PART VI
THE TOXIC AND CONSTITUTIONAL DISEASES

CHAPTER XXVII

GOUT AND RHEUMATISM

GENERAL DISCUSSION

Recent studies have thrown the old names, always unsatisfactory, into still greater confusion. The muscles and joints are subject to the adverse influence of several different factors, which may act singly or in various combinations in any given case.

The terms "gout" and "gouty" should be limited to those states in which the presence of excessive amounts of uric acid (monosodium urate) is an important factor in pathogenesis.

The term "rheumatism" or "rheumatic" should be limited to those states in which the streptococcus rheumaticus, or other infectious agents, or bacterial or other toxins, are responsible for the symptoms. Septic foci, tonsillitis, pyorrhea alveolaris, with their secondary infections, gonorrhea, latent infections anywhere in the body, are to be considered in these diseases.

There are other muscular and arthritic states in which the senile connective tissue hardening seems to be the only causative agent; others in which nervous disturbances alone appear responsible; while in another large group of cases the cause seems to be the bony lesion, affecting the joint either directly, or indirectly through its nerve or blood supply. This appears to be the case in lumbago, pleurodynia and cephalodynia, especially. (q. v.)

GOUT

(Podagra, gout of the foot; chiragra, gout of the hand; gonagra, gout of the knee)

Gout is a nutritional disorder of unknown pathogenesis, associated with an excess of uric acid (monosodium urate) in the blood and tissues, and manifested clinically by periodic attacks of acute arthritis, usually of the metatarso-phalangeal joint of the right great toe, certain visceral disturbances, and deformity of the joints attacked.

Etiology. Heredity is a considerable factor. It develops in the grandchildren, usually the males, and occurs chiefly in middle or

later life. Habitual indulgence in heavy or sweet wines and heavy malt liquors, excessive eating, particularly of nitrogenous food, with sedentary habits, are the common causes; defective hygiene, and sometimes deficient food, may cause "poor man's gout."

Chronic lead poisoning is often accompanied by gouty symptoms. In the predisposed, worry, emotion, or a trivial injury may determine an attack. Disturbances of protein metabolism, not yet understood, interfere with the purin balance, cause increased uric acid in the blood and other factors which produce the symptoms. Subluxation of the bones of the foot, notably the astragalus, or of the bones of any other part affected, together with subluxations in the spinal area from which the nerve supply comes, are factors in etiology.

The pathogenesis is uncertain. Uric acid is found in excess in the blood, in the gouty joint, and in the exuded serum of gouty arthritis.

The morbid changes are outlined as follows (taking the great toe as a type): Fine crystalline needles are deposited in the interstitial parts of the cartilage and in the synovial fluid. The synovial membrane, cartilages, and ligaments become covered with a chalk-like deposit of urates. The tissues underneath are more or less necrosed.

The cartilages may be eroded and the synovial membranes thickened, ends of the bones are enlarged and the joints deformed. Nodular masses appear around the joints consisting of urates plus calcium phosphate—the chalk-stones or tophi of gout. These may ulcerate through the skin. They appear in other structures than joints, as the lobes of the ears, tendinous aponeurosis of muscles, and in many other places.

Several types of gout are recognized, according to the effects produced by what seems to be a common metabolic disturbance.

Acute gout may occur as a single attack, or may recur at intervals, varying with the habits of the individual, precipitated by overindulgence in any of the dietetic errors mentioned in etiology, by emotional storms or trauma. Acute attacks occur during the course of chronic gout.

There are usually premonitory symptoms consisting of dizziness, mental depression, flatulence, irritability of temper, and scanty, high-colored urine. The attack most commonly commences after midnight with severe pain in the big toe, usually the right, the pain increasing to acute agony. The patient may or may not become feverish, to 102° F. The joint is first a bright red and exquisitely painful; later is swollen, of a dusky red color, and with distended venules. The swelling extends for some distance from the joint. Sudden spasmodic muscular contractions increase the agony. Toward morning the symptoms subside. This may be repeated several times. During the attack, the patient is usually most irritable; the tongue is furred, the breath offensive, and the bowels constipated. An attack lasts from five to eight days, the severity of the symptoms gradually abating.

The skin of the joint desquamates in thick flakes after the attack. Subsequent attacks may affect the joint first implicated, or a number of joints may become involved. If the attacks are fairly frequent, they cause the so-called chronic gout.

Chronic Gout (gouty arthritis). The small joints of the toes and fingers are affected. The fingers are stiff, swollen, flexed, or extended, sometimes deflected toward the ulnar side. Tophi may form in the joints, the bursæ or in the cartilages of the ears. Constitutional symptoms are present but milder than in the acute form. The kidneys are affected.

Suppressed or Retrocedent Gout is a condition in which the development of internal symptoms coincides with rapid disappearance of the joint signs.

The symptoms may be either gastro-intestinal, with nausea and vomiting, much severe pain, usually diarrhea and great, even fatal, prostration; pulmonary, as asthma, dyspnea; cardiac, with dyspnea, pain, arrhythmia, pericarditis, syncope; or cerebral, as headache and delirium which are probably uremic. Any of the smaller joints may become affected. Later, renal complications include deposits of urates, and interstitial nephritis. Arteriosclerosis is a common accompaniment. Uremia, pleurisy, pericarditis, peritonitis, and meningitis are common terminal affections.

Irregular Gout. (Lithiasis; uric acid diathesis; lithemia; lithemic state; uricemia; American gout.) Lithemia is a condition in which the fluids of the body contain an excess of nitrogenized wastes in the form of uric acid or related compounds, occurring in persons not suffering from articular gout and manifested by various digestive, nervous, and circulatory phenomena, muscular and articular pains, and scanty, high-colored urine.

The symptoms referred to the digestive system include esophageal spasm, gastralgia or gastritis; colic or enteritis; hepatic diseases or "bilious" attacks with furred tongue, foul breath, constipated bowels, and torpid liver. Circulatory phenomena are palpitation, arrhythmia, cardialgia or angina pectoris, dyspnea, syncope. The blood pressure is high, the vessel walls are stiff, and renal changes are found. Respiratory symptoms resemble bronchitis or asthma. Nervous phenomena are varied and include headache, neuritis, neuralgia, meningitis, and symptoms of cerebral congestion. Skin affections as eczema, urticaria, erythema multiforme, etc., may occur. Iritis, glaucoma, retinitis, and suppurative panopthalmitis have occurred. Urinary disturbances include gouty glycosuria, oxaluria, calculi and urethritis.

The **complications** are chronic interstitial nephritis, chronic bronchitis, hepatic enlargement, arteriosclerosis, leading to apoplexy, cardiac hypertrophy leading to dilatation.

All forms of gout are characterized by certain common factors. The **blood pressure** is always increased. The **blood** shows no common factors, but there is usually slight leucocytosis. The granular leucocytes show the effects of some destructive influence, in fragmented nuclei, vacuolated protoplasm, atypical staining reactions, and ragged cellular outlines.

The **urine** is characteristic. Before and during an acute attack the quantity is diminished; color high; acid reaction; specific gravity above normal; urea is not much altered; uric acid is diminished during the paroxysm; phosphates are nearly always diminished; albumin is present in a very small amount. The sediment contains hyaline and granular casts, renal cells and altered blood cells free or adherent to the casts.

Before and after recovery from the attack the quantity is normal or increased; the normal solids are usually increased; uric acid and urates are greatly increased, while evidence of more or less renal irritation persists.

Treatment. During the intervals the treatment should be devoted to securing better circulation through the liver especially; to the removal of lesions wherever found; to securing increased mobility of the spinal column; and to the correction of hip, innominate and lumbar lesions particularly. Bony lesions of the foot are frequent, and predispose to the usual location in the toe.

During the acute stage the intense pain can be relieved by careful manipulation of the joint itself, freeing the circulation around it. It is better to begin at the hip, working down to the affected joint. The joint is carefully stretched by tension and a careful side to side motion if in the great toe. Hot fomentations may be used. The limb should be at rest and elevated.

Restrict diet to milk and barley water during the attack and make the patient use plenty of water. The mineral waters are of no special use except for the water content. Lemon juice is a very good addition to increase the quantity of water taken.

As soon as the patient is over the attack, write out a regulated diet list consisting of a moderate amount of nitrogenous food without excess of carbohydrates, using plenty of dairy products, eggs, fats, green vegetables, fresh fruits except strawberries and bananas, and avoiding foods rich in nucleins, tea, coffee, and alcohol. Restrict the use of common salt. All rich foods of any kind are to be avoided. Meals must be regular. Water must be freely used, preferably between meals. Exercise should be regular and in the open air, walking and golf are advisable. Rides are good if walking is painful. In the robust, cold baths may be taken each morning; the warm evening bath is more beneficial for weaker patients. Friction should follow the bath. The clothing must be warm. Residence in a warm climate is often advisable.

After the acute attack subsides, gentle friction and passive movements for the affected joint promote recovery.

Prognosis. Acute gout is rarely fatal but is prone to recur. Chronic gout has a less favorable outlook, as the renal, arterial, and cardiac complications shorten life. Acute diseases and injuries arising during its course are more serious than under other circumstances. Suppressed gout may be fatal at any time.

MUSCULAR RHEUMATISM

(Myalgia, myositis, fibrositis)

Muscular rheumatism is an inflammatory affection of the voluntary muscles and their fibrous attachments, marked by pain, tenderness, and stiffness of the affected muscle.

Etiology. Muscular overstrain and exposure to cold and damp, bony lesions affecting the vaso-motor or sensory nerve centers of the muscles affected, gout, septic foci anywhere in the body, and rarely extension from a chronic infection of neighboring joints, are the usual cases found.

Diagnosis. The general symptoms are: a rather sudden onset with pain, slight tenderness, and stiffness of the affected muscles, increased on any attempt at movement. Spasmodic contraction and rigidity of the muscles may be present. Fever and constitutional symptoms are absent. The variety depends upon the location.

Lumbago. (Lumbodynia.) The aponeurosis of the erector spinæ and the latissimus dorsi is most frequently affected. Lumbar subluxations are usually present. It is often attributed to some physical exertion such as heavy lifting. The pain usually affects both sides, is often severe and may affect locomotion. When complicated with sciatica, the suffering is intense.

"Lumbago is usually classed among the myalgias, but, as a rule, it is rather a distortion of one of the lateral joints of the spine, due to sudden movement when the joint has not been prepared for it by preliminary fixation."—L. F. Barker, Johns Hopkins.

Cephalodynia is situated in the occipito-frontal muscles. It is distinguished from facial or occipital neuralgia by pain on both sides of the head aggravated by movement. It may affect the eye muscles when movement of the eye-ball excites the pain; or the temporal muscle, rarely. The masseter muscles are involved when pain is induced by mastication. The trouble can be often traced to the upper five cervical vertebræ.

Muscular Torticollis. (Wry or stiff neck.) The sterno-mastoid muscle of one side only is the usual one affected so the head is twisted and great pain is excited on attempting to turn it. This

form must not be confused with spasmodic torticollis nor with congenital deformity. Subluxations of the third, fourth, and fifth cervical vertebræ are usually found. If the muscles of the back of the neck are involved, it is known as cervicodynia.

Pleurodynia. The sheaths of the pectoral muscles, the intercostals, or the serratus magnus are most commonly affected. Respiratory movement of the affected side is embarrassed; the patient often leaning toward that side, and pain is excited by forced respiration, coughing or sneezing. It may be mistaken for pleurisy but the concomitant signs are absent except for a distinct fremitus. The subluxations found are those of the ribs and their corresponding vertebræ.

Treatment. In any form of muscular rheumatism search must be made for some source of poison or infection. The teeth, tonsils, nose, middle ear, gall-bladder, intestines, genito-urinary tract, may be associated with septic foci which constantly give either bacteria or toxins to the blood. These must be properly treated if recovery is to be permanent.

Fomentations applied to the affected area for twenty minutes prior to treatment is of considerable assistance. Careful, forced flexion of the thighs on abdomen for three of four minutes is frequently effective in lumbago. Springing the spine from the tenth dorsal to the fourth lumbar, gently, may permit corrections to be made with greater ease. Applications of heat may be needed to prevent muscular tension from reproducing the lesion after correction has been made. Adhesive straps may be useful in maintaining the normal relations. Thorough careful relaxation of the muscles affected, then correction of the specific lesions found will often relieve the patient immediately in acute cases. Stimulation in the splanchnic area is helpful in promoting elimination. In chronic cases more time is required as the subluxations are harder to reduce.

"In torticollis, lesions may be found from the first to the seventh cervical vertebræ, and first and second dorsal. A lesion of the first and second ribs may interfere by misplacement or pressure with the blood or nerve supply to the neck. The affected muscles undergo fibrous degeneration, becoming hard and unyielding. The sternal head of the sterno-mastoid muscle is more frequently affected symptomatically. There is pain on motion of the affected muscle and it becomes tense and stands out prominently from beneath the skin. The tenderness is marked. The head is drawn to one side and the face rotated upward.

"In severe cases the face may look directly toward the shoulder of the unaffected side. The sterno-mastoid muscle originates on the manubrium and clavicle and is directed upward and backward to the mastoid process and adjacent portion of the occipital bone. It flexes laterally the head and neck and rotates the face to the opposite side and when acting conjointly with its fellow, raises the manubrium and clavicle or flexes the head or neck. The constant pulling of the muscle would cause lesions of the axis.

"Cases have been cured osteopathically after section of the muscle and resection of the nerve have failed. The treatment consists in correcting

the lesions and improving the general health. Where the lesion is the primary cause, correction of the same will accomplish a cure."—G. W. Goode.

"Take a case of torticollis where the patient's neck is too stiff and sore to manipulate, and, as often in such cases, manipulation aggravates rather than helps: I give the patient just enough ether or chloroform to relax, then, with great care to avoid any additional irritation to the joint, gently adjust the third and fourth cervical. I have never failed to find a lesion there and I have never failed to produce a cure in one treatment, that is in acute cases."—C. G. Hewes.

The **prognosis** is favorable for recovery. The chronic form frequently recurs, especially with changes in the weather, hence the patient must increase his resistance by continued treatment for some time, by correct habits of living, and by avoiding things which tend to produce his particular subluxation.

THE CHRONIC ARTHRITIDES

(Including chronic articular rheumatism; rheumatoid arthritis; rheumatic gout; hypertrophic arthritis or osteo-arthritis; chronic infectious arthropathy; chronic progressive polyarthritis)

These diseases are thus grouped because the essential nature of all is now more or less uncertain, and because they have so many factors in common, with our present ignorance of their pathogenesis.

Etiology. The bacterial origin of all forms of rheumatism must be suspected. Septic foci in tonsils, intestinal tract, generative organs, middle ear, around the teeth, and other locations may be responsible for either chronic infection or chronic poisoning. Poverty, exposure, especially to cold and wet; trauma; worry; grief; fear; uterine and ovarian disease, heredity of tuberculosis, gout or rheumatism, or anything which lowers the general vitality, predisposes to the disease. Subluxations of vertebræ increase predisposition. An acute form appears to be infectious. Lesions affecting the innervation of the involved joints are constant—usually this includes structural impediments affecting the nerve trunks, as well as vertebral subluxations. Lesions of the first rib and clavicle, with contractions of the scaleni, may exert direct pressure upon the brachial plexus; these lesions are also effective as reflex disturbances affecting the trophic centers of the cervical enlargement. Lesions of the lumbo-sacral region are associated with tension of the psoas magnus; this causes slight direct pressure upon the lumbar plexus; this also exerts a reflex effect upon the trophic centers in the lumbar enlargement. These lesions are constant, in trophic affections of the articulations of hands and feet.

Pathology. In **arthritis deformans** the disease begins in the cartilages and synovial membranes. The cartilages become soft and vascular and are gradually absorbed; the result is the approximation of the two articular surfaces which become very dense, hard, and highly polished—eburnation. Rarefaction and atrophy may occur, leading to shortening and deformity. The

synovial membranes are inflamed and thickened; often portions become detached and form loose bodies in the joint.

Ligaments are thickened, contracted, sometimes calcified. Ankylosis is rarely complete. At the margin of the joint where pressure is less, ossification goes on, resulting in the formation of irregular bony outgrowths, called osteophytes. There is not tendency to suppuration; muscular atrophy is a common accompaniment.

In **chronic rheumatism** the shoulder and the knee are most frequently affected. The fibrous tissues are chiefly involved; the synovial membranes may be reddened but effusion is very slight. The capsules and ligaments of the joints, sheaths of adjacent tendons, and aponeurotic sheaths of muscles may be implicated. These become thickened and inflamed, thus limiting joint movement. There is little deformity and no bony ankylosis.

Pain and stiffness of the parts involved are the main features. This state is aggravated by damp or stormy weather. The joints may be a little swollen and tenderness present during the acute exacerbations. Many joints may be involved. The pain is usually worse at night, and in the morning it may be very severe, but after exercise it mitigates until it is tolerable but does not disappear. The joints may be felt and heard to creak. In very chronic cases, some atrophy of the muscles occurs; permanent stiffness or even fibrous ankylosis may follow.

Spondylitis Deformans is the name given when the disease attacks the vertebræ. It is more common in men. The spinal column becomes completely rigid and strongly kyphotic.

Mono-articular form attacks spine, shoulder or hip, in elderly men.

General Progressive Form. The process affects the smaller joints symmetrically, especially the metacarpo-phalangeal and inter-phalangeal joints of the hands. At first, the joints may be red, swollen, and tender, but this stage may not appear. Later, or from the beginning in other cases, stiffness and gradual deformity without signs of inflammation are present. The joint changes and the accompanying muscular atrophy cause the deformities to assume a very characteristic appearance. The lower ends of the ulna and radius project at the wrist, the metacarpo-phalangeal joints are flexed, the first phalangeal joints are overextended, the second are flexed, and the fingers deviate to the ulnar side. The joints give forth a creaking sound when moved. The attached muscles are subject to cramps. The temporo-mandibular articulation is apt to be affected.

The pulse is rapid, 100 to 120, or even higher, soft and compressible in the presence of a normal temperature. A return to a normal pulse-frequency is a sign that the process of the disease is arrested.

The skin is soft, subject to local sweats, often moist and clammy; diffuse melasmic discolorations, or level dark-brown patches with numbness and tingling, are often present. The blood, blood pressure and urine show no characteristic changes. The majority of patients reach a quiescent stage, suffer no pain and enjoy excellent health except for the inconvenience due to deformity.

