

thirst is not excessive; but in such cases the amount of urine passed is never large. The thirst is most intense an hour or two after meals. As a rule, the digestion is good and the appetite inordinate. A story is told of a man with diabetes who was paid to stay away from a certain restaurant at which dinners were given at fixed prices. It is sometimes impossible to satiate the ravenous appetite of a diabetic patient. The condition is sometimes termed *bulimia* or *polyphagia*.

The tongue is usually dry, red, and glazed, and the saliva scanty. The gums may become swollen, and in the later stages aphthous stomatitis is common. Constipation is the rule.

In spite of the enormous amount of food consumed a patient may become rapidly emaciated. This loss of flesh bears some ratio to the polyuria, and when, under suitable diet, the sugar is reduced, the patient may quickly gain in flesh. The skin is dry and harsh, and perspirations rarely occur, except when phthisis coexists. Drenching sweats have been known to alternate with excessive polyuria. The temperature is often subnormal; the pulse is usually frequent, and the tension increased. Many diabetics, however, do not show marked emaciation. Patients past the middle period of life may have the disease for years without much disturbance of the health, and may remain well nourished. These are the cases of the *diabète gras* in contradistinction to *diabète maigre*.

Diabetes in Children.—Recently Stern has analyzed 117 cases in children. They usually occur among the better classes. Six were under one year of age. Hereditary influences were marked. The course of the disease is, as a rule, much more rapid than in adults. The shortest duration was two days. In seven cases it did not last a month. One case is mentioned of a child apparently born with the glycosuria, who recovered in eight months.

Complications.—(a) *Cutaneous.*—Boils and carbuncles are extremely common. Eczema is also met with and at times an intolerable itching. In women the irritation of the urine may cause the most intense pruritus pudendi, and in men a balanitis. Rarer affections are xanthoma and purpura. Gangrene is not uncommon. William Hunt has analyzed 64 cases. In 50 the localities were as follows: Feet and legs, 37; thigh and buttock, 2; nucha, 2; external genitals, 1; lungs, 3; fingers, 3; back, 1; eyes, 1. Perforating ulcer of the foot may occur.

(b) *Pulmonary.*—The patients are not infrequently carried off by *acute pneumonia*, which may be lobar or lobular. *Gangrene* is very apt to supervene, but the breath does not necessarily have the foul odor of ordinary gangrene.

Tuberculous broncho-pneumonia is very common. It was formerly thought, from its rapid course and the limitation of the disease to the lung, that this was not a true tuberculous affection; but in the cases which have come under my notice bacilli have been present, and the condition is now generally regarded as tuberculous.

(c) *Renal.*—*Albuminuria* is a tolerably frequent complication. The amount varies greatly, and, when slight, does not seem to be of much moment. It is sometimes associated with arterio-sclerosis. It occasionally precedes the development of the diabetic coma. Occasionally cystitis develops.

(d) *Nervous System.*—(1) *Diabetic coma*, first studied by Küssmaul, is the most serious complication of the disease, and carries off a considerable proportion of all cases, particularly in the young. It may occur when diabetes is unsuspected, as in two cases recently reported by Francis Minot. Frerichs recognized three groups of cases: (a) Those in which after exertion the patients were suddenly attacked with weakness, syncope, somnolence, and gradually deepening unconsciousness; death occurring in a few hours. (b) Cases with preliminary gastric disturbance, such as nausea and vomiting, or some local affection, as pharyngitis, phlegmon, or a pulmonary complication. In such cases the attack begins with headache, delirium, great distress, and dyspnoea, affecting both inspiration and expiration, a condition called by Küssmaul *air-hunger*. Cyanosis may or may not be present. If it is, the pulse becomes rapid and weak and the patient gradually sinks into coma; the attack lasting from one to five days. There may be a very heavy, sweetish odor of the breath, due to the presence of acetone. (c) Cases in which, without any previous dyspnoea or distress, the patient is attacked with headache and a feeling of intoxication, and rapidly falls into a deep and fatal coma.

