A manual of the diseases of infants and children.

A MANUAL

OF THE

DISEASES OF INFANTS

AND

CHILDREN

BY

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THIS LITTLE BOOK

IS AFFECTIONATELY DEDICATED

TO MY FATHER.

PREFACE TO THE FOURTH EDITION.

THIS little book has been so cordially received that a fourth edition has been prepared with the idea of bringing it up to date. Numerous minor changes and additions have been made, and among these may be mentioned the insertion of an article on pellagra in children, the use of the soy bean, and some other methods in the section on infant feeding, a chapter on drug eruptions and a full account of the Binet-Simon test for the mentality of children. It has been the aim of the author to keep the book a small one so that the student may use it for rapid references in the wards or clinics, and it will also be found useful as a desk book for practising physicians.

The references throughout the book will be found of great use when the student wishes more extended information than is given in the average text-book. For the most part these references are in readily accessible journals in the English language and the articles referred to contain, in most instances, extensive bibliographies.

BALTIMORE, MD., *September*, 1914.

PREFACE.

THE average medical student attending the third and fourth sessions has about fifteen different branches with which to familiarize himself. The text-books treating of these subjects average about 1000 pages each, or a total of some 15,000 pages. The student is busy all day at the college or in the hospital. In the evening he is expected to review the subjects which he has considered during the day, as well as fill in the many gaps in the college curriculum. Small wonder is it that, as the German proverb puts it, he cannot see the wood for the trees.

This little book has been prepared for the medical student, not to supplant the larger and necessary text-book, but to enable the student to grasp quickly the more important parts of the subject of pediatrics, and to furnish him with a rapid reference-book for clinical use. It is hoped that the volume is not too condensed to be of service to the busy practitioner.

In preparing this book all of the more important text-books have been consulted, as well as the literature as found in the journals. The chapter on Infant Feeding has been made more comprehensive than might be expected in a work of this scope, owing to the great importance of the subject. A large number of references to journal articles have been added as footnotes to enable the student to look up any given subject in the medical library. Almost all of these references will be found to contain a more or less complete

bibliography of the subject. As many teachers suggest that students look up various topics in the medical library, a short chapter has been added on this subject.

The illustrations are partly original and partly from other authors. For these latter the writer wishes to express his obligations to the authors from whom they have been borrowed. Many thanks are also due to Dr. W. E. Magruder for assistance in reading the proof and to Messrs. W. B. Saunders and Company for their courtesy during the preparation of the work.

CONTENTS

MANUAL OF THE DISEASES

OF

INFANTS AND CHILDREN.

CARE OF THE NEWBORN.

Care of the Cord.—Dust with powdered starch (19 parts) and salicylic acid (1 part), and cover with sterile gauze. Avoid strong antiseptics, as they delay separation —which normally occurs about the fifth day. When the cord drops off a small pad of gauze should be placed over the umbilicus and held in place with the abdominal binder. This prevents the formation of umbilical hernia.

Care of the Eyes.—Prevent gonorrheal ophthalmia and possible blindness. In every case, in hospital and in private practice, where the mother has a purulent discharge from the vagina the child should receive a drop or two of a 10 per cent. solution of protargol or, preferably, of a 2 per cent. solution of silver nitrate. When the mother is free from any suspicious discharge a solution of boric acid (10 gr. to 1 oz.) may be substituted. This latter may be used daily during early life if there is any tendency to inflammation about the eyes. The eyes of the infant should be protected from strong lights.

Bathing.—After birth the child should be thoroughly oiled, to facilitate the removal of the vernix caseosa, and bathed in warm water (100° F.). After this, until the cord separates, a sponge bath only should be used. After that a full bath once daily.

Temperature of the Bath for Healthy Infants.

Up to six months	98° F.
Six to twelve months	95° F.
One to two years	90° F.

The bath should be given in a warm room, preferably before an open fire. Older children may have a cold douche (70° F.), for half a minute, at the end of the bath. If the child does not react after the bath, and becomes pale and blue about the lips and finger-nails, the full bath is doing harm, and a warm sponge should be substituted. If the skin is chafed, or if eczema is present, a handful of common salt or sea salt may be added to the bath, or a bran or starch bath may be used instead.

Clothing.—The clothing should be suited to the season and to the weather. The child is to be kept warm with light, loose unirritating clothing. There is great liability to overclothe. The abdominal binder should be used for the first few months, after which it may be dispensed with, unless the child is thin or suffers from colic. A long flannel band is best for the first month, after which a knit band, with shoulder-straps, should be used. Diapers or napkins should be soft and warm. Canton flannel or stockinet is the best. The arms and legs should be covered in cold weather. The child should not sleep at night in the clothing which it wears during the day. A union suit with feet is best for older children. The child should not be overloaded with bedclothes, but should be comfortably warm.

Mouth and Teeth.—The mouth should be kept clean with plain water. Should thrush appear or the mouth become inflamed, boric acid solution (10 gr. to 1 oz.) should be used. Borax or sodium bicarbonate (20 grs. to 1 oz.) is also useful. The teeth should be kept clean, and carious teeth filled or removed.

Too much stress cannot be laid on the care of the temporary teeth. If they are neglected and become decayed they are a source of danger, as the child is constantly absorbing toxic material. They also cause enlarged glands or even abscesses in the neck. When the teeth are bad, mastication

is difficult or impossible ; the child may suffer from indigestion in consequence, or be unable to take the proper amount of food. The loss of the first teeth may cause the second teeth to be irregular and out of alignment. The second teeth should receive most careful care, all carious spots being filled as soon as discovered. The first molars are often lost, as they are mistaken for temporary teeth and allowed to decay. Where the teeth are not in alignment or are irregular, a well-trained dentist can usually straighten them, but the treatment must be begun early and continued over long periods of time.

Care of the Skin.—Chafing and eczema are common in infancy. The use of clothing which does not bind or irritate, plain Castile soap, and bland unirritating powder will prevent much trouble. Napkins should be changed as soon as they are soiled, and the child dried and powdered. If irritation is already present the child should be wiped with an oiled cloth and then powdered. Oxid of zinc ointment and stearate of zinc powder are also useful. Salt, starch, or bran baths may be used.

Care of the Genital Organs.—In girls the genitals should be kept clean, as neglect leads to vulvo-vaginitis. In boys the foreskin should be retracted during the first few weeks. If this cannot be done, and the preputial orifice is very small, the child should be circumcised. The foreskin should be retracted daily, and the parts cleansed.

Vaccination.—Every healthy child should be vaccinated before the fifth month.

Training the Bladder.—This can usually, not always, be accomplished by the end of the first year by persistent efforts. The child should be instructed to indicate when he wishes to empty his bladder.

Training the Bowels.—The child should be placed on a small chamber about the time that it usually has a stool. Just after a morning feeding is the best time. The back should be supported. Training should be begun early—before the third month—and persisted in until regular habits are established. Regular habits and regular bowels mean

health for the child and much saving of trouble for the nurse.

Care of the Nervous System.—The child should be kept quiet, and its surroundings carefully regulated. Only simple toys should be allowed during the first two years. Romping with young infants is injurious. After 4 o'clock in the afternoon the child should be kept very quiet.

THE ANATOMIC AND PHYSIOLOGIC PECULIARITIES OF INFANCY AND CHILDHOOD.

For further information the reader is referred to the articles on the different organs, and to Dwight's *Frozen Sections of a Child*, Stratz's *Der Körper des Kindes*, Rotch's *Textbook*, Stanley Hall's *Adolescence*.

Sleep.—The newborn child sleeps soundly for several days; later it sleeps less soundly; but after three years of age the sleep is very profound.

Average Length of Time for a Child to Sleep.

First month	20–22 hours.
One to six months	16–18 "
Six to twelve months	15–17 "
One to two years	14–15 "
Two to three years	13–14 "
Three to four years	12–13 "
Four to five years	11–12 "
Five to ten years	9–11 "
Ten to fifteen years	9–10 "

One or two daily naps are taken until about four years of age. Dry napkins, a satisfied appetite, and a quiet darkened room, are all that is necessary. Good habits should be established early. Rocking to sleep is not necessary, and, if properly trained, an infant will sleep without it. Occasionally a child is found which cannot be trained to regular habits of sleep, but this is much more rare than is usually supposed.

Exercise.—The average infant in a family gets sufficient exercise. In hospitals and asylums the babes do not. They should be picked up and carried about the room, and,

wherever possible, not fed in their cribs. For older children out-of-door exercise is necessary.

Airing.—In summer and in suitable temperatures a child may be taken out-of-doors at the end of the first week. Sleeping out-of-doors is not injurious. In winter it should be accustomed to the fresh air by dressing as if for the street and then opening the window. The first airing may be fifteen-minutes long, and lengthened from day to day until it may be taken out in fine weather. Avoid high winds, wet, raw days, and very low temperatures. Otherwise, the little one should spend as much of its time in the open air as possible. The room in which it sleeps should be well-aired and ventilated.

The Nursery.—Choose a light well-ventilated room. If heated by a furnace or steam radiators, supply moisture by having a pan of water in the room. Avoid gas stoves. The furniture of the nursery should be plain and easily cleaned. The temperature should be 70° F. (68° is preferable to 72°). At night, during the first year, 65° F.; later, the temperature may fall to 50° F. Have plenty of fresh air. Infants require about 1000 cubic feet of air-space; older children several hundred less.

Weight.[1]—The weight is of especial value in early life, and it is the best index of the nutrition. If the child is not gaining regularly, it means something is wrong. The infant should be weighed once a week for the first six months; after that, twice a month. The weighing should not be done by the mother or in her presence if she is nursing it, as a loss of weight may cause such a strong mental impression that her milk secretion may be inhibited. The average child weighs a trifle over 7 pounds at birth. The first two days it loses about 11 per cent. of the original weight. This is called the physiologic loss of weight. After the third day the child begins to gain. During the first six months 4 ounces is an average weekly gain; later, it is slightly less. At the end of the first year the

[1] See Boas, *Science*, Apr. 2, 1895.

infant weighs about three times its weight at birth. The average gain during the second year is 6, during the third year 4½, and during the fourth year 4 pounds.

Height.—The average length at birth is about 20.5 in. (55 cm.). During the first year there is an average gain of about 8 in. (21 cm.). During the second year the gain is about 3½ in. (9 cm.), and thereafter the average gain is about 2½ in. (6½ cm.) a year until the eleventh year, when the growth becomes more rapid.

Closure of the Sutures.—Ossification is usuallycom-

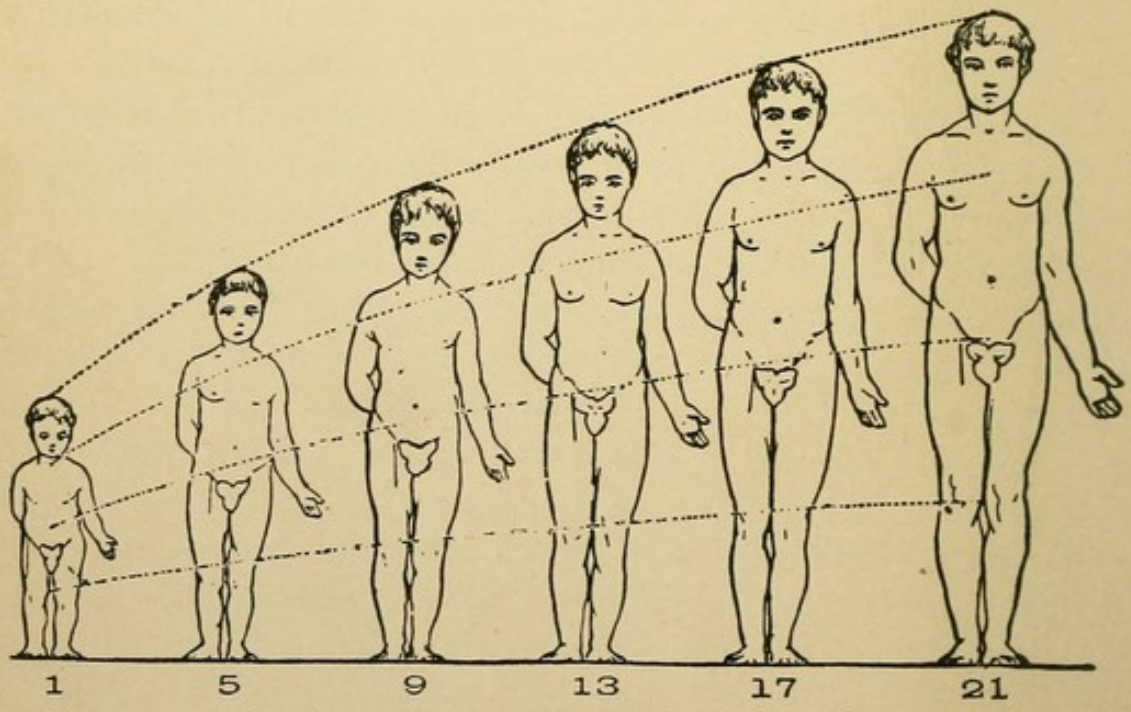


FIG. 1.—Diagram showing proportionate growth of different parts of the body at various ages from 1 to 21 years (J. P. C. Griffith).

plete by the sixth month. It may be delayed until the ninth month. Distinct separation after birth is abnormal, and is usually due to premature birth or syphilis.

Closure of the Fontanels.—The posterior fontanel closes about the end of the second month; the anterior about the eighteenth month. There is considerable variation in the time of closure. After two years an open fontanel is abnormal and is usually due to rickets. Cretinism may be a cause.

Rate of Growth in Height of American Children (Boas).

Approximate average age.	Number of observations.	Boys.		
		Average height for each year.	Absolute annual increase.	Annual increase.
Years.		Inches.	Inches.	Per cent.
5½	1535	41.7		
6½	3975	43.9	2.2	5.3
7½	5379	46.0	2.1	4.8
8½	5633	48.8	2.8	6.1
9½	5531	50.0	1.2	2.5
10½	5151	51.9	1.9	3.8
11½	4759	53.6	1.7	3.3
12½	4205	55.4	1.8	3.4
13½	3573	57.5	2.1	3.8
14½	2518	60.0	2.5	4.3
15½	1481	62.9	2.9	4.8
16½	753	64.9	2.0	3.2
17½	429	66.5	1.6	2.5
18½	229	67.4	0.9	1.4

Rate of Growth in Height of American Children (Boas).

Approximate average age.	Number of observations.	Girls.		
		Average height for each year.	Absolute annual increase.	Annual increase.
Years.		Inches.	Inches.	Per cent.
5½	1260	41.3		
6½	3618	43.3	2.0	4.8
7½	4913	45.7	2.4	5.5
8½	5289	47.7	2.0	4.4
9½	5132	49.7	2.0	4.2
10½	4827	51.7	2.0	4.0
11½	4507	53.8	2.1	4.1
12½	4187	56.1	2.3	4.3
13½	3411	58.5	2.4	4.3
14½	2537	60.4	1.9	3.2
15½	1656	61.6	1.2	2.0
16½	1171	62.2	0.6	1.0
17½	790	62.7	0.5	0.8
18½				

Weight of American Children (Burke).

Age.	Boys.		
	Average for each age.	Absolute annual increase.	Annual increase.
Years.	Pounds.	Pounds.	Per cent.
6½	45.2		
7½	49.5	4.3	9.5
8½	54.5	5.0	10.1
9½	59.6	5.1	9.3
10½	65.4	5.8	9.7
11½	70.7	5.3	8.1
12½	76.9	6.2	8.7
13½	84.8	7.9	10.3
14½	95.2	10.4	12.3
15½	107.4	12.2	12.8
16½	121.0	13.6	12.7
17½			
18½			

Weight of American Children (Burke).

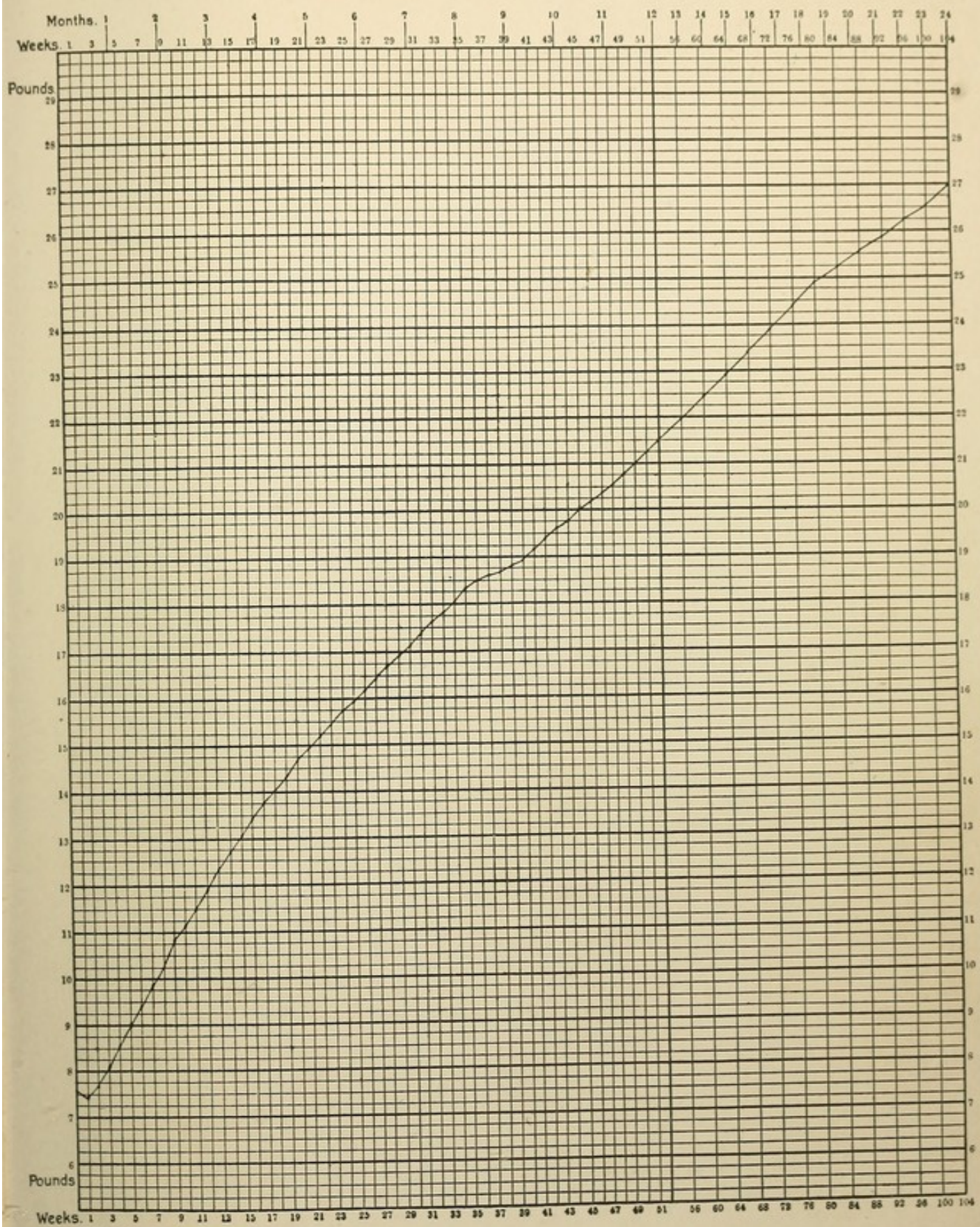
Age.	Girls		
	Average for each age.	Absolute annual increase.	Aunual increase.
Years.	Pounds.	Pounds.	Per cent.
6½	43.4		
7½	47.7	4.3	9.9
8½	52.5	4.8	10.0
9½	57.4	4.9	9.3
10½	62.9	5.5	9.6
11½	69.5	6.6	10.5
12½	78.7	9.2	13.2
13½	88.7	10.6	12.7
14½	98.3	9.6	11.9
15½	106.7	8.4	8.5
16½	112.3	5.6	5.2
17½	115.4	3.1	2.8
18½	114.9		

INFANT'S WEIGHT CHART.

Designed by J. P. CROZER GRIFFITH, M. D., Clinical Professor of Diseases of Children in the University of Pennsylvania.

Name, ...

Date of Birth, ...



Size of the Head.—Thomson gives the following figures for the size of the head:

At birth	13 to 13¾ inches.
At six months	16 inches.
At one year	18 inches.
At two years	19 inches.
At five years	20 to 20½ inches.
At ten years	21 inches.

There are, however, a great many normal variations in the size as well as in the shape of the head.

Shape of the Head.—Congenital deformities are frequently seen. These usually disappear early. Deformities due to difficult labor are generally corrected by the end of the first month. Lying in one position may change the

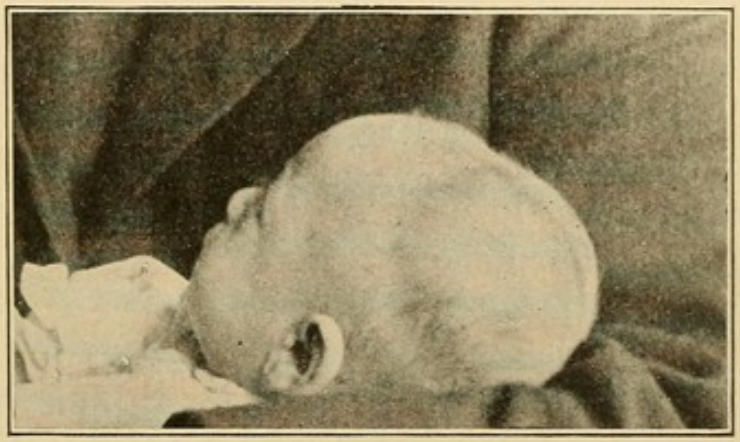


FIG. 2.—Natiform cranium.

shape of the head, as may also premature ossification of the sutures. A square head, with prominent bosses, is seen in rickety children. (See also Microcephalus and Hydrocephalus.)

The Chest.—At birth the anteroposterior and transverse diameters of the chest are about equal. As the child grows, the transverse becomes longer and the chest assumes an elliptical shape.

Muscular Development.—Voluntary movements usually begin about the fourth month. At this time the head can be held up. Near the seventh month the child can sit erect, and about the tenth month it can stand. Walking is begun toward the twelfth month, and the child can usually

walk alone by the fifteenth month. There are great variations, however. In asylums the children walk late.[1]

Special Senses.—Sight.—After the first week the child can usually distinguish the difference between light and darkness, and will very often follow a light about with the eyes. Toward the third month the mother's face or other familiar objects may be recognized, and in about the sixth month various things are recognized. The color sense is slow in developing. The difference between red and yellow may be noted during the first year, but blue and green may not be distinguished for a year or two later. It is important to recognize whether the child is blind or not. Older children are tested in the same manner as adults, and in younger children various tests may be made, by seeing if the pupils contract to light and, after a few months of age, to accommodation; by seeing if the eye is winked on bringing the finger close to the cornea without touching it (this test is of no value under two months of age); by seeing whether the child recognizes a bottle or other object when it is approached without making any noise; by seeing if the eyes follow a light or bright objects. Ophthalmoscopic examinations are valuable. It should be remembered that the choroidal pigment is irregularly distributed in infants and may be mistaken for diseased conditions. Amaurotic family idiocy can only be diagnosed by ophthalmoscopic examination. If the child does not see and the fundus of the eye is normal, one should suspect mental deficiency. Temporary amaurosis is sometimes seen, however, after coma, convulsions, severe whooping-cough, and basic meningitis. The condition known as congenital word blindness[2] should be borne in mind, as children so afflicted may be mistaken for idiots.

Training of Blind Children.[3]—It is important to treat them as nearly like normal children as possible, and this should be begun early. They should be taught to exercise, to wash and dress and feed themselves, to play with

[1] W. Preyer, *The Senses and the Will*, 1888; *The Development of the Intellect*, 1889. Fred. Tracy, *The Psychology of Childhood.*

[2] Hinshel Wood, *Lancet*, May 26, 1900, p. 1506.

[3] Drummond, *Pediatrics*, June, 1899.

toys of all kinds, and to indulge in games with other children. All of these things make a good foundation for the subsequent training of the child. Above all, they should be prevented, as far as possible, from acquiring the numerous disagreeable habits, as twitching, swaying, moving the head, etc., to which blind children are especially prone.

Hearing.—The child is usually deaf at birth, and this persists for two or three days. Loud noises are usually recognized at the end of the first or second week, and if at the end of two months the child does not pay any attention to loud noises it should be suspected of being either deaf or idiotic. Deafness may come on during childhood, and that which is seen apart from visible changes in the ear is apt to have a grave prognosis, such as that following whooping-cough, meningitis, and various infectious diseases where the middle ear is not involved.

The Early Training of Deaf and Dumb Children.[1]—They should be treated as much like normal children as possible, and encouraged to play with other children and with all sorts of toys. They should be talked to by the parents or other people as much as possible, for a little child who does not hear may in this way learn that there is a means of communication, and will understand better when it is taught lip reading. When possible a child should be taught a sign language, the manual alphabet, articulation, and lip reading.

Touch.—This is well developed at birth in the lips and tongue. After the third month it is noted that the surface of the entire body is sensitive to touch. Pain-sense is not so well matured as it is later in life. Temperature-sense is present very early.

Taste.—This is well manifested at birth.

Smell.—This probably develops last of all.

Speech.—Children differ greatly in the time at which they begin to talk. Girls usually commence a month or two before boys. Words are spoken at the end of the first year, and short sentences by the end of the second. After the sec-

[1] Drummond, *Pediatrics*, December 15, 1901, p. 440.

ond year dumbness should suggest mental deficiency. It should be remembered that some children talk late without any apparent cause. Examine the hearing and for tongue-tie in all these cases.

TEETH.

Eruption of the Milk Teeth.

1.—Two lower central incisors	6 to 9 months.
2.—Four upper incisors	8 to 12 "
3.—Two lower lateral incisors and four anterior molars	12 to 15 "
4.—Four canines	18 to 24 "
5.—Four posterior molars	24 to 30 "

At one year a child should have	6 teeth.
At one and one-half years a child should have	12 "
At two years a child should have	16 "
At two and one-half years a child should have	20 "

The above gives the average according to Holt. There are wide variations. Some children are born with teeth, but these are usually shed early. Others may not cut one until the end of the first year. About one-third of the children cut their teeth without any symptoms whatever. In a second third there are slight symptoms of discomfort with great nervousness and some digestive disturbances, and the remaining third usually are really ill each time a tooth is coming through the gum. There may be attacks of gastro-intestinal disturbances, such as indigestion, vomiting, and diarrhœa; bronchitis or eczematous eruptions, which disappear promptly when the tooth is cut.

Syphilitic children are said to have their teeth early, and that they decay rapidly.

Late dentition is usually due either to rickets or cretinism.

Eruption of the Permanent Teeth.

First molars	6 years
Incisors	7 to 8 "
Bicuspids	9 to 10 "
Canines	12 to 14 "
Second molars	12 to 15 "
Third molars	17 to 25 "

Mercurial Teeth (See also Hutchinson Teeth).—The permanent teeth may be of a bad color, dirty, with irregular and pitted surface. The incisors, canines, and first molars are most often affected. The teeth are not dwarfed, as in syphilis. The defect may be due to the administration of mercury and also to other causes.

Anatomic Peculiarities.—The **lachrymal glands** are not developed until three or four months, sometimes earlier. Infants under this age do not shed tears. If a child has shed

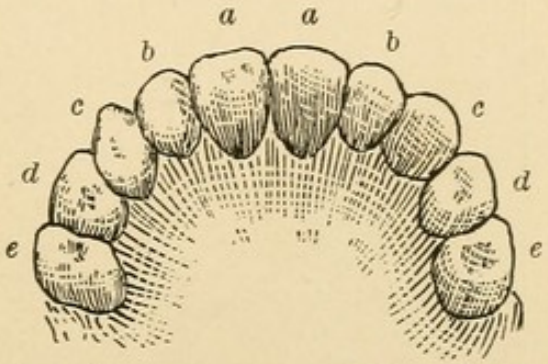


FIG. 3.—Diagram showing the temporary teeth: *a*, Central incisors; *b*, lateral incisors; *c*, canines; *d*, anterior molars; *e*, posterior molars (J. P. C. Griffith).

tears and ceases to do so during a severe illness the return of the tears may be regarded as a sign of convalescence.

The **salivary glands** are not very active, and the mouth is rather dry in early infancy. The parotid gland is developed at birth. The diastasic action is not seen in the saliva from the sublingual glands until the end of the second month, and is not very active until the end of the first year. The diastasic action of the saliva is feeble in early infancy. The amylolytic ferment in the pancreatic juice is also said to be feeble at this time.

The **sweat glands** are not active until after the first week of life. Profuse sweating, especially about the head, nearly always indicates rickets.

The **sebaceous glands** are active before and after birth. The secretion at birth is called vernix caseosa. After birth it is liable to collect on the scalp (see Seborrhea).

The **breasts** of babies (both sexes) contain a secretion looking like colostrum and having the composition of adult milk. This increases for a week or so and, if undisturbed,

usually disappears in two or three weeks. There is great danger of infecting the breast at this time, and abscesses and mastitis may result from attempting to squeeze out the milk.

FIG. 4.—One-sided mammary development. Note the "adenoid" expression.

The breasts should be kept clean and left alone. In girls when the breasts begin to develop, from the tenth to the

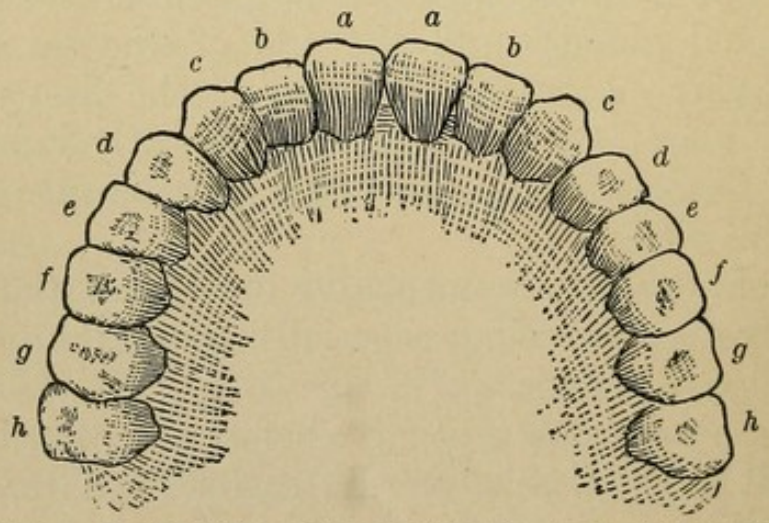


FIG. 5.—Diagram showing the permanent teeth: *a*, Central incisors; *b*, lateral incisors; *c*, canines; *d*, first bicuspids; *e*, second bicuspids; *f*, first molars: *g*, second molars; *h*, third molars (J. P. C. Griffith).

fifteenth year, one or both breasts may become enlarged and tender. This is often unilateral. If let alone the condition causes no trouble beyond the inconvenience.

The **testicles** usually pass down through the inguinal canal during the ninth month of intra-uterine life. This may be delayed, and they may be in the inguinal canal or in the abdomen at the time of birth, and make their descent during the first month or later. They may remain in their fetal position. If descent takes place after the first month after birth a hernia is liable to occur at the same time.

The **thymus** is relatively large in infants.[1] It increases in size until the end of the second year. It then remains stationary until puberty, when atrophy occurs.

The **stomach** is tubular in form and nearly vertical at birth. During the first year the position becomes more horizontal.

At birth the stomach holds about $1\frac{1}{5}$ ounces.

At three months the stomach holds about $4\frac{1}{2}$ ounces.

At six months the stomach holds about 6 ounces.

At twelve months the stomach holds about 9 ounces.

The stomach digestion is not nearly as complete in infants as in later life, and it begins to empty itself shortly after a nursing, and in breast-fed children the stomach is empty in from one to one and one-half hours in the young, and in about two hours in later infancy. In bottle-fed babies the time is half an hour or more longer.

The **intestines** are relatively longer in infancy and the muscles are weak. This accounts for the frequency of constipation and also of distention of the abdomen from gases. The sigmoid flexure is larger than in later life.

The **liver** is relatively larger in infancy, and at birth extends 1 to 2 cm. below the costal margin.

The **bladder** is almost entirely an abdominal organ in infancy, owing to the small size of the pelvis.

The Back.[2]—The child's spine is supple and flexible, and this gradually lessens as the child grows older, but any stiff-

[1] J. M. Brickdale, "Thymus Gland, Observations on, in Children," *Lancet*, October 7, 1905, p. 1029. T. G. Moorhead, "The Thymus Gland," *Practitioner*, December, 1905, p. 733. Bovaird and Nicoll, "Weights of Viscera in Infancy and Childhood, with Special Reference to the Weight of the Thymus Gland," *Archives of Pediatrics*, September, 1906, p. 641.

[2] Owen, "On Children's Spines, Healthy and Otherwise," *Pediatrics*, March 1, 1896.

ness should be regarded as a sign of disease. In a sitting position the child's back forms a graceful curve, broken only

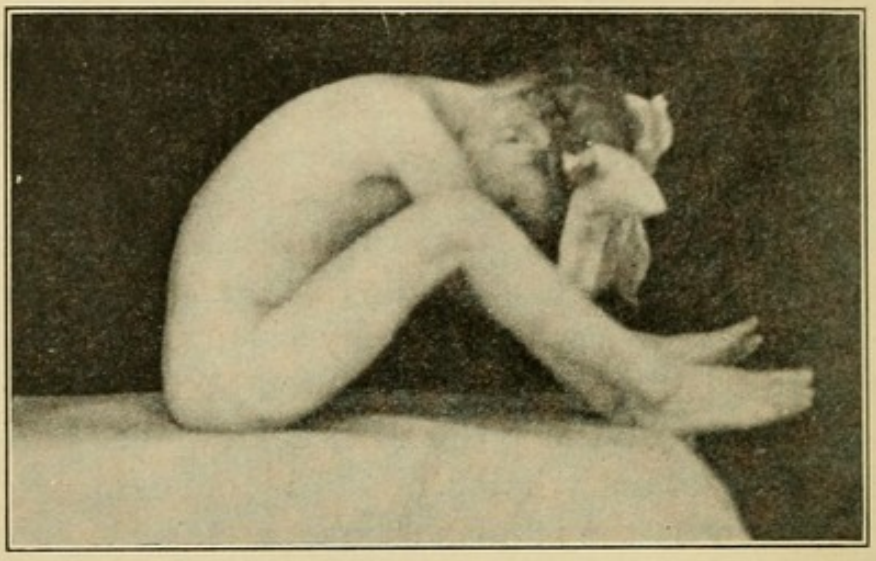


FIG. 6.—Normal spine.

by the prominence of the seventh cervical vertebra, which should not be mistaken for a deformity. Any stiffness or

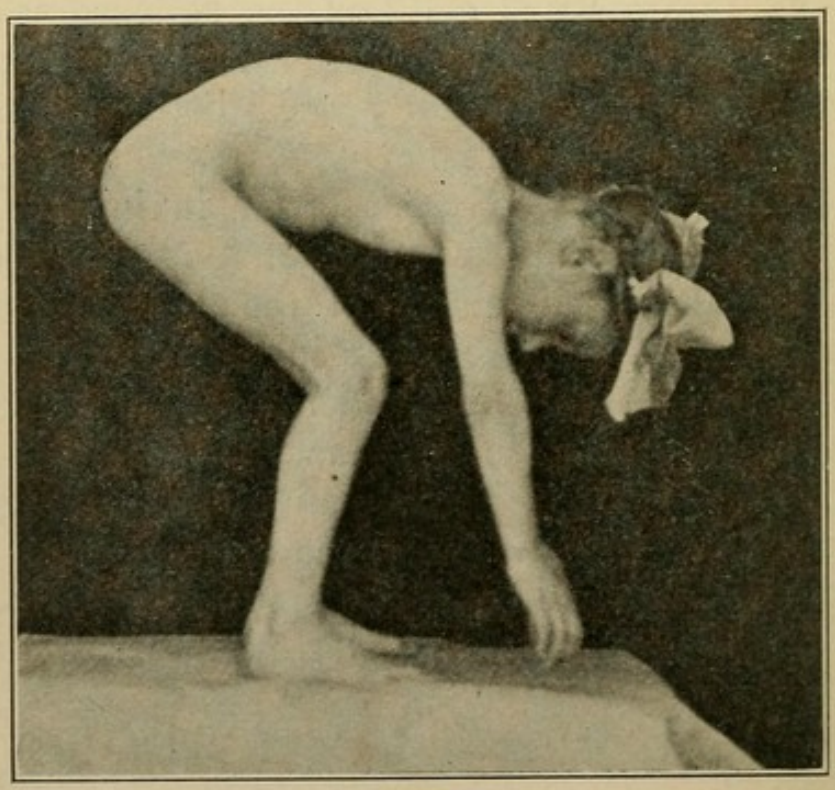


FIG. 7.—Normal spine.

straightness of the lumbar or cervical regions is as pathognomonic of disease as an angular deformity would be in the

dorsal region. Lateral deviation should also be looked for. The child faces away from the examiner, who holds the hips firmly and directs the child to look at him first from one side and then the other. Any difficulty in rotation is very easily noted. Tuberculosis of the vertebræ and rickets are the most frequent causes of stiffness. In the former there were pain, stiffness, and deformity, and in the latter

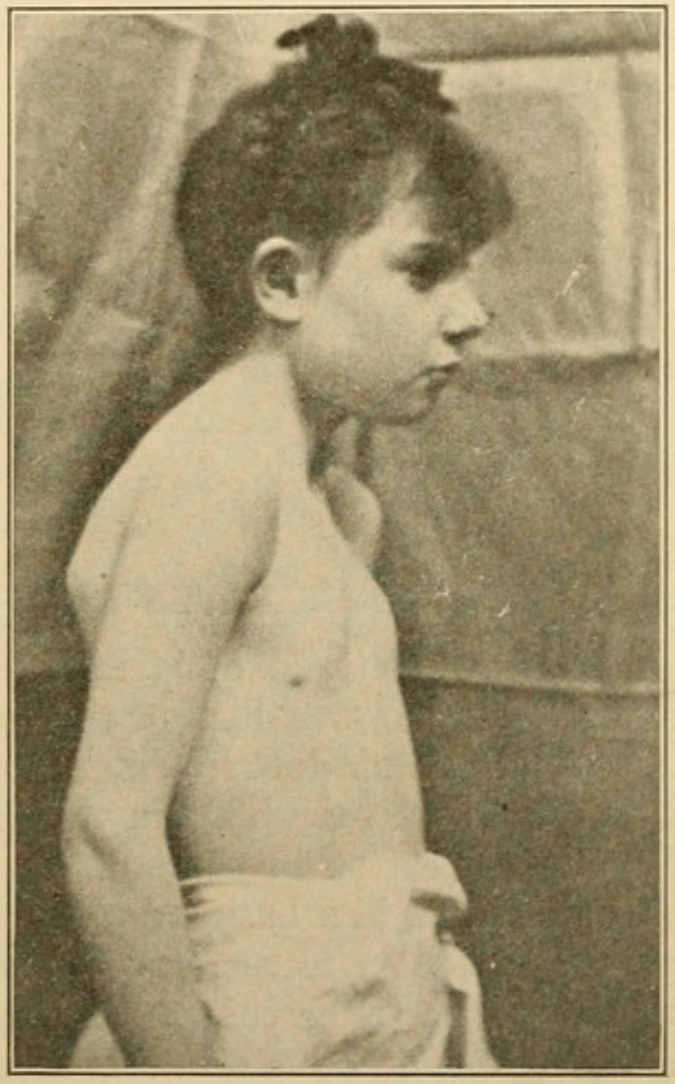


FIG. 8.—Funnel-shaped chest.

the deformity may be overcome by traction, and there is little or no pain.

Deformities of the Thorax.—In the infant the chest is normally more or less barrel shaped; that is, the anteroposterior and the transverse diameters are nearly the same. This is seen in later childhood in emphysema,

whooping-cough, and sometimes in bronchiectasis and pneumothorax.

The chest is contracted or flattened when there is obstruction to the breathing, as in adenoids, chronic stenosis of the larynx, etc., and it may be seen in weak sedentary children.

The **funnel-shaped chest**, in which there is a depression of the lower part of the sternum, is seen in rachitis, and it may occur as a congenital deformity.

The **pigeon breast**, in which the sternum is prominent and the sides of the chest depressed, is seen in rachitis, in stenosis of the upper air-passages, as in adenoids, and sometimes in congenital heart disease.

Harrison's sulcus, a depression of the ribs about the level of the ensiform cartilage, is frequently seen in rachitis.

Asymmetry is seen in rachitis and in the deformities accompanying or following pleural effusion, empyema, pneumothorax, chronic pleurisy, tuberculosis, and diseases of the spine.

PREMATURE AND DELICATE INFANTS.

Premature and small delicate children require especial care. If the weight is below 4 lbs., or the length below 9 in., an incubator should be used to maintain the body heat. If this is not possible, wrap the body in cotton, with a separate piece of absorbent cotton in place of a napkin, roll in several blankets, and place in a basket and surround it with hot-water bottles. The room temperature should be 80° F. The absorbent cotton should be changed when soiled. The body should be rubbed with olive oil every three days. No bathing is permissible. If placed in an incubator, the temperature should be from 80° to 85° F., according to the size and strength of the child. Oxygen is useful when there are attacks of asphyxia or cyanosis.

Feeding.—If possible, the child should take the food from a small bottle with a soft nipple. If it cannot suck it may be fed with a spoon, medicine dropper, or by gavage. The Breck feeder is most useful for this purpose. The food

should be given slowly to avoid regurgitation. The quantity and quality, as well as the interval, should be regulated by

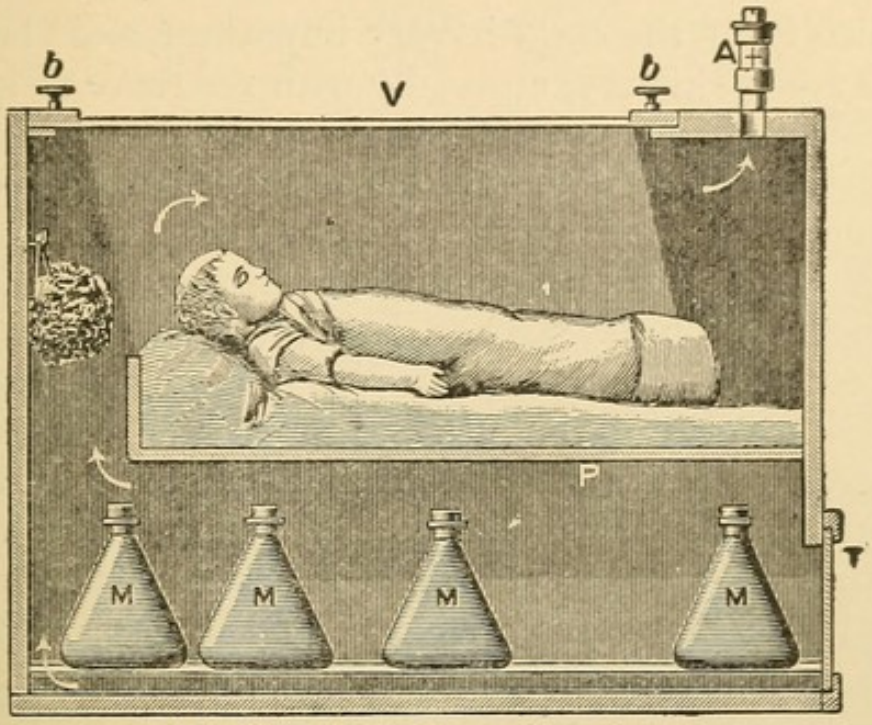


FIG. 9.—Modified Auvard incubator.

the size and condition of the infant. From 2 dr. to ½ oz. every hour, until the child is about the size of a full-term

FIG. 10.—Breck feeder for premature and weak infants.

infant, is an average allowance. With great care and experience many premature children may be saved.[1]

[1] Voorhees, *Archives of Pediatrics*, May, 1900.

THE EXAMINATION OF SICK CHILDREN.

The history of the child is very important, and should include the family history, especially with reference to syphilis, tuberculosis, and nervous diseases, the history of the mother during pregnancy, and the nature of the birth, as well as a consideration of the hygienic surroundings of the child. Inquiry should especially be made concerning the character of the food and feeding from birth, the condition of the teeth, whether or not the child walks and when it began, the same of talking, and also how the child sleeps. It should be ascertained what infectious diseases the child has had, whether it has ever had snuffles, and whether it has ever had any diseases of the ear. It is well to find out to what symptoms the mother attaches the most importance and why she has sought advice. The child should be carefully observed before it is touched. If the child is shy, it should be ignored at first, and the conversation directed to the mother. Friendly relations may often be established with the child by first examining its toys. Young children are usually more docile when in their mothers' laps than on the bed. The examination should be as thorough and of the same nature as that made in adults, but one should learn to make it rapidly, so that it may be completed before the sick child becomes tired and fretful. The pulse and respiration should be counted first, if possible, during sleep, as it is sure to be disturbed later by the examination. In fact, much of the examination may be made with the child asleep, but, if it is aroused, try to have the mother or nurse do it, or at least try to have the child see some familiar face on waking, lest it become frightened. As much of the examination as possible should be made with the child sitting up, as most young children resent being placed on their backs. Perhaps more can be determined by inspection and palpation than in the adult. It is often surprising how much can be learned by palpation. The presence of enlarged lymph-nodes, of other swelling, of tender points or places, the presence of rickets and other deformities

of the bones, the presence or absence of bronchial râles and vocal fremitus, the size of liver and spleen, the presence of gas in the intestines, or of ascites, the condition of the abdominal muscles, whether rigid or not, as well as the condition of the other muscles.

The ears and throat should be examined last, as it is usually impossible to do much with a child after this is done.

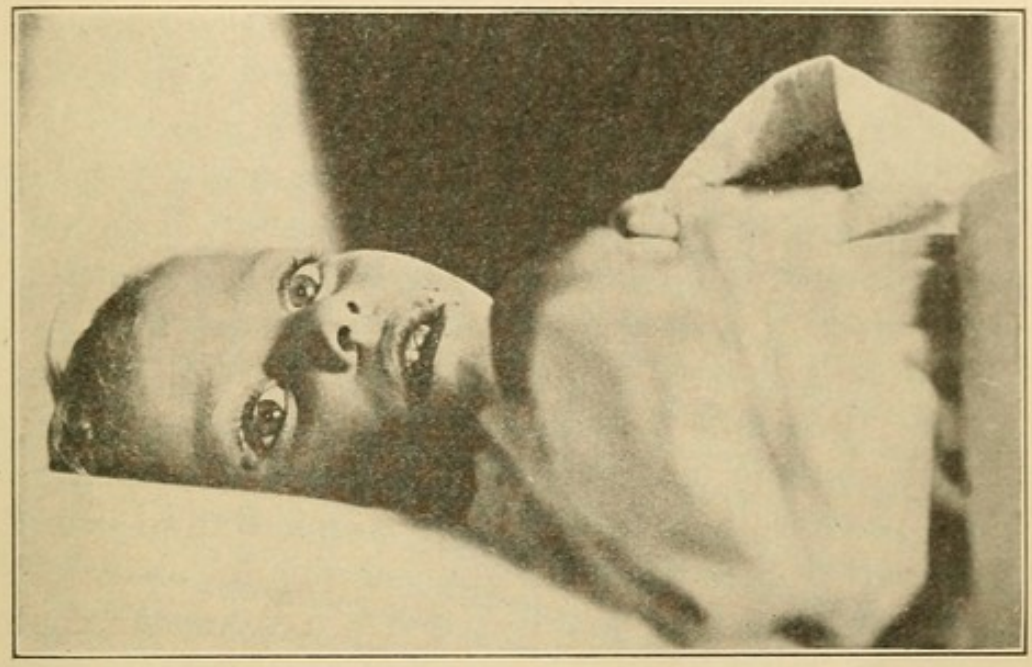


FIG. 11.—Facial expression in pneumonia. Note the herpes.

They should not be omitted from the examination, as they are frequently the seat of disease.

The **facial expression** is often suggestive, and may be pathognomonic. If the child is feeling well it generally looks it, and if not, pain, anxiety, or distress will be depicted in its expression. One often hears the remark: "The diagnosis must be very difficult with infants, as they cannot tell you anything." My invariable reply is: "That is balanced by the fact that they never lie." If the child has *adenoids*, the expression will vary with the amount of obstruction. The mouth is usually open, the nostrils narrow and the nose small, and the general expression is dull. One should not forget that sometimes the obstruction is due to nasal diseases.

In *meningitis* the expression is staring, there is often squint and inequality of the pupils, there may be also wrinkles in the face, giving it the appearance of an adult in distress. There is often retraction of the head and a bulging fontanel. In *pneumonia* the expression is anxious, the mouth is usually partly open, and the nostrils dilated and moving with the respirations. The face is often flushed. In *diarrhea* or *vomiting* the expression is staring, the eyes are sunken and there are hollows under the eyes, the cheeks may also be sunken. In *nephritis* there is often marked puffiness and edema of the face, with its characteristic expression.

The **anterior fontanel** should be carefully observed as regards the size and tension. It often closes early even in normal children, and always very early in microcephalus. It is usually closed by the eighteenth month, and if open after the second year it may be regarded as abnormal. The *delay in closure* may be due to hydrocephalus, rickets, or to cretinism. The fontanel pulsates, the pulsation increasing when the blood-pressure within the head is raised, and decreasing or ceasing altogether when the pressure is lowered. A *systolic murmur* may occasionally be heard over the fontanel, but apparently this has no diagnostic significance. The *tension of the fontanel* is very important. It is increased in cerebral hyperemia, which occurs in most acute fevers. It is increased on crying and on coughing. *Bulging of the fontanel* may be seen in meningitis and in brain tumor. *Depression of the fontanel* is noted when there is lowering of the blood-pressure in weakened conditions, and is noted in loss of fluid from the body, as in severe diarrheas. With meningeal symptoms in the course of the diarrhea the depression is a valuable indication that the meninges are probably not involved. In the same way a normal tension with meningeal or cerebral symptoms is of great value in making differential diagnosis between meningitis and pneumonia, or diarrhea with meningeal symptoms.

Craniotabes.—The thinning out of the bones of the skull in spots, so that they are no thicker than parchment, is

seen in early rickets and congenital syphilis. The same thinning is seen in premature infants along the sutures. The sensation to the finger is that of pressing in a derby hat and allowing it to reshape itself.

The **pupils** contract from light and after a few months on accommodation. *Contracted pupils* are noted in sleep, after the administration of opiates, and sometimes in meningitis, especially in the early stages. *Dilated pupils* are noted just before death in severe auto-intoxication, especially that from the intestinal tract, and often in meningitis.

Inequality of the pupils may be seen in meningitis and other serious brain diseases, as well as in diseases of the sympathetic nervous system. *Hippus*, or rhythmic contraction and dilatation of the pupils, may be noted in nodding spasm and in some other diseases.

Strabismus.—This is a puzzling symptom and requires especial study, for which the student is referred to the text-books on diseases of the eye.

The squint may be due to paralysis of the eye muscles, as after diphtheria, or, in the course of meningitis or brain tumor, it may be due to errors of refraction, and it is often due to a disturbance of the coördination of the muscles, as in high fever.

Amaurosis.—Blindness without apparent eye disease is met with in some forms of idiocy and sometimes after meningitis and in chronic hydrocephalus, after some infectious diseases, as whooping-cough, and in uremia. *Congenital word blindness* may occasionally be noted in school children.

Ophthalmoscopic examination may be useful in meningitis, brain tumor, amaurotic family idiocy, and diseases of the eye. The indirect method is most useful. In infancy the pigment of the choroid is arranged irregularly and should not be mistaken for diseases of the eye.

Nystagmus is seen with nodding spasm, sometimes in tuberculous meningitis, and in brain tumor or other nervous affections. It may also be present in diseases of the eye, as in choroiditis.

The **ears**[1] should be examined, and this may usually be done without a speculum, owing to the short meatus. Otitis is a frequent cause of fever, and is usually overlooked until rupture of the drum occurs.

Deafness.—This is usually the result of middle-ear disease or adenoids, but may follow various infection, such as cerebrospinal fever, whooping-cough, and mumps. It is frequently seen in late cases of congenital syphilis, and forms one of Hutchinson's triad of signs of congenital syphilis.

The prognosis depends on the cause. Adenoids should be removed and otitis media persistently treated. After the infections the outlook is bad. Deaf children should be talked to as much as possible, and efforts made to teach them how to read the lips. (See p. 354.)

An **acute nasal discharge** suggests coryza, diphtheria, scarlet fever, or influenza. A chronic nasal discharge is seen in adenoids and congenital syphilis.

The normal child sleeps with the mouth closed. If it is open in acute disease it usually means an acute coryza, swelling in the throat, as in diphtheria or scarlet fever, or retropharyngeal abscess. If it is chronic it usually indicates the presence of adenoids.

The Palate.—*High arching* of the palate is frequently noted, especially after the development of the second teeth. Much can be done by a skilful dentist to prevent this. It is very frequent in the mentally deficient.

Epithelial Pearls.—These are little inclusions of the mucous membrane in the median line of the palate, appearing as little white or yellow bodies about the size of a pin's head. They are most frequently seen in early infancy and sometimes ulcerate, leaving small oval ulcers which heal very slowly. The pearls should not be mistaken for any disease.

Perforation is nearly always due to syphilis.

Sucking Pads.—These are little masses of fat outside the buccinator and masseter muscles which prevent the cheeks

[1] J. F. McKernon, "Aural Examination in Acute Diseases of Children," *Journal of the American Medical Association*, January 7, 1905, p. 23.

from going in during sucking. They are especially noticeable when there has been rapid emaciation in children under one year of age, occasionally older children, and are best seen when the child cries.

The **sputum** is coughed up and swallowed until the child is five or six years old. It may sometimes be obtained by swabbing the throat immediately after coughing. Hemoptysis is rare in children. The spitting of blood is usually from the throat or gums.

The **cry of the child** is of some value. Infants cry from many causes besides pain. The more delicate the child and the more unstable its nervous system the more easily it cries. Cold feet, uncomfortable clothes, soiled napkins, anger, and hunger are the most frequent causes. The cry of hunger is irregular and fretful, and ceases when the child is fed. The cry of indigestion is very similar, but feeding aggravates, rather than lessens, the crying, except for a few moments after taking food. The cry of pain is a sharp, piercing cry. Sharp, piercing screams—the "hydrocephalic cry"—may be noted in chronic hydrocephalus, meningitis, idiocy, mental deterioration, acute otitis media, and at night in early hip-joint disease. General or local tenderness may cause screaming, as in handling a child with rickets, scurvy, or other disease, in voiding irritating urine, and in anal fissure.

Pain.—*Pain which is localized* by the child in the same place should always be regarded seriously, as it is usually due to organic disease.

Pleuritic pains may be referred to the median line, or to the epigastrium, and pleurisy with pneumonia often causes pain and rigidity in the abdomen, and if on the right side it may be mistaken for appendicitis.

Abdominal pain is usually due either to gastro-intestinal disorders, in young infants to wind colic, to caries of the spine, to appendicitis, or peritonitis.

Pain in the thigh or the inner side of the knee is usually due to hip-joint disease.

Pain or aches on both sides of the body or in both arms or legs should always lead to a careful examination of the spine.

Sleeplessness.—Disturbances of sleep in children, as a rule, are distinctly abnormal. They may be due to many causes. Any disease in which there is pain or itching will produce sleeplessness, and the same is true where there is cough, dyspnea, or diarrhea. Obstruction to breathing through the nose is another very important cause, and this most frequently is due to adenoids. Fever usually produces drowsiness, but in some children may cause wakefulness. Nervous children usually sleep badly. Disturbed, restless sleep is one of the characteristics of rickets and often of congenital syphilis. Indigestion is, of course, a very important cause.

Some children normally sleep but very little, apparently not needing so much sleep as the average child, and these children are a source of considerable worry. Another neglected cause of sleeplessness are the noises about the child. Under ordinary circumstances these seem to be disregarded, but certain neurotic children are very much disturbed by unusual or unaccustomed noises. Sleeplessness in these cases may make a very marked difference in the child's health, and these children usually do well when moved to a quiet place, and frequently their health again becomes poor on their return to the locality in which they get insufficient sleep. Sleeplessness may also be due to too much excitement, especially in the evening, to a lack of ventilation, and, above all, to improper training.

The **lymph-nodes**[1] should always be examined. The cervical are the most frequently enlarged, the most frequent cause being inflammations in the throat. The posterior cervical nodes are enlarged in measles and German measles, and in inflammations of the scalp.

The **position of the child** should always be noted. If there is pain in the abdomen the child lies on its back with its legs drawn up. Opisthotonos is seen in meningitis and

[1] Alfred Friedlander, "Lymph-nodes, Diagnosis of Enlaged," *Journal of the American Medical Association*, January 7, 1905, p. 19.

tetanus. Retraction of the head is seen in meningitis, marasmus, and retropharyngeal abscess.

The **skin** should be examined for eruptions, as to whether it is dry or moist, and whether there is any pigmentation or cyanosis.

Desquamation of the skin is seen in many skin diseases, after scarlet fever and measles, and in poorly-cared-for children the skin usually desquamates after a few baths.

Tâche cerébrale is the name given to the red line seen, in some conditions, after drawing the finger or a blunt instrument over the skin. It is seen in meningitis and many febrile and nervous conditions.

Chills or Rigors.[1]—Chill in a child is usually replaced by a convulsion, but occasionally a chill may be noted, or if not a distinct chill, a cyanosis and coldness of the body or of some part of it. This may be seen in malaria. Thomson has called attention to the fact that a distinct rigor in a child under two practically always means an acute pyelitis.

Temperature.[2]—There are certain differences in the temperature of children and in adults which are well to bear in mind. The first is that the child's heat center is not as well balanced as it is later in life, and smaller things may cause considerable variations in temperature. In premature children and very young children, and perhaps to a lesser extent in small children, the temperature is usually influenced by external heat and cold. The temperature may be subnormal after long periods, due to insufficient warmth and clothing, and this usually has a very detrimental effect on the child's nutrition. On the other hand, the temperature of such children may be raised and even pyrexia caused by having hot-water bottles about the child. I have been consulted on a number of occasions to explain fever in premature children that were being raised in home-made incubators; an explanation was found in the use of too much heat.

[1] Baldwin, "Rigors in Children," *Lancet*, June 13, 1896, p. 1635.

[2] "Temperature, Pulse, and Respiration in Infancy and Childhood," *Archives of Pediatrics*, December, 1905, p. 909.

The temperature will vary according to the method used in taking it. The best temperatures are those taken in the rectum, and the thermometer should be left in until it ceases to rise, quite regardless of whether it is a half-minute or a three-minute thermometer. The temperatures taken in the axilla or groin are usually from 0.5° to 1.5° F. in well children, and 0.5° to 2° F. in sick children. Sometimes the difference is not marked, particularly in temperatures taken in the groin, but at other times it may be. I have given up the use of axillary and groin temperatures entirely and depend upon the rectal temperatures in young children, and after four years of age, either on that taken in the rec-

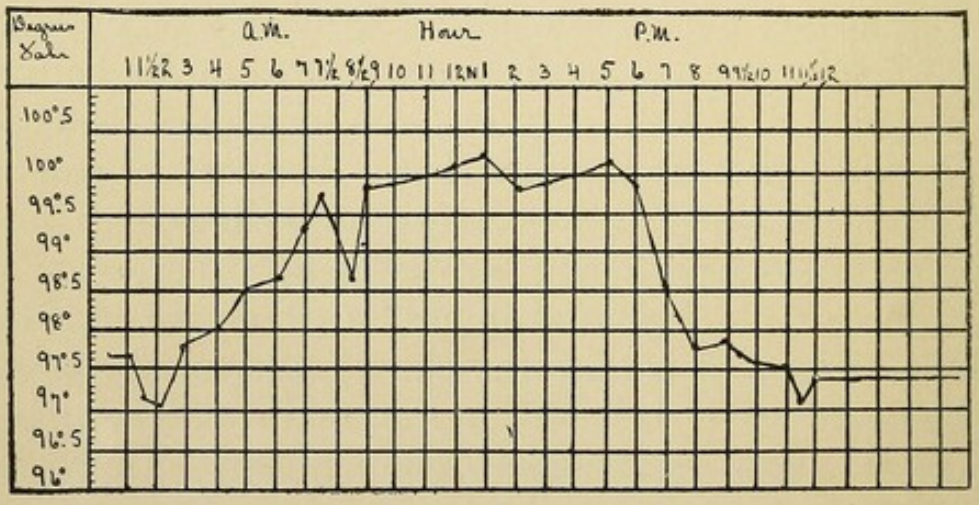


FIG. 12.—Normal daily range of temperature in children. (After Finlayson, *Glasgow Medical Journal*, February, 1869, page 186.)

tum or in the mouth. It is well to have colored thermometers for rectal use and plain white ones to be used in the mouth. The temperature will also be found to vary slightly with the extent that the thermometer is placed in the rectum, but this is usually but a trifling difference.

The daily range in the temperature, even in healthy children, is much greater than it is in adults. In some children it may vary from 2° to 3° F., while in others it may only be 1° F. In infants and young children the temperature is highest during the day, from the time the child wakes until evening. In the early evening the temperature starts to fall, and may drop from 1 to 3 degrees either before or after the

child goes to sleep. This low temperature continues until about 2 or 3 o'clock in the morning, when there is a gradual rise until about the rising time. The fall in the evening is most marked between 7 and 9 o'clock. It may begin as early as 5 o'clock, and there is considerable variation in different children, depending upon external circumstances and the child's individual peculiarities. A rise of temperature in the evening in a child is always significant, and if there is nothing else to account for it, and it recurs day after day, one should think of tuberculosis or typhoid fever, although there may be innumerable other causes. Persistent high temperature[1] is seen in quite a number of different diseases—tuberculosis, typhoid, bronchial pneumonia, infections of the urinary tract, diseases of the bones and joints being the most frequent examples. One occasionally meets with a child who apparently has some disturbance of the heat center; such children apparently have perfect health and have normally a high temperature. I have seen one or two examples of persistent temperature of 100° or 101° F., which continued for years without any apparent disturbance of the child's health. On the other hand, one frequently sees children who normally seem to have low temperature. These children usually have a poor peripheral circulation, suffer with cold hands and feet, and complain a great deal in cold weather, and usually suffer from changes in the temperature. Some of these children suggest a possibility of disturbance of the internal secretions, and which in turn might of course affect the heat center. A sudden high temperature in a child is most frequently due to indigestion or some disturbance of the stomach or intestines. It is seen also in the onset of the exanthems, especially scarlet fever. It is frequently seen in the onset of influenza and in pneumonia. Hyperpyrexia[2] is most frequently due to disease of the stomach and bowel, particularly in certain forms of summer diarrhea. It may also be noted from

[1] Bovaird, Jr., "The Differentiation of Common Types of Protracted Fever," *American Journal of Medical Sciences*, vol. cxxxvii, 1909, p. 49.

[2] Longwell, "Hyperpyrexia," *Scottish Medical and Surgical Journal*, January, 1899, p. 39.

the external application of heat in a premature child, as noted above.

The **pulse**[1] varies greatly in infants. It may be rapid and even irregular from slight causes. The regularity and volume are of greater importance than the pulse rate. A slow, irregular pulse suggests meningitis, and also occurs in brain tumor.

The **respiration** may be rapid and irregular from slight causes while the child is awake. It is frequently irregular during sleep in meningitis. Dypsnea is present in all severe diseases of the lungs and pleura—as in pneumonia, severe bronchitis, and empyema. It causes rapid respiration with sinking in of the supraclavicular, suprasternal, and intercostal spaces.

Pleural effusions[2] are frequently called pneumonia on account of the presence of bronchial breathing. A pleural effusion in a child under three years is nearly always purulent.

Palpation of the Abdomen.—If the abdomen is rigid and it is not advisable to give an anesthetic, the child should be immersed in a bath-tub in hot water. After five or ten minutes it will be found that in many cases the abdomen will be sufficiently relaxed to permit of a fairly satisfactory examination.

Lumbar puncture is of value in making a diagnosis of meningitis. If properly done it is perfectly harmless. (For procedure, see Cerebrospinal Fever.)

The **muscles** of the young child contract very easily, and may often be in a state of partial or even complete contraction. Too much stress should not be placed upon rigidity of the neck or other muscles, as trifling often unexplained causes may be responsible.

Myatonia.—A condition of general muscular weakness. There is a congenital form (myatonia congenita, Oppenheim)[3] in which there is pseudoparalysis with loss of deep reflexes and lessened electrical reactions. Lesser degrees of myatonia

[1] Nicholson, "The Pulse in Infancy," *Scottish Medical and Surgical Journal*, May, 1901, p. 419.

[2] G. S. Middleton, "Pleural Effusion and Empyema in Children, Diagnosis of," *Practitioner*, November, 1906, p. 602.

[3] Haberman, *The American Journal of the Medical Sciences*, March, 1910, p. 383.

are seen in rickets, congenital syphilis, in marasmus, Mongolian idiocy, and in advanced stages of the myopathies.

Edema if general and marked is usually from nephritis. It may result in the more dependent parts from heart or liver disease or any obstruction to the circulation. Edema of the eyelids may be seen in urticaria and in whooping-cough. Edema may be seen in severe anemias.

General edema may occur as a complication of marasmus, independent of any disease of the heart or kidneys. The edema may come on suddenly or gradually and may be slight or severe. It may disappear and reappear. It is evidently due to the hydremia and weakened blood-vessels. It is most frequent under six months of age, but may be seen in older children.

Acute Circumscribed Edema.[1]—Angioneurotic edema, or giant urticaria, may affect infants and children, causing an acute swelling of almost any part of the body, usually the skin, but sometimes the mucous membranes, joints, or muscles. It may cause puzzling symptoms if it affects stomach, intestines, or the genito-urinary tract. In the larynx it may be a source of great danger.

Edema of the Face.—Edema may be caused by a great variety of things, chief of which are acute or chronic nephritis; and in all cases of edema the urine should be carefully investigated. The swelling almost always begins about the eyes and forehead, and practically one rarely sees edema due to nephritis that does not affect these parts. It may also be due to edema in the course of anemia, and to food poisoning in which the edema has the manifestations of urticaria. Swelling of the face may also be seen in children who have been exposed to cold winds, and in these cases it is usually, if not always, accompanied by small, round, hard, bluish patches which may give rise to considerable alarm the first time they are seen. Angioneurotic edema may also affect the face. The swelling may be due to insect stings. It is usually more or less localized and frequently there is a history of being stung. The skin is reddened and the central puncture may often be made out. The swelling may be due

[1] Smith and Meara, "Edema, Acute Circumscribed," *Archives of Pediatrics*, May, 1906, p. 361.

also to inflammation, abscesses about the teeth being the most frequent form. The obstruction to the veins in the thorax may cause edema and cyanosis of the face, and may be due to enlarged thymus, enlarged lymphatics, or to new growths.

The Hands.—Changes in the hands are important, as the hands are always visible.

Clubbing of fingers, usually with cyanosis and changes in the nails, is seen in congenital heart disease, in chronic suppurative diseases of the chest, as empyema and bronchiectasis, in tuberculosis of the lungs or pleurisy, or in chronic pleurisy or pericarditis with adhesions. It is said to occur in cirrhosis of the liver.

The shape of the hand is characteristic in achondroplasia, the little finger is curved in Mongolian idiocy. In rickets the phalanges may be larger than the joints, causing a beaded appearance. Marked deformities are caused by arthritis deformans, and a dactylitis or inflammation of the fingers may result from either syphilis or tuberculosis. The *x*-ray may aid in differentiating these. In syphilis there is a gummatous periostitis, the interior of the bone being unaffected or sclerosed, while in tuberculosis there is a carious interior, the periostitis being secondary.

There may be characteristic movements, as in chorea and athetosis. Nervousness may also be revealed by clenched fists or movements. The presence of edema or cyanosis is easily seen, and the habits of sucking thumbs or fingers and biting the nails leave their traces.

Examination of Stools.—The length of time the food takes to pass through the bowel may be easily determined by marking any given meal by administering a teaspoonful of charcoal and noting when this is passed. It is highly important for the physician to examine the stool himself, for, as a rule, the nurse and attendants are not competent to describe them satisfactorily and, indeed, many physicians are lacking in knowledge on this point.

Mucus is frequently present in the stools of infants and young children, and is seen in diarrheas of all sorts. If there are shreds and strips of mucous membrane, membranous colitis should be thought of. Large quantities are

seen in mucous colitis of the nervous type, which is however, rare in children.

Blood in the stools may be due to bleeding from anal fissures, in which case the hard fecal massses are streaked with blood. Apart from this, small patches of bright red blood in otherwise more or less normal stools should suggest polypus of the rectum, and an examination should be made for it. Blood mixed with mucus is frequently noted in colitis, enterocolitis, and ulcer of the bowel.

The stools should also be examined for parasites of various kinds (see Intestinal Parasites and Hook-worm Disease).

If the *flow of bile* is interfered with, there will be white stools with a soft consistency and an offensive odor. See also page 106 for further points on the examination of the stools.

Sudden Death.—This is not uncommon in infants, and may occur in those previously healthy, but usually is seen in children, especially in asylums. It may lead to unjust suspicion as regards attendants. The more common causes are as follows:

1. Malformations of internal organs which may have escaped attention. This usually occurs in the first few days.

2. Internal hemorrhage. This is usually during the first or second week.

3. Asphyxia.

a. From overlying.

b. To the aspiration of regurgitated food.

In older infants the asphyxia may be due to rupture of a retropharyngeal or mediastinal abscess, or from pressure of an abscess or enlarged lymph-nodes on the pneumogastric nerve, or from sudden dislocation of the cervical vertebra in a course of caries of the spine.

4. Marasmus, apparently from heart failure. These children are often found dead in the morning, and there is not infrequently more or less atelectasis.

5. Enlarged thymus. Children with lymphatism are liable to die from slight accidents, the administration of anesthetics during a convulsion, or during slight or severe illness.

6. Convulsions without reference to their cause.

7. In high temperature after a few hours' illness, seen in the course of acute infections, toxemias, and heat-stroke.

DISEASES OF THE NEWBORN.

ASPHYXIA.

This may be intra- or extra-uterine, and the causes are given in the following table:

- **Intra-uterine.** Due to any disturbance of the placental circulation during labor.
  - **Mother.**
    - Hemorrhage.
    - Convulsions.
    - Use of ergot in second stage.
    - Prolonged second stage.
    - Death of mother.
  - **Child.**
    - Pressure on cord.
    - Twisting of cord.
    - Pressure on brain.
    - Early separation of placenta.
    - Entrance of mucus, blood, amniotic fluid, or meconium into air-passages.
- **Extra-uterine.** (Rare.)
  - Malformations of brain, circulatory, or respiratory organs.
  - Intra-uterine disease of brain, circulatory, or respiratory organs.
  - Injury of brain, circulatory, or respiratory organs.
  - In premature infants from weakness.

Lesions.—There are congestion and punctate hemorrhages of the viscera, aspirated material in the air-passages, and if the child has breathed or has been forcibly inflated there may be emphysema. In the extra-uterine form, malformation, disease, or injuries may be found.

Symptoms.—Two forms may be described, between which there are all grades:

Asphyxia Livida.	Asphyxia Pallida.
Cyanosis.	Pallor (lips may be blue).
Vessels of cord full and firm.	Vessels of cord almost empty and relaxed.
Pulse full, slow, and strong.	Pulse absent or nearly so. It may be impossible to make out heart-beat.
Muscle tone good.	Muscle tone poor, child relaxed.
Responds to external stimuli.	Does not respond to stimuli.
Symptoms disappear with beginning respiration.	Symptoms are liable to persist.
Prognosis good.	Prognosis bad.
Recovery usually prompt.	Recovery slow; symptoms liable to recur and child may die even after several days have elapsed.

Diagnosis.—Cerebral compression from hemorrhage may present similar symptoms and may be associated with asphyxia. There is usually the history of compression from a long labor or from instrumental delivery. The fontanel bulges, there is coma, and often paralysis.

Anemia from a large hemorrhage, as from cord rupture, may resemble asphyxia pallida.

Prognosis.—This depends upon the grade of the condition, and to a slight extent upon the skill with which the child

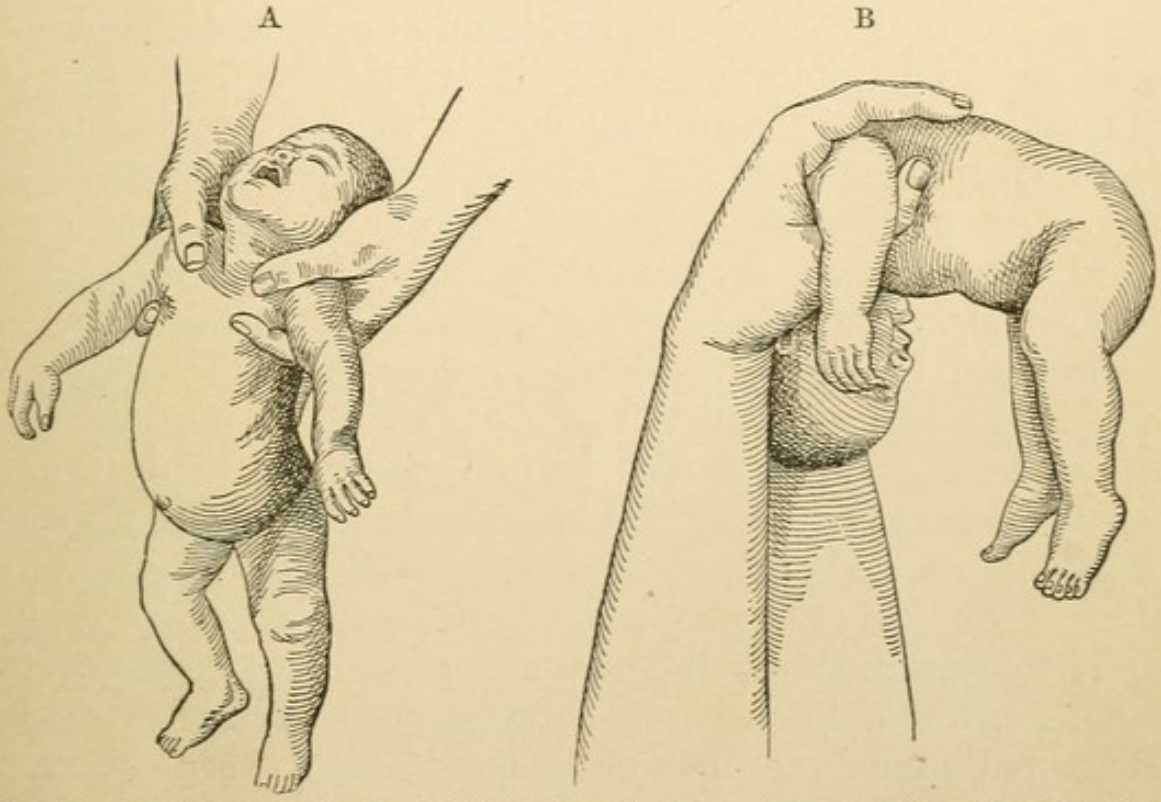


FIG. 13.—Schultze's method of artificial respiration: A, Inspiration; B, expiration (Hirst).

is treated. Attempts at resuscitation are apt to be abandoned too early.

Treatment.—Full accounts of the various methods of treatment will be found in the text-books on obstetrics.

Clean out the mouth and pharynx with the finger swathed in absorbent cotton. Stimulate respiration by spanking, alternate hot and cold baths or douches, by swinging in the air, and other means. If very livid, allow half an ounce of blood to flow from the umbilical cord. If it is thought that the bronchial tubes contain amniotic fluid or mucus, insert a

small soft-rubber catheter and try to remove it by suction. Laborde's method of resuscitation may then be tried. This consists in placing the child, wrapped in a blanket, on a chair or table, so that the head hangs over the edge. Traction is then made on the tongue, pulling it out as far as possible and then letting it recede at the rate of about fifteen times a minute. This often starts the respiration by irritating the superior laryngeal, glossopharyngeal, and lingual nerves, which in turn affects the phrenic nerve, causing contraction of the diaphragm and intercostal muscles. This is one of the best methods of resuscitation; if it does not succeed, artificial respiration must be tried. Schultze's method is most efficient. Grasp the child with the thumbs on the chest, the index-fingers in the axillæ, and the remaining fingers supporting the back. The child is held feet downward, face forward, between the physician's legs. The child is then swung upward until the physician's arms are about horizontal; the sudden stopping causes the child's body to double up, and expiration is produced. The inspiration is caused by the return to the original position. This should not be done too rapidly. This may be too severe for very weak infants, and other methods may be substituted. Inhalations of oxygen are sometimes of great service.

The lungs may be inflated artificially by the mouth-to-mouth method, by using a catheter in the larynx, or by Ribemont's inflator. Too much force should not be used.

CONGENITAL ATELECTASIS.

At birth the lungs are solid, but are rapidly expanded as soon as the child is born. This process of expansion is gradual, and may take one or two days or more before it is complete. It may be irregular, and areas of solid lung may remain, especially in the case of weak children. The lower part of the lungs, in the back, are said to be the last to expand. Where this fetal condition of the lungs persists it is called atelectasis.

Pathology.—The lung is only partly expanded, usually

the anterior part or in spots. These spots are generally emphysematous. Only one-quarter or one-third of the lung may be dilated; the older the child the more expanded lung it is apt to have. Marked atelectasis may be found as late as three months where it was not suspected. There may be evidences of pneumonia, and it may take a microscopic examination to decide whether there is hypostatic pneumonia or atelectasis, or both. The spleen is usually enlarged.

Symptoms.—The child may be asphyxiated at birth and only recover partly, dying after one or more relapses. The asphyxia may be apparently recovered from and not recur, but the child may never seem to thrive. The temperature of the body is low, the child feeble, and more or less cyanosed. The infant becomes weaker and weaker, and may die without any assignable cause.

Diagnosis.—This may be difficult. Symptoms and history are to be relied on more than physical signs, which may be wanting. The percussion note may be resonant over the entire chest, even when there is considerable solid lung, owing to the fact that the solid lung is surrounded with emphysematous lung. In other instances the areas of dulness are distinct, and over them there is absence or diminution of breath sounds. There may or may not be râles.

Treatment.—Full inflation of the lungs should be secured by seeing that the infant either cries or takes full, long, deep breaths. If the child is feeble, it should be made to cry at least once a day, if it does not do so of its own accord. Spanking, frictions, and alternate hot and cold douches may be used to this end. The child should be kept warm. It should be taken up and carried about and fed on the nurse's lap, never in the crib.

ICTERUS.

1. **Physiologic.**—This occurs in about one-third of all children born. Runge places it as high as 80 per cent. It comes on during the first week, usually from the third to the sixth day. It increases for a day or two and then disappears, taking a week or two to clear up entirely. The

urine is not usually bile colored, but may be. The stools are normal. Kehrer states that it is more frequent in the first child. It does not affect the child in any way, but it is said that these children do not gain as rapidly as those without it. It is liable to be more intense in weak children. There are numerous theories, the most plausible being that it is due to resorption of bile and of destroyed red blood-cells in the liver.

2. **From Malformation of the Bile Ducts.**[1]—The bile ducts may be absent or impervious. There is increasing jaundice coming on after birth. The urine is deeply colored, and the stools white. The liver and spleen are enlarged. Hemorrhages under the skin and from the mucous membranes are common. Vomiting is usually absent. Death usually takes place within three months, from wasting or convulsions.

3. **Syphilitic hepatitis** is a rare cause of icterus in the newborn.

4. In **septic infections** there may be slight icterus.

ACUTE INFECTIONS.

Any of the infectious diseases may be seen in the newborn, especially if the mother has the disease at the time the baby is born. There is, however, a natural immunity to most of the infectious diseases of childhood during the first few months of life. The *symptoms* are the same as in later life. The *prognosis* is bad, owing to the diminished resistance of early life.

PYOGENIC DISEASES.[2]

(Sepsis of the Newborn; Puerperal Fever of the Newborn; Septicemia; Pyemia, etc.)

Definition.—A variety of conditions, due to infection of the child with the ordinary pus-forming bacteria, are met with. The staphylococcus pyogenes aureus and albus and the streptococcus pyogenes are most commonly met with.

[1] Thomson, *Edinburgh Medical Journal*, 1892.
[2] Snow, *Archives of Pediatrics*, 1903, p. 659.

Etiology.—The infection may be localized, and the absorption of toxins may cause constitutional symptoms, or there may be a septicemia or pyemia. Infection frequently takes place through the umbilical stump (omphalitis); this may extend to the umbilical vessels or even to the peritoneum. Peritonitis is one of the most frequent forms of septic infection met with. Bronchopneumonia, associated with pleurisy, may also be met with complicating infection of the umbilical vessels or other inflammations. Pericarditis is rare. Streptococcus infection of the throat may occur with the formation of a false membrane, which resembles that seen in diphtheria.

Gastro-enteritis may be caused by pyogenic organisms. Inflammation of the cellular tissue with abscess formation is common, and septic arthritis and osteomyelitis are also seen. Erysipelas may start about the umbilicus during the first two weeks of life, and this form is usually fatal.

Symptoms.—Certain general symptoms are common to all infections in the newborn; fever, if present, is of the most irregular type. Icterus is common, and hemorrhages frequent. Loss of appetite, vomiting, and diarrhea are frequently seen. There is always loss of weight. The pulse is rapid and weak, and the respiration is irregular. Convulsions, twitching, and rigidity may be present, and coma may come on later.

Symptoms of special infections, as peritonitis, are, if present, like those seen later in infancy. There may, however, be little to call attention to the seat of the greatest trouble.

Prognosis.—This is always bad.

Prophylaxis, along general antiseptic lines, should always be carried out, to prevent infection, always bearing in mind that a young infant is easily infected.

Treatment.—This is symptomatic. Collections of pus should be evacuated. Ichthyol (5 to 30 per cent. in ointment) or glycerin is useful in skin infections.

OPHTHALMIA NEONATORUM.[1]

Etiology.—This is caused by the gonococcus, infection taking place from the vagina of the mother during labor, occasionally in other ways.

Symptoms.—There is great swelling of the lids, chemosis, and a profuse purulent discharge. If the progress of the disease is not arrested, ulceration of the cornea, or panophthalmitis, with total loss of the eye, may result. The duration of the disease depends largely on the treatment. Gonorrheal arthritis may occur from these infections.

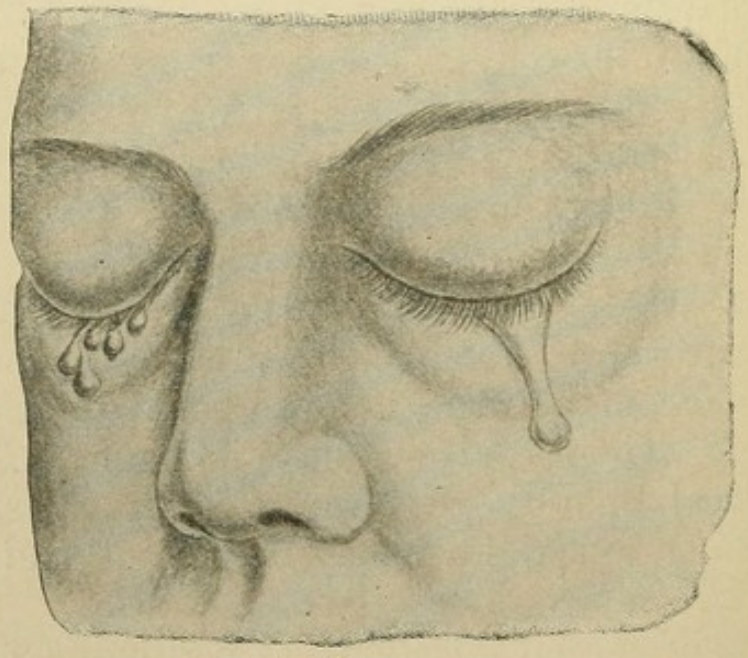


FIG. 14.—Ophthalmia (conjunctivitis) neonatorum (de Schweinitz).

Prognosis.—The outlook is good if the case is taken early and energetically treated. If handled late or if improperly treated the prognosis is bad. Nearly one-third of all blindness is from this cause.

Prophylaxis.—Every child born in an institution, and every suspicious case in private practice, should receive 1 or 2 drops of a 1 or 2 per cent. solution of nitrate of silver in each eye (*Crede's method*). The excess of silver may be neutralized afterward by flushing the eye with normal salt solution.

[1] Weeks, *Archives of Pediatrics*, May, 1905, p. 346.

Treatment.—Isolation of cases, strict antiseptic precautions, and cleanliness are necessary. If only one eye is affected, the other should be protected by pads moistened in some antiseptic solution. Cold compresses of surgical gauze should, almost constantly, be kept on the eyes. These may be changed every few minutes, taking them directly from a block of ice and applying. Every twenty minutes, night

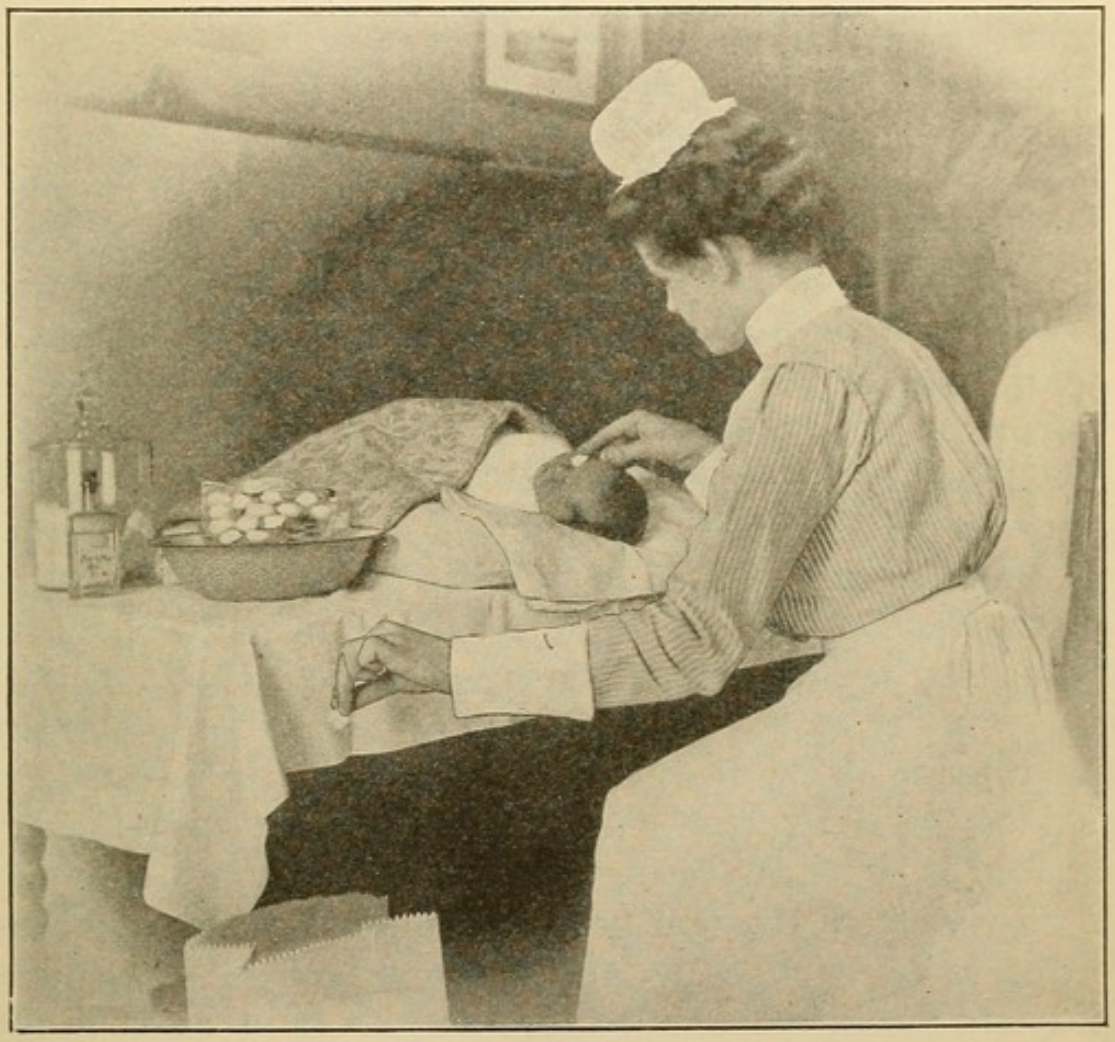


FIG. 15.—Arrangement for application of ice to the eyes (De Lee).

and day, the eye should be irrigated with a solution of boric acid (10 gr. to 1 oz.). A bulb-tip eye-dropper should be used—alternately at the inner and outer canthus of the eye—and the fluid injected with sufficient force to wash out the conjunctival sac. Once or twice a day a few drops of a 3 per cent. solution of protargol (in resistent cases a 10 per cent. solution), or a 1 or 2 per cent. solution of nitrate of silver

should be dropped into each eye. Atropin should be instilled if the cornea is affected. Later on a very mild ointment containing yellow oxid of mercury may be used to keep the abraded conjunctiva from adhering.

TETANUS.[1]

Definition.—An acute infectious disease characterized by tonic muscular spasms (which increase in severity by exacerbations) and by general convulsions.

Etiology.—The disease is caused by Nicolaier's tetanus bacillus, which produces a powerful poison—tetanotoxin. The bacilli are never found anywhere in the body except at the site of infection. The tetanus bacillus is found in the soil. In some places, as the Hebrides, Faroë Islands, and various places in the tropics, the disease is endemic, and a large percentage of the newborn die from tetanus. Infection in infants usually takes place through the umbilical wound.

Pathology.—About the only thing found is hyperemia, sometimes accompanied with small hemorrhages of the spinal cord. Congestion of the lungs is also usually noted.

Symptoms.—The disease comes on usually about the fifth or sixth day, rarely later than the twelfth. Trismus (stiffness of the jaws) is the first thing noticed, and this prevents nursing. The body next becomes slightly stiffened, and this increases by paroxysms until the whole body is rigid. The head is generally retracted, and the fixation of the muscles of the face gives a peculiar expression. Convulsions are apt to be excited by any manipulation. The pulse is rapid and weak, the temperature in the mild cases is low, 100° to 101° F., but may be 104° to 105° F., or even higher in the severer cases. In the fatal cases death usually takes place in from twenty-four to forty-eight hours, sometimes later; those which recover last from one to three weeks, the spasm gradually passing away. Death takes place from exhaustion or from spasm of the glottis or of the muscles of respiration.

Prognosis.—This is always bad—90 to 95 per cent. of the cases die.

[1] Hartigan, *American Journal of the Medical Sciences*, 1884.

Treatment.—Drugs tending to lower the spinal excitability should be used, in repeated doses, in quantities sufficient to produce some effect. Chloral and bromides, either alone or in combination, are most used. Calabar bean is also recommended. From 3 to 5 gr. or more of bromid of soda or potash may be given every two or three hours, reducing the dose as improvement takes place. Chloral may be used in 1 or 2 gr. doses, and may be increased. It may be given every hour or two until some effect is produced.

Phenol has given remarkable results. It is used in a 10 per cent. solution, the adult dose being 10 drops, children in proportion. This should be diluted with 25 to 30 minims of water. It should be given deep into the muscles. It may be repeated at intervals of three hours, and less frequently as improvement takes place. The urine should be watched, and if it becomes dark it should be stopped, at least temporarily.

Tetanus antitoxin should be given as soon as possible. From 1500 to 3000 units of the standard adopted by the United States Public Health and Marine Hospital Service may be given, and repeat it once or twice if necessary.

Tetanus in Older Children.—A very large number of cases of tetanus occur every year, usually about the Fourth of July, as a result of injuries received from the explosion of fireworks, a large majority of cases coming from the use of blank cartridges. Toy pistols made for the explosion of blank cartridges should be prohibited.

To prevent tetanus, the wound should be freely incised and every particle of foreign matter carefully removed. It should then be cauterized with a 25 per cent. solution of carbolic acid and a loose wet boric acid dressing applied, and the wound allowed to heal by granulation. The dressing should be changed once a day or oftener if necessary; 1500 units of tetanus antitoxin should be administered, and this is almost a certain prophylactic.

The child should be kept absolutely quiet and not touched unless absolutely necessary. Food and medicine may be given by means of a nasal tube.

PEMPHIGUS.

This disease is characterized by a blister-like eruption, which may be due to a variety of causes. The lesion is a bulla, varying in size from one-quarter of an inch to several inches, filled with clear serum, and usually upon a reddened base.

Etiology.—Epidemic pemphigus of the newborn some-

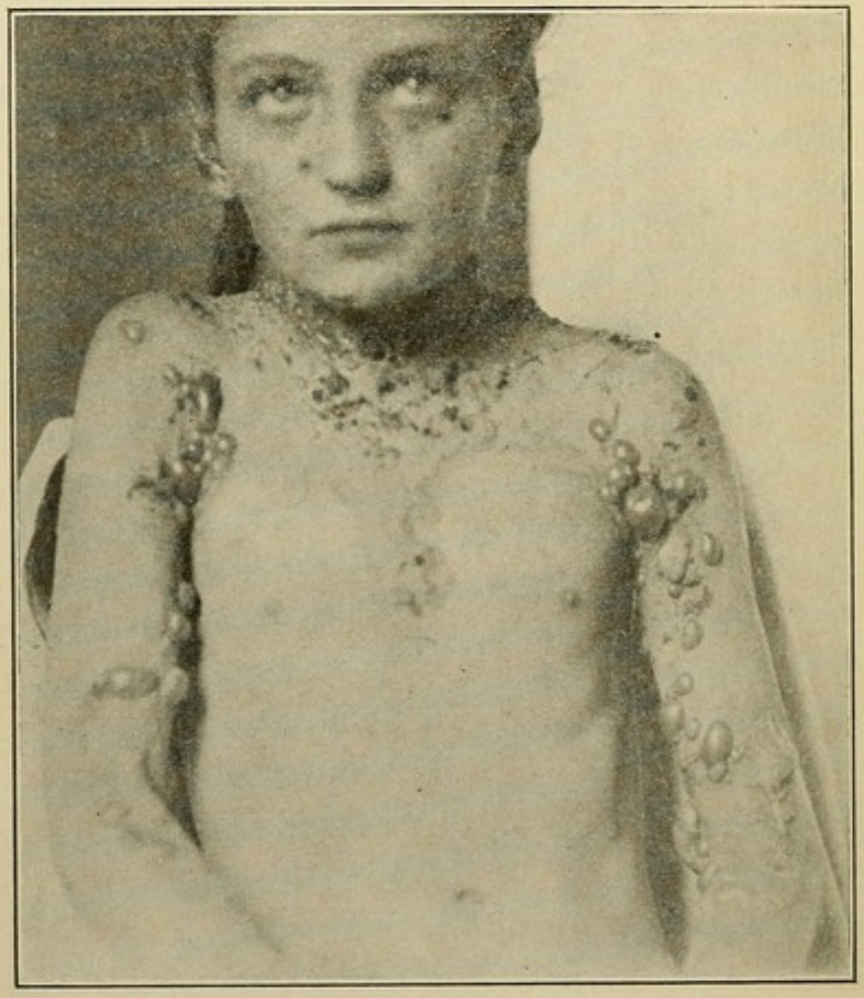


FIG. 16.—Pemphigus.

times occurs in institutions. It usually begins the latter part of the first week, but may be seen later. It is probably due to several sorts of pus-forming bacteria. Staphylococcus pyogenes albus and aureus have been found in the bullæ.

Symptoms.—There are twenty or thirty bullæ scattered over the body, but seldom on the soles or palms. They may appear on the mucous membranes. After a day or two they burst and dry up, and a few days later the scab falls, leaving

a reddish-violet base. New crops may appear. The disease lasts a week or two.

Prognosis.—This is usually good in strong infants. Sepsis may develop and prove fatal.

Diagnosis.—Impetigo may resemble it very closely, and the two may be only different forms of the same process.

Treatment.—Keep the child clean by bathing in mild antiseptic solutions, such as boric acid (10 gr. to 1 oz.) or 1 : 10,000 bichlorid of mercury. An antiseptic powder (mixture of boric acid and starch) or an ointment may be used. The best ointments are either a 1 per cent. ichthyol or a 1 to 2 per cent. ammoniated mercury ointment.

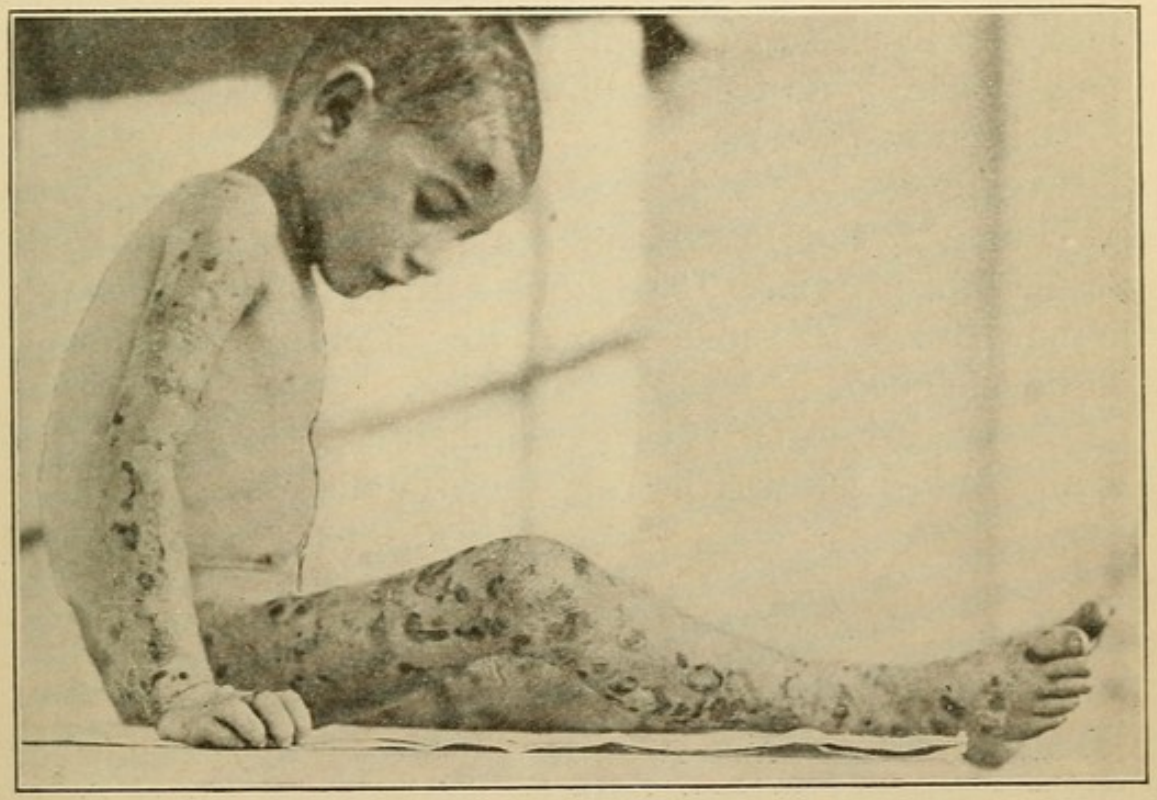


FIG. 17.—Pemphigus.

Traumatic pemphigus may result from bathing the child in very hot water.

Syphilitis pemphigus may be present at birth, or may develop during the first two weeks of life, rarely later. It is frequently seen upon the soles and palms; other manifestations of congenital syphilis are present. (See Syphilis.)

FATTY DEGENERATION OF THE NEWBORN.

(Buhl's Disease, 1861.)

Definition.—This is a rare disease, seen usually in infants who have been asphyxiated at birth and in whom the symptoms have persisted to a greater or less degree. The attempts at resuscitation may not always be successful. The cause of the disease is unknown.

Pathology.—The features of the disease are fatty degeneration of the organs (especially the heart, liver, and kidneys) and hemorrhages into the organs, the serous cavities, and from the mucous membranes. There may be hemorrhage from the cord when it separates.

Symptoms.—There is prostration, loss of weight, and sometimes icterus and edema; external hemorrhages may occur. There is no temperature. The disease usually proves fatal within two weeks.

Diagnosis.—This is made by microscopic examination of the organs, and may be of some medicolegal importance in cases of asphyxia. It resembles the pyogenic infection of the newborn. Phosphorus and arsenical poisoning should also be excluded.

Treatment.—This is symptomatic. Nothing known has any influence over the course of the disease.

EPIDEMIC HEMOGLOBINURIA.[1]

(Winckel's Disease, 1879; Maladie bronzée.)

Definition.—This is a rare disease of the newborn, usually occurring epidemically in institutions. It is characterized by hemoglobinuria, icterus, and cyanosis.

Etiology.—It is probably due to some sort of infection as yet unknown.

Pathology.—The lesions are swollen kidney, large hard spleen, hemorrhages into the various organs, and sometimes fatty degeneration of the heart and liver. The umbilical vessels are almost always normal.

Symptoms.—The disease attacks previously healthy infants, and comes on from the fourth to the eighth day after

[1] *Boston Medical and Surgical Journal*, March, 1875.

birth. It begins suddenly, with restlessness, followed by great prostration, rapid pulse, and respiration. The increasing cyanosis and icterus together give the child the appearance of a mulatto. The urine is dark and cloudy, is passed in small quantities, with pain and straining, and contains hemoglobin, kidney epithelium, and sometimes granular casts and blood, but no bile. The temperature is either normal or elevated. The child usually dies in thirty or forty hours from asthenia, coma, or convulsions.

Treatment.—This is symptomatic. Nothing known influences the course of the disease.

HEMORRHAGES.

Hemorrhages are common in early life. They may be (1) traumatic; (2) spontaneous, the so-called hemorrhagic disease of the newborn.

1. **Traumatic hemorrhages** are due to injury during labor—if the skin is unbroken a hematoma results.

Cephalhematoma is due to prolonged labor or forceps. It

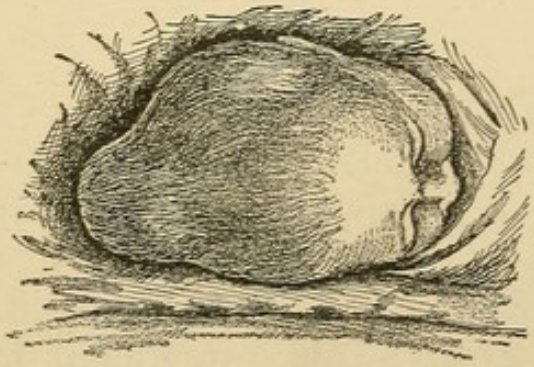


FIG. 18.—Cephalhematoma (Hirst).

is a collection of blood under the scalp, usually over one parietal bone. It may be noted any time—from birth to the fourth day. It increases in size for about a week and then slowly disappears. No treatment is required.

Differential Diagnosis.—*Cephalhematoma.*—Soft; fluctuates; not reducible; no pressure symptoms; no pulsation (may rarely pulsate); no heat; marginal ridge; skull felt at bottom; disappears in from one to three months.

Caput Succedaneum.—Edematous; does not fluctuate; disappears in two or three days.

Abscess.—Soft; fluctuates; not reducible; no pressure symptoms; local heat; redness; often fever.

Encephalocele.—Along line of sutures partly reducible; pressure causes symptoms. Increases on crying (see Encephalocele).

Depressed Fracture.—Depression of skull felt; sometimes paralysis, coma, etc.

Hydrocephalus.—Symmetrical enlargement of the head.

Hematoma of the Sternomastoid.—A condition noted during the second or third week, most frequently after breech pre-

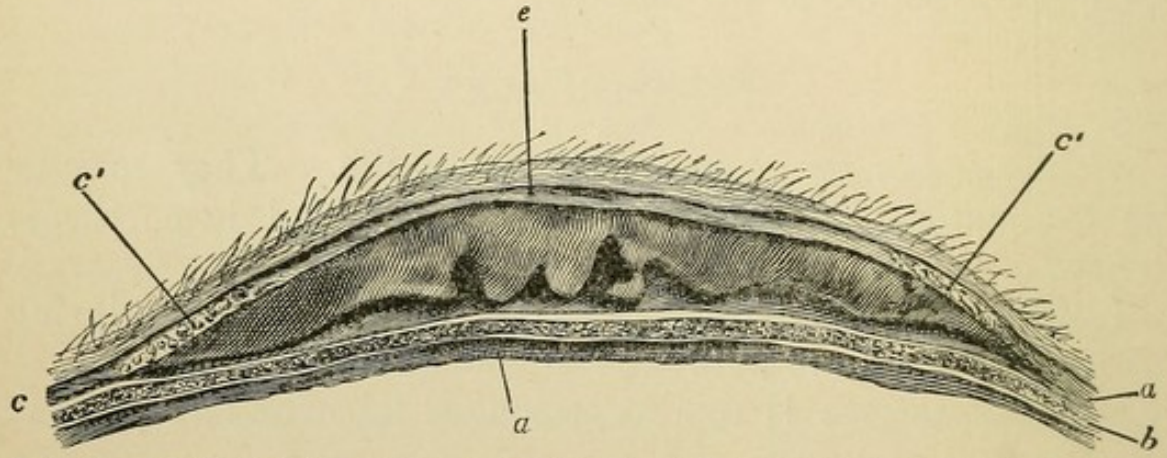


FIG. 19.—Longitudinal section through a cephalhematoma: *a*, Dura mater; *b*, cranium; *c*, pericranium; *c'*, *c'*, beginning hyperostosis; *e*, scalp (Davis).

sentation. It is a hard tumor, about the size of a pigeon's egg, situated in the muscle. It is immovable and sometimes slightly tender. It disappears spontaneously, leaving no deformity. Treatment is contra-indicated.

Visceral Hemorrhages.—These may be in the brain, lungs, or abdominal organs. The intracranial may be diagnosed by the nervous symptoms (see Birth Palsies); that of the lungs may occasionally cause hemoptysis; abdominal hemorrhage causes obscure symptoms, often fatal collapse, and diagnosis is rarely made during life.

2. **Spontaneous Hemorrhage.**[1]—Small hemorrhages may occur in the course of syphilis, pyemia, and other infections. Small or large hemorrhages may occur without any apparent cause. Do not confuse with hemophilia (see Hemophilia). Various bacteria have been demonstrated in the blood of these patients. The hemorrhages may vary in size from a pin-point ecchymosis to a large loss of blood.

[1] Townsend, *Archives of Pediatrics*, August, 1894, p. 559.

They may be single or multiple and may occur in any organ, into any serous cavity, from any mucous membrane, or under the skin. Townsend gives 50 cases as follows : Intestine, 20 ; stomach, 14 ; mouth, 14 ; nose, 12 ; umbilicus, 18 (umbilicus alone, 3) ; subcutaneous, 2 ; abrasions of the skin, 1 ; meninges, 4 ; cephalhematoma, 3 ; abdomen, 2 ; pleura, 1 ; thymus, 1. The hemorrhages occur usually on the second or third day, rarely later than the seventh day. There may, or may not, be temperature. There is rapid loss of weight. Death takes place in most cases in three or four days, or else the hemorrhages stop spontaneously (generally within the first day or two of the disease), and recovery takes place. Townsend collected 709 cases ; 79 per cent. of these died.

Treatment.—Keep up nutrition. Local treatment, where the hemorrhage can be reached. One drop of the 1 : 1000 solution of adrenalin diluted with normal salt solution may be given hourly for a few doses or until some effect is noted. The dried gland may be given in $\frac{1}{2}$-grain doses internally. For local bleeding, adrenalin solution 1 : 1000 diluted 1 : 10 with normal salt solution may be used. Gelatin (2 per cent. solutions) in normal salt solution sterilized several times has been recommended. It should be boiled for several hours. Injections of from 2 drams to $\frac{1}{2}$ ounce may be used, and repeated if no effect is produced. Normal horse serum has also been suggested as an injection. Human blood serum has also been used, 10 cc. subcutaneously three times a day, or even every two hours in severe cases.

Intracranial hemorrhage is sometimes amenable to surgical treatment.[1]

INTESTINAL OBSTRUCTION.[2]

In the newborn this is most frequently due to an imperforate anus, usually only the external orifice being absent.

[1] Cushing, *American Journal of Medical Sciences*, October, 1905, p. 563. J. E. Welch, "Normal Human Blood Serum," etc., *The American Journal of the Medical Sciences*, June 1910, p. 800.

[2] *Journal of the American Medical Association*, January 21, 1905. Arthur Edmunds, "Intestinal Obstruction in Children," *Practitioner*, August, 1906, p. 173. G. P. la Rouge, "Intestinal Obstruction, Diagnosis of Affections Characterized by," *Journal of the American Medical Association*, April 7, 1906. J. E. Erdmann, "Intestinal Obstruction in Children," *Journal of the American Medical Association*, January 21, 1905, p. 171.

The rectum may be absent in part or entirely or be closed by a septum. The obstruction may be due to malformations higher up in the gut.

The symptoms vary with the grade of obstruction. Absence of stools—or, if high up, absence of stools after the first few—vomiting, and distension of the belly are the most common symptoms. These may, in some instances, come on after a week or two. The lower the obstruction the longer the child lives. The higher up the obstruction the earlier the symptoms come on.

Imperforate anus and rectal septum may be treated surgically with success. The other forms are practically always fatal.

DIAPHRAGMATIC HERNIA.[1]

This is a congenital deformity. More or less gut is found protruding upwards through the diaphragm, usually on the left side. If the hernia is small the child may live. The symptoms are usually dyspnea or asthmatic attacks. There may be signs of a pneumothorax and, if on the left side, the heart is pushed to the right. Diagnosis is difficult or impossible, and there is nothing to do for it.

MASTITIS.

In the breast of the newborn it is very common to find milk secreted. This is most marked about the second week, but it may be noted for several months. Left to itself, it rarely causes any trouble, but if squeezed out or handled roughly the breast is apt to become inflamed and an abscess caused, which may prove fatal. The breast of infants should be kept clean and let alone.

Treatment.—For abundant milk paint the gland with tincture of belladonna and apply a large pad of cotton, and over this a roller bandage, making moderate pressure. If

[1] Abt, *Archives of Pediatrics*, April, 1900, p. 261. Stiles, "Operative Treatment of Hernia in Infants," *British Medical Journal*, October, 1904, p. 813. W. B. Coley, "Hernia, Management of, in Infancy and Childhood," *Journal of the American Medical Association*, January 14, 1905, p. 112. R. H. Russell, "Hernia in Children and Their Relation to Adult Conditions, Pathology and Treatment of," *Lancet*, January 7, 1905, p. 7. Edmund Owen, "Hernia, Reducible, in Boyhood," *Practitioner*, March, 1906, p. 289.

the gland becomes inflamed apply hot boric-acid solution on compresses. If an abscess forms it should be opened.

UMBILICAL HERNIA.

The ordinary form consists of a small protrusion of gut through the umbilical opening. It is most frequently seen in poorly nourished, rachitic girls. A carefully applied abdominal binder during the first few months does much to prevent its occurrence, and in the smaller ones a pad of gauze, held in place by the binder, is all that is necessary to effect a cure. Later on a piece of cork or a button, covered with a gauze and held in place with two strips of zinc oxid adhesive plaster, applied at right angles and crossing at the umbilicus, will be found efficient. The tendency is for these hernias to disappear even without treatment.

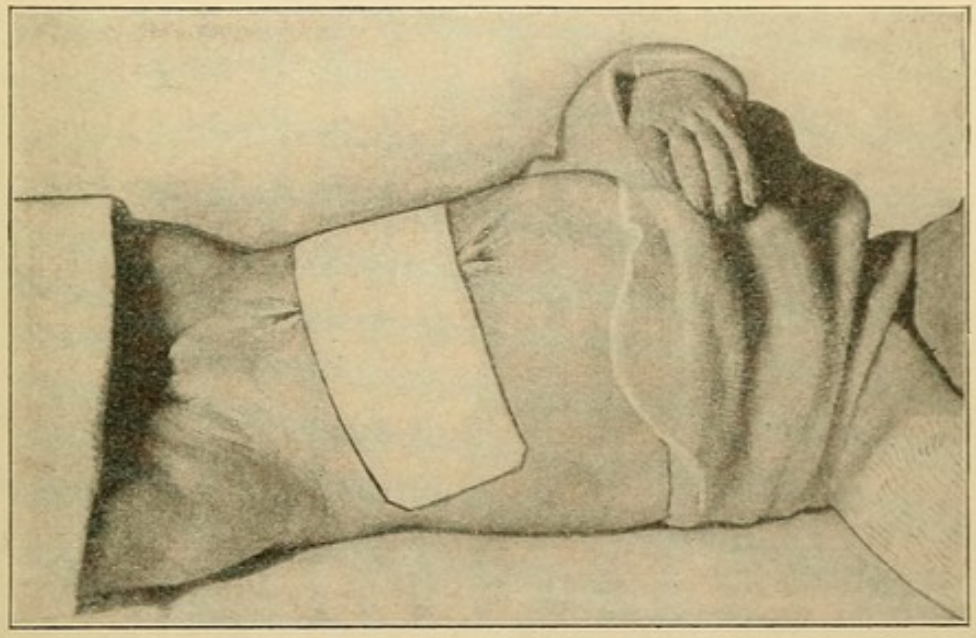


FIG. 20.—Adhesive plaster applied for the cure of umbilical hernia (De Lee).

LESIONS OF THE UMBILICUS.

Granuloma.—This is merely an excess of granulation tissue. It forms a small tumor mass, has a small amount of discharge and bleeds readily. Powdered burnt alum may be used as a dusting powder or sulphate of copper or nitrate of silver may be applied. If large, it may be cut off.

Adenoma; Mucous Polypus; Diverticulum Tumor.—Names applied to a tumor mass at the umbilicus caused by a prolapse of the mucous membrane of Meckel's diverticulum. Various sizes and degrees are met with. The tumor is of a pink color, smooth, irreducible, and has a slight mucous discharge. There may be a fecal fistula. The treatment is surgical.

SCLEREMA.

A curious, hard, board-like condition of the skin and subcutaneous tissues occasionally seen in the newborn and also in older infants. It occurs in weak infants. It may be in small areas or may extend to nearly the entire surface of the body. The temperature of the body is lowered and the skin feels like a cadaver. There is no pitting on pressure. The body may be rendered quite stiff if the sclerema is extensive. The circulation is very feeble. Most of the cases die, but not all.

Treatment.—The baby should be put in an incubator and kept warm. The heart should be stimulated and the feeding carefully regulated.

EDEMA.

Edema may be seen in young infants not associated with disease of the heart, liver, kidneys, or blood. It is usually seen in very weak infants; it may be general or local, and is most frequent in the dependent parts. As it occurs in the very weak the children often die, but some of them recover.

The edema lasts a week or so and disappears. It may recur.

Treatment.—Keep the child warm and stimulate the heart and circulation. Give digitalis, strychnia, and alcohol. In the very severe cases citrate of potassium may be given.

INANITION FEVER.

Inanition must not be forgotten as a cause of fever in the newborn. (See Inanition).

INFANT FEEDING.[1]

There are four methods of feeding infants: 1. Breast or maternal feeding. 2. Wet-nursing. 3. Mixed feeding—*i. e.*, breast-feeding supplemented by bottle-feeding. 4. Bottle or artificial feeding.

BREAST-FEEDING.

The milk from a healthy mother is by far the best nourishment for an infant during the first year, and cannot be fully replaced by any other form of feeding. Infants fed on breast milk are stronger and better able to resist disease. While it remains true that babies may be reared on artificial foods and remain healthy and grow strong, the percentage of robust bottle-fed babies is much smaller than that of healthy breast-fed infants. This is particularly true of the lower classes, who often lack both the time and intelligence required to rear a healthy infant by bottle-feeding.

Contra-indications to Maternal Nursing.—The following rules, adapted from Holt, will be found a reliable guide in determining whether or not a mother is fitted to nurse her child:

1. If the mother has tuberculosis in any form, latent or active, she should not nurse her child. A tuberculous mother not only exposes her child to infection, but hastens the progress of the disease in herself. If the mother has pulmonary tuberculosis, nursing is almost certain to prove fatal to her.

2. When the mother has had any serious complication, such as nephritis, convulsions, severe hemorrhages, or septic infection, during pregnancy or parturition, she should not nurse her child.

3. If the mother is choreic or epileptic, nursing is contra-indicated.

4. If the mother is very feeble or has any serious chronic disease the child will derive little, if any, benefit from breast-feeding, and the mother will be greatly injured.

[1] A very complete discussion of this subject will be found in *Diet in Health and Disease*, by Friedenwald and Ruhräh.

5. Nursing should not be attempted where experience has shown on two previous occasions, under favorable conditions, that the mother is unable to nourish her child.

6. Where no milk is secreted nursing is impossible.

Good artificial feeding is to be preferred to poor breast feeding. If artificial feeding is to be resorted to it is well to begin early, while the infant's digestive organs are in comparatively good condition. The question must always be carefully considered.

During pregnancy the breasts should be examined, and if the nipples are short, gentle traction should be made on them daily. If there is retraction the breast-pump may be needed to evert them. During the entire nursing period the breasts

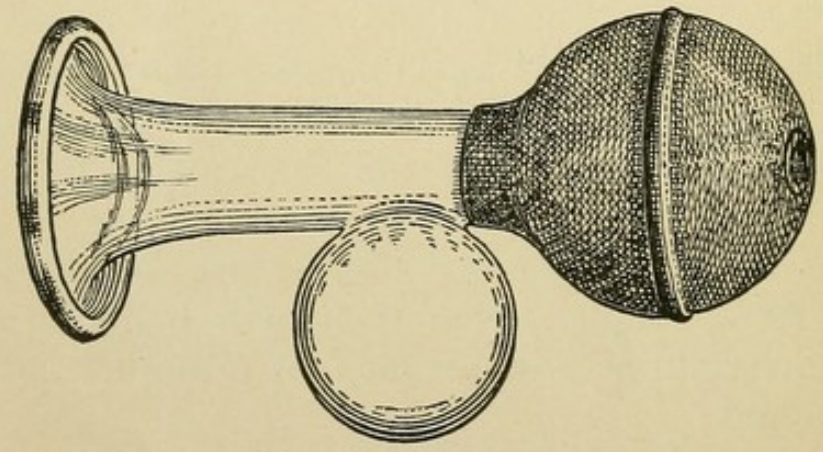


FIG. 21.—Breast-pump.

should be kept clean; they should be washed after each nursing, preferably with a boric-acid solution.

During the first forty-eight hours the child receives practically no nourishment from the breast; the only fluid secreted during this time is colostrum. This has a laxative effect upon the infant's bowels, emptying them of the dark, brownish material known as meconium, which has accumulated in the intestinal canal during uterine life. The child should, however, be put to the breast at regular intervals, so as to establish a free flow of milk; this generally begins on the third day, but is sometimes delayed.

During the first two days of its existence the child gets about six ounces of colostrum a day, which is all that is needed. It may, however, be given a teaspoonful or two of warm, boiled water or of a 5 per cent. solution of sugar of

milk. In unusually robust and fretful children, or when there is fever, a small amount of nourishment may be required; this should be given according to the rules for artificial feeding. If the milk is delayed beyond forty-eight hours, it becomes necessary to feed the child by the bottle until the flow is established. The child should be put to the breast regularly, or the breast-pump may be used to stimulate the secretion of the milk. Fennel, catnip tea, and the like should be excluded from the child's dietary.

Many mothers do not nurse their infants because they have not been properly instructed as to the importance of doing it.

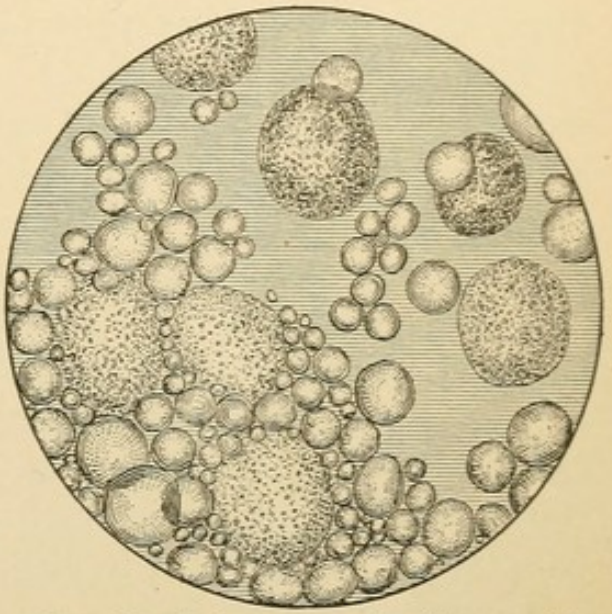


FIG. 22.—Colostrum and ordinary milk-globules, first day labor; primipara aged nineteen (Dorland).

The mental attitude of the mother has a marked effect on the milk secretion, and if she has been properly instructed and encouraged beforehand, there is usually no difficulty. If, on the other hand, she has grave doubts as to her capability, the milk secretion may be inhibited. The mental condition of the mother is often affected as the result of weighing the child. It is very desirable that the child be weighed regularly and the weight recorded; but if the mother is at all nervous, or if the child is not doing well, the weighing should not be done by the mother or in her presence.

Breast-nursing often proves a failure because the mother does not understand how to give the breast to the child. The child should lie on the right or left arm, according to whether the child is to nurse at the right or at the left breast. If the mother is in a sitting posture, her body should he inclined slightly forward. With her free hand she should grasp the breast near the nipple between the first two fingers. If, owing to the free flow of milk, the child takes the milk too rapidly, this may be checked by slight pressure of the fingers. The child should nurse until satisfied. The contents of one

breast are generally sufficient for one nursing, and the breasts should be used alternately. When satisfied, the infant will usually fall asleep at the breast. Under ordinary conditions the nursing should last from ten to twenty minutes. If the milk is taken too rapidly, vomiting may ensue immediately after or during feeding. If too much is taken, it is regurgitated almost immediately. If the infant consumes more than half an hour in nursing, the breast and the milk should be examined. As the infant grows older it requires and takes more food, and consequently will require a longer time to nurse than it did during the early days of life.

The inculcation of good nursing-habits cannot be too strongly insisted upon. Many attacks of indigestion, colic, and diarrhea may be traced to improper nursing. When good habits are once established, there is generally very little trouble, the success of the training depending largely on the manner on which it is done. Regular hours for feeding should be fixed and adhered to; and if the child is asleep at the feeding-hour, it may be aroused, for it will almost invariably go to sleep after nursing. After the last feeding, which should usually take place at 9 or 10 o'clock, the child should be quieted and allowed to sleep as long as it chooses.

During the first month or two the infant will, as a rule, awaken between 1 or 2 o'clock and again at 4 or 5 o'clock. After two or three months it will require but one night feeding, and after five months of age the average infant will sleep all night without nursing.

When the change is being made and the child awakens for its accustomed nursing it should be given a little warm water from a bottle and quieted, but not taken up. Regular nursing habits induce regular bowel movements and sleep, and the three combined insure health and comfort not only for the infant, but for the mother as well. A healthy child, if trained to do so, will sleep without rocking or coddling. Three things are, however, essential to secure success in this training: a satisfied appetite, dry napkins, and a quiet darkened room. If it has colic, the warm milk may soothe the child for a time, but later aggravates the trouble, which in many cases is due to overfeeding or too frequent feeding.

The following table, from Holt, may be used as a guide in breast-feeding:

Age.	Number in twenty-four hours.	Intervals during day.	Night nursing between 9 P. M. and 7 A. M.
First day	4	6 hours.	1
Second day	6	4 "	1
Third to twenty-eighth day .	10	2 "	2
Fourth to thirteenth week . .	8	2½ "	1
Third to fifth month	7	3 "	1
Fifth to twelfth month . . .	6	3 "	0

In case of sickness and when the infant is feeble and below the average, especial rules are required, and directions should be modified to suit each individual case. A good general rule is to feed the child according to the age to which the weight corresponds. The child's weight is the best index of its nutrition. During the first six months it may be weighed once a week; after that time twice a month is sufficient. The average minimum gain for an infant is four ounces a week. If the weight falls below this for several weeks consecutively, it is evident that something is wrong. During illness, of course, there may be no gain or loss according to the severity of the condition.

When the breast milk is insufficient for, or unsuited to the needs of the infant, it becomes fretful, colic occurs, and the baby appears to be "cross." Disturbances of the alimentary tract, diarrhea with greenish stools containing a large amount of mucus and undigested curds, takes place at times. At times the stools are brownish, and contain mucus and numerous curds the size of a grain of wheat or larger. In other cases there may be chronic constipation with small, hard, dry stools.

If the infant is getting *too little milk,* it is fretful and gains slowly or not at all, but there is rarely any disturbance of the stomach or bowels. In these cases the nursing is continued for over thirty minutes without satisfying the child, or it may nurse a minute or two and then refuse because the supply is so scanty. When the breast milk is nearly normal in quantity and in quality, certain measures, which will be discussed, may be taken to augment the supply and enrich the quality, or it may be supplemented by artificial feeding.

When the milk is very poor in quality, as, for example, when the specific gravity is from 1.015 to 1.025 and when only 2 or 3 per cent. of cream is present, the child should be weaned at once, for the condition is not amenable to treatment.

Mother's milk may easily be *tested* by means of Holt's milk set, which consists of a lactometer and a cream gauge.[1] With this the specific gravity and the amount of cream may easily be estimated. Estimated with this instrument the cream is to the fat as 5 is to 3. The following table will help in estimating the quality of human milk:

	Specific gravity, 70° F.	Cream, twenty-four hours.	Proteins.
Normal average . . .	1.031	7 per cent.	1.5 per cent.
Healthy variations . .	1.028–1.029	9–12 per cent.	Normal (rich milk).
Healthy variations .	1.032–1.033	5–6 per cent.	Normal (fair milk).
Unhealthy variations	Below 1.028	High (above 10 per cent.).	Normal or slightly below.
Variations	Below 1.028	Normal (5–10 per cent.).	Low.
Variations	Below 1.028	Low (below 5 per cent.).	Very low (very poor milk)
Variations	Above 1.033	High.	Very high (very rich milk).
Variations	Above 1.033	Normal.	High.
Variations	Above 1.033	Low.	Normal or nearly so.

When the mother's milk is found not to agree with the infant, it may often be modified by the following means:

1. If the milk is too rich, the diet should be limited, especially as to the amount of meat taken. All alcoholic and malted drinks should be prohibited. With plenty of fresh air and exercise, such as walking, the desired effect will generally be brought about. The exercise should be carried to the point of fatigue.

2. When the milk is good, but deficient in quantity, the supply may be augmented by massage of the breasts three times a day for from five to ten minutes. A good malt extract may be given with the meals, and fresh air and exercise prescribed. Sufficient fluid should be given, preferably milk.

3. When the milk is deficient in quantity and poor in quality, improvement may be brought about by various means; massage, malt, and iron are to be prescribed if there

[1] This may be obtained from Eimer & Amend, New York.

is anemia. An alcoholic malt extract combined with peptonate of iron, or of iron and manganese, is a good combination, and may be had in very palatable form. The diet should be ample and contain sufficient nitrogenous food. Milk should be taken with the meals, during the intervals between meals, and at bedtime.

4. When the quantity is sufficient, but the quality is poor, little can be done, and the child must generally be weaned. The foregoing measures may be tried, but not for too long a period, as the child may suffer in consequence.

After the second month the child may be given a bottle once a day. The child learns to take its milk from the bottle, which facilitates weaning when the time comes; it also allows the mother greater liberty.

Wet-nursing.—Some infants will thrive on nothing but breast milk. If the mother cannot nurse her child a wet-nurse should be chosen according to the following rules:

The woman should be healthy and of good habits. The absence of syphilis, tuberculosis, alcoholism, and other diseases should be determined by careful examination. The nipples should be carefully examined for fissures and ulceration. The breasts should be examined before and after nursing, and the milk tested as previously described. The size of the breast alone is not a good guide as to the amount or quality of the milk it secretes. The quantity may be judged by the size of the breast before and after nursing or by weighing the baby before and after nursing. This latter method, although a good one, is not usually resorted to. The wet-nurse should always be one who has nursed her own child successfully for at least a month. If possible she should be a primipara between twenty and thirty-five years of age. Younger or older women should not, as a rule, be employed. If the infant's condition permits, the nurse should be given at least a week's trial, for often the change in her mode of living may cause a scanty flow of milk or render it otherwise unsatisfatory. When she has become accustomed to her surroundings, the milk may become perfectly normal. Owing to idleness and a too abundant diet the milk may become too rich. In these cases the rules previously laid down may correct the condition.

Wet-nursing is now largely replaced by correct artificial feeding.

MIXED FEEDING.

The child is fed partly on the breast and partly on the bottle. This method is indicated when the mother's milk is poor or scanty, owing to some intervening illness, or when, owing to deficient quantity, the mother cannot entirely nurse the child; it is also useful in weaning. Weaning is accomplished with less discomfort to mother and child if done gradually. If the mother is nursing the child but once or twice a day, her milk may become very poor, and consequently should be examined from time to time. In these cases the child is usually satisfied after a bottle, but not after the breast-feeding.

ARTIFICAL OR BOTTLE-FEEDING.

When it becomes necessary to feed the child artificially the physician must understand the nature of the milk mixture that he prescribes, so that he may vary it to suit the child's digestion and modify it to meet the requirements of the growing infant.

In the United States the only milk available for infant feeding is cows' milk. To insure success by artificial feeding an accurate knowledge of the composition of the milk and in how much it differs from mother's milk is essential. A knowledge of the methods for overcoming these differences is also necessary. It should constantly be borne in mind that, while general deductions may be made and average figures given, the element of personal equation enters largely into the problem, and each infant must be considered a law unto itself. Children living in the country and in the smaller towns, where there is no overcrowding and where an abundance of fresh air can be had, seem to thrive on cows' milk that has been modified but little, perhaps merely by the addition of water in various proportions. In the larger towns, where overcrowding is frequent and fresh air and sunlight are not easily secured, the question is a more difficult one. Children with these environments require a more exact milk

mixture and additional care. City milk is often stale and preserved by the addition of chemicals.

The first requisite in artificial feeding is a pure, fresh milk. This can be obtained only by having the dairy farms, cattle, milk production, and distribution under competent supervision, and by cleanliness and care in the handling and transportation of the milk. Clean cows, clean stables, clean milkers, sterile milk pails and utensils are necessary, and the milk should be cooled rapidly after milking and kept cold until used. Pasteurization and sterilization should be necessary only under unusual conditions. They are often necessary now, because the milk is impure to start with and improperly cared for. No coloring matter or preservatives should be allowed. In the home the milk should be kept in closed jars or bottles until used, and it should be kept cold. Pure milk is best secured by having the supervision of the dairies and marketing under the same management. Bacteriological and chemical analyses are necessary from time to time to control the work.

In order to adapt cows' milk to the infant's digestion several changes must be made in it. These become apparent by studying the nature and composition of the milk.

Composition of Cows' Milk.—The proteins differ not only in amount, but also in character. In human milk the proteins consist of lactalbumin and casein, in the proportion of two-thirds of the former to one-third of the latter. In cows' milk one-sixth of the protein is lactalbumin and the remainder is casein. The protein of human milk precipitates in fine flakes; that of cows' milk, in heavy curds. The total amount of protein material also varies, being from 1.5 to 2 per cent. in human milk and, on the average, 3.5 per cent. in cows' milk. The modification consists in diluting the milk until the protein is from 0.6 per cent. or more, according to the age of the infant and its digestive ability. In some cases of difficult feeding the lactalbumin and casein may be separated and added in the required amounts. This is not, however, usually necessary. The proteins may be prevented from forming large curds by the addition of lime-water or of barley- or oatmeal-gruel. With the smaller percentages this is not ordinarily required. When necessary, as during illness, the proteins may be predigested.

Sugar.—The milk-sugar of human milk is present in a very constant proportion—from 6 to 7 per cent. In cows' milk it averages about 4.5 per cent. Diluting the milk, of course, decreases the proportion, and the amount must be made up by adding either milk-sugar or cane-sugar. The former, being that normally present in the milk, seems the most suitable. Cane-sugar has, however, many advocates, among them being Jacobi. Cane-sugar, owing to its excessive sweetness, is used in just half the quantity of milk-sugar. As it is inexpensive, it is useful in practice among the poor.

During the first few days of life sugar may be given in the proportion of 5 to 5.5 per cent.; from the second week to the third month, 6 per cent.; and from that time until the eleventh month, 7 per cent. may be used. At the eleventh month it may be reduced to 5, and a few months later to 4.5 per cent. There is no advantage in giving over 7 per cent., and it may give rise to symptoms of excessive sugar-feeding.

Fat.—The fat of human milk averages 4 per cent.; that of cows' milk is the same. When the milk has been diluted the amount must either be made up by adding cream or by using the upper one-third or upper half of the milk after the cream has risen. It is preferable to use fresh cream that has risen by the gravity method or the top-milk method.

There are objections, based on theoretic grounds, to the use of centrifugal cream; these are of less practical interest in infant-feeding than was formerly supposed.

The amount of fat to be given varies with the age, weight, and digestive ability of the infant. For an average infant 2 per cent. the first week, 2.05 per cent. the second, and 3 per cent. the third week are the amounts usually prescribed. At four months the amount may be increased to 4 per cent.; after that time this amount must not be exceeded, or the infant is apt to develop indigestion, with the large whitish stools giving off the characteristic odor of the fatty acids.

Salts.—The mineral constituents of human milk make up about 0.2 per cent. of its entire bulk; those of cow's milk are three or four times greater. These inorganic salts vary in about the same proportion as the proteins. When the milk is

modified for the purpose of increasing or diminishing the percentage of proteins it is, at the same time, modified for the salts.

Reaction.—The reaction of human milk is always alkaline. Since cows' milk is usually acid or neutral, this acidity must be corrected by adding either 5 per cent. of lime-water or sodium bicarbonate. The sodium salt is used in the proportion of 1 grain to the ounce. As the lime precipitates at the higher temperatures, when the milk is to be boiled it is better to add the bicarbonate. For young infants, when there is a hyperacidity of the stomach or acute illness, larger quantities than those just mentioned may be used. Coit recommends the use of potassium bicarbonate.

Caloric Needs of Infants.—There have been very few studies made in America on this subject, but Camerer, Heubner, Finkelstein, and others have made careful estimations, chiefly on breast-fed infants.

Finkelstein observed that the average breast-fed infant draws daily during the first weeks of life one-fifth of its body weight; from the middle of the first to the end of the second quarter of the first year, one-sixth to one-seventh, and during the latter half of the first year, one-eighth of its body weight. Expressed in round numbers per kilo of body weight, during the first three months it draws 150 cc.; during the second, somewhat less, and during the third period, 120 to 130 cc. Expressed in calories per kilo (Heubner's energy quotient), the requirement during the first three months is 100 per kilo (45.4 calories per pound), during the second three months between 100 and 90 (40.9 calories per pound), during the latter half of the first year the requirement gradually sinks to 80 or a trifle below (36.4 calories per pound).