The osteophytes upon the hands receive the name of **Heberden's** or **Haygarth's Nodosities.** They occur most commonly in middle-aged women, especially those who have long suffered digestive troubles. Little transparent cysts, possibly pouches of synovial membranes, may be associated with the nodes. After the hands and wrists, the knees and ankles may become involved. The thumb and the large joints usually escape. The muscular atrophy is largely contributed to by nonuse.

The **acute form** is much less common than the chronic. After a febrile onset, the joints become distended with fluid and are speedily disorganized. Erosion of the cartilages with a grating sound on motion follows but there are no osteophytes. It may subside in about a month or become chronic.

In children, it follows a somewhat different course. The onset is always before the second dentition with an attack which may be febrile, slight stiffness of one or two joints, gradually extending to others. There is no bony grating. The enlargement is due to general thickening and not to bony overgrowth. Limitation of movement may be extreme and there may be muscular wasting. There is enlargement of the spleen and lymph glands, which may be general, the lymph glands being quite large. Sweating is profuse. There is anemia although the heart complications are rare. The children look puny and generally show arrest of development.

Treatment. Correction of any lesions, especially those mentioned in etiology, is absolutely necessary. Local treatment to the joint involved must be careful, and is occasionally best omitted. All corrective work must be done without causing nerve shock. Attention to the general health by a liberal diet, fresh air, moderate exercise, and residence in a dry, warm climate are indicated.

Prognosis. Pronounced structural changes are incurable. In favorable cases the process can be checked, the function of the joint be partly restored, and the enlargement reduced.

CHAPTER XXVIII

DISTURBANCES OF METABOLISM

DIABETES MELLITUS

(Glycosuria; melituria)

Diabetes mellitus is a nutritional disorder characterized by excess of grape-sugar in the blood and its excretion in the urine and attended by polyuria and progressive emaciation.

Etiology. A posterior middle and lower thoracic curvature, especially containing "rotary" lesions, is a common predisposing factor. Lesions involving the tenth thoracic are also reported. Septic foci with systemic poisoning may be a factor. Other predisposing factors are Hebrew race, male sex, between 40 and 60 years, worry, nervous shock, gout, sexual excesses, syphilis, and excessive use of farinaceous foods and malt liquors.

Injuries or diseases of the brain or cord, especially to the floor of the fourth ventricle, and diseases of the pancreas, have borne a causal relation to this affection. Disease of the liver and of the kidneys may produce glycosuria.

Childhood is not exempt from this disease; it is speedily fatal in the young.

"The pathogenesis is not known. Disease of the pancreas, especially of the Islands of Langerhans, may be responsible for a lack of the glycolytic ferment normally formed in these bodies. Disturbance in the internal secretion of the posterior lobe of the pituitary body is associated with glycosuria. The secretion of the suprarenal glands seems to be necessary to normal action of the pancreatic islands, and disease of the adrenals is one factor in diabetes. The glycogenic activity of the liver may be disturbed by disease of that organ or of its nerve and glycosuria result. This type is less serious and fatal than is that due to the disease of the ductless glands. Injury to the nervous system, especially to the floor of the fourth ventricle, causes diabetes. Brain tumors, etc., may have glycosuria as an early symptom. Nervous shock, emotional storms, etc., produce glycosuria in certain individuals; rarely, such a shock may induce a very rapidly fatal diabetes.

"The pancreas and liver receive their secretory nerves from the eighth to the tenth thoracic segments. Bony lesions which disturb the normal balance of these centers are important in perpetuating glycosuria, and in predisposing to diabetes. In a number of cases reported by osteopathic physicians, the sugar appeared in the urine whenever such lesions were permitted to recur.

"The lesions I have found may be summarized: (1) In the lower dorsal and lumbar, marked posterior curvatures; (2) pressure lesions at the atlas, axis, clavicle, first two ribs, fourth and fifth dorsal, in relation to the heads of the ribs (sympathetic); (3) in acute cases there is intense muscular contraction in the lower dorsal and lumbar regions."—J. M. Littlejohn.

Diagnosis. Diabetes is to be suspected when a patient complains of thirst, hunger, polyuria, boils and carbuncles, pruritus,

debility, impotence, or loss of weight. Constant elimination of sugar, increased urea, constant marked polyuria, and loss of weight establish the diagnosis. The history varies according to several factors. The disease has the more rapidly fatal course in the young; in old people it may persist for years without causing any serious symptoms.

Acute Diabetes is usually found in the comparatively young, even in children; the symptoms very rapidly assume a grave type and post-mortem the pancreas is found extensively diseased. It may terminate in four or five weeks.

Chronic Diabetes. The symptoms are often obscure. Except for the peculiar urine, and attacks of dyspepsia, the patients may obtain a fair degree of health for a long time. A typical case has characteristic symptoms; polyuria, hyperorexia, and polydipsia with progressive muscular weakness and emaciation, and loss of sexual power. The tongue is irritable, beefy-red, often cracked, and glazed; the mouth is dry and the gums swollen and spongy with marginal gingivitis; the skin is harsh, dry, sallow, and often intensely itchy; the countenance assumes a distressed and worn expression; the bowels are constipated with pale, dry stools. The irritating urine causes constant itching, burning, and uneasy sensations along the urethra and at the meatus. Lumbar pain is common. There may be severe attacks of diabetic dyspnea or air-hunger. The breath has a peculiar sweetish, apple-like odor due to acetone. The onset of coma is often sudden but patients frequently die of intercurrent disease as pneumonia, critical diarrhea, and other infections.

Diabetic coma occurs in one of three ways: Suddenly, after exertion; gradually, with headache, delirium, dyspnea, very heavy sweetish odor to the breath and sometimes cyanosis; abruptly, with headache, feeling of intoxication and rapidly fatal coma. The coma is thought to be due to B-oxybutyric acid in the blood.

Complications. Peripheral neuritis is manifested by leg-cramps, knee-jerk often absent, numbness, tingling, neuralgias and paralyses. Herpes zoster and perforating ulcer of the foot sometimes occur. Diabetic tabes is a peripheral neuritis characterized by lightning pains in the legs, loss of the patellar reflex, and peculiar high steppage gait. Melancholia is frequent. Cutaneous effects include boils, carbuncles, eczema, pruritis of the vulva and pudendi, painful onychia and gangrene of the extremities. Acute pneumonia, gangrene of the lung, and tubercular lung conditions are common. Cataract is liable to occur and progress with great rapidity in young persons. Retinitis, hemorrhages, sudden amaurosis, optic atrophy, and paralysis of the muscles of accommodation occur.

Otitis media and mastoiditis are infrequent. Impotence is nearly always present; this may be the first recognizable symptom. Conception is rare and if it occurs, abortion is likely.

Blood. Polycythemia is not uncommon with marked polyuria due to the concentration of the blood. Hyperglycemia is present

in the plasma, often as high as 0.57% instead of the normal 0.15%. Lipemia is present. The fat may form a creamy layer on the top of clotted blood. Leucocytosis and anemia may supervene in diabetic coma. Blood pressure is usually subnormal in uncomplicated cases.

Urine. The quantity is large, 3,000 to 20,000 cc. (6 to 40 pts.) per diem, and generally in direct ratio to the amount of sugar present. The color is clear, very pale, greenish-yellow, and watery, becoming opalescent upon standing. Reaction is generally acid. The specific gravity is usually 1025 to 1050.

The urea is increased. The normal solids are relatively diminished. Preceding and during diabetic coma, they are relatively and absolutely diminished. The phosphates and calcium salts are markedly increased. Uric acid is not increased. The daily quantity of sugar varies from 0.5 to 12% or 20 gms. to 500 gms. in 24 hours. Glycogen may be present. Albumin is present in very small amounts in the early stages.

In the late stages, acetone, diacetic acid and B-oxybutyric acid are present. Occasional hyaline and finely granular casts, moderate excess of squamous epithelium and sometimes leucocytes are found.

Albuminuria with later cirrhosis of the kidneys and the symptoms arising therefrom occur. Edema of the feet and ankles is due to the renal disturbance.

Diabetic Diarrhea is very easily provoked and this should be remembered in treatment.

Treatment. The treatment of diabetes must rest upon a recognition of the especial factors producing the condition in each case. In the typical case, with the thoracic lesions mentioned, the corrective work is certainly indicated.

"The corrective work should be not only applied to the dorso-lumbar curve, but to relieving the approximation between the occiput and atlas. * * * Corrective work should at first be given three times weekly; later, twice weekly, and still later, once weekly. Follow up your case with occasional treatment and urinalysis to be sure you have a permanent result.

"In addition to the corrective work, by which I mean the replacement to normal position and securing of normal motion of the spine throughout the region of the curve, we must treat the liver direct.

"Next in importance to treatment is the limitation of the quantity and quality of the food. And I am inclined to believe that the limitation of the quantity, so as not to overwork the already crowded organs of assimilation, is of more importance than the limitation of the quality of food."—F. H. Smith.

Diet. In determining a diet for a diabetic patient, the output of urea is of more value than the output of sugar, so far as his maintenance of strength is concerned. If the urea can be kept within fairly normal limits, the prognosis is fairly good. The best way to decide an efficient diet is as follows: Give the patient a few

charcoal tablets; put him upon a strictly carbohydrate free diet. When the feces become black, make an analysis of the 24 hour urine each day for three days; if the findings are fairly constant, the test may be terminated; if the findings vary, the analyses and the carbohydrate free diet must be kept up for two days longer. The amount of sugar eliminated upon a sugar-free diet indicates the amount of sugar that his perverted metabolism demands; and will secure, if necessary, from proteids; even from his own body tissues. Carbohydrates to the equivalent of this elimination should then be added to the diet, and more charcoal tablets given. When the feces are again black, the 24 hour analyses are to be repeated; if the sugar is being eliminated in excess of that given, more must be added to the diet; and these tests are to be repeated until the sugar intake equals the sugar output. The urea, on this diet, should be about normal; the weight of the patient constant, and while the elimination of sugar is, no doubt, greater than would be the case with strictly carbohydrate free diet, yet the condition of the patient is much better. The better nutrition and strength give a better prognosis for recovery than the lessened sugar output with increased body loss. Some patients have idiosyncrasies for certain forms of carbohydrate—one can handle potato but not bread, another can take honey but not potato, another can handle oatmeal with ease, and so on. These conditions must be tested by urinalysis, since patients often have most unbased ideas of these things.

In more severe cases the full Allen diet should be given. In lighter cases a careful study should be made of the sugar tolerance, and different carbohydrates should be tested in order that as varied and satisfactory a diet as possible may be determined, which shall yet be free from danger of increasing the progress of the disease.

"The excretion of quantities of sugar overworks the kidneys, making them liable to specific kidney ailments. There is a very considerable variety of foods that a diabetic can take with impunity, and the diet should be as well balanced as may be considering the fact that so much of the carbohydrate food must be forbidden. * * *

A careful distinction that must be made between the foods which really contain little or no sugar, and those which seem to have none but in reality contain it; for example, sour milk and buttermilk—they are often given to a diabetic where sweet milk is forbidden. In the sour milk the sugar is still present and the taste merely concealed by the lactic acid. And again "tart" apples are prescribed and sweet ones barred. The sugar again is present, but simply disguised by the acid taste."—H. M. Conklin.

"An absolute withdrawal of carbohydrates from the food of patients having true diabetes mellitus will always increase the acetone and diacetic acid and often the ammonia and B-oxybutyric acid, and toxic acidemia and coma become imminent. Hence, it is unjustifiable, sugar having been discovered in the urine, to withdraw the starches absolutely or too rapidly from the diet."—O. T. Osborne.

"There is danger, then, in diabetes, of giving too much meat and too little carbohydrate, for meat, aside from being a prolific source of sugar, leads to the formation of acid products in the process of metabolism that may become

dangerous; meat moreover, in diabetes reduces the boundary of tolerance."—A. C. Croftan.

The patient must make up his mind to lead a quiet life, avoid worry, to take daily systematic exercise, bathe daily, and to behave, in short, as sensible, well people do in every way, except that he must avoid overtire.

The great thirst may be relieved by lemon juice, ice, or small amounts of water supped slowly.

The pruritis is relieved by cooling lotions of boric acid or hyposulphate of soda (1 oz. to 1 qt. of water). In coma, inhalations of oxygen may be necessary.

Prognosis. In these days true diabetes is regarded as curable. The younger the patient, the more likely and more rapid the fatal issue. In advanced cases, the outlook is grave. Patients past middle life may not suffer any serious inconveniences from the condition, provided they have proper care.

DIABETES INSIPIDUS

(Polyuria)

Diabetes insipidus is a rare condition characterized by the passage of an excessive quantity of pale limpid urine, free from sugar or albumin and accompanied by insatiable thirst.

Etiology. It is probably due to the presence of an excessive amount of internal secretion of pars media of the hypophysis in some cases. It has been experimentally produced by implantation of this tissue, and persons suffering from other pituitary diseases often have also diabetes insipidus. The essential feature is the inability of the kidneys to secrete urine of high osmotic tension. Severe nervous shock, diseases of the brain, or suddenly produced bony lesions affecting the eleventh and twelfth thoracic segments, may cause marked polyuria.

No constant structural changes are noted. The most common are the result of the polyuria—hypertrophy of the bladder and dilatation of the ureter and renal pelvis.

Diagnosis. The main symptoms are the polyuria and great thirst. The appetite is sometimes voracious; there are headache, dyspepsia, constipation, mental irritability, muscular weakness, severe lumbar pain. The mouth is dry, and thirst severe. The health may be undermined by the persistent thirst and the frequent micturition. The ability of the kidneys to secrete urine of high specific gravity should be tested. Give the patient very little water, with a salty diet. If urine of high specific gravity be voided, the condition is one of symptomatic polyuria, and should yield readily to correction of the vertebral lesions mentioned, with good hygiene.

If the urine is still of low specific gravity, the true diabetes insipidus is probably present. The X-ray should be used to determine the size and shape of the sella turcica.

The spinal examination often shows lesions of the ninth to twelfth dorsal vertebræ and the corresponding ribs.

Urine. The quantity is increased to 6,000 to 30,000 cc. per day. The color is very pale; the reaction is faintly acid or neutral. Upon standing it becomes ammoniacal and turbid, and often has an offensive, fish-like odor; the specific gravity is low, 1001 to 1005; the normal solids are absolutely much increased but relatively much diminished. The total urea is greatly increased; the chlorides, phosphates, and sulphates are high. Sugar and albumin are usually absent. Sediment is very slight, of cellular elements, squamous epithelium and small round cells.

Treatment. In true diabetes insipidus, when the pituitary is involved, treatment must be devoted to that gland. Usually other symptoms appear early, and the urinary condition evades notice. The urinalyses should be made, carefully grading the water intake, until just enough water is given to dissolve and carry away the total body wastes. The food should also be restricted to the actual body requirements, in order that the urinary solids may be kept low. In nervous polyuria, and in that due to bony lesions the prognosis is much better. The lesions of the lower thoracic region are to be corrected. Springing the spinal column gently gives immediate relief in many cases. The diet should be almost or quite free from sodium chloride; fruits and raw vegetables should be freely used as foods. Meat should be reduced in most cases; many patients do better upon a rather low proteid intake. Regular and systematic exercise in the open air is very beneficial. If the patient is of neurotic temperament, the educational measures indicated for hysteria may be needed; recurrences may follow emotional storms in neurotic patients.

ACIDOSIS

Acidosis is a condition of metabolism characterized by an excess of acid radicles in the blood and probably in the tissues. In diabetes mellitus, starvation, high fevers, certain wasting diseases, diet lacking in carbohydrates, and in other conditions, there is an accumulation of certain acid products of fat, or proteid, decomposition. These include acetone, beta-oxybutyric and aceto-acetic acids, and other acids of the volatile series. Diabetic acidosis is associated with weakness, stupor or somnolence, and later coma and death.

In other conditions, not well understood, there is faulty neutralization of the mineral acids. This may be due to lack of alkaline

salts in the foods; to imperfect oxidation; to defective metabolism, or it may be due to defective elimination of the urinary acids. There is lowered carbon-dioxide tension in the alveoli, air-hunger and hyperpnea, and varying nervous and digestive symptoms. Various writers attribute a great number of ills to acidosis, some of which may perhaps be due to the condition. When these acid wastes (the poorly oxidized katabolites) accumulate in the blood, they are usually neutralized by the use of a moiety of the proteid molecule, broken up into ammonia and other radicals. The amount of urinary ammonia thus gives a fairly accurate indication as to the amount of acidosis present. Another indication is found in the increase in the respiratory rate—this is due to the stimulation of the respiratory center by the increased acidity of the blood.

Acidosis should not be confused with diseases due to food deficiencies. For example, beri-beri is due to a loss of certain elements, probably those called "vitamins." If these are replaced, even without any alkaline substances being added, the patient recovers. In scurvy, other substances seem to be lacking, though so far the nature of these substances is not known. The addition of lime juice to the diet gives immediate relief, though this contains too small an amount of alkaline salts to neutralize any great amount of acids. Neither beri-beri nor scurvy are relieved by the use of alkaline substances, unless these contain the valuable vitamins or other "vital" substances. Acidosis, on the other hand, yields quickly to the administration of alkaline foods or soda, though these may be cooked or may be inorganic. The confusion resulting from an attempt to include all diseases due to food deficiencies under acidosis is regrettable.

Treatment. Acidosis characterized by acetone in the breath, and acetone, beta-oxybutyric and aceto-acetic acids in the urine, must be met by the administration of carbohydrates; oatmeal is perhaps the most useful of these, though other forms of starch or sugar may be better adapted to special conditions. (See diabetes mellitus.)

Acidosis characterized by excess of urinary ammonia must receive different treatment. Carnivorous animals or human subjects suffer less from this form of acidosis than do vegetarians; this is because they have a larger available supply of ammonia with which to neutralize the acids. This form of acidosis must be met by the administration of alkaline salts, preferably in the form of the vegetable compounds. Raw vegetables, such as lettuce, celery, carrots, onions, cabbage, and others are useful.

Every effort must be made to increase the oxygen supply and its use by the tissues. Respiration, circulation, the blood itself and the internal secretions should all be investigated, and whatever abnormal conditions are found should receive suitable treatment.

