the proper age has arrived, a little broth may also be allowed twice a day. To older children we permit sweetbread and some easily digested fish as well as milk, and even a little lightly cooked tender meat once daily. But enough has already been explained in Chapter VI and VIII to guide as regards diet.

Control functions.

Next we proceed to drain the liver by salines, of which for these cases the sal-ammoniac is especially suitable; we may give a child of two years old five grains dissolved in half a wineglassful of water twice a day (and double that quantity to a child of ten) on an empty stomach, while we also give arsenic (48A) twice a day after food. But there is another important point, and it is this, that to make the important chemical changes which take place in the liver as complete as possible, a plentiful supply of oxygen is essential, hence the necessity for pure, fresh, cool air and very gentle exercise. If this cannot be obtained by the change of locality already mentioned, it is obvious that the freest ventilation and a quiet out-of-door life must be insisted upon as far as the climate and the condition of the patient permit. Constipation is never to be permitted. It is to be met in the manner described previously. As the patient becomes better, probably after the lapse of some weeks of this treatment, especially when the low febrile condition abates or intermits markedly, the acid mixture (46A) may be substituted for the sal-ammoniac, the arsenic being continued separately and a purgative given when required. As the child improves, quinine in solution with Epsom salts, dissolved with diluted sulphuric acid, should be given for a long time—a month at least—and then the case may be finished up by the use of the tonic aperient (46) till health is quite restored. In older children, five years and onwards and particularly if they have had dysentery previously, the fever, jaundice or hepatic pain may threaten liver abscess. In

Drain liver.

Promote natural chemical changes.

these cases, medical advice should be urgently sought, as proper treatment may abort the disease (emetine injections or ipecacuanha).

Another
disease.
Constitu-
tional liver
form.

Constitutional Liver Disease.—Sometimes the liver may enlarge and become otherwise diseased in consequence of a constitutional fault. There may then be some dropsy, and even a little jaundice. Usually the disease commences shortly after birth. The belly enlarges and becomes shiny. The liver may be easily felt. The child wastes, its skin falls into wrinkles, and probably an eruption will appear on the body. The best thing then to do is to prescribe the iodide of potassium three times a day (without the bromide), and this should be continued for weeks, an occasional purgative of half a grain of calomel with three grains of bicarbonate of soda being given when required. When a marked improvement has taken place, the iodide may have added to it the syrup of iodide of iron (47) in appropriate doses. But professional advice should be sought when opportunity offers.

Another constitutional cause may be connected with a family history of consumption. The disease does not then generally show itself till the child has advanced in years (perhaps to six or seven). Fresh bracing air, iodide of potassium combined with the syrup of the iodide of iron, cod-liver oil and a generous diet are the measures to adopt.

CHAPTER XLV.

“INFANTILE LIVER.”

During the last seven years, 63 advanced cases of **Disease.** this disease, which we prefer to call **intercellular hepatic cirrhosis**, have passed through our hands, and we have been able to watch the results either directly or indirectly. Of these 63 cases, 27 have been European or Anglo-Indian children, 30 have been Hindus and 6 have been Mohammedans. In all these cases the children have ranged in age between 5 months and 3½ years; 17 children were on the breast, and in 12 out of these 17 cases the mother was a multipara. In all the remainder, the children, though temporarily on the breast, were suffering from obvious dietetic errors; for instance, **33 children were being fed on patent foods**, supplemented with sweets, jellabis, rosagollas, sandesh or any other fanciful food-stuff which a distracted mother may give to a peevish child in order to keep it temporarily quiet.

It is not therefore to be wondered at that the digestive system of the child mutinies, and **additional work is thereby thrown upon the excretory functions of the liver, which at first enlarges due to swelling and congestion of the cells (the result of toxins), and in the final stages contracts in consequence of the reactive intercellular fibrosis.**

Our views as regards the **ætiology** of this disease are as follows:—

(1) **If a mother feeds incorrectly before the birth Cause.** of her child, she may predispose her infant to develop this disease; for, if it be accepted as a fact “that the vitamins are to the endocrines what the endocrines are to the economics,” it will readily be understood that if the mother’s diet is deficient in vitamins, she will not only influence and diminish the quality of her breast secretion, but will also influence the endocrine system of the foetus *in utero* which, as has now been proved, commences to function between the 8th and 20th week of foetal life.

(2) **A nursing mother frequently suffers from pyorrhœa, anemia, or constipation resulting in, or the**

result of, auto-intoxication. The consequence of this is that the baby obtains a supply of milk from its mother lacking in stimulatory hormones, calcium, iron, phosphorus, iodine, etc.—such defects culminating in intestinal and hepatic derangement in the infant.

(3) **An infant reared on patent foods**, or given indiscriminate articles of diet by its parents, is the one most frequently seen, and I think the explanation is obvious, for many of these children are **overfed** and the liver, pancreas and intestinal glands are taxed to such a degree that the inevitable toxæmia or cirrhotic liver occurs. For instance, it is no uncommon thing to hear that a child has gone off its food and is being given cod-liver oil, olive oil, cream, ghee, lumps of sweet or chocolate, etc., in order to encourage or persuade it to eat, although its tongue is dirty and its stools indicate that there is an upset of the metabolism and more particularly of the glycogenic function of the liver. As a result of this hepatic toxic irritation, there is hepatic inflammation with consequent enlargement, and if the condition is neglected, the child goes from bad to worse.

(4) Another feature in the ætiology must not be forgotten, and that is that during many months of the year in India, **cows** particularly, and less often goats, **are fed on dry fodder** and are unable to graze properly because the grass has dried up. The consequence of this is that the cow's or goat's milk fails to contain those adequate and normal quantities of salts and endocrines which are necessary to the infant, if it is fed on boiled cow's milk.

Symptoms.

The first thing to lay stress upon is the fact that **this disease is one of insidious onset, and that in minor degree it occurs more frequently than is generally supposed.** Fortunately, however, mothers and doctors are gradually beginning to realise that when a child goes off its food and becomes flabby and peevish it is Nature's own effort to cure the child by rest and starvation.

Scores of times we have seen, in consultation, European children with such symptoms for whom nothing more was necessary **than strict limitation in diet and semi-starvation for a week or ten days with gentle saline laxative treatment.** On such lines the slightly tender enlarged liver has retrogressed and Nature's own method of cure been aided. The old maxim "You

have to get worse to get better” is a useful line of argument in such cases, for no child or animal is the worse for a week’s semi-starvation.

The early symptoms are low fever almost continuously, accompanied by constipation with earthy or putty-coloured offensive stools. The child has no appetite and peevishly refuses all food. It sleeps restlessly and often lies upon its stomach. The urine is scanty and high coloured, and contains indican and acetone. The mother will tell you that the infant is losing weight, that its muscles are flabby and its face sallow and anæmic.

The liver will be obviously large to start and the child will cry when you palpate it. The spleen, in the early stages, is not enlarged, but later becomes easily palpable. The conjunctivæ look muddy coloured, and in the late stages of the disease there may be actual jaundice. The skin is dry and inelastic, and frequently there is œdema of the feet. In the last and hopeless stages the liver seems to recede, and there may be marked ascites. Signs.

A typical blood count taken from one of these cases, aged seven months, is as follows:—

Red blood cells	..	..	3,000,000
White blood cells	..	..	8,000
Hæmoglobin	..	..	70 per cent.
Polymorphonuclears	..	..	27
Lymphocytes	..	..	65
Large mononuclears	..	..	7
Eosinophiles	..	..	1

No parasites found.

Stool examination in all cases has been negative, except that bile salts and pigment and excess of fat have been present with undigested debris. No ova or abnormal cocci or bacilli have been found on plating.

The diagnosis is as a rule perfectly easy, and in no case of mine has the possibility of kala-azar, syphilitic liver, or malarial cirrhosis been neglected in the examination. Indeed, most of the cases that we have seen in consultation have already been treated with quinine or its derivatives, or with a prolonged course of grey powder—that poor panacea for all evils, beloved of mothers and doctors!

In our opinion there is only one condition which might give rise to error, and that is infection with one of the typhoid group of organisms, but with this there is high fever with more or less an acute illness, whereas infantile intercellular cirrhosis is a disease of gradual onset and progressive debility over many months.

One final word of caution is necessary, however, in making the diagnosis and that is, **do not stamp the disease as rickets**; for, although from the ætiology, this disease, like rickets, is a metabolic deficiency one, if you hint to the parent that the condition is due to rickets, it is a thousand to one that nurses, friends, or an outside doctor will tell the parent to put the child on to cod-liver oil, Ostelin, Virol, or other vitamine A product before the baby is able to digest it and while its tongue is still dirty, with the result that Pelion is piled upon Ossa and fatal vomiting and coma may occur within a few weeks or even days.

Treatment.

If the ætiological factors are understood, the treatment of these cases, provided that they are seen early enough and before ascites or anæmic œdema occur, is successful in 70 per cent. of cases.

(1) **Prevention.**—A mother, during the ante-natal period, must be fed properly, and the following diet for all pregnant mothers is recommended, with the addition, if need be, of cod-liver oil and Parrish's food for anæmia or diminished calcium content.

Cereals.—Oatmeal porridge or any of the breakfast foods, with milk. Brown or wholemeal bread, toast, rusks, cream cracker biscuits.

Vegetables.—Any vegetable in any form except fried.

Fruits.—Any fruit either fresh or stewed.

Meat.—Beef, lamb, mutton, veal, not at all or only very occasionally. Pork never. Curry never.

Chicken, avoid duck, goose, game.

Croquettes or rissoles if not fried in deep fat.

Eggs.

Fish.—Any fish except salmon, mackerel, *hilsa*.

Soups.—Any soup, thick or clear, but free from fat.

Sweets.—Any jam or jelly, marmalade or honey, but pure honey is best of all.

Milk puddings. Boiled puddings occasionally.

No pastry, no cakes.

Salads.—Any salad, but sparingly of salad dressing.

Fluids.—Water, aerated water, home-made lemonade, orangeade, weak tea, coffee, milk if desired.

No alcohol of any kind.

Butter may be taken if desired, but not in large amounts. Cream, fat meats, and any fish fried in deep fat should be avoided. Fruits and vegetables must be taken at least twice a day, and meat, if at all, not more than once every other day. Mild cheese, such as St. Ivel's, is permissible.

(2) **During lactation**, the mother's diet should be on the same lines, the idea being to increase the calcium, iron, potassium, phosphorus, iodine, salts, etc., and also the hormone content of her secretion. If the mother is anæmic or a multipara, encourage her to take cod-liver oil or Ostelin, together with Parrish's food. A healthy wet-nurse may mean salvation in infants under one year.

(3) **When weaning occurs**, see that the food-supply of the cow or goat is or has been correct, that is, that green fodder is and has been provided. It is for this reason that in India we so particularly urge that goats should be kept, for they can be supervised, fed properly and milked easily and cleanly.

(4) **Avoid giving patent foods, sweets, chocolates**, jellabis, sandesh, rosagollas, ghee or other rich articles from the table. Remember that mono-saccharids such as honey and ripe sugar-cane are digestible, but all di-saccharids, such as sweets, etc., are indigestible and therefore are not permissible.

(5) **No child should have less than two to three ounces of fresh fruit juice per day**, oranges, pineapples, tomatoes, mangoes, grapes and pomegranates are easily obtainable all over India.

(6) All children, European or Indian, should be allowed **out in the sun from 6 to 9 a.m. and 3 to 6 p.m.**, that is, when the ultra-violet rays of the sun are at their maximum. If possible, a course of 10 to 20 exposures to ultra-violet rays from a mercury vapour quartz lamp is most beneficial.

(7) Remember that chicken broth is no food but merely a purin stimulant. Vegetable soup, on the other hand, made as in France of **fresh green vegetables boiled for no more than 15 minutes**, contains vitamine C and phosphorus, sodium, potassium, iron, calcium, magnesium and iodine; but in Bengal and India generally, owing to the poverty of the soil, vegetables contain smaller quantities of these salts, especially iodine, than in Europe. It is, therefore, best to follow the example of those who live in the valley of the Mississippi and add iodised salt to all food. An easy method of doing this

is to purchase "Iodosol" which is a ready prepared iodised salt sold by all leading chemists.

Actual Treatment.—Keep the child in bed and unclothed in the sun, or, if well enough, let him run about in the sun semi-naked at the hours stated above; and bear in mind that the absolute essential of the following treatment depends upon a fat-free diet which relieves the overworked and congested liver.

1st Day.—Give only barley water or rice water, sweetened if need be with $\frac{1}{4}$ grain of saccharine to the pint.

2nd Day.—Begin the skimmed milk treatment, that is, fat-free milk.

The easiest way of making skimmed milk is to take a small enamel douche can, insert a cork in the tube outlet, and simmer therein fresh milk for half an hour; then remove and place on ice or in a cool place for two or three hours. The fat of the milk will by then all have risen to the top, and the lower two-thirds in the vessel can now be obtained by removing the cork from the outlet and letting the milk run into a clean jug. This (lower two-thirds) milk is to all intents fat-free and should be given diluted 1 in 3 to start with, gradually increasing its strength.

As regards the quantities to be given, remember the law that an **infant requires not more than** $1\frac{1}{2}$ ounces of milk per pound weight per diem in order to maintain life. In the plains of India, for instance, a child aged nine months was brought to us with typical signs and symptoms of infantile hepatic cirrhosis. Its weight was 12 pounds, that is, it must have 18 to 21 ounces of milk per day, and the following directions were given:—Skimmed milk two ounces, water six ounces. Feed $2\frac{1}{2}$ to three-hourly.

3rd Day.—Skimmed milk $2\frac{1}{2}$ ozs., water $5\frac{1}{2}$ ozs.

4th Day.—Skimmed milk 3 ozs., water 5 ozs.

5th Day.—Skimmed milk $3\frac{1}{2}$ ozs., water $4\frac{1}{2}$ ozs.

6th Day.—Skimmed milk 4 ozs., water 4 ozs.

7th Day.—Skimmed milk $4\frac{1}{2}$ ozs., water $3\frac{1}{2}$ ozs.
 $3\frac{1}{2}$ -hourly.

8th Day.—Skimmed milk 5 ozs., water 3 ozs.
 $3\frac{1}{2}$ -hourly.

9th Day.—Skimmed milk $5\frac{1}{2}$ ozs., water $2\frac{1}{2}$ ozs.
 $3\frac{1}{2}$ -hourly.

10th Day.—Skimmed milk 6 ozs., water 2 ozs. four-hourly.

11th Day.—Skimmed milk 6½ ozs., water 1½ ozs. four-hourly.

12th Day.—Skimmed milk 7 ozs., water 1 oz. four-hourly.

13th Day.—Skimmed milk 7½ ozs., water ½ oz. four-hourly.

14th Day.—Pure milk, 4½ to five-hourly.

Rules up to the 14th day.—(1) Two to four ounces of fresh fruit juice to be given between meals. (2) Keep the teeth and mouth clean. (3) Allow as much water in between meals as desired, but no aerated waters or sugared water. (4) On the 4th day, add a teaspoonful of Mellin's (Dextrimaltose) to each feed. On the 7th day, 1½ teaspoonful of Mellin's (Dextrimaltose). On the 10th day, 2 teaspoonfuls of Mellin's (Dextrimaltose) per feed. On the 14th day, 2½ teaspoonful of Mellin's (Dextrimaltose) per feed. (5) The bowels must be opened daily and if possible, twice daily, but giving milk of magnesia and paraffin, of each one teaspoonful. (6) If you desire to give a cholagogue, three grains each of atophan, German Carlsbad powder, sod. salicylate with or without ½ gr. of hydrarg, cum creta will be found efficient at bed-time or twice a day.

We have found benefit also from **rectal douches** of potassium permanganate ½ grain (B. W. tabloids) dissolved in a pint of water, given slowly, b.d. with funnel and catheter.

From the 14th to the 21st day the child is kept on pure skimmed milk with Mellin's (three teaspoonful), and following the above rules it may also have Mellin's or Allenbury's rusks.

The rules after the 14th day are the same as before, except that one should substitute one or two feeds with fresh vegetable or fish soup. The amount of fruit juice should be increased if possible; and we are in the habit, after the 14th day, of giving fractional doses of extract thyroidæ sicc., e.g., ½ gr. b.d., as it seems to fan up the dormant metabolism, and is, as McCarrison states, “as the draught is to the fire.”

By this time the stools and general condition of the child, including its liver, will have much improved, and as progress continues the diet can gradually be increased,

with due regard to any set-back which may occur and have its origin in some particular food substance.

When the tongue is clean and eyes clear, begin giving a quarter of the yolk of an egg per day in one of the bottles, gradually increasing to one whole yolk. Cod-liver oil may now be given either in five-drop doses increasing to 15 drops t.d.s., or Ostelin one drop b.d. in honey or milk for the first week; two drops b.d. for the second week; three drops b.d. for the third week.

On the	give							
21st day	skimmed milk	7	ozs.	Ordinary milk	1	oz.,	4½-5	hourly.
22nd	"	"	6½	"	"	1½	"	"
23rd	"	"	6	"	"	2	"	"
24th	"	"	5½	"	"	2½	"	"
25th	"	"	5	"	"	3	"	"
26th	"	"	4½	"	"	3½	"	"
27th	"	"	4	"	"	4	"	"
28th	"	"	3½	"	"	4½	"	"
29th	"	"	3	"	"	5	"	"
30th	"	"	2½	"	"	5½	"	"
31st	"	"	2	"	"	6	"	"
32nd	"	"	1½	"	"	6½	"	"
33rd	"	"	1	"	"	7	"	"
34th	"	"	½	"	"	7½	"	"
35th	"	pure milk,						

Rice, butter or ghee, should be given sparingly for many months. European children should not be given meat or highly seasoned food substances. Fish roe and boiled fish or minced chicken or liver may be given gradually with advantage.

Prognosis.—Cases seen early, and the parents of whom are sensible and obedient to the written details of treatment which we have given, get well in the majority of cases in six to ten weeks; but any lapse on the part of the parents or servants, catering to a peevish child's inordinate appetite or desire for some article of food not allowed, will tend to cause relapse.

Bronchitis, broncho-pneumonia and skin diseases—such as boils and intertrigo—are frequently serious complications. Late cases, jaundiced or with ascites, we have never known to recover.

Sometimes, a child of four or five who does not seem particularly out of health will be observed to cry frequently and suddenly, without apparent provocation;

Disordered
liver affect-
ing the
urine.

just as suddenly he ceases and returns to his play. When this happens, the parent should watch the child. It will probably be discovered that he micturates very frequently, and further it will be found that the urine deposits a pink sediment. Plenty of outdoor exercise, **Treatment.** restriction as to puddings and sweets, a sufficiency of properly cooked meat, a dose or two of podophyllin (12A) to regulate the bowels, and effervescing citrate of magnesia three times a day, will effect a speedy cure. In addition, five grains of bicarbonate of soda at bed-time for a few nights will help in the more troublesome cases, and **fruits and sweets should not be allowed.**

CHAPTER XLVI.

CERTAIN DISEASES OF THE KIDNEYS AND BLADDER.

Dropsy.

Definition. Dropsy signifies the accumulation of a watery fluid, either in the abdominal cavity, or in the loose fat which lies immediately underneath the skin, throughout the whole body. It may involve the abdomen and the body generally at the same time or it may be only partial, the legs, below the knees, being the only parts affected.

As serious as in England. Dropsy among children in India is as serious a complaint as it is in England. The majority of the Indian cases are of malarial origin, or due to infantile cirrhosis of the liver (*see* Chapter XLV), whereas in England, scarlatina, by damaging the kidneys, is the most constant cause.

Symptoms. The countenance is the first part to appear puffy and swollen if the child has recently been much in the recumbent position; if otherwise, the feet are the first to swell. The swelling of the dropsical limb may be known by pressing the point of one of the fingers steadily into it for a few moments, the pit so caused will remain after the pressure is removed. The belly at the same time will probably begin to enlarge, and the child assumes a pasty appearance.

Classification. For popular practical purposes dropsy had better be divided into two classes, viz., (1) **those which are due to malarial debility or simple anæmia, or "infantile liver"** and (2) **those which arise from kidney affections.*** The first may be known by the fact of the child having been a sufferer from malarial fever, which has left him weak and debilitated, the spleen possibly enlarged, and the other signs mentioned in Chapter XXVII

* Dropsy is also a symptom of advanced liver disease, and it occurs too at the end of bad heart cases, but these affections will probably have been long under treatment before the dropsy appears, and the parent will not be called upon to diagnose and treat such cases.

present, without any indication of kidney disease. The second is recognised by the occurrence of a distinct febrile attack accompanied with pain across the loins, and a very scanty flow of urine, having ushered the attack in, or the fact of its having followed upon an attack of scarlatina. In India, evidence points to the fact that a number of cases of kidney disease have their origin in chronic septic skin disease. But in no case should it be neglected or treated until a competent opinion has been obtained on the urine analysis and the general condition of the patient.

As to the prospects of these cases, dropsy is always to be regarded as a serious complication, but the **majority of the malarial and liver cases recover under proper management.**

The first is very amenable to treatment.

The second class of cases is much more serious. So long as the quantity of urine voided remains scanty, and while at the same time dropsy goes on progressing, anxiety will justly be great; but one has seen many formidable cases of dropsy in India, in which the kidneys were severely affected, recover; so one cannot but think the proportion of recoveries is greater than in England, on account of the Indian climate, which increases so greatly the facilities for preserving or re-establishing the action of the skin.

The second serious.

As to treatment:—(1) The dropsy of malarial debility, being only a result of a general condition, is to be managed in the way laid down in Chapter XXVII, which in the majority of cases will yield a cure. (2) The dropsy which springs from the inability of injured kidneys to draw away sufficient water from the body is to be treated upon different principles. The great point here is to re-establish the functions of the skin, and to cause it to act as much as possible; in fact, we endeavour to get the skin to do a great part of the work of the kidneys, which thus obtain rest, while at the same time the noxious materials ordinarily got rid of through the kidneys are withdrawn through the skin, and blood-poisoning is prevented. From the commencement, therefore, we keep the child in bed and as warm as possible, administering a mixture containing spirits of ether, half a drachm and tincture of digitalis two minims per dose, with water, every third hour. A vapour bath should be given daily in acute cases; or even twice a day if the child be strong enough to bear it and the

Treatment.

Re-establish functions of skin.

Vapour bath.

weather permit. A copious perspiration should be induced on each occasion. Still with the same objects (viz., relief to the kidneys and removal of noxious material), the **bowels should be kept loose** by the use of the saline purgation No. 12. **This is a matter of prime importance.** The diet should be light but nourishing, consisting chiefly of milk at first and later farinaceous foods, such as bread and butter and milk puddings. Vegetable clear soups may also be allowed in moderation, but no meat till there has been considerable improvement. On no account should alcoholic stimulants of any kind or any medicine containing opium be given. A **large bran poultice** should be prepared and placed upon the bed, the child should then be laid upon his back so that the poultice envelop the whole of the loins; this may be done for an hour, morning and evening; or longer on each occasion, if the child have patience to bear it. **Dry cupping of the loins** is another very easy and excellent way of assisting the over-blooded kidneys. By these means the acute symptoms will be overcome, the feverishness will diminish, and the quantity of urine increase. As soon as this is effected, a diuretic mixture (33) will be of service, but not before. A very excellent preparation is that known as **imperial drink** which is made by mixing the juice of two limes with a teaspoonful of potassium acid tartrate and then adding a tablespoonful of brown or white sugar, and stirring with two pints of boiling water. On cooling, the patient should consume this in divided quantities during the twenty-four hours. When convalescence is fairly established, a course of tonics (44) may be commenced. It may be judicious to combine the tonics with an aperient (46) for a time, to ensure and prolong the relief to the kidneys. The child should not be exposed to any risk of cold or chill, and the loins should be protected. As soon as available, a medical opinion should be obtained, and an analysis of the urine done from time to time.

Purgation.
Diet.

Poulticing
kidneys.

Subse-
quently
tonics and
aperients.

STONE IN THE BLADDER.

It is necessary to draw attention to this condition which is not uncommonly met with in children in India between the ages of two and ten. Sometimes there is a previous history given by the mother of attacks of abdominal pain or colic which is attributed to flatulence, but

which probably is due to a small stone in the kidney, or the passage of uric acid or oxalate crystals. But more frequently the history is that of pain or screaming at the close of micturition. The pain is at the end of the penis or near the anus. There may be sudden stoppage of urine, and great straining, causing even prolapse of the rectum.

The passage of blood, mucus or pus is not usual as in adults. A history of masturbation is not uncommon. Competent medical advice should be sought **for, a microscopical report of the urine, examination of the rectum to exclude prolapse, worms or polyp, and possibly an X-ray investigation or other treatment will be necessary.**

As a temporary measure, the parent should place the child for fifteen minutes in a hot bath and give a mixture containing potassium citrate grains fifteen, tincture of belladonna minims three, dill water one teaspoonful—**one teaspoonful every four hours in water.**

If the trouble be proved merely to be due to certain peculiar crystals, such as oxalates, or uric acid or phosphates, which in passage give rise to the symptoms, then the appropriate rules of diet, drugs, etc., for each will be given by the doctor.

Blood alone, in the urine of infants, almost always spells scurvy.

VAGINAL AND LABIAL DISCHARGES.

These conditions are unfortunately of very frequent occurrence in India, and are met with in schools and private houses alike. **Sometimes** the condition is **due to dirt, to worms, to eczema, or to ill-health** (in feeble or tuberculous children). **But in far the greatest number it is due to contamination, and the discharge is infectious.** Unquestionably evil or dirty habits of servants and ayahs are responsible for many of these cases, though in others no direct or exact origin can be traced. A searching investigation and examination is necessary; and a very competent microscopical report should be obtained of the discharge at once.