There has been much dispute as to the nature of these symptoms, but our knowledge of the disease is not yet sufficiently advanced to give a rational explanation. The character of the attack and the similarity, in many instances, to uræmia would indicate that it depended upon some toxic agent in the blood. The theory most commonly held, that this material is acetone, is supported by the presence of the acetone reaction in the urine and its odor in the breath. Stadelmann believes that the condition is not acetonæmia, but that the poisonous agent is an intermediate product between the sugar and acetone, an oxy-butyric acid.

Saunders and Hamilton have described cases in which the lung capillaries were blocked with fat. They attributed the symptoms to fat embolism, but there are many cases on record in which this condition was not found, though lipæmia is by no means infrequent in diabetes.

The symptoms have been attributed to uræmia, and albuminuria frequently precedes or accompanies the attack.

(2) *Peripheral Neuritis.*—The *neuralgias*, numbness, and tingling, which are not uncommon symptoms in diabetes, are probably minor neuritic manifestations.

Diabetic Tabes (so called).—This is a peripheral neuritis, characterized by lightning pains in the legs, loss of knee-jerk—which may occur without the other symptoms—and a loss of power in the extensors of the feet. The gait is the characteristic *steppage*, as in arsenical, alcoholic, and other

forms of neuritic paralysis. Charcot states that there may be atrophy of the optic nerves.

Diabetic Paraplegia.—This is also in all probability due to neuritis. There are cases in which power has been lost in both arms and legs.

(3) *Mental Symptoms.*—The patients are often morose, and there is a strong tendency to become hypochondriacal. General paralysis has been known to develop.

(4) *Special Senses.*—Cataract is liable to occur, and may develop with rapidity in young persons. Diabetic retinitis closely resembles the albuminuric form. Hæmorrhages are common. Sudden amaurosis, similar to that which occurs in uræmia, may occur. Paralysis of the muscles of accommodation may be present; and lastly atrophy of the optic nerves. Aural symptoms may come on with great rapidity, either an otitis media, or in some instances inflammation of the mastoid cells.

(5) *Sexual Function.*—Impotence is common, and may be an early symptom.

Course.—In children the disease is rapidly progressive, and may prove fatal in a few days. It may be stated, as a general rule, that the older the patient at the time of onset the slower the course. Cases without hereditary influences are the most favorable. In stout, elderly men diabetes is a much more hopeful disease than it is in thin persons. Middle-aged patients may live for many years, and persons are met with who have had the disease for ten, twelve, or even fifteen years.

Diagnosis.—Glycosuria, which to all intents and purposes is a mild form of the disease, is to be distinguished only by its transient character. There is no other disease with which true diabetes can be confounded. It must not be forgotten that hysterical women sometimes put sugar in the urine for the purposes of deception.

Prognosis.—In true diabetes instances of cure are rare. On the other hand, the transient or intermittent glycosuria, met with in stout overfeeders, or in persons who have undergone a severe mental strain, is very amenable to treatment. Not a few of the cases of reputed cures belong to this division. Personally I have never seen *recovery* from a case of true diabetes. Temporary arrest, reduction to a minimum of the amount of sugar excreted, and prolonged periods of good health, I have frequently seen, but neither in any one of my personal friends or acquaintances who have suffered with the disease, nor in patients who have come under my care in hospital or private practice, have I known permanent and complete disappearance of the sugar, so that an ordinary diet could be taken with impunity. Cures are, however, reported. Practically, in cases under forty years of age the outlook is bad; in older persons the disease is less serious and much more amenable to treatment.

Treatment.—In families with a marked predisposition to the disease the use of starchy and saccharine articles of diet should be restricted.

The personal hygiene of a diabetic patient is of the first importance.