Acidosis is a symptom of many varying states, and it must everywhere be treated according to its underlying causes. Much more study is needed before we are ready to consider these questions answered.

RACHITIS

(Rickets)

Rickets is a chronic nutritional disorder occurring in infants and very young children, attended by changes in the development of the bones and clinically characterized by wasting, stunted growth, characteristic physiognomy and deformity.

Etiology. The real cause is unknown. It usually develops between the sixth and fifteenth months of age; from improper feeding, especially that poor in animal fat and protein; bad hygiene, including lack of sunlight; lack of exercise; overcrowding, and other conditions associated with extreme poverty or lack of sanitation. "Good" babies, left too long lying quietly, are apt to suffer from rachitis. Milk which has been cooked, or any of the prepared foods, used to the exclusion of fresh milk, or foods too largely carbohydrate, all are deficient in certain compounds required for the development of the skeleton. It is not merely a lack of lime that is responsible for the disease, since this is sufficiently supplied by those diets which appear most harmful. Breast milk, when this is deficient in quality, may cause rickets, as do the artificial foods. The disease is found in the new born; and some infants are born with evidences of having suffered before birth. It is supposed that maternal mal-nutrition is the cause of this condition. Family history of rachitis, syphilis, tuberculosis, and certain other wasting diseases also predispose to the disease.

Diagnosis. There are three early pathognomonic symptoms: (1) profuse sweating of the head and neck, especially during sleep; (2) restlessness at night, as if the weight of the clothing is uncomfortable—as it probably is—this occurs even if the room is cold; (3) the child lies unduly quiet when left alone, and cries as if with pain when handled. These symptoms, especially the last, should arouse a suspicion of rickets, even when no digestive disturbances have manifested themselves. A slight fever, some diarrhea and constipation, increasing weakness and fretfulness, and usually emaciation, may precede the bone changes for weeks, sometimes for months. An abnormal fat may be present, instead of emaciation. The changes in the ribs, later of other bones, and the bending of the long bones, with or without recognizable fracture, may be noticed early, or may not attract attention until the deformity becomes very serious. When the disease is well developed, the appearance of the child is characteristic. The long bones, ribs, and skull are chiefly affected. The lime salts are much

diminished in amount; the cartilaginous epiphyses are thickened; ossification and dentition are delayed and when taking place are imperfect. Periosteal proliferation causes thickening of the flat bones of the skull but ossification is slow so that the fontanelles remain open an abnormally long time. The occipital bone is apt to be thinned so that it may crackle under the fingers (parchment crackling or craniotabes).

The head is elongated from back to front, flat on top, the forehead square and overhanging, the fontanelles slow in closing, the skull sutures prominent if ossification is complete, the maxilla flattened, and the skin veins distended. Raised areas, "bosses," may be felt on the skull. The face appears small in proportion to the rest of the head but may be plump. The ribs show a characteristic "beading" at the junction of the costal cartilages (rickety rosary), this being usually the first change noted. Pressure of the external air on the softened anterior ends of the ribs produces the "rickety chest" marked by a shallow vertical depression on each side of the sternum. "Pigeon breast" and "Harrison's grooves"—a transverse depression running from the xiphoid cartilage toward the axilla—are due to impeded inspiration.

The legs are bowed or sickle-shaped, showing well-marked epiphyseal enlargements, especially at the lower ends of the tibia. The pelvis is often much deformed, being of later significance in the female in regard to parturition. The arms show the most marked changes at the lower ends of the ulna and radius. The humerus and clavicle may be affected.

The spine may be kyphotic. Scoliosis is not so common. The deformities of the limbs are largely due to yielding of the softened bone to mechanical pressure hence rickety subjects must avoid any undue strain such as walking or using the arms. The mind may be deficient; the body stunted and emaciated; the abdomen is prominent from flatulent distention and from enlargement of the liver and spleen; muscular weakness is marked and digestive disturbances are common. Mental development is usually retarded, though with better nutrition these children may attain normal minds later.

The **blood** presents the picture of secondary anemia, sometimes of the chlorotic type; sometimes developmental. A slight lymphotosis may be present; it must not be forgotten that lymphocytes are high in normal children's blood.

Among the **complications** are: Pulmonary diseases; tetany; laryngismus stridulus; convulsions; adenoids and hypertrophied tonsils; green-stick fractures are frequent. The disease predisposes to the various affections of childhood. These must be kept in mind during the treatment.

Treatment. The main treatment is to correct the causes, dietetic and hygienic. If the mother is unhealthy, she must stop nursing the child, placing it with a healthy wet-nurse if possible, or upon artificial feeding, cow's milk suitably modified to the age of the baby being the essential element during the first year of life. Goat's milk is better than cow's milk. Barley water or oatmeal gruel properly made and strained are excellent additions to the milk and aid in keeping the bowels in a normal condition. Plenty of good water should be given. Orange juice an hour before feeding; olive oil at night, according to the age of the child, may be added to the diet.

The older child can have beef juice, light meats, eggs, green vegetables and fruits according to his age. A large proportion of fat is a good addition.

A daily warm bath is necessary. An olive oil rub aids in nutrition; no oil is absorbed, but its use keeps the skin soft, and gives comfort.

The clothing should be light, yet warm. The child should be well wrapped up and kept in the open air and sunshine, shading the eyes, as much as possible. No attempt to persuade the child to use his arms or legs is permissible, until the general nutrition is recognizably bettered; walking must be prevented until the child is thoroughly strong. Gentle massage of the arms and legs, with very gentle pulling and attempts to straighten them out, may help in correcting deformities already present, and prevent further distortions.

The spinal curve usually yields readily to manipulative treatment, supplemented by posture. The child should not be permitted to lie upon one side, or to maintain any position too long.

The limb deformities may be outgrown if mild and the proper manipulation is employed, or may require braces or orthopedic surgery.

The active symptoms cease when the child reaches the age of eighteen to twenty-four months. The earliest signs of recovery are a diminution of the nervousness, increased muscular strength, diminution of the head sweats, and disappearance of craniotabes. Improvement is slow but progressive as there are seldom relapses.

Prognosis. The disease is not fatal in itself but renders the child very susceptible to intercurrent affections, especially those of the respiratory tract.

A condition called **Late Rickets** or delayed rickets, may appear at any time from four to twelve years, and is usually due to some severe infectious disease. The symptoms and bony disturbances are atypical. Fractures at the epiphyses are frequent. During puberty, a form of malnutrition with some rachitic symptoms may appear; this is often present in overfat boys, and the fracture of the femur may simulate hip joint disease. It seems to be due to

some disturbance of the pituitary secretion, and is associated with delayed puberty.

SCORBUTUS

(Scurvy; scorbutic purpura)

Scorbutus is a nutritional disorder characterized by great debility, a spongy condition of the gums, a tendency to hemorrhage, and anemia.

Etiology. It is due to improper and insufficient food, especially lack of fresh vegetables, and insanitary surroundings. It is rare except in Russia. A very mild form appears among people living upon a diet chiefly of canned or dried foods, especially with salt meats in too great proportion.

Diagnosis. The onset is gradual. The patient becomes weak and thin, drowsy or languid, with more or less general aching of the bones. The gums are soft and swollen, bleeding easily on the slightest pressure; the tongue is coated and red, the skin is dry, rough and sallow; diarrhea alternates with constipation.

As the disease progresses, the teeth may fall, the mouth ulcerate and emit an intensely fetid odor. Petechiæ around the hair follicles or large subcutaneous extravasations appear on the extensor aspects of the limbs. Epistaxis or subconjunctival hemorrhages may be annoying. Death may occur from hemorrhages into the body cavities. Hard, brawny, tender swellings of the calves are due to subcutaneous and intramuscular hemorrhages.

The patients present a cachectic appearance. Sometimes a peculiar night blindness develops which is dependent upon the exhaustion of the retina.

Infantile Scurvy or **Barlow's Disease** is sometimes present in children fed constantly with proprietary foods; occurs most frequently between the ages of six and twenty months, and is marked by tenderness of the limbs, and weakness. Exclusive diet of malted milk, condensed milk, various baby foods, and sterilized milk are the causative factors.

Diagnosis. The legs are kept drawn up and still. When these are moved there is continuous crying. The child grows cachectic. Some obscure swellings may be found, ill-defined, but resembling thickenings, around the shafts of the bones. Crepitus may be found in epiphyseal regions, due to separation of shaft and epiphysis. Proptosis of one or both eyes with puffiness and very slight staining of the upper lid appears. A profound anemia develops. The complexion becomes sallow or earthy-colored and small ecchymotic petechiæ appear upon various parts of the body. Asthenia is well marked but emaciation is not so apparent. The

temperature is erratic. If teeth have appeared, the gums may become spongy and bleed.

The heart may show a hemic murmur, the impulse is feeble and irregular.

Subluxations are apt to be found in the splanchnic area. The urine is high-colored, of high specific gravity, the phosphates are increased, there is often blood and albumin. The blood is that of severe secondary anemia.

Treatment. The most important factor is the diet. Give first a little lime juice or lemon juice in water. Good soup with raw vegetable juices, in very small quantities at first, may be added. As soon as the digestion will permit a mixed diet—with amounts of fresh fruit and vegetables—leads to rapid recovery. In the infantile form, breast-feeding should be employed if possible. Properly modified cow's or goat's milk may be used. Orange juice should be given, one tablespoonful four times a day, one hour before feeding. Normal saline or other bland solutions should be used as a mouth wash, several times a day. Other treatment depends upon conditions as found on examination.

Prognosis. Recovery is the rule if appropriate treatment is instituted early.

Prophylaxis consists in good feeding and good hygiene. Too great a proportion of canned and salt meats are to be avoided.

OBESITY

(Including corpulence; lipomatosis universalis; polysarcia adiposa; Dercum's disease; adiposa dolorosa)

Obesity is a nutritional disorder characterized by an abnormally increased deposit of fat in the body. It begins insidiously, and by its presence weakens the muscular and glandular tissues of the body.

Etiology. Several classes are recognized. The plethoric type is the result of habitual overnutrition. Persons who constantly assimilate even a very little more food than they utilize each day, must inevitably put on weight; this process continued for years, results first in uncomfortable weight, then in the embarrassment of the active organs, and pathological states affecting almost or quite the entire body. The anemic type is due to deficient oxidation processes, and usually follows some wasting or exhausting disease, or is associated with chlorosis or cardiac weakness. Lack of certain internal secretions may be responsible; it appears in men after the climacteric, in women after the menopause, or during prolonged lactation, or after exhausting child birth, or who suffer from ovarian disease. Typhoid, syphilis, and other wasting dis-

eases may be followed by this type. The hydremic type may follow either of the two just given, or may be directly due to cardiac weakness, arteriosclerosis or nephritis. In this form the connective tissues are fatty, but are also slightly edemic.

Hypophysial obesity is due to disease of the pituitary body; it is associated with delayed development of the genital organs, in the young, or with their atrophy, in older patients. The relation of disturbances of the reproductive organs with ordinary types of obesity suggests the possibility that these also may be due to deficient activity of the hypophysis. In this form the use of pituitary extract is to be commended, after the failure of ordinary methods of treatment.

Adiposa Tuberosa is characterized by the deposit of lumps or tumors of fat. When this is associated with general lipomatosis, the prognosis is fairly good for improvement; when not associated with the generalized condition, it may be intractable. The tumors are often painful. The term **Adiposa Dolorosa** (Dercum's disease) is usually applied only to those cases in which the fatty deposit is localized and very great, as in the abdomen, the neck, or the mammæ. It may be exquisitely painful.

Bony Lesions in obesity vary greatly. In the form due primarily to overnutrition or to under exercise, the spinal condition is good in the beginning. Later, the weight of the abdominal organs compels overextension of the spinal column, rigidity of the lower thoracic region, and variations in the normal spinal contour. In the anemic type, the spinal variations are those associated with the primary disease. In many cases in which the fatty deposit appears to be due to lack of oxydizing ferments, lesions of the eleventh thoracic are present and seem to be active etiological factors. Correction of this lesion, in these cases, results in gradual return to the normal, even with no change in exercise or food intake, when these are already not unhygienic.

Heredity is a strong factor, though many cases supposed to be hereditary are due to family habits of eating and exercise.

Diagnosis. The recognition of the condition presents no difficulty. In order to determine what causes are active in perpetuating the disease much study of the case may be necessary. The history should indicate whether the disease is hereditary or is the result of over-nutrition. Examination of the heart with a history of rheumatism or other etiological factor in cardiac disease; of some wasting disease just previous to the beginning of obesity, may lead to useful information concerning the further treatment of the case. Gouty forms can usually be recognized by a study of the urea-uric acid relationship. An examination of the blood may explain some cases. When the hypophysis is at fault there are changes in the genitals and in adults disturbances of the sex feelings. Symptoms of increased intracranial pressure are present. (See brain tumor.)

Treatment. Almost as many methods of treatment have been advised as there are patients. When it is remembered that obesity

is not a disease but is a result of some departure from the normal structure of the body or from the normal care of the body it is evident that every patient requires some special care. A large proportion of cases are primarily of a plethoric type. In these cases it is necessary first to plan a diet and daily regime which shall put the patient into nitrogen and carbon equilibrium. This done the amount of carbon must be reduced until the loss of weight becomes established. No rule can govern the diet list but each patient is a law to himself. The fact that the reduction in carbohydrates is necessary in most cases is due to the fact that an excessive intake of carbohydrates is habitual with many people. Each patient must be given exercises which also are adapted to his individual case.

Great care must be taken to avoid heart injury in advising both diet and exercise for obese patients. Excessively nitrogenous diets may seriously embarrass the action of the kidneys. Too great limitation of a watery intake and too sudden reduction in the food as well as too violent exercise may produce serious injury to the heart.

In young, vigorous, plethoric subjects the most rapid loss of weight is secured by the following regime: Two days' fasting with plenty of hot water to be taken as often as possible. Third day, a plentiful amount of a single nitrogenous food, such as milk, cheese, meat, eggs, etc. Fourth day, fast with hot water. Fifth day, raw, green vegetables, celery, lettuce, etc., as freely as may be desired. Sixth day, fast and hot water. Seventh day, nitrogenous food, and so on. Fast may be for two days if this is desired. In outlining such a regime as this it is necessary to examine the heart and to analyze the urine at least twice each week. This plan may be modified by omitting the day of fast in patients who must keep on working.

When obesity is complicated with anemia or endocrinic, circulatory or other organic disturbances great care must be exercised in treatment. A high cellulose diet especially of raw, green vegetables is usually safe and often efficient. Ordinary massage is useful in the hyperemic or anemic form. Violent rubbing may reduce the weight temporarily. The same is true of baths, sweats and other methods especially in vogue at various sanatoriums. Such courses of treatment reduce the weight speedily in many cases, but unless the life habits of the individual are modified a return of the disease is to be expected. When there is reason to suspect that obesity is due to lack of the secretions of the ductless glands the attempt should be made first to secure increased activity of these glands through controlling their circulation. When this is found impossible and when the condition of the patient does not yield to ordinary methods of treatment the use of the animal extracts of the gland may be cautiously begun.

From what has been said it is evident that the treatment of obesity is really best secured by the treatment in each case of the factors which cause or which perpetuate the abnormal fat deposit.

"The cardinal points of treatment are: first, removal of osteopathic lesions; second, diet; third, baths; fourth, exercise and regulation of clothing. The greatest problem in treatment is the dietary. The diet may be reduced as much as two-fifths without danger, but it must contain normal proportions of the proteins, carbohydrates and fats. In other words, the diet should be a mixed one."—Earl Scammon.

Prognosis. The outlook depends upon the nature of the case. In plethoric subjects in whom no ordinary disease has manifested itself the outlook is measured absolutely by the self-control of the individual. Upon a wholesome diet with normal habits of life his weight can be kept within a normal limit and his strength and comfort be assured. If he is unwilling to control himself the condition becomes fixed and organic disease is inevitable. Older patients and those in whom organic disease has become fixed should be permitted to lose weight only gradually and should be watched carefully to prevent complications. Such patients do very much better with a reduction of fatty deposit and life is prolonged as well as made more comfortable by the reduction which need not be very great in amount. The most efficient prophylaxis is based upon the recognition of the fact that when the carbon intake exceeds the carbon outgo an accumulation of fat in the body is inevitable.

Whether there is an abnormal state of the body, so that less than the usual amount of carbon can be utilized, or whether there is simply the habitual ingestion of too great an amount of carbon in food, the principle still remains, that one who assimilates more carbon than he eliminates must inevitably store fat; while one who habitually assimilates less carbon than he eliminates must as inevitably lose fat.

CHAPTER XXIX

DISEASES OF THE DUCTLESS GLANDS

GENERAL DISCUSSION

The glands of the body which elaborate an internal secretion include the thyroid, pituitary body, suprarenal capsules, the islands of Langerhan in the pancreas, the ovaries and testes. To a very much less marked extent, practically every other organ seems to form and supply to the body substances more or less important to the general metabolism. The liver gives off urea and glucose into the blood stream though these are not of the same class as the substances elaborated by the glands first mentioned. The function of the spleen and thymus, the hemolymph, the carotid and the coccygeal glands, as well as the other lymph nodes of the body must be mentioned in this connection though their function has not yet been thoroughly studied. The thyroid may be taken as an example of a ductless gland. The thyroid gland is subject to three types of diseases: In the first place it is subject to diseases which do not affect its functional activity to any great extent as is the case in simple goiter. Second, diseases may destroy its power of elaborating its internal secretions, as is the case with cretinism or myxedema. Third, diseases may increase the functional activity of the gland as in the case of the exophthalmic goiter. It is probable that further study will demonstrate these three classes of disease for all of the glands which elaborate internal secretions.

Secretory nerves have been demonstrated for most of the ductless glands. Vasomotor nerves are distributed through all of them. All have extremely plentiful blood supply and venous and lymphatic drainage is plentiful. All of the true internal secretions are of great importance to the general metabolism of the body and it is usually true that a very small amount of the secretion is sufficient for all of the needs of the body, for this reason diseases of the ductless glands do not usually produce characteristic symptoms until the gland itself is almost completely destroyed.