In the majority of cases the symptoms are few. The mother or matron may be told there is pain in micturition, and then see that the parts are red or swollen and that there is a profuse purulent discharge.

Treatment consists in **immediate isolation** of the child from other children, and the attendant should take every care to cleanse her hands after tending the child, and everything used for or by the child should be kept and washed separately.

The acute signs of the disease disappear rapidly with treatment, but parents are warned that a long time may elapse before the chronic discharge disappears and that relapses are very common. The chief therapeutic measures are hot antiseptic and alkaline hip baths with daily lavage of the vagina and urethra. In older children, the vagina may be dried with a swab on a stick after douching, and dermatol powder insufflated. The vagina should be douched out two or three times a day (using a glass catheter connected by rubber tube to a funnel) with a quarter per cent. solution of picric acid or silver nitrate or acriflavine or chloramine tincture in glycerine. If these are not procurable, very dilute potassium permanganate solution may be used. At bed-time, a small medicated bougie (Merck) of protargol should be inserted. Sometimes if there is great urethral pain, an urethral bougie is useful. Repeated changing of the antiseptic is advised and in every case the vulvar surface should be left as dry as possible by dusting it with some antiseptic powder. The essentials of treatment are (1) to establish good drainage from urethra, vulva and vagina; (2) to produce a slight hyperæmia of the infected parts by hot hip baths and hot vagina douches; (3) to use a sterile all-glass catheter for douching; (4) to dry the parts after douching; (5) to treat the urethra if necessary; (6) to obtain a microscopic report on the pus and, if possible, an autogenous or detoxicated vaccine should be employed. Fortunately, there are not many complications of this distressing condition; in rare cases, cystitis or inflammation of the bladder may occur or the spread of inflammation and discharge to the rectum may happen. When the mother is careless and ignorant, infection may be carried by the hands of the child from the vulva to the eyes, setting up an intense inflammation for which expert treatment is necessary. In very rare cases we have known the inflammation to spread from the vagina to the uterus and pelvis setting up pelvic peritonitis; such a case demands expert opinion. Out of hundreds of cases we have never seen inflammation of the joints as a complication; the average duration

of these cases is two to six months. Therefore the mother should not lose hope or patience. Chronic cases are sometimes best treated by giving the child chloroform and swabbing the whole vagina with a twenty per cent. solution of silver nitrate and thereafter douching the vagina twice a day with a hypertonic saline solution.

The external parts should be thoroughly cleansed and swabbed with a solution of zinc sulphate (grains two to the ounce) or weak Condy's fluid three or four times a day, and then after each swabbing the vagina should be douched out with the same solution or two per cent. protargol, using a funnel and small rubber catheter. At least three times a day the child should sit in a basin of warm zinc lotion or Condy for quarter of an hour at a time. All underlinen and pads should be changed frequently. Of course, if there are worms, these will be treated as mentioned under that heading. Many of these children are ill-nourished and anæmic, and they should be given iron and cod-liver oil. It is most necessary here to warn parents that this is a very troublesome complaint, and, **despite the most painstaking and efficient methods of treatment, it may be many weeks or even months before the discharge ceases.** Many of these cases find their way to hospitals and then frequently more powerful remedies are used under light anæsthesia in order to accelerate a cure.

CHAPTER XLVII.

GLANDULAR SWELLINGS.

The lymphatic glands are distributed all over the body, both superficially and deep. The superficial glands are grouped chiefly in the folds of the large joints, the axilla, elbow, hip and knee and also in the neck. The glands are linked up into a system by the lymphatic vessels and each gland or group of glands drains the tissues in its neighbourhood.

In health, save in the very thin, the glands are not perceptible, but in childhood there is a particular tendency to enlargement often from trivial causes.

The more common types of swelling of the lymphatic glands may be described as follows:—

(a) **Acute inflammatory.**—Such enlargement is caused by some irritative or septic area draining to the gland and will be situated according to the area affected. The gland acts as a filter or barrier preventing the further dissemination of infection throughout the body; bacteria or toxic products are here held up and as the body tissues or the infection prevails, so will the swollen glands subside or suppurate.

The common examples of acute inflammatory enlargement of the glands are:—

(1) **From acute follicular tonsillitis, diphtheria or scarlatinal throat.**

Glands in the neck.

Situation.

Immediately behind the angle of the jaw and spreading down the neck in front of the sterno-mastoid muscles. The gland or group of glands immediately behind the jaw is known as the tonsillar gland. The routine examination of the sick child should invariably include inspection of this gland, as its enlargement may reveal some infection of the throat otherwise unsuspected.

(The Sterno-mastoid muscle extends from the skull immediately behind the ear to the junction of the collar-bone and breast-bone, dividing the superficial area of the neck into two spaces spoken of as the anterior and posterior triangles.)

(2) **From decayed and septic teeth, ulcers in the mouth, infection within the nasal cavity, especially in association with adenoids (anterior triangle).**

(3) From inflammation of the outer or middle ear.

Immediately under the ear and running in a chain to the posterior triangle.

(4) From skin diseases of the scalp.

Situation according to the area of scalp involved, most commonly the posterior triangle.

From septic sores on the hands, infected skin disease and scabies.

Glands in the arm-pit and elbow.

Glands in the groin.

Septic sores or blisters on the foot or leg. Sores or inflammation in the region of the anus or genitals.

(b) The result of acute general disease.—The superficial glands all over the body may be involved but the enlargement is as a rule most marked in the neck. Scarlet fever, in which there is a marked tendency to suppuration, measles and German measles. Certain inherited constitutional disease.

The lymphatic glands, when acutely inflamed, may be felt like hard kernels underneath the skin, often causing visible protrusion. They are extremely tender and the limb or neck may be fixed in a position of flexion to relax the tissues over them.

Signs.

If the cause is speedily removed, the glands subside, but unrelieved, the skin over the inflamed area becomes reddened, a series of fine red lines (lymphangitis) appear in the skin running to the glands, the skin itself partakes in the general inflammation and finally an abscess forms.

(c) Chronic inflammatory enlargement.—All the causes which produce acute inflammatory enlargement may produce chronic enlargement if the infection is not of sufficient virulence to cause suppuration and the source of irritation is not removed or recurs.

The commonest causes of chronic enlargement of the glands of the neck may be said to be **recurrent infection of the tonsils, infected adenoids, chronic suppurative disease of the ear and parasitic infection of the scalp** (pediculosis).

(d) Certain children at periods of ill-health, appear to be susceptible to swelling of the glands of the neck from no ascertainable cause other than a constitutional tendency.

(e) Tuberculous glands.—Infection of the glands is a common manifestation of tuberculosis between the

ages of three and adolescence. The infection may be produced either by bacilli swallowed with food or by bacilli inspired. The portal of entry is the tonsil, which is particularly prone to invasion if it is enlarged, ragged, pitted, or the subject of recurrent inflammation. In the same way, the resistance of the glandular tissues in the neck is lowered by chronic or recurrent inflammation of non-tubercular origin and the path is laid open to tuberculous invasion. It is a remarkable fact that at the hospital for sick children, Great Ormond Street, the operation for removal of tuberculous glands in the neck has become one of rarity since the introduction of the operation of complete enucleation of the tonsils.

As with tuberculosis elsewhere, the incidence of infection depends to a great degree on the general health of the child and he is rendered **more susceptible by debilitating diseases**, such as measles and whooping-cough.

Tuberculosis of the superficial glandular system almost invariably makes its appearance in the neck, extending as a chain of hard ovoid lumps down the anterior edge of the sterno-mastoid muscle. As the disease progresses, these glands become matted together, the inflammation extends to the glands of the posterior triangle and to those above and below the collar-bone and in the axilla.

Occasionally, the inflammation may subside in the early stage, but more frequently the glands become adherent to the skin, the substance of the gland breaks down, the skin over it becomes purple and finally gives way, resulting in a discharging sinus. Such sinuses may be multiple and persist for months or years before finally healing with unsightly scarring.

Outlook.

The condition is not as a rule dangerous to life, though generalised tuberculosis may result and occasionally the process may spread direct to the lungs. The glandular involvement is, however, at times only one manifestation of a widespread infection throughout the body.

(f) **Non-inflammatory swellings.**—Hodgkin's disease is a general enlargement of the lymphatic glands of the body, starting most commonly in the neck.

The glands reach a considerable size and in a case of some standing, the glands of the neck, axilla and groin

will be found to be enlarged. The disease is intrinsically of the lymphatic system. Treatment is by increasing doses of arsenic and exposure to X-rays, but little hope of cure can be entertained.

(g) **A second disease** in which there is general enlargement of the lymphatic glands independent of inflammation is lymphatic leukæmia. This disease is, fortunately, rare in children. The disease is one of the blood-forming system and in the acute form of early life is accompanied by irregular fever, enlargement of the spleen and marked blood changes. The outlook is hopeless.

OTHER FORMS OF GLANDULAR SWELLING IN THE NECK.

First must be mentioned inflammation of the salivary glands, the Parotids and Submaxillary. In its most typical form, it is seen in mumps and the diagnosis affords no difficulty (*see* Chapter XXII). These glands are also liable to swelling and even suppuration in long-drawn-out diseases of the bowel, notably typhoid fever and dysentery, when owing to stasis of the salivary secretion from want of stimulus by solid food, some form of bacillary infection is able to creep up the salivary duct from the mouth. For this reason, in all long illness and especially when the amount of fluid or food taken by the mouth is limited, the toilet of the mouth must be carried out with the greatest care.

This enlargement, which will be manifest over or immediately on either side of the larynx, must not be mistaken for lymphatic enlargement. The causes of the enlargement are so diverse and some of them so important that expert advice should be sought at the earliest moment. It may be stated that in some young girls a functional enlargement takes place at about the age of ten, but has no significance and will pass off when puberty is attained.

Enlargement of the Thyroid.

The main difficulty in diagnosis will lie in the distinction of tuberculous glands in the early stage. The first step will be to exclude all sources of chronic irritation of the type described in the preceding pages. The most persistent glands, suspected to be tuberculous, may subside when some source of irritation has been found and removed. Tuberculous glands tend to be oval in shape, matted together and adherent to the skin. If

Diagnosis.

the mass is of any size, there is likely to be some breaking down area with dusky adherent skin over it. They are thus quite distinct from the glands of Hodgkin's disease which are more spherical in shape, are distinct from each other and not adherent to the skin and do not tend to break down whatever degree of swelling is attained.

Treatment.

The treatment of acutely inflamed glands consists firstly in **an enquiry into the underlying condition** and appropriate treatment of this. The glands are protected with a dry woollen dressing or better still with an application of antiphlogistine, but are not poulticed unless they are red, acutely inflamed and suppuration appears imminent. It is undesirable to encourage suppuration on account of the unsightly scar likely to be left. Should pus have formed, an incision is made, the pus evacuated and the wound dressed aseptically.

For chronic enlargement as well as acute, the first step will be to seek the cause. Such septic foci as chronically infected tonsils or adenoids are removed as early as possible. Energetic treatment is desirable, for, as has been said above, such persistent glands are liable to be infected with tuberculosis.

Local applications in the form of mild counter-irritants, such as liniment of iodine, may be of value.

Attention is paid to the general health and tonics, preferably cod-liver oil and iron (No. 47) are given.

**Tuber-
ulous
glands.**

Here again the possibility that the disease, if not caused, is at least exaggerated by some focus of infection, must not be forgotten and the condition of the tonsils, nasal space, ear and teeth must be investigated and, if necessary, corrected.

The child spends as much time as possible in the open air if the weather is favourable and an early change to the hills or to the sea-side, according to season, is desirable.

The diet must be carefully regulated and should contain an ample supply of milk and fresh vegetables. Tonics in the form of iron and cod-liver oil are administered. The cod-liver oil is of special value, but care should be taken not to overdose the child. When available, a course of exposures to ultra-violet rays should be given or exposure to direct sunlight.

The result of treatment by tuberculin is usually disappointing. The question of the removal of the

glands by operation is likely to arise. The usual practice is to test the effect of thorough treatment, including the extirpation of all sources of irritation for a month or six weeks and if, at the end of this time, there is no evidence of radical improvement, the operation is undertaken.

In favourable cases, the operation holds out the hope of complete extirpation of the tuberculous infection from the body, a consummation greatly to be desired.

CHAPTER XLVIII.

SKIN DISEASES.

Nettle-rash, Eczema, Prickly-heat, Herpes, Itch, Ringworm, Boils, etc.

1. **Red Gum** or **White Gum** are names given by nurses to a trivial eruption of the skin of infants consisting of little groups of red or white pimples, hard and shotty to the feel, often with a translucent centre, but from which no fluid exudes when pricked. The forearm, leg, and trunk are its favourite sites. It is very irritable. A modification of diet, a few doses of the red mixture, scrupulous cleanliness, and the application of a lotion consisting of one drachm of oxide of zinc, half an ounce of glycerine, and six ounces of lime-water, will relieve the irritation and soon cure the complaint.

2. Nettle-rash.

2. **Nettle-rash** may be caused by the presence of worms in the intestine, but nearly always improper food, or a chill is the cause; for instance, unripe fruit, cucumber, pickles, and so forth. The rash consists of a number of elevated, itching, and burning wheals, very like in appearance the effects produced by the sting of a nettle; it seldom lasts more than a few days, and requires for its management the simplest treatment—an emetic, if there is likely to be any offending food in the stomach; purgation (7, 8, 10), careful regulation of the diet, and the administration of three or four grains of bicarbonate of soda in some infusion of chiretta after each meal, for a few days. Calcium chloride or lactate grains 2 to 5 according to age, viz., with advantage, be given. Locally, tepid sponging or a warm bath affords almost instantaneous relief; oil should be applied to the part afterwards, or, better still, the zinc and lime-water lotion abovementioned. Bicarbonate of soda dissolved in equal parts of glycerine and rose water is an elegant and efficient application.

Description and treatment.

3. Eczema. Very troublesome.

3. **Eczema** is often a troublesome affection. It usually selects the bends of the elbows and knees, the scalp, and, in young children, the cheeks, neck and

arms, for its position. When on the scalp, it is sometimes very chronic. A number of minute watery vesicles appear, the surrounding skin being irritable, red, and hot, the contents of the vesicles soon become whitish, the irritation increases, and the child is sure to scratch and break them. The discharge still further irritates the surrounding skin—indeed, it seems almost to burn it and to remove the thin outer layer. After a short time the discharge hardens into a yellowish crust, which cracks in many places, and from these cracks more of the clear irritating fluid exudes, as well as from under the outer edges. Portions of the crust may even become detached, leaving behind a raw, angry, moist surface. When of a mild form, the crops of vesicles die away naturally, the skin of the affected part scaling off afterwards; but fresh crops of vesicles are apt to recur.

The eruption.

Mild form.

Eczema is caused by defective digestion, and it indicates debility. It is not contagious.

Causes.

The objects of treatment are to relieve the local distress and to improve the general health. A piece of stiff card-board bandaged round each elbow acts as a splint and prevents the child scratching the upper part of its body. Soap should be avoided and oatmeal in muslin bags used in its place. A poultice should be applied to the scabs and repeated until the latter are detached. An excellent application to remove scabs is to soak some dosooti or lint in olive oil and then bandage this on overnight.

**Treatment.
Local.**

In the morning the scabs will all easily come off; the inflamed surface thus exposed should not be washed or wiped, but the exuding fluid may be sopped up by a little bit of gauze. Over the raw surface, so long as there is any "weeping" discharge, a lotion must be used; the lotion we have found most effective is forty grains each of zinc oxide and zinc carbonate, one drachm each of olive oil and glycerine of carbolic (B. P.), added to one ounce of lime-water. This is well shaken and then dabbed on to the raw surfaces several times a day, and allowed to dry. While any inflammation remains, this treatment should be persisted in. Afterwards the oleate of zinc ointment (to be had of any chemist) may be applied, and if the disease still persists, white precipitate ointment should be used; or it may, as a very efficient remedy, be used in the first instance, though it is apt

to irritate if incautiously applied. Some prefer five grains each of resorcin, salicylic acid and sulphur to an ounce of lanolin.

The child's diet should be nourishing but simple, consisting chiefly of milk, light puddings, and soups. All starchy or saccharine food should be avoided.

An aperient should always be given at the commencement, if there is any constipation. In any case it is well to give the red mixture (7) for four or five days to ensure the healthy action of the digestive organs. Ten grains each of bicarbonate of soda and potassium citrate should be given in milk three or four times a day. Afterwards tonics, of which the iodide of iron and cod-liver oil (47) will best suit most cases, are to be prescribed; or if the child has recently suffered from any malarial affection, steel and quinine (44) is to be preferred. In cases of obstinacy, arsenic (*see* Chapter LVIII) alone may prove of benefit. When there is much itching, a dose of chloral may be given at bed-time.

Crookes' Collosol Manganese one teaspoon three or four times a day is a most excellent corrective.

4. **Prickly-heat** is an affection due to congestion of the skin from heat, and to excessive perspiration. The appearance is too well known to need description. As a rule, no treatment is needed further than to avoid the use of harsh flannel next to the skin, but when troublesome, the ordinary dusting powder, composed of oxide of zinc and starch (55), is sufficient to effect a cure or to give relief. If not, a little powdered sulphate of zinc or menthol in the proportion of twenty grains to each ounce of the dusting powder, may prove effectual. A lotion of borax, half an ounce in eight ounces of water, is often found very useful in allaying the irritation. The addition of one tablespoonful of sodium bicarbonate to the morning bath will do much to relieve the irritation. Colonel Acton, I.M.S., is of the opinion that there is a close relationship between seborrhoea of the scalp and extensive infection of the body by prickly heat and that the rash yields rapidly to remedies like sulphur which is a specific for seborrhoea of the scalp. For this reason he advocates that the initial treatment should be for the scalp which supplies the organisms which cause prickly heat. He suggests that the scalp should be washed with a soap spirit lotion as follows:—*Spiritus rectificatus* 1 oz.,

soft soap 2 ozs. and tincture of lavender one teaspoonful, and that a hair dressing should be rubbed into the roots night and morning. His prescription is:—

Eurosol	..	..	grs.	40
Spiritus Ætheris	..	..	mins.	30
Spiritus Rosemary	..	..	„	30
Oleum Ricini	..	..	„	4
Rose water	..	..	oz.	1

For the rash itself he advocates the following powder:—

Sulphur	..	..	oz.	$\frac{1}{2}$
Camphor	..	..	„	1
Zinc Oxide	..	..	„	2
Starch	..	..	„	3
Boric Acid	..	..	„	1

This powder should be lightly dusted on with a powder puff after the morning and evening bath. He emphasises the fact that the powder must not be rubbed in with the hand, but merely lightly dusted on.

As regards clothing, the mother must remember that the child should not wear flannel or wool next the skin, and that silk or linen of the lightest texture are the best materials.

There is no truth in the assertion that prickly-heat is a good thing, and that it should not be “driven in.” The fact is that it seldom appears much upon debilitated subjects, whose skins are deficient in blood; it affects more readily the healthy integument, but in no way contributes to health; on the contrary, the function of the affected skin is, for the time being, impaired.

5. A vesicular eruption, termed **shingles** or **herpes**, sometimes occurs. It may appear as a number of little blebs about the lips, mouth and forehead, especially after attacks of fever, and then it is of such a trivial nature as to require no treatment. But when a patch of rather large vesicles, filled with clear fluid resting upon an inflamed base, passes half-way round the body as a sort of half belt, which seldom encroaches at all upon the opposite side, is observed, we have to deal with a case of true shingles. Of course, the eruption may be much more limited than this in extent, but its peculiarity is that it confines itself to its own side, almost never passing the spine or the breast-bone. On the fourth

or fifth day the blebs dry up and form dark scabs, which fall off. The appearance of the eruption may be ushered in with a good deal of fever and general disturbance and severe shooting pains in the neighbourhood of the rash. For a short time during the formation of the vesicles, there may be a good deal of local pain, but it does not last long.

It is important to prevent children scratching and rubbing off the heads of the vesicles. If the eruption is very painful and hot, the application of cold in any shape will be found to relieve it. Mild saline laxatives such as (12), or the effervescing citrate of magnesia, with occasional warm baths, and the use of a plain and somewhat low diet, will frequently be found sufficient treatment. The eruption should be protected by being dusted with the oxide of zinc and starch (55) and afterwards covered with a layer of cotton-wool, the air being as far as possible excluded. Another method, if this gives no relief, is to paint the rash with collodion; this usually relieves the pain and any tendency to itching. Some are made more easy by applying a paste made by mixing equal parts of zinc oxide and castor oil. A course of tonics should be commenced after a few days.

6. **The Itch** is a contagious affection, dependent upon the presence of an animal parasite, which burrows beneath the skin and produces by its irritation the appearances which characterise the affection. The favourite positions of the parasite are between the fingers, at the elbows, and on the insides of the thighs; but in young children the hands are rarely affected, the belly, feet, and ankles being selected. Intolerable itching, particularly after the child has become warm in bed, is the most annoying system; the scratching which results removes the tips of the minute pimples which mark the positions of the insects, and sores may be produced, which may prove troublesome to treat.

A child affected with the itch **should be isolated** from all others. All clothes which he has recently worn should be boiled before being washed. At bed-time a hot bath is ordered, and, while in the bath, the child is thoroughly scrubbed with a loofa, or hand rub and soft soap. The soap is well rinsed off in more hot water, and then the skin is vigorously dried with a towel, and sulphur ointment well rubbed in to the whole affected area. This process is repeated in two days' time. For a

young child $\frac{1}{4}$ to $\frac{1}{2}$ strength sulphur ointment usually suffices, as occasionally the full strength ointment itself causes inflammation of the skin. The iodide of potassium ointment is also very efficacious, and it has the advantages of having no smell, but some absorption of the iodide may take place and cause inconvenience. The child should be clad in some old flannel garments of little value, which should be destroyed subsequently.

7. **Ringworm** is the product of a vegetable parasite. It is contagious and appears either on the head or body. It occurs in circular patches, varying in size from that of a two-anna piece to that of a rupee. The surface of these patches is covered with scurf of a dirty whitish colour, the margins being reddish and elevated. When the scalp is attacked, the hair breaks off a little above the surface, so that patches of baldness result; but when the disease is cured, the hair grows again. On the body, ringworm is easily cured, but on the scalp, it is generally troublesome and persistent.

7. Ringworm. Due to a vegetable parasite.

When situated **on the body**, a small portion of an ointment made by mixing equal parts of white precipitate ointment (Ung. Hydrarg. Ammon. Dil.) and sulphur ointment well rubbed in twice a day, generally effects a rapid cure. If this fail, which is not likely, an ointment, twenty grains of salicylic acid to the ounce of lard may be substituted or the part may be painted twice a day with tincture of iodine, to which are added two grains of perchloride of mercury to the ounce of iodine tincture. Occurring on the scalp of infants and young children nothing severe must be employed. It will often suffice to cleanse the head with soap and water every night and then after careful drying to paint each patch with tincture of iodine and perchloride of mercury, and after a few days' use an ointment for rubbing in twice a day composed of Ung. Hydrarg. Ammon. Dil. or this ointment mixed with sulphur. An excellent treatment for chronic cases in older children is Hutchison's plan. He washes the scalp twice a week with the solution of coal tar known as "Liquor carbonis detergens" (one teaspoonful to a pint of water), and twice a day a little of the following ointment, which should be obtained from a chemist, is rubbed into the patches:—

Treatment.

Chrysophanic acid, half a drachm.

White precipitate powder, twenty grains.

Pure lanolin, one drachm.
Benzoated lard, six drachms.
Liquor carbonis detergens, ten drops.
Mix into an ointment.

Dr. Kirley recommends first scrubbing the head, after close cutting of the hair, with hot water and yellow soap to remove all the dead hair and scales and then rubbing into the whole area a paste made by first dissolving two grains of perchloride of mercury in a little methylated spirit and then mixing this well with $\frac{1}{2}$ ounce each of olive oil and kerosene. This is rubbed in once a day until the scalp is tender, and then discontinued, and repeated after a few days for three or four weeks, and the child kept under observation. Since the average duration of ringworm of the head with treatment is over seven weeks, X-ray treatment is a far more speedy method, but needs to be in the hands of an expert, as very serious consequences may occur from careless or ignorant use.

Another method of treatment worth a trial is as follows:—

The hair is cut short, permitting a good examination of the whole surface, the affected parts are shaved, and then washed with ether soap, dried, and the following lotion applied. Calomel five grains, tinct. iodi (*B.P.*) 1 drachm; stir with glass rod—a reddish precipitate is formed. This lotion is poured upon small pieces of cotton-wool and applied to the ringworm area by gentle rubbing. The piece of wool is then discarded, clean white lint applied and bandaged. The child returns to the clinic the next day, the dressings are removed, the areas are washed well with ether soap, ammoniated mercury ointment (*B.P.*) applied, and a bandage again used. This process is continued until cure results, generally within fourteen days; the child is ready to return to school during the third week.

As the lotion is very active, it is necessary to limit the surface of application by dividing the scalp into six equal areas. On the first day, the whole scalp is washed with ether soap, and dried. To area 1, freshly prepared calomel iodine lotion is applied gently, and ammoniated mercury ointment rubbed into the remaining five-sixths; the head is then bandaged. On the second day, the five-sixths part is washed with ether soap, and the lotion applied to another sixth part. The part to which the lotion was applied is then washed as a separate area, and ammoniated mercury ointment applied, and so on. On the seventh day, the whole head

is again treated as one area with ether soap wash, and ammoniated mercury ointment applied.