In regard to artificially fed children, Heubner is of the opinion that the assimilation of cow's milk requires more work than breast milk, and places the energy quotient at 120. Czerny and Keller at times regard both breast and cow's milk as about equal in this respect. It is, perhaps, well in any case to avoid excessive overfeeding.

The Determination of the Caloric Value of Modified Milk.—Moorehouse has given a very simple method for estimating the caloric value of infants' food when the total quantity of the percentage formula is known. The method is as follows:

Reduce the twenty-four-hour amount to cubic centimeters, one ounce being equal to 29.5 cc. Next, determine the number of grams of fat, sugar, and protein in the mixture by multiplying the number of cubic centimeters and daily amount by the percentages of fat, sugar, and protein. The calories from each constituent may be determined by remembering that a gram of fat furnishes 9.3 calories and a gram of sugar or protein furnishes 4.1 calories. The calculation may be simplified by expressing the arithmetic process by equations, thus: Calories from fat equal $Q \times F \times 2.74$; calories from sugar and protein equal $Q \times (S + P) \times 1.21$. The sum of these two values gives the total calories furnished by the mixture, and this figure, divided by the weight of the child in pounds, gives the calories per pound per day. In the above formula Q equals the twenty-four-hour amount in ounces, F, S, and P, the percentages of fat, sugar, and protein expressed as whole numbers; for example, 1 per cent. equals 1, and not 0.01.

Fraley's Method.—This is not strictly accurate, but sufficiently so for all practical purposes. In calculating milk mixtures he uses the following formula:

$$2F + P + S \times 1\tfrac{1}{4} = \text{Calories},$$

or twice the fat percentage plus the protein percentage and the sugar percentage multiplied by $1\frac{1}{4}$ times the total quantity in ounces gives approximately the number of calories.

MILK MODIFICATION.

(Methods of Practical Value in Modifying Milk.)

There are a number of methods of milk modification that may be used with good results in the artificial feeding of infants. A practical knowledge of these methods is a desideratum in the rearing of bottle-fed infants. Those most in use are:

1. Laboratory feeding.
2. Top-milk method.
3. Materna graduate.
4. According to Maynard Ladd's table (after Rotch).
5. Baner's method.
6. According to Louis Starr's table.

1. **Laboratory Feeding.**—In cities the best substitute for breast-feeding is furnished by milk laboratories, where

modifications are made according to the physician's prescription. The Walker-Gordon laboratories, now established in many cities, supply an ideally clean milk, unsterilized, pasteurized, or sterilized at any temperature desired. The milk is supplied in nursing-bottles, each bottle holding enough for one feeding and being ready for use. Beyond warming the bottle and putting on a nipple no further preparation is necessary. In winter the milk is delivered in baskets, and in summer in small refrigerators. When economy must be practised, the milk may be obtained in larger jars and divided into the requisite number of feedings by the mother or nurse. Blank forms on which to write prescriptions are furnished physicians. The following is an example of such a prescription :

℞

	Per Cent.		
Fat	4	*Number of feedings* . .	 6
Milk-sugar	7		
Proteins	2	*Amount at each feeding*	. . 7 ounces.
Lime-water	5		
Other Diluent . .		*Infant's age* . .	. . . .
Heated at 167° F.		*Infant's weight*	. . . . .

ORDERED FOR.....

.....

DATE, SIGNATURE,

.....190 .....M. D.

These prescriptions are filled at the laboratory by mixing together milk, cream, standard sugar solutions, and water in the proper proportions. In some cases a 16 per cent. gravity cream is used, and in others a 20 per cent. centrifugal cream. Other things being equal, it is more desirable on theoretic grounds to use gravity cream.

Sometimes the casein and whey are separated by using rennin or Fairchild's Essence of Pepsin, and so more digestible mixtures made. The whey must be heated to 150° F.

for five minutes before being added to the milk to destroy the enzyme or it will cause coagulation.

The Walker-Gordon Company supply the following table:

Theoretical Basis for Feeding a Healthy Infant.

Age.	Fat.	Sugar.	Proteins.	Proteins if split.		Amount at each feeding in ozs.	Interval between feedings in hours.	No. of feedings in 24 hours.
				Whey proteins.	Casein-ogen.			
Premature	1.00	4.00	0.25	0.25	0.25	⅛–¾	1–1½	24–18
	1.50	4.50	0.25	0.50	0.25			
At term	2.00	5.00	0.50	0.50	0.25	1	2	10
End of second week	2.50	5.50	0.50	0.50	0.25	1½	2	10
End of third week	3.00	6.00	0.75	0.75	0.25	2	2	9
End of fourth week	3.50	6.50	1.00	0.75	0.50	2½	2	8
End of sixth week	4.00	7.00	1.00	0.90	0.60	3	2½	7
End of eighth week	4.00	7.00	1.25	0.90	0.75	3½	2½	7
End of twelfth week	4.00	7.00	1.50	0.90	1.00	4	2½	6
End of fourth month	4.00	7.00	1.50	0.75	1.25	4½	2½	6
End of fifth month	4.00	7.00	1.75			5½	3	6
End of sixth month	4.00	7.00	2.00			6	3	6
End of eighth month	4.00	7.00	2.50			7	3	6
End of ninth month	4.00	7.00	3.00			8	3	6
End of tenth month	4.00	6.00	3.00			8	3	6
End of eleventh month	4.00	5.00	3.00			10	3	5
End of twelfth month	4.00	4.75	3.50			10	3	5

In most cases whey mixtures are unnecessary. In acute illness or when there is decided lowering of the protein digestive power they may be of great service.

The percentage of fat, protein, and sugar required by an infant of any given age must be borne in mind if one is to use any method of percentage feeding. The following schedule will be found useful as an aid to the memory. The figures for intermediate ages are easily calculated:

Schedule for Average Infants.

Age.	Percentage.		Average quantity for one feeding.			Number of feedings 24 hours.	Interval by day.
	Fat.	Sugar.	Protein.	Ounces.	Grams.		
Premature infants	1.0	4.0	0.25	¼–¾	10–20	12–20	1–1½ hrs.
First to second day	. .	5.0	. .	1–1½	30–45	4–6	6–4 "
Second to eighth day	2.0	6.0	0.50	1½	45	10	2 "
Third week	2.5	6.0	0.75	2	60	10	2 "
Second month	3.0	6.0	1.00	3	90	9	2½ "
Third month	3.0	6.5	1.25	3½	110	8	3 "
Fourth month	3.5	7.0	1.50	4	125	7	3 "
Fifth month	3.5	7.0	1.75	5	160	7	3 "
Sixth to tenth month	4.0	7.0	2.00	7	220	6	3 "
Eleventh month	4.0	5.0	2.50	8	250	5	4 "
Twelfth month	4.0	5.0	3.00	9	280	5	4 "
Later	4.0	4.5	3.50	9	300	5	4 "

The quantity should be increased half an ounce or an ounce at a time. Later, as the child's appetite grows stronger —that is, when he seems dissatisfied after his bottle—the quality is raised. The fat may usually be increased 0.5 per cent. at a time; the sugar, 0.5 to 1 per cent. at a time; the proteins, from 0.1 to 0.25 per cent. at a time. Strong, healthy, large babies require more and richer milk than those of frailer constitution.

Ssnitkin, of St. Petersburg, has estimated the amount to be fed to a child according to the weight. He ascertained that a baby's stomach held about one-hundredth of its weight at birth, and that the increase amounted to about a gram a day. By taking one-hundredth of the initial weight at birth and adding a gram for each day the average amount required for each feeding is ascertained.

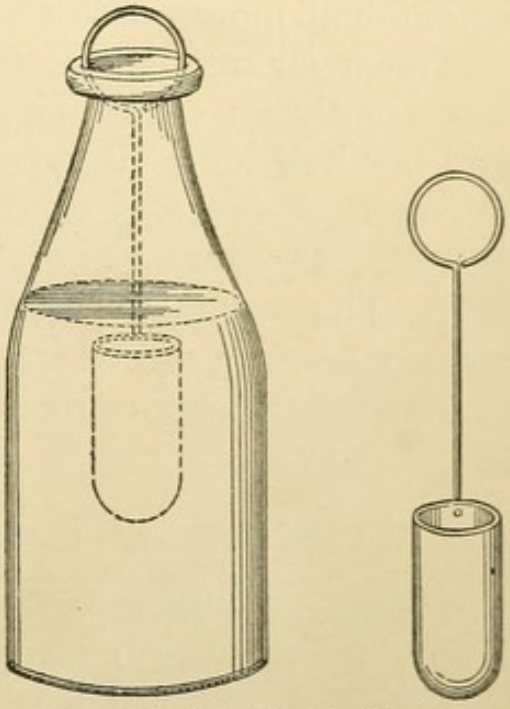


FIG. 23.—The Chapin dipper.

2. **Top-milk Method.**—Many methods have been devised for obtaining the desired percentage from milk as it is used in the home.

Holt's top-milk method is a very satisfactory one. Care should be taken to secure good, fresh cows' milk.

The top-milk method consists in using the mixture of cream and milk in the upper one-third or upper one-half of a jar of milk that has been allowed to stand for some time. Later, the whole milk may be used. This method works satisfactorily only when the milk is bottled soon after milking, before the cream has separated. For those who cannot obtain such milk the necessary mixture of cream and milk may be made as indicated in the table. The top layer of cream may be removed from the bottled milk with a spoon; the remainder, by means of a small dipper; for this purpose a Chapin milk-dipper, which may be obtained at any drug-

store, will be found very useful. Another method is to use a siphon. The plan of pouring off the upper third is not nearly so reliable. After it has been removed, and before the required portion is taken out, the entire upper one-third or one-half, as the case may be, should be thoroughly mixed.

The following tables require no explanation. When desired the percentage of lime-water may be increased, or it may be replaced by sodium bicarbonate, one grain or more per ounce, if the milk is to be boiled. If the quantity required exceeds twenty ounces the smaller supplementary tables may be used, or the quantity may easily be calculated by adding an additional one-fourth to each item for twenty-five ounces, or one-half more for thirty ounces, etc.

The sugar may be measured by means of a pill-box holding exactly an ounce, or very conveniently by allowing two and one half level tablespoonfuls of milk-sugar to the ounce. When cane-sugar is used only one-half the quantity is required. Dry measure of sugar is just twice that of weighing. Thus, one ounce of sugar by weight would measure two ounces in a measuring glass.

The following formulas have been taken from Holt:[1]

First Series of Formulas—Fat to Proteins, 3 : 1.

Primary Formula.—Ten per cent. milk—fat, 10 per cent.; sugar, 4.3 per cent.; proteins, 3.3 per cent. Obtained—(1) as upper one-third of bottled milk or (2) equal parts of milk and 16 per cent. cream.

Derived formulas, giving quantities for 20-ounce mixtures:

										Fat per ct.	Sugar per ct.	Proteins per ct.
1.	Milk-sugar . 1 oz. Lime-water . 1 oz. Water, q.s. ad. 20 oz.			with	2 oz.	10	p.c.	milk	. .	1.00	5.50	0.33
2.	"	"	"	"	3 oz.	"	"		. .	1.50	5.50	0.50
3.	"	"	"	"	4 oz.	"	"			2.00	6.00	0.66
4.	"	"	"	"	5 oz.	"	"		. .	2.50	6.00	0.83
5.	"	"	"	"	6 oz.	"	"		. .	3.00	6.00	1.00
6.	"	"	"	"	7 oz.	"	"		. .	3.50	6.50	1.16

[1] *Diseases of Infancy and Childhood*, pp. 189, 191, 192.

Table Giving in a Condensed Form the Quantities Usually Required for Obtaining the Different Fat-percentages.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
To obtain fat per cent. . .	0.50	1.0	1.5	2.0	2.0	2.5	2.5	2.75	3.0	3.0	3.0	3.25	3.5	3.7	4.0
For total food, ounces . . .	0.20	20.0	20.0	20.0	25.0	25.0	28.0	28.00	30.0	33.0	36.0	36.00	37.0	38.0	40.0
Take 10 per ct. milk, ounces	0.10	2.0	2.0	4.0	5.0	6.0	7.0	8.00	9.0	10.0	11.0	12.00	13.0	14.0	16.0

Proteins: The percentage in each case will be one-third fat.

Sugar: 1 ounce in 20, or 1 tablespoonful in 8 ounces, gives 5.5 per cent. for the lower and 6.5 for the higher formulas.

Lime-water: 1 part to 20 of the food, the average required.

Water: Sufficient to be added to the foregoing ingredients to bring the total to the number of ounces specified; in part of this water the milk-sugar is dissolved. Barley-water or any other dilutent may be added in the same manner.

SECOND SERIES OF FORMULAS—FAT TO PROTEINS, 2 : 1.

Primary Formula.—Seven per cent. milk—fat, 7 per cent.; sugar, 4.4 per cent.; proteins, 3.5 per cent. Obtained—(1) as upper one-half of bottled milk, or (2) by using 3 parts of milk and 1 part of 16 per cent. cream.

Derived formulas, giving quantities for 20-ounce mixtures:

			Fat per ct.	Sugar per ct.	Proteins per ct.
1.	Milk-sugar . 1 oz. Lime-water . 1 oz. Water, q.s. ad. 20 oz.	with 3 oz. 7 p.c. milk . .	1.00	5.50	0.50
2.	" " "	" 4 oz. " " . .	1.40	5.75	0.70
3.	" " "	" 5 oz. " " . .	1.75	6.00	0.87
4.	" " "	" 6 oz. " " . .	2.10	6.00	1.05
5.	" " "	" 7 oz. " " . .	2.50	6.50	1.25
6.	" " "	" 8 oz. " " . .	2.80	6.50	1.40
7.	" " "	" 9 oz. " " . .	3.15	7.00	1.55
8.	" " "	" 10 oz. " " . .	3.50	7.00	1.75
9.	Milk-sugar . ¾ oz. Lime-water . 1 oz. Water, q.s. ad. 20 oz.	" 12 oz. " " . .	4.00	7.00	2.00

Table Giving in a Condensed Form the Quantities Usually Required for Obtaining the Different Fat-percentages.

	A	B	C	D	E	F	G	H	I	J	K	L	M
To obtain fat, per cent.	1.0	1.0	1.4	1.8	2.0	2.33	2.75	2.75	3.1	3.5	3.5	4.0	4.0
For total food, ounces .	20.0	30.0	30.0	33.0	33.0	36.00	36.00	40.00	40.0	40.0	44.0	44.0	48.0
Take 7 per ct. milk, ozs.	3.0	4.0	6.0	8.0	10.0	12.00	14.00	16.00	18.0	20.0	22.0	25.0	28.0

To obtain the exact fat-percentages take one-third the number of ounces of top-milk in a 20-ounce mixture and add 0.15 to the result. In practice this slight error may be disregarded.

Proteins: The percentage in each case will equal one-half of the fat.

Sugar: 1 ounce in 20, or 1 even tablespoonful in 8 ounces, until the food becomes half milk; after that 1 ounce in 25, or 1 even tablespoonful to each 10 ounces of the food, will give the proper amount.

Lime-water: Usually in the proportion of 1 part to 20 of the total food.

Water or other diluents: Sufficient to be added to the foregoing ingredients to make the total number of ounces specified; in part of this the sugar is dissolved.

Third Series of Formulas—Fat to Proteins, 8 : 7.

Primary Formula.—Plain milk—fat, 5 per cent.; sugar, 4.5 per cent.; proteins, 3.5 per cent.

Derived formulas, giving quantities for 20-ounce mixtures:

			Fat per ct.	Sugar per ct.	Proteins per ct.
1.	Milk-sugar 1 oz.; Lime-water 1 oz.; Water, q.s. ad. 20 oz.	with 5 oz. plain milk	1.00	6.00	0.87
2.	" " "	" 6 oz. " "	1.20	6.00	1.00
3.	" " "	" 8 oz. " "	1.60	6.50	1.40
4.	" " "	" 10 oz. " "	2.00	7.00	1.75
5.	Milk-sugar ½ oz.; Lime-water ½ oz.; Water, q.s. ad. 20 oz.	" 12 oz. " "	2.40	5.00	2.10
6.	" " "	" 14 oz. " "	2.80	5.50	2.50
7.	" " "	" 16 oz. " "	3.20	5.50	2.80

Table Giving Quantities of 16 per cent. Milk Required for Obtaining Formulas with High Fat and Low Proteins.

	A	B	C	D	E	F	G	H	I	J	K
To obtain fat, per cent.	1.6	1.6	2.0	2.5	3.0	3.0	3.0	3.5	3.5	4.0	4.0
For total food, ounces	20.0	30.0	30.0	32.0	32 0	37.0	42.0	36.0	40.0	40.0	44.0
Take 16 per cent. milk, ounces	2.0	3.0	4.0	5.0	6.0	7.0	8.0	8.0	9.0	10.0	11.

Proteins in all cases will be one-fifth the fat.

Sugar: 1 even tablespoonful for each 8 ounces will give 5.5 per cent. for the lower formulas (A, B, C, etc.) and 6 per cent. for the higher formulas (G, H, I, etc.).

Lime-water: 1 ounce to 20 ounces of the food will give 5 per cent.

3. **Holt's Percentage Milk Method.**—Holt has devised another method of modifying milk which is very useful. The following method at first sight looks very complicated, but it is not, and it permits of great numbers of reasonably exact formulæ. The first step is to obtain milks containing definite amounts of fat from 7 per cent. down to 1 per cent. Ordinary market milk from mixed herds averages 4 per cent. milk, from Jerseys and Alderneys 5 per cent. or more.

Uniform results may be obtained by having patients use milk from one dairy, or by having them buy milk containing a certain percentage of fat from milk laboratories.

For convenience the formulæ are calculated for 20-ounce mixtures.

Every ounce of 7 per cent. milk in 20-ounce mixture has one-twentieth of 7 or 0.35 per cent. fat.

Every ounce of 6 per cent. milk in 20-ounce mixture has one-twentieth of 6 or 0.30 per cent. fat.

Every ounce of 5 per cent. milk in 20-ounce mixture has one-twentieth of 5 in 0.25 per cent. fat.

Every ounce of 1 per cent. milk in 20-ounce mixture has one-twentieth of 0.05 per cent. fat.

The variations in protein and sugar used may be considered. Four per cent. milk contains 4.50 per cent. sugar and 3.50 per cent. protein, so each ounce of 4 per cent. milk in any of the formulæ in a 20-ounce mixture will contain one-twentieth or 0.225 per cent. sugar and 0.175 per cent. protein.

The tables from Holt (p. 88) show the variations that may easily be obtained. To raise the fat without the protein use a milk of a higher fat percentage. To raise the protein and not the fat use more ounces of the same milk or even of a weaker one if need be.

The necessary sugar is added, remembering that each ounce of milk-sugar by weight in a 20-ounce mixture increases the sugar 6 per cent., or each ounce by volume about 3 per cent., and that each level tablespoonful in a 20-ounce mixture increased the sugar about 1.75 per cent.

These formulæ give rather low fat percentages, but otherwise are sufficiently elastic to suit all needs. As a matter of fact, comparatively few variations are required except in difficult cases.

4. **Materna Graduate Method.**—The very simple and useful apparatus known as the Estraus Materna Graduate is of great value where one cannot secure intelligent coöperation in the home, and also where there are no facilities for milk preparation. With its six formulas, however, it is not adaptable to all cases, some infants being totally incapable of taking the step from one formula to another.

Formula Obtained from Milk Containing Different Percentages of Fat.

		A. 7 per cent. milk.	B. 6 per cent. milk.	C. 5 per cent. milk.	D. 4 per cent. milk.	E. 3 per cent. milk.	F. 2 per cent. milk.	G. 1 per cent. milk.		Per cent.		Per cent.
I.	1 ounce in 20 has fat . .	0.35	0.30	0.25	0.20	0.15	0.10	0.05	With protein.	0.175	Sugar.	0.225
II.	2 ounces in 20 have fat . .	0.70	0.60	0.50	0.40	0.30	0.20	0.10	" "	0.35	"	0.45
III.	3 " " " . .	1.05	0.90	0.75	0.60	0.45	0.30	0.15	" "	0.50	"	0.65
IV.	4 " " " . .	1.40	1.20	1.00	0.80	0.60	0.40	0.20	" "	0.70	"	0.90
V.	5 " " " . .	1.75	1.50	1.25	1.00	0.75	0.50	0.25	" "	0.85	"	1.10
VI.	6 " " " . .	2.10	1.80	1.50	1.20	0.90	0.60	0.30	" "	1.05	"	1.35
VII.	7 " " " . .	2.45	2.10	1.75	1.40	1.05	0.70	0.35	" "	1.20	"	1.55
VIII.	8 " " " . .	2.80	2.40	2.00	1.60	1.20	0.80	0.40	" "	1.40	"	1.80
IX.	9 " " " . .	3.05	2.70	2.25	1.80	1.35	0.90	0.45	" "	1.60	"	2 00
X.	10 " " " . .	3.50	3.00	2.50	2.00	1.50	1.00	0.50	" "	1.75	"	2 25
XI.	11 " " " . .	3.80	3.30	2.75	2.20	1.65	1.10	0.55	" "	1.90	"	2.45
XII.	12 " " " . .	. . . .	3.60	3.00	2.40	1.80	1.20	0.60	" "	2.10	"	2.70
XIII.	13 " " " . .	. . . .	3.90	3.25	2.60	1.95	1.30	0.65	" "	2.25	"	2.90
XIV.	14 " " " . .	. . . .	. . . .	3.50	2.80	2.10	1.40	0.70	" "	2.40	"	3.15
XV.	15 " " " . .	. . . .	. . . .	. . . .	3.00	2.25	1.50	0.75	" "	2.60	"	3.35

From 4 Per Cent. Milk.	From 5 Per Cent. Milk.
To obtain 7 per cent. milk use upper 16 ounces	Upper 20 ounces from 1 quart.
To obtain 6 per cent. milk use upper 20 ounces	Upper 24 ounces from 1 quart.
To obtain 5 per cent. milk use upper 24 ounces	All.
To obtain 4 per cent. milk use all	Remainder after skimming off 2 ounces.
To obtain 3 per cent. milk use remainder after skimming off 2 ounces . . .	Remainder after skimming off 3 ounces.
To obtain 2 per cent. milk use remainder after skimming off 4 ounces . . .	Remainder after skimming off 5 ounces.
To obtain 1 per cent. milk use remainder after skimming off 8 ounces . . .	Remainder after skimming off 8 ounces.

With Formula I. to V. enough sugar should be added to raise the amount to 5 per cent.
With Formula VI. to XV. enough sugar should be added to raise the amount to 6 per cent.

The apparatus consists of a glass jar with a lip and seven panels, and a capacity of sixteen ounces. One of the panels exhibits an ordinary ounce graduation; the other six panels present six different formulas for the modification of cows'

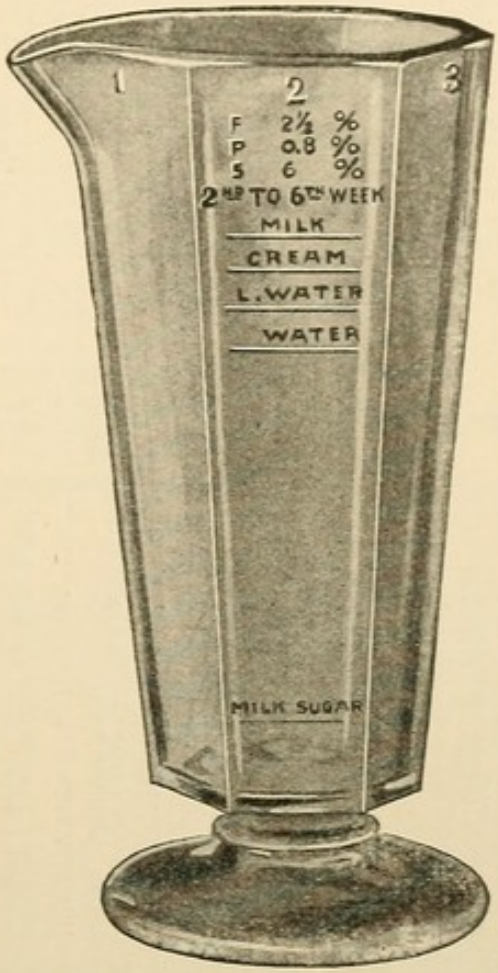


FIG. 24.—The "Materna" glass (De Lee).

milk, each formula being so arranged as to keep pace with the infant's growth. (See Table, next page.)

Having decided which formula is to be used, the panel containing that formula is the only one to be followed.

The quantity desired for twenty-four hours is next to be considered, and the apparatus filled—once if 16 ounces or less are required for the twenty-four hours; twice if from 16 to 32 ounces are required for the twenty-four hours; three times if from 32 to 48 ounces are required for the twenty-four hours.

Fat	2	per ct.	2½	per ct.	3	per ct.	3½	per ct.	4	per ct.	3½	per ct.
Sugar	6	"	6	"	6	"	7	"	7	"	3½	"
Protein	0.6	"	0.8	"	1	"	1½	"	2	"	2½	"

Modification According to Growth.

	Third to fourteenth day.	Second to sixth week.	Sixth to eleventh week.	Eleventh week to fifth month.	Fifth to ninth month.		Ninth to twelfth month.
Milk . . . . . parts	1¼	1⅝	2	4½	6	Milk . . . . parts	9¾
Cream . . . . . "	1¼	1⅝	2	2	2	Cream . . . "	1
Lime-water . . . . "	1	1	¾	¾	¾	Barley-gruel "	5¼
Water . . . . . "	12½	11¾	11¼	8¾	7½	Granulated sugar,	
Milk-sugar . . . . "	1	1	1	1	1¼	parts	¼

Maynard Ladd's Table.

Prescriptions calling for a mixture of 20 ounces.			Cream in ounces.					Fat free milk in ounces used with creams of—				Lime-water in ounces.	Boiled water in ounces.	Milk-sugar in measures.
Fats.	Sugar.	Protein.	Lime-water, per cent.	10 per cent.	12 per cent.	16 per cent.	20 per cent.	10 per cent.	12 per cent.	16 per cent.	20 per cent.			
0.50	5.00	2.00	5	1	1¾	¾	½	9¼	9½	9½	9¾	1	8¾	1¼
0.75	6.00	1.00	5	1½	1¼	1	¾	3½	3¾	4	4¼	1	14	2¼
1.00	5.00	0.75	5	2	1½	1¼	1	2	2½	2½	3	1	15	2
1.50	4.00	0.50	5	(1)	2½	2	1½	(1)	¼	¾	1¼	1	16¼	1½
2.00	5.00	0.75	5	4	3	2½	1¾	0	1	1½	2¼	1	15	2
2.00	5.50	1.00	5	4	3	2½	1¾	1½	2¼	2¾	3½	1	13½	2¼
2.50	6.00	1.00	5	5	4	3¼	2½	0	1½	2¼	3	1	14	2½
3.00	6.00	0.50	5	(1)	(1)	3¾	3	(1)	(1)	0	¾	1	15¼	1¾
3.00	6.00	0.75	5	(1)	5	3¾	3	(1)	0	1¼	2	1	14	2½
3.00	6.00	1.00	5	(1)	4¾	3¾	2¾	(1)	¾	1¾	2¾	1	13½	2¼
3.50	6.50	1.00	5	(1)	5½	4½	3½	(1)	0	1	2	1	13½	2½
3.50	6.50	1.50	5	7	5½	4½	3½	1	2½	3½	4½	1	11	2½
3.00	7.00	1.00	5	(1)	4¾	3¾	2¾	(1)	¾	1¾	2¾	1	13½	2¾
3.00	7.00	1.50	5	6	4¾	3¾	2¾	2	3¼	4¼	5¼	1	11	2½
3.00	7.00	2.00	5	6	4¾	3¾	2¾	4½	5¾	6¾	7¾	1	8¾	2¼
4.00	7.00	1.00	5	(1)	(1)	5	3¾	(1)	(1)	½	1¾	1	13½	2¾
4.00	7.00	1.50	5	8	6¼	5	3¾	0	1¾	3	4¼	1	11	2¾
4.00	7.00	2.00	5	8	6¼	5	3¾	2½	4¼	5½	6¾	1	8½	2½
4.00	7.00	2.50	5	8	6¼	5	3¾	5	6¾	8	9¼	1	6	2
4.00	7.00	3.00	5	8	6¼	5	3¾	7½	9¼	10½	11¾	1	3½	2
4.00	6.00	3.00	5	8	6¼	5	3¾	7½	9¼	10½	11¾	1	3½	1¼
4.00	5.00	3.00	5	8	6¼	5	3¾	7½	9¼	10½	11¾	1	3½	1
4.00	5.00	3.50	5	8	6¼	5	3¾	10	11¾	13	14¼	1	1	½

(1) indicates that the combination is impossible with the percentage of cream given.

5. **Maynard Ladd's Table.**[1]—Another method of modifying milk is according to Maynard Ladd's table (preceding page). In this the quantities have been estimated. This method is useful in hospitals where there is a milk laboratory. In general practice it is of slight value, for it necessitates memorizing a lengthy table, or carrying it about, both of which methods are open to objection.

6. **Baner's Method.**—Many attempts have been made from time to time to compute a table of equations from which the quantities of milk, cream, etc., may be determined for any given mixture; the simplest of these is that of Baner;[2]

Quantity desired (in ounces) $= Q.$
Desired percentage of fat $= F.$
Desired percentage of sugar $= S.$
Desired percentage of protein $= P.$

To find in ounces—

Cream (16 per cent.) $= \frac{Q}{12} \times (F - P).$

Milk $= \frac{Q \times P}{4} - C.$

Water $= Q - (C + M).$

Dry milk-sugar $= \frac{S - P \times Q.}{100}$

Example.—Suppose it is desired to make 40 ounces of a 4 per cent. fat, 7 per cent. sugar, 2 per cent. protein mixture. By substituting the figures in the equations above we have—

Cream $= \frac{40}{12} \times 2 = 6\frac{2}{3}$ ounces.

Milk $= \frac{40 \times 2}{4} - 6\frac{2}{3} = 13\frac{1}{3}$ ounces.

Water $= 40 - 20 = 20$ ounces.

Sugar $= \frac{5 \times 40}{100} = 2$ ounces.

7. **Louis Starr's Table.**—This is a frequently used guide to milk-prescribing. It may be employed as a basis for modification by those who object to the percentage method. The latter method, however, once mastered, will be found more satisfactory for general purposes.

[1] Taken from Rotch's *Pediatrics.* [2] *New York Med. Jour.*, Mar. 12, 1898.

Louis Starr's Table of Ingredients, Hours, and Intervals of Feeding, and Total Quantity of Food for a Healthy Artificially Fed Infant from Birth to the End of the Seventh Month.[1]

Age.	Cream.	Whey.	Milk.	Milk Sugar	Salt.	Water.	Hours for feeding.	Intervals of feeding.	Total quantity.
								Hours	
During 1st wk	f℥ij	f℥iij	. .	gr.xx	. . .	f℥iij	5 A.M. to 11 P.M.; sometimes 1 A.M. and 3 A.M.	2	f℥xij
From 2d to 6th week .	f℥ij	. .	f℥ss	gr.xx	a pinch	f℥j	5 A.M. to 11 P.M.	2	f℥xvij
From 6th wk. to end of 2d month	f℥ss	. .	f℥x	℥ss	a pinch	f℥x	5 A.M. to 11 P.M.	2	f℥xxx
From 3d to 6th month	f℥ss	. .	f℥ij	℥j	a pinch	f℥iss	5 A.M. to 10.30 P.M.	2½	f℥xxxij
During 6th and 7th months .	f℥ss	. .	f℥iiiss	℥j	a pinch	f℥ij	7 A.M. to 10 P.M.	3	f℥xxxvj

Throughout the eighth and ninth months five meals a day will be sufficient, each meal composed of:

Milk . . . . . f℥℥vj
Cream . . . . . f℥ss
Milk-sugar . . . . . ℈j
Water . . . . . f℥iss

This allows 40 fluidounces of food a day.

Malted Gruels.—Malted gruels are advocated by some, especially in preparing milk for infants with weak digestion. They are prepared in the following manner: A tablespoonful of barley flour, or of any other flour desired, is boiled in a little more than a pint of water for fifteen minutes. As soon as it has cooled, a teaspoonful of good malt extract or a teaspoonful of diastase is added. This mixture is stirred thoroughly, and may then be used in the place of ordinary barley-water. Diastase preparations are made by most of the leading manufacturing chemists. Diastoid, maltine, and dyazyme are preparations of this class. The thick malt extracts are sometimes given to infants just before a feeding. Of these, several doses may be given daily for indigestion and constipation.

[1] From *Diseases of the Digestive Organs in Children*, p. 24.

Farinaceous Gruels.—In the methods of feeding just described the addition of farinaceous gruels—*i. e.*, barley, oatmeal, arrow-root, rice, etc.—to some of the foods has been recommended by certain observers. That such addition to the infant's dietary during the first year is advisable is a question that has not been fully decided. When deemed necessary, it is probably best to begin the addition of a starchy gruel to the milk at about the eighth or ninth month in normal infants. In those infants who experience difficulty in digesting the proteins, and for the purpose of preventing coagulation of the milk into large clots, the addition may be made earlier. It is well to begin by adding a half-ounce or an ounce for each feeding, and, as the infant's starch-digesting power increases, to increase this amount proportionately.

Condensed Milk.—This is most useful in many cases as a temporary expedient, especially where children are not gaining, and those that have been fed on too high fat and protein. It should be used in dilutions of 1 in 16, 1 in 12, and 1 in 8. It should be measured in a measuring glass, otherwise too much will be used. It may be diluted with plain boiled water or, if desired, with a thin cereal gruel. Cream may be added later, or olive oil may be given in addition. Orange juice should be given every other day or every day as an antiscorbutic. If condensed milk feeding is continued too long, anemia, scurvy, or rickets is liable to develop.

Buttermilk.—Real buttermilk may be used, which has the advantage of having a low fat and sugar content and the presence of large numbers of lactic-acid bacilli. If desired, whole milk, which has been soured by the addition of lactic-acid bacilli, may be used. It may be diluted with water or cereal gruels the same as whole milk. It is very useful in diarrheas, especially where abnormal bacteria are present in intestinal indigestion and other difficult cases.

Albumin Milk.[1]—This is made from curd and buttermilk. It is useful in diarrhea, indigestion, and certain forms of nutritional disturbances. It should be carefully studied before being used. (See Friedenwald and Ruhräh, "Diet in Health and Disease," Fourth Edition.)

[1] Hess, *American Journal of Diseases of Children*, December, 1911, vol. iv., p. 222.

The Soy Bean.[1]—This is very useful when milk is badly borne, and in certain forms of intestinal disorders and convalescence after diarrhea, in marasmus and malnutrition. Soy-bean flour made by the Cereo Company, Tappan, New York, contains 120 calories per ounce. A gruel may be made by using one tablespoonful of soy-bean flour, two tablespoonfuls of barley flour, and one quart of water. It should be boiled hard for twenty minutes or longer. This may be diluted, if desired, and may be increased in strength up to double the quantity stated. It may be used plain for short periods and for long periods with the addition of condensed milk. Cream may be added, if desired. Orange juice should be given as an antiscorbutic.

Other Methods.—Chapin, Coit and many others have devised methods of milk modification. Gärtner's milk is a milk modified by centrifugalization, and Backhaus' milk is prepared in a somewhat similar way, but is previously partially digested by the use of rennet, trypsin, and sodium carbonate.

Sodium Citrate.—Poynton, Shaw, and others, following the suggestion of A. E. Wright, recommend the use of sodium citrate. The soda forms a compound with the casein and alters the curd produced, rendering it more digestible. The citric acid forms calcium citrate by uniting with the calcium salts. The use of sodium citrate enables one to give a milk containing more protein than would otherwise be digested. It is useful in weaning infants, in practice among the poor where milk modification is imperfectly done, and is useful in protein indigestion, and in some other cases where milk is not well borne without the sodium citrate. From 1 to 3 gr. to the ounce may be used. It may be ordered in solution in water in which it is freely soluble. A drop or two of chloroform should be added to prevent the growth of organisms which is liable to take place.

Beginning Bottle-feeding.[2]—In order to succeed it is necessary that this method be begun properly. The percentage used to begin with should always be well within the

[1] See Friedenwald and Ruhräh, "Diet in Health and Disease," Fourth Edition.

[2] H. L. K. Shaw, "Citrate of Soda in Infant Feeding," *Archives of Pediatrics*, March, 1906, p. 161.

infant's digestive powers, and raised as rapidly as possible to a milk suited to the age of the infant. It is a good plan to start with a milk given in the schedule for a baby one-third the age of the one to be fed. Each day, or even at longer intervals if necessary, the milk may be made slightly stronger. If the milk is made too strong at first or the percentage raised too rapidly, indigestion, colic, and offensive stools will be the result. On the other hand, the opposite mistake, that of feeding an infant on a milk too weak, should also be avoided. When the mistake is made, the infant becomes pale, cries, and does not increase in weight. Severe hunger may result, and symptoms of inanition may follow.

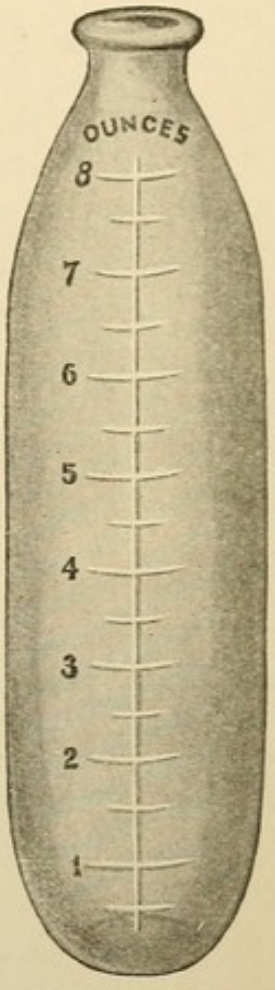


Fig. 25.—Hygienic nursing bottle (De Lee).

Technic of Modifying Milk at Home.—To insure success a very careful technic must be followed. In the absence of a nurse specially trained for the purpose the physician should give careful written and verbal instructions, and then to see personally that these are carried out. Knowledge on the part of the mother or nurse should not be assumed, for, as a rule, she does not possess it.

The vessels and instruments used should be kept scrupulously clean, and be used solely for the purpose intended. After use, or what is decidedly better, just previous to being used, they should be either boiled or scalded with boiling water, preferably the former.

The nursing-bottles should have rounded bottoms, so that there are no corners for holding dirt, and also that they cannot be stood about the room. If only one or two bottles are used, they should be scalded after each feeding and filled either with boric acid or sodium bicarbonate solution, made by adding a teaspoonful of either drug to a pint of water. When the bottle is to be used again, the solution should be poured out and the bottle rinsed with plain sterile water.

The nipples should be of the ordinary short black-rubber variety. White nipples, which are said to contain lead, as well as all complicated nipples and tubes, should be avoided. These latter cannot be kept clean, and are a source of infection diarrhea. In some cities their sale is prohibited by law. After each feeding the nipple should be washed, turning it inside out to do this thoroughly, and then placed in a glass of boric acid solution (ʒj–Oj). It is a good plan to have several nipples on hand and to boil them before using them for the first time, and then for five minutes every day. The hole or holes in the nipple should be just large enough to allow the milk to drop out somewhat rapidly. It should not flow out in a stream. If the holes are too small, they may be enlarged or new ones made by using a red-hot darning-needle. Some nipples are made without holes, and these may be perforated in the same manner.

Preparation.—It is best to prepare the entire quantity for twenty-four hours at one time. If the weather is warm, the milk must be pasteurized or sterilized immediately. If neither can be done, then, unless the weather is cold and a clean milk can be obtained, but one feeding should be prepared at a time.

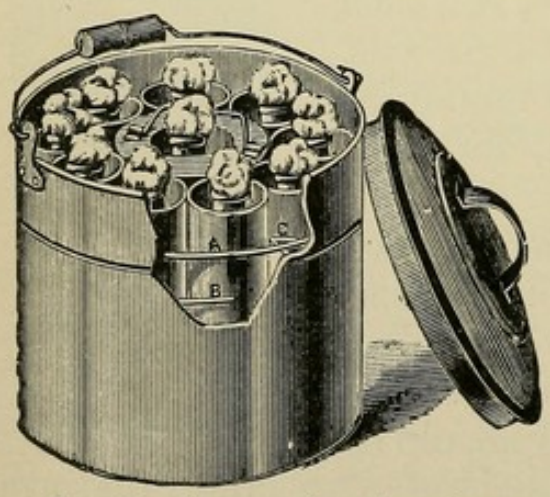


FIG. 26.—Freeman's pasteurizer.

FIG. 27.—Arnold sterilizer.

The physician should always write out the quantities to be used for preparing the milk. The milk- or cane-sugar is dissolved in hot water. Care should be taken to use a sugar

that gives a clear solution without filtering. If the solution is not clear, it should be filtered through a wad of cotton placed in the bottom of a funnel or through a piece of druggist's filter-paper. This solution, together with the lime-water or sodium bicarbonate, should be poured into a pitcher. Into this the milk, or milk and cream, should be poured, and the remainder of the water added. The water should always be boiled. The mixture should then be stirred and poured into the nursing-bottles. The bottles should then be stoppered with moderately tight plugs of non-absorbent cotton, to keep out bacteria. The bottles are then pasteurized or sterilized and placed in a refrigerator.

At the feeding hour the bottle is taken out of the refrigerator, placed in a pitcher or tall vessel of hot water to warm it, the cotton plug removed, and a nipple substituted. The milk should be heated until it is lukewarm—about 98°–99° F. The nipple should never be placed in the mouth to test the heat, but the milk may be allowed to drop on the wrist, where it should feel warm, but not hot.

FEEDING DURING THE SECOND YEAR.

During the second year of life as much care is required in feeding as during the first. The fear of the second summer would largely be overcome if the child were not allowed to eat food unsuited to its digestion. Most of the illness and many of the deaths of childhood are traceable to improper diet.

During the second year milk should form the basis of the diet. In cities or where the milk-supply is not above suspicion, it is best to pasteurize the milk until the second summer has been passed, or even longer if circumstances warrant. As a rule, the milk requires but little modification, and after the eighteenth month, and often before, may generally be taken unmodified. As the child is now able to digest starchy food, milk-sugar may be omitted. In cases where the milk is not thoroughly digested, as is evidenced by curds in the stools, lime-water may be used, and may be added in quantities of from 5 to 10 per cent., or even more if necessary. During illness and often under other circum-

stances the alkaline carbonated waters will be found useful for diluting the milk. If the milk is poor, another plan is to use the upper two-thirds of the milk.

Starchy food may be given in the form of gruel, either alone or, what is better, mixed with milk. Barley-gruel or, if there is a tendency to constipation, oatmeal-gruel is added, one-fifth or one-fourth part of gruel being added to each feeding. The gruel should be freshly prepared and mixed immediately with the milk. A pinch of salt and a very small quantity of cane-sugar may be added to render it more palatable.

During the **second year** five meals at about four-hour intervals should be given. The bottle should be dispensed with, and the food be taken from a cup or spoon. If the bottle is not taken from the child early, it may be difficult to break it of the bottle habit. The following diet-lists for different ages will be found useful:

Twelfth to Fifteenth Month.—Milk, barley, oatmeal, wheat-flour, farina, or arrow-root gruel; barley or oatmeal jelly; lightly boiled yolk of egg, given with stale bread-crumbs.

Beef, mutton, and chicken broth, chicken jelly, beef-juice.

Orange-juice or the juice of other ripe fruit, as of peaches.

First Meal.—On waking, the child should receive a cup of warm milk, modified as previously suggested. If the child is accustomed to waking very early, more milk may be given at about 7 A. M.; otherwise this last may be regarded as the first meal.

Second Meal (10.30 A. M.).—Eight ounces of warm milk and barley-gruel.

Third Meal (2 P. M.).—One of the following:

(*a*) Eight ounces (a cupful) of beef broth.
(*b*) " " " veal "
(*c*) " " " mutton "
(*d*) " " " chicken "
(*e*) Yolk of a lightly boiled egg with stale-bread crumbs.

Fourth Meal (5 P. M.).—Eight ounces of milk and barley-gruel.

Fifth Meal (10 P. M., if required).—Eight ounces of milk. Orange-juice, one or two tablespoonfuls at a time may be given one hour before the 10.30 A. M. feeding. If there is a tendency to loose bowels, this should be omitted.

If the child's appetite is very good, a small piece of zwieback may be given with either the second or the fourth meal. This should not be soaked in the milk, but the child should be allowed to nibble at it dry.

Fifteen to Eighteen Months.—Same as above, together with zwieback, stale bread (oven dried), whole eggs very soft boiled; strained oatmeal, barley or wheat porridge; bread and milk, thin biscuit (crackers), junket, scraped raw beef or mutton in very small quantities.

Eighteen Months to Two and One-half Years.—Milk is to be regarded as the chief article of diet. Many children have no desire for other foods until after the second or third year. These children will generally be found to thrive on milk alone or with slight additions to the diet. As the child's digestive power increases, the following articles may, however, be added one at a time:

Fruits.—Juice of ripe fresh fruit, that of oranges and peaches being best. Ripe fresh grapes skinned and seeded. Baked apple—pulp only, the skin and seeds to be carefully removed. Stewed prunes, the skins to be removed by passing through a sieve.

Meats.—Scraped raw beef or mutton; rare roast-beef or mutton pounded to a pulp. Chicken or turkey, the lean white meat minced to a pulp.

Vegetables.—Mashed baked potato with cream or covered with gravy from roast meats. If the latter is very fat, the fat should be removed by skimming or by means of a piece of blotting-paper. Very well-cooked spinach, celery, and cauliflower tops.

Cereals.—Well-boiled rice and other well-cooked cereals already mentioned.

Desserts.—Boiled custard, milk and rice puddings, junket.

Four meals will generally suffice after the eighteenth month.

From two and one-half years up to the sixth year the diet

of the child may gradually be increased. Milk should still, however, be taken in large quantities—about a quart daily—as well as some form of cereal for breakfast, with or without an egg, or fresh fruit if there is a tendency to constipation. Meat prepared as above should be given once a day, and preferably at the midday meal, together with potato and some green vegetable, as spinach, asparagus, or cauliflower tops. The evening meal should be light, and consist of bread and milk.

It is well to prepare two lists, which may be given to the nurse or mother as a guide. One list should contain the food allowed, and the other list those forbidden. It is not well to depend on verbal instructions as they are easily forgotten or misconstrued.

THE DIET FROM TWO AND ONE-HALF TO SIX YEARS.

Milk may be allowed with every meal (may be omitted from dinner if desired). The average child should take a quart a day, plain or, when plain milk is not thoroughly digested, modified as for twelve to fifteen months.

Cream.—Two to eight ounces a day mixed with the milk, taken as a beverage, with cereals, etc.

Bread and **biscuit** may be allowed with every meal, stale bread, dried bread, also the so-called "pulled bread," zwieback, and the various forms of biscuits or crackers.

Cereals.—Almost any kind of cereal for breakfast; oatmeal and wheaten grits are the best. Rice and hominy for dinner. Barley is useful in soups.

Vegetables may be allowed for dinner—potatoes in some form or a cereal with one green vegetable; spinach, cauliflower tops, and the like are the best.

Eggs are very good, but children are liable to tire of them easily. They should be given for breakfast, as a rule, but never day after day.

Meats.—Allowed once a day for dinner and in older children for breakfast occasionally. Boiled or broiled fish may be given for breakfast or dinner.

Broths and **soups** of simple composition may be eaten. Meat broths with cream and cereals are especially nutritious.

Desserts.—Once a day, with dinner. Plain custard, milk and rice pudding, bread and custard pudding, and junket are the best; ice-cream once a week. Fruit should be given once daily, and only ripe fresh fruit, in season, should be used. The best are oranges, baked apples, and stewed prunes. Ripe peaches, pears, grapes without skins or seeds, may also be given. Fresh juice of berries in small quantity, strawberries in perfect condition sparingly. Ripe cantaloupe and watermelon in moderate quantities may also be allowed. Great care should be used in choosing and giving fruit to children. It is a very important article of diet, but if stale, spoiled, or unripe, is capable of doing much harm. Too much should not be given in hot weather. Lemonade is useful during very hot weather.

Articles Forbidden (after Holt).—The following articles should not be allowed children under four years of age, and with few exceptions they may be withheld with advantage up to the seventh year.

Meats.—Ham, sausage, pork in all forms, salted fish, corned beef, dried beef, goose, game, kidney, liver, bacon, meat-stews, and dressing from roasted meats.

Vegetables.—Fried vegetables of all varieties, cabbage, potatoes (except when boiled or roasted), raw or fried onions, raw celery, radishes, lettuce, cucumbers, tomatoes (raw or cooked), beets, egg-plant, and green corn.

Bread and Cake.—All hot bread and rolls; buckwheat and all other griddle-cakes; all sweet cakes, particularly those containing dried fruits and those heavily frosted.

Desserts.—All nuts, candies, pies, tarts, and pastry of every description; also salads, jellies, syrups, and preserves.

Drinks.—Tea, coffee, wine, beer, and cider.

Fruits.—All dried, canned, and preserved fruits; bananas; all fruits out of season and stale fruits, particularly in summer.

The meals should be given at fixed hours, which practice should be strictly adhered to. Feeding between meals, even

when consisting of the most trifling things, should be avoided. If the child cannot go from one meal to another without discomfort, the intervals should be shortened. In certain cases it may be advisable to give a small cup of milk or broth and a cracker between the meals, at stated intervals, as in feeding younger children.

Candies, cakes, and the like should be kept from young children. In well-regulated homes, if he once learns that he cannot have them, the child will soon cease to demand sweets. The frequent indulgence in sweets of various kinds creates a desire for them to the exclusion of other food. This craving is analogous to that for alcohol in adults. Overindulgence in sweets causes indigestion, headache, and the like, ailments that may easily be prevented.

The child should be taught to eat slowly and to chew the food well. To this end, some older individual should always be present at meal-time to see that sufficient time be taken for the meal, and that the food be finely divided, as young children do not, as a rule, chew very well. The quantity given to a healthy child should depend on his appetite. In sick children this is not a reliable guide, and, where possible, fixed amounts may be given. The child should not be forced to eat, nor should he be given special articles to tempt the appetite. If the food offered is not taken, it is well to wait until the next meal, when it will generally be found that the appetite has returned. Loss of appetite is often merely an indication that the digestive organs require a slight rest.

During the heated portions of the year the child will require less solid and more liquid food. The same is true during sickness. Many of the gastro-intestinal disturbances attributed to teething are the result of improper feeding.

DIET OF SCHOOL CHILDREN.

The period usually spoken of as "school days" is an extremely active one physically. The vast number of metabolic changes going on and the growth of the body demand a plentiful and a suitable diet. Both in and out of school and in seminaries careful attention should be given to food, fresh

air, and exercise. In other words, the physical development should receive as much attention as the mental growth. In boarding-schools especially the diet should be the subject of careful study, the aim being to avoid monotony and to provide a sufficient and satisfying diet. In many schools the dietary is left to the discretion of the cook. In considering school dietaries several points are worthy of consideration.

Milk, being easily digested in most cases, is of great value, especially for children whose nutrition is below normal. It should be furnished as a beverage daily for breakfast and supper, and is advisable even with dinner. It may also be used in the preparation of puddings and soups. Cream is very valuable, and whenever possible should be supplied in sufficient quantities. A cup of warm milk with bread or crackers is helpful during the middle of the morning, and as a substitute for tea in the afternoon. Delicate children and others may with advantage take a glass of warm milk a short time before going to bed. If the rising hour is some time before that set for breakfast a cup of milk or of bread and milk should be given on rising.

Eggs may be used alone or in the preparation of various dishes. They may be used in almost any way, except fried. Fried eggs are liable to be very indigestible. They are often prepared in this way in order to disguise the stale taste of an egg that has been in storage for some time.

Meat is a very important part of the diet, as it contains a larger quantity of protein, from which the tissues are built up, and in a more available form, than in any other form of food. Milk and eggs are also valuable sources of protein. Meat should be provided, therefore, in sufficient quantities, half a pound a day being, perhaps, a good average allowance for a growing boy, the larger and more robust taking somewhat more. Steaks, chops, and roasts of beef, mutton, lamb, fowl, and bacon are the most suitable meats, although pork, together with meat stews, meat puddings, sausages, and hashes may be allowed in small quantities. These last, while generally relished, are not so digestible nor such good sources of nutriment as those first named. With care and proper

preparation many of their ill effects can be obviated. More meat is required in winter than in summer, and more in cold climates than in warm.. Yeo states that too much meat may give rise to eczema.

Meat may be given twice a day, and eggs or fresh fish may be substituted for it about three times a week. When these do not satisfy the appetite meat may be added. For this purpose cold sliced meat is useful.

Bread and **butter** should be given with each meal. Bread made from the whole wheat-flour may be used in the largest quantity, but it is well to supply various kinds of bread to avoid monotony. "Brown bread" given continuously becomes very tiresome. Rye bread may be given occasionally, and bread made from mixtures of wheat and rye is very palatable. Rusk, biscuit, and crackers may also be supplied. Corn-bread, when properly made, may be given once a week or oftener, and griddle cakes of buckwheat, corn, or wheat flour two or three times a week. These last may be served with syrup or fruit-juices.

Cereal porridges of all kinds may be given for breakfast, oatmeal being probably the most desirable.

Vegetables of almost all varieties may be used. For dinner two varieties should be given—one green vegetable and potatoes. Salads made of the green vegetables, with the very simplest dressings, are useful additions to the diet.

Fruit should invariably be given once a day.

Sugar should be provided for in the dietary. Candies and many of the sweets given to children are harmful and cause indigestion and dyspepsia. If proper sweets were provided there would be slighter tendency to indulge in the less desirable forms whenever opportunity afforded. With the meals, and when the appetite demands satisfying between meals, they may be given with or without a glass of milk. Regularity should, however, be observed, and they should not be given immediately before or after a meal. Fruit syrups, sugar syrups, honey, preserved fruits, and jam may be eaten with bread. Caramels, chocolates, maple sugar, and plain sugar taffies are the best of the other forms of sweets.

Simple desserts, such as custards, milk puddings with rice, tapioca, and the like, bread puddings, plain cakes, and properly prepared pastry may be used.

The **beverages** should be water and milk. Weak cocoa or chocolate may be given after the seventh year. Tea and coffee should not be given before the thirteenth year, and may be withheld advantageously still longer. Alcohol is not to be used except by a physician's direction.

Especial care should be taken to avoid a monotonous diet, for there are many instances where the constant repetition of a certain form of food has created a dislike for it that has persisted throughout life or been overcome only with difficulty.

A second point to be remembered is that the food should be well prepared and attractively served. This has more to do with influencing the appetite of delicate, nervous children than is generally supposed, and cannot be insisted upon too strongly.

Overeating should be avoided, and to this end an older person should always be present when practicable ; in school this should be insisted upon. On the other hand, a child should not, through caprice or habit, be allowed to eat too little. By exercising a little tact most of the dislikes which are not deeply rooted, but which may become so if persisted in, may generally be overcome. These dislikes are often the result of imitation.

Sufficient time should be allowed not only for the meal, but for the performance of whatever small duties may be required of the child. A time should be set for one or two regular daily visits to the water-closet. Hurrying to school should be avoided. Reading and studying immediately before and after meals should be prohibited, as should bathing or any very active exercise. Some light form of recreation may, however, be indulged in. The hours for meals should be so arranged that the child may have freshly prepared meals, and not cold luncheons or warmed-over dinners. Lastly, nibbling and eating between meals, except under the conditions previously described, should be strictly prohibited.

In spite of stringent rules, however, many infringements will occur.

It is by neglect of the diet, fresh air, and exercise that many cases of tuberculosis gain headway ; anemia may result from such neglect, and a delicate, nervous child be the outcome of one that should by right be healthy.

OTHER FACTORS IN INFANT FEEDING.

Feeding in Infant Asylums.—The feeding of infants in overcrowded infant asylums, with their lack of fresh air and paucity of attendants, is a matter of great difficulty. Any attempt at scientific feeding under such circumstances will ultimately lead to failure, the method in these cases being held to blame. The primary cause of malnutrition and marasmus in institutions is the lack of fresh air and individual care, and until these are obtainable it is useless to attempt to accomplish anything by special feeding methods. In smaller institutions the use of the Materna graduate will be found satisfactory.

In the larger asylums it is well to have two or three general working formulas, such as fat 3 per cent., sugar 6 per cent., protein 1 per cent. ; and fat 4 per cent., sugar 7 per cent., protein 2 per cent. These may be varied by adding more or less water to them to adapt them more closely to special needs. The younger infants may, when possible, receive special mixtures. For substitute feeding, condensed milk, barley- and egg-water will be found most useful.

The allowance of a few cents a day generally made for an infant's entire care is quite inadequate to accomplish any good.

The Infant's Stools.—An examination of the stools should be regarded as part of the routine examination. The number of stools in the twenty-fours is not as important as their character. As long as the character of the stool is normal the child is not said to have diarrhea even if it has a number of stools daily.

The normal stool is smooth, about the consistence of butter

and contains no curds or solid masses. Mucus is not seen in the perfectly normal stool, but can usually be demonstrated microscopically.

The **reaction** of infants' stools is usually acid or neutral, although sometimes it is alkaline. Either acid or alkaline stools may be altered in color. A return to a normal color is usually brought about in these cases by the administration of an alkali when the stools are acid, and *vice versa*. Alkaline stools, green in color, may be produced by giving alkalies in large doses for several days. The color of the stools furnishes considerable information as to the condition of the infant. Normally the color is a light butter-yellow, but the stools may vary somewhat in this respect and be lighter or darker. In young breast-fed infants the stools may be a dark yellow, like the yolk of an egg. In artificially fed babies the stools are frequently very light in color, or even decidedly whitish. Rhubarb imparts a yellow color to the stool.

White stools are seen sometimes in artificially fed children that seem to be otherwise in normal condition. As a rule, however, white stools are either the result of the ingestion of excessive quantities of fat or indicate an absence of bile. In the former cases the stools are large, whitish, and have the characteristic odor of fatty acids, which resembles that of rancid butter. The stool may be dried and burnt with the same odor and the fat may be dissolved by ether. When bile is absent, the stools are white and have a very foul, almost cadaveric, odor.

Red stools may owe their color to the presence of fresh blood from the rectum or the lower part of the intestinal tract. When it comes from the upper parts, the blood is always black. The streaks of fresh blood frequently seen where hard stools are passed come from slight excoriations of the anus.

Black stools are caused by the presence of blood. In this case the stools are black and tarry. The blood may come from the intestines or stomach, or from blood swallowed, especially that from hemorrhage from the posterior nares.

Black or **blackish-brown stools** may also be caused by the administration of bismuth, iron, or tannic acid. Brown stools are frequently seen as the result of bacterial and chemic changes in the intestine in the course of intestinal indigestion and intestinal infection. Raw beef-juice may give rise to foul-smelling brownish or grayish-colored stools.

Green stools are due to a large number of causes. This may result from intestinal indigestion and infection due to improper food, usually either an excess of sugar or of fat, or to the presence of bacteria. Calomel causes green stools, and alkalies, if continued and not neutralized in the stomach, may produce the same effect.

Symptoms of Dietetic Errors.—Too much stress cannot be laid upon the importance of investigating the source of disturbances due to dietetic errors.

Too Low Protein.—The stools are small and constipated, if the other food elements are low, as they usually are. The child does not gain weight so rapidly as a normal child, or it may remain stationary or even lose weight. It is anemic, and if the low protein is continued the child becomes marantic.

Too High Protein.—The child is liable to have colic, vomiting at any time, but usually half an hour or more after feeding. The stools contain undigested curds and mucus, and may be yellowish green or otherwise discolored.

Too Low Sugar.—The gain in weight is liable to be slow, and the child may be constipated. These infants are usually thin.

Too High Sugar.—Vomiting an hour or two after meals, the vomited matter usually being sour. Acid eructations are common. Colic is frequent. The stools are generally grass green and very irritating, the buttocks often being excoriated.

Too Low Fat.—The child gains weight slowly, and is usually constipated unless an excess of sugar is given, as in condensed-milk feeding.

Too High Fat.—The child vomits an hour or two after feeding. Colic is common. The stools may be thin and

green or greenish yellow, and contain small masses of undigested fat and considerable mucus. These small lumps are often mistaken for curds. They are more or less translucent, and when burnt give off the odor of fatty acids; they may be dissolved in ether. Curds are not, however, dissolved in ether. Too much fat may also cause large, white, rather dry stools having the odor of rancid butter.

It must be remembered that the condition of the stools may be due to one or more of the food elements, and experience in these cases is the best teacher.

THE FEEDING OF SICK INFANTS.

The Feeding of Difficult Cases—At the outset it must be remembered that the fault may not be due to the food itself, but to its preparation or to the mode or time of administration, and to improper surroundings and care. To succeed in these difficult cases it is necessary to look diligently into the minutest details of the infant's life.

Loss of Weight.—Loss of weight in an infant should always be considered a very serious symptom. During an acute illness, such as pneumonia or diarrhea, this is to be expected. In chronic conditions the weight may fluctuate, going up and down, or remaining more or less stationary. If, however, in a period of a month or two there is no general tendency to gain, in spite of the fluctuation, this indication is a serious matter. Where an infant is losing weight without any special cause, this may be attributed to insufficient or improper food.

In all cases a careful study of the food is essential. Accurate charts of the quantity of food taken, the time, whether the child vomits and at what time, and the number and character of the stools, etc., are of great help. If the food is increased or decreased, as the case may be, to an average strength for a child of the size and weight of the one under consideration, and there is then no change in the child's condition, the food should be peptonized, either partially or completely, or mixed with albuminized or malted food or with

barley water. The addition to the dietary of albumin water or of small quantities of one of the predigested beef preparations (Panopepton, 5 to 30 drops; Liquid Beef Peptonoids, 5 drops to 1 dram; or one of the other beef preparations in similar doses mixed with water) is indicated. Minute doses of nux vomica, or strychnin, with or without an alkali, as bicarbonate of soda, or creasote (Liquid Beef Peptonoids with creasote, 5 to 20 drops, of the Arlington Chemical Company, is an excellent form in which to give creasote) are often of value, especially where tuberculosis is suspected. Loss of weight may be caused by persistent vomiting (see Vomiting).

The physiologic loss that occurs during the first forty-eight hours of life should not be forgotten.

Stationary Weight.—This frequently follows where an infant is weaned or when one is fed artificially from the outset. Even if the child is receiving a correct percentage of food it may not gain for several weeks. So long as the infant is well and the percentage and quantity given correspond to those directed for an infant of the same age and weight no alarm need be felt, even if a month should elapse without showing an increase in weight. However, once the regular gain in weight is established it should not remain stationary, but should increase gradually from week to week. The average weekly gain during the first year of life is between four and eight ounces.

Colic.—This is more liable to occur in breast-fed than in bottle-fed babies on the percentages usually recommended. It is especially likely to come on during the first three months. In breast-fed infants it is often a difficult matter to overcome. If on examination the proteins are found to be too high, an effort should be made to reduce them, and the intervals of nursing may be lengthened. In bottle-fed infants colic is usually due to the fact that the percentage of protein is too high. The condition may also be caused by the food being given too cold, as well as by a host of causes that bear no relation to the food.

Vomiting.—**Immediately After Feeding.**—(*a*) From the food being given in too large quantities. Reduce quantity.

(*b*) From food being too dilute, and so necessitating the taking of too large quantities. Reduce the quantity and increase the strength.

(*c*.) From taking food too rapidly. Give it more slowly—in breast-fed children, by regulating the flow by grasping the nipple between the fingers; in bottle-fed babies by using a nipple with a smaller hole.

At Any Time.—Due to the abdominal binder being too tight, or to shaking or holding the infant with the head over the nurse's shoulder, patting on the back, etc. From too high proteins—this is more liable to be accompanied by other symptoms, as colic, curds in stools, etc.

One or Two Hours After Feeding.—The vomited material is usually sour and curdled, or it may be watery and contain mucus. This is due to the percentage of fat or sugar being too high. The fat, or both fat and sugar, should be decreased, and the food be given slowly and at longer intervals.

Vomiting also occurs in many diseased conditions. It is a frequent accompaniment of gastric and intestinal disorders, infection, and all acute diseases; it occurs in nervous diseases, such as meningitis, and in brain tumor, in peritonitis, and in intestinal obstruction, with coughing spells, as a habit, or reflexly from intestinal or pharyngeal irritation, or in toxic conditions, such as uremia. The treatment depends on removal of the cause where possible. When it occurs in ordinary acute diseases, however, much can be done in a general way to overcome vomiting. The food should be given in sufficiently small quantities at two-hour intervals, or in some cases a teaspoonful of food may be given every hour, or even every half-hour where larger quantities are not retained. If the case is acute it may be necessary to secure a wet-nurse. Washing out the stomach and gavage are two very important means (which should not be forgotten) of treating persistent vomiting.

Gavage,[1] or feeding by means of a stomach-tube, is a method used in various diseases and conditions of infancy and childhood. In cases where the child is not able to take nourishment, or only an insufficient amount, and in cases of

[1] Battams, "Forced Feeding," *Lancet*, June 16 and 23, 1883.

uncontrollable vomiting, this method may be resorted to. It is used in the feeding of premature infants, whether in an incubator or not, and in cases of small, weak, marantic ones, who, owing to weakness or lack of appetite, do not take sufficient nourishment. It is also employed after surgical

FIG. 28.—The practice of gavage (De Lee).

operations about the head or neck where swallowing is interfered with, and in acute diseases, such as pneumonia, in fevers, and delirium or coma.

The results that follow this method of feeding are surprising, especially in cases where there is constant vomiting or

where the stomach has a very small capacity. In the former case the vomiting may cease and the food be retained; in the latter, the capacity of a stomach that previously held only an ounce or two may rapidly be increased until an average-sized feeding is retained with ease.

The **technic of the method** is simple, and the procedure conducted without difficulty in children under two years of age; above that age it may be difficult, and a mouth-gag may be required; in some cases nasal feeding must be substituted. The apparatus employed is the same that is used for washing out the stomach, and since it is frequently desirable to wash out the stomach before introducing the meal, the same tubing may serve for both purposes. It consists of a soft rubber catheter connected, by means of a piece of glass tubing, to a piece of rubber tubing, to the other end of which a funnel is attached. The nurse reclines the child on her lap, with the head held straight—not inclined in either direction. The catheter is moistened with warm water and held several inches from the end, so as to allow enough of it to pass into the esophagus with the first attempt at introduction. The mouth is opened, if necessary, and the catheter passed rapidly into the pharynx; there is usually a swallowing movement, and the tube is readily passed into the stomach. If the procedure is carried on too slowly, the tongue may interfere, or if the catheter is held too near the end, it may cause gagging. Before introducing the food it is well to wash out the stomach with a normal salt solution. As soon as all the food has entered the stomach, the catheter is pinched and rapidly withdrawn. If it is withdrawn slowly the food may come up with the tube. If the catheter is left open as it is withdrawn, the dripping into the pharynx may cause vomiting. If the child is young, it is a good plan to keep the finger between the jaws for a few moments to prevent gagging. If the food comes up the feeding must be repeated.

Nasal Feeding.—For this purpose a catheter in proportion to the size of the child should be used. The catheter is well oiled and passed through the nostril and esophagus into the stomach.

DISEASES OF NUTRITION.

There are three conditions which cannot be clearly separated:

Inanition, a condition of acute starvation.

Marasmus, a sub-acute condition but a very serious one.

Malnutrition, a chronic condition, of poor assimilation. These terms are often interchanged by medical writers.

INANITION.

Definition.—This is acute starvation due to insufficient or improper food. It is most often seen in very young infants, but may also be met with in the older ones.

Etiology.—It is seen where the child gets no food (as in abandoned infants); where the supply of food is insufficient; where the infant refuses to nurse; where the food is suddenly changed, and where the food is not adapted to the infant's digestion, and where the infant's digestion is too weak to utilize the food supplied.

Symptoms.—These may come on gradually or suddenly, or the onset may be gradual with the sudden appearance of severe symptoms. The child is usually under three months of age, and the most striking symptom is the rapid loss in weight. The child is pale or cyanosed, the temperature may be subnormal, or there may be fever. The fontanel is depressed. The circulation is poor and the respiration irregular. The child is fretful at first, but later may become comatose. The urine is scanty and low in chlorids. There is generally some disturbance of the gastric and intestinal digestion, and often vomiting and diarrhea.

Prognosis.—This is usually bad, but some cases recover if properly managed. The weight and general appearance are the best guides as to how the child is doing. The presence of vomiting or diarrhea, cyanosis, very high fever, or great prostration is of grave significance. The duration of the disease is usually a few days or a week or two.

Diagnosis.—This is made on the absence of other dis-

cases and on recognizing the cause. Where there is fever these cases may be mistaken for either pneumonia or diarrhea. Fever in a young infant should always lead to a careful inquiry into the amount and character of food taken.

Treatment.—General treatment like that given for marasmus. The feeding is the most important thing. Breast milk from the mother or a wet-nurse should be given, either with a spoon, medicine dropper, or by means of a stomach tube. The milk may be diluted with limewater, and if very rich the cream may be partly removed by skimming. If a wet-nurse is not obtainable, whey, peptonized milk, condensed milk, very weak modifications of milk, malted, farinaceous gruels, or predigested-beef preparations may be given.

The child should be kept warm, or if there is fever, this should be reduced by sponging or bathing. Whisky or strychnin or both may be administered by mouth and, if they cause vomiting, by rectum. Oxygen should be administered by inhalation. Normal salt solution injections into the rectum may help supply the lack of fluid in the body.

Infants over a year old may thrive on solid food where all liquid foods are refused or vomited.

See Management of Marasmus.

MARASMUS.[1]

(Athrepsia; Simple Atrophy; the Wasting Disease of Infants.)

Definition.—This is a subacute condition where there is extreme wasting, usually terminating fatally. It is due to the lack of ability on the part of the tissues to utilize the food taken.

Etiology.—It is due to the lack of proper feeding, lack of fresh air, lack of care, and an absence of "mothering." Any or all of these may be the cause. It is common in overcrowded institutions for infants, and infrequent in the

[1] A. H. Wentworth, "Atrophy, Infantile, Etiology and Dietetic Treatment of," *Journal of the American Medical Association*, August 26, 1905, p. 579. "Atrophic Infants and Children, Metabolism in," *Journal of the American Medical Association*, September 9, 1905, p. 771.

country or in private practice among the well-to-do. In some instances the child is congenitally weak.

Lesions.—Great wasting of the muscles and body-fat and an atrophy of the thymus gland are the only constant lesions. Atrophy of the intestinal mucosa has been described. Secondary lesions such as pneumonia may be found where death is due to a terminal infection.

Symptoms.—There is a steady loss of weight, until the child is reduced to mere skin and bones, and the skin hangs in folds on the limbs. The cheeks are sunken and the fontanel depressed. The abdomen is enlarged, and the hands and feet are like claws, so that these children suggest young birds in appearance. The circulation is weak and respiration feeble. The temperature is usually subnormal. The child is very pale or may be somewhat cyanosed. There may be marked digestive disturbance, as vomiting and diarrhea. In other cases the child takes its nourishment well almost to the time of death. There is usually stiffness of the muscles in the severe cases and retraction of the head. The course of the disease is

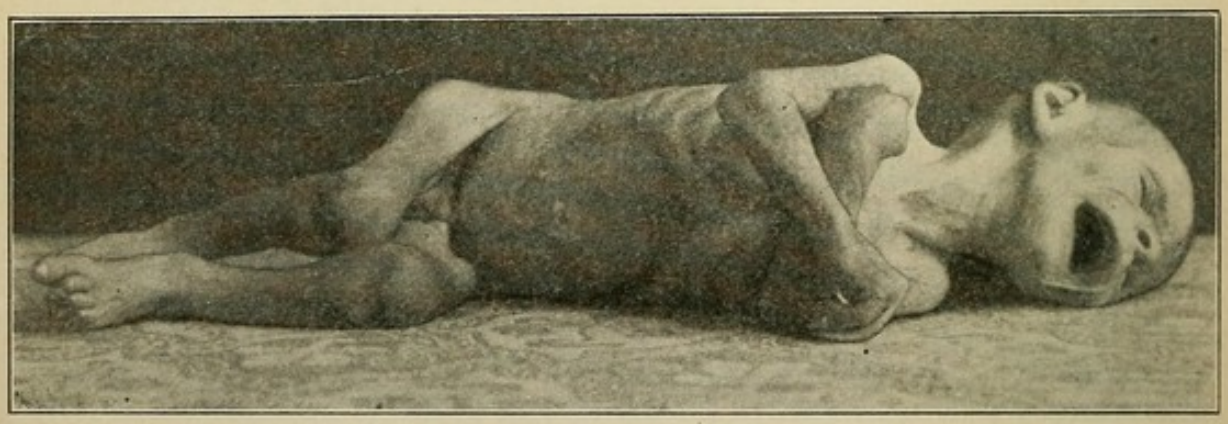


FIG. 29.—Marasmus with purpura.

weeks or months, and, as a rule, the children become weaker and weaker and finally sleep away.

Prognosis.—This is bad. Cases in institutions invariably die. In private practice, where every care can be given, the outlook is better.

Diagnosis.—This by exclusion. Care should be taken not to mistake tuberculosis for marasmus. Several careful examinations should always be made before a final diagnosis is made.

Treatment.—Plenty of fresh air, individual care, light,

and "mothering." Remove to the country where possible. Do not allow the infant to lie in the crib all the time. It should be picked up and carried about. It should never be fed in the crib, but on the nurses' arm or lap. It should be kept warm. Hot-water bottles may be used or the child placed in an incubator. It should not be bathed too frequently. It should be rubbed gently, twice daily, with cocoa-nut butter or some bland oil. It should be encouraged to cry sufficiently to expand the lungs.

The feeding is very important. A wet-nurse is best. Next to that, carefully modified milk or whey mixtures may be used. If necessary these should be wholly or partially peptonized. Predigested-beef preparations are useful.

Drugs are of little use, but small doses of alcohol or condensed milk is often of great service. Strychnin sulphate, gr. $\frac{1}{400}$, or atropin sulphate, gr. $\frac{1}{1000}$, may be used where the circulation is very weak, and the peptonate of iron and manganese where there is severe anemia. The doses should be small, and if digestion is interfered with the drugs should be stopped. Small doses of thyroid[1] (gr. $\frac{1}{3}$–j) are sometimes of value, but should be used with caution.

MALNUTRITION.

Definition.—A chronic condition in which there are no apparent lesions, but a decidedly faulty nutrition. This condition is a matter of months or more, often of years.

Etiology.—It may be inherited from weak, puerile, or aged parents, and where there is an alcoholic, syphilitic, gouty, or tuberculous taint in the family. It may result from some severe disease from which the child does not recover its strength. It may be caused by lack of food, fresh air and exercise.

Symptoms.—These children are small, poorly nourished, and badly developed. They are under-sized, under-weight, flabby, pale, and anemic. The circulation is poor and they are easily chilled. They are nervous, sleep badly, and are easily tired out. Mentally, the older children may be very

[1] Simpson, "Thyroid Treatment in Infantile Wasting," *British Medical Journal*, April 30, 1910, p. 1049. "Thyroid Gland in Relation to Marasmus," *Scottish Medical and Surgical Journal*, Dec., 1906, p. 504.

bright. Digestive symptoms are common. As a rule, the appetite is poor and they are difficult to feed.

Prognosis.—In institutions the outlook is bad. Where directions can be fully carried out many cases recover. They usually require care for years.

Diagnosis.—By excluding tuberculosis and other diseases. Several careful examinations should always be made.

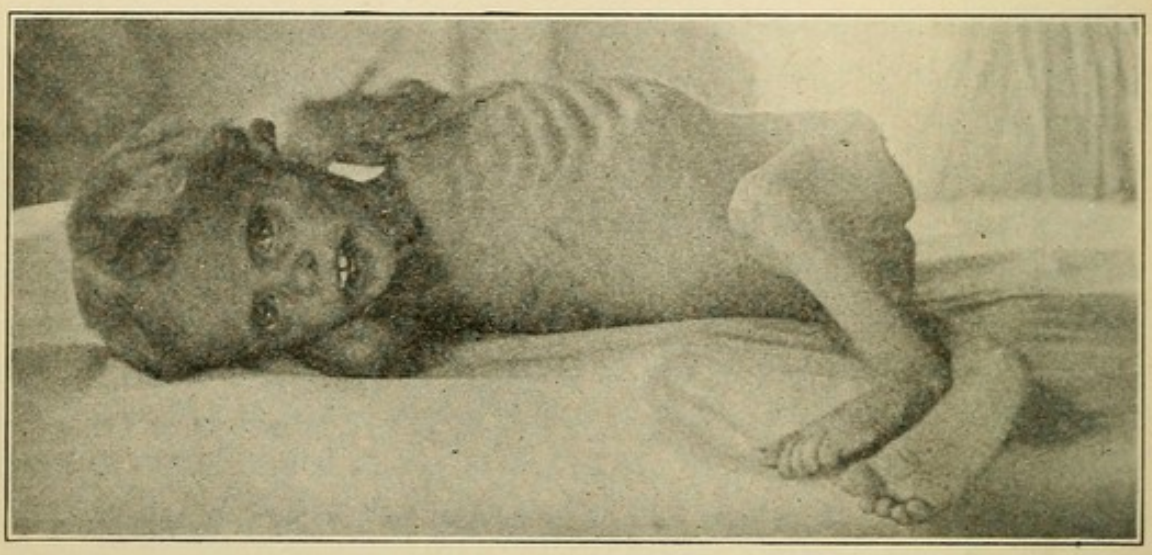


FIG. 30.—Malnutrition after intestinal diarrhea.

Treatment.—Careful feeding, as directed for difficult cases, if the child is an infant, or along the lines laid down for the feeding of children. Often a child must be fed in a way that would suit a healthy child of half the age.

Fresh air, country life where possible, exercise, baths, massage, rubbing with oil, and a life free from excitement are indicated. Regular habits are very important.

Medicine is less important than the above. Cod-liver oil in winter, iron, arsenic and occasionally strychnia and alcohol are indicated. The less medicine the better.

FOOD INTOXICATIONS.[1]

Definition.—A form of auto-intoxication due to taking more food than can be properly assimilated, whether too much carbohydrate, fat, or protein. The maximum amounts that can be utilized normally differ greatly in different individuals.

Symptoms.—The most striking feature is attacks coming

[1] Ruhräh, *Journal of the American Medical Association*, July 10, 1909, p. 105.

on periodically. These attacks vary in their character. There may be vomiting (see Cyclic Vomiting), headaches, recurring fever, with or without diarrhea, asthma, and other symptoms too numerous to mention.

Diagnosis.—Careful physical examination to exclude any disease of any organ, and this having been done, a study of the child's habits and food should be made. In over half the cases the error is evident, in others it may require trial diets to determine the cause.

Too Much Food of all Kinds.—This usually causes such attacks as are called biliousness. There is fever, a coated tongue, foul breath, headache, malaise, and often drowsiness. There is often vomiting or diarrhea or both, the liver may be somewhat enlarged and tender.

Too Much Protein.—The symptoms are as in the preceding. Sometimes one symptom is especially prominent, as recurring headache or attacks of vomiting, or in milder cases periods when the tongue is furred and the breath foul without much other disturbance.

Too Much Fat.—The child's general health is poor, the skin is pale and muddy, there are large dark circles under the eyes, the tongue is coated, the breath is exceedingly fetid, and there is frequently gastric disturbance and vomiting, and there is often diarrhea with the passage of undigested fat in the stools.

Too Much Carbohydrate.—This is the most frequent form, owing to the fact that many children are given large quantities of starches and sugars. Recurring attacks of vomiting, diarrhea with fever, often headache, or asthma are the most frequent symptoms.

Prognosis.—Where the co-operation of the parent can be secured the results are usually satisfactory.

Treatment.—The intestinal tract should be cleaned out with a brisk purge and occasional doses of phosphate of soda given. The diet should be carefully regulated to suit the child's age and condition. Where any special class of foods is at fault, it should be reduced to the minimum.

ACID INTOXICATION.

Disturbances of metabolism are characterized by the presence in the urine of acetone and oxybutyric acid. This may be caused in children by many things : starvation changes in

the diet, infectious diseases, especially pneumonia, late in diabetes, poisoning by salicylic acid, and as a sequela of anesthetics. In cyclic vomiting (see same) it is also present. In milder cases symptoms are slight or absent. In the severe cases there is a more or less comatose condition, loss of eye-ball tension, slow deep breathing, sometimes called air-hunger, and usually marked and persistent vomiting. The diacetic acid is present in the urine.

Treatment.—Some forms of sugar, particularly glucose, by rectum or even subcutaneously, and sodium bicarbonate by mouth or by rectum.

RACHITIS (Rickets).[1]

Definition.—Rickets is a constitutional disease caused by faulty feeding and improper hygiene. The bones show the principal changes, but almost all the tissues of the body are affected.

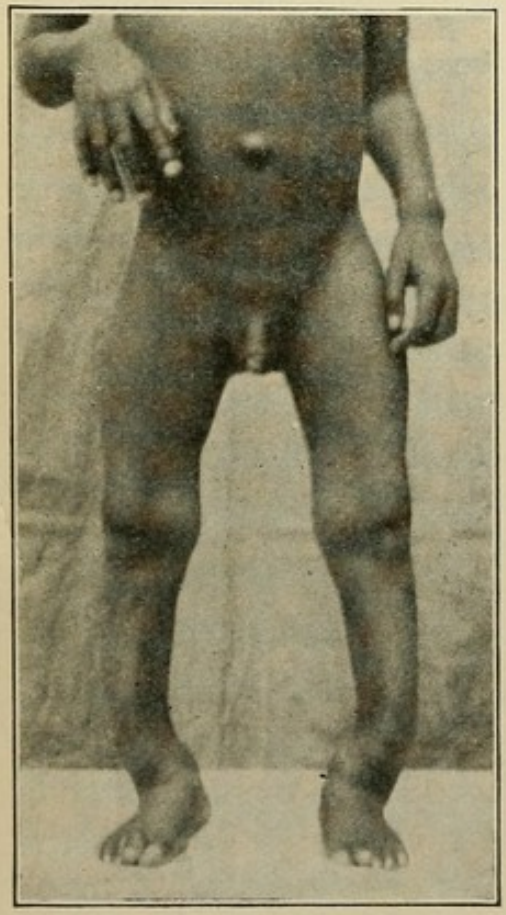


FIG. 31.—Rickets.

Etiology.—Rickets is usually seen in artificially fed children, rarely in the breast-fed. It is primarily caused by a food too low in fats and proteins. Such foods usually contain an excess of carbohydrate material. Rickets may be experimentally produced in young animals by such food. In addition, however, in human beings there seem to be other factors in its causation, such as bad hygiene, particularly overcrowding. Rickets is seen in the temperate zones and most often in Southern races which have moved to the North. In the United States it is especially common among the negroes and the Italians.

[1] James, "Late Rickets," *Scottish Medical and Surgical Journal*, January, 1897. William Ewart, "Rickets, Abdominal Atony in, its Significance and Treatment," *British Medical Journal*, October 13, 1906, p. 920. R. W. Marsden, "Rickets, Late," *Edinburgh Medical Journal*, vol. xvii., 1905, p. 344.

Lesions.—The bone changes are the most striking. The growth of the epiphyseal cartilages, especially in the long bones, is rapid and excessive, and there is a similar process in the production of cells beneath the periosteum. Ossification takes place slowly and irregularly. Instead of the bone containing about two-thirds mineral matter and one-third animal matter, the composition is about one-third mineral matter and two-thirds animal matter. The bones are deformed and soft. After from three to fifteen months the pathologic process in the bone stops.

Other lesions frequently seen are enlargement of the spleen and lypmph glands and catarrhal conditions of the mucous membranes.

Symptoms.—Rickets comes on usually between the sixth and fifteenth month. It may, however, be seen earlier.

In the early cases, and especially so in young infants, the early symptoms are great restlessness at night, sweating, especially about the head, beading of the ribs, craniotabes, and constipation.

After a short time the disease becomes well developed. The following conditions may be noted. As a rule not all of them are present in any one case.

The head is large, the bones of the skull thickened, the fontanels remain open late, and the union of the sutures is delayed. The head is generally square and shows deformities in about one-third of the cases. Craniotabes, a crackling sensation produced by slight pressure of the fingers over the parietal and occipital bones and due to thinning of the bones in spots, is rarely seen after six months. It is also found in syphilis. Dentition is delayed and irregular.

The lymph-glands all over the body are enlarged. The mucous membranes are relaxed and catarrhal conditions are frequent.

The chest shows enlargement of the ribs at the junction of the bone with the cartilages, the so-called rickety rosary. The chest is frequently deformed by vertical and transverse sulci. There may be a funnel breast. The ribs often flare at the bottom. There may be kyphosis of the dorsal spine; lordosis may also be present.

The abdomen is enlarged, and the child is pot-bellied. This is due to deficient tone in the intestinal and abdominal muscles. Constipation is associated with this. The spleen is enlarged. The children are flabby and weak. They are generally under-sized, under-developed, and walk late.

The blood is more or less normal, although anemia may be present, due to other causes.

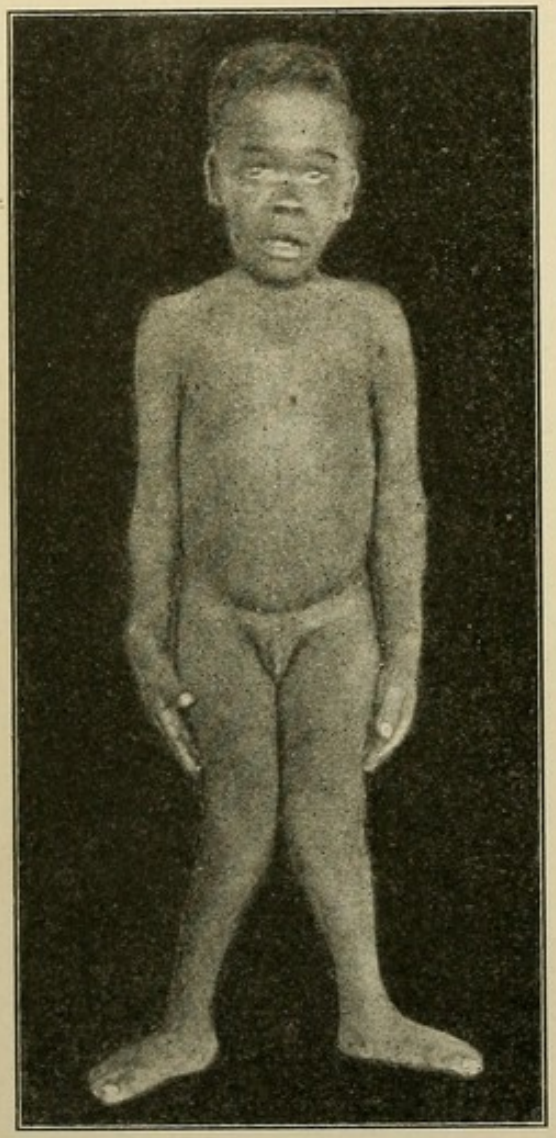


FIG. 32.—Rickets.

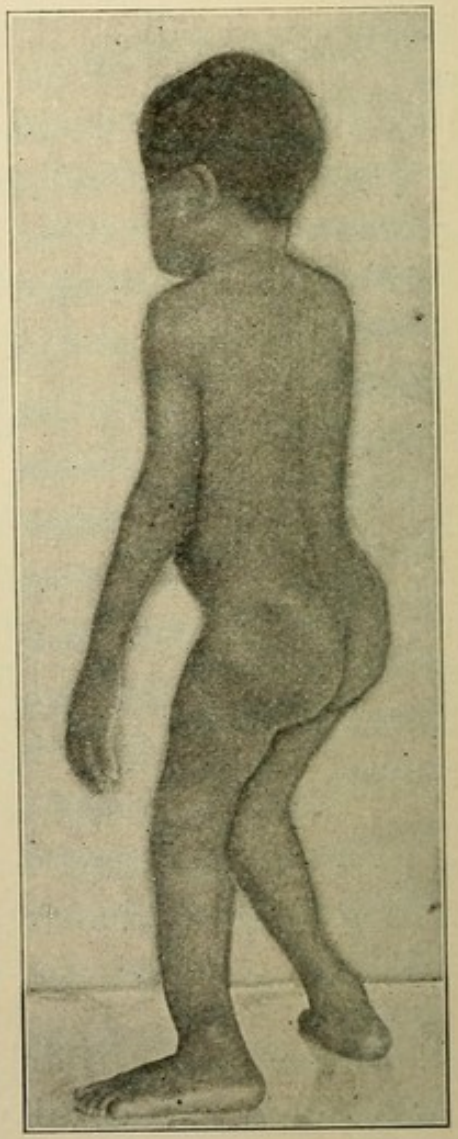


FIG. 33.—Rickets.

The most marked changes are seen in the long bones. They are bent, irregular in shape, and usually have marked thickening of the ends about the epiphyses. The tibia and fibula and radius and ulna show the most marked deformities. The pelvis may be deformed.

Rachitic children are usually nervous and convulsions are common.

After an active stage of several months the process subsides and the child generally recovers. The deformities remain for years and may never disappear.

Prognosis.—As far as life is concerned it is good, and with proper treatment the cases eventually do well. Rachitic children are liable to convulsions, bronchitis, pneumonia, their resistance is generally lowered, and they are liable to die with intercurrent affections.

Diagnosis.—As a rule this is easy. Syphilis shows other symptoms of the disease, and the shafts of the bones are affected rather than the epiphyses. Syphilitic bones are apt to break down. Necrosis is never seen in uncomplicated rickets. Antisyphilitic treatment helps to differentiate obscure cases. Rickets of a severe type must be separated from actual paralysis. The reflexes are preserved and the muscle can be stimulated to move. Scurvy is differentiated by the cardinal symptoms of scurvy and antiscorbutic treatment.

Treatment.—Good hygiene and proper food are essential. Fresh milk properly modified, fresh meat juice, cream or other fat should be added to the dietary. Eggs, fresh meat, vegetables, and fruit for older children. Cod-liver oil and olive oil are the best medicaments. Phosphorus has been advised in $\frac{1}{200}$-gr. doses. Iron, hypophosphites, and arsenic may also be used.

The deformities should be treated by orthopedic means.

ADOLESCENT RACHITIS.

This is regarded as a recrudescence of a condition which existed in infancy, occurring about puberty, due to a disturbance in nutrition at the time of great bone activity. The pathologic and histologic changes approach those seen in the infantile type. In general the symptoms resemble the infantile type, but the acute form is rare, and the local changes are more marked than the general. In girls scoliosis is the most common deformity, while in boys disturbance in the legs is most frequently observed. Changes in the cranium are rarely seen.

SCURVY.[1]

(Scorbutus; Barlow's Disease.)

Definition.—A constitutional disease due to errors of diet, characterized in infants by hemorrhages from the mucous

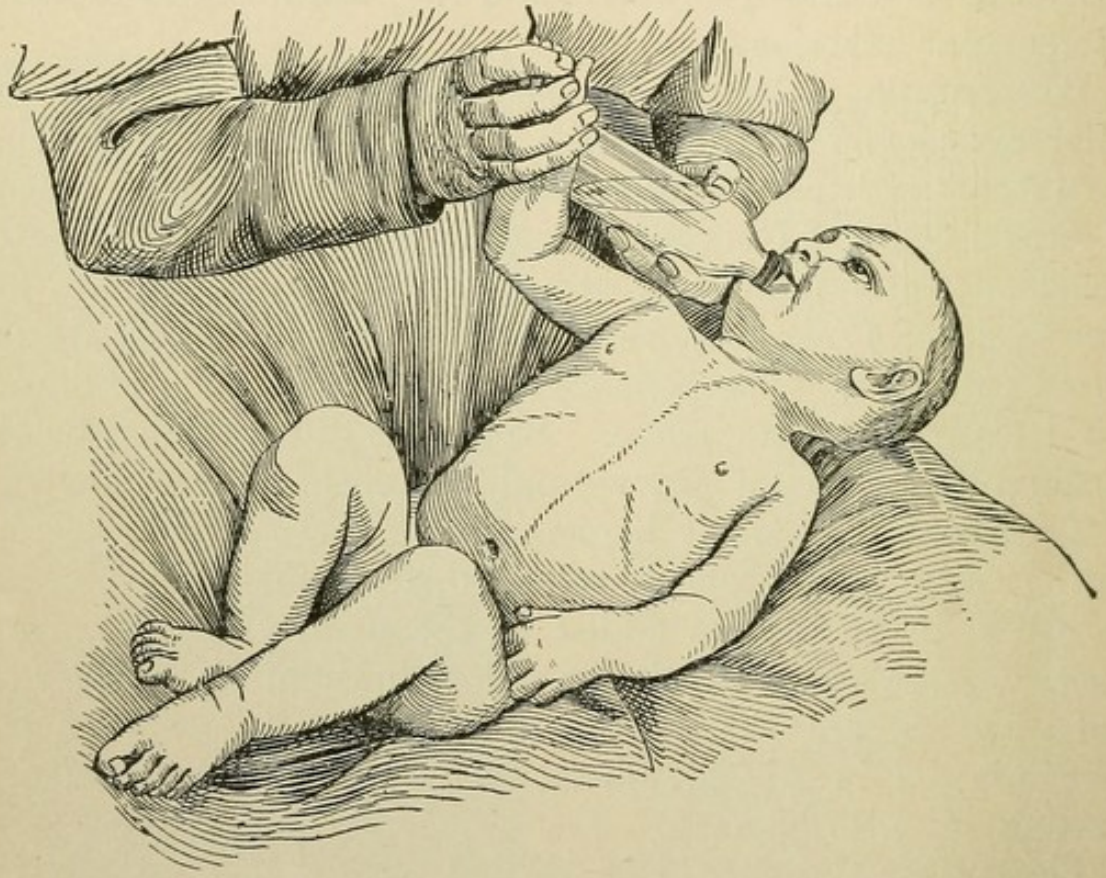


FIG. 34.—Infantile scurvy: Characteristic attitude of the legs (Northrup and Bovaird).

membranes and under the skin, by swelling and pain about the larger joints, by an ulcerative stomatitis, and a severe anemia. It is frequently associated with rickets.

Etiology.—Food which is not fresh seems to be the causal factor. The American Pediatric Society found that the kind of food used in the cases reported was as follows:

[1] "American Pediatric Society Report," *Archives of Pediatrics*, July, 1898, p. 481. J. L. Morse, "Scorbutus, Infantile," *Journal of the American Medical Association*, April 14, 1906, p. 1073. G. F. Still, 'Scurvy, Infantile," *British Medical Journal*, July 28, 1906, p. 186.

Proprietary infant food, sterilized milk, condensed milk, pasteurized milk, cows' milk unboiled, breast milk. The former are common, and the latter rare, causes. The use of the improper diet usually covers a period of several months. The greatest number of cases are between seven and ten months of age.

Lesions. — Hemorrhages, especially under the periosteum, about the large joints, and hemorrhages elsewhere and changes in the blood-vessels, are the common findings. Other changes are given under the head of symptoms.

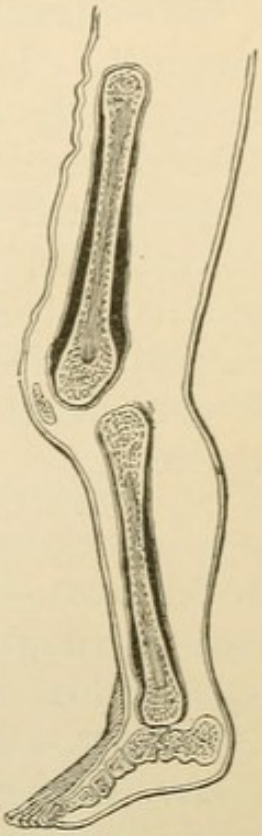


FIG. 35.—Vertical section of the thigh and leg in a case of infantile scorbutus. The dark areas along the femur and tibia represent subperiosteal hemorrhage (W. P. Northrup).

Symptoms.—The child becomes anemic, sometimes cachectic in appearance, and it is fretful and irritable. Pain in one or more joints is one of the earliest manifestations. The gums swell and bleed readily, and sooner or later there is an ulcerative stomatitis. There is a great tendency to hemorrhage, and this may take place almost anywhere, as nosebleed, hemorrhage from the stomach or bowel, or any of the mucous membranes. There may be hematuria. Hemorrhages may take place under the skin, and ecchymoses (black and blue spots) may be noted, especially about the larger joints. There may be effusion or hemorrhage into the larger joints, causing swelling, or it may be under the periosteum or between the muscles, causing swellings. These are liable to be symmetric. Hemorrhage into the orbit may cause protrusion of the eye. There may be edema or ecchymoses of the eyelid. There may be pseudoparalyses, and separation of epiphyses is not uncommon in advanced cases. There may be edema, especially of the extremities. Slight fever is not uncommon.

Diagnosis.—The character of food is important, and scurvy should always be borne in mind when there is a his-

tory of an absence of fresh food. Rheumatism is rare under one year of age, yet the pain and swelling most often lead to the erroneous diagnosis of that disease. Scurvy may be mistaken for sarcoma, osteomyelitis, or abscess, acute anterior poliomyelitis, or other joint or spinal disease. If separation of the epiphysis occurs it may be mistaken for fracture. It may be confused with nephritis. Antiscorbutic treatment clears up the diagnosis in almost all cases.

Prognosis.—Good if seen early; poor if seen very late. Untreated cases usually end fatally.

Treatment.—A proper diet and the administration of fresh fruit juice. One-half to three or four ounces of orange juice a day, given in four or five doses. Fresh ripe peach juice, grape juice, or lemon juice may be substituted. For older children the addition of fresh-beef juice and potato is of service.

DIABETES MELLITUS.[1]

Definition.—A symptom complex, the most marked symptoms being glycosuria, polyuria, increased thirst, and a progressive loss of weight.

Etiology.—Rare in infancy and childhood. Undoubted cases have been reported as early as four months. The tendency to the disease increases with age. Heredity is marked as a cause. Blows on the head may precipitate the disease. Too much starch and sugar may bring it on where there is a predisposition.

Pathology.—Not clear. Lesions have been found in the floor of the fourth ventricle, and in the pancreas.

Symptoms.—Polyuria is marked, more during the day than at night. From 1 to 5 liters or more may be excreted daily. The child's napkins must be changed twenty or thirty times a day. Enuresis is frequent. Thirst is marked. The appetite is usually ravenous. Mouth and tongue are dry; the gums bleed easily. Constipation is usually present. Skin is dry and scaly and frequently eczematous. Furunculosis and pruritus are common. Edema may be present.

[1] Stern, *Archives of Pediatrics*, June, 1902, p. 425, and Aug., 1904, p. 617.

The wasting is rapid and marked. Headache and neuralgia are common. Patellar reflexes may be diminished or absent. The child becomes irritable and capricious. Insomnia is marked. There may be blindness or diabetic cataract.

The disease comes on suddenly and runs a rapid course, lasting usually a few weeks or months, although it may last a year or two. Death is from pneumonia, tuberculosis, or coma.

Diabetic Coma.—There may be prodromes, a sweetish chloroform-like odor to the breath and diacetic acid in the urine. There is apathy and then loss of consciousness. The pupils are fixed and equal, either dilated or contracted; patellar reflexes are lost. Temperature may be lowered or sometimes raised. Pulse rapid and breathing irregular and sighing. Child becomes algid and cyanotic and death takes place in from eighteen to thirty-six hours.

Urine in Diabetes.—As in adults. Specific gravity, 1.030 to 1.040; marked glycosuria; and there may be acetone or diacetic acid in the urine.

Diagnosis.—From diabetes insipidus, lactosuria, and alimentary glycosuria.

Prognosis.—Always bad.

Treatment.—Dietetic measures are rarely tried with diabetic children, owing to the hopelessness of the condition. They should, however, be given a trial. Feed on proteid food, fats, and alcohol. Reduce starches and sugars or absolutely prohibit them. v. Noorden's oatmeal cure may be tried. (Well-cooked oatmeal, to which vegetable or egg albumin and butter has been added; alcohol is also allowed. Meat or vegetables allowed once a week. Gradually return to regular diet.) Soy beans in combination with an otherwise carbohydrate-free diet may reduce the amount of sugar in the urine.

Prophylactic Diet.—In diabetic families the amount of carbohydrate food should be limited.

Drugs.—The following are a few of those recommended: morphin, codein, bromid of potassium, antipyrin, and lactophosphate of lime.

DISEASES OF THE MOUTH AND PHARYNX.[1]

PERLÈCHE. (Lemaistre, 1886.)

A grayish-white ulceration, usually at the angle of the lips, caused by constant licking. It may be confused with a

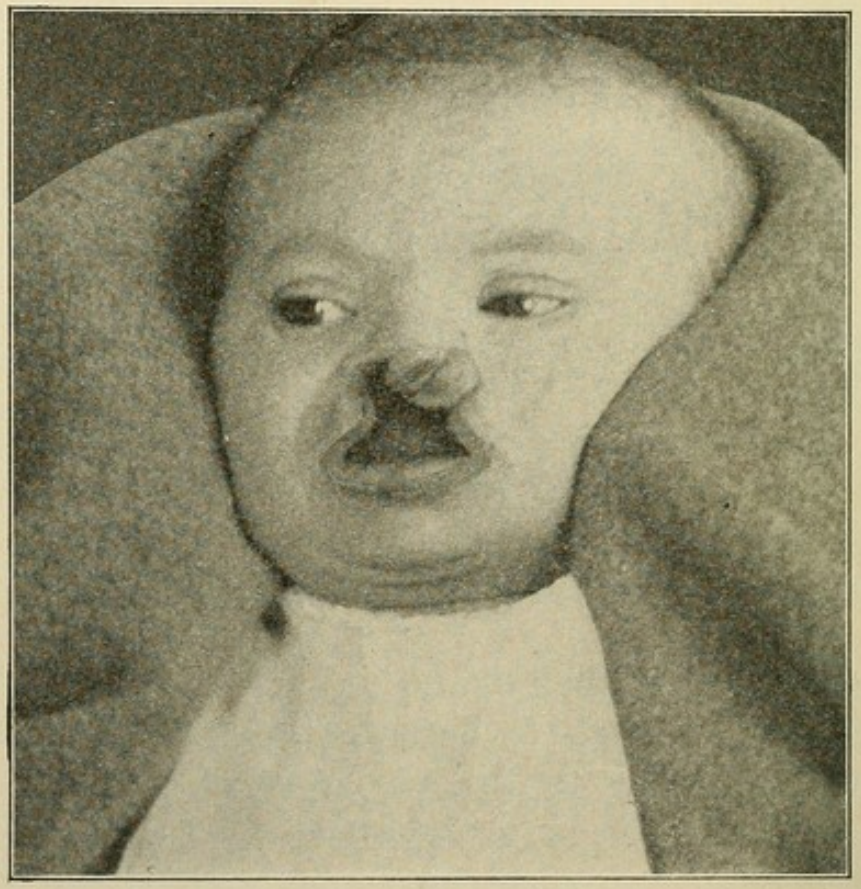


FIG. 36.—Double harelip and cleft palate. The prominence on the left side of the deformity shows the protruding intermaxillary bone, with the skin of the median line of the lip covering it (skin of frontonasal process) (Eisendrath).

syphilitic mucous patch. Burnt alum or nitrate of silver should be used with antiseptic washes and dusting powders.

HARELIP.[2]

Due to incomplete fusion of one or both lateral processes to the central process in the development of the face. May

[1] Mayer, "Affections of the Mouth, Throat," etc., *American Journal of the Medical Sciences*, 1902.

[2] G. V. I. Brown, "Hare-lip and Cleft Palate, Surgical Correction of," *Journal of the American Medical Association*, March 18, 1905, p. 848.

be single or double. Interferes with sucking and is an unsightly deformity.

Operation should be performed. Opinions differ as to the best time to operate. In simple cases it may be performed after one month, and the more serious ones after six months.

CLEFT PALATE.[1]

This is frequently associated with harelip. The children are generally weakly and apt to die from inanition or intercurrent affections. Great care in feeding and great cleanli-

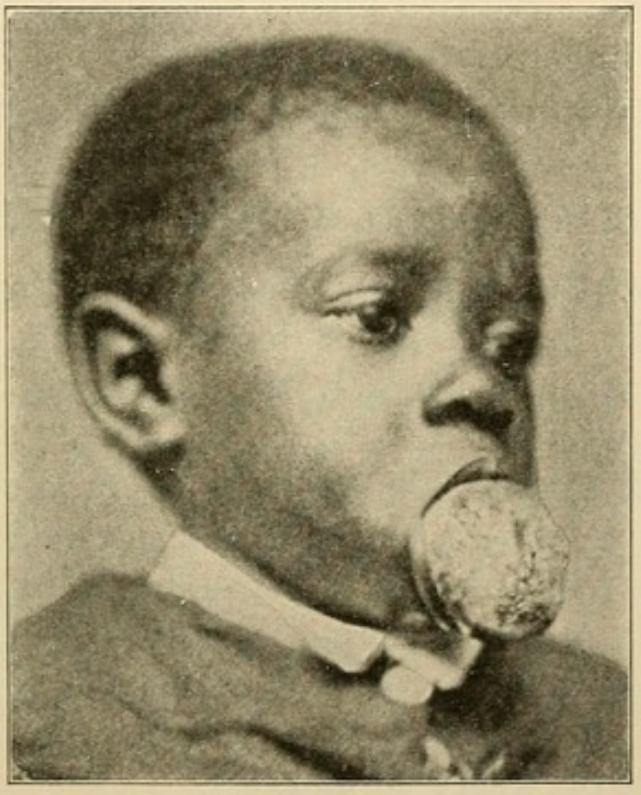


FIG. 37.—Macroglossia (Dandridge).

ness about the mouth are required. Feeding may be done with a spoon, a long medicine dropper, or by a stomach tube. The mouth should be frequently swabbed with a mild antiseptic solution.

Operations should be deferred until the child is from two to six years old, according to the general condition and the severity of the deformity.

[1] Brown, *Journal of the American Medical Association*, March 18, 1905.

CONGENITAL HYPERTROPHY OF THE TONGUE.

This is due to disease of the lymphatics, and demands surgical treatment. It should not be confused with the protruding tongue of the cretin.

OTHER DEFORMITIES.

Tongue-tie.—This is due to the frenum extending to the tip of the tongue, holding it down, and interfering with speech and sometimes with sucking. Inability to speak may depend solely on this cause. It should be divided with the scissors and separated to the normal length by pressing back with the fingers.

Bifid tongue and **bifid palate** may be met with.

EPITHELIAL DESQUAMATION OF TONGUE.

Acute Forms.—The margins of the tongue are red; the center white. The red, or denuded, parts of the tongue advance in crescentic areas until the entire tongue is red. Lasts several weeks.

Chronic Form.—The epithelium desquamates slowly and irregularly. The denuded patch is red and is bounded by a crescentic white line of white and thickened epithelium. The remainder of the tongue is normal. These lines of desquamation move about over the tongue. It lasts months or years, is of no importance and requires no treatment. It is often a cause of worry to mothers.

GLOSSITIS.

Acute swelling of the tongue may occur in urticaria.

Inflammation of the tongue may occur from infection—usually from a tooth. Local inflammations, with thickening of the tongue, are common from the same cause.

Treatment.—Liquid food, nasal feeding if necessary. Cold mouth-washes or ice in the mouth. If interfering with respiration, scarification or needle punctures.

TONGUE SWALLOWING.

May occur in pertussis and other conditions. If not relieved may cause death by interfering with respiration. In weak infants the tongue may fall back into the pharynx and cause asphyxia.

ULCER OF THE FRENUM.

This is usually seen in weakly infants, and especially in those who have pertussis or some other form of cough. It is caused by the central incisors coming in contact with the tongue. Burnt alum or nitrate of silver application is usually efficient.

RIGA'S DISEASE.

This is a rare condition where there is an ulcerated papilloma of the frenum. It is an indolent ulcer, quite hard, and covered with a grayish false membrane. It requires surgical treatment.

ALVEOLAR ABSCESS.

This comes from decayed teeth, and causes great swelling at the side of the face and of the jaw. The abscess, of its own accord, generally breaks into the mouth. It may open externally or into the nose or antrum, or it may cause necrosis of the bone, and open into the maxillary sinus. Decayed teeth should be filled or drawn, and an antiseptic mouth-wash used to prevent abscess. When it has already formed it should be opened and treated like any other abscess.

DIFFICULT DENTITION.[1]

Roughly speaking, about one-third of all infants cut their teeth without any trouble, about one-third have slight disturbance of their general health, while the remaining third are made really ill by the cutting of each tooth. Sometimes one tooth will cause trouble, while others do not. Before making a diagnosis of difficult teething a most careful examination should be made. The following symptoms may at times be

[1] L. Guthrie, "Dentition, Primary, Disorders Associated with," *Practitioner*, October, 1905, p. 547.

caused by, or accompany, difficult teething: Restlessness, sleeplessness, fever, stomatitis, vomiting and diarrhea, enlargement of the cervical glands, eczema and urticaria, bronchitis, and convulsions; this last especially in rickety children.

Treatment.—If the gum is swollen and the tooth nearly through, the former may be lanced; rubbing it with a silver thimble or with the finger covered with gauze may give relief. A dose of calomel often relieves the fever or gastro-intestinal symptoms. The restlessness and sleeplessness may be relieved by rubbing the gum with a drop or two of paregoric, or applying sodium bromid in solution with a little glycerin, or by the internal use of bromids, or of bromids and chloral, or of bromids and phenacetin, or codein and antipyrin.

DISEASES OF THE UVULA.

Uvulitis.—This is rare. There is swelling, elongation, and edema of the uvula. There is an irritating cough, and there may be interference with swallowing. Ice in the mouth, needle puncture, and astringent applications are indicated.

Elongated Uvula.—This is probably congenital, but is increased by repeated inflammations. There is an irritating cough and often asthmatic attacks on lying down. Diagnosis is made by inspection. A small amount of the uvula should be cut off.

BEDNAR'S APHTHAE.

There are two symmetric ulcerations over the hamular process of the palate bone. The mucous membrane at this point has poor circulation, owing to frequent stretching every time the pterygomaxillary muscle is contracted, as in opening the mouth. Any abrasion of the mucous membrane at this point, as by rough washing of the mouth, results in an intractable ulceration.

Treatment.—Touch twice daily with 10 per cent. silver nitrate solution and keep the mouth clean.

CATARRHAL STOMATITIS.

This is caused by taking irritating or overheated things into the mouth, and is also present as a complication of many of the infectious diseases and in teething.

There is redness and swelling of the mucous membrane with an increased flow of mucous and saliva. There may be slight swelling of the tongue and lips. The cervical glands are slightly enlarged, and there is some pain on taking food.

Treatment.—Keep the mouth clean by using antiseptic and mildly astringent washes. If food is refused give it cold. If any ulcerations occur powdered burnt alum may be applied.

HERPETIC STOMATITIS.

(Aphthous Stomatitis; Vesicular Follicular Stomatitis.)

This is caused by herpetic eruption (fever blisters) in the mouth. The top of the little vesicle is rubbed off and a small round or oval, punched-out ulcer with bright-red edges and a white base remains. It is common after the first year. The ulcers are over the tongue and also on the cheeks, and come on in successive crops. They are very painful.

Diagnosis.—From diphtheria, which it may somewhat resemble if several ulcers coalesce, and from Koplik spots.

Treatment.—Apply burnt alum or touch with nitrate of silver and use antiseptic mouth washes.

THRUSH.[1]

(Sprue; Soor; Muguet.)

This is a form of stomatitis due to the growth of a fungus (the Saccharomyces albicans, Grawitz) in the mouth. It is most frequently seen in the mouths of nursing infants where there is a lack of cleanliness. It rarely affects other parts of the body.

It occurs as white flakes or crusts which look like milk

[1] Langford Symes, *International Medical Magazine*, vol. iii., No. 12.

seen in the mouth immediately after feeding. It cannot, however, be wiped off, and when it is removed leaves some bleeding-points.

The **diagnosis** is easy. The fungus may be easily demonstrated under the microscope. The outlook is good, but in very weak infants it may interfere with the taking of food.

Treatment.—Cleanliness regarding nipples, nursing-bottles, and everything which comes in contact with the infant. Nipples should be kept in boric acid solution. Cleanse the mouth carefully but gently, before and after feeding, with some mild antiseptic mouth-wash. Where this does not relieve it paint the mouth with a boric acid solution or a solution of protargol (3 per cent.) three or four times a day and feed by gavage.

ULCERATIVE STOMATITIS.

Definition.—An ulceration of the mouth starting on the gums at the edges of the teeth and spreading to the other tissues.

Etiology.—It is seen only in children with teeth. It occurs in mercurial, lead, and phosphorus poisoning, in scurvy, from uncleanliness, and also in children who are weak and run-down in health.

Symptoms.—The ulcers are covered with a yellowish-gray deposit, the gums are swollen, congested, and bleed easily. The teeth may loosen and fall out. Necrosis of the jaw may occur. There is a very foul odor to the breath and profuse salivation. The cervical glands are swollen, tender, and may suppurate. As a rule, there is marked constitutional disturbance consisting of high fever, loss of appetite, malaise, and the like.

Diagnosis.—The condition is self-evident. The cause should be sought.

Prognosis.—Good with proper care and treatment. If neglected it may prove fatal.

Treatment.—Remove cause when known. In scurvy give fresh fruit and proper diet, and in all cases keep the mouth

clean with antiseptic mouth-washes. Peroxid of hydrogen (1 : 4), permanganate of potassium (1 : 4000), or a saturated solution of chlorate of potassium are the most satisfactory. Burnt alum or nitrate of silver may be used to hasten the healing of the ulcerations.

Internally, chlorate of potassium is almost specific. Two grains (half a teaspoonful of the saturated solution) may be given hourly for the first day and every two hours for one or two more days. It should be well diluted. The urine should be watched. Later, acids and iron should be used with general building-up treatment. The diet should in all cases be antiscorbutic and as nourishing as possible.

GANGRENOUS STOMATITIS.

(Cancrum Oris; Noma.)[1]

Definition.—A form of gangrene seen in children, usually in the mouth, but also affecting other mucocutaneous orifices, as the vulva, anus, prepuce, the external auditory canal or the nose.

Etiology.—It is rare and is seen usually in institution children and almost always follows an attack of some of the infectious diseases, as measles or scarlet fever. It is apparently contagious, but no one organism has been described as the cause, although many have been mentioned as the etiologic factors.

Symptoms.—It begins as a small discolored spot on the lip or cheek. This is hard and becomes rapidly larger. It soon becomes black and breaks down at the center with the formation of a dark necrotic mass which has a very offensive odor which may be the first thing noted. There is edema of the cheek, and the gangrene spreads rapidly. The teeth loosen and fall out, and the jaws necrose. The cheek may be perforated, and most of the face may slough away. There is little or no pain. There may be high temperature, which

[1] Bloomer and Macfarland, *American Journal of the Medical Sciences*, November, 1901. "Noma," *British Medical Journal*, April 15, 1909, p. 473. Neuhof, "An Epidemic of Noma," *American Journal of the Medical Sciences*, vol. cxxxix., 1910, p. 705.

grows less as the child weakens. The child is apathetic and dull; may be almost comatose. There is muscular relaxation and often diarrhea.

Diagnosis.—This is, as a rule, easy.

Prognosis.—The disease lasts from a week to ten days, and death occurs in three-fourths or more of the cases.

Treatment.—Radical early treatment is the only hope.

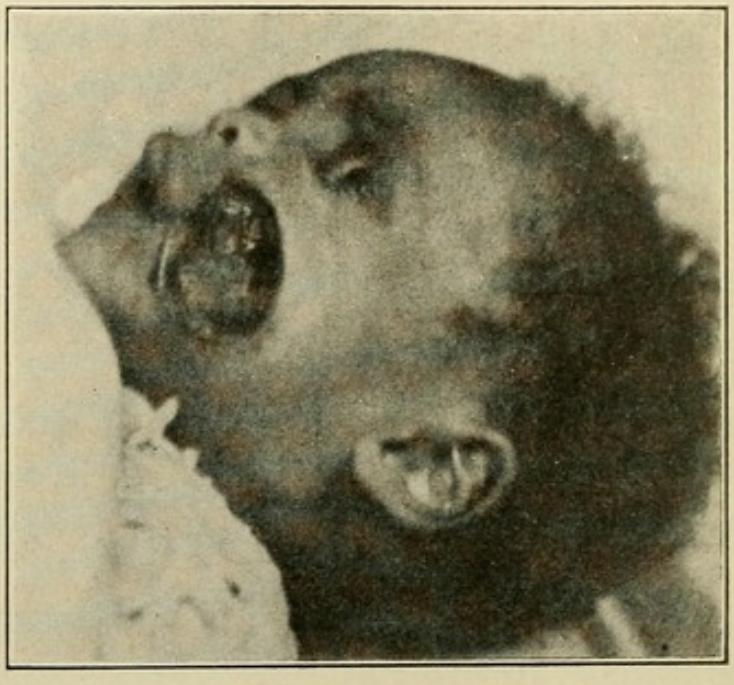


FIG. 38.—Gangrenous stomatitis.

The diseased area may be removed by excision or by actual cautery. Another method of treatment is to cleanse with peroxid and then paint twice daily with a 10 per cent. chromic acid.

Injections of carbolic acid may be made around the entire area, a little outside of the gangrene. Nitric acid may be injected into the mass. Antistreptococcic and antidiphtheritic serum have been used with benefit in some cases. The frequent use of antiseptic washes is required. The cases should be isolated.

OTHER FORMS OF STOMATITIS.

Stomatitis may occasionally be caused by the gonococcus, the diphtheria bacillus, and other organisms. A syphilitic stomatitis is also seen.

DISEASES OF THE TONSILS.[1]

Acute catarrhal tonsillitis is seen in acute pharyngitis, but rarely alone.

CROUPOUS TONSILLITIS.

This is a more severe form in which there is a fibrinous exudate which first fills the crypts and then spreads over the entire tonsil, usually affecting both sides. The exudate produces a grayish-yellow film (which can be swabbed off without any bleeding-points) over the tonsil. The streptococcus is usually present. Symptoms and treatment like follicular tonsillitis.

Diagnosis.—From diphtheria by the high fever and that it may be wiped off without leaving bleeding-points.

ULCEROMEMBRANOUS TONSILLITIS (Vincent, 1896).[2]

A process similar to ulcerative stomatitis caused by Vincent's bacillus. It is often unilateral. There is a dirty-gray false membrane with superficial ulceration. The breath is very foul, as in ulcerative stomatitis, with which it may be associated. The lymph glands at the angle of the jaw are swollen. There is no constitutional disturbance of any moment.

Diagnosis.—From diphtheria by means of bacteriological examination, by absence of constitutional symptoms.

Treatment.—Chlorate of potassium internally, as in ulcerative stomatitis, the local application of nitrate of silver, and the use of antiseptic mouth-washes.

FOLLICULAR TONSILLITIS.

Definition.—An inflammation of the entire tonsil where the crypts are filled with plugs of exudate. The constitutional disturbance is very great for the small amount of local trouble.

[1] G. B. Wood, "Tonsils, Lymphatic Drainage of," *American Journal of the Medical Sciences*, Aug., 1905, p. 216. Chapin, *Medical News*, vol. lxxiv., No 9.

[2] Sobel and Hermann, *New York Medical Journal*, December 7, 1901.

Etiology.—Rare in infants, but common during childhood. Frequent attacks in the same child. Often associated with the presence of rheumatism. The staphylococcus and the streptococcus can usually be found in the exudate.

Pathology.—Acute swelling and congestion of the whole tonsil, with an exudate plugging up the crypts, and sometimes a fibrinous exudate covering the remainder of the tonsil, but not extending beyond it.

Symptoms.—On inspection the tonsils are seen to be swollen and the crypts filled with yellowish plugs, which may be pressed out, and sometimes there is a film of exudate

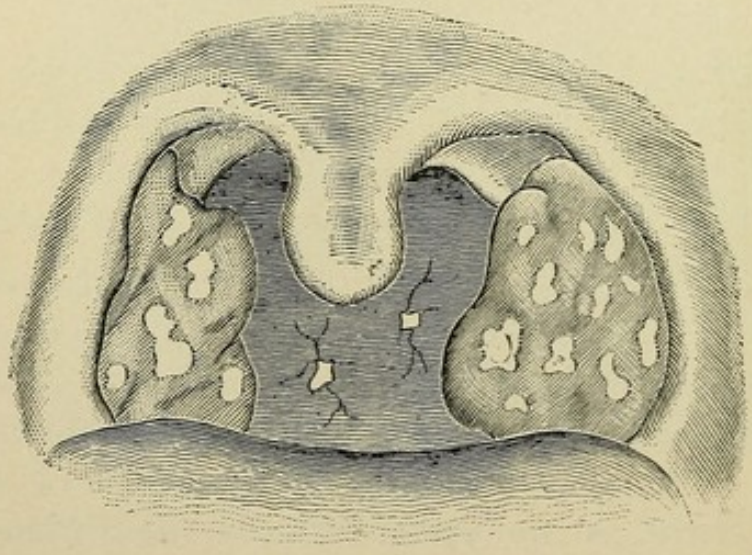


FIG. 39.—Acute infectious pseudomembranous tonsillitis (follicular): The two whitish points on the posterior wall represent exudate formed on isolated muco-lymphoid follicles (Casselberry).

(which can be wiped off with a swab) over the tonsil. Both sides are affected.

There is sudden onset, often with a chill, followed by high fever, which may be 104° or 105° F. There is headache, backache, and pains in the limbs. There may be vomiting and diarrhea, especially in young children. The glands at the angle of the jaw are, as a rule, not much enlarged, and the throat is not very painful. The symptoms gradually grow better and disappear in three or four days.

Diagnosis.—From diphtheria, scarlet fever, influenza, pneumonia, and malaria. By inspection of the throat and

the presence or absence of the signs and symptoms of these diseases (which see).

Prognosis.—Good.

Treatment.—Relieve the pain by using phenacetin or antipyrin and codein. Give salicylate of sodium where there is a history of rheumatism. Give effervescing draught or limewater and cinnamon water to relieve nausea. Antiseptic mouth-washes may be used.

PHLEGMONOUS TONSILLITIS.

(Peritonsillar Abscess; Quinsy.)

Definition.—A unilateral inflammation of the tissues about the tonsil, and often of the tonsil itself, which usually suppurates, but which may go on to resolution. Sometimes it may extend to the pharyngeal wall. It is rare in children.

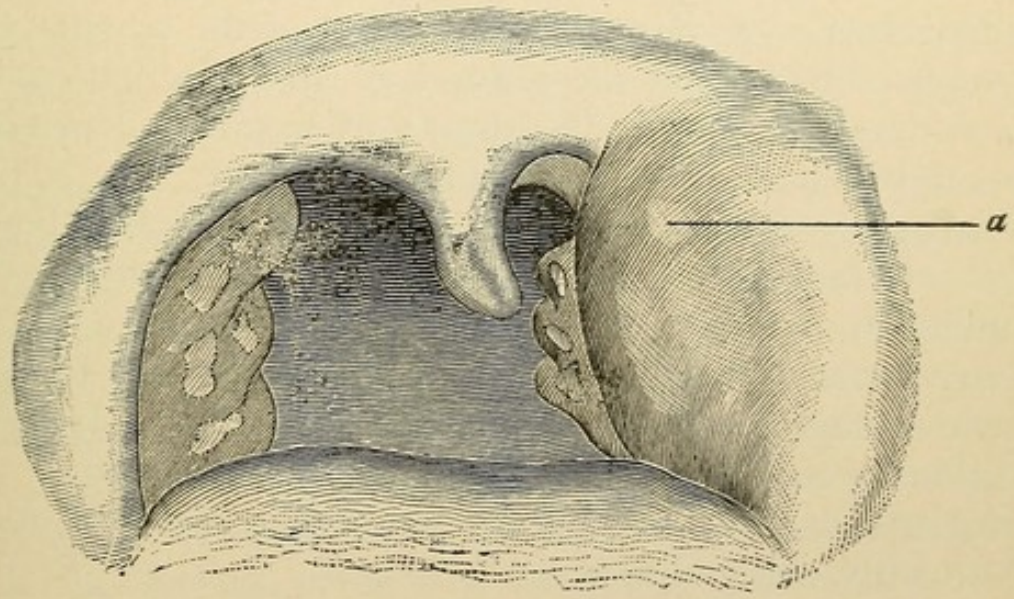


FIG. 40.—Peritonsillar abscess: *a*, Point for puncture (Casselberry).

Etiology.—Exposure or excesses. Infection with pus-forming bacteria.

Symptoms.—Like follicular tonsillitis as regards general symptoms, but less intense the first day, and increasing as the disease progresses.

There is pain in the throat, difficult swallowing, and pain on opening the mouth. There may be tenderness externally. On the first or second day little can be seen which, with the

presence of symptoms of sore throat, is extremely suggestive. After one or two days there is marked swelling in and about the tonsil, and the uvula may be pushed to one side. Fluctuation may be made out after the first few days. If left alone the abscess forms and breaks, as a rule, inside of a week.

Treatment.—Salol in rather large doses may be given if the case is seen early. Phenacetin and codein may be given to relieve the pain. Hot or cold applications, whichever is more grateful to the patient, may be used. Open as soon as fluctuation is well determined. Relief after opening is usually immediate.

CHRONIC HYPERTROPHY OF THE TONSILS.

(Chronic Tonsillitis.)

Definition.—A general enlargement of the tonsil. Both the lymphoid tissue and the connective tissue are increased—all grades are met with. The degree of hardness depends on the amount of connective tissue present.

Etiology.—Associated with adenoids; also in "lymphatism." It is found in certain families. It is quite a common affection.

Symptoms.—Similar to those produced by adenoids, with which this condition is usually associated. Difficulty in swallowing and disturbed sleep may be troublesome.

Diagnosis.—By inspection, when the enlarged tonsils can be readily made out.

Prognosis.—After puberty they atrophy somewhat.

Treatment.—If sufficiently enlarged to cause symptoms they should be removed by using a tonsillotome. Syrup of the iodid of iron is a useful tonic for these children.

RETROPHARYNGEAL ABSCESS.[1]

There are two forms: The idiopathic abscess of infancy, and that secondary to caries of the vertebræ.

[1] Ripley, *Archives of Pediatrics*, February, 1884, p. 104.

Idiopathic Abscess.—This is a suppuration of the retropharyngeal lymph nodes and is the same process as that described as the acute adenitis of infants.

Etiology.—Three-fourths of the cases occur under one year of age. They follow rhinitis, pharyngitis, or the acute infectious diseases.

Symptoms.—There is usually a history of an attack of one of the above. A week or two later there are fever and constitutional disturbance. The cause of this may not at first be apparent. Local symptoms soon make their appearance. These are dyspnea, which may be mostly inspiratory and most marked on lying down; difficulty in swallowing and refusal to nurse; regurgitation of the food through the nose; there may be cough and a nasal character to the voice; there may be complete aphonia. Snoring is noted. The head is thrown back and torticollis may be the first symptom observed. There is an abscess swelling, to be made out by inspection or palpation, in the back of the pharynx, and it may also be apparent just below the angle of the jaw to the front of the sternomastoid muscle.

Diagnosis.—By digital examination of the pharynx, which should be made in every case where there is dyspnea. Retraction of the head with dyspnea, difficult swallowing, and mouth-breathing are the principal symptoms. Exclude sarcoma.

Prognosis.—This is fairly good if the diagnosis is made. The abscess may open itself. Death may result from asphyxia or from rupture during sleep, when the pus may block the larynx, or from a secondary pneumonia or septicemia.

Treatment.—Hot applications to the throat until fluctuation can be ascertained, and then open immediately. Opening through the mouth is ordinarily to be preferred, but sometimes it can be opened to advantage externally.

Retropharyngeal Abscess from Pott's Disease.—This is similar to the above, but comes on very slowly, and generally there are symptoms of Pott's disease for some time before there is any abscess. They do not heal promptly as the idiopathic abscesses do, but leave a suppurating sinus.

The diagnosis is made by digital examination. The opening should be made externally, just below the jaw and in front of the sternomastoid muscle.

ACUTE PHARYNGITIS.

Definition.—An inflammation of the pharynx which may be primary or may occur as a part of some other disease, especially the exanthems.

Symptoms.—There is at first dryness of the throat; later redness, swelling, edema, and increased secretion. There is pain at the angle of the jaw, which is increased on swallowing. The cervical lymphatics are slightly enlarged.

There is fever, from 100° to 103° F. or even higher, and there may be considerable malaise. The symptoms generally pass off in a day or two.

Diagnosis.—Measles may generally be distinguished by Koplik spots and the other catarrhal symptoms. Scarlet fever cannot be excluded until sufficient time has elapsed to be sure there will be no rash. Influenza can be told by the presence of the other catarrhal and constitutional symptoms.

Treatment.—Open the bowels with calomel or castor oil. Rest in bed, liquid diet, ice to suck, and an effervescing draught if there is vomiting. Phenacetin or codein and antipyrin can be used if there is much pain or nervousness.

RETRO-ESOPHAGEAL ABSCESS.[1]

A rare condition due to Pott's disease or to breaking down of the retro-esophageal lymph nodes. Symptoms are dyspnea, often spasmodic, and usually most marked on inspiration. There may be spasmodic cough and a change in the voice. Most cases die from pressure on the pneumogastric or from rupture. Rupture into the esophagus may rarely result favorably.

INFLAMMATION OF THE ESOPHAGUS.

The esophagus is seldom diseased. Diphtheria may very rarely extend into it from the pharynx. Lacerations due to

[1] Griffith, *Archives of Pediatrics*, January, 1898, p. 1.

swallowing rough or sharp objects usually heal promptly. Ulcers are rare in early life. Catarrhal inflammations from swallowing hot or irritating food cause slight pain on swallowing. This form heals in a few days.

Corrosive Esophagitis.—This is comparatively frequent and results from the child drinking lye or strong acids. If the patient survives the poison, extensive ulceration remains, which gradually heals, leaving large scars. These gradually contract, producing stricture of the esophagus. The immediate symptoms are severe burning, great thirst, inability to swallow, or great difficulty and pain on swallowing. Edema of the glottis may prove fatal. Symptoms of stricture come on after several months or years. The treatment of the stricture is surgical, generally consisting of the passing of bougies, although some cases are amenable to operation.

MALFORMATIONS OF THE ESOPHAGUS.[1]

These are of various kinds. Fistulæ may open into the trachea or through the neck. The esophagus may be absent, end in a blind pouch, or be strictured or constricted.

Many of these deformities may be corrected by surgical operation. Complete obstruction is always fatal. The symptoms are vomiting after a very small amount of food has been taken and inability to pass a stomach-tube.

[1] Marsh, *American Journal of the Medical Sciences*, August, 1902, p. 304.

DISEASES OF THE STOMACH.

VOMITING.

Vomiting is an exceedingly common symptom in infancy and may be due to the following causes:

1. Overfilling the stomach.
2. Outbursts of anger.
3. Stricture or obstruction in the esophagus.
4. Acute gastric indigestion.
5. Pyloric stenosis.
6. Acute intestinal obstruction.
7. Appendicitis and peritonitis.
8. Acute infectious diseases, especially at the onset.
9. Fever from almost any cause in infants may be accompanied by vomiting.
10. Brain-pressure, as in acute meningitis and brain tumor.
11. Any persistent prolonged cough, but especially whooping-cough.
12. Toxic. From the accumulation of poisons in the blood, as in cyclic vomiting, uremia, the absorption of ptomaines from the intestinal tract, etc.
13. Reflex irritation of the pharynx, as in sucking the hands.
14. Habit.

Chronic vomiting is generally due to habit or to chronic indigestion.

The treatment depends on the cause.

CYCLIC VOMITING.[1]

Definition.—Attacks of vomiting lasting several days, uninfluenced by any known treatment, and recovering spontaneously. The attacks come on at regular or irregular intervals without any apparent cause.

Etiology.—It may begin as early as two years of age.

[1] Shaw, *Archives of Pediatrics*, November, 1902, p. 825. Shaw and Tribe, "Recurrent Vomiting," *British Medical Journal*, February, 1905, p. 347. F. Langmead, "Vomiting, Recurrent, of Children," *British Medical Journal*, February 18, 1905, p. 350.

The sexes are affected equally. Sometimes fatigue or excitement may seem to precipitate an attack.

Pathology.—This is unknown, although the condition is apparently an auto-intoxication, usually an acid intoxication. The urine gives evidence of congestion of the kidneys, and also contains indican and acetone, and usually diacetic acid. Holt and Herter point out that there is a disturbance of the ratio of uric acid and urea excreted. Normally it is about 1 to 54. In Holt's case it was 1 to 152 on the second day of the attack.

Symptoms.—There are often prodromes for a day or less, consisting of languor, headache, and malaise, and then the vomiting begins suddenly and is forcible and distressing. There may be slight temperature. The violent repeated vomiting causes great exhaustion and the child lies in an apathetic condition. There is great thirst. The abdomen is sunken and not tender.

Prognosis.—Usually good, although occasionally a case ends fatally. The vomiting ceases spontaneously after a few days. Toward puberty the attacks become less frequent and may stop altogether.

Diagnosis.—Meningitis, brain tumor, nephritis, acute indigestion, intussusception, and appendicitis must be excluded.

Treatment.—Calomel at the outset if seen before vomiting starts. After it begins nothing can be done to stop it, although large doses (ʒi–ij) of sodium bicarbonate, given by rectum, sometimes seem to shorten the attack. Give enemata of water every four or five hours and nutrient enemata when the case lasts over three days. When the vomiting stops, food may be cautiously given, albumin-water, barley-water, and milk and lime-water. Convalescence is rapid. Between the attacks a carefully regulated out-of-door life with a diet in which there is a lessened amount of sugar and starch, giving plenty of milk, eggs, meats, green vegetables, and stale bread. (See Auto-intoxication.)

GASTRALGIA.

Severe pain in the abdomen, which may be due to a number of causes. It recurs frequently in some children and causes great distress. It may be due to indigestion, to cold

feet, to chronic malaria, to drinking iced water, and in some cases apparently to irregular contraction of the intestines. Severe abdominal pain may also be caused by dorsal Pott's disease, pneumonia, diaphragmatic pleurisy and various diseases of the abdominal organs.