DISEASES OF THE THYROID GLAND

The thyroid gland is one of an important series of organs which elaborate an internal secretion. The relation between the pathological changes in the thyroid gland and the symptoms of the diseases associated with these pathological changes is yet

somewhat uncertain. Whether the thyroid changes are causes of the other symptoms, or whether they are due to some other etiological factor which also causes the symptoms observed, is as yet uncertain. There seems no question that to a certain extent at least, the symptoms of some diseases of the thyroid gland are directly referable to variations in the secretions of the gland itself. Very much yet remains to be cleared away before our understanding of any of the internal secretions is satisfactory. The presence of accessory thyroid masses adds complicating factors.

The thyroid gland is extremely vascular and it is normally subject to marked variations in its blood supply. The blood vessels are controlled by vasomotor nerves from the superior, middle and inferior cervical sympathetic ganglia. These ganglia are in turn controlled by way of the white rami, which originate in the first or second to the fourth or fifth spinal segments. Irritating conditions of the thyroid cause reflex muscular contractions and areas of hypersensitiveness through the upper cervical areas and the upper thoracic. The tissues around the clavicles and first ribs are always hypersensitive. The scaleni and certain others of the anterior cervical muscles are usually contracted.

The third cervical vertebra is practically always included in the bony lesions present in all forms of goiter. Lesions of other cervical vertebræ, the clavicles, the first and second ribs, and the mandible are present in varying combinations. These bony mal-positions probably act by modifying the circulation through the thyroid gland, and possibly by interfering with the normal secretory or trophic nerve impulses. The correction of these lesions usually exerts at least a slight effect upon the goiter, and under favorable circumstances, results in a return to approximately normal conditions.

ACUTE THYROIDITIS

This is an acute inflammation of the thyroid gland, whether the gland is or is not normal before the onset. The term "strumitis" is limited to the inflammation of a previously diseased or goitrous thyroid. The usual phenomena of inflamed glandular tissue—swellings, dilated blood vessels, sometimes hemorrhages and accumulations of pus—are present. It is almost always secondary to acute infectious diseases, or to septic surgery, or to trauma.

The **diagnosis** is to be made by the severe symptoms, the recognition of the causative factors, and the history of the case. Congestion, such as occurs at the menstrual period, is not to be included as an inflammation of the gland. The symptoms include swelling, dyspnea and other pressure symptoms, cyanosis, epistaxis, sometimes hemorrhages, usually fever, and sometimes rapid, irregular,

or slow heart from pressure on the vagus, with its palpitating carotid neighbor.

The **treatment** includes correction of the muscular contractions and of whatever other structural causes of thyroid congestion may be found; raising the ribs, increasing the flexibility of the lower thoracic spinal column, and such other measures as may be indicated on examination. No food is to be taken during the active stage; water, ice and fruit juices much diluted may be allowed. Pus should be surgically evacuated. If the pressure causes symptoms of asphyxia, intubation or tracheotomy may be necessary—the danger of infection in such cases must be clearly remembered.

Prognosis. The evacuation of the pus, either spontaneously or surgically, or the absorption of the products of inflammation, without evacuation, may result in recovery, with the formation of scar tissue which may or may not be of later significance. The pus may evacuate into the trachea, leading to fatal pulmonary disease; or into the tissues of the neck, leading to cellulitis, perhaps with abscesses later. The pressure may cause death from asphyxia. After apparent recovery, the symptoms of myxedema may occur, due to the destruction of the secreting tissue of the gland.

SIMPLE GOITER

Enlargement of the thyroid gland not associated with symptoms of hyperthyroidism is called simple goiter. The enlargement may be due to increase in its connective tissues; to dilation of the blood vessels or the lymph spaces; or to increase in the amount of colloidal material within the cysts, or to other less common pathological changes in the gland. Simple goiter may attain tremendous size without seriously impairing the health of the patient. In other cases, the growth exerts pressure upon the nerves of the neck or, extending downward, may diminish the size of the thoracic inlet.

Etiology. The disease is sometimes endemic. Change of climate frequently improves the condition in these cases. Heredity is a factor in many cases. The children of goitrous parents may be cretins, or may be normal, or may themselves suffer from goiter later in life. The relation of goiter to sexual disturbances is well marked. In men goiter may increase after sexual excess. In women the gland frequently enlarges in menstruation and pregnancy, while it is practically normal in the intervals. Emotional disturbances may initiate or exacerbate the thyroid enlargement. Ernest Sisson calls attention to the place of the third cervical lesion in goiter and also to the overuse of the voice as in voice training as a cause of goiter. C. P. McConnell's experiments show the place of the third cervical lesions in the etiology of simple

goiter. The upper thoracic, first rib, clavicle, hyoid, atlas, axis and other cervical vertebræ are reported by other writers as being etiological in simple goiter.

Diagnosis. The enlargement of the gland is easily recognizable. When the tumor is small, or when its growth invades the cervical tissues causing pressure upon the vagus and sympathetic nerves, or upon the jugular vein and carotid artery, or upon the trachea, the symptoms may be very much confused. Irregular heart beat, sometimes rapid; dilation of the pupils with mild exophthalmos; giddiness, vertigo, nausea and more or less marked mental symptoms due to abnormal pressure conditions may suggest exophthalmic goiter. The fact that simple goiter may occasionally take on the exophthalmic type adds difficulty to the diagnosis. More frequently degeneration occurs in the simple goiter, leading to symptoms of myxedema; usually the simple goiter remains unchanged in character throughout life.

As the simple goiter increases in size its weight may cause considerable discomfort. The pressure exerted upon the trachea may lead to asphyxia. Small goiters are not incompatible with long and comfortable living.

Treatment. The correction of the bony lesions already mentioned is sometimes the only treatment that is necessary. Usually several weeks or months of attention is necessary in order to prevent recurrence. The upper ribs should be raised and the clavicles lifted; the cervical tissues well relaxed; the hyoid moved from side to side and attention paid to all tissues which might possibly interfere with the normal drainage of the gland. Undue pressure or manipulation of the gland may cause symptoms of hyperthyroidism. This was often noted in the old-time treatment by bandaging the neck. Tissues around the gland may be lifted and pushed toward the gland in order to permit free exit of blood and lymph from that neighborhood. (R. D. Emery.) The patient should not overuse the voice and should be warned against sexual indulgence. (E. Sisson.)

Prognosis. Circulatory goiters may diminish with remarkable speed. Cystic goiters become smaller but rarely regain normal size unless the condition is of very recent development. Fibroid goiters (and those which have existed for several years usually are more or less fibroid) rarely regain normal size, if indeed they ever do. They may be diminished and may cause no further symptoms.

EXOPHTHALMIC GOITER

(Basedow's disease; Graves' disease; hyperthyroidism; hyperplastic goiter)

Enlargement of the thyroid gland, with protruding eye-balls, muscular tremor, and rapid heart make up a syndrome called

exophthalmic goiter. The thyroid enlargement is never very great; the exophthalmos may be delayed until after the other symptoms have been some time present.

Pathology. The structural changes are not well understood. A true hypertrophy of the gland has been described; increased vascularization is constant. The superior and middle cervical sympathetic ganglia have been found more or less degenerated. The pathogenesis of the disease has been much discussed; the relationship between this disease and myxedema and cretinism is of interest.

Other tissues and organs of the body are abnormal in this disease; the adrenals, pituitary body, pancreas, thymus and para-thyroids are variously atrophied or inflamed when the thyroids are hypertrophied. Sugar-metabolism is often perverted, though rarely to the point of typical diabetes mellitus; polyuria without glycosuria occurs. The pigmentation of the skin, with or without scleroderma or leucoderma, is of interest in this connection; the bronzing of Addison's is not often present. A fatty cushion behind the eyeball is the result, rather than the cause, of the exophthalmos. F. J. Feidler and others view exophthalmic goiter as a systemic disease, in which hyperthyroidism is a symptom rather than a cause. Most of the evidence is in favor of hyperthyroidism as a cause of the other symptoms as observed, though the ultimate cause of the increased thyroid activity is yet to be found.

Etiology. Occasionally a simple goiter assumes the characteristic features of the exophthalmic type. Emotional storms have often been mentioned, by the patient or his family, as the cause of the disease; it is difficult to determine whether the emotionalism was a cause, or was simply one of the earlier symptoms of the disease; the causes of the emotionalism are usually found to be comparatively mild, such as are "the common fate of all" and which are not associated with any permanent after-effects in most individuals. Pregnancy and lactation, exhausting diseases, and other factors which certainly lower the general bodily resistance to disease are considered causative factors in many cases. Foci of infection of the upper respiratory tract and mouth, and intestinal stasis are possible factors.

Lesions of the first to sixth thoracic are most important; lesions of the cervical vertebræ, the first, second and third ribs, of the occiput, hyoid, mandible, and clavicle, are reported.

Diagnosis. In well-developed cases, the protruding eye-balls, nervous instability, rapid pulse, muscular tremor, and slightly enlarged thyroid, make the diagnosis easy. In the early stages, diagnosis may be somewhat difficult. Wasting may be a very early symptom; when this is associated with muscular tremor hyperthyroidism should be suspected. When to these symptoms the rapid heart is added, with nervous instability, the diagnosis is fairly certain; exophthalmos removes doubt, even if the enlargement of the gland is not yet perceptible.

The onset is usually insidious, though occasionally the disease may develop rapidly, even to death within a few days or weeks. In these acute cases diarrhea and vomiting are associated with

extremely rapid pulse, dyspnea, and speedy emaciation. In chronic cases the heart may beat at 100 or more, rarely to 200. The thyroid pulsation is constant; a peculiar rushing sound is frequently heard over the gland. The heart may be enlarged; hemic murmurs may be present.

Diarrhea and vomiting may or may not be present. The appetite is whimsical. The secretion of sweat is usually increased; sometimes this affects the hands or feet especially; rarely one side of the body is most affected by the hyperidrosis. Night sweats are common. Flushings and pallor may occur without recognizable cause; these often resemble the "hot flashes" of the menopause. Discolorations and thickenings of the skin may suggest Addison's disease, pregnancy, scleroderma, and other trophic disturbances of the skin.

The eye symptoms are marked; the protrusion of the eye-balls may become so pronounced that closure is impossible. The upper lid does not follow the eye-ball when the gaze is directed downward—von Graefe's sign. Retraction of the upper lid causes widening of the palpebral fissure—Stellwag's sign. Imperfect convergence for very close vision—Moebius' sign—may be present also in myopia, hysteria and neurasthenic states. Rarely paralysis of the external eye muscles is observed. Tremor of the muscles of the eye-ball and of the lids is frequent. The exophthalmos appears to be due to the contraction of the nonstriated muscle fibers of the capsule of Tenon; the symptoms referable to the upper lid are probably due to action of the non-striated fibers of the levator palpebræ; both these muscles are controlled by the sympathetic nerves.

The nervous symptoms are conspicuous. The muscular tremor is fine—about 8 per second. Muscular tone is increased. Psychic changes are marked. The mental instability rarely reaches the point of actual insanity, but may resemble mania or delirium temporarily. Most often irritability with rapid and exaggerated tendency to be affected by trifles is the most conspicious factor in the mentality. This is responsible for the erratic way in which such patients change physicians and methods of treatment—they are often very unsatisfactory patients, disobedient and refractory.

The **urine** may show increased nitrogen elimination; it is difficult to keep these patients in N-equilibrium. Increased excretion of phosphorus is present in some cases. The **blood** is normal in hemoglobin and erythrocyte count; the lymphocytes are often greatly increased while the neutrophiles are diminished. The viscidity is increased; the coagulation time is usually increased.

Treatment. The treatment of exophthalmic goiter includes those measures already advised for simple goiter, and attention to the factors in etiology, plus an increased amount of rest, the

avoidance of all excitement, worry, or overstrain of any kind and a largely vegetable diet. These patients seem to have a peculiar inability to dispose of the waste products formed by a meat diet. Correction of the bony lesions as found has resulted in apparently permanent recovery in many cases. Rest in bed for a few days, at intervals of a few weeks, is useful in cases with marked heart-hurry. The ice bag over the heart gives relief in exacerbations of tachycardia. Change of climate is useful in some cases, especially from a goitrous region to higher altitude—not best above 4,000 feet. Sea level relieves the dyspnea and heart-hurry in certain cases—individuals vary in susceptibility to climatic conditions.

The preferred operative treatment consists of consecutive ligations of the thyroid arteries—one is tied, and the effects noted, then another, until normal activity of the gland is secured. Partial thyroidectomy sometimes gives good results. Injection of boiling water into the gland destroys a part of the glandular tissue, and this may result in toxic symptoms, not usually very serious. It is employed only in mild or early cases. In a few cases operation on the thymus seems necessary.

In acute forms, and during exacerbations of the chronic forms, operations are apt to be fatal. In any case, injury or destruction of a part of the gland may result in atrophy of the rest of the gland; the symptoms of myxedema may appear, or death may occur too rapidly for these symptoms to become noticeably developed.

It is necessary to recall that secretory, trophic and vasomotor nerves arise from the upper dorsal, and, though cervical lesions are important, the effect is probably due to the contiguous structural relationship of the sympathetics. Then, there is a distinct relationship between the adrenal secretion and thyroid activities.

D. L. Tasker reports a case with third cervical and seventh to tenth thoracic lesions, in which treatment for correction was not successful so far as the bones were concerned, but was followed by relief of symptoms, with increased mobility and lessened tension of the tissues.

Prognosis. This is always grave. Death may occur in a few weeks, in the acute cases—rarely in a few days. In the more frequent chronic cases, death may be postponed for months, rarely years, unless a remission occurs—as is not infrequent. With treatment of the structural conditions, recovery may be apparently complete; some cases have been watched for several years with no recurrence of the disease.

MYXEDEMA AND CRETINISM

Myxedema is a condition of perverted body metabolism associated with disturbances in the secretion of the thyroid gland and probably due to the lack of this secretion.

Three forms are recognized. In the **congenital** form the thyroid gland is absent or is functionally inefficient from birth. Children so affected are called cretins. **Operative** myxedema or cachexia strumipriva is due to the surgical or accidental destruction of the thyroid gland. **Atrophic** myxedema is due to the degeneration or atrophy of the thyroid and it may follow goiter.

Cretinism. Cretins are usually idiots; they appear fairly normal at birth, but they fail to develop as normal children should. They are often unable to support the head until long past the time when they should be sitting alone. Sometimes the condition does not become manifest until the child is able to walk. The position of the body is characteristic—the child stands with the feet apart, often with the knees bent together; the abdomen is very protuberant; there is marked lumbar kyphosis, which adds to the apparent size of the pendulous abdomen; the mouth usually hangs open. The muscles of the body are deficient in tone. The child appears fat, but this appearance is due to a hardened and slightly edematous condition of the skin; pitting does not occur on pressure. The growth of the skeleton is greatly delayed—at the age of twenty the cretin may not be more than forty inches tall. The face, arms and legs are abnormally broad. Mental development ceases at an early stage; the child may never learn to talk. The blood pressure is low, the heart's action slow, but not correspondingly strong. The fact that the condition is, in part, due to the lack of the thyroid secretion is indicated by the improvement which occurs upon the administration of thyroid extract.

Etiology. Cretinism appears to be hereditary. In some cases there are families in whom cretins occur in every generation. No direct inheritance is possible. Parents who have goiter often have children who are cretins. The disease may appear, very rarely, sporadically. Malaria and syphilis in the parents is supposed to be responsible for some cases. In one Pacific College Clinic case, it was not possible to find anything in either parent, or anywhere in the family, which could have been responsible for the condition of the child. In other cases, paternal syphilis, maternal goiter, or family inheritance were found present.

Treatment. The symptoms of cretinism do not occur in a typical manner when any part of the functional thyroid gland remains. Definite permanent improvement has been noted following adjustment of upper dorsal and cervical lesions, even when the use of extract has failed. Any method of treatment may include the administration of the thyroid gland of animals, or the use of extracts from these. The commercial extracts should be administered first, and it is necessary to give very small doses in the beginning, increasing these until the physiological effects are

observed. Different preparations of thyroid contain varying amounts of different products of thyroid metabolism. If one preparation causes unpleasant symptoms, or if it seems to be inefficient in modifying the symptoms of cretinism, another should be tried. If none of the ordinary preparations on the market modify the course of the disease, the thyroid itself may be fed. In order to receive the best results, the fresh thyroid should be ordered. It may be sliced and slightly cooked upon its outer surface. The equivalent of one thyroid should be eaten once to three times each week. This method is not very accurate, but it sometimes brings about improvement in the condition when the more convenient methods of administration have failed. Overfeeding of thyroid extract may cause rapid heart beat, dyspnea, nervous instability, diarrhea, nausea, headache, and sometimes other symptoms. The amount of thyroid should be cut down in such cases. It must be remembered also that whatever conditions have been responsible for the lack of the thyroid may have affected, also, other organs.

Prognosis. It is not to be expected that the cretin will ever occupy the place in life to which he might, otherwise, be entitled. By the artificial administration of the thyroid extract, which the body needs, life may be made much more comfortable and efficient. In those cases in which the thyroid of the patient becomes active, the prognosis is brighter for fairly normal mental development.

Operative Myxedema is now of infrequent occurrence. It follows total extirpation of the thyroid, or the degeneration of parts of the gland that might be left after operation for goiter. It is characterized by low blood pressure, increased breadth of the face, hands and feet, with marked thickening and hardening of the skin. The edematous areas do not pit on pressure, nor do they contain fluid. The mental processes become steadily deficient, resulting in dementia if death does not occur at an early time. The progress of the disease may be delayed by the use of animal extracts, as in cretinism. The cause of the original disease for which the operation was necessary should be studied, and that condition also should receive attention. Structural perversions should be corrected and symptomatic treatment instituted when necessary; the use of the animal extracts alone may not meet all the individual requirements of the case.

Atrophic Myxedema. This may appear as a primary disease, or may result from degenerative processes following goiter. The symptoms are those of the operative type, except that the onset is more gradual, and is often confused by some of the symptoms of hyperthyroidism. The mental state is frequently confused; the patient is at times erratic and penetrating, at others stupid and indolent; confusional symptoms are usually present in either case,

and dementia finally results. The treatment consists in first, an attempt to restore normal function to the gland by correcting the conditions which interfere with its circulation, drainage, innervation, and after this has failed, the administration of the animal extracts, or of the fresh gland. If one extract does not meet the requirements, other preparations should be tried; the use of the fresh gland is inconvenient and often of no value but is sometimes more efficient than the prepared extracts. Hypodermic preparations may be more useful than those given by mouth, or vice versa.