As bazar remedies, Dr. Waring recommends borax **Bazar remedies.** one drachm dissolved in two ounces of vinegar, for an application; or the following ointment:—Sulphate of copper powdered, twenty grains; powdered galls, one drachm; lard, one ounce; mixed thoroughly and rubbed into the diseased part. He also speaks well of the leaves of the cassia (or ringworm shrub), the plant is named by the natives dadmurdan, or dád-ká-pát. The fresh leaves should be bruised with lime-juice into a thick paste and thoroughly well rubbed into the affected part twice daily till a cure is effected.

Harrison gives a prescription for a “preventive pomade,” to be used by other children who reside in the same house. It is this:—

Eucalyptus ointment,	} of each two ounces.
Boracic ointment,	
Olive oil,	

Oil of cloves, half a drachm.

Mix well together.

8. **Pemphigus** is not uncommon in infants. In **Pemphigus.** one form it may be the manifestation of a severe constitutional disease, in another it occurs as an epidemic or sporadic affection usually due to inoculation with some organism through the skin or umbilical cord. In the constitutional form the blebs occur particularly on the soles of the feet and palms, whilst in the septic form there is usually high fever and toxæmia. Both conditions commence as small red spots, the skin soon then rises into blebs, which may grow to be as large as marbles. At first the blebs are filled with clear fluid, which afterwards become opaque; round each there may be a slightly red zone, but usually the surrounding skin is healthy. There is a little fever. When a bleb bursts, it either forms a scab, or a rather painful little sore is left. The remedies are arsenic or grey powder internally, zinc ointment (61) to the sores, and a bland nutritious diet. “Unna’s paste” is a very soothing application. It consists of one ounce of each of the following:—Prepared chalk, oxide of zinc, linseed oil and lime water. But whenever possible, a medical opinion should be called as to the proper treatment to pursue.

9. Boils.

9. **Boils** are too well known to need description. They are troublesome pests, difficult to relieve.

When a boil first appears, we may endeavour to make it abort by carefully plucking out the little hair which is always found growing at its inflamed summit. At this stage the boil may be covered with Ung. Hydrarg. Ammon. Dil. or, better still, Ung. Chloramine T liberally spread on a small piece of lint. If the throbbing and pain be great, it will be necessary to apply a poultice, which, however, should be carefully restricted to the size of the boil itself, otherwise crops of little very painful boils are likely to appear in the neighbourhood. Before applying a poultice, it is good to smear the boil and surrounding parts with boracic ointment, or daily paint around with iodine tincture to protect them from contamination. It may become necessary to request a surgeon to incise the boil. No known medicine acts as a preventive, except perhaps one teaspoonful of Crookes' Collosol Manganese three or four times a day, but tonics should be given, and of these arsenic and iron (48a) are the best. A change from the plains to the hills is usually followed by speedy cure. A course of rhubarb and soda (red mixture) will help matters usually, as frequently there is or has been gastro-intestinal disturbance.

In chronic cases, great benefit may be derived from the use after medical advice of small repeated doses of vaccines of the germ (*Staphylococcus*) which is causing the boils.

A vaccine may be prepared from the patient himself or $\frac{1}{4}$ to $\frac{1}{2}$ of the dose of a stock vaccine prepared by reliable firms and sold in Calcutta may be injected at intervals a few times.

WARTS.

Many European and Anglo-Indian children suffer from warts which occur on the face and hands particularly and show themselves as yellowish, rounded bosses varying in size from a millet seed to a pea. They cause much worry and disgust, for no clear assignable reason can be given for their appearance.

Treatment.

In some cases, rubbing on to the wart the fresh juice expressed from the castor-oil bean once a day for two or three weeks is successful. In others, painting with a saturated solution of salicylic acid in

alcohol three times a day for one day, and then the following day passing a sterilised flat razor blade (Gillette) under the wart and painting immediately the small raw surface with the above solution again twice that day, is successful. A brown scab forms, which drops off in about a week, leaving a perfectly healthy skin surface.

If this treatment is unavailing, electrical treatment is best. Frequently they go away of their own accord, quite suddenly.

CHAPTER XLIX.

INFLAMMATION OF THE EYE.

Some reference to the more common diseases of the eye is desirable in this volume, but it need hardly be said that in disease of the eye of any degree of severity, the advice of an expert must be sought without delay.

Lids.

Inflammation of the lids, known as blepharitis, arises mainly from want of care and cleanliness or in debilitated children. It is also seen in association with conjunctivitis or as the result of eye-strain. The lid margin is red and swollen, yellowish crusts or scabs are formed along the line of the eyelashes, which, being separated, leave small ulcers. The eyelashes are matted together and the lids commonly adherent to each other after sleep.

Treatment.

The crusts must first be loosened with an alkaline lotion:—(Sodium bicarbonate grains 5 to warm water one ounce) and then the antiseptic ointment, preferably yellow ointment (yellow oxide of mercury half a grain, paraffin mollis and lanolin of each 1 drachm) is gently applied to the edges of the lids. The general health also needs attention, as the condition not infrequently arises in debilitated children. As in all conditions of the eye dependent on ill-health, cod-liver oil appears to have a specially beneficial result.

It may be mentioned here that many of the milder and more **chronic inflammatory conditions of the eye are due to or exaggerated by eye-strain, so that their occurrence should prompt an enquiry as to the presence of errors of refraction and such errors, if present, should be corrected by glasses.**

STYE IN THE EYE.

A common disorder appearing as a red painful spot at the lid margin, often leading to swelling of the whole lid and difficulty in opening the eye. Styes not infrequently appear in crops and indicate that the child is

out of sorts or has some error of refraction needing correction by glasses.

Cold or hot compresses may abort a sty, but as a rule pus forms which can be evacuated by pulling out one or more lashes or by opening the sty with the point of a sterilised needle. The lids are smeared with the yellow ointment of mercury twice daily, concomitant conjunctivitis is treated (*vide infra*) and attention is paid to the general health.

Granular lids or trachoma is a contagious disease of the eyes accompanied by pain, swelling of the lids and a thin muco-purulent discharge. On everting the lids, the inflamed conjunctiva will be seen to be studded with minute granules. The condition is serious and, neglected, will be fraught with the most disastrous consequences to vision.

It is of importance that the disease be recognised early, both on account of its infectivity and on account of the urgency of skilled treatment.

OPHTHALMIA NEONATORUM.

The toilet of the eyes in the early days of life is by no means the least important part of the nurse's duties. Failure to attend to this point may lay the infant open to an attack of ophthalmic neonatorum, an infection of such virulence that the eyes may be permanently damaged. It has been mentioned in Chapter IV that the disease is preventable by the care of the eyes immediately after birth. The lids are cleaned with boracic lotion, then separated and a few drops of silver nitrate solution half grain to one ounce of water or argyrol solution 10 per cent. are instilled into the eyes.

Should, however, infection occur, about the third or fourth day the eye becomes inflamed and red, the lid swells and pus oozes from the eye. If the disease progresses unchecked, the cornea becomes filmy, then white, and deep ulceration, leading to perforation and infection of the deeper parts of the eye, occurs. Treatment is on the lines laid down for purulent conjunctivitis and only by the most constant and skilled attention can we hope to save the eye.

Conjunctivitis is inflammation of the membrane covering the white part of the ball of the eye and the

lining of the lids. The symptoms vary considerably in degree according to the cause and type of infection. The causes are numerous:—Exposure to wind, dust and glare, foreign bodies in the eye or eye-strain. Bacillary infection, sometimes in epidemic form as illustrated by the acute contagious conjunctivitis or Pink Eye, The condition may be part of some general infection of the upper air passages, in cold in the head, in influenza or measles.

The more purulent forms are due to infection by certain specific bacilli.

The affection usually begins with smarting or itching of the eye and a sensation as if dust had got under the lids. The secretion is increased, the eye waters, and there is a dislike of exposure to light (Photophobia). The usually clear white of the eye becomes pink, red or streaked with blood-vessels and the smooth lining of the lids becomes red and rough. The discharge is watery or muco-purulent, but in the most severe infective cases almost pure pus is exuded from between the lids. The lids swell, in severe cases to such a degree as to make the opening of the eye, even passively, difficult.

Infectivity.

The subject of the infectivity of the discharge from the eye is one of the highest importance, as some even of the simpler forms are highly infectious and the disease tends to appear in seasonal or epidemic form. The more severe forms with purulent discharge are invariably highly infectious and liable to conveyance to other children through the media of towels or washing utensils, by flies or by the drying of minute particles of matter, which may be carried through the atmosphere. Not only should the greatest care be taken when the discharge is purulent, that other children are not infected, but if one eye only is infected, the other eye of the patient should be guarded by a carefully placed pad and bandage.

Treatment consists in bathing the eye, the application of antiseptic drops and the prevention of the sticking together of the lids. In addition to such local measures, attention is desirable to general hygiene and health. When there is debility, tonics, especially cod-liver oil, good food and fresh air are necessary. In the more mild cases, the child should be allowed to take

exercise out of doors, the eyes being guarded from excessive light by an eye shade or tinted glasses.

In the more severe or purulent cases, there will be marked prostration: the child will remain in bed, special attention will be paid to the nourishment and stimulants may be necessary. The condition will, in fact, be treated on the general lines applying to any other acute illness.

For the purpose of bathing the eye a warm mild lotion is employed, such as the boracic lotion (No. 59) or normal saline solution. The eyes of young children are best bathed by allowing a stream to run from saturated cotton-wool, but for older children some form of irrigator or an eye bath may be used. Great care is observed in opening the eye. On no account should pressure be exerted on the eyeball. The thumb of one hand should depress the lower lid while the two fingers gently raise the upper one. Local treatment.

After the washing out, a few drops of antiseptic are instilled, or, better still, when skilled hands are available, the lids are painted out. For this purpose, a solution of argyrol 10 per cent. or silver nitrate grain $\frac{1}{2}$ to 1 ounce are used.

It is most important that the lids should not stick together, thus locking up the infective discharge. To prevent this, the edges are smeared with vaseline or the yellow ointment.

The number of times that the above toilet should be performed will depend on the gravity of the infection. On the milder cases three times a day will suffice, but in the acute purulent cases, it must be carried out every hour if the eye is to be saved.

Should the cornea lose its lustre or greyish spots appear on the surface and should the redness of the eyeball change to a darker hue, ulceration has taken place. The same treatment will be carried out, but in addition, the following ointment will be applied within the eye three times a day. Yellow oxide of mercury grain $\frac{1}{2}$, atropine grain $\frac{1}{2}$, lanolin and soft paraffin of each 1 drachm. Ulceration.

If the pain is intense, a few drops of 2 per cent. cocaine may be instilled, but repeated application of cocaine will soften the cornea and tend to encourage the

ulceration. As a substitute, a solution of chloretone grains $\frac{1}{4}$ to 1 ounce of water is free from this objection and has the additional advantage that it is an antiseptic.

After the acute stage has passed there may be a tendency to the persistence of some slight redness of the eye. At this stage astringent drops are indicated. Zinc sulphate grains $\frac{1}{2}$ to 1 ounce of water dropped in the eye night and morning. Such drops are also useful in the mild chronic cases due to dust, glare or eye-strain.

**Phlyctenular
ulceration.**

This condition arises in children as the result of bad hygiene, faulty or deficient diet and after debilitating illnesses.

On the surface of the conjunctiva or cornea there appear one or more small greyish spots towards which there is a small brush of injected vessels. After a short while these pimples become yellowish and form a small ulcer. Should they be on the conjunctiva, they clear up quickly leaving no trace, but on the cornea, there is danger that in healing some degree of opacity will be left, leading to impairment of vision. Associated with these ulcers there is pain, difficulty in opening the eye, increase of tear secretion and photophobia.

The treatment consists of the application between the lids of the yellow ointment of mercury and atropine (*see* above) and general treatment with tonics and suitable diet.

The application of ointment within the eye:—A quantity of the ointment about the size of a small pea is taken on a glass rod or match-stick; the lower lid is drawn down and the ointment allowed to melt against it, or the upper lid is drawn forward by the eyelashes and the ointment placed beneath it.

Finally, let it be emphasised that skilled advice should invariably be sought for affections of the eye and that the milder inflammations of the lids and conjunctiva are frequently due to errors of refraction and are a sign that the child needs glasses.

CHAPTER L.

THE EAR.

The ear is built of the following parts:—
The outer, the middle and the internal ears.

Structure and Function.

This consists of the auricle from which the passage of the ear—the external auditory canal—passes inwards. **The outer ear.** The external auditory canal is divisible into two parts—an outer part which consists of cartilage and an inner part which is bony. The cartilaginous portion of the canal has hairs and hair follicles and ceruminous glands from which the wax of the ear is secreted. In the newborn infant, owing to the non-development of bone in this neighbourhood, there is no bony portion to the canal, but as growth advances, the bony portion of the canal is completed by the second or third year of life. The external auditory canal of the infant is like a collapsed tube whose upper and lower walls are in contact. In order, therefore, to convert it into an open tube, the lobe of the ear should be drawn downwards. In a grown up child and adult, on the other hand, the canal is curved and can only be rendered straight by drawing the ear upwards and backwards. These points should be borne in mind when it is necessary to examine the drum head or to syringe the ear. The narrowest portion of the canal—the isthmus—is situated just internal to the commencement of the bony canal. The function of the outer ear is to collect and transmit the waves of sound to the tympanic membrane which lies stretched at the bottom of the external auditory canal.

Beyond the tympanic membrane is the middle ear. **The middle ear.** This is a small cavity and it contains a chain of three small bones called the ossicles. The first of these ossicles is called the malleus or hammer bone; it is attached to the tympanic membrane on one side and to the incus on the other. The incus resembles an anvil and in turn is jointed to the third ossicle, the stapes or stirrup bone, the foot-plate of which fits into the oval

window of the internal ear. The middle ear is in communication behind with a cavity known as the mastoid antrum, around which are a large number of smaller cavities—the mastoid air cells. When infection spreads from the middle ear into these cavities, the condition is known as mastoiditis—a very dangerous complication—for which an operation may be required. In front, the middle ear is in communication with the post-nasal space by a tube known as the Eustachian tube—this tube constitutes a passage through which small amounts of air constantly enter the middle ear during the act of swallowing. The function of this tube is to maintain the air within the cavity of the middle ear at the same pressure as the outside air. Anything, therefore, interfering with the patency of this tube may cause deafness. The bone immediately behind the auricle forms a conical projection ending in a teat-like process, this is the mastoid process, and in it are the mastoid air cells just spoken of. In an infant, there is no mastoid process or mastoid air cells, but there is always, however, a mastoid antrum present. The mastoid process and cells develop at about the age of two. In children, the Eustachian tube is relatively shorter, wider or more horizontal than in the adult, and this difference may provide an explanation of the greater frequency with which infection passes up this tube to the middle ear in a child. The function of the middle ear is to transmit the vibrations of sound falling upon the tympanic membrane via the chain of ossicles to the internal ear.

The internal ear.

This consists of a maze of canals called the labyrinth. These canals are filled with a fluid. The labyrinth consists of two different sets of canals, one of these is called the cochlea, which is a spirally twisted tube of 2 and $\frac{1}{2}$ turns, exactly like the shell of a snail. In the cochlea are the fine nerve endings of the auditory nerve. It was stated before that the stapes or stirrup bone is fixed by its foot-plate which fits into the oval window of the internal ear, the vibrations caused by the waves of sound are transmitted by the foot-plate of the stapes to the fluid contained within the tube of the cochlea. The fluid here is set into motion which causes a stimulation of the nerve endings in the cochlea. A message along the auditory nerve then travels up to the brain causing us the perception of sound. The other system of canals subserves the function of equilibrium or balancing.

This mechanism consists of three semi-circular canals; in these are the nerve endings of the vestibular nerve, the balancing nerve. Movements of the head and body set the fluid in these canals into motion, this motion stimulates the nerve endings in the semi-circular canals, we are thus informed of the position of our heads and bodies and are enabled to balance ourselves. Any condition which interferes with this balancing mechanism tends to make us giddy and unsteady.

It will be seen from the foregoing that there are three distinct parts to the function of hearing. The first is the conduction of sound and the second is the reception of sound, and the third is the perception of sound which is subserved by the hearing centre in the brain. The outer and middle ears are concerned with the conduction of sound, the internal ear is concerned with the reception of sound. Any condition, therefore, which interferes with the function of the outer or middle ears causes an "Obstructive Deafness" (obstruction to the conduction of sound). Anything which interferes with the function of the internal ear and the delicate nerve endings of the nerve of hearing or the perceiving centre in the brain causes a **nerve deafness**. These are the two main types of deafness we are called upon to deal with, of which the first is by far the most common.

Common Symptoms of Aural Disease.

It is well at the outset to bear in mind that there are four common symptoms of which a patient suffering from any form of aural disease, whether it be of the outer or middle ear, acute or chronic, may complain. The symptoms are these:—I Earache; II Deafness in greater or lesser degree; III Discharge from the ear; and IV Tinnitus Aurium or the sensation of noises in the ear. It is seldom that a child will complain of any of these unless it is earache when severe. The symptoms are given, however, in order to help parents to recognise them when any condition leads one to suspect the ears to be at fault. Any or all of the above symptoms may be present in the conditions about to be described.

Examination of the Ear.

The examination of the ear should be conducted with the affected ear facing a good light. The presence

of swellings both in front and behind the ear should be looked for. The rules for straightening the canal of the ear given above should be followed. It is possible to see the commencement of the external auditory canal by this means. When the tympanic membrane is required to be seen, a beam of light either reflected from the sun or from an electric lamp has to be projected into the ear through aural speculum.

Affections of the outer Ear.

**Auricular
Eczema and
Impetigo
and its
treatment.**

One of the commonest conditions met with in the external ear is eczema and impetigo; it is seen chiefly in uncared for ill-fed children living under unfavourable conditions. These are the predisposing causes, the direct cause of the condition is nearly always a purulent discharge from the middle ear pouring over the skin of the auricle and infecting it. There are three distinct stages to the disease. At first, the ear is red and swollen, later on blebs form and burst, the exuded fluid drying in the form of scabs. In the last stage, the whole area may be denuded of skin presenting a raw and bleeding surface. Treatment should be directed to the cause, namely, the discharge from the middle ear (*see* later). Locally a starch poultice should be applied to soften and remove scabs and then the ear should be treated with a mild mercurial ointment. Hydrarg. ammon. grain 5 to the ounce of vaseline.

**Furuncles
or Boils
and their
treatment.**

These are not so common in childhood as in later life. They are situated in the outer or cartilagenous portion of the external auditory canal. Boils are, therefore, quite near to the surface. The exciting cause is a local infection often brought about by a chronic middle ear discharge acting on a denuded area in the canal or a scratch or injury resulting in an abrasion which provides the point of entrance of bacteria. Boils in the ear passage are very painful indeed, any manipulation of the auricle causes pain. Mastication in this condition becomes difficult owing to the movements of the jaw causing pressure on the inflamed canal of the ear. The condition is usually accompanied with a slight rise of temperature. It is important to know when a child complains of earache, whether the pain is caused by an inflammatory condition in the canal of the ear or whether the pain is of middle ear origin. The points are these. If a boil is present, there is usually some swelling to be

seen either in front of the auricle or behind. Movements of the auricle cause pain and if the ear passage is examined, it will nearly always be seen that it is occluded by swelling.

In the very early stages a boil may be aborted by the insertion of a wick of cotton-wool into the canal and keeping this wool saturated with a solution of 1 in 4000 hydrarg. perchlor. in equal parts of rectified spirits and water or in pure spirit. Continuous heat should be applied in the form of a hot-water bag. If these measures do not bring prompt relief, the furuncle should be incised under a short general anæsthesia and the pus evacuated. Spirit dressings of the above solution should be applied and the ear cleansed and the dressings changed every day. After healing takes place, a mild antiseptic mercurial ointment should be applied for a few days in order to prevent recurrences.

Treatment.

Wax is secreted by the cerumenous glands in the front part of the auditory canal. New collections forming in front of old ones may cause the wax to be pressed deep into the ear until a large mass is formed filling up the whole canal and pressing on the tympanic membrane. Plugs of wax may cause much deafness and pain. On inspecting the ear, they appear as a dark brown shining mass. The correct treatment is to evacuate the mass by means of syringing the ear with plain warm water. The wax may be old and very hard, in which case it should be softened by the instillation of soda bicarb. grains 40 to the ounce of water. The ear should be filled with this solution three times a day for two or three days, allowing the fluid to soak in for ten minutes at a time. The mass is then sufficiently softened and can be easily removed by syringing.

Accumulation of cerumen or wax and its treatment.

Children are very fond of inserting foreign bodies into the ear. The common objects inserted are seeds or beads, stones, etc. Indian parents sometimes insert a whole garlic into the ear of a child complaining of ear-ache. It cannot be insisted upon too strongly that a pair of forceps should never be used for the extraction of a foreign body in the ear. The body is usually driven further in by attempts with such an instrument. **In the vast majority of cases and in nearly all types of foreign bodies, syringing is all that is necessary.** If a good trial with a syringe has failed, a small blunt hook should be

Foreign bodies in the ear and their treatment.

passed by sight and manipulated behind the foreign body which is then gently drawn out. Objects such as peas which swell in contact with moistures may have to be gently broken up before syringing. If these measures fail, it may be necessary to perform a cutting operation for the removal of the offender, but cases treated with care need never come to an operation. Ill-planned attempts to remove a foreign body may cause the foreign body to be driven into the middle ear through the tympanic membrane. Much laceration and tearing of tissue may be caused by ill-attempts at the extraction of a foreign body, and cases thus treated have been known to terminate fatally. It is sometimes necessary to give a child a short general anæsthesia for the successful removal of a foreign body, either by syringe or hook.

Perichondritis.

Inflammation of the cartilage of the ear is often seen in Indian children who have their ears perforated for ear-rings. The small wounds are made without any aseptic precautions and are then neglected with the result that a condition very painful and difficult to treat arises. Usually operations for the removal of infected cartilage have to be undertaken as simple incisions are not of much avail. Great deformity of the auricle may result from the loss of cartilage and subsequent scarring. This paragraph is merely to serve as a warning.

The Inflammatory Diseases of the Middle Ear.

Predisposing causes.

Of predisposing causes, little may be said beyond the fact that conditions of lowered vitality render children more susceptible to middle ear inflammations. Only in this way can we explain the prevalence of these diseases in the ill-nourished and badly housed children of the poorer classes.

Age.

Children, undoubtedly, suffer more frequently than adults. This is due in part—

- (a) To the presence of adenoids in early life.
- (b) To the greater susceptibility of children to the acute infective fevers nearly all of which are accompanied by catarrhal conditions of the nose and throat, and
- (c) To the anatomical differences in the Eustachian tubes (*see* above) in the young as compared with the adult.

The most potent predisposing cause of middle ear disease is to be found in conditions interfering with nasal respiration. Children are the greatest sufferers in this respect, because of the presence in their post-nasal space of adenoid growths. These with or without enlargement of the tonsil constitute the greatest menace to the ears. Examination of any series of children suffering from adenoids will reveal in the vast majority of cases some degree of middle ear inflammation in one or both ears.

Nasal obstruction.

Broadly speaking, there are many conditions which are accompanied with a catarrhal process in the nose post-nasal space and throat. Thus amongst the commonest causes may be mentioned—

Immediate exciting causes.

- I The ordinary cold in the head,
- II The acute fevers—influenza, measles, diphtheria, scarlet fever, etc.
- III **Sore throats** acute and chronic forms of tonsillitis.

There are three common types of middle ear disease which affect children. They are (I) Catarrh of the Eustachian tubes, (II) Acute middle ear suppuration, and (III) Chronic middle ear suppuration. Quite 99 per cent. or over of all the above conditions owe their origin to a spread of infection into the middle ear from the post-nasal space via the Eustachian tubes.

Types.

Adenoids is the most potent factor in the production of this condition and children are much more frequently sufferers from this complaint than is generally recognised. Adenoids may not only cause a mechanical block to the openings of the Eustachian tubes, but they may, if they are inflamed, as they are during a common cold, cause an inflammation of the mouths of these tubes, the swelling thus produced causes an obstruction to the tubes and does not allow sufficient air to enter the middle ears. The air pressure within this cavity of the middle ear becomes less than that of the outside air causing the membrana tympani to be pushed inwards and become retracted. The main symptom of this condition is deafness. Children do not as a rule complain of deafness. It is only when a parent notices that the child is deaf and seeks advice that an examination of the tympanic

Catarrh of the Eustachian tubes and its treatment.

membranes shows them to be retracted. Twinges of pain sometimes occur, but on the whole, the condition is painless. Permanent deafness is frequently the result of Eustachian catarrh if the cause is not quickly removed. Adenoids and infected tonsils should be removed without delay. After the operation, attempts should be made to restore the function of these tubes by inflating the ears with the Politzer bag. The nozzle of the bag is placed in one nostril and held there by the finger and thumb which also serve to close the other nostril. The patient is then either made to swallow a gulp of water or blow out his cheeks and concurrently with these actions the bag is forcibly compressed, air is thus forced up the nose through the Eustachian tubes into the ear. The treatment should be performed two or three times a week.

**Acute sup-
puration of
the middle
ear and its
treatment.**

Infection travels up into the middle ear via the Eustachian tubes and causes an intense inflammation here. Owing to the obstruction in the tubes, the products of inflammation collect in the middle ear, ultimately, the tympanic membrane bursts and through the perforation thus caused, a discharge of pus runs out of the ear. The disease is usually accompanied with high fever in a child. Earache may not be complained of in the very young, though it generally is in older children. Restlessness, irritability, sleeplessness, crying without apparent cause, grabbing at the ears or rubbing the ears are all signs which should arouse suspicion. Sometimes, the condition is latent and the first sign is a discharge from the ears. The child should be put to bed, a smart purge is given and the nose and throat are treated as described in the section dealing with these conditions. If the ears are examined before the discharge has appeared, the tympanic membrane will be found to be red and swollen. The proper treatment is to incise the membrane before it has burst, as this shortens the attack. The discharge should be treated with the utmost energy. The great principle in the treatment of a discharging ear is that it should be kept dry and clean. For this purpose, the ear should be mopped out as often as the profuseness of the discharge makes the drying out necessary, little swabs of cotton-wool are made round the end of a match stick and these are inserted into the ear as far as they will go. Several are used until the last one returns dry. An instillation of the following drops is then made.