Treatment.—Rest in bed. Keep the child warm if chilled. Hot applications over the epigastrium, using either a hot water bottle, mustard plaster or turpentine stupes. Spirits of chloroform in five-drop doses with the compound tincture of cardamom given in very hot water usually gives prompt relief. Tincture of ginger, brandy and gin in hot water are also much used. A few drops of peppermint in water is a frequent household remedy.

In the interval a correct diet, careful hygiene, and in the frequently recurring attacks nux vomica or Fowler's solution of arsenic may be given.

ACUTE GASTRIC INDIGESTION.[1]

Etiology.—Usually from errors in diet, the use of indigestible, stale or unsuitable food. Frequently seen in other forms of illness from continuing diet suitable for health, but not for the weakened condition. It may be caused by exposure, overheating, and in infants from difficult teething.

Symptoms.—Pain and discomfort in the stomach followed by eructation or vomiting. There is distention of the abdomen in most cases. There is usually fever which may be alarmingly high. There are often marked nervous symptoms such as dulness or even stupor or extreme restlessness and often convulsions. These usually disappear promptly with proper treatment.

Diagnosis.—From acute gastritis and other conditions mentioned as causing vomiting.

Prognosis.—Good in previously healthy children. Weak children sometimes do badly. Death may be caused in either case from convulsions.

Treatment.—Empty the stomach and keep it at rest. In infants wash out the stomach; in older children give a

[1] Clarke, "Gastric Digestion in Infants," *American Journal of Medical Sciences*, vol. cxxxvii., 1909, p. 674.

large quantity of warm water and induce vomiting. Withhold all food for half a day, when, if the stomach is quiet, a little albumin-water may be given. Egg-water or whey may be substituted if desired. On the second day the same may be given with the addition of weak broths. After a day or two longer, if all goes well, peptonized or malted milk may be given or equal parts of milk and barley-gruel boiled together. If the child is breast-fed take it off the breast for a day and feed albumin-water or barley-water. The following day nursing may be allowed for a few minutes at a time and albumin-water and plain boiled water given in addition. The nursing time may be gradually increased.

Calomel may be given in small doses until the bowels move freely. After that equal parts of lime-water and cinnamon-water may be given in teaspoonful doses to allay the nausea. Chalk mixture or small doses of bismuth may be used in place of the above if it is necessary. Heat over the epigastrium is grateful; a hot water bag, mustard plaster, spice bag or turpentine stupes may be used.

ACUTE GASTRITIS.

Definition.—An acute inflammation of the stomach. Usually seen as a part of a gastro-enteritis, rarely uncomplicated. There is a catarrhal, a membranous, and an ulcerative form.

Lesions.—There is hyperemia of the stomach-wall and a marked increase in the mucus secreted. The glands are swollen and the stomach-wall infiltrated with an inflammatory exudate. In the membranous form there is a false membrane similar to that seen in diphtheria. It may be caused by true diphtheria, pseudo-diphtheria or occasionally complicating membranous entero-colitis. In the ulcerative form there are one or more small ulcerations. Various forms of bacteria have been found in cases of gastritis. Gastritis due to taking irritant poisons produces changes similar to those found in corrosive esophagitis.

Symptoms.—Similar to acute gastric indigestion, but more severe, more prolonged, and often there is vomiting of

blood, especially in the ulcerative form. The membranous form presents no especial symptoms.

Diagnosis.—It is impossible to distinguish it from acute gastric indigestion at the outset.

Prognosis.—Usually good, except in the corrosive form, which is usually fatal.

Treatment.—Wash out the stomach and give it rest. Diet and drugs as in acute gastric indigestion. Bicarbonate of soda or other alkalis may be given. Bismuth is one of the most efficient drugs.

CHRONIC GASTRIC INDIGESTION.

(Chronic Gastric Catarrh; Chronic Gastritis.)

Definition.—The symptoms of these conditions are about alike and they may be grouped together.

Etiology.—Repeated attacks of acute gastric indigestion, or the continued use of improper food, may cause it, or it may be a complication of other diseases.

Pathology.—There is infiltration of the stomach-wall, and in rare instances the presence of considerable connective tissue.

Symptoms.—There are lessened digestive ability, increased mucus, fermentation, and motor insufficiency. There are also vomiting, regurgitation of food, acid eructations, distention of the stomach, and pain. Tongue is coated; the appetite varies; there is restlessness and sooner or later malnutrition.

Prognosis.—Good under favorable surroundings and where proper treatment can be carried out. Bad where they cannot be properly managed.

Treatment.—**In Infants.**—Good hygiene is essential. Wash the stomach once a day, or oftener, if necessary. Proper food. (See Infant Feeding.) The meals must be smaller than recommended for a normal child and at greater intervals. Drugs are of little value. Hydrochloric acid and pepsin may be given. For eructations, if they continue after stomach washing, grain doses of sodium salicylate may be given.

Older Children.—Large quantities of hot water with bicar-

bonate of soda in it or Vichy water, may be taken slowly on rising and an hour before each meal.

Diet.—Milk which has been diluted with a carbonated water, lime-water or peptonized milk, koumiss, and rare meat should be given at the outset. Then the following may be added one after the other: Zwieback, toast, stale bread,

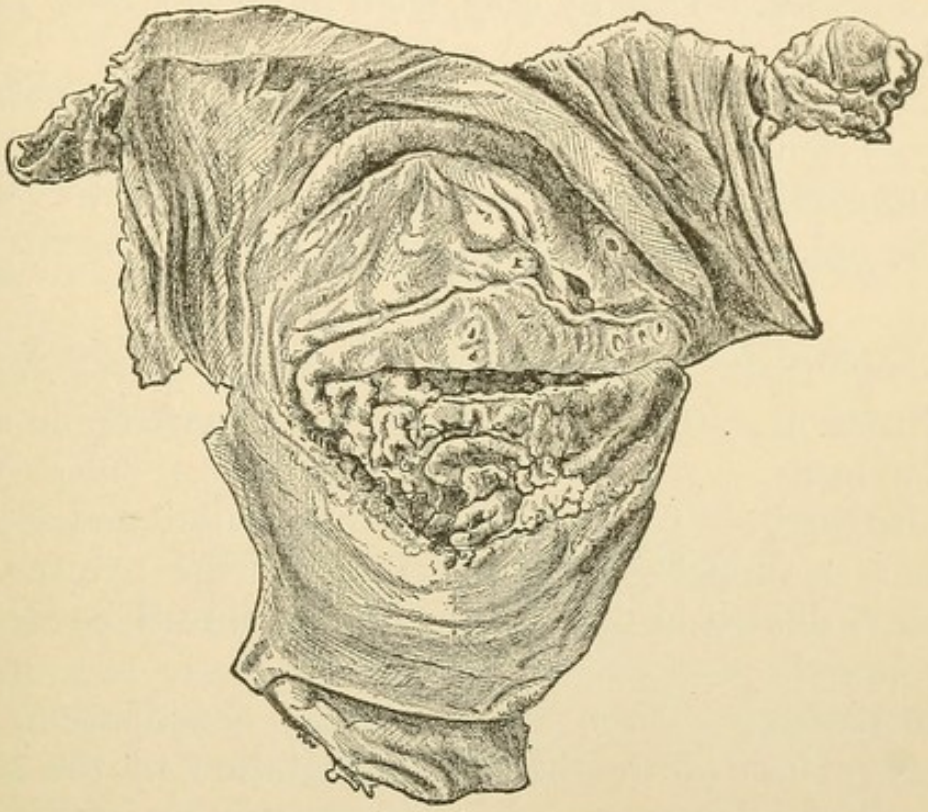


FIG. 41.—Stomach, showing ulcers and pseudomembranous exudation (Wollstein).

spinach, well-cooked cauliflower tops, asparagus tops, young peas (mashed), young green string beans, well-baked mealy potato (in small quantity). Later on, vegetables and more starchy food.

Prohibit all undigestible articles (see List, page 101).

Drugs.—Nux vomica or some other bitter tonic before meals, and hydrochloric acid after meals, are usually all that are needed. The peptonate of iron may be used if there is anemia.

DILATATION OF THE STOMACH.

This may be seen even in young infants, especially a moderate degree with chronic gastritis. There are usually symptoms of gastric indigestion and motor insufficiency.

The stomach is distended and can often be seen through the abdominal walls. The size may be determined by giving water and percussing the lower border of the stomach. If it is near the umbilicus it is dilated. The size may also be measured by filling the stomach with water and withdrawing it with a stomach tube.

Diagnosis.—Usually easy, from physical signs. Exclude dilated colon.

Prognosis.—Good if properly treated, bad if not. Bad in pyloric stenosis.

Treatment.—Smaller meals at greater intervals and treat the indigestion. Nux vomica is the most useful drug.

CONGENITAL STENOSIS OF THE PYLORUS.[1]

Definition.—This is a congenital hypertrophic stenosis of the pylorus.

Pathology.—The condition is congenital and the lesion consists of a funnel-shaped thickening of the pylorus. The stomach is dilated in most cases, and the intestines are empty and collapsed.

Symptoms.—There are vomiting, constipation, and a progressive loss of weight. The dilatation of the stomach can usually be demonstrated. The gastric peristaltic movements can be seen. The thickened pylorus can often be felt.

Diagnosis.—This may be difficult. In wasting infants with chronic vomiting unrelieved by the treatment of a skilled pediatrician, the condition should always be suspected.

Prognosis.—Practically all cases die unless treated surgically. About 50 per cent. recover with operation.

Treatment.—Three operations have been tried. Gastroenterostomy, Loreta's operation of forcibly dilating the pylorus, and pyloroplasty. The last has thus far given the best results. If operation is impossible, systematic washing of the stomach may be tried.

[1] Scudder and Quinby, *Journal of the American Medical Association*, May 27, 1905, p. 1665. Thomson, "Pyloric Hypertrophy," *Scottish Medical and Surgical Journal*, June, 1897, p. 511. Fischer and Sturmdorf, "Pyloric Stenosis," *Archives of Pediatrics*, May, 1906, p. 341.

ULCER OF THE STOMACH.[1]

This is rare in infants and young children. It may be seen in the hemorrhagic disease of the newborn, in acute gastritis, in tuberculosis, and there is an idiopathic form which tends to perforate.

Symptoms.—Pain, tenderness, vomiting (often with blood), bloody stools (black). If perforation occurs peritonitis follows.

Diagnosis.—Forms cannot be distinguished. The above symptoms are characteristic.

Prognosis.—Bad in most cases. Death may be due to perforation or to hemorrhage.

Treatment.—Rest in bed for at least three weeks, longer if necessary. Hot fomentations may be used if there is much pain or tenderness. Small frequent feedings are best, as a rule. Bismuth subnitrate may be used in large doses. If perforation occurs, immediate operation.

TUMORS OF THE STOMACH.

Carcinoma,[2] sarcoma, and lymphadenoma have been reported in infants and young children. They are all very rare.

HEMATEMESIS.

(Hemorrhage from the Stomach.)

This may be caused by the following: The hemorrhagic disease of the newborn, ulcer of the stomach, acute gastritis, the swallowing of blood from the nose or pharynx, and in nursing infants, blood from a fissured or ulcerated nipple, hemophilia, purpura, the purpuric forms of the infectious diseases, scurvy, and in young girls about puberty from vicarious menstruation.

If the blood is immediately ejected it may be bright red in color. If it has been in the stomach any length of time the color is dark and it is grumous. The stools are a tarry black.

If from a lesion in the stomach keep at rest, and give adrenal extract. Do not feed by the mouth, but by the rectum for a day or two.

[1] "Gastric Ulcer in the Young," *New York Med. Jour.*, Oct. 3, 1909, p. 837.
[2] Osler and McCrae, *New York Med. Jour.*, April 21, 1900, p. 581.

DISEASES OF THE INTESTINES.

MALFORMATIONS OF THE INTESTINES.

There may be stenosis or atresia at any point in the intestinal canal. The lesions are frequently multiple and usually at the upper part of the small intestine. Atresia is the more common. In stenosis the child may live weeks or even months; in atresia death usually takes place within a week after birth.

Meckel's Diverticulum.—This is the remains of the omphalomesenteric duct which connects the umbilical vesicle and the intestine during fetal life. When it persists it is usually seen as a blind pouch several inches long, coming off from the lower part of the ileum. It may occur in hernias. There may be a fibrous cord from it ending at the umbilicus, which is a cause of intestinal strangulation.

Deformities of the Rectum.—There are three deformities of the rectum. It may end in a blind pouch some distance above the anus. There may be an anus, and the lower part may be present, but separated from the upper by a membranous septum, or there may be a complete rectum but no anus. The last-named is easily operated upon successfully. The second may be sometimes, while the first is practically always fatal.

CONGENITAL ABSENCE OF THE ABDOMINAL MUSCLES.

This is a rare condition in which the abdominal muscles are either partially or entirely absent. The abdomen is enlarged and pendulous. The folds of the intestines and the peristaltic movements are plainly visible. On palpation the abdominal organs can be plainly felt, as the abdominal wall consists of only skin and connective tissue. In cases where the muscles are only partially absent the bands of muscle fibers can usually be seen and felt. In rickets the rectus abdominalis is frequently deficient. Children whose abdominal muscles are defective are generally constipated. Where there are other malformations, or an absence of abdominal skin as well as muscles, the child may either be born dead or die soon after birth.

Treatment.—In the more severe grades the abdomen should be supported by a snugly fitting supporter. A flannel

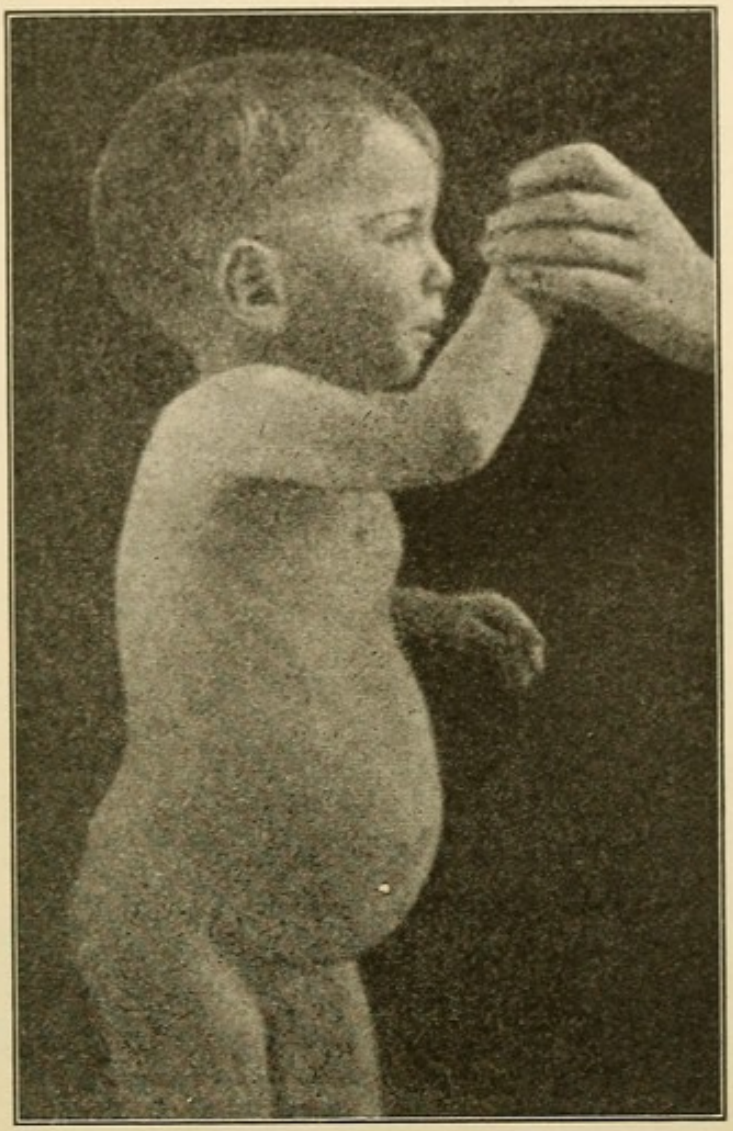


FIG. 42.—Congenital absence of abdominal muscles.

bandage may be all that is required where the muscles are partially present.

CATARRHAL JAUNDICE.—GASTRODUODENITIS.

Definition.—A catarrhal inflammation of the stomach and upper part of the small intestine which extends into the bile duct.

Etiology.—It is rare under two years of age, but is seen in older children. It may come on without apparent cause or it may complicate any of the infectious diseases.

Pathology.—Besides the catarrhal condition of the

stomach and intestine the bile-duct is inflamed, and frequently there is a plug of tenacious mucus filling Vater's diverticulum and causing an obstructive jaundice.

Symptoms.—There is a sudden onset with pain in the right hypochondrium, vomiting, and slight fever. After several days jaundice appears. This varies in intensity, but is generally not very severe. The liver is usually somewhat enlarged and tender, the urine is bile-stained, the stools are white and with a foul odor, the tongue is coated, with complete loss of appetite and great lassitude. Itching of the skin and slow pulse are rare under seven years of age. After a week or two the symptoms pass off and the jaundice disappears a little later.

Diagnosis.—See Diseases of the Liver for symptoms of the other diseases.

Prognosis.—Good.

Treatment.—**Diet.**—Give little or no starchy food or fats. Give a moderate amount of milk peptonized or diluted with a carbonated water or lime-water. Give fresh green vegetables, fruit, and rare meat. Diet until the jaundice has disappeared.

Medicine.—Vichy water to drink. Calomel at the outset. Phosphate of soda in hot water every other morning or every morning. Treat gastric symptoms like acute gastric indigestion. If there is pain use counter-irritation.

DIARRHEA.

Diarrhea is a term used to designate frequent loose movements of the bowel. Diarrhea is most common in hot weather, especially seen in frequency and severity in July and August. It is more common and also more fatal among poor children whose surroundings are unhygienic, where there are filth, overcrowding, and lack of fresh air. The weak and diseased suffer more than the healthy, and the teething child more than the one who is not teething. Four-fifths of the cases are under two years of age, and the greatest number of these between twelve and eighteen months. The mortality corresponds with the frequency of attack. One of the greatest

factors in causing diarrhea is the use of improper or impure food. Spoilt milk is the most common cause. Impure water may also be a causal factor. Over 95 per cent. of the cases of the so-called summer diarrheas occur in artificially fed babies.

Diarrhea may be classified as of simple and infectious origin. In the simple forms there are only present the normal bacteriologic flora of the intestine. In the infectious form there are present bacteria not normally present in the intestine, and which, we may assume, are causal factors or the cause of pathologic complications.

The simple diarrheas, according to Holt, are:

1. **Mechanical.**—From indigestible articles taken into the intestine. These may be taken as food or otherwise. Green fruit is the most common example.

2. **Medicinal.**—From laxative drugs.

3. **Reflex.**—From fright, overheating, or chilling, and the like.

4. **Eliminative.**—As the diarrhea of uremia.

The first causes what may be described as intestinal indigestion.

There is at present no very good classification of the infectious forms. They are described below under the following headings: Acute gastro-enteritis, including cholera infantum, acute ileocolitis and colitis, chronic ileocolitis, and amebic colitis.

ACUTE INTESTINAL INDIGESTION.

Etiology.—The same as acute gastric indigestion, which it may accompany. It is frequently seen, however, without any gastric involvement.

Symptoms.—If the stomach is involved as well there will be symptoms of gastric indigestion. There are pain and diarrhea. There may or may not be distention of the abdomen. There are present prostration and fever ranging from 100° to 105° F. or more.

The stools are at first the normal feces, but loose and frequent. Later there are thin movements which are greenish or brownish in color, which may have a very foul odor and which contain particles of undigested food, fat, the curd of

the milk, or other things if they have been taken. After a day or two there may be mucus in large quantity.

Diagnosis.—Diagnosis from the infectious forms is made by its comparative mildness, the infrequency of vomiting, and short duration. At the outset there is absolutely no way to tell what form of diarrhea one has to deal with.

Prognosis.—Good in strong children where the attack is properly treated at the time and subsequently. May cause death in weak infants and predisposes to other bowel disease.

Treatment.—Clean out the stomach and bowel. Wash out if necessary. Give calomel (10 $\frac{1}{10}$ gr. doses) if there is vomiting, or a full dose of castor oil if there is not. After the bowel has been thoroughly emptied (but never until then) small doses of paregoric or Dover's powder may be given if there are very frequent stools or very much pain. Opium should always be used with great caution. After the bowels are emptied bismuth may be given in combination with chalk mixture. Subcarbonate (1–2 gr.) or subnitrate (5–10 gr.) every two or three hours. Essence of pepsin may be added if desired.

Withhold all food for the first twenty-four hours, except a little albumin-water. This is best given in small doses at not too great intervals. Plain boiled water may be used instead. Very weak tea to which a little red wine has been added may be given if the child is weak. On the second day the albumin- or barley-water may be given with the addition of weak strained broth, and on the third day malted milk may be added to the list. After four or five days cows' milk diluted and boiled or peptonized may be tried. It is best mixed with a farinaceous gruel or with malted milk to start with. It may be given every other feeding for a day or two if it agrees, and the former feeding gradually resumed.

In nursing infants withhold the breast twenty-four hours and feed as above. After that the breast may be given once for a few minutes and the feeding pieced out with albumin- or barley-water. If it agrees the breast may be given for three or four feedings, every other feeding followed by albumin- or barley-water. On the following day the breast may be given at each feeding. The time of nursing should be increased gradually until the child is back on its old schedule.

THE INFECTIOUS DIARRHEAL DISEASES.[1]

The infectious diarrheal diseases are not very thoroughly understood as yet, and there are, in consequence, numerous classifications and a diverse nomenclature. There may be severe symptoms, with few or no lesions in the bowel, or there may be extensive lesions. The disease may run a rapid course or a prolonged one. Toxic symptoms may be pronounced or wanting. The differences seem to depend on the virulence of the infection and the condition and resistance of the child. In the very acute cases the symptoms are chiefly of a toxic nature, from the absorption of the poisons produced by the bacteria in the bowels.

There are practically always some pathologic lesions, usually of an inflammatory type. In the more prolonged cases they are liable to be more severe and may result in ulceration of the intestine.

Certain fairly well-marked clinical forms may be described, but it is sometimes difficult to draw hard-and-fast dividing lines.

ACUTE GASTRO-ENTERITIS.[2]

(Summer Diarrhea; Summer Complaint; Acute Intestinal Intoxication; Cholera Infantum, Etc.)

Definition.—An acute infectious diarrhea occurring most frequently in summer.

Etiology.—While it is seen the whole year the greatest number of cases occur in hot weather. Nearly all the cases and nearly all the deaths are in bottle-fed babies. It is most prevalent among the poor and overcrowded. It is most frequent in children under two years of age.

The bacteria findings are various. It appears that many different organisms may under certain conditions multiply in the intestinal tract and cause diarrhea. The Shiga-Flexner bacillus (Bacillus dysentericus) has been found in the stools

[1] *Studies of the Diarrheal Diseases of Infancy*, from the Rockefeller Institute for Medical Research.

[2] Maurice Ostheimer, "Diarrhea, Summer, Prevention of," *Journal of the American Medical Association*, August 26, 1905, p. 595.

in some instances, but the majority of the cases are not caused by it. Pus germs are found in some cases, usually in the severer forms described as cholera infantum.

Pathology.—The bowel contains mucus and fecal material similar to the stools. There may be some congestion of the mucous membrane and some swelling of the lymph-nodes. There are degenerations in the epithelium. There may be an associated nephritis, bronchopneumonia, and degenerations in the liver cells.

Symptoms.—The onset may be gradual, with but little fever and symptoms of intestinal indigestion, or it may be

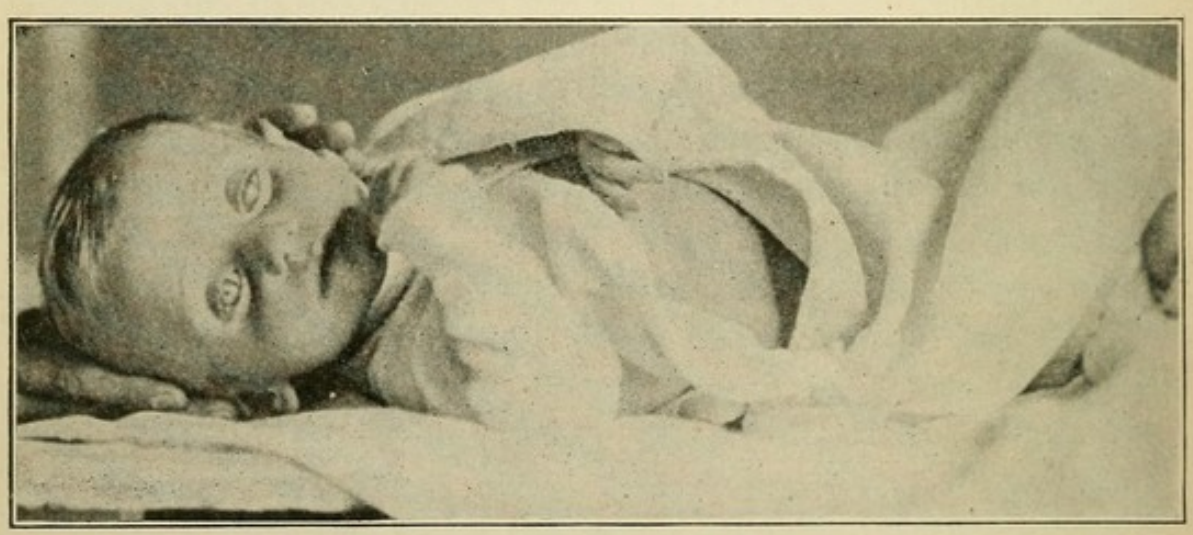


FIG. 43.—Acute intestinal intoxication. Note the facial expression and corneal ulcer.

sudden with high fever. In the first class the child is not quite well, has loose stools, usually undigested and discolored. Recovery may be prompt or the disease may assume the character of the severe form.

In the severer form fever and prostration exist; the child is at first restless and nervous, but later on may become listless and semicomatose. There may be delirium, convulsions, or coma. There is vomiting, frequently continuous, and of everything that the child swallows. The stools are frequent. First the natural intestinal contents are passed, then mucus mixed with fecal matter, usually greenish or brownish in color. There may be blood or pus. The loss of weight is great and the child becomes weak, pale, and a few days may so change a child's appearance that it is unrecognizable. The child may recover, die, or the disease may become chronic

and change into an ileocolitis. Relapses are frequent, usually due to errors in diet.

Cholera Infantum.—This is a form of diarrhea characterized by marked toxic symptoms, high fever, severe vomiting, profuse discharge of copious thin stools, great loss of weight, and usually death. A small percentage recover. The symptoms resemble those seen in Asiatic cholera; hence the name.

Diagnosis.—At the outset it is impossible to tell whether a diarrhea is of the severe type or merely an intestinal indigestion. The latter usually responds to treatment, and when the bowel is cleansed the symptoms subside. A continuance of the symptoms means an infectious diarrhea.

Acute diseases, such as pneumonia or scarlet fever, may start in with a diarrhea. Meningeal symptoms may be marked and the case mistaken for a meningitis. A sunken fontanel belongs to diarrhea rather than meningitis. Lumbar puncture may be resorted to.

Prognosis.—In good surroundings with proper treatment, fair; in weak children and in poor surroundings or with improper care, bad.

Prophylaxis.—Fresh air; cleanliness; pure food; more water and less food during the hot weather; disinfection of the stools and things which have been in contact with the case.

Treatment.—If in city send to country where it is possible. Keep the child in the fresh air. Keep the child clean. Cold sponging or bathing should be used to reduce fever. An ice-bag may be used on the head.

Dietetic Management.[1]—**Breast-fed Infants.**—*In Winter.*—Lengthen nursing periods to six hours. In the meantime give boiled water, whey, albumin-, rice- or barley-water. After a day or two, if all goes well, resume nursings on the regular schedule.

In Summer.—Withhold all milk for twenty-four hours and give above-mentioned articles every three or four hours. Plain boiled water is perhaps best, allowing the bowel a perfect rest. This alone often cures the diarrhea promptly. Whisky and water, or one of the liquid beef preparations, may

[1] See *Diet in Health and Disease*, by Friedenwald and Ruhräh.

be given in water if the child is weak. If the child is better on the second day it may be allowed to nurse a few minutes. If this does not cause an increase in the diarrhea nursing may be gradually resumed. The mother's breasts should always be pumped out at the nursing intervals to maintain a free flow of milk.

Bottle-fed Babies.—Withhold all fresh milk until complete recovery. During the first twenty-four hours nothing but boiled water. Whisky and water, or liquid beef preparations and water, may be used if baby is very weak. On the second day albumin-, barley-, or rice-water. On the third or fourth day try malted milk. If this is well borne, milk and barley or rice-water, equal parts, well boiled, may be tried. The return to fresh milk should be gradually made. Whey is useful.

If there is vomiting withhold food and wash out the stomach. Equal parts of lime water and cinnamon water in teaspoonful doses is useful to stop vomiting. Tiny bits of ice may be given to allay thirst. Lime-water with the food in 20 per cent. to 30 per cent. proportion is useful if gastric symptoms persist.

If the fluids are abstracted from the body so that collapse threatens give several ounces of normal salt solution under the skin.

Other Treatment.—Wash out the stomach and bowel. If seen early administer calomel ($\frac{1}{10}$ gr. every half hour for ten doses) if there is vomiting, or castor oil if there is not. Salines may be used. After cleansing the bowel give one of the following: Bismuth subnitrate (5–10 gr. every two hours); bismuth subcarbonate (1–5 gr.); bismuth subgallate (1–5 gr.). Resorcin, bismuth salicylate, salicylate of soda, salol, and beta-naphthol bismuth may be used. Bismuth subnitrate in chalk mixture is about the best. Avoid too much drugging. Opium should be used with great caution to diminish the number of stools, relieve pain and produce sleep. It should never be used until the bowel has been thoroughly cleansed, as it may cause the retention of very toxic fecal material. Paregoric and Dover's powder are most frequently used.

Strychnia and whisky may be administered if stimulants are needed. Use small doses well diluted.

ACUTE ILEOCOLITIS.

Enterocolitis; Enteritis; Dysentery; Inflammation of the Bowels.

Definition.—An inflammation of the large and small bowel characterized by frequent bowel movements, tenesmus and marked constitutional disturbance. Three forms may be described: catarrhal, ulcerative and membranous.

It is often impossible to distinguish cases of acute gastro-enteritis from cases of ileocolitis. The classification is by no means perfect.

Etiology.—The causes are the same as for acute gastro-enteritis. The Shiga-Flexner bacillus can be demonstrated in many cases. There may be pus germs present as well. Many cases follow the milder forms of diarrhea.

Pathology.—The lymph follicles are enlarged and ulcerated in most cases. In others there is a simple catarrhal inflammation and there may be simple ulcerations of the mucous membrane. In other cases there is a membranous inflammation. The lesions are for the most part in the colon and lower part of the ileum. The most frequent complicating lesions are bronchopneumonia and nephritis.

Symptoms.—**Catarrhal Form.**—There is usually a sudden onset, vomiting and diarrhea; the stools contain blood and mucus. There is great pain with tenesmus. The stools are very frequent. There are fever and toxic symptoms with more or less prostration. In mild cases the acute symptoms last about a week, but there is a great tendency to become chronic. In severe cases the acute symptoms may last weeks.

Ulcerative Form.—This is usually secondary to a gastro-enteritis. There is not so much temperature as in the preceding, and the stools are not as frequent. Blood is seen sometimes. There is progressive emaciation with great weakness. The diagnosis is made from the general history.

Membranous Form.—This is always severe. There is a sudden onset with vomiting and high fever, as in the catarrhal form, but if anything more intense. There may be marked nervous symptoms. The diagnosis is made on the presence

of pieces of membrane in stools otherwise like those seen in catarrhal ileocolitis.

Diagnosis.—From typhoid by the Widal reaction and the slower invasion of typhoid. From intussusception by the constipation following the onset and the symptoms of obstruction. The membranous form is sometimes mistaken for meningitis if the cerebral symptoms are marked. Diarrhea is rare in meningitis.

Prognosis.—Bad in all cases. Many of the catarrhal forms recover, but relapse is frequent. The ulcerative form is usually fatal, but sometimes partial recovery takes place, and the child may die of some intercurrent affection. The membranous form is usually, though not always, fatal. In the poor, in previously ill children, and in hot weather the outlook is especially bad.

Treatment.—Very much the same as in acute gastroenteritis. Fresh air or a change of air is important. Opium is needed for the pain and frequent stools. Irrigation of the bowel is also useful. Flush the bowel with normal salt solution and then use fluid extract of witch-hazel (1 dr. to 1 pint) or some other astringent. Nitrate of silver is sometimes useful.

CHRONIC ILEOCOLITIS.

(Chronic Dysentery.)

Definition.—A chronic inflammation, often with ulceration of the ileum and colon, characterized clinically by pain and chronic diarrhea.

Etiology.—It almost always follows the acute form of the disease.

Pathology.—There is a catarrhal form in which there are present an increased amount of mucus, pigmentation of the mucous membrane, proliferation of the lymphoid tissue of the intestines and of the lymph-nodes connected with it. There is also an ulcerative form in which, in addition to the above, there are ulcerations. These may be follicular or of a broad flat type. Cystic degeneration of the intestine is a rare lesion. The liver is fatty, nephritis is not uncommon,

and lesions in the lungs, either tuberculosis or bronchopneumonia, may be present.

Symptoms.—Emaciation and weakness, little or no fever. Numerous thin, brownish or greenish stools containing undigested food and pus and occasionally blood. Colic and pain in the abdomen may be present. The abdomen is usually distended with gas. There are frequently ulcerations about the mouth and anus. Nervous symptoms may be marked.

Diagnosis.—It may be impossible to tell the disease from tuberculosis, as tuberculosis is not uncommon as a complication. Fever is absent or slight, while it is nearly always present, though irregular, in tuberculosis.

Prognosis.—Cases last from weeks to a year. The longer the preceding acute stage has lasted the worse the prognosis. Death frequently takes place within several months. Remarkable recoveries may take place.

Treatment.—Good care and careful diet is the most important part. A change to mountains or seashore may work wonders. Foods leaving but little residue should be used. Predigested milk and beef preparations, white of egg, rare or raw scraped beef, malted foods, and alcohol are the most useful. Washing out the bowel is of value; a cleansing enema of warm salt solution, followed by a small injection of fluid extract of witch-hazel or some other mild astringent, is best. Opium may be used to lessen the number of stools if excessive. Drugs may be given for flatulence, pain, or other symptoms.

AMYLOID DEGENERATION OF THE INTESTINES.

This is sometimes seen in older children. The causes are the same as for amyloid changes in other organs. There are anemia and cachexia, enlargement of liver and spleen, a cause of amyloid disease, and in some cases there may be a diarrhea. In many instances of the disease diagnosis is not determined until after death. The treatment is to remove the cause where possible.

AMEBIC COLITIS.[1]

Definition.—A form of colitis associated with the presence of the ameba coli in the stools and lesions.

Etiology.—This is rare in children, but is perhaps more frequent than is generally supposed. The ameba coli is regarded as the cause of the disease. The youngest case reported was in a child about two years old.

Pathology.—This is the same as in adults. There are

FIG. 44.—Ameba coli.

ulcerations in the colon, which undermine the mucous membrane.

Symptoms.—The disease is usually subacute or chronic, although acute cases may be seen. The onset is frequently abrupt, with fever and diarrhea. The symptoms frequently disappear to recur after a short interval. During the exacerbations there is diarrhea accompanied with pain and tenesmus and some fever.

Diagnosis.—This is made on finding the ameba in the stools, or, better still, from scrapings from the ulcers.

Prognosis.—The disease lasts months or years and frequently ends fatally from exhaustion, hemorrhage, or liver abscess.

Treatment.—General supporting treatment, together with irrigation of the bowel with normal salt solution, followed by quinin solution from 1 : 5000 to 1 : 1000.

CHRONIC INTESTINAL INDIGESTION.

Definition.—A condition in which food in the intestine is imperfectly digested.

[1] Amberg, *Bulletin Johns Hopkins Hospital*, Dec., 1901.

Etiology.—It may follow acute attacks, improper feeding, or general debility.

Pathology.—There is usually an associated catarrh of the intestinal mucous membrane.

Symptoms.—In infants gastric indigestion is frequently associated. Malnutrition is the most prominent symptom. There may be diarrhea or constipation. Undigested food is seen in the stools. The stools are frequently discolored (see Infant Stools, p. 106).

Symptoms in Older Children.—These children are emaciated, nervous, and capricious. There is flatulence and often a distended abdomen. There may be chronic diarrhea, or a diarrhea alternating with constipation, or more rarely constipation. The stools are, as a rule, very offensive and contain a great deal of mucus. Fever and nervous symptoms may be present at times. The symptoms are very numerous and varied.

Diagnosis.—This usually presents no difficulty.

Prognosis.—This is good if seen early and the child can be properly cared for and dieted.

Treatment.—This is mainly hygienic and dietetic. Infants should be cared for as suggested for malnutrition, and the food regulated according to general principles. Considerable experience is often required to adapt the food to the infant's digestion.

In older children the diet should be milk, meat juice, and rare meat and egg albumin. Later malted food, zwieback, orange juice, and other articles of diet may be cautiously added.

INTESTINAL COLIC.

Definition.—Severe paroxysmal pain in the intestines.

Etiology.—Flatulence from indigestion, especially in nursing infants; in artificially fed babies, excesses either in proteins, sugar or fat; indigestible articles of food; inflammation of the abdominal viscera and reflexly from cold feet and exposure to cold.

Symptoms.—Crying, evident discomfort and pain, and

a hard tympanitic abdomen. There may be cyanosis of feet and hands. Relief frequently follows the expulsion of gas.

Diagnosis.—Exclude peritonitis, appendicitis and inflammatory conditions.

Prognosis.—Good as regards attack. The disease may recur frequently.

Treatment.—An enema of warm water or of water and glycerin to expel the gas. Heat or counterirritation to abdomen by hot-water bottle or spice bag. Internally, aromatics, and in very severe cases doses of codein or paregoric. In the intervals treat the indigestion.

CHRONIC CONSTIPATION.[1]

Definition.—A condition where the stools are less frequent or harder than normal.

Etiology.—Constipation may be due to a large number of causes. Improper diet is one of the most frequent. A diet which gives too little volume of refuse, or one lacking in fat in younger children, or in fruits and vegetables in older children, may be the cause. Atony of the intestines is also a frequent cause. Insufficient secretion from the intestinal glands or the liver may also be a cause. Pain on defecation, caused by fissures of the anus and the like, may result in infrequent stools.

Symptoms.—Discomfort, pain in the abdomen, and straining at stool. In some cases there are no apparent ill effects, whereas in others there may be toxic symptoms, headache, languor, and disturbed sleep.

Diagnosis.—The cause should be sought. The anus and rectum should be examined.

Prognosis.—Often persists for a long time.

Treatment.—Regular habits of stool. Regulation of the diet. In infants see that they get sufficient fat and protein. Well-cooked and sweetened oatmeal gruel is useful. Orange juice, baked apples, or prune juice taken on an empty stomach is of service. Olive oil, the malted foods, or malt

[1] Pritchard, "Constipation in Infants," *The Practitioner*, May, 1910, p. 583. Poynton, "Constipation in Childhood," *The Practitioner*, May, 1910, p. 567.

extracts are also useful. In older children fresh fruits, vegetables, and oatmeal porridge are of value. Graham bread, dates, figs, and prunes may be used. Massage of the abdomen is of some value. A glass of water taken immediately on rising is also advisable.

Enemata should be used to empty the bowel in case of need.

Suppositories, either plain or gluten, or containing nux vomica, belladonna, or hyoscyamus, may be tried.

From one to four teaspoonfuls of pure liquid petrolatum may be given at bedtime in obstinate cases.

Of the drugs, castor oil, calomel, and the salines should be used only when it is desired to empty the bowels quickly, never as a routine; nux vomica, belladonna, hyoscyamus, and cascara are the best for chronic constipation, and are usually given in combination. The aromatic syrup of rhubarb is frequently used. Phosphate of soda is useful in some cases.

INTUSSUSCEPTION.[1]

Definition.—The invagination of one piece of gut into another is called intussusception. Intestinal obstruction results. The commonest form is that occurring at the ileocecal valve (ileocecal), but intussusception of the small intestine (enteric) or colon (colic) may occur.

Postmortem intussusception is a frequent autopsy finding. It occurs just before or after death and causes neither local reaction nor clinical symptoms. It is of no importance.

Etiology.—Intussusception is more common in boys than girls, and the majority of cases occur before the third year, most frequently between the sixth and ninth month. It is caused by irregular intestinal contraction. This is sometimes produced by injury, but generally no exciting cause can be determined.

Pathology.—Congestion and swelling of the gut follow, rendering reduction difficult or impossible. Gangrene may follow unreduced intussusception. The portion of the gut

[1] Snow, *Archives of Pediatrics*, vol. xxi., p. 494. I. H. Hess, "Intussusception in Infancy and Childhood," *Archives of Pediatrics*, September, 1905, p. 655. Dunbar, "Acute Intussusception," *Scottish Medical and Surgical Journal*, August, 1906.

sloughed may be passed through the rectum. In chronic intussusception adhesions take place, but gangrene is less common.

Symptoms.—The onset is sudden, with pain and vomiting. The pain recurs in paroxysms; the vomiting continues and may become fecal. There are one or two loose stools, after which only blood and bloody mucus are passed. The abdomen is relaxed, and a tumor is felt either in the right iliac fossa or through the rectum. There is marked shock. If not reduced the vomiting continues, tympanites occurs, and later on fever. There may be symptoms of peritonitis. A rapid rise in temperature usually means death within twenty-four hours. Occasionally there may be subacute or chronic cases with less intense symptoms.

Diagnosis.—The symptoms are characteristic. Make careful abdominal and rectal examinations in all suspicious cases. Do not mistake ileocolitis.

Prognosis.—This is always bad. Death usually takes place between the third and the fifth day. With prompt diagnosis and treatment the outlook is somewhat better than formerly. Recurrences may take place, usually within twenty-four hours after reduction.

Treatment.—Anesthetize and either inflate with air or inject salt solution. Rumbling, uniform filling of the colon, and sometimes the passing of feces determine if reduction has occurred. The disappearance of the tumor is important. If doubt exists or the symptoms return perform a laparotomy. Act promptly; delay means death. In using injections do not raise the syringe over three feet above the patient's body for fear of rupturing the bowel. After operation keep quiet, give opium, very light diet, and avoid cathartics.

APPENDICITIS.[1]

This is rare in infants. More frequent in boys than girls. Foreign bodies are an occasional cause, digestive disturbances

[1] Kelly and Hurdon, *The Vermiform Appendix*, p. 450. Vincent, "Acute Appendicitis in Children," *Boston Med. and Surg. Jour.*, Sept. 24, 1908, p. 427.

especially; constipation may precede it in some cases; in most there is no apparent cause.

Catarrhal, suppurative, gangrenous, and chronic forms have been described in infants.

Catarrhal Appendicitis.—Rarely diagnosed as such. The appendix is thickened. There is pain with tenderness over the abdomen. This may be extreme, and is located midway between the umbilicus and the right iliac spine. There may be vomiting and some fever. A tumor can sometimes be felt in the right iliac fossa. The attack passes off in a few days or a week or passes into one of the severer forms. Entire recovery may take place or a chronic form may follow. Recurrences are frequent.

Suppurative Appendicitis.—Onset as above. It may end in any of the following:

Localized Peritonitis.—The acute symptoms last a week or two. There is a diffuse hardness in the right iliac fossa, which becomes more definite and then gradually disappears.

Abscess.—A tumor mass can easily be made out. There are fever, pain, and tenderness. Pus is present early. Subsidence sometimes takes place or it may rupture into the bowel. Rupture into the peritoneum causes peritonitis.

General peritonitis, which may also be caused by perforation in gangrenous appendicitis.

Gangrenous Appendicitis.—Onset as in catarrhal form. May become rapidly worse at any time with sudden pain, vomiting, and symptoms of shock. Peritonitis follows with tympanites and great tenderness. There may be a lull in the symptoms, but death takes place in nearly all cases in from one to five days.

Prognosis.—The prognosis of appendicitis is worse in children under six or seven than in the adult. Over seven it is somewhat better. Much depends on good judgment and skilful treatment.

Diagnosis.[1]—Sudden onset, pain in the abdomen, vomiting, tenderness, rigidity, and sometimes tumor in the right iliac fossa, are the principal points. Colic is of shorter duration;

[1] J. N. Hess, "Appendicitis in Children, Diagnosis of," *Archives of Pediatrics*, May, 1905, p. 329.

there is no fever and no localized tenderness. Intussusception is rare after two years of age; the sudden onset, with a tumor at the start and the more intense symptoms, paroxysmal pain and the bowel obstruction, usually suffice. Acute indigestion cannot be differentiated at the start, but it is relieved by treatment. Pneumonia or pleurisy may cause extreme abdominal tenderness. Psoas abscess generally presents no difficulties. Blood-counts are of some value in the hands of an expert, but do not draw too definite conclusions from blood-counts. Leukocytosis over 20,000 may mean abscess and may be helpful in differentiating appendicitis from other intestinal disturbances. Rapidly increasing leukocytosis is of more value. Leukocytosis may occur in any severe intestinal disorder, and is present in pneumonia.

Treatment.—Rest. If very restless use a long side splint or a light plaster cast. Watch carefully. Opiate for pain. Give castor oil at the outset and then wash out the colon daily, and the stomach, too, if there is vomiting and it is possible to do it without too much excitement on the part of the child. Avoid cathartics. Operate at once in localized abscess and the gangrenous form. In other forms, if seen during the first forty-eight hours, operation may be done at once; if seen later wait until the process becomes localized and walled off by peritoneal adhesions. Operation between the attacks may be considered in the catarrhal form.

DILATATION AND HYPERTROPHY OF THE COLON.[1]

This is a rare disease seen in infants and older children. There is hypertrophy of the muscular coats of the colon, together with marked constipation and distention of the abdomen. The distention may disappear temporarily after a stool. The patients are emaciated. Some die early, whilst some live to be adults. The treatment is symptomatic. Treves has operated on a case with good results.

A certain amount of simple dilatation of the colon is seen in infants with chronic constipation, especially the rachitic ones. This usually disappears during early childhood.

[1] Osler, *Archives of Pediatrics*, February, 1893, p. 111.

INTESTINAL WORMS.[1]

Cestodes (Tapeworms).—The eggs of these worms are taken into the body of certain animals (intermediary host), and the embryos are set free in the stomach. These embryos migrate and become encysted in the muscles. When such meat is eaten by man the embryo is set free and attaches itself to the mucous membrane of the bowel and grows into an adult worm. The eggs are contained in the mature segments, which are furnished with the male and female sexual organs.

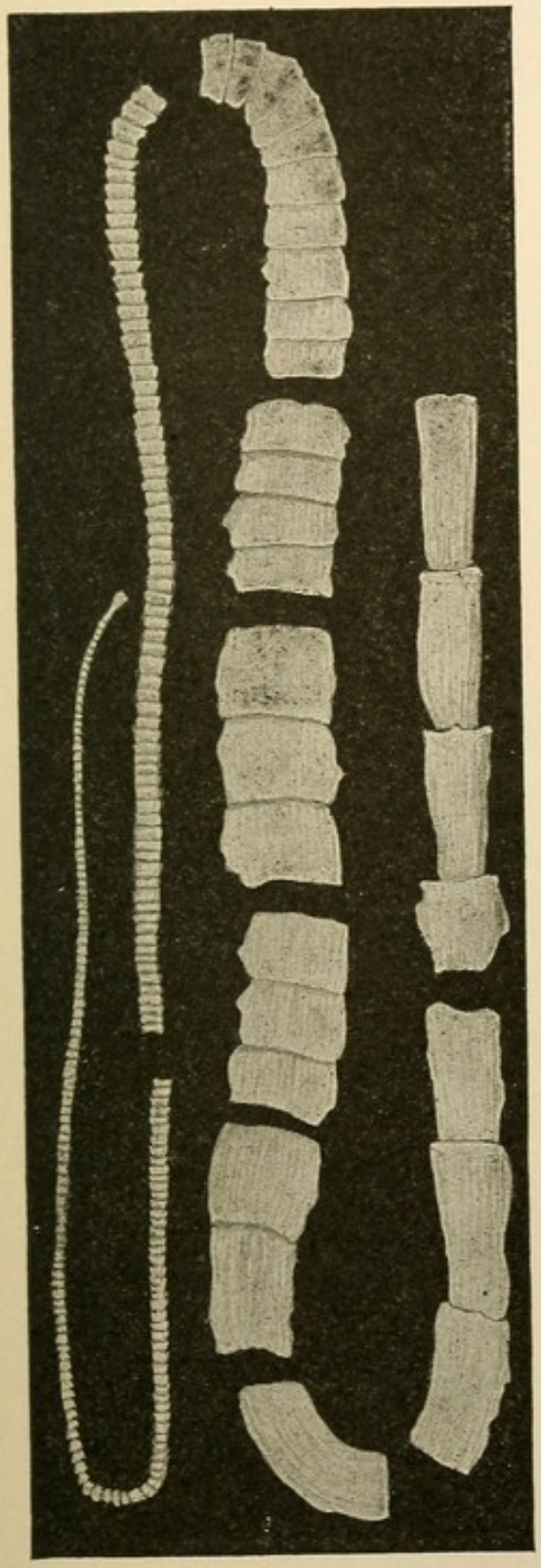


FIG. 45.—Tænia mediocanellata: Small portions from different parts in the length of the tapeworm (J. P. C. Griffith).

Tænia Mediocanellata or Saginata (*The Beef Tapeworm*).—This is the common tapeworm of America. In-

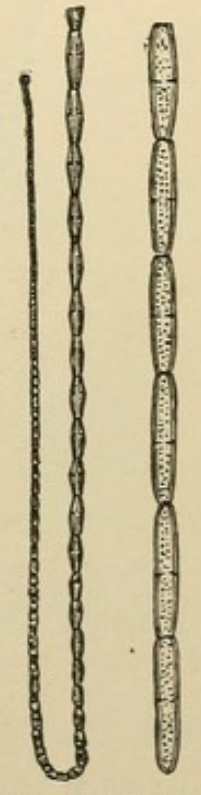


FIG. 46.—Tænia elliptica (Mosler and Peiper).

[1] Schloss, "Helminthiasis in Children," *Amer. Jour. of Med. Sci.*, vol. cxxxix., 1910, p. 675. Still, "Thread-worms," *Brit. Med. Jour.*, Apr. 15, 1899.

fection takes place from eating "measly" beef. The adult worm is from ten to twenty feet long. The head has four suckers, but no hooks. The adult segments are about as long as they are broad.

Tænia Solium (*The Pork Tapeworm*).—This is rare in America. It is shorter than the preceding, and the head has four suckers and a circle of hooklets about the proboscis. The adult segments are nearly square.

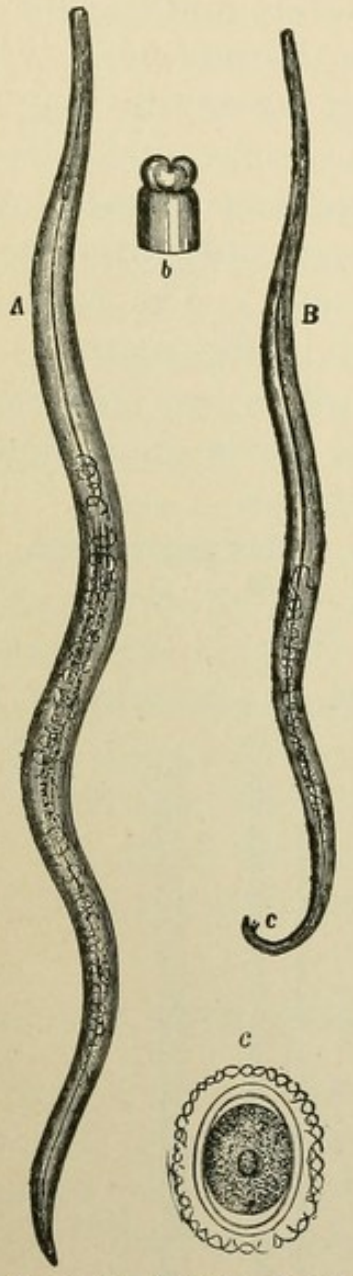


FIG. 47.—Ascaris lumbricoides: A, Female; B, male; C, egg (× 300); *b*, head (magnified) (after Perls).

Hymenolepis Nana (*The Dwarf Tapeworm*).—This will doubtless prove a common parasite in America. It is the smallest cestode parasite affecting man. The worms are present in great numbers. The ova are found in the feces, are colorless or brownish, and are easily seen with the low power of the microscope. The eggs have two membranes, and the six hooklets of the embryo are seen inside. The worm is from 12 to 15 mm. long and 0.5 to 0.7 mm. broad at its widest part. There are from 110 to 200 segments. It is delicate and easily broken. The head has suckers and hooklets. A similar worm has been found in rats.[1]

Tænia Cucumerina or Elliptica.—The embryos are found in dog and cat lice. Infection occurs by getting the embryos on the hand from dogs or cats. The adult is from six to twelve inches long.

Bothriocephalus latus, the fish *tapeworm*, and *Tænia flava punctata* are rare forms occasionally met with.

[1] Bulletin No. 18, Hygienic Laboratory of the Public Health and Marine Hospital Service, 1904.

Symptoms.—There are no distinctive symptoms, but increased appetite, unpleasant abdominal symptoms, bad breath, and sometimes pain and diarrhea are complained of. Usually the first knowledge of the parasite is the finding of the segments in the stool. This is the only certain means of diagnosing it. Anemia of a severer grade may be met with and the bothriocephalus may cause pernicious anemia. Eosinophilia is present.

Prophylaxis.—Thorough cooking of meat. Careful government inspection.

Treatment.—Light diet for a day and a laxative to empty the bowel. Oleoresin of male fern in several doses at intervals of an hour. From 10 to 20 minims may be given at a dose to children. Give a purge a few hours after the anthelmintic, and a milk diet for the remainder of the day. Examine the stools for the head, which is about the size of a grain of mustard. If the head is not passed the worm will grow again. Pelletierine (3–12 gr.) or pumpkin seed ($\frac{1}{2}$ oz.) may also be used.

Nematodes.—Ascaris Lumbricoides (Roundworm).—The eggs are taken in with water or food, and they develop in the intestine into round worms from 4 to 6 inches long, $\frac{1}{4}$ of an inch in diameter. The females are longer than the males. A number are present at one time.

Symptoms.—Often none, but at other times colic, indigestion, loss of appetite, disturbed sleep, picking at the nose and all sorts of curious reflex nervous symptoms, such as convulsions, vertigo, and paralyses. Occasional febrile disturbances may be present. Obstruction of the bowel has been caused by masses of the worms. They migrate and may crawl out of the nose or into the larynx or Eustachian tube. Their presence in the stools is the only positive way to diagnose them.

Treatment.—Empty the bowl as for tapeworm, then give three or four doses of santonin, $\frac{1}{2}$ to 1 gr. Follow by castor oil or calomel. Give the santonin in powder with sugar.

Oxyuris Vermicularis (Seatworm; Pinworm).—These are

small round worms as thick as a pin and from $\frac{1}{8}$ to $\frac{1}{2}$ in. in length. They are found in the lower colon and rectum. They cause intolerable itching of the anus, sometimes proc-

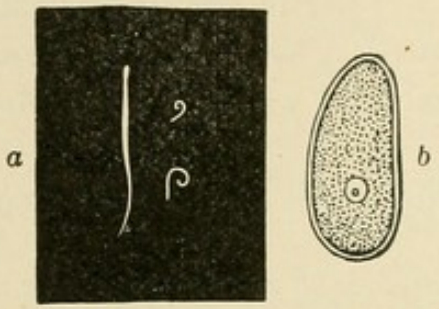


FIG. 48.—Oxyuris vermicularis and egg: *a*, Natural size; *b*, egg (after Heller).

titis. There may be large quantities of mucus in the stools. They may cause convulsions.

Treatment.—Require persistent treatment. Wash out the bowel with borax and water (teaspoonful to the pint) and then inject half pint of quinine sulphate solution (2 gr. to 1 pint) or 1 : 10,000 bichlorid of mercury. Infusions of quassia or garlic are also useful. Garlic may be given by the mouth. In resistant cases try santonin.

DISEASES OF THE RECTUM.

Prolapse of the Anus.[1]—This may be simply of the mucous membrane, or the entire rectum may be everted. It is most frequent in the second and third year and is frequently caused by prolonged straining at stool.

Symptoms.—Usually occurs at stool and frequently can be easily reduced. Where several inches of the rectum are everted there is a red tumor-like mass which may be more or less difficult to return.

Treatment.—Oil the finger and return by pressure. Keep the child quiet for an hour afterward. If difficult to return apply cold cloths. Painting with 4 per cent. cocain may be used in obstinate cases. In recurring cases have child defecate on its back or while using a seat inclined to

[1] Kelsey, "Prolapse of the Rectum," *Archives of Pediatrics*, 1885.

an angle of 45 degrees. Keep the bowels well open. Inject tannic acid (5 grs. to ½ oz.) water twice daily or anoint with belladonna ointment. A pad and a T bandage may be used as a support where the bowel tends to come down between stools. Local injections of strychnia ($\frac{1}{100}$ gr.) or linear marking with the cautery may be tried.

Fissure of the Anus.—Looks like a tear or an ulcerated surface. Causes very great pain, especially at stool.

Treatment.—Keep clean and the bowels open. Touch with nitrate of silver. If not relieved anesthetize and stretch the sphincter of the anus.

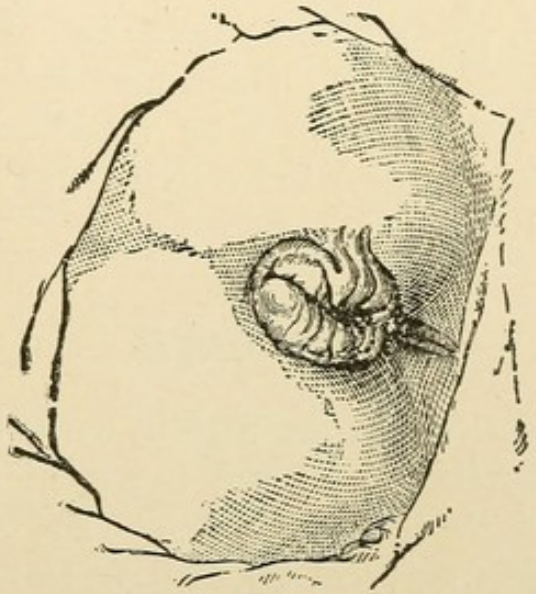


FIG. 49.—Prolapsus of the rectum (after Bryant).

Irritation of the Anus and Hemorrhoids.—Irritation of the anus is frequent, while hemorrhoids are comparatively rare. Constipation should be relieved, the child should be kept clean, and the following ointment used liberally:

℞	Tannic acid,	gr. x;
	Powdered camphor,	gr. v;
	Ichthyol,	℥iss;
	Zinc oxid ointment,	℥j.—M.

(Kerley.)

Proctitis.—This occurs with inflammations of the colon, but may occur alone from suppositories, pinworms, gonor-

rhea, or from syphilis, scarlet fever, measles, and other infectious diseases. It may be catarrhal, ulcerative, or membranous.

Treatment.—Regulate the bowels. Magnesia or sodium bicarbonate by mouth if stools are acid. Keep clean with normal salt solution injections, follow with injections of oil and lime-water in the acute cases, fluid extract of hamamelis, teaspoonful to the pint in the chronic forms, and boric acid in the ulcerative cases. Nitrate of silver (1 gr. to the ounce) may be used in very resistant cases. Neutralize the excess of silver with salt solution.

Incontinence of Feces.—Seen in injuries and diseases of the spinal cord, in comatose conditions, and in very severe illness of any kind. Is also sometimes seen in very nervous children. This last form may be benefited by local injections of strychnia ($\frac{1}{100}$ gr.) twice daily and by using ergot in a suppository or by mouth.

PERITONITIS.

All forms of peritonitis are rare in early life.

Acute Peritonitis.—In the newborn it may be caused by infection through the umbilicus. In later childhood it may follow wounds, surgical operations, burns, and exposure. It may be a sequela of appendicitis or be caused by an extension of other purulent inflammations or it may be a complication of the infectious diseases.

Pathology.—It may be localized or general. It may be fibrinous, serous, or purulent, according to the nature of the exudate. Adhesions are frequent.

Symptoms.—Sudden onset, vomiting, usually high fever, crying, and fretfulness. The abdomen is distended, tympanitic, and tender. The muscles are rigid. There may be convulsions or collapse. In young infants it may be found at autopsy where it was not suspected during life.

Prognosis.—In infants it is very fatal, the average duration being four days. In older children the outlook is better,

especially if the inflammation becomes localized. If the child lives over a week the chances are then much better.

Treatment.—An initial purge of calomel or a saline or both, opium in some form for the pain, stomach washing if there is vomiting, high saline injections into the rectum several times daily. Abdominal applications of cold, heat, or counterirritants may be used. Do not irritate the skin if a surgical operation is to be performed. Careful feeding with liquid predigested foods. Stimulants as required. Surgical operation may be indicated. Exploratory laparotomy and the evacuation of pus may be considered.

Chronic (Non-tuberculous) Peritonitis.—This is a rare disease of late childhood. The cause is unknown. It has been supposed to follow measles, rheumatism, and exposure. There is usually a considerable serous exudate with fibrin flakes. Numerous adhesions are present.

Symptoms.—Gradual enlargement of the abdomen, which is somewhat tender. There is gradual loss of weight and strength. There is slight fever, as a rule. The disease runs an irregular course with periods of improvement and relapses.

Diagnosis on above symptoms with absence of evidence of disease of other organs. (See Tuberculous Peritonitis.)

Treatment.—Rest, careful diet, restricted fluid, and salines. The abdomen may be opened and flushed out with salt solution.

ASCITES.

An effusion of fluid into the peritoneal cavity. It is usually a clear serous fluid, but may be bloody (sometimes in tuberculous or malignant disease) or milky. (See Chylous Ascites.)

It may be part of a general edema, as in heart disease, chronic pleurisy, interstitial pneumonia, nephritis, anemia, etc., or it may be due to portal obstruction caused by cirrhosis of the liver or the pressure of a gland or adhesions on the portal vein, or it may be seen when there is an abdominal tumor.

The abdomen is enlarged, and the fluid can usually be made out by fluctuation or by the alteration in the position of dulness on changing the position of the patient.

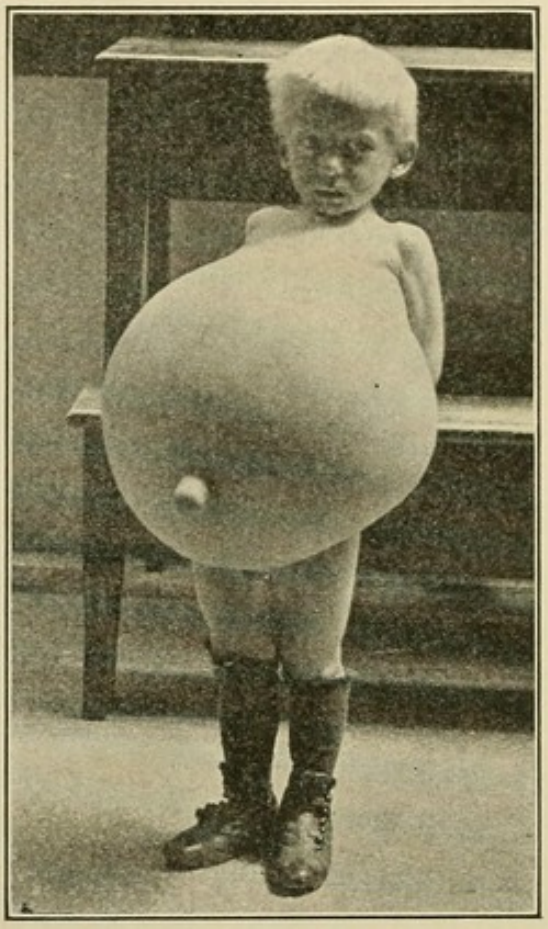


FIG. 50.—Omental cyst. (Courtesy of Dr. J. N. Mendelsohn.)

CHYLOUS ASCITES.[1]

Ascites in which the fluid contains fat, giving it a milky appearance. Simple or tuberculous peritonitis may be present. It has been caused by wounds in the thoracic duct, but also occurs where the lymphatics appear normal. The prognosis is, as a rule, bad. Treatment as in tuberculous peritonitis.

[1] Letulle, *Revue de Medecine*, 1884, No. 9.

DISEASES OF THE LIVER.

Icterus.—Jaundice is only a symptom, and may be due to a number of different causes. These may be either obstructive or toxic. Under the first heading may be mentioned stricture or obliteration of the ducts; inflammation of the ducts, as in catarrhal jaundice; foreign bodies in the duct, as a roundworm; and pressure on the ducts from an enlarged gland or tumor. The toxic forms are sometimes seen in malaria, scarlet fever, Weil's disease, and other infectious diseases.

Icterus in the newborn is usually the physiologic jaundice, but may be stricture or occlusion of the duct or Winckel's disease. In older children icterus is nearly always the catarrhal jaundice; all other causes of icterus are extremely rare in children.

The skin is yellow, and the secretions, urine, etc., are tinged yellow and contain bile pigment, the stools are whitish and very offensive, there is a great irritability and many other nervous symptoms, and also a tendency to hemorrhage. Slow pulse and itching of the skin are not common until after seven years of age.

Acute congestion of the liver may be met with as in the enlarged and tender liver of malaria. Chronic congestion results from general venous obstruction, as in heart and lung diseases. The liver is enlarged, but there are rarely symptoms referable to it.

Fatty liver is common in infancy and childhood. About half the cases autopsied show this lesion. Tuberculosis is a frequent cause. The liver is enlarged, sometimes enormously so. It is smooth and has rounded edges and is not tender. There are no symptoms referable to the liver. Treat the accompanying disease.

Amyloid liver is seen as a sequela of long-standing suppuration, especially of the bones. It is supposed to be due to poisoning with the toxins of the staphylococcus pyogenes aureus. Amyloid changes are present in the other organs, and there is always an enlarged spleen. The liver is enlarged, hard, waxy, and gives a characteristic brown reaction with iodin. There is no jaundice and no symptoms referable to the liver. Edema, ascites, and albuminuria may

be present from the kidney degenerations or from pressure. The condition is chronic and usually means a grave prognosis. The treatment is to get rid of the focus of suppuration. Antisyphilitic treatment should be given if indicated.

Cirrhosis of the liver[1] is very rare in infancy and childhood. In infancy it is usually syphilitic, while in older children the cause is obscure and probably due to infectious diseases. The morbid anatomy, symptoms, and treatment are as in adults. Antisyphilitic treatment should be tried.

Abscess[2] **of the liver** is rare in early life. It may be due to the migration of roundworms, or may be secondary to suppuration elsewhere in the abdomen or may be seen as a complication of an infectious disease.

Symptoms are chills, fever, and sweats, pain in liver or referred to other regions, vomiting, diarrhea, loss of weight, and a septic appearance. Mild icterus is present in about half the cases. The liver is enlarged and fluctuation may be made out. Treatment is incision and drainage.

Gallstones[3] are very rare in early life. They may, however, be met with in infants, where it is a fatal condition.

Hydatid cysts may be met with in childhood, but this disease is practically unknown in America.

Acute yellow atrophy[4] has been reported as early as the twentieth month.

CHRONIC FAMILY JAUNDICE.[5]

A peculiar form of jaundice may be seen in several members of a family, sometimes in two, three, or even four generations. It does not interfere with growth, and may be present from birth. There is a mild icterus with the other symptoms, usually present with jaundice or absent. The spleen is enlarged and there is a moderate anemia. Bilious attacks are common. There is no known treatment that influences the condition.

[1] Howard, *American Journal of the Medical Sciences*, 1887, p. 350.

[2] Musser, *Keating's Cyclopedia*, vol. iii., p. 466.

[3] John Thomson, *Edinburgh Hospital Reports*, 1898.

[4] A. H. Wentworth, "Yellow Atrophy, Acute," *Archives of Pediatrics*, February, 1906, p. 81. Clark and Dalley, "Hepaptosis, Congenital," *American Journal of the Medical Sciences*, December, 1905, p. 969.

[5] Tileston and Griffin, *American Journal of the Medical Sciences*, June, 1910, p. 847.

THE RESPIRATORY SYSTEM OF INFANTS AND CHILDREN.

Respiration according to Uffelmann :

At birth	35
End of first year	27
At second year	25
At sixth year	22
At twelfth year	20

At birth the anterior and posterior diameter of the chest are about the same, and the thorax nearly the same size at the top and bottom, or cylindric in shape. Later, about the third year, it becomes flattened, and this increases until puberty, when the chest is wider below and being pointed like a cone above. The greatest part of the lung in infants and young children is at the back. One should also remember that in early childhood the chest walls are thinner and softer, and changes in shape due to disease, as in pleural effusion, are more frequent than in later life. The diaphragm is higher, and may be still further pushed up by gas in the stomach and intestines, the frequent source of dyspnea in diseases of the lung in the young. The thymus is larger and occupies a considerable portion of the anterior part of the mediastinum. The respiration in the infant is more or less irregular when it is awake, and the movements of the two sides of the chest may be unequal. After the second year there is the tendency for the respiration to become more regular, and it is also regular when the child is asleep. The chest walls move less in children and the diaphragm more, so that the respiration rate is more easily counted by watching the epigastrium. About the sixth year and later the respiration becomes more like that of adults. The trachea and bronchi are relatively much larger than in adults, while the air cells are smaller and there is more interstitial tissue. The percussion note is louder and more resonant than in older people, owing to the thinner chest wall and the larger bronchi. Abdominal tympany is more easily transmitted. Between the scapulas and below the clavicles the note is often tym-

panitic, rather more pronounced on the right side. Cracked-pot sound can frequently be elicited even in health in these regions. The thymus dulness can frequently be made out over the upper part of the sternum, especially in children of the lymphatic type. The respiratory murmur is more bronchial than in later life. This may be mistaken for bronchial breathing. Bronchial râles may be mistaken for friction-rubs. Flatness on percussion usually means fluid, even though bronchial breathing is plainly heard. Absence of dulness does not exclude consolidation, as the note may be affected by small areas of supervening normal or emphysematous lung.

CORYZA.[1]

(Acute Rhinitis, Cold in the Head.)

Definition.—An acute inflammation of the nasal cavities and of the rhinopharynx.

Etiology.—Most frequent in children housed too closely. Is brought on by exposure to cold and wet, irritating vapors, and is seen as a complication of infectious diseases, especially measles, influenza and nasal diphtheria, and as a symptom of iodism. The associated organisms are most frequently the micrococcus catarrhalis, micrococcus paratetragenous, bacillus septicus, Friedländer's bacillus, and it is probable that the pneumococcus and the bacillus of influenza may be associated with mild catarrhs.

Pathology.—The mucous membranes are reddened and swollen; later there is a profuse discharge.

Symptoms.—It begins with sneezing, malaise, fulness in the head, and after the onset a profuse discharge which may become mucopurulent. The nostrils may be occluded by the swelling, and the child breathes through the mouth.

Complications.—Adenitis may follow in young infants. Conjunctivitis or catarrh of the middle ear may be present.

Diagnosis.—Examine for diphtheritic membrane and in young infants for syphilis. In measles and influenza there is more constitutional disturbance, and in measles Koplik spots may be present.

[1] Allen, "The Common Cold," *Lancet*, December 5, 1908.

Prognosis.—Good.

Treatment.—Open the bowels, keep in a warm room (70° F.) and give light diet. Atropin gr. $\frac{1}{1000}$ for each year of the child's age, or belladonna. In older children a quarter of a grain of camphor and quinin may be added. Use cleansing sprays, as Dobell's or Seiler's solution, and follow by oily applications, as

℞. Menthol . . . . . gr. v (0.3);
Eucalyptol . . . . . gr. vi (0.4);
Camphor . . . . . gr. v (0.3);
Liquid petrolatum . . . . . ℥j (30.0).—M.
Sig.—Use in an oil atomizer after cleansing the nose.

CHRONIC NASAL CATARRH.

(Chronic Rhinitis.)

Chronic inflammation of the nasal mucous membranes may be due to a number of different causes. Among them are adenoids, deviation of the septum, hypertrophy of the mucous membrane, polypi, repeated attacks of coryza, and syphilis. A one-sided nasal discharge is usually due to a foreign body in the nose or to a new growth or tertiary syphilis.

Symptoms.—A mucous or mucopurulent discharge from the nose, mouth-breathing, obstruction of the nostril, nasal voice, diminution, or loss of the sense of smell, irritation of the upper lip, frontal headache, and catarrh of the neighboring organs.

Three varieties are described: simple, hypertrophic, and atrophic.

Simple Rhinitis.—This is rare in children, and when seen is usually due to adenoids. There is profuse discharge and swelling of the mucous membranes. Prognosis is good if the cause is removed.

Hypertrophic Rhinitis.—This is rare in early childhood, but it is seen in older children. The tissues covering the turbinated bones are inflamed and thickened. Adenoids are usually present. There is marked nasal obstruction and a mucopurulent discharge. Prognosis is good if persistent treatment is carried out.

Atrophic Rhinitis.—This is occasionally seen in late childhood. The mucous membranes of the nose are atrophied, and there is a scanty discharge which tends to dry and form crusts which cause a very disagreeable odor. The sense of smell of the patient is usually lost. This form can be relieved by constant treatment, but a cure is not to be expected.

Treatment.—The health of the child should be looked after, and it should have plenty of fresh air, good food, and tonics. Adenoids and obstructions should be removed. Hypertrophies may be cauterized if they persist after local applications. In all cases cleansing sprays should be used. In the hypertrophic form apply astringents to the mucous membrane (6 gr. of iodin, 12 gr. of potassium iodid, and 1 oz. each, of glycerin and water; ½ per cent. solutions of silver nitrate; 20 to 40 per cent. aqueous solutions of ichthyol). In the atrophic form the nose must be cleansed twice daily with copious douches of hot antiseptic solutions and oily sprays used to keep the mucous membranes moist. Solutions of potassium permanganate, formaldehyd, or peroxid of hydrogen may be used to lessen the intolerable odor.

Syphilitic Rhinitis.—In early hereditary syphilis this is a most constant symptom, coming on usually between the third and sixth week. There is a profuse discharge and the child sniffles.

In late hereditary syphilis, rhinitis is usually due to the breaking down of a gumma, with subsequent ulceration and necrosis, which may be very extensive. The bridge of the nose may sink in.

Membranous Rhinitis.—This is almost without exception diphtheritic and should be treated as such.

ADENOID VEGETATIONS OF THE VAULT OF THE PHARYNX (Meyer, 1868).[1]

Definition.—Hypertrophy of the mass of lymphoid tissue normally present in the vault of the pharynx, and often called the pharyngeal tonsil.

[1] Glogau, "Nasal Obstruction in Children," *Am. Med.*, April, 1909, p. 195.

Etiology.—Often hereditary, frequently seen in rachitic children, and also a part of the general lymphatic enlargement known as "lymphatism." A small percentage are of tuberculous origin, and in others they are first noted after some acute infectious disease or after frequent colds.

Symptoms.—May be present at birth, but usually not until the child is several years old. The symptoms increase with the age of the child until about puberty, when there is

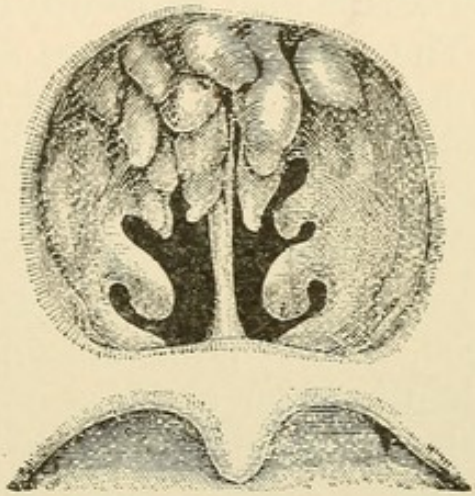


FIG. 51.—Adenoid vegetations.

a gradual atrophy of the adenoid tissue and a lessening of the symptoms.

Adenoids cause: Chronic rhinopharyngitis with frequent attacks of coryza, especially in winter.

Obstruction of the air-passages causing mouth-breathing, which may be constant or only when the child lies down, a nasal twang to the voice, inability to blow the nose, attacks of dyspnea at night and night terrors; a dyspnea on lying on the back, consequently the child in sleep assumes other positions. There is frequently a paroxysm of coughing which may be mistaken for whooping-cough. The child frequently snores at night, and there may be enuresis. There is also frequent deformity of the chest, due to deficient expansion (pigeon-breast), most marked in rachitic children.

In infants adenoids may cause difficulty in sucking, so that the child takes only sufficient food to satisfy the pangs of hunger, is consequently underfed, and malnutrition follows. There are also frequent attacks of coryza, bronchitis, and even a catarrhal laryngitis and croup.

Deafness of a more or less severe grade is present in nearly every case. This may be due to otitis or to obstruction of the Eustachian tube. Mental dulness and apathy, indisposition to exertion, anemia, and general malnutrition are also present. Enuresis is also frequently present.

Diagnosis.—The above symptoms and the typical expression of nasal obstruction should lead to a digital examination. The growths are easily felt by the finger, except in young infants or children with a very small nasal pharynx. In these latter the diagnosis may often be made by lifting up the soft palate, when in young infants the adenoid growths may usually be seen, as the nasal pharyngeal vault is much lower in infants than in older children. It should be borne in mind that mouth-breathing may sometimes be due to obstruction in the nose, and careful examination for this should always be made.

Prognosis.—This is good if the growths are removed, and the earlier the operation is done the better the ultimate results. If delayed until after puberty the breathing may be benefited, and by that time there may be incurable deformities of the chest or tuberculosis or deafness may have resulted.

Treatment.—The growths should be removed by means of a curet, best under the first stage of ether anesthesia. Children who have been mouth-breathers usually have to be taught to breathe through the nose by daily breathing exercises. In most cases a local astringent may be tried:

℞ Iodin, gr. ¼ to ½;
Menthol, gr. j;
Camphor, gr. v;
Liq. petrolatum, ℥j.—M.
Sig.—Five drops in each nostril three or four times a day.

DISEASES OF THE LARYNX.[1]

Note that in all laryngeal affections in early life the amount of spasm is always much greater than the amount of disturbance and may be the cause of the principal symptom.

CATARRHAL SPASM OF THE LARYNX (Goodhart).

(Spasmodic Croup; Catarrhal Croup; False Croup; Spasmodic Laryngitis.)

Definition.—A spasm of the larynx caused by a mild catarrh.

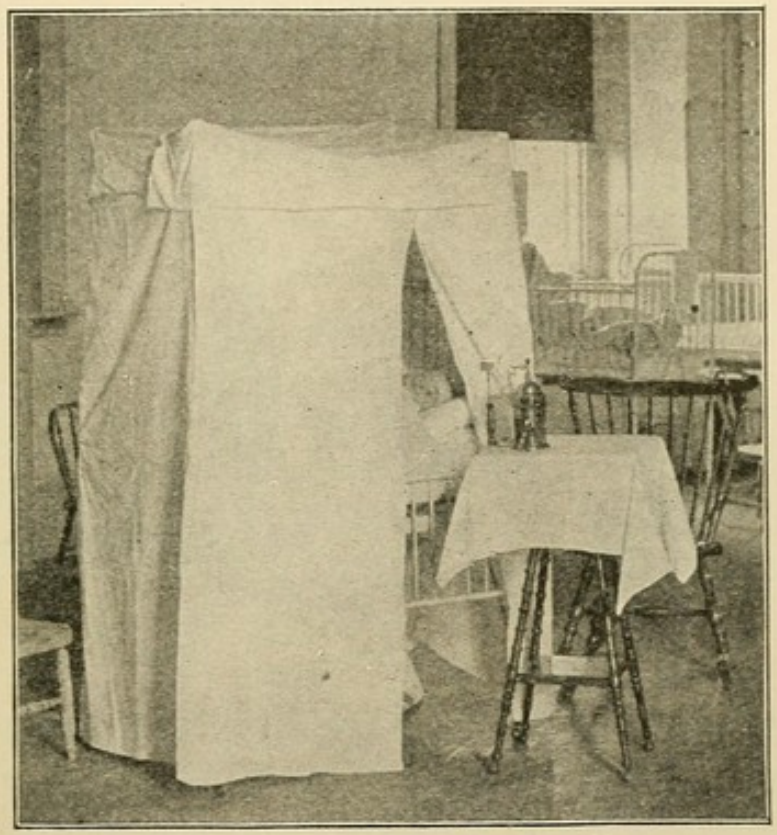


FIG. 52.—Croup tent (J. P. C. Griffith).

Etiology.—This is most frequently seen between the sixth month and the fourth year, in certain children who are predisposed to it and who have frequent attacks. Exposure to cold or indigestion is usually the exciting cause.

[1] Sutherland and Lack, "Laryngoscopy," *Lancet*, September 11, 1897.

Symptoms.—During the evening the child has a barking cough and is slightly hoarse. During the night the child wakes with a hard metallic cough, marked dyspnea, loss of voice, and cyanosis. There is a loud inspiratory stridor. The child is frightened and struggles for breath. There may

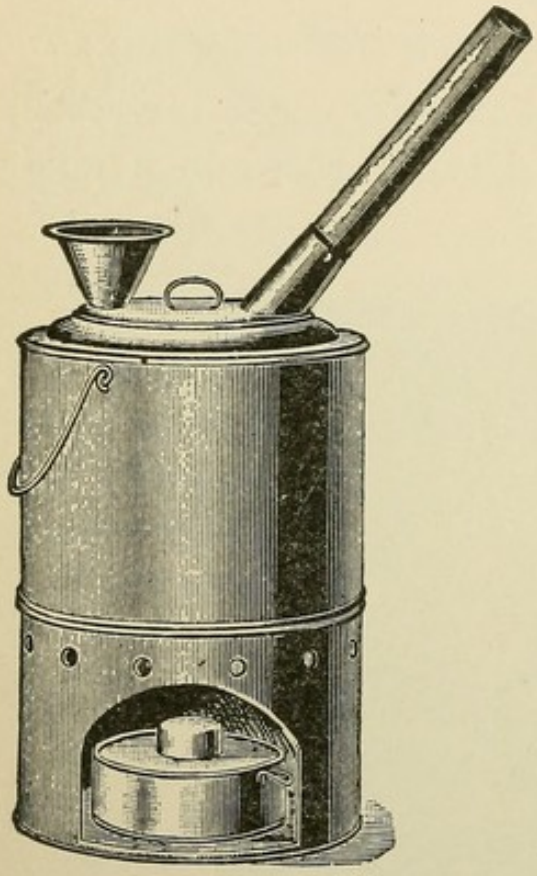


FIG. 53.—Croup kettle.

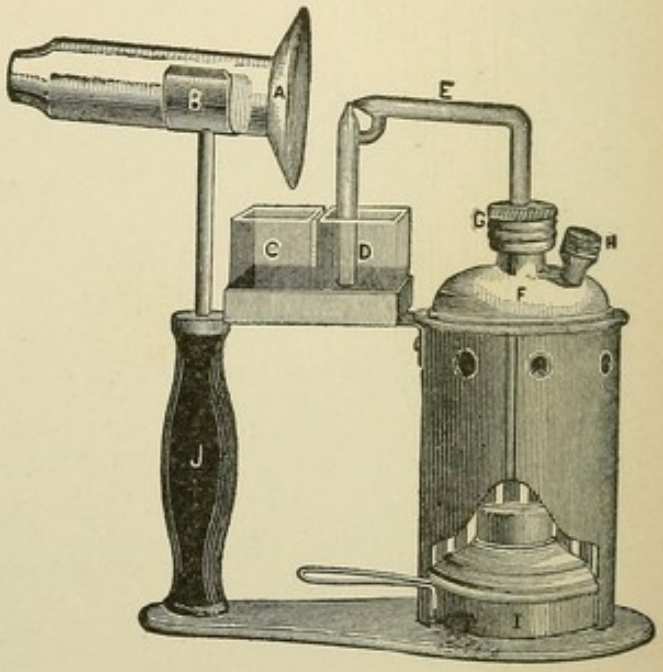


FIG. 54.—Steam atomizer.

be a slight fever. After an hour or two the attack wears off, but may recur the same night. A recurrence is to be looked for on the two or three following nights, but during the day the child is perfectly well, save for slight cough and hoarseness.

Diagnosis.—From laryngismus stridulus (which see) and laryngeal diphtheria (membranous or so-called true croup, both unfortunate names). The sudden onset, the spasmodic character of the dyspnea and the remissions, together with a history of previous attack, usually makes the diagnosis from diphtheria easy. If there is doubt, give a little chloroform. The catarrhal spasm relaxes immediately while

the laryngeal obstruction from a diphtheritic membrane is unaffected.

Prognosis.—Good.

Treatment.—During the attack relax the spasm by applications of heat, inhalations of steam or emetics. Syrup of ipecac, in teaspoonful doses every fifteen minutes until vomiting occurs, is a favorite remedy. A tablet of antimony and ipecac (each $\frac{1}{100}$ gr.) is also efficient, but is more depressing if vomiting does not occur promptly. To prevent recurrence a dose of antipyrin (1 to 3 gr.) with or without sodium bromid or codein should be given and repeated if necessary. On the following day small doses of ipecac (10–15 drops) or the tablet mentioned should be given every four hours, and a dose of antipyrin with or without codein at night.

ACUTE CATARRHAL LARYNGITIS.

This is more rare than catarrhal spasm, and is usually due to exposure to cold or to irritating vapors.

Symptoms.—The principal symptoms are hoarseness, occasionally aphonia, pain on speaking and swallowing, a barking cough, slight, sometimes high fever, and attacks of dyspnea. The vocal cords are red and swollen. Edema of the glottis is a serious complication.

Diagnosis.—From catarrhal spasm by the more continuous symptoms. From laryngeal diphtheria the diagnosis may be difficult. The more intense symptoms and the loss of voice suggest diphtheria. In laryngeal diphtheria after the first twelve hours the dyspnea is inspiratory and expiratory, while in catarrhal laryngitis it is chiefly inspiratory. With diphtheritic membrane elsewhere, enlarged glands, or albuminuria, the diagnosis of diphtheria is almost certain. Make cultures from the larynx and watch the patient closely.

Prognosis.—This is usually good except in the cases following the infectious diseases or in very young infants.

Treatment.—Put the patient to bed, open the bowels, give ipecac or squills to reduce the spasm, or use inhalations of steam from water to which tr. benzoin comp. (1 dr. to 1

pint) has been added. Hot applications may be used. Intubate if dyspnea is urgent. In doubtful cases not improving under treatment give diphtheria antitoxin.

Membranous Laryngitis (*True Croup*).—A name applied to laryngeal diphtheria. Occasionally a membrane may form in the larynx from some other infection, usually streptococcus, as a complication or sequela of one of the infectious diseases, most frequently scarlet fever or measles. The symptoms in the latter are nearly similar to laryngeal diphtheria (which see).

EDEMA OF THE GLOTTIS.

This may occur as a part of general edema, as in nephritis, or it may be due to injury or to the extension of an inflammatory process (submucous laryngitis).

Symptoms.—There is marked inspiratory dyspnea with normal expiration, pain, cough, hoarseness, and dysphagia. Diagnosis by digital examination.

Treatment.—Scarification, application of adrenalin or astringents (alum, 3–5 gr. to the ounce), external application of cold, leeches over the larynx, tracheotomy if necessary. Intubation is of no service.

CHRONIC LARYNGITIS.

Simple Laryngitis.—In children this is nearly always caused by adenoids. It may be due to irritating vapors.

Symptoms.—There are hoarseness, aphonia, cough, and some expectoration. Laryngoscopic examination is difficult and reveals redness and swelling of the vocal cords or of the entire larynx.

Treatment.—Remove the adenoids and use cleansing sprays, inhalations of benzoin, etc., and if necessary local applications of astringents. (Alum, 3–5 gr. to the ounce; sulphocarbolate of zinc, 1–3 gr. to the ounce.)

Tuberculous Laryngitis.—This is almost unknown in early life and is rare in later childhood. When it occurs there is tuberculosis elsewhere, usually in the lungs.

Symptoms.—There may be hoarseness, aphonia, cough, pain, in the throat, increased on swallowing, speaking or coughing. Laryngoscopic examination shows tuberculous deposits or ulcerations, but these are not characteristic of tuberculosis.

Diagnosis on general condition.

Treatment.—Keep clean with sprays, apply astringents locally—nitrate of silver, sulphate of zinc, or iodoform.

Syphilitic Laryngitis.—Frequent in early life as a symptom of early hereditary syphilis, less often as a manifestation of late hereditary syphilis. There is usually ulceration with great destruction.

Symptoms.—These are the same as in other forms of chronic laryngitis. In hereditary syphilis there may be little or no pain. There is nothing characteristic on laryngoscopic examination. The **diagnosis** is on the general condition.

Treatment.—Iodid of potassium and mercury internally. Local applications and sprays as in above. Intubation may give great relief.

TUMORS OF THE LARYNX.

These are usually papillomata, but granulations following tracheotomy may be seen.

Symptoms.—These are the same as any form of chronic laryngitis, but there is slowly increasing dyspnea.

Diagnosis by laryngoscopic examination.

Treatment.—Operation by a specialist.

FOREIGN BODIES IN THE LARYNX.[1]

This may happen by the inspiration of the object from the mouth during laughing or crying. It causes coughing and dyspnea. The object may be forced out by the coughing or may be drawn into the trachea or bronchi, or it may remain in the larynx. Death may occur from suffocation. If drawn into the trachea there are pain, cough, and sometimes bloody

[1] J. P. Clark, "Papilloma of the Larynx in Children," *Boston Med. and Surg. Jour.*, Sept. 28, 1905, p. 377. John Rogers, "Larynx, Chronic Obstruction of," *Amer. Jour. Med. Sci.*, Nov, 1905, p. 293. Clark, "Treatment of Laryngeal Papilloma," *Boston Med. and Surg. Jour.*, Oct., 1905.

expectoration. There is absence of breath-sounds, according to the location of the object. Abscess may follow.

Treatment.—Invert the patient and it may be coughed out. If lodged in the larynx and suffocation is imminent perform a tracheotomy. Operation for removal should be done by a skilful surgeon.

LARYNGISMUS STRIDULUS.

(See page 306.)

CONGENITAL LARYNGEAL STRIDOR.

Definition.—A curious stridor or crowing sometimes seen in early life, coming on immediately or shortly after birth.

Etiology.—The attacks may be increased by excitement and exposure to cold.

Pathology.—There is an increase in the infantile character of the larynx, the sides of the epiglottis being turned back so that they almost meet, making the opening of the larynx smaller and of a peculiar shape. In cases lasting a long time there may be a pigeon-breast deformity of the chest.

Symptoms.—"The stridor consists of a croaking sound, which accompanies inspiration and which rises to a high-pitched crow on quicker or deeper breathing. Expiration is usually noiseless, and sometimes when the inspiratory noise is loud it is accompanied by a short croak" (Thomson). There is little or no cyanosis. The stridor may be present all of the time or may intermit, or may only come on in attacks due to excitement. The child appears otherwise normal and unconcerned. There is no disturbance in the voice. The disease reaches its height about the sixth month, and begins to diminish and usually ceases entirely by the eighteenth month or the second year. During the later months the stridor only comes on during excitement.

Diagnosis.—This is easy. The congenital character of the disease and absence of other symptoms separating it from laryngismus stridulus, and the normal cry from laryngitis and papilloma of the larynx. There may be croaking in cases of adenoids, which disappears on their removal, and in enlargement of the mediastinal lymph-nodes; this latter is

usually coupled with marked disturbance of health, with hoarseness, and is sometimes suggestive of whooping-cough.

Prognosis.—This is good.

Treatment.—Protect the child from excitement, regulate the diet carefully, and have the child out of doors as much as possible.

Diseases of the Bronchi and Lungs.

BRONCHITIS.

Definition.—An inflammation of the mucous membrane lining the bronchial tubes or, in infants, of the entire tube, characterized by cough, expectoration, soreness about the chest, and moist and dry râles.

Varieties.—Acute catarrhal bronchitis, chronic catarrhal bronchitis, and fibrinous bronchitis.

ACUTE CATARRHAL BRONCHITIS.

Etiology.—The primary form usually results from exposure to cold, wet, or draughts, but may also be due to irritating vapors or dust. The secondary form is seen as a complication of almost all of the infectious diseases, especially of measles, influenza, and pertussis.

Pathology.—There are swelling and congestion of the mucous membranes lining the tubes, together with an inflammatory exudate mixed with mucus, pus cells, and desquamated epithelium. The ordinary "cold" is a tracheobronchitis; the severe "cold" involves the medium-sized tubes, while the severe forms in infants extend to the smallest tubes (capillary bronchitis).

Symptoms.—**In Infants.**—*Bronchitis of the larger tubes* (mild form). The onset is gradual, with coryza, pharyngitis, and cough. The respiration is rapid and irregular, and there are loud râles which can be easily heard and felt. There may be fever (100°–102° F.). Vomiting may result from the severe coughing spells. The attack usually lasts about a week. Relapses are common.

Bronchitis of the smaller tubes, capillary bronchitis (severe

form). The onset may be gradual or sudden. All the symptoms of the mild form are increased. There may be high fever, marked dyspnea, prostration, and cyanosis. It may resemble a pneumonia for a few days. Death may take place in young or weak infants from respiratory failure or from suffocation due to the inability to cough up the sputum. The severe stage lasts two or three days and then changes into a milder form. (For differential diagnosis, see Bronchopneumonia.)

In Older Children.—Either mild or severe forms may be seen, but there is little tendency to extend into the smaller tubes. The symptoms as given in the mild form in infants are present. The breathing is less rapid and more regular, and the cough is more pronounced. In the severe forms there are fever, pain in the head and chest, and general malaise. The attack lasts from one to three weeks. Relapses are frequent.

Prognosis.—In weak and young (under six months) infants the severe form may prove fatal. In strong ones (over six months) the outlook is good.

Prophylaxis.—Well-ventilated rooms, neither too hot nor too cold. Cold sponging over neck and chest, night and morning. Cod-liver oil every winter to susceptible children.

Treatment.—Keep indoors and, if there is fever, in bed. Open the bowels and, if seen early, sweat by means of a hot bath (foot or full) and Dover's Powder and phenacetin. Rub chest with camphorated oil. If fever is not too high use an oiled-silk jacket over the chest. In severe forms use counterirritation over the chest; a mustard plaster just to redden the skin is best. This may be repeated every three or four hours. In the first stage inhalations of steam from lime water; later from creosote or compound tincture of benzoin (1 dr. to pint of water). Strychnin and atropin may be used to stimulate respiration, and alcohol given if the heart is weak. Attacks of suffocation are best treated by hot bath, mustard plaster, and stimulants. In mild cases in infants the Jackson mixture containing syrup of squills may be used; otherwise in infants it is best to avoid expectorants.

In older children squills, ipecac, or Dover's powder in the dry stage. Later, ammonium muriate and mistura glycyrrhiza composita or citrate of potassium may be used. If there is pain and cough is troublesome, codein with antipyrin or phenacetin may be used. Heroin hydrochlorate, with or without terpin hydrate, may be used if the cough is excessive. For persistent bronchitis creosote or terebene is best. Cod-liver oil may be used during convalescence. A change of air is advisable where circumstances allow.

FIBRINOUS BRONCHITIS.

Primary fibrinous bronchitis is a rare disease, more frequent in children than in later life. A secondary form may be seen complicating laryngeal diphtheria. Casts or strings of mucus are expectorated, and the diagnosis rests on finding the casts. The symptoms are like ordinary bronchitis, but there are few or no râles. It may become chronic, attacks occurring every few days or weeks. The acute form is frequently fatal (75 per cent.), but the chronic form is not.

Treatment.—Not satisfactory. Inhalations, counterirritation, and the administration of stimulating expectorants or emetics. Iodid of potassium is useful in the chronic form.

CHRONIC BRONCHITIS.[1]

This is not common in early life, but may be seen associated with heart disease, emphysema, interstitial pneumonia, tuberculosis, hereditary syphilis, and following the acute infections. It may also be seen in malnutrition and rickets.

Symptoms.—There is cough, which is frequently paroxysmal and is liable to be more severe at night. The sputum may be scanty or abundant. There may or may not be coarse râles. Exacerbations are common.

Diagnosis.—From pertussis by the course of the disease. A marked leukocytosis is suggestive of pertussis. From tuberculosis by fever and loss of weight with progres-

[1] Allan, "Persistent Chronic Bronchitis in Children," *The Practitioner*, April, 1910, p. 532.

sive weakness. A positive diagnosis can be made by finding the tubercle bacilli in the sputum.

Treatment.—The associated disease should receive attention. Creosote is the most satisfactory drug. Cod-liver oil is of great service. Terebene and iodid of potassium may be used. If the cough is excessive heroin may be prescribed. A change of climate is beneficial.

BRONCHIECTASIS.[1]

Definition.—A dilatation of the bronchial tubes.

Etiology.—This is seen in weak, syphilitic, or rickety children who have had bronchitis. It often follows influenza. Lord has isolated the influenza bacillus in cases of bronchiectasis.

Pathology.—The lung presents a honeycombed appearance throughout part or even all of the lungs, due to the dilated bronchioles and small cavities. The bronchi are surrounded by a small zone of inflammation. On the surface of the lung there are small vesicles which contain air.

Symptoms.—There is cough, paroxysmal in character, and relieved by the expectoration of a considerable quantity of foul-smelling pus. In some cases the sputum is swallowed, and only expelled by vomiting. There is usually some deformity of the chest, and often clubbing of the fingers. There is anemia and often fever.

The physical signs consist in tubular breath-sounds, together with râles, which vary with the size of the cavities and the amount of pus in them. If the lesion is limited there may be dulness.

Diagnosis.—Principally from tuberculosis. In the cases where there is no expectoration this may be very difficult. In tuberculosis, fever is more constant, the disease progresses more rapidly, and there may be involvement of the lymph-glands.

Prognosis.—Bad. Some of the cases live for many years,

[1] Godlee and Fowler, *Diseases of the Lungs.* Stanley Box, "Bronchiectasis, Treatment of," *Practitioner*, June, 1906, p. 839.

but almost invariably the disease sooner or later causes death.

Treatment.—Fresh air, good hygiene and food, tonics, especially cod-liver oil, and creosote are advised. Locally inhalations of creosote, eucalyptus, or sprays of iodoform emulsion may be tried.

NERVOUS COUGH; REFLEX COUGH.

These terms are applied to cough produced by disease of other organs than those of respiration. It may be caused by adenoids, elongated uvula, enlarged mediastinal glands or abscess in the posterior mediastinum (as that caused by Pott's disease), heart disease, anemia, and general nervousness.

Symptoms.—The cough is usually worse at night, and is liable to be paroxysmal in character, especially if due to intrathoracic causes.

Diagnosis.—This is possible only by the most careful observation and examination.

Treatment.—Treat the underlying cause when found. To relieve the cough phenacetin or antipyrin, combined with sodium bromid, may be given at bedtime.

ASTHMA.[1]

This is a term applied to most conditions where there is dyspnea, but it should be limited to the spasmodic attacks associated with catarrh of the bronchi. It is not a very common disease in early life, but may be seen in later childhood.

Etiology.—It may be hereditary and is most frequently seen in gouty or neurotic families. It may be due to local causes, as rhinitis, adenoids, or elongated uvula. The pollen of certain plants and numerous other things may cause it.

Symptoms.—**Adult type.**—There are wheezing respiration, cough, and dyspnea. Loud râles are heard on auscultation. The attack passes off with treatment or after several

[1] La Fétra, *Archives of Pediatrics*, December, 1904, p. 904.

hours without treatment, but recurs after hours, days, or weeks. Emphysema may result. Attacks simulating capillary bronchitis may occur in infants, but lasting only a few hours or a day. Some children get spasmodic dyspnea with every attack of catarrhal bronchitis. Hay fever is rarely seen before puberty.

Diagnosis.—This is, as a rule, easy. Sometimes the disease can only be told by the recurring attacks.

Prognosis.—If due to a removable cause, as asthma, the outlook is good. The infantile forms usually have a favorable outlook, but death may occasionally result. The danger usually is that the disease becomes chronic.

Treatment.—Examine nose, throat, and chest, and treat all abnormalities or diseases as far as possible. During an attack place the child in a tent filled with the fumes of stramonium leaves and niter paper. (Himrod's, Kidder's, or Kutnow's cures are convenient mixtures to use.) Emetics may be given if the stomach is full. To prevent recurrence full doses of antipyrin may be given. A change to another climate is best where the disease shows a tendency to become chronic. Iodid of potassium and tonics may be used between the attacks.

PNEUMONIA.[1]

This is one of the most frequent diseases of infancy and childhood, and is often a cause of death. It is an inflammation of the lung. There are two principal forms—bronchopneumonia, also called catarrhal or lobular pneumonia, and lobar or croupous pneumonia. Other forms are hypostatic and chronic bronchopneumonia. Pneumonia is frequently complicated with pleurisy, and then the condition is called pleuropneumonia. Pneumonia may also be due to tuberculosis or other diseases. In a general way the diagnosis of pneumonia may be suspected when a child is taken suddenly ill with fever, cough, and depression, with rapid respiration, in which the ratio of the pulse is about 1 to 3, and if added to

[1] W. P. Northrup, "Pneumonia, Cold Fresh Air Treatment in," *Boston Medical and Surgical Journal*, February, 1906, p. 216.

this there is flaring of the nostrils, a change from the ordinary breathing, which is first inspiration, then expiration, then a pause, to what might be called pneumonic breathing, which is inspiration followed by a pause, then expiration followed by a grunt, and if there is also slight rigidity of the neck and upper extremities, the diagnosis is almost certain, and can easily be confirmed by a careful examination of the chest.

BRONCHOPNEUMONIA.

This is seen most frequently in infancy.

Etiology.—Somewhat over half the cases occur during the first year and one-third more during the second year. After the fifth year it is very rare. The primary form affects males more frequently than females (5 : 4). In the secondary form the sexes are affected about equally. It is most often met with in the weak, the sick, poorly nourished, and poorly housed. It is common in asylums. Over half the cases are secondary to other diseases, especially to measles, pertussis, diphtheria, and ileocolitis. No one organism is found in all cases. Most frequently there is the pneumococcus, the streptococcus, or the staphylococcus aureus. Other organisms are found more rarely. There are frequently two or more forms of bacteria found in the same case. The secondary cases are often due to streptococci, and the areas are small and separated. Large areas of consolidation are usually due to the pneumococcus.

Pathology.—The disease involves the smaller bronchi and the adjacent air cells. The walls of the bronchi, the air cells, and the interstitial tissue of the lung are infiltrated with an exudate, and the bronchi and air spaces are filled with it. The areas of consolidation are usually small and are scattered through the lung, and are separated by patches of normal lung. They may run together, however, and form areas of consolidation of considerable size. The patches vary in size from less than a millimeter to several centimeters. The disease is usually bilateral, but in about one-tenth of the cases one lung only is involved. In this case the apices

(right) are most frequently affected. As a general rule the left lower lobe is most frequently involved. The exudate consists of red and white cells, and differs from the exudate of lobar pneumonia in that it contains numerous epithelioid cells and very little fibrin. In some cases the process is not unlike the lobar pneumonia, and in these cases the fibrin is more abundant. The disease runs no definite course. During the first day or two there is congestion of the lungs, but after several days the process becomes localized in certain areas which are reddish and semisolid. There may be hemorrhages. After a few more days there is more complete consolidation, and the lung presents a mottled red and gray appearance which turns to gray almost entirely after the first two weeks. (The bronchi are filled, as well as the air cells, and not empty as in lobar pneumonia.) Sometimes one part of the lung clears up and another becomes affected. There is compensatory emphysema over the unaffected part of the lungs. The bronchial lymph-glands are swollen. Pleurisy is common if the disease reaches the surface of the lung. Death or resolution may occur at any time, or the disease may last for weeks. Gangrene and abscess or empyema may follow.

Symptoms.—Bronchopneumonia has no regular course. The primary form may come on suddenly or gradually, while the secondary form has nearly always a gradual onset. In most cases the disease starts in as a pneumonia, but sometimes it is apparently a bronchitis for several days and then changes into a pneumonia. In other cases the dominant symptoms are vomiting and diarrhea and the real disease may be overlooked. The pulse is rapid, the respiration is labored and rapid, the child is depressed, and usually has an appearance suggesting pneumonia. There may be vomiting, chill, or convulsions, at times there are intense nervous symptoms at the onset, even delirium, and later coma. The disease may terminate at any time either in death or by getting well. Some cases last only a few days and are called the abortive form. The average form lasts from two to three weeks, and the protracted form from one to four months and occasionally longer. The very protracted cases usually die from exhaustion.

The temperature is extremely irregular, going up and down without apparent reason. In vigorous children and in severe cases the tendency is to be high, in weak depressed children it may be low, and some cases run a subnormal temperature.

The respirations vary from 40 to 60 and sometimes go as

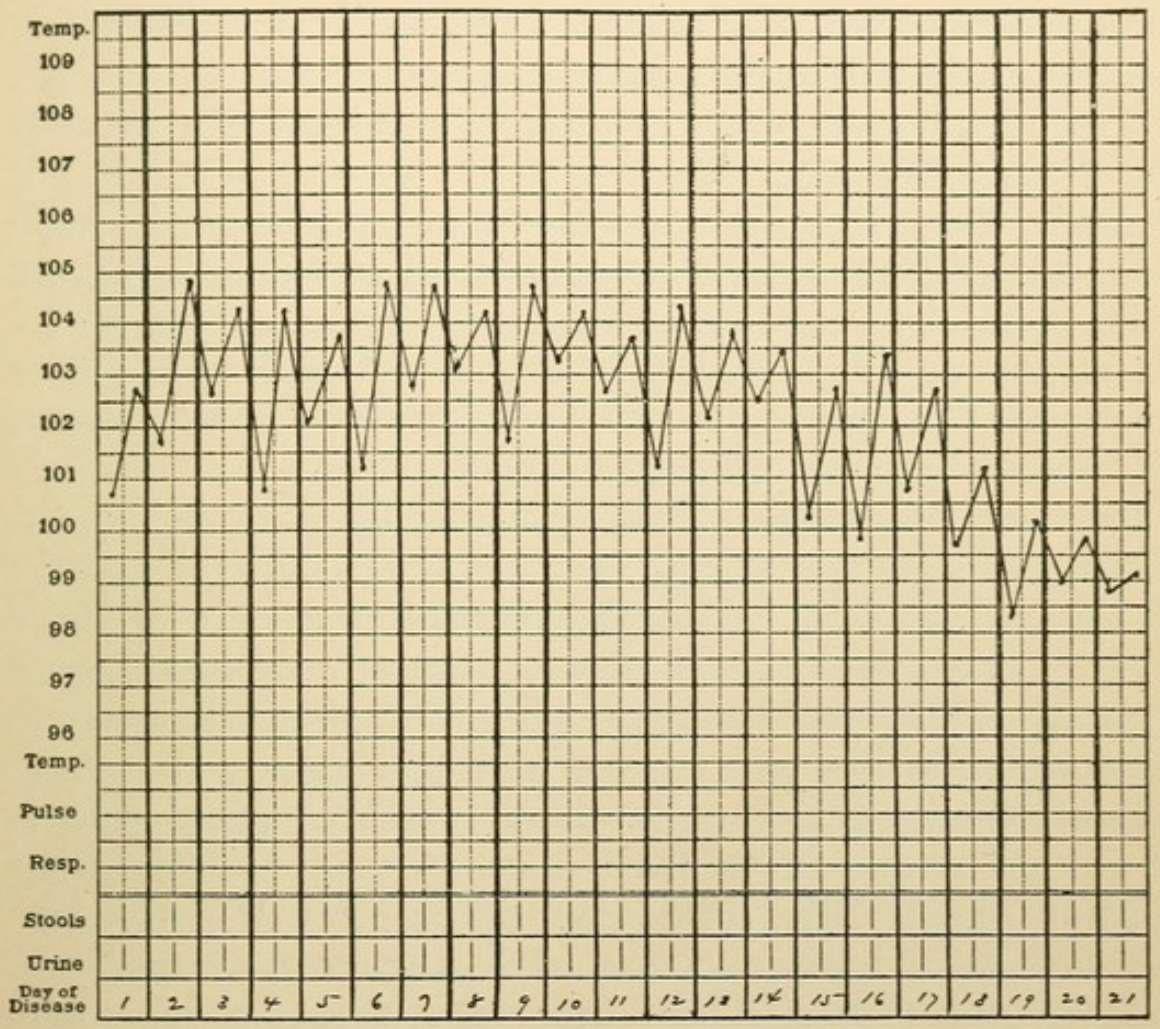


FIG. 55.—Temperature chart in a case of typical bronchopneumonia of average severity.

high as 80 or over. The amount of cough varies; in some it is troublesome and painful and in others slight.

The pulse is rapid, ranging from 120 to 160 to 200. It usually grows weaker and more rapid as the disease progresses, especially in unfavorable cases.

Cyanosis is a common symptom and comes on when the temperature is high, the respiration labored, or when the heart flags.

Nervous symptoms are often marked, restlessness, delirium, and later, apathy, stupor, and even coma. Sometimes symptoms resembling meningitis are seen. Convulsions may occur.

Pain is not frequent unless the pleura is involved, but the patients are usually considerably distressed.

There may or may not be gastric and intestinal disturbance. Flatulence is common and distressing and, in weak children, a source of danger. Diarrhea is not infrequent, and is usually due to intestinal indigestion.

There is albuminuria in most cases and there may be casts and nephritis in some.

Acute Congestive Form.—This comes on suddenly, with high temperature, often a convulsion, rapid breathing, rapid pulse, cyanosis, and intense nervous symptoms. The physical signs are those of congestion. The child may die or recover almost entirely in the first few days, or the disease may change into the ordinary form.

Capillary Bronchitis.—This is essentially a bronchopneumonia, although cases occur in which the lesions are nearly if not entirely confined to the bronchi, especially the finer tubes. There is irregular fever, cyanosis, dyspnea, rapid respiration, and troublesome cough. The physical signs are those of bronchitis, with coarse and fine râles and usually subcrepitant râles. The breath sounds are feeble and the percussion notes may be more resonant than normal, owing to emphysema. The child may die or get well in four or five days or, as in the above, it may change to the usual form.

Protracted Cases.—These are distressing, the symptoms and signs usually decrease somewhat and persist. The child gets weaker and weaker, and usually dies from exhaustion. Recovery may take place even in cases apparently almost hopeless. Convalescence is always slow.

Secondary Bronchopneumonia.—These cases are like the above except that they complicate other diseases, usually measles, diphtheria, influenza, whooping-cough, and gastro-enteric diseases. The signs, symptoms, and course are about as outlined above, except that the secondary cases are more liable to prove fatal.

Physical Signs.—**Congestion.**—There is lessened breathing over the affected area, later, fine crackling râles; then higher pitched breathing, and over the remainder of the chest often loud bronchial râles. A common error is to place the pneumonia on the wrong side at first, owing to the louder breathing being mistaken for the diseased area.

Cases with Signs of Bronchitis.—There may be only signs of bronchitis. Fine râles, usually moist, and usually localized to one area or to several, sometimes more or less general. The breath sounds are usually higher in pitch over the affected area; coarser râles are usually heard throughout the chest. The diagnosis in these cases may depend more on the general appearance and symptoms than the signs.

Small Areas of Consolidation.—There is high-pitched, bronchovesicular breathing, crackling râles, and the breath sounds are transmitted more clearly. There is little or no dulness, and the respiration, being feeble, may lead to the same mistake mentioned above.

Consolidation.—There is some dulness, slight increase in fremitus, bronchial breathing, fine crackling râles, and louder bronchial râles.

Complications.—These are numerous. There may be acute emphysema, pleurisy, abscess, or gangrene. There may be meningitis, endocarditis, or pericarditis, gastro-enteritis, or nephritis. In some epidemics there seems to be an especial tendency to some one complication.

Prognosis.—This is bad in weak or young infants. After one year of age the prognosis is better, and increases with the age of the child. The disease is particularly fatal in institutions and among the very poor. The outlook is better in breast fed than in bottle fed. The outlook is unfavorable in badly nourished children, where there is a lack of fresh air, when the chest muscles and bones are weak, when the amount of lung involved is large, when there is continuous high fever, when there is cyanosis and cerebral symptoms. Secondary cases are more fatal than primary ones.

Treatment.—The child should be kept at rest and in the fresh air, either out of doors or in a well-ventilated room.

The clothing should be light, and there should not be any heavy poultices or jackets used, as they embarrass respiration. The position should be changed from time to time. There should be quiet about the child and no visitors or unnecessary talking. Sufficient but not too much water to drink. Careful feeding is imperative (see Feeding). Nervous symptoms and high temperature are both best relieved by cold sponging, packs, or ice-bags. Antipyrin with or without codein may be used for intense nervousness, excessive cough, or pain. Codein, heroin, or sodium bromid may also be used for excessive cough. The fewer drugs given the better, and never give expectorants, they do no good and upset the stomach. The heart should be stimulated with strychnin, alcohol, strophanthus, camphor, or atropin. If necessary, strychnin or Merck's digitalin may be given hypodermatically. Aromatic spirits of ammonia by mouth or adrenalin (1 to 3 minims of the 1 : 1000 solution) injected into the muscles is useful in acute collapse, and atropin or strychnin in respiratory failure. Dyspnea and cyanosis are often best relieved by a mild mustard plaster applied to the entire chest and left on only until the skin reddens. This may be used every three or four hours if necessary, and if used with caution may be continued for days. The chest should be greased after it is removed. Camphorated oil may be used as a mild counterirritant. Inhalation as in bronchitis. In very severe cases oxygen inhalations may be used. Creosote or guaiacol carbonate may be given in protracted cases. A change of climate does more for these than anything else. The bowels should be kept open and all annoying symptoms relieved. The more comfortable the child the more liable he is to get well.

Diagnosis.—Bronchopneumonia is characterized by râles. Sudden onset, cough, rapid respiration, and high fever suggest pneumonia. If the fever remains above 102° to 103° F. for over forty-eight hours, or there is marked cyanosis or prostration, the diagnosis is almost certain. From atelectasis during first few months of life by the subnormal temperature. The two conditions may be associated and diagnosis be impossible.

Bronchopneumonia.	*Lobar pneumonia.*
Primary or secondary.	Usually primary.
Onset sudden or gradual.	Onset sudden.
High irregular fever.	High continuous fever.
Gradual defervescence.	Crisis frequent—sixth to twelfth day.
Usually involves both lungs.	Usually only one lung.
Marked râles throughout entire course.	Râles at beginning and during resolution only.
Bronchial breathing may or may not be present.	Bronchial breathing marked.
Dulness rarely marked.	Dulness marked after third day.
Slight increase in fremitus.	Fremitus marked.
Resolution slow.	Resolution rapid.
Relapse common.	Relapse rare.
Prognosis bad.	Prognosis good.

LOBAR PNEUMONIA.[1]

(Croupous Pneumonia; Inflammation of the Lungs; Lung Fever.)

Etiology.—This is usually primary and comes on after exposure to cold and wet. It affects the healthy as often as the weak. Fränkel's diplococcus is nearly always present. Lobar pneumonia is the common form of pneumonia after two years of age.

Pathology.—A lobe or a part of a lobe is affected. The left base is the most frequent location; then the right apex, right base, and left apex. More rarely both lungs may be attacked. There are four stages: Congestion, red hepatization, gray hepatization, and resolution. The air cells are filled with an exudate, which in the red stage is composed of fibrin, red and white blood cells, the red predominating. In the gray stage the white cells are most numerous. After a week or ten days resolution begins, often suddenly, and by the end of another week the lung is cleared up. The smaller bronchi are also filled with exudate, but the larger ones rarely (*massive pneumonia*).

Symptoms.—The onset is sudden, with a chill or a convulsion. The face is flushed; there are high fever, rapid,

[1] Morse, *Archives of Pediatrics*, September, 1904, p. 641. Coutts, "Occurrence and Treatment of Lobar Pneumonia in Young Children," *Edinburgh Medical Journal*, September, 1902.

irregular respiration, and a dry, hacking cough. Later on delirium may be present or even coma. Where the mental symptoms predominate the disease is sometimes called cerebral pneumonia. The temperature rises rapidly to 103°–105°,

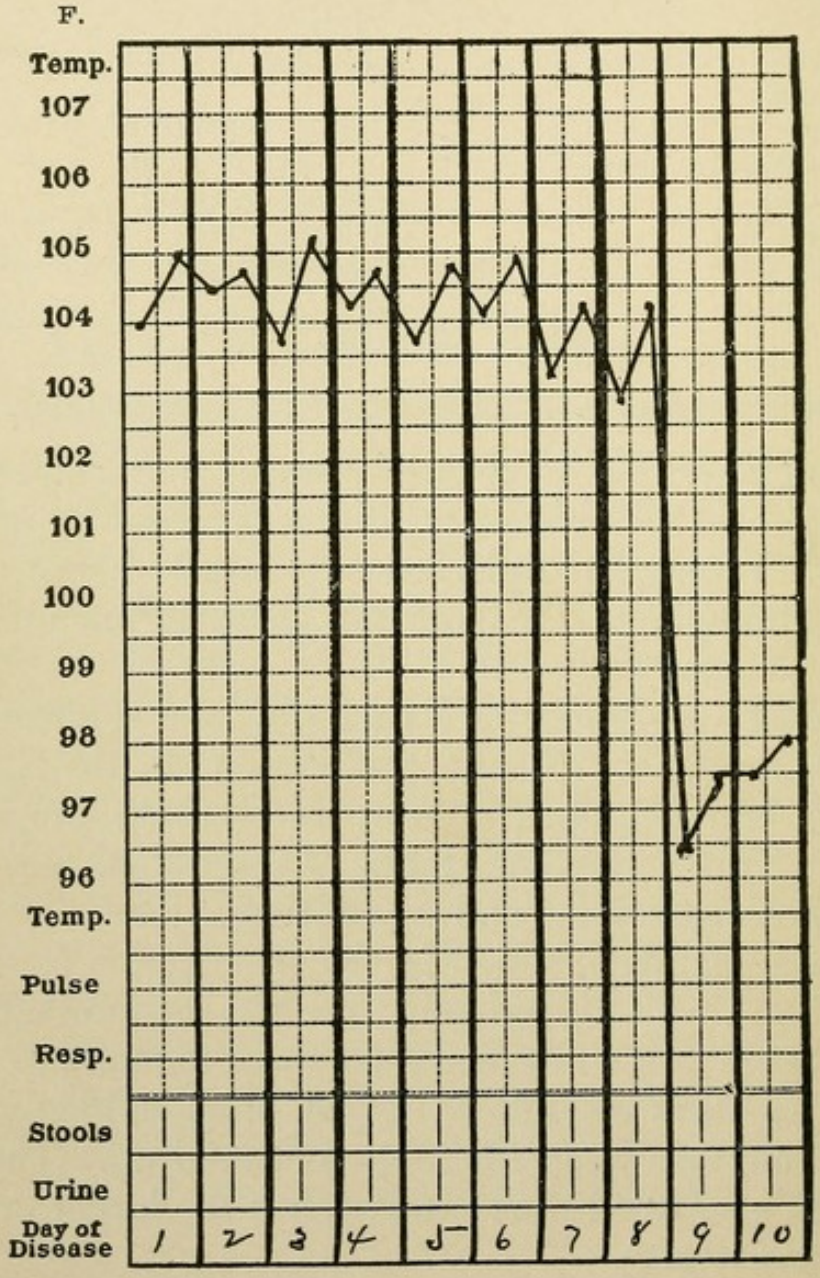


FIG. 56.—Typical temperature chart in lobar pneumonia showing crisis on the ninth day.

and remains high until resolution begins, when it usually ends by crisis. It may end by lysis in some cases.

The Physical Signs.—**Congestion.**—The breathing over the affected area is diminished, and it is increased over the

remainder of the lung. Later, as the exudate fills the lung, there are fine subcrepitant râles.

Consolidation.—There are lessened mobility of the chest over the affected area, increased fremitus, dulness, bronchial breathing, and after the first stage few or no râles until resolution begins.

Resolution.—There are numerous moist râles, the breathing becomes bronchovesicular, and the dulness and fremitus diminish.

Varieties.—A central pneumonia may be confusing. The area is surrounded by healthy lung, and it may be days before the consolidation reaches to the surface of the lung. In the meantime the symptoms of pneumonia are present, but no physical signs. The area of consolidation may gradually extend from one place to another (*creeping pneumonia*). After a typical onset the patient may suddenly recover after two or three days. Either a creeping or ordinary pneumonia may last two or three weeks (*prolonged pneumonia*) or longer.

Complications.—Pleurisy is most common. Dry pleurisy is present in nearly every case. Pericarditis, meningitis, otitis, and peritonitis may occur. Gangrene and abscess are rare.

Diagnosis.—Any disease beginning with sudden onset with high fever may be mistaken for a pneumonia. Examine the chest in every case. (See Meningitis.) Empyema may be mistaken for pneumonia in children. (See same.) A puncture settles the question.

Prognosis.—Good. About 4 per cent. of all cases die.

Treatment.—Very much as in bronchopneumonia. Codein, bromids, or antipyrin or phenacetin may be used for the cough and nervousness. Cold pack will often relieve it.

HYPOSTATIC PNEUMONIA.

This is a term applied to the congestion of the posterior part of the lungs when a child lies on its back much of the time. It is seen as a complication of many chronic diseases.

The affected part of the lung has a strip of very dark solid or nearly solid lung, which is dark red and edematous-looking. There are no symptoms and no physical signs beyond a few moist râles along either side of the spine.

Treatment should be directed toward the original condition. The position of the child should be changed frequently.

PLEUROPNEUMONIA.

This is a lobar pneumonia with an exudate, usually of fibrin, into the pleural cavity. The symptoms are more intense than in simple pneumonia, and there are pleuritic friction sounds until the exudate fills the pleural cavity, and then the physical signs of the pneumonia are somewhat lessened. It may be mistaken for empyema, but the diagnosis may usually be made by puncture. Sometimes a little pus may be found even in pleuropneumonia. The treatment is the same as for uncomplicated pneumonia.

CHRONIC INTERSTITIAL PNEUMONIA.

(Chronic Bronchopneumonia.)

This is a chronic inflammation of the connective tissue of the lung, and follows tuberculosis or repeated attacks of bronchopneumonia. The bronchi are affected and are usually dilated (bronchiectasis).

Pathology.—There are thick bands of connective tissue running through affected portions of the lung and firm adhesions to the pleura. There are emphysema and enlargement of the bronchial lymph glands.

Symptoms.—Following a pneumonia there is a little cough and dulness with bronchovesicular breathing. This lasts months or years. After several attacks of pneumonia the disease becomes marked. There are retraction of the chest, increased fremitus, dulness, feeble respiratory murmurs or bronchial breathing.

Diagnosis.—Tuberculosis is diagnosed on finding the tubercle bacilli or by exposure, surroundings, and family history.

Prognosis.—This is poor. Patient usually succumbs sooner or later. In the most favorable cases the patient is more or less feeble all his life.

Treatment.—Change of climate and the out-of-door life, as in tuberculosis—cod-liver oil and the like.

GANGRENE OF THE LUNG.[1]

This is rare, but occasionally follows bronchopneumonia, lobar pneumonia, empyema or tuberculosis, especially after measles or in general pyemia. The surface of the lower lobes is most frequently affected. The areas are generally small, but may involve the entire lung.

Symptoms.—The majority of cases are not recognized during life, as death takes place before the lungs break down. If this occurs before death there is a gangrenous odor, pieces of the lung are expectorated, and there may be hemorrhage. In all cases there are great prostration and severe anemia.

Prognosis.—Bad.

Treatment.—Symptomatic and the use of deodorizing inhalations. Keep the child in the open air. Surgical measures are sometimes of value.

EMPHYSEMA.

(Volumen Auctum Pulmonum.)

This is due to overdistention of the air vesicles, and may be caused by the lung doing the work of a non-functionating part (compensatory emphysema), as in tuberculosis, pneumonia, pleurisy, and the like. It may also be caused by stenosis of the larynx, in severe coughing, as in whooping-cough, and by holding the breath.

Lesions.—The connective tissue of the lung is stretched and loses part of its contractility. The emphysema may affect a part or the whole of the lung. It is most frequently seen about the edges. The vesicles may rupture and the air escape into the connective tissue, causing various-sized blebs (interstitial emphysema), and the air from these may find its

[1] Carr, *Archives of Pediatrics*, March, 1904, p. 176.

way into the mediastinum and thence to the subcutaneous tissue of the body.[1] If the cause be removed the emphysema disappears in a few weeks or months.

Symptoms.—There is increased resonance, and in marked

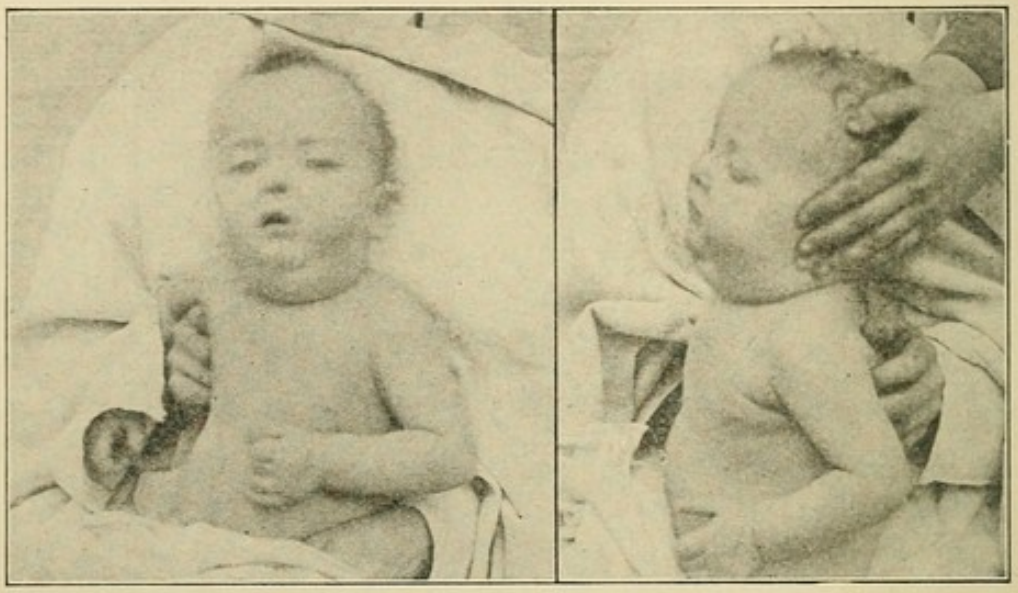


FIG. 57.—Cutaneous emphysema.

cases the lung boundaries are enlarged. There may be expiratory dyspnea.

Treatment.—Treat the underlying cause. In the severe cases from coughing, etc., rest in bed.

PLEURISY.

This occurs as a complication of the various lung diseases, also of rheumatism, and occasionally of other constitutional and infectious diseases, and there may be a primary form from exposure to cold or wet. Tuberculosis is also a frequent cause. There may or may not be an effusion.

Dry Pleurisy.—This occurs as a complication and in older children may be primary.

Lesions.—The pleura is congested, and there is an exudation of fibrin on the surface which takes off the gloss. There may be large amounts of fibrin present. If it become chronic the pleura becomes thickened.

[1] Pierson and Carr, *Archives of Pediatrics*, February, 1902, p. 108.

Symptoms.—There are pain, cough, and tenderness. The diagnosis rests on hearing the rubbing friction-sound. Recovery takes place coincidently with that of the original disease; but some cases may become chronic. The primary cases usually recover within a week.

Treatment.—Strap the chest or use counterirritations, as iodin or mustard. Anodyns may be required.

Pleurisy with Serous Effusion.—The layers of the pleura are separated by an effusion of serous fluid. This may contain bacteria.

Symptoms.—This may come on suddenly or gradually. It may follow a dry pleurisy or complicate a pneumonia or tuberculosis. If it follows a dry pleurisy the pain stops when the effusion appears. There may be symptoms referable to pressure of the fluid, such as displacement of the heart, dyspnea, and cyanosis. The fluid is usually absorbed. If it persists general weakness and anemia follow.

Physical Signs of Fluid in the Pleural Cavity.—*Mensuration.*—The affected side is somewhat larger than the other if the effusion be large.

Inspection.—Immobility of the affected side, bulging of the intercostal spaces, and there may be displacement of the heart (apex-beat). Litten's phenomenon is absent.

Palpation.—Immobility and the absence of vocal fremitus.

Percussion.—The note is dull or flat. The position of the dulness changes with the position of the patient. The area above the fluid gives a tympanitic note (Skoda's resonance). The upper border of the effusion makes an S-shaped curve (Ellis's curve), but this is obliterated in very large effusions.

Auscultation.—In children there is usually bronchial breathing, and consequently the diagnosis of pneumonia is frequently made. There are no râles, but friction-sounds may be heard above the fluid and after its absorption. The voice-sounds are usually distinct in children, and near the edge of the fluid sometimes a peculiar bleating quality is added (egophony).

Diagnosis.—From pneumonia by the absence of change on changing the position of the patient, absence of Ellis's curve, and the presence of râles. From empyema by puncture. This should be done whenever fluid is suspected.

Prognosis.—This is good, as a rule.

Treatment.—This is largely symptomatic. Rest, careful feeding, anodyns as required, and counterirritation by iodin or mustard. If the effusion be large, aspirate. If absorption be prolonged, give iodid of potassium. During convalescence keep in the open air and manage as in a case of tuberculosis.

EMPYEMA.[1]

Under three years of age a pleural effusion is in almost every instance purulent. This usually follows a pneumonia, occasionally one of the infectious diseases, or suppuration elsewhere. In later childhood it may be tuberculous.

Pathology.—The pleural cavity is filled with pus and the lung—and often the heart—displaced. The pneumococcus, streptococcus pyogenes, staphylococcus pyogenes aureus, or the tubercle bacillus may be found.

Symptoms.—Very much as in serous effusion. There are dyspnea, cough, and fever, which is usually high and irregular, but which may be moderate. There is a leukocytosis. Seen later, there is always profound anemia and prostration with emaciation. There is albuminuria, and frequently in the chronic cases clubbing of the ends of the fingers. The physical signs are the same as in serous effusion.

Diagnosis.—By puncture. Pus may not always be found the first time.

Prognosis.—In weak and very young children, or if seen late, the prognosis is bad. The cases where the pneumococcus is found are the most favorable. The presence of streptococci and staphylococci is always serious. The tuberculous cases have the same prognosis as tuberculosis of the lungs.

[1] Morse, *American Medicine*, vol. vii., p. 430. William Broadbent, "Empyema, Interlobar," *Practitioner*, February, 1905, p. 145.

Treatment.—Open the chest by incision and secure free drainage. Under two years of age a longer drainage-tube, which will syphon out pus gradually, is advisable.[1] In older children a rib may be resected if necessary. During convalescence it is important to see that the lung is expanded by deep respiration. Blowing bubbles and the like are recommended.

[1] Holt, *American Medicine*, June, 1913, p. 381.

HEART AND CIRCULATION IN INFANCY AND CHILDHOOD.

At birth the circulation through the umbilical vessels and the ductus venosus and the ductus arteriosus stops. The circulation through the foramen ovale ceases at birth or shortly afterward. The umbilical vessels atrophy and become mere fibrous cords.

Pulse.—The pulse-rate is very easily disturbed during childhood, and varies greatly when the child is awake. Holt gives the following pulse-rates during sleep:

Six to twelve months	105–115
Two to six years	90–105
Seven to ten years	80– 90
Eleven to fourteen years	75– 85

Apex-beat.—In infants this is higher and further to the left than in adults. It is in the fourth space, and later in

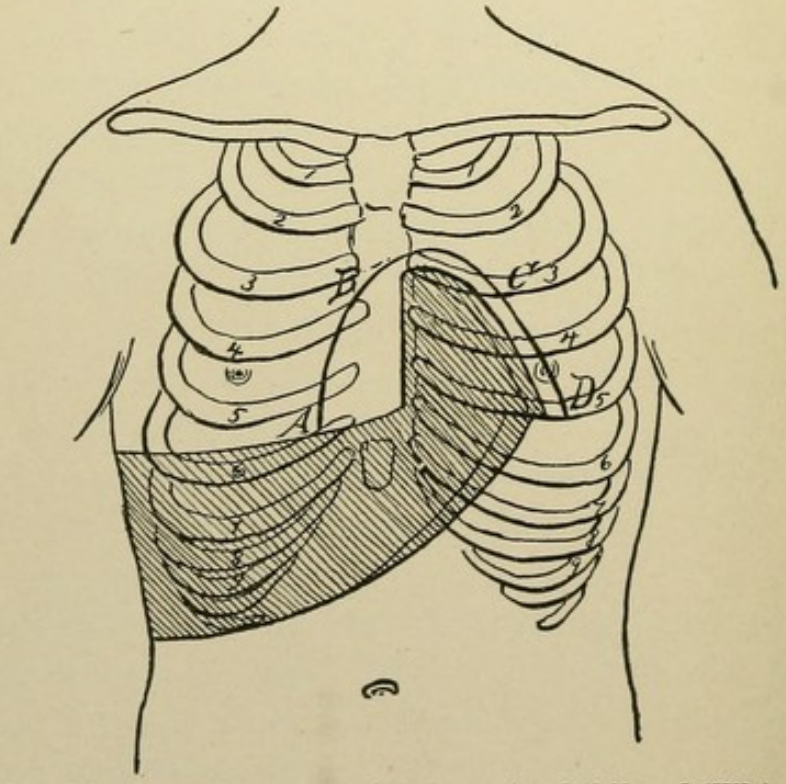


FIG. 58.—Diagram of precardial dulness in childhood (Whitney).

childhood a little lower. It lies in the mammillary line, or a little outside of it in infants, and as the child grows older

gradually moves inward and downward, until by the thirteenth year it is in the fifth space, just inside the mammillary line. The apex-beat may be difficult to see, but can usually be easily felt.

Both relative and absolute heart dulness are relatively larger in childhood. The absolute heart dulness is a triangular area with the hypothenuse running from the third costal cartilage a short distance from the left border of the sternum to the fourth rib somewhat inside the mammillary line. The left border of the sternum and the lower border of the fourth rib are the other two sides of the triangle. As the child grows the area of dulness changes its position somewhat, the lower border being lower and the left limit extending about to the apex-beat.

The heart-beat is so rapid that it is difficult to determine exactly changes in the sounds of the infant's heart. The first sound is loudest at the apex, and is heard with considerably lessened intensity over the lower end of the sternum. Reduplication, due to the valves not closing in perfect time, is very common in children, and may be caused by excitement. It has no especial significance in children.