DISEASES OF THE PARATHYROIDS

These small ductless glands lie in the neck and their position is decidedly variable. One disease, tetany, is supposed to be due to lesion of the parathyroids. It seems probable that certain convulsive disturbances, sometimes mistaken for hysteria, are really due to the lack of secretion or to the abnormal secretion of these small glands.

Etiology. Perhaps the most common cause of parathyroid injury is that due to the injury or removal of these in thyroid operations. Other causes are the infectious diseases, extension of inflammation from neighboring tissues, and rarely a primary interstitial inflammation without recognizable cause.

Tetany is a disease of the body which is characterized clinically by variations in the muscular tone, and disturbances of motor control. During the intervals between the attacks, the patient appears to be fairly well, except for the existence of areas of extreme hypersensitiveness in various parts of the body. The hands, feet, and face appear to be swollen or edematous, but do not pit on pressure. There is a tendency for the skin to be somewhat purplish. Pressure over the nerve trunks, or over large vessels which lie near nerve trunks, may produce an attack at almost any time. The attacks may vary from a few minutes to several hours, or sometimes several days. At first there appears a peculiar sensory disturbance, as numbness, tingling, or other parasthesias. The muscles, usually first of the fingers, seem to stiffen and this condition gradually extends to the arms, trunk and finally to the entire body. The spasmodic cramps are not especially painful when the muscular contraction is feeble; the greater the amount of contraction, the greater the pain in the affected muscles. Attacks may be nocturnal only, or may occur at varying intervals. An attack may be precipitated at any time by violent emotional storms, or by any strenuous effort (Trousseau's sign).

Slight fever may occur during the attack. The urine is especially rich in the phosphates and the calcium salts.

The prognosis for recovery is gloomy. There may be an interim in the progress of the disease. Death may occur at any time within a very few days from the development of the disease from cachexia, respiratory failure, or the effect produced in the central nervous system by the poisons in the circulating blood.

Treatment. The treatment must be symptomatic. It may be necessary to use chloroform for the relief of the spasms. The general health of the patient should be improved. Occasionally the administration of thyroid extract, either with or without parathyroid extract, results in recovery.

DISEASES OF THE PITUITARY BODY

Diseases of the pituitary body may affect either its anterior or its posterior lobe or both. The symptoms produced vary accordingly and may be confused by the effects of pressure upon the optic nerves and neighboring tissues and in the case of tumor of the pituitary by the effects of increased intracranial pressure.

Overfunction of the anterior lobe (hyperhypophysism, hyperpituitarism), gives rise to acromegaly or gigantism, with various modifications of these. Overfunction of the posterior lobe or the pars intermedia causes symptoms of diabetes insipidus. Underfunction of the anterior lobe (hypohypophysism, hypopituitarism), gives rise to the symptom complex included under "Frohlich's type," (hypophyseal dystrophia adiposogenitalis), characterized by rapid obesity, infantilism of the genitals, myxedema-like skin. This state is sometimes associated with dwarfism, pseudohermaphroditism, asthenic states, tachycardia, bronzing, and other symptoms referable to various endocrine disturbances.

In all diseases of the pituitary body X-ray plates may show peculiarities of the sella turcica.

Acromegaly. This is a rare disease most often associated with tumor of the pituitary body, characterized by gradual deformity of the face, hands, feet and to a less marked extent other bones of the body. The face shows broadening and prognathism; the malar bones increase in size until they may resemble horns. The bones of the fingers, hands and feet broaden very conspicuously. The skin becomes hard and thick. The hair thins and falls. The nails become very broad, thick and heavy. Mentality slowly diminishes in vigor to complete dementia. Blindness, either partial or complete, is usually due to pressure upon the optic nerves or the optic tracts.

Giantism. Disease of the pituitary body occurring before or shortly after birth may result in symmetrical enlargement of the bones so that the child becomes abnormally large without being

especially deformed. These giants may attain a height of seven or eight feet. They are weak in body and mind.

Dwarfism. Deficient development of the long bones or of all of the bones of the body may be due to pituitary disease. In both giantism and dwarfism, hereditary syphilis may be a factor.

Osteitis Deformans. This disease may not be due to pituitary involvement, but the symptoms suggest very strongly such a relationship.

The name is also applied to a very different condition—in which single bones are affected through repeated irritation, as in men who are much on horseback, and may suffer from deforming osteitis of the femur. In such cases disease of the pituitary body is not probable.

In its systemic form osteitis deformans affects nearly all of the bones of the body. It appears in middle life, chiefly among males, and is not due to any recognizable antecedent disease. The skull thickens and increases in size so that the circumference of the head may be two inches or more above normal. The bones of the arms and legs are greatly thickened and softened. They are bowed anteriorly and laterally producing a characteristic waddling gait and position of the arms. The subcutaneous knife edge of the shin may become broadened to two inches or more. The X-ray of the bones shows them much broader and much less dense than normal. During the stage of active inflammation circular areas of diminished density cause the X-ray plate to display a peculiar "bubbly" appearance.

The stage of active inflammation is associated with dull, aching pain of a peculiarly unbearable type. The muscles attached to the affected bones and the skin over them are hypersensitive and the seat of considerable pain. The mental attitude of the patient is characterized by profound gloom, not like melancholia nor with any evidences of true insanity, but simply a distressing depression of spirits, which is most unendurable to the patient himself and to his friends.

In one P. C. O. clinic case, palliative treatment, devoted to securing relief from reflex muscular contractions, was moderately successful in relieving pain during exacerbations.

Hypophysis Adiposity. Disease of the pituitary body sometimes manifests itself as a loss of control of fatty growth. These cases occur in childhood or puberty and are characterized by a remarkable and uncontrollable obesity. Such children retain health and strength for months or even a few years after the obesity becomes pronounced. With the development of the sexual organs and other ductless glands at puberty the adiposity may slowly disappear and the patient retain good health for the rest of his

life. In other cases, probably those in which there is a structural disorganization of the pituitary body, the symptoms of brain tumor appear, usually followed by death. In all these cases of adiposity the bones seem rather more easily broken than is normal. The fatty overgrowth interferes with the recognition of the fracture so that permanent deformity, especially of the hip joint, may be produced by neglect due to imperfect diagnosis. In one patient examined in the P. C. O. clinic fracture of the surgical neck of the femur was found which had been overlooked for some months.

Treatment and Prognosis. Disease of the pituitary body, like that of other ductless glands, is not apt to manifest itself until the internal secretion is almost or quite totally absent. For this reason there is very little that can be done in the way of treatment. Compensatory activity on the part of other glands appears to occur when the pituitary body is involved to a greater extent than is the case with other ductless glands. The use of the animal extracts in the diseases characterized by bone changes has not been successful. In adiposity the use of pituitrin has been followed by good results.

The possibility of surgery should be considered. Since the prognosis is hopeless when the pituitary fossa is invaded by malignant tumor, surgical interference even with its very doubtful prognosis may be justified. Recovery is never to be expected in pituitary disease of the common sarcomatous type.

DISEASES OF THE ADRENALS

Over-function of the adrenals, or hypertrophy of adrenal tissue, as in hypernephroma, is called hyperchromaffinopathy, or hyperepinephrinemia. The condition is supposed to be responsible for arteriosclerosis, and to be associated with Graves' disease, diabetes mellitus, and other disturbances of internal secretions. Certain peculiar types of pseudohermaphroditism are referred to this disturbance, as are also cases of premature puberty, and other disturbances in the development of the sexual characteristics.

Diminished function leads to the symptoms of Addison's disease.

Addison's disease is the term applied to the symptoms produced by disease of the suprarenals. It is characterized by slowly developing weakness of the skeletal, visceral and vascular muscles, emaciation, and a peculiar bronze-like pigmentation of the skin.

Etiology. Men are more affected than women. The third and fourth decades include the time of onset in most cases. Tubercular infection is responsible for the disease in about nine tenths of the cases. Other causes include sarcoma and other tumors, and the involvement of the adrenals in disease of other abdominal organs.

Simple atrophy or atrophy depending upon a chronic interstitial inflammation may be present, for which sometimes no adequate cause is to be found.

The pathogenesis of the condition is not well understood. Several theories have been offered in explanation of the manner in which the symptoms of Addison's can be referred to disease of the suprarenal capsules, but the physiological relationships of these organs are, as yet, too little known to warrant any adequate statement concerning their relationships in disease.

In the few cases reported, lesions of the eleventh and twelfth thoracic vertebræ, with marked muscular tension and hypersensitiveness in the immediate neighborhood, have been constant. These lesions may be either produced by the reflexes (which can be produced experimentally in animals) or they may be causative factors.

Diagnosis. The symptoms are, in the beginning, atypical. A noticeable weakness usually appears first; this is associated with extremely weak heart beat and low blood pressure. The symptoms of tuberculosis are usually associated with these. Gastro-intestinal symptoms include nausea, vomiting and diarrhea. The appearance of the peculiar discoloration is usually necessary to a diagnosis. This is a characteristic bronze color and it may be at first diffusely spread over the body, or it may appear in rather well marked patches. It is worse in those parts of the body which are normally darker, as around the nipples, and in those parts subject to irritation of clothing, as around the waist. It is distinguished from other conditions associated with pigmentation by its metallic hue and by the presence of weakness, low blood pressure, and weak heart.

Since the symptoms do not usually appear until the suprarenals have been almost completely destroyed, it is evident that the outcome is necessarily fatal. Attempts to treat the condition by the use of adrenalin, or varying combinations of extracts of the suprarenal capsules, with the extracts from other ductless glands, have not met with marked success. The symptoms must be met with suitable palliative treatment, but in typical cases with no hope of avoiding the ultimate fatal outcome.

Death usually occurs from exhaustion. Sometimes syncope, sometimes delirium precedes death.

Treatment. The treatment is largely symptomatic and palliative. The muscular contractions should be kept relieved; such other lesions as may be found should be corrected, if this can be done without too great discomfort. The diet should be largely but not exclusively cellulose—especially the raw green vegetables and raw fruits, except such as increase the diarrhea. The anemia associated with the disease is met by the treatment for secondary

anemia. (q v.) The low blood pressure and muscular weakness cause less discomfort, and the progress of the disease is delayed, by limiting the amount of muscular and cardiac exertion. The patient must spend much time resting in the fresh air, mostly in the recumbent position. He may take walks, slowly, may ride, but never hurry, or engage in any exercise which requires strenuous effort.

THE PINEAL BODY

This body has only recently been studied as an endocrine gland. Cysts or tumor of the pineal body may compress the aqueduct and thus cause internal hydrocephalus, or may exert pressure upon the hypophysis or upon the cranial nerves or their nuclei. These facts render exact diagnosis of pineal disease very difficult.

Premature puberty and disturbances of carbohydrate metabolism occur in pineal disease. Girls may menstruate in infancy. In either sex the genital organs may reach adult size very early in childhood. Obesity, cachexia and emaciation may be associated with the disturbed carbohydrate balance.

THE GONADS

The interstitial cells of Leydig appear to be responsible for the internal secretion of the testicle, while in the ovary the interstitial cells produce an internal secretion. The place of the corpus luteum has not yet been determined. The corpus luteum of pregnancy gives evidence of endocrine function, while the corpus of menstruation yet remains almost unstudied.

Over-function of the glands is associated with premature sexual development. Children of one or two years of life begin to show abnormally rapid skeletal growth, and may become sexually mature within a few months. Under-function of the gonads is associated with deficient development of the body. Menstruation is lacking or scanty; the primary and secondary sexual organs remain infantile, the voice of the boy remains high. Obesity is common in both boys and girls.

Tuberculosis or pneumonia terminate the life in most cases, usually in the early twenties.

MULTIGLANDULAR DISEASES

Several glands may be diseased in one individual, or the disease of one gland may affect others, thus producing complex symptoms. Sometimes sclerosis of several glands is found at autopsy. The effects thus produced include variations in the functions of many organs.

The bones, skin and hair may undergo marked changes. Pigmentation is frequently noted. Sexual functions are modified. Mentality may or may not be affected, but emotionalism is often marked. Blood pressure varies, and is more often lowered. Heart action is variously disturbed. Alternate constipation and diarrhea may occur. Polydipsia and polyphagia are variably present.

CHAPTER XXX

UNCLASSIFIED DISEASES

PURPURA

(The purples)

This is a general term applied to subcutaneous, submucous or subserous extravasations of blood. In its most easily recognized form spots resembling bruises appear upon the skin, usually the limbs, without being caused by trauma. Petechial hemorrhages, resembling flea bites, also occur, and may be overlooked in making the diagnosis.

Etiology. Purpura may be due to many causes, as a complication or symptom, or may appear without recognizable cause (idiopathic purpura). It is often present in severe cases of the infectious diseases such as "black" measles, small-pox, or malaria, and in scurvy, the anemias and leukemias. Certain poisons, as ergot, the iodids, quinine, antipyrin, turpentine, snake venom, and many others may cause purpura; it appears in some nervous diseases, hysteria, myelitis, and others; and is present as the result of mechanical forces, severe coughing and vomiting, arteriosclerosis, heart lesions; in senility several agents may be responsible for the condition.

Idiopathic Purpura includes several types, which have received different names.

Purpura Simplex usually occurs in children before puberty. Petechiæ, vibices or ecchymoses appear, usually upon the legs, especially after standing or running more than usual. The spots are slightly sore, and present the changes in color characteristic of ordinary bruises. When they are conspicuously due to standing, and are severe, the condition is **orthostatic purpura.** Rarely the extravasation of blood may lead to the blebs; joint pains, probably hemorrhagic, are not uncommon. Diarrhea is frequent, and blood may appear in the stools; these symptoms may be present without apparently causing any particular ill-health. A similar condition occasionally appears at about the climacteric, in either sex.

Chronic Purpura is probably due to weakness of the vessel walls, and may be present for years, or throughout life, without causing any serious symptoms; the ecchymoses rarely appear upon parts of the body exposed to the light, and evidences of internal hemorrhage are rare.

Factitious Purpura is probably associated with hysteria; it is characterized by irritability of the vasomotor centers, plus vascular weakness. Any sharp irritation of the skin, as by a pencil mark, is followed by purpuric reaction; it is possible to write upon the skin, and leave the letters written in ecchymotic colors. It is probably related to dermographia. (q. v.)

Henoch's Purpura occurs in children. Swollen joints, extravasations of blood over the joints, and also as a generalized eruption; vomiting and diarrhea; epistaxis; and the presence of blood in diarrheic and vomited discharges, and in the urine, are the usual symptoms. Fever is slight, nephritis is often a sequela. The joints are painful, and abdominal pain is often very severe.

Peliosis Rheumatica (Schonlein's Disease) begins with sore throat and fever, resembling acute rheumatism. The joints are very sore and are swollen, subcutaneous edema and an eruption which may be urticarial, petechial or ecchymotic appears; bullæ may be filled with blood (pemphigoid purpura). Bleeding from the mucous surfaces—epistaxis, hematemesis, hematuria, metrorrhagia—may occur. There may be extravasations of blood into the joint cavities.

Purpura Hemorrhagica (Werlhoff's disease) is the most severe form of the primary purpuras. It is probably due to some intense toxin which injures the endothelial cells of the blood vessels. It is rather more frequently found among young women than elsewhere. After a day or a few days of malaise, the disease appears rather abruptly, with fever, headache, and slight bleeding from some mucous membrane. The temperature may rise to 105° F. or more; the bleedings increase in amount and frequency; death occurs either from acute anemia, from hemorrhage, or from apoplexy. In **Purpura Hemorrhagica Fulminans** death results within a day or two—sometimes before the bleeding has been noticed upon the surface of the body at all; death is due to apoplexy or to hemorrhage in some other vital organ. The diagnosis must be made upon the symptoms, in those cases not rapidly fatal, and is possible only post-mortem in the fulminating form of the disease.

Diagnosis. The diagnosis of purpura is usually difficult—the recognition of the submucous, subcutaneous, and internal hemorrhages is not often difficult, but the distinction between the primary and secondary forms, and the finding of the causative factors is frequently almost impossible. The blood examination is necessary in all cases; urine analysis is indicated; while the history of the case may include many variable factors of value.

Treatment. The treatment of the underlying nutritional disease is of first importance. Feeding of gelatine is often advised; in

some cases its use is associated with good results. An abundance of fresh air is always indicated.

Raising the ribs, and the correction especially of lesions of the thoracic spine are always indicated; care must be taken to avoid strenuous movements; the slightest pressure is sometimes followed by the appearance of large ecchymoses which may be very painful. The diet should be mixed, including considerable proteid and green vegetables. In cases associated with symptoms of toxemia, the diet should not include the purin bases very abundantly. Foods rich in calcium are indicated, if delayed coagulation is a factor in the hemorrhagic tendency; usually, however, it is the weakness of the vascular walls that permits the hemorrhagic tendency.

Prognosis. In purpura simplex the prognosis is good for speedy and complete recovery, especially in children. In the rheumatic type, the outlook for recovery is good, but may be slow. In hemorrhagica fulminans, death is probably inevitable when the diagnosis is made; in the ordinary hemorrhagic type death may occur at any time, from cerebral or other hemorrhage, but recovery may be complete.

HEMOPHILIA

(Bleeder's disease)

Hemophilia is a disease, usually hereditary, in which hemorrhages occur profusely upon slight provocation. Nasse's law, that the disease exists only in males, but is transmitted only by females, has many exceptions. Females do sometimes have the disease, and it is sometimes transmitted by males without the intervention of female blood—directly from father to son, for example. The law holds for most cases, however, and females in the families of bleeders, and bleeders themselves, should avoid marriage. Men in bleeder families are able to marry safely, however. Strangely enough, while women may be bleeders, they rarely die in the menstrual period or in childbirth, though they may die of hemorrhage from a scratch or the pulling of a tooth. The most important factor seems to be a weakness of the walls of the capillaries and other blood vessels, though a deficient coagulability of the blood is present in some cases. Spontaneous hemorrhages upon the mucous membranes, or into the joint cavities may occur.

Diagnosis. The patient is usually aware of his peculiarity early in life, from his bloody experiences with slight wounds of boyhood. Rarely, the first hemorrhage is fatal.