Acid Carbolic,	m. viii	} or {	Glycerine Acid Carbolic, drachms 2
Spt. Vini Rect.	half an		
ounce			
Water to the	ounce		Glycerine to the ounce

The drops should remain in the ear for ten minutes, the ear is then emptied and dried again. If the above drops are not tolerated, a few drops of hydrogen peroxide may be instilled into the ear. Time should be given for frothing to take place and when this has ceased, the ear should be dried out with meticulous care. The majority of cases, if carefully treated, clear up and are well in two or three weeks' time. If the discharge persists much beyond this time, ionization should be tried, it is very effective in completely stopping all discharge. After the acute symptoms have subsided, it is imperative that tonsils and adenoids should be removed. The general health of these young patients should be attended to. Fresh air, plenty of good nourishing food, and cod-liver oil and malt should be given, as the discharge is apt to recur in children, these recurrences coincide with colds and fevers.

Generally speaking, few cases become chronic if efficient treatment of the acute condition is carried out. One may say that if a discharge has lasted more than three months it has become chronic. There are many reasons for chronicity which have to be looked for by a specialist. The question of operation has always to be considered in this condition. The local treatment is the same as for acute middle ear suppuration.

Chronic middle ear suppuration.

Both acute and chronic middle ear diseases are potentially dangerous. The inflammation may spread from the middle ear into the antrum and mastoid air cells giving rise to acute mastoiditis and mastoid abscess. When this complication occurs, there is great pain and tenderness in the bone behind the ear with later on a swelling in this region. By reason of the close relationship of the antrum with the brain and with a large vein—the laperal sinus—inflammation may spread to these parts producing in the first case abscess of the brain and in the second a blood poisoning. Infection may also spread to the brain coverings and the facial nerve which lies close to the middle ear, producing meningitis and facial paralysis. If the organ of equilibration is affected, great giddiness may result.

The complications of acute and chronic middle ear suppuration.

**Danger
signals.**

If a patient in the course of an acute or chronic suppuration of the middle ear develops high fever with or without rigors, complains of severe headache or pain of a serious character and tenderness over the mastoid process, if he has giddiness and vomiting or facial paralysis, then it is to be assumed that a complication of middle ear disease has set in. We should never wait for all these signs to appear. This list of symptoms is given in order to show the limit beyond which no case of aural suppuration should be allowed to go without operation.

**Syringing
the ear.**

The object of syringing the ear is to cleanse the external auditory canal. It should, therefore, never be done with such force that water may find its way into the middle ear through a perforation should one exist. Before syringing the ear, the canal should be rendered straight as indicated above. The stream of water should be injected steadily along the side or roof of the canal. In the case of foreign bodies or wax the idea is allow the water to get behind the foreign body or wax which is driven out by the outflow of the returning water.

Frequent inspections should be made in order to find a little chink through which to direct the stream of water behind the foreign body and the ear should be completely emptied at the end of the small operation. Syringing the ear in acute and chronic middle ear disease should not as a rule be practised for fear of driving pus into healthy parts of the ear through perforations. It is legitimate, however, to employ it when a discharge is so very profuse that the ear cannot be rendered dry satisfactorily.

**Deaf
mutism.**

If the power of hearing is absent from birth or if it is lost in early life, the child will be a deaf mute. The former condition is known as congenital deaf mutism and the latter acquired deaf mutism. In the latter condition, mutism follows if deafness sets in before the ages of four to six according to the intelligence of the child. The congenital variety is due to absence or malformations of parts of the organs of hearing or to intra-uterine disease affecting the ears. By far, the largest number of deaf mutes, however, belong to the second class and a majority of these are due to preventable disease—such as measles, pneumonia, influenza, scarlet fever and to acute and middle ear suppuration just

described. Meningitis affecting the auditory nerves and syphilis may also be causes. If the child is not totally deaf, every advantage should be taken of the remnants of hearing present even if one has to shout in speaking to these children. Education in lip reading should be started very early in life.

Modern treatment is directed mainly to the prevention of deafness. Treatment for deafness may improve the condition or even arrest its progress, but, unfortunately, when deafness is once firmly established, it is a slowly progressive condition for which there is no cure. The seeds of deafness are often sown in infancy and childhood, and it is during these periods of life that a watch should be kept for the first signs of aural disease. The most fruitful causes of deafness are due to preventable diseases in children. These have been mentioned above. Of all conditions, it is no exaggeration to say that the one that takes the first place in producing the catarrhal and suppurative processes in the ear leading to deafness is adenoids and diseased tonsils.

The prevention of deafness.

The Nose.

Each nasal cavity is a chamber separated from its fellow of the opposite side by a partition partly bony and partly cartilagenous. This partition is called the septum of the nose. On the outer wall of the nose are three curved shell-like bones called the turbinate bones, each of these is covered with mucous membrane. The two upper ones have the nerve endings of the sense of smell and the lowest one—the inferior turbinate bone—the most important structure in the nose warms, moistens and purifies the air and makes it ready for its reception into the lungs. The outer wall of the nose has also connected with it a system of large air cells whose function is to act as resonators for the voice. The nose opens behind into a space which is curtained off from the mouth by the soft palate. This space is called the post-nasal space. It is from here that adenoids grow.

Structure of the nose.

Functions of the Nose.

The chief functions of the nose are:—

Respiratory, olfactory, i.e., connected with the sense of smell and vocal. The nose also serves as a ventilating shaft by means of which air can enter the Eustachian tubes. The respiratory function is the most important.

The importance of nose breathing.

It is by means of the nose that the cold outside air is warmed to the temperature of the body before it enters the lungs. Owing to the moisture secreted in the nose, the air is also moistened. It is important that the lungs be supplied with warm moist air. The mucous membrane of the nose in certain areas is rich in cells which have projecting hairs, the movements of these hairs act as a filter, and all small particles of dust and germs of disease are prevented from reaching the lungs. When there is any obstruction to nose breathing, not only does the child not attain sufficient oxygen, but having to open its mouth, its lungs receive cold, dry air unfiltered of micro-organisms and impurities. The nose subserves the sense of smell. This sense gives us the appreciation of flavours and helps to put us on our guard against evil smelling and irritating substances in the air. The nose by reason of the large number of air cells in its vicinity gives to the voice its peculiar resonance, these cells acting as resonators. The child whose nose is blocked does not thrive for numerous reasons which will be found fully dealt with when the subject of adenoids is discussed.

**Examina-
tion of the
nose.**

To examine the front part of the nose, the child should be taken to a good light and the nostril tilted up when the front part of the septum and the ends of the inferior turbinate bone come into view. It is generally, however, necessary to examine the deeper portions, a small nasal speculum or a large sized ear speculum is inserted within the nostrils and with the aid of a head mirror a beam of light is projected into the nose when the deeper parts are seen. A post-nasal examination must always be made in a child. It is seldom possible to perform this in the ideal way, that is, by inspection with a mirror. A digital examination has to be made and it is to be done in the following manner. The observer stands to the right side of the patient, he puts his left arm over the patient's head and having asked the child to open its mouth, the left forefinger pushes the cheek gently between the upper and lower teeth to prevent the child from biting the examiner's finger. The right forefinger is swept in underneath the soft palate into the post-nasal space where any abnormality such as adenoids are felt for.

**Cleansing
the nose in
a child.**

The best way to cleanse the nose is to blow it. Older children can usually be taught to blow their noses. It is not sufficient simply to wipe the nostrils. For

cleansing purposes watery solutions have to be used, the best solution is an alkaline one, and the following formula is a good one:—

Sod. Bicarb.	}	aa. gr. iii.
Sod. Chloride		
Borax		
Acid Carbolic		m. $\frac{1}{2}$.
White Sugar		gr. v.
Water		to the ounce.

This solution may be dropped or gently squirted into the nose by means of an ordinary fountain pen filler or poured in by means of a glass nasal douche or sprayed into the nostrils with a spray.

Owing to its prominent and exposed position, falls on the face are particularly liable to fracture the nose. It may be taken as a general rule that whenever a child after a fall upon its face has bleeding from the nose, it has sustained a fracture either of the nasal bone or the cartilagenous portion of the septum. These injuries should be attended to with care by a surgeon, because the former can produce an unsightly deformity and the latter may cause nasal obstruction by producing a twist of the septum.

Injuries to the nose.

Children are very fond of inserting foreign bodies into their nose. In Indian children, the commonest foreign body met with in the nose is the tamarind seed and portions of areca-nut. Buttons and beads are also favourite objects. When seen early, these foreign bodies are seldom deep in the nose, they can be extracted with the greatest ease by means of a long bent probe. The bend of the probe is got beyond the foreign body and on withdrawal of the probe, the body comes away. It is seldom necessary to use a pair of forceps for the extraction of a foreign body. If one is used, its blades should clearly be seen to grasp the foreign body. An object left in the nose for any length of time gives rise to septic complications. A purulent foul smelling and bloody discharge from one nostril is nearly always indicative of a long-standing and neglected foreign body in the nose of a child.

Foreign bodies in the nose and their treatment.

Nose bleeding is common in children. It is a very alarming condition to a parent. It is to be remembered that in nearly every case the bleeding comes from a

Epistaxis and its treatment.

vessel situated on the front part of the septum and within easy sight of the surgeon's eye. The simplest way to control the bleeding is to tightly hold the nose between the finger and the thumb for a few minutes. It is hardly ever necessary to do anything so drastic as to plug or pack the nose, this practice is much to be deprecated owing to the serious consequences which may follow. Should the bleeding persist, a small pledget of cotton-wool moistened with adrenalin or peroxide of hydrogen inserted just within the affected nostril for a short time is sufficient to arrest the bleeding. Cold applications on the bridge of the nose are also very useful. Epistaxis is common in children suffering from adenoids. It frequently also is the first sign of an acute fever, such as measles or pneumonia. Frequent and persistent attacks of epistaxis should always lead to a careful examination by a specialist, in order to exclude such serious causes as a growth or some constitutional condition.

**The cold
in the hand.
Acute nasal
catarrh and
its treat-
ment.**

Children are more apt to suffer from colds in the head than adults are, whilst the condition is a trivial matter in an adult, it often is quite a serious affair in a child. The reason of this is that a cold is more liable to spread downwards and affect the bronchial tubes in children. Colds are invariably caused by infection with micro-organisms and are to be regarded as infectious fevers just like measles. When a child, however, suffers from repeated attacks of cold, the probabilities are that there is some obstruction to nasal respiration which causes that particular nose to be an ill-drained cavity, and therefore more susceptible to the attacks of micro-organisms than healthy unobstructed noses. The commonest obstruction to nasal respiration in a child is adenoids. These children are, therefore, much more liable to colds than children who do not suffer from this complaint. In them there is a constant nasal discharge and the parents of these little sufferers will tell you that they are in a state of perpetual cold. Prevention of colds is better than cure. No one suffering from a cold in the head ought to be allowed anywhere near children. Fresh air is of prime importance, but the rules of hygiene such as baths, exercise and suitable clothing should receive adequate attention. A child who catches cold should be treated in bed and isolated from other children. Such household remedies as hot gruel, mustard baths

and a purge may abort an attack. Many remedies have been praised, among these may be mentioned vini ipecac. antimonial wine and cinnamon oil and ammoniated tincture of quinine. Care must be taken to graduate the doses of these to the age of the child.

In children, a constant nasal discharge is almost always due to adenoids. Such conditions as infections of the nasal air cells which produce a chronic discharge in an adult are so very rare in children that they need not be mentioned.

Chronic nasal discharge.

Most cases of this distressing disease begin between the ages of five and twelve. The child is brought by its parent who complains of the presence of a very foul-smelling purulent or crusty discharge sometimes blood-stained, which makes social intercourse with the child intolerable. If a foreign body is not present, then the condition most probably is ozæna. The cause of this trouble is unknown and it is incurable. Much, however, can be done towards alleviation, one of the most successful treatments is to pack the nose for twenty minutes with ribbon gauze soaked in glycerine, the glycerine provokes a flow of mucus which loosens the crust which can then be syringed out. The treatment should be carried out every day over long periods.

Ozæna and its treatment.

This condition may appear in the form of a chronic nasal discharge popularly known as snuffles. It usually begins in the first three months of life. The discharge is obstinate and tends to form crusts. There is much destruction of bones in the interior of the nose, causing the bridge of the nose to flatten. The appropriate anti-syphilitic measure should be taken without delay.

Inherited syphilis.

A word should be said here about nasal polypus. Parents are sometimes greatly alarmed by the fact that they have seen a pinkish swelling in the insides of their children's noses whilst they were being washed. It is immediately assumed that the swelling is a polypus. The swelling in question is the inferior turbinate bone with its covering of mucous membrane. A polypus is a very rare condition in a child.

Nasal polypus.

There is normally present a small collection of lymphoid tissue in the post-nasal space. This collection of lymphoid tissue is called the naso-pharyngeal or Luschka's tonsil when this tissue undergoes enlargement, the condition is popularly known as adenoids.

Adenoids.

The exact cause of this enlargement is unknown. In a few cases it is met with at birth or shortly afterwards, but usually the enlargement begins to appear from the age of three to ten. The tendency is for these growths to disappear as age advances, but this may not invariably be the rule. The enlargement causes an obstruction at the back of the nose to the passage of air into the lungs.

Symptoms. The **Symptoms** can be described under several headings, of which the most important is the disturbance with normal function of the nose causing an obstruction to nasal respiration. The commonest signs in a typical case are these. The mouth is open and the upper teeth project. The nose is pinched up from want of use. The mouth being open, the cheeks are dragged upon causing an obliteration of the natural folds. The face on this account acquires a dull, vacant and expressionless appearance. In a marked case there is a constant discharge from the nostrils leading to excoriation of the surrounding skin. The child breathes heavily in the day and snores at night. He gets out of breath easily and complains much of thirst owing to the dryness of the throat occasioned by mouth breathing. He takes hours over his food, frequently having to give up eating in order to take a mouthful of air, a young infant on the breast chokes owing to its inability to suck and breathe through the mouth at the same time. The voice is dead and toneless. Bleeding from these growths often cause epistaxis.

Skeletal changes. Owing to adenoid obstruction, the lungs cannot expand sufficiently and the chest is flattened. In those cases where there is an element of rickets, the typical pigeon chest is produced. The palate is high arched, in consequence of this, the teeth grow irregularly and are crowded. The upper teeth project and being exposed to the air are very liable to decay.

Interference with food and digestion. The inability to eat and breathe at the same time has been referred to above. The appreciation of flavours is lost owing to the obstruction interfering with the sense of smell, the appetite is thereby impaired and becomes capricious. Owing to the constant swallowing of mucus secreted from these adenoids, the digestive juices are rendered more dilute. These children frequently suffer from vomiting and digestive troubles.

Adenoids may, therefore, be a serious cause of malnutrition.

The lungs are not filled sufficiently with air, the blood, therefore, suffers from the want of oxygen, unwarmed and unmoistened air makes the child more susceptible to bronchitis; indeed, these children frequently suffer from cough, both of bronchial origin and reflex due to mucus trickling into the larynx.

Owing to the proximity of these growths to the Eustachian tubes, the function of these tubes is interfered with. Air cannot enter the ears, deafness resulting. Ear discharges are of frequent occurrence, also owing to infection travelling into the ears from inflamed adenoids. Indeed, adenoids may be said to be the greatest of all menaces to the function of hearing.

Influence
on the
ears.

Susceptibility to colds and the infective fevers and to glandular enlargements in the neck is common owing to the great liability of this adenoid tissue to inflammation.

Many nervous symptoms, such as night terrors, nocturnal incontinence of urine, convulsions and stammering may be explained by the interference with respiration, eating and sleep.

Affects on
the nervous
system.

The mental attitude of these children is peculiar, they are dull and listless, irritable and peevish, they do not join in games and are very backward in school.

The above picture is one of typical nasal obstruction due to adenoids. It must be remembered that there are all grades of nasal obstruction and that one group or other of the above signs may be absent in a particular case. The important point is that whenever any of these symptoms are present, suspicion should be aroused as to the presence of this condition which has such a baneful influence on the growth and intelligence of these little patients.

Diagnosis may be obvious from the symptoms and frequently there is no necessity to make an examination. It is the exception rather than the rule to get a child so docile as to be able to see these growths in a post-nasal mirror. When examination is necessary, it is usually necessary to pass the finger into the post-nasal space and feel the growths.

The treatment should in all cases be surgical. The instrument used is a curette, and the growths are scraped away with this. At the operation, care should be taken to make a thorough examination and remove all growths with the finger from the recesses into which the instrument cannot reach.

The results of the operation are marvellous as regards the improvement in general health, but when such advanced structural changes as pigeon chest, irregularities of teeth and palate have occurred, it is hardly to be expected to find an amelioration in these. Inveterate mouth breathers are so accustomed to not using these noses that the pernicious habit of mouth breathing may persist after the operation. It then becomes necessary to institute breathing exercises in order to re-educate these patients in the art of nose breathing.

CHAPTER LI.

ACCIDENTS.

Bruises, Bleeding, Wounds, Burns and Scalds, and Sprains.

(1) Bruises.

When a part is bruised, it turns "black and blue," because the minute blood-vessels beneath the skin have been ruptured by the force employed, and the blood flows into the loose fat which underlies the skin. The more blood that has been thrown out, the greater the intensity of the discolouration. If in addition to discolouration there is heat of the part, then inflammation accompanies the bruise.

Cause of
"black and
blue" ap-
pearance.

By treatment we endeavour to prevent any more blood being effused, to prevent or allay inflammation, and to induce absorption of the blood already effused. The application of cold in the shape of ice, or of a cold lotion such as lead lotion, or (57), will usually effect the first and second of these objects. A piece of folded rag, saturated with the lotion, should be firmly and evenly bandaged upon the injured part. Leeches should never be applied to a bruise, they only increase the mischief. Subsequently, when only some hardness and discolouration remain, rubbing the part once or twice daily with the soap liniment—soft soap, gr. 40; camphor, gr. 20; ol. olivæ, m. 5; alcohol (90 per cent.) $\frac{1}{2}$ oz.; water add 1 oz. will prove useful. Rest and elevation of the injured part should always be adopted.

Treatment.

(2) Bleeding.

Pressure and cold are the two chief means by which bleeding may be arrested; but there are medicaments known as styptics, which are also often very useful; and finally there is the tourniquet or ligature.

Means of
checking.

It is usually found that when the edges of a wound have been brought together, and the part firmly but not too tightly bandaged, all bleeding ceases, or nearly ceases; any little oozing may be stopped by the application of cold water or ice.

Adaptation
of edges of
wound.


Pressure of a pad.

Should these means not prove sufficient, a thick, small, hard pad of linen placed over the bleeding spot, and secured there by a firmly adapted bandage, will nearly always completely staunch the flow. By and by the tightness of the bandage may be relaxed, say after two or three hours; but should bleeding then recur, it will be necessary again to tighten it, taking care that the limb be bandaged from its extremity upwards to beyond the wound.

Wound of an artery.

Should a jet of blood spout from a wound: at once press the point of the finger upon the bleeding spot, and keep it there till preparations are completed for dressing the wound properly, when by placing the edges in apposition, and adapting a pad as above described, success will probably be attained. Cold should then be applied, and the child should be kept extremely quiet for a couple of days, during which time the pad, if removed for the purpose of cleansing and dressing the wound, should be replaced with the original care, but diminished pressure.

Ligature may be necessary.

Should a jet of blood issue forcibly the instant the finger is removed, a ligature should be applied. By means of a forceps or pair of tweezers seize the piece of flesh from which the blood is issuing, including, of course, the bleeding orifice—a portion about so large  only need be pinched up. Then, while still holding it tightly with the forceps, a piece of thin thread or stout silk should be passed around the raised part at the place shown by the dotted line, and tied as tightly as possible by an assistant: one end of the cord should be cut off short, and the other left hanging from the wound. In a few days it will become detached, and allow of removal.

When impracticable use tourniquet.

Should it be impracticable to apply a ligature, a handkerchief should be tied around the limb between the wound and the heart, while pressure with the pad is still to be made upon the wound itself. It may be difficult to tighten the handkerchief sufficiently; in such a case, by passing a short piece of stick underneath and giving it a few twists round, tightening to any extent may be made. But it is dangerous to keep up a severe tightening for any length of time; the circulation is thus stopped, and mortification might ensue. Very

Danger of too prolonged constriction.

severe tightening is seldom essential, and if it be, gradual loosening should be made after a short time, to ascertain how far the handkerchief may with safety be relaxed.

Oozing from a cut or torn wound usually yields to the free application of cold, but should it persist notwithstanding, the surface may be stopped with a strong solution of alum or tanin, or in case of urgency with the pure tincture of steel.

Oozing of blood.

Bleeding from a vein is known by a copious continuous flow of dark-coloured blood. This is not of anything like the same gravity as bleeding from an artery. Pressure and elevation are almost always sufficient to arrest it. Should direct pressure upon the wound not prove sufficient, then pressure should be made with the handkerchief and stick between the wound and the end of the limb—that is, “below” the wound, not above it.

Bleeding from a vein.

(3) Wounds.

Wounds are divided into (1) clean-cut or incised wounds, (2) lacerated or torn wounds, and (3) punctured wounds.

Classified.

1. **Incised** wounds are easily treated, unless they bleed much, in which case the means just enumerated are to be employed to check the hæmorrhage. The next thing to be done is to cleanse the surface most thoroughly, and to remove all particles of foreign substances, such as pieces of gravel or glass. For this purpose a stream of cold water and a piece of clean rag (not sponge) are to be used. It is a matter of great importance that the rag employed be thoroughly clean, otherwise unhealthy inflammation, or even erysipelas, may ensue. Iodine sufficient to turn the water the colour of weak tea or Condy's fluid should be added to the water.

1. Incised.

Check bleeding. Clean the surface thoroughly.

Bleeding having been checked, except perhaps some little oozing which will remain while the wound is open, the sides are to be brought accurately together. In simple cuts, a strip of sticking-plaster or of court-plaster to keep the edges together will be sufficient. Sticking-plaster should never be made to encircle a limb wholly, yet the strips should be sufficiently long and broad to

Adapt edges.

How to
apply stick-
ing plaster.

grasp the skin firmly. Each strip must be attached to one side of the wound, then the free end is to be pulled firmly with one hand (while the other hand is employed keeping the wound edges together) and fixed firmly on the opposite side. Unless the cut be very small, each strip had better be about half an inch broad and sufficiently long to go a little more than halfway round the limb. When preparing the strips, it is a good plan to



Fig. A.

double each upon itself and cut a piece as in Fig. A, from its centre, so that when opened it will appear as in Fig. B, the aperture being placed directly over the wound to

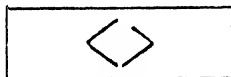


Fig. B.

Bandage

Cold if
inflammation.

Wounds of
palm of
hand.

permit the escape of any discharge and thorough cleansing. Each strip when applied should slightly encroach upon the edge of its neighbour. Then place a strip of lint soaked in carbolic lotion lengthways over the openings, and adapt a bandage over all with just sufficient tightness to support the part thoroughly. If painful, cold water, to which Condy's fluid has been added, may be applied to the bandage. The sticking-plaster need not be removed till it has become loose, in which case the sides of the wound, if not already united, should be held together till the plaster be renewed.

Wounds of the **palm of the hand** may be accompanied with severe bleeding. The best thing, to do, pending the arrival of a surgeon, is to place a padded clean golf ball or cork in the hand, which should then be closed and bandaged firmly upon the ball or cork, while at the same time the elbow should be bent as much as possible, and so retained by means of a bandage. It is preferable that incised wounds, especially wounds of the face, should, when a surgeon is available, be sewn up.

2. **Lacerated** wounds seldom bleed much, but they are especially liable to inflammation and suppuration. There may be a great deal of difficulty in thoroughly cleansing them, but this must be effectually and patiently done, the iodine lotion being employed for the washing. The best method is to saturate a pledget of wool with ordinary tincture of iodine and then swab the whole wounded surface with the solution. Lockjaw or tetanus occasionally follow such injuries from dirt and germs getting into the wound. Tincture of iodine either with a brush or as above is the best method of disinfecting such a wound. The deeper parts, if they cannot be got at, ought to be syringed out with Eusol lotion. This done, we may bring the edges together with sticking-plaster as before, except that the plaster is not to be pulled too tightly, lest the escape of matter be impeded. A piece of lint, doubled twice upon itself, and saturated with Eusol lotion, should now be applied so as to cover more than the extent of the wound: over this a piece of plantain leaf, oiled silk, or gutta-percha tissue is to be laid, and the whole bandaged loosely.

2. Lacerated, liable to suppuration.

Do not confine the matter.

Should the discharge become very free, and the wound smell, every second strip of plaster should be removed, and the wound syringed out twice daily with carbolic 1—100, Eusol lotion, or hydrogen peroxide. Should the edges become red, livid and pouting, the discharge being copious and offensive, it is better to remove all the dressings, and after thorough syringing to apply a large boric lint fomentation, which can be repeated every four hours. When once again healthy in appearance, that is, of a bright red colour and presenting a clean surface, aseptic water-dressing only need be applied.

Syringe with carbolic lotion.

A poultice may be necessary.