THE HEART IN OLDER CHILDREN.

The following points should be borne in mind considering the heart in later childhood. Mistakes in diagnosis are common at this age by inexperienced observers, owing to the fact that the cardiac area is very large and one frequently hears accidental murmurs. The most reliable method of outlining the heart in the child is to percuss for the absolute cardiac dulness. There are considerable normal variations of this, but the average area will be found to extend to the third rib above, to the apex beat below and to the left; and to the right the area should be found to vary according to the character of percussion used. With ordinary percussion the heart dulness will be found to extend, in most instances, to the right border of the sternum or even slightly beyond it; while with light percussion the dulness extends only to

the middle of the sternum, or perhaps more frequently to the left border of the sternum. The apex beat is usually found in the fifth space just inside the nipple line, although it may be found in the nipple line or slightly beyond it. If the child is placed in a recumbent position there may be slight changes in the heart area, chief of which consists in a frequent moving upward of the dulness a short distance and a diminution of the dulness to the right.

The intensity of the sounds at this age varies considerably, but, as a rule, the pulmonic sound at the base is louder, or at least as loud as the aortic sound, both in the erect position and when lying down. The first sound at the apex beat is almost invariably louder than the second.

Accidental murmurs are very frequent at this age, and there has been considerable discussion both as to the cause and to the value of diagnosis of these murmurs. The chief point is to distinguish the accidental from an organic murmur, and this can usually be done by considering the following points: Accidental murmurs are almost invariably systolic at times. They are most frequently heard at the base of the heart, but may be heard at times over almost any area. They vary in character, both as to intensity and as to the point at which they may be best heard. One time the murmur may be heard over the base and over the apex as well, and at other times only over the base, or *vice versâ*. They are exceedingly inconstant, as they may be present at one time and absent at another. They frequently change on varying the position, usually, although not always, becoming more intense when the child is placed on the left side. They also frequently vary with the respiratory movements, being heard rather better during expiration than during inspiration, and sometimes they may be made to vary by pressure made on the abdomen. The presence or absence of gas in the stomach may also influence these sounds. The organic murmur is more steady in its character and changes but little in position, and varies but little from time to time. The inorganic murmur is unaccompanied by changes in the size of the heart.

CONGENITAL HEART DISEASE.[1]

Congenital heart disease is due to malformation from imperfect development, changes as the result of fetal endocarditis, or the persistence of fetal conditions, as a patent foramen ovale.

Defects in the septa, abnormalities in the vessels, or stenosis or insufficiency of any opening may be present. The most common are the following in the order of their frequency:

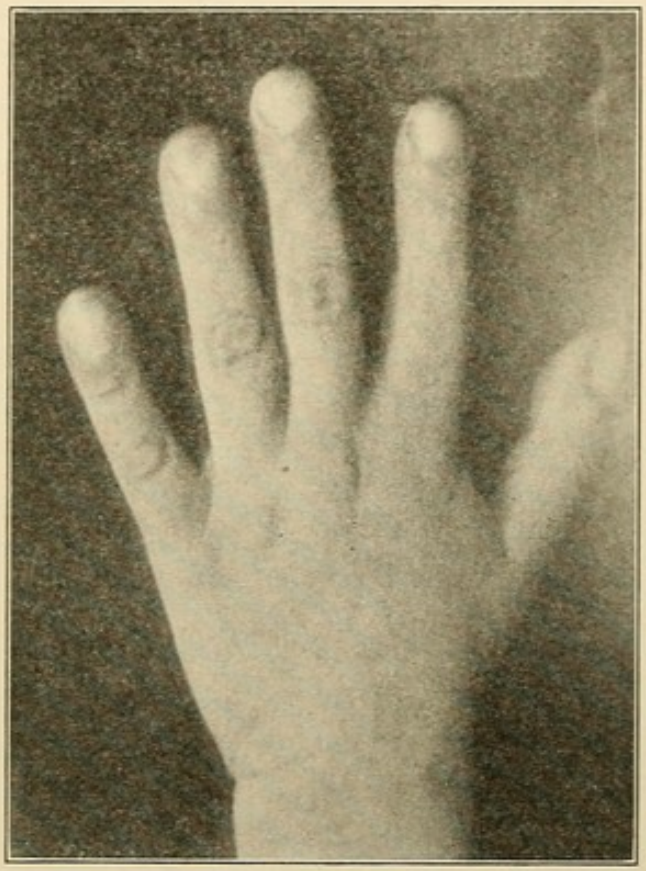


FIG. 59.—Clubbing of fingers in congenital heart disease.

Defect of the ventricular septum, defect in the auricular septum or patent foramen ovale, pulmonic stenosis, patent ductus arteriosus, abnormalities in the origin of the vessels, and pulmonic insufficiency. The other forms, while met with, are rare. Two or more lesions are frequently associated. Pulmonic stenosis with septum defects is the most frequent.

[1] Morse, *Archives of Pediatrics*, October, 1901, p. 744. F. J. Poynton, "Heart Disease, Congenital," *British Medical Journal*, June 23, 1906, p. 1458.

Patent foramen ovale while common has but little clinical significance.

Symptoms.—These are usually noted soon after birth, but sometimes not until later life, even after puberty. Cyanosis is the most constant, and the "blue babies" of the laity are usually cases of congenital heart disease. The number of the red blood-cells is increased in these cases. Enlargement of the right heart and loud systolic murmurs heard at base are frequent. There are clubbing of the fingers and sometimes hemorrhages, especially from the nose or lungs, and dropsy. Dyspnea is present in some cases.

Diagnosis.—From acquired heart disease by the cyanosis, the clubbed fingers, the enlargement of the right heart, loud systolic murmur at the base of the heart, and a very young patient with no history of rheumatism.

From Hemic Murmurs.—This may be made if the above symptoms are present; but if they are absent and only the loud murmur heard at the base be present, this question can only be decided by careful watching.

As to the Lesion.—This is difficult or impossible. Holt gives the following useful points based on a study of 225 cases:

Systolic Murmur at the Base with Cyanosis.—Eighty per cent. of these are pulmonary stenosis, frequently with an associated lesion; twenty per cent. complicated cases of various kinds.

Systolic Murmur, no Cyanosis.—Either a defect in the ventricular septum, tricuspid regurgitation, or stenosis of the aorta.

Systolic Murmur at the Apex with Cyanosis.—Complex lesions.

Cyanosis, but No Murmurs.—Pulmonary atresia or transposition or irregular origin of the great vessels.

Diastolic Murmur.—Pulmonary insufficiency.

Absence of Both Cyanosis and Murmurs.—Atresia of the aorta or septum defects.

Presystolic Murmur.—This was noted in 1 case of patent foramen ovale.

Prognosis.—Holt gives the following figures: 30 per cent. die before the end of the second month; 60 per cent. before five years; 16 per cent. live to reach sixteen years of age; 8 per cent. live to be over thirty years of age. The general condition is a better guide to what the case is doing than cyanosis or murmurs.

Treatment.—Symptomatic. Nothing influences the lesion.

PERICARDITIS.

Definition.—Inflammation of the pericardium. This is rare in infancy. It is seen oftener in later childhood, especially in boys.

Etiology.—Pericarditis is secondary to rheumatism or to an infectious disease, as pneumonia, scarlet fever, tuberculosis, or it may be caused by pyemia, extension from an adjacent pleurisy, or from injury.

Pathology.—**Fibrinous or Dry Pericarditis.**—There is an exudate of fibrin, covering part or all of the pericardium. Adhesions between visceral and parietal layers of the pericardium are frequent.

Serofibrinous Pericarditis or Pericarditis with Effusion.—Some fibrin covers the pericardium, which gives it a shaggy appearance. There is an effusion of a serous fluid, which is absorbed if cure results. Adhesions are a frequent sequela.

Purulent Pericarditis.[1]—The pericardium contains pus.

External Pericarditis.—Inflammation of the outside of the pericardium, usually from extension of pleurisy, pneumonia, or tuberculosis.

Symptoms.—These are obscure and the disease is frequently overlooked, especially as the disease is usually secondary. Palpitation of the heart with feeble, irregular pulse, precordial pain, and dyspnea are the most frequent. There may be cyanosis.

Physical Signs.—**Dry Pericarditis.**—A to-and-fro friction-rub, consonant with heart beat, not transmitted, and usually heard at the base; if the heart is very rapid, this may

[1] Batten, Still, *Pediatrics*, October, 1901, pp. 328, 332.

be heard as a sort of hum. This frequently is the first stage of the following:

Serofibrinous Pericarditis.—*Inspection.*—Bulging of the precordium with obliteration of the intercostal spaces over it.

Palpation.—Friction-rub may sometimes be felt. Apex beat feeble or absent.

Percussion.—A large area of heart dulness. Dulness in the shape of two triangles joined together in the midsternal

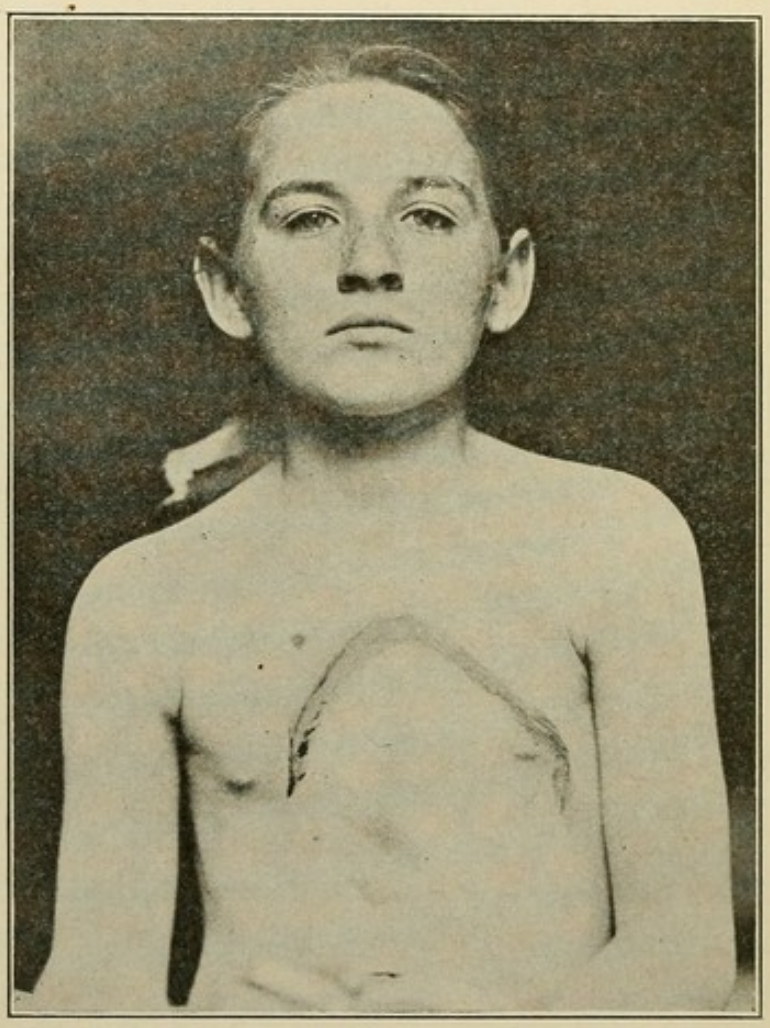


FIG. 60.—Pericarditis with effusion, showing area of dulness.

line, having a common base about the fifth rib, the dulness merging into the liver dulness below on the right and into the stomach tympany on the left. The right triangle is smaller than the left, with its apex about the upper border of the fourth rib. (This varies.) There may be an area of dulness in the left infrascapular region.

Auscultation.—Often a friction-rub, to be elicited by changes in the position of the patient. If the effusion is large there

will be no rub. Endocardial murmurs may also be heard. The heart sounds may be distant and indistinct.

Purulent Pericarditis.—As above, with the addition of chills, sweats, irregular fever. Marked leukocytosis is present. There may sometimes be edema of the precordium.

Diagnosis.—**Acute Endocarditis.**—This and pericarditis are so rare in infants under two years that they need not be considered. In older children, as in adults, the endocarditis is accompanied by a softer murmur, heart beat at the apex and transmitted to the axilla and back.

Dilatation of the Heart.—This is seen late in uncompensated valve lesions, and in these cases the diagnosis is easy. The milder grades, seen after infectious diseases, are often puzzling.

Hypertrophy of the Heart.—The heart is enlarged downwards, the apex beat is marked, and the dulness does not extend beyond the apex beat.

Pleuritic Effusion.—This is difficult. The two may be associated and diagnosis impossible. Dulness over the left front of the chest, with weak heart sounds and apex beat in normal position, suggests pericarditis.

Prognosis.—As regards life the outlook of rheumatic cases is good, after infectious diseases bad. The remote effects of all cases are serious.

Treatment.—Absolute rest. Milk diet. Counterirritation or ice bag over heart. Antirheumatic treatment where indicated. Opiates for pain. Stimulants, alcohol, strychnia, Merck's digitalin if needed. If effusion be large, aspiration may be considered, but as yet the results are unsatisfactory.

OTHER PERICARDIAL LESIONS.

Hydropericardium.—An increase in the serous fluid in the pericardium may be due to other causes than inflammation, as in general dropsy due to nephritis, heart disease, or anemia.

Hemopericardium.—An effusion of blood into the pericardium. Very rare in children and practically always traumatic, but it may occur in purpura and hemophilia.

Pneumopericardium.—Air in the pericardium is very rare. It may come from rupture into the pericardium of a pyopneumothorax or a tuberculous cavity.

CHRONIC PERICARDITIS WITH ADHESIONS.

This follows acute pericarditis and is usually accompanied by myocarditis, hypertrophy, or dilatation of the heart. It may not cause symptoms, or those of heart failure may be present.

Physical Signs.—**Inspection.**—Bulging of the chest over the heart. Apex beat feeble or absent. Systolic retraction of intercostal spaces near apex beat. There is often systolic retraction in the tenth or eleventh spaces in the back, usually to the left, sometimes to the right (Broadbent's sign). Diastolic collapse of the veins in the neck.

Percussion.—Increase in dulness in all directions. Apex beat and dulness unchanged by inspiration or change in position.

Auscultation.—There may be endocardial murmurs.

Pulsus paradoxus, the pulse being more feeble during inspiration, is frequently present.

There may be enlargement of the liver with ascites. Edema, cyanosis, and dyspnea may be present.

Treatment.—Symptomatic.

ENDOCARDITIS.

ACUTE ENDOCARDITIS.

Definition.—An inflammation of the endocardium. Fetal endocarditis is nearly always right-sided, and may cause congenital malformations. From birth up to three years of age the disease is almost unknown; after that it is not infrequent.

Etiology.[1]—Rheumatism is the most frequent cause. It may be the first manifestation of that disease. It is often associated with chorea. Any infectious disease may be the cause of endocarditis.

[1] Blum, *Archives of Pediatrics*, May, 1903, p. 341. Sappington and Rau, "Pericardium, Adherent," *Archives of Pediatrics*, 1906, p. 816.

Pathology.—The inflammation usually affects the mitral valve, the aortic more rarely, and the right side of the heart almost never. The valve becomes infiltrated with an inflammatory exudate, and the fixed connective tissue cells proliferate, causing a collection of small round cells. On the inflamed area fibrin is deposited, which results in small excrescences or vegetations. These, or the swelling of the valve, may cause leakage. Contraction of the chordæ, tendinæ, or deformity of the valve may follow and cause chronic insufficiency. Ulceration may occur in malignant endocarditis.

Symptoms.—There are fever, restlessness, prostration, and frequently some dyspnea. The heart's action is more rapid and vigorous. The physical signs may not be present for several days, and are often overlooked if the heart be not examined regularly. There is slight enlargement of the heart dulness due to dilatation. There is a soft blowing, systolic murmur, heard best over the apex and transmitted to the axilla. There may be a thrill, and the second pulmonic sound is sometimes accentuated.

Symptoms of rheumatism, chorea, or some infectious disease are frequently present.

If there be marked insufficiency there are dyspnea, cyanosis, and edema. These cases may prove fatal. The average case recovers, but recurrences are frequent and chronic heart lesions often result.

Diagnosis.—Hemic or functional murmurs are heard best at the base, and are not transmitted. They are usually inconstant.

Pericarditis.—There is a friction-rub or signs of pericardial effusion.

Prognosis.—The majority of the cases recover. See above.

Treatment.—The child should be kept in bed, and as quiet as possible. For pain and increased heart action the use of the ice-bag is best. It may be used continuously or intermittently. Occasionally a hot-water bag may be used, but is less efficient. In rheumatic cases sodium salicylate may be used, and aspirin is useful where there is much pain

in cases from all causes. Codein in sufficient doses is best for restlessness, or sodium bromid may be used. Excessive heart action is often difficult to manage. It may be controlled by strophanthus or codein, sometimes by aconite, and sometimes by atropin.

These cases are usually difficult to feed. The food should be concentrated, easy of digestion, and sufficient time allowed between meals.

During convalescence iron is of benefit.

MALIGNANT OR ULCERATIVE ENDOCARDITIS.[1]

Definitions.—Inflammation and ulceration of the valves or other heart structures.

Etiology.—Usually occurs in older children, in those who already have a valvular lesion, and is generally secondary to rheumatism, meningitis, or pneumonia.

Lesions.—There are vegetations which may become detached and cause emboli. The ulceration is the essential lesion.

Streptococci, staphylococci, or pneumococci are usually present.

Symptoms.—There is great prostration with irregular fever, chills, sweats, delirium, or coma. A petechial eruption is common. The emboli may cause symptoms of pneumonia, paralysis, bloody urine and the like. Heart murmurs are generally present.

Diagnosis.—It may be mistaken for meningitis or malaria.

Prognosis.—Fatal.

Treatment.—Symptomatic.

CHRONIC VALVULAR DISEASE.

Excluding congenital malformations, chronic valvular disease in children may be said to be due to changes caused by endocarditis.

[1] Osler, "Gulstonian Lectures." *British Medical Journal*, March, 1885, p. 467.

Etiology.—There may be either insufficiency or stenosis, or both. One or more valves may be affected. Insufficiency is caused by imperfect closure of the valve, due to thickening or contraction of the valve, or to shortening of the chordæ tendinæ. Stenosis is due to thickening, calcareous deposits, or adhesions. Mitral disease is the most frequent, associated mitral and aortic next, and aortic disease the most common of all.

When there is valvular disease the heart hypertrophies in order to do the extra work caused by the lesion. In some dilatation occurs. As soon as this becomes marked the heart is no longer able to pump the blood through the body and circulatory disturbances result. This is called broken compensation. The other lesions are due to venous obstruction and consist of congestion of the lung, chronic bronchitis, and chronic pneumonia when the pulmonary veins are affected, and to congestion of the liver, spleen, kidneys, and later dropsy, when the systemic veins are affected.

Symptoms.—**Stage of Compensation.**—This may continue for a short or a long time. There is shortness of breath on exertion, and occasionally headache, pain over the heart, palpitation, and other variable symptoms.

Stage of Broken Compensation.—This may be brought on by the heart having hypertrophied to the limit and dilatation taking place, or it may be hastened by overexertion, weakening diseases, or other attacks of endocarditis. There are numerous symptoms. Among the most marked are the dyspnea, cyanosis, and edema. There are cough, enlarged liver and spleen, albuminuria, clubbing of the fingers, headache, sleeplessness, bad dreams, anxiety, and often hallucinations of sight, especially at night.

Varieties.—**Mitral Insufficiency (Mitral Regurgitation).**—This is leakage at the mitral orifice, due to imperfect closure of the valve. It causes hypertrophy of the left ventricle and enlargement of the right auricle; then of the right side of the heart. Later on tricuspid insufficiency is caused; then dilatation becomes marked.

Inspection.—The apex beat is displaced downward, and especially to the left. There is pericardial bulging in some cases.

Percussion.—There is an enlarged area of dulness particularly to the left and downward; later on to the right of the sternum and downward.

Auscultation.—There is a systolic murmur, heard best at the apex and transmitted to the axilla and to the back about the angle of the left scapula. There is accentuation of the second pulmonic sound.

Pulse.—Full and strong.

Stage of Dilatation.—Apex beat becomes weak, diffuse, and undulatory. The dulness becomes enlarged, and is nearly square, losing the distinct transverseness of the earlier stage. Heart sounds feeble and sometimes not heard at all. The pulse becomes weak and irregular.

Mitral Stenosis.—This is an obstruction at the mitral orifice, due to thickening or adhesions of the valve. It is usually associated with mitral insufficiency, but may occur alone. It causes hypertrophy of the left auricle, followed by dilatation. The blood is then dammed back into the pulmonary veins, and the right ventricle hypertrophies and then becomes dilated. The left ventricle is about normal in size.

Inspection.—The apex beat is about in the normal position.

Palpation.—A rough presystolic thrill at or near the apex, ending abruptly with the apex beat against the chest.

Percussion.—Dulness increased to the right of the sternum.

Auscultation.—Rough presystolic murmur heard best at or near the apex beat. This ends abruptly when the apex beat occurs. The second pulmonic sound is accentuated.

Pulse.—Small.

Aortic Stenosis or Obstruction.—This is an obstruction at the aortic orifice, due to thickening or adhesions of the valve segments.

It is rarely seen alone in children. The accompanying murmur is frequently mistaken for a functional or hemic murmur. It causes hypertrophy of the left ventricle, followed by dilatation, and then mitral insufficiency and its consequences.

Inspection.—Apex beat displaced downward and to the left.

Palpation.—Impulse usually strong. Sometimes a systolic thrill at the apex.

Percussion.—Enlarged area of dulness, especially to the left.

Auscultation.—Loud systolic murmur, heard best in the second intercostal space to the right of the sternum and transmitted to the vessels in the neck. Aortic sound feeble or absent.

Pulse.—(Pulsus tardus.) Pulse slow, not frequent, and wave slow to rise.

Aortic Insufficiency or Regurgitation.—Leakage at the aortic orifice. This is very rare in childhood. It causes dilatation and hypertrophy of the left ventricle. The ventricle may become very large. Later there is further dilatation of the left ventricle until mitral insufficiency and all its sequences are produced.

Inspection and Palpation.—Apex beat forcible; displaced downward to the left. There may be bulging of the precordium.

Percussion.—Area of dulness enlarged, especially to the left and downward.

Auscultation.—There is a diastolic murmur heard best over the second intercostal space to the right and transmitted downward along the sternum. There is sometimes a presystolic murmur heard at the apex (Flint Murmur).

Pulse.—Water-hammer or "Corrigan" pulse, which is quite characteristic. There is a full, sudden rise and a very sharp fall to the pulse wave. A capillary pulse may be seen under the finger-nails or by pressing a piece of glass over the lips.

Tricuspid Insufficiency or Regurgitation.—This is a leakage at the tricuspid orifice, due to lesions of the valve or to dilatation of the right ventricle. It may be secondary to mitral disease or to diseases of the lungs, causing obstruction of the pulmonary veins, as chronic pleurisy, emphysema, chronic interstitial pneumonia.

Diagnosis.—This is chiefly from functional and hemic murmurs (see same). Too much stress is usually laid on murmurs and not enough on the changes taking place in the heart.

Physical Signs.—There is enlargement of the area of dulness, especially to the right of the sternum, a systolic murmur heard best over the lower end of the sternum, and a systolic pulse in the veins of the neck.

The **other forms** of heart lesions, tricuspid stenosis, pul-

monary stenosis, and insufficiency, are always congenital. (See Congenital Malformation of the Heart.)

Prognosis.—Very trifling lesions may sometimes be recovered from. In the main the ultimate outlook is grave. Children contracting heart lesions early in life may not die at the time, but are liable to fail about puberty or immediately afterward. Recurrent attacks of endocarditis increase the danger of rupture of compensation, as does every other illness.

Treatment.—With perfect compensation a quiet out-of-door life, with moderate exercise, is to be recommended; exercise to be regulated by the child's condition and the effect produced. When rupture of compensation is threatened, rest in bed and heart tonics should be used. Rest in these cases is of the utmost importance. Digitalis and strychnin are the most useful heart stimulants. Infusion of digitalis is of great service when there is dropsy or enlargement; salines or calomel may be given at the same time. Tonics, especially iron and arsenic, are useful. Morphia is the best drug to relieve the sleeplessness, nervousness, and dyspnea due to broken compensation. Applications of cold or counterirritation are useful to relieve pain. Heart failure is best met by Hoffmann's anodyn, ether, whisky, and aromatic spirits of ammonia internally and strychnia hypodermatically.

MYOCARDITIS.[1]

Definition.—Inflammation and degeneration of the heart muscle.

Etiology.—In children it is most frequently seen in the infectious diseases, especially diphtheria and scarlet fever. Adherent pericarditis may be a cause.

Pathology.—There is cloudy swelling or fatty or hyalin degeneration of the heart muscle, and infiltration between the heart muscle fibers with small round cells. It may be acute or chronic.

Symptoms.—There may be no symptoms. If the dis-

[1] Koplik, *Med. News*, March 31, 1900, p. 481. Knox and Schorer, "Rhabdomyoma of the Heart Muscle," *Archives of Pediatrics*, August, 1906, p. 561.

ease is marked there is a feeble heart, with pallor, fainting attacks, and dyspnea. The apex beat is feeble or not to be made out. There is frequently dilatation of the heart with symptoms of insufficiency. This is seen in diphtheria and scarlet fever. The sudden death occurring in these diseases is usually from myocarditis.

Diagnosis.—On the above symptoms. It is difficult or impossible in many cases.

Prognosis.—Always guarded. Sudden death may occur, especially on sudden exertion.

Treatment.—Rest in bed, avoidance of sudden exertion, tonic, and general supporting treatment. Strychnia is the most valuable drug. Morphin hypodermatically may be of service in repeated fainting attacks.

HEMIC AND FUNCTIONAL MURMURS.

These are frequently heard in anemia and in acute febrile diseases, and are often mistaken for organic heart disease.

The hemic murmur is heard over the base of the heart, is inconstant and variable, and sometimes may be altered by changing the position of the patient. Such a murmur often may be heard over the entire chest and in the vessels of the neck, but is not transmitted in any particular direction. A venous hum may often be heard over the vessels in the neck. There are no other signs of organic disease.

Treatment.—Treat the anemia.

FUNCTIONAL HEART DISORDERS.

These are rare in early childhood, but are seen frequently as puberty approaches.

Etiology.—Functional disturbances are most frequently seen in children of neurotic parents. Tea, coffee, tobacco, fright, and masturbation are set down as causes. They may follow infectious diseases.

Symptoms.—Attacks of palpitation are the most frequent. Tachycardia (rapid heart) and bradycardia (slow

heart) may also be seen. Other symptoms may be present, as flushing or pallor, perspiration, dizziness, headache, buzzing in the ears, and cyanosis.

Diagnosis.—There is usually more complaint from functional than from compensated organic disease. The absence of the physical signs of organic disease is the main point.

Prognosis.—Usually good.

Treatment.—The underlying disease should be treated. Iron and arsenic should be used for anemia. Fresh air, good food, plenty of sleep, and but little study and worry are the best things. Avoid tea, coffee, and tobacco. Bromids may be used for the acute attacks.

DISEASES OF THE BLOOD-VESSELS.

Atheroma.—Degeneration of the arteries is rarely seen in early life, but does occur even in infants. Contracted kidneys are seen as an accompaniment.

Aneurism.—This is very rare in young people, but has been met with. The arch of the aorta is the most frequent site. Syphilis is the usual causal factor, but is not present in all cases.

Arterial Hypoplasia.—This is a congenital narrowing of the arteries, especially of the aorta. Chlorosis may be caused by it, and other malformations or imperfect developments, usually of the genitals, may be present. (See Status Lymphaticus.)

Embolism.—This is rare in early life. Pieces of vegetations in endocarditis may become detached and swept along in the blood current until they are stopped in a small artery. The symptoms depend on the location of the artery. They are most marked in organs having terminal arteries, as brain, lungs, kidneys, and spleen.

Thrombosis.—This is common in the right side of the heart just before death. It has no clinical significance. It may occur during life from infectious diseases or pressure. Thrombosis of the sinuses of the brain, of the vena cava, internal jugular, and even of the aorta have been reported.

THE BLOOD IN INFANCY AND CHILDHOOD.

Number of Red Blood-cells.—At birth the average is from 4,500,000 to 6,500,000 per cubic millimeter. This number diminishes during the first weeks, and during the first year the average is 5,500,000; 5,000,000 may be taken as an average for later childhood.

Abnormalities of the Red Cells.—**Polychromasia.**—This term is applied to a brownish stain taken with Ehrlich's triacid dye by some of the cells in the severe anemias. This may be seen normally in the fetal blood and in marrow cells.

Nucleated Red Cells.—**Normoblasts.**—Normal size with dark-staining nucleus. Seen in mild and severe anemia, disease of the bone marrow, and in severe leukocytosis.

Megaloblasts or Gigantoblasts.—These are very large cells, 10 to 20 μ in diameter, with various-shaped nuclei and polychromasia. Seen in very young infants and in pernicious anemia.

Microcytes.—Small red cells 4 to 10 μ in diameter, seen in chlorosis and in severe anemias.

Megalocytes.—Large red cells 10 to 20 μ in diameter, seen in severe anemias. They are taken as indicating blood regeneration.

Poikilocytes.—Irregularly shaped cells seen in severe anemias.

Hemoglobin.—This is high at birth, usually above 100 on von Fleischl's scale. It falls to 100 by the second week, and gets lower, until the third month, reaching from 60 to 80. After the second year it increases to about puberty. It is very variable in childhood.

White Blood-cells.—Ehrlich's classification is as follows:

Lymphocytes.—(Small mononuclear leukocytes.) Size of a red blood-cell, with a large deeply-staining nucleus. The small rim of protoplasm about the nucleus stains more deeply with basic dyes.

Large Mononuclear Leukocytes and Transitional Forms.—

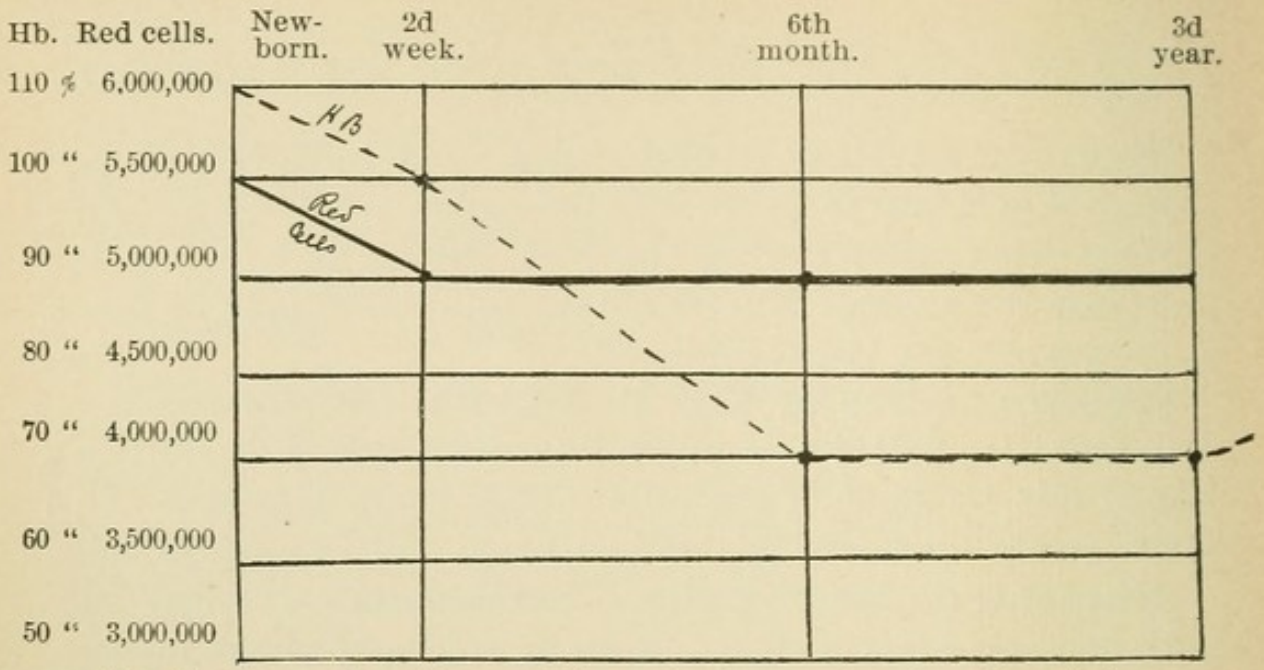


FIG. 61.—Proportion of hemoglobin and red corpuscles throughout infancy (Hutchison).

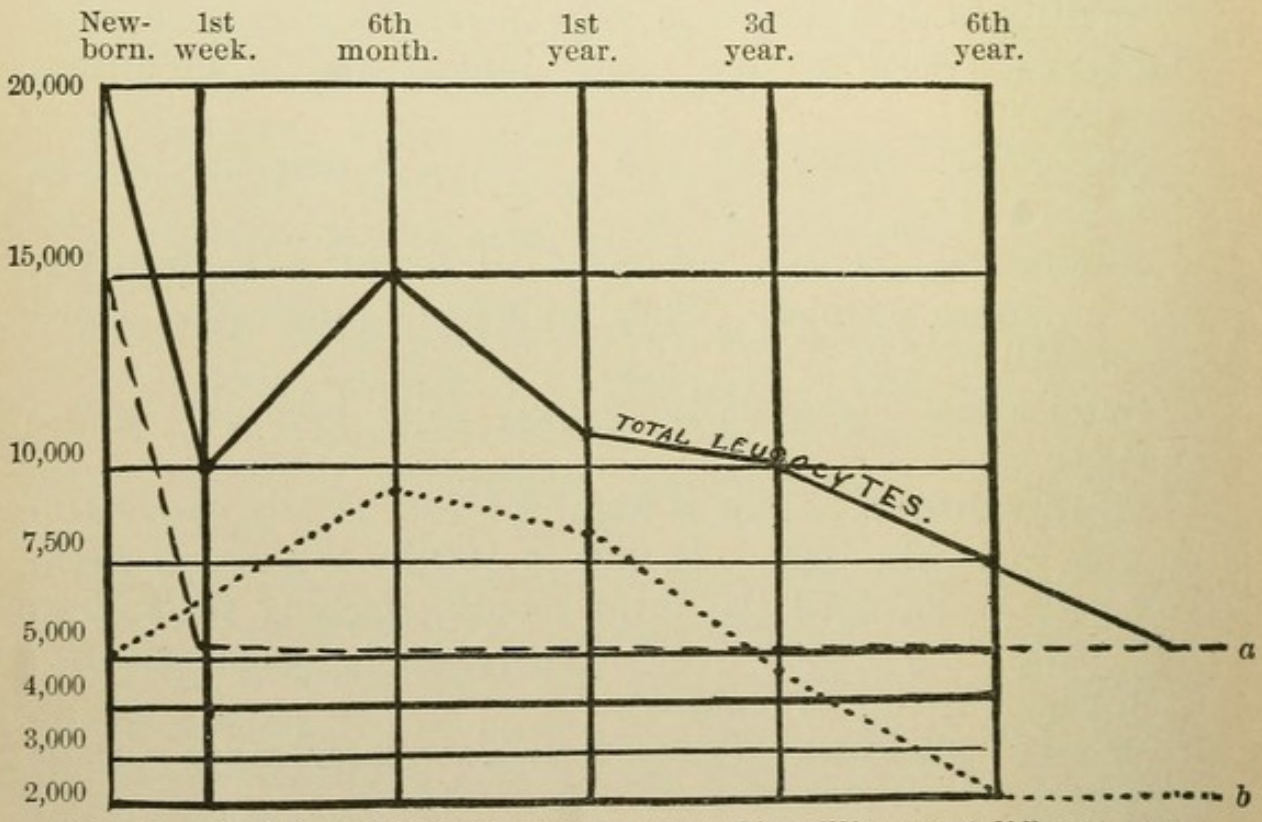


FIG. 62.—Absolute number of leukocytes per cubic millimeter at different ages: *a*, Polynuclear: *b*, lymphocytes (Hutchison).

Two or three times larger than the preceding, with the oval nucleus not quite in the center. Nucleus does not stain as deeply as preceding, but darker than the surrounding proto-

plasm. The nucleus of the transitional cells is irregular, stains darker, and may contain a few neutrophilic granules.

Polymorphonuclear Neutrophilic Leukocytes, Usually Called Polynuclears.—Slightly smaller than preceding. Nucleus is composed of several parts joined together ; stains deeply with basic dyes. The protoplasm of the cell is filled with small granules, staining with neutral dyes.

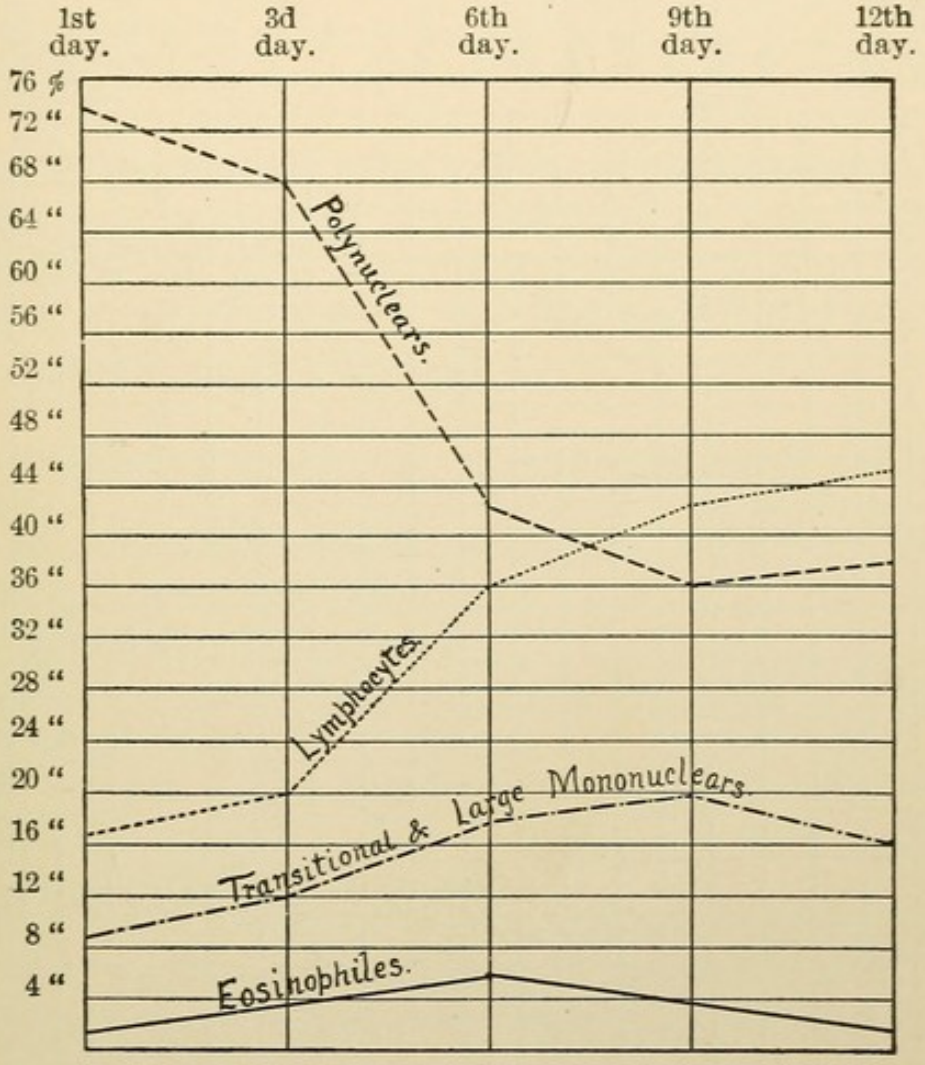


FIG. 63.—Differential percentage counts during first fortnight (Hutchison, after Carstanjen).

Eosinophiles.—Same as preceding, but the granules are larger and stain deeply with acid dyes.

Mast Cells.—Much like preceding, except the nucleus may be mono- or polynuclear and the granules stain with basic dyes.

Abnormal White Cells.—Myelocytes.—Found nor-

mally in bone marrow. A very large round or nearly round cell with a large feebly staining nucleus and neutrophilic granules. These cells may vary in size.

Eosinophilic Myelocytes.—Like preceding, except the granules are stained by acid dyes.

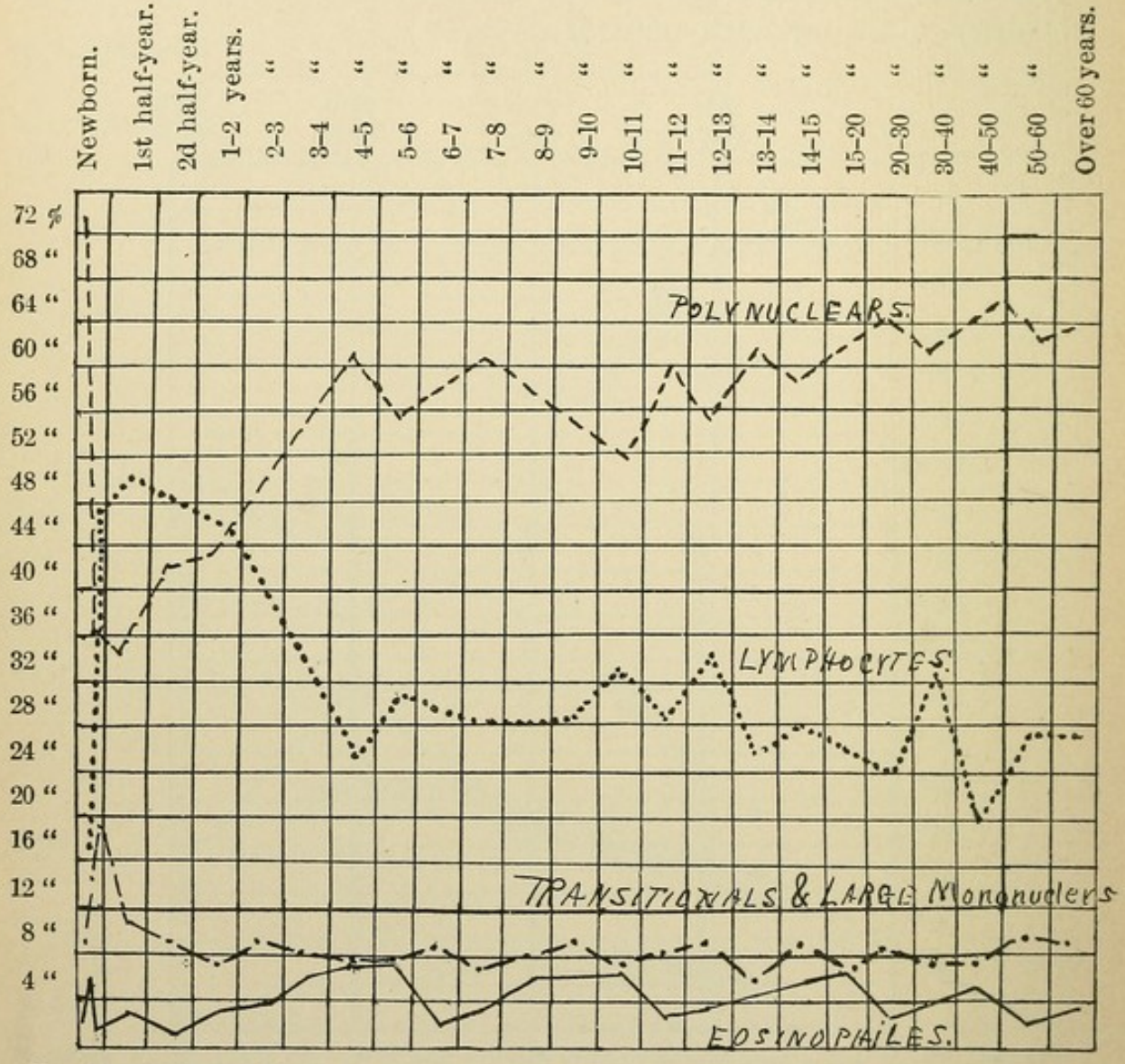


FIG. 64.—Differential percentage counts throughout life (Hutchison, after Carstanjen)

Nongranular Myelocytes may be seen in severe anemias.

Degenerated Leukocytes.—Stain irregularly and may contain vacuoles and no nuclei.

Blood-plates.—Small cells half size of a red blood-cell, colorless, and usually clumped together. Their significance is not known.

Blood-dust.—Numerous highly refractile, actively moving bodies seen in fresh blood. These are supposed to be granules from the eosinophiles.

FREQUENCY OF THE VARIOUS FORMS OF LEUKOCYTES.

	Infancy.	Adult (Cabot).
Lymphocytes	40–60	20–30 per cent.
Large mononuclears	4–12	4– 8 "
Polynuclears	20–40	62–72 "
Eosinophiles	2– 4	½– 4 "
Mast cells		$\frac{1}{40}$–½ "

The total number per cubic millimeter is somewhat larger in infancy than in adults. At birth they are from 12,000 to 25,000. This number diminishes rapidly during the first few days to 9,000 to 14,000. In childhood 6,000 to 12,000 may be regarded as an average.

SIGNIFICANCE OF BLOOD CHANGES.

Red Blood-cells.—The number is diminished in primary and secondary anemia.

Normal in chlorosis.

Increased in cyanosis, in high altitudes, and at sea coast.

Hemoglobin.—The total quantity is diminished in all forms of anemia. The corpuscle contains less in chlorosis and secondary anemia. The corpuscle contains a normal amount or more in pernicious anemia.

White Blood-cells.—**Lymphocytes.**—Normally more present than in adults, and in many severe diseases of childhood the blood tends to revert to the infantile type.

Lymphocytosis (increased number of lymphocytes) is seen in lymphatic leukemia, whooping-cough, scurvy, rickets, and hereditary syphilis.

Leukocytosis (neutrophilic).

Physiologic.—This is marked in infancy. Is seen in the newborn, after meals, after massage, cold baths, exercise, etc.

Pathologic.—In numerous conditions; in toxemias, after severe hemorrhages; in inflammatory conditions, when there is pus-formation, septicemia and pyemia, pneumonia, etc.

Normal Number of Leukocytes and Disease.—There are many diseases where leukocyte count is unaffected, as malaria, typhoid, tuberculosis, mumps, measles.

Leukopenia.—(Diminution of the white blood-cells.)—Seen in severe anemias, malnutrition, leukemia complicated by infectious diseases, and in severe disease when there is no reaction—*i. e.*, leukopenia in pneumonia usually means a fatal prognosis.

Eosinophilia.—Found in many conditions, among which may be mentioned : the infection of the body with animal parasites, as in trichinosis, in malignant tumors, in many skin diseases, in leukemia, scarlet fever, etc.

Mast Cells.—Said to be more numerous in the lower classes. Are increased in some forms of leukemia and some other diseases.

Myelocytes.—Seen in most cases of leukemia, in small numbers in severe anemias, in the leukocytosis of some diseases, as diphtheria, and after any severe blood disturbances, as asphyxia, uremia, etc.

BLOOD CHANGES IN DISEASE.

Pneumonia.—Diminution of hemoglobin and of red blood-cells, leukocytosis, except in very mild and very severe forms. Absence of leukocytosis in severe cases means a grave prognosis. Eosinophiles diminish, and their reappearance means the height of the disease is over. Leukocytosis may be of value in diagnosis of doubtful cases. Leukocytosis after normal has been once reached usually means a complicating empyema.

Diphtheria.—Great diminution in hemoglobin and red blood-cells after a few days. Leukocytosis usually present. Myelocytes in severe cases ; where they exceed 2 per cent., a fatal prognosis may be made (Engel).

Scarlet Fever.—Diminished hemoglobin and red cells. Leukocytosis varies with intensity of the disease. Eosinophiles, beginning after two or three days, increasing to 8 to 15 per cent. in two or three weeks, gradually reaching normal

about the sixth week. Eosinophiles are increased in favorable cases and decreased in unfavorable ones (Neusser). Leukocytosis, after third day, is of value in differentiating scarlet fever from measles in doubtful cases.

Whooping-cough.—Marked leukocytosis comes on early and persists through the entire disease. It averages 25,000 to 30,000, and is more marked under four years of age. Half the cells are lymphocytes. Leukocytosis is useful in differentiating spasmodic cough from other causes.

Meningitis.—Septic meningitis has leukocytosis. Cerebrospinal fever has leukocytosis in about two-thirds of the cases. Tuberculous meningitis may or may not be accompanied by leukocytosis.

Congenital Cyanosis.—Increase in hemoglobin and in number of red cells (6,000,000 to 12,000,000). There may be an increase in the leukocytes.

CHLOROSIS.

(Green Sickness.)

Definition.—A primary anemia with a lowering of the hemoglobin without any great decrease of the red blood-cells, except in severe cases.

Etiology.—Usually occurs about or just after puberty, It may occur earlier and is rarely seen in boys. Previous ill health, overcrowding, lack of fresh air and sunshine, and overwork are the predisposing causes.

Pathology.—Some fatal cases have shown a small heart and congenital narrowness of the aorta and other vessels. Complicating tuberculosis or ulcer of the stomach is the most frequent cause of death.

Symptoms.—Blood-changes are characteristic. Low hemoglobin, 20, 30, or 40 on von Fleischl's scale is common; red blood-cells, normal in number or nearly so; in severe cases poikilocytosis; no leukocytosis. Other symptoms are the general symptoms of anemia; a greenish pallor; weakness without loss of flesh; nervousness; perversions of appetite (pica); and in girls, menstrual disorders. Hemic

murmurs are heard over the base of the heart and larger vessels. The heart may be dilated or the left ventricle hypertrophied.

Complications.—Constipation, gastric ulcer, gastralgia, hyperacidity, amenorrhea, albuminuria.

Prognosis.—Good, but relapses are common. It may last months or even years.

Treatment.—Fresh air, sunshine, good food, rest, and baths if there is a reaction after them. Solutions of iron and manganese peptonate or Blaud's pills may be given. Saline laxatives are needed. In hyperacidity give alkalis, especially calcined magnesia. Arsenic may be tried, but is of less value than iron.

PERNICIOUS ANEMIA.

Definition.—A grave anemia, which is usually fatal, having the characteristic blood-changes given below.

Etiology.—Very rare in infancy. It may follow a severe secondary anemia, it may be caused by intestinal parasites, or it may come on without assignable cause.

Pathology.—Severe anemia of all the organs and fatty degeneration in most of them. Small hemorrhages; deposits of iron in the liver; hemolymph glands may be enlarged and congested; bone marrow is dark red and soft with numerous nucleated reds; there may be atrophy of the stomach mucosa.

Blood-changes.—Specific gravity lowered; hemoglobin very low, but color index of the cell normal or above normal; great reduction in the number of the red cells; megalocytes common; marked poikilocytosis; red cells may be polychromatophilic; normoblasts and megaloblasts present; polymorphonuclear leukocytes diminished.

Symptoms.—The symptoms are those of a severe anemia. Skin has a light lemon tint; there may be slight edema; there may be effusion into the serous cavities; there may be but little emaciation. Great weakness; later prostration. Nervousness and sleeplessness. Heart may be dilated; hemic murmurs common. Shortness of breath on exertion. Digestive disturbances.

Diagnosis.—Great diminution of red cells, high color

index, diminution of polymorphonuclears. An eosinophilia points to intestinal parasites. Retinal hemorrhage is nearly always present in pernicious anemia and rarely seen in secondary anemias (Hesse).[1]

Prognosis.—Bad; recovery is of very rare occurrence. High color index, increase in size of red cells, degenerative changes, numerous megaloblasts, few or no normoblasts, and lymphocytosis are all bad signs.

Treatment.—Good hygiene and diet. Mountain or sea air. Baths, glycerin extract of red bone marrow, arsenic, and for digestive symptoms bitter tonics and hydrochloric acid.

SECONDARY ANEMIA.

Definition.—A secondary anemia is one that is due to some known underlying cause. The blood-changes are characteristic.

Etiology.—Very common in infancy and young children. It may be due to lack of food, bad hygiene, drugs, parasites (malaria), hemorrhage, or practically any disease.

Blood-changes.—Remember that in infancy any change tends to bring blood back to the embryonic type. The number of the red cells and the hemoglobin are lowered proportionately. The specific gravity is lowered. There is poikilocytosis in the severer cases. Microcytes may be present, as may also megalocytes. Normoblasts are seen in the average cases and megaloblasts may be present in the severe ones. There may or may not be leukocytosis.

Symptoms.—The symptoms common to all anemias are present: pallor, languor, digestive disturbances. In infants and children irritability and peevishness are nearly always present. There may be slight edema and hemorrhages.

Prognosis.—This depends on the cause. Where it can be removed the prognosis is usually good. Red blood-cells below 2,000,000, megalocytes, megaloblasts, polychromasia, and a high color index are all bad signs.

Treatment.—Remove cause when possible, good hygiene, fresh air, and good food. Iron, arsenic, tonics.

[1] W. d'Este Enery, "Anemia, Pernicious, Diagnosis of," *Practitioner*, December, 1905, p. 755.

LEUKEMIA.

(Leukocythemia.)

Definition.—Leukemia is a disease characterized by a persistent increase in the number of white blood-cells, with lesions in the spleen, bone marrow, and sometimes in the lymph glands. Ehrlich calls it a "mixed leukocytosis."

Etiology.—The causes are unknown. It is rare in infancy and childhood, but may be seen. The acute lymphatic form is the most frequent in early life. It is more common in boys. Congenital syphilis, rickets, malaria, and the various infectious diseases may precede it. It has been regarded by some as having an infectious origin. Löwit claims to have found a hemameba.

Varieties.—(1) Myelogenous and (2) lymphatic. The lymphatic has two forms: acute and chronic.

Pathology.—The blood may contain so many white cells as to resemble pus. The bone marrow is affected in the myelogenous type, the fat being largely replaced with red or white marrow cells. The myelocytes are largely increased. The liver is enlarged and contains lymphomatous nodules. The spleen is enormously enlarged and contains a great increase in the number of leukocytes. In the lymphatic form the lymph glands are enlarged, but generally movable. The lymphoid structures in the intestinal tract and about the mouth may also be affected. In the acute form the spleen is moderately enlarged, and there is a great tendency to petechia and hemorrhages. This has been regarded by some as an infection. In the chronic form the spleen is very much enlarged. Lymphomata may be found in the other organs.

Blood-changes.—The hemoglobin is lowered. The red cells are diminished in number. Normoblasts may be found. Splenomyelogenous form. White cells enormously increased in number. Myelocytes numerous. Polynuclear neutrophiles actually increased, but the percentage may be diminished. Lymphocytes vary, being increased in some cases more than in others. There is an increase in eosinophiles, large mononuclears, large eosinophilic mononuclears,

and mast cells. The last are of considerable diagnostic importance in some cases. In the lymphatic form the small mononuclears are enormously increased, and may be 80 or 90 per cent. of all white cells present. There may or may not be myelocytes. The white cells may fall to normal just before death or during some intercurrent infectious disease as typhoid.

Symptoms.—The symptoms are those of an anemia. Onset is usually insidious. Hemorrhages are common. The pallor, muddy skin, enlarged glands, enlarged spleen and liver make a striking picture in a developed case. There may be disturbances of vision and hearing and of the nervous system. There may be fever.

Diagnosis.—From leukocytosis by the actual increase in the number and percentage of polynuclear neutrophiles. The number of white cells is never so high as that which may be seen in leukemia.

Prognosis.—Unfavorable. In early life the course is rapid, and cases last but a few weeks or months. Occasionally a case may last a year or two.

Treatment.—Rest, good hygiene, and proper diet. Arsenic. The Röntgen rays are said to be beneficial when applied over the spleen or lymphatic glands.

SPLENIC ANEMIA OF INFANTS.[1]

(Pseudoleukemia of Infants (von Jaksch, 1889); Anaemia Infantum Pseudoleucaemica.)

Definition.—A rare grave anemia characterized by leukocytosis, enlargement of the spleen and lymph glands and often of the liver.

Etiology.—Seen in infants, especially between seven and ten months, always under four years. Rickets is present in many cases.

Pathology.—Simple hyperplasia of the spleen; enlargement of the liver with infiltration of white cells; enlarge-

[1] Wentworth, *Boston Med. and Surg. Jour.*, Oct. 3, 1901, p. 374. Scott and Telling, "Splenic Anemia, Infantile, Case of," *Lancet*, June 17, 1905, p. 1638.

ment of the lymph-glands. Bone-marrow changes may be present. Some observers believe that these are due to rachitis.

Blood-changes.—Lowered specific gravity; lowered hemoglobin; great diminution of red blood-cells; microcytes, megalocytes, megaloblasts, and normoblasts are present, and there is poikilocytosis; leukocytes increase and myelocytes may be present. The large mononuclears are usually increased. The cells stain irregularly with the ordinary dyes.

Symptoms.—General symptoms of anemia; cachectic appearance, loss of appetite, and digestive disturbances. Drags along with improvement and relapses.

Diagnosis.—Difficult. A term used to classify little understood cases of infantile anemia. Any severe anemia of infancy may be accompanied by leukocytosis. From leukemia by recovery and lessened number of myelocytes.

Prognosis.—About 25 per cent. of the cases die.

Treatment.—Good hygiene and proper diet. If there is rickets, give cod-liver oil; if syphilis, give mercury, with or without iodid of potassium, alternating with iron. Arsenic or iron may be tried.

HEMOPHILIA.[1]

(Hemorrhagic Diathesis; Bleeder's Disease.)

Definition.—A family and hereditary disease, characterized by a tendency to severe hemorrhage from slight causes or spontaneously.

Etiology.—Heredity is the chief cause. It is more common in boys than in girls. The tendency is transmitted through the daughters of bleeders even though they may not have the disease themselves. The daughter of a bleeder family, herself a bleeder, is no more likely to transmit the tendency than is her non-bleeder sister. A son of a bleeder family, himself a bleeder, should he live to beget children, does not often transmit the disease to his children, but to his

[1] Dunn, *American Journal of the Medical Sciences*, 1883, vol. lxxxv., p. 68. J. J. Wilson, "Hemophilia," *Practitioner*, December, 1905, p. 829. R. C. Larrabee, "Hemophilia in the Newborn," *American Journal of the Medical Sciences*, March, 1906, p. 497.

grandsons through his daughters. Again, should he have non-bleeder brothers, their grandsons seldom bleed.

Pathology.—Unknown. In some cases the artery walls have been thin and degenerated.

Symptoms.—It usually begins in the first two years of life, rarely after ten and practically never after twenty. Persistent hemorrhage, which cannot be checked by ordinary means, follows slight injuries or occurs spontaneously from the mucous membranes. Some cutaneous hemorrhages also occur. There may be effusions of blood into the joints, and also other joint troubles not unlike rheumatism.

Prognosis.—Bad. Almost all cases die before they are ten years of age, and the remainder before they are twenty. If they live beyond that age they are liable to die of some other disease.

Treatment.—Protect such children from injury. For the hemorrhage, rest and local pressure and styptics. Gelatin, calcium chlorid, thyroid extract, sulphate of soda, perchlorid of iron, and adrenalin are among the numerous drugs recommended. Injection of normal blood serum has been suggested.

PURPURA.

Definition.—Spontaneous subcutaneous hemorrhages are called purpura. These may be small (petechiæ) or large (ecchymoses). When the skin is alone affected it is called *purpura simplex*. When there are hemorrhages from the mucous membranes it is called purpura hæmorrhagica.

Etiology.—Purpura may be regarded as a symptom and may be due to many causes. The most important are the infectious diseases; cachectic conditions; from toxic substances, either drugs, as chlorate of potassium, or from ptomaines; mechanical, as after the removal of splints; in whooping-cough, in hemorrhage into the adrenal, scurvy, and lastly neurotic.

Symptoms.—The appearance of the hemorrhagic spots and the hemorrhages, together with the clinical picture of the disease which causes it.

Diagnosis.—This is from the purpuric diseases given below.

Prognosis.—As a rule, purpura occurring in the course of a serious disease is a bad sign.

Treatment.—Treat the original disease. Prevent bruising. An antiscorbutic diet may be tried. Adrenalin and similar preparations may be tried. Ergot, calcium chlorid, and many other drugs are recommended. The injection of normal blood serum has been suggested.

PURPURIC DISEASES.

Purpura Rheumatica (*Schönlein's Disease*).—This rarely occurs under five years of age. In addition to the clinical picture of acute rheumatism there is a purpura, often urticaria, and erythema multiforme as well. There may be edema. The condition lasts a couple of weeks and tends to relapse.

Treatment.—Antirheumatic.

Purpura Simplex.—The hemorrhages are limited to the skin. It may appear suddenly, or there may be indisposition for several days, with vomiting, diarrhea, and slight fever when the purpura appears. It lasts from one to four weeks. Relapses are common. Recovery is the rule. Occasionally death occurs.

Purpura Hæmorrhagica.—(Morbus maculosus Werlhofii is often incorrectly used for this.) This is a severe disease with prostration, fever, nausea, vomiting, often diarrhea, and frequently albuminuria. There is a marked purpuric rash and hemorrhages from the mucous membranes; these may be very severe. Edema may be present. Pains are felt all over the body. There may be marked nervous symptoms, even delirium and coma. It lasts from one to six weeks and resembles typhoid, from which it is distinguished by the Widal reaction. It may terminate fatally.

Giant Purpura Without Symptoms.[1]—Werlhoff's disease (morbus maculosus Werlhofii) is a term frequently applied incorrectly to the severe forms of purpura.

[1] Werlhoff, 1735

Giant purpura is a rare disease seen usually between five and fifteen years of age. There is a sudden onset, a hemorrhagic rash, and sometimes hemorrhages from the mucous membranes. There are no symptoms. The hemorrhages under the skin are enormous—several inches in diameter. They last about two weeks and disappear. There is a tendency to frequent recurrence.

The **diagnosis** is easy. Take care to exclude scurvy in the very young.

Treatment.—Unsatisfactory. As in purpura.

Purpura Fulminans.—This is an acute fatal form of purpura most frequently seen under five years of age. Large hemorrhages are noted in the adrenals. The onset is sudden, with a chill or convulsion, vomiting, high temperature, and marked prostration. The purpura comes on rapidly and covers the entire body. Death takes place in from ten hours to three days.

Henoch's Purpura.[1]—This disease is seen most frequently in childhood; also in later life.

Skin Manifestations.—Usually purpura, but there may also be erythema, exudations, circumscribed edema, or urticaria. Any or all of these may be present.

Visceral Symptoms.—Gastro-intestinal crises consisting of pain, often with vomiting and diarrhea. These last from a few hours to days. There may be cerebral or pulmonary symptoms.

Arthritic Changes.—Swelling of synovial sheaths of one or more joints with pain.

The attacks recur at intervals of weeks, months, or years, sometimes manifested by one of the above, sometimes by another, and sometimes in combination. The ultimate outlook is for about 25 per cent. mortality.

Treatment.—Between the attacks, good food, quiet out-of-door life, iron if anemic. During attacks, rest in bed and protect from injury. Antiscorbutic diet may be tried or drugs, as in purpura, although little may be expected from the latter.

[1] Osler, *American Journal of the Medical Sciences*, January, 1904.

DISEASES OF THE DUCTLESS GLANDS.

HODGKIN'S DISEASE. (1832.)

(Pseudoleukemia; General Lymphadenoma; Adenia; Lymphatic Anemia.)

Definition.—A disease in which there is progressive enlargement of the lymph-nodes and the spleen, with the formation of nodules in the internal organs, such as the liver, kidney, and spleen, etc., and sooner or later a secondary anemia and cachexia.

Etiology.—It is a disease of early life. In 43 cases 10 were under ten years of age (Clarke). The cause is unknown, but it has been suggested that it is of infectious origin.

Pathology.—There is an enlargement of the lymph-nodes, the spleen, and lymphomatous nodules in the internal organs. The marrow of the long bones may be involved. The nodes do not tend to break down unless there is secondary infection, and there is no tendency to invade the surrounding tissue, as in lymphosarcoma. The histologic changes are characteristic (Reed).[1] There are proliferation of the endothelial and reticular cells and an increase in the lymphoid cells. There are also giant cells which differ from the giant cells of tuberculosis. The connective-tissue stroma of the nodes is increased, and eosinophiles are seen in the nodes. Tuberculosis is a frequent secondary infection.

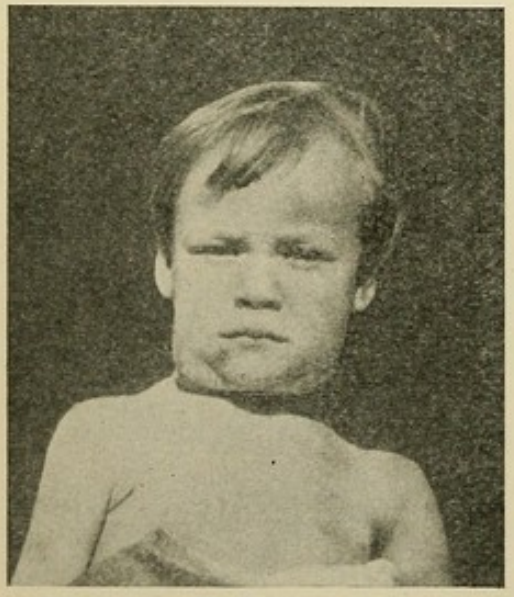


FIG. 64 *a*.—Hodgkin's disease.

Symptoms.—It resembles lymphatic leukemia, but there is no leukocytosis. It usually starts in the neck, and the nodes are first soft, but become harder, and are rarely painful. They are freely movable, and do not suppurate

[1] Johns Hopkins Hospital Reports, 1902, vol. x.

unless secondary infection takes place, and this is rare. There is often fever of an irregular remittent type. The progress of the disease is steady, but there may be temporary remissions. There may be pressure symptoms caused by the enlarged nodes pressing on the trachea, bronchi, nerves, ureters, etc.

Diagnosis.—From leukemia, by the absence of leukocytosis. From tuberculosis, by the absence of fusion and matting of the nodes, by the tuberculin test, and, best of all, by histologic study of an excised gland. Tuberculosis is a frequent complication, and without the histologic examination may obscure the diagnosis. From lymphosarcoma, by histologic study and the absence of a tendency to invade adjacent tissue.

Prognosis.—This is unfavorable. The usual duration is from one to four years after the appearance of the disease, but some last only months. There may be remissions from time to time, but sooner or later the patient becomes cachectic, and frequently dies from tuberculosis or some other intercurrent infection.

Treatment.—This is not very satisfactory. Arsenic is the best drug, and is best administered hypodermatically, or Fowler's solution may be given by the mouth. The Röntgen rays have been used recently and apparently with great benefit in selected cases, and further investigation should determine its exact value.

STATUS LYMPHATICUS.[1]

(Lymphatism; Status Thymicus.)

Definition.—A condition characterized by a general hypertrophy of the lymphatic system, an enlarged thymus gland, an enlarged spleen, hyperplasia of the vascular system, particularly of the aorta, a chlorotic condition, and a tendency to sudden death from trifling causes.

Etiology.—This condition is frequently associated with rickets. It may be seen at any age, but is most frequent in young children.

Symptoms.—The child appears pale and flabby. There

[1] Bloomer, *Bulletin Johns Hopkins Hospital*, 1903, vol. xiv., p. 263.

are enlarged tonsils, adenoids, and other structures as given above. Sudden death may call attention to the condition. Death may follow some slight accident, as a fall, or result from chloroform. Sometimes there is a cry and a convulsion and the child drops dead.

Diagnosis.—By the physical findings.

Prognosis.—There is a tendency for the condition to disappear about puberty.

Treatment.—Careful dieting to avoid convulsions, due to improper food. Good hygiene. Cod-liver oil in winter; syrup of the iodid of iron may be given. Iodid of potassium may be tried.

SIMPLE ACUTE ADENITIS.

Definition.—An acute inflammation of the lymph-nodes. Either the external or internal nodes may be affected. The external frequently suppurate, while the internal rarely do.

Etiology.—About three-fourths of cases are seen under two years of age, and the lesion is usually secondary to an adjacent inflammation, as pharyngitis, bronchitis, or tonsillitis, or it may be due to eczema of the scalp, carious teeth, or stomatitis, or it may be caused by the infectious diseases, as German measles.

Pathology.—There is swelling in the node, due to congestion and to a hyperplasia of the lymphoid cells. The nodes may suppurate or they may subside entirely after a few weeks, or they may remain enlarged and hard for some time.

Symptoms.—There are always the symptoms of the original disease, which may be so slight as to pass unnoticed. The cervical glands are the most frequently affected. The swelling comes on gradually. They are painful, tender, and there may be redness of skin. Suppuration, when it takes place, usually starts before the first or second week, but it may be delayed for three or even four weeks. After the pus is discharged the healing is usually quite rapid. When suppuration does not occur the nodes remain swollen from a week to two months, and gradually become smaller and harder. Recurrences are not infrequent. Fever is usually present at the height of the disease. The bronchial lymph-nodes are

infected in lesions of the lungs and bronchi, and may be the cause of continued fever. The mesenteric nodes may be infected in intestinal disorders.

Diagnosis.—The age of the child and the acute onset usually suffice to exclude tuberculosis, but after two years of age tuberculosis of the nodes is common. The location of mumps in the parotid region, with the lobe of the ear as the center of the swelling, and a history of exposure are usually sufficient to differentiate this disease. The other affections of the lymph-nodes are chronic.

Treatment.—Where the local cause is apparent, it should be removed if possible. The nodes, throat, or teeth should receive prompt attention. Internally, iodid of potassium or the syrup of the iodid of iron may be used. Externally, local applications of heat or cold—cold if there is swelling and congestion, and heat if the process is one of pus formation. Five to 10 per cent. ichthyol ointment is one of the best external applications. If suppuration takes place the abscess should be opened, it being usually better to wait until suppuration is marked, and make rather a small opening.

SIMPLE CHRONIC ADENITIS.

Definition.—A chronic inflammation and enlargement of the lymph-nodes.

Etiology.—Repeated attacks of adenitis or a long-standing irritation, as a chronic eczema or a carious tooth, is the most frequent cause. It is one of the features of the status lymphaticus.

Pathology.—The nodes are enlarged, hard, and show hyperplasia of the cells and connective tissue changes.

Symptoms.—The chronic enlargement of the disease is the only symptom. The glands are hard, usually not tender, and they suppurate but rarely.

Diagnosis.—Usually from tuberculosis or Hodgkin's disease. A node may be removed for microscopical examination if very strong doubt exists.

Prognosis.—Good if cause can be removed.

Treatment.—Remove cause, as carious teeth, adenoids, or enlarged tonsils. Cod-liver oil, syrup of iodid of iron,

iodid of potassium, and Fowler's solution of arsenic may all be recommended.

Syphilitic Adenitis.—Syphilis may occasionally cause a marked general or local adenitis. The diagnosis rests on finding other manifestations of the disease and on rapid improvement by antisyphilitic treatment.

DISEASES OF THE THYMUS GLAND.

The thymus gland increases rather rapidly in size from birth until about the second year, and more slowly until puberty. Then it remains about the same size until about twenty-five or thirty, when it atrophies and is replaced slowly by fat and connective tissue.

In Infantile Atrophy and Marasmus.—The thymus shows marked changes macroscopically and microscopically. There is atrophy of the gland in direct proportion to the atrophy of the body. The severe cases show a decrease in the lymphoid cells and an increase in the connective tissue.

The thymus may show changes in **syphilis** and **tuberculosis,** and may be the site of tumors and abscesses. Hemorrhages may be found especially in children who have been asphyxiated.

It is hypertrophied in some cases of **acromegaly,** gigantism, chlorosis, leukemia, Hodgkin's disease, Graves' disease, and epilepsy. Some authors state that it is also enlarged in infectious diseases. It is found enlarged in thymic asthma and Paltauf's status thymicus. It is atrophied in atrophic conditions, rickets, and Bourneville states that it is present in only 27 per cent. of idiots.

Sudden Death.—If sufficiently hypertrophied the thymus may be a cause of sudden death in infants. The child has previously been well or slightly cyanosed. Usually found dead. There is marked lividity of the body, and there may be hemorrhages into the gland. The gland may weigh 30 to 45 gm. Important from medicolegal point of view.

Thymic Asthma.—When the hypertrophy comes on gradually; there are symptoms of intrathoracic pressure. Pallor and edema of the face, suffusion and hemorrhages into the conjunctiva; cyanosis of lips and finger tips; labored

respiration with inspiratory stridor. This last may be due to laryngeal spasm or direct pressure on the trachea. There is dulness over the gland. The Röntgen rays have given remarkable results in some cases. If this is not successful, the gland may be entirely or partially removed by surgical operation.

THE ADRENALS.

The adrenals are relatively larger in infants than in adults.

Hemorrhage into the Adrenal.[1]—May be seen in the newborn in the course of infectious diseases and toxemias, as well as in any condition of general congestion. The symptoms may be asthenic, peritoneal, or nervous. These vary in different cases. One class occurs in previously healthy infants, coming on suddenly with vomiting, diarrhea, and in a few hours a petechial eruption and generally high fever. Death occurs after a short time. (**Purpura fulminans.**) These cases are sometimes mistaken for purpuric small-pox, measles, or scarlet fever. There may be nothing to suggest an infectious disease in some of these cases.

ADDISON'S DISEASE.

This is very rarely seen in early life. The lesion is usually a tuberculosis of the adrenal or degenerative changes in the abdominal sympathetic ganglia. The symptoms are bronzing of the skin and pigmentation of the mucous membranes. There are great weakness, cachexia, and great irritability of the stomach. The pulse is rapid and weak. Death may take place from tuberculosis, asthenia, coma, or convulsions. The diagnosis is from arsenical pigmentation and malarial cachexia. The treatment is along general tonic lines. Adrenal tablets or extract should be tried, the effect closely watched, and the dose regulated accordingly. Recovery is the exception.

THE SPLEEN.

The Normal Spleen.—The spleen lies with the upper border on about the ninth rib, and the lower about the eleventh rib. Posteriorly it extends to the posterior axillary

[1] Dudgeon, *American Journal of the Medical Sciences*, February, 1904.

line, and anteriorly to about the midaxillary line. It does not normally pass a line drawn from the left nipple to the end of the eleventh rib. The splenic dulness corresponds to the above. It is often obliterated, however, by abdominal tympany due to inflated stomach or intestines. An overloaded intestine may give rise to dulness and simulate an enlarged spleen.

Enlargement of the Spleen.—If the spleen is enlarged it can usually be made out by palpation. A spleen which extends beyond the edge of the ribs may be looked upon as enlarged. A pleural effusion may push a normal spleen downward.

An enlarged spleen during inspiration moves downward and to the right, in the direction of the right iliac crest. If the liver is enlarged the liver and splenic dulness may be continuous. The same is true when there is an effusion in Traube's semilunar space. In a good light, with the abdominal walls properly stretched, an enlarged spleen can often be seen to move up and down. There may be enlarged veins seen in the splenic area, and over a very large spleen there may be a blowing murmur like that over a pregnant uterus.

An enlarged spleen is seen in almost all acute infectious fevers. It is especially marked in typhoid fever and malaria, only occasionally enlarged in cerebrospinal fever and rarely in mumps. In almost all the chronic diseases of early life the spleen is enlarged. In active rickets, in leukemia and pseudoleukemia and Hodgkin's disease it is constantly enlarged. It is usually, but not always, enlarged in syphilis.

Amyloid Spleen.—(*Sago Spleen.*)—This is large, thick, and smooth. It is seen in long-standing suppurations, especially of the bones; also in chronic pulmonary tuberculosis and in old cases of syphilis. The liver is also enlarged, and there is a cachectic condition. Amyloid changes are not as frequent as formerly owing to the improved surgical treatment of suppurative diseases.

Chronic Passive Congestion of the Spleen.—This follows stasis in the portal and splenic vessels. It is seen

in diseases of the liver, especially cirrhosis, from lesions in the lungs, which obstruct the blood-current, and especially in acquired or congenital heart disease. The liver is always enlarged at the same time, except when the spleen vessels are alone involved.

New Growths.—These are rare in infancy and childhood. A new growth may be suspected if the surface of the spleen is nodular. This may be tuberculosis, sarcoma, carcinoma, syphilis, cysts, or parasites. Tuberculosis is the most frequent.

Splenitis.—Splenitis may occur from extension of a neighboring inflammation. The diagnosis is always doubtful.

Perisplenitis.—This may follow injuries, hemorrhagic infarcts, or be caused by extension, tuberculosis, or syphilis. A friction-rub can often be heard. The spleen may become adherent and immovable in cases of long standing.

Floating Spleen.—This is occasionally seen as a congenital condition. The diagnosis is made from its shape and the presence of tympany over the area of splenic dulness. It must be differentiated from tumors of the same size and from fecal masses.

PRIMARY SPLENOMEGALY (Gaucher).[1]

A rare form of splenic enlargement without any apparent cause. There is a hyperplasia of the endothelial cells of the spleen and of the connective tissue of the liver. The disease is slow and progressive. It begins between the second and seventh year. There are anemia and symptoms referable to the enormous spleen. The prognosis is bad.

DYSTROPHIA ADIPOSOGENITALIS.

Fröhlich's syndrome is due to inactivity of the pituitary gland, characterized by obesity and a lack of development of the genital organs, an increased assimilation limit for carbohydrates, often dry skin, subnormal temperature, and lack of development of the hair. Pituitary gland administrations have been administered occasionally with benefit.

[1] Bovaird, *American Journal of the Medical Sciences*, October, 1900.

THE URINE IN INFANCY AND CHILDHOOD.

Character of the Urine.—The urine of the newborn is highly colored, stains the napkin, and often leaves deposits of urates or uric acid.

Later the urine is pale and often contains considerable mucus, which makes it cloudy.

The specific gravity varies, but is high during the first two days, lowest from the fourth to the sixth day, and gradually increases to puberty.

Hyaline, and more rarely granular, casts may be found. Phosphates, chlorids, and sulphates all increase with age.

Albumin may be present in early infancy.

Sugar, usually lactose, may sometimes be found in early infancy.

Collecting the Urine.—For male infants place the penis and scrotum in a large condom and secure in place with a tape. For girls a small cup may be secured over the vulva. This is rarely successful. The child may be placed on a chamber immediately on waking or it may be catheterized.

Age.	Quantity.		Specific gravity.	Urea, daily quantity.	Ratio uric acid to urea.
	Grams.	Ounces.		Grams.	
First 24 hours	0–60	0–2	1.010–1.012	0.076–0.114	1 : 14
Second 24 hours	10–90	½–3		0.140–0.660	
3 to 6 days	90–250	3–8	1.004–1.008		
7 days to 2 months	150–400	5–13	1.004–1.010	0.90–1.40	1 : 60–80
2 to 8 months	210–500	7–16			
6 months to 2 years	250–600	8–20	1.006–1.012	. . .	1 : 60–80
2 to 5 years	500–800	16–26	1.008–1.016	13.09–14.01	1 : 50–70
5 to 8 years	600–1200	20–40		16.05–21.03	1 : 45–60
8 to 14 years	1000–1500	32–48	1.012–1.020		

Quantity.—Relatively more urine is passed by infants than by adults. Infants micturate very frequently, hourly or oftener, while they are awake, and every two or three

hours while asleep. Later the urine is held several hours without difficulty. Well-trained infants control the bladder at two or three years of age. Nervous or untrained children may wet themselves for several years. Sometimes an infant does not void any urine for ten or twelve hours, and then after passing a very large quantity returns to its former habits.

The table on the preceding page gives the quantity and other facts about the urine. It has been compiled from various authorities.

FUNCTIONAL ALBUMINURIA.[1]

(Physiologic or Cyclic Albuminuria.)

Definition.—Albuminuria occurring without any demonstrable signs or symptoms of disease.

Etiology.—It is most frequently seen in boys between five and fifteen years of age. It may be present in the urine excreted while the individual is in the erect posture (orthostatic albuminuria) and absent while he is lying down, and consequently albumin is not present in the urine passed early in the morning on rising. It may also apparently be due to exercise, fatigue, indigestion, and too much protein food.

Symptoms.—There are no symptoms. The patients may be well or suffer from other diseases. The albumin is usually discovered accidentally.

Diagnosis.—Sometimes difficult. Absence of other signs of disease, absence of casts, passing urine free from albumin at night or in the early morning, and high specific gravity are the most important points.

Prognosis.—If albumin is not constantly present and is in small, not increasing, quantities, the outlook is good. If it is increasing and is constant, actual disease of the kidney is probably present.

Treatment.—General hygiene; proper diet; relieve the indigestion. Alkaline mineral waters are sometimes used. Iron should be given if anemia is present.

[1] Rachford, "Albuminuria," *Archives of Pediatrics*, August, 1908. Sutherland, "Orthostatic Albuminuria," *Amer. Jour. Med. Sci.*, August, 1903.

HEMATURIA.

(Blood in the Urine.)

The red blood-cells may be demonstrated. Is due to injury, nephritis, new growths, stone in kidney, ureter or bladder, tumor in the bladder, hemorrhagic disease of the newborn, scurvy, purpura, and similar conditions; various infections, as malaria and scarlet fever; and to the administration of drugs, as chlorate of potassium and quinin.

Diagnosis. — Best by microscopic examination. It should be suspected where the urine is dark and cloudy. If from the urethra, the urine first passed is cloudy; if from the bladder, the blood is often with the last urine passed; if from the kidney, the blood is thoroughly mixed with the urine.

Treatment. — This depends on the cause. Chronic cases may be given alum water or Rockbridge spring water.

HEMOGLOBINURIA.[1]

Blood pigment is found in the urine with a few or no blood-cells. It may be seen in epidemic hemoglobinuria (Winckel's disease), in acute infections (as malaria and typhoid fever), purpura, poisons (chlorate of potassium or carbolic acid), from the absorption of hemorrhagic effusions, and there is a paroxysmal hemoglobinuria met with in childhood.

GLYCOSURIA.

(Sugar in the Urine.)

May be seen in young infants otherwise in good health. The sugar in these cases is usually lactose (milk sugar). It may occur from eating excessive amounts of sugar (alimentary glycosuria); the kind of sugar given will be found in the urine, as cane sugar, milk sugar, or grape sugar. Glycosuria is one of the symptoms of diabetes.

[1] Herman, *Archives of Pediatrics*, February, 1903, p. 105. Guthrie, "Hematuria," *Lancet*, May 3, 1903, p. 1243.

PYURIA.

Pus in the urine usually comes from the pelvis or the kidney, but may come from inflammation of any part of the genito-urinary tract or from rupture of abscess into it. The treatment depends upon the cause. Urotropin is useful. It may be given in from 1 to 5 gr. doses several times a day.

LITHURIA.

Excessive amounts of urea and uric acid in the urine. Uric acid is derived from the destruction of the cell nuclei. The quantity for twenty-four hours must be estimated. Urine of low specific gravity from which amorphous urates are deposited may be regarded as containing excessive amounts of uric acid.

The **symptoms** of the condition are of a general nature, and may be regarded as an indication of disturbed metabolism. It is seen in anemia, chorea, rheumatism, malnutrition, etc. Where crystals of uric acid are deposited from highly colored urine of high specific gravity the solvent power of the urine for uric acid is diminished. It may be associated with digestive disturbances.

Treatment.—This depends on the existing conditions; where otherwise allowable, exercise in the open air and alkaline mineral waters, as Vichy, should be ordered. Holt advises cutting off sugars, reducing the starchy food, and giving a diet rich in protein.

INDICANURIA.

The presence of indican in the urine. A trace may be found in normal urine. A strong reaction is found in urine of children suffering with suppurative conditions, as empyema, constipation, and tuberculosis. Also seen in intestinal fermentation and chronic intestinal indigestion.

The treatment consists in removing the cause, diminishing intestinal putrefaction, and giving a milk diet.

ACETONURIA.

The presence of acetone in the urine is rather a frequent occurrence, and small amounts may sometimes be found in health. It is found in a number of conditions which show no symptoms of acidosis, among these may be mentioned the excessive ingestion of fat, starvation, high fever, gastric ulcer, malignant disease, and many others. There is another group of cases where the symptoms of acid poisoning may be noted in connection with other diseases, as in diabetes, intracranial disease, toxic forms of gastro-intestinal disturbance, diarrhea, sepsis, intestinal obstruction, acute peritonitis, and due to the influence of certain drugs used in poisonous doses, as morphin and salicylate of sodium. There is a third group of uncomplicated cases, such as are seen following the administration of anesthetics in recurrent or cyclic vomiting.

DIACETURIA.

The presence of diacetic acid in the urine. This is found in the same conditions as acetone. It is quite common in high fevers and disappears when the fever falls. It may precede diabetic coma.

Where acid auto-intoxication is present bicarbonate of soda in rather large doses is indicated.

ANURIA.

An absence of secretion of urine. This may be seen in infants without any apparent cause. As long as there are no other symptoms there is no danger. It may be caused by uric-acid infarcts. The treatment is the same as in diminution of urine.

DIMINUTION OF URINE.

This may occur from excessive sweating, fever, diminished ingestion of fluid, etc.

Treatment.—Hot applications over the kidneys, the ad-

ministration of hot water and of sweet spirits of niter with or without citrate of potassium.

DIABETES INSIPIDUS.

(Polyuria.)

Definition.—A chronic disease characterized by great thirst and the excretion of large quantities of urine.

Etiology.—The disease is rare. It usually begins under ten years of age. It may occur in families. It may follow injuries about the head or brain lesions.

Pathology.—Obscure. It is usually classed as a neurosis.

Symptoms.—The passing of large quantities of urine (from 2 to 10 liters daily), great thirst, and frequently nervous symptoms, as neuralgia, headache, and other motor disturbances, are the principal symptoms. The urine is clear and contains neither grape sugar nor albumin.

Diagnosis.—From diabetes by the absence of grape sugar. From interstitial nephritis by careful study of urine and symptoms.

Prognosis.—As regards cure, usually bad. A few cases recover spontaneously or with treatment.

Treatment.—Good hygiene; out-of-door life; good, well-balanced diet. Restrict the amount of fluids taken. Numerous drugs have been recommended; atropin or belladonna, arsenic, and bromids are most useful; antipyrin or ergot may be tried.

DISEASES OF THE KIDNEYS.

MALFORMATIONS AND MALPOSITIONS OF THE KIDNEY.[1]

Only one kidney may be present, the other being rudimentary or entirely absent. Both kidneys may be fused together—the so-called "horseshoe kidney." Cystic degeneration of the kidney is sometimes seen affecting one or both

[1] Anders, "Congenital Single Kidney," *American Journal of Medical Sciences*, March, 1910, p. 314.

kidneys. The kidney substance is replaced by cysts wnich may reach a considerable size. There are no symptoms referable to the kidneys, but sometimes the enlarged kidney may be felt.

Hydronephrosis.—The bladder may be enlarged, the ureters and the pelvis of the kidneys dilated. There is usually—but there may not be—some obstruction to the outflow of urine causing this. The deformity may be unilateral or bilateral. An abdominal tumor may be felt in some cases.

There may be malpositions of one or both kidneys, and movable kidneys may occasionally be met with. There may be additional ureters.

URIC-ACID INFARCTIONS.

Deposits of uric acid or of urates in the tubules of the kidneys are common during the first few weeks of life. They may or may not cause symptoms. Diminished urine or anuria, pain on urinating, and priapism are symptoms which may be met with. The urine stains the napkin, and the crystals may sometimes be demonstrated upon it.

Hot water to drink, together with citrate of potassium (1 gr. every two hours), usually gives prompt relief.

HYPEREMIA OR CONGESTION OF THE KIDNEY.

Acute Congestion.

Etiology.—From exposure to cold; the ingestion of drugs, as turpentine, cantharides, etc.; from injuries or fevers.

Symptoms.—The urine is scanty, highly colored, of high specific gravity, and may contain small quantities of blood, albumin, and tube casts. There may be headache, backache, etc. The condition may pass off in a day or two or may precede an acute nephritis.

Treatment.—Rest in bed; milk diet; hot packs, hot steam baths, hot applications or dry cups over the kidneys; saline cathartics.

CHRONIC CONGESTION OF THE KIDNEY.

(Passive Hyperemia.)

Etiology.—From impeded circulation, most frequently from chronic diseases of heart or lungs, but also from anything which prevents the return circulation of the kidneys, as tumors or enlarged glands pressing upon the veins.

Pathology.—The kidneys are enlarged and of dark-red color. The capillaries are distended with blood.

Symptoms.—The urine is scanty, dark, and of high specific gravity. It may contain blood, albumin, and hyaline casts. When dependent upon general stasis, other symptoms, as edema and cyanosis, may be present.

Treatment.—The primary condition should be treated. In addition, rest in bed, milk diet, and diuretics. Citrate of potassium, infusion of digitalis, caffein, calomel, or sweet spirits of nitre, diuretin.

INFLAMMATION OF THE KIDNEY.[1]

The student is sometimes confused by the numerous terms applied to various conditions. The simplest classification is into *acute nephritis* and *chronic parenchymatous nephritis* and *chronic interstitial nephritis.*

ACUTE NEPHRITIS.

(**Acute Bright's Disease; Acute Tubular Nephritis; Acute Parenchymatous Nephritis; Acute Desquamative Nephritis; Acute Diffuse Nephritis, etc.**)

Definition.—An acute inflammation of the kidney.

Etiology.—The principal causes are: (1) Infectious diseases, especially scarlet fever and diphtheria; (2) exposure to cold and wet; (3) toxic agents, such as turpentine, chlorate of potassium, and carbolic acid.

Pathology.—There are changes in the vascular, epithelial, and interstitial tissues. These may vary in intensity, and this has led to the numerous classifications. If the entire kidney

[1] Morse, *American Medicine*, April 5, 1905, p. 551.

is more or less uniformly involved it is called a **diffuse nephritis**; if the tubules are chiefly affected, **parenchymatous nephritis**; if the glomeruli are the seat of marked changes, as in scarlatina, **glomerulonephritis**. In children, after fevers, the interstitial tissue may be the seat of extensive changes.

The kidney may not present any marked naked-eye change, or it may be enlarged in the early stages, red and dripping blood, the cortex swollen and turbid, pyramids intensely congested. Later the kidney may be paler.

Histology.—The tubular cells show cloudy swelling, and may be desquamated, and the tubes may be blocked by hyaline or granular casts. The vessels are engorged. The interstitial tissue is frequently infiltrated with cells (leukocytes and plasma cells).

Symptoms.—Nephritis may be primary or secondary to some other disease.

Primary Nephritis.—*In Infants.*—Sudden onset, vomiting, frequently diarrhea, high fever, nervous symptoms, dulness and apathy, marked anemia, sometimes edema. The outlook is bad; the majority of the cases prove fatal.

In Older Children.—Onset less often sudden, moderate fever, vomiting, anemia, often edema. Prognosis is better than in infants.

Secondary Nephritis.—Comes on usually at the height of the febrile stage of the primary disease. It may be overlooked. There is often an increase in temperature, headache, vomiting, sometimes edema. The nephritis of scarlet fever usually comes on late—at the third or fourth week of the disease. There is fever, with the edema always marked.

The Urine.—The urine is at first scanty or even suppressed. It is dark, of high specific gravity, contains blood, albumin, tube casts, and desquamated epithelium. The daily amounts of urea are diminished. Later the urine becomes freer, lighter in color, and of lower specific gravity.

Diagnosis.—On the symptoms and examination of the urine.

Nephritis should be suspected whenever there is fever with marked pallor. The disease is often overlooked.

Prognosis.—Under three years the prognosis is grave. If the child does not die in the acute attack it is liable to have evidence of chronic nephritis later in childhood. In older children the outlook is, on the whole, much more favorable. Death may occur from edema of the lungs, uremia, or exhaustion. The disease may become chronic.

Prophylaxis.—In all acute fevers, but especially scarlet fever, bland unirritating diet, principally of milk and carbohydrates, should be given. Protect from cold and injudicious drugging.

Treatment.—Rest in bed; keep warm. Sponge or warm or vapor baths to promote sweating. Hot wet-packs are useful. Dry cups or warm applications over the kidneys. Saline cathartics. As long as the urine is very scanty or suppressed and water is excreted with difficulty, the amount of fluid given should be rather limited. Citrate of potassium may be given with alkaline mineral waters. If there are any symptoms of uremia, stimulants are indicated; nitroglycerin is useful. Nervous symptoms are best controlled by chloral or morphin. Nitroglycerin may be tried when there is high pulse tension, vomiting, delirium, and high temperature. Bleeding may be tried where uremia threatens. From two to five ounces of blood may be withdrawn, according to circumstances. This should be followed by subcutaneous injections of normal salt solution. Rectal enemata of hot salt solution may cause free diuresis. As soon as the diuresis becomes freer, hot (105° F.) saline injections into the rectum should be given several times a day. Increased amounts of alkaline mineral waters or imperial drinks (see formulas) should be given.

The diet should be milk diluted with mineral waters or thin gruels, buttermilk, koumiss, whey, junket, and farinaceous gruels. Meat should not be given until convalescence is well established. Where anemia is severe, solid food may be added cautiously, watching the temperature. The diet must be carefully supervised for a long time. If there is edema, a salt-free diet may be tried.

CHRONIC NEPHRITIS.[1]

This may be either parenchymatous or interstitial, or a combination of both.

Etiology.—It is rare in childhood. It may be seen after acute infections, especially scarlet fever or prolonged suppurative diseases. It may occur in the course of chronic tuberculosis, hereditary syphilis, or chronic heart disease. It may be seen in gouty children and in those rare cases of early arteriosclerosis of obscure origin.

Pathology.—In chronic parenchymatous nephritis the

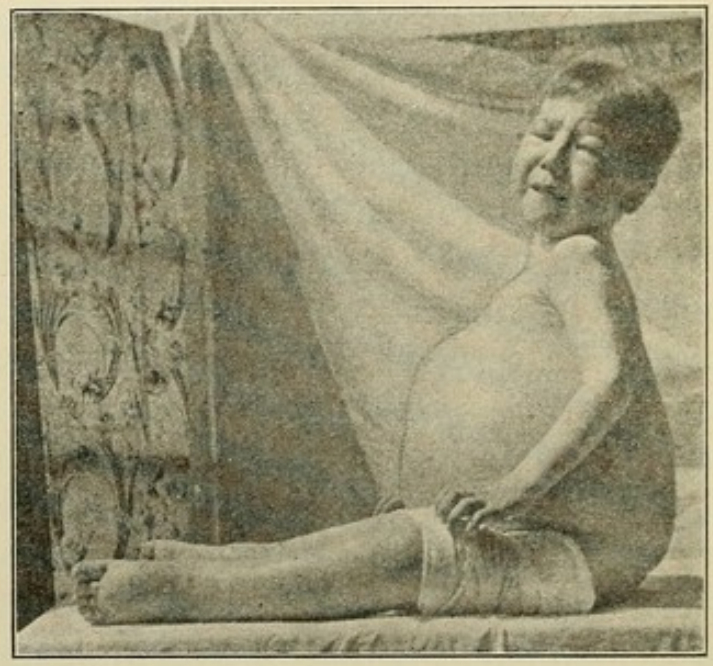


FIG. 65.—Chronic parenchymatous nephritis.

organs are referred to as "large white kidney." The kidney may be red, however, and show very little change. The histologic changes are cloudy swelling of the epithelial cells, or they may be fatty or granular. The cells are desquamated and the tubules contain casts and granular material. In chronic interstitial nephritis the change is the same as in adults. The kidney is small and granular, with adherent capsules, thin cortex, and the histologic changes are an in-

[1] Cotton, *Archives of Pediatrics*, April, 1904, p. 241. Sawyer, "Interstitial Nephritis," *Birmingham Medical Review*, August and September, 1903.

crease of the connective tissue, arteriosclerosis, and atrophy of the parenchyma.

Symptoms.—**Chronic Parenchymatous Nephritis.**—

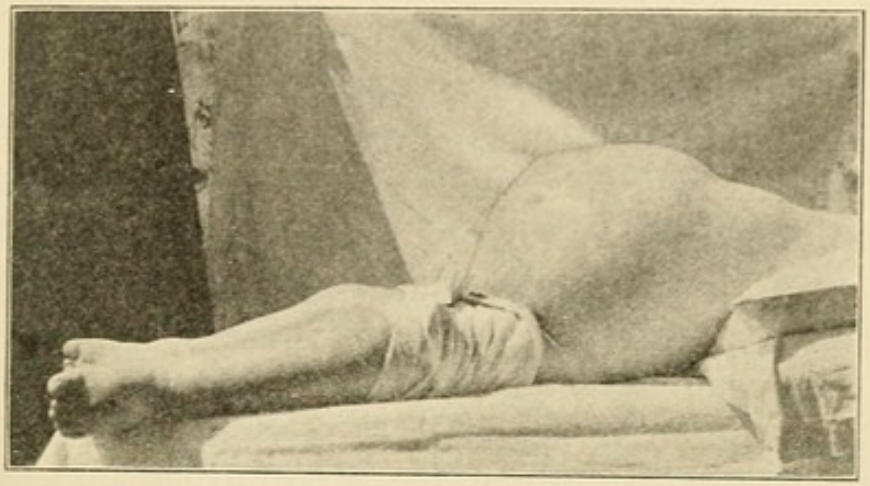


FIG. 66.—Showing edema and ascites in chronic parenchymatous nephritis in a child of five years.

Edema, effusion into the serous cavities, with digestive disturbances, are the most marked symptoms. There are also anemia, headache, occasional vomiting, or diarrhea. There may be enlargement of the heart with murmurs and accentuation of the aortic sound.

The Urine.—The urine varies from time to time. It contains varying amounts of albumin and granular and fatty casts. The specific gravity is high and the quantity normal or less than normal.

Prognosis.—The outlook is not very good. The disease lasts from two to four years. These patients frequently die of intercurrent diseases.

Chronic Interstitial Nephritis.[1]—This form is very rare in children. Syphilis is the most frequent cause. Edema is rarely marked. The disease begins gradually with headache, neuralgia, and attacks of dyspepsia. There are high arterial tension and arteriosclerosis. Large quantities of pale urine with a low specific gravity are passed. Small quantities of albumin and an occasional tube cast may be present. The outlook in this form is always grave. The disease runs a very chronic course.

[1] W. P. Herringham, "Nephritis, Chronic, Prognosis of, in the Young," *Edinburgh Medical Journal*, July, 1906, p. 24.

Diagnosis.—The urine should be examined in all cases of headache, pallor, edema, and high arterial tension.

Treatment.—This is much the same as in adults, and requires attention and experience. The amount of exercise should be regulated to the child's condition, and many cases should be confined to bed. A daily warm bath is of use. The child should be protected from cold, and a warm, dry climate is best where circumstances allow a change. The diet should consist largely of milk, cereals (oatmeal excepted), bread and butter, and vegetables (legumes sparingly, if at all). Meat should be given according to circumstances, not over once a day, sometimes only every other day. Eggs should be used sparingly as a rule. A salt-free diet may often be used to advantage, especially where there is a tendency to edema. (See *Diet in Health and Disease*, fourth ed., p. 543.) Iron is of value in most cases, and the liquor ferri et ammoniæ acetatis a good preparation to use in these cases.

AMYLOID DEGENERATION OF THE KIDNEY.

(Waxy Kidney; Lardaceous Kidney.)

Etiology.—This is seen in long-standing suppurations, especially of the bones, and in syphilis and chronic tuberculosis.

Pathology.—The kidney is enlarged, firm, and pale. On section it has a translucent appearance. This turns mahogany brown on being treated with Lugol's solution. The liver and spleen are also affected. Amyloid changes are less common than formerly, owing to the more radical treatment of suppurating foci.

Symptoms.—There are anemia and general ill health from the original disease. The liver and spleen are enlarged. The cachexia is sometimes called "alabaster cachexia."

The Urine.—The quantity is increased, pale, of low specific gravity, and contains large quantities of albumin. There are casts giving amyloid reaction.

Diagnosis.—The history, the cachexia, increased quantity of urine with small albuminuria, together with the enlarged liver and spleen, usually render diagnosis possible.

Prognosis.—Grave unless the predisposing cause can be removed early.

Treatment.—Along general lines, both hygienic and tonic. The main thing is the treatment of the original disease.

NEW GROWTHS IN THE KIDNEY.[1]

Tumors of the kidney in children are usually malignant. The majority of these are sarcomata. The growth is primary in the kidney. The growth usually starts in the pyramids, which is just the opposite of the adult type, which starts in the cortex. The pelvis may be the starting-point or it may begin in the adrenal or an adjacent lymph gland. The tumor may reach an enormous size. Sarcoma is most frequently seen in the left kidney.

Symptoms.—The tumor, cachexia, and often hematuria. There may be pressure symptoms, depending on the size of the growth.

Diagnosis.—Almost all tumors in the abdomen under ten years are sarcoma. Benign growths usually grow slowly, while these malignant ones grow rapidly.

Treatment.—Removal by surgical operation.

PYELITIS.[2]

Definition.—Inflammation of the pelvis of the kidney, which is often associated with inflammation of the kidney, pyelonephritis; or of the bladder, pyelocystitis; or it may lead to accumulation of pus in the kidney, pyelonephrosis.

Etiology.—(1) Renal calculi, (2) malformations, (3) tuberculosis, (4) from extension of an inflammation, (5) pyemia, (6) secondary to cystitis.

Symptoms.—Pain, and often swelling of the kidney, chills, irregular fever, sweats, leukocytosis, acid urine with blood, pus, desquamated epithelium from the pelvis of the kidney, mucus, and albumin.

[1] Strong, *Archives of Pediatrics*, May, 1903, p. 321.

[2] Fischer, *Archives of Pediatrics*, January, 1901, p. 13. Thomson, "Acute Pyelitis," *Scottish Medical and Surgical Journal*, July, 1902.

Diagnosis.—Acid urine with pus and pelvic epithelium are sufficient to make the diagnosis.

Prognosis.—In the mild forms, good; in the severe forms with stone or sepsis, bad.

Treatment.—Alkaline mineral waters (Celestine, Vichy) may be used to neutralize the urine if acid. Citrate of potassium is sometimes given. If the urine is alkaline, benzoate of soda may be used or monosodium phosphate. Hexamethylenamin is of great value, but only when the urine is acid. Surgical treatment is indicated in the stone, pyelonephrosis, or in very severe cases.

CYSTITIS AND CYSTOPYELITIS.[1]

Definition.—An inflammation of the bladder and often of the pelvis of the kidney, due to infection with various bacteria.

Etiology.—Usually the colon bacillus is the exciting cause, but pus cocci, gonococci, typhoid bacilli, tubercle bacilli, and other bacteria may be the cause. Congenital malformations predispose to bladder infections. The infection usually takes place through the urethra, may follow the introduction of foreign bodies into the bladder, and very rarely tumors or bladder-stones may be the cause. Sometimes the infection seems to come through the circulation, and at others it is apparently an extension from an enteritis or colitis. Most cases occur in infants under eighteen months of age.

Symptoms.—The disease is characterized by great restlessness, loss of appetite, great thirst, high irregular fever, loss of weight, anemia, and frequently vomiting and some bowel disturbance, which may obscure the diagnosis. There are also mild forms, with only minor local symptoms. In the severe forms there is vesical tenesmus and painful frequent urination. There is sometimes pain on pressure over the bladder and kidneys. There is usually a leukocytosis.

Urinary Findings.—The specific gravity is usually low

[1] Abt, *Journal of the American Medical Association*, December 14, 1907, p. 1972.

(1.007–1.015). The urine is cloudy and acid in reaction when the colon bacillus or tubercle bacillus is present, and usually alkaline in infections with the staphylococcus and streptococcus. Albumin is present, as a rule, and pus and epithelium are found on microscopic examination.

Diagnosis.—This is made on the urinary findings, and in all cases of high irregular fever the urine should be examined. In the tuberculous cases there is liable to be marked pallor, cachexia and malnutrition, and blood-clots may be passed. In calculus hypogastric pain is more marked, there may be difficulty in urinating, hematuria is frequent, and there may be pain on deep pressure on the perineum. Sounding for stone may settle the diagnosis.

Prognosis.—This is variable. Most cases recover in a week or two if promptly treated, while others drag along a most chronic and disappointing course.

Treatment.—In a measure this will depend on the cause. Calculi or tumors should be removed if present. Internally, hexamethylenamin gives the best results, and this may be given in doses of 1 grain four times a day in an infant one year of age, and the dose gradually increased. It acts only if urine is acid. Monosodium phosphate, grains 1 to 5, may be given in sweetened water to render urine acid. Salol has also been advised, and guaiacol in drop doses in orange juice may be used. Guaiacol carbonate may be given in 1-grain doses. Potassium citrate may be used in place of the above. Irrigation of the bladder is not to be advised except in severe infections with the staphylococcus or streptococcus.

RENAL CALCULI.

Small calculi are frequent in early infancy. These are chiefly uric acid or urates, are quite small, and are apparently usually passed through the ureter. They may cause pyelitis, colic, or give rise to no symptoms.

In older children. There is pain over the kidney region, radiating to the opposite side and downward. Renal colic may occur if the stone is passed into the ureter. The

Röntgen rays are frequently used to detect stone in the kidney.

Treatment.—Alkaline treatment just sufficient to render urine neutral. If diagnosis is clear, surgical treatment.

PERINEPHRITIS.

Definition.—Inflammation about the kidney.

Etiology.—Trauma. Frequently no cause can be found.

Pathology.—An abscess forms which burrows between the muscle sheaths in one direction or another.

Symptoms.—The onset may be sudden, with fever, chill, and localized tenderness, or it may be gradual with pain, stiffness of the hip muscles, and lameness. These symptoms increase, fever appears, and child becomes bedridden.

There is scoliosis with concavity toward the affected side, the thigh is flexed, extension is painful, but all other movements of the hip may be made. The cases last weeks or months, and the abscess may rupture.

Diagnosis.—Often mistaken for hip-joint disease. In hip-joint cases there is a more gradual onset, atrophy, limitation of all movements, and not of extension only. Psoas abscess from Pott's disease can be differentiated by locating the diseased vertebræ.

Prognosis.—Good unless rupture occurs into peritoneal cavity.

Treatment.—Rest in bed with hot or cold applications. If suppuration occurs, surgical treatment.

THE GENITAL ORGANS.

MALFORMATIONS OF THE GENITALIA.

Hypospadias.—The urethral opening is on the underside of the penis, some distance from the glans. In some cases there may be a fissure in the perineum, which may lead to the diagnosis of hermaphroditism, especially if the testes are undescended.

Epispadias.—The urethral opening is on the dorsal surface of the penis.

Exstrophy of the Bladder.—A more or less complete absence of the abdominal wall in the median line which exposes the bladder. This organ is also fissured, and appears as a red velvety surface on which the openings of the ureters may be made out. The treatment is surgical.

Cryptorchidism (*Undescended Testicle*).—The testes usually descend from their fetal position below the kidney into the scrotum during the ninth month or shortly after birth. In some cases they may remain in the abdominal cavity or in the inguinal canal. If nearly in the scrotum they may descend on manipulation, otherwise they are best let alone unless they give trouble, when removal may be advisable.[1]

Adherent Prepuce.—This is found in nearly every male infant. The prepuce should be forcibly retracted, the smegma washed off, and the glans covered with a little ointment. This should be done daily until there are no more adhesions. The adherent prepuce may cause frequent and painful urination, and the irritation may lead to the habit of masturbation.

Phimosis.—The prepuce has such a narrow orifice that it cannot be retracted. The orifice may be so small as to interfere with the free passage of the urine. It may cause balanitis, painful urination, night terrors, and other reflex conditions, such as retention or incontinence of urine. The

[1] Bland-Sutton, "The Value of the Undescended Testicle," *The Practitioner*, January, 1910, p. 19.

prepuce may be stretched or cut so as to allow retraction. Thorough anointing with glycerin greatly facilitates retraction. Circumcision is to be preferred in most cases.

DISEASES OF THE MALE GENITALS.

Balanitis.—An inflammation of the prepuce caused by uncleanliness or phimosis. There are edema, swelling, and a discharge of pus. Cleanliness, the use of antiseptic solutions, and applications of lead water and opium or of ice may be sufficient. It may be necessary to slit up the prepuce in order to clean it properly.

Urethritis.—This may result in young children sometimes from uncleanliness, more often from gonorrheal infections, from direct contact. The disease resembles that of adults, but constitutional symptoms are not as severe or may even be absent. The **treatment** is as in adults. Guard against infecting the conjunctiva.

Hydrocele.—This is an effusion of fluid into the pouch brought down with the testicle. In the congenital hydrocele there is direct communication between the tunica vaginalis and the peritoneal cavity. The fluid may disappear *slowly* into the abdomen. It may be mistaken for a hernia. In the ordinary form the canal is closed above and there is a fluctuating tumor, translucent and dull on percussion. There may also be hydrocele of the cord, which is sometimes encysted, giving rise to a small tumor.

Treatment.—In the congenital form a truss should be worn until adhesions have shut it off from the peritoneal cavity. Absorption frequently occurs. The scrotum may be painted with collodion. Iodid of potassium internally.

DISEASES OF FEMALE GENITALIA.

Vulvovaginitis.—**Definition.**—Inflammation of the vulva, vagina, and frequently of the urethra as well. It may be simple or gonorrheal.[1]

[1] Holt, "Vulvovaginitis," *New York Medical Journal*, March 18 and 25, 1905.

Etiology.—Direct contact, either sexual or by handling; infection less frequently takes place from towels, water-closet seats, and the like. It may be the result of injury. Small epidemics may occur in hospitals and institutions.

Symptoms.—Redness and swelling of the parts, excoriations of the thighs, pain on micturition. In the simple form, a whitish, yellowish, or greenish discharge. In the gonorrheal form the discharge is yellow and abundant. Crusts form on the discharge drying. There may be suppuration of inguinal glands. In gonorrheal cases there may be arthritis.

Diagnosis.—Differentiation by microscopic examination of the pus.

Prognosis.—The simple form is cured in two or three weeks with careful treatment; without treatment it lasts indefinitely. The gonorrheal forms last weeks, even months, and relapses are frequent.

Treatment.—Isolate where there are other children. If severe, keep in bed. Flush vagina several times daily with boric acid (saturated solution): permanganate of potassium (1 : 4000) or bichloride of mercury (1 : 10,000). Follow this in obstinate cases with protargal solutions 3 per cent., and in resistant cases 10 to 20 per cent. Apply oxid of zinc ointment freely over vulva and thighs. Place over this a sterile pad. A napkin should be used in younger children and closed drawers in older ones to prevent infection of the eyes.

Gangrenous Vulvitis (*Noma*).—A gangrene-like cancrum oris beginning either alone or with that disease (see same). The general course and treatment are the same as in that disease. If the patient survives there may be atresia of the vagina.

Herpes of the Vulva.—This may occur on the skin or mucous membrane or both. In its appearance and course it resembles the same condition seen in the mouth or about the lips. Cleanliness and a dusting powder are all that is required.

DISEASES OF THE BLADDER.

Vesical Calculi.—These are rare in infants, but may be met with in older children. They are usually uric-acid stones.

Symptoms.—Pain on urination, sudden stoppage of urine, incontinence of urine often absent at night, and prolapse of the rectum.

Diagnosis.—By use of a sound.

Treatment.—Surgical.

Vesical Spasm.—Frequent micturition with intense pain, due usually to very acid urine.

Treatment.—Alkaline waters in abundance, citrate of potassium, and hyoscyamus.

Enuresis[1] (*Incontinence of Urine; Wetting the Bed*).—**Definition.**—Frequent involuntary urination.

Etiology.—It may be due to malformations of the genitalia, to malformations, injury or disease of the nervous system. The usual form considered here is a neurosis, and both genitalia, and organically the nervous system, are normal. The causes may not be discoverable; it may be due to reflex action due to very acid urine, worms, adherent foreskin, and general irritability of the nervous system. The causes are too numerous to mention, but among them enlarged tonsils and adenoids should not be forgotten. In many cases where there is infection of the urinary passages hexamethylenamin may be given, and salol is often useful.

Symptoms.—The incontinence may occur by day or night, or both, and varies greatly in severity. The urine is passed in considerable quantity at a time and does not drip gradually. It may occur only at times.

Prognosis.—The cases due to organic nervous diseases are hopeless. Those due to malformations may be sometimes relieved by surgical measures. In the ordinary cases cure may result at any time. It may last until five or six years

[1] Williams, "Nocturnal Enuresis and Thyroid," *Lancet*, May, 1, 1909, p. 1245. V. C. de Bainville, "Enuresis, Nocturnal, Causes and Treatment of," *Practitioner*, March, 1906, p. 396. C. G. Kerley, "Incontinence of Urine," *Boston Medical and Surgical Journal*, August 16, 1906, p. 172.

of age or even to puberty. With persistent treatment many cases can be relieved.

Treatment.—Relieve the cause where possible. Build up general health. If urine is very acid give alkaline diuretics or citrate of potassium. Avoid irritating articles of diet, especially tea and coffee. The child should be taught to urinate as infrequently as possible, so as to train the bladder to be distended. But little fluid should be given after 4 P. M. in the nocturnal cases, and the bladder should be emptied at bedtime. If the urine is scanty see that the child has sufficient water at other times. If the urine is very abundant diminish amount of fluid. Belladonna or atropin is the most useful drug; $\frac{1}{1000}$ gr. of atropin may be given for each year of the child's age, and it is best given at 4 and 10 P. M.; later at 4, 7–10 P. M. (Holt). The quantity may be gradually increased until flushing of the face occurs, and the dose should then be diminished very slightly. This must be kept up a long time. Strychnin and nux vomica are also valuable, especially in the diurnal cases. Faradism or passage of a sound sometimes gives relief. Williams suggests the use of thyroid extract; from $\frac{1}{2}$ to $2\frac{1}{2}$ grains may be given three times a day. The initial dose should be small and the increase made gradually. Care should be taken not to give too much, and the patient should be under observation.

Cystitis.—**Definition.**—An inflammation of the bladder. This may or may not be associated with a pyelitis.

Etiology.—The inflammation is due to bacteria, usually the colon bacillus, more rarely the typhoid bacillus, tubercle bacillus, or pyogenic micrococci. Gonorrheal cystitis is rare. Cystitis is much more common in girls than in boys.

Symptoms.—Infections of the urinary tract are frequently overlooked in children. There are restlessness, loss of appetite, an irregular but persistent fever, and pain, usually referred to the abdomen if the child is old enough to locate it. The urine is acid and contains pus and bacteria. In staphylococcic and streptococcic infections the urine is alkaline. There may or may not be symptoms distinctly referable to the genito-

urinary tract; if present these are frequent and painful micturition and chafing of the external genitalia.

Diagnosis.—This depends upon the examination of the urine. The urine may be drawn with a catheter if necessary.

Prognosis.—This is usually good if the child is properly treated. Occasionally the disease persists in spite of treatment.

Treatment.—Local treatment and washing of the bladder is liable to do more harm than good in young children. Hexamethylenamin (urotropin) may be given internally in doses of from ½ to 1 gr. three or four times a day. Salol may also be used, and in persistent cases guaiacol may be administered in orange juice.

DISEASES OF THE SKIN.[1]

CONGENITAL ICHTHYOSIS.

(Keratoma Diffusum; Fish-skin Disease; Xeroderma.)

Definition.—A congenital disease of the skin characterized by dryness, scaliness, and a thickening of the skin.

FIG. 67.—Ichthyosis congenita: Case photographed when four days old; mother pregnant seven times, giving birth the fifth and the last (present case) to infants with congenital ichthyosis (from Stelwagon, courtesy of Dr. J. MacF. Winfield).

[1] See Stelwagon, *A Treatise on Diseases of the Skin*, for further references. T. C. Fox, "Skin Diseases of the Young Child," *Practitioner*, Oct., 1905, p. 565.

Etiology.—There may be an hereditary tendency to the disease.

Pathology.—The condition is usually regarded as an inherited deformity. There is thickening of the epidermis, especially of the horny layer.

Symptoms.—This condition may be present at birth or develop later; it is usually not noted until the end of the first or second year. There are all gradations in severity, from a scaly, parchment-like thickening of the skin to thick plate-like scales.

Diagnosis.—Usually easy; care should be taken to exclude scaly eczemas and linear nævus.

Prognosis.—Many of the cases are born prematurely and may die soon afterwards. In the cases noted later the disease does not affect life, but the outlook as regards cure is bad.

Treatment.—Thyroid tablets may be given a trial internally. Externally, frequent baths with an ointment containing salicylic acid may be tried.

ECZEMA.

(Salt Rheum; Tetter.)

Definition.—An inflammation of the skin, which may be acute, subacute, or chronic. It is characterized by various lesions, as erythema, papules, vesicles, and pustules, either alone or in combination. There is more or less infiltration of the skin, together with a variable amount of exudate, and usually intense itching.

Etiology.—Certain children seem predisposed to eczema. The exciting cause may be any irritation—heat, cold, parasites, rough clothing, scratching, and the like. Intestinal disturbances may also cause it.

Pathology.—The changes in the skin are those of an acute or chronic inflammation, as the case may be.

Symptoms.—Only the more important infantile forms can be mentioned. Eczema is a disease of countless manifestations and varieties. The eczema of older children resembles that of adults.

Eczema Mucosum or Intertrigo.—This develops where two

surfaces come together, as in the inner side of the thighs or axillas. It is frequently caused by uncleanliness or irritating stools. There is intense redness of the skin and exudate, rendering the surface moist. There is little itching.

Eczema Vesiculosum (*Milk Crust*).—A form frequently seen on the face of infants. There is at first redness; then small vesicles appear which are likely to coalesce; and when the top is scratched off, a yellowish-brown crust forms.

Seborrheic Eczema.—This is most frequently seen on the scalp in connection with seborrhea; it may, however, be seen elsewhere on the body. There are greasy, yellowish scaly crusts underneath which there is an inflammation of the skin. There is itching.

Pustular Eczema of the Scalp.—There are numerous pustules which break, and the dried pus and hair form a crust over the head. Lice may be the exciting cause. In some cases no definite cause can be assigned.

Simple Chronic Eczema (*Eczema Rubrum*).—The most frequent form of eczema. The face is most often affected, but the body may also be involved. There are first red papules which run together. Exudation follows, and this dries, forming crusts. Bleeding is frequent. The itching is intolerable, as a rule. Later, considerable thickening of the skin occurs. The disease can usually be readily relieved, but frequently returns as soon as treatment is discontinued.

Diagnosis.—Usually easy. Syphilis and scabies should be excluded.

Prognosis.—In the acute cases the outlook is good. The chronic cases always last a long time and tend to relapse.

Treatment.—Good hygiene and proper feeding are essential. Each case demands especial study. Intestinal indigestion, if it exists, should be treated. Overfeeding is the most common error; excesses in carbohydrate the second. In infants the trouble is frequently too high fats and sometimes too high sugar or proteins. Tonics are often necessary. Iron or arsenic or cod-liver oil may be useful.

Cleanliness and care in regard to the skin are important. The part should be cleansed and the crusts removed with oil and soap and water. Water often irritates, and when it does

a bran or starch bath may be substituted or only oil used. In the acute stage a zinc and calamine lotion is most satisfactory. If itching is severe 1 per cent. carbolic acid may

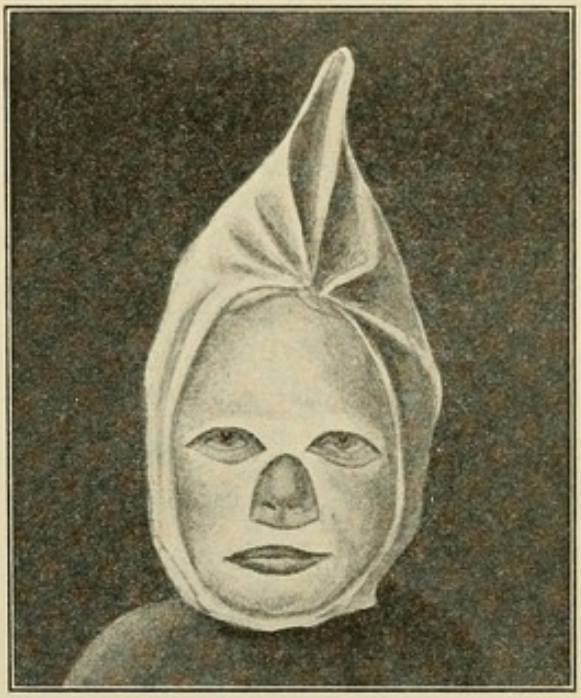


FIG. 68.—Method of treating eczema capitis.

be added. Carron oil or a substitute made from equal parts of lime water and oil of sweet almonds is useful. Later, oxid of zinc ointment or Lassar's paste may be used. Tar, salicylic acid, and resorcin are most frequently used to stimulate the skin. Dusting powders are useful in intertrigo and the milder forms of acute eczema.

DERMATITIS VENENATA.

(Poison Ivy or Oak Rash.)

Definition.—A vesicular eruption caused by contact with plants of the *rhus* species. It may also be caused by irritating drugs.

Etiology.—There are too many causes of this eruption to enumerate them in this brief space. By far the most frequent, however, is the poison ivy or oak. Some persons are peculiarly susceptible.

Symptoms.—A few hours or a day after exposure there

is an eruption, usually on the face, hands, and arms, sometimes on the genitalia or other parts of the body. The skin

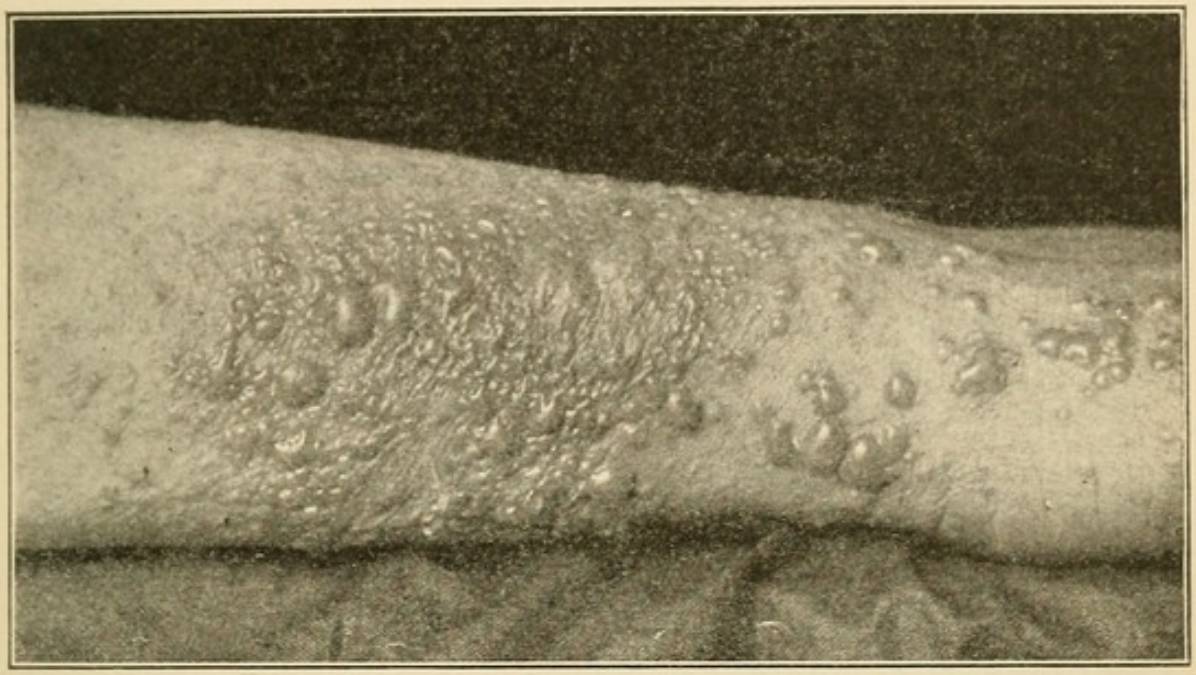


FIG. 69.—Dermatitis venenata from exposure to *poison-ivy*, following shortly after exposure; vesicular and bullous lesions; not an uncommon type; hands and forearms involved; a days' duration (Stelwagon).

is reddened and covered with numerous small vesicles. There are burning and itching.

Diagnosis.—Usually easy.

Prognosis.—Recovery usually takes place in a week or ten days. Eczema may follow.

Treatment.—The calamine and zinc oxid lotion is useful. The fluid extract of grindelia robusta diluted with water (1 : 5) is frequently used. A lotion of sulphate of zinc (15 gr. to 1 pint) is useful. Mild astringent and antiseptic applications are also of service. Zinc oxid ointment may be applied.

MILIARIA.

(Prickly Heat; Strophulus; Red Gum; Lichen Tropicus; Heat-rash, etc.)

Definition.—An acute inflammation of the sweat glands, characterized by small papules and vesicles and accompanied by itching and burning.

Etiology.—Overheating either from hot weather, overheated rooms, or too much clothing. It is seen also in fevers.

Pathology.—More or less obstruction of the sweat glands, due to congestion and exudation. There are a number of different theories about this condition.

Symptoms.—There are several forms, usually seen together. There may be a preponderance of the vesicles or of the papules. These are discrete, but often closely set. They vary in color from transparent vesicles to the intense red papules. There are itching, burning, and a pricking sensation.

Diagnosis.—When irritated or rubbed, the disease may resemble an eczema; otherwise the diagnosis is easy.

Prognosis.—Good.

Treatment.—Proper temperature and clothing. Give a purge. Apply a bland dusting powder liberally. If the itching is intense apply a lotion of carbolic acid, boric acid, alcohol, and water. Resorcin, 1 gr. to the ounce, or saturated boric acid solution is useful.

SEBORRHEA OF THE SCALP.

(Milk Crust.)

Definition.—A functional disease of the fat-producing glands, characterized by an excessive secretion which forms greasy, yellowish crusts over the head.

Etiology.—This is very frequent in infants and young children, especially where the scalp is not kept very clean. After infancy is passed it is not common until after puberty.

Pathology.—An overproduction of fat in the seborrheic glands. Some think it is caused by a short bacillus (Sabouraud).

Symptoms.—The scalp is covered more or less completely with a greasy, yellowish, scaly crust. This may, if neglected, cause an eczema of the scalp.

Diagnosis.—The greasiness of the scales separates it from psoriasis, eczema, and ringworm.

Prognosis.—Good, but with a great tendency to recur.

Treatment.—Oil the scalp well and wash with soap and water, preferably tar soap. Resorcin ointment (5 to 10 gr. to the ounce) or a mild sulphur ointment is usually quite

efficient. The scalp must be kept clean by frequent washings with tar soap.

FURUNCULOSIS.

(Boils.)

Definition.—A condition in which numerous furuncles or boils are present.

Etiology.—Frequent in young infants, in marasmus, and in malnutrition from any cause. Uncleanliness may be another cause.

Pathology.—The furuncle consists of an inflammation the center of which becomes necrotic and forms a "core." Pus-forming bacteria are always present.

Symptoms.—Furuncles in infants are most frequently upon the scalp, but may be anywhere on the body. Septic infection may result, and gangrene of the skin may be a cause of death.

Diagnosis.—This is easy. Syphilis should be excluded.

Prognosis.—In very young and very weak children this may prove fatal. In stronger children the outlook is good.

Treatment.—Good hygiene and feeding. Syrup of the iodid of iron, arsenic, and other tonics are advised. The boils should be opened and mild antiseptic dressings applied and kept in place with bandages. Chronic furunculosis may be treated by means of vaccines. The variety of organism present should be determined. Vaccines may be made from this or the stock vaccines may be used; 50,000,000 or somewhat less may be given as an initial dose and repeated in a week. The dose may be gradually increased, but should neither be so large nor so frequently repeated as to cause any symptoms. The initial dose for streptococcus vaccine is about one-fourth the above.

IMPETIGO CONTAGIOSA.

Definition.—A contagious disease seen especially in infants and young children and characterized by vesicopustules, especially on the exposed parts of the body.

Etiology.—Seen in young children, in institutions, and

among the poor. It is readily communicated from one child to another, and it may be inoculated from one part of the body to another.

Pathology.—The specific cause is some pus-forming germ; staphylococci and streptococci have both been isolated.

FIG. 70.—Impetigo contagiosa (after Lesser).

There is a bleb-like vesicle, the contents of which become turbid and then dry.

Symptoms.—The lesions are found chiefly on the face and hands and the parts of the body which the child can scratch. The pustule is on a slightly reddened base. The resulting crust looks as if it were "stuck on." When this scab falls off it leaves a reddened area which gradually clears up.

Diagnosis.—Easy. It has been confused with pemphigus, chicken-pox, and small-pox.

Prognosis.—Good. It lasts several weeks, and by auto-inoculation may be kept up much longer.

Treatment.—Some antiseptic wash or ointment should be applied and auto-inoculation prevented if possible. A diluted ointment of ammoniated mercury is a very satisfactory application.

ECTHYMA.

Definition.—A disease seen in poorly nourished children, characterized by discrete, flat pustules on an inflamed base.

Etiology.—In very poor children, in malnutrition from disease, and from irritation, such as from bedbugs.

Pathology.—Streptococci are usually found in the pustules. They are considered by some to be the same as impetigo.

Symptoms.—The eruption is seen on the legs, back, and forearms. The pustule appears about the size of a pea, becomes flattened, and gets a little larger. The base is indurated, reddened. Hemorrhages frequently take place into the lesion, causing them to turn black. They last a week or two and disappear, new ones forming from time to time. There may be pain and itching.

Diagnosis.—From impetigo by the flat pustule on an indurated, very much reddened base, and the absence of any tendency to coalesce. Syphilis should be excluded.

Prognosis.—Good.

Treatment.—Good food, fresh air, and tonics. Locally, antiseptic dressings. Ammoniated mercury ointment is a satisfactory application. Bacteriologic vaccines may be tried in resistant cases.

URTICARIA.

(Hives.)

Definition.—A condition characterized by the appearance of numerous wheals and by intense itching. In children irregular forms are frequently seen in which vesicles and papules are present.

Etiology.—Certain children are particularly liable to urticaria. Indigestion and certain articles of diet are the most frequent causes. At times no cause can be assigned.

Symptoms.—There are papules and wheals over the hands, feet, and body. The itching is intense. Scratching may result in infecting the skin. After a few hours or much longer the lesions disappear.

Diagnosis.—This is easy. Scabies and chicken-pox should not be mistaken for it.

(See Henoch's Purpura, p. 245.)

Prognosis.—As a rule good. In some cases it recurs with great persistence.

Treatment.—Give a purge and repeat if necessary. Calomel, salines, as phosphate of soda and castor oil, are best. Give a simple, easily digested diet or a milk diet. Treat any attendant indigestion.

Locally, applications of hot bicarbonate of soda solutions or hot soda baths may be given; lotions of menthol (2 gr. to 1 oz.) or carbolic acid (1 per cent.) and water may be applied.

Internally, alkaline drugs should be tried, especially if the tongue is clean. Aromatic spirits of ammonia is one of the best drugs to use. Ammonium chlorid is useful and full doses of antipyrin sometimes give relief. If sleep is much disturbed, bromids and chloral, veronal, or similar drugs may be given. A change of air and an out-of-door life are frequently advisable.

ALOPECIA AREATA.

Definition.—A disease characterized by patches of baldness without any apparent changes in the skin.

Etiology.—It is slightly more frequent in boys, and rare before five years of age. The exciting cause is unknown. By some it is thought to be neurotic, by others parasitic.

Pathology.—There are degenerative changes in the hair bulb and in the hair above it.

Symptoms.—The loss of hair over the bald patch is complete. The hairs about the edges of the patch are often

loose, especially when the patch is increasing in size. There are usually several patches. The entire scalp may be affected.

Diagnosis.—**Ringworm.**—This rarely presents absolutely bald patches; the hairs are broken off close to the head. The fungus may be demonstrated in doubtful cases.

Favus.—There is rarely complete baldness; there are crusts and some inflammatory reaction.

Bald spots from abscesses and boils should be excluded.

Prognosis.—Usually good in children. Sometimes the

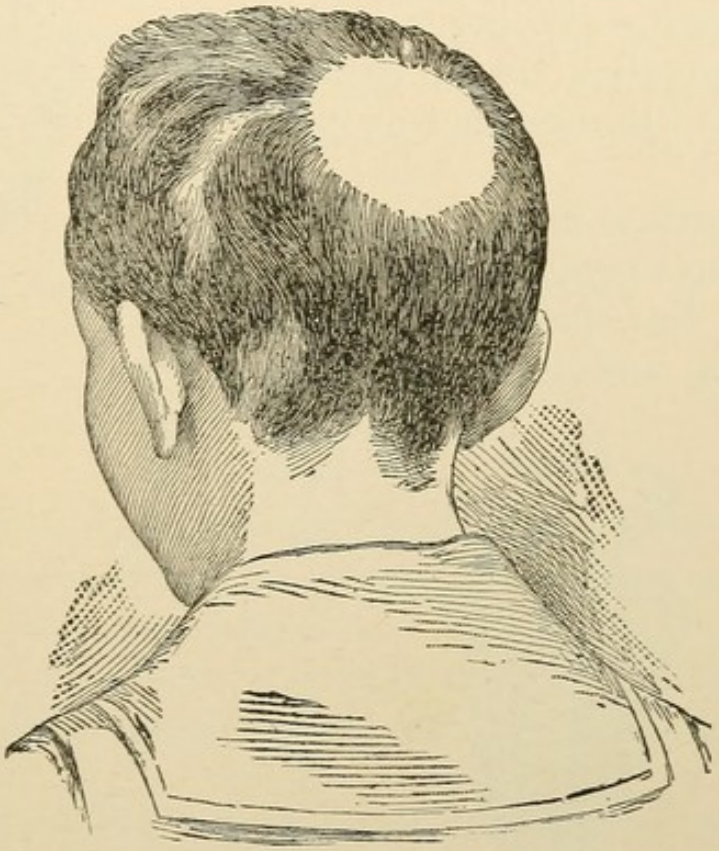


FIG. 71.—Alopecia areata (Hardaway).

baldness is permanent. It lasts months or even years. A downy growth on the spot is favorable. Relapses may occur.

Treatment.—Internally, tonics as indicated. Iron, cod-liver oil, arsenic, and strychnia are the most useful. Locally, washing with green soap or naphthol sulphur soap, and applying stimulating ointment or lotions. Beta-naphthol tar, sulphur, and cantharides are the most frequently used.

PEDICULOSIS.

(Phthiriasis; Lousiness.)

Definition.—This term is applied to the irritation of the skin and scalp caused by lice. There are three species: pediculus capitis, or head louse; pediculus corporis, or clothes or body louse; and pediculus pubis, or crab louse. The last-named is not often seen in young children.

Etiolgy.—Lice are usually seen in the poorer classes of people. They are communicated by direct infection.

Pathology.—The irritation produces inflammation of the skin and enlargement of the neighboring lymph nodes.