Treatment is mostly prophylactic. No surgical operations should be performed upon a "bleeder" except as a very last resort in a case otherwise hopeless. Circumcision, tonsillectomies, are best omitted. Teeth should not be lanced, nor pulled if this can be

avoided. Strong massage around a wound may increase the formation of thrombin by the tissue cells.

Feeding of gelatine has been employed; it seems to increase the viscidity of the blood, and apparently its coagulability. Increased amount of the calcium-containing foods is advised.

Prognosis. These men usually die of hemorrhage, sooner or later. The disease itself does not interfere with life or health.

DISEASES OF THE SPLEEN

The function of the spleen is as yet unknown. It is composed chiefly of tissue which greatly resembles ordinary lymphoid tissue and it is certainly associated in some way with the development of the white blood cells and with the disintegration of those red blood cells whose term of usefulness is past. The spleen is enclosed in a muscular capsule and this is innervated from the eighth, ninth and tenth thoracic spinal segments. The spleen undergoes marked variations in its size, which appear to be due to the nervous control of the muscular fibers of its capsule and to the variations in the circulation of the abdominal viscera. It seems to act as a reservoir for the blood content of the abdomen.

Lesions of the seventh to the tenth vertebræ and the corresponding ribs cause a relaxation of the muscular capsule and predispose to splenitis. The relationship of these lesions to splenomedullary leukemia is discussed in connection with that disease.

Splenic hyperemia passes by degrees into **acute splenitis.** The bony lesions above mentioned predispose to splenitis. During any of the infectious fevers, or any acute inflammatory process of the abdominal viscera, the spleen is likely to become involved.

Diagnosis is rarely possible, the treatment is that of the primary disease and the prognosis for recovery, so far as the spleen is concerned, is usually good. The consideration of the various forms of splenitis are chiefly pathological in interest.

Embolism is not infrequent. The infarcts are small and usually terminate as small white fibrous masses. After infection occurs, localized abscesses are produced. Because of the peculiar structure of the spleen, hemorrhages of small degree are not recognizable. Profound hemorrhages may rupture the wall of the spleen and the blood thus escape into the peritoneal cavity.

Interstitial Splenitis leads to an overgrowth of the connective tissue of the trabeculæ which is constant and does not terminate by any apparent shrinkage. The cirrhotic spleen is larger than the normal spleen, and has a tendency to constantly increase in size.

Proliferative splenitis follows typhoid and other acute fevers, and reaches its most pronounced extent after malaria. The "**ague cake**" characteristic of chronic malaria is of this type. The tremendously large spleen of leukemia is associated with a chronic proliferative process of the spleen pulp.

Splenitis causes a heavy, aching pain over the left ribs and is associated with reflex muscular contractions, involving the lower intercostals and interthoracic region, and sometimes the small of the back. Pain over the tip of the left shoulder is frequently found and the tissues over the top of the shoulder and around the lower part of the neck are usually hypersensitive. The ribs on the left side may be raised and separated as the result of the splenic enlargement, or they may be drooping and approximated as the result of the reflex muscular contractions.

Amyloid degeneration of the spleen (sago spleen) occurs in connection with amyloid diseases affecting the other viscera. The malphigian bodies possibly are chiefly and sometimes solely affected. It is to this fact that the name sago spleen is due. The disease may extend to the splenic pulp and trabeculæ, until practically the whole organ may become involved in the degenerative process. No treatment is possible and death cannot be very long delayed after the recognition of this splenic disease.

Primary Splenic Tumors are rare, except for the peculiar overgrowth which occurs in leukemia. This is probably to be considered an adeno-lymphoma and it may reach tremendous size. Leukemia, on the other hand, is sometimes considered a form of sarcomatous growth.

Secondary Neoplasms are rather common. Carcinoma of the spleen usually originates in the stomach or duodenum. By far the most common cause of splenic tumors is found in tubercular or syphilitic infection. Splenic tubercles may reach considerable size and they may abound throughout the splenic pulp. Syphilitic gummata may be very large and often associated with amyloid degeneration.

STATUS LYMPHATICUS

This is a peculiar disease of childhood characterized by a persistent thymus and marked enlargement of the thymus, spleen and all other lymphoid tissues of the body, which often manifests itself first by the sudden death of the patient.

The etiology of the disease is completely unknown. Its existence is rarely recognized ante-mortem. Children so affected die suddenly upon very slight provocation. Anesthesia itself or a very slight surgical operation such as circumcision or the removal of adenoids may result in sudden death. More rarely a child may die as the result of a fall, or of fright. At a post-mortem it is

found that the thymus extends well down into the thorax and around the heart. In a few cases, careful physical examination ante-mortem shows the increased thymic dullness, enlarged spleen and enlarged superficial lymphatic nodes. Children in whom these conditions are found must be carefully guarded against shocks or fright until atrophy of the thymus occurs.

Though the condition is rare, the seriousness of its occurrence should lead to the careful examination of children before surgery or anesthesia is advised.

MOUNTAIN SICKNESS

Mountain sickness is a condition due to rarefied air, and which develops in high altitudes. It is characterized by severe headache, gasping for breath, parched tongue, intense thirst, loss of appetite, and an intense malaise. There may be a slight fever. It may be a transient condition or may last for several days.

In a less degree, it occurs in moderate altitudes in susceptible individuals. Tubercular individuals who go to high altitudes often suffer very severely from mountain sickness. In some cases this clouds the diagnosis of tubercular systemic infection. The involvement of the meninges, especially, gives symptoms not easily distinguishable from mountain sickness, and this may lead to serious error in prognosis.

The **treatment** must be based upon the patient's general condition. He should be put to bed at first, and kept on either a very dry diet, with water given only between meals, in small quantities sipped slowly, or on a completely liquid diet, taken in small quantities, sipped slowly. As the symptoms diminish he may take more food. The iron-containing foods are needed.

A patient whose physique is poor, especially those who are tubercular, should be sent to lower altitudes if the symptoms do not clear up within a few days—or even earlier, if the symptoms are severe.

Susceptibility to mountain sickness may be based upon low hemoglobin, weak heart, valvular lesions, "nervous" heart; bony lesions affecting the cardiac, gastric, or vasomotor centers; chronic inflammations affecting the middle or inner ear. Suitable treatment for these conditions may enable the individual previously susceptible to mountain sickness to live comfortably in high places.

SEASICKNESS

This is a disease due to irregular motion of the body, characterized by nausea and usually vomiting, sometimes intense headache, and always very severe sensations of extreme illness, which are indescribable.

Etiology. Primarily, the illness is due to the motion of the boat. Predisposing causes include disturbances of the digestive tract and the nerve centers. Bony lesions of the upper cervical region are important factors. Seasickness is "no respecter of persons," and people in excellent health may succumb while those of deficient vitality remain comfortable; the opposite relation is also true. The same person may be free for many voyages, only to succumb at some more or less unpleasant time. Usually one becomes exempt after a few hours or days, but some people never become adapted to the motion of a boat. No doubt the odors and sights are also factors, though these are popularly exaggerated.

Carsickness is the same disease, appearing among those riding upon swaying railroad coaches.

Pathogenesis. The disorder is probably due to the effects of the motion upon the vestibular nerves, and the effects of this irritation upon the visceromotor centers in the basal centers and the medulla.

Treatment. Rest in bed with plenty of fresh air is the best thing. Plentiful liquid intake is good in some cases, very dry diet, eaten slowly, gives good results. "General treatment" often terminates an attack.

Prophylaxis. Before voyage, the digestive tract should be known to be clean. The cervical region should be examined and lesions corrected; also the thoracic.

Prognosis. The disease terminates with the voyage. Elderly or weakly persons may die, though rarely.

RAYNAUD'S DISEASE

(Symmetric gangrene)

This is a disease apparently affecting the vasomotor nerves, and characterized by circulatory disturbances and later gangrene of the peripheral parts of the body, especially the fingers and toes.

Several grades of the affection have been described. In none of these is a satisfactory **etiology** known. Exposure to cold is the most common. The condition resembles "frost-bite" slightly.

Diagnosis. Very early in the course of the disease, variations in the size of the pupils and especially dilatation affecting both pupils is noticed. **Local syncope** is characterized by pallor and numbness of the fingers of both hands. There may be neuralgic pains and peculiar sensory disturbances in the arms. These attacks may be precipitated by cold and occur more frequently during the autumn and spring seasons. Such attacks may be caused by emotional disturbances. **Pseudo-Raynaud's** is hysterical local syncope. It is not followed by gangrene.

Raynaud's disease is certainly due in some cases to lesions of the third and fourth thoracic vertebræ and the corresponding ribs. Several very typical cases have been reported in which recovery has followed correction of such lesion. In one case at least, no recurrence has appeared for ten years after such correction. (P. C. O.)

Local asphyxia is a more severe grade of the vasomotor disturbance. The fingers or toes are blue and edematous; there is much aching, especially after the attack passes away. This condition may affect the tips of the ears and the nose, as well as some other parts of the body more rarely. Hemoglobin may be found in the urine. Trophic changes characterized by ridges upon the finger nails and by skin lesions of the affected part may be noted. Following this, **gangrene** may appear. The fingers soften, blebs appear under the skin and unless recovery occurs speedily, the fingers fall off. Autolytic enzymes digest the dead tissue which may dry away, leaving the fingers mummified (dry gangrene).

The injured part may drop off, leaving a stump. This may heal over and the progress of the disease be stopped.

The **treatment** consists in thorough corrective work applied to the upper thoracic and cervical spine. General measures for increased nutrition are helpful. In the first and second stages, the prognosis is very good; and even after considerable destruction of tissue, the progress of the disease may be stopped and the patient make remarkably good recovery.

ANGIONEUROTIC EDEMA

This is a disease of unknown cause, characterized by the sudden appearance of localized swellings of the skin or mucous membrane.

Aside from a slightly neurotic tendency on the part of these individuals, nothing of etiological importance can be found. The disease rarely affects females and is most likely to appear during early adult life.

The edema usually appears suddenly and disappears with equal rapidity. Any part of the body may be affected. In a few instances, edema of the glottis has caused death. Aside from the annoyance due to the presence of the swellings upon the face, hands, or other parts of the body, no evil results are usually present.

The treatment should be directed to the underlying neurotic condition. The prognosis is uniformly good.

SUNSTROKE

(Insolation; thermic fever; heat-stroke; coup de soleil; siriasis)

Sunstroke is an attack due to excessive heat, and characterized by marked increase in the body temperature, rapid heart, syncope,

coma, delirium, or other nervous symptoms, and sometimes by symptoms referable to hemorrhages in various parts of the body.

Etiology. Among the contributing causes may be mentioned excessive bodily fatigue, depression due to long exposure to the heat; insufficient food and the overuse of alcoholic drinks. In true sunstroke the brain shows parenchymatous degeneration. After death, the whole body is found in a state of venous congestion, the left ventricle firmly contracted and the right heart and vessels engorged with dark fluid blood. Rigor mortis is early and marked.

Sunstroke is properly applied to those working under the direct rays of the sun; the violet rays, as well as the red rays, are active. Men who work hard, and are heavily clothed, are especially liable to sunstroke. Farmers and soldiers on the march suffer in this way.

Heat Stroke or Thermic Fever occurs in men who work hard in intense heat, but in dim light. Bakers, engineers, firemen, are very liable to heat stroke. In all these cases the temperature of the body is high.

Heat Apoplexy may occur under any of the preceding conditions. There are some prodromal symptoms referable to the heat, dizziness, visual disturbances, and dyspnea. Sweating may cease; the patient may fall in coma or convulsions, and die immediately; or he may remain convulsive or delirious and recover in a few days, or finally die as the result of the injury. The temperature rises very high, reaching 115°, or more, in fatal cases. Such temperature, maintained for more than a very few minutes, must coagulate the globulins of the entire body and render death inevitable.

Heat Prostration has milder symptoms, unconsciousness does not occur, and recovery is to be expected.

Heat Cramps, myospasm, due to direct injury to the muscle cells, occur in men whose work is hot and exhausting—stokers on steam ships, for example. The calves are most affected; they contract rigidly with much pain. The paroxysms last less than a minute, and recur almost at once; the attacks may last a day or longer; recovery is attended with soreness and exhaustion.

In any form of heat injury, the blood is dark, thin, either feebly alkaline or slightly acid and the coagulation time is exceedingly slow or absent. The blood pressure is low.

It is important to distinguish between sunstroke and heat exhaustion, and also between these and alcoholic coma, apoplexy and epilepsy.

The **sequelæ** include headache, vertigo, insomnia, inability to bear high temperature, loss of power of concentration, failure of

memory, peripheral neuritis, epilepsy, mental enfeeblement, monoplegia, paraplegia, or hemiplegia.

Treatment. Remove the patient to a cool place, place in the recumbent posture with the head low, loosen clothing, stimulate the respiratory and cardiac spinal areas from second to fifth dorsal and directly over the heart. In hyperpyrexia cold douching to the head is the first indication, with strong relaxation of the cervical muscles. Remove to a hospital as soon as possible where cold baths, cold pack, or rubbing with ice can be used until the temperature is reduced. Cold enteroclysis or hypodermoclysis may be used. Keep the whole spinal musculature relaxed as the muscles are usually very contracted, paying particular attention to the cervical region. Tonic treatment is necessary during the stage of depression and during convalescence.

Prognosis. Hyperpyrexia has unfavorable outlook, death resulting in one half to several hours in many cases. Permanent injury results if death is avoided.

The unfavorable indications are: increased temperature, cardiac failure, convulsions, absent reflexes, followed by complete muscular relaxation.

The favorable indications are: decline in surface heat and in axillary and rectal temperature, stronger pulse, increased depth of respiration, restored reflexes, and return of consciousness.

HEAT EXHAUSTION

This is a state of asthenia or collapse due to overwork in hot, usually dark and unaired places, such as furnace rooms, foundries, etc. It may also occur in weak children or older persons, in hot, unaired rooms, especially in tenement districts. The exhaustion of the vasomotor, heart and other nerve centers is due to the increased viscosity and toxicity of the blood, resulting from increased perspiration and diminished urine and other secretions. Fatigue, any form of toxemia, alcoholism or other drug-taking, weakening diseases, mal-nutrition, all predispose.

Diagnosis. The most important symptom is the hypothermia, sometimes to 95° F. or even lower. Marked pallor, weakness, vertigo, syncope or delirium, weak pulse and low blood pressure are characteristic. The skin is clammy; symptoms of apoplexy may occur. Death may be sudden or delayed for hours, or recovery may occur.

Treatment should be stimulating. The patient should be placed in bed, if possible; plenty of fresh air is essential. Warmth is necessary; heat may be applied to feet and body. Liquids must be speedily added; hot drinks, tea, coffee, hot lemonade, warm

enemas, sometimes hypodermoclysis or enteroclysis are to be employed for this purpose. Friction of the limbs should be vigorous.

The heart centers are stimulated by work in the upper thoracic and cervical region, and over the apex region; the ribs are to be raised and the flexibility of the thorax increased; pressure over the liver, suddenly released, is useful.

A warm bath and warm enema may be given, if convenient. The patient should be put to bed, if possible, or placed in a reclining position, with fresh air, warm covering, and heat at feet and perhaps near the body. Friction over the limbs is useful. In applying friction and heat, the danger of injuring the skin of an unconscious person must not be forgotten. Drugs and alcohol are dangerous. Hot drinks, such as broth, tea, or coffee may be freely given; it is necessary to add liquids to body rapidly.

With returning consciousness and increasing heat, chilling and overwarmth must be equally avoided.

Sequelæ. The symptoms of the attack persist for some time, in severe cases. The patient must avoid overwork and overheat for some months, and may be unable to endure extremes of heat for several years. Frequent bathing, wholesome food, the avoidance of alcoholic drinks and of excessive heat, should diminish the tendency to recurrence.

SNOW BLINDNESS AND DELIRIUM

People who are exposed to the glare of snow and ice, especially in great cold, suffer from a peculiar ocular disturbance, due to the effects of the constant strain upon the eye muscles which are often totally unable to protect the retina from the evil effects of excessive light. The ultra-violet rays are especially disastrous in the glare from the snow. The glare from the desert and the glare from the electric lights give similar but usually less disastrous reactions. Blindness may occasionally persist, but it usually disappears with rest from the intense light. It may be necessary to wear dark bandages for days, and to remain in a dark room, and then to wear dark glasses for weeks or months, after a severe exposure.

The effects produced upon the entire system, and upon the mind, by the glare and the snow, may be serious. The isolation of individuals in the extremes of Arctic and Antarctic latitudes, the difficulty of securing proper foods, the desolation of the surroundings, all tend to develop a mental and physical depression. The mental effects include increasing irritability, and a sense of the unreal; hallucinations are frequent, and quarrels among friends are not rare. Gastro-intestinal disturbances are sometimes due

to poor food, but appear to be inevitable even with good food. Constant nausea, vomiting and diarrhea are usually associated with scurvy; attacks of these symptoms occur without recognizable causes. The cold air leads to various pulmonary diseases, especially tuberculosis and pneumonia.

All symptoms disappear rapidly with return to the latitudes to which the patients have been accustomed. Colored glasses prevent the trouble to some extent.

DESERT SICKNESS

The intensely dry air of the desert, plus the desolation and isolation, the glare of the sunshine, and the intense heat, often affect those who first visit the desert. The effects are more pronounced in the higher altitudes.

Nausea, vomiting and other symptoms of mountain sickness are frequent. The dryness causes roaring of the ears, which may be severe. Increased thirst leads to the drinking of too much ice water, if it is available, and gastritis may result; the condition is more severe if alcoholic drinks are used.

The quivering light rays lead to hallucinations; this is magnified by the occurrence of the mirage, with its strange and varying pictures.

If water is lacking, the symptoms are serious. In the dry air, the mucous membranes dry out rapidly, and the effects are apparent in every organ of the body. Delirium results rapidly. The mirage is not recognized, and a wild dash for the water and greenery thus seen often leads to hasty death. A peculiar effect is the tendency to remove the clothing; shoes are thrown away, the hat, and ultimately every thread of clothing is removed. Death occurs from exhaustion.

SIMPLE CONTINUED FEVER

(Febricula; irritation fever; ephemeral fever)

Simple continued fever is an acute, noncontagious disease of short duration and of mild type unattended by characteristic lesions, occurring most commonly in childhood and arising from gastro-intestinal disturbances, mental or physical fatigue, excitement, emotion, or exposure to high degrees of heat or cold.