3. **Punctured wounds**, that is, wounds which are produced by sharp, long, narrow instruments penetrating the flesh, such as might be caused by treading upon a nail, or falling upon a splinter of wood, are often troublesome. The great thing is to allow the orifice to remain completely and freely open, for the free discharge of matter. Of course, should any portion of a foreign substance remain embedded in the wound, every endeavour should be made to remove it with the forceps, the orifice being enlarged for that purpose if necessary. Eusol or carbolic lotion should then be injected

3. Punctured.

Allow free exit to matter.

Inject carbolic lotion. Poultice. Carbolic oil.

into the wound, and antiseptic water-dressing applied; and when healing, a folded piece of lint should continually but loosely cover the aperture.

(Refer also to Chapter XXIX. Tetanus.)

(4) Burns and Scalds.

Great constitutional shock.

Burns and Scalds. A severe burn or scald is chiefly dangerous on account of the shock it occasions to the whole system. The great pain is accompanied with violent shivering, a pallid face and cold hands and feet.

The dangers from burn are firstly those of shock, dependent largely on the surface area of the burn, but also to some degree on the depth. Those on the chest, abdomen and head are the most serious. Secondly, there is toxic absorption from the burnt tissues and some degree of sepsis is inevitable, and thirdly, there are more remote complications, pneumonia or ulceration of the bowels which may supervene about the tenth day.

Treatment, object of.

In treating a burn there are three matters requiring immediate attention, viz., to relieve the pain, to counteract the shock, and to protect the injured **surface from contact with the air.** If the patient be seen immediately after the accident, give a dose of brandy into which laudanum to the extent of one drop for each year of age has been put or a hypodermic injection of morphia grains 1/40 to 1/30 for a child of one year old. Then the instant application of a saturated solution of bicarbonate of soda will relieve pain on the spot and prevent blistering. This remedy is only of use if employed without any delay; wherefore, if the soda be at hand, it is better not to wait to make a solution, but moisten the soda a little and smear it on as a paste, adding water drop by drop subsequently. *If the above cannot be done,* either on account of delay in seeing the case or the absence of soda, deluge the parts with carron oil (which is made by shaking together equal parts of lime-water and any bland oil, such as sweet or linseed oil, till they form a thick white emulsion), use sweet oil alone or a paste made of equal parts of castor oil and zinc oxide spread on lint. It is most desirable to use some antiseptic with the oil dressing; this can be best done by mixing one part of eucalyptus oil to four parts of carron or olive oil. Eucalyptus is a powerful antiseptic and a good deodorant.

Administer a stimulant with opium.
Apply soda.

Apply carron oil.

Application should be

Whichever application is used, the whole part should be at once enveloped in large quantities of cotton-wool, kept in position by very lightly-applied bandages. Should the burn be very severe, and when seen, the clothes are scorched and sticking to the child, it is best to **immerse at once the whole body in a warm bath** to which sodium bicarbonate or washing soda has been added, and then when they have loosened somewhat, cut or take the garments off; the bath **has the effect also of combating the severe shock.**

With cotton-wool.

Bath.

The child should be put to bed as soon as possible, with hot bottles wrapped in blankets applied to his feet and sides. More brandy may be administered if the shivering and depression continue, and as soon as possible a little warm beef-tea should be given.

Warmth.

More stimulant if necessary. Beef-tea.

The greatest gentleness is required in handling the child lest the injured surface be abraded. The clothes should be removed by cutting them off with a pair of scissors piece-meal **taking care not to expose a large surface to the air at any one time.**

Out off the clothing.

When blisters appear, they are to be pricked with a needle, great care being taken not to remove the elevated skin.

Prick the blisters.

Redressing of the wounds will be undertaken for the purpose of allowing the discharges and sloughing tissues to escape. The wounds should never be swabbed but washed clean with a flow of normal saline. Only a small section of the burnt area must be exposed to the air at one time. When the burn is extensive, the child or the whole limb may be immersed in the warm alkaline bath and allowed to remain there as long as he comfortably can.

Ointments or lotions containing cocaine or carbolic should never be used.

It may be necessary to repeat the administration of stimulants once or twice within the first twenty-four hours, but reaction will by that time probably have been fully established, and therefore we must be very guarded in the exhibition of alcoholic stimulant lest the excitement produced prove injurious.

Caution as to over-stimulation.

The carron oil or castor oil and zinc oxide mixture may be employed till healing is well advanced and then the wound be protected with strips of lint soaked in paroline (Medicinal liquid paraffin).

Subsequent dressings.

Proud flesh. Should granulations, often called proud flesh, elevated above the line of the skin, form, such should be touched lightly every second day with the solid blue-stone (sulphate of copper). **The liability to contractions occurring during the healing of a burn should always be kept in mind.** A limb should invariably be bandaged in the straight position.

Position of the limbs.

Fluid. The administration of ample fluid plays no small part in the treatment of burns. The shock and toxic absorption inseparable from such accidents will induce some degree of acidosis. Sodium bicarbonate in doses of from ten to thirty grains is therefore indicated.

(5) Sprains.

Nature. A sprain is a twist of a joint, which stretches and perhaps partly tears the ligaments which bind the bones together.

Symptoms. Upon the occurrence of the accident there is a sickening pain experienced, and there is inability to bear weight upon the limb; swelling succeeds and perhaps the skin becomes "black and blue." If a sprain be neglected, chronic inflammation of the joint may succeed, which may result in permanent stiffness of the part.

May inflame joint.

Treatment. The great principle upon which a sprain is to be treated is rest. As soon as possible after the accident, immerse the injured foot or hand in a basin of hot water for ten minutes, and then in a basin of cold water for a similar period. Then apply a wet bandage rather tightly from the toes or fingers well up beyond the injury; put the child to bed, and insist upon the most perfect rest. The bandage should be wetted at intervals with water or the lotion as in the case of a bruise, and should be loosened as swelling increases. When all pain and inflammation have subsided, the joint should be rubbed with a stimulating liniment. Caution should be observed in allowing the child to resume play.

CHAPTER LII.

SNAKE-BITES, STINGS OF INSECTS AND BITES OF ANIMALS.

Snake-bites.

There are seven common fatally poisonous snakes in India:—the Cobra, the King Cobra, the Krait, the Banded Krait (not always fatal) Coral snakes, Russel's Viper and the Echis Viper.

In addition to this, there are several varieties of Viper whose bite, though virulent, is not usually fatal. Perhaps the most common of these is the small green Pit Viper or Bamboo snake.

The majority of bites from snakes in India are due to non-poisonous snakes, and the average untreated mortality rate from snake-bite in India is about 6 per cent. of all persons bitten (R. Knowles).

The venom of Cobras and Kraits kills by causing asphyxia. There is œdema and paresis at the site of the bite. The general symptoms are ptosis, inco-ordination of speech, falling of the head, paralysis of all the voluntary muscles; later shallow, rapid and failing respiration; swelling of the tongue and salivation. Nausea and vomiting are common. Death occurs in from thirty minutes to thirty hours after the bite.

Viperine venoms kill by causing hæmorrhages from all mucous membranes, and under the skin. There is great and persistent pain at the site of the bite, and persistent oozing of hæmolysed blood from the bite. With big doses of venom, death may occur within a few hours from cardiac failure, due to vaso-motor paralysis. With small doses there are hæmorrhages from all mucous membranes and under the skin. Extensive local gangrene may occur, or secondary septic infection. Death occurs from cardiac failure, usually within a few days of the bite (Knowles).

The immediate treatment after the bite of a poisonous snake has one object only; that is, to prevent or rather, to delay the spread of the poison from the bite

to other parts of the body long enough to permit of skilled treatment. For this purpose, **a ligature of cord is tied round the limb two to three inches above the bite.** A piece of stick is introduced under the cord and by twisting the ligature is tightened. A second ligature is applied some four inches above the first. The ligature must compress the tissues against a single bone. A ligature between the knee and the ankle cannot form a complete block as there is uncompressed tissue between the two bones.

The patient is taken to the nearest hospital without delay. Should it be impossible to obtain medical treatment, the wound will be scarified by cutting across the tooth puncture to the depth of a quarter of an inch and blood encouraged to flow. Crystals of potassium permanganate or pure carbolic may be applied to the wound.

Stimulants in the form of brandy, sal volatile or strong black coffee are given and the patient kept quiet and warm. After some twenty minutes it will be necessary to relax the ligatures, otherwise the limb will mortify.

In case of poisoning by the Vipers, blood may ooze from the wound for hours or days. A good astringent for local use is two teaspoonfuls of alum in a tumbler of water.

The capture of the snake and the proof that it is harmless or comparatively harmless will do much to alleviate anxiety and neutralise that collapse which may be due to fear of impending death rather than to actual poisoning.

The account of further treatment, here appended, is taken from the chart "The Poisonous Snakes of India," Lieut.-Col. R. Knowles, I.M.S. (Messrs. Thacker, Spink & Co.). Those interested in the identification of the poisonous snakes may obtain the chart from the publishers.

1. Apply a tourniquet. The best type of tourniquet is narrow rubber pressure tubing. It should compress all the tissues against a single bone, e.g., in bites on a finger, the tourniquet should be applied round the base of the finger, with a second perhaps above the elbow; in cases of bite on a toe apply one tourniquet round the base of the toe, and a second above the knee.

The patient will be able to stand the tourniquet on for about twenty minutes, but not longer.

2. If possible, kill and identify the snake which bit. If (as is quite often the case) it is a harmless snake, the tourniquet may be released, and the patient dismissed. If it is one of the above seven, immediate measures must be taken. If one cannot get the snake, one can only judge by the symptoms whether it was a poisonous one or not.

3. If a patient is bitten on the finger or toe by a Lethal snake, and is seen within ten minutes of the bite, immediate amputation will save life. If more than ten minutes has elapsed, amputation will be useless.

4. The substance which most rapidly and most certainly destroys snake venom is gold chloride, which is stocked in 15-grain tubes by most photographers and chemists in India. Unfortunately, it also destroys tissues, and its use is apt to be followed by local sloughing. It should, therefore, only be used for cases of Cobra, King Cobra, Krait and Russell's Viper bites. Dissolve six grains of gold chloride in half an ounce of water in a small test-tube by the aid of heat (3 per cent. solution). Fill a 2 c.c. hypodermic syringe with this, and by injecting into several points at the site of the bite, try to infiltrate the whole site of the bite. Everything depends on how successful one is in getting at and destroying every particle of venom injected. On no account should any incision be made, as it will let out more gold chloride solution than venom.

An alternative remedy is hypochlorite of lime. Dissolve five grains of *fresh* bleaching powder in half an ounce of water. Fill a 2 c.c. hypodermic syringe with the solution, and by injecting at several points into the site of the bite, try to reach and destroy all the injected venom.

5. Inject Kasauli antivenene intravenously. Antivenene is four times more potent when given intravenously than when given subcutaneously. It should be given in *large* doses, e.g., 80 c.c. or more. Up to 160 c.c. is readily tolerated by the body. Next release the tourniquet.

6. Put the patient to bed. Administer cardiac stimulants if necessary. Next commence a careful watch

for the onset of symptoms (as above) of venom intoxication. If they set in, go on administering further 20 c.c. doses of antivenene intravenously at half-hour intervals. In cases of Cobra bite, if breathing stops, try artificial respiration.

7. In cases of Viper bite, be prepared for the onset of hæmorrhages, and if these appear, try the effects of adrenalin subcutaneously, intravenous injection of calcium salts, horse serum, hæmostyl, etc. In cases of Russell's Viper bite, gangrene may set in subsequently, and necessitate amputation.

8. In cases of recovery after local injection, a slough will probably form at the site of the bite, and the wound must be carefully dressed daily with antiseptic dressings until it heals.

STINGS OF VENOMOUS INSECTS.

In young children may not be altogether unattended with some danger.

Treatment.

Tie a ligature above the place, if possible. Extract the sting if it can be seen, suck the wound, and then apply liquid ammonia, which will at once relieve a **wasp** sting. Sal volatile will also answer, but not so quickly. If neither is at hand, use a strong solution of bicarbonate of soda or carbolic oil. If swelling has already set in, do not use the ammonia, but the soda solution on a rag.

Mosquito bites are relieved by the application of oil of peppermint, and the oil of eucalyptus is a good preventive. For the inflammation which sometimes follows these bites, a poultice of ipecacuanha powder and mint leaves is very good, or ipecacuanha alone made into a paste.

An application as follows will be useful when bites are attended with much irritation:—Chloretone grains 10, Hazeline 1 drachm, Carbolic acid minims 4, Alcohol 2 drachms, water to one ounce.

For **scorpion** stings or **spider** bites, ligature as above, suck the part and apply a drop of carbolic acid. If the acid be put into a little cut made into the punctured spot, so much the better; afterwards poultice with ipecacuanha paste. Sal volatile and brandy should be given if there is faintness in any of the above cases.

BITES OF RABID ANIMALS.

There is reason to believe that all warm blooded animals are susceptible to rabies (hydrophobia), though the dog and the jackal are the two common agents of transmission to man. **When the bite of an animal is sustained, there are two matters for immediate attention, the first, the cauterisation of the wound, the second, whether Pasteur treatment is necessary,** that is, if the animal is mad and if it has infected the patient.

For the first, pure carbolic acid or pure formalin is employed. It is essential that the caustic be made to penetrate the lowest depths of the wound, which should afterwards be dressed aseptically and not sutured. Next, attention is directed to the animal which has inflicted the bite; if obviously rabid and uncontrollable, it should be destroyed before it does more damage, but when possible, it should be tied up and kept under observation so that the diagnosis may be confirmed.

Cauterisation.

The problem more often arises with pet dogs; it is not realised for some little time that the dog is mad and, in the meantime it has been allowed loose and handled by the owners. The earliest sign is a change in disposition, disobedience, shyness, the dog is restless and tends to seek shelter in dark corners. The popular conception of the rabid dog is by no means always the rule, instead of being fierce and aggressive, the dog may become even more affectionate, but there is always a perceptible change in the character. The voice also is changed, the dog may howl with a note quite unlike its own or even unlike the howl of any dog. Later, all voice is lost. Not infrequently an early sign is difficulty in swallowing together with accumulation of saliva in the throat. This causes the dog to paw at the mouth and gives rise to the suspicion that there is a bone stuck in the throat. The owner will then explore the throat, putting his hand inside the mouth, and so unwittingly expose himself to infection if he has open sores on the hand.

Signs of a rabid dog.

A paralysis, often accompanied by convulsions, soon sets in, the tail droops, the hind quarters sway and become powerless, so that the dog cannot rise.

It should be mentioned that in spite of the name hydrophobia, fear of water is not a sign of the disease, rather will the dog make every effort to drink, but is

unable to do so on account of paralysis of the throat. Frothing of at the mouth again, though common, is not invariable.

The illness lasts from three to five days and ends in death. When there is any doubt, the brain may be removed by someone competent to do so and sent to the nearest Pasteur Institute preserved in rectified spirit or formalin solution one in ten. It is wiser that those bitten should not wait for the confirmatory report, but should proceed to the institute and begin treatment, which may be stopped if it turns out that the dog was not rabid.

Infectivity.

The saliva of the rabid dog is infective three days before any signs of rabies occur, but owing to the short term of life once the disease has set in, **if the dog is alive and well ten days after the infliction of the bite, there is no fear of infection.**

Treatment is not considered necessary if the bite has not broken the skin. Again, if the saliva has fallen on the skin, there is no fear of infection provided there are no fresh abrasions. The hands of those who have handled rabid dogs must therefore be carefully examined with a magnifying glass for cuts and abrasions and it should not be forgotten that the soiled fingers may convert infection to abrasions elsewhere.

Only a small proportion of those bitten by actually rabid dogs become infected. **The Pasteur treatment is a practically complete safeguard, but there should be no unnecessary delay in submitting to treatment, especially if the bite is on the head or face.** The Pasteur Institutes in India are at Kasauli, Calcutta, Coonoor, Shillong and in Burma, Rangoon.

It will interest owners of valued dogs to know that they also can undergo preventive inoculation if bitten by other rabid animals, but as the treatment sometimes fails, all precautions should be taken, and the dog tied up for six months in strict quarantine.

CHAPTER LIII.

FRACTURES.

Fractures of the long bones of the limbs are fortunately of comparatively rare occurrence. The fracture of childhood is more often incomplete, or greenstick, owing to the elastic properties of the bone at this age, resulting in deformity of the limb, but not complete separation of the fragments. The signs which lead to suspicion of a fracture are as follows:—

1. Absolute immobility and uselessness of the injured limb.

2. Pain always referred to the actual site of the fracture on the slightest movement; often there is a burning sensation of the skin over the broken ends of the bone.

3. Swelling characteristically rapid in development and of extreme degree. In young children and infants, the only sign may be a rapid obliteration of the dimples on the limb.

4. The late development, sometimes three or four days after the injury, of discolouration and bruising of the skin, which may extend over the greater part of the injured limb. The discoloured skin, in contrast to the blackened skin of an ordinary bruise, is quite free from tenderness except at the immediate site of the injury.

5. Distortion of the limb is an usual but not essential sign. In young children, complete fracture of a long bone may occur without any visible alteration in the shape of the limb, except swelling.

By such signs, we can recognise a fracture or the probability of a fracture and by so doing, can save our patient from the further pain and possibly further damage by manipulations in search of enlightenment.

When it is suspected that a bone is broken, the greatest care must be taken, lest by incautious movements one of the ends be made to penetrate the skin.

As soon as possible after the accident, should there be deformity, gentle efforts at reduction should be

made. The limb above and below the site of the injury is grasped, preferably by separate individuals and gentle continuous traction is made in the line of the limb. On no account should other manipulations, such as "bending" movements, be attempted.

If the patient is at any distance from home, a dozen or so straight bamboo twigs should be cut and rolled in grass or pieces of cloth and placed at intervals around the limb, and there secured by tying them with a two or three pocket handkerchiefs moderately tight. This done, the child may with safety be carried home, and a surgeon summoned. The straw cases in which wine bottles are usually packed serve excellently for those temporary splints, one being placed at either side of the fracture.

Reduction. On reaching home, the child is placed upon a perfectly level and rather hard bed, and the limb is again examined for deformity and carefully measured for shortening as compared with the other side. Should examination reveal that the position of the limb is not yet satisfactory, the process of reduction, as detailed above, should be repeated. The sooner after the occurrence of the accident reduction is made, the more easy will it be of accomplishment.

Splints. The next step is, retain the injured limb in the natural position to which it has been reduced, by means of splints, which must be sufficiently firmly applied to ensure immobility, while pressure on prominent points must not be too great. The most simple form of splints consists of pieces of thin light board cut somewhat longer than the broken limb. One of these, well padded, should be placed at either side of the broken limb, and, if desired, a third may be placed behind for it to rest upon. With three straps or pieces of bandage they should be bound firmly, but not too tightly, in position around the limb.

Swelling. In splinting a limb care should be taken to immobilise the joints above and below the injured bone in the position which affords most relief.

A special word of warning must be given about the use of splints. Splints and bandages applied soon after the accident and apparently comfortable may, by the subsequent swelling of the limb, become so tight that blistering or even ulceration of the skin is produced.

Splints must therefore be examined every few hours for the first twenty-four hours after the accident. For the same reason, **padding must be loose over bony points and the heel especially guarded from injury.**

Modern opinion favours the daily removal of splints and massage of the limb, but this can only be undertaken by the expert. The untrained assistant must let well alone, contenting himself with a periodical inspection of the limb under the splints to ensure that the skin is not becoming damaged. In most cases it will be necessary to wear the splints for three or four weeks.

These directions are of the simplest nature; many fractures require special apparatus, but the limits here available do not permit of more than the most general allusions to the subject. In all cases it is very desirable that **a surgeon should inspect a fracture as soon after its occurrence as possible.**

When possible, X-rays should be employed both as an aid to diagnosis and in checking the position of the bone after splinting. Such measures are particularly desirable in children as there is a liability to displacement of the epiphysis or growing end of the long bones, which, if uncorrected, will lead to partial cessation of growth in the limb.

A compound fracture that is, when the broken bone has penetrated the skin and made a wound which communicates with the break, is to be treated in the same way—by reduction and splints—the wound being treated upon general principles (*see* Wounds), the most important of which is thorough cleansing with carbolic lotion or Condy's fluid solution in the first instance, or better still, with tincture of iodine as mentioned above, and then carefully applying an antiseptic dressing. In these cases, the very greatest care should be taken that all dirt is removed, and that the neighbourhood of the skin wound is clean. Spirits of wine is the most efficient cleanser of the skin. All dressings which are applied must be sterilised by being boiled in a kettle for ten minutes and then when cool applied. If the most rigorous care be not taken, the child may lose the limb or life from gangrene or acute poisoning. In every possible case surgical aid should be called to a compound fracture.

Compound fractures.

CHAPTER LIV.

INJURIES TO THE HEAD.

In childhood, the skull is elastic and well adapted to encounter the falls and blows which are inseparable from that period.

Occasionally, however, the child sustains a blow of sufficient degree to cause concussion, that is to say, the child is rendered unconscious for a varying length of time. During unconsciousness, all functions are to some degree suspended, the child is cold, the temperature sub-normal, the pulse feeble and the respiration shallow. In the stage of recovery there may be signs of cerebral irritation, the child lies curled up, turned away from the light and resents any interference. As the child revives, vomiting is to be expected, but is of no significance unless it becomes persistent, in which case, it is to be regarded as a sign of more severe injury.

Treatment.

Every child who has been rendered definitely unconscious, even though for a short time only, should be treated as a case of concussion, lest troublesome after effects, such as headache or even grave inflammation sets in. Many cases of tuberculous meningitis are referred to some blow or fall, and though it is probable that in the majority the blow was incidental, it is at the same time to be expected that such injuries temporarily lower resistance to infection.

The child should be put to bed in a darkened room, with an ice-bag or cold application to the head. If there is collapse, hot bottles are placed at the feet and sides. Absolute quiet should be maintained and the recovery of the consciousness awaited. On no account should stimulants be given.

In all cases of head injury, the administration of a purgative may be regarded as essential. If the child is unconscious, calomel in appropriate but free dosage may be put at the back of the tongue. Of all aperients, magnesium sulphate is the most valuable in such conditions and should be given daily so long as symptoms

continue in doses sufficient to maintain a free watery evacuation.

Rest in bed must be adequate, ten days for the more mild cases and for some time afterwards care must be taken that the child does not join in active or boisterous play. More serious injuries may occur to the skull should the child fall from a height or be struck heavily. In such cases, there may be bleeding from the nose, the ears or under the eye, indicating that the base of the skull is fractured or there may be dinting or fissuring of the vault.

The symptoms are commonly due to hæmorrhage within the skull or actual pressure from the dinted bone.

When such damage is present, unconsciousness is deep, the respiration is irregular and snoring, the pulse is slowed and there may be convulsions. Early treatment will be on the lines laid down above and skilled surgical aid will be sought without delay. If there is bleeding from the ears, they should be gently cleaned with cotton-wool soaked in Condy's lotion or other suitable antiseptic and the ear lightly plugged with aseptic gauze. In all cases of head injury, expert advice is desirable, and in the more severe cases it is essential.

CHAPTER LV.

RUPTURE.

Definition. By rupture is meant a protrusion of a portion of intestine through the muscles of the belly, causing a soft swelling underneath the skin.

Varieties. There are two common localities of rupture—(1) at the navel, and (2) at the groins. Children are sometimes born with ruptures.

1. Navel rupture. Either at the time of birth or shortly after the separation of the navel-string, a soft, round swelling may be observed at the navel. The swelling subsides when the child is placed upon its back, but a fit of crying or sneezing will cause it to reappear. Gentle pressure with the fingers will push back the protrusion out of sight, and then probably the circular edge of the opening through which it has passed may be felt with the tip of the finger. There is no pain of any kind.

Groin rupture. Groin rupture is usually confined to male children. The mother notices that the scrotum of her infant is of unusual size, that it is soft, compressible, and often semi-transparent. At times, when the child is at rest, the swelling wholly disappears, again to show itself when he cries.

Prospects. There is usually no danger attending these cases in infancy, but if not then cured by simple mechanical means, they are apt to remain permanent throughout life, a remark which especially applies to groin rupture; and they are sure ever afterwards to be a source of continual annoyance, and sometimes of danger.

Treatment.
1. Navel rupture. Properly arranged pad. The domestic management of navel rupture is simple. A pad made of a flat piece of thick gutta-percha covered with two or three folds of linen, should be secured to the centre of an elastic binder, and should be continually worn night and day around the belly: that is all that is required. A convex pad should never be used, because, although it pushes the bowel back more effectually, it at the same time pushes into and enlarges the opening, instead of helping it to close.

After a few months, recovery will probably be complete, the aperture having closed up.

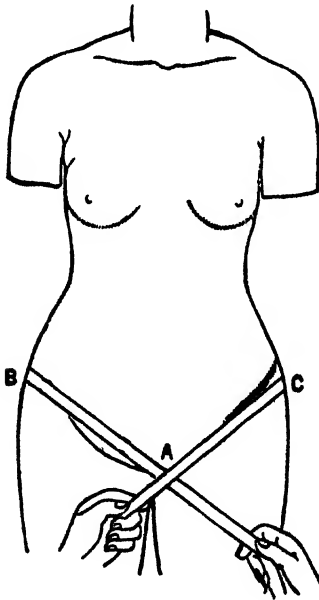
Another simple home method is to sew up a rupee in a piece of lint. This is then applied over the rupture and a piece of strapping (sticking-plaster), round the abdomen used to help to keep it in place.

A groin rupture is not so simply managed. Here there is no need for great hurry, and therefore, even if there be a delay of a few weeks, it is better to wait for the opinion of a surgeon, because there are one or two easily-cured affections of the parts involved which closely resemble rupture—so closely that the mother cannot discriminate. A long delay should never be permitted, because it is only during infancy that cure without operation is possible. The foot of the bed of

2. Groin rupture not so easily managed.

Surgeon's opinion to be obtained.