Symptoms.—Head Lice.—These are rarely seen anywhere except on the head. The lice themselves are seen on the hairs, and there are always numerous little hard pinpoint-sized bodies, called nits, attached to the hairs. There are itching and inflammation of the scalp and nape of the neck, together with enlargement of the post-cervical lymph nodes.

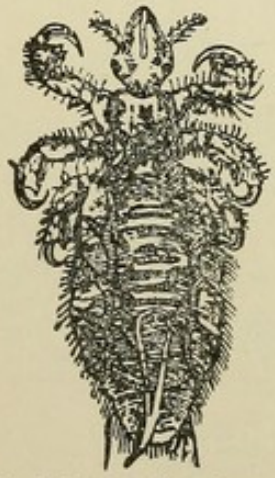


FIG. 72.—Male pediculus capitis (after Küchenmeister).

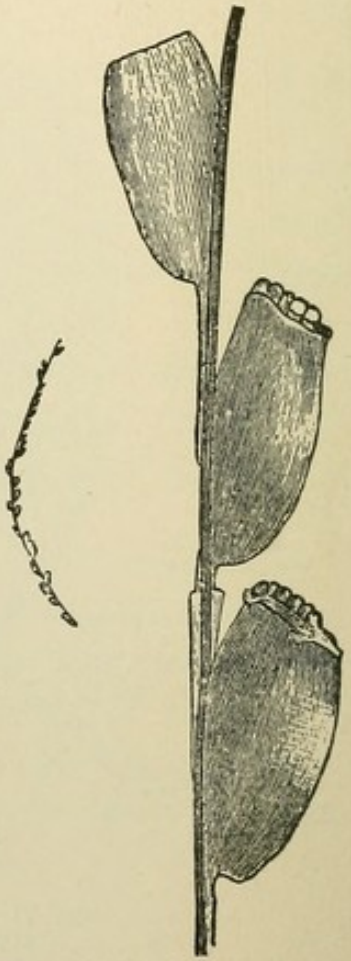


FIG. 73.—Nits of pediculus capitis (after Kaposi).

Body Lice.—These are seen on the body and in the folds of the clothing. They may be suspected from the many scratch-marks on the body. There may be pigmentation.

Crab Lice.—In older children they may be found about the genitalia, as in adults. In young children, if seen at all, they are usually on the eyebrows or eyelashes.

Diagnosis.—This is made by finding the lice.

Prognosis.—It requires considerable time to rid the body of lice if once infected.

Treatment.—**Head Lice.**—Anoint the hair with crude petroleum. (Caution, very inflammable.) Put on a cap and allow to remain on twelve hours. Wash the head in soap and water. The nits may be removed by using hot vinegar and a fine-tooth comb. Tincture of cocculus indicus, diluted several times with water, is also used. Sulphur-naphthol soap may be used in mild cases. The accompanying eczema should be treated as such.

Body Lice.—Sulphur-naphthol soap and a full bath should be used. The clothing should be disinfected by boiling or ironing.

SCABIES.

(Itch.)

Definition.—A contagious disease caused by the acarus scabies, and characterized by intense itching and an eruption of papules, vesicles, and pustules.

Etiology.—It is seen mostly in the poorer classes. Infection occurs from direct contact, unclean bedding, clothing, and the like.

Pathology.—The lesions are caused by the irritation of the parasite burrowing in the skin. Vesicles and papules are always present, and frequently pustules, these last probably from infection with pus germs. The female parasite alone burrows into the skin. The burrows can often be seen as fine dark lines from $\frac{1}{2}$ to $1\frac{1}{2}$ in. in length.

Symptoms.—These are the intense itching, which is worse at night, and the characteristic eruption seen, especially on the hand, between the fingers, about the wrists, folds of the elbow, axillas, groins, genitalia, inner side of the thighs, and the back of the knees. The scalp and face are never involved. There may be eczema as a complication.

Diagnosis.—The intense itching, especially at night, and the character and location of the eruption, make the diagnosis easy, as a rule. The parasite may often be demonstrated.

Prognosis.—Good.

Treatment.—Full baths with green soap, followed by inunction with sulphur ointment diluted to half strength, or the following:

℞ β-naphthol . . . . . 4 (ʒj);
Prepared chalk . . . . . 8 (ʒij);
Green soap . . . . . 50 (ʒiss);
Benzoinated lard . . . . . 100 (ʒiij).—M.

This should be repeated for three days and then underclothing and bedding changed and sterilized. If not perfectly cured, repeat. Soothing ointments may be applied if eczema exists.

RINGWORM.[1]

(Tinea Tricophytina; Tricophytosis; Dermatomycosis Tricophytina.)

Definition.—A parasitic skin disease caused by fungi of various kinds, chiefly, however, by different species of the genus *tricophyton*. It may affect the scalp or body.

Etiology.—The chief fungi are the tricophyton megalosporon.

The disease is contagious, and is transmitted by direct contact, brushes and combs, wearing apparel, and the like. Ringworm is most common in the young, and ringworm of the scalp is almost entirely limited to children.

Pathology.—The fungus is easily demonstrated in scrapings from the edge of the patch which have been moistened with liquor potassæ. The fungus grows in the horny layer of the epidermis.

Symptoms.—**Ringworn of the Body** (*Tinea Circinata*).—This usually begins with one or more slightly scaly, reddened spots, which are sharply outlined and raised a little above the surface. These grow and the center clears up partially, so that the spots are ring-shaped areas with a raised, reddened

[1] T. C. Fox, "Ringworm of the Scalp, Treatment of," *Practitioner*, April, 1905, p. 468.

border and a slightly scaly center. The appearance is usually characteristic.

Ringworm of the Scalp (*Tinea Tonsurans*).—One or more scaly bald spots are seen. The edges are sometimes slightly hyperemic and raised. The hairs are broken off short near the scalp and can be seen on close inspection.

Diagnosis.—Usually easy. In the scalp the scaliness and the short broken hairs separate it from alopecia and favus. In seborrhea the scales are greasy and the affection general, while in eczema there is often an exudation and always itching.

Prognosis.—Eventually good. Body ringworm is usually cured. Ringworm of the scalp is difficult, and re-infection is frequent.

Treatment.—Separate towels, etc., for the infected child. A cap for the scalp. Scrub with green soap and hot water and apply a parasiticide. Beta-naphthol, sulphur, resorcin, and the tincture of iodin are most frequently used. The Röntgen rays may be used with good effect in resistant cases.

FAVUS.

(Tinea Favosa; Porrigo Favosa, etc.)

Definition.—A contagious disease usually of the scalp caused by the Achorion Schoenleinii and characterized by cup-shaped crusts which tend to coalesce.

Etiology.—It is seen in poor children in America, especially in immigrants.

Pathology.—The Achorion Schoenleinii is a vegetable parasite, consisting of mycelium and spores. Infection occurs about a hair, the hairs fall out, and a pustule is produced.

Symptoms.—There are yellowish cup-shaped crusts, often running together. The hairs are either gone or are split or broken. There are atrophy and scarring of the skin. There is a peculiar characteristic mouse-like odor.

Diagnosis.—The characteristic crusts and odor, with atrophy of the skin and brittle hairs, usually make the diagnosis easy.

Prognosis.—Good, if treated early. Permanent baldness may result.

Treatment.—Oil the scalp and wash with soap and water, removing all crusts. Cut the healthy hair short. Pull out the hairs of the affected areas. Apply parasiticides. Resorcin and lanolin (1 : 8), or sulphur, tar, and mercury. The Röntgen rays may be used with good effect.

GANGRENE.

Gangrene occasionally is seen in infants and young children, and is always a very serious condition. It may be due to a great variety of causes. The commonest form is noma, which has been described under that heading, but which also may

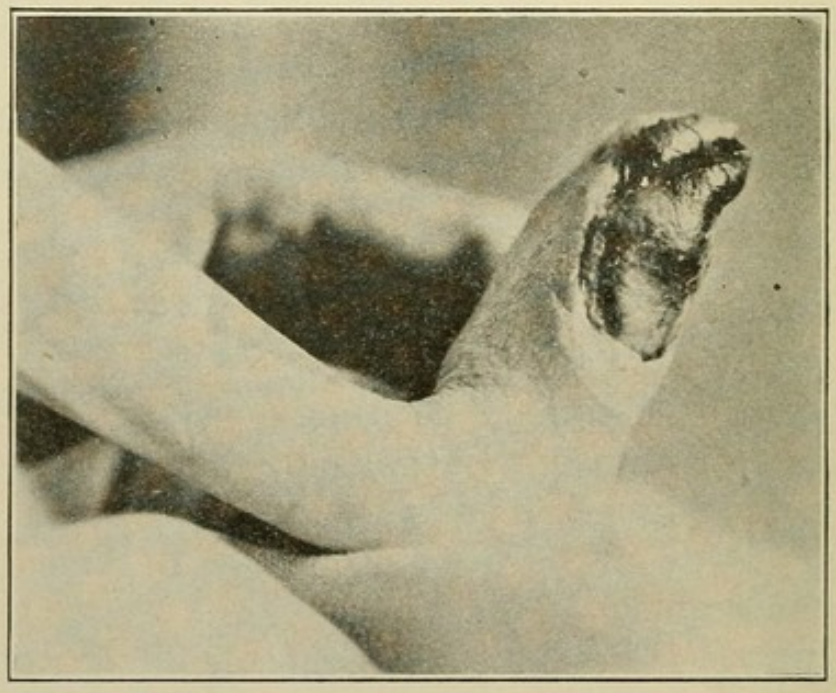


FIG. 74.—Gangrene of the great toe.

affect the genitalia and sometimes other parts of the body. Gangrene of the skin may occasionally be met with in other infectious diseases, particularly chicken-pox, and it may also be seen to follow septic infections of the skin and pemphigus.

Raynaud's disease is sometimes met with in early life, and occasionally gangrene may follow embolus or thrombosis.

DRUG ERUPTIONS.

Erythematous eruptions may be produced by :

Antipyrin, resembling measles and diffuse erythema.
Arsenic, occasionally.
Belladonna, scarlatiniform erythema.
Borax and boric acid.
Chloral, scarlatiniform rash with desquamation.
Copaiba and cubebs, eruption like measles.
Digitalis (rarely), scarlatiniform and measly eruption.
Iodoform, scarlatiniform.
Mercury (rarely), scarlatiniform erythema.
Opium and morphia, rash resembling measles or scarlatina.
Quinin, scarlatiniform erythema with desquamation, sometimes attended with pyrexia.
Salicylates and salicylic acid, scarlatiniform.
Sulphonal, macular and diffuse erythema.
Tar, erythema with fever, sometimes an eruption like measles.

Urticarial eruptions :

Copaiba and cubebs.
Quinin.
Salicylic acid and salicylates.
Santonin.
Tar and creosote.
Turpentine.
Valerian.
Erythema with infiltration and edema resembling erysipelas. Aconite, bromid, and iodid of potassium.

Vesicular aud bullous eruptions :

Arsenic (rare), boric acid (rare), bromids, iodids, and iodoform.
Cubebs and copaiba (rare), quinin.

Herpes zoster :

Arsenic.

Pustular eruption :

Antimony.
Arsenic.
Bromids.

Iodids.
Calcium sulphide.
Salicylic acid (rare).

Petechial eruption, purpura:
Chloral.
Copaiba.
Iodids.

Cyanosis:
Acetanilid.

Pigmentation:
Arsenic (brown).
Silver (slate color).

Hyperkeratosis, epidermic thickening:
Arsenic (epithelioma has been known to arise in an area of arsenical hyperatosis).
Borax, eruption like psoriasis.

ACUTE OTITIS.

Definition.—An acute inflammation of the middle ear.

Etiology.—Usually secondary to other diseases. The majority of the cases occur in winter. The most common causes in the order of their frequency are simple catarrhal pharyngitis, measles, influenza, dentition, scarlet fever, and whooping-cough. Other diseases are occasional causes. Infection takes place through the Eustachian tube.

Pathology.—There is a congestion of the middle ear and tympanum. Later, there is either a catarrhal or purulent exudate. There may or may not be rupture of the ear-drum.

Symptoms.—In infants fever may be the only symptom, and the ear may not be thought of until the drum ruptures and there is a discharge of pus, usually with a fall of the temperature. If the perforation is near the center of the drum, it suggests infection through the Eustachian tube; if on the periphery, from disease of the bones. There may be evidence of pain and discomfort and the child may sleep poorly. Sometimes there may be rolling of the head and evidence of pain on pulling the lobe of the ear. In older

children there is deafness, pain, and great restlessness, and sometimes delirium or convulsions.

Complications.—Mastoiditis, thrombosis of the lateral sinus, meningitis, facial paralysis, and involvement of the internal ear.

Diagnosis.—Usually by examination of the drum membrane, the deafness, and earache. The disease is frequently overlooked in infants. The ear should always be examined, as in unexplained prolonged fever otitis is a frequent cause. If the disease continues for a month, mastoiditis should be suspected, and if the pus returns immediately after being wiped out of the ear, the diagnosis of mastoiditis is almost certain. Pain, fever, redness, and swelling over the ear are later symptoms.

Prognosis.—Catarrhal form good. In the purulent form some impairment of hearing often results.

Treatment.—Dry heat applied externally. Salines and leeches if seen early. A 4 per cent. cocaine solution may be dropped in the ear for pain or, better still, a 5 to 10 per cent. solution of carbolic acid in glycerin.

If the symptoms persist or rupture of the drum is threatened, paracentesis should be done. After that, or if rupture occurs, syringing with warm saturated solutions of boric acid. If there is odor permanganate of potassium solution (1 : 4000) or peroxid of hydrogen (1 : 4) may be used. If long in healing use once daily a few drops of 1 : 3000 bichlorid of mercury in 60 per cent. alcohol. Mastoiditis requires prompt surgical treatment.

DISEASES OF THE NERVOUS SYSTEM.

The nervous system is only partially developed at birth, and during the first few years its functions are easily disturbed, even by minor causes. The brain and cord are relatively larger and softer than in adults. Reflexes are more marked and brain inhibition absent, or only present to a slight degree.

THE EXAMINATION OF THE NERVOUS SYSTEM AND THE SIGNIFICANCE OF SYMPTOMS.

The **history of the illness,** and especially of diseases which may affect the nervous system, should be gone into carefully. The presence or absence of the nervous symptoms noted below should be determined by direct questioning of the mother or nurse, and a complete physical examination of the child should be made, with especial reference to the reflexes, the amount of power, the condition of the muscles, and other things having a bearing on the nervous system, as noted below. An exact knowledge of the normal child is indispensable and can only be acquired by experience.

In making a diagnosis always have the child undressed, always try to ascertain the family history, especially as regards syphilis, alcoholism, nervous and mental diseases. Remember that development depends much upon environment, and too much is not to be expected from neglected children. It is well to remember that there are more functional than organic diseases of the nervous system in early life, and that it takes but little to upset the nervous equilibrium of the young child.

Irritability and change in disposition are seen in the onset of most acute diseases, in chronic bowel and kidney disease, and the auto-intoxications.

Delirium is not uncommon in children, and is most often due to fever and, it should be remembered, often with rather low temperatures. It is also frequent as a result of auto-intoxication, as in gastro-intestinal disorders and as the result

of intracranial disease. Belladonna, alcohol, and other drugs may also be the cause.

Drowsiness is frequently seen, and may be due to a variety of causes, among which may be mentioned the administration of alcohol, opium, bromids, soothing syrups, and other drugs; the poisoning which occurs in diseases of the kidney, liver, and also of the stomach and intestines; the onset of measles and during the course of many febrile disorders, such as typhoid fever and pneumonia, after epileptic seizures, and of very great importance during the onset and during the course of brain diseases, and especially of meningitis.

Coma is often seen in meningitis, diseases of the brain, and later in any severe affection, as in uremia, diarrhea, and pneumonia. It is always a serious symptom and usually means an unfavorable prognosis. Coma is easily produced in children by sleep-producing drugs.

Dizziness or **vertigo** may be noted, the child complains of things turning round or that he is falling when there is no danger of it, as when in bed, and there may be disturbance of gait and station. This may be due to brain tumor (especially cerebellar), to disease of the ears, to meningitis, to digestive disturbances, and is occasionally noted in the onset of acute diseases.

Photophobia is sometimes seen in meningitis, especially early in the disease, in cerebral hyperemia, and to a lesser degree in measles and sometimes in influenza. It may be caused by local disease of the eye, and at other times is apparently due to irritation of the mouth.

The **superficial skin reflexes** are not observed under the third day, and they develop slowly and are comparatively constant at five months of age, although they are sometimes feeble or even absent during the first year or two of life, and in young infants the area over which a reflex may be elicited is often enlarged. Sometimes they appear at once and at other times successively. In the latter case the upper reflexes are observed before the lower.

The **knee jerk** is present from the second day and in in-

fants is rather more marked than in later life, and there may be what is considered a marked increase without any organic disease; but the deep reflexes may be difficult to elicit in children, owing to only partial relaxation of the muscles. It is increased in most cases of infantile cerebral paralysis and is usually absent in cases of poliomyelitis affecting the extensors of the thigh, in neuritis, progressive muscular atrophy, and pseudohypertrophic paralysis.

Plantar Reflex.—In the adult, stroking the sole of the foot causes quick flexion of the toes, inversion of the foot, and often a drawing up of the leg. In the young infant the

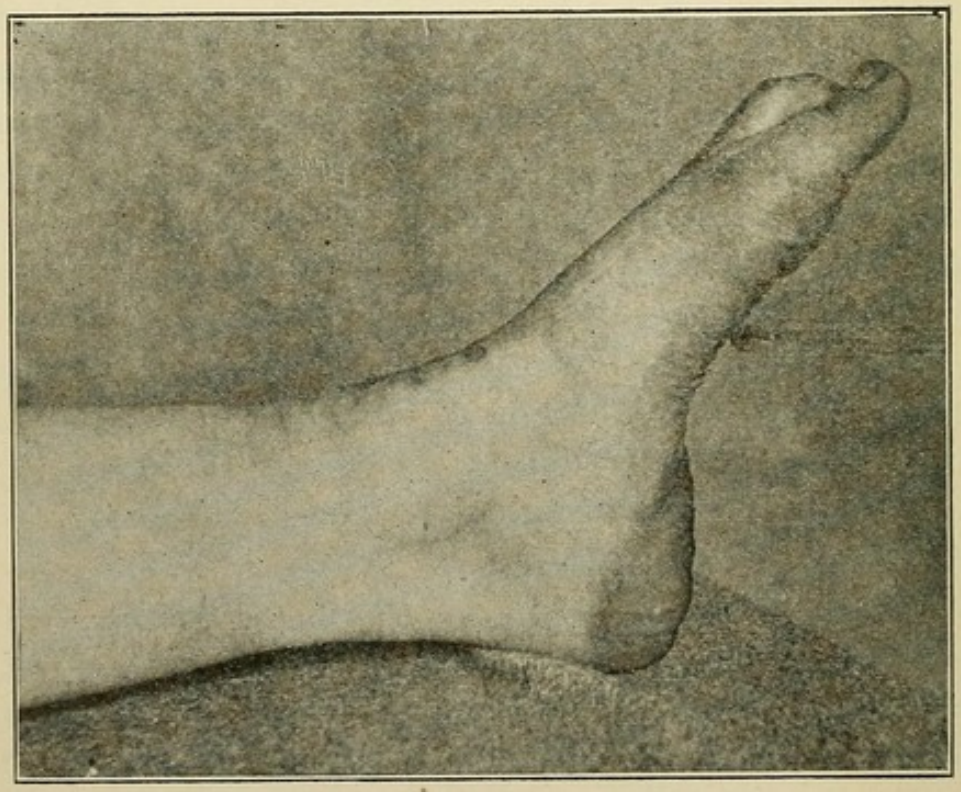


FIG. 75.—Normal plantar reflex.

reflex is usually extension and a spreading out of the toes, and more or less irregular movements of the leg and hip. By the end of the first year 50 per cent. of the reflex is flexion, and by the third year flexion is the normal reflex. Flexion in children who walk late is a good sign.

Kernig's Sign.—This consists in the inability to extend the leg fully on the thigh when the thigh is at a right angle with the trunk, or to flex the thigh at a right angle with the

trunk when the leg is extended on the thigh. In other words, when an attempt is made to extend the leg the contraction of the muscles keeps the thigh at right angles to the body and the legs at right angles to the thigh. This is seen chiefly in cerebrospinal fever, but it may be noted both in tuberculous meningitis and in other forms where the spinal meninges are involved. It may be absent in some cases, but is sometimes present only intermittently. It is more often present when the knee jerk is increased than when it is diminished. It is rarely seen in other diseases of infancy

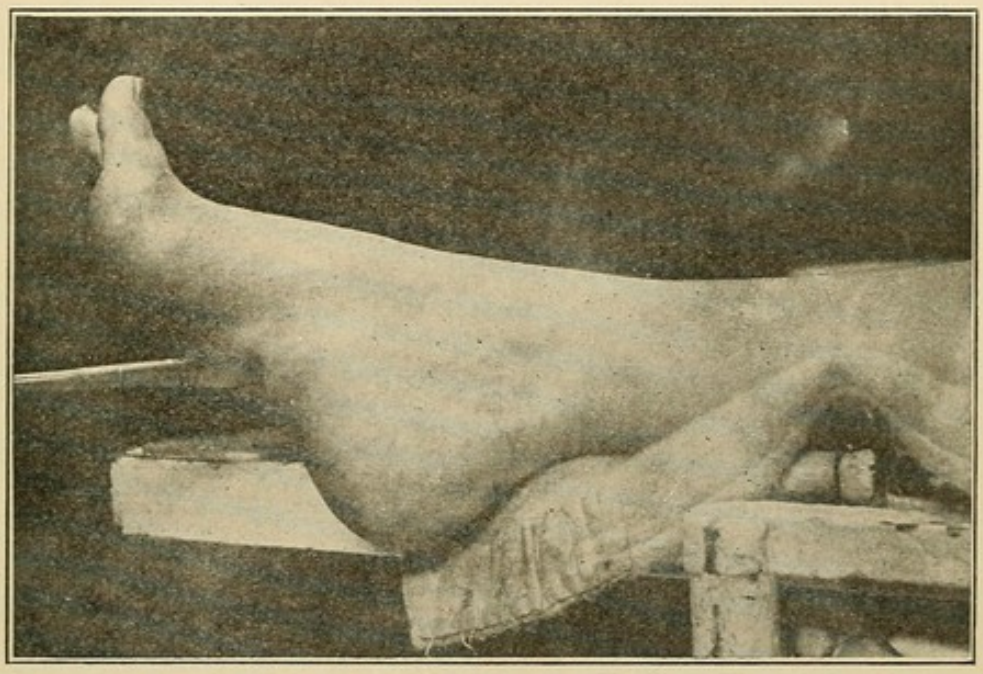


FIG. 76.—Plantar reflex, showing Babinski's sign.

except in chronic marasmus, where there is considerable muscular rigidity.

Chvostek's Sign.—This is the mechanical irritability of the motor nerves and is best observed in the facial nerve, although tapping over the motor points elsewhere will cause contraction of the corresponding muscles. A tap on the cheek below the malar bone causes a sharp contraction of the muscles supplied by the facial nerve. The phenomenon is pathologic, is rarely seen during the first six months, but after that it indicates an abnormal excitability of the nervous system. It is seen in tetany, laryngismus stridulus, also less

often in rickets, and in older children in digestive disturbances.

Lip Reflex of the Newborn.—This is elicited by a number of taps on the upper lip a little above the angle of the mouth, or on the lower lip a little below it. In some infants touching or tapping anywhere on the cheek will cause it. The reaction consists in drawing the lip to one side or the other, followed by a pouting or pursing up of the lips, as if the child attempted to suck something, and lastly, a marked protrusion of the lips. It is most easily elicited during sleep, becomes less marked as the child grows older, and is rarely noted after the fourth year. In some cases of spastic diplegia there is a similar reflex which may be obtained that is combined with chewing movements.

Tremor.—This is very rare in children. It is seen in multiple sclerosis, occasionally in a course of infectious diseases, and sometimes in brain tumor.

Ataxia is often overlooked, owing to the fact that coordination is not very perfect in early life. It is seen in tumors of the brain, especially cerebellar tumors and Friedreich's disease, also in the severe choreas. In the transient form it is sometimes seen after prolonged rest in bed.

Tâche Cérébrale.—A very light stroke on the skin produces a persistent hyperemia seen in meningitis, typhoid, and other fevers. It is seen also in children with urticaria.

Electrical Reactions.—These are almost impossible to elicit satisfactorily in young children and perhaps are best left to the expert.

Pseudoparalysis.—This is loss of muscular power due to other than nerve lesions. It presents the appearance of a true paralysis, but that differential diagnosis may usually be made by careful examination; slight movements sometimes being made on pinching or otherwise irritating the skin. Pseudoparalysis is seen in rickets, scurvy, syphilis, as well as in joint and bone disease. In some instances the lack of power is due to weakness; in others, to the child's inhibiting movement owing to pain.

CONVULSIONS.[1]

Definition.—A convulsion is a motor discharge resulting in muscular contractions of one or more parts of the body (Sachs).

Etiology.—During the first few days from meningeal hemorrhage due to protracted instrumental delivery, from diseases of the brain as meningitis, or tumors, onset of acute infections in place of a chill; may be reflex from an undigested meal; may be due to toxemia—either from intestinal auto-intoxication or uremia; frequently seen in rickets and in exhausting diseases, from injury, and in epilepsy, which will be considered separately. Convulsions are most frequent under two years of age.

Pathology.—There are many theories. The convulsion is produced by irritation of the cortical cells of the brain either directly, reflexly, or from toxic substances in the blood. A convulsion is to be regarded as a symptom of some pathologic condition.

Symptoms.—In many cases there are initial cry, deviation of the eyes, loss of consciousness, tonic or clonic muscular spasms, and the involuntary passage of urine and feces. A convulsion is often seen in a child where an adult would have a chill.

No two convulsions are alike, but there is no difficulty in recognizing one. Following a convulsion the child may be dazed, or even remain unconscious for some time. Several convulsions may follow one another in rapid succession. Death may take place from asphyxiation or exhaustion.

Diagnosis.—The convulsion itself is easily recognized. The cause may be difficult to determine. A convulsion coming on without previous illness is usually functional. A general convulsion is usually functional; a partial convulsion

[1] H. H. Scott, "Convulsions, Causation of," *Practitioner*, August, 1906, p. 237. John Thomson, "Convulsions in Early Infancy," *Practitioner*, October, 1905, p. 510.

has usually, though not necessarily, an organic cause. A partial convulsion is usually evidence that the corresponding part of the brain cortex is diseased. The history of improper feeding may help. The initial convulsion often seen at the outset of an acute disease is generally accompanied with very high fever. The urine should be examined where possible. (See *Epilepsy.*)

Prognosis.—Depends on the cause. Functional convulsions are rarely fatal except in the very young and the rachitic. A convulsion in a child previously healthy is rarely fatal. A convulsion coming on late in any severe disease is serious.

Treatment.—Chloroform to quiet the convulsion, wash

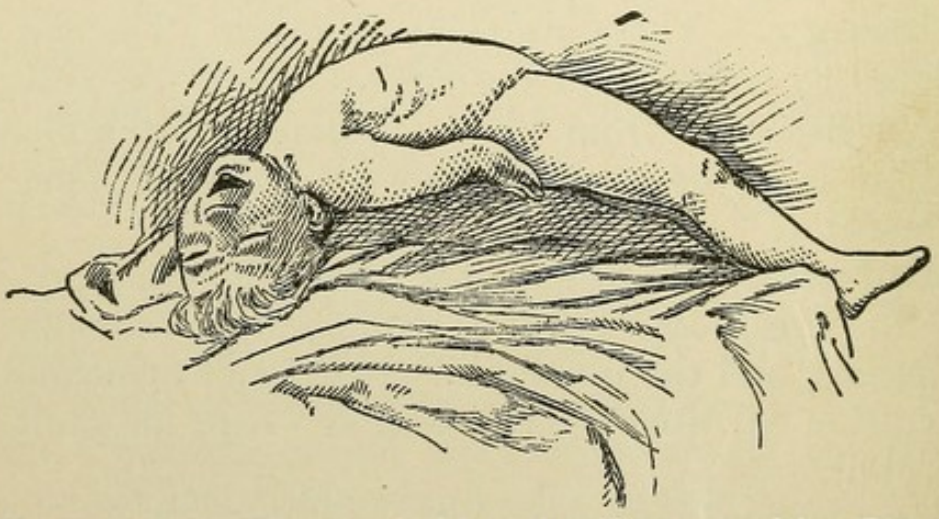


FIG. 77.—Paraplegia. Photographed in epileptiform convulsion (Peterson).

out stomach and bowel, or give an emetic (teaspoonful doses of syrup of ipecac repeated every fifteen minutes until effectual). Hot mustard pack or bath. Cold applications to the head. Chloral or chloral and bromid, internally, by mouth or rectum. If not effectual give morphia hypodermically. (Six months, $\frac{1}{48}$ gr.; one year, $\frac{1}{24}$ gr.; two years, $\frac{1}{16}$ gr.) Later on if there is still a tendency to recurrence antipyrin or phenacetin and bromids may be given. Urethane is sometimes used. Inhalations of oxygen may be given if cyanosis is marked. Calomel, castor oil, or salines may be used to clean out the bowel.

EPILEPSY.[1]

(Falling Sickness.)

Definition.—Periodic attacks of unconsciousness, with or without convulsions. Usually divided into grand mal—major epilepsy—and petit mal—minor epilepsy.

Jacksonian Epilepsy.—This is confined to a group of muscles, sometimes called "symptomatic," as it denotes brain disease.

Psychic Epilepsy.—A temporary loss of consciousness, without other manifestations.

Etiology.—It may be hereditary. A neurotic taint in a family may appear in the form of epilepsy. Reflex convulsions from any cause if frequently repeated may cause epilepsy. May begin very early in life, usually between ten and twenty years. It may follow the acute diseases of childhood. It may follow injury.

Pathology.—Probably due to degenerative changes in the cerebral cortex.

Symptoms.—**Grand Mal.**—Often preceded by a warning sensation called an *aura*, which may be a feeling in a member or of special sense. There is a cry; the patient falls in a violent tonic spasm. This is followed by a clonic spasm, which passes off. The patient may remain unconscious for a short or long time after the convulsion, and on recovery complain of muscular weakness and mental confusion. Sometimes the patient is apparently conscious and comes to himself later with no recollection of what he has done. There may be maniacal attacks after a fit. The face is pale at the outset and the pupils contracted; later the face becomes cyanosed and the pupils dilate. The tongue is frequently bitten.

Petit Mal.—The attack may consist of a transitory pallor, with or without twitching of the muscles, sometimes involuntary urination. The lapse in consciousness may be but a few seconds long.

[1] Smith, "Epilepsy," *Lancet*, January 24, 1903, p. 221.

Between these two forms there are all grades of severity.

Status epilepticus is a condition in which the seizures follow one another rapidly without any intervening return of consciousness.

In epilepsy there is sooner or later mental deterioration, and stigmata of physical degeneration are frequently present.

Diagnosis.—From Organic Brain Disease.—The convulsions are liable to be limited to a group or groups of muscles. Other evidences of brain lesions are frequently present.

Hysteria.—By the nature of the seizure, stigmata of hysteria, and absence of injury on falling, tongue is not bitten, etc.

Uremia.—History and examination of urine.

Epilepsy attacks.	*Fainting spells.*	*Hysterical attacks.*
Loss of consciousness very sudden.	Loss of consciousness gradual.	Loss of consciousness not absolute.
Warning of short duration.	Warning of some minutes before consciousness is lost.	The attack often preceded by emotional excitement.
Pupils dilated; do not contract to light.	Pupils contracted or unaltered.	Pupils not dilated.
Tonic and clonic spasms in various parts of the body.	Pulse feeble; no spasms.	Tonic rigidity; exaggerated conscious movements; arching of back; excessive noises.
Bloody foam at the mouth.	No evident biting of the tongue.	
Involuntary passage of the urine and feces	No involuntary passage of urine or feces excepting in rare instances.	No involuntary passage of urine or feces.
Prolonged stupor after the attacks.		Recovery gradual; no stupor. The patient may pass, however, into a trance condition.
Tonic and clonic spasm.		Attacks may be frequently repeated.
Attacks not frequent, as a rule.	Recovery prompt after attack.	Duration of the attack much longer than in epilepsy.

Prognosis.—Usually bad, but is benefited by treatment, and cases seen early where convulsions are brought on by dietetic errors can often be relieved entirely.

Treatment.—Remove all sources of irritation, as adenoids, phimosis, etc. Good hygiene, open-air life, with mod-

erate exercise and pleasant occupation. Careful feeding, meat but once a day, and not more food than patient can assimilate. Avoid constipation. Intestinal antiseptics, sodium salicylate or salol may be of value. Bromids are of decided value in controlling the seizures. Proportionately larger doses are required for children than for adults. Tonics should be used when indicated. Clonic spasms can sometimes be suppressed and consciousness restored by placing the epileptic on his left side during the tonic spasm.

FIG. 78.—Infant with mild attack of tetany, showing characteristic spasmodic position of hands and feet (Church).

TETANY.[1]

Definition.—A condition characterized by tonic muscular spasm, intermittent or continuous. The hands and feet are affected most (carpopedal spasm).

Etiology.—Usually under two years of age; frequently associated with rickets, sometimes with marasmus, diarrhea, and other diseases.

Pathology.—Unknown. Probably in some cases due to disease of the parathyroid bodies.

Symptoms.—Gradual or sudden onset. Convulsions are frequent. The extremities become spastic. The wrist is flexed to a right angle, the fingers are flexed at the metacarpal joint and are straight, the thumb in extreme adduction (main accoucheur). The feet are in an equinovarus position.

[1] J. P. Crozer Griffith, "Tetany in America," *American Journal of the Medical Sciences*, 1895. C. P. Howard, "Tetany," *American Journal of the Medical Sciences*, February, 1906, p. 301.

Wrists and ankles stiff; elbows, shoulders, knees, and hips usually freely movable. Spasm of the glottis is often present. Deep and superficial reflexes are exaggerated. Pressure upon the nerves or arteries produces spasm of parts supplied (Trousseau's Symptom). Percussion over nerve causes contraction in muscle supplied; especially marked in the facial nerve (Chvostek's Symptom). Pain is often present. Lasts days or weeks.

Diagnosis.—Characteristic attitude. Trousseau's and Chvostek's symptoms make diagnosis easy. From meningitis by absence of brain symptoms, from tetanus by absence of or only slight trismus.

Prognosis.—Usually good.

Treatment.—Empty intestinal tract. Give vermifuges. Hot baths and frictions for the spasm. Chloral, bromids, or antipyrin may be used to combat the spasm. Calcium lactate has been suggested.

LARYNGISMUS STRIDULUS.

Definition.—A spasm of the larynx, frequently seen in children who have rickets or tetany.

Etiology.—It is most frequently seen in boys from six months to two years of age, and almost invariably there are symptoms of rickets and often the history of convulsions. The spasm may be precipitated by excitement or exposure to cold.

Symptoms.—The spasm comes on suddenly, the child looks frightened, the muscles become stiffened, the chest fixed usually in expiration, the face becomes cyanosed, and if the spasm lasts very long there may be an ashy pallor. In some instances there may be a short loss of consciousness and a convulsion. Sometimes there is no crowing sound. The attacks vary greatly in severity, are most frequent at night, and there may be only an occasional one or as many as twenty a day.

Diagnosis.—Usually easy. From catarrhal spasm (false croup) by the frequency, shortness, and character of the attacks and the younger age. (See also Whooping-

cough.) If there is Chvostek's sign, tetany, or the history of convulsions, a doubtful case may be regarded as one of laryngismus. (See also Epilepsy.)

Prognosis.—Usually good. Exceptionally death takes place in an attack. Coming on in the course of an acute disease it is a bad sign.

Treatment.—Antispasmodics, as chloral, bromid, and antipyrin, are the most useful drugs if the attacks are frequent. Inhalation of chloroform may be needed to stop the spasm in exceptional cases. Smelling-salts may be tried. In the intervals, cod-liver oil, out-of-door life, and an antirachitic diet may be used. The bowels should always be kept open.

CHOREA.

(Saint Vitus' Dance; Sydenham's Chorea.)

Definition.—A disease characterized by irregular involuntary movements of the muscles, often slight mental disturbance, and frequently endocarditis.

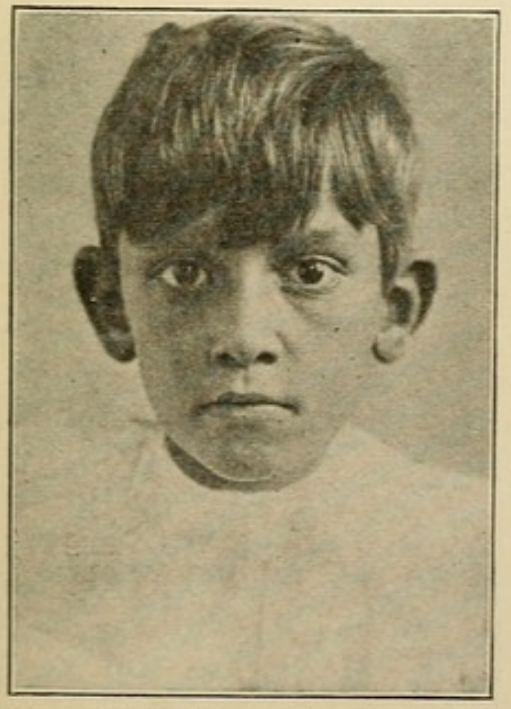


FIG. 79.—Facial expression in chorea.

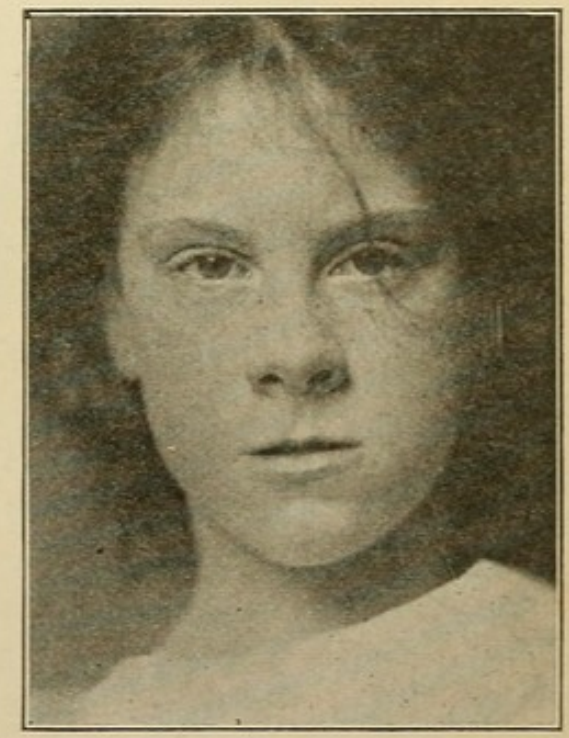


FIG. 80.—Facial expression in chorea.

Etiology.—Most often in girls between five and fifteen years of age. Often associated with rheumatism. It may

follow other infectious diseases. It may also be due to overwork at school or in factories.

Pathology.—There is no constant lesion in the nervous system. Endocarditis is often present.

Symptoms. — Child first noticed to be nervous, stumbles, and is awkward; then marked purposeless movements of any or all the muscles. There may be difficulty in talking plainly. There is marked muscular weakness. Symptoms of rheumatism are associated in some cases. Anemia is usually marked. The reflexes are usually normal, but may be increased or diminished. With proper treatment it lasts about six weeks. There is a tendency to relapse. Without

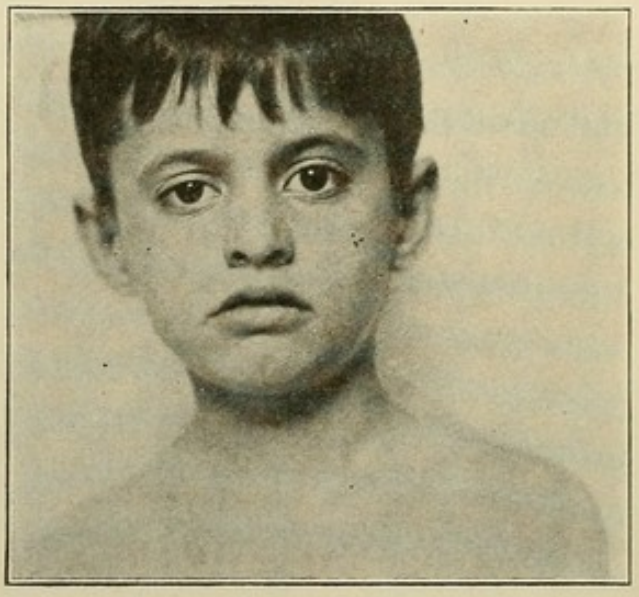


FIG. 81.—Facial expression in chorea.

proper treatment it lasts months and tends to recur. In rare cases the disease is unilateral.

Diagnosis.—Usually easy, but care should be taken not to mistake athetosis for this disease.

Prognosis.—As a rule, good.

Treatment.—During acute stage rest in bed; if possible, isolation with a nurse who is a stranger. Milk diet, and later a good, plain, nutritious food. Regulate the bowels. Iron or arsenic may be given, and where rheumatic symptoms are present, salicylates. Antipyrin and strychnia are also used. The rest and feeding are more important than drugs.

OTHER SPASMODIC AFFECTIONS.[1]

Habit Spasm.—The repetition of some movement a great number of times from habit; usually seen in neurotic children. Frowning and winking are frequently seen. May be difficult to differentiate from tics.

Athetosis and Athetoid Movements.—These are usually seen in diplegias and hemiplegias, but may be seen as the only symptom. Movements are irregular and choreiform in character. Some rigidity is present. Athetosis is not affected by treatment.

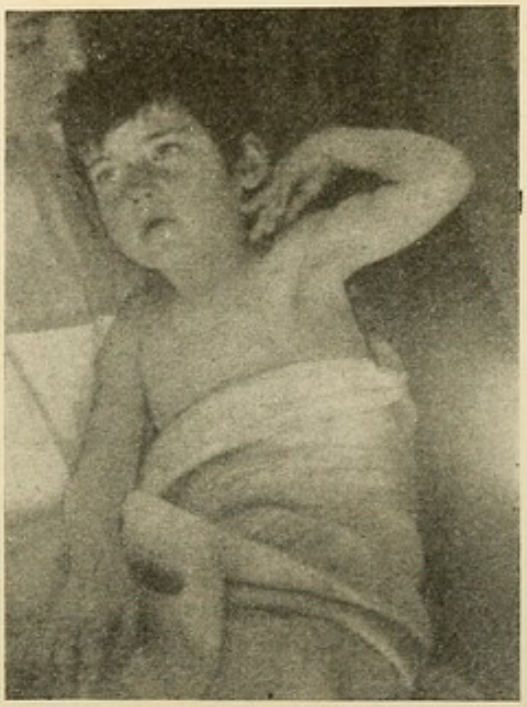


FIG. 82.—Athetoid movements.

Rotary and Nodding Spasm.—A rare disease seen in infants, usually between the third and eighteenth month. Consists in either rotary or nodding movements of the head, which stop if the eyes are bandaged. Nystagmus is frequently associated. Usually gets well after several months. If severe, bromids may be given.

Nystagmus.—This is a peculiar oscillation of the eyeball, most noticeable on moving the eye. It may be vertical

[1] Spiller, "Treatment of Spasticity and Athetosis by Resection of Posterior Spinal Roots," *American Journal of the Medical Sciences*, June, 1910, p. 822. G. F. Still, "Habit Spasm in Children," *Lancet*, December 16, 1905, p. 1754.

or horizontal. Jerking movements of the eyeballs may also be seen in idiots and in children with squint.

Nystagmus is seen in multiple sclerosis, in Friedreich's ataxia, and sometimes in spastic diplegia, meningitis, and hydrocephalus. It is also seen in diseases of the eye, choroiditis, corneal opacity, and other diseased conditions where the sight is affected.

Spasmus nutans or **nodding spasm** is characterized by nystagmus. This is a peculiar condition in which there is a nodding of the head. It comes on between the sixth month and second year, lasts several weeks or several months, and then recovery takes place.

Rhythmic jerking of the head during sleep may also be met with.

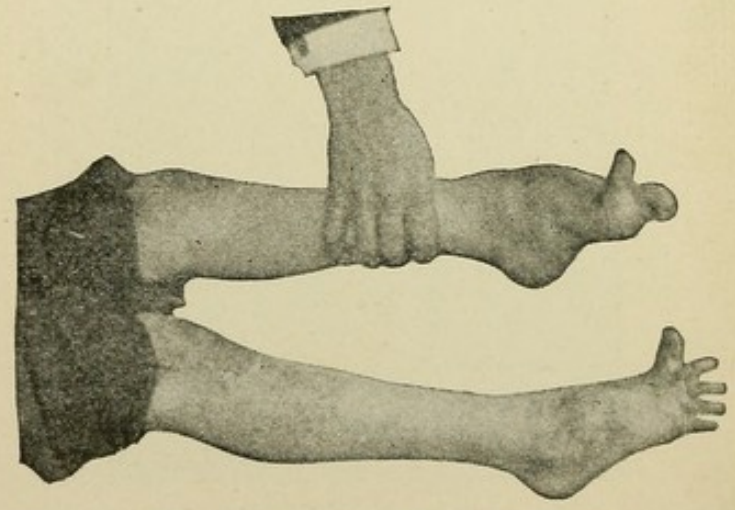


FIG. 83.—Athetosis of feet (Church).

Hiccough (*Singultus*).—Spasm of the diaphragm, usually due to disturbances of the stomach, occasionally to other causes.

Expel gas from stomach; holding the breath, drinking water, or producing sneezing by tickling the nose with a feather may stop an attack. Chloral is useful in persistent cases.

Thomsen's Disease[1] (*Congenital Myotonia*).—A family hereditary disease in which the muscle becomes rigid on being

[1] Haberman, "Myatonia Congenita of Oppenheim, or Congenital Atonic Pseudoparalysis," *Amer. Jour. Med. Sci.*, vol. cxxxix., 1910, p. 383.

moved. After several movements the spasm passes off. Improved by muscular exercise. It is incurable.

Cervical Opisthotonos or Retraction of the Head.—This is most marked in posterior basic meningitis and cerebrospinal fever, but is also seen in tuberculous men-

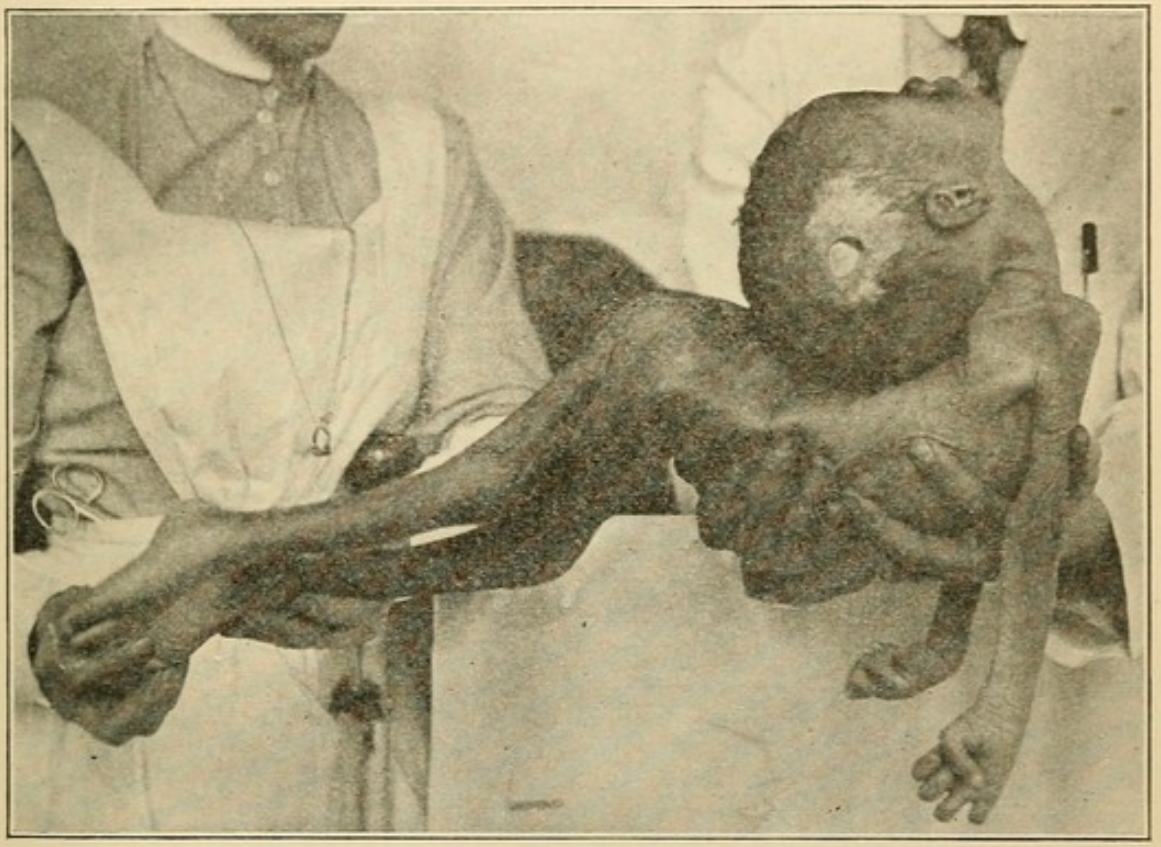


FIG. 84.—Extreme opisthotonos.

ingitis. It may be noted in many other conditions when the meninges are not affected, as acute middle-ear disease, in severe marasmus, in the acute infectious diseases, in acute diarrheal diseases, in chronic hydrocephalus, and cerebellar tumor. It may be seen in caries of the spine and in retro-pharyngeal abscess.

Torticollis[1] (*Wry-neck*).—Usually caused by a spasm of the sternomastoid muscle; sometimes the cervical muscles and trapezius are also involved. The head is drawn to one side. If the posterior muscles of both sides are affected the head is drawn backward. It is caused by irritation of the

[1] A. H. Tubby, "Torticollis or Wry-neck," *British Medical Journal*, June 16, 1906, p. 1387.

eleventh nerve, and it may be congenital or acquired. It may be caused by enlarged glands, or exposure to cold or rheumatism. The prognosis depends on the cause. The acute cases are favorable; the congenital unfavorable.

Treatment.—Remove the cause if known, anti-rheumatic remedies in rheumatic cases; heat, massage, and injections of atropin may all be of service. Old cases require surgical treatment and orthopedic supports.

FIG. 85.—Congenital torticollis (Moore).

Huntington's Chorea (*Hereditary Chorea*).—A rare disease, mentioned here because hereditary. It usually comes on between thirty and forty years of age in some of the members of affected families. There is a coarse, grimacing chorea with gradual mental deterioration.

HYSTERIA.

This is occasionally seen in childhood, usually not until after the ninth or tenth year. The causes, symptoms, and

treatment are the same as in adults. Any disease may be simulated, and hysteria may be overlooked because the physician may ignore its occurrence in children. Isolation or removal from the home is nearly always essential in the successful treatment of these cases.

TIC.[1]

These are complex movements; always of some definite character. These movements are repeated at intervals; occasionally they are continuous. They usually occur in children with organic brain lesions or malformations, but may also occur in otherwise apparently healthy children. They may be regarded as a neurosis. The treatment is liable to be unsatisfactory.

Convulsive Tic.—Convulsive twitching of the muscles—usually one group of muscles or convulsive movements of some regular kind, often associated with making certain sounds or repeating certain words (echolalia) or the involuntary utterance of obscene or profane language. It is a very chronic disease, and the prognosis is not very favorable.

Treatment.—Young patients should be isolated and taught self-control. Opiates may be necessary if sleep is interfered with; hyoscine has been advised.

HEADACHE.

Headache is due to many causes. Persistent and recurrent headaches often cause a special expression, "a look of depression, heaviness, and fulness about the eyes, especially about the under eyelids: this sign is usually bilateral, and is due to a relaxed condition of the muscle (orbicularis) which surrounds the eyelids" (Warner). This expression may disappear momentarily if the patient is made to laugh.

In very young children headache is usually associated with meningitis, brain tumor, and other organic diseases. In older children the more common causes of headache are ade-

[1] C. Herrman, "Tics in Children," *Archives of Pediatrics*, June, 1906, p. 426.

noids, errors of refraction and eye strain, digestive disturbances, toxemia, caries of the teeth, anemia, malnutrition, rheumatism, malaria, fever, gout, uremia, hysteria, epilepsy, meningitis, and brain tumor.

DISORDERS OF SLEEP.

The normal child sleeps soundly. With but few exceptions restlessness and sleeplessness are indications of disease or pain. Digestive disturbances, fevers, and, in fact, any diseased condition may be a cause. Poor ventilation, overheated or too cold rooms, and improper training are frequent causes. Real insomnia is sometimes met with.

Pavor Nocturnus[1] (*Night Terrors*).—A curious condition in which, after sleeping soundly for several hours, the child wakens in a condition of terror. This continues for some time, during which the child cannot be comforted and does not seem to understand. It may regain consciousness or drop off to sleep. Night terrors are most common from three to eight years of age, and are most frequent in neurotic children. Overstudy and exciting "dime novels" are commonly the most frequent causes. It is usually outgrown.

Treatment.—Careful hygiene of the nervous system, out-of-door life, avoidance of excitement, are all important. Sedatives, such as bromids, chloral, and antipyrin, are useful in severe cases.

Day Terrors.[2]—Attacks similar to night terrors may occur during the waking hours, and these are more serious than the above.

Somnambulism (*Sleep-walking*).—This is not uncommon in children. The individual goes through a series of purposeless actions, such as walking about, closing doors or windows, while sound asleep, and retains no consciousness of what he has done. It is frequently associated with nightmare, due to errors in diet.

[1] Coutts, "Night-mare and Night Terrors," *American Journal of the Medical Sciences*, February, 1895.

[2] Still, "Day Terrors," *Lancet*, February 3, 1900.

SPEECH DISTURBANCES.[1]

These may be due to organic brain diseases, as the difficult speaking in cerebral diplegia, or to functional disturbances. These latter are more common in boys than girls. Functional speech disorders may be regarded as stigmata of degeneration; other stigmata are usually present.

Stuttering.—Stuttering is due to an excessive innervation of the vocal muscles, producing cramps of the muscles of breathing, and sometimes hypertonicity of the laryngeal muscles, and sometimes also of the muscles of pronunciation. Sometimes the excessive nervous energy causes movements of other muscles, so that the face may be contorted or there may be abrupt irregular movements of the arms or even of the entire body. The voice is usually monotonous, the articulation is good, but there is difficulty in continuous speech. There is often hesitancy and repetition of a syllable several times before the next one can be said. It may be inherited or acquired by imitation, or it may come on after acute illnesses. The acute cases usually recover, and the others may be overcome in many cases by systematic training by a skilful teacher.

Stammering.[2]—Often used synonymously with the preceding, but better limited to cases where articulation is imperfect; frequently (not always) due to deformity. Treatment is to correct the deformity and train.

Nasal speech is due to adenoids, enlarged tonsils, nasal obstruction, and many American children seem to use a disagreeable nasal twang. Sudden onset of nasal speech is due to inflammation of the throat or paralysis of the soft palate.

Lisping.[3]—Imperfect formation of certain sounds, often of *s*. It is common in young children and generally outgrown.

Lalling is a term applied to very marked lisping, and in older children it indicates mental deficiency.

Alalia.—Inability to talk; in older children usually associated with mental disturbance.

[1] Wyllie, "The Disorders of Speech," *Edinburgh*, 1894.

[2] Langwill, "Stammering and its Treatment by the General Practitioner," *Practitioner*, January, 1903.

[3] Ashby, "Lisping," *Medical Chronicle*, October, 1903, p. 1.

Backwardness.—Seen in untrained children, as in overcrowded asylums, etc.

Functional Aphasia.—This may be associated with mental deficiency, chorea, hysteria from fright, etc.

Idioglossia.—A curious form of speech disturbance usually occurring in children who are normal mentally. There is marked lalling with the substitution of *t*, *d*, or *n* or some other easily pronounced letter for all syllables with which difficulty is experienced. Those accustomed to the child may understand it, others cannot.

Treatment of Speech Defects.—**Stuttering.**—The shallow, ill-managed respiration which is frequently seen should be corrected by systematic breathing exercises which should be carried out daily. If there is any obstruction to the respiration it should be removed. The child should be taught to speak from a well-filled chest, and not to use the reserve air, and must be taught to speak with a resonant and modulated voice instead of the low muttering intonation usually adopted, but it should not be allowed to shout. It should be taught to speak slowly and distinctly, making all the consonants clear. The child should be taught to sing sentences instead of speaking them, so as to introduce a new method of speaking, and also to modulate the voice. Attempts should be made to make the child talk with expression and to distract the mind from the idea that he must stutter; for this last beating time forcibly with the hand may be employed.

Treatment of Other Defects.—The following alphabet will be found of great use in locating quickly the seat of the trouble, and the methods to correct them as suggested by Scripture[1] will be found of value:

WYLLIE'S PHYSIOLOGIC ALPHABET.

I.—Vowels.

(y—i e a o u—w.)

These should be pronounced in the Latin manner, as *ēē*, *eh*, *ah*, *oh*, *oo*. *y* and *w* are consonants, not vowels, but have

[1] *Medical Record*, March 21, 1908; *Ibid*, August 15, 1908; and Gutzmann, *Sprache und Sprachfehler*, Leipzig, 1894.

very close relationships to the vowels, initial *y* being very closely related to *i* and initial *w* to *u*.

II.—Consonants.

	Voiceless oral consonants.	Voiced oral consonants.	Voiced nasal resonants.
Labials	P	B	M
(First stop position)	(W)	W	
Labiodentals	F	V	
Linguodentals	Th[1]	Th[2]	
	S	Z	
	Sh	Zh	
Anterior Linguopalatals	T	D	N
	(L)	L	
(Second stop position)		R	
Posterior Linguopalatals	K	G	Ng
	H or Ch	Y	
(Third stop position)		(R)	

Lip Defects.—Instead of *W* some children say *V*. In saying *V* the lower lip is brought against the upper lip, and for *W* the two lips are brought near each other. To change the *V* to *W*, instruct the patient to say "wood" or "war," and just as he begins press the lower lip down with the finger.

Tongue Defects.—1. *"S–T" Lisping.*—The patient says "toup" for "soup," etc. When "*S*" is said the tip of the tongue is brought against the palate, but a small space is left through which the air may be blown. In this form of lisping the patient presses his tongue too hard, closing the air channel, and "*T*" results. The treatment for this is to insert a probe just over the middle of the tongue and press it down just as the patient tries to say "*T*," thus making an airspace and changing it to "*S*."

2. *"TH–T" and "TH–D" Lisping.*—This is a very common defect, the children saying "tin" for "thin" and "dis" for "this," etc. In both cases in saying "*th*" the tongue is placed against the palate, but so slightly that air escapes from both sides. The lisping comes from too much pressure of the tongue. The treatment is to place a probe at the side of the mouth, and when the patient says "*t*," press down the tongue at the side and he is forced to say "*th*."

3. "*S–TH*" *Lisping.*—An interchange of sounds due to the tongue not rising sufficiently at the edges in front to cut off the air at the sides while having a small channel in the middle. This is the form present when there is tongue-tie. If the frenum is too short it should be cut. The treatment is the same as for No. 1.

4. "*T–TH*" *Lisping.*—"Wather" is said for "water," etc., due to the failure to cut off the air with the tip of the tongue firmly against the palate. It is usually sufficient to explain the formation of the two sounds.

5. "*R*" *Defects.*—"*W*" is used in place of "*r*," and the patient must be taught how to get the tongue in the right place to say "*r*." He may be taught to roll the "*r*" as in French; if this fails, have him repeat words which bring the tongue in approximately the same position, as "sun, run, sun, run," or "tun, run, tun, run," etc.

6. *Various Substitutes.*—"*T*" may substitute for "*k*," but not in all words, and this is usually due to negligence. Have the patient repeat the "*k*" sound before various vowels, and then pass over to the incorrect word, as "kat, kat, kat, ka-ka-kan, ka-ka-, ka-kandy." In cases where the velum action is defective the patient must be taught to say "*p, b, t, d, . . . a, o*" without passing air through his nose. A rubber tube with a nose tip on one end and a glass tube on the other is held in a support, so that the glass tube end is just in front of a candle flame. If the air passes through the nose the flame moves. Playing on a mouth harmonica may help in severe cases.

Laryngeal Defects.—Laxness of the vocal cords is frequently noted both in persons with other defects and independently. There is defective closure of the glottis, and this may be overcome by staccato singing and practising notes on the vowel *ah*.

Laryngeal Monotony.—This is seen in epileptics and others. The voice does not rise and fall normally. This may often be overcome by explaining the difference to the patients and having them practice.

THE INJURIOUS HABITS OF INFANCY AND CHILDHOOD.

Sucking.—Sucking the fingers is very common in hungry infants and is natural. Continued sucking of the fingers or toes, of a "pacifier," or of a nipple is a bad habit; usually easily overcome if taken early, and difficult to control if allowed to run on. It may lead to the habit of masturbation later on, and may cause deformities of the jaws and fingers as well as eczemas and infections. Sucking the hands may be a cause of chronic vomiting. Other bad habits are biting the nails, picking at the face or hands, eating dirt (pica), and making various movements with the head, arms, legs, or body.

Treatment.—The hands may be covered with mittens, tied

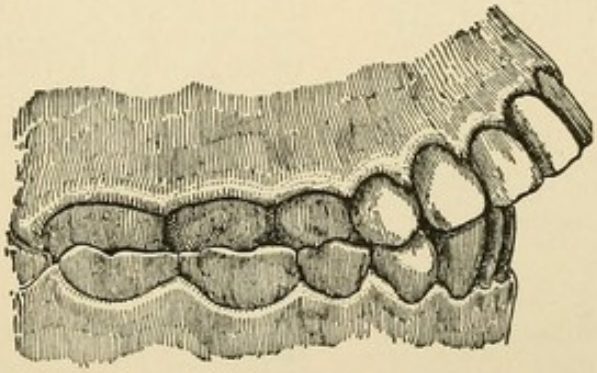


FIG. 86.—Deformity caused by thumb-sucking. (Darby, in Keating's *Cyclopedia of the Diseases of Children.*)

into long sleeves or buttoned under the jacket. Splints may be resorted to in aggravated cases.

Masturbation.—**Definition.**—The habit of producing sexual excitement by rubbing the genitalia or other parts of the body.

Etiology.—It may be practised by very young infants, even as early as the eighth month. Girls and boys are both affected. It may be started by rubbing to allay irritation caused by uncleanliness, inflammation, etc. If the habit is formed in early childhood without cause it may be regarded as a stigmata of degeneration. It may be taught by vicious nurses or other children.

Symptoms.—Friction with the hands against some object, or by holding the thighs fixed and moving the body. This is followed by flushing of the face and relaxation. The chil-

dren are liable to become nervous, and later may develop hysteria or other functional nervous disorders. In older children the pupils are dilated, the palms moist, and the child is inattentive and absent-minded.

Prognosis.—If the cause is removed early the outlook is fair.

Treatment.—Early recognition and close observation are the most important. Remove all sources of irritation and do a circumcision if necessary. The child's moral nature should be awakened if possible. Out-of-door life and a building-up treatment are essential.

ANGIONEUROTIC EDEMA.[1]

A rare affection sometimes seen in children. It may occur in families or be hereditary. It is a sudden localized edema which may jump from place to place. Disappears quickly. Frequent attacks may occur. Affected individuals should have good hygiene and tonic treatment.

EXOPHTHALMIC GOITER.[2]

(Parry's Disease; Graves' Disease; Basedow's Disease.)

A disease characterized by rapid heart beat, swelling of the thyroid, and protrusion of the eyes. It is very rare in childhood, but has been described.

Enlargement of Thyroid at Puberty.—Between twelve and fifteen the thyroid may enlarge (in girls), and there may be a rapid pulse and nervous symptoms suggestive of exophthalmic goiter. This condition usually rapidly subsides by the use of rest, good feeding, tonics, and fresh air.

MALFORMATIONS.[3]

The most frequent are meningocele, encephalocele, and hydrencephalocele.

[1] T. H. Halsted, "Edema, Angioneurotic, of Upper Respiratory Tract," *American Journal of the Medical Sciences*, November, 1905, p. 863.

[2] Kocher, "Thyroid Gland, Pathology of," *British Medical Journal*, June 2, 1906, p. 1261. A. F. Martin, "Thyroid Gland, Significance of Some Enlargements of," *British Medical Journal*, Sept. 22, 1906, p. 691.

[3] Ruhräh, *Archives of Pediatrics*, July, 1902.

Definition.—**Meningocele.**—A protrusion through an opening of the skull of the brain membranes. The sac so formed is usually filled with fluid.

Encephalocele.—A protrusion of part of the brain substance.

Hydrencephalocele.—A protrusion of the brain containing a cavity communicating with the distended lateral ventricles.

Location.—They may be located anywhere, but are most frequently in the median line, either occipital or frontal. They may be small or enormous in size.

Diagnosis.—In *meningocele* there is usually a small

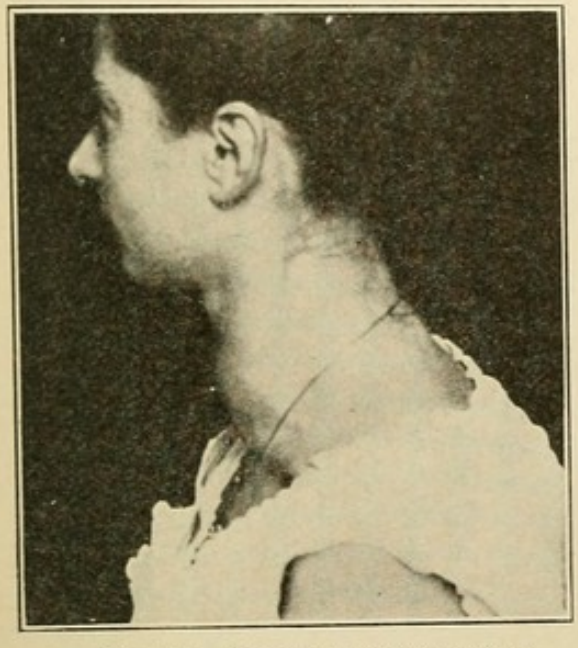


FIG. 87.—Exophthalmic goiter.

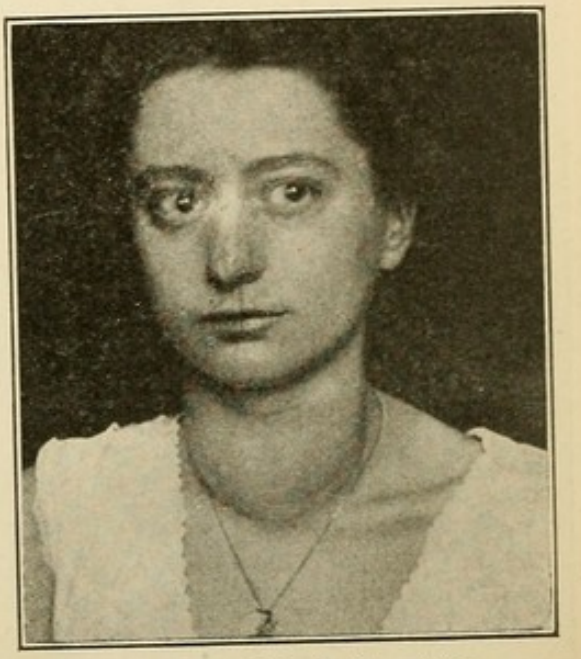


FIG. 88.—Exophthalmic goiter.

tumor at birth which increases in size; it is usually pedunculated, but may not be. The tumor is smooth, but has a distinctly cystic feel. It fluctuates, and in some cases is reducible, or it may be diminished in size from pressure. It is translucent, if the tumor is not too large nor the walls too thick. Pulsation is rare. Pressure usually produces cerebral symptoms, such as crying, vomiting, convulsions, and stupor. On crying or forced expiration they become more tense. The skull is normal.

In *encephalocele* there is a small, smooth tumor, pulsating

and non-translucent. It is rarely pedunculated. Pressure produces cerebral symptoms. On moderate pressure there is no pain, malaise, nor reduction. On attempting to effect reduction by harder pressure there is noted dilatation of the pupil, strabismus, and, more rarely, vomiting and convulsions. On crying, it becomes more tense. Pulsation synchronous with the pulse practically always means encephalocele.

In *hydrencephalocele* there is a large tumor, generally

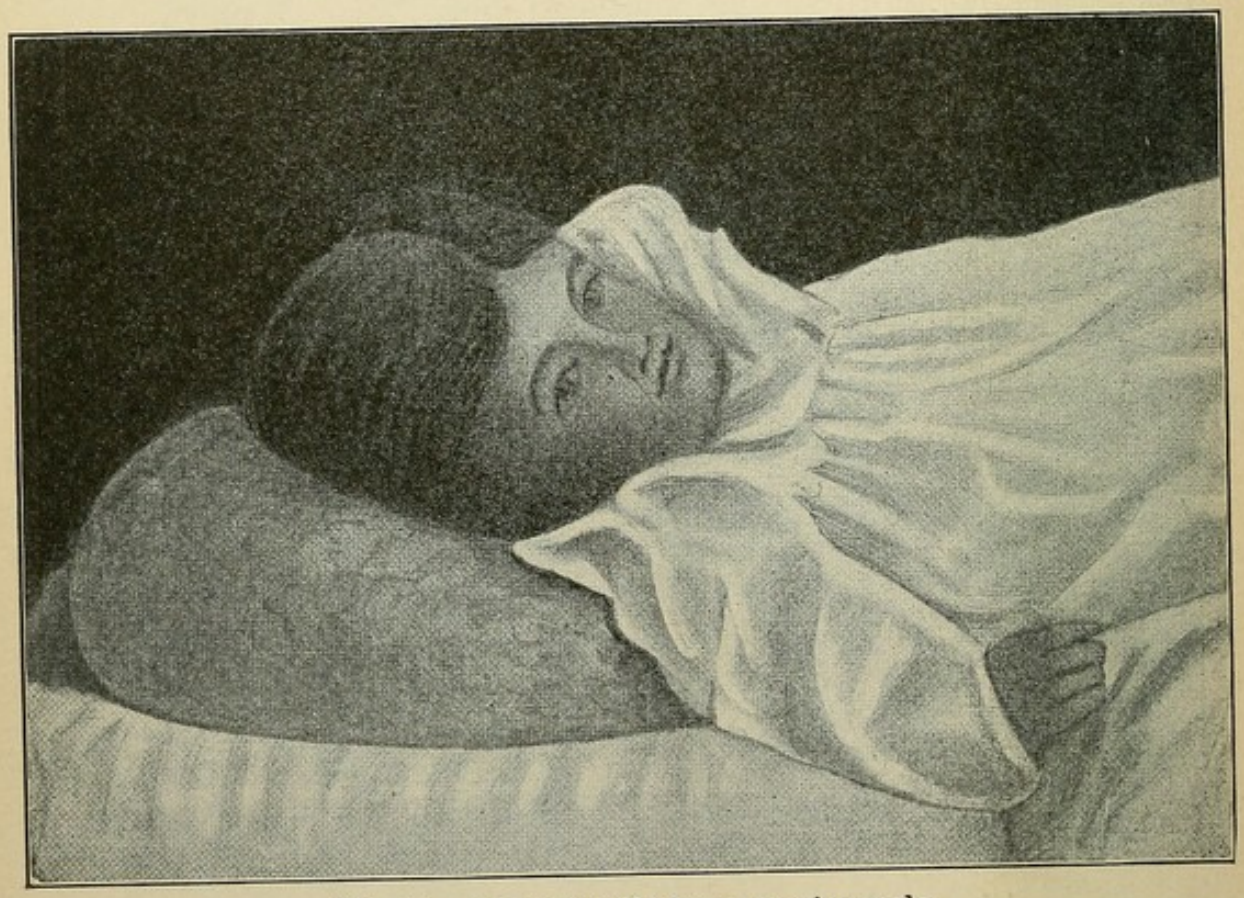


FIG. 89.—An unusually large meningocele.

pendulous, pedunculated, and lobulated. It is generally not translucent nor reducible. Fluctuation is present, but pulsation rarely. Pressure does not, as a rule, produce symptoms. On crying, it is made only slightly more tense. Very large tumors are practically always hydrencephalocele.

From other tumors by their growing more tense on crying.

False Meningocele.—A cystic tumor following injury by the history of an injury or operation.

Prognosis.—Serious. Almost all die early. A few attain old age, but are usually weak-minded.

Treatment.—Three methods are used: (1) Let it alone; (2) aspirate and inject an iodin mixture, as Morton's solution;

FIG. 90.—A meningo-encephalocele.

(3) removal by excision. This latter is usually preferred. Internal hydrocephalus may follow the operation.

BIRTH PALSIES.[1]

These are most frequently due to prolonged pressure during difficult labor or to artificial delivery. (See also p. 324.)

Cerebral Paralysis.—Most of these hemorrhages are meningeal and at the base of the brain, but they may occur from brain laceration or from depressed fractures. The child may be born dead or asphyxiated. Convulsions are common. There may be general rigidity or, more rarely, general relaxation. The pupils are frequently contracted, and there may be oscillation of the eyeballs. Pulse is slow and weak, and

[1] Gowers, "On Birth Palsies," *Lancet*, vol. i., 1888, p. 709. Spiller, Frazier, and Van Kaathoven, "Palsies, Cerebral, Spinal, and Peripheral, Treatment of Selected Cases of," *American Journal of the Medical Sciences*, March, 1906, p. 430.

the respirations slow and irregular. Death usually takes place during delivery or within three or four days afterward. Cases which survive show monoplegia, hemiplegia, diplegia, or mental disturbance, according to the location of the clot.

Treatment.—The judicious use of forceps to hasten slow labors may prevent hemorrhage, which usually is caused by the long pressure. If the diagnosis is made, a very skilful surgeon might operate with success.

Spinal Paralysis.—Very rare. Due to hemorrhage or laceration, and results in paraplegia.

Paralysis of the Arm in the Newborn (*Erb's Paralysis*).—This is from injury to the nerves of the brachial plexus during parturition. This may take place in a number of ways. The most frequent form is the so-called Erb's upper-arm paralysis, where the fifth and sixth cervical nerves are injured, causing paralysis, partial or complete, of the biceps, deltoid, brachialis anticus, supinator anticus, supinator longus, and occasionally of the supra- and infra-spinatus. Usually noted on the first day or two, but it may escape notice for several weeks. The upper arm is paralyzed and rotated inward, the forearm is pronated and the palm turned outward. The triceps and the muscles of the forearm

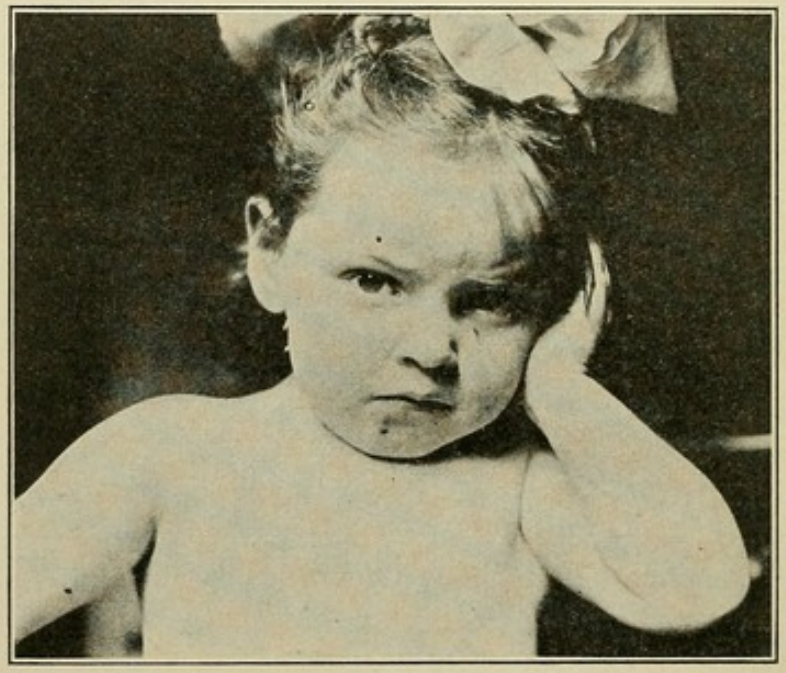


FIG. 91.—Brachial birth palsy, showing limitation of motion.

and hand are unaffected. Atrophy occurs, but is not very noticeable on account of subcutaneous fat. Atrophy is more marked in older children.

More rarely the paralysis may be of the lower-arm type, in which the seventh and eighth cervical and first dorsal nerve routes are involved, or there may be a combination of the upper- and lower-arm types, in which all of the nerve routes mentioned above are injured.

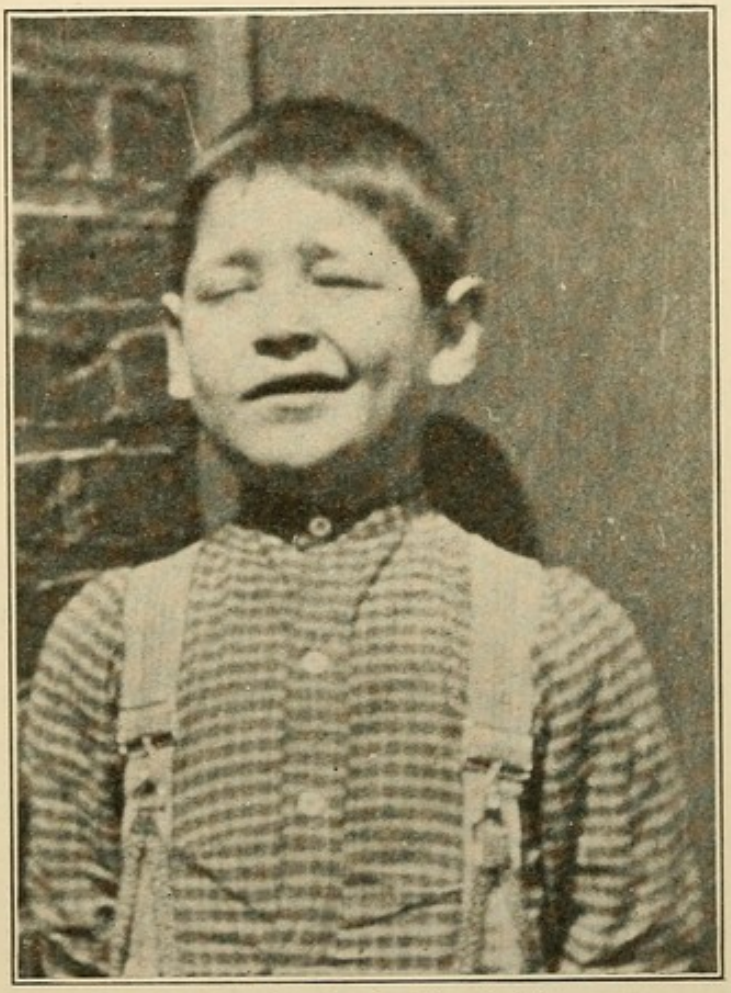


FIG. 92.—Paralysis of right facial nerves.

Diagnosis by the group of muscles affected. Look for fractures of the clavicle, separation of the epiphysis, and dislocation of the humerus.

Prognosis varies. If recovery takes place it does so within three months; it is rare after that time. If the muscles respond to faradism the prognosis is good. If the reaction of degeneration is present the prognosis is bad.

Treatment as in facial paralysis. Surgical treatment, consisting in cutting down upon the brachial plexus, removing the cicatrix, and approximating the ends of the injured nerves, has been tried recently, with success (see Literature).

Facial Paralysis of the Newborn.—This is usually, but not always, from the pressure of forceps, and for that reason is generally unilateral. Meningeal hemorrhage may also be a cause.

Symptoms are the same as in ordinary facial paralysis, and are noted on the first or second day.

Exceptionally facial paralysis may be due to congenital defect of the nucleus of the seventh nerve. Both sides may be affected, as well as some of the eye muscles. There is no treatment for this form.

The **prognosis** is generally good, recovery taking place in two weeks, though in some the paralysis may be delayed months or be permanent.

Treatment.—None the first three weeks. If recovery has not taken place, use faradic electricity daily. If muscles do not react to it, use galvanism.

INFLAMMATION OF THE BRAIN AND ITS MEMBRANES.

Pachymeningitis.—Inflammation of the dura. It may be acute or chronic.

Acute Pachymeningitis.—*External.*—Rare, and usually follows the extension of suppuration, as in middle-ear disease.

Internal.—As a part of inflammation affecting all the membranes.

Chronic Pachymeningitis.—*Internal.*—This is seen in cachectic states and marantic children. There is usually hemorrhage.

Symptoms.—Usually not marked unless there is hemorrhage, which may cause vomiting, convulsions, and loss of consciousness. The child may have rigidity of the muscles, enlarged pupils, and paralysis, according to the location of the hemorrhage.

Diagnosis.—Cases without hemorrhage are usually only

discovered at autopsy. From acute meningitis by lower temperature; coma later, and rigidity less marked.

Prognosis.—External hemorrhages are usually fatal; smaller ones are not.

Treatment.—Ice cap to head. Bromids and chloral to quiet the nervous symptoms.

Acute Meningitis[1] (*Cerebrospinal Fever*).—**Definition.**—An acute inflammation of the pia mater. (See also Cerebrospinal Fever and Tuberculous Meningitis.)

Pathology.—The inflammation may be general, involving the entire meninges, both cerebral and spinal, or it may be more or less limited to an area. In cerebrospinal fever it is liable to be general; in tuberculosis and cachectic conditions, chiefly basal; in pneumonia and endocarditis, chiefly cortical; from extension of middle-ear disease it is unilateral, and involves the dura more extensively. There is congestion, and later an effusion of greater or less intensity.

Etiology.—Osler gives the following table of causes:

The Etiology of Acute Meningitis (Osler).

Acute leptomeningitis.	Primary.	1. Of cerebrospinal fever	(*a*) Sporadic. (*b*) Epidemic.	Diplococcus intracellularis.
		2. Pneumococcic	Meninges alone involved or in a general pneumococcic infection.	Pneumococcus.
	Secondary.	1. Tuberculous		Bacillus tuberculosis.
		2. Pneumococcic	(*a*) Secondary to pneumonia, endocarditis, etc. (*b*) Secondary to disease or injury of cranium or its fossæ.	Pneumococcus.
		3. Pyogenic	(*a*) Following a local disease of cranium or a local infection elsewhere. (*b*) Terminal infection in various chronic maladies.	Various forms of staphylococci and streptococci.
		4. Miscellaneous acute infections.	In typhoid fever, influenza, diphtheria, gonorrhea, anthrax, actinomycosis, and other acute diseases.	Typhoid bacillus, influenza bacillus, diphtheria bacillus, gonococcus, etc.

Symptoms.—The symptoms are also given under Cerebrospinal Fever and Tuberculous Meningitis.

[1] Cohoe, "Influenzal Meningitis," *American Journal of Medical Sciences*, January, 1909, p. 75. W. T. Councilman, "Meningitis, Acute," *Journal of the American Medical Association*, April 1, 1905, p. 997.

Cortical meningitis may not produce any symptoms which may not be produced by congestion or by the toxemia of the specific infections. Basilar meningitis is accompanied by retraction of the head and symptoms referable to the cranial nerves. There may be ptosis or strabismus; the pupils are at first contracted; later, dilated or unequal. There may be twitching or facial paralysis. There is dread of light (photophobia) and, later, often blindness. There is a dread of noises and, later, often deafness. Optic neuritis is common.

There may be general or local convulsions, paralysis, tenderness of the skin and muscles of the extremities. There is delirium, and frequently profound coma. Vomiting is common. Tâche cérébrale is common. Kernig's sign is present when the lower spinal meninges are involved. Lumbar puncture is of service. (See Cerebrospinal Fever.)

There is an irregular fever curve.

Diagnosis.—(See Cerebrospinal Fever and Tuberculous Meningitis.)

Prognosis.—Bad. All cases except the cerebrospinal fever cases, and possibly the pneumococcus cases, die. It may become chronic.

Treatment.—The disease is not influenced by treatment. Open the bowels, feed carefully, keep quiet. Ice bag to head. Counterirritation to spine and nape of neck. Salines if there is much congestion. Lumbar puncture to relieve brain-pressure is advisable. Surgical treatment is advisable in localized suppuration and meningo-encephalitis.

Chronic Basilar Meningitis in Infants.[1]

(Posterior Basic Meningitis.)

Definition.—A chronic non-tuberculous inflammation, especially of the basal meninges, which usually occurs sporadically, but which may be seen during epidemics of cerebrospinal fever.

[1] Still, "Posterior Basic Meningitis," *Journal of Pathology and Bacteriology*, May, 1898, p. 147. O. Hildesheim, "Meningitis, Postbasic, Prognosis in," *British Medical Journal*, March 21, 1906, p. 733. H. Koplik, "Meningitis, Postbasic," *American Journal of the Medical Sciences*, February, 1905, p. 266.

Etiology.—Usually due to the diplococcus intracellularis. There is a syphilitic posterior basic meningitis as well.

Pathology.—There is thickening of the pia and dura mater at the base of the brain.

Symptoms.—There is usually a gradual onset, followed by retraction of the head, which is continuous, opisthotonos and muscular rigidity. In some instances the disease may come on rather suddenly, with vomiting, fever, convulsions and rigidity. The child may be partially or wholly blind, often without any optic atrophy, and there is frequently nystagmus or strabismus. There may be hydrocephalus, and the fontanel, if open, bulges. The position assumed is that of extreme opisthotonos, with the arms drawn in, the forearms, hands, and fingers flexed, the thighs adducted, the legs flexed, the feet extended, and the toes flexed. There is extreme emaciation and the abdomen is retracted. The temperature is normal or but slightly elevated, with occasional irregular periods of high temperature.

Diagnosis.—From muscular rigidity of marasmus by the greater severity of the opisthotonos, the hydrocephalus, and the cerebral symptoms. Lumbar puncture is of value. A dry tap may result in these cases.

Prognosis.—Usually bad, death taking place in from one to four months. Recovery occasionally occurs. The older the child the better the prognosis. Sudden death sometimes takes place, and the disease is usually followed by paralysis or retarded development, and occasionally by inability to gain flesh, by the persistence of headache and subsequent development of peculiarities of temper, morals, or emotions. Amaurosis and optic neuritis have been met with, but both are rare. The same is true of deaf-mutism.

Treatment.—Iodid of potassium and mercurial inunctions may be tried, and is of value in syphilitic cases. Lumbar puncture may be done to relieve pressure. Flexner's antimeningitis serum might be tried in the cases due to the meningococcus.

THROMBOSIS OF THE SINUSES.

Cachectic Thrombosis.—**Definition.**—A rare condition where the blood clots in the sinus.

Etiology.—It is seen in young children or infants wherever a cachectic condition supervenes, especially in the course of infections, as pneumonia, whooping-cough, and diphtheria.

Symptoms.—Usually obscure; diagnosis is rarely made during life. There may be convulsions, coma, and paralysis.

Prognosis.—Fatal.

Septic Thrombosis; Inflammatory Thrombosis; Sinus Phlebitis.—**Definition.**—A clotting of the blood in the sinus from meningitis or the extension of an inflammation, as from otitis or pharyngitis.

Symptoms.—In meningitis it produces no new symptoms. Headache, localized tenderness of the scalp, and symptoms of meningitis are present.

Localized Symptoms.—Superior longitudinal sinus causes cyanosis of the face, nose-bleed, dilatation of the temporal veins. Lateral sinus: Dilatation of veins and edema of the mastoid region. The clot may extend into the jugular vein. Cavernous sinus: Protrusion of the eyeball, edema of the eyelid, and enlargement of the retinal veins.

Prognosis.—Fatal unless operated upon.

Treatment.—Surgical.

ABSCESS OF THE BRAIN.

Abscess of the brain may be single or multiple.

Etiology.—Not infrequent in early life; secondary to inflammations of the ear and petrous bone, or of either cranial bones. It may follow sinus thrombosis. It may follow injury.

Location.—Usually in frontal, temperosphenoidal lobes, or cerebellum.

Symptoms.—In acute cases there are symptoms suggesting meningitis, as headache, painful scalp, vomiting, fever, etc. There may be localized symptoms if motor areas are

involved. In chronic abscess, which may last a long while, attacks of headache, fever, or vomiting may be noted.

Diagnosis.—Always difficult. Marked rigors and very irregular temperature may help in differentiating tumors or meningitis, especially when the symptoms follow ear disease.

Prognosis.—Always bad.

Treatment.—Surgical.

CEREBRAL TUMORS.[1]

Starr's table gives the frequency of the various kinds as follows: Tubercle, 152; glioma, 37; sarcoma, 34; gliosarcoma, 5; cyst, 30; carcinoma, 10; gumma, 1; not stated, 30; total, 299.

Location.—In order of frequency: Cerebellum, pons, centrum ovale, basal and lateral ganglia, corpora quadrigemina, and crura; the other locations are rare.

Etiology.—Tuberculous tumors are secondary; carcinoma and sarcoma may be primary or secondary. Injury is sometimes stated as a cause. Boys are twice as frequently affected as girls, and most cases occur before eight years of age.

General Symptoms.—Headache, general convulsions, changes in disposition and mental activity, double optic neuritis and nerve atrophy, vomiting, vertigo, and insomnia are the most important general symptoms.

Local Symptoms.—These may be wanting, or may be modified by size, rapidity of growth, or by meningitis.

1. **Cortex of Cerebral Hemispheres.**—Optic neuritis, vomiting, and vertigo are infrequent.

Frontal Lobes.—Mental deterioration, sometimes loss of smell on affected side if tumor presses on olfactory tract. In the third frontal of the left hemisphere of right-handed children (right side in left-handed) there are aphasia and agraphia.

Central and Paracentral Convulsions.—Paralysis and spasm of limbs on opposite side of body.

Parietal Lobe.—None, or disturbances of muscular temperature and pain-sense.

Occipital Lobe.—Hemianopsia, psychic blindness, and

[1] Starr, *Keating's Cyclopedia*, 1890.

word-blindness (if on the left side) in right-handed patients; right in left-handed children.

Temperosphenoidal Lobes.—Sensory aphasia or word-deafness if in left first or second convolution; right in left-handed children.

2. **Basal Ganglia.**—Marked indirect symptoms from pressure on internal capsule; optic neuritis occurs early.

3. **Corpora Quadrigemina and Crura Cerebri.**—Rare. Pupillary reflex is lost; there are nystagmus, strabismus, vertigo, and ataxia. Irregular disturbances of sensation of face and body. If large the tumor causes third-nerve paralysis on same side and hemiplegia on opposite side.

4. **Pons and Medulla.**—Symptoms may be bilateral on opposite side of body; facial and other cranial nerve paralysis on same side.

5. **Cerebellum.**—Vertigo, cerebellar ataxia, headache, and vomiting. If the patient falls it is usually in same direction. Hydrocephalus, general convulsions, and rolling of head from side to side may occur.

6. **Tumors of the Base.**—Symptoms referable to the cranial nerves or frontal lobes if frontal, basal ganglia and crura if middle fossa, pons and medulla if posterior fossa.

Diagnosis.—Variety. Tubercle most frequent and of rapid growth. Gliosarcoma is of slower growth.

From Abscess.—Severe rigors and leukocytosis are most important.

Meningitis.—More rapid course and intense symptoms. In chronic cases symptoms are of a diffuse lesion.

Prognosis.—Always bad.

Treatment.—Surgical if tumor is accessible; antisyphilitic in syphilis and palliative in other cases.

HYDROCEPHALUS.

(Water on the Brain.)

Acute Hydrocephalus.—A collection of fluid either beneath the dura or in the ventricles, due to basilar meningitis. This is usually tuberculous, but may be due to

syphilis or to other diseases. The term is often used to designate tuberculous meningitis.

Chronic Hydrocephalus. — **External.** — Very rare. The fluid is between the dura and the pia. Congenital or due to pachymeningitis or subdural hemorrhages. *Deformities of the brain are usually present.*

The brain is atrophied or deformed and pressed against the floor of the skull. General appearance and symptoms as in the internal form. The two forms may be associated.

Internal or Usual Form.—Congenital or due to tumors at the base of the brain or to basilar meningitis. The lateral

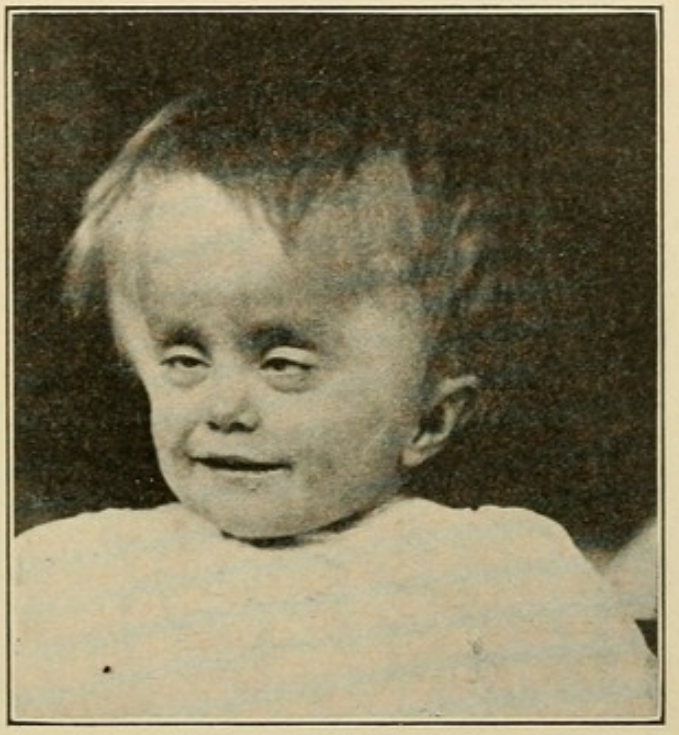


FIG. 93.—Hydrocephalus.

ventricles are distended with cerebrospinal fluid. The brain substance atrophies and the convolutions are flattened. The disease usually begins early, either in intra-uterine life or soon after delivery. The bones of the skull are forced apart, the sutures are very wide, and the fontanels enormous. Other deformities, as spina bifida and harelip, may be found at the same time. Hydrocephalus may occur with a small head, due to premature ossification. These children are idiots and die early, often during a convulsion. Such cases cannot be diagnosed during life.

Symptoms.—All grades of symmetrical enlargement of the head are met with; the prominent forehead and the white of the eye showing between the cornea and the upper lid give a characteristic expression. The head may fluctuate. The skin is thinned and shiny and the superficial veins dilated. The enlargement of the head may be congenital; it may come on during the first few months of life or occasionally later. These children are idiotic, lethargic, often blind and deaf. The extremities are rigid or relaxed. Nystagmus and convergent squint are common. Convulsions are frequent. Occasionally a child may have a moderate grade of hydrocephalus, which is gradually recovered from with only slight mental impairment. As a rule almost all die during the first year and the remainder before seven years of age. Now and then a patient lives longer.

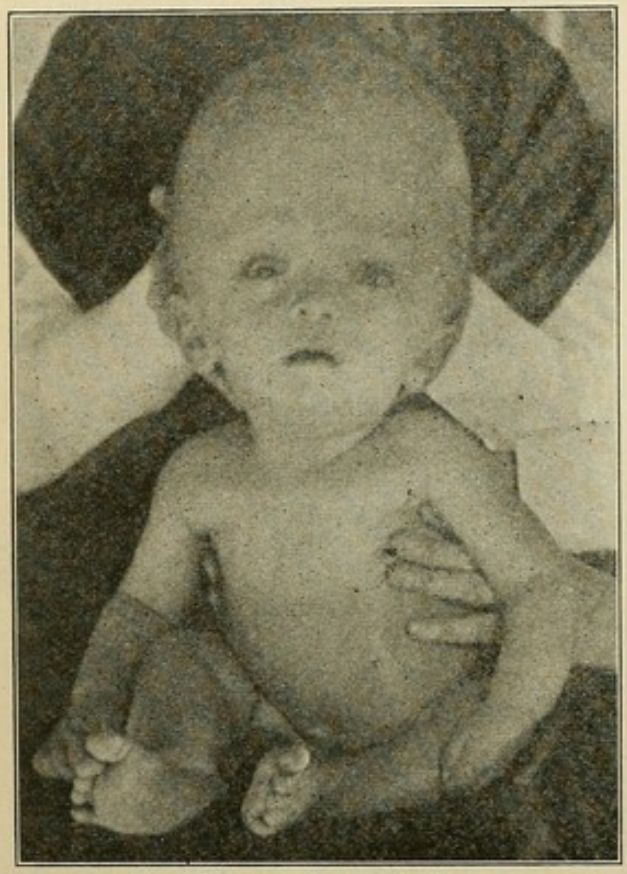


FIG. 94.—Hydrocephalus.

Treatment.—Unsatisfactory. All sorts of measures nave been tried. Aspiration gives temporary relief, but the fluid soon accumulates. Various operative procedures have been tried, such as permanent drainage.

INFANTILE CEREBRAL PARALYSIS.[1]

(Spastic Diplegia, Paraplegia, or Hemiplegia.)

Definition.—Paralysis of one or more members due to disease or defects of the brain; either congenital or acquired in early life.

[1] H. W. Noxon, "Paralysis, Infantile," *Practitioner*, November, 1906, p. 675.

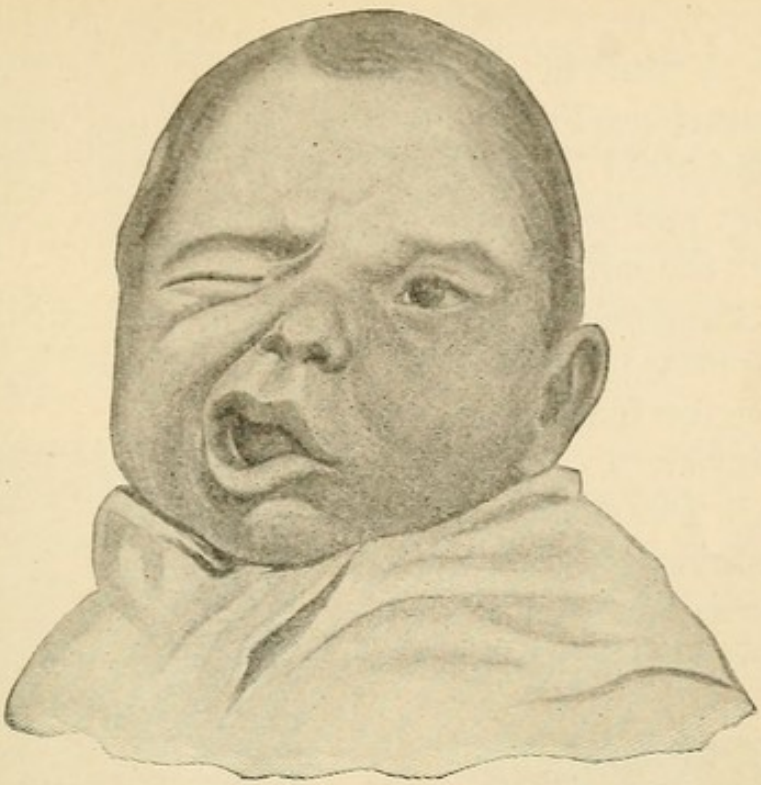


FIG. 95.—Left facial paralysis following delivery by forceps (Budin).

Paralysis of Intra-uterine Origin.—These are infrequent and are due to arrested development, hemorrhage, or other lesions. There may be large or small cysts or defects (poren-

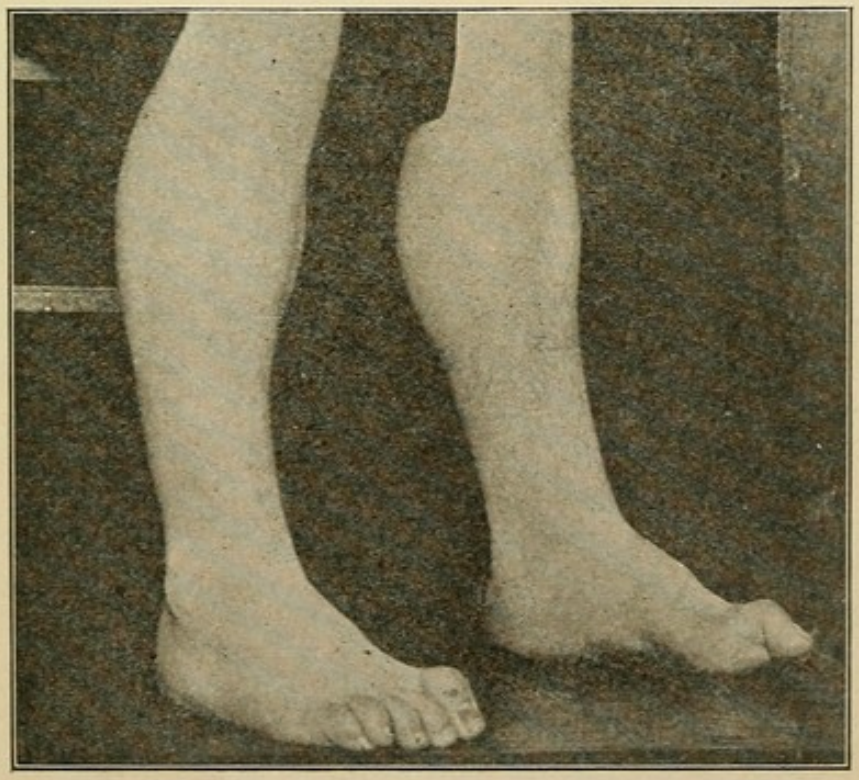


FIG. 96 —Showing contraction in infantile cerebral paralysis.

cephaly) in any part of the brain. There may be cortical agenesia—*i. e.*, want of development of the cortical cells.

Birth Paralysis.—These are due to hemorrhage (see page 323). If the child lives there may be meningo-encephalitis, cysts, atrophy and sclerosis of the cortex, or secondary degeneration of the cord.

Cerebral Paralysis.—This is usually a hemiplegia; but other forms may be met with. It may follow injury, infectious diseases, or from a convulsion or paroxysm of coughing, as in pertussis. The lesions found may be hemorrhage, meningitis, or atrophy or sclerosis of the cortex, with secondary degenerations.

FIG. 97.—Right hemiplegia following meningeal hemorrhage.

FIG. 98.—Infantile cerebral paralysis (Gillette).

Symptoms.—Paralysis dating from birth is usually either diplegia or paraplegia; but hemiplegia may be met with. The degree of paralysis and its extent depend on the lesion. There is usually a spastic condition of the muscles with increased tendon reflexes, but the paralysis may be of the flaccid type. Athetoid movements are common. Speech

disturbances may be met with, and there is nearly always mental impairment, often idiocy.

Symptoms of Acquired Paralysis.—Sudden onset, generally with a convulsion, fever, and loss of power. The paralysis is usually a hemiplegia. There may be speech disturbances. Later there is lack of development and contractures. The mental condition is, as a rule, unimpaired. Sometimes there may be athetoid movements.

Diagnosis.—It may be impossible to tell the acquired from the congenital forms except by the history; from spinal paralysis by the wide extent, diplegia, paraplegia, or hemiplegia, by the spasticity of the muscles, increased reflexes, contractures, and absence of reaction of degeneration. Often mistaken for rickets.

Treatment.—Training of the muscles remaining. If there are deformities and contractures, orthopedic appliances and operations may be advisable.

MYASTHENIA GRAVIS.[1]

(Erb-Goldflam Syndrome; Asthenic Bulbar Paralysis.)

A disease usually beginning in early life and characterized by a marked loss of power on exertion of certain muscles, which is recovered from after rest. The muscles supplied by the nerves emanating from the medulla (bulb) are first affected. Paralysis and atrophy may follow. There is a curious myasthenic reaction (Jolly), the muscles rapidly tiring on application of the faradic current, but not from the galvanic. About one-third of the cases die; some persist for years and some recover.

Treatment.—Mercury and iodide rest, strychnin, and massage.

IDIOCY; FEEBLE-MINDEDNESS; IMBECILITY.[2]

Idiocy is mental deficiency depending upon malformations, arrested developments, or lesions acquired before the mental

[1] Campbell and Bramwell, *Brain*, 1901.

[2] Ireland, *Mental Diseases of Children.* Lepage, "Diagnosis of Permanent Mental Deficiency in Infancy and Childhood," *Practitioner*, August, 1909, p. 211.

faculties have developed. Imbecility is a term applied to mild grades of idiocy which are not severe enough to warrant the confinement of the individual in an institution.

Various classifications of idiots are used. The following is a modification of Ireland's classification :

1. **Genetous Idiocy.**—This form is caused by malformations of the brain.

FIG. 99.—Genetous idiot.

2. **Microcephalic idiocy** is associated with a very small head ; frequently there is premature ossification of the bones of the skull. The fontanels close early or may be closed at birth. The head is pointed, the forehead receding, and the occiput flat.

3. **Hydrocephalic idiocy,** where the lesion is hydrocephalus.

4. **Epileptic idiocy,** where the idiot is an epileptic.

5. **Paralytic idiocy,** in which there are associated paralyses such as described under Cerebral Paralysis.

6. **Inflammatory idiocy,** following inflammatory changes, usually the result of meningitis.

7. **Idiocy by deprivation,** where the brain is apparently normal, but owing to blindness or deafness and want of instruction the child remains an idiot.

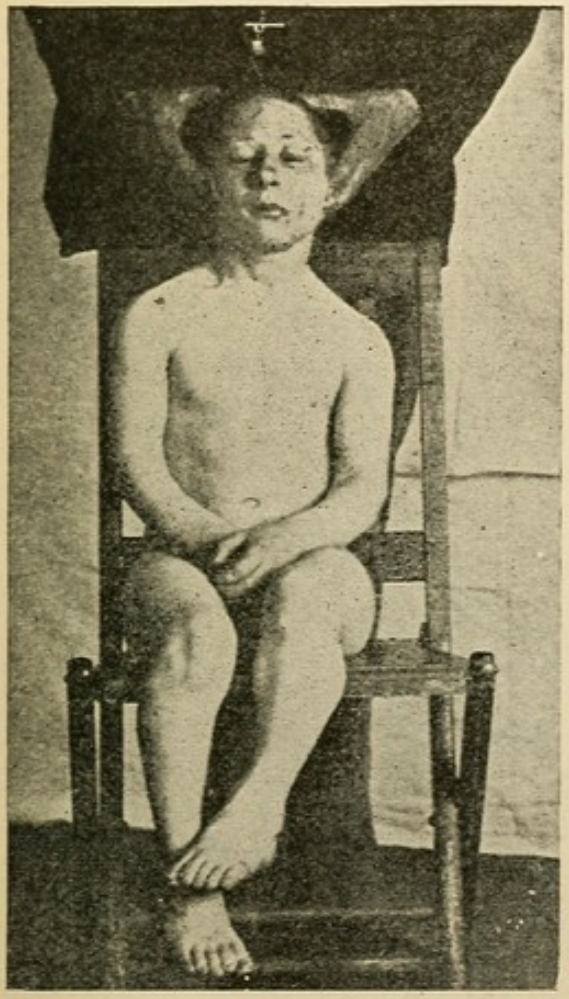


FIG. 100.—Congenital idiot of low grade (Mills).

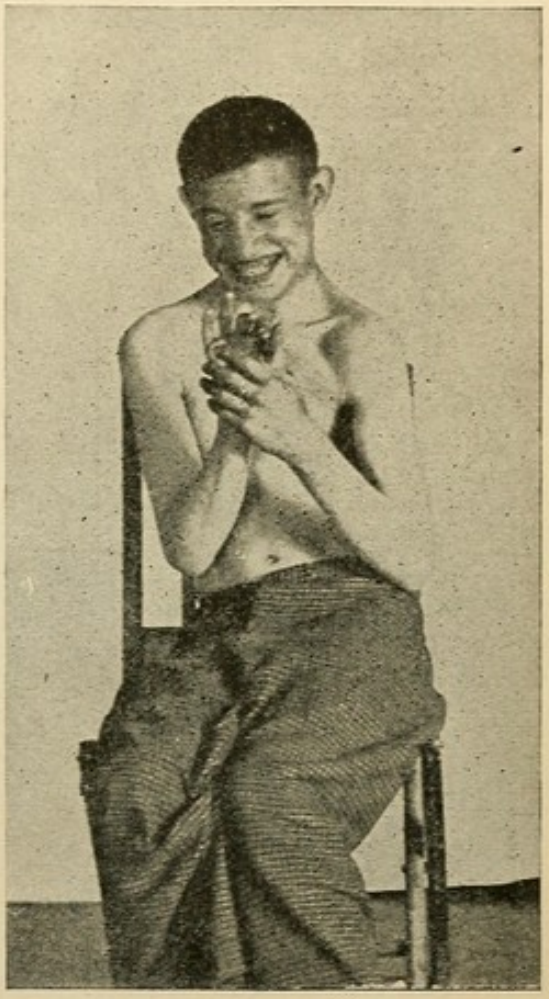


FIG. 101.—Epileptic imbecile (Mills).

8. **Mongolian idiocy** comprises about 5 per cent. of all idiots, and in it there are physical characteristics suggesting the Mongolian race, associated with mental and physical deficiency. They are usually born of older mothers, the average age being thirty-eight (Thomson). The head is short, small, and round, and the eyes have a decided slant, the outer canthus being higher than the inner, and there is often an

epicanthic fold at the inner canthus. There is often blepharitis. Adenoids are common, causing mouth breathing, and the tongue is usually large and protruded. The teeth are small and decay early, and the incisors may be set at an angle. The ears often lack the normal state and are smooth. The extremities are small, relaxed, and soft. The little finger has a curve. Congenital heart lesions are common. De-

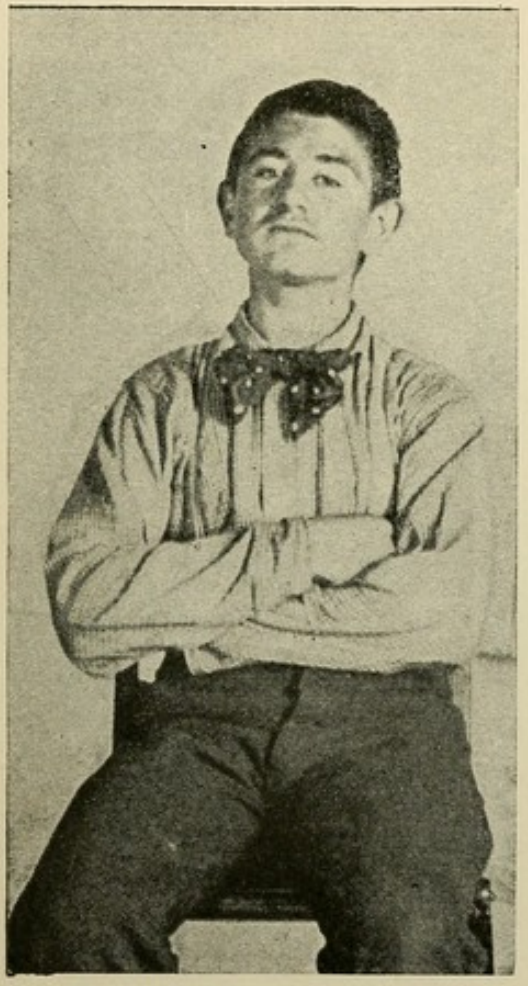


FIG. 102.—Insane imbecile (Mills).

FIG. 103.—Congenital idiot of low grade (Mills).

velopment is slow and they may not walk for several years. They learn to talk slowly and with difficulty. They are usually bright, mischievous, and learn to do a few tricks by imitation. The outlook is unencouraging, for while they may conduct themselves with fair propriety, they never become self-supporting.

9. **Cretinism.**—(See below.)

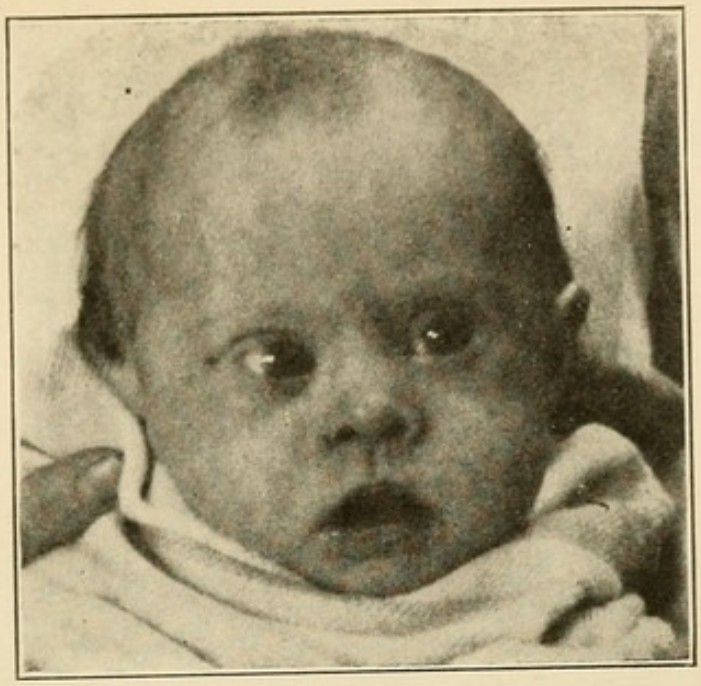


FIG. 104.—Mongolian idiot.

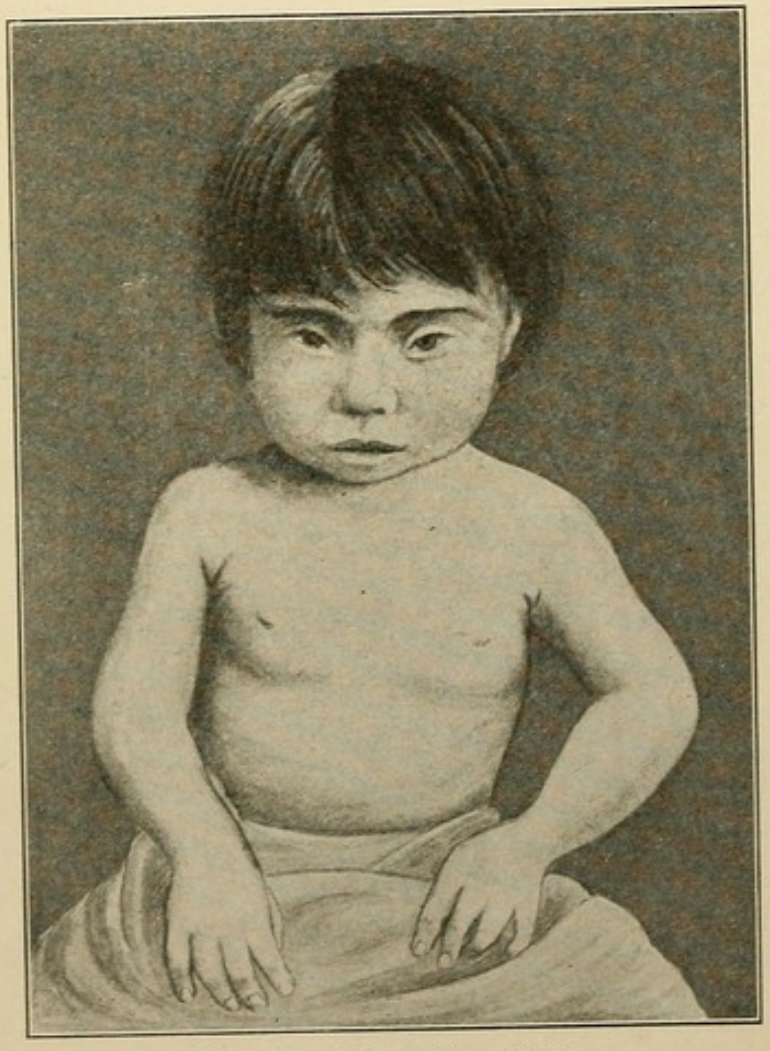


FIG. 105.—Mongolian idiot.

10. **Amaurotic Family Idiocy.**[1]—This is a pecu-

[1] Sachs, *New York Medical Journal*, May 30, 1896.

liar disease of unknown origin seen in Hebrew children, several cases often occurring in one family. It begins usually between the third and sixth month, and the men-

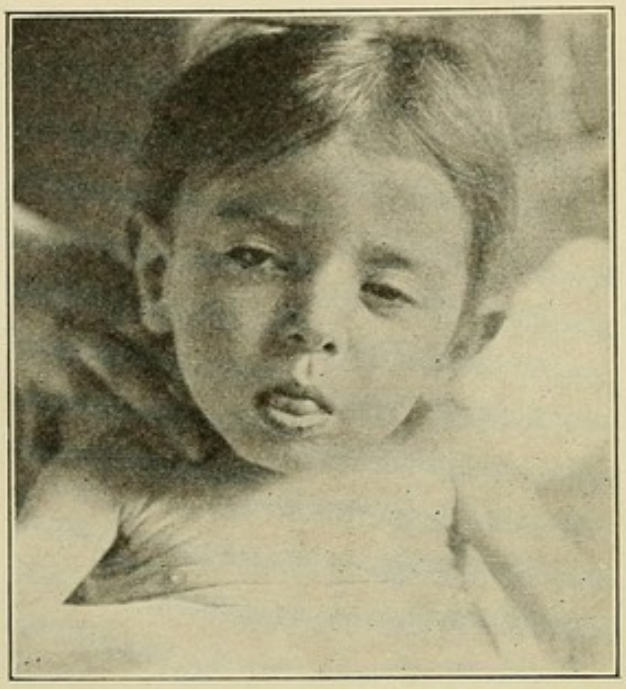


FIG. 106.—Amaurotic family idiocy, showing facial expression.

tal condition becomes that of a hopeless idiot. There is a vacant idiotic expression. The most characteristic thing is blindness, associated with optic atrophy and a red spot on the center of a red spot in the center of a bluish-white disk

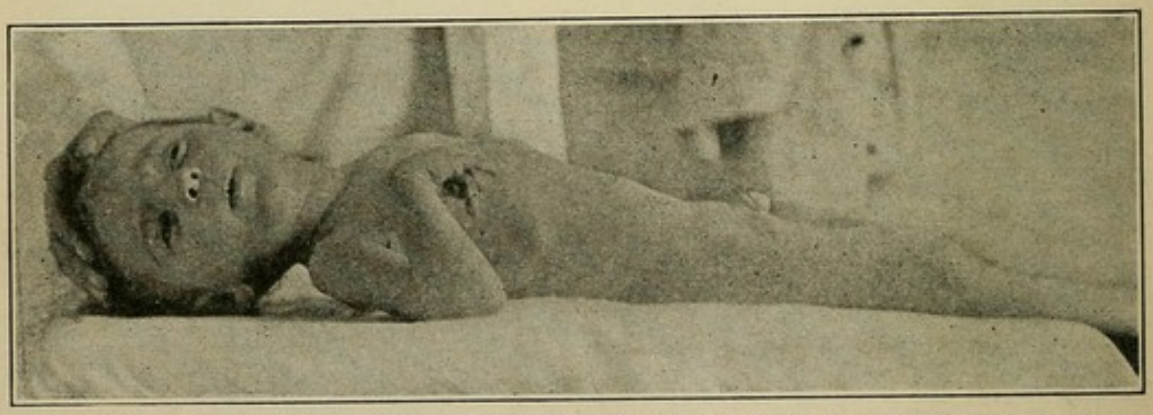


FIG. 107.—Amaurotic family idiocy, showing flaccid condition of the muscles.

on the site of the macula lutea. There is a relaxed, flaccid condition of the muscles of the entire body, occasionally spasticity, the reflexes are usually absent, but may be in-

creased. The child passes into a condition of malnutrition, and usually dies within a year.

The diagnosis is confirmed by ophthalmic examination.

The prognosis is hopeless, and there is no treatment known that influences the disease.

Diagnosis.—As a rule the exact grade of mentality cannot be estimated in a young infant, but mental deficiency may often be determined early by the presence of some marked physical accompaniment, as microcephalus, hydrocephalus, or spastic diplegia, and of recent years a great

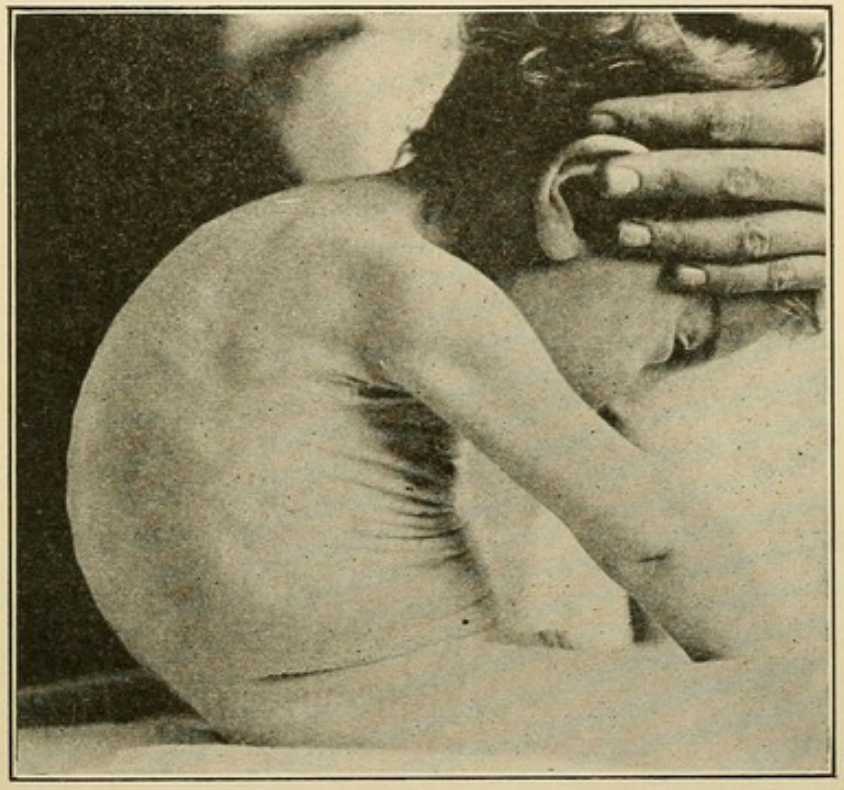


FIG. 108.—Amaurotic family idiocy, showing extreme relaxation.

deal has been written about the stigmata of degeneration (see same), or minor physical malformations which may be seen in otherwise normal children, but which in accordance with Warner's law of coincident development ("when any part or parts of the body present signs of defective development the brain is very apt to be defective likewise") are most frequent in the mentally deficient. Convulsions are frequent in idiots and imbeciles, and of considerable importance are the numerous abnormal gestures and actions, head rolling, and the like. There is sometimes constant crying

for no apparent cause, grimacing, or senseless laughter. The child cannot fix its attention, or only for very short periods. The development mentally, physically, and morally is always slow and irregular, even in the milder cases.

In estimating a child's mental condition it is important to bear in mind the effect of physical defects on its education, such as blindess, deafness, and other physical defects, also of the effect of serious, prolonged illnesses, and of the child's previous environment.

Prognosis.—Many of the mentally deficient die early, and the remainder may be divided into the hopeless cases and those who can be benefited by training.

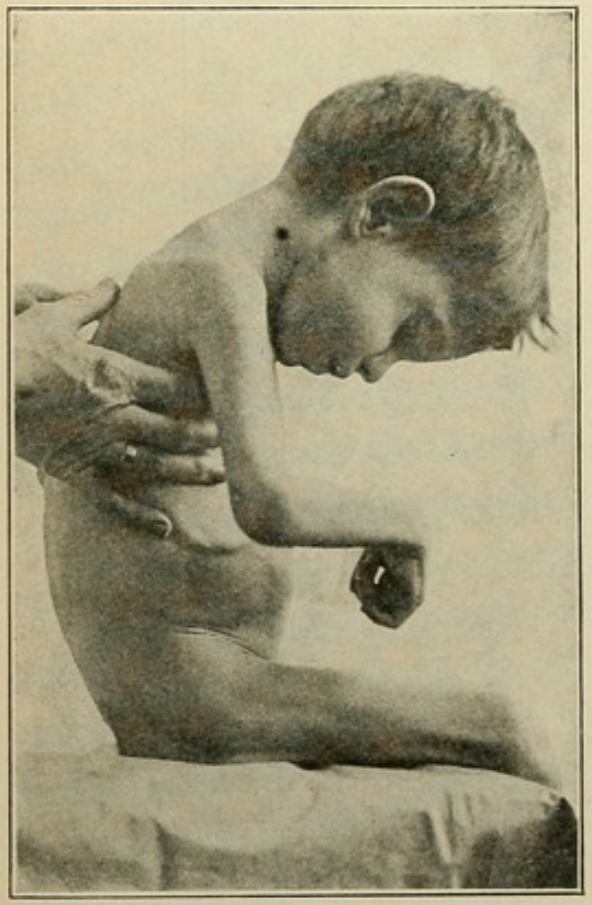


FIG. 109.—Idiot. Flaccid type.

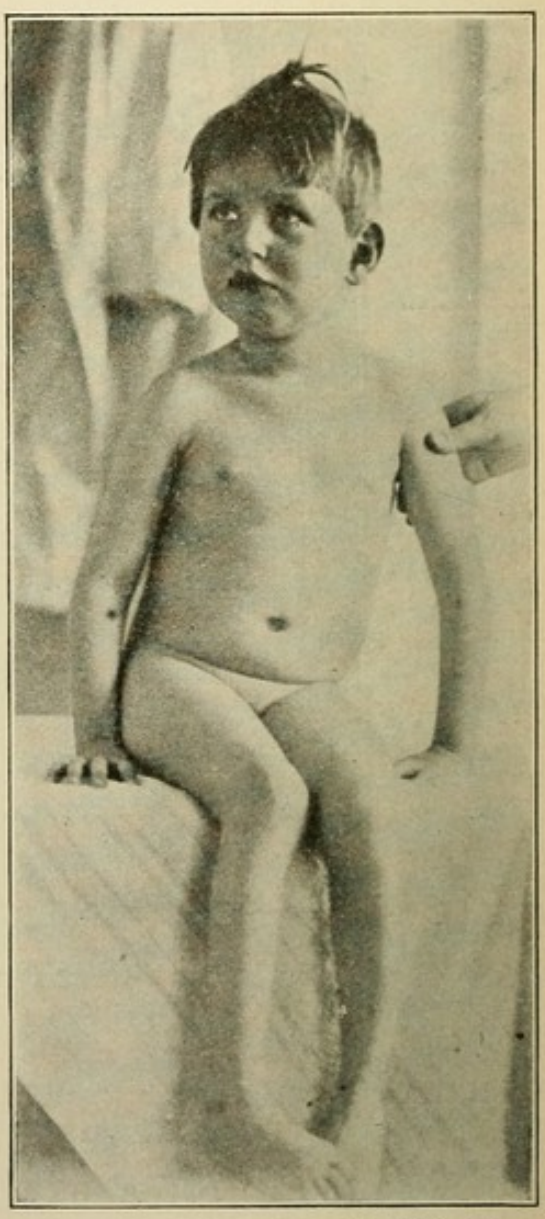


FIG. 110.—Idiot. Spastic diplegia.

Treatment.—The child's physical welfare should be cared for, suitable food, warm clothing in cold weather, baths,

and out-of-door life are all important. Adenoids should be removed, if present, and all physical ailments treated. Epileptics and cretins need especial treatment. Surgical operations on the head are of no value. Training of mind and body should be begun as early as possible, and various physical exercises carried out daily; all sorts of games and drills may be utilized. The child must be taught to chew his food, to wash and dress himself. Arouse his interest, if possible, by music, lights, pictures, and objects. Encourage

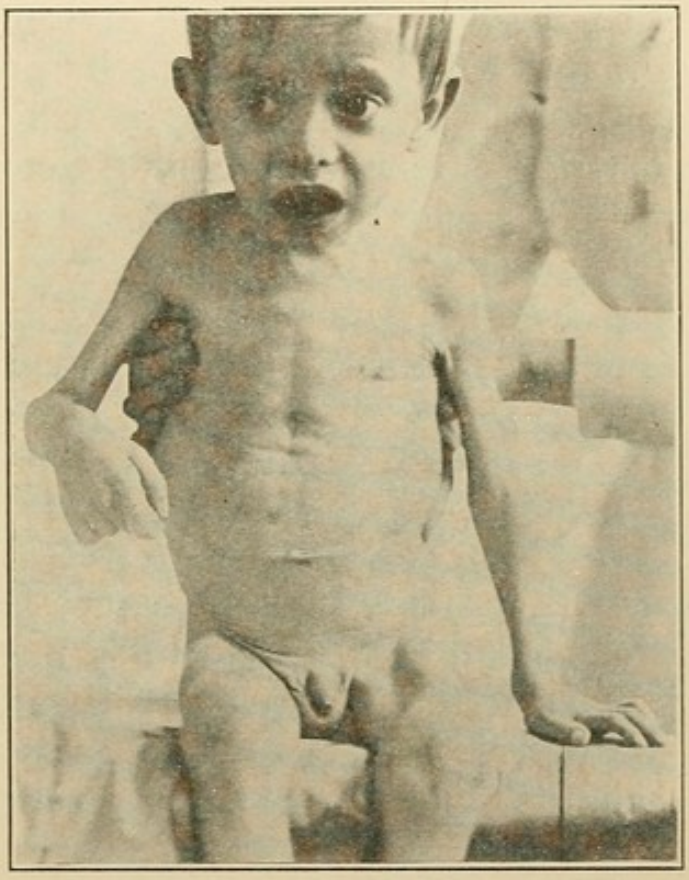


FIG. 111.—Idiot. Flaccid type.

him to play with things and to do things for himself. The acquisition of undesirable traits and habits, such as grimacing and making various movements and noises, should be discouraged. Self-control should be inculcated. In most instances these children do better in institutions of the right sort than at home. (See pamphlet, page 528.)

High-grade Imbeciles and the Morally Deficient.—These represent a very difficult class to deal with, as the

diagnosis and prognosis are difficult and uncertain. These children comprise those from the beginning of the school age up to puberty, and are represented by those children who are nearly normal, both physically and mentally, but who are slow in acquiring the difference between right and wrong, and who exceed the extreme limit that might reasonably be allowed for childish pranks and juvenile irresponsibility, and who persistently and repeatedly do so. Stealing, arson, destruction of property, masturbation, uncontrollable fits of temper are the more troublesome features. Sometimes the condition may be ascribed to previous environment or lack of control, and may be entirely overcome by proper training and development, but in my experience the majority of these cases represent high-grade imbeciles with a gloomy prognosis.

Treatment.—The child should be removed from its accustomed environment and placed in a good strict school. If possible, they should never be sent to institutions for the feeble-minded nor to penal institutions, as is often done.

CRETINISM.[1]

(Infantile or Juvenile Myxedema.)

Definition.—A chronic disease characterized by a retardation in development, both physical and mental, a curious edema-like condition of the subcutaneous tissue, and absence of disease of the thyroid gland. Cretinism may be endemic or sporadic. The sporadic form may be congenital or acquired.

Etiology.—The endemic form is seen in certain mountainous countries, in dwarfs with short bodies, legs, and arms, a low grade of mentality, a myxedematous condition of the subcutaneous tissue, and many of them have a goiter.

The sporadic form is found all over the world. The cause is unknown. The lesion or absence of the thyroid seems to be responsible for the retardation and myxedema. The acquired form may come on after the acute infections in which changes in the thyroid have taken place. It may follow removal of the thyroid by operation.

[1] Osler, *American Journal Medical Sciences*, 1897.

Pathology.—Absence, degeneration, or atrophy of the thyroid, or in some cases goiter, together with slow ossification and growth of the bones, and deposits in the subcutaneous tissue giving the reactions of mucin.

Symptoms.—These may come on at any time, but are usually not noticed until the second year.

In Early Infancy.—Sluggishness, torpor, low temperature, and cretin expression, puffy eyelids, open mouth, and pro-

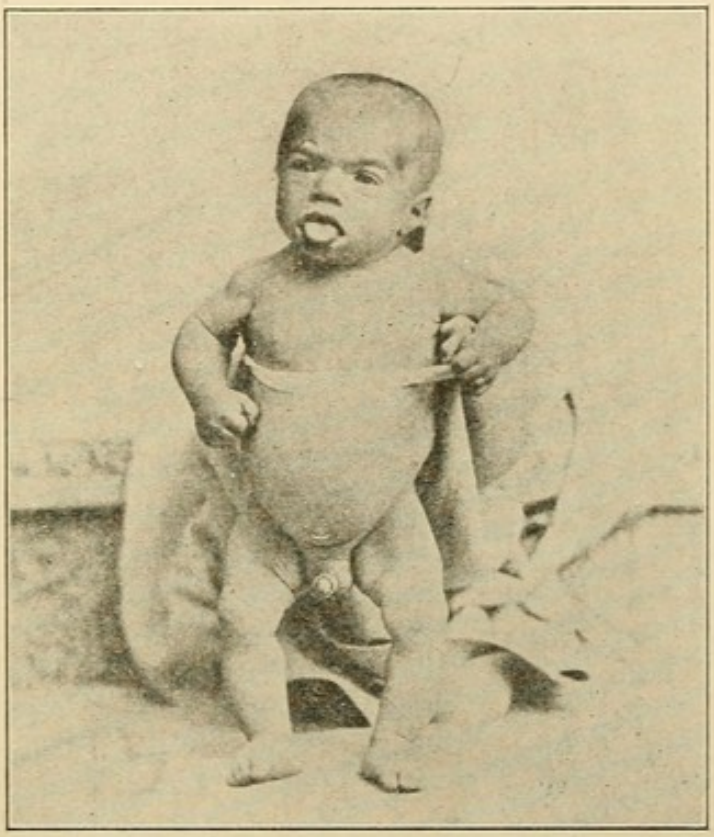


FIG. 112.—Sporadic cretin: before treatment. (From Osler, *Sporadic Cretinism in America.*)

truding tongue. There is hoarseness. The abdomen is prominent.