Diagnosis. The onset is sudden, may be ushered in with nausea and vomiting, convulsions or chill. There is great lassitude, temperature rises suddenly to 102° to 103° F., accompanied by headache, increased respiration, quick, tense pulse, dryness of the skin, thirst, coated tongue, constipation and febrile urine. Delirium may be present. There is no characteristic eruption; herpes is common on the lips.

The duration is short, if lasting for a day and completely disappearing is called ephemeral fever; if persisting for three or more days without any local affection, it is then called febricula, or continued fever. The affection terminates by lysis or crisis, and convalescence is rapid.

Treatment. Rest in bed is the first consideration. Then a gentle, thorough spinal treatment from occiput to coccyx, paying particular attention to the thoracic area and adjusting every deviation found, and lastly giving direct manipulation to the abdomen to secure free elimination. An enema may be given at first. The diet should be liquid, preferably fruit juices and plenty of water.

Prognosis. Recovery occurs without after-effects. Future attacks are prevented by the correction of hygiene, diet, and regulation of hours of play.

ANAPHYLAXIS

This condition has not been sufficiently studied to warrant its classification. It appears to be a factor in the pathogenesis and symptomatology of certain infections, certain cases of hay fever and asthma, proteid poisonings, autointoxication, urticaria, and in some cases of personal idiosyncrasy. Its importance increases with the tendency to employ serums in the treatment of disease.

Foreign proteids in the blood stream produce sensitization within a few days to a few weeks. The amount injected is not important; either extremely minute or very large doses appear to produce equal effects. After this sensitization, further injections of this proteid may produce immediate and very serious symptoms, including respiratory and circulatory disturbances, urticaria, syncope, paralysis, and other nervous symptoms, diarrhea and vomiting, and often death within a few minutes or several hours.

Sensitization persists throughout life, and may be transmitted from mother to offspring. Both the sensitizing and the activating doses may gain entrance into the body in one or more of several different ways. Recently the use of serums in diagnosis, prophylaxis, and therapeutics is responsible for injection of foreign serums, usually horse serum, directly into the circulation. Inhalation may be efficient as in cases of asthma from association with horses. Absorption may occur through abrasions but not, apparently, through healthy skin. Absorption may occur through the walls of the alimentary tract, as in urticaria from eating strawberries, shell-fish, or other articles of food by persons sensitive to them. In this case it may be that the products of imperfect digestion of the foods are the efficient agents, rather than the proteids of the foods themselves.

CHAPTER XXXI

CHRONIC DRUG POISONING

GENERAL DISCUSSION

For the recognition and treatment of accidental and suicidal poisoning, books on toxicology must be consulted. But chronic poisoning often confuses the diagnosis of organic disease, and is so often associated with organic disease, that a short description of the more common of these is included in this volume.

Generally speaking, the treatment of the chronic poisonings depends upon stopping the intake and hastening the elimination of the drugs. It is rarely harmful to stop the drug suddenly; in a very few cases its gradual diminution may be necessary on account of the weakness of the patient. Elimination may be hastened only by the use of the milder measures—the use of emetics and purgatives is limited to the acute poisonings. Antidotes are rarely of value in the chronic cases, since in these the drug is within the fluids of the body, and probably in some cases within the cells themselves. The treatment finally narrows down to the efforts made to keep the eliminating organs in the best possible condition, and to keep the blood flowing as rapidly, with normal pressure, as possible. It is necessary in some cases to provide new blood cells as rapidly as possible. This is secured by good food, good circulation through the red bone marrow, and the usual treatment for secondary anemia.

It is suggested that the organs of elimination might be induced to work beyond their normal capacity. This is possible, for a short time, but a reaction is bound to occur, so that the ultimate efficiency of any organ is lessened. In acute poisoning, the rapidity of elimination may be so necessary that the later inactivity of the eliminating organs becomes a negligible matter; in chronic poisoning, the need for good elimination persists for days, sometimes for weeks, and any attempts to stimulate liver, kidneys or bowels to greater activity, by adding yet other poisonous substances to the blood circulating through them, must ultimately interfere with the elimination of the poison for which the treatment is being planned.

Just normal structure, just normal blood, flowing freely under normal pressure, just normal innervation, are necessary to enable the organs of elimination to throw out from the system those substances which they are capable of handling.

So the treatment for chronic poisoning includes the correction of structural perversions which prevent normal activity of the

eliminating organs; such washings of the colon as may be necessary to remove the accumulating feces; such increased drinking of water, and of fruit and vegetable juices, and such eating of good food, as may be necessary in order to provide fluids and foods for the body. Fresh air, in abundance, exercise in the open air, and all hygienic conditions, enable the elimination processes to go on more rapidly than could be the case under unhygienic conditions.

ALCOHOLISM

Alcoholism is the term used to designate the physical and mental phenomena induced by the use of alcoholic liquors, and occurring in several distinct forms.

Etiology. Heredity, local and family custom, the use of alcoholic and other drugs in infancy; occupation, those handling liquors; social association; and the physical depletion due to improper food, the use of other drugs, worry and overwork, all tend to establish the habit.

Morbid changes are numerous and affect nearly every portion of the body; including chronic nasal, oral, esophageal, gastric or gastro-intestinal catarrh; fatty and cirrhotic liver; arteriosclerosis, dilatation of the heart; and interstitial nephritis. The nervous system is especially liable to suffer. Peripheral and multiple neuritis, pachymeningitis, myelitis, apoplexy, and degenerative brain lesions occur. The germ cells in both sexes are affected.

Certain peculiar forms of alcoholism may be mentioned. The use of the cheaper grades of whisky leads to poisoning with wood alcohol, in which blindness and visual disturbances are common. Cheap drinks are sometimes mixed with other poisons, each of which may modify the picture presented by uncomplicated alcoholic poisoning.

Women sometimes use Cologne water, or other alcoholic extracts, for stimulation. A warm bath, perfumed by any of these, may give enough inhaled alcohol to produce recognizable effects. Alcohol used in the arts and the trades may give off fumes enough to result in poisoning. Jamaica ginger is taken as a drug, but really for its alcohol; the use of patent medicines containing alcohol is, fortunately, diminishing.

Absinthe is a peculiarly deadly liquor, made from wormwood and alcohol. It gives greater exhilaration than alcohol alone, with more profound depression and more violent delirium. Its effects upon the nervous system are more profound than are those of alcohol in other forms.

Acute Alcoholism (Temulentia; drunkenness or alcoholic intoxication). The ordinary forms do not often come under treatment unless at a receiving hospital. Alcoholic coma (dead drunk)

is important as it may be confused with more serious conditions. The breathing is stertorous, the face bloated and congested, the lips swollen and purplish, the pulse feeble and slow, the temples depressed, the skin cold and clammy, the pupils dilated; frequently control of the sphincters is lost. It is too often confused with cerebral hemorrhage, uremia, brain injury and coma from other causes.

Von Wedekind's test is: "By simple pressure on the supra-orbital notches with a steadily increasing force one may, with certainty of success, bring an unconscious alcoholic to his senses, and thus differentiate between alcoholic and other comas."

Treatment. Emergency treatment is given, according to circumstances. Wash out the stomach. Hot coffee may be given by the stomach tube. Alternate hot and cold applications should be made to the skin. Vigorous stimulation of the upper thoracic area is necessary if the heart and respiration are failing. If the diagnosis is at all doubtful, physical diagnosis, urinalysis, and blood, retinal and other examinations should be made to reveal the true condition.

The odor of alcohol upon the breath is of no value in diagnosis; abstemious men may drink when symptoms of coma appear. Coma cases should be considered serious until a diagnosis of alcoholism is demonstrated. The common view that a drunk man is immune to abuse is responsible for much injury. More humane care of the drunk, followed by further measures for cure of the habit would work almost as much of a revolution as did the establishment of similar measures in the care of the insane.

Mania a Potu (Crazy drunk) is a state of transitory, acute, often homicidal mania which occasionally replaces ordinary intoxication in those of neurotic temperament. It must be distinguished from acute mania. Wash stomach and colon, unless vomiting has been free and has ceased. Give much hot water, weak tea, lemonade, and diluted fruit juices. Restraint may be necessary, but must be made as nonirritating as possible. Chloroform may be required in violent cases, when restraint is difficult. The paroxysm is short, and terminates in stupor, from which the patient awakens with no memory of his storm.

Heavy extension of the neck, with the sudden correction of whatever lesions may be found, employing strong movements, has been known to terminate suddenly the paroxysm, and produce sleep. After an attack, the knowledge of things done and the dangers incurred during the paroxysm may serve good educational purpose.

Dipsomania (Oinomania) is a true mental disease manifested by periodic attacks of excessive alcoholic indulgence or this may be replaced by other irresistible desires such as lead to the com-

mission of crimes and the gratification of depraved appetites. During the intervals the patient may neither wish nor crave alcohol. Imbecility and dementia frequently follow.

Chronic Alcoholism. After months or years of alcohol using with no serious effects, the symptoms begin with nausea or a feeling of sinking in the morning, soon followed by morning vomiting. The tongue is furred and tremulous, the appetite fails, and the bowels are first constipated, then loose. Later, the hands become tremulous, muscular power is diminished and the gait may become ataxic. The patellar reflex is lost. Insomnia or disturbed sleep is common. Sensory disturbances of nearly every kind are found in different individuals. The mental state is expressed by Korsakoff's syndrome—weak memory, weak morals, weak will. Hallucinations of sight and hearing may arise. Some cases end in dementia, others in cirrhosis of the liver or kidneys, cardiac failure or meningitis.

Delirium Tremens occurs in habitual drinkers and may be excited by injury, shock, exposure, prolonged debauch, abstinence from proper food, or in the course of acute diseases. The onset is accompanied by irritability, restlessness and disturbed sleep. Tremor is marked especially of the small muscles of the hands, face, and tongue. The patient talks to himself or answers imaginary voices. In a day or so, visual hallucinations of moving animals appear from which he tries to escape. Illusions of smell and hearing may also appear. Paresthesias of various sorts may be present. Noisy delirium may appear. Perspiration is abundant; the temperature is somewhat elevated, rarely above 103° F.; the pulse is rapid and soft and easily compressible. There is complete insomnia. Sleep usually returns about the third to the fifth day, from which the patient awakens sane and hungry and convalescence begins.

Should the delirium subside into a low muttering type, with subsultus tendinum, dry cracked tongue, regurgitation of a dark brownish and bilious matter, an early death is to be expected, in coma, convulsions or from exhaustion.

The urine is often albuminous and contains casts, kidney cells, blood. The blood may show leucocytosis at the height of delirium tremens.

The four diagnostic points of chronic alcoholism are: insomnia, morning vomiting, muscular tremor, causeless mental restlessness. It is to be distinguished from general paralysis, disseminated sclerosis, paralysis agitans, locomotor ataxia, cerebral and spinal softening, epilepsy, dementia chronica, and nervous dyspepsia.

All forms of chronic alcoholism require scientific institutional care to build up the patient physically and morally.

Prognosis. Acute alcoholism has good outlook if the patient is manageable. Chronic alcoholism tends to shorten life by producing morbid changes in the vital organs. Delirium tremens produces liability to heart failure or death through a gradually deepening coma. Acute lobar pneumonia is a very fatal complication in any form of alcoholism.

MORPHINISM

(Morphine habit; morphinomania)

Morphinism is a term used to designate the phenomena following the habitual use of opium, especially of its derivative, morphia.

The habit usually originates in use for the relief of pain. The ordinary narcotic effect is succeeded by euphoria and exaltation, with quickening of the mental processes; this lasts for a limited time and is in turn followed by profound depression. Brain workers are especially liable to fall victims of the habit which has been greatly on the increase in this country. Doctors of medicine and nurses are frequent victims.

Diagnosis. The victim usually presents a characteristic appearance; has a sallow, hard, wrinkled skin, is prematurely aged, emaciated and of cachectic appearance. Variable, occasional colic, alternating constipation and diarrhea, chills followed by profuse sweating, variable fever, itching of the skin, restlessness, exaggerated sensibilities, disturbed sleep or insomnia, are the usual symptoms. The reflexes are at first increased; later abolished. The pupils are contracted just after a dose and dilated, sometimes unequally, in the intervals. Patients are remarkably untruthful and ingenious in concealing the habit.

If a patient shows evidences of malnutrition without cause, has some fever, pruritis, and the appearance above indicated, it is well to examine the urine or washings from the stomach for morphia. Death may be due to progressive asthenia, intercurrent disease, or to accidental or intentional overdose.

Acute Opium Poisoning (Opium narcosis) is due to an overdose and may occur in habitues as well as with nonusers. The first symptoms appear within five to forty minutes. In subjects of alcoholic mania, it may be followed by sudden and complete coma. The onset is usually abrupt; the patient may be talking one moment, the next be profoundly unconscious; the jaws, at first fixed, are, later, relaxed. The pin-point pupils do not react to light, and sensation is lost in the cornea.

The respiration drops to 10, perhaps 4, per minute; the heart action is weak, the pulse feeble and well nigh imperceptible, the face is pale, sometimes cyanotic, the skin is dry or bathed in perspiration. The coma is profound. When partially aroused, speech

is incoherent and the patient relapses quickly. There is retention of urine and later vesical tenesmus. The tongue may drop back into the pharynx. Respiration is stertorous and the cheeks flap. Under successful treatment, the coma lessens, the color and pulse improve. Relapses are frequent and days may elapse before the patient is out of danger. Diagnosis must be made from coma of uremia, alcohol, sunstroke, and cerebral hemorrhage.

Morphia may be isolated from the urine and from the stomach contents.

Treatment. In opium narcosis, the main thing is to prevent coma, hence walking the patient, and elimination by all possible avenues, hot and cold sprays, sharp blows upon the skin, anything to keep him awake, are indicated. Give strong, stimulating movements to the cardiac areas; raise the ribs and give shaking movements to the lower part of the thorax; extend the cervical spine. If convenient, electric stimulation of the skin may help. As much strong hot coffee as the patient can swallow helps to overcome the narcosis. When the breathing becomes regular and the heart strong, he may rest, but not sleep for several hours. For two days he must be watched. Toxic symptoms may appear at any time for several days.

Chronic morphinism must receive institutional care, as a rule. The habit depends partly upon the existence of an antibody which results from the use of the drug, for which the morphine itself is an antidote. In order to rid the system of this poisonous antibody, it is necessary to promote elimination in every possible manner. This, with the fact that absolute control of the patient is necessary to keep the drug away from him, at first, renders the home care of such patients most difficult.

It is best to take the drug away at once, in all but a very few badly depleted persons, and from them within a few days. There is not apt to be any appetite, and food is denied, anyway. Free drinking of water or diluted fruit juice is necessary, the colon washed, sometimes the stomach, if nausea and vomiting are bad; very heavy treatment for the rigidity of the thorax and the lower thoracic spine are helpful. Baths, hot and cold sprays, massage, should keep the patient occupied with something practically all the time during his wakefulness. It may be necessary to use some purgative drug at first, this is to be avoided if possible. The patient must not be permitted access to the drug until his entire body is clean and strong, and he has shown evidences of recuperated will power as well as body strength.

Prognosis. Few habituated morphinists recover, alone. Those who receive proper care may overcome the habit permanently.

COCAINISM

The cocaine habit is frequent, especially in the southern states. It is used by morphinists, after the morphine has become too expensive or hard to procure. Its use is indicated by emaciation and mental disturbances. Moral perversion develops rapidly. There is frequently a sensation of sand under the skin. If unchecked it leads to melancholia or mania.

Its treatment is even more difficult than the morphine habit, with which it is frequently associated. Its use by boys who show other signs of degeneracy makes the prognosis still more serious. It is rather widely used among artistic and literary people of neurotic type, and in these it terminates suddenly with marked mental and nervous disturbances, total inefficiency, and death after a variable period of invalidism.

LEAD POISONING

(Plumbism; saturnism)

Lead poisoning is a common occupational disease, the lead entering the system by deglutition, inhalation, and absorption through the skin. It is eliminated principally by the bowels and kidneys.

The morbid changes affect the whole body especially the nervous and the circulatory systems, and the blood.

Acute Lead Poisoning usually results from lead acetate or subacetate being swallowed by mistake. The chief symptoms are sense of constriction in the throat and at pit of stomach, crampy pains around the umbilicus, and stiffness of the abdominal muscles.

Treatment is sodium sulphate, magnesium sulphate or alum dissolved in water to form the insoluble lead sulphate. Emesis is indicated.

Chronic Lead Poisoning. Among the first symptoms are anorexia, constipation, a metallic taste in the mouth mornings, tendency to headache, fetid breath and coated tongue. The patient becomes morose, apathetic, and irritable. Saturnine cachexia appears, the face becoming progressively pale and sallow. The blue-black line, the specific symptom, is seen at the margins of the gums; if no teeth, no blue line.

Lead Colic (Painter's colic; Devonshire colic; colica pictonum). This is of sudden onset and is briefly outlined as follows: There may be acute or superficial, paroxysmal pain centered about the umbilicus accompanied by tenderness and more severe on one side; or, constant deep-seated pain with retracted abdomen and constipation. The pulse is slow, of high tension, and sometimes unequal in the two wrists. Vomiting is frequent. The attack

usually passes off in about three days but may be frequently repeated.

Lead Paralysis (Paralysis saturnina; lead palsy). This frequently appears as a bilateral **wrist-drop** in which the extensor muscles supplied by the musculo-spiral nerve to the fingers and wrists are affected, the hands hanging flabbily at the sides. The supinator longus and extensor metacarpi pollicis also supplied from the musculo-spiral usually escape.

Ankle-drop (Peroneal paralysis) may be present instead of the brachial variety. Occasionally both are seen in the same patient. Paralysis of the upper arm muscles and Aran-Duchenne type of paralysis are less frequent. In all forms, muscular atrophy is rapid and the reaction of degeneration present. Pain is slight or absent.

Cerebral symptoms may appear, as optic neuritis, delirium with hallucinations, tremor, and headache.

Encephalopathy Saturnina is less common. It is most frequent in women. It is marked by severe headache followed by either delirious, convulsive, or comatose symptoms.