Curable during infancy without operation.



small children should be raised, six to eight inches, and sometimes cure is obtained by using a two-inch flannel bandage, with a pad of wool over the site of rupture. But this should not be used for longer than six months.

Trusses are expensive and often not effective; moreover, they have to be changed frequently as the child grows in size, and in this country cause much chafing of the skin. If they are used, the skin should be daily bathed under the truss with spirits of wine and then powdered. If the case is pronounced to be rupture, the instrument-maker will, upon the precise measurements, etc., being supplied to him, furnish a proper light vulcanite truss, an apparatus which is essential to efficient treatment. To measure for a truss, it is necessary to take the girth of the child round the pelvis, as in figure above which is the same for child or adult from the point. Around the points B and C and back to A and state what side the rupture is on, right or left and whether it is big or small. A surgeon may cure the case permanently by operation. A truss **should never in any case of a child be used after the age of four years. This is one of the best times for operation, and the results are always excellent.** The operation is so simple, that nowadays many authorities advocate operation while the child is still at the breast, for there need be no interfering with this function, and my own experience coincides with their results.

It is to be remembered that a child if not operated on, cannot later enter any public service, and that his health may be severely endangered by obstinately denying operation for him. **Moreover, such a condition precludes a child from enjoying the full happiness of his school days.**

CHAPTER LVI.

ACCIDENTAL POISONING.

Poisons are of three kinds:—

1. Corrosives, which have a local burning action. **Classification.**
2. Irritants $\left\{ \begin{array}{l} \text{metallic} \\ \text{vegetable} \\ \text{animal} \end{array} \right\}$ which cause local inflammation.
3. Narcotics which act chiefly on the nervous system.

Examples of **corrosives** are: corrosive sublimate, the mineral acids, ammonia, lunar caustic and chloride of zinc; of the **irritants**: arsenic, antimony (metallic), croton oil (vegetable), and cantharides (animal); of the **narcotics**: opium, chloral, aconite and numerous others. **Examples.**

The symptoms of the **corrosives** are: burning pain of the mouth, gullet and stomach, extending soon over the whole belly; mouth bleached inside; vomiting, it may be of blood, mucus; the abdomen swells, and collapse comes on. Of the **irritants**: after an interval, a burning constriction of the mouth, gullet and stomach, which latter is tender to pressure; nausea, thirst and vomiting follow, generally accompanied by purging and fever; the pulse fails, and the body becomes cold and clammy. Of the **narcotics**: some produce deep sleep (opium, chloral, camphor), some noisy delirium (belladonna, camphor), others cause convulsions and cramps (strychnine, nux vomica, arsenic), and so on. **Symptoms.**

In most cases, the object is to **empty the stomach** quickly and thoroughly. The parent is confined to emetics for this purpose, though the stomach-pump is the most effectual of all, by not only emptying, but repeatedly washing out the organ. In most cases of **corrosive poisoning**, the use of the stomach-pump is not permissible in any hands because the gullet and stomach are so softened and eroded that they might be perforated. **General remarks on treatment.**

Even of emetics, the amateur is precluded the employment of that one (apomorphine) which is the most certain, because it must be used hypodermically and in very minute doses to be safe. A dose by the mouth which would act, would be dangerously depressing. In the same way he is precluded the use of strychnine and other powerful remedies. These disabilities all point to the necessity for the speedy attendance of a medical man, but much may be done meanwhile. The best substitutes will be suggested where there are these difficulties.

Emetics. *Mustard* (a heaped tea or dessertspoonful) in tepid water, given repeatedly, is a good and quick emetic. The sulphate of *zinc* (5 to 15 grains), or sulphate of *copper* (2 to 4 grains repeated) dissolved in water are also most useful and reliable. *Ipecacuanha* is too slow, but may be used when others are not available.

Antidotes. **Antidotes** are remedies which unite with poisons to form harmless substances. Examples: arsenic with dialysed iron or magnesia; the mineral acids with chalk or lime; tartar emetic with tannin or tannin containing substances, as catechu, bark, etc., corrosive sublimate with white of egg or milk. Epsom salts in solution is an antidote to carbolic acid poisoning, and oil is subsequently given to relieve the pain. But many of the *vegetable poisons* cannot be dealt with in this direct way. We get rid of them as far as possible by rapid emetics, and then we give medicines which have effects antagonistic to the poison. Examples: for strychnine poisoning we use chloral after emetics, for belladonna cases we give opium after emetics, and for opium poisoning we use belladonna after emetics; for aconite poisoning, after emetics we give digitalis and stimulants to keep the heart and respiration going, and so on. Strong tea and coffee precipitate the active principle (alkaloids) of many vegetable poisons.

General advice.

When alcohol is recommended, take care not to induce intoxication.

An emetic promptly given is always admissible.

When writing for the doctor, state the case as fully as you can, to enable him to bring the proper remedies and appliances.

“Never regard a case as hopeless. In every case, if you see the patient at once, and have the requisite appliances at hand, there is a good chance of recovery.”*

“Do not relax your endeavours, because at first your efforts appear unavailing. You may have to work for three or four hours before there is much improvement.”*

“Do not leave your patient alone even when he has apparently quite recovered. Often enough, as the circulation improves the symptoms reappear, probably from re-absorption of the poison.”*

* What to do in cases of Poisoning, by Dr. W. Murrell. A little book which is a model of brevity and mastery of the subject.

CHAPTER LVII.
SOME SPECIAL POISONS.
 Arranged Alphabetically with their Symptoms and Treatment.

Name and how taken.	Symptoms.	Treatment.	REMARKS.
<p>Acids. Mineral (Sulphuric or vitriol, nitric, or hydrochloric).</p> <p>By mistake for something else.</p>	<p>Violent burning pain in mouth, gullet, and stomach. Vomiting of shreddy membrane and blackened blood. Thirst. Constipation. Loss of voice. Difficulty breathing. Mouth and throat white or yellow coloured. Collapse.</p>	<p>Chalk, soda (washing soda if no other), carbonate of potash or magnesia—Dilute and give freely. Wall-plaster and water. Soap and water.</p> <p>Seize the nearest remedy. Half a dose of laudanum. All food by bowel. Drinks of olive oil, white of egg, barley-water, or arrow-root.</p>	<p>These are "corrosives," but if taken diluted they are only "irritant." Then not nearly so dangerous. Any alkali is an antidote. May be immediately dangerous by causing swelling of the throat and suffocation.</p>
<p>Aconite or Monkshood.</p> <p>Liniment in error. Root mistaken for horse-radish.</p>	<p>In three minutes a tingling, numbing pain of mouth, lips and tongue. Numbness of the skin. Often retching. Paralysis first of the legs, then of the arms. Failing pulse and respiration. Collapse. Mind clear throughout.</p>	<p>Mustard (or zinc) emetic. Alcohol and sal volatile. Mustard plaster over heart. Tincture digitalis. Dose, 5 minims each ½ hour, thrice (for child of five) in water. Recumbent position and absolute rest. Friction to the limbs. Artificial respiration.</p>	<p>Real horse-radish is white, has a pungent odour when scraped, and the scraped surface remains white. Aconite root is brown, has no odour, and the scraped surface soon becomes pink. <i>N.B.</i>—Aconite is often combined with <i>belladonna</i> in liniments. Treatment then as above.</p>

<p>Ammonia. Ligament in error. " Liquid ammonia." " Compound camphor liniment."</p>	<p>Burning of mouth, chest and throat. Mouth bleached inside. Cough. Bloody saliva escaping. Voice lost. Pulse falling. Cold limbs. Danger of suffocation.</p>	<p>Vinegar largely diluted, freely. Followed by draughts of olive oil, melted butter, white of egg with water or barley-water. Half an ordinary dose of laudanum. Tracheotomy sometimes necessary.</p>	<p>Vinegar (it may be "toilet") is the antidote.</p>
<p>Antimony. Tarter emetic, pure or ointment Antimonial wine mis-taken for sherry</p>	<p>Incessant vomiting, faintness, and clammy perspiration. Burning of throat and stomach. Violent purging. The vomit and stools may be bloody. Cramps and collapse.</p>	<p>Emetic of mustard or zinc if vomiting deficient, followed by draughts of water. Tannic acid, 10 to 15 grains in water, repeated if vomited (tincture of bark, catechu, or even strong tea), followed by white of egg and barley-water. Half a dose of laudanum, <i>when recovering</i>. Enema of peptonised milk and raw beef with brandy.</p>	<p>Four or five grains of the ointment, or half an ounce of the wine would be dangerous to a child. Tannin (or anything containing it) is the antidote.</p>

SOME SPECIAL POISONS—(contd.)

Name and how taken.	Symptoms.	Treatment.	REMARKS.
<p>Arsenic.</p> <p>Fowler's Solution. "Rough on Rats." Fly-papers. Arsenical soap. White arsenic used by builders.</p>	<p>In $\frac{1}{2}$ hour, faintness, nausea and burning of stomach. Vomiting which may be tinged with blood. Cramps in legs. Great thirst. Belly tender. Straining and bloody purging. Clammy skin. Collapse.</p>	<p>Emetic (mustard or zinc) followed by large draughts of water. Dialysed iron (a dessert-spoonful or more) well diluted and repeated; or, in its absence, carbonate of magnesia, or olive oil freely. Barley-water and white of egg with water. Large dose of castor oil. Hot blankets and bottles Frictions.</p>	<p>Less than a grain might be fatal. Fowler's solution contains 1 grain in 100 drops. If <i>no dialysed iron at hand</i>, mix carbonate of soda with tincture of steel, and filter through a handkerchief. Of the moist remainder give freely to the patient.</p>
<p>Belladonna or Atropine. Eye-drops in error. Liniments. Extract of belladonna. Berries of the plant.</p>	<p>Dryness and heat of throat. Flushed face. Great thirst. Widely dilated pupils. Mirthful delirium. Staggering gait. Deep sleep.</p>	<p>Emetic (mustard or zinc). Brandy, sal volatile, chloric ether. Half a dose of laudanum Tannin, freely. Strong tea or coffee (mouth or enema). Artificial respiration.</p>	<p>Known as "deadly nightshade." Children bear large doses. When <i>belladonna and opium combined</i> in a liniment are taken, treat as for opium. (which see).</p>

Camphor.

Eaten from lump for colds.
Essence or spirit of camphor.

Odour of breath. Giddiness. Faintness. Delirium. Cold. Clammy skin. Difficult breathing. Deep sleep.
'No pain, no purging, no vomiting'" (Murrell).

Emetic (mustard or zinc), followed by draughts of water and brisk purgative. Sal volatile and chloric ether at intervals. Warm blankets and hot bottles. Cold and hot douches to head and chest.

Alcohol not to be given by the mouth if solid camphor has been taken, because it would dissolve it.
May give brandy by enema if necessary.

Burnett's Fluid.

See Zinc.

Carbolic Acid.

Lotions in error.
Dressings and oil by absorption.
Injections for worms.

Burning of mouth.
Inside of mouth white and shrivelled. Odour from breath. Cold.
Clammy skin. Lips and eye-lids livid.
Urine inky-coloured.
Pupils contracted.
Deep insensibility.

A couple or three teaspoonfuls of Epsom salts in tumbler of water.
Then emetic of mustard or zinc.
More Epsom salts at intervals.
Follow by olive oil and castor oil mixed, and white of egg in water, freely.
Stimulate with brandy, sal volatile and chloric ether.

Whitla recommends washing out the stomach with pure glycerine, using a soft tube, but this could only be done by a skilled person.

SOME SPECIAL POISONS—(contd.)

Name and how taken.	Symptoms.	Treatment.	REMARKS.
Caustic, Lassar.		See Silver.	
Charcoal Fumes. (Carbonic Acid Gas.)	At first headache, giddiness and drowsiness, succeeded by insensibility, with a livid face.	Removal into fresh air. Ammonia at short intervals to nostrils. Stimulants by mouth or bowel. Electricity. Artificial respiration. Oxygen.	Common among the natives of India.
Charcoal fires in closed apartments.			
Chloral. Sedative syrup. Patent medicines	At first a natural sleep, which deepens into coma. Livid face. Failing pulse. Low temperature. (Murrell says it may fall to 91 degrees.) Pupils contracted at first, afterwards dilated.	Emetic of mustard or zinc. Sal volatile, alcohol and ether as stimulants. Strychnine. Hot bottles and blankets applied. Strong hot coffee as enema. Rouse patient by talking and shaking. Electricity. Artificial respiration.	A few grains might prove dangerous to a very young child.

<p>Copper.</p> <p>Sulphate of copper (blue stone) lotion. Copper cooking utensils (verdigris).</p>	<p>Metallic taste. Constriction of the throat. Vomiting, griping and straining. Purgine. Jaundice. Difficult breathing. Great thirst. Insensibility and perhaps convulsions.</p>	<p>White of egg and milk, freely. Emetic of mustard or ipecuanha if vomiting deficient. Mucilaginous drinks. A single dose of laudanum. Poultice abdomen.</p>	<p>The proper "tinning" of cooking utensils is important. Acids should not be cooked in copper vessels. This is not a likely cause of acute poisoning. A sufficient dose acts as an emetic.</p>
<p>Corrosive Sublimite.</p> <p>Lotion in mistake, or ointment.</p>	<p>Metallic taste and feeling of constriction in the throat. Pain in stomach. Vomiting of bloody mucus. Bloody purging. Pulse very weak and rapid. Skin cold and clammy. Urine suppressed. Convulsions.</p>	<p>Emetic of mustard or zinc. White of egg with water, copiously. Failing eggs, use flour and water, or milk and lime-water. Stimulants as required. Sodium thiosulphate by mouth and intravenous.</p>	<p>The lotion has the appearance of water, and very little taste.</p>
<p>Croton Oil.</p> <p>Mistaken for castor oil. Lament swallowed.</p>	<p>Severe pain in stomach. Copious watery purging. Vomiting. Face pale. Faintness. Cold skin.</p>	<p>Emetic of mustard or zinc. Drink freely of barley-water or white of egg and water, or arrowroot. Stimulants (brandy, sal volatile and chloric ether). A half-dose of laudanum. Linseed poultice to stomach.</p>	

SOME SPECIAL POISONS—(contd.)

Name and how taken.	Symptoms.	Treatment.	REMARKS.
Fly-Paper.		See Arsenic.	Chewing the paper, or drinking the water in which it lies.
Fowler's Solution.		See Arsenic.	Mistake for something else.
Myoscyamus (Henbane).		Treat as for belladonna.	Overdose.
Iodine. Tincture or liniment.	Pain and burning in the throat and stomach. Vomiting and purging. Faintness; possibly convulsions.	Starch (arrowroot, or any flour) in water freely (given raw). Emetic of mustard or zinc. Repeat the starch. A small dose of opium if much pain.	Not often fatal. The vomited starch-water will be blue.

<p>Lead. Sugar of lead is sweet. Goulard's extract. White lead mistaken for chalk. Lotions swallowed.</p>	<p>Metallic taste. Great thirst. Severe colic relieved by pressure. Constipation. Cramps. Cold sweats and convulsions.</p>	<p>Emetic (mustard, zinc, or ipecacuanha), zinc the best because it is an antidote too. Dilute sulphuric acid 10 to 15 minims in glass of water repeatedly; or Epsom salts in water freely. Milk and white of egg to follow. Poulitice belly. Half dose of opium. Afterwards iodide of potassium in mixture.</p>	<p>Not at all so poisonous as is generally supposed.</p>
<p>Lucifer Matches.</p>	<p>See Phosphorus.</p>		
<p>Morphia.</p>	<p>See Opium.</p>		<p>The heads may be eaten in play.</p>

SOME SPECIAL POISONS—(contd.)

Name and how taken.	Symptoms.	Treatment.	REMARKS.
Mushrooms.	In $\frac{1}{2}$ hour or more colic, followed by vomiting and diarrhoea. Pulse becomes very weak. Mental excitement. Insensibility.	Emetic of mustard, zinc, or ipecacuanha. Tincture of belladonna (5 drops every $\frac{1}{2}$ hour for three doses to a child of five). Castor oil. Stimulants (brandy, sal volatile or ether). Warmth to surface. Poultice belly.	
Nitric Acid.		See Acids, mineral.	
Nux Vomica.		See Strychnine.	
Opium. Solid lump. Laudanum. Soothing syrups. Battley's solution. Enema. Poultices or liniments by absorption. Dover's powder. Compound Kino powder.	Pupils contracted. Face livid. Skin dry. Insensibility, which becomes very deep with heavy breathing. This is succeeded by great prostration, shallow breathing, and general clammy perspiration.	Emetic of mustard or zinc. Strong coffee or tea liberally. Pour cold water over the head at intervals. Tincture of belladonna (5 drops to a child of five, every $\frac{1}{2}$ hour for three doses). Wash out stomach with potash, permang. two grains to pint of warm water. Artificial respiration.	Often combined with belladonna in a liniment, then treat as for opium, but do not administer belladonna. Infants are very easily affected by opium. Two drops of laudanum, and one grain of Dover's powder have caused death.

<p>Oxalic Acid.</p> <p>Mistaken for Epsom salts. "Salt of Sorrel" for removing iron mould.</p> <p>Pain-killer.</p> <p>Phosphorus.</p> <p>Rat-paste poison. Match-heads.</p>	<p>Burning pain in throat and stomach, vomiting of bloody matter, imperceptible pulse, and great depression. Mouth may be white inside.</p> <p>Burning pain in the stomach. Vomiting, which may contain blood. Delirium. Deep insensibility or convulsions. The patient may recover the local symptoms, the graver symptoms not appearing for a couple of days.</p>	<p>Chalk, whitening, or lime freely with water. The saccharated solution of lime in half tea-spoonful doses frequently in water is the best. Castor oil and olive oil afterwards.</p>	<p>Very poisonous. Must not give the alkalis (potash and soda) as they form poisonous compounds with the acid. The purely acid taste might attract a child.</p>
<p>Rat-paste Poison.</p> <p>Rough on Rats.</p> <p>Salt of Sorrel.</p>	<p><i>See</i> Aconite.</p> <p>Emetic—copper the best, as it is also an antidote. Repeat it.</p> <p>Turpentine purgative (3 drachm with mucilage) followed by Epsom salts.</p> <p><i>See</i> Phosphorus.</p> <p><i>See</i> Arsenic.</p> <p><i>See</i> Oxalic Acid.</p>	<p>All oily and greasy substances to be avoided when treating a case.</p>	

SOME SPECIAL POISONS—(concl'd.)

Name and how taken.	Symptoms.	Treatment.	REMARKS.
<p>Silver Nitrate of (Lunar Caustic).</p>	<p>Vomiting of white flaky matter, which turns black on exposure.</p>	<p>Common salt in water or milk, repeatedly, in large quantities. Emetic after first draught. White of egg with water freely afterwards.</p>	<p>A small quantity taken is rendered harmless by the gastric juice. The antidote, salt, acts in a similar way.</p>
<p>Portion falling down throat during an ap- plication.</p>			
<p>Strychnine.</p> <p>Mistaken for santonin or salicin. Some rat poisons (Simpson's paste, Butler's vermin-killer).</p>	<p>Convulsions and lock-jaw. Body bent backwards. Countenance wildly excited. Pulse rapid and small. Respiration difficult.</p>	<p>Emetic of mustard or zinc. Tannic acid in water, given copiously. Bromide and chloral (8b) by bowel, and repeated to keep the convulsions in abeyance. Artificial respiration. Chloroform to control convulsions.</p>	<p>The active principle of nuxvomica. One-sixteenth of a grain has killed a child of two. Twenty grains of a nuxvomica nut would be dangerous.</p>
<p>Sulphuric Acid.</p>		<p>See Acids, mineral.</p>	

Tatar Emetic.

See Antimony.

Tobacco
(including Lobelia).

Nausea, vomiting and faintness.
Confusion of sight.
Clammy skin and weak pulse.

Emetic of mustard.
Tannic acid, ten grains or so in water frequently, or strong tea. Stimulants—brandy, sal volatile, and chloric ether.
Warmth to surface of body.

Vermis-killers.

Battle's.
Buttler's.
Gibson's.
Simpson's.
Roth and Ringeisen's.
Rough on Rats.

Recumbent position.

See Strychnine.
See Strychnine.
See Strychnine.
See Arsenic.
See Phosphorus and Arsenic.
See Arsenic.

Zinc Chloride.
Burnett's fluid.
Disinfecting fluid.

Corrosion of lips and mouth. Pain and burning of stomach.
Constant vomiting of bloody fluid. Difficulty of swallowing and breathing. Quick, feeble pulse, deep insensibility.

Carbonate of soda in large quantities dissolved in warm water (common washing soda will do). Milk and white of egg very freely.
Tannic acid or strong tea.
A dose of laudanum.
Linseed poultice to stomach.

CHAPTER LVIII.

THE ADMINISTRATION OF REMEDIES.

It is well to approach the subject of the administration of remedies to children with the full realisation that medicines are but the second line of defence against disease, the first being maintained by careful attention to the dieting and hygiene of the child. Even in sickness, particularly in the diseases of early infancy, our first consideration is whether we cannot cure the disease by such measures as the correction of dietetic errors before seeking the assistance of drugs.

The discrete and timely administration of medicinal remedies, will, however, produce effects more rapidly beneficial than in the adult and will also, in many cases, prevent further development or aggravation of illness.

For home medication, only the simplest and mildest of remedies should be employed. Patent or other medicines of unknown composition should not in any circumstances be permitted. Further, the practice of borrowing prescriptions written for other children, on the assumption that what has benefited one child will benefit another, is unreasonable and dangerous.

There are certain drugs which, when taken by the mother, are secreted in the milk in sufficient quantities to affect the child. The most conspicuous among these are:—the salicylates, belladonna, atropine, arsenic, iodine in any form, potassium iodide, bromides, the saline purges and possibly opium and morphia. Such drugs, therefore, should be used in strictly controlled doses and only when absolutely necessary by the nursing mother.

Whatever medicine is necessary for the child, it should be made up so as to occupy the smallest bulk possible and as free from objectionable taste as the nature of the contents permits. It is a matter of the greatest difficulty, even of impossibility to give a complete list of the correct doses of drugs for infants of all ages. Individual susceptibility, the condition of the

**Drugs
affecting
child
through
mother's
milk.**

child and other factors must inevitably render variation necessary. In some instances, in order to produce the desired effect, it may be necessary to push the dose beyond the standard safety limit, but of course, such procedures must only be undertaken under medical guidance.

The secret of safety in the use of dangerous drugs lies in the administration of initial doses well within the safety limits and increase only after the effect has been observed and the individual tolerance of the patient ascertained.

A short note on the medicines more commonly employed, grouped according to their action, is now appended:—

Anthelmintics are medicines which have the power of destroying the life of intestinal worms. They are commonly administered in conjunction with a purgative, to ensure the rapid passage of the drug and to expel the dead worm. For each species of worm there is a specific remedy which is powerless against other species; consequently we must be aware of the type of infection before embarking on treatment. It is also clear that the so-called worm powders sold as an universal remedy are in many cases useless (*see* also Chapter XLII).

Antipyretics or fever mixtures act by promoting a free flow of perspiration and urine. For mild degrees of fever, the simple fever mixture of the type of No. 33 is perhaps the most satisfactory. The effect may be enhanced by judicious warm bathing or sponging.

The coal-tar derivatives such as aspirin and antipyrin (phenazone) are more powerful in their action. Their use, however, in the very young is not altogether free from danger. These drugs have the additional attribute of relieving many forms of pain and restlessness. Phenazone especially is of value in the control of the spasmophilic tendency (*see* Chapter XXVIII). Full details regarding the control of fever by hydrotherapy will be found in Chapter XIV.

Antispasmodics and sedatives are medicines in frequent demand to neutralise that excessive excitability of the nervous system which is such a common feature in the illness of infancy and childhood. Of this class, the bromide of potassium is an effectual and at the same time safe remedy for the parent to handle. With it

harm can hardly be done unless there be utter recklessness and disregard of the effects. The continued use of bromides may induce a severe and even disfiguring eruption. In most cases, this amounts only to the appearance of red blotches, which soon vanish when the medicine is stopped, but occasionally these blotches develop into pustules or wart-like growths.

Chloral is a more powerful sedative and must consequently be used with caution; the dose advised in prescription 37 is safe and may be repeated after six or eight hours should there be necessity. When combined with the bromides it acts more powerfully.

Mention has been made above of the value of phenazone. The drug is especially indicated in cases in which there is a persistent tendency to convulsive manifestations.

Arsenical preparations occupy an important place in the formulary of childhood. The indications for the use of the drug are as follows:—

1. As a stimulus to blood formation; it is therefore indicated in anæmia and after debilitating diseases.
2. As a parasiticide in malaria, relapsing fever and in certain specific diseases.
3. In certain nervous diseases, especially those expressed by muscular spasm or uncontrolled action such as chorea, asthma, croup or whooping cough.
4. In certain skin diseases.

The usual form and dose is liquor arsenicalis or Fowler's solution, of which from $\frac{1}{4}$ to 1 minim may be given to a child of one year three times a day, but in certain diseases, notably chorea, larger doses are required. When arsenic is given in heavy doses, the most careful watch must be kept for signs of poisoning, sore eyes, vomiting, tenderness of the abdomen and skin rashes. Arsenic being a cumulative drug, it is important that the course should be interrupted periodically, at the end of a fortnight or three weeks, and an interval of ten days allowed, during which the system will get rid of the excess.

Of late years, the organic preparations of arsenic such as neosalvarsan, sulfarsenol and stovarsol have taken the place of the inorganic compounds when large doses are required.