Later Symptoms.—In well-developed cretins the appearance is characteristic. The arms and legs are short; body seems too large and head much too large for the extremities. The fontanel is open for years. The expression is pig-like. The eyes are wide apart and the palpebral fissure is narrow. The eyebrows are scanty or wanting; the cheeks are prominent. The lips are thick, the mouth open, the tongue

large and protruding. There is drooling of the saliva. Dentition is delayed. The body and extremities are misshapen and lack the grace and proportion of normal infants. The hands are thick and broad; the abdomen prominent, the genitalia undeveloped. The skin is rough and there is an edematous condition which does not pit on pressure. Subcutaneous lipomata are common. The voice is hoarse. Some cretins are deaf and dumb. Constipation is present. Walking is begun late. A cretin of twenty may resemble a child

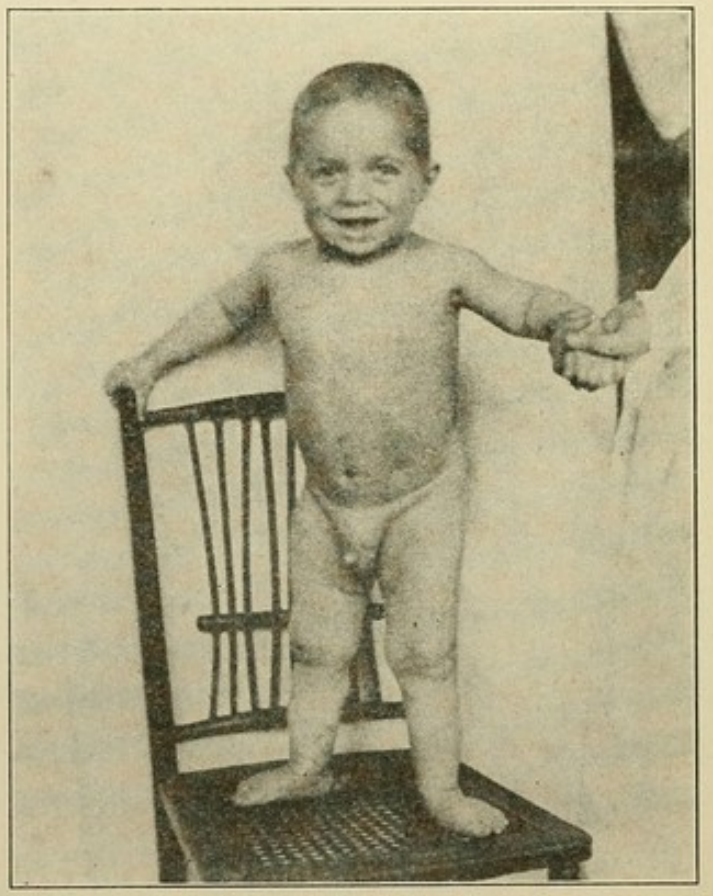


FIG. 113.—Sporadic cretin: after treatment. (From Osler, *Sporadic Cretinism in America.*)

of a few years of age, both in stature and mentality. The mental condition of cretins is one of apathy and little or no development.

Partially developed cases of cretinism (myxedeme fruste) are sometimes seen. They show the symptoms partially developed.

Diagnosis.—Late dentition, open fontanel after two

years, with mental inactivity, and the changes described above make the diagnosis easy.

Differential Diagnosis.—*Mongolian Idiocy.*—The Mongolian type of face, brighter mentality, and no myxedema.

Infantilism.—(See same.)

Achondroplasia.—(See same.)

Prognosis.—If untreated, hopeless. They remain idiots and usually die before thirty from some other disease. Treated early, the outlook is most promising for full recovery; treated late, the results are not satisfactory.

Treatment.—The internal administration of tablets of the thyroid gland. Small doses increased gradually to 5 grains three or four times a day, or even larger doses. Too much causes rapid pulse, flushing, and fever. Changes begin to take place in a month or six weeks. The child becomes natural in appearance and develops mentally and physically. After the normal appearance and development is reached, reduce treatment to two 5-grain tablets a week. This must be continued. If it is stopped, symptoms of cretinism return in a month or six weeks. Small portions of thyroids are sometimes grafted into cretins.

INFANTILISM.[1]

A condition in which the appearance of infancy or childhood is preserved in the adult. Sexual development is backward, absent, or perverse. Lamy gives the following description: "The face is rounded and chubby; the lips prominent and plump, the nose poorly developed, the face smooth, the skin fine and of a clean color, the hair fine, the eyebrows and lashes sparse, the trunk long and cylindrical. The abdomen is somewhat prominent, the arms and legs plump and tapering from the trunk to the extremity. A layer of adipose tissue surrounds the body and marks the bony and muscular prominences. The genital organs are rudimentary. There is an absence of hair on the pubes and axillæ. The voice is shrill and piercing. The larynx is

[1] W. B. Ransom, "Infantilism," *Practitioner*, September, 1906, p. 339.

poorly developed and the thyroid small." These cases may be mistaken for cretinism by careless observers.

ACHONDROPLASIA.[1]

(Fetal Rickets; Fetal Myxedema.)

A curious form of dwarfism, usually congenital, but exceptionally appearing a few years after birth. Most cases

FIG. 114.—Achondroplasia (case of Dr. West and Piper, courtesy of the *Archives of Pediatrics*).

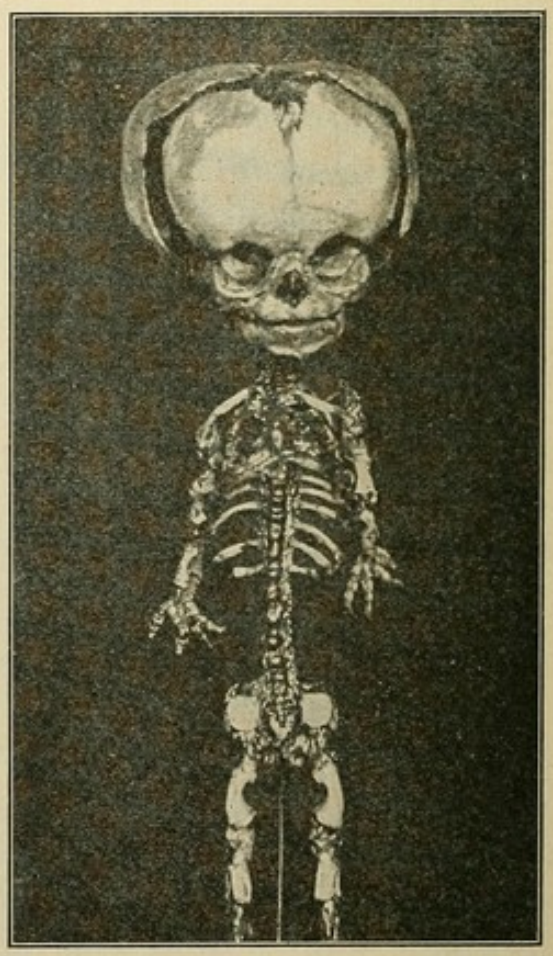


FIG. 115.—Achondroplasia: Skeleton.

are born dead or die soon after birth, but some live to old age. They have large heads, very short arms and legs. The humerus and femur are liable to be very short. The trunk

[1] Rankin and Mackay, "Achondroplasia," *British Medical Journal*, June 30, 1906, p. 1518. C. Herrman, "Achondroplasia, Mongolism, and Cretinism, Diagnosis of," *Archives of Pediatrics*, 1905, p. 493. Thomson, "Achondroplasia, Clinical Features," *Edinburgh Medical Journal*, June, 1893.

is small and normal. The epiphyses of the long bones are enlarged, the shafts normal. The hands are short and spade-like and the fingers deviate ("Trident Hand"). The intellect is about that of a child of the same size; occasionally the intellect is fair. They are mischievous and, unlike most dwarfs, have strong sexual instincts.

DWARFISM.

This may be due to a variety of causes, among them cretinism, infantilism, mongolism, achondroplasia, and rickets (see same). It may also be due to prolonged periods of

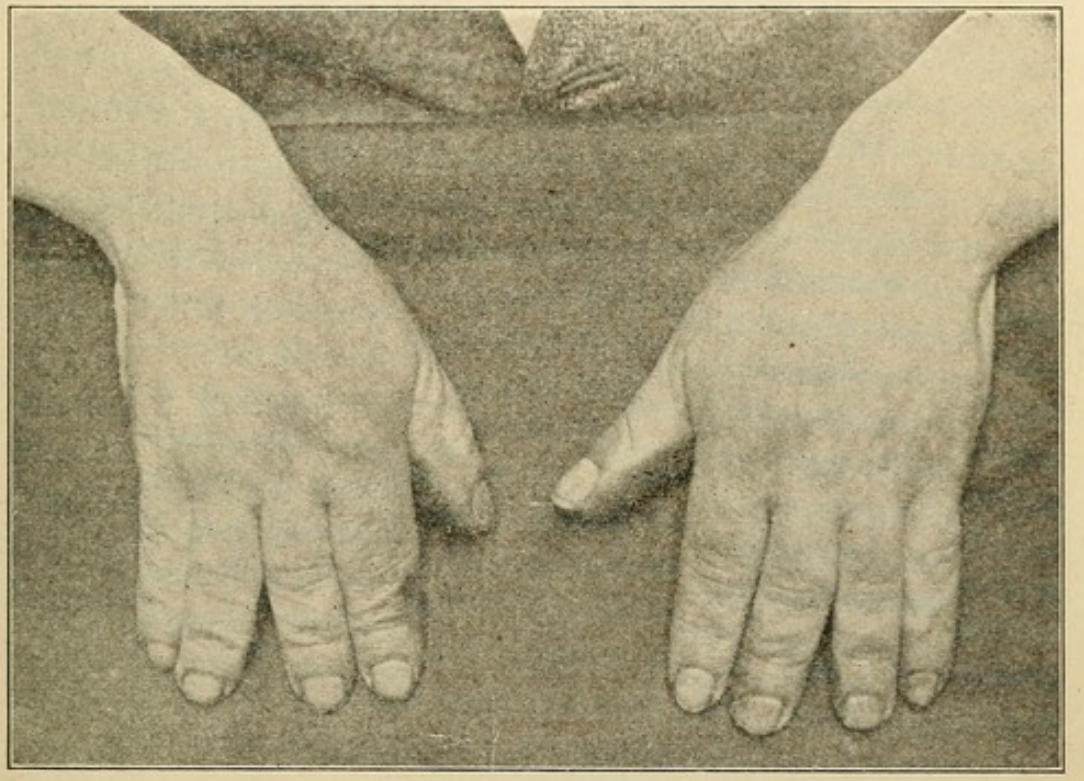


FIG. 116.—Achondroplasia: Trident hand.

underfeeding, especially when combined with bad hygienic surroundings. Prolonged stomach or intestinal disease, syphilis, severe disease of liver or pancreas, chronic heart or lung disease, and certain forms of congenital brain defects may also at times cause dwarfing. There is no specific treatment except in the case of cretinism, but thyroid extract may be cautiously tried in all forms of dwarfing, as occasionally a defective thyroid may cause slow growth and little else. Syphilis should be treated if it exists, and other disorders relieved if possible.

CLEIDOCRANIAL DYSTOSIS.[1]

This is a rare congenital condition in which there is an enlarged cranium and small face bones, a late closing fontanel, and an entire or partial absence of the clavicles, so that the shoulders may be brought together in front of the body. There may be other defects of the bones. The soft parts are normal and the mental condition usually good. The disease most often occurs in families. There is no treatment.

INSANITY.

Comparatively little is known concerning the psychoses of infancy and childhood. In insanity the mind has been previously sound. Insanity is rare in childhood. The same forms are met with as in adults, mania being the most frequent. Epileptic children often show symptoms of mental disease, and the same is true of defective children.

Etiology.—Infectious diseases, neurotic taint, reflex disturbances, and mental strains are the most frequent causes.

Symptoms.—These are somewhat similar to the adult form of mental diseases.

Prognosis.—Good in acute cases with proper treatment. Where the insanity is hereditary the prognosis is bad.

Treatment.—As in adults.

DEVELOPMENTAL OR JUVENILE GENERAL PARALYSIS.[2]

This is a mental deterioration resembling closely the general paresis of adults. It is usually syphilitic in character. It usually comes on in children who have previously shown some mental defects. Once started, the course is progressive. The symptoms vary considerably, but in younger children there is usually spastic diplegia and often convulsions. There may be optic atrophy, the pupils may be unequal, and there may be an Argyll-Robertson pupil. There may be a tremor. The speech is affected as in adults.

[1] Schorstein, *Lancet*, January, 1899, p. 10, and G. Carpenter, *Ibid.*, p. 13.
[2] Thomson and Welch, *British Medical Journal*, April 1, 1899.

The knee-jerks may be exaggerated and later lost. The plantar reflex may be extension. The disease lasts several years and terminates fatally.

No treatment known has any effect.

STIGMATA OF DEGENERATION.

Stigmata of degeneration are signs of physical, mental, or moral degeneracy, and are to be regarded as indicating a

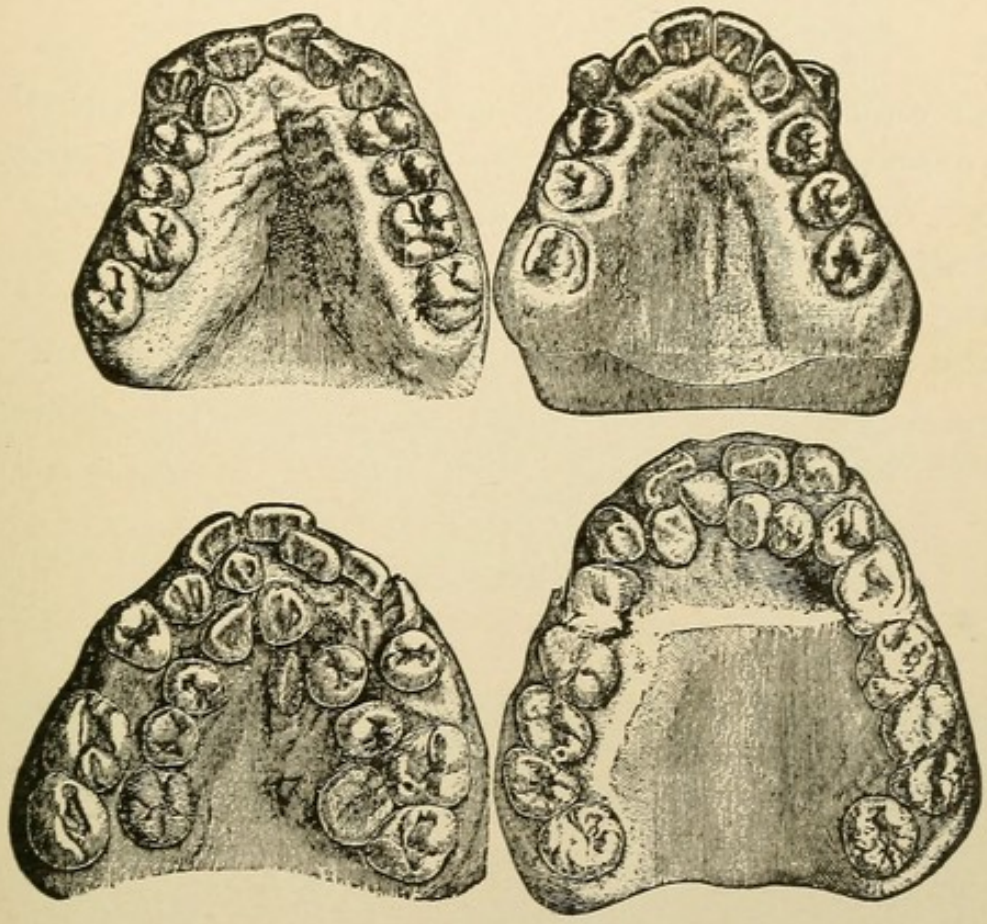


FIG. 117.—Dental irregularities in idiocy and degeneration (Talbot, *Gaillard's Medical Journal*, 1902).

neuropathic taint. Some of the following are always to be regarded as signs of degeneracy, others only when associated. They are divided into anatomic, physiologic, and psychic.

Anatomic.—Facial asymmetry, very high arched or other deformities of the palate, pigmentary retinitis, and deformities of the ear and genitalia are among the more important ones. Anomalies or malformations of any of the

organs, infantilism, gigantism, and dwarfism are also to be regarded.

Physiologic.—Hysteria, epilepsy, tics, tremors, migraine, hyperesthesia, color-blindness, and speech disturbances are the most important. Anomalies of the function of any organ may also be considered.

Psychic.—Imbecility, idiocy, insanity, moral delinquency, and sexual perversion are the most important.

DEAF-MUTISM.[1]

This may be congenital or acquired. The acquired form follows scarlet fever, cerebrospinal fever, or other infectious diseases, or it may be due to otitis from other causes.

Treatment.—Educating what little hearing remains and teaching the child to talk. This is best commenced at three years of age, and the child should be in an institution.

[1] Drummond, "The Early Care of the Deaf and Dumb," *Pediatrics*, December 15, 1901, p. 440.

DISEASES OF THE SPINAL CORD.

MALFORMATIONS.

Spina bifida is the most important. The most frequent form is *meningomyelocele* (fluid in the meningeal sac) of the

FIG. 118.—Spina bifida.

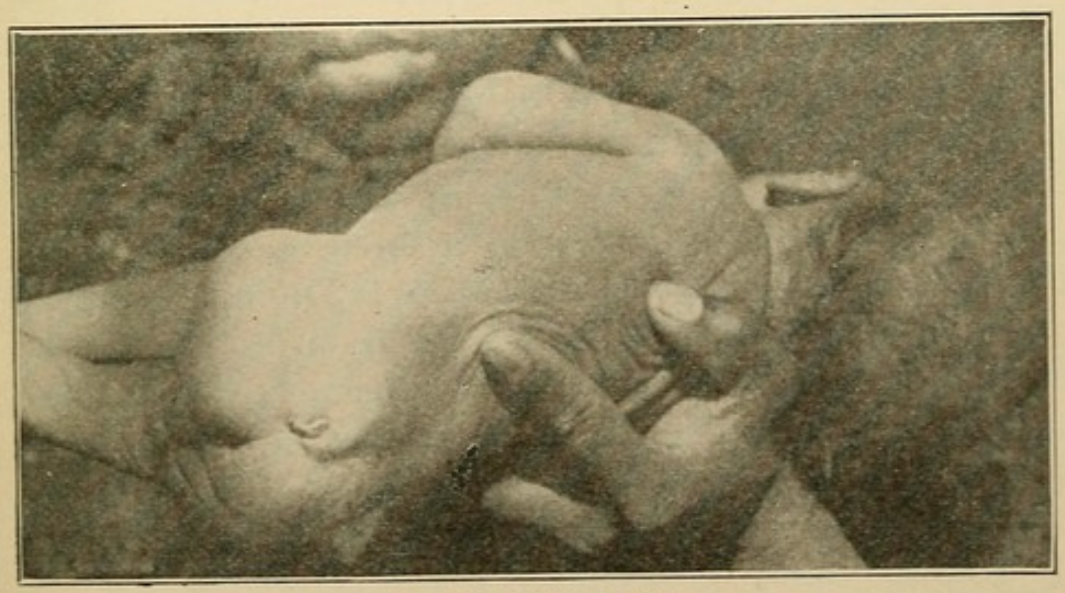


FIG. 119.—Spina bifida.

sacrolumbar region. *Meningocele* or *syringomyelocele* (the fluid is accumulated in the central canal of the cord) may

fluid is accumulated in the central canal of the cord) may also be occasionally seen. Other malformations may be present. The tumor is present at birth and tends to increase in size. Rupture may take place, and death result from infection or secondary infection.

Prognosis.—Meningocele covered by skin may be cured. In meningo-encephalocele the prognosis is bad, especially if there is paralysis, and hopeless if there is hydrocephalus. Syringomyelocele is hopeless.

Diagnosis.—Meningocele gives usually a pedunculated translucent tumor; meningomyelocele, a sessile tumor having a central scar or umbilication, is frequently associated with paraplegia, and a fissure can be felt in the spine; syringomyelocele is usually associated with hydrocephalus.

Treatment.—Protect from rupture. Operations should be done if there is no paralysis or hydrocephalus or severe associated conditions.

SPINAL MENINGITIS.

Definition.—Inflammation of the spinal meninges.

Etiology.—Most frequently associated with cerebral meningitis, or myelitis, occasionally traumatic. External pachymeningitis follows spinal caries.

Symptoms.—These are due to pressure on the nerve roots or cord itself. The most marked are rigidity of spine and muscles of extremities, pain in the course of the nerves pressed upon, tenderness over the spine, and from cord-pressure, paralysis, atrophy, and anesthesia.

Diagnosis.—Irritative symptoms point to meningitis, marked paralysis and anesthesia to myelitis.

Treatment.—Rest, immobilization of spine, counter-irritation; internally, iodid of potassium.

MYELITIS.

Definition.—An inflammation of the spinal cord.

Etiology.—In children it is usually either acute poliomyelitis or compression myelitis. Acute myelitis may be traumatic or follow the infectious diseases. Chronic myelitis is seen in hereditary syphilis.

Symptoms.—Acute poliomyelitis and compression-myelitis are given below. Symptoms depend upon the location of the lesion. There are "girdle pains" at the level of the lesion and loss of reflexes. Below the lesion the reflexes are increased. There may be loss of control of bladder and rectum, contracture or flaccidity of the muscles, reaction of degeneration, and bed-sores. Localizing symptoms are exactly the same as in adults.

Prognosis.—Bad. The course is chronic and progressive; death usually results from intercurrent disease.

Treatment.—Rest; counterirritation. Iodid of potassium should be given in large doses after the acute stage is passed.

COMPRESSION MYELITIS.

(Pott's Paraplegia; Pressure Paralysis of the Cord.)

Definition.—Myelitis due to pressure on the spinal cord.

Etiology.—Nearly always from tuberculous caries of the spine; exceptionally from tumor or aneurism. It may follow injury.

Pathology.—The cord is usually compressed in the angle of the spine caused by the caries, or from inflammatory products between the cord and spine, or both together. The cord becomes inflamed and degeneration may take place.

Symptoms.—Spastic paralysis and increased reflexes of slow onset usually affecting the legs only; in cervical caries, legs and arms. Radiating pains and other symptoms, as in myelitis, are present.

Diagnosis.—From other forms of myelitis, by the presence of deformity, where this does not exist by absence of other causes of myelitis, tenderness over the spinal processes, and pain with the paralysis are of value.

Prognosis.—This depends largely on the course of the original bone disease. Cervical cases are more serious than lower ones. The motor symptoms, as a rule, persist longer than the sensory ones.

Treatment.—This is surgical, usually by orthopedic appliances, plaster casts and the like.

TUMORS OF THE SPINAL CORD.

These are very rare in childhood and present the same symptoms as in adults. They may be mistaken for Pott's disease. The diagnosis is not made in infants during life.

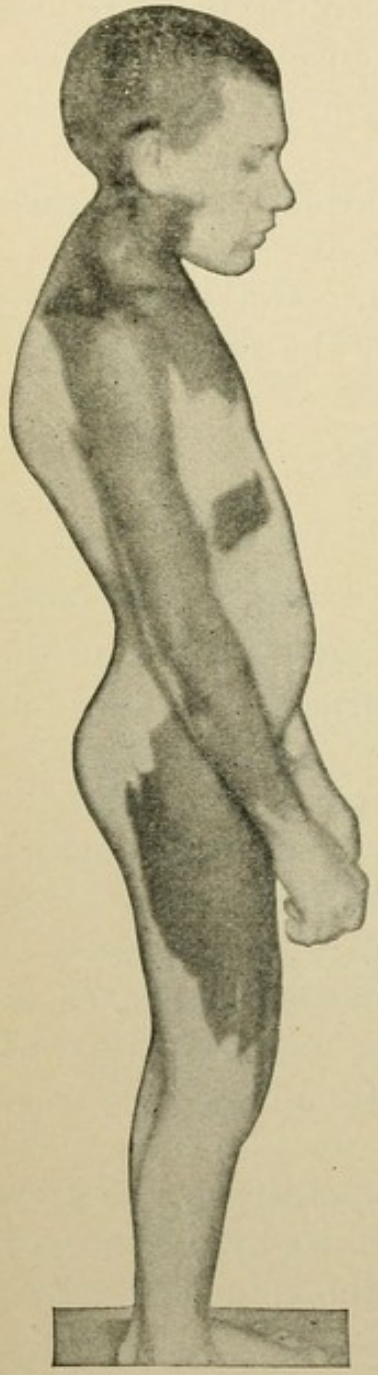


FIG. 120.—Case of syringomyelia with areas of thermo-anesthesia marked in black. There is cervical kyphosis (Church).

SYRINGOMYELIA.

This is occasionally seen in early life. There is dilatation of the central canal of the spinal cord, with or without the pressure of glioma. There is progressive paralysis with atrophy. Cyanosis or other vasomotor disturbances; trophic changes are frequent ulcerations, bullæ and even gangrene causing deformities. The deformities in the hands are asymmetric. There is loss of pain and temperature-senses, while the ordinary touch-sensation is unaffected. The course is exceedingly chronic and nothing influences the course of the disease.

HEREDITARY ATAXIA.[1]

(Friedreich's Ataxia.)

Definition. — An hereditary or family disease characterized by ataxia.

Etiology.—It begins in early life between infancy and puberty. In some cases the hereditary factor cannot be found.

Pathology.—There are imperfect development of the cord and sclerosis of the lateral and posterior columns.

Symptoms. — Usually begins in legs; child walks with legs far apart and has a staggering gait.

[1] Batten, "Ataxia in Childhood," *Brain, Autumn and Winter Number*, 1905, p. 484.

Later arms are affected and there is general ataxia. There is a nodding of the head and a coarse tremor, nystagmus, scanning speech, muscular weakness, scoliosis, little or no disturbance of sensation, a hollow foot with marked extension of the big toe. The deep reflexes are usually lost.

Diagnosis.—From locomotor ataxia by the absence of Argyll-Robertson pupil, pains, crises and anesthesia, and the presence of nodding, nystagmus, altered speech, and general incoördination.

Multiple sclerosis is distinguished by the marked intentional tremor, spastic gait, increased reflexes, and ocular paralysis.

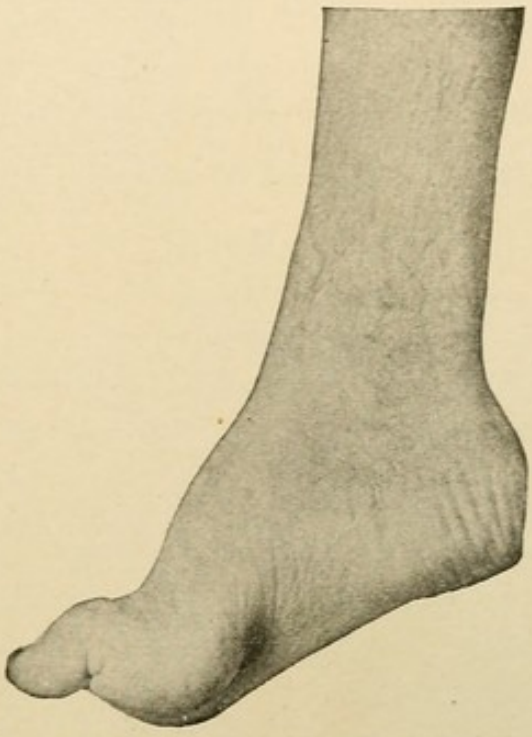


FIG. 121.—Clubbed foot of Friedreich's disease, showing shortened arch and retracted great toe (Church).

Prognosis.—The disease gets steadily worse, and in a few years the patient is crippled and, later, becomes demented.

Treatment.—Symptomatic.

CEREBELLAR HEREDITARY ATAXIA. (Marie.)

This is an hereditary affection in which the lesions are in the cerebellum. It comes on about puberty or later, and is

distinguished from Friedreich's ataxia by the presence of increased patellar reflexes, absence of scoliosis and trophic changes.

LANDRY'S PARALYSIS.

(Acute Ascending Paralysis.)

This is rare in children. It is characterized by a flaccid paralysis, beginning in the legs and progressing rapidly upward, affecting all or almost all the muscles of the body. The reflexes are lost, and there may be some disturbance of sensation. Almost all the cases die within a week or two. Recovery may take place with disappearance of the paralysis.

ATROPHIES OF NERVOUS ORIGIN.

(Progressive Central Muscular Atrophy.)

These are rare in early life, usually coming on after puberty. They are due to changes in the motor cells of the cord and

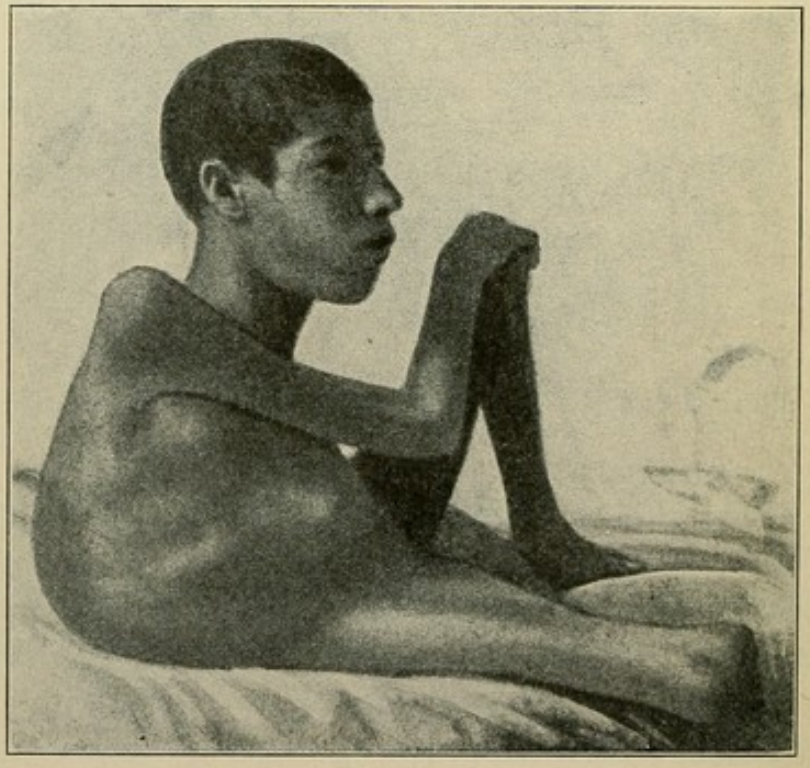


FIG. 122.—Kyphoscoliosis in extreme muscular atrophy.

are characterized by their starting in the periphery (usually in the hands), the presence of fibrillary contractions, and the

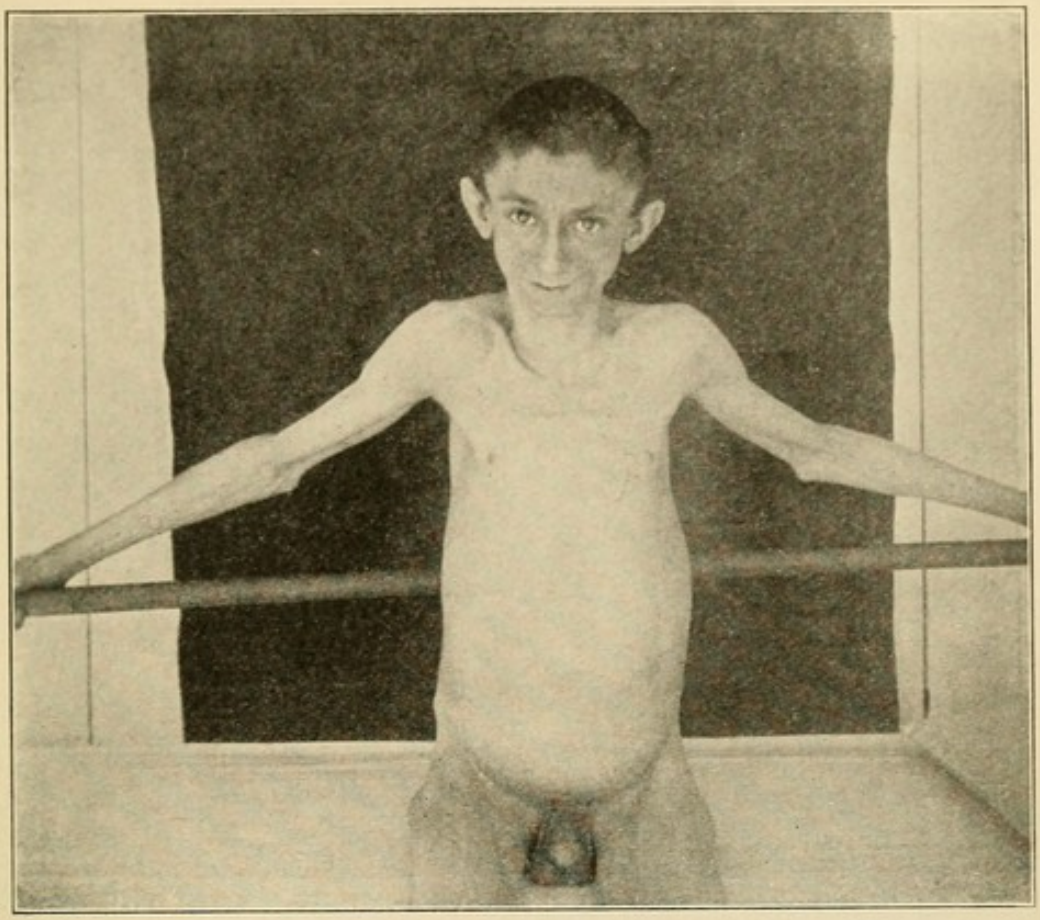


FIG. 123.—Extreme muscular atrophy.

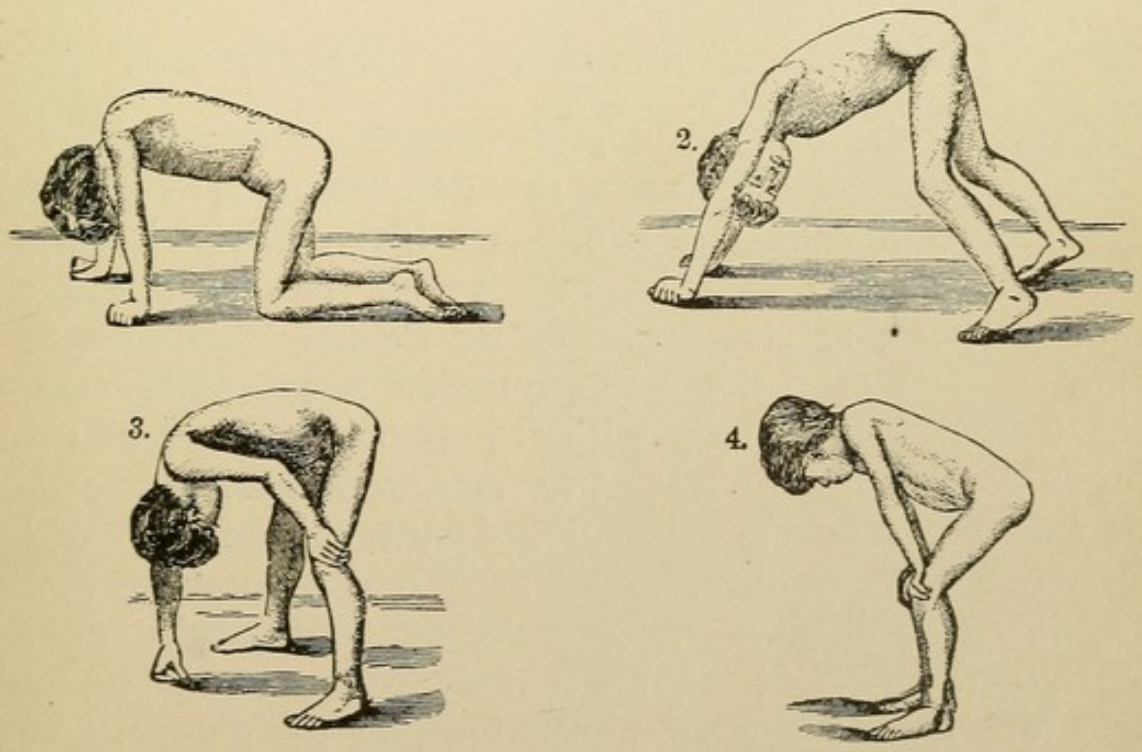


FIG. 124.—Pseudohypertrophic muscular paralysis: Postures in rising to the erect position (Gowers).

reaction of degeneration. Their course is usually progressive and slow, but it may be rapid.

There are several types, as follows:

Muscular Atrophy of the Duchenne-Aran Type.—Beginning in the hands and extending to the other muscles of the body. The lesion in this is a chronic anterior poliomyelitis. There is chronic progressive atrophy of the muscles, and the tendon reflexes diminished or abolished.

Amyotrophic Lateral Sclerosis (*Charcot's Disease*).—Where there is progressive muscular atrophy with increased tendon reflexes.

Glosso-labial-laryngeal Paralysis.—Bulbar paralysis—often seen at a late stage of the preceding.

Syringomyelia.—(See same.)

Chronic Anterior Poliomyelitis of Childhood (Werdnig, 1891).—A family disease beginning in infancy, characterized by progessive muscular atrophy and great muscular weakness. It resembles in a general way the adult type of the disease, but the following contractions are wanting, and the reaction of degeneration may or may not be present. It progresses slowly, death usually taking place within four years.

The Progressive Muscular Dystrophies.

These have certain features in common. They are seen in early life; the spinal atrophies usually come on after puberty. Hereditary influences are common. The atrophy is usually symmetric and affects the muscles of the limbs near the trunk earlier and to a greater extent than the distal muscles. Fibrillary contraction of the muscles is generally absent. The tendon reflexes vary with the amount of muscular disturbance. There are frequently contractions of portions of the muscle. There may be marked retraction of some of the muscles causing deformities. There is a diminution of the electric excitability of the muscle, but no reaction of degeneration. They have an extremely slow course. In some there may be at the outset hypertrophy of the muscle.

Forms of the Disease.—Facial-scapulohumeral Type

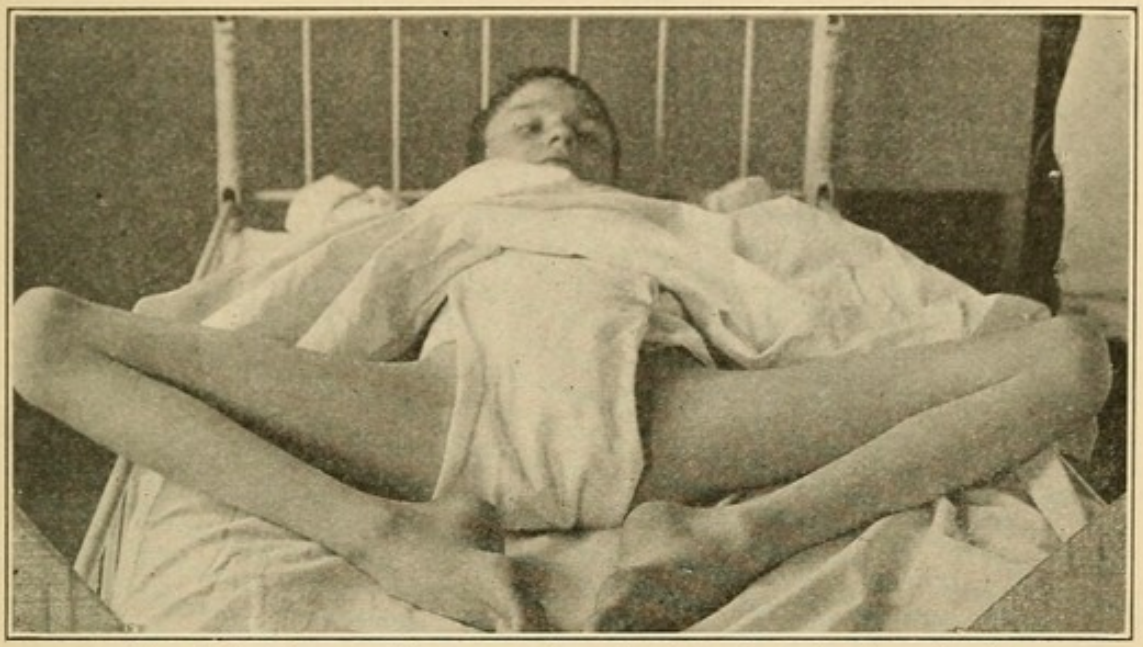


FIG. 125.—Progressive muscular atrophy, showing hypotonia.

(Landouzy-Dejerine).—(*Progressive Muscular Paralysis of Childhood*, of Duchenne of Boulogne.) — The muscles of the face and the scapulohumeral group are first affected. The expression is characteristic, the lips not partaking in the atrophy; there is the so-called "tapir face"; there is the "wing scapula." Later the other muscles of the body atrophy.

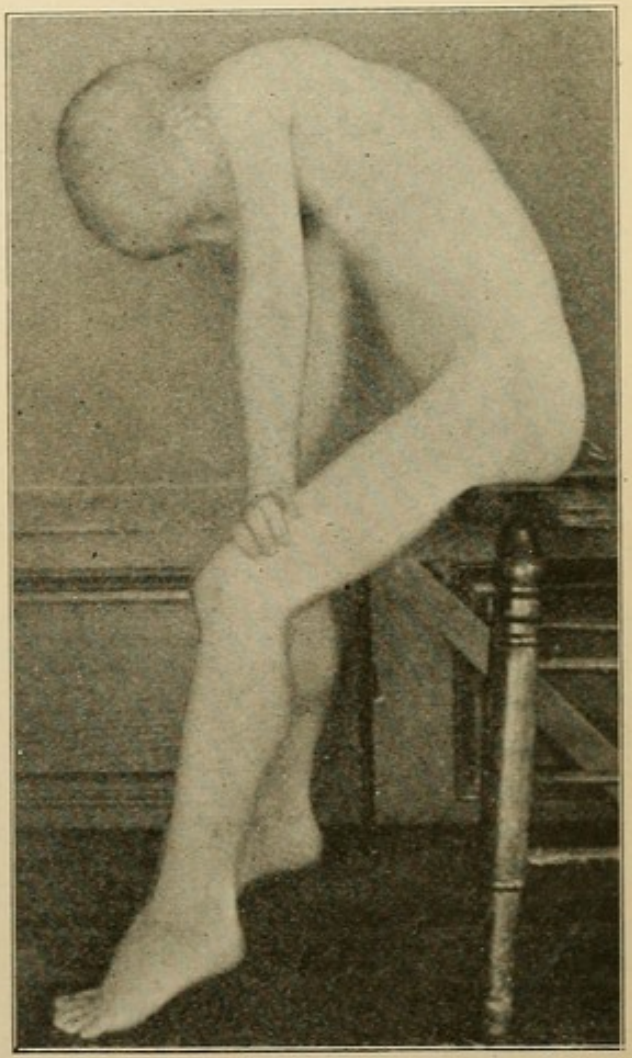


FIG. 126.—Pseudohypertrophic paralysis.

Scapulohumeral Type (Erb).—Same as above, except face is not affected early.

Pseudohypertrophic Paralysis (Duchenne) (*Muscular Pseudohypertrophy*).—This is more frequent in boys. In this form there is at the start an hypertrophy of some of the muscles, especially of the calves of the legs, but often of other muscles. There is marked loss of

power. When lying on the floor they get up by "climbing up," as it were, by resting the hands on the legs. Later there is atrophy.

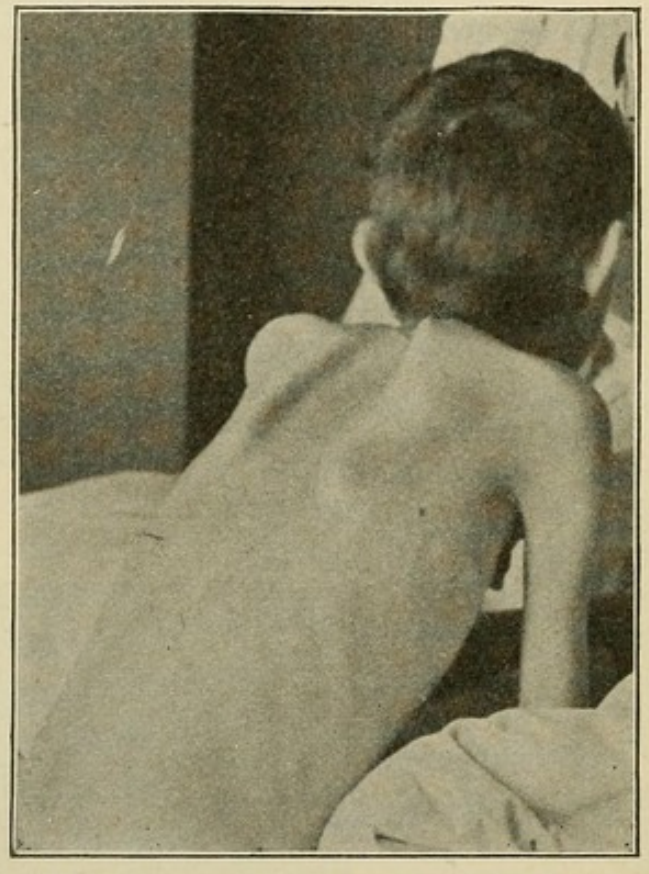


FIG. 127.—"Winged scapulæ" in progressive muscular atrophy.

Prognosis.—The outlook is bad. The disease, as a rule, gets progressively worse. Occasionally it is arrested.

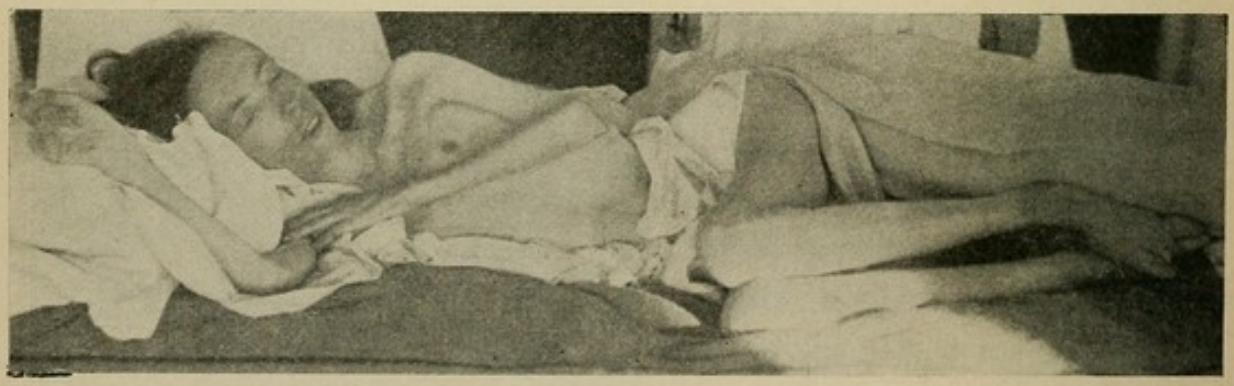


FIG. 128.—Progressive muscular atrophy (Aran-Duchenne type).

Treatment.—Massage, electricity, and general hygiene.

PERONEAL MUSCULAR ATROPHY (Charcot-Marie).

Progressive Neuritic Muscular Atrophy (Hoffman.)

A disease beginning in early life with marked atrophy of the muscles of the feet and legs ; later the hands and forearms

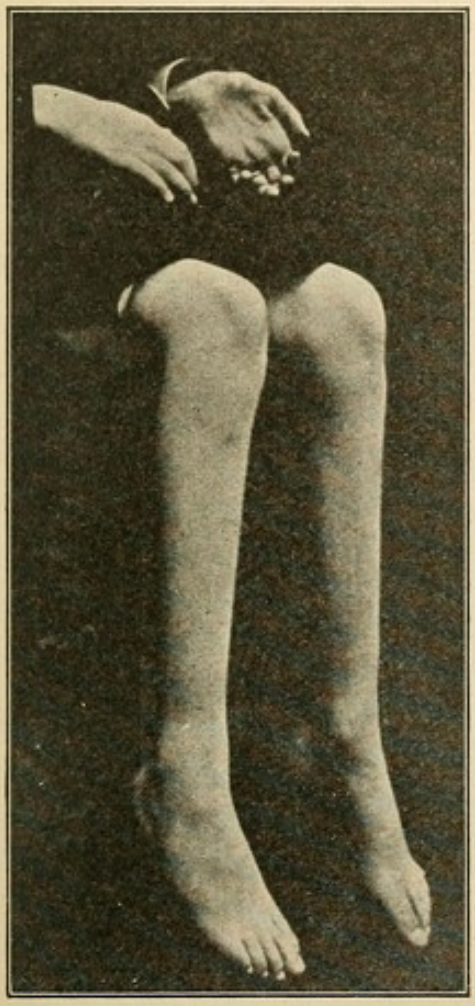


FIG. 129.—Hands and feet in muscular atrophy of the Charcot-Marie type.

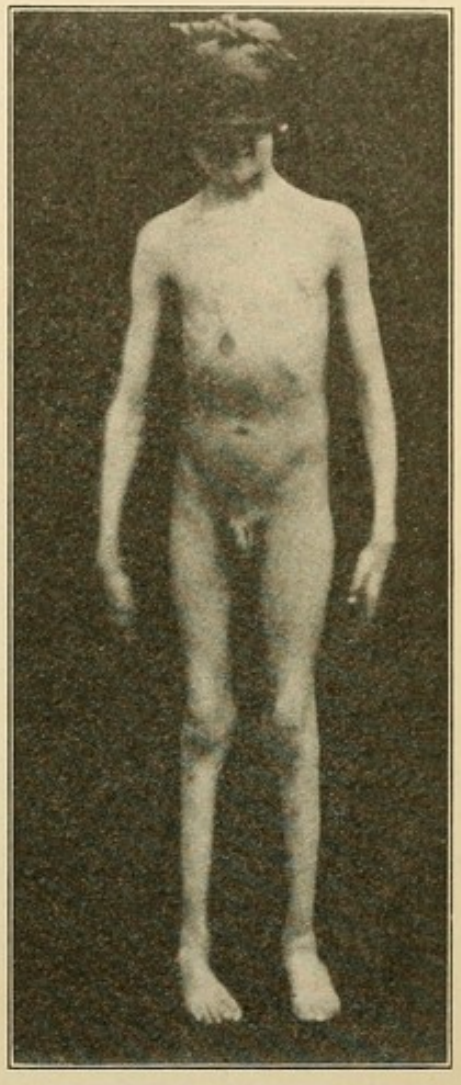


FIG. 130.—Muscular atrophy of the Charcot-Marie type (P. Marie).

are involved. The atrophy is extreme. The tendon reflexes are abolished. Sensation is normal or slightly disturbed. There is frequently a distinct family tendency.

HYPERTROPHIC INTERSTITIAL NEURITIS (Dejerine and Sottas).

This is a disease beginning in early life, sometimes occurring as a family disease. It resembles the preceding, with the addition of shooting pains, disturbances and retardation

of sensation, kyphoscoliosis, Argyll-Robertson pupil, and marked ataxia. There is distinct hypertrophy of the peripheral nerves. Late in the course of the disease there is the clinical picture of locomotor ataxia.

MULTIPLE NEURITIS.

Definition.—An inflammation of the peripheral nerves. It may affect several nerves, usually symmetrically, or it may be general.

Etiology.—Diphtheria and occasionally the other infec-

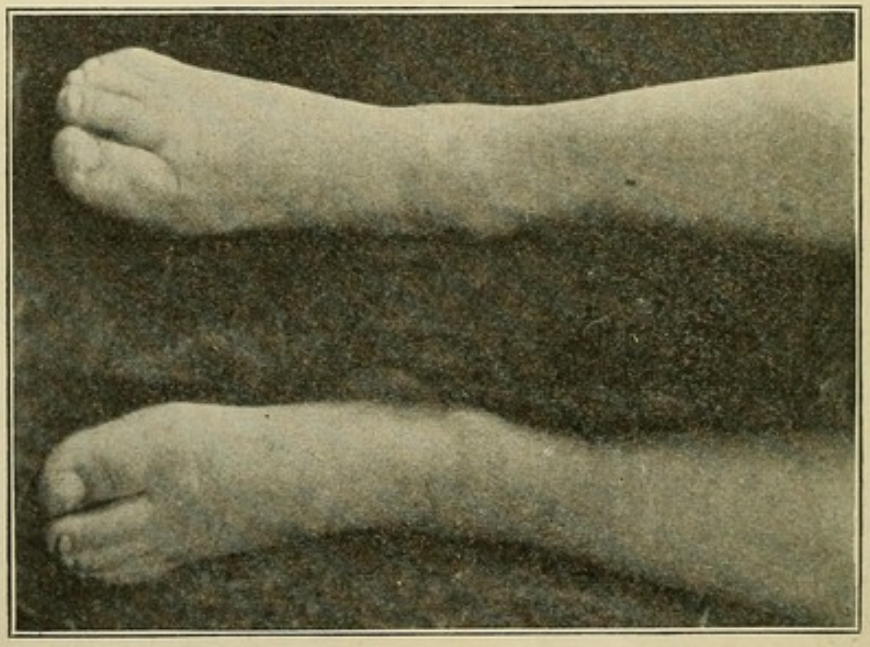


FIG. 131.—Foot-drop in neuritis, following typhoid fever.

tious diseases; sometimes exposure or cold; and rarely alcohol, arsenic, or lead.

Pathology.—There is an inflammation of the affected nerve, followed by more or less complete degeneration of the nerve-fibers.

Symptoms.—The onset may be sudden, with chill or convulsion and fever; generally, however, it is gradual. During the onset there is pain, with great sensitiveness along the course of the nerve; later there may be anesthesia. There is weakness; then paralysis of the muscle, both arms or legs or all four may be affected, and the extensors of the

foot and hand and the peroneal and muscular spiral nerves are usually most severely affected. Tendon reflexes are diminished or abolished altogether, and reaction of degeneration. Marked atrophy follows. Muscular contractions may cause deformities.

Diagnosis.—By the association of motor and sensory symptoms to the course of the affected nerves. When the

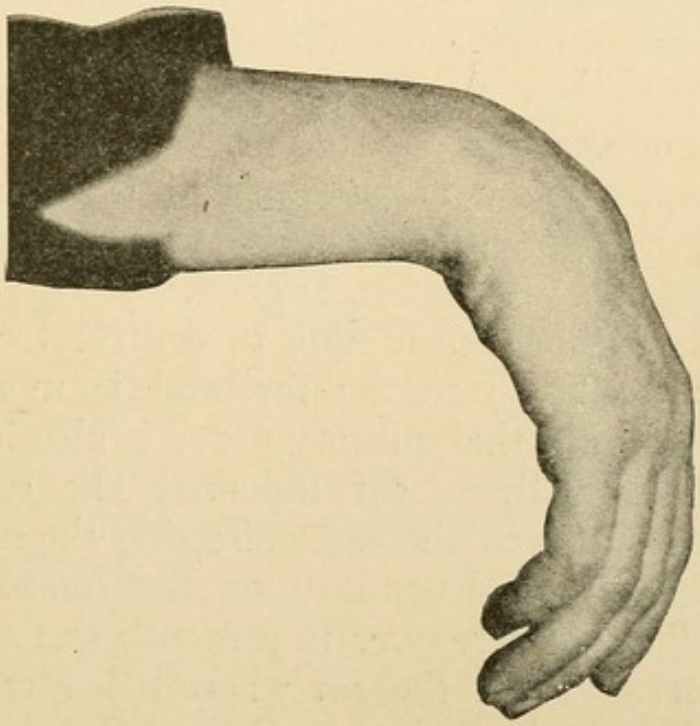


FIG. 132.—Dropped wrist from musculospiral palsy, showing retrocarpal tumor (Church).

back muscles are affected it may be mistaken for Pott's disease.

Prognosis.—The average case begins to improve after the first month, recovery generally being complete in three months. The sensory symptoms clear up first. In some cases the paralysis may be permanent and cases may even be fatal.

Treatment.—Rest and hot applications during onset. Later, electricity as in infantile spinal paralysis. Strychnia and tonics.

FACIAL PARALYSIS.[1]

(Bell's Palsy.)

The paralysis may be due to lesions in the skull, in the petrous bone, or in the peripheral part of the nerve.

The most frequent cause is neuritis. This is usually due to middle-ear disease and affects the nerve in the bony canal. Many cases set down to "cold" are of this form (Reik). Inside the skull the lesion may cause meningitis, tumor, or injuries to the skull; in the peripheral part inflammation of the lymph glands of the neck or mumps.

Symptoms.—There is paralysis of the muscles of one side of face; it is smooth and does not change on closing eyes, laughing, etc. Sensation is good.

Diagnosis.—The causes due to central trouble do not affect the upper fibers; so the forehead is unaffected. At the base of the brain the auditory nerve is also involved, and there is deafness without ear lesions. The ear trouble is evident, if looked for in the cases affecting the canal.

Prognosis.—This depends upon the cause. The cases due to "cold" usually recover in a month or two.

Treatment.—Treat the ear where it is a cause. Later, electricity as in spinal paralysis. Central cases are unaffected by local treatment.

DIPHTHERITIC PARALYSIS.

The paralyses, coming on early, are supposed to be due to the soluble toxins in the blood, and they are a part of the picture of the toxemia.

The late paralyses, coming on after the first week after the acute stage of the disease and as late as the sixth week, generally result where there has been an extensive membrane with severe toxemia. It usually begins in the uvula or the larynx, and may spread to other muscles supplied by cranial

[1] Taylor and Clark, "Facial Palsy, Results of Faciohypoglossal Anastomosis for," *Jour. Amer. Med. Assoc.*, March 24, 1906, p. 856. Rainy and Fowler, "Facial Paralysis," *Review of Neurology and Psychiatry*, March, 1903.

nerves or to the extremities. Usually there is a generalized muscular asthenia (and not an absolute loss by muscular innervation), flaccidity, muscular hypotonus, and loss of tendon reflexes. Voluntary movements to a very slight degree can generally be made.

When the soft palate is affected, attempts to swallow fluids result in their return through the nose. This may be the earliest symptom. If the paralysis extends to the pharynx, swallowing may be difficult or impossible. The muscles of accommodation may be involved, as well as the external muscles of the eye, the latter causing strabismus and double vision.

The **prognosis** is good, recovery taking place usually within two months, sometimes later, but it must be remembered that fatal cases occur where the heart or respiration or muscles of deglutition are involved.

The **treatment** consists in rest in bed. Gavage may be necessary if the child cannot swallow. Strychnin and atropin are the most useful stimulants if the heart and respiration become affected.

ACUTE INFECTIOUS DISEASES.

THE TRANSMISSION OF INFECTIOUS DISEASES.[1]

Infectious diseases are transmitted in several ways. Perhaps most frequently the patient transmits the disease directly, as in the case of diphtheria or measles. Mild and unrecognized cases of the disease are an especial source of danger, as they mingle freely with others. Some diseases may be transmitted by an individual apparently in perfect health, who has been associated with some one who has the disease, and harbors in his mouth or elsewhere the disease-producing germs. Such an individual is called a disease carrier. In some instances the disease may also be transmitted by objects which have come in contact with the sick person or with his discharges, and such objects are spoken of under the head of fomites. In other instances an intermediate host is required, and is usually an insect which takes the infectious material into its body and transmits it later on to human beings, and, lastly, some diseases may be transmitted through the air, but this happens rarely and under exceptional circumstances. Air infection is possible over a small range in measles and chicken-pox. In whooping-cough, during the paroxysm, the patient causes a small spray of mucus and saliva which may infect the air for a short time for a few feet in front of him. The transmission of disease by fomites is probably not as great a danger as was formerly supposed, and with rational disinfection of infected articles there is no danger at all.

In a general way it may be stated that patients having infectious diseases should be isolated, as the fewer people who come in contact with the disease the fewer will get it. The patient should be protected from mosquitoes, flies, and other insects, especially from mosquitoes in case of yellow fever and malaria, from flies in case of typhoid fever and cholera, and from fleas in case of plague.

[1] Doty, *American Journal of Medical Sciences*, July, 1909, p. 30. Edsall, *Journal of the American Medical Association*, July 9, 1909, p. 123. Chapin, *Ibid.*, December 12, 1908, p. 2048.

SCARLET FEVER—SCARLATINA.

Definition.—An acute infectious disease characterized by a sudden onset, vomiting, a scarlet rash, sore throat, high fever and rapid pulse, and a tendency to nephritis. There are great variations in the intensity and character of the disease.

Etiology.—The disease is communicated by direct contact, by fomites, and it may be carried by a third person. The poison lingers for a long time and may remain active for a year or more. Epidemics have been started by infected milk. The disease is infectious from the onset until after desquamation has been completed. About 50 per cent. of the persons exposed take the disease. The susceptibility is greatest between three and six years of age and diminishes with age. After fifteen the disease is not common. Fall, winter, and spring are the seasons of greatest prevalence; in other words, when people are crowded together indoors or when the schools are in session. The disease is much less common in the tropics, and is practically unknown near the equator, while in the cities where there are tenements it is especially common. One attack usually produces immunity, and second attacks rarely occur. The specific organism has not been definitely isolated. Streptococci are almost constantly associated with the disease, and are doubtless responsible for many of the symptoms. Mallory, of Boston, has described a parasite in the skin of scarlet fever patients.

Pathology.—The macroscopic skin changes are not noted after death. Microscopically the changes in the skin consist of dilatation of the blood- and lymph-vessels just beneath the epidermis and in the papillæ, together with varying amounts of exudation. The same is true of the mucous membranes of the pharynx, soft palate, tonsils, and also of the tongue when the papillæ are markedly affected, causing macroscopic enlargement. Inflammation of varying extent and intensity is seen in the throat and, in some cases, a false membrane may be present. The lymph-nodes of the neck are enlarged. There are degenerations in the muscles and also in the heart muscles. There may be endocarditis, peri-

carditis, or myocarditis. The spleen and liver may be enlarged. The kidneys show marked changes, usually a glomerulonephritis of a hemorrhagic form.

Incubation.—This is difficult to determine, and is apparently somewhat variable. Cases are said to develop as early as twenty-four hours and as late as twenty-one days after exposure. The consensus of opinion is that the period is usually short, from two to six days.

Onset.—The disease begins suddenly, usually with an attack of vomiting; fever is high, often 104° and 105° F.

Eruption.—This appears on the first or second day, first on the neck and chest, and from there spreads over the entire body. It consists of a more or less uniform scarlet blush or of fine punctate spots set closely together. The lips are not affected. The rash disappears on pressure and returns the moment that pressure is removed. It is usually punctate in the groins, axilla, and roof of the mouth. It lasts from three to seven days, when it gradually fades, and is followed by a desquamation lasting from two to six weeks. The desquamation, if the skin is not cared for, usually takes place in large pieces. There are many variations from this typical rash. It may be pale and transient, or there may be miliaria and, in severe cases, purpura.

Tongue.—This is quite characteristic. On the first day it is furred, then the enlarged papillæ show through the white surface (strawberry tongue). In three or four days the white disappears, leaving a red tongue with enlarged papillæ (mulberry tongue). Sometimes the enlargement of the papillæ may be the only sign.

Throat Symptoms.—These vary greatly. In mild cases there is only redness of the pharynx. In moderate cases there is enlargement of the tonsils, some patches of membrane, and great redness of the entire throat. In the severe or anginoid cases there is a marked membranous angina with involvement of the pharynx, swelling of the lymph-nodes and other tissues of the neck, and this condition may be mistaken for diphtheria. Suppuration or a gangrene may follow.

General Symptoms.—The onset is sudden, and generally corresponds in severity with the character of the disease later on. Vomiting is commonly noted, and there is usually also sore throat and high fever; the temperature rises rapidly, and usually reaches its highest point (104° to 105° F.) on the first or second day. In uncomplicated and not very severe cases it gradually falls and becomes normal in from four to seven days or more. A recurrence of the fever nearly always means some complication. The pulse is rapid, the digestion is disturbed, there is scanty, high-colored urine which often contains albumin. There are restlessness, headache, and there may be delirium or coma. The blood shows a marked leukocytosis. The cases may be classified as mild, moderately severe, anginoid, and malignant. The very mild cases may be overlooked. There is usually fever, sore throat, and the rash is most marked on the body. The eruption and symptoms disappear in from three to five days. In cases of moderate severity all the symptoms are generally present and last from a week to ten days.

Anginoid Scarlet Fever.—These are severe cases, with marked throat symptoms. There is a membrane over the tonsils, the throat is swollen and reddened, and there is usually involvement of the cellular tissues of the neck, together with enlargement of the lymph-nodes.

Malignant Scarlet Fever.—This may come on suddenly with hyperpyrexia and coma (atactic form), death taking place within the first two days, or it may be of the hemorrhagic variety, when there is a purpuric rash and also hemorrhages from the mucous membranes. Death usually occurs within three or four days.

Relapses or *recurrences* are often seen, the disease apparently subsiding and then recurring, with the reappearance of all or nearly all the symptoms.

Second attacks are rare, the immunity conferred by the first attack being quite perfect. Second attacks are occasionally noted, however, and there are cases on record where the child has had three attacks. One must bear in mind the frequent errors in diagnosis in this connection.

Complications.—These are numerous and important. Albuminuria is of very common occurrence and nephritis is also frequent. The latter comes on most frequently during the second or third week of the disease, or even later, and presents the usual features of nephritis. It may be mild or severe, and chronic nephritis may result. Otitis media is very frequent, and may result in deafness or impaired hearing, or by extension to meningitis. Acute endocarditis, pericarditis, and myocarditis may occur, and inflammation of other organs and tissues, such as pneumonia and pleurisy, are not infrequent. The lymph-nodes, especially those of the neck, are enlarged and sometimes suppurate.

Diagnosis.[1]—This is, as a rule, easy, but at times it may be difficult, chiefly owing to the variations in the rash. Skin eruptions resembling scarlet fever are so common that it is never safe to make the diagnosis on the rash alone. In doubtful cases the entire body should be inspected, special attention being paid to the groins, axillæ, and back. It is most frequently confused with the following:

Acute Exfoliative Dermatitis.—This may occur again and again. It resembles scarlet fever closely, having a sudden onset, fever lasting a week or so, and is followed by desquamation. The desquamation is more marked than in scarlet fever, the tongue and throat are usually unaffected, and the nails and hair are involved.

Measles.—The longer period of invasion, the catarrhal symptoms, the characteristic rash, Koplik's spots, and the absence of leukocytosis should make the diagnosis easy.

German Measles.—The enlarged lymph-glands, mild or no throat symptoms, polymorphous rash, and absence of constitutional disturbance usually make the diagnosis clear.

Diphtheria.—It may be difficult to tell without cultures

[1] Whitfield, "Rashes of Scarlet Fever and Other Skin Eruptions," *Practitioner*, January, 1909, p. 62. Beggs, "Differential Diagnosis of Scarlet Fever," *Practitioner*, January, 1909, p. 52. Cuff, "Diagnosis of Scarlet Fever and Diphtheria," *Practitioner*, January, 1909, p. 47. Goodall, "Diagnosis of Scarlet Fever," *Practitioner*, January, 1909, p. 38.

whether one has a diphtheria with a rash or a scarlet fever with a bad throat. One should bear in mind that the former is the exception, the latter the rule. The history of exposure and the persistence of the rash in scarlet fever are of value

Septicemia.—There may be scarlet rashes in blood poisoning having exactly the same appearance as scarlet fever.

Drug Rashes.—These may follow the use of antipyrin, quinin, belladonna, copaiba, potassium iodid, diphtheria antitoxin, etc. They are not, as a rule, attended with fever, and are usually transient.

Prognosis.—The mortality varies in different epidemics. As a rule, the younger the child the worse the prognosis. The mortality varies from 5 to 20 or even 30 per cent.

Treatment.—The child should be isolated, and similar prophylactic precautions taken to those recommended in diphtheria. The child should be kept in bed throughout the entire attack, and in severe cases from one to two weeks afterward. The diet should consist of milk or milk and cereals for at least a month. By following this dietetic treatment the cases of nephritis are reduced to a minimum. Cold packs or sponges may be used to reduce high fever (over 103° or 104° F.), also to relieve nervousness, delirium, and sleeplessness. Cold may be applied to the head for headache and to the throat when there is adenitis. The throat may be sprayed, as in diphtheria. Stimulants may be used as indicated. Iron and strychnin may be given if necessary during convalescence. The skin should be thoroughly cleansed once or twice a day, and anointed with equal parts of lanolin and vaselin or some other ointment. This facilitates desquamation and prevents the fine scales of epidermis from flying about.

MEASLES.

Definition.—Measles is a specific, acute, infectious disease characterized by extreme contagiousness, catarrhal symptoms, fever, Koplik spots, and a characteristic red papular

eruption, which usually appears on the fourth day, and a branny desquamation during convalescence.

Etiology.—Measles is one of the most contagious diseases. Infection is usually by direct contact. It may result from being in the same room, as the contagion can be carried through the air for a short distance. It may be carried by fomites or a third person, but this is rarely the case. The disease is contagious during the latter part of the incubation period and throughout the course of the disease. Susceptibility is very great and very few are naturally immune. It is seen most frequently in childhood. It is endemic in the larger cities and also occurs in epidemics, most frequently in winter. One attack confers immunity, but second attacks

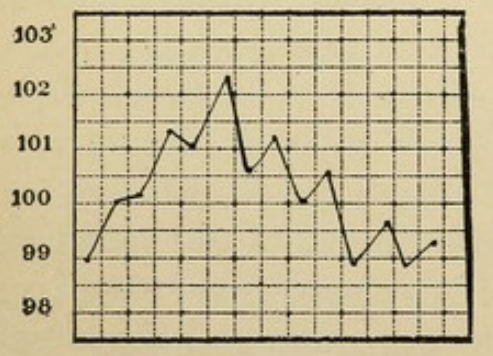


FIG. 133.—Measles temperature chart. Mild case.

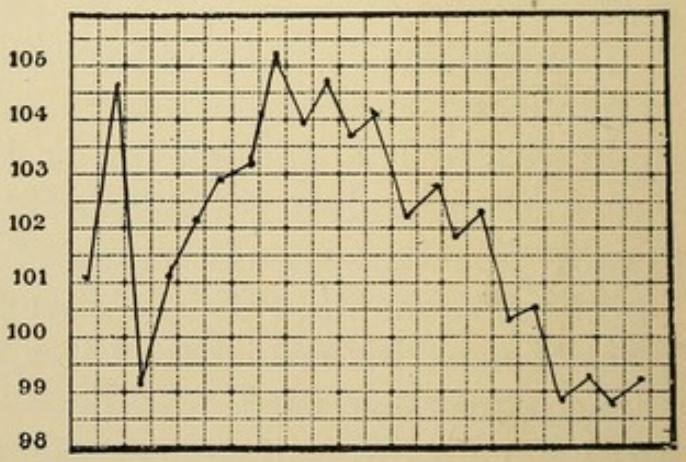


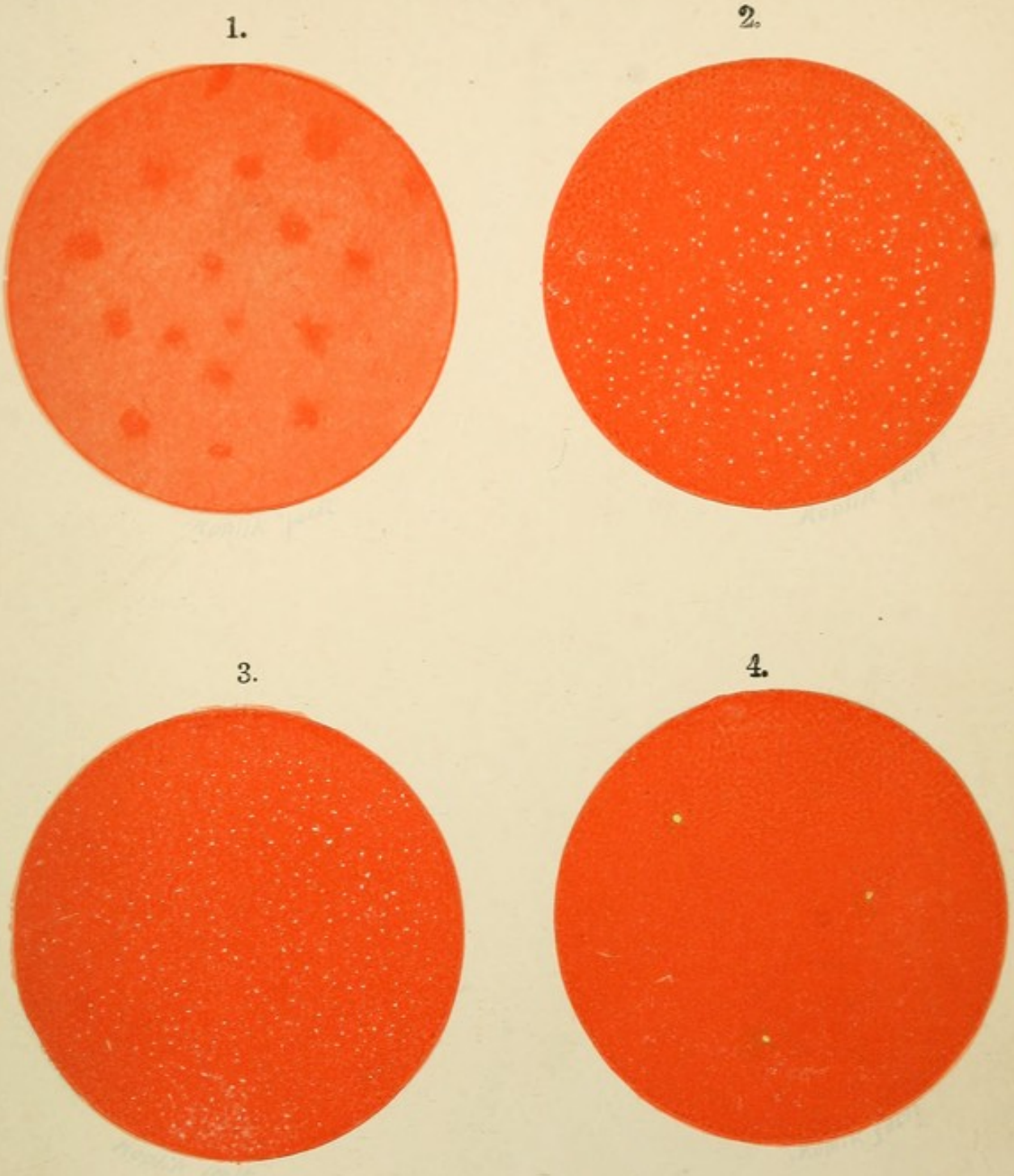
FIG. 134.—Measles temperature chart, showing initial rise and fall.

may occasionally occur. No specific organism has as yet been isolated.

Pathology.—There is a catarrhal condition of the respiratory tract, and often of the gastro-intestinal tract as well. Measles itself rarely kills, and in fatal cases bronchopneumonia is the most frequently observed lesion.

Period of Incubation.—This is variously stated, as to whether one counts to the appearance of the symptoms or to the appearance of the eruption. Symptoms appear from nine to eleven days and the rash quite uniformly on the thirteenth or fourteenth day after infection.

Symptoms.—**Invasion.**—There may be languor for some



The pathognomonic sign of measles (Koplik's spots).

1. The discrete measles-spots on the buccal or labial mucous membrane, showing the isolated rose-red spot, with the minute bluish-white center, on the normally colored mucous membrane. 2. The partially diffuse eruption on the mucous membrane of the cheeks and lips; patches of pale pink interspersed among rose-red patches, the latter showing numerous pale bluish-white spots. 3. The appearance of the buccal or labial mucous membrane when the measles-spots completely coalesce and give a diffuse redness, with the myriads of bluish-white specks. The exanthem is at this time generally fully developed. 4. Aphthous stomatitis, likely to be mistaken for measles-spots. Mucous membrane normal in hue. Minute *yellow points* are surrounded by a red area. Always discrete. (Medical News, June 3, 1899.)

days, with drowsiness and then coryza, cough, headache, nausea, and fever. The temperature usually reaches its height (about 104° F.) on the second day, but may begin

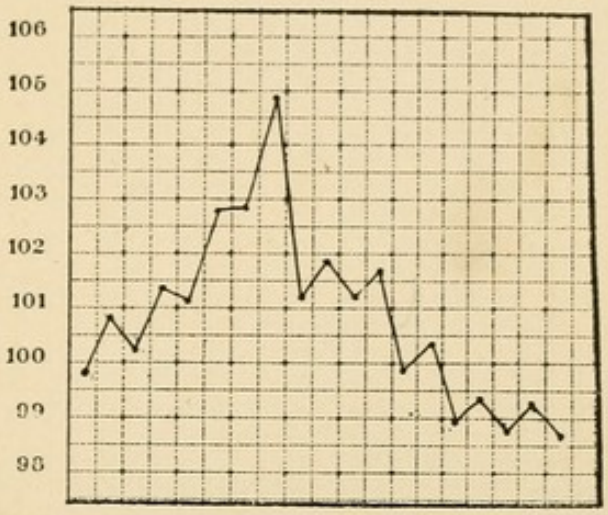


FIG. 135.—Measles temperature chart, showing sudden fall at the appearance of the eruption.

abruptly and drop, to ascend later. After the second day the temperature gradually falls and reaches normal in about a week. The temperature varies with the severity of the case.

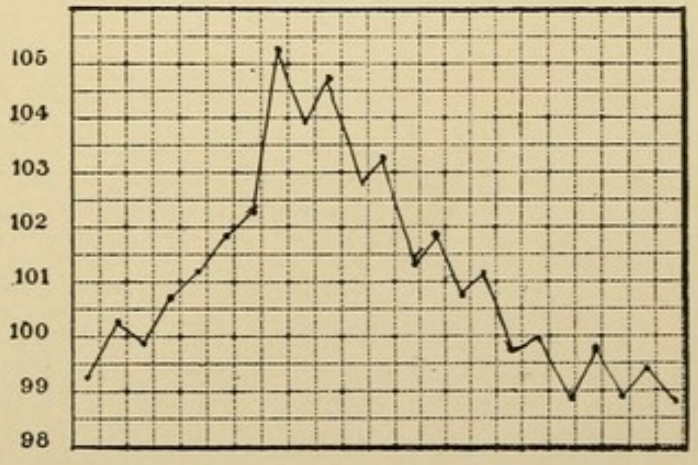


FIG. 136.—Measles temperature chart. Case of moderate severity, showing rather abrupt rise at beginning of eruption.

Subsequent rises in temperature are almost invariably caused by complications.

Koplik's Spots.—These are of great value in diagnosis. They appear usually the day before the eruption, but often two, three, or even four days before. They are best seen on

the inner side of the cheeks on a level with the second molars, and consist of small bluish-white specks with a red areola. The white spot disappears early, leaving a little red spot about the size of a pin head. The bluish-white spots must

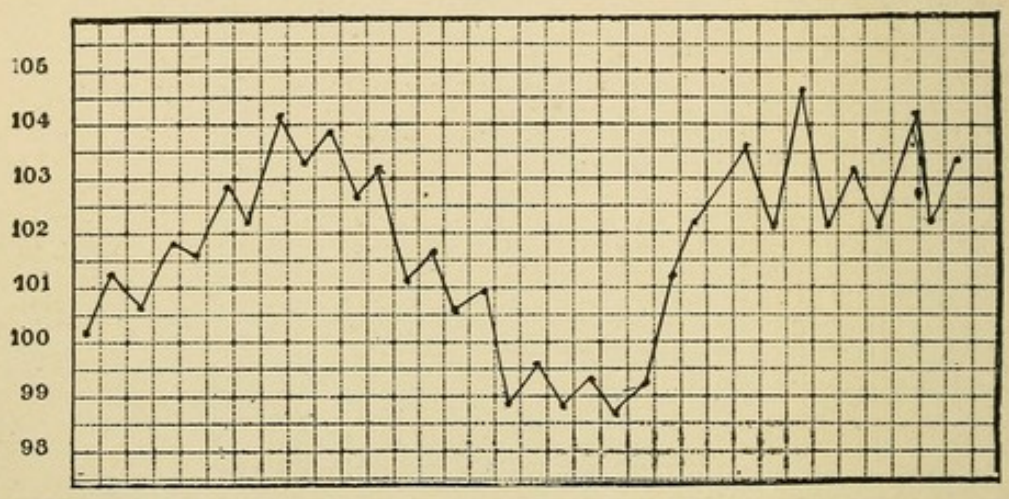


FIG. 137.—Measles temperature chart, showing a complicating pneumonia coming on after the temperature had fallen to normal.

be looked for in daylight, as it is difficult or impossible to see them by artificial light. As the skin eruption begins to appear the eruption on the mucous membranes becomes diffuse and the spots are lost in the general redness.

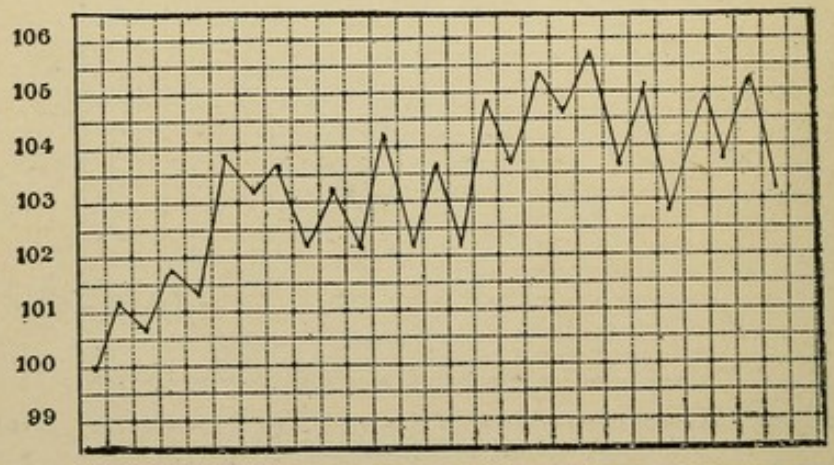
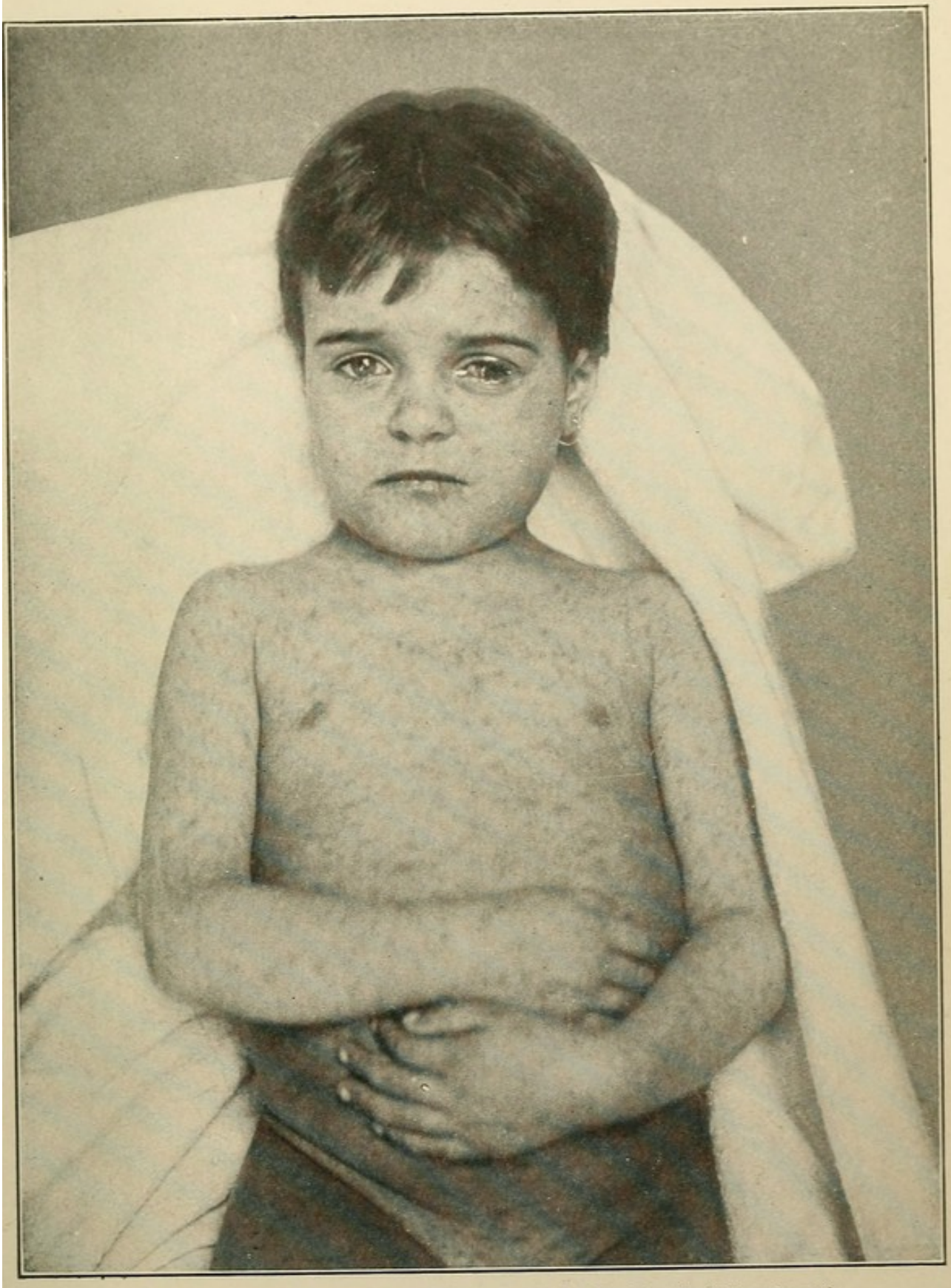


FIG. 138.—Measles temperature chart, showing pneumonia complicating the case from the sixth day.

Eruption.—This appears on the fourth day, although sometimes on the third or fifth days. It is first seen on the forehead, cheeks, along the margin of the hair and back of the ears, and then on the face, back, sides, arms, front of the



From a case of measles. (Photograph by Dr. Jay F. Schamberg.)

body, and legs. It consists of small papules about the size of a pin head, which have a tendency to group themselves in crescentic patches. In many places these patches may be confluent. The rash often has a distinct shot-like feel, the skin is hot and itches. The early spots are a rose-red color and rather bright, and later the color somewhat resembles that of a purple raspberry, becoming darker as it grows older. After several days it fades rather quickly, leaving purplish brown spots, which in a day or two become faint yellowish brown in color. This slight pigmentation persists for two or three weeks. The rash is followed by a fine, branny desquamation. There may be atypical cases, and many variations of the rash have been described. The eruption may be hemorrhagic (black measles), and this form is usually very severe. The rash is more intense in a warm room or in a warm bed, and exposure to cold may cause the rash to fade somewhat.

Other Symptoms.—During the height of the disease the patient is usually quite uncomfortable, there is marked inflammation of all of the mucous membranes, there is conjunctivitis and more or less photobia and marked coryza, with considerable discharge from the nose. The mucous membranes of the mouth and throat are intensely reddened, there is a bronchitis, and usually a marked disturbing cough. Albuminuria is usually present, vomiting is not uncommon, and sometimes there is diarrhea. There is leukocytosis beginning early in the period of incubation, reaching its maximum six days before the appearance of the eruption, and lasting into the first part of the stage of invasion, then the leukocytes fall to normal, or there may be leukopenia. During the eruptive period a leukocytosis means a complication, although complications may exist without any leukocytosis.

Complications and Sequelæ.—These are very numerous. Bronchopneumonia is most common and may be the cause of death. Laryngitis is also frequently seen. Lobar pneumonia, empyema, and gangrene of the lung may all be noted. Gangrenous stomatitis sometimes follows in weak

children. Paralysis is sometimes seen and occasionally inflammation of the joints and bones. Tuberculosis may be seen following measles, and the resistance to all infectious diseases is lowered.

Diagnosis is usually easy.

Scarlet Fever.—This is distinguished by the sudden onset with fever, the absence of catarrhal symptoms and Koplik spots, the characteristic eruption, the strawberry tongue, the angina, and the presence of leukocytosis.

German Measles.—This differs in the more rapid invasion, the polymorphous character of the rash, the absence of Koplik spots, and of symptoms.

Drug Eruptions.—Copaiba and other drugs may give a rash which often quite closely resembles measles. The diagnosis is made on the history of the administration of the drug, the absence of fever and other symptoms, the absence of Koplik spots, and the shorter duration.

Prognosis.—This varies in different epidemics. It may prove very fatal at times, rarely from the disease, but from complications, especially bronchopneumonia.

Prophylaxis.—Care should be taken to prevent infection, especially of young children. Isolation is not effective unless the patient is separated from others by an open-air space. Susceptible children should be sent away as soon as the disease is discovered, and if this is not done promptly infection usually takes place. Isolation in the average household is usually either started too late or is not strict enough to be of service. In hospitals and institutions the rooms occupied by the patient should be disinfected, and also in private houses if the room is to be occupied immediately by susceptible children. If two or three weeks elapse there is no danger from infection.

Treatment.—The children should be kept in a well-ventilated room with a temperature of 70° F. and not overheated. The skin may be anointed with equal parts of vaselin and lanolin, and kept clean by sponging with warm water and Castile soap. The itching may be relieved by using carbolized vaselin or the free use of powder. High

fever and restlessness are best treated by sponge-baths or cold packs. The mouth and nose may be sprayed with Dobell's solution and a boric acid eye-wash used for the conjunctivitis.

GERMAN MEASLES.

(Rubella; Rotheln; Epidemic Roseola.)

Definition.—Rubella is a specific infectious disease occurring in epidemics, and characterized by a polymorphous rash which sometimes resembles that of measles, sometimes that of scarlet fever, and sometimes that of both diseases, but differing from them in incubation, invasion, in having no symptoms and no dangerous sequelæ, and by an almost constant enlargement of the cervical and sometimes other lymph-nodes.

Etiology.—Rubella exists as a separate disease, and it does not protect against either scarlet fever or measles. It is contagious throughout the attack, and epidemics are most frequent in spring or winter, but the disease may occur sporadically. It rarely affects children under six months, but after that age the susceptibility is rather general. One attack usually confers immuuity. It is usually transmitted by direct contact, although occasionally by fomites. The contagiousness seems to vary in different epidemics, being slightly so in some and intensely so in others. It is more common among the poor, which may be explained by the lesser resistance and greater danger to exposure.

Period of incubation is from five days to three weeks or longer, usually from ten to sixteen days.

Symptoms.—Prodromes are slight or absent. The stage of invasion lasts but a day or less, and during this time there may be slight drowsiness, sometimes slight fever, sore throat, and more rarely a chill or vomiting. The eruption begins on the first or second day, and in many instances the child wakes up with the eruption, nothing having been previously noted.

Eruption.—This begins on the face, and spreads rapidly

over the body to the ends of the extremities, usually in one day. It lasts two to four days and occasionally longer, and when it fades it leaves, especially in brunettes, a slight pigmentation, which disappears in a day or two. One of the characteristics of the rash is its polymorphous character. It may resemble measles (rubella morbilliforme), or it may be a more uniform blush, like scarlet fever (rubella scarlatiniforme), or there may be combinations and all gradations between the two. The scarlatiniform eruption is liable to occur where there is pressure upon the skin, as around the waist-band or on the buttocks. Slight desquamation follows. The eruption may be seen on the mucous membranes in small red points somewhat raised above the surface on the uvula and soft palate during the first day, and is of some value in diagnosis. During the attack there are slight fever, a little malaise, and swelling of the lymph-nodes, especially of the posterior cervical nodes, which may attain the size of a pigeon's egg.

Blood.—Blood findings resemble those in measles. There is a leukocytosis during the incubation, followed by leukopenia when the eruption appears. After the disappearance of the eruption the blood becomes normal.

Complications are rare, as are also recurrences and relapses.

Diagnosis.—The polymorphous rash, the eruption on the uvula and soft palate, and the glandular enlargement with an absence of other symptoms, are the most important features. It is not safe to diagnose German measles apart from an epidemic. The absence of Koplik spots is of value in excluding measles, and the rashes due to heat, indigestion, and to drugs, so common in infancy, should be carefully excluded. The rash caused by handling certain varieties of caterpillars should not be mistaken for rubella.

Prognosis.—This is almost invariably good. Complications and fatalities are exceptional.

Treatment.—As a rule, none is required. The patient may be isolated if in school or an institution.

DIFFERENTIAL DIAGNOSIS OF RUBELLA, SCARLET FEVER, MEASLES, AND ERYTHEMA INFECTIOSUM.[1]

	RUBELLA. German Measles.	MEASLES.	SCARLET FEVER.	ERYTHEMA INFECTIOSUM.
Contagion.	Apparently varies in epidemics. Direct contact. Possibly from fomites, not through the air.	Highly contagious. By direct contact. By fomites. Through the air.	Marked. By direct contact. By fomites.	Feeble. Usually by direct contact.
Incubation.	Variable average, 4 to 3 weeks.	Average 9 to 14 days.	Average 1 to 6 days.	Average 6 to 14 days.
Prodromes.	Slight and of short duration. Occasionally a day or two of malaise.	3 to 4 days. Drowsiness and catarrhal symptoms.	Short or wanting, onset usually sudden.	Very slight and of short duration.
Koplik spots.	None.	Present in 90 or 95 per cent. of cases.	None.	None.
Vomiting.	Rare.	Occasional.	Common.	Uncommon.
Fever.	Slight — average 1 to 2 days, sometimes for 4 days, seldom more than 101 to 102 degrees.	Marked high curve, lasting about a week, average from 102 to 105 degrees.	High fever, lasting about a week, averages 104 to 105 degrees.	Little or none.
Catarrhal symptoms.	Slight.	Marked.	Absent.	None.
Tongue.	Slight coat, nothing characteristic.	Tongue coated, that of any fever.	Strawberry, later mulberry tongue.	Sometimes slightly coated.
Throat.	Small punctiform red spots over uvula and palate. Pharynx slightly reddened.	Moderate pharyngitis and redness of mucous membranes.	Usually a severe angina	Sometimes very slight sore throat at onset.
Diarrhea.	. . . . .	Frequent.		
Lymph-nodes.	General enlargement, especially of postcervical nodes.	Postcervical, postauricular, and submaxillary nodes enlarged.	Depends on extent of throat involvement, glands at angle of the jaw involved.	Not enlarged.
Pulse.	Varies with fever.	Varies with fever.	Very rapid.	Normal.
Albuminuria.	Rare and slight.	Rare.	Common.	None.

[1] Ruhräh in "Osler's Modern Medicine."

DIFFERENTIAL DIAGNOSIS OF RUBELLA, SCARLET FEVER, MEASLES, AND ERYTHEMA INFECTIOSUM—*Continued.*

	RUBELLA.	MEASLES.	SCARLET FEVER.	ERYTHEMA INFECTIOSUM.
Eruption.	Begins on face, spreads to neck and breast, then to arms, legs, and feet. Is fading from older parts while spreading to new. Two forms—common form, morbilliform, small, slightly elevated papules, discrete, sometimes confluent, more rarely scarlatiniform, lasts 2 to 4 days or less, color rose-red, but this varies.	Begins on face, spreads gradually over entire body. Covering it by the second or third day, consists of small papules arranged in crescentic groups, these are confluent in places, lasts 4 to 5 days. Is deep red, often purplish.	Begins on neck and chest, spreads slowly over entire body — maximum about the fourth day. Does not affect lips. Consists of small punctate spots or a diffuse blush, disappears on pressure, lasts about a week. Intense red color.	First on face, as symmetrical rose-red blush, for the most part sharply defined, and resembles erysipelas. It is hot to the touch, but not sensitive, and it does not itch. The second day it spreads to the body and extremities, small discrete crescentic patches over the body and sparingly on the inner and flexor surfaces of limbs. Marked map-like eruption on outer and extensor surfaces. Begins to fade on face in 4 or 5 days. Lasts altogether 6 to 10 days.
Desquamation.	Slight and branny.	Branny.	Marked in flakes and large pieces.	None.
Convalescence.	Rapid, no complications.	Slow, frequent complications, as pneumonia. Later other infectious diseases, as tuberculosis.	Slow, complications frequent, as nephritis, otitis media, etc.	Rapid, no complications.

ERYTHEMA INFECTIOSUM.[1]

Definition.—A feebly contagious disease characterized by a maculopapular, rose-red rash and an absence of complications and sequelæ.

Etiology.—Most frequent between four and twelve years. Epidemics are most frequent in spring and summer. No specific organism has as yet been described.

[1] Escherich, 1896, named by Sricker, 1899; Shaw, *American Journal of Medical Sciences*, January, 1905.

Incubation.—Six to fourteen days.

Occurrence.—This disease has not been noted in America up to the present time. It has been described in Germany and Austria.

Symptoms.—There are slight prodromes, as malaise and a little sore throat. These may be wanting. The rash appears first on face, later on arms, legs, and trunk. It spreads downward, involving hands and feet last of all. The rash is rose-red, macular, raised slightly above the surface. In some places it is sharply defined, suggesting erysipelas; in other places it shades gradually into the healthy skin. The affected skin is hot to the touch, but is not sensitive and does not itch. The color disappears on pressure, but quickly reappears. On the cheeks it is confluent, on the body it is seen in discrete, crescentic spots, and on the extremities it is most marked on the extensor surfaces; is not so red as the face and is more measles-like, having a sort of map-like arrangement. It is evanescent, and may disappear and reappear. It lasts from six to ten days, sometimes less, and there is no desquamation and no subsequent pigmentation. The lymph glands are not enlarged, and there are few or no subjective symptoms.

Prognosis.—Good. No fatal cases have been reported.

Diagnosis.—From measles by absence of catarrhal symptoms and of Koplik spots. From scarlet fever by the absence of characteristic tongue, constitutional symptoms, and appearance of rash. From drug rashes by the history, from urticaria by the absence of itching. Erythema exudativum multiforme begins in the hands and feet, becomes vesicular, lasts longer, and there are marked constitutional disturbances.

Treatment.—Symptomatic.

VARICELLA.

(Chicken-pox.)

Definition.—An acute infectious disease characterized by a typical discrete eruption, slight fever, and trifling constitutional disturbances.

Etiology.—It is very contagious, and is conveyed by direct contact, by fomites, or even through the air for short distances. Isolation, to be effective, must be in a separate building. It occurs sporadically and in epidemics. Children are most often affected, and susceptibility is very general, although adults are but rarely affected. One attack confers immunity. Varicella has no relationship whatever to small-pox. No specific organism has been described as yet.

Period of Incubation.—This is usually from fourteen to sixteen days, occasionally longer.

Symptoms.—As a rule the prodromes are unimportant or absent and the eruption may be the first thing noted. Sometimes there are chilliness, slight fever, and malaise a day before it appears, and occasionally pain in the back and abdomen, vomiting, and other symptoms. The fever is highest on the second or third day, usually 101° to 102° F.; sometimes it is less, and it may go as high as 105° F. After a few days it disappears. There are no other characteristic symptoms.

Eruption.—This comes out in successive crops. It begins as a small papule, slightly raised above the surface, and surrounded by a red areola, not unlike a small flea bite. This changes rapidly to a clear vesicle, which looks almost like a drop of water on the top of the papule. The vesicle drys from the center and sinks in, causing umbilication. Further drying reduces it to a brownish crust. Several days are needed for it to complete its course, and some of the papules go through their cycle more rapidly than others. All stages of the eruption may be seen at one time on the body, and this is one of the most distirguishing characteristics of chicken-pox. The eruption is most marked over the trunk. On the exposed surfaces it is liable to be infected and become pustular, and these pustules may leave deep white scars, while the ordinary eruption leaves none. Under bandages and where there is irritation from discharges, or where the skin is otherwise irritated, the eruption may be usually thick, sometimes even confluent. The number of vesicles varies from ten to eight hundred. They also vary in size, the

average being that of a lentil. Sometimes there is a pemphigus-like form of varicella, and a rare form is *varicella gangrenosa*, in which the eruption becomes gangrenous. This latter is usually fatal. The eruption may also be noted on the mucous membranes, in the mouth, on the conjunctiva, or on the genitalia.

Complications.—Erysipelas may develop, or there may be ordinary pus infections. Adenitis is common if there are many pustules, and nephritis is occasionally noted. Pains in the joints are sometimes met with.

Diagnosis.—The course of the disease, the eruption coming out in crops, the greater frequency on the trunk, and the sparseness of it on the hands and face distinguishes it from small-pox. There is usually little difficulty, except in differentiating the lighter and irregular forms of small-pox, such as occur after vaccination. The differential diagnosis from other conditions usually presents little difficulty. The course of the disease ordinarily makes the diagnosis plain, if the appearance of the eruption does not. Impetigo, urticaria vesiculosa, herpes, pemphigus, and some forms of eczema are sometimes confused with it.

Prognosis.—This is usually good.

Treatment.—Little or no treatment is required in the average case. If there is fever the child should be kept in bed and carbolized vaseline may be applied to relieve the itching. Cold sponges may be used if the fever is high or the child is nervous. The child should be kept clean, and the hands and finger nails should be kept clean. If the scratching cannot be controlled, the hands and arms should be restrained.

THE FOURTH DISEASE.

In 1900 Clement Dukes, physician to the school of Rugby, published a description of what he believed to be a disease not before described, to which he gave the name of fourth disease. The chief difference between this supposed disease and German measles is in the rash. It is very probable that the so-called fourth disease is either a scarlatinal form of rubella or mild scarlet fever.

VACCINIA.[1]

(Cow-pox; Vaccination.)

Definition.—Vaccinia is a disease produced in men by the inoculation with the virus of cow-pox. It is characterized by a local pock at the seat of inoculation, fever, and some constitutional disturbance. It affords more or less perfect protection from small-pox. The virus is secured from the vesicles on the calf (animal virus) or from vaccinated persons (humanized lymph).

History.—Prior to the introduction of vaccination, small-pox was about as common as measles is now. Since vaccination, small-pox has diminished very greatly, and where a second vaccination is compulsory, as in Germany, small-pox has disappeared.

Nature of Vaccinia.—This question is not yet settled. The majority of observers claim that cow-pox is small-pox, modified by passage through the cow. Others, especially French writers, insist that vaccinia and small-pox are separate diseases.

Bacteriology.—Numerous bacilli and other forms of microscopic parasites have been described. The question may be regarded as unsettled.

Time to Vaccinate.—As soon as the child begins to gain in weight it may be vaccinated. The second or third month is usually chosen. If done before the fifth month the constitutional disturbance is slight; if done later there are fever and malaise. Vaccination should be repeated about the seventh year, or when the child starts to school, and again about puberty. Vaccination should always be repeated when small-pox is prevalent.

Choice of Lymph.—Calf lymph is always to be preferred, as syphilis and other diseases have followed the use of humanized lymph. Either the glycerinated lymph or that dried on points may be used. Vaccine virus rapidly loses its virulence if kept at 70° F. or over. It should be kept in a cool place.

[1] Edward Jenner, 1798.

Technic.—The skin above the insertion of the deltoid on the left arm is usually chosen as the site. Girls may be vaccinated on the leg. Wash the skin well with soap and water. Stretch slightly and cut with a sharp lancet just into the skin. The cut should be quarter of an inch long. Rub in the virus, allow it to dry, and protect for twenty-four hours with sterilized gauze.

Symptoms.—The little primary irritation quickly subsides. In three or four days there is a little papule with a reddened zone about it. By the sixth day there is an umbilicated vesicle. This increases in size for a day or two, and by the tenth day it is a pustule. There is usually considerable swelling about the arm, and the axillary lymph glands are enlarged. The pustule gradually dries, and by the end of the second week is a brownish scab. This falls off in a week or ten days more. There is marked leukocytosis. There is considerable constitutional disturbance: fever, headache, and general malaise. These are slight in young infants.

Irregular Vaccination.—The pock may appear earlier or later than usual or may rarely recur a second time. There may be other vesicles, usually in the neighborhood of the pock. There may be a rash over the body.

Complications.—These are rare. Acland gives the following list:

1. During the first three days: Erythema, urticaria, vesicular and bulbous eruptions, invaccinated erysipelas.
2. After the third day and until the pock reaches maturity: Urticaria, lichen urticatus, erythema multiforme, accidental erysipelas.
3. About the end of the first week: Generalized vaccinia, impetigo, vaccinal ulceration, glandular abscess, septic infections, gangrene.
4. After the evolution of the pocks: Invaccinated diseases, as syphilis.

Treatment.—The pustule should be protected by a dressing of gauze or by a shield, which should be removed every day or two and cleansed. Care should be taken with the shield that it does not press on the pustule and cause in-

flammation or upon the surrounding tissue. If the pustule becomes infected, wet dressings with boric acid frequently changed will usually be found satisfactory. If the child has fever, it should be kept in bed with cold sponging used for the temperature. Codein and antipyrin may be used to allay nervousness and pain, especially at night.

PERTUSSIS.

(Whooping-cough; Kink Cough.)

Definition.—An infectious disease characterized by catarrh of the respiratory tract, a paroxysmal or spasmodic cough, usually ending in a long sonorous inspiration or whoop, and this is frequently accompanied by vomiting.

Etiology.—The disease is seen sporadically and epidemically and is endemic in most large cities. It is more frequent in cold climates and epidemics are somewhat more frequent in winter. The susceptibility is very general, and the majority of persons have the disease some time during their life. The greatest predisposition is from six months to five years, and over half the cases occur during the first two years of life. The susceptibility decreases as the individual grows older.

Period of Incubation.—This is from one to two weeks. One attack usually protects from a second. The disease may be transmitted from the earliest symptoms until late in the disease. It is usually transmitted by direct contact, and only a very short exposure is necessary for infection. It may, however, be carried by fomites. If after exposure sixteen days pass, and the disease has not made its appearance, the chances are that it will not develop.

Pathology.—A bacillus has been described by Koplik, Czaplewski, Wollstein, and others. Another organism has been described by Bordet and Gengou,[1] which is found in the mucus from the parts of the respiratory tract below the larynx. It disappears early in the disease. There is more or less congestion and catarrhal inflammation of the larynx,

[1] *British Medical Journal*, October 9, 1909, p. 1062.

trachea, and bronchi, and severe coughing may produce emphysema. Hemorrhages and pulmonary complications are frequent and are the usual causes of death. Coughing also frequently produces a small ulceration of the frenum of the tongue in children who have cut their teeth.

Symptoms.—There are three stages: Catarrhal, spasmodic, and the stage of decline.

Catarrhal Stage.—The child has a slight bronchitis which cannot be distinguished from an ordinary cold. There is often headache, general malaise, and slight fever. After one or two weeks this passes into the spasmodic stage. Some children whoop almost from the beginning, others may not do so for over two weeks, and some not at all. There may be occasional paroxysms of coughing during the catarrhal stage, and a persistent cough which is more frequent at night should suggest whooping-cough.

Spasmodic or Paroxysmal Stage.—The fever and catarrhal symptoms disappear, and the cough becomes more and more paroxysmal, and in nearly all cases there is the long inspiration or whoop. The child usually feels the paroxysm coming on and runs to the mother or nurse for support, or grasps the nearest object, and, if there is nothing near, braces the body with the hands on the legs near the knees. There is a severe barking cough of a loud metallic character, the face becomes reddened and cyanotic, the eyes suffused, and the veins of the neck and head stand out prominently. There is protrusion of the spoon-shaped tongue. After a series of coughs there is a prolonged whoop, and finally a small ball of tenacious mucus is expelled, frequently with vomiting. There are from four or five to thirty or forty paroxysms a day. About twenty is the average. Hemorrhage under the conjunctiva or from the nose may be caused by a paroxysm.

Stage of Decline.—The severity of the cough gradually diminishes until it resembles an ordinary bronchitis. After excitement and violent exercise it may become paroxysmal again for a short time, and the paroxysmal character may be added to any ordinary bronchitis which the child may have during the next six months.

The Blood.—There is a constant leukocytosis which begins early before the paroxysmal stage, continues through it, and disappears with it. The leukocyte count varies from 20,000 to 25,000, but may run as high as 45,000. The principal increase is in the lymphocytes. In doubtful cases the blood examination is of great value in diagnosis.

Duration.—The duration of the attack is variously stated, and differs greatly in different epidemics. Average figures are: Incubation, one week; catarrhal stage, one to two weeks; paroxysmal stage, four to six weeks; decline, two to three weeks.

Complications.—These are very numerous. Hemorrhage from the mucous membranes or into the organs is frequent. Bronchopneumonia, acute emphysema, and collapse of the lung may occur. Vomiting and diarrhea are not infrequent. There are numerous nervous complications, convulsions and cerebral hemorrhage being the most frequent. Tuberculosis and chronic bronchitis may follow.

Symptoms from drugs are sometimes erroneously attributed to whooping-cough. The most frequent are drowsiness, or even unconsciousness from narcotics; delirium, dry throat, and mydriasis from belladonna; tinnitus, gastric disturbances, rashes, and other symptoms from quinin.

Diagnosis.—History of exposure, the frequency of the cough at night and its spasmodic character make the diagnosis easy. In doubtful cases the blood examination is important. If the child does not have a paroxysm in the presence of the physician, one may be brought on for diagnostic purposes by introducing a spoon along the teeth, as in a throat examination, and carry the spoon to the base of the tongue in such a manner that the epiglottis comes into view. Spasmodic cough may occur in catarrhal laryngitis when there is an elongated uvula, adenoids, and enlarged tonsils. Paroxysmal coughing may be caused by foreign bodies in the larynx, trachea, or bronchi. The spasmodic cough of hysteria is rare in children. Enlarged tracheal or bronchial glands produce a cough much like whooping-cough. Barthez and Sanneé give the following table of differential points:

WHOOPING-COUGH.	ENLARGED GLANDS.
1. Contagious, epidemic.	1. Isolated, not contagious.
2. Three periods, second paroxysmal.	2. No distinct periods.
3. Paroxysmal cough, with whoop, vomiting, and viscid expectoration.	3. Paroxysms short, frequently without the whoop, expectoration, or vomiting.
4. Respiratory sounds normal.	4. Signs of enlarged glands sometimes present.
5. Respiration normal in interval, apyrexia if simple.	5. Asthma in some cases alternating with paroxyms. Febrile movements with recrudescence in the evening, sweats, progressive wasting, etc.
6. Voice natural.	6. Sometimes a change in voice.
7. Usually acute.	7. Chronic.

Prognosis.—Good in the better classes, especially after the first year. During the first year it is serious, and in overcrowded institutions the outlook is very bad.

Prophylaxis.—Children with whooping-cough should be isolated from others, and especial care should be taken to avoid infecting young children and those with other diseases. The patient is to be regarded as a source of infection until the spasmodic stage is over. Where other children are to use the same room, or in institutions, disinfection should be used after the disease.

Treatment.—Much can be done to make the course of the disease less severe, but it is very doubtful if any treatment has any influence in shortening the duration. Fresh air is of great importance. The child should be kept out of doors as much as possible, if conditions permit, and the house, especially the sleeping-room, should be well ventilated. The child should be moved from room to room where possible. Protect the child from drafts and excitement. The diet should be light and nourishing, and young children and those where there is much vomiting should be put on a milk diet. If one meal is vomited, a second should be given shortly afterward.

Nagele suggests the following method of stopping the paroxysms: Pull the jaw forward and downward in a manner frequently employed by the anesthetists. This can be

done by the mother or nurse if the child feels a paroxysm coming on. A snugly fitting elastic band applied to the abdomen is of use where there is much vomiting. It should be made with a piece of elastic sewed in the front, and should lace up the back, extending from the pubes well up on the chest. No one drug should be given continuously; changes should be made from one to another as needed. Do not upset the child's stomach by indiscriminate drugging. The following drugs will be found useful: Heroin hydrochlorid ($\frac{1}{100}$ to $\frac{1}{20}$ grain). Belladonna (small doses, increased until slight flushing of face occurs after dose). Antipyrin (1 to 3 grains). Bromoform (1 to 3 drops, with caution). Quinin (1 to 5 grains). Sodium bromid (1 to 5 grains). Antiseptic and sedative sprays are sometimes used, and inhalation of vapors and steam from creosote and water are of value if there is much bronchitis.

MUMPS.

(Epidemic Parotitis.)

Definition.—An acute infectious disease characterized by fever and by swelling and tenderness of the salivary glands, usually of the parotids, but sometimes of the submaxillary and sublingual. Metastases occasionally occur in other organs.

Etiology.—It is endemic in large cities, and occurs in epidemics and sporadically. Epidemics are apparently uninfluenced by the weather and climate, and the sexes are affected about equally. Most cases occur between five and fifteen years of age. Susceptibility diminishes after fifteen, and it is not very common under five. Almost all children are susceptible, but in any given epidemic only about one-third of those exposed have the disease. Infection is by direct contact, but it may be carried by fomites. One attack usually gives immunity, though second and even third attacks may occur.

Pathology.—The parotid gland is inflamed, and the principal change is said to be in the interstitial tissue. An

organism has been discovered by Laveran and Catrin, but it has not been definitely proved to be the cause of mumps.

Period of Incubation.—This is usually long, being from seventeen to twenty-one days, and is said to vary from three to twenty-five days or longer.

Symptoms.—Prodromes may or may not be present. These consist of fever, with or without chill, general malaise, vertigo, drowsiness, vomiting, or diarrhea and epistaxis. There may also be sweats, fainting spells, pain in the ear, and trismus. The temperature ranges from 101° to 104° F. It disappears as the swelling subsides, and sometimes several days before. After an attack of mumps there may be subnormal temperature for some days. There is pain at the angle of the jaw and in the swollen parotid. One or both sides may be involved, the glands enlarging rather rapidly for from three to six days, then remaining stationary for a day or two, and gradually subside. The subsidence is usually complete in two or three days, although in severe cases it may be three weeks or a month before it disappears entirely. Where both sides are not affected at the onset, the opposite side is generally involved in from one to four days. The swelling is extremely tender and there is painful deglutition. The average case presents a much-rounded swelling at the angle of the jaw, with the lower end of the lobe of the ear at its center. It is sometimes boggy at first, but does not pit on pressure. Later it becomes very tense and firm, the skin is stretched and glazed, and there may or may not be redness. All grades of intensity may be seen. Some articles of food, such as lemons, vinegar, etc., may cause intense pain. The saliva may be increased or diminished. In very severe cases there may be enormous swelling and edema of the tissues, which may extend all around the head and neck. The submaxillary and sublingual glands may be affected either after the parotids, at the same time, or alone. Orchitis may occur in boys, coming on usually when the parotid swelling is subsiding, and sometimes after it has disappeared entirely. There is tender and painful swelling of the gland, lasting three to five days, and is often followed

by atrophy of the testicles. Vulvovaginitis and, rarely, ovaritis may occur in girls. Mastitis may occur in either sex. Pancreatitis may sometimes occur, and tenderness over the pancreatic region is not uncommon. There may be conjunctivitis and other eye complications. Tinnitus aurium occurs in some cases, and nervous complications have been described. Cerebral symptoms, like meningitis, convulsions, facial paralysis, and peripheral neuritis, as well as arthritis, albuminuria, and nephritis, may be observed.

Diagnosis.—First from adenitis, chiefly by palpation and the location of the swelling. Parotitis occurring in the infectious diseases and septic infections following disease or injury of the abdominal or pelvic organs should be excluded.

Prognosis.—As a rule, this is good.

Treatment.—Keep the patient in bed. Give a saline purge, and use hot or cold applications locally for the pain. The food should be liquid or soft. Acids and highly seasoned foods should be avoided. The swelling may be anointed with an ointment or a glycerin application, 5 per cent. guaiacol or belladonna may be used. In orchitis suspend the gland and apply lead-water and opium and guaiacol ointment. Anodynes may be given if necessary.

DIPHTHERIA.[1]

Definition.—A specific infectious disease due to the Klebs-Löffler bacillus, usually characterized by the formation of a false membrane locally, generally on the tonsils, pharynx, nose, or larynx, and by constitutional symptoms, chief of which are moderate fever, great prostration, and anemia. It is a disease in which there are great variations,

[1] Park and Thorn, "Diphtheria Antitoxin, Results of the Use of Refined," *American Journal of the Medical Sciences*, November, 1906, p. 686. A. Seibert, "Diphtheria in Early Life," *Archives of Pediatrics*, February, 1905, p. 116. Joseph Priestley, "Diphtheria Outbreak, History of," *Practitioner*, September, 1906, p. 372. J. D. Rolleston, "Diphtheria, Some Aspects of the Serum Treatment of," *Practitioner*, May, 1905, p. 660. J. T. C. Nash, "Diphtheria, Treatment of," *Practitioner*, April, 1905, p. 510. Ker, "Treatment of Diphtheria," *Practitioner*, January, 1909, p. 94. Rolleston, "Diphtheritic Paralysis," *Practitioner*, January, 1909, p. 110.

both in the local and constitutional manifestations. It may be followed by localized or general paralysis.

Etiology.—The Klebs-Löffler bacillus causes the formation of the false membrane, and the absorption of the toxins formed by it causes the constitutional symptoms. The bacillus is found in the local lesions, and sometimes in the blood and the various organs.

The disease is endemic in most cities, but may be seen sporadically and in epidemics. The majority of the cases occur in children between one and five, and three-fourths of the cases under ten. The sexes are about equally affected. The disease is most common in winter, but may be seen at any time.

Predisposing causes are poor hygiene, poor health from other diseases, chronic catarrh, and diseased tonsils.

Infection.—This occurs by direct infection in the great majority of cases. The bacilli may be carried in the discharges from the infected part, in the sputum, and mucus. The bacilli may be harbored in the throats and noses of otherwise healthy people (diphtheria carriers), and these are great sources of the spread of the disease. These may be persons who have had the disease, or others who have never shown any symptoms whatever. These carriers can only be detected by bacteriologic examination. Nurses who have been in close contact with it may transmit the disease. It may be carried in fomites. Domestic animals may be carriers, and epidemics have been spread by milk. The virulence of the bacteria exists for a long time even in the dried state. Diphtheria bacilli exhibit great differences in virulence, and there are great variations in the intensity of different epidemics.

Mixed Infections.—Other pathogenic bacteria may be associated with the diphtheria bacillus, and help in causing both local and constitutional symptoms, usually greatly intensifying both. The pus-forming organisms, streptococci and staphylococci, are most frequent. Their presence may usually be suspected from certain symptoms, and they may be demonstrated by bacteriologic examination.

Pathology.—The lesions are local and constitutional. The latter are due to the toxin circulating in the blood and lymph, and consist in acute degenerations of the cells of the principal organs and tissues of the body. Local cell changes may be noted in the affected epithelium, in the cells of the liver, heart, kidney, nervous system, and elsewhere. The changes may be only degenerations, but sometimes focal necroses may occur. Constitutional symptoms may be due to other associated bacteria.

The local changes are variable. The bacillus may cause only a catarrhal inflammation with certain degenerations in the epithelial cells. This can only be differentiated clinically by bacteriologic examination. The most frequent lesion is the formation of a false membrane. There is necrosis and a hyaline degeneration of the tissues, fibrin is poured out, and this, with the necrotic tissue and cellular exudate, forms a dense, adherent "false membrane." The location of the membrane is usually in the fauces, about 65 per cent., or the fauces and nose, about 15 per cent., or in the larynx, about 15 per cent. The remaining 5 per cent. is distributed in the nose, mouth, conjunctiva, skin, vulva, vagina, etc.

Other lesions are fatty degeneration of the heart, anæmia, enlargement of the cervical lymph-nodes, enlargement of the spleen, and changes in the blood-vessels, kidneys, and central nervous system. Pneumonia and nephritis are frequent complications.

The Incubation Period.—This is usually short and varies from two to seven days.

Immunity.—This varies greatly, and in cases in which antitoxin is used early is probably short, as the immunity is passively acquired. In cases where it is not used the immunity is more lasting, having been actively acquired, but on this point there are great differences of opinion.

Symptoms.—These vary greatly, differing with the severity of the infection and the location of the local changes.

Cases Without Membrane.—These may be noted especially during epidemics and in persons exposed to the disease.

The symptoms are those of an ordinary coryza or pharyngitis, as the case may be. The diagnosis is made by bacteriologic examination, but an irritating discharge from the nose, which is persistent and causes excoriations, should always arouse suspicion. Sometimes these cases persist for weeks, and may change into diphtheria of the ordinary type. These catarrhal cases are most common in infants.

Mild Membranous Cases.—In these the membrane is, as a rule, limited to the tonsil or near it, and in some cases it may resemble an ordinary follicular tonsillitis. There is little constitutional disturbance. The temperature is usually about 100.5° to 102.5° F., and the child may complain of slight pain in the throat, and the lymph-nodes at the angle of the jaw are slightly swollen. The disease starts as a reddened area, which becomes covered with a filmy grayish-white membrane, and this becomes whiter as it grows thicker. The edges are more or less sharply outlined and irregular in shape. It requires considerable force to remove the membrane, and a bleeding surface is left. The diagnosis is usually reasonably certain from the appearance of the throat, but sometimes it can only be made by cultures, which should be taken in all diseases where there is an exudate. Without treatment the membrane usually lasts a week or so, but when antitoxin is given it disappears promptly.

Severe Cases.—The onset may be abrupt, with a chill, vomiting, headache, and high fever, or it may be gradual, beginning with mild symptoms, which grow progressively worse. The membrane begins as above, but usually spreads rapidly over the fauces, soft palate, and uvula, and extends into and covers the pharynx, and often extends into the nose, causing an irritating discharge. Sometimes the progress of the membrane is more slow. As the membrane gets denser it becomes darker in color and may take on a greenish cast. If it is disturbed, there may be hemorrhage, which may change the appearance to a blackish color. The membrane may extend over the mucous membranes of the mouth, tongue, and lips, although this is rare. The lymph-nodes under and behind the jaw swell and are painful, and there

may or may not be considerable pain in the throat. The child usually breathes through the mouth, the breath has a characteristic fetid odor, the tongue is dry and cracked, and there may be hemorrhages. There is usually considerable discharge from the mouth and nose, which excoriates the lips and chin.

The constitutional symptoms are all severe. The child shows signs of marked toxemia and is prostrated, very much weakened, has a rapid, weak pulse, is apathetic, and may even become unconscious; occasionally there is great irritability. There is a severe grade of anemia and the child has a marked pallor, which may become ashy or cyanotic as the circulation fails. The fever is irregular, but usually rather low, unless there are other bacteria present. There is loss of appetite, and there may be vomiting and diarrhea. The urine contains albumin and casts.

If no antitoxin is used the disease progresses for about a week, and then after a day or two more begins to subside, the membrane shrivels, loosens, and comes away, and sometimes part of it seems to be absorbed. Sometimes the membrane and symptoms persist longer. The constitutional symptoms lessen and a slow convalescence begins, characterized by a weak heart and anemia. Since the introduction of antitoxin the prolonged course is fortunately not often observed.

Laryngeal Cases.—Sometimes the disease extends into the larynx, and this most frequently happens between the second and fifth day. The disease may start in the larynx in about 15 per cent. of the cases and be limited to it. In either case there is loss of voice, a hoarse, barking, croupy cough, and dyspnea. The symptoms increase steadily, and the respiration becomes noisy and labored and cyanosis becomes marked. The expression is anxious and the child is very restless. If not relieved by intubation, tracheotomy, or the disappearance of the membrane due to the administration of large quantities of antitoxin, young children usually die inside of forty-eight hours, in older ones the progress is more slow, especially in robust children.

Atypical Forms.—There may be a catarrhal inflammation only, as noted above. These cases are seen during epidemics and may be the means of spreading the disease, as the diagnosis cannot be made without cultures.

There may be the appearance of an ordinary follicular tonsillitis, or there may be a membrane which occurs only in spots.

Nasal Diphtheria.—The usual form of nasal diphtheria is secondary, although it may be primary; the nose is filled with the membrane; the nasal discharge is frequently bloody and may cause excoriations of the upper lip. The constitutional symptoms are very severe; there are marked prostration and pallor. This is probably due to the absorption of toxin by the numerous nasal lymphatics.

A second form is the so-called membranous or fibrinous rhinitis, in which a thick membrane fills the nose; the Klebs-Löffler bacillus is present. Constitutional symptoms are absent or slight. Recovery always follows in this class of cases.

Mixed Infections.—These are fairly common, the streptococcus being the most frequent organism, but pneumococcus and staphylococcus, as well as other germs, may be found. Locally, the membrane is extensive, and there is great redness and swelling of the adjacent tissues. The lymph-nodes and cellular tissue of the neck are frequently involved. All the constitutional symptoms are severe. Death may take place from septicemia, toxemia, involvement of the larynx, or, later, from heart failure. Pneumonia, nephritis, suppuration, and hemorrhage may complicate the case later.

Complications.—**Paralysis.**[1]—This is most frequent from two to ten years of age, and is less frequent if antitoxin is used in the first or second day of the disease. Some cases come on during the first week, but by far the greatest number come on in the second, third, and fourth week.

Paralysis of the palate is most frequent, of the eye muscles next, and cardiac paralysis most frequent of all. The cardiac, pharyngeal, and diaphragmatic palsies are the most serious,

[1] Rolleston, *Practitioner*, January, 1910, p. 110.

especially those beginning before the third week, and paralysis coming on after the third week usually recovers.

Pneumogastric paralysis usually comes on in the second week; there is anorexia, vomiting, slow, weak, irregular pulse, anemia, slight cyanosis, often some dyspnea, and abdominal pain. These symptoms get worse, and death usually takes place from syncope, especially after exertion. Milder cases may be seen in which recovery may take place.

Diphtheria in Other Locations.—**Conjunctival Form.**—This may be primary or secondary, and usually results in the loss of sight. It is frequently fatal.

Skin.—In severe cases this may be seen as a complication, but it may occur as a result of wound infection, and occasionally more or less chronic skin infections are seen. They have a somewhat characteristic appearance, difficult of description.

Ear.—This may be seen as the result of extension from the throat.

Complications and Sequelæ.—Hemorrhage may follow ulceration. Most frequently this is in the nose or throat. Gangrene of the throat and suppuration of the lymph-nodes in the neck may follow secondary infections. Bronchopneumonia is perhaps the most common of all complications.

Albuminuria is present in all severe cases and severe nephritis may be seen.

Myocarditis and dilatation of the heart are frequently seen in severe cases, and cardiac thrombosis and endocarditis may also be met with.

Diphtheritic paralysis is frequent, and is considered above and elsewhere.

Skin rashes of various kinds, erythema, urticaria, etc., may complicate diphtheria.

Diagnosis.—Two things must be considered: bacteriologic diagnosis and clinical diagnosis.

The bacteriologic diagnosis is made by passing a sterile cotton swab over the suspected membrane, and then drawing this gently over a culture tube of blood serum agar. This is incubated at body temperature from twelve to twenty-four

hours, and after that time the diphtheria bacillus gives a characteristic appearance in the culture and also in smears examined microscopically. Often a diagnosis may be made by examining a smear made directly from the membrane, but this is not a very reliable method.

The presence of diphtheria bacilli in the mouth does not necessarily mean that the person has diphtheria, but where there are inflammations or membrane, it may usually safely be regarded as the cause and the diagnosis of diphtheria made.

A negative culture does not necessarily mean that the disease is not diphtheria, as the bacillus may not be found in early laryngeal or late pharyngeal cases; when an antiseptic has been used a short time before taking the culture; when the culture has been badly contaminated by carelessness in taking it, and when the disease is in a tonsillar crypt or fossæ. Common sense and clinical findings should always be used in judging bacteriologic reports.

Virulent bacilli may be found in the throats of those recently exposed to the disease, and these may transmit the disease to others. These people are called diphtheria carriers.

Non-virulent diphtheria bacilli may be found in the throats of people who have not been so exposed, and also other organisms more or less closely resembling the diphtheria bacillus. These people are not, as a rule, a source of the disease.

Clinical Diagnosis.—The majority of cases can be told clinically by an experienced observer, but atypical cases and membranes seen in the course of other infectious diseases, as scarlet fever and measles, may require cultures to determine their nature. Cases of streptococcus and staphylococcus sore throat offer the most difficulty.

Membranous croup is almost without exception diphtheria. A membrane in the throat apart from scarlet fever is more apt to be diphtheria than anything else.

The table on page 404 [1] gives the chief points in diagnosis at a glance.

[1] Reference to this table unfortunately lost.

	Distribution.	Color.	Symmetry.	Pain.	Glands.	Local accompaniments.	Pyrexia.	Progress.
1. Scarlet fever.	Palatal arches, uvula, tonsils, and sometimes pharynx and roof of mouth. Does not involve larynx.	Vivid red.	Symmetric.	Considerable.	Usually unaffected in early stages; enlarged, and may suppurate later.	Strawberry tongue.	Marked.	Disappears slowly.
2. Simple tonsillitis.	May extend over fauces, palate, and pharynx. Larynx not involved.	Deep red and almost shining.	Generally bilateral.	Considerable.	Gland at angle of jaw usually enlarged and painful at an early date.	Furred tongue and foul breath.	Marked.	Disappears rapidly.
3. Septic tonsillitis.	Rarely extends beyond base of soft palate; one or both tonsils affected.	Deep red, often almost purple.	Usually although not always unilateral.	Very severe.	Slightly enlarged at an early date, but quickly subsides.	Thick furring of tongue.	Marked.	Usually slow tonsillar abscess.
4. Follicular tonsillitis.	As above.	Bright red, not so deep as 2 and 3.	Almost always bilateral.	Fair amount.	As above.	As above.	Slight.	Somewhat slow disappearance.
5. Diphtheria.	Extremely variable, but usually settles on tonsils first. Larynx occasionally involved.	Very faint reddening.	Asymmetric.	Usually slight or absent.	Frequently enlarged, but suppuration very rare.	Typical odor; frequent croupous symptoms or nasal discharge; subsequent local paralysis.	Keeps in region of 102° F.	Rapid disappearance (lasts a few days only).
6. Syphilis.	Involves all fauces, palate, pharynx, and larynx.	Bright red.	Symmetric.	Little or none.	Very seldom enlarged.	Ulceration; mucous patches; sulci on tongue, etc.	None.	Persistent, but rapidly clears up under treatment.
7. Measles.	Palate appears to be chiefly affected, but only slightly so.	Red blush with tiny red papules.	Symmetric.	Slight or none.	Normal.	Koplik spots.	Marked.	Rapidly subsides.
8. Thrush.	Variable.	Normal.	Asymmetric.	None.	Normal.	Patches on tongue, buccal mucosa, etc.	None.	

Scarlet Fever.—The high fever, characteristic rash, and tongue, rapid pulse, and absence of diphtheria bacilli are the distinguishing features.

Follicular Tonsillitis.—This is distinguished by the membrane being limited to the tonsil, and its being easily wiped off without leaving any bleeding points, and in the follicular form by the plugs of cheesy material. The fever in tonsillitis is, as a rule, higher than in diphtheria, unless the latter is complicated by a secondary infection.

Ulcerative tonsillitis caused by Vincent's bacillus presents a dirty, soft, yellowish slough, and there are few or no constitutional symptoms.

Cultures should be resorted to in every doubtful case.

Prognosis.—This varies a great deal, both in the intensity of the infection and as to how much and how early antitoxin is used. If a sufficiently large dose is given on the first day the mortality is less than 1 per cent., is less than 2 per cent. on the second day, less than 4 per cent. on the third day, and about 12 per cent. on the fourth day. Later it is about 25 per cent. Cases seen late, those with mixed infection, laryngeal, and conjunctival cases, are all severe and the outlook is grave. Death may be caused by heart failure, suffocation, pneumonia, nephritis, and occasionally other causes.

Prophylaxis.—All doubtful cases should be managed like diphtheria until the diagnosis is fully established. The case should be isolated, and nobody allowed in the room except the nurse and physician. Municipalities should provide hospitals to which the children of those unable to carry out the proper isolation could be removed. There should be as little in the room as possible. The nurse should wear wash dresses and change the dress to go out. She should keep her throat sprayed with some antiseptic solution and should be immunized. The physician should wear a gown or long coat and thoroughly disinfect his hands. Everything that goes into the room should be disinfected—dishes by boiling, clothes, towels, and bedding by placing in carbolic solution 1 : 40 to 1 : 20 and boiled later. Unpainted wood work and furniture

should be washed daily with 1 : 3000 bichlorid solution and painted surfaces with 1 : 40 carbolic acid solution. Cultures should be taken from the throat of the patient and nurse before quarantine is raised. The nurse and anyone who has been exposed to the disease should be immunized by injecting 1000 units of antitoxin or 500 in case of young infants. Where expense is an object, 500 units may be used, although this amount occasionally fails to give immunity. The immunity lasts from one month to six weeks.

Treatment.—Antitoxin should be administered at once. It is best injected under the skin of the abdomen. Five thousand units should be given as the initial dose, and this should be repeated in six hours if the progress of the membrane is not checked, and it does not tend to shrivel up or become broken and granular looking. In very severe cases, those seen late and in laryngeal cases, 10,000 units may be given as the initial dose. Where expense is an object, 3000 units may be used as the initial dose in mild cases and 2000 in young infants. There are no bad effects from antitoxin, except an occasional urticaria four to eight days after its administration and occasional joint pains. Very exceptional individuals are sensitive to the effects of serums of any kind, but these need not be considered in practice. Antitoxin should be injected with aseptic precautions.

Local Treatment.—The throat should be sprayed with mild antiseptic solutions. Peroxid of hydrogen (1 to 4) and a saturated solution of boric acid may be used alternately. The nose should be douched with Dobell's solution or peroxid of hydrogen (1 to 10) four to six times daily.

General Treatment.—Strychnin and alcohol may be used as heart stimulants as indicated. Iron is always indicated for the subsequent anemia. In all cases where the heart is weak the child should be kept quiet, not allowed to move itself, and all struggling with the child, as in making applications and douching, should be avoided.

The Treatment of Laryngeal Obstruction.—If the diphtheritic membrane is in the larynx there will be more or less dyspnea. If the dyspnea is urgent, or if the child is not

within easy reach of the physician, an *intubation tube* should be inserted. Every practitioner should learn how to intubate. It should be practised on the cadaver under competent instruction before it is attempted on the living child. The O'Dwyer tubes are the best. The procedure is as follows: The proper-sized tube is selected by measuring it on a gauge which comes with the intubating set. The graduations are according to the age of the child, but it should be remembered that a large child will take a larger tube than the average, and a small one a smaller tube. The tube is threaded with a stout thread, which serves to remove the tube if it is inserted into the esophagus by mistake, or if the child does not breathe properly after the tube is introduced. It is a good plan to keep all the tubes threaded with a single thread, and when a tube is to be used it may be taken out already threaded by pulling the thread out of the other tubes. It frequently happens that in an urgent case time is lost in threading the tube. The arms of the child should be placed straight along its sides, and the child wrapped in a blanket so as to secure both arms and legs. The child may be intubated either lying down or held in the sitting position. All other things being equal, the lying down position is to be preferred, chiefly on there being less danger of heart failure in advanced cases of diphtheria. The child should be placed on a low table or on a bed. If on a bed, the mattress should be very firm. One person holds the child's body still and a second assistant holds the head. The head should be held straight in the median line, and should be neither inclined forward nor backward. If the sitting posture is used the child is held by one assistant, the legs between the legs of the assistant, while a second assistant, standing behind, holds the head. A mouth-gag is used to hold the mouth open. The tube is held on the introductor in the right hand, and the thread attached to the tube is wound lightly around one finger, care being taken not to get it twisted. The index-finger of the left hand is passed into the mouth and the opening of the larynx accurately located. The tube is then introduced, using the finger as a guide. The introductor should be kept in the middle line, and when the end

of the tube reaches the opening of the larynx the handle of the introductor is raised, and at the same time the tube pressed gently downward. But little force is necessary. The introductor is then removed, the finger in the mouth holding the edge of the tube to prevent its being withdrawn. If the tube is in the right place the child usually coughs a few times to clear it of mucus and the breathing becomes easier, and in a few minutes the color of the child becomes normal. The position of the tube may be verified by the finger. If the tube is accidentally placed in the esophagus it may be withdrawn by means of the thread. As soon as the child breathes easily the thread may be removed, and the child's hands should not be released until it is. The mouth-gag should be introduced, and the finger used to hold the tube in place lest it be withdrawn. If the child coughs the tube up shortly after it is introduced it should be replaced, using a larger tube. If it is coughed up in two or three days after the free use of antitoxin it may be allowed to remain out unless the dyspnea returns. Sometimes, just after the tube is introduced, it is advisable to give the child a teaspoonful of pure whisky to cause coughing, and thus clear out the tube. If antitoxin has been used the tube may generally be removed in four or five days. The same preparations are needed as for the introduction. The extraction is rather the more difficult. The index-finger of the left hand finds the opening of the tube. With this as a guide, the extractor is introduced, holding it in the median line. As soon as the opening of the tube is reached the handle of the extractor is raised, and this allows the end of the extractor to enter the tube. The tube is grasped and removed. One difficulty experienced is trying to get the extractor into the tube without raising the handle as directed, another is, that as soon as the extractor touches the tube the larynx is pulled downward by the muscles contracting. The latter may be overcome by holding the larynx down with the finger.