The delirium is at first tranquil, becoming later furious and paroxysmal, with intervals of quiet. Later, true sleep follows with complete restoration, or coma, ending in death. Rarely, insanity and amaurosis may be permanent.

Arthralgia (Arthralgia saturnina) is not uncommon. There are often severe, tearing, burning, paroxysmal pains with exacerbations and remissions, present in the joints and contiguous muscles. The knee is most commonly affected. Gout is frequent among lead workers.

Pregnant women abort or have still-births. If children are born alive, they usually succumb in infancy.

Lead poisoning may result in contracted kidney, hypertrophy of the heart, and arteriosclerosis.

Lead may be isolated from the **urine** in minute quantities. Hematoporphyrin has also been found.

The **blood** shows a moderate grade of anemia. The red cells do not usually fall below 50% but show basophilic granular degeneration of large numbers of cells and nucleated reds are constantly present. There may be a slight increase in the diameter of the reds; megaloblasts are sometimes seen and their rigidity is increased. The white cells are practically normal.

Treatment. Lead colic requires rest in bed, hot applications, enemas and the usual treatment for colic. Change of occupation is very desirable in chronic lead poisoning preferably to some active outdoor pursuit. Paralyzed limbs require treatment at the spinal source of nerve supply and local treatment to keep the

circulation active. Saturnine encephalopathy is best treated by securing free elimination as rapidly as possible. In rare and exceptionally severe cases, lumbar puncture may be necessary.

Prophylaxis. All lead works should teach their employees the dangers of uncleanliness, should provide means of thorough cleanliness and should use every precaution possible to keep the amount of lead dust at a minimum. The employees should keep their hands and finger nails clean, bathe frequently, and use respirators when it is necessary. Painters must be very careful about eating with unwashed or poorly washed hands.

MERCURIALISM

(Chronic mercurial poisoning)

This is chronic poisoning, by mercury, of persons who may be susceptible to its effects. Its presence from the use of mercury as a drug is diminishing rapidly, on account of the less frequent use of calomel in medicine. Those who work in smelters, or mines of quicksilver, or who make thermometers, mirrors, certain pigments, etc., breathe in the vapor, even should their hands be kept scrupulously clean. Mercury is still used in drugs, and thus a few cases are yet found, of poisoning therefrom.

Diagnosis. It may be difficult to distinguish between this poisoning and late syphilis, especially since the drug is used in treating the infection. The symptoms of mercurialism include salivation and stomatitis, loosening of the teeth, softening of gums, with ulceration and necrosis of the jaw, brittle nails, brittle and falling hair, anemia, gastrointestinal disturbances, tremor, aphasia, paralysis, confusional insanity, various sensory disturbances, including severe pains in the legs and in other parts of the body.

The **treatment** is chiefly the removal of the possibility of further poisoning. The drug is eliminated slowly from the body, and structural lesions never are repaired. The usual treatment for chronic poisoning is to be adapted to the condition of the patient on examination.

Prognosis depends upon the amount of structural injury. Recovery is slow, at the best.

ARSENICISM

(Chronic arsenic poisoning)

This is a slow poisoning by arsenic. It is taken into the body as a drug, especially for its effect upon the complexion, and in the medical treatment of anemia; it may be an occupational disease, as in those who work in smelters, dyers, makers of wall

paper, rugs; or who embalm animals or prepare hides and furs, or who use arsenic in their work in any way. Those who live in poorly ventilated rooms whose walls, rugs, and ornaments contain arsenic may suffer arsenic poisoning—this form is less commonly found than before. Children who drink the milk from cows that feed upon the grass wet by the rain, in air polluted by smelters, may suffer from arsenic poisoning.

Diagnosis. Arsenic poisoning should be suspected when the following symptoms appear: a gradually increasing neuritis, affecting the legs first; mild and constant catarrhal gastritis; headache and vertigo; mild nephritis. A slow anemia, with waxy skin, bright eyes, with little or no loss of weight are usually present in varying degrees, and should lead to a urinary test for arsenic; this may have to be several times repeated before the positive reaction is secured.

Treatment. The immediate removal of the arsenic is indicated, though this may be followed by symptoms of increased intoxication. Later treatment to provide for increased nutrition may be necessary.

HEADACHE MEDICINES

Many very different medicines for the relief of headache and other pain are in constant use. Their effects are variable, but mostly include low blood pressure, erratic and fleeting pains in the nerves and muscles, hypersensitiveness of the skin and deeper tissues, and diminished powers of resistance to the ordinary emergencies of life. Mental effects are mostly included in an increasing loss of attentiveness and memory, and progressive inability to endure any pain or discomfort.

The habit is extremely obstinate. The effects upon the heart, the nervous system or the stomach, according to the particular nostrum affected, may cause influenza, pneumonia, or other disease to be speedily fatal. Comfort and efficiency are lowered throughout life, and much suffering ultimately results from this pernicious habit.

It is sometimes possible to recognize these drugs by urinalysis. A deep purple, blue or red color appears upon the addition of a few drops of a saturated ferric chloride solution to the urine. A negative reaction has no significance; and there are many drugs which may give a positive reaction.

CHAPTER XXXII

FOOD POISONING

GENERAL DISCUSSION

Poisons which enter the body with foods, or foods which as the result of bacterial or other changes become transformed into poisons, are receiving more than usual attention just now, since the comparative prevalence of pellagra is recognized.

The chemical differences between foods and poisons are often very slight. The bacteria which invade food may change its molecules from food to poison, rarely without changing recognizably the taste or the appearance. Bacteria may be taken into the body with the food, and acting upon them in the intestinal tract, may form poisonous compounds slowly, which are thus enabled to be absorbed into the blood stream without arousing inflammatory reaction, and cause death. Other materials are acted upon, either by autolytic enzymes, or by perverted digestive juices, in such a way as to become poisonous. It is not possible to deny absolutely that these cases are not really due to bacterial action, but there are several reasons for supposing that the reaction is sometimes due to an enzyme rather than to cellular activity.

Other substances which are foods for one person may be poison for another. Personal idiosyncrasies cover many puzzles. There are yet other instances in which the too constant use of some single class of food, itself desirable, perhaps necessary, results in disturbed metabolism and finally symptoms of intense poisoning. In many diseases, especially of the digestive tract, it is probable that the place in the symptom complex due to the absorption of perverted food molecules is a very large one; the diseases and deaths due to the absorption of poisonous compounds from foods at all times are probably more than we now realize.

Diagnosis. The recognition of acute poisoning by food must be based upon the symptoms, plus the history. Speedy evacuation of the entire digestive tract is urgent, and this must be secured in any way that does not injure the membranes. It must not be forgotten that an inflamed membrane may take up more poison than a normal membrane. There is a protective action of normal intestinal membrane, for certain poisons, which may be destroyed by too urgent purgation. If the material is still in the stomach, the stomach tube may remove it completely; later, purgative medicines that are least irritating should be used. The constant and free use of the enema is indicated in all cases; prac-

tically no absorption takes place in the lower bowel, and the constant removal of this material promotes peristalsis of the upper part of the digestive tract.

After the poison has been absorbed, it must be removed by liver, kidneys, lungs and skin. Circulation must be kept active by stimulating manipulations, hot and cold spray, friction of the skin, etc. Body heat must be artificially maintained in some cases —friction, hot coverings, packs must be freely employed. These also promote oxidation and elimination. The patient should drink very freely of hot or cold water; if he is unable to do this, sterile normal salt injected into the subcutaneous tissues is absorbed into the blood stream, eliminated by the kidneys, and thus much poison is carried away.

When the intestinal tract is cleaned, the systemic symptoms may be severe. Fever is combatted with the ordinary methods— suboccipital and mid-dorsal inhibition; baths; collapse requires stimulating manipulations affecting the heart centers, raising the ribs, stimulating the liver and spleen, and plenty of hot drinks and warm clothing, with hot water bottles. Convulsions may need the neutral bath, friction, rarely chloroform inhalations; parasthesias and paralyses do not require immediate attention.

After the acute attack is over, there probably remains some poisonous material in the system, and the cells of the body have been injured by the poisoning. In order to promote the most complete and rapid recovery, whatever structural changes may have been produced from the illness, or which may have been present before, should be corrected. Free drinking of water promotes the elimination of the remaining poison. The intestinal tract may have suffered from the violent purgation and emesis; rest and bland foods are best for a few days. As soon as conditions permit, the patient should go upon a very largely cellulose diet; this fills and stimulates the intestines; carries no putrefiable material, and little that is fermentable. The digestive secretions receive normal stimulation, the intestines are cleaned, and conditions permit rapid recovery. A certain amount of nutrition, and especially the inorganic salts in organic compounds, is given by this class of foods, and they are excellent to use under all toxic conditions.

PELLAGRA

(Alpine scurvy; Italian leprosy; maidismus)

Pellagra is a disease due to some unknown cause. Several bacteria and protozoa have been described. Lack of vitamins seems important, as is also intoxication from an unbalanced diet, chiefly carbohydrate, and often more or less injured by fermentation. It appeared first in those who eat too much stale and sour polenta in Italy; later it appeared in this country, among those with

various unbalanced diets—excess of cotton seed oil; excess of sugar cane; generally a lack of fresh nitrogenous foods is characteristic. Cases appear in asylums, orphanages, prisons, when the diet is too greatly restricted and too greatly carbohydrate. Insanitary conditions are fairly constant, though a few cases have been reported among people of fairly good homes.

Diagnosis. This rests almost exclusively upon the symptoms. The pathognomonic triad includes obstinate diarrhea with marked cachexia; eruption recurring each spring, mostly on exposed areas, exacerbated in sunshine; and melancholia often of the excitable type, with tendency to suicide by drowning.

The **blood** is of chlorotic type, with leucopenia and a relative excess of large mononuclears. No characteristic symptoms are found in the urine, nor upon physical examination.

"The prodromal stage varies in length, and is marked by clinical symptoms that appear in any disease of microbic origin—general malaise, headache, languor, and mild digestive disturbances. One of the earliest symptoms is an erythema that usually first appears on the hands and feet and that is particularly severe on exposed parts of the body. The eruption comes on suddenly, and manifests itself as a dark, or bright red, diffuse erythema. This may be a simple hyperemia that will disappear on pressure, or a livid congestion that may become hemorrhagic. The skin swells, burns, and itches severely. The rash lasts about two weeks and is followed by desquamation of the epidermis, first in large flakes and then in branny scales. The skin is left pigmented and somewhat thickened, conditions that with repeated annual attacks of the disease are increased. Following four or five such recurrences, the skin atrophies and becomes thin, loose, dry, wrinkled, and pigmented. The area affected by these changes also increases as years go on, until finally the entire body may become involved. The peculiar distribution of the lesion is very characteristic, and seems to point to the sun as an exciting cause, in that the exposed parts of the body—backs of hands, forearms, face, neck, and dorsum of the feet are particularly affected. Sensation is disturbed. Patients describe their feelings as that of flames surrounding them, of hot or cold water being poured over their heads or backs; others, of prickly sensations, formication, etc. In passing, it may be of interest to note that on account of this burning sensation, water has a peculiar fascination for the pellagrins. They like its feeling on their skin; they gaze at it; yet they are lured on by the spell in which it holds them until overcome by nausea and vertigo they become the victims of its charm. With others the sight of water seems to cause a vertigo that temporarily overwhelms them. So strong is this influence on pellagrins that statistics from pellagrinous districts show a striking percentage of deaths by drowning. The extreme sensitiveness of the skin may induce a spasm from so slight an exciting cause as a breath of air or a ray of light. Most victims suffer pain of varying intensity in some parts of the body.

Later Symptoms—The disease appears in the spring, lasts until midsummer, disappears—perhaps completely—during the winter, only to reappear the next spring with increased severity. After two or three years all of the constitutional symptoms become exaggerated. The tongue becomes red and dry, there is a burning sensation in the mouth, swallowing is painful, diarrhea increases, and the patient emaciates rapidly. There are severe headache and backache, tenderness over the dorsal vertebræ, and insomnia. Paralysis of the third nerve is common The reflexes are at first increased and later diminished or disappear. Perverted appetite is frequently observed, and may lead the patient to gluttony or to abhorrence of food. In the late stages of the disease all of the cerebro-spinal symp-

toms are increased. Mild cases may run ten or fifteen years, but the average duration is about five years. In the most advanced cases mental disturbance, in the form of depression, acute melancholy or insanity, adds a stroke that makes the picture more gruesome."—L. M. Beeman.

"The spine was found quite rigid, however, especially in the splanchnic area. The whole of the spine was abnormally rigid, but this I am led to believe is reflex, rather than primary.

"The osteopathic treatment was given every day and often twice per day to overcome this rigid condition and to keep the spinal muscles relaxed. There certainly is no specific osteopathic lesion accounting for pellagra, hence there can be no specific treatment given; but on the same principle that we treat pneumonia, measles, scarlet fever, etc., successfully without recognizing or removing a specific lesion, so we can deal with pellagra. That character of treatment which removes the cause of nerve impingement, or circulatory disturbance, and promotes elimination of disease toxins, is the treatment indicated.

"To that end the diet should be regulated and adapted to each individual case. Corn products were eliminated from the food of my patients, otherwise a light, well-balanced diet was given."—E. W. Patterson.

"The diet I am using on all cases now under treatment, is ten ounces of fresh beef per day and plenty of fresh vegetables, except cabbage, collards, etc., two ounces of sugar in egg custard, absolutely no corn bread, rice, hominy, or grits. It will be apparent to the reader that the purpose of this diet is to eliminate as much as possible the articles of food the patient eats or has eaten as a sole diet; for investigation proves beyond doubt that all pellagrins eat practically the same thing 365 days in the year and that is largely composed of starchy food. I allow them to cook their vegetables with salt pork, but do not allow them to eat the pork.

"In addition to the dietetic treatment, of course, the osteopathic lesions are given proper attention and the symptoms are cared for as they arise, but the distressing symptoms almost always rapidly subside under this radical change of diet."—E. C. Armstrong, D.O.

GRAIN AND VEGETABLE POISONING

(Sitotoxismus)

Ergotism. The prolonged use of bread made from rye contaminated with claviceps purpurea (ergot fungus) causes digestive disturbances and later one of two forms, gangrenous or convulsive symptoms.

The gangrenous form begins in spasmodic muscular contractions, pain, paresthesias, anesthesias, and finally blood stasis, gangrene resulting usually in the fingers and toes although sometimes in the nose and ears.

The convulsive form is accompanied by a prodromal period of one to two weeks of headache, slight fever, occasional tingling or pain. This is succeeded by muscular cramps and spasm during which there is painful spasmodic clenching of the hands and hyperextension of the feet. In very severe cases, there is early delirium or epilepsy but dementia or melancholia are more frequent. Ataxia may be present. The degeneration of the posterior spinal columns resembles that of tabes dorsalis.

Lathyrism (Lupinosis) is due to eating food made from the seeds of the vetches, Lathyrus sativa or L. cicera, and produces symptoms of spastic paraplegia, most frequently affecting the legs only.

Potato Poisoning is due to the solanin, the amount of which may be increased over the normal under certain circumstances by the action of the bacillus solaniferum noncolorabile and the bacillus solaniferum colorabile, occurring in those potatoes which are partially exposed above the ground or in those sprouted during storage.

The symptoms are chills, fever, headache, vomiting, diarrhea, colic, and great prostration. Jaundice may occur and collapse is not infrequent. The patients recover.

Mushroom Poisoning is less common now than formerly, yet incidents occasionally occur. Fresh morels are dangerous; the poison disappears on drying. Nausea, diarrhea, vomiting, hemoglobinemia and jaundice may precede death; if the poison taken was small, or if the stomach is quickly emptied, recovery may occur. Red agaric (amanita muscari) is very dangerous; convulsions, gastro-intestinal symptoms, slow pulse, dilated pupils, salivation, coma and death follow when this is eaten, unless speedy removal of the poison is secured.

POISONING FROM NITROGENOUS FOODS

Milk Poisoning (Galactotoxismus) is marked by gastro-intestinal and choleraic symptoms and high fever.

In **Cheese Poisoning** (Tyrotoxismus) the fever is not continuous and collapse occurs early.

Mussels (Mytilis Edulis) produce mytilotoxin if they have been placed in filthy water. The symptoms are of an acute poison without fever, profound nervous symptoms with collapse appearing rapidly. There are no gastro-intestinal symptoms.

Fish Poisoning (Ichthyotoxismus) is unattended by fever, the symptoms are referable to the nervous system and collapse occurs early.

Meat Poisoning (Kreotoxismus) is due either to the alkaloidal products of decomposition (true ptomaine); or to organisms, usually bacillus botulinus, bacillus enteritidis, or proteus vulgaris and allied organisms. These gain access to meat after slaughter and produce a chemical poison, without evidences of decomposition, or they may be swallowed with food and produce their poison within the body. Sausage poison (botulinus; allantiasis) is destroyed by boiling.

Diagnosis. One form (true ptomaine) resembles atropin poisoning, appears within a very short time, with dryness of throat, hoarseness, dysphagia, rapid pulse, dilatation of the pupils (which do not respond to light), nausea, vomiting, abdominal pain, diarrhea, and prostration. Death is not infrequent and recovery is slow.

The more common form may appear at once or after an incubation of 12 to 48 hours during which there may or may not be prodromal symptoms of malaise, anorexia, nausea, and colicky pains.

Chilliness or rigor is followed by fever, 101° to 104°, prostration, giddiness, faintness, cold perspiration, great thirst, headache and backache, diarrhea, crampy tearing and burning pain in the chest or between the shoulders, and increasing abdominal pain. The clammy perspiration becomes more pronounced; the pulse is rapid, 100 to 128, and later may become thready; there is extreme muscular weakness; cramps in the legs and arms are followed by convulsive movements; there are paresthesias of various forms. Choleraic symptoms are present in some cases. In mild cases, the symptoms of acute gastro-intestinal irritation and muscular weakness with fever are the main manifestations. In more severe cases, the fever is replaced by collapse.

Treatment. In all these forms of acute poisoning, the offending material must be eliminated speedily, without causing inflammation of the gastro-intestinal membranes. The stomach tube and the enema may be used freely. Strenuous purgation may so inflame the membranes as to facilitate absorption of the poison. After the alimentary canal seems fairly clean a diet chiefly cellulose should be given for several days. The further treatment is that of acute gastritis and acute enteritis. (q. v.)