Astringents.—The term is somewhat erroneously applied to all classes of drugs employed in the control of diarrhœa. More correctly the term should be applied to those drugs which by direct or indirect application cause a contraction of the blood-vessels. Examples of such drugs are tannic acid, tincture of ferric chloride, catechu, zinc sulphate (for eye application) and adrenalin. For the control of diarrhœa, it is preferable as a rule to use drugs having different actions, those having an antacid and soothing effect on the mucous membrane, such as bismuth carbonate or chalk powder and those which control the over-action of the musculature of the bowel, belladonna and opium. The latter is reserved for more severe or special cases in children.

It cannot be too strongly emphasised that the immediate administration of such medicines in the diarrhœa of children is bad practice. The diarrhœa is symptomatic and calls for a careful investigation and removal of the exciting cause.

Bael fruit is classed among the astringents, but its action is that rather of a general regulator of the bowels. In irregularity of the bowels, presenting alternations of diarrhœa and constipation, one draught (*see* Prescription No. 22) taken early in the morning often exercises the most beneficial effect.

In bazaar specimens, the wood-apple (fruit of the *Feronia dephantum*) is often substituted for bael. Though they bear a close resemblance externally, they can easily be distinguished by opening them. In the true bael there are, in the centre of the pulp, a number of cells, from five to eighteen, containing one or more seeds and glutinous mucus, whilst in the wood-apple, there are no cells and the seeds are embedded in the pulp. **Caution.**

When the fresh fruit is not procurable, the liquid extract of bael or the dietetic bael can be obtained from the chemist.

Of local astringents for the checking of bleeding from a wound or from the nose there is none more valuable than ice. For internal hæmorrhage such as from the lungs or within the abdomen or for deep inflammation or congestion, as for example in meningitis, the application of the ice-bag brings relief in a manner in which no other therapeutic agent can.

When ice is not obtainable, the following freezing mixture may be employed:—Sal ammoniac 5 ounces, saltpetre 5 ounces, water 10 ounces mixed together and enclosed in a bag.

Carminatives stimulate gently the nerves of the stomach and relax its orifices, facilitating the escape of gas and relieving spasm. They are, therefore, useful for flatulence and, when combined with aromatics and soda, they are of great value both in colic and in certain kinds of diarrhoea.

Emetics are medicines which induce vomiting; they are indicated when we wish to clear the stomach of its contents. In the early stage of croup, the act of vomiting may serve to relax the spasm or in bronchitis and diseases of the lungs when the viscosity and amount of the phlegm is such that it seriously obstructs the air-passages. Emetics exert a depressant effect on the action of the heart and are therefore contra-indicated when there is already any degree of prostration. Unless there is great urgency and more or less instantaneous vomiting is required, the dose should not be too large at first but rather a small dose should be given every fifteen minutes till the desired effect is obtained. The emetic most certain in its action, the least irritating to the stomach lining and having also the effect of loosening the bronchial secretion is ipecacuanha. In the case of infants the powder is used, but for older children the wine is preferred; a grain of the former or a teaspoonful of the latter every quarter of an hour till vomiting is produced, is the usual method of employment (*see* Prescription Nos. 23 and 24). When ipecacuanha is not available and the matter is urgent, or when it is suspected that poison has been taken, mustard and water, one teaspoonful to half a pint may be employed. This remedy, on account of the large bulk which must be taken, is only suitable for older children.

Salt and water is also used, but the action is uncertain.

Expectorants are drugs which induce an increased fluidity of the phlegm and thereby prevent it from clogging the bronchial tubes.

The expectorants commonly in use are of two classes, the first act as mild irritants to the mucous membrane of the stomach and reflexly on the bronchial mucous membrane. Of this class are ipecacuanha, squills, senega and ammonium carbonate. On account of this action, ipecacuanha is given in emetic doses when there are suffocative symptoms due to the

blocking of the air-tubes with viscid mucus. Even if the drug fails to produce vomiting, much benefit will be derived from the increased fluidity of the mucus.

The action of ammonium carbonate in young children is sometimes too pronounced, leading to serious gastric irritation and diarrhœa. Other drugs, notably potassium iodide, act directly on the mucous membrane of the bronchi, increasing the secretion and in all probability helping to relax the spasm of the tubes which so often accompanies inflammatory conditions.

It follows from the above that expectorants should not be given when the bronchial tubes are already flooded with watery mucus; on the contrary, in such conditions it may be necessary to administer drugs such as atropine, which dry up the secretion.

The choice of expectorants will depend to a certain extent on other subsidiary actions that they may have, thus ipecacuanha has a depressant action on the heart, but is a valuable antipyretic. The drug will therefore be indicated in the early stages of inflammatory disease of the lungs or air-passages, but in the later stages, when heart failure is to be feared, it will be replaced by squills which has an action on the heart similar to digitalis, though in a lesser degree.

The expectorant drugs must not be expected to control cough except by rendering the expulsion of sputum more easy; when there is but little mucus, but the air-tubes are inflamed and irritable, some sedative such as compound tincture of camphor or paregoric may be added to the mixture, but as this contains a small quantity of opium, grain $\frac{1}{4}$ to sixty drops, it must be used with caution in the case of younger children.

Mercury is a drug well tolerated by children. In the form of calomel it is a valuable purgative in acute febrile disease or when there is derangement of the liver function. When combined, as it conveniently may be, with sodium bicarbonate, the powders should be made up fresh as required.

Grey powder, the familiar friend of the nursery, must be used only in the form of some well recognised brand of tabloid, to be crushed before use. The powder is liable to serious deterioration in this climate with the production of poisonous substances.

Opium and its derivatives must be regarded as the **most dangerous of all drugs in infancy** and early childhood. They should never be prescribed for infants under six years of age except under expert advice, and after that age strictly and only as directed on the foregoing pages. By the administration of cordials, soothing syrups or powders of unknown composition, we may run the risk of unwittingly administering opium or other narcotics.

Purgatives and aperients may be divided into two classes, the first for employment when it is desired to induce a rapid and copious evacuation of the bowels and the second, to be used as regulators to ensure daily action.

Of the first class, for all ordinary purposes castor oil is the safest and most satisfactory. In acute disease, however, and especially where there is derangement of the liver function, castor oil may cause vomiting. In such cases, calomel in appropriate doses, followed by a dose of salts, is the most suitable. The saline purgatives are used when it is desired to remove large quantities of fluid from the body or relieve cerebral congestion.

For the habitual regulation of the bowels we shall depend on the vegetable aperients, cascara, aloes or senna, perhaps assisted by some saline aperient.

It will be found that, for daily use, a combination of different drugs will not only be more efficient, but that a smaller dose proportionately will be required. For example, there may be reason to believe that the muscles of the bowel are sluggish, at the same time the motions are hard and dry. A mixture containing cascara to stimulate the muscles combined with magnesium sulphate to render the motions more watery and liquid paraffin as a lubricant (No. 15) will be found in every way more satisfactory than a large dose of any one of the constituents.

Medicinal liquid paraffin is a valuable addition to the pharmacopœa, it has no action beyond that of a lubricant, so that no habit of dependance is established and it may be with advantage, combined with a tonic (45).

Many fruits and other simple pleasant articles exert a laxative action, which will be utilised by the

thoughtful parent before having recourse to the medicine chest:—such are prunes, figs, tamarinds, honey, treacle and manna.

Stimulants are required in acute illness to tide over periods of collapse and prostration. The majority act by increasing the force of the heart beat and raising the tone of the circulation. Stimulants may be divided into four classes, alcoholic, nutritive, drugs for administration by mouth and drugs for hypodermic use.

In childhood, undoubtedly, the most valuable stimulant is brandy (for doses, *see* Prescription No. 42). Caution should be exercised that excessive doses inducing narcosis are not employed. Alcohol in any form should not be given to children over long periods as there is danger that by doing so the liver may be damaged permanently.

Nutritive stimulants.—These are easily digested foods such as beef-tea, or meat jellies, having but slight food value, but mild stimulant and appetising qualities. The high value of glucose as a heart muscle stimulant has been mentioned in the text.

Of medicinal stimulants for administration by mouth as rapid restoratives we may mention, sal volatile, ether and camphor, with strychnine and digitalis for prolonged use. For hypodermic administration we have at our disposal adrenalin, strychnine, digitalin and camphor in oil.

Tonics are administered to restore the health and vigour of the child after debilitating illness or when from any cause the child is run down. The action of all tonics is not the same and it should be clear what the indications are and what conditions it is necessary to correct, before deciding on the particular form of tonic to be employed.

Tonics in general may be divided into six classes:—

1. Rebuilders, to replace mineral bodies especially calcium, iron and phosphates.
2. Stimulants to blood formation. Arsenic.
3. Vitamine containing tonics. Cod-liver oil, Metagen and Beemax.
4. Appetisers. Gentian and quinine in small doses.
5. To restore muscular tone. Strychnine.
6. Digestive tonics. Mineral acids. Rhubarb.

Tonics should not be given till the cause of the disease is removed. Particularly is this the case with iron tonics which are frequently given to anæmic children with indigestion, with the result that the indigestion is increased and the iron is not absorbed.

It must not be forgotten that fresh fruits, vegetables and other food contain the constituents of most tonics in easily digestible form and have in addition the vitamine constituent, without which tonics are of no avail.

Enemata and bowel irrigation play an important rôle in the treatment of sick children. For the purpose of relieving constipation, a soapy water enema of roughly the following dimensions is introduced by means of the child's enema syringe.

Infant at breast 1 to 2 ounces; age 1 to 5, 3 to 4 ounces; 5 to 10, 6 ounces.

The tube, well vaselined, is introduced with a slight inclination to the left following the line of the bowel and the fluid at a temperature of about 100 is injected slowly.

As an alternative, glycerine one half to one drachm or one drachm in an ounce of water is injected with a glycerine syringe.

The high enema or bowel wash is employed when it is desired to free the whole of the large bowel from irritating or toxic contents. For this purpose, larger quantities of saline solution are employed, as much as one pint for a child of six months and from one to two pints at the age of two years. If the motions are excessively acid as evidenced by scalding of the buttocks, sodium bicarbonate in the proportion of grains two to one ounce of the saline, is added. Ample time must be allowed for the fluid to find its way along the bowel and the enema syringe replaced by an apparatus consisting of a funnel, rubber tube and catheter.

The method of administration is as follows:—The child lies on the back with the hips raised by a pillow. The catheter is inserted four or five inches into the rectum and the funnel held some eighteen inches above the level of the patient's hips. "When sufficient fluid has been run in, it may be syphoned off by lowering the funnel and the process repeated till all the returning fluid is clear."

Medicines may be administered in the form of an enema when the child is unable to swallow or to retain them in the stomach. This route of administration is commonly employed during convulsions. On account of the slower absorption it is necessary to give twice the quantity which would be administered by mouth. Opium and its derivatives, on the contrary, are said to be more potent when given by the rectum, the quantity should, therefore, be half instead of double. It is, however, more convenient and exact to administer morphia by hypodermic injection.

Both medicinal and nutrient enemata should be preceded by a bowel wash. **Nutrient enemata.**

The rectal route is employed when for any reason it is undesirable or impossible to administer fluids or food by the mouth. The more complicated methods of rectal feeding with peptonised milk, beef tea and other substances have been abandoned in favour of a solution of glucose one teaspoonful in an ounce of normal saline solution, the amount according to the age of the child. This can be repeated every four to six hours.

For the administration of fluid, the apparatus may be so arranged that a continuous drop is delivered. By this method, there is more hope of retention than if large quantities are administered at one time.

Poultices are employed for the relief of pain and deep inflammation. Before the application of the poultice, the skin should be oiled to prevent sticking. A pure mustard poultice should never be applied to the skin of a child. The plaster should be made of a mixture of flour and mustard well mixed before water is added. The strength is:—Mustard one, flour six, in infancy; mustard one, flour three or four, for older children.

The flour is made into a paste, spread between layers of muslin and applied. The skin should be inspected frequently to see that no blistering occurs. As a rule, the plaster should be removed after ten minutes and all traces washed off with soap and water.

Hot-water fomentations are very useful in many cases. The water should be as hot as the patient can bear it. Two thickly folded and large flannels should be used, one being removed from the hot water and

wrung out should be applied to the part; after an interval of two or three minutes, the second should be similarly applied upon the removal of the first, and the process continued for half an hour if possible.

Turpentine stupes may be applied by sprinkling a little turpentine upon the flannels when they are wrung out in hot water before application. The action must be watched carefully. Of late years, the use of poultices or other hot applications has given way to some degree to the employment of **thermogene wool** or **antiphlogistine**, both valuable preparations. Thermogene wool should not be employed after the skin has been oiled, lest blistering should take place.

Of the application of cold to the surface of the body we have already spoken, but it may here be advisable to reiterate the importance of cold bathing, sponging or wet packing in conditions of high fever, restlessness or delirium.

The vapour bath is valuable in cases of dropsy. The child, quite naked, should be seated upon a cane-bottomed chair; a blanket reaching to ground on all sides should be thrown around the patient, and tied at the neck so as to leave no aperture. A **chattie**, or other open vessel of boiling water having been placed under the chair, sweating soon commences, and it should be kept up for a quarter of an hour at least. The child should then be rapidly and thoroughly dried, and put into a warm bed. Another plan is to conduct steam beneath the bed-clothes, which have been raised from the body by arching a couple of bamboo twigs across the bed underneath them, through a hollow bamboo or India-rubber tube from the spout of a kettle; but care must be taken not to allow the jet of steam to impinge directly upon any part of the body.

A hot pack performed in the same way as a cold pack, but using very hot water, is also an admirable method of inducing perspiration in cases of dropsy or collapse.

A hot bath usually has a temperature of about 104° to 106°, and the warm bath a temperature of 98° or 100°. To be of use, the water should be deep enough to reach to the child's arm-pits. It is not of any consequence whether drying be effected completely, but it is important that it be done rapidly. The child should be

wrapped in a blanket and put to bed, whether with or without his night-dress matters not, but a garment should be warmed previously to being put on. Irritation and pain are thus subdued, and probably perspiration induced.

The use of carbolic acid as an application or lotion for **infants and young children**, is **to be deprecated**. Not only is carbolic acid poisoning as evidenced by blood in the urine, easily produced, but there is a possibility of severe damage to the skin.

A mustard bath is used in certain cases of threatened collapse. It is prepared by using mustard in the proportion of one ounce to each gallon of warm water. To ensure equal diffusion, the mustard should first be made into a paste, and placed in a muslin bag, through which it should be squeezed into the water.

The alkaline bath made up as follows:—Sodium carbonate (washing soda) $\frac{1}{4}$ ounce or sodium bicarbonate $\frac{1}{4}$ ounce to each gallon of water, is useful in irritative skin lesions, especially prickly-heat.

APPENDIX.

1. Albumen Water.

The white of two or three fresh raw eggs is mixed well with a pint of cold water. The mixing is best done by shaking them together in a closed bottle. Then a pinch of salt and one teaspoonful of Brandy is added, and, if preferred, a little Dill water or sugar may be used for flavouring purposes.

2. Barley Water.

Two teaspoonfuls of washed pearl barley, one pint of cold water.

Put into a saucepan, and boil down to two-thirds. Strain.

A whole day's supply should not be made at once. It soon turns sour. Once made it should never again be heated to boiling.

3. Barley Jelly.

(1) Soak four level tablespoonfuls (or three ounces measured in a medicine measure) of well-washed pearl barley in a quart of warm water for an hour. Boil, then keep just about the boil for three hours. While hot, strain through muslin or a very fine, perfectly clean, boiled wire gauze gravy strainer into a scalded jug. Cover loosely, cool rapidly in running water; keep in a cool airy safe. Make fresh every day.

(2) Rub two level tablespoonfuls of Robinson's Barley into a paste with cold water, and make up to three-quarters of a pint by stirring in boiling water. Boil gently for half an hour, and make up at the end of that time to three-quarters of a pint. (A more accurate method is to measure two ounces of Robinson's Barley in a medicine measure and make up to a pint with water.) Treat as above.

N.B.—When using Jelly for the first time (say at nine months) begin with Barley Jelly, because Oat Jelly is more apt to irritate the bowels.

4. Batter Pudding.

Take half a pint of milk with one ounce of Benger's or Allenbury No. 3. Boil and allow to cool, add two eggs and a pinch of salt, well beaten up. Pour mixture into basin and steam slowly.

5. Beef Tea.

Put half a pound or a pound of rump steak, cut up into small pieces, into a copper-covered saucepan, with one pint of cold water. Let it stand by the side of the fire for four or five hours, and let it then simmer gently for two hours. Skim well, and serve.

The meat should be as fresh as possible—the fresher the better—and should be cleansed beforehand of all fat and gristle. If this precaution be neglected, a greasy taste is given to the beef tea, which cannot afterwards be removed by skimming. Iron sauce-pans, if used, should be enamelled.

In re-warming beef tea which has been left to cool, care must be taken to warm the tea up to the point at which it is to be served, and no higher. It should on no account be allowed to boil. (Eustace Smith.) Beef tea is a food stimulant, not a true food, and should never be wholly trusted to for nourishment in a prolonged illness.

6. Brandy and Egg Mixture.

Rub the yolks of two eggs up with about half an ounce of sugar. To this add four ounces of cinnamon water, and finally four ounces of brandy.

Half to one teaspoonful as often as necessary for a child of a year old.

7. Cheadle's Bread Jelly with Meat-juice and Cream.

Is prepared by soaking in cold water for six or eight hours four ounces of stale bread; after being well squeezed, the pulp is boiled in fresh water for $1\frac{1}{2}$ hours; strained and rubbed through a fine hair sieve and allowed to cool to a jelly. A tablespoonful is to be mixed with eight ounces of water previously boiled. Makes a cream-like food.

To five teaspoonfuls of the solution, six teaspoonfuls of raw meat-juice, two teaspoonfuls of cream, and about half a teaspoonful of white sugar may be added. The meat-juice must not be added to the food while hot. From two to three ounces of raw meat-juice may thus be given in twenty-four hours.

This is an excellent food when it is necessary to suspend milk temporarily. The proportion of meat-juice may be increased as required by the case.

For many cases the meat-juice is not suitable. Then the bread jelly alone, or the jelly with the addition of cream may be used. Milk can subsequently be added in small quantity as the case improves. If meat-juice is given, only sufficient for immediate use should be prepared, as it decomposes very rapidly.

8. Buttermilk.

Various forms of fermented milk are in use which differ according to the milk used and the process followed; they resemble each other in that the fermentation is excited by some of the varieties of Lactic Acid organisms. The ordinary Buttermilk of commerce is sometimes made from sweet, but usually from sour, milk. In India, due to the risk of contamination, I advise that Buttermilk should be made from the tablets of Lactic Acid Bacilli which are sold by all chemists.

The milk is first sterilised, and then the ferment is added in the form of a tablet, according to the directions printed with each tube. As a rule, the fermentation takes from 6 to 12 hours in a warm place, e.g., temperature 84 deg. Fahrenheit. The product is then

bottled and placed on ice ready for use. The taste is pleasant unless due to too prolonged fermentation, there is pronounced acidity. Buttermilk is very useful in cases of Chronic Diarrhoea and Colic, where feeding at first is often difficult. Personally, I have found it of greatest use in those cases of breast-fed infants, who develop a troublesome diarrhoea, or it may be vomiting. In either case, the cause is due to an excess of sugar and fat in the milk. Do not stop nursing the baby, but before each or every other feed give one or two ounces of Buttermilk, and then gradually decrease. In severe cases, it may be necessary to stop the breast milk entirely.

Buttermilk contains very little fat and sugar and hence can be only used temporarily. **But as a stand-by in troublesome cases, it is invaluable.**

9. Cereal Decoctions.

A pint of Jelly strained from boiled Barley, Rice, or Oatmeal contains only a fourth, or at most a third, as much food as a pint of Mother's Milk or Humanised Milk. A tablespoonful of Milk contains as much food as a pint of Barley Water: indeed, *Barley Water is merely water thickened with a trace of starch, and should not be regarded as a food but as a diluent.*

10. Chicken Broth.

A chicken thoroughly cleaned and with all the skin and fat removed is to be chopped, bones and all, into small pieces; put them, with a little salt, into a saucepan and add a quart of boiling water; cover closely and simmer over a slow fire for two hours; after removing allow to stand, still covered, for an hour; then strain. (Starr.)

11. Custard Pudding.

Take half a pint of milk with one ounce of Benger's or Allenbury No. 3 and boil together, then cool and add two eggs and two teaspoonfuls of sugar which have been well-beaten up. Place in pie dish and bake. Flavour with nutmeg. Serve hot or cold.

12. Gelatine Solution.

A teaspoonful of good gelatine or isinglass.

Half a tumblerful of cold water.

Mix. Allow to stand for three hours. Turn into a cup. Stand the cup in a saucepan half full of water, and boil till the gelatine is dissolved.

When cold this forms a jelly, of which a teaspoonful is to be added to half a bottleful of milk and water food to prevent curdling in the stomach.

13. Junket.

Take a pint of new milk to which a teaspoonful of sugar has been added and let it stand in a bowl near a fire or on a stove, until it has warmed to blood heat (about 100 deg. Fahrenheit) then

add two teaspoons of essence of Rennet and stir gently for a few seconds. Allow to stand for a little distance from the fire until the curd is firmly set: then place in a cool place until required. A little Brandy can be added to the milk if desirable.

14. Lime Water.

Add two ounces of slaked lime to one gallon of pure water, in a stoppered bottle, shaking well for several minutes. Allow the bottle to stand without any agitation till the superfluous lime is deposited at the bottom, the solution above being perfectly clear. The bottle should stand for twenty-four hours before the clear solution is drawn off for use. Water is capable of dissolving only a certain small proportion of lime, the proper proportion to constitute "lime water" being just as much as the water can dissolve.

A bottle containing lime water should always be kept well corked; access of air spoils lime water.

15. Saccharated Solution of Lime.

Take of slaked lime one ounce, and of powdered white sugar two ounces.

Mix them carefully into a powder in a mortar. Transfer the powder to a bottle, and add one pint of water, shaking the bottle well.

The quantity required for each meal is from fifteen to twenty drops of the clear solution.

16. Milk Jelly.

Take half a pint of milk, quarter ounce of gelatine, rind of half a lemon and one ounce of white sugar. Put the gelatine in a saucepan with the milk and add the sugar, then peel off the lemon rind very thinly, and add it to the other ingredients, stir over very moderate heat until the gelatine is melted. Then strain into a basin and stir occasionally until cool. Finally, pour into a prepared mould and place in a cold place until set.

17. Malt Soup Extract.

Is a food preparation obtained from the chemist, which is of extreme value in cases of recurrent diarrhoea, mostly of the putrefactive type, in which, despite rigorous care, there is no gain in weight. The mother, for instance, following instructions may have given correct quantities of milk and water without sugar and the diarrhoea stops. Gradually she increases the quantities and adds a little sugar. But before the food is strong enough to allow the child to gain in weight, the bowels become loose and again she has to stop all sugar. This may go on again and again and the child fails to thrive or gain in weight. In such cases Malt Soup is strongly indicated and, as a rule, eminently satisfactory. The food should be prepared as follows:—

To the proper amount of cold milk for use per day add one level tablespoonful of flour and to the proper amount of hot water for use per day with the milk add one level tablespoonful of Malt Soup Extract. Place the milk and flour on the stove and add then

Malt Soup Extract and water. Slowly bring to the boil, gently stirring all the time: when boiling the food is completed.

Before giving Malt Soup Extract, place the child for two or three days on milk and water without sugar, and then, when first using the food in very small infants, begin with a milk dilution of 1-3 milk, 2-3 water. In older infants you may use half milk and half water, and later 2-3 milk and 1-3 water. The Flour and Malt Soup may gradually be increased, but never beyond four level tablespoonfuls of each per day.

Cases which are treated with this food thrive and rapidly put on weight. If the stools are still loose, though normal in appearance, but the weight is increasing, the food may be continued for months. Orange juice should be given.

18. Mutton Broth.

Cut one pound of lean mutton into small pieces and place it in a saucepan with three pints of cold water; add a little salt. Heat to boiling point and then allow it to simmer for three hours; strain, and when cold, skim off the fat. Serve warm.

19. Oatmeal Water.

Add from one to three tablespoonfuls of well-cooked Oatmeal Porridge to a pint of water. Heat almost to boiling point with constant stirring until a smooth mixture is obtained, then strain.

20. Oat Jelly.

Proceed as for Barley Jelly, using Oatmeal instead of Barley-flour. A simpler way is to take equal parts of boiling water and well-boiled porridge, bring to the boil, stir for a few minutes, then strain, cool, and keep cool as above.

After 15 months of age, if the baby has good digestion, use a coarser strainer, the handiest being the cylindrical flour-dredger in common use. If the boiled oatmeal is placed in this while boiling-hot, a few turns of the handle will cause all that is fine enough to go through, and the result is a kind of strained, jelly-like Porridge. The dredger can be readily cleansed, and should always be boiled just before use. Thin ordinary gruels can be made by using about half the proportion of meal given in the above recipes.

(TRUBY KING.)

21. Peptonised Milk.

Add a pint of boiling water to a pint of new milk. Then add two teaspoonfuls of Benger's *liquor pepticus*, and twenty grains of the bicarbonate of soda. Or one of Fairchild's Peptogenic Powders. Mix well, and put it aside in a warm but not hot place for an hour, in a jug. Then pour it again into the saucepan and boil for two minutes to prevent further action of the ferment. Sweeten to taste with sugar of milk.

The same object may be more easily attained by the use of "Fairchild's Peptonising Powders." Printed directions accompany each box of powders.

22. Protein Milk.

This is a food made by adding the curds of one quart of milk (the whey having been separated and discarded) to one pint of water and one pint of Buttermilk. It contains very little sugar, a moderate fat, a high proteid content and is exceedingly valuable in cases of severe ferment-active diarrhoea, certain cases of Marasmus and chronic dysentery.