The voice is lost when the tube is in, and only a whispered voice possible; the voice returns after the tube is removed, and in some instances the return requires a number of days.

In some instances the child swallows without any difficulty, but in others it must learn to swallow under the new conditions. Semisolid food may be used, or the child may take its food with the head lower than the body, as suggested by Casselberry, either from a bottle with a tube lying on the nurse's lap, or, in older children, with the head over the edge of the bed, using a tube placed in a glass. This is usually only necessary for a day or two.

Tracheotomy.—If intubation instruments are not at hand, or if for any reason an intubation cannot be done, a tracheotomy should be resorted to if the dyspnea becomes dangerous. Intubation is always to be preferred.

TYPHOID FEVER.[1]

(Enteric Fever; Typhus Abdominalis.)

Definition.—An acute infectious disease caused by the bacillus typhosus, characterized anatomically by swelling and ulcerations of the lymph-follicles of the intestine, enlargement of the spleen and mesenteric lymph-nodes, and clinically by continued fever, a rose-red eruption, toxemia, abdominal tenderness, and constipation or diarrhea, and often marked nervous symptoms. The course and symptoms are extremely variable.

Etiology.—The disease may be transmitted from the mother to the fetus. Abortion usually results, but the child may be born at term suffering with a general typhoid infection.

[1] Morse, *Boston Medical and Surgical Journal*, February 27, 1896; *Archives of Pediatrics*, December, 1900. Adams, "A Study of 550 Cases of Typhoid Fever in Children," *American Journal of Medical Sciences*, vol. cxxxix., 1910, p. 638. Patterson, "Surgical Treatment of Perforation of Intestines," *American Journal of Medical Sciences*, May, 1909, p. 660. Jopson and Gittings, "Intestinal Perforation During Typhoid Fever in Children," *American Journal of Medical Sciences*, vol. cxxxviii., 1909, p. 625. Ker, "Typhoid Fever, Antisepsis and Asepsis in the Treatment of," *Edinburgh Medical Journal*, July, 1906, p. 29. W. J. Butler, "Typhoid Fever in Children," *Journal of the American Medical Association*, November 11, 1905, p. 1468. C. B. Ker, "Typhoid Fever, Recent Work on," *Practitioner*, December, 1906, p. 780. D. L. Edsall, "Typhoidal Insanity in Children," *American Journal of the Medical Sciences*, February, 1905, p. 327.

Typhoid fever is rare in infants under two years of age, but does occur. After the fifth year typhoid is not uncommon.

Infection takes place usually from drinking contaminated water or milk.

Pathology.—There have been but few autopsies, as the disease is rarely fatal in very young children. The lesions are the same as in adults, but, as a rule, less severe. There may be no ulceration of Peyer's glands, but only swelling, together with enlargement of the spleen and mesenteric lymph glands. Definite diagnosis is only by cultures or the Widal reaction.

Incubative Period.—Two to three weeks.

Symptoms.—The onset may be gradual, general malaise, nervousness, and gradually increasing fever, but in about half the cases the onset is sudden, with vomiting, fever, nervous symptoms, and prostration. There may or may not be diarrhea. Constipation is frequently seen in young children, especially at the onset.

Temperature.—This is more irregular than in adults. The fever may come on abruptly or very slowly. Throughout the entire disease the fever may be irregular, but is continuous. There may be hyperpyrexia. During convalescence errors in diet may cause fever.

Eruption.—This is not as constant as in adults. It consists of the same rose-colored spots, appearing on the back and abdomen about the tenth day. The spots last three or four days and disappear; successive crops appear for a week or more.

Mouth and Tongue.—The mouth is usually dry and the lips dry and parched. The tongue is coated with a white coat early in the disease, and later this becomes brownish or yellow. The tongue may clear off and become glazed and dry. Fissures of the tongue and lips are not infrequent.

Pulmonary Symptoms.—Bronchitis is a common occurrence, and it is usually observed by the end of the first week. Bronchopneumonia and lobar pneumonia are not so frequent, but may be observed. Pleurisy may also be noted.

Lymph-nodes.—These are often slightly enlarged.

Abdominal Symptoms.—These are less marked than in adults. There may or may not be tenderness and tympanites. Diarrhea is present in about half the cases. The spleen is usually enlarged and easily palpated.

Nervous Symptoms.—These vary with the fever; there may be delirium or a general nervous condition, or there may be symptoms not unlike meningitis. Mental symptoms are not uncommon either during the course of the disease or convalescence.

Pulse.—This is rapid, but in typhoid fever the pulse is lower than in a like amount of fever from other causes.

Emaciation.—This is usually marked.

Urine.—There is often a little albuminuria. After the first week Ehrlich's diazo-reaction is usually present.

Intestinal Hemorrhage and Perforation.—These are both rare in children, especially so in very young children.

Course and Duration.—The average duration of the disease in childhood is about two weeks. Many cases have fever only a week or ten days. Some cases last for weeks. Relapses are not uncommon.

Complications and Sequelæ.—Bronchitis is frequent. Pneumonia is occasionally seen. Suppuration of the middle ear or of the bones may follow. Meningitis may also occur.

Diagnosis.—The presence of the Widal agglutination reaction is the most positive evidence, and may be demonstrated in about 95 per cent. of the cases. Unfortunately it is rarely obtained before the seventh day and often much later.

Typhoid bacilli can often be demonstrated in the urine and feces.

A continued fever, with rose spots and an enlarged spleen, is usually typhoid fever if malaria, tuberculosis, and ileocolitis have been excluded.

Ophthalmic tests for both typhoid and colon infection[1] along the same lines as the conjunctival test in tuberculosis

[1] *Journal of Medical Research*, January, 1909, p. 95.

have been suggested, and a reaction similar to the Wassermann, Neisser-Bruck has also been used and is apparently very reliable.[1]

The presence of the malaria parasite and the influence of quinin clear up the question of malaria.

General miliary tuberculosis is usually impossible to distinguish (except by the Widal reaction) until lung symptoms appear. The pulse is more rapid in tuberculosis.

Ileocolitis is most frequently seen in young children, and the bowel symptoms are, as a rule, more intense than those seen in typhoid.

Meningitis may be difficult to distinguish, as marked cerebral symptoms may simulate it closely. The coma of typhoid is not as complete, the pulse is not as slow or so irregular; there is rarely paralysis, and the abdomen is not retracted.

Prognosis.—During the first year typhoid is a serious disease, after that the prognosis is much better than in adults. The average mortality is from 3 to 5 per cent.

Prophylaxis.—Everything used by the patient should be kept separate and frequently sterilized. All laundry articles should be soaked in 1 : 20 carbolic acid for two hours or more. Stools and urine may be sterilized by mixing them with a 1 : 20 solution of carbolic acid for six hours and then boiled. Blankets, mattresses, and pillows should be sterilized by steam.

Antityphoid vaccination may be done on persons about to travel in countries where typhoid is prevalent, or in those constantly exposed.[2]

Treatment.—Rest in bed, a liquid diet, consisting largely of milk, cold sponging or bathing to reduce high temperature and allay nervous symptoms. Water should be given at frequent intervals. Alcohol and strychnin should be given as soon as the heart flags, but not until then. The bowels should be moved once a day by enema or occasionally by calomel, and an additional dose of calomel is advisable if toxic symptoms are marked. If diarrhea is present, bismuth and some form of opium or beta-naphthol bismuth, salicylate of bismuth, and codein sulphate may be used. A mixture

[1] *Progressive Medicine*. March, 1910, p. 188.
[2] Stone, *Jour. Amer. Med. Assoc.*, October 16, 1909, p. 1253.

of all three of these is of value when the stools are loose and offensive.

Tympanites is often relieved by the use of turpentine stupes, and turpentine or chloroform internally. Charcoal may lessen it. Injections of glycerin and water are often effective.

Hemorrhage from the Bowel.—Absolute rest, morphin hypodermically to control the bowel; do not give any food for twelve hours, but ice may be given. An ice-bag or coil should be applied to the abdomen. Turpentine is recommended. For collapse, infusions of salt solution and stimulants hypodermically.

Perforation demands immediate operative interference.

Convalescence should be managed with care. Liquid food should be continued for about a week after temperature has reached normal. Errors in diet frequently lead to a recrudescence.

CEREBROSPINAL FEVER.[1]

(Epidemic Cerebrospinal Meningitis.)

Definition.—An infectious disease characterized by inflammation of the brain and spinal cord. It occurs sporadically and epidemically. Symptoms and course of the disease present great irregularity.

Etiology.—The diplococcus intracellularis meningitidis of Weichselbaum is constantly associated with the disease. Overcrowding, overexertion, and exposure seem to be predisposing factors. The meningococcus is easily killed, and the disease is probably transmitted directly and by meningococcus "carriers."

Pathology.—In cases dying early there is intense congestion of the meninges. Later there is a fibrinopurulent exudate between the dura and pia mater. In chronic cases there is thickening of the meninges. Pneumonia is a frequent complication.

[1] Councilman, Mallory, and Wright, Massachusetts State Board of Health, 1898. J. L. Morse, "Meningitis in Infancy," *Journal of the American Medical Association*, June 23, 1906, p. 1906. Elser and Hontoon, *Journal of Medical Research*, 1909, p. 397. G. C. Robinson, "Meningitis, Bacteriological Findings in Epidemic Cerebrospinal," *American Journal of the Medical Sciences*, April, 1906, p. 603.

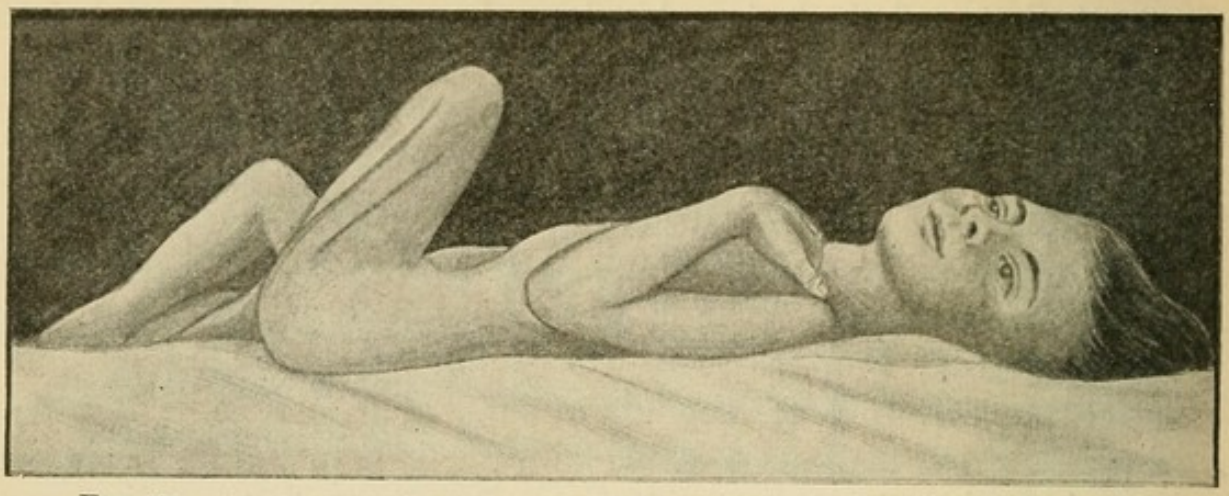


FIG. 139.—Cerebrospinal meningitis. Tâche cérébrale shown on left thigh.

Stage of Incubation.—Unknown.

Symptoms.—There is great irregularity in the course of the disease.

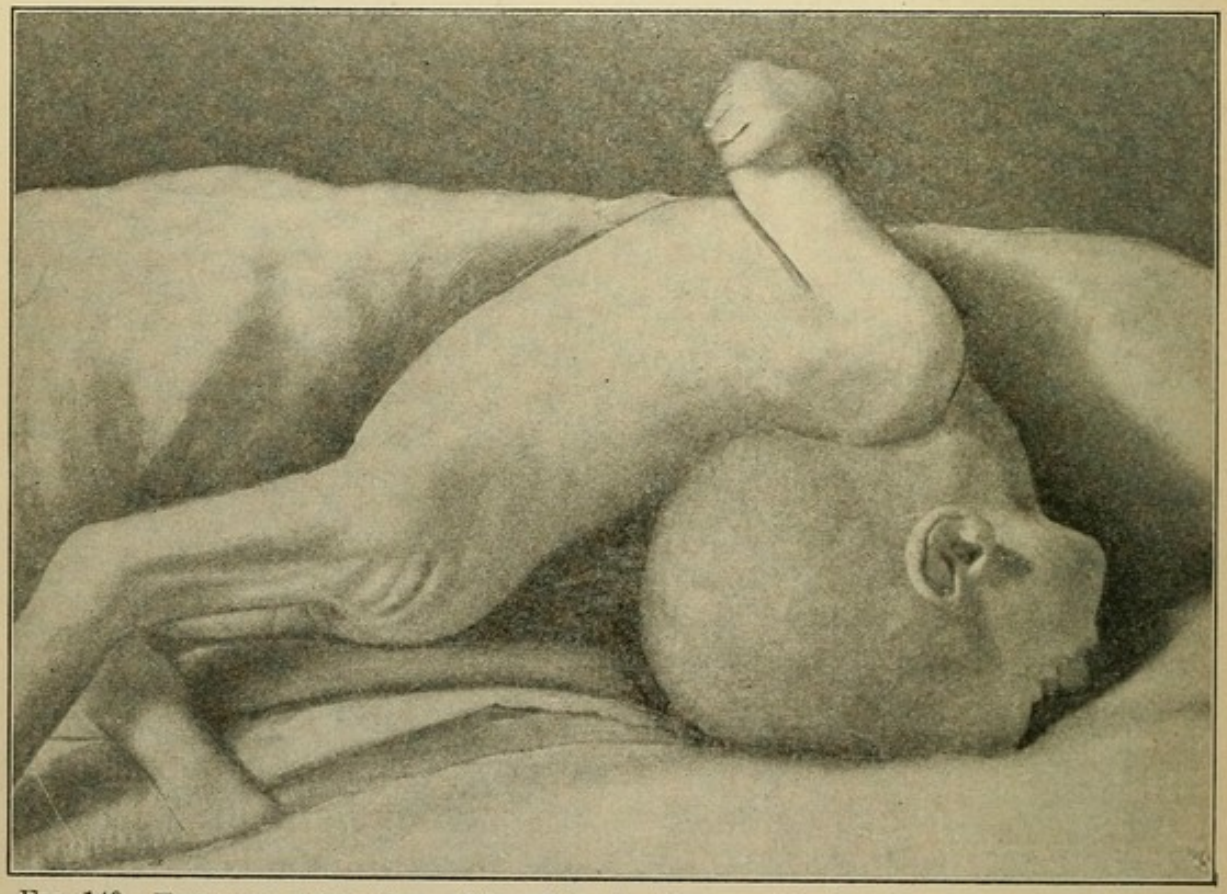


FIG. 140.—Extreme retraction of head in basilar meningitis (Great Ormond Street Hospital for Children, London, 1901) (Photographed by Dr. Thursfield).

Ordinary Form.—Usually a sudden onset with headache, chill, and vomiting. There are frequently stiffness of the neck, photophobia, and dread of noise. There are headache and pains

in back and limbs. There is stiffness of the muscles and often tonic or clonic spasm. There is restlessness, delirium, or coma. Paralysis of various muscles, especially of those supplied by the cranial nerves, is common. Optic neuritis may occur as a result of cranial pressure, or there may be a direct extension of the inflammation.

Skin eruptions are common, especially herpes. There is often a purpuric rash or there may be simple erythema, ery-

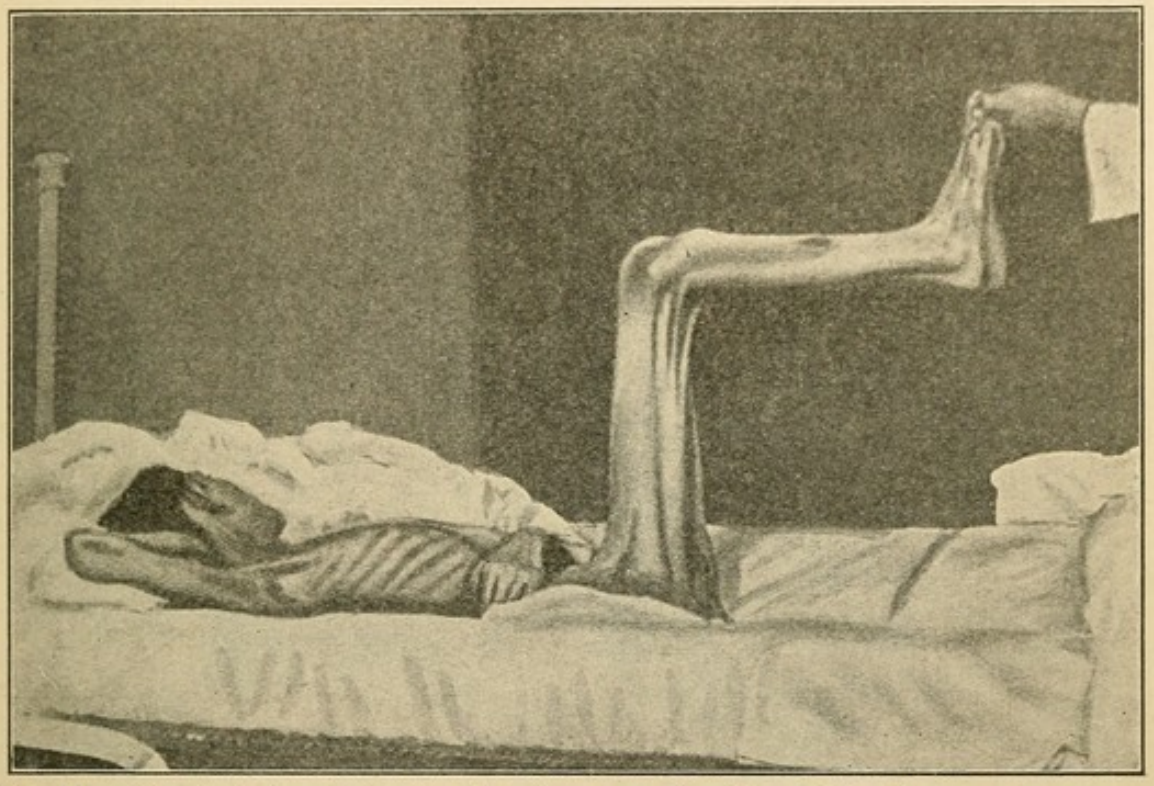


FIG. 141.—Kernig's sign, showing the strong contraction of the flexors on attempting to extend the leg (Osler).

thema nodosum, or urticaria. A flush follows drawing any object across the skin (tâche cérébrale, Trousseau).

The temperature is extremely variable. It may be high or low. The pulse is at first rapid, later slow and full, becoming more rapid before death. Deep-sighing respiration is common. Cheyne-Stokes breathing may be noted.

In infants cerebrospinal fever usually gives the clinical picture of chronic basilar meningitis (see same).

There is always a considerable leukocytosis.

Unusual Forms.—*Malignant Form.*—Fulminating or apoplectic meningitis. A sudden onset, with chills, headache,

delirium, or coma, convulsions, fever, slow, weak pulse, and death within a day or two.

Abortive Form.—The disease starts with symptoms of the ordinary form, but rapid recovery takes place after a few days.

Intermittent Form.—Cases have been observed with a fever resembling malaria.

Chronic Form.—The symptoms may persist for weeks or even months. These cases are usually fatal in the end.

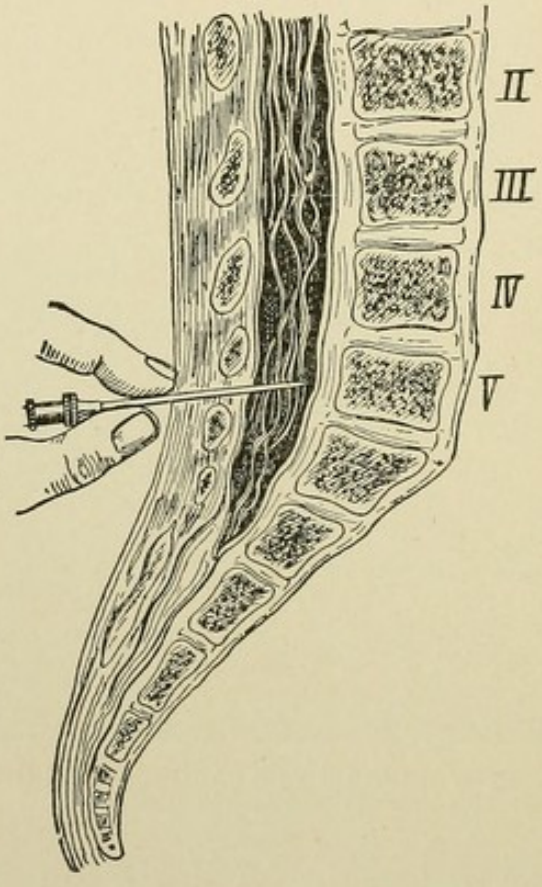


FIG. 142.—Anatomic preparation from a child twenty-one months old, showing location for lumbar puncture between third and fourth spinous processes (Frühwald).

Complications.—Pneumonia, pericarditis, parotitis, and arthritis are the most frequent. Paralysis, blindness, deafness, or mental deterioration may follow meningitis.

Diagnosis.—Fever, headache, retraction of the neck, delirium or coma, tremor or rigidity of the muscles, are the most important signs. Kernig's sign is of value. Contractions of the flexors of the leg prevent the full extension of the leg on the thigh. Leichtenstern's phenomenon, a light-

ning-like contraction of the muscles of the entire body elicited on striking any part of the bony framework with a percussion hammer, may be present. Vincent and Bellot have described a precipitin reaction which is of value in diagnosis.[1]

Centrifugalize the cerebrospinal fluid, and place 100 drops in three test-tubes. One is used as a control. To the other two a drop of antimeningitis serum (Flexner or Wassermann) is added, and all the tubes placed in an incubator at a temperature of from 50° to 53° C. In from eight to twelve hours there is a clouding; if the disease is due to cerebro-

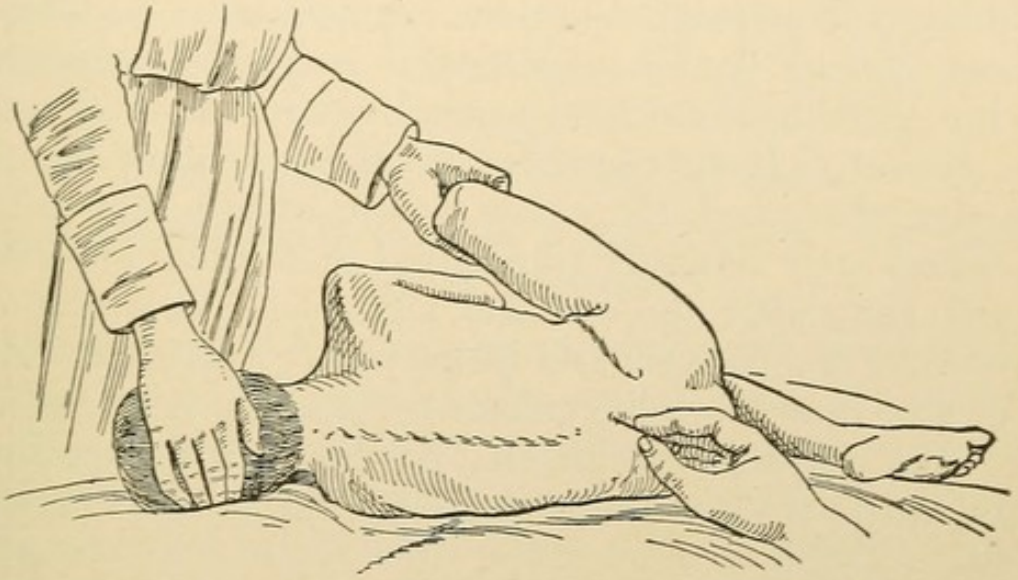


FIG. 143.—Method of inserting needle in lumbar puncture—child in lying posture (Boston).

spinal fever the control remains clear. If the disease is due to any other bacteria or with cerebrospinal from normal persons the tubes remain clear.

Lumbar Puncture.[2]—With perfect technic this is harmless. A small aspirating needle is introduced into the spinal canal and the fluid then obtained examined for bacteria and cells.

[1] *Bulletin Académie de Médecine*, vol. lxi., p. 326, and *Bulletin Société Médicale des Hopitaux*, 1909, p. 952.

[2] S. J. Kopetzky, "Lumbar Puncture," *American Journal of the Medical Sciences*, April, 1906, p. 648. Edward Turton, "Cytodiagnosis of Pleural and Cerebrospinal Fluids," *Practitioner*, April, 1905, p. 497.

Procedure.—Use strictly aseptic precautions, an anesthetic is rarely necessary. Flex the body, have it held firmly, and introduce the needle between the second and third or, the third and fourth lumbar vertebra. A simple method is to choose the space which corresponds to a line drawn from the crest of the ilium. The easiest method is to go through the median line and slightly upward. Another method is to introduce the needle about 1 cm. from the median line and point it slightly upward and toward the median line. The needle is introduced from 2 to 4 cm. The fluid drops or, if pressure is great, runs from the needle. It is turbid, occasionally purulent or bloody. A fluid may even present its normal clearness and meningitis be present. Cultures should be made, although coverslip preparations from the centrifugalized fluid generally show whatever organism is present. If no centrifuge is at hand, allow the fluid to stand undisturbed for a few hours, when a film will be seen, which may be easily transferred to a slide, allowed to dry, and stain with the ordinary methods. This film contains most of the bacteria and leukocytes. Apparently sterile fluid may be tested for tuberculosis by injecting it into guinea-pigs. The tubercle bacilli, if present, can generally be demonstrated if a number of specimens are carefully studied.

Prognosis.—The mortality is high. Without treatment it averages about 80 per cent. Lumbar puncture for the relief of pressure reduces this slightly. With the use of the Flexner-Jobling serum the mortality has been reduced to about 30 per cent. or less. Deep coma and a protracted course are both unfavorable signs.

Treatment.—This is as outlined in meningitis, with the addition of the use of the Flexner-Jobling serum. The serum should be kept in a refrigerator until it is to be used, when it should be warmed to the body temperature before it is injected. From 30 to 40 c.c. are given at a dose, injected directly into the spinal canal after the withdrawal of the cerebrospinal fluid by lumbar puncture. It is desirable, although it is not essential, to withdraw from the spinal canal at least as much

fluid as the amount of serum to be injected. The injection should be made slowly and carefully, to avoid the production of symptoms due to increased pressure. The injection should be repeated in twenty-four hours, and three or four injections may be made, depending upon the nature and gravity of the case. As much as 120 c.c. have been injected into the spinal canal in four days. The earlier the injection the better the results. If the first fluid obtained by spinal puncture is turbulent, or if it shows Gram-negative diplococci, some of which are within the leukocytes, an injection should be immediately made without waiting for the results of the culture. The treatment should only be continued where the disease is proved to be cerebrospinal fever. A relapse should be treated in the same manner as a fresh case.

ANTERIOR POLIOMYELITIS (Heine).

(Infantile Spinal Paralysis; Acute Wasting Paralysis; The Essential Paralysis of Children.)

Definition.—An acute infectious disease usually attacking the anterior horns of the spinal cord, but sometimes affecting the gray matter in the medulla, pons, or cerebrum. (The varieties of the disease are given below.) The disease is characterized by an acute onset, with or without vomiting, restlessness or apathy, rigidity of the neck and often of other muscles, headache, often general pain, and, most striking of all, a more or less extended paralysis of the muscles, usually of the extremities.

Etiology.—Noguchi has announced the discovery of the organism. It has been shown by Flexner and Lewis and others that it may be transmitted to monkeys by inoculating them with emulsions made from the spinal cord and also from the brain, lymph-nodes, salivary glands, mucous membrane of the nasopharynx, and in the acute stage by using the blood and cerebrospinal fluid. Other animals have not been found susceptible.

The inoculation may be made by injecting the material into the brain, subdurally in either cranium or spinal canal, in or about the peripheral nerves, into the general circulation

and the anterior chamber of the eye. It has also been caused by rubbing on the mucous membrane of the nasopharynx, with or without previous scarification, and by placing it into the trachea, stomach, or intestines.

The virus will pass through the finest filters, is not destroyed by drying or by cold, but is injured by heat (45° to 50° C.). The incubation period is from six to over thirty days in monkeys, and doubtless the same is true of human beings.

The method of transmission in the case of human beings is not quite clear. It is possible that some insect is the carrier. Some cases appear to be by direct transmission, but the question is still unsettled.

The disease occurs sporadically and in epidemics. It is most frequent in the summer months, and most of the cases occur during the first three years. Boys are more frequently affected than girls. Immunity is conferred by one attack, but individuals affected are liable to develop nervous diseases in later life. Paralysis in domestic animals has often been noted during epidemics, but probably there is no relation to the disease.

Pathology.—There is congestion and inflammation of the gray matter of the anterior horns of the entire cord, and this may extend to the posterior horn, to the white matter, and also to the meninges. The medulla, pons, and brain may also be affected. There may be hemorrhage into the anterior horns. There is degeneration of the nerve-fibers of the anterior roots and atrophy of some of the cells of the anterior horns. Later there is some sclerosis.

Symptomatology.—Wickman has made the following clinical classification :

1. *Spinal Poliomyelitic Form.*—Sudden onset, followed by paralysis.

2. *The Ascending Form* (*Landry's Paralysis*).—Involvement of respiratory centers. Most fatal cases belong to this type.

3. *The Bulbar or Pontine Form.*—Nerves most often involved : facial, ocular, hypoglossal. May exist alone or with paralysis of extremities.

4. *Encephalitic or Cerebral Form.*—May exist alone or with spinal involvement.

5. *The Ataxic Form.*—Much like Friedreich's ataxia.

6. *Polyneuritic form.*

7. *Meningitic form.*

8. *Abortive Form.*—(1) General infection. (2) Symptoms of meningeal irritation. (3) Cases of much pain, like influenza. (4) Cases with marked digestive disturbances.

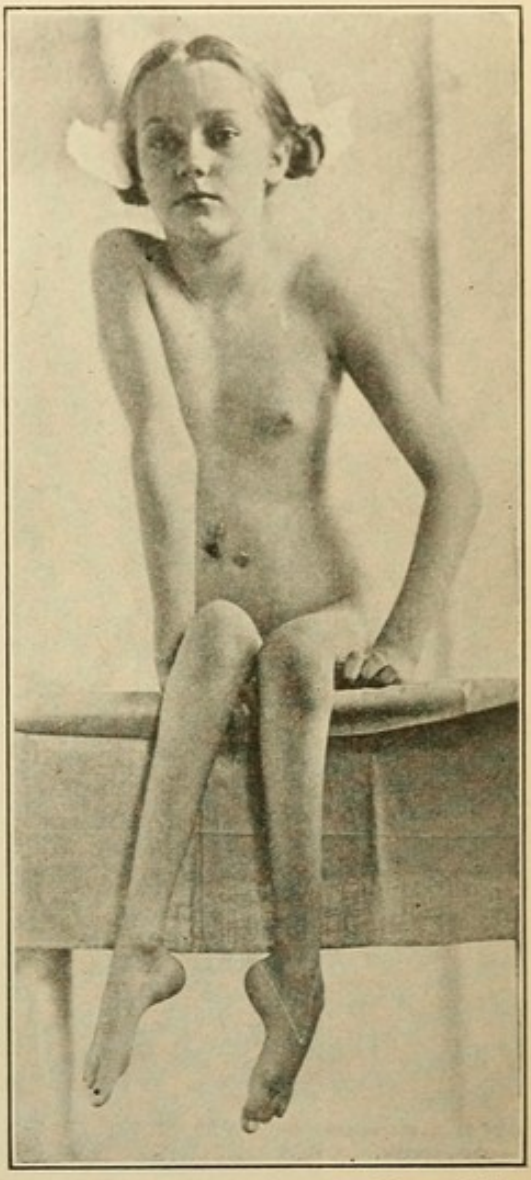


FIG. 144. — Anterior poliomyelitis. Paralysis of both legs.

Symptoms.—The prodromal symptoms are irritability and restlessness, or apathy and pain in the spine and extremities. The onset becomes definite, with fever ranging from 100° to 106° F. and lasting from two days to a week. In about one-quarter of the cases there is vomiting. There is a tendency to sweating, pain on movement, and hyperesthesia. During the early stage there is leukopenia. The child is very restless and irritable and complains of pain and headache, or may be delirious and there may be convulsions. On the other hand, the child may be apathetic or pass into a stupor. There is usually photophobia and sluggish pupil reactions. There is often rigidity of the neck and other muscles. The deep reflexes are diminished or lost, and there is coldness of the extremities due to vasomotor changes. There may be difficulty in swallowing. The spleen is enlarged. The acute symptoms last from a few days to a week.

The paralysis may appear the same day as the fever, or during the first few days, and less frequently during the

next two weeks. The paralysis may involve any group or groups of muscles, but one leg is the most frequent, and both legs the next, then follow in frequency both arms and legs, back, arm and leg of same side, etc. The paralysis is totally recovered from in 10 per cent. of the cases in a few days to three months' time. About 10 per cent. recover par-

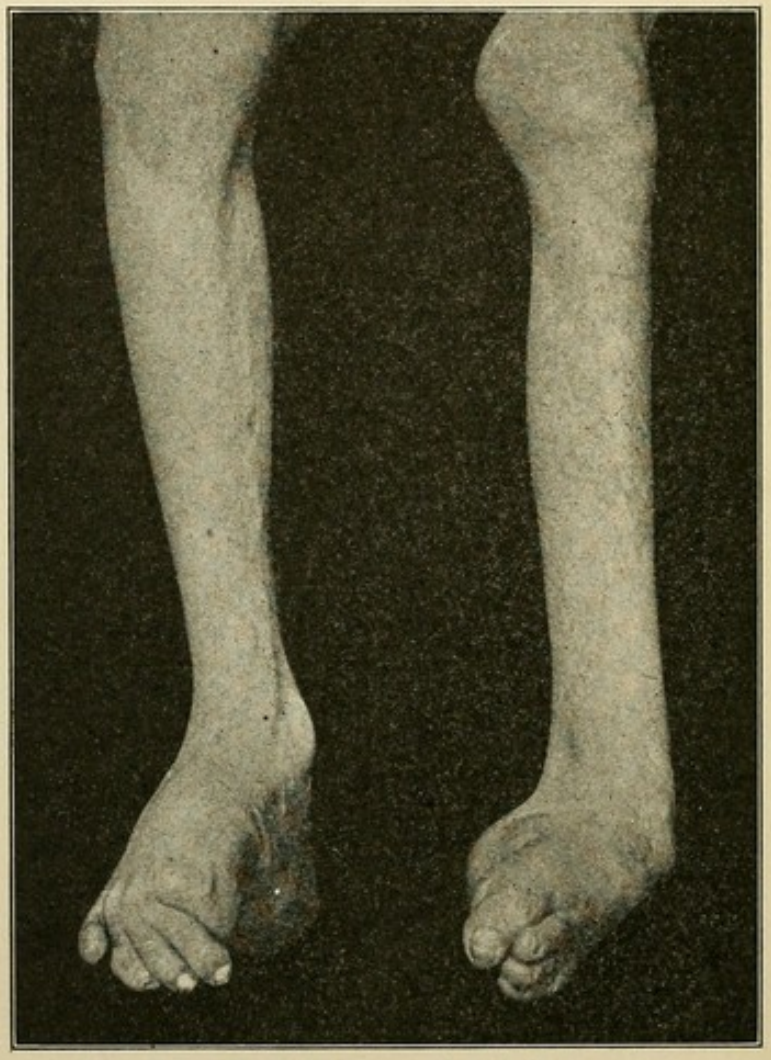


FIG. 145.—Club-feet from infantile paralysis.

tially. There is marked paralysis left in about two-thirds of the cases, and but little improvement takes place after the third month. The paralyzed limb is atrophied, the circulation poor, and there is retarded growth. The reaction of degeneration is seen in all atrophied muscles which are to be permanently affected. The amount of permanent paralysis may be estimated early by the use of the faradic current, as permanently affected muscles do not react at all after a week or two. Muscles which are paralyzed, but which may be

expected to recover, show a diminution in the reaction; healthy muscles give a normal reaction.

The ascending form and the bulbar form are liable to prove fatal, either from failure of heart or respiration or from bronchopneumonia. The onset is usually severe in these cases, and there is paralysis of the facial muscles, as well as of the extremities, with marked vasomotor disturbances, and of heart and respiration.

Diagnosis.—See Wickman's classification. Pseudoparalysis, such as is seen in rickets, scurvy, and syphilis, must be excluded. Multiple neuritis comes on more slowly, is very painful, and there is loss of sensation. Moreover, it is rare, except following diphtheria. Some cases resemble cerebrospinal fever closely and some suggest tuberculous meningitis. The diagnosis may be difficult in either case, but a lumbar puncture may help. There is usually an increase in the cerebrospinal fluid in meningitis with a cloudy fluid in cerebrospinal fever. In anterior poliomyelitis there may be a slight increase in the fluid, but it does not show any organisms.

Prognosis.—This is bad as far as permanent paralysis is concerned, although some cases improve and some get entirely well (see above). It is fatal in about 8 per cent. of the cases, but this varies in different epidemics.

Prophylaxis.—Patients should be isolated in screened rooms. Dust should be suppressed as far as possible, and all objects coming in immediate contact with the patient should be sterilized.

Treatment.—Rest, careful feeding, and quiet during the acute stage. Hexamethylenamin has been suggested as a cerebrospinal antiseptic. Hot applications and counterirritation over the spine have also been suggested, but are of little value. The throat may be sprayed with some antiseptic solution, as peroxid of hydrogen diluted with an equal amount of water. As soon as the pain is out of the affected parts, they should be massaged twice daily. Electricity may be used, but only much later. It acts in the same way as the massage in preserving the nutrition of the muscles while the nerves are regenerating. Iron is needed for the anemia and strychnin may be used later, but not in the early stages

of the disease. Re-education of the muscles should be systematically undertaken, and much of the helplessness can often be overcome by this method. Later, orthopedic or other surgical treatment may be indicated. The patients should be isolated and the discharges disinfected.

INFLUENZA.

(La Grippe; Acute Catarrhal Fever.)

Definition.—A specific infectious disease characterized by marked catarrhal symptoms.

Etiology.—The disease is endemic in large cities. It occurs in frequent epidemics, and occasionally very widespread epidemics occur.

The specific cause of the disease is Pfeiffer's bacillus influenzæ.

Pathology.—The disease is rarely fatal except from complications. There are inflammatory changes in nearly all the mucous membranes. There may be myocarditis or nephritis.

Incubation Period.—This is usually placed at from one-half to three days.

Symptoms.—There is a sudden onset, with high fever. There are coryza, pharyngitis, bronchitis, and conjunctivitis. In addition there may be marked disturbance of the gastro-intestinal tract, with vomiting and diarrhea. In other cases nervous symptoms may predominate. These cases may be mistaken for meningitis. The disease lasts from a few days to weeks.

Complications.—Pneumonia, pleurisy, empyema, otitis media, meningitis, and colitis are the most frequent. Myocarditis or endocarditis may be a serious complication.

Diagnosis.—Usually easy. The disease is sometimes mistaken for meningitis.

Prognosis.—Good in uncomplicated cases.

Treatment.—Rest in bed, sponging for fever and nervousness. Antipyrin and codein or bromids for nervousness. Drugs may also be administered to relieve severe cough or diarrhea when present.

EPIDEMIC PNEUMOCOCCIC INFECTIONS.

Definition.—A disease caused by the diplococcus pneumococcus, occurring in epidemics, with production of a catarrhal inflammation, sometimes with a fibrinous exudate.

Etiology.—Usually in family or institution epidemics, and most common in young children under seven years of age. The epidemics occur usually in the spring or fall. Incubation period two to seven days.

Symptoms.—Chilliness, slight fever, and occasional night sweats at the onset; temperature usually from 99.5° to 102° F., lasting from three to seven days; sneezing, lacrimation, mucous discharge from the nose, running sensation of the nose, itching of the eyelids, and slight sore throat; spasmodic croupy cough, sometimes vomiting; there is an intense inflammation of the mucous membranes and of the upper air-passages and of the eyes. There may be a purulent conjunctivitis, sometimes corneal ulcers, but little or no mental or physical depression. In some cases there is a light yellow fibrinous membrane on the inflamed surfaces. The cough may persist for weeks afterward.

Diagnosis.—One must exclude measles, whooping-cough, and influenza. From epidemic catarrh the diagnosis is only by bacteriologic examination, the presence of the pneumococcus, and absence of the micrococcus catarrhalis.

Prognosis.—Good.

Treatment.—Rest in bed. Alkaline washes for the nose and eyes. Sodium salicylate or aspirin may make the patient more comfortable.

TUBERCULOSIS.[1]

Definition.—Tuberculosis is a specific infectious disease caused by the bacillus tuberculosis of Koch. It may be general or it may affect one or more organs or tissues of the body; its clinical characteristics are, therefore, almost innumerable.

[1] Martha Wollstein, "Tuberculosis, Congenital," *Archives of Pediatrics*, May, 1905, p. 321. J. H. Parsons, "Tuberculosis, Ocular, in Children," *Lancet*, November 4, 1905, p. 1308. J. L. Morse, "Tuberculous Infection, Protection of Young Infants and Young Children from," *American Journal of the Medical Sciences*, October, 1906, p. 587.

Etiology.—Tuberculosis may be inherited directly from the mother. This is very rare, but may occur. What is more frequent is an inherited predisposition to the disease. A general predisposition may be caused by lack of fresh air, sunlight, cleanliness, and food. Any disease which lowers the resistance of the body predisposes to tuberculosis; measles and whooping-cough may be mentioned especially. Any local lesion may cause a local predisposition. All ages are liable to tuberculosis. The negro when living in towns in crowded quarters seems especially susceptible.

Mode of Infection.—The greatest source of tubercle bacilli is the sputum of consumptives. These bacilli in the dust are inspired in the air breathed and also taken into the mouths of children from dust gotten on the hands in playing on the floor. The former may cause lesions in the lung directly; the latter are carried off by the lymphatics and are liable to cause gland tuberculosis, which may lead to lesions elsewhere. Tubercle bacilli swallowed or taken in with the food, as in tuberculous milk, may infect the intestine or pass into the blood directly by passing through the intestinal wall in a fat-droplet. Infected milk, while a possibility, is not a frequent source of infection.

Pathology.—Tuberculosis most frequently affects the bronchial lymph nodes, lungs, and less frequently the brain in children under two years of age. After two years other lymph nodes, the intestine and peritoneum, and the bones are most frequently affected. By the time death takes place the lungs are generally involved. Autopsies on children dead from tuberculosis frequently show lesions in many organs.

There are in general two types of lesions: scattered gray miliary tubercles or coalescing yellow tubercles accompanied by caseation. If the process is acute there is but little fibrous tissue; if it is chronic there is usually marked fibrosis. There may be infection with pyogenic bacteria and suppuration with extensive destruction of tissue. The lesion may be walled off with a zone of fibrous tissue. There are all forms and gradations of the above. The more important forms are described on pages 428–440.

Diagnosis by Tuberculin Tests.[1]—**Tuberculin Injections.**—These can only be used in fever-free patients. The temperature should be taken at four-hour intervals for the twenty-four hours preceding the injection. For infants under six months $\frac{1}{2}$ mg. and older infants 1 mg. may be used. This is diluted with a little 0.5 per cent. carbolic acid solution and injected subcutaneously or into the muscles. The temperature is now taken at two-hour intervals, and if the reaction is positive there is a rise, beginning in six to twelve hours after the injection and then falling to normal. The temperature varies in different cases, but is usually over 102.5° F. There may be some general disturbance. If the injection was made subcutaneously, there is a local reaction of swelling and redness.

The Cutaneous Test (*Von Pirquet's Test*).—The skin of the forearm is cleansed with alcohol and a drop of pure tuberculin is placed on the skin, and through it a few very superficial scarifications are made with the point of a scalpel. The active reaction or the specific normal reaction begins from four to six hours after the inoculation, and attains its maximum in from twenty to twenty-four hours. The reaction consists of a redness about the scarifications. This persists on the second day, and shows a decrease on the third or, at the latest, on the fourth day.

Conjunctival Test (*Calmette or Wolff-Eisner Test*).—The eyes are first inspected to see that the conjunctivæ are alike in appearance and healthy, and then one drop of a 1 per cent. solution of pure old tuberculin is dropped into the left conjunctival sac. The sac is so manipulated that the fluid is equally distributed. If the left eye shows no reaction in from twenty to twenty-four hours, a drop of a 5 per cent. solution is instilled into the right conjunctival sac. If there is no discernible difference in the two conjunctivæ the reaction is negative. Sometimes a slight doubtful redness occurs. The positive reaction is a marked redness of the conjunctivæ. This test should not be used generally, as eyes have been injured by it.

[1] Hamman and Wolman, *Archives of Internal Medicine*, May, 1909.

Other Tests.—There are other tests, as the Moro test, which consists in rubbing over a small spot of skin a mixture of 6 parts of old tuberculin with 5 parts of lanolin. This is followed by redness and papules in twenty-four hours. Hamburger uses an injection of a minute dose subcutaneously. There is a local reaction inside of twenty-four hours in positive cases.

Value of Tuberculin Diagnosis.—The injection method gives most reliable results, but cannot be used where there is fever, and requires considerable care in observation. The von Pirquet reaction is fairly reliable in infants, but in older children it is often present when there is no evidence of tuberculosis. A very small inactive lesion may cause the reaction, and an incorrect conclusion may be drawn. Care and common sense should be used in drawing conclusions from tuberculin reaction. If the cutaneous and ophthalmic tests are done simultaneously, and if both are negative, it means an absence of an active tuberculous focus. If both are positive, it points to an active focus, and if one is positive and the other negative the test is of no particular value.

Acute General Miliary Tuberculosis.

In this form there are miliary tubercles scattered throughout the body in the various organs. The infection is carried by the blood-stream. The lesions may be rather uniformly distributed with symptoms somewhat resembling typhoid fever, or there may be more marked deposits in certain organs, as in the meninges, causing cerebral symptoms, or in the lungs, causing pulmonary symptoms.

Symptoms.—The disease may resemble a case of marasmus; sooner or later, however, there is fever. Respiration and pulse are rapid. There may be digestive disturbances. Lesions can usually be made out in the lungs before death. Exposure to tuberculosis and a family predisposition are both important in diagnosis. The disease, if in older children, may resemble typhoid fever. There is loss of weight and a continuous irregular fever. Sooner or later pulmonary, cere-

bral, or other symptoms make their appearance. An eruption, consisting of scattered, discrete papules the size of a pin-head, dull red in color and slightly elevated, may be noted. It is of great diagnostic value, cases showing it always proving fatal. The tubercle bacillus may usually be demonstrated in them.

Diagnosis.—The Widal reaction is important in distinguishing it from typhoid fever. Malaria should be excluded by blood examination and quinin.

Prognosis.—Always bad.

Tuberculosis of the Respiratory Organs.[1]

Pathology.—There may be miliary tuberculosis of the lungs or tuberculous deposits resembling a bronchopneumonia. Both lungs are involved, as a rule. There are areas of caseous tubercles which may be large and resemble cheese. This is sometimes called "cheesy pneumonia"; suppuration and breaking down occur sooner or later. The bronchial lymph nodes are enlarged; in older children there may be a chronic tuberculosis presenting like features as the same disease in adults.

The pleura is involved in nearly every case of tuberculosis. There may be an acute tuberculous pleurisy with or without effusion. Empyema may result.

Symptoms.—Tuberculous bronchopneumonia may be seen together with any other tuberculous lesion; it may be a marked feature of general tuberculosis, occur as a primary disease, or be the cause of death in other forms of tuberculosis.

The **course** of the disease varies. If there are numerous scattered miliary tubercles the course of the disease is very rapid. There are fever, wasting, rapid respiration, cough,

[1] J. E. Squire, "Tuberculosis, Pulmonary, in Children," *British Medical Journal*, July 21, 1906, p. 133. White and Carpenter, "Tuberculous Pulmonary Cavities in Infants," *American Journal of the Medical Sciences*, vol. cxxxviii., 1909, p. 79.

signs of bronchitis, and later of bronchopneumonia. Death takes place in a few weeks.

If there are **large caseous deposits** there are similar symptoms running a slower course. There are the physical signs of bronchopneumonia, with larger areas of consolidation; the course is steadily downward, with death in from one to three or four months.

There may be very **chronic cases of pulmonary tuberculosis**, with small deposits and few or no physical signs, and

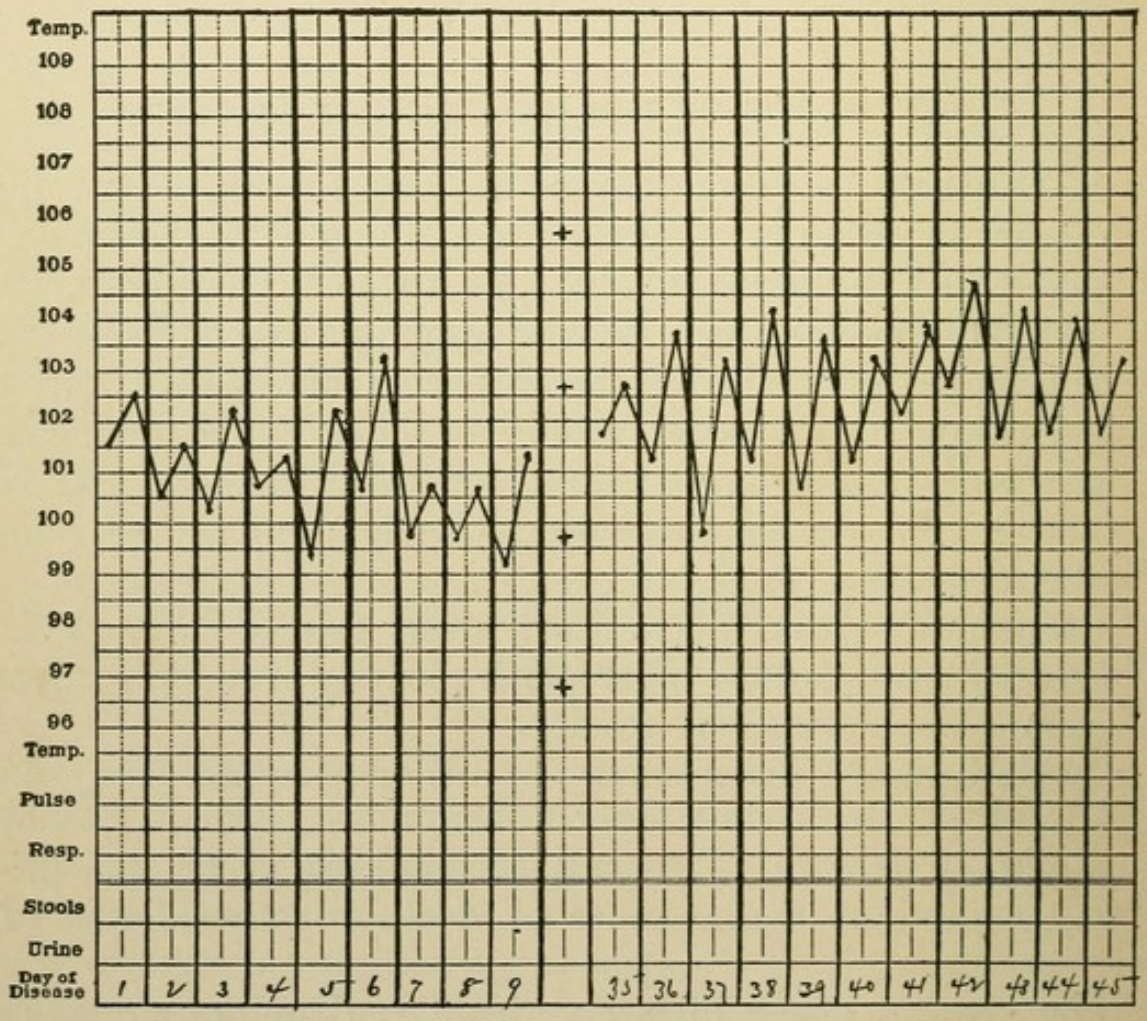


FIG. 146.—An acute tuberculous bronchopneumonia temperature chart.

periods of symptoms and periods of remission. These cases are often called delicate children with chronic bronchitis.

Diagnosis.—A history of tuberculosis in the family or of exposure to the disease is important. The irregular fever, rapid pulse, general downward course, are all suggestive; if

the sputum can be obtained on a swab immediately after a coughing spell, before it has been swallowed, the tubercle bacilli may be demonstrated. In general the physical signs do not differ from bronchopneumonia.

Prognosis.—Always bad, except in cases recognized early in older children.

Prophylaxis.[1]—All tuberculosis patients who are expectorating should use a special spit-cup and see that the sputum is destroyed. Children should not live in close contact with

FIG. 147.—Clubbing of fingers in tuberculosis.

a tuberculous patient, and should never occupy the same bed. Where there is a family tendency to tuberculosis the child should, if possible, be brought up in the country and in the fresh air. The general health and strength of the child should be kept up. A sedentary indoor life should be avoided.

Treatment.—Fresh air both day and night. A change of climate is often desirable. Careful feeding is of especial

[1] See *Handbook on the Prevention of Tuberculosis*, published by the Charity Organization Society of New York.

value. Raw and rare meat, milk, and the whites of eggs should be given in sufficient quantities. The stomach should not be upset by using nauseating drugs. Tonics, as iron, quinin, strychnin, and arsenic, may be used where indicated. Cod-liver oil is one of the most valuable remedies. Creosote, creosote carbonate, or guaiacol carbonate may also be used.

Tuberculous Bronchitis.

This has been noted of recent years. The symptoms are those of an ordinary bronchitis with a few scattered râles. Later there are fever, weakness, anemia, sweats, etc., and the disease is frequently followed by a tuberculous broncho-pneumonia. A persistant cough in an infant who has been exposed to tuberculosis should suggest the disease. The diagnosis is by tuberculin and finding the tubercle bacillus.

Tuberculous Meningitis.[1]

(Whytt's Disease; Acute Hydrocephalus; Water on the Brain; Basilar Meningitis.)

Definition.—Tuberculosis of the pia mater usually of the cerebrum, sometimes of the cord as well.

Etiology.—Tuberculosis is almost always present elsewhere in the body; most frequently seen in the first two years of life.

Pathology.—Miliary tubercles, sometimes tuberculous deposits, together with an exudate. The principal lesion is usually at the base of the brain. The ventricles may be distended with fluid.

Symptoms.—The onset is almost always gradual. General malaise, loss of appetite, constipation, and headache are present. There are frequent vomiting and slight fever. There are more or less indefinite brain symptoms, which may be present one day and absent the next. Then there is the appearance of marked cerebral symptoms, as convulsions, delirium, later coma, rigidity of the muscles, retraction of the

[1] H. W. Cheney, "Meningitis, Primary Tuberculous," *Journal of the American Medical Association*, July 8, 1905, p. 105. Robert Whytt, 1768.

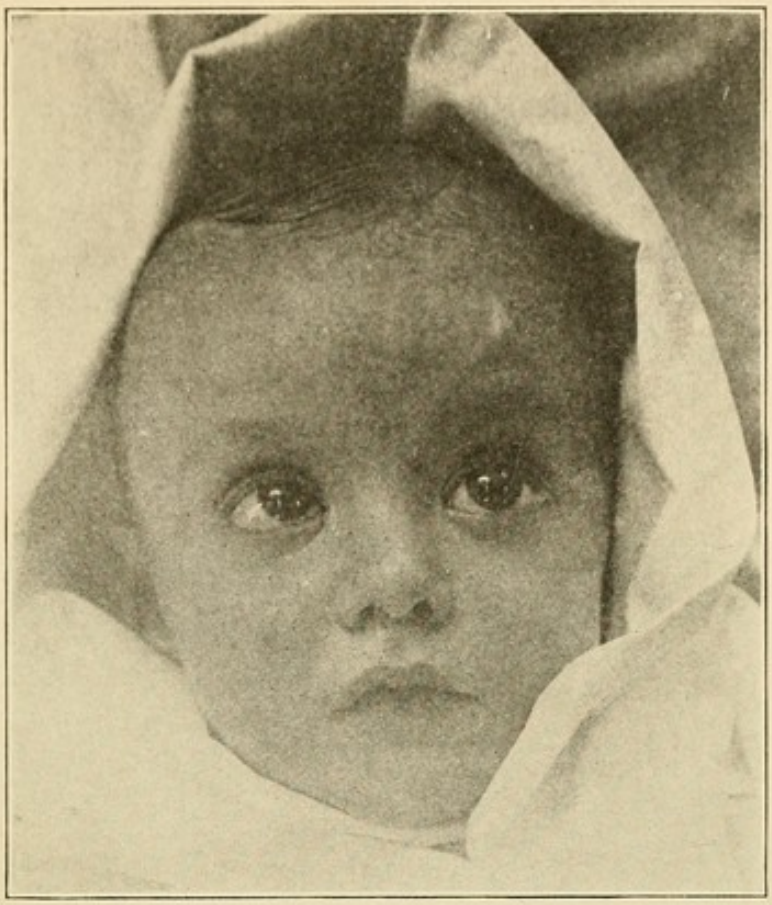


FIG. 148.—Tuberculous meningitis, showing strabismus from paralysis of eye muscles.

neck, and other symptoms mentioned in meningitis. The pulse is at first rapid, then slow, usually becoming rapid before death. The fever is very irregular. There are retrac-

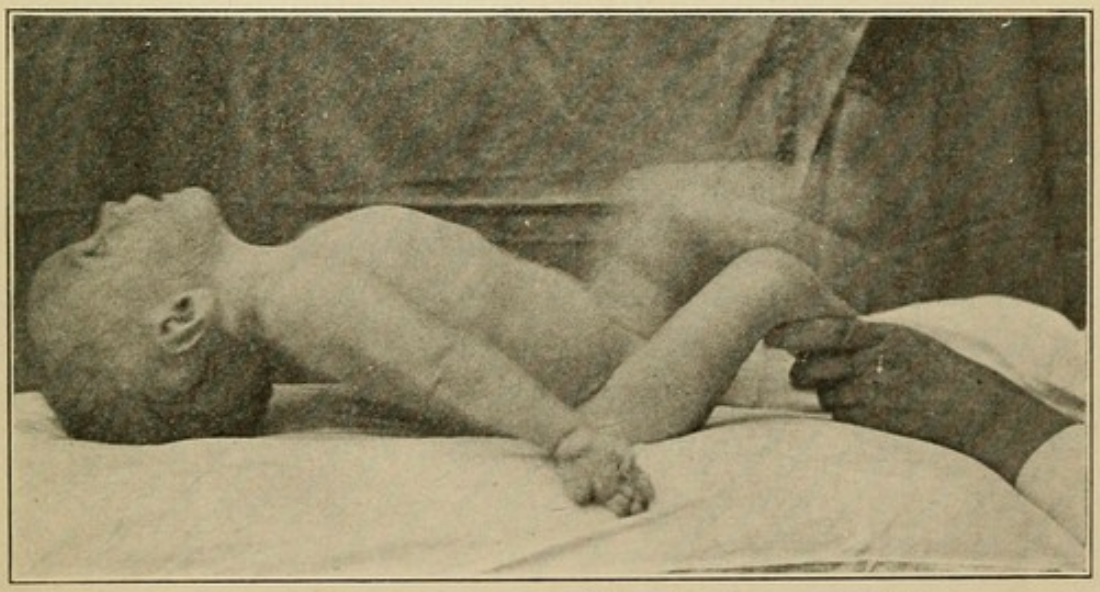


FIG. 149.—Tuberculous meningitis, showing convulsion.

tion of the abdomen, marked constipation, and often paralysis. The fontanel bulges if it is open. There may be temporary remissions of a marked character. The course after coma starts is usually rapid, death taking place in from one to two weeks.

In the **last stage** there are rapid pulse, relaxation of the muscles, dilated pupils, which do not respond to light, deep coma, and sometimes convulsions.

The **course** of tuberculous meningitis is very irregular.

Diagnosis.—In the first stage it cannot be diagnosed.

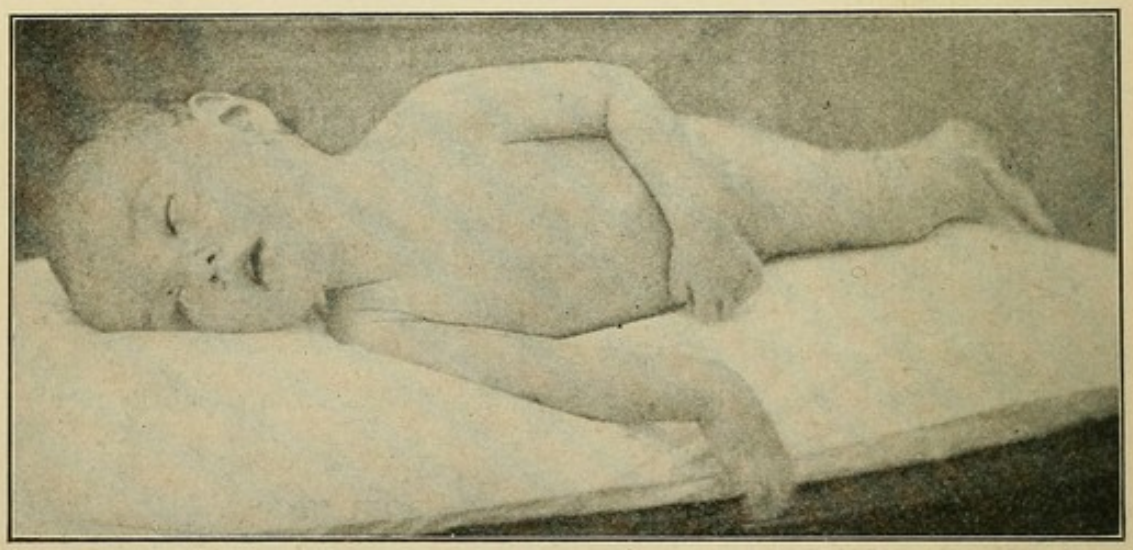


FIG. 150.—Tuberculous meningitis. Note paralysis of eye muscles.

In the second stage the most important diagnostic points in the order of their frequency are "constipation, drowsiness, irregular respiration, vomiting without apparent cause, irregular pulse, convulsions, opisthotonus, and fever, which is usually slight" (Holt). Strabismus, loss of pupil reflexes, and facial paralysis are of great value if associated with the above symptoms. The tubercle bacillus can usually be found in the spinal fluid if sufficient search is made.

Prognosis.—Uniformly fatal.

Treatment.—As outlined in meningitis.

TUBERCULOUS ADENITIS.

(Tuberculosis of the External Lymph Nodes.)

Etiology.—The greatest number of cases are seen from two to ten years of age. Local irritation of the nodes from adjacent inflammations may furnish a suitable soil for the tubercle bacillus. An hereditary tendency and a previous attack of measles or whooping-cough may be mentioned as predisposing causes.

Pathology.—The cervical nodes are most frequently

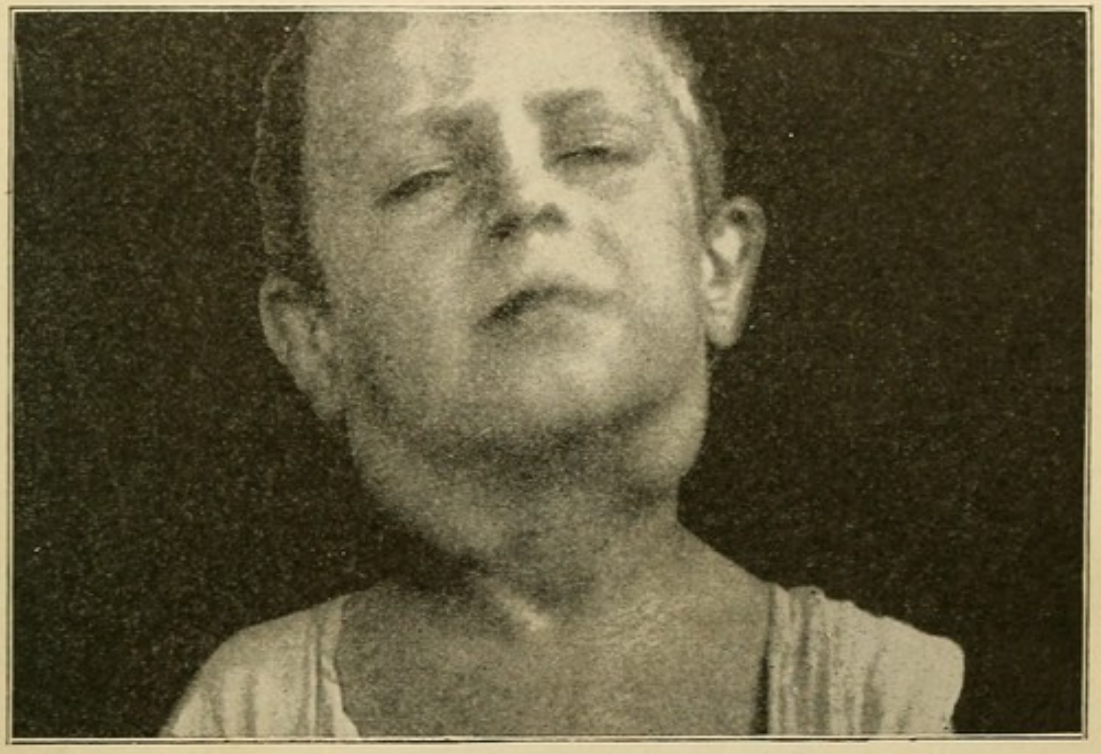


FIG. 151.—Tuberculous lymphadenitis of the cervical glands (Stengel).

affected, the axillary and inguinal nodes at times; the cervical nodes are usually infected through the mouth. The process involves one or more chains of nodes. There are rapid cases where there are numerous gray tubercles, which caseate and usually become infected with pus-forming bacteria and suppurate with involvement of the adjacent tissue. All the affected nodes do not break down. There are, on the other hand, chronic cases where the formation of connective tissue is marked and the tubercles less numerous. Suppura-

tion is not so common in these cases. All gradations between these two forms may be met with.

Symptoms.—The process is essentially a chronic one. There is enlargement of a few nodes, with a little tenderness. This disappears; later there is again tenderness, usually with the extension to other nodes. The enlarged nodes vary in size from a split pea to a walnut. There is a tendency to fusion and involvement of the adjacent tissues. Later there is frequently suppuration with breaking down of the skin. A chronic discharging sinus is often left or an ugly irregular scar. About puberty the process usually subsides.

Tuberculosis of the Bronchial Lymph-nodes.—This may exist apparently as a primary lesion, but is usually secondary to a lesion in the lungs.

Etiology.—This form of tuberculosis is met with in children of all ages, but rarely causes symptoms until after two years of age.

Pathology.—As in tuberculous adenitis.

Symptoms.—There may or may not be general symptoms, as in other forms of tuberculosis. The most striking symptoms are the result of pressure or irritation. In the pneumogastric or recurrent laryngeal there may be spasmodic cough, resembling whooping-cough (see same for differential diagnosis), the effects of which do not entirely subside after the paroxysm, a little wheezing remaining. There may also be hoarseness and dyspnea. Pressure on the superior vena cava results in cough, dyspnea, cyanosis of face, and sometimes edema of the face. Sometimes pressure causes difficulty in swallowing.

Physical signs are only present when the nodes attain considerable size. There is dulness over the sternum, and also on each side of the spine, from about the third to the seventh vertebræ. There are changes in the breath sounds, these being more or less amphoric, and may suggest a cavity.

Diagnosis.—Syphilis and Hodgkin's disease affecting the mediastinal nodes are both rare in children. The Röntgen rays are of value in doubtful cases.

Prognosis.—Sudden death may follow rupture. The child

may die from tuberculosis of the lungs or elsewhere. Sometimes the disease becomes quiescent and recovery takes place. This probably happens often after slight involvement that has passed unnoticed.

Treatment.—The same general measures as advised in tuberculous adenitis and other forms.

Diagnosis.—This is usually easy. In very young infants it may be confused with simple adenitis at the outset. Hodgkin's disease may be often distinguished by its rapid involvement of other nodes. A gland may be removed in cases of doubt, or tuberculin tried. The nodes in Hodgkin's disease frequently become tuberculous. Syphilitic adenitis of a marked degree is rare, and yields promptly to iodid of potassium.

Prognosis.—With proper treatment the outlook is fair. Tuberculosis may develop elsewhere.

Treatment.—Fresh air, good food, and a general building-up treatment is needed; if possible a change to the mountains or seashore. Food is of more use than drugs, but cod-liver oil, hypophosphites, and syrup of the iodid of iron are useful. Creosote, creosote carbonate, or guaiacol carbonate may also be used. As a change nux vomica or quinin may be given in small doses. Iron should be used for the anemia.

Early cases may have the entire chain of nodes removed by a radical operation. Iodoform is the best application when there are sinuses. If a node suppurates the abscess should be opened. The *x*-rays are useful in treating sinuses and very chronic cases, as well as ulcers that will not heal.

TUBERCULOSIS OF INTESTINES; MESENTERIC LYMPH NODES.

Etiology.—The intestines and mesenteric lymph nodes are involved in from one-third to one-half of the cases of tuberculosis. Infection of the intestine occurs usually from swallowed sputum. Primary intestinal tuberculosis is rare. The mesenteric involvement is frequently but not always secondary to the lesion in the intestines.

Pathology.—In the intestine there may be scattered

tubercles, or ulcers, or both. The ulcers are most frequent in the lower end of the small bowel. They run around the gut, following the course of the vessels. They are deep, ragged, often excavated ulcers, which may perforate or, what is more frequent, cause adhesions of the peritoneal surface of the intestines. The lymph nodes show the same changes as seen in the nodes elsewhere in the body.

Symptoms.—These vary. There may be diarrhea, hemorrhage, abdominal pain, and intestinal indigestion. If the nodes are enlarged they may be felt on deep palpation.

Diagnosis.—From the tubercle bacilli in the stool, or on the above symptoms with tuberculosis of the lungs.

Prognosis.—This depends on the extent and character of the lesions, both in the intestines and elsewhere.

Treatment.—As for tuberculosis elsewhere. Drugs may be given for the diarrhea and pain.

Tuberculous Peritonitis.

This is seen in children of all ages, but rather more frequently in later childhood. It may be primary or secondary to tuberculous deposits elsewhere in the body. It may be acute or chronic.

1. **Scattered miliary tubercles may be found in the peritoneum in general tuberculosis.** There are few or no symptoms referable to the abdomen.

2. **Miliary Tuberculosis of the Peritoneum with Ascites.**—In this form the entire peritoneum is covered with miliary tubercles, discrete and conglomerate. There is a large exudate usually serous and of a greenish hue, but it may be bloody or purulent. It may be free in the general peritoneal cavity or it may become sacculated. It may change to the fibrous or to the ulcerative form.

Symptoms.—Gradual onset with loss of strength and weight. There is usually slight fever, and later the abdomen is distended. There is slight abdominal discomfort with a little pain and slight tenderness. The disease lasts from one

to four months. Some recover without treatment, but most cases die. With operation many of these cases recover.

3. **Ulcerative Tuberculosis of the Peritoneum.**—This is analogous to ulcerative phthisis and is the most common form. The tuberculous deposits may be an inch thick in places. The viscera are matted together, and here and there are sacculations filled with pus. Caseation may be marked. Tuberculosis is always present elsewhere in the body.

4. **Fibrous Tuberculosis of the Peritoneum.**—This is analogous to fibroid phthisis. The tuberculous deposits are largely composed of fibrous tissue, and there is no caseation. There are numerous adhesions between the folds of the intestines. There may be more or less serous exudate.

Symptoms.—Gradual onset and very slow course, lasting months or years. Slight, irregular fever, which may be absent at times. The abdomen enlarges gradually, and there may be marked ascites. Symptoms may disappear entirely and the patient remain well for a time or indefinitely.

Tuberculosis of the Mesenteric Lymph Nodes (*Tabes Mesenterica*).—Large irregular masses of enlarged lymph nodes are felt in the abdomen. They lie close to the spine, and may cause edema of the legs from pressure on the veins. There is localized peritonitis. The masses can usually be made out by palpation. These glands may also be affected in other forms of tuberculosis of the peritoneum, but then the condition cannot be made out.

Diagnosis of Tuberculous Peritonitis.—Family history of tuberculosis, tuberculosis elsewhere in the body, irregular fever, rapid pulse, and progressive loss of weight are all suggestive. Chronic ascites with fever is almost always tuberculous; especially is this true if irregular tumor masses can be felt.

From the non-tuberculous form of peritonitis diagnosis may be impossible.

Cirrhosis of the liver is rare in early life, and then there is usually a history of syphilis and there may be jaundice.

Treatment.—General measures as for tuberculosis else-

where. Laparotomy and washing out of the abdomen with salt solution should be done in all cases with ascites, where there is suppuration, where the fluid is localized to one spot, in intestinal obstruction, and in all doubtful cases. This should not be done in the non-painful fibrous cases nor where there are numerous sacculations in the ulcerative form.

Tuberculosis of the Kidney.

This is usually a secondary infection taking place through the circulation. Primary tuberculosis of the kidney has been reported.

The **symptoms** are pain and tenderness in the lumbar region, and there may, in cases of enlargement of the kidney, be a tumor. There is great irritability of the bladder. The urine contains pus and frequently blood. The tubercle bacillus can usually be demonstrated in the urine.

The **treatment** is surgical.

SYPHILIS.

Definition.—Syphilis is a communicable disease characterized by an initial lesion, called a chancre, secondary manifestations, especially marked on the skin and mucous membranes, and by late tertiary symptoms affecting all the tissues of the body, but especially the bones, nervous system, and organs of special sense. The disease may be communicated in two ways: by direct contact, the acquired form, and by inheritance, the hereditary form. It is caused by the Spirochæta pallida (Schaudinn).

Acquired Syphilis.

Etiology.—The child is usually infected by the parent or nurse through kissing or accidental contact; by infected towels, nipples, spoons, and the like; occasionally by sexual contact, and formerly by vaccination with humanized lymph.

Pathology.—This is essentially the same as in adults.

Symptoms.—The symptoms are much the same as in adults. There is a chancre usually on the lips or face, fol-

lowed by the characteristic eruption and the later manifestations. The disease is milder than the hereditary form, and the child may have reasonably good health in spite of the disease. The tertiary symptoms come on in from three to an indefinite number of years later.

Diagnosis.—Unless the chancre is seen it may be mistaken for hereditary syphilis.

Prognosis.—Good. Fournier reports 42 cases with but 1 death.

Treatment.—As in hereditary syphilis.

HEREDITARY OR CONGENITAL SYPHILIS.[1]

Etiology.—Syphilis may be inherited from either the father or mother alone, or from both. The more recent the disease in the father the more liable it is to be transmitted. The fetus may be infected by the father, and it is possible for the mother to remain uninfected. In this case she acquires immunity (Colles' law). An infant with hereditary syphilis is capable of transmitting the disease to others, but probably not as great a source of danger as an infant with the acquired form.

Pathology.—The fetus is liable to die before the eighth month and miscarriage result. There are changes in the bones (epiphysitis) and glands in these cases. There may be papular or bullous skin eruptions at the time of birth. The lungs may show whitish areas of consolidation—the so-called "white pneumonia." The liver may show cirrhotic changes or marked infiltration with small round cells. The spleen is usually enlarged. There may be endarteritis. The heart may show myocardial changes and endocarditis. The mucous membranes show inflammatory changes. The bone lesions are marked. There is usually an epiphysitis with irregular calcification; later there may be necrosis and suppuration. The skin may be of a greenish-yellow color, the nose is broad and retracted, and there may be a purulent discharge from the nose and ears.

[1] Saxe, "Syphilis, Diagnosis of Hereditary, in School Child," *Archives of Pediatrics*, December, 1906, p. 916.

Gummata are rare under two years of age. Later they are not uncommon.

Symptoms.—A dead fetus should always suggest syphilis, especially where several have been born dead.

The symptoms may be present at birth, or come on any time after that; usually, however, within eight weeks. In most cases the symptoms appear in the second, third, or fourth weeks. Sometimes symptoms are not noted until years later. (See Late Hereditary Syphilis.) The earlier the symptoms appear the more severe the disease.

At birth there may be bullous and macular eruptions.

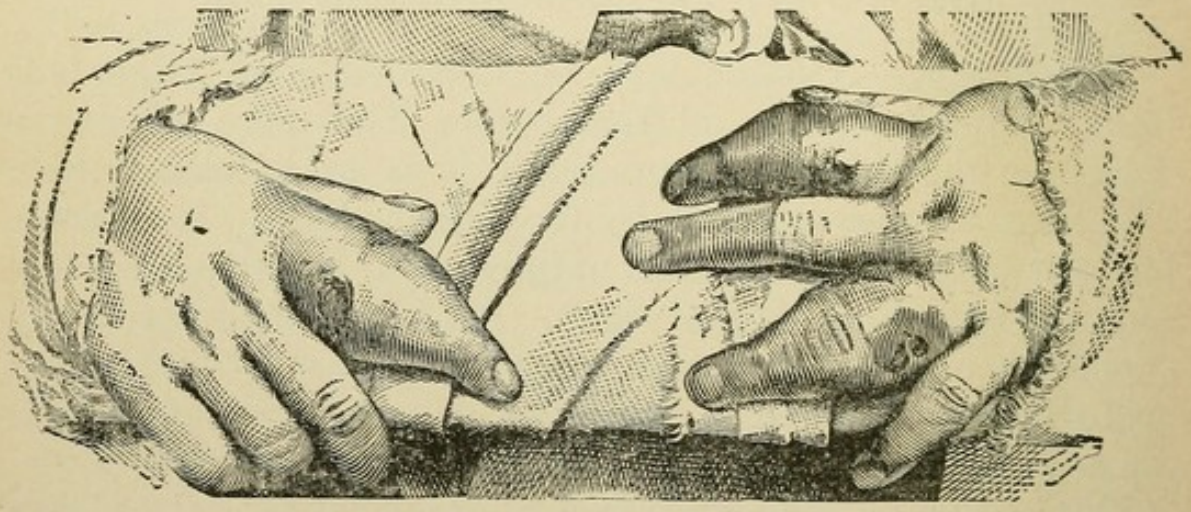


FIG. 152.—Syphilitic dactylitis (Chapin).

The most marked symptoms of hereditary syphilis are wasting and marasmus, coryza (snuffles), a hoarse cry due to laryngitis, pharyngitis, and facial expression like that of an old man, a muddy, discolored skin, fissures about the mouth and anus, mucous patches on the mucous membranes and adjacent skin, claw-shaped or otherwise misshapen or malformed nails, and there may be great weakness of the muscles, suggesting actual paralysis, and a characteristic eruption. The hair may fall out, there may be baldness, either general or in spots, or there may be unusually thick long hair, either over the entire scalp or in spots. There may be thickening of the eyelids and scanty eyelashes.

The eruption comes on as a roseola (diffuse blush) or macules. These macules are small, dark red, copper-col-

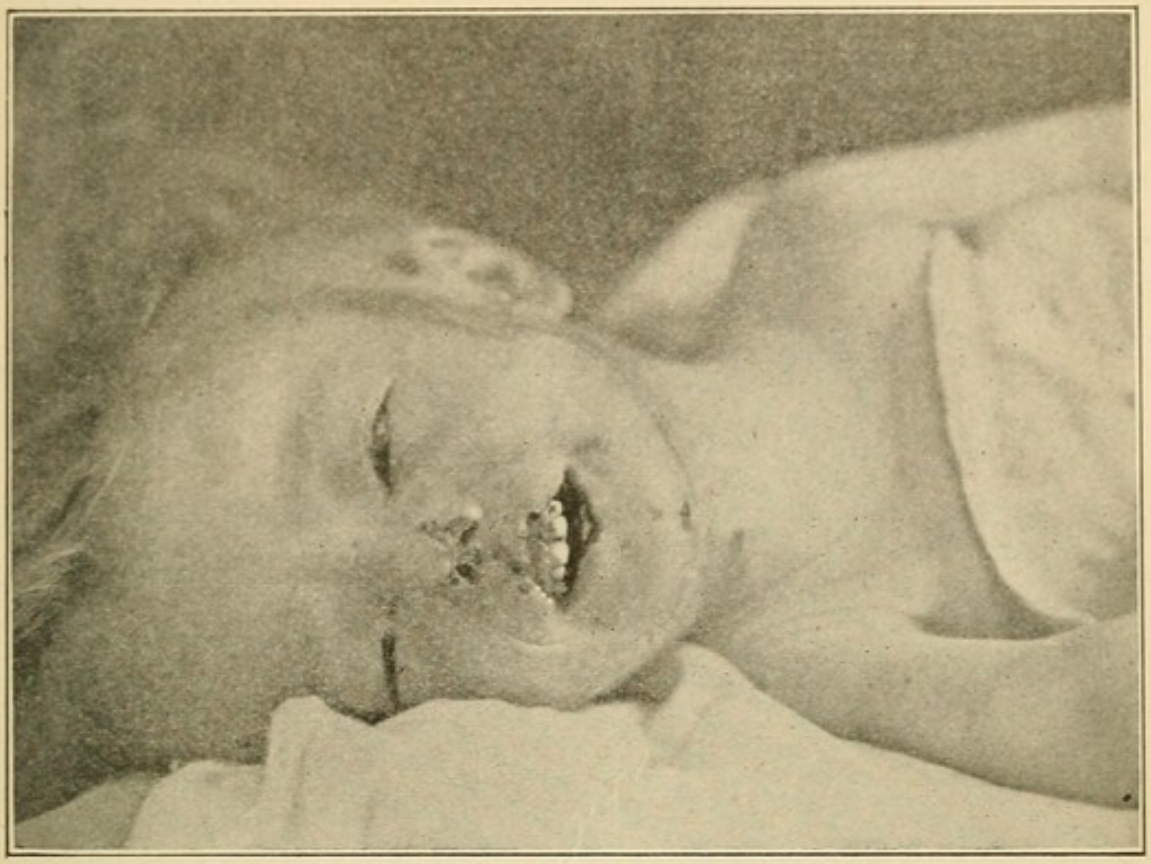


FIG. 153.—Late congenital syphilis.

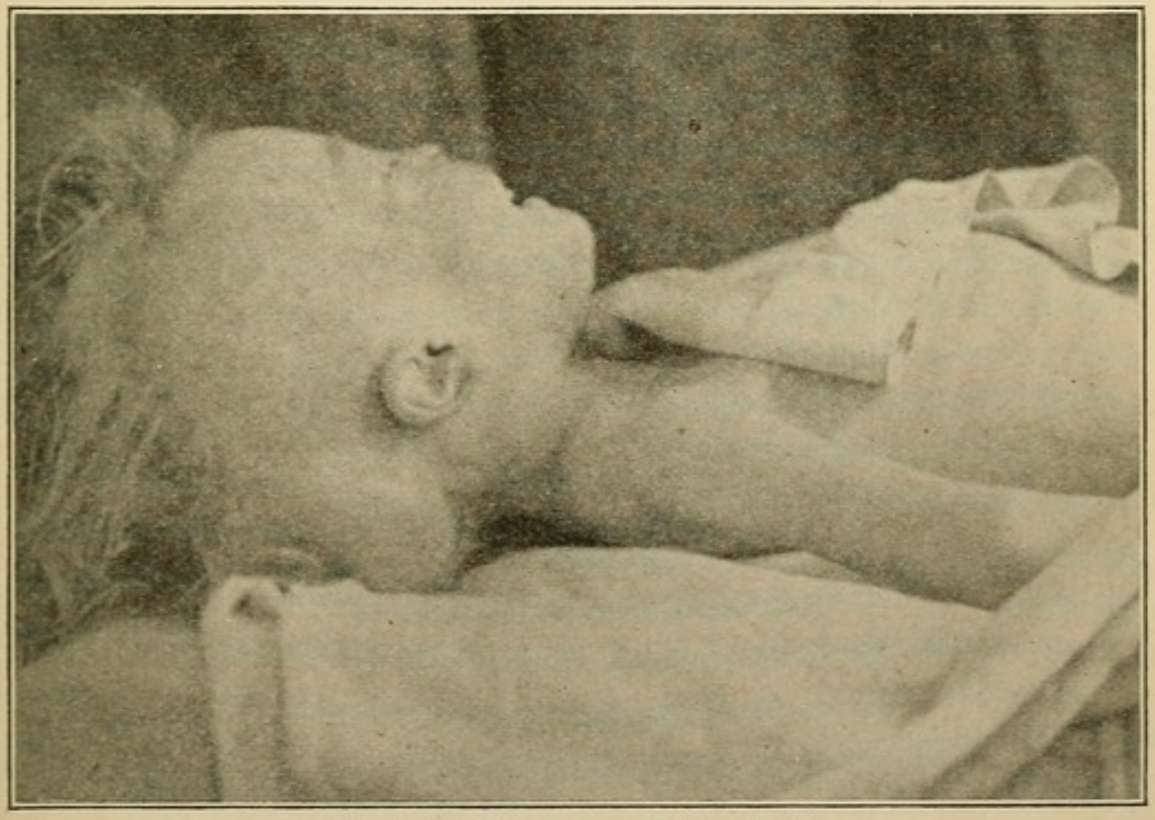


FIG. 154.—Late congenital syphilis.

ored spots occurring over the body, includiug the palms of the hands and the soles of the feet. There may be scaling

of the skin. The eruption should be looked for especially about the eyebrows, the lips and chin, about the anus and genitalia, and on the thighs. There develop later papules and pustules, paronychia, and moist surfaces about the lips, anus, and where the folds of the skin come together. Condylomata about the anus are not uncommon. There is a tend-

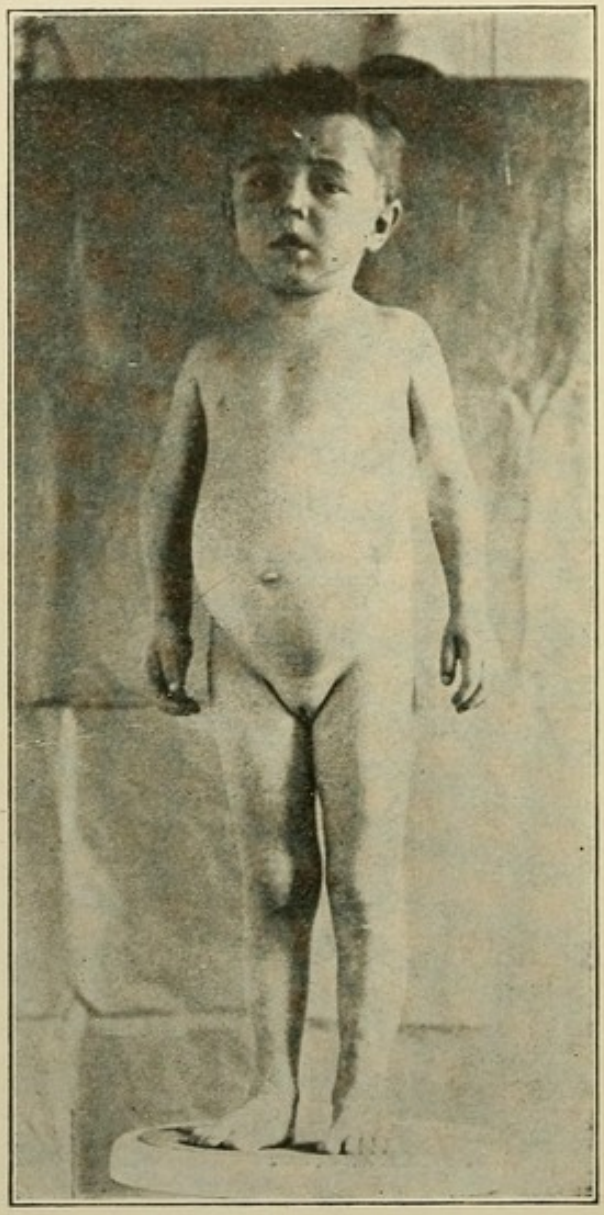


FIG. 155.—Congenital syphilis, same as Fig. 153 after treatment.

ency to hemorrhage, which in itself is suggestive. General debility and wasting, especially when improvement takes place under antisyphilitic treatment, is a point of value.

These symptoms may be present in various combinations and some may be absent. The clinical picture is much changed by treatment.

Diagnosis.—Usually easy on the above features. Other skin diseases are frequently called syphilis. Rapid response to treatment is sometimes of value. In doubtful cases the diagnosis can be settled by testing for the Wassermann reaction.[1] The test should be made by an experienced observer to be reliable.

Prognosis.—Bad. A very large percentage die. Some authors give 70 to 80 per cent. mortality.

Treatment.—Mercury is the specific. It may be administered by inunction, using the ointment or the oleate or vasogen-mercury; but inunctions should not ordinarily be used in very young infants or when the skin is tender or broken. Internally it may be given in the form of calomel, $\frac{1}{30}$ to $\frac{1}{10}$ gr. three or four times daily, mercury and chalk in 1-gr. doses, or the bichlorid in doses of from $\frac{1}{200}$ to $\frac{1}{50}$ gr. The protiodid may be used in doses of from $\frac{1}{24}$ to $\frac{1}{12}$ gr. If there is diarrhea, opium or codein may be used in addition. Mercury should be given for a year, with occasional breaks in the treatment, giving tonics, as iron (syrup of the iodid) or cod-liver oil. If symptoms persist, it should be used

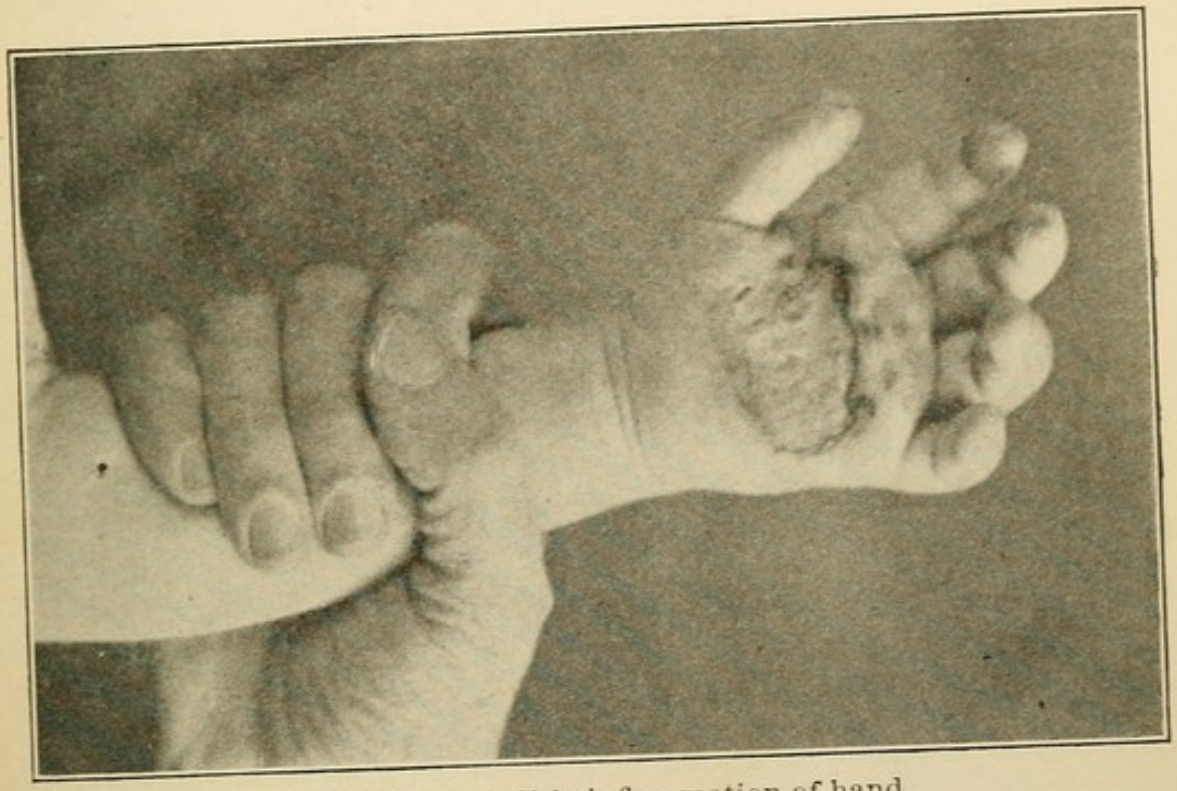


FIG. 156.—Syphilitic inflammation of hand.

[1] Fox, *Medical Record*, March 13, 1909, p. 421.

longer. Iodid of potassium should then be given with or without mercury, and it should be given subsequently for any tertiary symptoms.

When there is a general eruption, bichlorid baths may be used. Fissures may be dusted with calomel or carefully touched with 1 per cent. bichlorid solution. Condylomata should be washed with a 1 or 2 per cent. salt solution and then dusted with calomel. Persistent onychia may have mercurial plaster applied. For snuffles a powder of 1 part

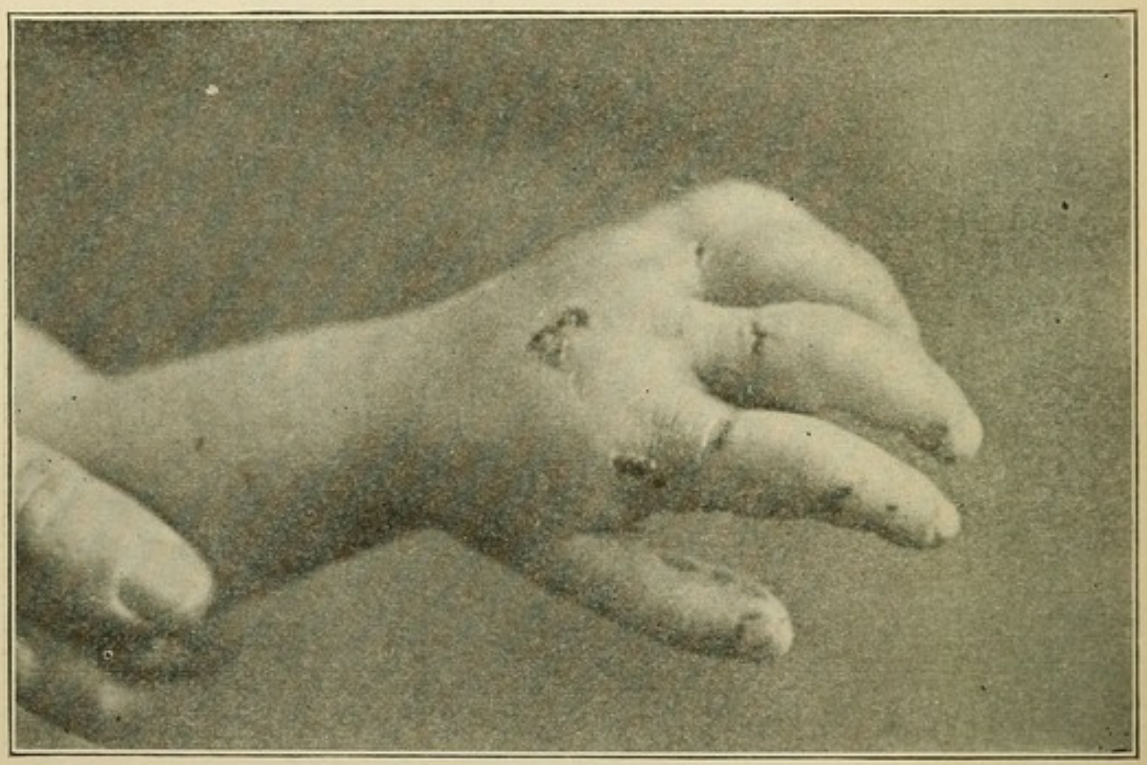


FIG. 157.—Syphilitic dactylitis.

calomel and 20 parts sugar may be insufflated, or an ointment of yellow oxid, gr. j to ʒj, may be used in the nose, or the white precipitate ointment 1 part and petrolatum 3 parts may be used.

Injections are perhaps best not used in infants, although the method has some warm advocates. They may be used in severe or malignant cases, and where there are severe visceral lesions or intracranial complications.

Salvarsan may be given in two or more injections not less than a week apart. The mercurial treatment may be used coincidently or afterward if desired. After five years of age it is best given, as in adults, intravenously, in doses of

0.1 gram to 0.2 gram. In younger children this is difficult, and injections into the muscles, in doses of from 0.03 to 0.05 to 0.1 gram, according to age and size. The drug may be suspended in benzoinol or any bland oil or in water. The injection should be made into the buttocks in such a manner as not to avoid the neighborhood of the sciatic nerve and the larger vessels. Two sites are recommended: first, a point midway between the anterior superior spine and the top of the internatal cleft, the needle to go forward, outward, and slightly upward. In thin children there is not much tissue at this point; second, draw a line from the top of the great

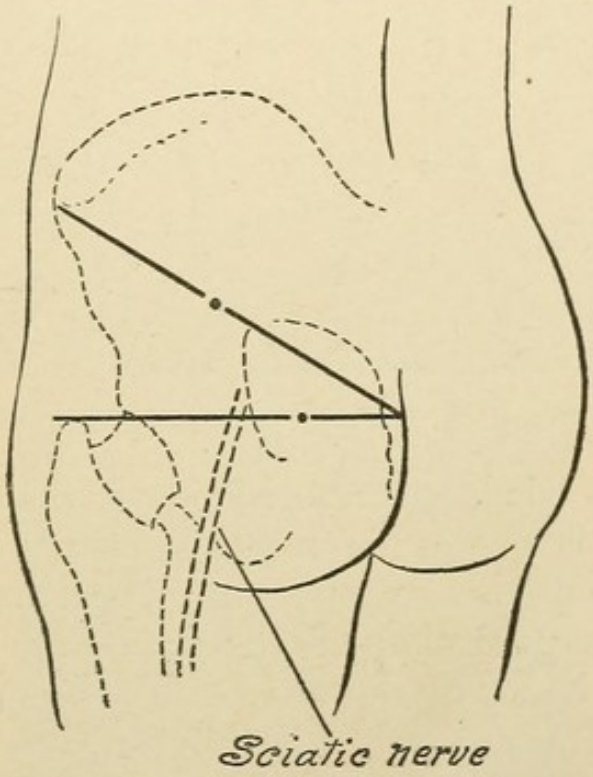


FIG. 157a.—Sites for intramuscular injection, showing location where to avoid the sciatic nerve.

trochanter to the top of the internatal cleft. Inject at the junction of the inner and middle thirds. This has the objection of being near the gluteal vessels. Neosalvarsan may be used. It has the advantage of being soluble in water, but the disadvantage of being more unstable, and it must be used as soon as prepared. 0.9 gram of neosalvarsan is equal to 0.6 gram salvarsan. 0.05 gram of salvarsan may be dissolved in 5 c.c. water and injected intravenously. The dose may be repeated in two weeks and in one or two months until Wassermann reaction is negative.

Late Hereditary Syphilis.[1]

Symptoms of tertiary syphilis may be seen in late childhood. Early symptoms may never have existed, or have been overlooked or forgotten.

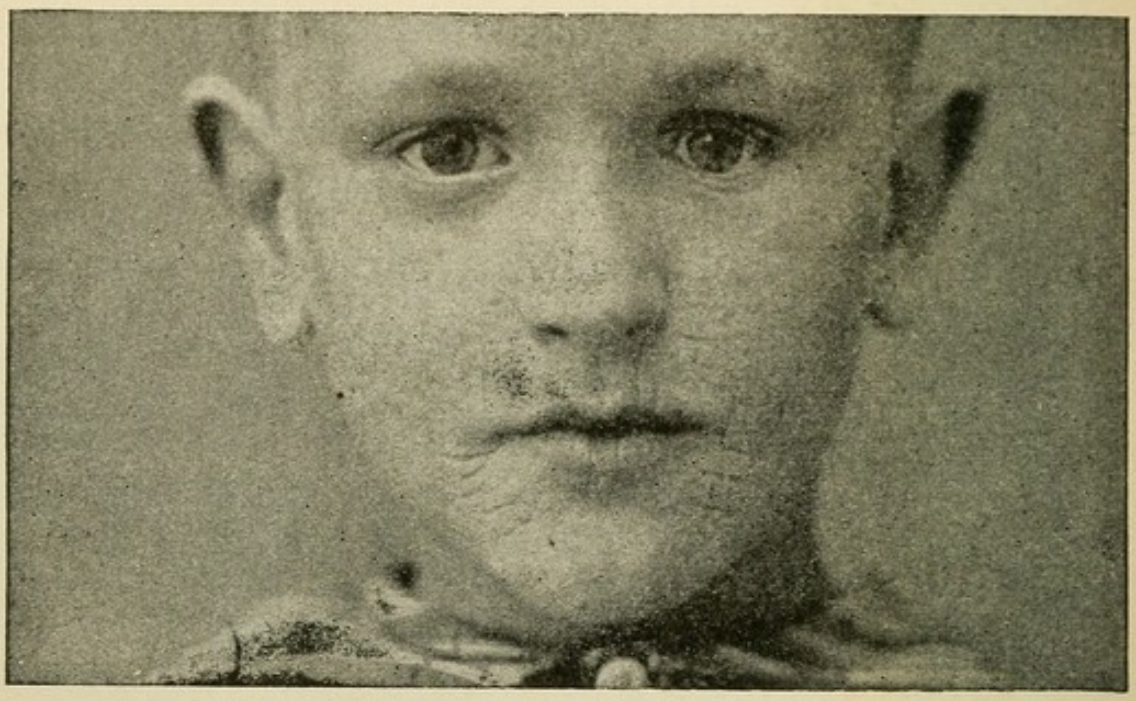


Fig. 158.—Fissures, or rhagades (Dr. Stowell's case).

Hutchinson's triad, the association of lesions of the teeth, eyes, and ears, is one of the most important diagnostic features. There may also be gummata, especially of the bones. Necrosis and suppuration of the bones are also frequent. Necrosis of the bones of the nose with subsequent depression of the bridge of the nose is a striking feature in some cases. The lymph nodes may be enlarged.

Interstitial keratitis is one of the most frequent eye lesions, and the resulting corneal opacities should always be looked for. This is not necessarily syphilitic. The pigment of the choroid may be absorbed in spots, especially toward the periphery. Chronic otitis with deafness is frequent.

The teeth show marked changes. *This applies only to the second* or *permanent teeth.* Hutchinson's teeth[2] consist of peg-

[1] Dunlop, "Arthritis from Congenital Syphilis," *Edinburgh Medical Journal*, vol. xvi., 1904, p. 516.

[2] Hutchinson, "Mercurial Teeth," *Illustrations of Clinical Surgery*, vol. i., 1878, p. 53.

like teeth with concavities on the grinding edge, this being noted in the upper central incisors. Teeth which are peg-like or shaped like a screw-driver or which are twisted are more frequently seen. A milk-white transverse line is sometimes seen across the upper central incisors. The teeth are abnormally soft and they are usually discolored.

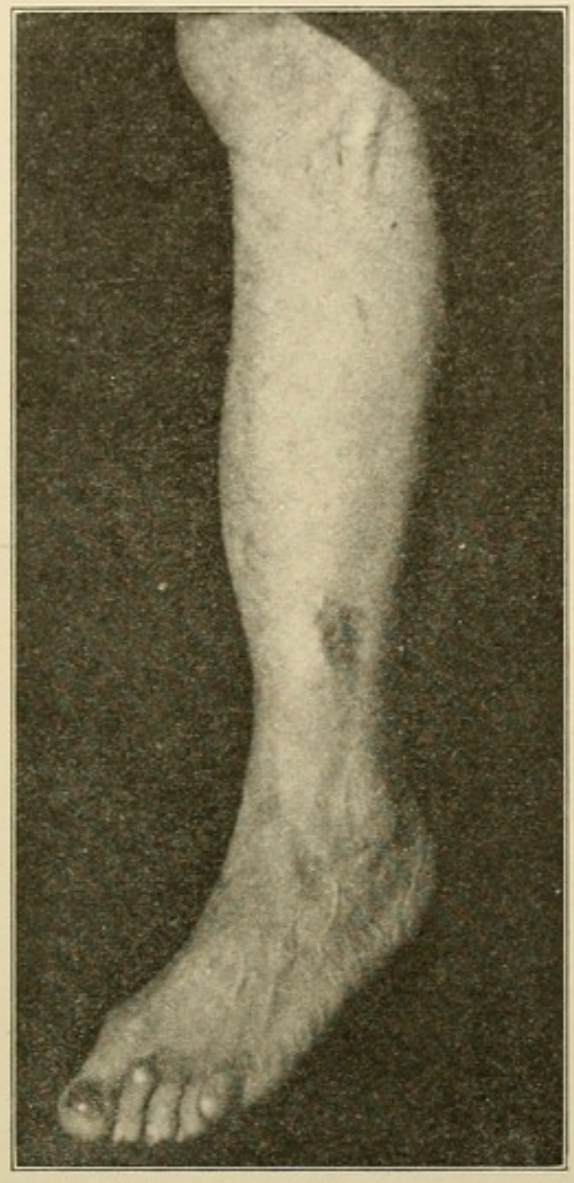


FIG. 159.—Sabre deformity of tibia in congenital syphilis

Subcutaneous gummata which break down, leaving ulcers and later irregular scars, are also of frequent occurrence. Joint pains and swellings resembling rheumatism are also frequently met with. There may be periosteal nodes, especially of the tibia, which are usually painful at night.

Syphilitic children may show stigmata of degeneration, mental backwardness, and nervous affections.

Diagnosis.—The presence of bone lesions, gummata, and Hutchinson's triad are the most important points.

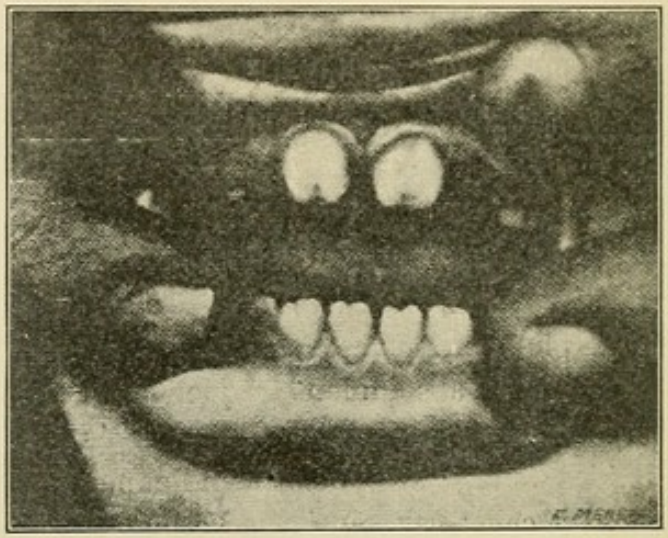


FIG. 160.—Hutchinson's teeth (after Fournier).

Treatment.—Iodid of potassium should be given in large doses. It may be alternated with the syrup of iodid of iron. If improvement does not occur, mixed treatment,

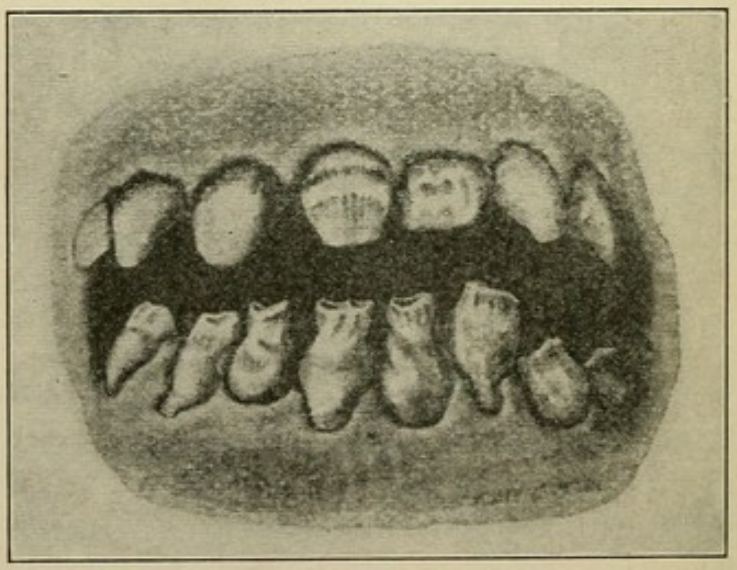


FIG. 161.—Syphilitic teeth (after Fournier).

consisting of inunctions of mercurial ointment or the bichlorid, internally, together with iodid of potassium, should be tried.

MALARIA.[1]

Definition.—This is an infectious disease caused by the hemocytozoa described by Laveran. It is characterized by paroxysms of intermittent fever, which may be of a quotidian, tertian, or quartan type, or by a remittent fever. Pernicious and chronic forms are also seen.

Etiology.—It is seen in certain localities, especially where there are marshes and undrained land. In temperate climates it is most frequent in August, September, and October, but some cases may be seen in the spring. The usual mode of infection is through the bite of a certain genus of mosquitoes, which act as an intermediate host for the malarial parasite.

The Parasite.—This is a hemocytozoa or a parasite which

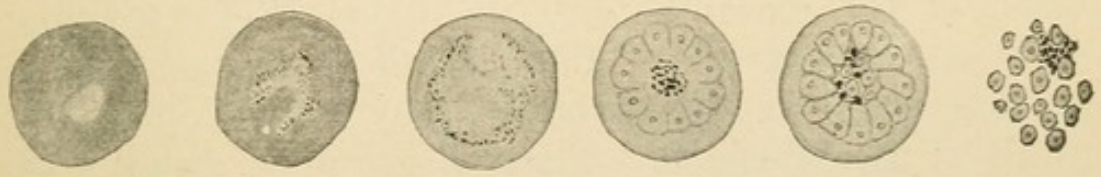


FIG. 162.—Various forms of hemocytozoa (Stevens).

lives in the red blood-cells. It was discovered in 1880 by Laveran.

There are three forms of the parasite: the tertian, quartan, and æstivo-autumnal.

The *tertian parasite* completes its cycle of development in man in forty-eight hours. It is first seen as a small unpigmented mass in the center of a red blood-cell. This looks much like the spore forms seen during a chill. After a few hours pigment may be seen. This is fine and granular. There is ameboid movement of the parasite. The pigment which at first is seen about the periphery becomes grouped in the center of the parasite. The parasite breaks up into about fifteen or twenty segments. These are the so-called spore forms which enter the red blood-cells and repeat the cycle. Some of the full-grown parasites do not segment. They are sexually differentiated parasites and are called gametocytes.

[1] Craig, "Malaria," *Boston Medical and Surgical Journal*, May 27, 1909.

The *quartan parasite* is rare in the United States. It takes seventy-two hours to complete its cycle. The granules of pigment are larger and darker than those of the tertian organism. The red cell is of a dark-brass color. The segments are larger and only from six to twelve are formed. The chill occurs every fourth day.

The *æstivo-autumnal parasite* is found in the more irregular fevers. Its cycle probably takes from twenty-four to forty-eight hours. It is smaller than either of the preceding. After a week or two in untreated cases curious crescentic forms appear which are larger than the red cells. Both this and the quartan form also have gametocytes.

The gametocytes do not develop in the blood. The male parasite gives off flagellæ which enter the female parasite, fecundating it. The malaria organism is taken into the stomach of the mosquito with the blood. The fecundated parasite enters the wall of the mosquito's stomach, and two days later small refractive bodies may be demonstrated in the wall of the stomach. These develop in about a week and break up into myriads of spindle-shaped sporozoids. These get into the salivary glands of the mosquito and thence into the individual bitten.

Malaria-carrying Mosquitoes.[1]—The species of the genus Anopholes are the only ones which act as intermediate hosts. The common mosquito is the culex. They are easily distinguished. The culex has small palpi, no spots on the wings beyond the veins, and the body, when resting, is parallel to the wall, the two posterior legs usually crossed over the back. The Anopholes has two large palpi, mottled wings, and the body is inclined away from the wall.

Pathology.—Fatal cases are rare in young people in America. The changes are similar to those found in adults. There is enlargement of the spleen and liver, and great destruction of the blood-cells. There may be pigmentation of the tissues.

Symptoms.—The clinical picture is varied. The younger the child the more irregular the form.

[1] L. O. Howard, *Mosquitoes.*

In later childhood the attacks are similar to the adult form. In the tertian form the paroxysm occurs every other day. If there is a double infection, as is frequent in children, the paroxysm occurs daily (quotidian). In the quartan form the paroxysm occurs every fourth day. In the aestivo-

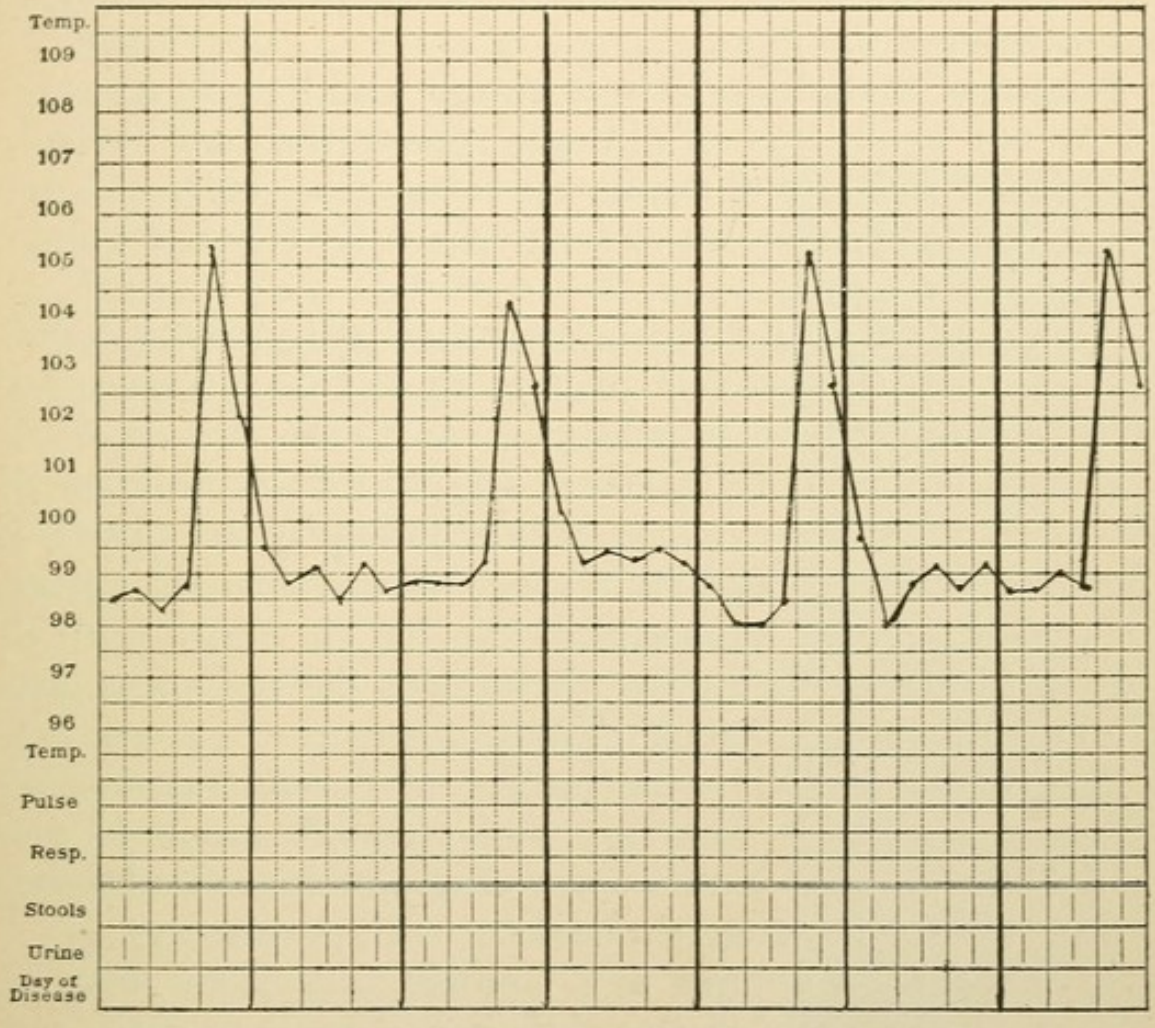


FIG. 163.—Typical temperature chart in tertian malaria.

autumnal form there may be an irregular intermittent or remittent fever.

The Malarial Paroxysm.—There is a chill, sometimes a convulsion or only chilly sensations; this may be accompanied by vomiting. There is cyanosis, and the child feels very ill. After from a few minutes to an hour there is high fever, lasting from a half hour to four or five hours. This often ends in a sweat. Following the paroxysms the child feels fairly well until the next one.

Under five years the paroxysm may be atypical. There

may be only cyanosis or a peaked expression with fever. The fever may be irregular. The disease may be subacute or chronic.

Malaria Cachexia.—The child is pale, sallow, and there are marked anemia, languor, loss of appetite, coated tongue, and often gastro-intestinal symptoms. The spleen is enlarged, and sometimes the liver.

Pernicious Malaria.—This is rare in children in America. There are symptoms of intense prostration and usually marked nervous symptoms, as convulsions or coma. Unless treated with subcutaneous or intravenous injections of quinin, death usually results.

Associated Conditions and Complications.—Enlargement of the spleen, anemia, bronchitis, coryza, and neuralgia are the most important.

Diagnosis.—This is best made by an examination of the blood. A fever which yields promptly to quinin is probably malaria. The paroxysms, fever, enlarged spleen, and cachexia are all important.

Prognosis.—With proper treatment the outlook is good in all except the pernicious forms.

Prophylaxis.—The destruction of mosquitoes and the protection from their bites are both valuable means of preventing the disease. Small doses of quinin may also be used as a preventive in malarial districts.

Treatment.—Quinin is a specific. A grain may be given for each year of the child's age until 5 grains are reached. It should be repeated every few hours for a day or two, and then smaller doses given in connection with iron. It may be given in the elixir glycyrrhiza, or the elixir of yerba santa, or in the syrup of orange or sarsaparilla. It should be mixed with a vehicle just before the dose is given. In the less severe cases the syrup of the cinchona alkaloids, euquinin, or the tannate of quinin may be given.

For pernicious malaria Bacelli uses the following:

℞ Quinin bimuriate . . . . . 1.0 (gr. xv);
Sodium chlorid . . . . . 0.06 (gr. j);
Distilled water . . . . . 10.0 (℥iiss). —M.

Or the following may be used:

℞ Quinin bisulphate . . . . . 1.0 (gr. xv);
Tartaric acid . . . . . 0.15 (gr. ij);
Distilled water . . . . . 10.0 (ʒiiss).—M.

THE HOOK-WORM DISEASE.

(Uncinariasis; Ankylostomiasis; Ground Itch, etc.)

Definition.—A severe anemia caused by the Uncinaria Americana (Necator Americana, Stiles).

The Parasite.—This is 7 to 11 mm. long, as thick as a hat-pin, and curved at one end. The eggs are 64 to 72 mm. long and 36 to 40 mm. broad. The worm attaches itself to the intestinal wall first one place, then another, sucks blood, and causes small hemorrhages. The eggs are passed with the feces and hatch in about twenty-four hours. It sheds its skin in forty-eight to seventy-two hours and again in five to nine days, then becomes an "encysted larva." This gets into man either through skin wounds (ground itch) or through the mouth in contaminated food or water.

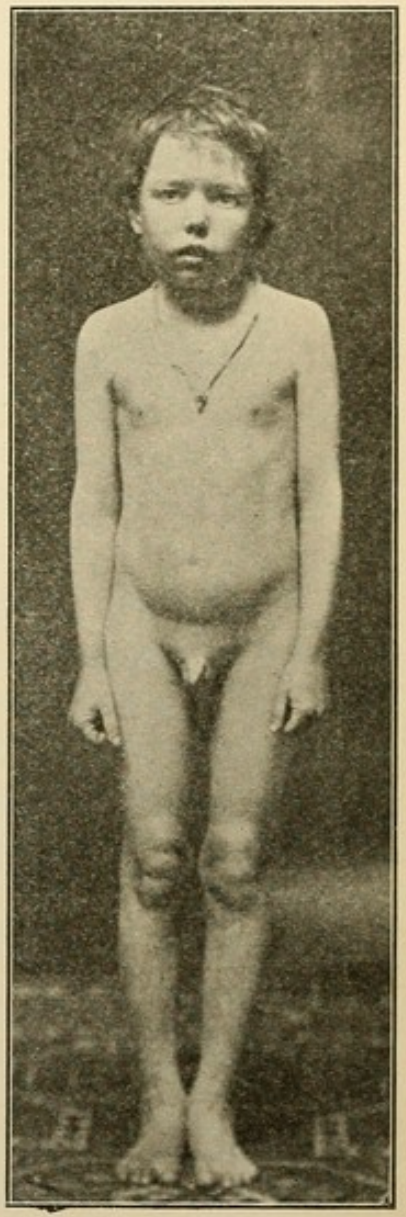


FIG. 164.—Hook-worm disease. Child fourteen years old; looks like seven or eight. Has worked three weeks in cotton mills, Gadsdon, Ala. (Courtesy of Dr. C. W. Stiles.)

Symptoms.—The infection may be mild, medium, or severe. The first show few symptoms, but the parasite and eggs can be found. The medium cases have a decided anemia, while the severe cases have an almost characteristic appearance. There is frequently an irritation of the skin (ground itch). There is marked anemia and pallor, or a yellowish discoloration of the skin. There may be edema, visible pulsation in the neck, and the expression is anxious and stupid. "Pot belly" is frequent and ascites may be

present. There is anorexia and a perverted appetite for all sorts of inedible articles. There is salivation, gastric pain and tenderness, and there may be constipation or diarrhea. There may be dyspnea, palpitation of the heart, and hemic murmurs. There may be slight fever. The mental condition is backward and there is timidity. There may be somnolence or insomnia. The muscles are weak and flabby.

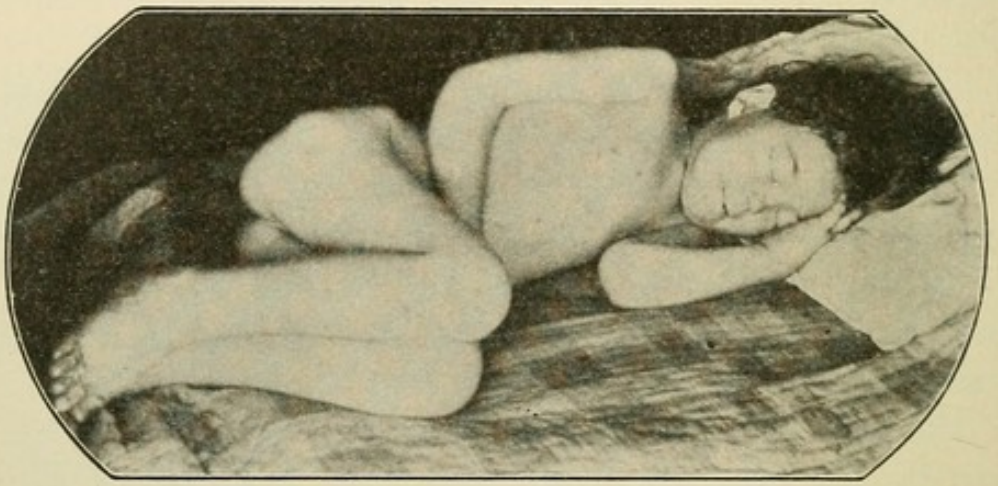


FIG. 165.—Fatal case of hook-worm disease, showing edema. Patient died a few hours after the photograph was taken. Photograph by Dr. H. H. Niehuss, Wesson, Ark. (Courtesy of Dr. C. W. Stiles.)

The Blood.—The hemoglobin is low, usually under 50. The red cells from under 1 million to 2.5 millions. There is no leukocytosis, but rather a leukopenia. There is usually eosinophilia in the favorable cases.

Diagnosis.—Examine stools for the eggs, give thymol, and look for the parasites. Blood in the stool is suggestive.

Prognosis.—Good in early cases, fair otherwise, and bad in late cases.

Treatment.—A purge at night, in the morning thymol 3 to 5 grains up to five years, 5 to 10 grains from five to ten years, and 10 to 15 grains in older children. Repeat in middle of morning and purge at noon. Repeat this once a week until cured. Betanaphthol in half the above doses may be used or oleoresin of male fern may be given.

RHEUMATISM.[1]

Definition.—This is an acute non-contagious disease, the exact cause of which is as yet unknown. In children over ten years of age the disease resembles rheumatism as seen in adults; in younger children it is liable to be atypical.

Etiology.—There are numerous theories as to the cause. These may be mentioned:

1. That rheumatism is an infectious disease. It often occurs in epidemics. Poynton and Paine, Triboulet and Wassermann, have all isolated a diplococcus which they regard as the cause of the disease. The infectious theory is very generally accepted.

2. That the disease is due to chemic or metabolic causes. Lactic acid is frequently mentioned as a cause.

3. That the disease is of nervous origin.

Rheumatism is most frequently seen in cold, damp climates. It affects certain families more than others, and often occurs in small epidemics. Girls are more frequently affected than boys. Exposure to cold and wet may be the exciting cause. One attack does not produce immunity, but rather predisposes to a second.

Pathology.—There are swelling and hyperemia of the synovial membranes and of the tissues about the joint. There is also a small amount of effusion into the joint. Permanent joint-changes are seen but rarely in true rheumatism. There are no characteristic changes found at autopsy.

Symptoms.—After ten years of age the attacks resemble the disease as seen in adults. There are fever, multiple arthritis, pain, sweating, and frequently involvement of the heart. The pain is not as great, as a rule, as in adults, and the sweat is not so sour-smelling. In younger children the disease differs considerably from that as seen in adults. The joints are less liable to be involved. There is less fever and hyperpyrexia is rare. Pleurisy, especially on the right side, may be present. The younger the child the greater the

[1] Barlow, "On the Diagnosis and Treatment of Rheumatism in Children," *British Medical Journal*, September 15, 1883.

variation. The attacks are shorter, lasting two weeks or less, as a rule. Recurrences are frequent.

The **onset** is usually sudden, with fever and pain in one or more joints. There may be fever and puzzling symptoms for several days before the joints are affected. There may be tonsillitis and heart murmurs.

The **joints**, if affected, are swollen, hot, and painful; but the pain in young children may be trifling. The knees, ankles, wrists, and small joints of the hands and feet are the most frequently affected; but any joint may be involved. Under seven, acute articular rheumatism is not common, and under three it is rare, but may be seen. In young children the diagnosis is made on the association of manifestations, sometimes one and sometimes another symptom being most marked.

Heart Lesions.—The heart is involved in children more than it is in adults. There may be either pericarditis or endocarditis, both of which are frequently overlooked. The heart should be carefully examined at each visit when rheumatism is suspected. Chronic heart lesions affecting the valves are nearly all of rheumatic origin.

Chorea.—This is a frequent accompaniment or sequela of rheumatism. In about one-half of the cases of chorea there is a history of rheumatism.

Tonsillitis.—This is frequently associated and may be the first manifestation of the attack.

Skin Lesions.—Various rashes are seen. Miliary and erythematous rashes are most frequent. Purpura may be present.

Subcutaneous Nodules.—These are as frequently seen in America as in England. They are small, transitory nodules, varying in size from a split pea to a pin-head. They are most frequent along the tendons and bones, which are covered only by skin.

Nervous Symptoms.—Nervousness, nightmare, headaches, and even severer symptoms may be met with.

Anemia.—There is always more or less anemia of a secondary form.

Muscular Rheumatism.—The pain may be in the muscles,

and the muscles may often be tender to touch in spasmodic contraction, as in rheumatic torticollis.

Duration.—Rheumatism in children usually lasts two weeks or less, the attack being shorter and somewhat less severe than in adults. The tendency to relapses and recurrences is greater.

Diagnosis.—This is often extremely difficult in young children. Remember that true rheumatism rarely leaves the joint with any permanent change. The following are most frequently mistaken for rheumatism.

Scurvy.—The nature of the food, the bleeding from the gums, the ecchymoses, the subperiosteal hemorrhages, and absence of fever should all be considered.

Rickets.—Early rickets can be told by the sweating about the head, the restlessness, the rickety rosary, and craniotabes.

Multiple Secondary Arthritis.—This may be seen after almost any acute infection. It is most frequently seen after gonorrhea, scarlet fever, cerebrospinal meningitis, and dysentery.

Septic Arthritis.—There is high temperature with marked local and constitutional disturbances. The joint is filled with a purulent effusion. If in doubt, aspirate the joint.

Acute Osteomyelitis.—There is marked local and constitutional disturbance. The swelling is below rather than in the joint.

Prognosis.—Usually good. Involvement of the heart is the most serious feature.

Treatment.—Put the child to bed; keep him there. Protect from cold and draughts. Use flannel underwear and nightgowns. Locally Fuller's lotion (carbonate of soda, ʒvj; laudanum, 1 oz.; glycerin, 2 oz.; water, 9 oz.), applied hot on flannel cloths, gives relief. Chloroform liniment may also be used. If very painful, fix the joint at rest in a well-padded splint. "Fire" the joint with the Paquelin cautery; this should produce just a slight degree of glossiness of the skin.

Internally the salicyl compounds or alkalis may be used. One grain of salicin may be given for each year of the child's

age, and repeated every hour or two until the pain is relieved, and then less frequently. Salicylic acid, salicylate of soda, aspirin, or oil of winter-green may be used. Morphia or opiates may be necessary if the salicylates do not relieve the pain. Bicarbonate of potassium may be given to render the acid urine neutral. Iron and tonics should be used afterward.

Chronic Fibrous Rheumatism.—Repeated attacks of rheumatism may occasionally lead to thickening of the tissues about the joints and of the joint capsule itself. There may be endocarditis, pericarditis, or rheumatism nodules.

Diagnosis.—This is made on the repeated attacks of rheumatism and the involvement of the heart. As a rule, attacks of joint pain attended with permanent changes in the joint are not rheumatism.

Prognosis.—This is good as regards life, but bad as regards the joints. The disease is apparently uninfluenced by treatment.

Treatment.—Salicyl derivatives, iodin, and tonics should be given. Passive movements, massage, and the use of hot air at high temperature may all be tried. A dry, equable climate is desirable.

DISEASES OF THE JOINTS.

ARTHRITIS DEFORMANS.[1]

Definition.—A chronic joint disease characterized by repeated exacerbations, each of which leaves the joints a little more disabled.

Etiology.—This is obscure. In some cases there is the family history of joint troubles. Some cases are evidently due to faulty metabolism, and still others to absorption of toxins from some focus of infection.

Pathology.—There are two classes of cases. In one there is a hypertrophy of the bone, with exostoses and the formation of new bone tissue, which may "solder," as it were, the joints together. In the second class there is atrophy of the tissues about the joint, and ankylosis finally results from erosions. There is marked deformity.

Symptoms.—In some cases there is a gradual onset, with progressive joint changes, and later atrophy of the muscles and deformity. In others there are repeated attacks of swelling of the joint, some pain, little or no temperature, and a rapid pulse rate. The lymph glands are usually enlarged. There is a form known as Still's disease,[2] in which the spleen is very much enlarged and early permanent disability from joint-changes.

Diagnosis.—From rheumatism by the marked swelling and little pain, the persistence of the swelling for some time, the absence of any tendency to move from joint to joint, a high pulse rate, and little or no temperature.

Prognosis.—As regards life good, but the patient is liable to be eventually badly crippled and have poor health.

Treatment.—Good food, out-of-door life, massage, passive movements, etc. Firing the joint during the acute

[1] Nathan, "The Nature, Diagnosis, and Treatment of Metabolic Osteoarthritis, So-called Rheumatoid Arthritis, Arthritis Deformans, Etc." *American Journal of Medical Sciences*, vol. cxxxvii., 1909, p. 817.

[2] Still, "Medical and Surgical Transactions," London, 1897, vol. lxxx., p. 47.

attacks, rest in bed, warmth. Furunculosis or any source of chronic absorption of toxin should be treated.

Spondylitis Deformans.—Arthritis deformans may attack the spinal column and proximal joints, causing stiff

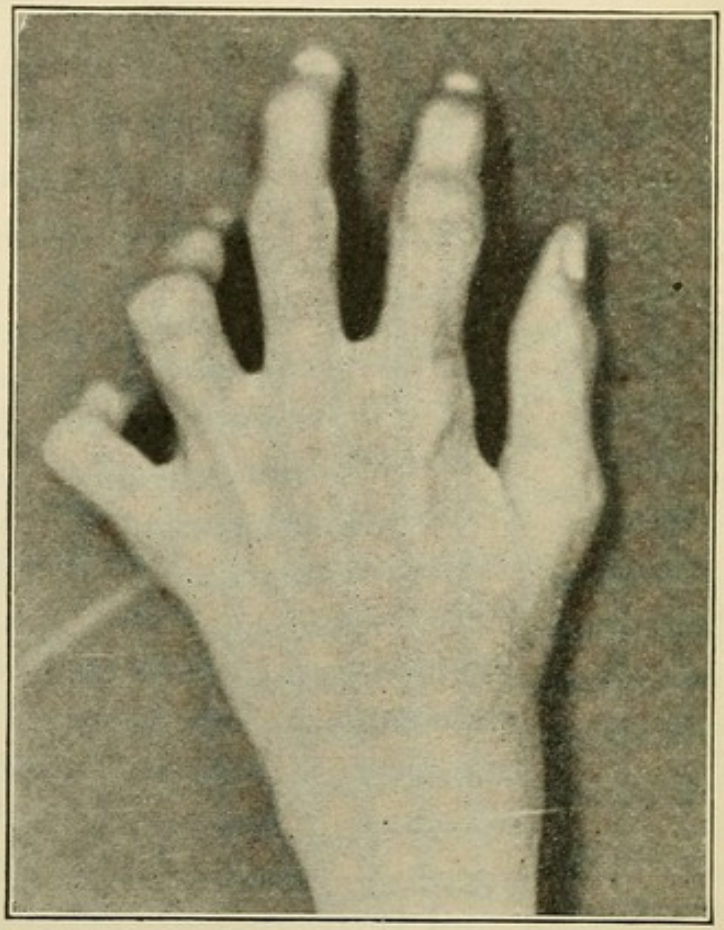


FIG. 166.—Arthritis deformans.

back, pain, and nervous symptoms. The treatment is to immobilize the back by a cast or suitable brace.[1]

ACUTE ARTHRITIS OF INFANTS.[2]

(Acute Epiphysitis; Acute Suppurative Synovitis.)

Definition.—An acute pyogenic infection of the joint with abundant pus-formation.

Etiology.—It is a disease of early life; most cases occur during the first year. The infection may spread from an

[1] Ruhräh, *American Journal of the Medical Sciences*, November, 1903.
[2] Townsend, *American Journal of the Medical Sciences*, January, 1901.

osteomyelitis or it may start in the joint. It may follow an acute infectious disease or other foci of suppuration.

Symptoms.—The onset is sudden, usually with marked constitutional symptoms. The joint is swollen and tender. Later the character of the trouble is very apparent. The hips, knee, shoulder, and wrist are the most frequently affected.

Diagnosis.—See Rheumatism. Aspiration should be used in cases of doubt.

Prognosis.—Good if opened and drained early; otherwise ankylosis or a flail joint may follow. Death may result from septicemia.

Treatment.—Surgical.

TUBERCULOUS ARTHRITIS AND OSTITIS.

Chronic tuberculosis of the joints is really a surgical disorder, but the early diagnosis and treatment is so important that it is included.

Etiology.—The onset rarely occurs before two years of age, and is infrequent after eight. It most often follows an acute infectious disease, as measles or whooping-cough, but may come on in children in apparent health. It is usually primary, but tuberculosis of other parts of the body may follow. Sometimes the disease develops after an injury.

Pathology.—The spine, knee, and hip are most frequently affected in the order named, and the ankle, elbow, wrist, and shoulder follow, but much less often. The disease usually begins in the bone near the joint, and involves the joint later. There is a tuberculous ostitis, which may become quiescent or which may go on to suppuration. The joint becomes involved by extension. All the structures about the joint may be involved, and the pus may burrow along the muscle sheaths and sinuses result.

Caries of the Spine (Pott's Disease).—This is a tuberculous inflammation of the vertebræ which extends to the surrounding structures and involves the joints and sometimes

the meninges, nerve roots, and cord. Under the weight of the body the spine becomes deformed, which progresses as the softening goes on. The resulting kyphosis is commonly called "hunch back." Nearly three-fourths of the cases are dorsal; of the remainder, the lumbar slightly exceed the cervical.

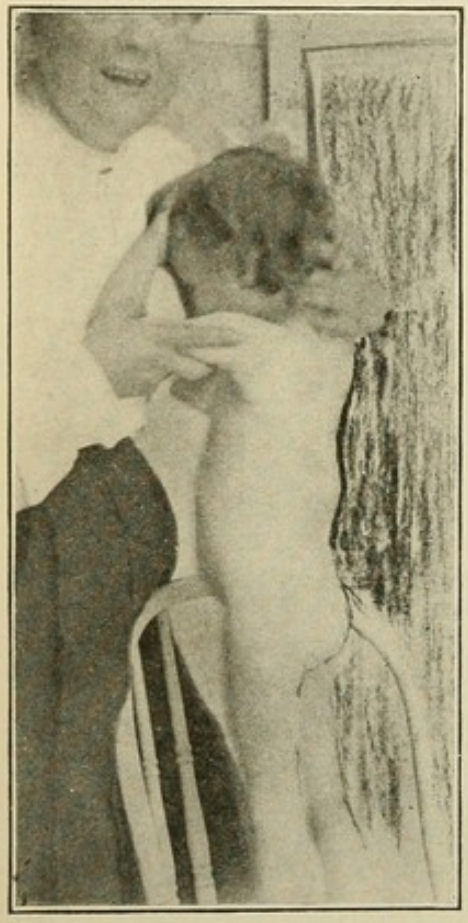


FIG. 167.—Tuberculosis of dorsal and lumbar vertebræ.

Symptoms.—Early symptoms are obscure, and diagnosis may not be made until there is deformity. Early symptoms are very important.

(*a*) Rigidity of spine. In stooping, etc., the back is kept rigid.

(*b*) Referred pain. This may be any place supplied by the spinal nerves of the part affected. Abdominal pain is frequent where the dorsal region is affected. Pain may come on at night.

(*c*) The child assumes a position such as will relieve pressure on the vertebræ.

(*d*) There may be pressure paralysis.

Cervical Form.—Pain is usually of a neuralgic type, either occipital or on side of neck. This should always lead to a careful examination of the spine. There may be pain only on motion; there may be stiff neck. Paralysis or retropharyngeal abscess may be the first thing noted.

Dorsal Form.—There may be intercostal neuralgia or abdominal pain. Child sleeps lying with abdomen downward (prone position). The spine is stiff and held so. Early there may be frontal lordosis, the backward kyphosis coming later.

Lumbar Form.—The pelvis is tilted to one side, causing lateral curvature of spine. The pain is usually referred to hip or knee, and there is usually limping on one side, often

mistaken for hip or knee disease. Deformity is usually late in appearing.

Diagnosis.—The child should be naked and the position noted, also the presence of any deformity of spine or elsewhere, and the mobility of the spine tested. Paralysis and abscess should be looked for. "The child walks with its legs, but not its back." The knee and hip are bent in picking up objects from the floor, while the spine is held stiff. The disease is made more apparent if a normal child is examined at the same time. Lumbar cases should be differentiated from hip cases.

The spine may be bent in rickets and in malnutrition, but this is most frequent under two years of age; there are other signs of rickets or malnutrition, and the back is mobile and not rigid. The deformity is usually dorsal, and disappears more or less if an attempt is made to straighten the spine.

Rotary lateral curvature is usually seen in girls from eleven to fourteen, and there is neither rigidity nor pain.

Prognosis.—The disease is very chronic, and it is usually from one to three years before repair starts. Relapses and exacerbations are common, and are due to traumatism, lack of proper support, and improper treatment. Abscesses occur in about 20 per cent. of the cases, and paralysis in about 50 per cent., when the disease is in the lower cervical or upper dorsal region. Death takes place in about 10 per cent. of the cases. The amount of deformity varies with the site of the disease, the treatment, and especially on how early it is begun. If begun very early there may be little or none.

Treatment.—The general treatment is important, and is the same as in any other form of tuberculosis, and is in these cases too frequently neglected. The local treatment is best carried out by an orthopedic specialist, and consists in keeping the spine at rest and taking the weight off of it by means of plaster jackets or specially constructed apparatus.

Tuberculous Articular Ostitis of the Hip (Hip-joint Disease); Morbus Coxarius.—This begins in the head of the femur or acetabulum as an inflammation of the bone—first stage; spreads to the joint—second stage; and

may soften and destroy the joint with considerable resulting deformity—third stage.

First Stage.—There is early morning stiffness and slight lameness, slight tenderness about the hip, disinclination to walk, then pain, usually referred to knee. A little later there are "shooting pains" at night, which cause the child to cry out suddenly. Later there is lameness. This stage may last weeks, months, or years.

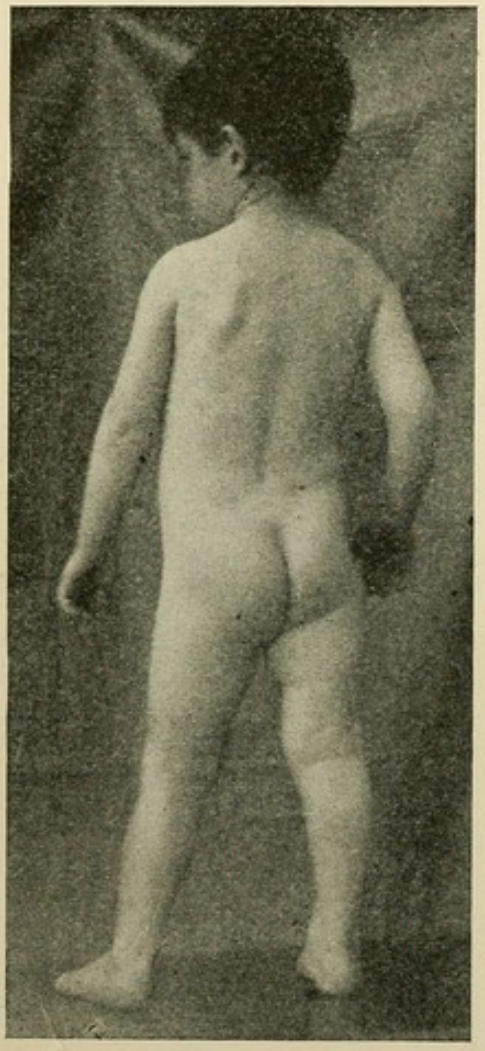


FIG. 168.—Position in early tuberculosis of the hip-joint.

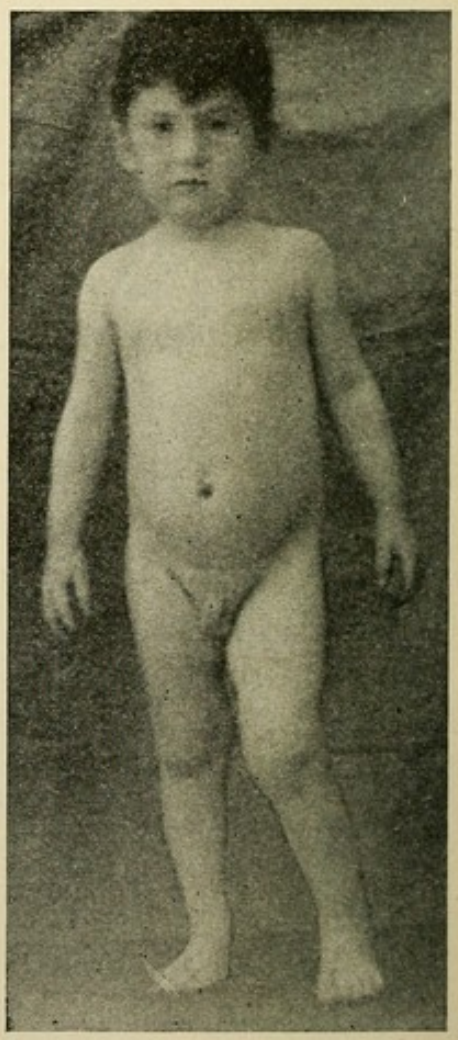


FIG. 169.—First stage in tuberculosis of the hip. Note position and apparent lengthening.

The physical signs are flattening of the gluteal fold, which may be single, and of the buttock, atrophy of the leg on the affected side; the trochanter is prominent. The weight is carried on the sound leg. The affected side should be compared to the well one standing and lying down, both legs

should be rotated, flexed, extended, abducted, and adducted. A comparison with the well leg reveals limitation of motion which could often not otherwise be detected. Later on the hip may be fixed.

Second Stage.—This gradually follows the above, occasionally it comes on suddenly. The leg is apparently lengthened, the foot turned out, the thigh flexed and rotated outward. There is muscular spasm which limits or prevents movement of the hip; there may be infiltration of the joint and abscesses and sinus formation. This stage lasts weeks, months, or years, and the disease may not progress further.

Third Stage.—There is marked, real deformity, due to de-

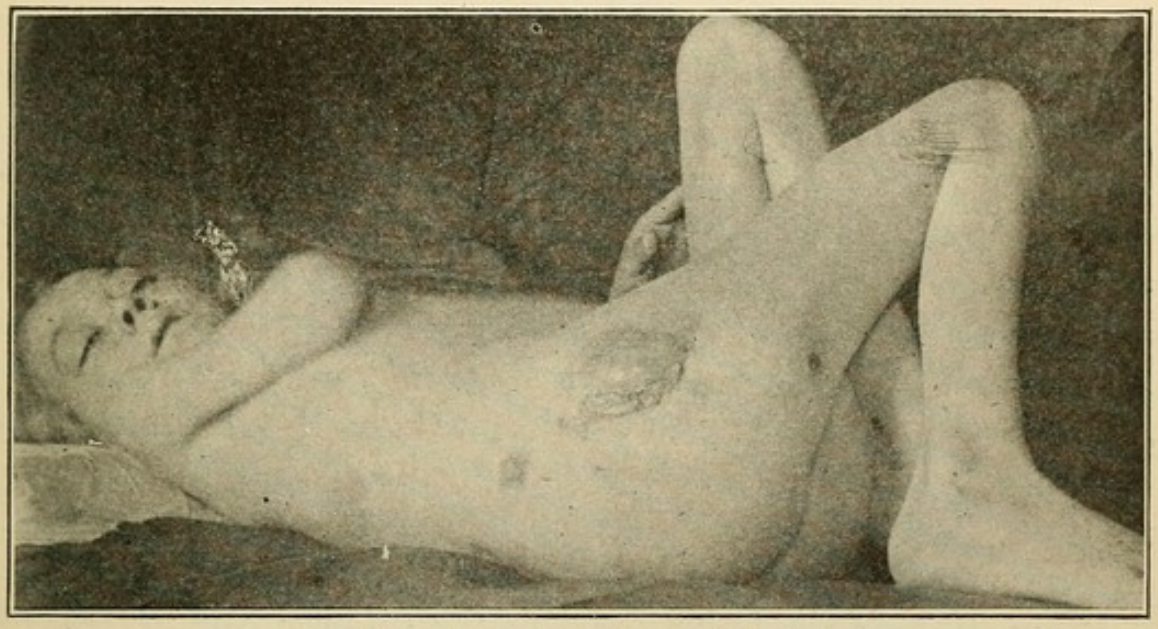


FIG. 170.—Late tuberculosis of hip-joint.

struction of the joint and drawing up of the leg by muscular action. The leg is shortened from one to four inches. The foot is turned inward, the thigh flexed, adducted, and rotated inward. The trochanter is above Nelaton's line and the trochanter against the ilium. There is marked curvature of the spine and atrophy of the leg. There may be abscesses and sinuses.

Diagnosis.—Shooting pains, any lameness, pains in knee or leg should lead to examination. In the first stage mistakes are easily made, and sprains, poliomyelitis, rheumatism, tuberculosis of the lumbar vertebræ, and inflammations of the

soft parts must all be excluded. Appendicitis or perinephritic abscess may cause a drawing up of the hip and be mistaken for the second stage.

Prognosis.—About 25 per cent. die. If the disease is treated in the first stage there may eventually be little or no deformity; if treatment is started in the second stage there is always some deformity, and if in the third, there is always marked deformity.

Treatment.—This consists in rest, immobilization, and relieving the joint from carrying the weight of the body by means of proper apparatus. The patient can usually be up and about except in the third stage.

Tuberculous Articular Ostitis of the Knee (White Swelling).—The changes are similar to the above. The disease usually begins in the inner condyle of the femur and extends to the joint. The amount of change is variable. There may be only a slight synovitis or, on the other hand, there may be complete destruction of the joint. Abscesses and sinuses may be present.

Symptoms.—There are slight lameness, tenderness, the knee is flexed, and there is some stiffness and pain. Later there is swelling, atrophy of the muscles above and below the joint, and a deformity, consisting in flexion and outward rotation. The disease lasts months or years, with remissions and relapses.

Prognosis.—This is better than the other forms as regards life, and if treatment is instituted early there may be little deformity. This is variable, however.

Diagnosis.—In infants scurvy must be excluded, also synovitis, and in older children acute rheumatism.

Treatment.—Rest and immobilization by means of proper apparatus.

OTHER FORMS OF ARTHRITIS.

Quite a number of other forms of arthritis are met with in infants and young children, the chief of which is, perhaps, the gonorrheal arthritis which occurs in very early life, usually following a gonorrheal ophthalmia.

Gonorrheal Arthritis.—This may be seen in the course of

ward epidemics of gonorrhea. There may or not be conjunctivitis or genital lesions.

The clinical picture varies a great deal, and in some cases the condition is very acute, the joint looking as if suppuration would take place. As a rule, in three or four weeks recovery takes place without surgical interference. Sometimes the joints suppurate, owing to a secondary infection with pus germs. There may be only one joint or there may be a number of joints affected.

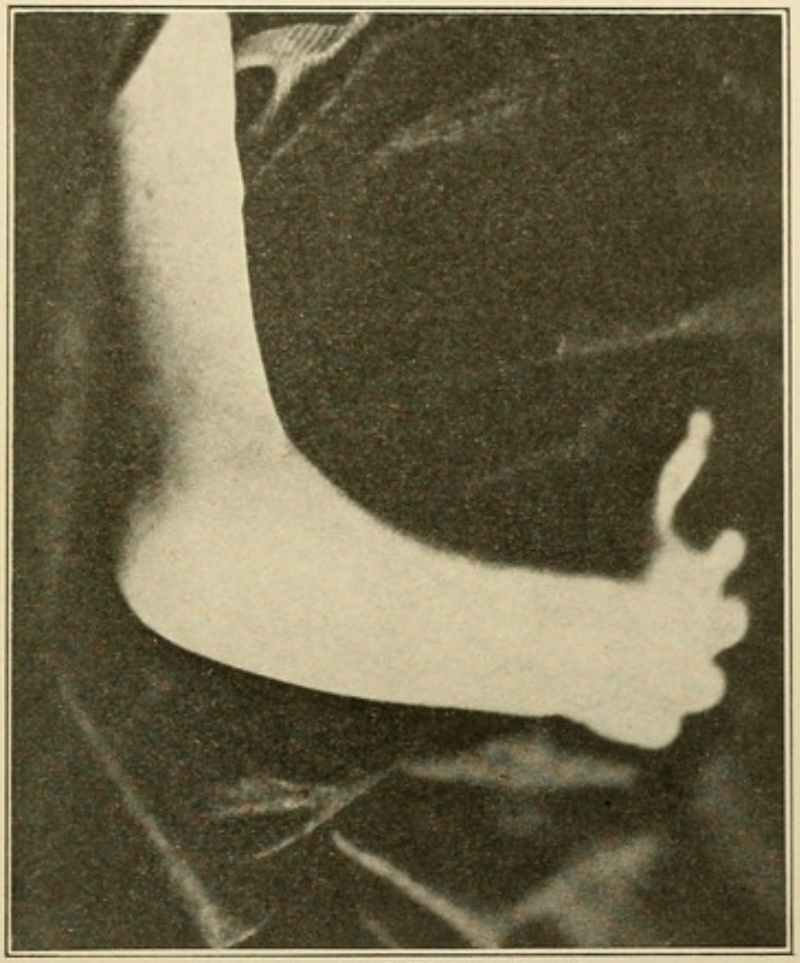


FIG. 171.—Syphilitic arthritis.

Meningococcal Arthritis.—Arthritis may be met with in epidemic cerebrospinal fever and postbasic meningitis. One or more joints may be affected, the special feature being that the swelling is peri-articular rather than intra-articular. The swelling is not especially painful.

Acute Tuberculous Arthritis.—This is very rare, but is occasionally met with, and should be borne in mind in making a diagnosis.

Pneumococcal Arthritis.—This is exceptional. It occurs in the course of pneumonia or a pneumococcal empyema.

Acute Rheumatism.—Swelling of the joints in rheumatism in children under five years of age is exceedingly rare, but arthritis due to rheumatism may occasionally occur in young children.

Arthritis is Associated with Hemophilia.—Several forms of joint affection may be met with in this condition. There may be an acute infective arthritis; there may be hemorrhages into the joints, and there may be an arthritis deformans.

Congenital Syphilis.—This rarely affects the joints under five years of age, and yet occasionally one meets with marked cases. In early life syphilitic epiphysitis is not uncommon, and may be mistaken for a multiple arthritis. It comes on usually in the first three months, there is swelling about the epiphyses, pain, loss of motion. It may be mistaken for a birth palsy.

DISEASES OF THE BONES.

ACUTE OSTEOMYELITIS.

THIS may be overlooked on account of several features of the disease. It may be mistaken for rheumatism, especially when it is accompanied with pericarditis and swelling about the joint. It may be mistaken for erysipelas. The diagnosis can usually be made by deep pressure, which in erysipelas produces no especial amount of pain, but does in osteomyelitis. It should be remembered that delirium is one of the characteristic features of the disease, and the bone may be overlooked on account of this. On examination there may be found to be a thickening of the shaft of the bone and tenderness on pressure. The joint immediately below may apparently be swollen, but it is easy to determine by pressure that the pain is in the shaft of the bone and not in the joint. The treatment is surgical.

MULTIPLE EXOSTOSES.

These are hereditary and are due to abnormal development of the bones. The exostoses vary in size, and are most frequent on the long bones about the epiphyses. They come on most frequently about puberty, when the bone development is most rapid. When the growth of bone ceases, they stop growing. Unless giving trouble, they should be let alone. If they cause symptoms from pressure on the nerves or vessels they should be removed.

OSTEOGENESIS IMPERFECTA.[1]

This is a rare congenital disease of the bones, changes taking place during fetal life and also later. At birth the skin is thickened, and the infants present an obese appearance. If the child grows there are bending deformities of the extremities. The bones are exceedingly brittle, and the most characteristic feature is frequent fractures, which usu-

[1] Nathan, *American Journal of Medical Sciences*, January, 1905, p. 1.

ally heal promptly. The cranium is usually enlarged and deformed. Little is known about the cause or pathology of the disease. Most of the cases die early, though some survive until later in life.

The patient should be handled carefully to avoid fracture, and in mild cases braces may be used to protect the limbs. No effective treatment has yet been instituted.

DISEASES NOT OTHERWISE CLASSIFIED.

PELLAGRA.

Definition.—A constitutional disease frequently overlooked in childhood. The pathology and symptomatology

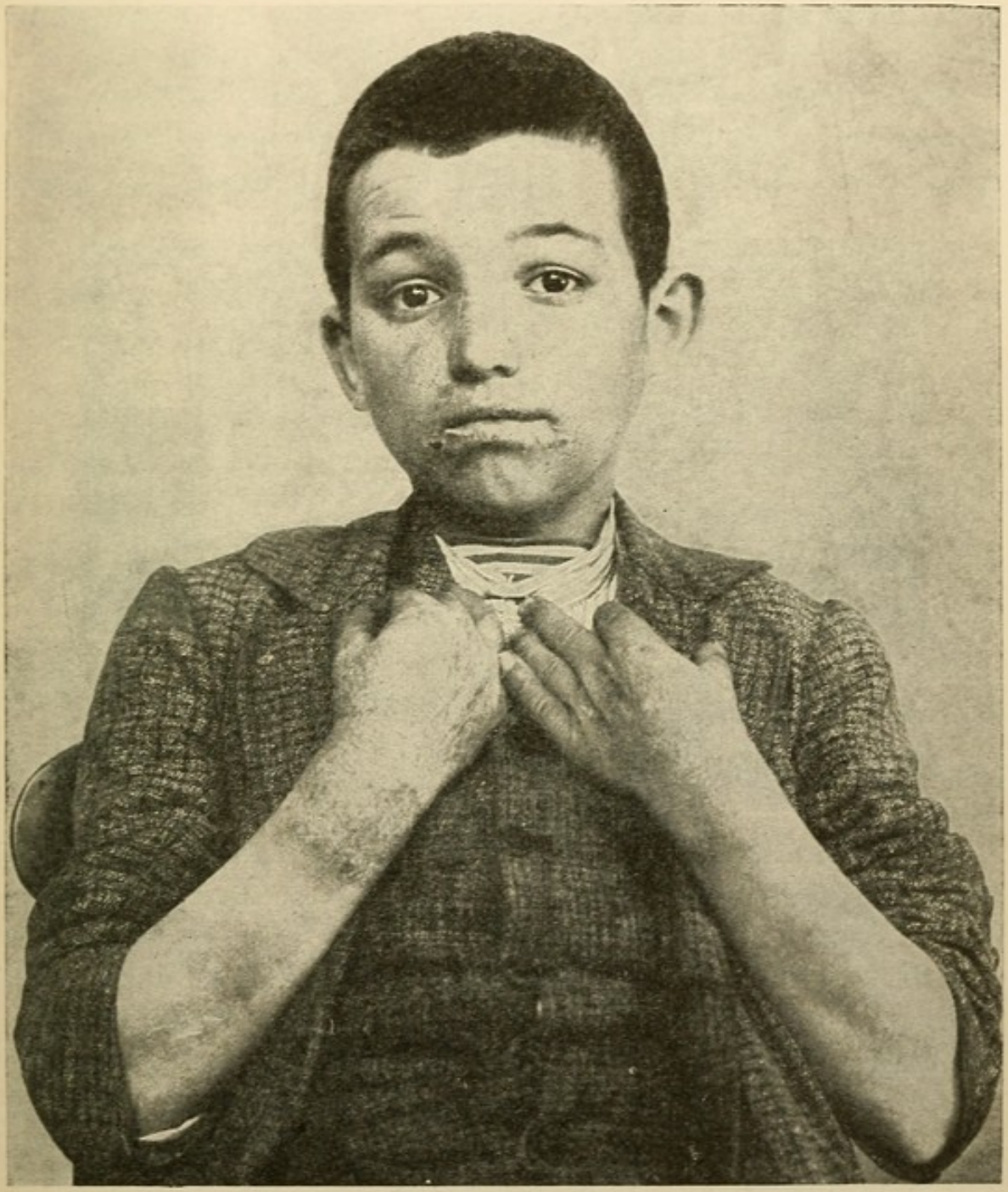


FIG. 172.—Lesions on hands and face. Photograph from Dr. Eugenio Bravatta, Mombello, Italy. (Courtesy of Dr. William Weston, Columbia, S. C., from *The American Journal of Diseases of Children*, February, 1914.)

are extremely varied. The chief manifestations are upon the skin in the alimentary canal and the nervous system.

Etiology.—Seen at all ages, and sexes are equally affected. Most of the attacks occur in spring or early summer or autumn, rarely in cold weather. Sunlight aggravates the rash. It is usually seen in unsanitary surroundings. The cause of the disease is not known at the present. One theory is that it is due to spoiled maize. Sambon believes it to be a parasitic disease transmitted by a species of simulium.

Pathology.—There is usually anemia and cachexia and emaciation. There are changes in the meninges, brain, and spinal cord. The erythema is trophoneurotic in origin. There

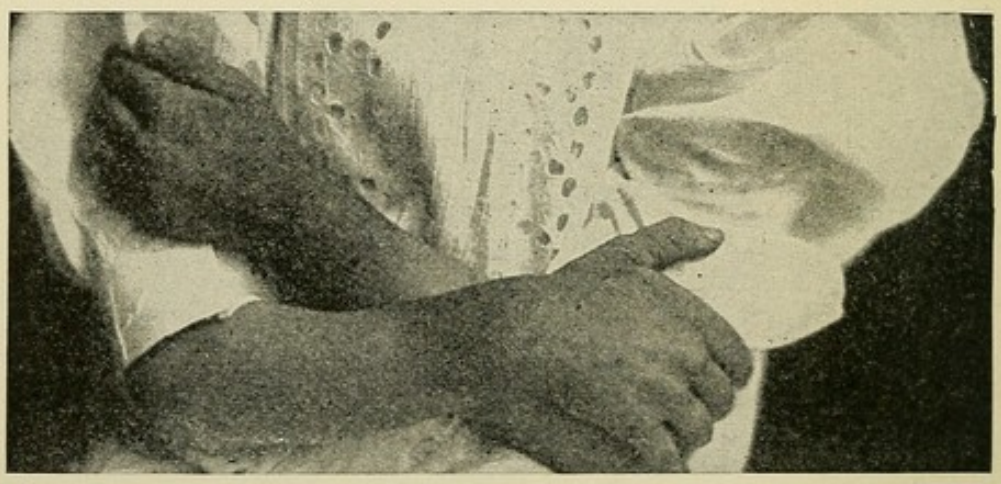


FIG. 173.—Hands from white girl, aged six. Fifth attack of pellagra. First attack occurred before the age of two. (Courtesy of Dr. William Weston, Columbia, S. C., from *The American Journal of Diseases of Children*, February, 1914.)

are atrophic, sometimes ulcerative, changes in the intestinal tract.

Symptomatology.—The disease generally comes on gradually, either with changes in the skin or digestive symptoms. There is usually diarrhea, sometimes constipation. The digestive disturbances are more common after the fourth year. The nervous symptoms consist of marked insomnia, paresthesia, exaggerated knee-jerk, and there is often mental depression. The rash is symmetrical, chiefly on the hands and face, sometimes on other parts of the body, sometimes wet and sometimes dry. It is intensified by light. In the dry form there is an erythema with a tendency to fissures and repeated attacks of thickening of the skin.

Diagnosis.—On the symptom-complex, consisting of a red tongue, fissured lips, diarrhea, headache, insomnia, restlessness, paresthesia. In the later cases rigidity of the muscles and even spasms, and photophobia. There is muscular weakness of the legs. The presence of the skin lesion makes the diagnosis almost certain.

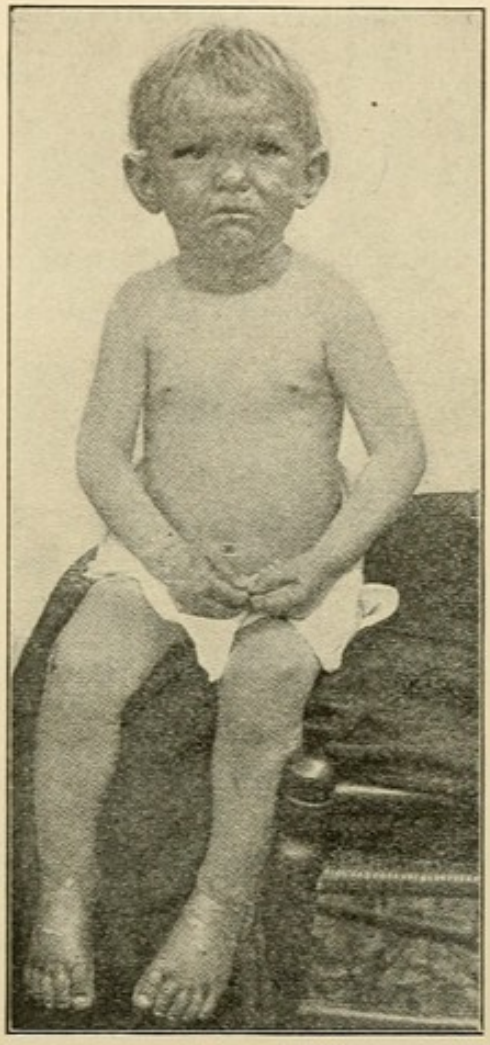


FIG. 174.—Wet variety of pellagra in an eighteen-month-old child. Patient of Dr. J. J. Watson. (Courtesy of Dr. William Weston, Columbia, S. C., from *The American Journal of Diseases of Children*, February, 1914.)

Prognosis.—The younger the child the less favorable the prognosis. Infants nursing the breasts of pellagrous mothers become marantic unless the diet is changed. From four to ten years of age the attack is more mild.

Treatment.—If the mother has pellagra the child should be weaned. Improved hygiene and change of climate if possible. The child should be kept out of the sunshine. Iron or arsenic may be given internally.

THERAPEUTICS FOR INFANTS AND CHILDREN.

Prescribing for children and ordering therapeutic measures other than drugs deserve especial attention. There are certain well-known principles and rules that should be borne constantly in mind. These may be briefly expressed as follows:

Never give a dose of medicine without a definite indication.

Never give an unnecessary dose of medicine.

If a placebo is prescribed, give a harmless, palatable dose.

Give small doses, often repeated, as a rule, in preference to larger doses at long intervals, unless there is some especial reason for the latter proceeding.

Never give an unpalatable dose where a pleasant-tasting one can be given instead.

Avoid drugs that produce nausea and so destroy the appetite and endanger nutrition, except in the few indications for so doing.

Give simple prescriptions. In most instances one drug by itself will give better results than a number mixed together. There are, however, many exceptions to this.

As a rule children like syrups without too much flavoring. Avoid as far as possible the highly seasoned and flavored elixirs. Properly diluted, these may be very acceptable.

Bitter medicines are frequently well taken, especially by young infants, if they are well diluted with water. In many instances the mixtures intended to disguise bitter drugs are worse than the drugs themselves.

As far as possible always see and taste every medicine, unless certain as to what the result of the combination will be.

Size of the Dose of Medicine.—This is an important and often a perplexing problem. There have been many rules devised, and probably none better than the old one of add twelve to the age in years and divide the age by the sum.

This gives the proportion of the adult dose which should be prescribed. Example: For a child of three years,

$$\frac{3}{12+3} = \frac{1}{5}.$$

This does not apply to all drugs, for some are especially well tolerated, while others are badly borne, even in the indicated proportions. Cowling's method is to divide the following birthday of the child by 24. For example, at two years, 3 divided by 24 equals $\frac{1}{8}$. Clark has suggested that the dose should correspond to the weight, assuming 150 pounds is the average weight, to which the dose is 1. If the weight be divided by 150 the resulting fraction represents the proper proportion of the dose for that particular case. For example, the proper dose for a baby of 10 pounds would be $\frac{1}{15}$.

For infants under one year great care should be exercised. Find the dose for an infant of one year and give about one-twelfth of the dose for each month of the child's age. Opium should always be used with the greatest caution in the young.

The doses in the table on pages 478–480 are what may be regarded as safe initial doses. It should be remembered that no hard-and-fast rules can be made for estimating the size of the dose for children, and that in some instances the doses given may be rather larger than would be warranted, as in a very small, weak child, for example, and in many more instances the size of the dose may be increased with great benefit. Almost without exception the doses given have been used by the author in actual practice.

Drug. Where solubility is mentioned, water at 75° F. is understood.)	Dose. Six months.	One year.	Two years.	Three years.	Five years.
Acetphenetidin (phenacetin), in powders	gr. ½	gr. 1	gr. 1½	gr. 2	gr. 3
Acids (dilute well with water).					
aromatic sulphuric	♏ ¼	♏ ½	♏j	♏ij	♏iij
dilute hydrochloric	♏ ½	♏j	♏ij	♏iij	♏v
phosphoric	♏ ½	♏j	♏ij	♏iij	♏v
Aconite, tincture of	♏ ¼	♏ ⅓	♏ ½	♏j	♏i–ij
Ammonia, aromatic spirits of, well diluted with water	♏i–ij	♏ij	♏iij	♏v	♏v–x
Ammonium acetate, solution of	. . . . .	ʒss	ʒj	ʒj	ʒij
chlorid (soluble in 2 parts of water)	gr. ¼	gr. ⅓	gr. ½	gr. 1	gr. 2–3
Antimony and potassium tartrate, soluble in 15.5 parts of water; precipitated by alcohol. Tablet triturates	gr. $\frac{1}{200}$	gr. $\frac{1}{200}$	gr. $\frac{1}{150}$	gr. $\frac{1}{100}$	gr. $\frac{1}{100}$
Antipyrin, soluble in less than 1 part of water. In syrup of orange	gr. ⅓	gr. ½–1	gr. 1–1½	gr. 2	gr. 3
Arsenic. Solution of potassium arsenate. Fowler's solution. Dilute well with water	♏ ¼	♏ ½	♏j	♏ij	♏iij
trioxid. For older children, with or without Blaud's mass	. . . . .	. . . . .	. . . . .	. . . . .	gr. $\frac{1}{100}$
Aspirin	gr. ⅓	gr. ½	gr. 1	gr. 2	gr. 3
Atropin sulphate	gr. $\frac{1}{1000}$–$\frac{1}{600}$	gr. $\frac{1}{800}$–$\frac{1}{400}$	gr. $\frac{1}{400}$–$\frac{1}{300}$	gr. $\frac{1}{300}$	gr. $\frac{1}{200}$
Belladonna tincture	♏ ¼	♏ ½	♏j	♏i–ij	♏ii–v
Betanaphthol-bismuth, not official. In powders	gr. 1	gr. 1	gr. 1	gr. 2	gr. 3
Bismuth, in powder or in suspension. Subcarbonate	gr. 10	gr. 10	gr. 10	gr. 10	gr. 20
subgallate	gr. 2	gr. 3	gr. 4	gr. 5	gr. 10
subnitrate	gr. 3–10	gr. 10	gr. 10	gr. 10	gr. 20
subsalicylate	gr. 1	gr. 2	gr. 2	gr. 3	gr. 5
Bromoform. Drop with a dropper	. . . . .	. . . . .	♏j	♏ii–iij	♏ii–v
Calcium chlorid, soluble in 1.3 parts of water	gr. ½	gr. 1	gr. 1	gr. 2	gr. 2
Camphor, soluble in oils. May be used subcutaneously in 10 per cent. oils	gr. $\frac{1}{10}$	gr. ⅛	gr. ⅛	gr. ¼	gr. ¼
spirits of	♏ij	♏v	♏v	♏v–x	♏x
Cascara sagrada, extract	. . . . .	gr. ⅓	gr. ½	gr. 1–2	gr. 3–5
aromatic fluidextract	♏x–xv	♏xxx	♏xlv	ʒj	ʒi–ij
Castor oil	ʒj	ʒij	ʒss	ʒss	ʒss
Cerium oxalate, in powders	gr. 1	gr. 2	gr. 2	gr. 3	gr. 5
Chalk mixture	ʒj	ʒj	ʒij	ʒij	ʒiij
Chloral hydrate, freely soluble	gr. 1–2	gr. 2	gr. 3	gr. 4	gr. 3–5
Citrated caffein	gr. ⅓	gr. ½	gr. ½–1	gr. 1	gr. 1–2
Cocain hydrochlorid	. . . . .	gr. $\frac{1}{100}$	gr. $\frac{1}{75}$	gr. $\frac{1}{50}$	gr. $\frac{1}{25}$

Codliver oil	℥v–x	℥x	ʒss	ʒj	ʒi–ij
Digitalin (Merck's). May be used hypodermatically	gr. $\frac{1}{200}$–$\frac{1}{100}$	gr. $\frac{1}{100}$–$\frac{1}{75}$	gr. $\frac{1}{75}$–$\frac{1}{50}$	gr. $\frac{1}{50}$	gr. $\frac{1}{25}$
Digitalis, infusion	℥x–xv	℥x–xx	ʒss–j	ʒi–ij	ʒi–iij
Ergot, fluidextract of	℥i–ij	℥ii–iij	℥v	℥v–viij	℥x
Glycyrrhiza, compound mixture of (Brown mixture)	℥x	℥xv	℥xx	ʒss	ʒj
Guaiacol carbonate, in powders	gr. $\frac{1}{2}$	gr. 1	gr. $1\frac{1}{2}$	gr. 2	gr. 3
Hexamethylenamin (urotropin). Soluble in 1.5 parts of water	gr. $\frac{1}{2}$	gr. 1	gr. $1\frac{1}{2}$	gr. 2	gr. 2–5
Ipecac, syrup of, as expectorant	. . . . .	℥ $\frac{1}{2}$–1	℥i–ij	℥iij	℥v
as emetic	ʒj	ʒj	ʒj	ʒij	ʒij
Iron and ammonia citrate. Freely soluble	. . . . .	. . . . .	gr. $\frac{1}{2}$	gr. $\frac{3}{4}$	gr. 1
saccharated carbonate. In powders or capsules	. . . . .	. . . . .	gr. 1	gr. 3	gr. 5
soluble ferric pyrophosphate. Freely soluble	. . . . .	. . . . .	gr. 1	gr. 2	gr. 3
soluble, and quinin citrate. Freely soluble	. . . . .	. . . . .	gr. 1	gr. 2	gr. 2
solution of peptonate, or iron with manganese (N. F.)	℥v	℥x	℥xv	ʒss	ʒj
syrup of the iodid of	℥ij	℥v	℥vij	℥x	℥xx
wine of	℥j	℥ij	℥v	℥x	ʒss
bitter	℥j	℥ij	℥v	℥x	ʒss
Magnesia, milk of	ʒss	ʒj	ʒi–ij	ʒi–iij	ʒi–iv
Magnesium citrate, solution of	. . . . .	. . . . .	. . . . .	ʒij	ʒii–iv
carbonate. Insoluble	gr. 5	gr. 10	gr. 20	gr. 20–40	gr. 40–ʒj
sulphate	gr. 5–10	gr. 15	gr. 20	ʒss	ʒj
Male fern, oleoresin of	. . . . .	. . . . .	. . . . .	℥v–xv	℥x–xx
Mercury, corrosive mercuric chlorid (bichlorid). Soluble in 13 parts of water	gr. $\frac{1}{200}$	gr. $\frac{1}{200}$	gr. $\frac{1}{100}$	gr. $\frac{1}{100}$	gr. $\frac{1}{75}$
mild mercurous chlorid (calomel)	gr. $\frac{1}{10}$	gr. $\frac{1}{10}$	gr. $\frac{1}{10}$	gr. $\frac{1}{10}$	gr. $\frac{1}{10}$
with chalk	gr. $\frac{1}{4}$	gr. $\frac{1}{4}$	gr. $\frac{1}{4}$	gr. $\frac{1}{2}$	gr. $\frac{1}{2}$
Nitroglycerin, spirit of	℥ $\frac{1}{6}$	℥ $\frac{1}{4}$	℥ $\frac{1}{3}$	℥ $\frac{1}{2}$	℥j
tablet triturates	gr. $\frac{1}{400}$	gr. $\frac{1}{300}$	gr. $\frac{1}{300}$	gr. $\frac{1}{200}$	gr. $\frac{1}{100}$
Nitrous ether, spirit of (sweet spirits of nitre)	℥ii–iij	℥iii–v	℥v	℥v	℥x
Nux vomica, tincture of	℥ $\frac{1}{4}$	℥ $\frac{1}{2}$	℥j	℥i–ij	℥ii–v
Opium, camphorated tincture (paregoric)	℥ii–iij	℥v–x	℥xv	gr. 20–30	gr. 30–40
codein sulphate	gr. $\frac{1}{100}$–$\frac{1}{60}$	gr. $\frac{1}{60}$–$\frac{1}{30}$	gr. $\frac{1}{16}$	gr. $\frac{1}{10}$	gr. $\frac{1}{10}$–$\frac{1}{8}$
deodorized tincture	℥ $\frac{1}{8}$	℥ $\frac{1}{4}$–$\frac{1}{2}$	℥j	℥ij	℥ii–iij
heroin hydrochlorid	. . . . .	gr. $\frac{1}{150}$	gr. $\frac{1}{75}$	gr. $\frac{1}{40}$	gr. $\frac{1}{30}$
morphin sulphate	gr. $\frac{1}{400}$	gr. $\frac{1}{200}$	gr. $\frac{1}{40}$	gr. $\frac{1}{30}$	gr. $\frac{1}{30}$–$\frac{1}{20}$
powdered ipecac and (Dover's powder)	gr. $\frac{1}{8}$	gr. $\frac{1}{4}$–$\frac{1}{2}$	gr. 1	gr. 2	gr. 2–3
tincture of ipecac and (tincture of Dover's powder)	℥ $\frac{1}{8}$	℥ $\frac{1}{4}$–$\frac{1}{2}$	℥j	℥ij	℥ii–iij
Pelletierin tannate	. . . . .	. . . . .	. . . . .	gr. 1–2	gr. 2–3
Potassium bromid (soluble in about 1.5 parts of water)	gr. $\frac{1}{2}$–1	gr. 1–2	gr. 2–3	gr. 3–5	gr. 5–10
chlorate (soluble in 16 parts of water)	gr. $\frac{1}{2}$	gr. $\frac{3}{4}$	gr. 1	gr. 2	gr. 2–3
iodid. Freely soluble	gr. $\frac{1}{2}$–1	gr. 1	gr. 2	gr. 3	gr. 3–5
and sodium tartrate (Rochelle salts)	gr. 10–15	gr. 20	gr. 30	ʒi–ij	ʒiii–iv

Drug. (Where solubility is mentioned, water at 75° F. is understood.)	Dose.				
	Six months.	One year.	Two years.	Three years.	Five years.
Quinin sulphate	gr. ½–1	gr. 1	gr. 2	gr. 2	gr. 3
Rhubarb, aromatic syrup of	ʒss–j	ʒi–ij	ʒij	ʒiij	ʒss
mixture of, and soda	ʒss	ʒj	ʒij	ʒiij	ʒiv
Santonin in powders. Not over four doses	gr. ⅛	gr. ¼	gr. ¼	gr. ¼	gr. ½
Senna, syrup of	♏xv–ʒss	ʒss–j	ʒss–ij	ʒi–iij	ʒii–iij
Sodium bicarbonate (solubie in 12 parts of water)	gr. 1–2	gr. 2	gr. 3	gr. 4	gr. 5
bromid (soluble in about 1.7 parts of water)	gr. ½–1	gr. 1–2	gr. 2–3	gr. 3–5	gr. 5–10
citrate (soluble in 1.1 parts of water)	gr. 1–5	gr. 1–5	gr. 5–10	gr. 10	gr. 10
phosphate (soluble in 11.5 parts of water)	gr. 5–10	gr. 15	gr. 20	gr. 30	gr. 30
compound solution of (1 drop equals approximately 1 gr.)	♏v–x	♏xv	♏xx	♏xxv	♏xxx
salicylate (soluble in 0.8 part of water)	gr. ½–1	gr. 1	gr. 2	gr. 3	gr. 3–5
sulphate (soluble in 2.8 parts of water)	gr. 5–10	gr. 15	gr. 30	gr. 40	ʒj
Squills, syrup of	♏ii–iij	♏v–x	♏x–xv	♏xv–xx	♏xxx
Strophanthus, tincture of	♏ ½	♏ ¾	♏j	♏ij	♏iij
Strychnin sulphate	gr. $\frac{1}{400}$	gr. $\frac{1}{300}$	gr. $\frac{1}{200}$	gr. $\frac{1}{100}$	gr. $\frac{1}{100}$
Sulphonethylmethanum (trional)	. . . . .	. . . . .	. . . . .	. . . . .	gr. 2–5
Sulphonmethanum (sulphonal)	. . . . .	. . . . .	. . . . .	. . . . .	gr. 2–5
Terebene	. . . . .	♏ ½	♏j	♏ij	♏iij
Terpin hydrate (soluble in about 200 parts of water)	. . . . .	. . . . .	. . . . .	gr. ¼–½	gr. ½–1
elixir (N. F.)	. . . . .	. . . . .	. . . . .	♏xv–ʒss	ʒss–j
with codein (N. F.)	. . . . .	. . . . .	. . . . .	♏xv–ʒss	ʒss–j
with heroin (N. F.)	. . . . .	. . . . .	. . . . .	♏xv–ʒss	ʒss–j
Thymol	. . . . .	. . . . .	gr. 1	gr. 2	gr. 3–5
Turpentine (rectified oil of turpentine)	. . . . .	♏ ½	♏j	♏ij	♏iij
Whisky (brandy same doses)	♏v–x	♏x–xx	♏ xx–xxx	♏xx–xl	ʒss–j

Antipyretics.—These are used to reduce temperature. Study the natural history of disease, and unless the temperature is higher than it should ordinarily be in the disease which causes it, let it alone, unless attended by nervousness, restlessness, or other troublesome symptoms. A temperature of more than 104½° F., from whatever cause, should be reduced if possible.

The best antipyretic is the external application of cold. This may be done in the following ways:

Ice Bags.—These may be applied to the head, to the carotids, over the heart, and over the wrists. If there is local inflammation they may be placed over the seat of the disease. They are an efficient way of relieving the pain, especially in that caused by the congestion or inflammation of a serous membrane, as in pericarditis or pleurisy.

Cold Pack.—This is effective, and is to be preferred to the bath where the patient is weak. Place a rubber sheet on the bed; over this place an old blanket. Wet a sheet or a very large Turkish towel in water, the temperature of which may be from 70° to 90° F. Wrap the patient up in this and fold the blanket over the patient. Place cold compresses upon the head. Cold water may be poured on the sheet from time to time, or if the temperature is high, ice may be rubbed over the sheet. This may be continued from five to thirty minutes. Cold packs are useful in high, temperature, nervousness from fever or other causes, and often induce sleep.

Cold Sponge.—Place a rubber sheet on the bed and a sheet or old blanket upon this, and put the patient upon them. Sponge with water the temperature of which is from 70° to 90° F. Colder water may be used in some cases. After sponging a few minutes take the temperature to note the effect of the cold. (See Cold Baths.)

Cold Bath.—These are very useful in treating sick children, as a child can be tubbed much easier than an adult. In many cases of high fever this is the only means to control it. If the bath causes great prostration or nervousness it is better to use some other form of cold. The water may vary from 70° to 95° F., according to circumstances. It may be

used warm at first and reduced after the child is accustomed to it. This is done by adding cold water or placing a piece of ice in the tub. If the child is apprehensive, place him upon a blanket or a sheet put over the tub and allow him to sink into the water.

Take the temperature from time to time, and do not reduce too much, as the temperature continues to fall after the child is taken from the bath. If the temperature is reduced to normal in the bath, it may become subnormal afterwards and cause collapse. A reduction of 100° to 101° F. is sufficient in most instances.

After the bath, dry rapidly and wrap the child in bed. If there is great prostration, give a small dose of wine or other stimulant.

Evaporating Bath.—This is sometimes used, but has certain objections. The child is covered with a wet sheet and the water allowed to evaporate. The sheet is wet from time to time. Sometimes the patient is placed in the draft from an electric fan to facilitate evaporation.

Certain **therapeutic measures of a general nature** are very important in the treatment of disease in infancy and childhood, and these are often neglected. If the child has fever it should be kept in bed, and in all cases the child should be kept quiet and not disturbed unnecessarily; it should not have exciting games or visitors. *Rest in bed* and *quiet* are the greatest factors in curing many conditions in which there is a large nervous element. It is particularly needful in the present day. Upset conditions resulting from overwork at school, too much excitement, and too little rest are easily cured in this manner. *Fresh air* is a second factor on which too much stress cannot be laid. Care should be taken, however, to have the child adequately protected from cold if necessary. *Changes in the climate* are of great service and often utilized too late. They are of particular value in tuberculosis and protracted cases of bronchitis, bronchopneumonia, intestinal indigestion, and ileocolitis. *Massage* is useful, especially in children taking the rest cure, for keeping up

the nutrition of paralyzed limbs, chronic constipation, for stimulating nutrition in cases of marasmus and malnutrition, and other conditions too numerous to mention. *Good nursing* is of inestimable value, and a well-trained, tactful nurse is an asset in the treatment of all the severer diseases which is hard to overestimate. The nurse should be instructed to care especially for the *comfort* of the child, a point of greatest importance in the treatment of bed-ridden children. The physician and nurse should both pay careful attention to the *treatment of minor symptoms*, often of little importance when compared to the real disease, but very annoying and wearing to the patient.

Directions in regard to giving drugs and food and the use of other therapeutic measures should always be written and explained to the mother or nurse. By so doing many mistakes are avoided.

Anesthetics.—Under ordinary circumstances ether is always to be preferred. Sometimes it is advisable, if a skilled anesthetist, to administer nitrous oxid or ethyl chlorid before beginning the ether. Children do not bear nitrous oxid well, as a rule, as it is liable to cause convulsions. Ethyl chlorid requires too much care in its administration for ordinary use. Chloroform should be chosen when there is bronchitis, pneumonia, pleurisy, or diseases of the larynx. It is very dangerous and often causes sudden death in the so-called lymphatic type.

Antipyretic Drugs.—These are to be prescribed for the nervous symptoms accompanying fever rather than for the high temperature. The temperature is, as a rule, better controlled by cold. Acetanilid is depressing and should not be given to children. Antipyrin is of the greatest service, as it relieves pain and allays nervousness. It has a bitter taste, which is disguised by the syrup of orange.

℞ Antipyrin . . . . . 1 (gr. xvi);
Syrup of orange . . . . . 60 (℥ij).—M.
Sig.—A teaspoonful every two hours.

Children bear antipyrin well, and it may be given in

1-gr. doses to a child one year old, and in 2-gr. doses at three or four years. Some authors estimate the dose at $\frac{1}{6}$ gr. for each month of the child's age. This answers for young infants, but later results in too large doses. Combined with small doses of codein it is a good hypnotic, analgesic, cough sedative, and antispasmodic.

℞ Codein sulphate . . . . . 0.03 (gr. $\frac{1}{2}$);
Antipyrin . . . . . 1.0 (gr. xvi);
Syrup of orange . . . . . 60.0 (℥ij).—M.
Sig.—A teaspoonful every two hours as needed. (For a child of two years.)

The above is better than morphia for children and is one of the most useful prescriptions in pediatric practice. Antipyrin sometimes causes a scarlatiniform rash.

Phenacetin may be used. It is insoluble and is tasteless. It is best given in powders with a little sugar.

Opiates.—**Opium** and its derivatives should be used sparingly in early life; for, while they are among the most valuable drugs, they are frequently not well borne. Opium should never be used in diarrhea until the bowel is thoroughly cleansed. In the infectious forms it should always be used with *great caution*. It is used to relieve pain and to lessen the number of stools. After two or three years of age opium may be used for the same indications as in adults, but in proportionately much smaller doses. Where possible it is better to resort to other drugs. Codein is of especial value during childhood. Holt gives the following table of the initial doses of the various preparations. These may be repeated at intervals of several hours as needed:

	1 month.	3 months.	1 year.	5 years.
Paregoric	♏ 1	♏ 11	♏ v–x	♏ xxx–xl
Deodorized tincture	♏ $\frac{1}{20}$	♏ $\frac{1}{10}$	♏ $\frac{1}{4}$–$\frac{1}{20}$	♏ ij–iij
Dover's powder	gr. $\frac{1}{20}$	gr. $\frac{1}{10}$	gr. $\frac{1}{4}$–$\frac{1}{2}$	gr. ij–iij
Morphin	gr. $\frac{1}{1000}$	gr. $\frac{1}{600}$	gr. $\frac{1}{200}$	gr. $\frac{1}{30}$–$\frac{1}{20}$
Codein	gr. $\frac{1}{300}$	gr. $\frac{1}{200}$	gr. $\frac{1}{60}$	gr. $\frac{1}{10}$–$\frac{1}{8}$

Somnifacients.—**Chloral hydrate** is a very efficient drug in producing sleep and allaying spasms. Its greatest use is during or after convulsions. It may be administered by the rectum where possible or else by the mouth. It sometimes causes vomiting. 1 gr. may be given to a child of one month of age, 2 gr. at six months, 3 gr. at nine months, and 4 gr. at one year. 1 or 2 gr. often suffice even at this age and should be tried. It may be combined with bromids to great advantage.

℞ Chloral hydrate . . . . . 0.5 (gr. viii);
Sodium bromid . . . . . 1.0 (gr. xvi);
Syrup of orange . . . . . 60.0 (℥ij).—M.
Sig.—A teaspoonful at a dose as a sedative. Repeat in an hour if necessary.

For convulsions use larger doses and repeat oftener.

Urethan may be used in the same manner as chloral and in the same doses.

Veronal is a good hypnotic and may be used in doses of from 1 to 2 gr. It is best prescribed in powder and given stirred up in a spoonful of water or milk.

Trional is sometimes used in doses of 1 gr. or a little less for each year of the child's age. Prescribe in powders to be stirred into water or milk.

Sulphonal may be used in doses of from 1 to 8 gr. It takes several hours before the effect is produced.

Bromids.—These are useful in nervousness, after convulsions, and in epilepsy. Small doses often produce sleep in children. Sodium bromid is to be preferred as being less irritating than either potassium or ammonium bromid. Combinations of all three are frequently advised. Bromids are best given in essence of pepsin or in the aromatic waters, as peppermint water.

Bromipin (10 per cent. brominized sesame oil) is frequently used in epilepsy where it is to be continued for a long time. It may be given in from ½ to 1 dr. doses three or four times a day.

Stimulants.—**Alcohol.**—This is a most useful drug when given in proper-sized doses. It is also of value as a

food in long-continued fevers. It should not be given in high sthenic fevers where there is a full-bounding pulse and a flushed face.

In infants pure old whisky diluted at least eight times with water is the best. Pure brandy may be substituted. In vomiting, teaspoonful doses of iced champagne are sometimes useful. In older children sherry wine or other wines may be used if desired, or the spirits may be continued with a bitter tonic.

The dosage varies with the effect produced. The doses should be small and repeated often. Large doses may cause mental symptoms which are most undesirable. If the odor of alcohol is apparent on the breath, too much is being given. From 5 to 30 drops of whisky may be given at a dose, according to the age and condition of the child.

5 or 10 drops of gin in a little sweetened water is a good carminative in infantile colic.

The time-honored brandy-and-egg mixture of Stokes is a useful means of combining food and a stimulant. The following is the formula as modified for infants by Louis Starr:

Yolk of a raw egg; 10 drops of brandy; 1 teaspoonful of cinnamon water; 1 coffeespoonful of white sugar. Beat together into a smooth mass.

Strychnin.—This is useful as a tonic and as a stimulant. Nux vomica is much used as a bitter tonic for older children. Strychnin is best given in small doses well diluted with water. From $\frac{1}{400}$ to $\frac{1}{60}$ gr. may be given at a time, according to the age of the child. If it causes twitching it should be stopped and smaller doses given subsequently. In giving stimulants it is well to alternate whisky and strychnin at from two- to four-hour intervals. Do not stimulate too early. Do not use too large doses of stimulants. Remember, stimulation is usually overdone.

Merck's digitalin is a useful heart stimulant. It may be given in doses of from $\frac{1}{400}$ to $\frac{1}{20}$ gr., according to the age of the patient. It is non-cumulative in its action. Do not confuse this with the ordinary digitalin.

Camphor.—This is much used in Germany as a stimulant.

The dose is from $\frac{1}{6}$ to 3 gr. It is usually given hypodermatically in 10 per cent. solution in sterilized oil.

Digitalis.—This is useful in uncompensated heart disease. In aortic disease it should not be used except as the last resort. The infusion is frequently used as a diuretic.

Belladonna and Atropin.—These are both well borne in early life. They are used as stimulants sometimes, but especially to allay irritability, as in whooping-cough. They are used in enuresis. Large doses are advised in intussusception.

The dose should be small at the outset, and increased until slight flushing of the face is observed, twenty or thirty minutes after administration. Blondes require less than brunettes. Overdoses cause a red rash, dry throat, and mydriasis. Too large doses may cause delirium.

The dose of the tincture is from 1 to 10 drops; of the extract, $\frac{1}{200}$ gr. for one year, $\frac{1}{150}$ gr. for two years, $\frac{1}{100}$ gr. for three years, etc.

Atropin is best given in solution. Add 1 gr. to 2 oz. of water; each drop represents $\frac{1}{1000}$ gr., and 1 drop may be given for each year of the child's age, and the dose increased gradually. Do not prescribe strong solutions of atropin where the people are ignorant or careless.

Hyoscyamus.—Tincture dose, 1 to 5 min. This is a useful antispasmodic in cystitis, vesical spasm, and whooping cough.

℞ Tincture of hyoscyamus . . . . . 2 (ʒss);
Potassium citrate . . . . . 4 (ʒj);
Water . . . . . q. s. ad 120 (ʒiv).—M.
Sig.—Teaspoonful in water every two hours. (Two years.)

The fluid extract, dose $\frac{1}{8}$ to $\frac{1}{3}$ min., is frequently used, in chronic constipation, combined with nux vomica and other drugs.

Tonics.—The most important of these are iron, cod-liver oil, and the bitter tonics, such as nux vomica and quinin.

Cod-liver oil may be given plain in doses of $\frac{1}{2}$ a teaspoonful to a tablespoonful. Small doses are to be preferred, as they do not upset the stomach. A drop or two of oil of wintergreen added to the bottle of oil makes it more palatable for some children. Do not give cod-liver oil in very hot

weather. See that the oil is fresh. Emulsions of cod-liver oil may be used when the plain oil is not well borne.

℞ Cod-liver oil . . . . . 60.0 (℥ij);
Dry extract of malt . . . . . 15.5 (℥iv);
Calcium hypophosphite,
Sodium hypophosphite . . . . . āā 1.0 (gr. xvj);
Potassium hypophosphite . . . . . 0.5 (gr. viij);
Glycerin . . . . . 7.5 (℥ij);
Pulverized acacia . . . . . 15.0 (℥iv);
Water . . . . . q. s. ad 120.0 (℥iv).—M.
Sig.—Teaspoonful three times a day. (Louis Starr.)

Iron.—The syrup of the iodid of iron is one of the best preparations for use in childhood. From 5 to 40 drops may be given at a dose three or four times a day. The astringent iron preparations should not be used in infancy, and but little during later childhood.

The **solution of iron and manganese peptonate**, although not officinal, is an excellent way in which to prescribe iron. The dose for infants and young children is from 10 drops to a teaspoonful.

Ferrosomatose in doses of from 5 to 10 gr. may be added to milk or broths.

Reduced iron, lactated iron, and the saccharated carbonate may all be prescribed in from ½- to 2-gr. doses in powders.

The **bitter wine of iron** is frequently prescribed—it may be advantageously added to an aromatic.

Arsenic.—This is a valuable tonic in anemic and other conditions. Fowler's solution (liquor potassæ arsenitis) is most frequently used in doses of from 1 to 10 drops three times a day. Arsenious acid in doses of $\frac{1}{100}$ gr. or less is often prescribed.

Alteratives.—Mercury.—This is most frequently used as a purgative in the form of calomel. Tablet triturates, with or without bicarbonate of soda, are generally employed. It is best given in doses of $\frac{1}{10}$ gr., repeated every half hour or every hour, and followed in older children by a saline if necessary.

Mercury with chalk is often used in doses of from $\frac{1}{10}$ to 1 gr.

In syphilis **calomel** ($\frac{1}{10}$ gr.), mercury with chalk (1 gr.), or bichlorid ($\frac{1}{100}$ gr.), given three or four times a day, are most frequently used. Mercurial ointment is used externally once or twice daily.

In late syphilis, mercury and the iodid of potassium may often be advantageously combined as follows:

℞ Bichlorid of mercury . . . . . 0.03 (gr. ss);
Iodid of potassium . . . . . 4.0 (℥j);
Compound syrup of sarsaparilla . . . . 60.0 (℥ij);
Water . . . . . q. s. ad 120.0 (℥iv).—M.
Sig.—Teaspoonful in water four times a day.

Iodin.—This is of great value in late syphilis and in strumous conditions. Sodium or potassium iodid are the most frequently used preparations. The former is said to be less irritating to the stomach. They are best given in essence of pepsin. The dosage varies from 5 gr. up to 1 dr. or more.

Iodin ointment is frequently used externally.

℞ Iodin . . . . . 0.06 (gr. j);
Iodid of potassium . . . . . 4.0 (℥j);
Vaselin . . . . . 30.0 (℥j).
M. and make into an ointment.

Iodoglycerin is frequently used as an application to mucous membranes.

℞ Iodin . . . . . 0.06 (gr. j);
Iodid of potassium . . . . . 1.3 (gr. xx);
Glycerin . . . . . 30.0 (℥j).—M.

External Use.—*Potassium Chlorate.*—Dose, $\frac{1}{2}$ to 2 gr. This may be given in a saturated solution, of which each teaspoonful represents 4 gr. It should be well diluted. It is almost a specific for ulcerative stomatitis, and is useful in follicular tonsillitis. It may be given alone or combined with iron.

℞ Potassium chlorate . . . . . 1.5 (gr. xxiv);
Syrup of orange . . . . . 30.0 (℥j);
Water . . . . . q. s. ad 90.0 (℥iij).—M.
Sig.—Teaspoonful every two or three hours. (Two years), or

℞ Potassium chlorate . . . . . 1.5 (gr. xxiv);
Tincture of the chlorid of iron . . . . 2.5 (♏xxxvj);
Syrup of ginger . . . . . 15.5 (℥ss);
Water . . . . . q. s. ad 90.0 ℥iij).—M.
Sig.—A teaspoonful in water every two hours. (Louis Starr.)

Stomachics.—Aromatic and bitter tonics are often used either to excite an appetite and for their tonic effect or to allay an irritable stomach. Pepsin is frequently added to such mixtures, or they may be combined with alkalies.

℞ Tincture of nux vomica . . . . . 1.5 (♏xxiv);
Essence of pepsin (Fairchild's) . . . . 15.5 (℥iv);
Aromatic elixir . . . . . q. s. ad 90.0 (℥iij).—M.
Sig.—Teaspoonful in water three times a day.

℞ Tincture of nux vomica . . . . . 2.0 (℥ss);
Dilute hydrochloric acid . . . . . 8.0 (℥ij);
Essence of pepsin . . . . . 15.5 (℥iv);
Aromatic elixir . . . . . q. s. ad 90.0 (℥iij).—M.
Sig.—Teaspoonful in water three times a day.

The **aromatic waters**, as anise water, cinnamon water, fennel water, or peppermint water, are frequently used to allay pain in the stomach and to facilitate the expulsion of gas. The dose is from 10 min. to 1 dr. They are much used as vehicles for other drugs.

An aromatic water and an alkali are very efficacious in checking vomiting and allaying nausea, as

℞ Lime water,
Cinnamon water . . . . . āā 60 (℥ij).—M.
Sig.—A teaspoonful every fifteen or thirty minutes as needed.

Dr. Louis Starr recommends **effervescing draughts** for the same purpose, especially where there is fever, as

Solution No. 1:
℞ Citric acid . . . . . 5.5 (℥iss);
Water . . . . . 90.0 ℥iij).—M.

Solution No. 2:
℞ Potassium bicarbonate . . . . . 4.0 (℥j);
Water . . . . . 90.0 (℥iij).—M.
Sig.—Mix a teaspoonful of each in a glass and drink while it effervesces Dilute with water if desired.

Another prescription of use in chronic vomiting in infants is

℞ Solution of potassium arsenite (Fowler's soution) . . . . . 0.75 (♏xij);
Sodium bicarbonate . . . . . 1.50 (gr. xxiv);
Peppermint water . . . . . 90.0 (℥iij).—M.
Sig.—One teaspoonful three times a day.

Cerium oxalate is frequently prescribed for vomiting. The dose is from ½ to 3 gr., given in powders.

Digestants.—Pepsin.—This is frequently prescribed either in scale pepsin (dose, 1 to 2 gr.) or in solutions, as the essence of pepsin, which is given in doses of from 10 min. to 1 dr.

Taka-diastase is useful in starch indigestions. To children it is best given in solution in doses of 15 min. to 1 dr.

Cathartics.—There are a great many drugs under this head. The most useful are the following:

Castor Oil.—Dose, 1 dr. to 1 oz. Castor oil is one of the most valuable drugs we have. In almost every acute illness it is desirable to thoroughly empty the bowels at the start. Castor oil does this effectually and is not irritating to the bowel. It may be diluted with olive oil for very young infants. Ritter gives the following formula for palatable castor oil:

℞ Saccharini . . . . . 0.12 (gr. ij);
Olei menthæ piperitæ . . . . . 0.30 (gtt. v);
Alcoholis, q. s. M. fiat sol. et adde;
Olei ricini . . . . . 240. (℥viij).—M.

Calomel (see *Mercury*).—One of the most valuable cathartics, especially in cases where there is nausea and vomiting.

Magnesia.—This is frequently used. Calcined magnesia may be given in doses of ¼ of a teaspoonful. In smaller doses it is useful as an antacid.

Milk of Magnesia (Phillips).—This is useful as antacid and laxative. The dose is from 1 to 4 teaspoonfuls.

Sulphate of Magnesia (*Epsom Salts*).—This is a useful saline for older children. It may be given in doses of ½ dr. to ½ oz. The following is a valuable hospital mixture:

℞ Magnesium sulphate, q. s., to make saturated solution.
Aromatic sulphuric acid . . . . . 4.0 (ʒj);
Water . . . . . 120.0 (℥iv).—M.
Sig.—One to two teaspoonfuls in a little water. Repeat in an hour or two if necessary.

Citrate of Magnesia.—This is an effervescent solution of pleasant taste. It may be given to children in doses of from 1 tablespoonful to 1 wineglassful.

Rhubarb.—This is a useful stomachic and laxative. It is of especial value in mild diarrhea. The aromatic syrup is the best preparation for children, and can be given in doses of ½ to 1 dr. The syrup is sometimes used in similar doses. The rhubarb and soda mixture is used in doses of ½ to 2 dr.

℞ Sodium bicarbonate . . . . . 1.5 (gr. xxiv);
Aromatic syrup of rhubarb . . . . . 15.5 (℥ss);
Simple syrup . . . . . 30.0 (℥j);
Peppermint water . . . . . q. s. ad 90.0 (℥iij).—M.
Sig.—A teaspoonful at a dose. (At two years.)

Cascara Sagrada.—This is a useful laxative. The dose of the fluid extract is from 5 to 15 drops. It is often prescribed in equal parts of simple syrup and water. The aromatic extract in doses of from ½ to 1 dr. may be prescribed. Preparations of cascara are now made in palatable form by the manufacturing chemists.

Manna.—This is pleasant to taste and useful. From half to a teaspoonful may be given to the child to eat.

The following is a useful laxative for infants:

℞ Manna,
Magnesium carbonate . . . . . āā 8.0 (ʒij);
Fluid extract of senna . . . . . 15.5 (℥ss);
Simple syrup . . . . . 30.0 (℥j);
Peppermint water . . . . . q. s. ad. 90.0 (℥iij).—M.
Sig.—One teaspoonful two or three times a day. (Louis Starr.)

Senna.—This is very useful. Senna leaves may be added to stewed prunes and make a pleasant laxative. There is a confection of senna containing tamarinds and senna (dose, ½–1 dr.), and it is also one of the ingredients of compound licorice powder. The syrup of senna is usually given to children in doses of 5 drops to 1 dr.

Diuretics.—These are useful in fevers and to assist in

causing the absorption of serous effusions. Mixtures of calomel and digitalis and squills are useful in the edema due to heart disease. The infusion of digitalis is also of value in such cases.

Potassium Acetate.—Dose, 3 to 5 gr. Usually given in simple syrup or syrup of lemon and water.

Potassium Bitartrate (*Cream of Tartar*).—Dose, 1 to 10 gr.; in larger doses is laxative. Is useful in fevers as the **Imperial Drink**, which is made by pouring a pint of boiling water over a teaspoonful of cream of tartar and adding the juice of a lemon. It is given cold as a beverage.

Solution of Ammonium Acetate (*Liquor Ammonii Acetatis, Spirit of Mindererus*).—Dose, 5 drops to 1 dr. This is frequently used as a fever mixture.

Iron and Ammonium Acetate Mixture (*Basham's Mixture*).—This is frequently used as a diuretic and tonic in chronic nephritis, and where it is desirable to produce diuresis in anemic subjects. For children the dose is from ½ to 1 dr.

Diuretin (*Sodiotheobromin Salicylate*).—This is given in doses of from 2 to 10 gr. It usually produces free diuresis. It is best given in powders or capsules, followed by water.

Diaphoretics.—Sweet spirit of niter is the most frequently used diaphoretic. It is usually prescribed in doses of two minims to half a dram combined with simple syrup or some aromatic water. It is frequently used in fever mixtures.

Spirit of mindererus is also used as a diaphoretic in fever mixtures.

Expectorants and Cough Mixtures.—Ipecacuanha.—This is of great service in increasing and thinning the bronchial secretions. In small doses it forms part of many cough mixtures. The syrup is usually given in doses of 1 to 5 drops and the wine in ½- to 2-drop doses. Larger quantities produce nausea and vomiting. Teaspoonful doses repeated every fifteen minutes until vomiting occurs may be used to empty an overloaded stomach or to afford relief in bronchitis when the mucus is filling up the tubes and cannot be coughed up.

Dover's Powder is frequently used. (See *Opium.*)

Antimony and Potassium Tartrate (*Tartar Emetic*).—This is used in bronchitis and catarrhal spasm of the larynx. It is best given in tablet form in doses of $\frac{1}{200}$ to $\frac{1}{100}$ of a grain. It may be combined with an equal quantity of ipecac.

℞ Antimony and potassium tartrate . . . 0.0016 (gr. $\frac{1}{40}$);
Solution of ammonium acetate . . . . . 15.5 (℥ss);
Syrup of tolu . . . . . 30.0 (℥j);
Water . . . . . q. s. ad. 90.0 (℥iij).—M.
Sig.—One teaspoonful every three hours. (Four to six years.)

Ammonium Chlorid.—This is one of the best stimulating expectorants. About $\frac{1}{4}$ gr. may be given for each year of the child's age. It is frequently added to cough mixtures, particularly to the compound licorice mixture (brown mixture).

Senega.—This is a stimulating expectorant of especial value in the later stages of bronchitis where difficulty is experienced in raising the large quantities of secretion. The syrup is prescribed in doses of 5 to 10 min. or more and the fluid extract in doses of 1 to 5 min.

Balsam of Tolu.—This is used in the form of the syrup of tolu and makes a pleasant vehicle for other expectorants.

Squills.—This is one of the most valuable expectorants and is of especial value after the first stage of bronchitis. The syrup is most frequently used in 2- to 10-drop doses. The time-honored Jackson mixture is an efficient cough mixture for young children.

℞ Syrup of squills . . . . . 8 (℥ij);
Oil of sweet almonds . . . . . 15 (℥ss);
Mucilage of acacia . . . . . 15 (℥ss);
Syrup of tolu . . . . . q. s. ad. 120 (℥iv).—M.
Sig.—Shake well. One-half to one teaspoonful every two or three hours. (One to three years.)

The *compound syrup of squills* contains $\frac{3}{4}$ gr. of tartar emetic to each $\frac{1}{2}$ oz., and should be used with caution, if at all, for young children.

Terpin Hydrate.—Dose, 1 to 5 gr. Useful as an expectorant in bronchitis. It is frequently combined with heroin in an elixir.

Licorice.—This is used as a vehicle for quinin, the elixir being the best preparation. Combined with paregoric, ℥ij, wine of antimony, ℥j, and sweet spirits of niter, ℥ss to the pint, it is the compound licorice mixture or brown mixture frequently used for coughs, either alone or with ipecac, squills, ammonium chlorid, or senega. For children it is advisable to have it made with half the quantity of paregoric. The dose is from 10 drops to a teaspoonful. The compound licorice powder (dose 10 gr. to 1 dr.) is used as a laxative.

Creosote.—This is a most valuable drug, and is used in bronchitis, tuberculosis, bronchiectasis, pulmonary gangrene, and also as an intestinal antiseptic. It is used as an inhalation (see Inhalations) or internally. From ½ to 2 drops are given at a dose. For internal use in young children the liquid beef peptonoids with creosote is the best preparation to use. From 10 drops to 2 dr. may be given at a dose.

Creosote Carbonate (Creosotal).—This is an excellent preparation, and may be given in place of creosote. It rarely causes any disturbance of the stomach. It may be given in syrup or glycerin and wine. The dose is 1 drop for each year of the child's age up to ten.

Guaiacol.—This is useful in follicular tonsillitis. It should be combined with an equal part of glycerin and applied directly into the crypts of the tonsil by means of cotton on a very fine-pointed probe.

Guaiacol Carbonate (Duotal).—This is used in exactly the same indications as creosote. It is administered in powders or in capsules for older children. The dose is from 1 to 8 gr.

Heroin.—This is a useful cough sedative, and may be used to diminish the intensity and frequency of cough as well as to allay irritability. It is most useful in whooping-cough. It is best given in an elixir, and may be combined with terpin hydrate. From $\frac{1}{200}$ to $\frac{1}{24}$ gr. at a dose. The hydrochlorate is always prescribed when solutions are ordered. When prescribing with opium or its derivatives the aggregate should not exceed the maximum of any single one of the group.

Antacids.—This class of drugs is much used in infancy to correct hyperacidity, allay colic, and in intestinal disorders. Magnesia is useful, especially when a laxative effect is desired. (See same.)

Sodium Bicarbonate.—Dose, 1 to 10 gr. This is useful alone or combined in an aromatic water or with the aromatic syrup of rhubarb.

Aromatic Spirit of Ammonia.—Dose, 1 to 30 drops. This is a useful stimulating antacid, used with or without other alkaline drugs. It is often prescribed for colic.

Anthelmintics.—*Santonin.*—This is a specific for ascaris, and may be tried in obstinate cases of oxyuris. It is best given in doses of $\frac{1}{4}$ or $\frac{1}{2}$ gr., combined or followed by calomel. Four to six doses are usually prescribed.

Oleoresin of Male Fern.—This is the best remedy for tapeworm. It is given in $\frac{1}{2}$ dr. or 1 dr. doses, either in capsules or in an aromatic vehicle. It should be given on an empty stomach, and the intestinal tract should be previously emptied by means of an active cathartic. A cathartic should be used several hours after the male fern has been given.

℞ Oleoresin of male fern . . . . . 4 (℥j);
Mucilage of tragacanth . . . . . 15 (℥ss);
Syrup of ginger . . . . . 8 (℥ij);
Water . . . . . q. s. ad 60 (℥ij).—M.
Sig.—Two tablespoonfuls at a dose.

Pelletierin Tannate.—Dose, 2 to 4 gr. This is sold in bottles containing the adult dose, about half of which may be given to a child. The same precautions should be used as for male fern. The dose may be given in sweetened water.

Astringents and Drugs Useful in Diarrhea.—**Chalk Mixture.**—This is a useful aromatic antacid mixture containing chalk, gum acacia, syrup, and cinnamon water. A teaspoonful or two may be given at a dose. It is an excellent vehicle for bismuth.

Bismuth.—This is one of the best drugs to use in summer diarrhea.

Bismuth Subnitrate.—Dose, 5 to 30 gr. The best bismuth preparation. Give 1 or 2 dr. a day.

℞ Bismuth subnitrate . . . . . 15 (ʒss);
Chalk mixture . . . . . 90 (ʒiij).—M.
Sig.—A teaspoonful every two hours. (One year.)

Bismuth Subcarbonate.—Dose, 1 to 10 gr. More astringent than the subnitrate.

℞ Bismuth subcarbonate . . . . . 8 (ʒij);
Essence pepsin . . . . . 15 (ʒiv);
Mucilage of acacia . . . . . 15 (ʒiv);
Elixir aromatic . . . . . q. s. ad 90 (ʒiij).—M.
Sig.—Shake well. Teaspoonful every two hours.

Bismuth Salicylate.—Bismuth subgallate. Dose, 1 to 5 gr. Useful alone or in combination.

Beta-naphthol Bismuth.—Dose, 1 to 3 gr. A most powerful intestinal antiseptic. Very constipating. Is of marked value when the stools are loose and foul-smelling.

℞ Beta-naphthol bismuth,
Bismuth salicylate . . . . . āā 1.5 (gr. xxiv).—M.
Sig.—Make twelve powders. One every two hours.

Tannin.—Various tannic acid derivatives are employed internally in summer diarrhea in doses from 1 to 10 gr. Among them are tanigen, tannalbin, tannopin, and protan. They are best administered in powder form.

Antirheumatic Remedies.—These include the salicyl derivatives and similar preparations. They are used in rheumatism to relieve pain, and some of them in stomach and intestinal disorders.

Aspirin.—This is an excellent substitute for sodium salicylate, and is given in the same doses. It is best given in capsules.

Salicylic Acid.—Dose, 1 to 5 gr. This is used in the same indications as sodium salicylate. Small doses are usually well borne. Larger doses are liable to cause vomiting.

Sodium Salicylate.—Dose, 1 to 10 gr. This is generally used as an antirheumatic and to check fermentation. For

the former purpose it is given in full doses; for the latter small doses suffice. It may be given in essence of pepsin or as follows:

℞ Sodium salicylate . . . . . 4 (℥j);
Solution of ammonium acetate . . . . . 15 (℥ss);
Syrup of orange . . . . . 30 (℥j);
Water . . . . . q. s. ad 90 (℥iij).—M.
Sig.—Teaspoonful every three hours.

℞ Sodium salicylate . . . . . 1 (gr. xvi);
Syrup of ginger . . . . . 8 (℥ij);
Peppermint water . . . . . q. s. ad. 60 (℥ij).—M.
Sig.—One teaspoonful every two hours. (For a child of two years.)

Salol.—Dose, 1 to 5 gr. This is used in rheumatism, intestinal disorders, and cystitis. It decomposes in the intestine into salicylic acid and carbolic acid. Small doses are generally well borne, but larger ones are liable to cause vomiting.

℞ Salol . . . . . 1 (gr. xvi);
Aromatic elixir . . . . . 8 (℥ij);
Water . . . . . q. s. ad. 60 (℥ij).—M.
Sig.—Teaspoonful every two hours to a child of two years.

Salophen.—Dose, 1 to 5 gr. This is useful in neuralgia and rheumatism.

Salipyrin.—Dose, 1 to 5 gr; used in same indications as salophen.

Antispasmodics for Whooping-cough.—Belladonna, antipyrin, heroin, quinin, and many other drugs are used.

Bromoform.—Dose, 1 to 5 drops. Do not give over 15 or 20 drops a day. A useful but dangerous drug. Do not prescribe it for ignorant or careless people, as there is danger of poisoning from overdoses. In emulsions there is danger that the last dose will contain too much.

Urogenital Antiseptic.—Hexamethylenamin (Urotropin).—Dose, 1 to 5 gr. This is best given in water. It is very useful in all conditions in which pus is found in the urine.

To Render Urine Acid.—Monosodium phosphate, grains 1 to 5 or more in sweetened water. Benzoic acid may be used in older children, but it is liable to cause nausea.

Vasomotor Stimulant.—Ergot.—The fluidextract is used in doses of ½ to 2 drops. It is best given in simple syrup and water. It is useful in hemorrhages and in atony of the intestines.

Antimalarial Remedies.—Quinin.—Used in malaria and useful as a bitter tonic. May be given by mouth, rectum, or in extreme cases subcutaneously. Abscesses are liable to result from the last-named procedure.

Quinin Tannate.—In 1-gr. chocolate tablets. The quinin is tasteless, and the tablets are readily taken by children.

Euquinin.—Dose, 1 to 2 gr. This is also tasteless.

Syrup of cinchona alkaloids is also tasteless and pleasant to take.

Quinin Sulphate.—Dose, ⅙ gr. per month for the first year; later, from 1 to 5 gr. This may be given in warm chocolate, in syrup of yerba santa or in the elixir of licorice. It should be added to the vehicle just before taking, otherwise a bitter taste develops.

Quinin Suppositories:

℞ Quinin hydrochlorate . . . . . 0.4 (gr. vj);
Cocoa butter . . . . . 12.0 (ʒiij).—M.
Sig.—Make 12 suppositories. One every six hours.

Quinin hypodermatically (Bacelli's formula):

℞ Quinin hydrochlorate . . . . . 1.0 (gr. xv);
Sodium chlorid . . . . . 0.06 (gr. j);
Distilled water . . . . . 10.0 (ʒiiss).—M.

Remedies for the Common Skin Diseases.—Acute Eczema:

℞ Oxid of zinc . . . . . 8 (ʒij);
Prepared calamine . . . . . 12 (ʒiij);
Lime water . . . . . 250 (ℨviij).—M.
Sig.—Apply on gauze to the affected part.

℞ Oxid of zinc . . . . . 8 (ʒij);
Prepared calamine . . . . . 12 (ʒiij);
Glycerin . . . . . 30 (ℨj);
Lime water . . . . . 60 (ℨij);
Rose water . . . . . 250 (ℨviij).—M.
Sig.—Apply on gauze to the affected part. 1 per cent. carbolic acid may be added to either of the above if there is much itching.

Lassar's Paste:

℞ Salicylic acid . . . . . 0.65 (gr. x);
Oxid of zinc,
Starch . . . . . āā 8.0 (℥ij);
Vaselin . . . . . 30.0 (℥j).—M.
Sig.—Apply several times a day to the affected part.

Pick's Paste:

℞ Pulverized tragacanth . . . . . 4 (℥j);
Glycerin . . . . . 6 (℥iss);
Rose water . . . . . q. s. ad 120 (℥iv).—M.
Sig.—To this may be added various medicaments, as zinc oxid (40 gr.), tar (10 min.), or carbolic acid (5 gr.).

Tar Ointment:

℞ Ointment of liquid tar . . . . . 4 (℥j);
Ointment of zinc oxid . . . . . 30 (℥j).—M.
Sig.—External use.

Carbolic Acid Ointment:

℞ Carbolic acid . . . . . 0.3 (gr. v);
Ointment of zinc oxid . . . . . 30.0 (℥j).—M.

Dusting Powder:

℞ Zinc oxid . . . . . 30 (℥j);
Pulverized starch . . . . . 120 (℥iv).—M.

Sulphur and Salicylic Acid Ointment:

℞ Salicylic acid,
Sulphur . . . . . āā 4 (℥j);
Vaselin . . . . . 30 (℥j).—M.

Sulphur Ointment:

℞ Sulphur . . . . . 4 (℥j);
Vaselin . . . . . 30 (℥j).—M.

For Scabies:

Sulphur and Balsam of Peru Ointment:

℞ Sulphur . . . . . 4 (℥j);
Balsam of Peru . . . . . 15 (℥ss);
Vaselin . . . . . 30 (℥j).—M.

Resorcin Ointment:

℞ Resorcin . . . . . 0.65 (gr. x);
Ointment of rose water . . . . . 30.0 (℥j).—M.
Sig.—Useful in seborrhea and chronic eczema.

Parasitic Ointment.—For children the ointment of ammoniated mercury (white precipitate) is most satisfactory. It should not be applied to too large an area.

Ichthyol.—Useful in 5 to 10 per cent. ointment as an application for various skin diseases and glandular swellings.

℞ Ichthyol . . . . . 8 (℥ij);
Ether,
Glycerin . . . . . āā 15 (℥ss).—M.
Sig.—Apply with a brush.

For Local Inflammations:

℞ Acetate of lead . . . . . 2.7 (gr. xl);
Tincture of opium . . . . . 15.0 (℥ss);
Water . . . . . 250.0 (℥viij).—M.
Sig.—Apply on gauze to the affected part.

Carron Oil:

℞ Linseed oil,
Lime water . . . . . āā 120 (℥iv).—M.
Sig.—Apply to affected part.

A good substitute for carron oil:

℞ Oil of sweet almonds,
Lime water . . . . . āā 120 (℥iv).—M.
Sig.—Useful in inflammations of the rectum and chafing.

Escharotics.—Powdered burnt alum is a simple application to check the growth of granulation tissue and also as an application in stomatitis. It is best applied with a small camel's-hair pencil. Silver nitrate, generally used in the shape of a stick of lunar caustic, is useful to cauterize the ulcers in herpetic stomatitis, etc. It is quite painful.

Stomach Washing (see *Gavage*).—The procedure is the same as for gavage. The stomach is filled with tepid water, which is allowed to siphon off. This procedure is repeated until the water comes back perfectly clear. If there is mucus in the stomach it is advisable to add a teaspoonful of sodium bicarbonate to each pint of water. Boric acid is sometimes used in the same quantity where there is fermentation.

Irrigation of the Colon.—This is useful in diarrheal

diseases. The infant is laid face downward on the nurse's lap. A piece of rubber sheeting is arranged to carry the water into a slop-jar. The floor should be protected for several feet by rubber sheeting or oilcloth. A well-oiled catheter is attached to the nozzle of a fountain syringe. The catheter is introduced into the anus with a slight twisting motion. As soon as it is in the rectum the water is allowed to flow in and the catheter inserted to nearly its full length. It is desirable to have it go high up in the colon, but it frequently doubles up in the rectum. The water is allowed to flow in, and when the bowel is full it will be ejected around the catheter. This is continued until the water returns clear. Before the catheter is removed any astringent or other application, as desired, is introduced through it.

Enemata.—For the purpose of cleansing out the rectum and lower bowel, from half a pint to a pint and a half, according to the size of the child, of warm water made soapy with Castile soap may be allowed to flow into the rectum from a fountain syringe or funnel and tube. The nozzle or tube should be well oiled. The child should be face downward on the nurse's lap or bed. For infants, to stimulate the bowel to move, small rubber bulb syringes holding an ounce or two may be used to advantage. The small one-piece soft bulbs used for washing out the ear are particularly suitable for this purpose. Normal salt solution is sometimes used, and sodium bicarbonate (ʒj to Oj) if there is much mucus, and boric acid (ʒj to Oj) if there is inflammation of the bowel. Quinin solutions are used in thread worms. Small injections (ℨss to ij) of boiled starch solution, to which from ½ to 5 minims, according to age, of tincture of opium have been added, is useful in relieving tenesmus. Fluidextract of hamamelis (ʒj to ℨviij) is one of the best astringents, and may be used in the relaxed conditions of the mucous membranes common in summer diarrheas. Silver nitrate (gr. 1 to Oj) may be used in ulcerative colitis. Enemata of normal salt solution are also used to relieve thirst and supply fluid in cases of great weakness, as in marasmus, in continuous vomiting, after hemorrhage, and plain water enemata may be used in nephritis.

Hot-air Bath.—This is used to promote sweating in threatened uremia, etc. The bedclothes are raised from the child by means of a wire frame (one can be improvised by using barrel-hoops) and hot air introduced through an elbow of stovepipe. A Bunsen burner or an alcohol lamp is used to furnish the heat. The bath is continued for from ten minutes to half an hour or even longer.

Hot Pack.—This is often an efficient way of causing sweating. A rubber sheet is placed on the bed and an old blanket is laid on this. The child is wrapped in a large Turkish towel or an old blanket which has been dipped in hot water. The blanket is folded over the child, and he is allowed to remain from ten to twenty minutes.

Hot Bath.—This is often used in place of the above, the child being wrapped in blankets immediately afterwards.

Salt Bath.—Use a tablespoonful of salt to a gallon of water. This may be used hot or cold, and may follow the ordinary bath if desired. The child is kept in from five to ten minutes, with friction. It is used as a tonic in poorly nourished children.

Soda Bath.—A heaping teaspoonful of bicarbonate of soda is used to each quart of warm water. The child should remain in the bath five minutes, with little or no friction. This is useful in diseases where there is itching, as in urticaria and prickly heat.

Bran Bath.—A quart of bran is placed in a cheese-cloth bag, then immersed in the bath and squeezed about until the water becomes milky white. It is used in bathing children with irritating skin lesions and in eczemas.

Starch Bath.—Two heaping tablespoonfuls of starch are placed in the bath. It is used for exactly the same conditions as the bran bath.

Counterirritants.—Only mild counterirritants should be used in infants and children. Blisters and wet cups should not be used, and dry cups but rarely.

Camphorated Oil.—This is a mild and efficient liniment much used in bronchitis as an application to the chest.

Mustard Plaster.—For children this should be made weak;

1 part of mustard to from 1 to 6 parts of wheat flour. This is made into a smooth paste and spread between two pieces of cloth or paper. It should be left on until the skin becomes reddened, and the skin should be looked at every two or three minutes to see when this occurs. The skin should be wiped dry. The application may be repeated every few hours if desired. If the plaster is left on too long, the skin will be blistered and further application will be impossible.

Mustard Pack.—This is sometimes resorted to in cases of convulsions and in other conditions where it is desirable to bring the blood to the surface. Four tablespoonfuls of mustard flour are moistened thoroughly and stirred into about 2 gallons of hot water. A large towel is saturated with this and the body wrapped in it and then in an old blanket. As soon as the skin becomes reddened the mustard application is removed and the skin thoroughly dried.

Mustard Bath.—This is more efficient than the above, but for larger children is often not as conveniently given. Four tablespoonfuls of mustard flour are stirred up with a little water in a cup and the whole stirred into a foot-tub (about 5 gallons) of water. This should be between 101° and 105° F. The child is left in the bath from two to ten minutes, and it may be repeated if necessary.

Turpentine Stupes.—These are frequently used over the abdomen or chest. From 1 teaspoonful to 1 tablespoonful of turpentine is added to 1 quart of boiling water. A towel is dipped in this, wrung out, and applied as hot as the hand can bear (do not have it too hot); cover this with several layers of woolen cloth. Allow it to remain until the skin is thoroughly reddened.

Spice Bag.—The old-fashioned spice bag, made by sewing up in a bag 1 or 2 teaspoonfuls of each of the powdered spices, is a convenient application in colic and the milder pains of childhood. It is placed in hot water, thoroughly squeezed out, and placed upon the painful spot. It is left on until the skin is reddened.

Liniments.—Stokes's, chloroform, and other stimulating

liniments are often used; care should be taken not to blister the delicate skin of the child by too strong or too frequent applications.

Inhalations.—Various drugs are used specially in the treatment of diseases of the larynx and bronchi. The drugs to be vaporized are usually added to water and boiled either in a fruit kettle or in a small teapot. Plain lime-water is often used in bronchitis, and creosote, eucalyptol, compound tincture of benzoin, in proportion of a dram to a pint, are also of service. A few grains of menthol may be added to the last named if desired.

Nasal Sprays and Washes.—For cleansing the nose normal salt solution ($\frac{9}{10}$ of 1 per cent.), Seiler's solution, or Dobell's solution are the most frequently employed. The best method is to use a fountain syringe, having the bag one foot above the nose. The patient may be lying down, in which case the nozzle is placed in the nostril which is uppermost, and the head may be turned to the other side for the other nostril, or the child may be held in the upright position, the head somewhat forward. The child should breathe through the mouth while the nose is being sprayed. In young infants and children, where it is necessary to cleanse the throat, the fountain syringe may also be used to advantage, the child holding its head face downward over the edge of the bed. Oil sprays used in an atomizer or, in case of young infants, dropped in the nose by a medicine-dropper are of great service (see Coryza).

Subcutaneous Injection of Saline Solution.—This is of great service where the fluid content of the body has been rapidly reduced, as in some forms of diarrhea and vomiting. From 1 to 5 ounces of a 0.9 per cent. solution (a teaspoonful to a pint, roughly speaking) of sodium chlorid in sterile water may be given at a time. The injection is given with a funnel, a piece of rubber tubing, which should be interrupted by a piece of glass tubing, and an aspirating needle. Strict aseptic precautions should be used. The loose tissue about the abdomen is ordinarily the best place to give the injection, and the wound should be sealed with collodion.

Vaccine Therapy.—This is still in the experimental stage, but certain vaccines are of recognized value either in the prevention of disease or in its treatment. Stock vaccines are prepared from laboratory cultures of the organisms without reference to their source. Autogenous vaccines are prepared from the organism derived from the patient to be treated. As a general rule the autogenous vaccines are to be preferred, but in many cases stock vaccines are nearly or just as efficacious and much less expensive. The dose varies with the different organisms. The dose is generally repeated between the sixth and tenth day. If reactions follow the doses must be smaller and the longer intervals used.

Typhoid.—Stock vaccines may be used to produce an immunity, three doses being given at intervals of ten days. From 100,000,000 to 500,000,000 bacilli may be used at a dose. Injections are best given about five o'clock in the afternoon, so that if any reaction occurs it will be during sleep. Occasionally fever for twenty-four hours is noted.

Gonococcus.—This is sometimes used in chronic cases of vulvovaginitis which resist other forms of treatment. Five million may be given for the first dose, and this may be increased gradually up to 50,000,000.

Streptococcus.—In streptococcus infections, apart from scarlet fever and in erysipelas, these may be tried. The autogenous vaccine is to be preferred—the dose may vary from 2,000,000 for babies under one year of age to two or three times that amount between one and two years and from 10,000,000 to 30,000,000 for older children.

Staphylococcus.—The best results are obtained in treatment in furunculosis, acne, styes, otitis media, osteomyelitis, empyema, and infection of the various sinuses. Autogenous vaccine is to be preferred, but stock vaccines in many cases are efficient. The variety of staphylococcus should be determined or mixed vaccines may be used if this is impracticable. The dose may vary between 50,000,000 and 100,000,000, sometimes more may be given.

Meningococcus.—In widespread epidemics of cerebrospinal fever three doses have been suggested to produce immunity.

Five million has been suggested as the first dose and 1,000,000,000 for the second and 2,000,000,000 for the third. The doses may be given one week apart.

Bacillus Coli Communis.—Cystitis and pyelocystitis, resisting other methods of treatment, injections from 10,000,000 to 50,000,000 may be tried.

Tuberculin.—Koch's old tuberculin may be used in chronic localized lesions, beginning with minute doses of $\frac{1}{5000}$ milligram, and this may be very gradually increased to $\frac{1}{2000}$ or $\frac{1}{1000}$ or more. Injections should be made not closer than ten days as a rule. The temperature should be watched, and if there is a rise the dose should be diminished in size. If too much is used, latent foci may be stimulated into activity.

THE MEDICAL INSPECTION OF SCHOOL CHILDREN.

The following short notes are inserted in this book for the guidance of those who may have to examine school children, or who may be called upon to instruct teachers in such examination.

SCHOOL HYGIENE.[1]

Where it is possible a record of the physical condition for all students should be kept, showing the principal measurements and the weight, so that the development of the child may be followed. Where it is possible, notes should be made concerning the food that the child receives and the kind of a home it lives in. School physicians should have the general supervision of the hygiene of the school, and should give especial care to the lighting, heating, ventilation, drinking-water, closets or outhouses, outdoor and indoor exercise for the children, and the adjustment of the seats for the pupils. Where it is possible, they should urge school gardens. Care should be taken to guard the pupils against overpressure and fatigue, and an effort should be made to regulate the length of the school hours to the capacity of the children. It is also advisable to investigate the mental condition of the pupil.

THE EYES.

Simple tests should be taught the teacher and a vision chart supplied. The chart should not be exposed except when the tests are being made, as the pupil will otherwise become familiar with the letters, and be able to tell them from memory without actually seeing them. Each pupil should be examined separately, and the examination of each one should be made privately, and if the child is already wearing glasses the test should be made with the glasses properly adjusted. Each eye should be examined separately, the other eye being

[1] T. F. Harrington, "Child, the, and the Public School Curriculum," *Boston Medical and Surgical Journal*, September 6, 1906, p. 247.

covered with a card, and care should be used not to press upon the eye, as, if pressure is exerted, a correct test cannot be made. The chart should hang in a good light, should not be covered with glass, and should be so hung that the pupil may be twenty feet from it. The line marked twenty on the chart should be read by a normal eye at the distance of twenty feet (Snellen's Test Types). The pupil should read from the top of the card downward with each eye as far as he can, and a record be made of the result. The eyes should be tested each year at the beginning of the fall term, but the test need not be made of the children in the first grade who do not know how to read.

If a child cannot read the "twenty" line with either or both eyes, the parents should be notified of the fact, and requested to have the eyes examined by a physician who makes a specialty of the eye. It should be remembered that the child may see the test types correctly, and yet the vision may be defective. The parents should be requested to have the child examined if it complains frequently of headache during school hours, if the eye deviates from the normal position even only now and then, if the book is held nearer than twelve or fourteen inches when reading, if the face twitches, if the child habitually scowls when reading, and if the child does not make progress in studies requiring the use of the eyes, but is bright in other ways. If the eyes are habitually red or inflamed the attention of the parents should be called to this fact.

THE EARS.

Each child should be tested separately and alone as regards its hearing. The teacher may make this test, or it may be made by the school physician. The ordinary speaking voice should be heard twenty feet in a quiet room. The test should be made by having the child close the eyes and cover the ear which is not being tested with one hand. If the hearing is not equal to this test in either or both ears, the parents should be requested to have the ears examined by a competent physician. A request for such an examination should also be

made if the child has a discharge or foul odor coming from either ear or if the child complains of earache. If the child is inattentive in classes which involve the hearing a test should be made.

THE NOSE AND THROAT.

If there is a discharge from one nostril a foreign body in the nose should be suspected and an examination made. If there is a chronic discharge from the nostrils the nose should also be examined. If the discharge is not chronic, and is purulent in character, *diphtheria* may be suspected and a culture made. If there is an *eczema* about the nostrils the head should be examined for lice. If the child has repeated nose-bleed, the nose should be examined, or the parents requested to have it examined by a physician.

Adenoids should be suspected, and the parents requested to have the child examined by the family physician or a surgeon, if there are recurrent attacks of earache or difficulty in hearing, frequent colds in the head, chronic discharge from the nostrils, and mouth breathing.

If the tonsils are very large, or if the child has repeated attacks of *tonsillitis*, or if there are large cervical glands, a request may be made for an examination by the family physician with reference to the removal of the tonsils. It should be remembered that when the mouth is wide open and the tongue depressed in an examination of the throat that the tonsils may seem to be very large, when as a matter of fact they are normal or nearly so. On the other hand, it should be borne in mind that deafness and earache may be caused by the pressure of a large tonsil. It should be noted in cases of recurrent tonsillitis whether or not the tonsil is bound down to the pillars of the fauces by adhesions. These adhesions may be the cause of trouble when the tonsil is not very large.

In all acute illnesses the throat should be examined for *tonsillitis*, for the exanthems of *scarlet fever* and of *measles*, and for *diphtheria*. If diphtheria is suspected a culture should be taken.

THE TEETH.

The teeth of most school children are badly neglected. The teeth should always be inspected in a routine examination, and if they are carious the parents should be requested to have them attended to. The first molars of the permanent teeth are especially liable to be lost by decay, because they are mistaken for the milk teeth. They are cut about the sixth year, and appear just back of the temporary teeth. Diseased teeth may cause toothache, mouth-breathing, neuralgia, pain in the ear, enlarged glands in the neck, swelling of the face, difficulty in chewing, and consequently indigestion; there is also indigestion from the poisons from the pus and germs from diseased teeth. Carious teeth may be the site of absorption of bacterial poisons, which may cause very serious constitutional trouble and lowering of the vitality. Very irregular teeth should be straightened by a competent dentist. The general public is not educated in the possibilities of the correction of oral deformities.

MENTALLY DEFECTIVE CHILDREN.[1]

These form a rather large and a very important class, and provision should be made for their separate instruction. Many a defective child could be educated and made a self-supporting citizen if it could be properly cared for.

Great care should be taken to distinguish between temporary backwardness and the mentally defective children. A child may be temporarily backward from various causes, many of which are removable. The history of the child's mental and physical development before entering school is of great value, especially information concerning the age at which it began to walk, talk, etc., as the defective child usually is very much behind the average child.

There are a great many causes which may make a child lag behind the others at school. Defective sight and hearing, adenoids, any illness causing physical depression, anemia,

[1] Love, "Cerebral Physiology and the Education of Abnormal Children," *Glasgow Medical Journal*, February, 1909, pp. 90 and 242.

too little sleep, too much to do outside the school, troubles at home, lack of care, and too little food may all make the child dull or appear so. Diseases of the nervous system, as well as other diseases, should always be taken into account. A child's previous training and education should also be considered, and due allowance made for its surroundings.

Mentally defective children are usually incapable of attention for any great length of time. The attention is easily diverted, and the child is easily fatigued mentally. They do not learn easily, and have difficulty in exercising the attention, reasoning power, judgment, and will-power. Some of them memorize easily, but cannot apply what they know. It is common for the child to have attended school for several years without learning to read or cipher. They usually associate with children younger than themselves, and are often precocious sexually. They are often stubborn, excitable, and what is commonly called incorrigible. They are frequently very untidy in their habits. They usually exhibit some of the stigmata of degeneration (see same). Usually the expression denotes a low grade of intellect, the body is ungraceful and unattractive, and the movements are awkward. Some defective children are but little below the average intellect, but are morally defective. They lie, steal, are frequently destructive, and often commit other crimes. Some defective children delight in cruel acts.

NERVOUS DISEASES.

The teacher should be instructed to refer for examination all cases suggesting diseases of the nervous system. The following are points for the teacher to know:

Chorea.—A child who was previously quiet becomes very nervous and is not able to sit or stand still. There are awkward twitching movements of the muscles, and the child often drops things which it is holding. Writing and drawing are interfered with. The child is irritable, loses its temper easily, and is unable to keep its attention fixed.

Habit Spasm.—This should not be confused with the above. The habit spasm is characterized by the same move-

ment, usually a grimace, a twitching of the muscles about the eye, or a movement of some part of the body. A child with a habit spasm need not leave school.

Epilepsy.—The two forms, major and minor, should be explained. In minor epilepsy there is a temporary loss of consciousness, the child stares, stops what he is doing, the lips may become blue, and there may be some unusual movement. The child does not remember anything about this. Any senseless movement which the child makes from time to time, and which it does not remember, should lead to an examination for minor epilepsy. The major attack, with its fall, convulsion, jerking movements, cyanosis, loss of consciousness, is usually easily diagnosed. The child may injure itself in the fall, and the tongue may be bitten and the urine and feces may be passed.

Hysteria.—The convulsion of hysteria should not be confused with epilepsy. The hysterical convulsion is a noisy one, the child talks, sings, cries, makes all sorts of movements, may answer questions, and rarely hurts itself in the fall, and does not bite the tongue, and rarely passes either urine or feces.

Nervousness.—Many children are very nervous, having often a neurotic family taint, or sometimes have become so through too much work, too little exercise, worry, and a lack of sleep, food, and care. The teacher should be instructed to try to make friends with such children and to determine the cause of the nervousness, and if possible to have it removed. If the cause is not removable, such children should be carefully looked after to prevent further development of the trouble.

Paralysis.—All children with paralysis should be referred to the school physician for examination.

PHYSICAL DEFECTS.

All children with physical defects should be examined by the school physician. Children with one shoulder higher than the other and those with stooped shoulders should be looked for especially, as in many instances proper exercise

and proper desks will correct what might otherwise become an ugly deformity. Sometimes these deformities are signs of serious spinal disease. Lameness may be due to improper shoes or to disease of the bone, joints, or nerves.

SKIN DISEASES.

The teacher should be on the lookout for diseases of the skin, especially the contagious ones. *Impetigo contagiosa, scabies, favus, ringworm, head- and body-lice* are the most frequent ones, and the ones which should be excluded from school (see Skin Diseases).

OTHER SYMPTOMS.

The teacher should be instructed in regard to the following symptoms, and children with any of them should be referred to the physician for examination.

Skin Eruptions.—These may be the eruptions of the infectious diseases—scarlet fever, measles, German measles, or chicken-pox, or some infectious skin disease—and should always be investigated promptly.

Irritating Discharge from the Nose.—This may be an indication of diphtheria.

Running Nose and Eyes, especially with Drowsiness and Cough.—These symptoms should suggest measles.

Flushing of the Face.—This usually indicates that the child has fever, and he should be examined.

Cough.—A spasmodic cough may be whooping-cough; a croupy cough may mean diphtheria, a chronic cough may mean tuberculosis, and a cough which is painful may mean pneumonia or pleurisy. Usually a cough merely means a "cold"; that is, a simple bronchitis.

Vomiting.—This may be the beginning of an acute infectious disease, especially scarlet fever. Usually it means some disturbance of digestion, often caused either by too much or by improper food.

Swelling of the Face, Hands, or Legs.—This may mean serious disease of the kidneys, and should always be

promptly investigated. It may also indicate either heart or kidney disease.

Shortness of Breath.—This may mean either disease of the heart or lungs.

Swellings About the Neck.—These may be enlarged lymph-nodes, the cause of which should always be sought for by the physician. Mumps may be the cause.

Paleness.—This means anemia. If associated with emaciation it indicates some disease or disturbance of nutrition; if in a girl who is well nourished, short of breath, and who has a sort of greenish pallor, it may be chlorosis; if associated with swelling or puffiness of the face it may be an indication of heart disease or kidney disease.

Emaciation.—This may indicate malnutrition or some serious disease.

INFECTIOUS DISEASES.

The teacher and the school physician should exercise great care in watching for infectious diseases. The teacher should be instructed in the detection of these diseases. The following points will be found useful:

Scarlet Fever.—A sudden onset with vomiting, headache, sore throat, and high fever should always lead to the isolation of the child. A child coming to school with the skin peeling off, especially after an acute illness, should always be regarded as a source of danger until an examination has been made by the school physician. The same is true of a running ear.

Measles.—A combination of sore eyes and a slight dread of light, coryza, sore throat, and a cough should suggest measles. The mouth should be examined for Koplik spots.

Chicken-pox.—Small vesicles and a few pustules should suggest chicken-pox, and the black scabs of the later stage may be regarded with equal suspicion.

Diphtheria.—A mild, unrecognized case of diphtheria may be responsible for an epidemic in a school. It is important that all cases of sore throat, running of the nose, especially if the discharge is purulent, or if the upper lip is inflamed,

and of hoarseness should be investigated promptly. Any membrane in the nose or throat should lead to prompt isolation.

Whooping-cough.—A persistent spasmodic cough, cough with vomiting, and cough with ulceration of the frenum of the tongue should all be looked on with suspicion, and the case reported.

Mumps.—Any swelling at the angle of the jaw and just under the ear should be reported.

Danger from Infectious Diseases after Exposure.—The question of how long a time must elapse before there is no danger of a child developing an infectious disease after exposure is frequently asked. Also how infectious are the various communicable diseases.

Scarlet Fever.—Little danger after one week has elapsed, but ten or twelve days is a safer time to state. About half the children exposed take the disease.

Measles.—Little danger after sixteen days and practically none after twenty-two days. Almost every child exposed takes the disease.

German Measles.—Little danger after three weeks and none after six. The disease is but feebly contagious; from one-third to one-half the children exposed take the disease.

Varicella.—Little danger after seventeen days and practically none after three weeks. Almost all children exposed take the disease.

Small-pox.—Little danger after sixteen days. Almost everyone exposed takes the disease unless protected by sufficient vaccination.

Diphtheria.—Little danger after four days and practically none after one week. The susceptibility is very general.

Whooping-cough.—There is but little danger after sixteen days and perhaps none after three weeks. The susceptibility is general.

Mumps.—Little danger after four weeks. Cases are on record thirty-five days after exposure. About one-third of the children exposed to mumps contract the disease. In some epidemics the proportion is very much greater.

Typhoid Fever.—Little anxiety need be felt after three weeks have elapsed. The susceptibility is rather general.

The Return of Children to School after Infectious Diseases.—This is a question which comes up very frequently.

Scarlet Fever.—Desquamation should be completed over the entire body, the discharge from ears and nose should have entirely ceased, there should be no albuminuria, and there should be no discharging abscesses or wounds which have resulted from complications. The inflammation in the throat should be entirely well.

Measles.—The desquamation should be entirely completed, and the child should be well from the bronchitis which always accompanies measles.

German Measles.—The desquamation should be entirely completed.

Varicella.—Every scab should have separated and the child be entirely clean. Care should be taken to examine the scalp, as the crusts persist there longer than elsewhere.

Small-pox.—A week after the complete separation of every scab and after the skin has become entirely clean. All abscesses and the like should be entirely healed.

Diphtheria.—The child should be entirely well. There should be no discharges from the nose, no albuminuria, and the cultures from the nose and throat should be negative. At least two cultures should be taken at intervals of forty-eight hours. The so-called "latent" cases are a great danger in spreading the disease (see Latent Diphtheria, Myer Solis-Cohen, *Journal of the American Medical Association*, July 6, 1907, page 30).

Whooping-cough.—The spasmodic cough should have been absent at least two weeks, and a better rule is to wait until the cough has disappeared entirely.

Mumps.—At least one week should elapse after the swelling and tenderness have disappeared from the glands. In exceptional cases the patient is a source of danger much longer, but the rule given is reasonably safe.

THE MEASURING OF THE DEVELOPMENT OF THE INTELLIGENCE OF CHILDREN.

Binet and Simon have devised a scale for measuring the intelligence of children, and by the use of the scale it is easy to ascertain whether the child under examination gives results equal to the normal child of his age or whether he is advanced or retarded. Feeble-minded children may be divided into three classes: idiots, imbeciles, and morons. The idiot never reaches the plain spoken language, but is limited to the use and understanding of gesture. The imbecile understands spoken language and talks himself in varying degrees of fluency. The moron, in addition to using spoken language, is capable of learning to read and write. In Binet's scale the idiots come in group one or two, the imbeciles correspond to the ages three, four, five, six, and seven, and the morons to the ages of eight, nine, ten, eleven, and twelve. The feeble-minded child does not develop beyond this period.

Mentality of One and Two Years.

1. Eye follows light.
2. Block placed in hand is grasped and handled.
3. Candy is chosen instead of block.
4. Paper is removed from candy before eating, the child having seen the wrapping.
5. Child executes simple commands and imitates simple movements.

Three Years.

6. Shows nose, eyes, and mouth.
7. Repeats two digits, as 2–4.
8. Enumerates objects in a picture.
9. Gives family name.
10. Repeats a sentence of six syllables without error.

Four Years.

11. Names his sex, as boy or girl.
12. Names small objects, as key, knife, and penny.

13. Repeats three numerals, as 5–2–8.

14. Can tell which is the longer of two lines drawn parallel an inch apart and one-third of an inch difference in length.

15. Knows family name. Occasional failure in this.

Five Years.

16. Tells which is heavier of two blocks of wood of equal size and appearance, one weighted.

17. Can copy a square.

18. Can repeat an easy sentence of ten syllables.

19. Can count four pennies.

20. Can rearrange a rectangular card that has been cut diagonally into two triangles. Ask the child to make a figure like the uncut card. One child in twelve fails.

21. Knows whether it is morning or afternoon. Remember that certain children will always answer the last of two alternatives. If it is morning, put the question "Is it morning or afternoon?"

22. Executes three commissions, given simultaneously, as, Take this key, put it on that chair, then shut the door. After that bring me the box that is on the chair.

23. Can show right hand and left ear. Say "Show me your right hand," and when this is done, "Show me your left ear." At four, no child points to the left ear. At five, half the children make a mistake. At six, all succeed.

24. Distinguishes pretty from distinctly ugly or deformed faces in a picture. At six, all choose correctly. At five, about half.

Seven Years.

25. Counts thirteen. They should be placed in a row and counted with the finger. The finger must touch the piece at the same time that the child names the number, and no piece should be counted twice and none omitted.

26. Describes pictures. Binet used three pictures. The first is a man and a boy drawing a cart loaded with furniture. The second, a woman and a man sitting on a bench in the

park. The third, a man in prison looking out of the window, a couch, chairs, and tables. The child of three names the things. The child of seven describes what is going on.

27. Notes omission of nose, mouth, or arms from sketches.

28. Draws diamond shape from copies so that it can be recognized.

29. Names four colors. Use red, green, blue, and yellow papers in pieces of about one to two inches. Touch the color with the finger and ask, "What is this color?" It should be done in six seconds.

Eight Years.

30. Compares two things from memory, as "What is the difference between a butterfly and a fly?" A glass, paper, and cloth? At least two out of three should be answered correctly. If it takes over two minutes it is a failure. At six, one-third of the children do this test. At seven, nearly all, and at eight, all.

31. Can count backward from twenty to one. This should be done in twenty seconds with not more than one mistake.

32. Names the days of the week in order in ten seconds.

33. Can count the value of six stamps, three ones and three twos, in less than fifteen seconds. Arrange these in order, one, one, one, two, two, two, and ask how much are they worth or how much will it take to buy them?

34. Repeats five numerals in order when pronounced once, as 3–7–2–5–4. About 25 per cent. fail.

Nine Years.

35. Can give correct change, play store, using real money. The child should be storekeeper with cash consisting of twenty-five pennies, five nickles, and two dimes. One buys something that costs seven cents. The child should return eighteen cents in change as well as say it. At seven none do this, at eight one-third succeed, at nine all do it.

36. Defines the objects fork, table, heat, horse, mamma in other words than the statement of their use.

37. Names the day of the week, the month, the day of the month, and the year. If the child gets within three days of the day of the month it has passed.

38. Can name the months of the year. Recite them in order within fifteen seconds. One omission or transposition is allowed.

39. Arrange in order and weight boxes of the same size and appearance, weighing 6, 9, 12, 15, and 18 grams. This can be done in two minutes in two out of three trials.

Ten Years.

40. Can name nine pieces of money, as cent, nickle, dime, quarter, half dollar, two, five- and ten-dollar bills. This should be done in forty seconds. The pieces should be placed on a table in a row, but not in the order of value, and should be named when pointed to.

41. Can copy simple design from memory after ten seconds' exposure.

42. Can repeat six numerals, as 8–5–4–7–2–6. Can tell what one should do in various emergencies. Ask, for example, "What would you do if you missed a train?" Correct answer is, "Wait for another train or take the next." Incorrect answers: "I would try not to miss it, run after it, buy a ticket." "What would you do if one of your playmates should hit you without wanting to do so?" Correct answer, "Do nothing to him, excuse him, pardon him, tell him to be more careful another time." Incorrect answer: "Tell the teacher or punish him." "What would you do if you broke something belonging to some one else?" Correct answer is, "Pay for it. Ask to be excused. Replace it. Confess it." Incorrect answers to this are generally unintelligible. The test is considered passed if two of the three questions are answered satisfactorily.

43. Uses three given words in two given sentences, as Baltimore, money, and river. One minute should be allowed. At eight none succeed, at nine one-third, and at ten one-half. The question should be answered either in a single idea involving the three words or ideas involving conjunction not

in three separate sentences. This test shows the distinction between intelligence and judgment. Some children give a complete sentence with three words, but without sense to it.

Eleven Years.

44. Detects nonsense in three out of five statements in two minutes. The statement should be made to the child, "I am going to give you some sentences in which there is some nonsense and you listen carefully and tell me what it is. Binet uses the following:

1. A bicyclist fell and broke his neck and died on the spot. He was taken to the hospital and they fear very much that he cannot get over it.

2. I have three brothers, John, Jim, and myself.

3. Yesterday the police found the body of a young girl cut into eighteen pieces. They believe that she killed herself.

4. Yesterday there was a railroad accident, but it was not serious. The number of deaths was only 48.

5. Some one said if, in a moment of despair, I should commit suicide I should not choose Friday, because Friday is an unlucky day and it would bring me ill luck.

6. A man was about to be hanged, and said this will teach me a lesson how to behave in the future.

About two minutes should be taken for this test. At least three of the questions should receive satisfactory answers. At nine the child rarely answers correctly, at ten about one-fourth, and at eleven about one-half.

45. Uses three words in a sentence the same as under ten years of age. At eleven all succeed.

46. Can say as many as sixty words in three minutes, as board, chair, table, draw, wagon.

47. Can name three words that rhyme in one minute. Can use a simple word, as day, spring, mill.

48. Can arrange eight words correctly. Three simple sentences of eight words should be given. The words should be printed.

Twelve Years.

49. Can repeat seven numerals in order when heard once. Give three trials. One success is sufficient.

50. Can give abstract definitions, as of charity, justice, goodness.

51. Can repeat a sentence of twenty-six syllables, as, The other day I saw on the street a pretty young dog. Little Morris has got spots on his apron.

52. Rejects suggestions as to the length of lines. Make a booklet of six pages. On the first page draw two horizontal lines in ink. The one to the left 2 inches long, the one on the right $2\frac{1}{2}$ inches. On the second page the one to the left is $2\frac{1}{2}$ and on the right 3 inches. On the third the left line is 3 and the right $3\frac{1}{2}$ inches. On the three remaining pages all lines are $3\frac{1}{2}$ inches long. When the child has found the right line longer three times in succession, will he continue to make this judgment even when he comes to those that are alike or will he reject suggestions and pronounce them alike? For the first two pages ask which is the longest line. For the others say merely, "And there?"

53. Gives the correct inference from a problem of various facts, as What is it? A man was walking in the woods near Baltimore, and suddenly stopped very much frightened, and then ran to the police station to tell them that he had just seen hanging from the limb of a tree a . . . . My neighbor has just received some peculiar visits. There came one after another a doctor, a lawyer, and a minister. What is going on at my neighbor's? Such answers as a dead person is hanging, my neighbor is dying, are correct.

Fifteen Years.

54. Writes correctly the opposite of seventeen out of twenty given words. Use such words as good, outside, tall, quick, loud.

55. Can imagine the hands of a clock at any given hour transposed and tell what time it would then be.

56. Can interpret pictures, in addition to enumerating and describing the objects in them.

Over Fifteen Years.

57. Distinguishes between abstract terms of similar sound and meaning, such as pleasure, welfare, event, and prevent.

58. Can give the difference between the president of a republic and a king.

59. Can imagine and draw the new form produced by joining transposed pieces of a diagonally divided rectangular card.

60. Imagines and draws the result of cutting triangular forms of twice-folded paper. Fold a square paper twice, allowing the person to see it done, and then cut a small equilateral triangle with its base on the middle of the closed edge. Have the person draw the paper as it will look when unfolded.

61. Can give the central thought of a selection read to him. For this purpose the following is used: "Many opinions have been given on the value of life. Some call it good; others call it bad. It would be more just to say that it is mediocre; but on the one hand, our happiness is never so great as we would have it and, on the other hand, our misfortunes are never so great as others would have them. It is this mediocricity of life which prevents it from being radically unjust."

This method of testing the intelligence of children is very valuable, particularly for determining what should be done in regard to a child's schooling. The test is not as simple as it looks, and accurate results can only be obtained after considerable practice. The child should be examined alone, and should not be criticized or instructed at the time of the examination. The results of the examination should be recorded at the time made. A child has the intelligence at that age all the tests that he succeeds in passing. After determining the age for which a child passes all the tests a year is added to the intelligence age if he has succeeded in passing five additional tests belonging to superior age groups. Two

years are added if he has passed ten such tests, three years if he has passed fifteen, etc. Thus, a child passed five tests for the seventh year, and also three for the eighth and two for the ninth, add one year for the five tests. These tests are for average children. Those from the better-class homes will generally show a higher intellectual development. The same examination should not be made too frequently, and the child should not be coached in giving correct answers. It must be remembered that this scale is one which must be used with common sense, and the examination must be made in accordance with certain restrictions, and where it is to be used Binet and Simon's original work may be consulted to great advantage.[1]

[1] "A Method of Measuring the Development of the Intelligence of Young Children," Binet and Simon, translated by Clara Harrison Town, published by the Courier Co., Lincoln, Ill.; "A Syllabus for the Clinical Examination of Children," by Huey, published by Warwick and York, Baltimore, Md.; "Manual of Mental and Physical Tests," by Whipple, published by Warwick and York, Baltimore, Md.; "The Conservation of the Child," by Arthur Holmes, Lippincott Company, Philadelphia, Pa.

It should be remembered that in early examination the child may not answer because it is frightened, or it may voluntarily remain mute and motionless, especially children of three and four. A too hasty conclusion should not be formed as to the child's mental condition, and it should be remembered that at best the estimate is only approximate. The child may show a retardation in its development, but this is not to be taken as an evidence of feeblemindedness, unless there is a retardation of three years or of two years for the child under nine, and due allowance must be made for the advantages which a child may or may not have had. It may be remembered that enumeration of objects normal to about three years of age, that about seven the child begins to describe objects, while interpretation of pictures or events generally is not noted until about fifteen.

SAMPLE PAMPHLET OF INFORMATION FOR DISTRIBUTION AMONG THE POOR IN SUMMER.

Nurse the baby, mother's milk is the best of all foods.

Do not wean the baby in hot weather.

Remember that ten bottle babies die to one that is breast-fed.

One-third of the deaths of infants and young children occur during the hot summer months.

Heat kills the baby chiefly by spoiling the milk given it.

Nurse the baby regularly, not oftener than two hours during the day and four hours at night. After three months of age do not nurse oftener than every three hours. No night feedings are necessary after five months.

Do not nurse the baby every time it cries.

If you cannot nurse your baby, consult your doctor before giving it the bottle.

Fresh Air.—Give the baby fresh air day and night.

Keep the windows open all day and all night.

Keep the baby out of doors as much as you can.

The out-door air is better for the baby than that of the house.

The air in the squares and parks is better than that of the streets.

Keep the rooms clean.

Do not let garbage, slop, or dirty clothes stand about the room.

Sleep.—Do not let the baby sleep in the same bed with any other person.

Keep the baby quiet, and let it sleep as much as it will.

Do not handle the baby too much ; let it alone.

Bathing.—Bathe the baby every day.

In very hot weather sponge the baby several times a day to keep it clean and cool.

Wash the baby whenever the diapers are changed.

Clothing.—The baby feels the heat as much or more than you.

In hot weather take off most of the baby's clothing.

If it becomes cold the clothing can easily be put back.

If the baby has fever, take some of the clothing off, but do not put more on. A baby with fever will not catch cold.

Diapers.—Wash the diaper as soon as it is soiled, and dry in the open air.

Do not use a diaper a second time before washing it.

Water.—In hot weather the baby needs a little more water and not so much food.

Give a few teaspoonfuls of pure, boiled water several times a day.

Summer diarrhea is caused by spoiled milk or other food, bad air, dirt, and too much clothing, too much handling, too little sleep, too little water.

If the baby vomits or has loose bowels, stop all food and give plain, boiled water until you have seen your doctor.

Do not drug the baby. If your baby is sick send for a doctor or take it to a hospital or dispensary.

Do not ask your neighbor's advice about your baby, ask your doctor.

The Bottle-fed Baby.—*The Bottles.*—Use a common round-bottomed bottle; boil or scald it each time before putting the baby's milk in it.

The Nipples.—Use plain black-rubber nipples. Boil them once a day. Wash the nipples before and after each feeding. When not in use, keep the nipples in a covered glass filled with water in which you have put a pinch of baking soda or borax.

Never use a nipple with a tube to it.

The Milk.—Get only the best milk for the baby. Better pay more for milk and save doctor's bills and possibly funeral expenses. It costs less to buy a baby good milk for a year than to bury it.

The best milk is bottled at the dairy and delivered in bottles. Milk sold from the can is apt to be dirty and unfit for use. Milk in summer from an open can in a shop is never fit to give a baby.

Milk from a herd is better than milk from one cow.

To Keep Milk.—Take it in as soon as delivered. As

soon as possible mix the baby's milk. Place this in clean bottles and stopper with raw cotton.

Keep the milk cold—on ice if possible. If you have no ice, wrap a cloth wrung out in cold water about the bottles.

If you have difficulty in keeping milk, bring it to a boil as soon as it is delivered to you.

Keep the things for the baby's milk separate.

Keep the things clean.

Scald them with boiling water before using.

Milk will spoil
- if it is not kept cold;
- if it is not kept covered;
- if it is dirty;
- if it has been put in dirty bottles or cans;
- if it is measured in dirty cans;
- if it gets dust in it.

DIRECTIONS TO MOTHERS OF MENTALLY DEFECTIVE CHILDREN.

The improvement will be slow, and no one can tell how much it will be, but much of it will depend on teaching.

The child should have as much out-door life as possible, and should have the food and clothing looked after.

Teach the child to do some simple thing, and then when he can do that, something else.

Do not try to teach too much at one time, nor too difficult things.

Eventually aim to teach the child to dress and undress itself, to keep itself clean, to control the bladder and bowels, to avoid disagreeable habits of all kinds.

Give the child simple toys, as blocks of different shapes, sizes, and colors, and later various kindergarten games.

Encourage as much as possible, and don't let other children tease or discourage the child.

Remember not to lose your temper with the child.

If possible, get a teacher of the feeble-minded to tell you how to train and educate the child.

Remember that all of these things require the greatest amount of patience.

An Inexpensive Home-made Refrigerator.—Dr. Alfred Hess, of New York (*Journal of the American Medical Association*, July 25, 1908, p. 317), has devised an efficient and

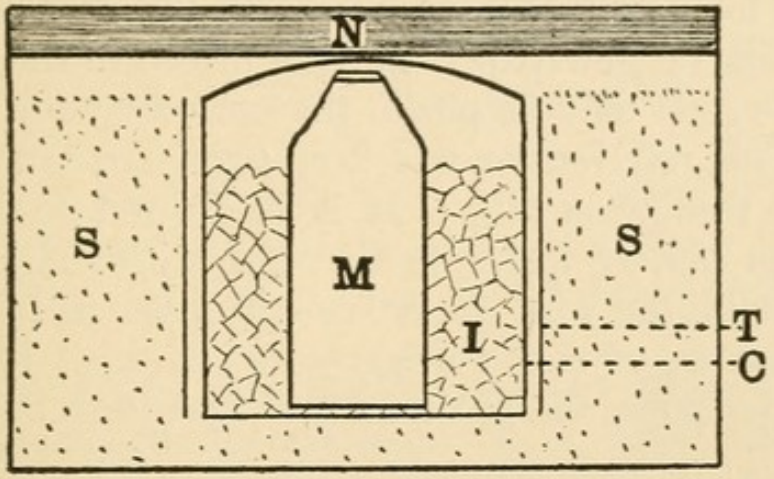


FIG. 175.—Vertical section of home-made milk refrigerator: S, sawdust, excelsior, or other cheap non-conductor of heat; T, cylinder of tin or galvanized iron; C, can in which is placed the milk-jar, M, surrounded by broken ice, I; N, newspapers nailed to lid of case. (Hess, in *Journal of American Medical Association*.)

cheap refrigerator, which may be made as follows: An ordinary packing case, measuring at least 13 x 18 x 11 inches, should have a substantial layer of sawdust placed in the

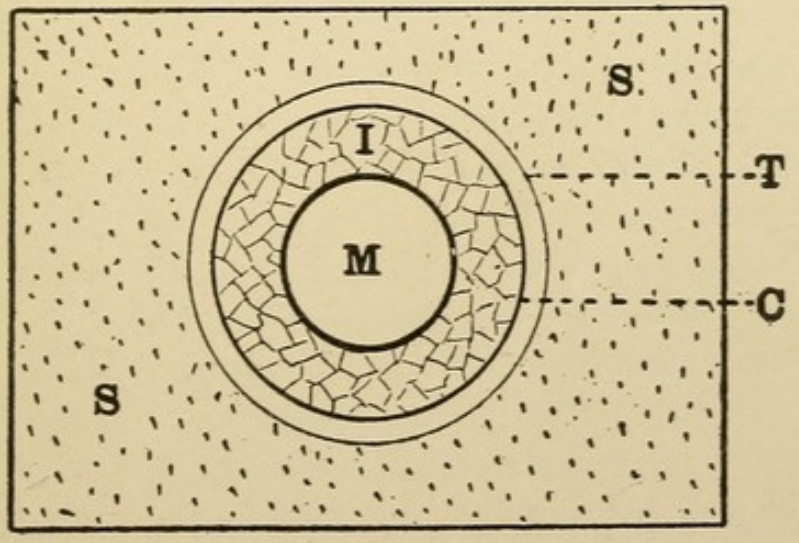


FIG. 176.—Horizontal section of home-made milk refrigerator: M, milk container; I, broken ice; C, can for holding ice; T, tin or galvanized iron cylinder to prevent sawdust, S, from falling into space when can is removed for purpose of emptying water. (Hess, in *Journal of American Medical Association*.)

bottom. On this set a tin can, eight inches in diameter, and tall enough to hold a quart milk bottle, and around this place

a cylinder of tin a little larger in diameter than the can. The cylinder is then surrounded by sawdust, the lid of the can is left free, and the ice-box is completed by nailing about fifty layers of newspapers to the lid of the case. Excelsior may be substituted for sawdust if desired. If the case is shallow, several layers of newspapers may be placed in the bottom of it. A little soda may be put in the can every day to prevent rusting. This refrigerator will keep two quart bottles or four eight-ounce feeding-bottles. If it is desired to keep more bottles, a tin can, $8\frac{3}{4}$ inches in diameter, with a slightly larger case, will hold the wire frame usually used as a bottle-container. The use of such refrigerators is a great help in the homes of the poor, and the total cost is only from 25 to 50 cents.

PEDIATRIC LITERATURE.

It is important that the student know how to use the information which has been collected by others and which is preserved in medical literature. Nowadays there is in almost every medical center one or more well-equipped medical libraries. In most of these there are trained librarians who can assist the student in finding just what he wants. It frequently happens, however, that the student is thrown on his own resources, and the following hints may be of value how to proceed in looking up the literature on any given topic.

To find the older literature consult the *Index Catalogue of the Surgeon-General's Library.* This work was begun in 1880, and the first series, in sixteen volumes, completed in 1895. In 1896 the second series was started, and up to date (1907) ten volumes have been issued. This valuable work will be found in every good working library. It contains a very complete list of books and monographs, as well as numerous references to journal articles.

To find the more recent literature, there are several methods of procedure. One of the quickest is to consult some known article which contains a list of references. In most instances the articles referred to in the footnotes of this manual contain more or less complete bibliographies. By referring to the journals mentioned other references will usually be found. The most certain method is to use the *Index Medicus.* This is a publication which gives a classified list of all medical publications, and is of the greatest value. It was published by the United States Government, from the Surgeon-General's Library, from 1879 until April, 1899. Congress failed to make an appropriation for it, and the publication ceased. In 1900 the French undertook a work on similar lines—*Bibliographia Medica.* Three volumes of this were issued. The Carnegie Institution started a second series of the *Index Medicus* in 1903, and the French journal was discontinued. The *Bibliographia Medica* is arranged in the same way as the *Index Medicus,* and a knowledge of

French is not absolutely essential to enable one to find the references. It is not, however, very complete in American journal articles.

The *Index Medicus* has a very complete index for the bound volumes, both of subjects and of authors. By making a list of references in each volume a complete bibliography of any subject may easily be prepared. The current numbers are not indexed separately, but the subjects are so classified as to facilitate finding all the articles mentioned.

Information on any topic may be quickly and easily found by consulting the various text-books and monographs, especially the larger works on pediatrics. Of these latter there is one in English, Keating's *Cyclopedia of the Diseases of Children*, in five volumes. There is a very complete work in German in a number of volumes—Gerhardt's *Handbuch der Kinderheilkunde.* In French there is the excellent five-volume *Traité des maladies des enfants*, edited by Grancher and Comby, the second edition of which has just been issued. The work of Barthez and Sannée is a perfect treasure-house of information, but is available only to those who read French.

The more important journals on the diseases of children are *The Archives of Pediatrics* and *Pediatrics*, in America; *The British Journal of Diseases of Children*, in England; *Archiv für Kinderheilkunde, Jahrbuch für Kinderheilkunde, Centralblatt für Kinderheilkunde, Monatschrift für Kinderheilkunde*, and *Der Kinderarzt*, printed in German; *Archives de medecine des enfants* and *Journal de clinique et de thérapeutique infantile*, in French; and *La Pediatria*, in Italian.

INDEX.

Musser and Kelly on Treatment

A Handbook of Practical Treatment. By 82 eminent specialists. Edited by JOHN H. MUSSER, M. D., and A .O. J. KELLY, M. D., University of Pennsylvania. Three octavo volumes, averaging 950 pages each, illustrated. Per volume: Cloth, $6.00 net; Half Morocco, $7.50 net.

THE TREATMENT THAT IS ALL TREATMENT

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