The directions for making it are as follows:—One quart of fresh milk is warmed to blood heat and to this is added half ounce of liquid Rennet. Stir for a moment and allow to stand for 20 minutes until jellied. Then strain off and discard the whey and wash the strained curd twice with cold boiled water, after which the dry curd is rubbed through a fine sieve with a wooden spoon. This requires some effort, but is essential. After the curd has been mashed through the sieve, gradually add to it one pint of Buttermilk and finally sufficient boiled cold water to make a quart mixture altogether. One grain of saccharine to the quart may be added to make it most palatable to infants. The food when finally strained is smooth and homogenous and will readily pass through a teat. It is not necessary to dilute it. It should not be heated above blood heat. It should not be given for more than a week. The quantities to be given and the times are the same as for the ordinary milk feeds of the age.

Remember, it is a most valuable within 48 hours there is a complete change in the stools and bien être of the child. If it is decided to continue this food for more than a few days, it is necessary to add half tablespoonful of cane sugar or Maltose to the feeds per day.

However, when improvement is obvious and it is decided to stop the Protein Milk, boiled milk and water without any sugar should be given for the first few days. Later, sugar may be added very gradually.

Protein Milk incurs some trouble in preparation, but no mother will grudge this, if other methods have failed to check the disastrous course of marasmus, diarrhoea or dysentery.

23. Juice of Raw Meat.

Take a pound, or whatever quantity required, of the best rump steak, free from all fat. Cut it into the finest mince. Put it into a bowl. Add cold water, to which a few drops of diluted muriatic acid and a pinch of salt have been added, just sufficient to moisten the mass well. Set aside to stand for an hour, during which time it may occasionally be stirred. Strain through a coarse cloth, using pressure. The pulpy mass of flesh ought to be nearly bleached, while the liquid should be of a port-wine colour.

24. Raw Meat.

The lean of steak or chop pounded in a mortar into a pulp and then strained through a fine sieve. It may be eaten as it is, or diffused through jelly or broth. A dose of pepsine should always precede its consumption. A teaspoonful four times a day may be increased to half a pound daily.

At first the motions become very fetid, but this soon passes off.

25. Rice Water.

Wash well one ounce of good rice in cold water. Then macerate for three hours in a quart of water kept at tepid heat, and afterwards boil slowly for one hour and strain.

26. Rice Jelly.

Proceed as for Jelly—using whole rice. Jelly is preferable to Barley Jelly if the bowels are relaxed. Oats Jelly is the most laxative.

Rice Water or Barley Water may be made by using six times as much water as for preparing the jelly; or by adding five parts of boiling water to one of the prepared jelly.

27. Vegetable Broth.

Take a pint of beef tea, mutton or chicken broth. Add a handful of mixed vegetables—cabbage, spinach, carrots, onions, and fresh or dried peas and beans. Allow to simmer for one hour and strain through muslin.

From two to four ounces may be added daily to one bottle after the fifth month.

28. Whey.

N.B.—Always keep jugs, containing milk, whey or other food for babies loosely covered to exclude falling particles, flies, etc., but not to prevent access of air. A piece of clean white paper through which the thermometer can be thrust, serves the purpose.

To make 12 ounces of whey.

Put 18 ounces of milk in a jug. Keep a dairy thermometer standing in the milk and heat to 105 deg. Fahrenheit, by placing the jug in a saucepan of hot water. Stir in thoroughly a teaspoonful of best Rennet extract; allow to stand for three minutes, when a firm curd should have formed. Break up thoroughly with a perfectly clean fork. Replace jug in saucepan. Heat up to 160 deg. Fahrenheit, reading the thermometer when the bulb is about the middle of the whey—not in the curd or near the top. Draw the saucepan aside so that the temperature may remain about 160 deg. Fahrenheit for ten minutes; now pour off the whey from the curd (which should have sunk in a lump to the bottom of the jug), straining it through a scrupulously clean boiler strainer. . . . Complete clearing of the whey is sometimes desired when a baby is ill. This may be promoted by carefully cutting the curd into blocks, with a sharp dinner knife, after it has set very firmly, instead of breaking it up with a fork.

“ Food Value ” of Whey.

Whey made from new milk contains about a third of the fat of the milk; whey made from skim milk contains little fat; if from “separated” milk, almost no fat.

The thinnest, clearest, most transparent Skim-milk-whey has fully a third of the “ food value ” of New Milk, and contains four times as much food per pint as beef tea. The weakest

Whey may therefore be of great practical importance in tiding a sick or delicate baby over a critical period—a period when it happens to be necessary to exclude almost completely both Fat and Casein, giving for the time being a solution of Sugar of Milk and Soluble Albumen—in other words, “Skim-milk-whey.” The mother is apt to regard such a diet as nearly valueless whereas it is “as strong as” thick Oat Jelly, and contains seven times as much food as Barley Water. Moreover, the solids of Whey are specially adapted to the digestive capacity of the young infant, while the solid in Barley Jelly, etc., is almost pure starch—a substance not present in the natural food of any young mammal. However, Whey is not a complete food for continued use.

Though Whey tends to be laxative, it often agrees well in the early stages of convalescence from Diarrhœa, especially if milk boiled for ten minutes be added to it step by step, say, at the rate of an ounce a day, up to three ounces per pint. Then a gradual return may be made to Humanised Milk.

(Truby King.)

29. White Wine Whey.

To a breakfast-cupful of new milk in a saucepan, placed upon a fire, add a wineglassful of cheap cooking sherry when the boiling-point has been reached. Then boil again for one minute and strain off the curd. Sweeten with sugar. A feeble infant will take a tablespoonful every fourth hour.

30. Lime Whey.

Bring half a pint of milk to the boil. Remove and squeeze a few drops from a fresh lime (Limbu) into the milk. Stir well and allow to simmer on the stove for a few minutes, then set aside and strain through muslin.

This is a good method, easily and cheaply done. To each six ounces of this whey, add a level teaspoon of sugar of milk; and a pinch of bicarbonate of soda or sodium citrate, if you are intending to use it as a diluent of milk.

31. Lemon Sago Pudding.

Boil two ounces sago in three-quarters of a pint of water till cooked: then mix with it three ounces of golden syrup and the juice and rind of one lemon, put in a mould and turn out when cold. If the grated rind is not liked, thinly peel the lemon and boil in the water for a few minutes and strain before adding the sago.

32. Raisin Tea.

Half a pound of raisins split and stoned, one pint boiling water. May be infused like tea, or cook the raisins and water rather slowly for about two hours. Strain and take hot or cold.

PRESCRIPTIONS.

CLASSIFIED AS FOLLOWS:—

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(*N.B.*—The difficulty of stating the doses of medicines for children of all ages is very great, indeed almost impossible. A rule generally applicable is here stated with the object of releasing parents from occasional dilemma, but it should be remembered that it is not applicable to all drugs. Reference has been made in the text to those drugs which must be handled with special care and the warning against the indiscriminate use of such highly dangerous drugs as Opium and Strychnine may be repeated. The reader is also particularly requested to peruse carefully Chapter LVIII the Administration of remedies.)

Rule for the calculation of the dosage of the commoner non-poisonous drug in childhood:—

Add twelve years to the age of the child and divide the actual age by the result. The fraction so obtained will give the fraction of the adult dose suited to the child. Example, a child is aged 4 years; 4 plus 12 is 16. Therefore four-sixteenths, that is one fourth, of the adult dose is the proper dose for the child in question. Put shortly $4 + 12 = 16$
 $4|16 = \frac{1}{4}$ the adult dose.

For infants of three months $1|30$ full dose or $1|3$ dose for one year.

For infants of six months $1|20$ full dose or $1|2$ dose for one year.

For infants of nine months $1|15$ full dose or $2|3$ dose for one year.

1. Anthelmintics.

• Take
 Santonin, two grains.
 Compound scammony powder, three grains.
 Calomel, one grain.
 The powder to be taken as directed in Chapter XLII (for six or eight years).
 Specific for round-worms.

2. Pomegranate.

Take of fresh-sliced pomegranate root bark, two ounces. Of water, two pints. Boil down to one pint and strain. Of this, one to two tablespoonfuls should be taken fasting, in the early morning, and repeated every half hour until four doses have been taken. An aperient should be given subsequently. Castor oil being the most

suitable. The worm will probably be expelled in about twelve hours.

3. Male Fern.

Take

Liquid extract of male fern, twenty minims.

Essence of ginger, ten minims.

Glycerine, two drachms.

Water to half an ounce. Mix.

The draught to be taken as directed in Chapter XLII (for children of three years and upwards).

4. Carbon Tetrachloride.

For a child of from ten to fifteen.

Take of

Carbon tetrachloride, thirty minims.

Saturated solution of magnesium sulphate, one-half ounce. Mix.

For a child of five to ten years.

Carbon tetrachloride, fifteen to thirty minims.

Saturated solution of magnesium sulphate, one-fourth to half ounce.

Child from two to five.

Carbon tetrachloride, ten to fifteen minims.

Saturated solution magnesium sulphate, one-sixth to one-fourth ounce.

The mixture will be repeated once or twice after intervals of ten days.

In case of liver disease, the drug should not be given and, in debilitated children, the dose given should be half that indicated above.

For Hookworms.

N.B.—The drug should only be given under professional supervision.

5. Enema for Whip-worms.

Take

Table salt, one or two teaspoonfuls.

Olive oil, half an ounce.

Conjee water, three ounces. Mix and inject with children's enema syringe.

Aperients and Purgatives.

6. Castor Oil.

Dose—Half a teaspoonful for a child under one year of age.

A full teaspoonful is sufficient for a child of any age. May be mixed with an equal quantity of glycerine.

7. Red Mixture.

Take of

Rhubarb, ten grains.

Carbonate of magnesia, thirty grains.

Sal volatile, half a drachm.

Aniseed oil, two drops.

Water, two ounces. Mix.

Dose—A teaspoonful, repeated every fourth hour till it operates.

8. Gregory's Powders.

Take of

Rhubarb, two drachms.

Magnesia, six drachms.

Ginger, one drachm. Mix thoroughly and pass through a fine sieve.

Dose—Five to twenty grains.

9. Castor-oil Emulsion.

Take of

Powdered gum acacia, three drachms.

Powdered loaf sugar, three drachms.

Oil of peppermint, two drops.

Castor oil, one ounce.

Rub the acacia, sugar, and oil of peppermint together into a powder; add about six drachms of water; then add the castor oil by degrees, with a little more gum or a little more water, as may be necessary to make a perfect emulsion. Then add water slowly to bring the quantity to *four ounces*. Of this mixture one tablespoonful equals one teaspoonful of castor oil, and a teaspoonful equals fifteen drops.

Dose—For inflammatory diarrhoea, half to a whole teaspoonful.

every fourth or sixth hour for a child of two or three years.

Or,

Castor oil, one drachm.
Gum acacia, twenty grains.
Syrup, two drachms.
Caraway water to one ounce.

Dose—One drachm (equal seven and a half drops) every fourth hour, or oftener.

10. Senna.

Take of

Senna leaves, one ounce.
Bruised ginger, half a drachm.
Bruised cloves, half a drachm.
Boiling water, ten ounces.
Stand for half an hour.

Dose—For a child of two years, one teaspoonful. The simple infusion without the aromatics may be given with sugar and milk, when it can hardly be distinguished from ordinary tea.

11. Salts and Senna.

Take of

Sulphate of magnesia, one drachm.
Infusion of senna, one ounce.

The draught to be taken by a child of ten or twelve.

12. White Mixture.

Take

Magnesium sulphate, ten grains.
Sodium sulphate, ten grains.
Magnesium carbonate, two grains.
Peppermint water, one drachm.

Dose—One drachm at one year, two at three years, three at six years to be repeated in six hours if necessary.

12 (a). Podophyllin.

Take

Tinct. of podophyllin, one minim.
Glycerine, ten minims.
Dill water to one drachm.

Dose—One drachm for a child of three.

12 (b). Aloes.

Take

Tincture of aloes, five minims.
Tincture of ginger, two minims.
Tincture of hyoscyamus, five minims.
Syrup of senna, one drachm.

Dose—Suitable for daily administration to a child of two; may be increased according to the necessities of the case.

To which may be added
Tincture of nux vomica, one minim to each dose. If the dose is increased, the nux vomica is not increased.

13.

Take

Pulv. Hydrarg. cum cretae, half grain.

Put Rhei Co., two grains.
Cinnamon, one-fourth grain.

Dose—The powder for a child of one to two, once or twice daily.

14.

Take

Liquid extract of cascara, five minims.

Liquid extract of liquorice, five minims.

Syrup of orange peel, ten minims.
Chloroform water to one drachm.

Dose—One drachm at one year, two drachms at three years, three drachms at five years (the dose may be increased according to individual requirements)... Tincture of belladonna one minim may be added to each drachm if there is griping.

15.

Take

Syrup of figs, thirty minims.
Extract cascara aromat., five minims.
Liquid paraffin, one drachm.
Decoction of Irish moss to two drachms.

(To which may be added magnesium sulphate ten grains or more as required.)

To be made into an emulsion.

Dose—For a child of one to two years, one to two drachms, older children up to half an ounce as required once or twice a day.

(*N. B.*—The mixture is apt to froth over and sometimes blow out the cork, but this does not detract from its value.)

16.

Take

Sodium bicarbonate, two grains.
Aromatic spirit of ammonia, two minims.

Glycerine, five minims.

Chloroform water to one drachm.

To which may be added tincture of belladonna one to two minims as required.

Dose—One drachm three-hourly or more often for a child of one year.

17.

Take

Spirits of ether, two minims.

Spirits of chloroform, one minim.

Compound tincture of cardamoms, three minims.

Potassium citrate, five grains.

Peppermint water to one drachm.

Dose—One drachm at one year, two drachms at three years.

18. Aromatic Waters.

(a) Useful caraway water may be made in the nursery by boiling two teaspoonfuls of crushed caraway seeds enclosed in a muslin bag, in a pint of water, until the quantity is reduced by half.

(b) An useful dill water for the nursery in the absence of the distilled preparation as obtainable from the chemist, may be made as follows:—

Take of Indian dill seeds (soyab or shulpha of the bazaar), three drachms.

Hot water, half a pint.

Infuse till cold and then strain.

Dose—A dessertspoon slightly sweetened with sugar. (*Waring.*)

19. Diarrhoea Mixture.

Take

Aromatic chalk powder, five grains.

Tincture of catechu, five minims.

Mucilage, fifteen minims.

Peppermint water to one drachm.

Dose—One drachm at one year, two at three, three at seven.

20.

Take

Bismuth carbonate, five grains.

Sodium bicarbonate, three grains.

Tincture of belladonna, one minim.

Mucilage of tragacanth, ten minims.

Peppermint water to one drachm.

Dose—One drachm at one year, two drachms at three.

(*N. B.*—When specially indicated, tincture of opium may be added one-fourth to half minim for a child of one year old, not more than one minim in the twenty-four hours.

21. Acid Astringent.

Take

Acid sulphuric aromatic, two minims.

Tincture of catechu, five minims.

Syrup of ginger, five minims.

Water to one drachm.

Dose—One drachm at one year, two at three, three at seven, four at ten, four-hourly.

22. Alterative Astringent.

Take

Bael fruit (the half-ripe fruit, if obtainable, is best, but the dried fruit also is of value) is an useful remedy in the convalescent stage of acute diarrhoea or in chronic diarrhoea.

Take of the soft interior pulp, half an ounce, mix with one ounce of milk or water; sweeten to taste; take two or three times a day. (*Caution see Chapter LVIII.*)

23. Emetics.

Take

Ipecacuanha powder, one grain.
Sugar, four grains. Mix.

Dose—The powder for an infant of one year.

24.

Take

Ipecacuanha powder, one grain.
Ipecacuanha wine, one drachm.
Mix.

Dose—One teaspoonful every quarter of an hour till vomiting is produced. Suitable after the age of infancy.

Enemata.**25. Purgative Enema.**

Take

Castor oil, two drachms.
Thin warm gruel, three ounces.
Mix. Inject with ordinary child's enema syringe.

26.

Take

Castor oil, two drachms.
Turpentine, fifteen minims.
Tincture of asafetida, half a drachm.
Rice water, three ounces. Mix.
Inject with ordinary child's enema syringe.

27. Expectorants or Cough Mixtures.

Take

Spirits of nitric ether, two minims.
Compound tincture of camphor, two minims.
Ipecacuanha wine, two-and-a-half minims.
Syrup, ten minims.
Water, one drachm.
Caution.—

Dose—This mixture contains 1|120 grain of opium in each dose.

28. Expectorant.

Take

Ipecacuanha wine, two-and-a-half minims.
Sodium bicarbonate, two-and-a-half grains.
Spirits of nitric ether, two-and-a-half minims.
Syrup, ten minims.
Water to one drachm.

Dose—One drachm four-hourly for a child of one year old, two drachms at five.

29.

Take

Ammonium carbonate, half a grain.
Ipecacuanha wine, two-and-a-half minims.
Tincture of squills, two-and-a-half minims.
Glycerine, five minims.
Spirits of chloroform, one minim.
Water to one drachm.

Dose—One drachm four-hourly for a child of one year old, two drachms at five, three drachms at ten, four-hourly.

30.

Take

Ammonium carbonate, half a grain.
Ipecacuanha wine, two-and-a-half minims.
Tincture of senega, five minims.
Oxymel of squills, five minims.
Water.

Dose—One drachm at one year old, two at five and three at ten, four-hourly.

31. For Sticky and Difficult Expectorations.

Take

Potassium iodide, one grain.
Ammonium carbonate, half a grain.
Ipecacuanha wine, two-and-a-half minims.
Syrup of orange, ten minims.
Water to one drachm.

Dose—One drachm four-hourly for a child of two, two drachms at five.

32. Antiseptic and Sedative Expectorant for Bronchitis and Whooping-cough.

Creosote, one-fourth minim.
Tincture Benzoin Co., two-and-a-half minims.
Oil of cinnamon, one-fourth minim.
Syrup of tolu, five minims.
Mucilage of tragacanth, fifteen minims.
Peppermint water to one drachm

Dose—One drachm at one year, two at three, three at six, four at eight, three times a day.

33. Fever Mixture.

Take

Solution of acetate of ammonia, ten minims.
Sweet spirits of nitre, two minims.
Potassium citrate, five grains.
Syrup, fifteen minims.
Water to one drachm.

Dose—One drachm four-hourly to a child of one year, two drachms at three, three at seven, four-hourly.

34. Imperial Drink.

Potassium acid tartrate, one drachm.
Lemon juice, half ounce.
Sugar, half ounce.
Hot water to one pint to be drunk cold.

35. Effervescing Draught.

Take

Bicarbonate of potash, one drachm.
Water sweetened and flavoured with syrup of lemon, three ounces. Mix and put into a bottle. Then dissolve forty-two grains of citric acid in three ounces of water in another bottle. One tablespoonful of each mixed together will form a refreshing draught.

36. Linctus for Cough.

Oxymel scillæ, ten minims.
Syrup of tolu, ten minims.
Glycerine, ten minims.
Water to one drachm.

Dose—One drachm four-hourly or more often if necessary.

37. Sedatives.

Take

Phenazone, one grain.
Sodium bromide, two grains.
Glycerine, ten minims.
Aqua camphoræ to one drachm.

Dose—One drachm thrice daily to a child of one year old to be increased if necessary (Gt. Ormond St.)

38. Chloral.

Take

Chloral hydrate, one grain.
Glycerine, ten minims.
Water to one drachm.

Dose—One drachm four-hourly to a child of one, but may be increased if circumstances demand (*see* Chapter XXVIII).

39.

Take

Bromide of potassium, two grains.
Sweet spirits of nitre, one minim.
Chloral hydrate, one grain.
Syrup of orange, ten minims.
Chloroform water to one drachm.

Dose—One drachm every second hour for a child of one year old or four-hourly as circumstances demand (*see* Chapter XXVIII).

40. Bromide of Potassium.

Bromide of potassium, one grain.
Water, one drachm.

Dose—One drachm for a child of one year old, may be repeated within half an hour if the child is not drowsy and increased if convulsions are threatening (*see* also Chapter XXVIII).

41. Stimulant Carminative.

Take

Ammonium carbonate, half a grain.
Spirits of chloroform, two minims.
Infusion of cloves to one drachm.

Dose—One drachm at one year,
two drachms at five years, four-
hourly.

42.

Take

Spirit of ether, three minims.
Aromatic spirit of ammonia, three
minims.

Water to one drachm.

Dose—One drachm at one year,
two drachms at five years, four-
hourly.

43. Alcohol.

Take

Brandy, five to twenty minims, diluted
one to twenty for child of one
year old up to one-fourth ounce in
twenty-four hours.

Ten to forty minims diluted one to
ten for a child of four up to half
ounce in twenty-four hours.

Usually given four-hourly, but may
be increased to hourly over a short
period of emergency.

44. Tonics.

Take

Liquor ferri perchloride, two minims.
Glycerine, ten minims.
Aq. ad one minim.

Dose—One drachm to a child of
two, two drachms at four. These
doses will be increased in the treat-
ment of erysipelas.

45.

Take

Paraffin liquid, thirty minims.
Calcium hypophosphite, one grain.
Benzoate of soda, one grain.
Essential oil of almonds, 1|24th
minim.

Chloroform, 1|16th minim.

Decoction of Irish moss to one
drachm (Gt. Ormond St.)

Suitable for a child of two, double
at four, thrice daily.

46. Aperient Tonic.

Take

Magnesium sulphate, five grains.
Acid sulphuric dilute, two minims.
Ferrous sulphate, one grain.
Syrup of ginger, two minims.
Peppermint water to two drachms
Suitable for a child of two years:
thrice daily.

46 (a). Acid Tonic.

Take

Liquor strychnine hydrochlor., half
a minim.

Acid hydrochloric dilute, two minims.
Infusion of gentian to two drachms.
Suitable to a child of two, thrice
daily.

47. Iron and Cod-liver Oil.

Take

Syrup of iodide of iron, ten minims.
Cod-liver oil, fifty minims.

Dose—Half to one teaspoonful thrice
daily to a child of two years.

48. Cod-liver Oil Emulsion.

(Gt. Ormond St.)

Cod-liver oil, thirty minims.
Mucilage of acacia, five minims.
Decoction of Irish moss, twenty-five
minims.

Oil of cinnamon, 1|40th minim.

Oil of almonds, 1|16th minim.

Elixir of glucide, 1|5th minim.

Chloroform, 1|16th minim.

Benzoic acid, 1|16th grain.

Suitable for a child of one year.

Double dose at three.

48 (a). Iron and Arsenic.

Fowler's solution of arsenic, half a
minim.

Iron or ammonium citrate, one
grain.

Infusion of calumba to one drachm.

Dose—For a child of two, one
drachm thrice daily.

N.B.—The arsenic may be increased
cautiously (see Chapter LVIII).

49. Tonsillitis of Inflammation of the Mouth.

Take

Potassium chlorate, two grains.
Compound tincture of cinchona, five minims.
Acid nitro-hydrochloric dil, one-and-a-half minims.
Glycerine, ten minims.
Water to one drachm.

Dose—One teaspoonful three to four times a day at two years. Double the dose at five. (Kings College Hospital.)

50. Gargle.

Potassium chlorate, ten grains.
Tincture of myrrh, five minims.
Water to one ounce.

51. Gargle.

Tincture of ferric chloride, thirty minims.
Potassium chlorate, ten grains.
Glycerine, one drachm.
Water to the ounce.

Throat Paint.

52. Mandel's Paint.

Take

Iodine, six grains.
Potassium iodide, twenty grains.
Oil of peppermint, five minims.
Glycerine to one ounce.
To be used for children of over five and not more than three times a day.

52a.

Take

Salol, twenty grains.
Alcohol, three drachms.
Oil of peppermint, one minim.
Glycerine to one ounce
May be applied to the throat four-hourly.

53.

Take

Tannic acid, one part.
Glycerine, five parts.
May be applied to the throat four-hourly.

54. Urinary Antiseptic.

Hexamine, three grains.
Sodium acid phosphate, three grains.
Sodium benzoate, two grains.
Syrup of orange, twenty minims.
Water to two drachms.

Dose—Two drachms three to four times a day for a child of four.

External Applications.

55. Dusting Powder.

Take

Oxide of zinc, one part.
Powdered starch, three parts.
Mix thoroughly in a mortar.

Liniments.

56. Soap Liniment.

Take

Soft soap, one drachm.
Hot water, one ounce.

57. Stimulating Liniment.

Take

Turpentine liniment.
Olive oil.
Of each equal parts.

58. Evaporating Lotion.

Take

Sal ammoniac, one-and-a-half drachms.
Methylated spirits, six drachms.
Water to six ounces. Mix and apply on thin layers of muslin.

59. Eye Lotion.

Take

Boracic acid, ten grains.
Boiled and filtered water to one ounce.

Ointment,

60. Ringworm.

Take

Chrysophanic acid, ten grains.
Lanolin or vaseline one ounce; rub well together.
This stains linen.

61. Zinc Ointment.

Take

Oxide of zinc, eighty grains.
Fresh lard, one ounce; rub together.

62. Itch.

Take

Sulphur, one ounce.
Lard, four ounces; rub together.

63. Galls.

Take

Galls (mai-phal of the bazaar)
powdered, one-and-a-half drachms.
Lard, one ounce. Mix. For piles
or protrusion of the bowel.

**64. Strong Antiseptic for
Septic Skin Rashes.**

Resorcin, ten grains.
Ammoniated mercury, five grains.
Lanolin.
Soft paraffin.
Of each half an ounce.

In acute septic conditions, for
example, erysipelas, the strength
of resorcin may be increased to
forty grains per ounce.

65. Yellow Eye Ointment.

Yellow mercuric oxide, four grains.
Soft paraffin to one ounce.

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