Sources of worry should be avoided, and he should lead an even, quiet life, if possible in an equable climate. Flannel or silk should be worn next to the skin, and the greatest care should be taken to promote its action. A lukewarm, or if tolerably robust, a cold bath, should be taken every day. An occasional Turkish bath is useful. Systematic, moderate exercise should be taken. When this is not feasible, massage should be given.

Diet.—Our injunctions to-day are those of Sydenham: "Let the patient eat food of easy digestion, such as veal, mutton, and the like, and abstain from all sorts of fruit and garden stuff."

The *carbohydrates* in the food should be reduced to a minimum. Under a strict hydrocarbonaceous and nitrogenous regimen all cases are benefited and some are cured. The most minute and specific instructions should be given in each case, and the dietary arranged with scrupulous care. It is of the first importance to give the patient variety in the food, otherwise the loathing of certain essential articles becomes intolerable, and too often the patient gives up in disgust or despair. It is well, perhaps, not to attempt the absolute exclusion of the carbohydrates, but to allow a small proportion of ordinary bread, or, better still, as containing less starch, potatoes. It is best gradually to enforce a rigid system, cutting off one article after another. The following is a list of articles which diabetic patients may take:

Liquids: Soups—ox-tail, turtle, bouillon, and other clear soups. Lemonade, coffee, tea, chocolate, and cocoa; these to be taken without sugar, but they may be sweetened with saccharin. Potash or soda water, and the Apollinaris, or the Saratoga Vichy, and milk in moderation, may be used.

Of animal food: Fish of all sorts, salt and fresh, butcher's meat (with the exception of liver), poultry, and game. Eggs, butter, buttermilk, curds, and cream cheese.

Of bread: Gluten and bran bread, and almond and cocoanut biscuits.

Of vegetables: Lettuce, tomatoes, spinach, chiccory, sorrel, radishes, water-cress, mustard and cress, cucumbers, celery, and endives. Pickles of various sorts.

Fruits: Lemons, oranges, and currants. Nuts are, as a rule, allowable.

Among *prohibited articles* are the following: Thick soups, liver, crabs, lobsters, and oysters; though, if the livers are cut out, oysters may be used.

Ordinary bread of all sorts (in quantity): rye, wheaten, brown, or white. All farinaceous preparations, such as hominy, rice, tapioca, semolina, arrowroot, sago, and vermicelli.

Of vegetables: Potatoes, turnips, parsnips, squashes, vegetable marrow of all kinds, beets, corn, artichokes, and asparagus.

Of liquids: Beer, sparkling wine of all sorts, and the sweet aerated drinks.

The chief difficulty in arranging the daily *menu* of a diabetic patient is the bread, and for it various substitutes have been advised—bran bread, gluten bread, and almond biscuits. Most of these are unpalatable, and the patients weary of them rapidly. Too many of them are gross frauds, and contain a very much greater proportion of starch than represented. A friend, a distinguished physician, who has, unfortunately, had to make trial of a great many of them, writes: "That made from almond flour is usually so heavy and indigestible that it can only be used to a limited extent. Gluten flour obtained in Paris or London contains about 15 per cent of the ordinary amount of starch and can be well used. The gluten flour obtained in this country has from 35 to 45 per cent of starch, and can be used successfully in mild but not in severe forms of diabetes."

Unless a satisfactory and palatable gluten bread can be obtained, it is better to allow the patient a few ounces of ordinary bread daily. The "Soya" bread is not any better than that made from the best gluten flour. As a substitute for sugar, saccharin is very useful, and is perfectly harmless. Glycerin may also be used for this purpose.

It is well to begin the treatment by cutting off article after article until the sugar disappears from the urine. Within a month or two the patient may gradually be allowed a more liberal regimen. An exclusively milk diet, either skimmed milk, buttermilk, or koumyss, has been recommended by Donkin and others. Certain cases seem to improve on it, but it is not, on the whole, to be recommended.

Medicinal Treatment.—This is most unsatisfactory, and no one drug appears to have a directly curative influence. Opium alone stands the test of experience as a remedy capable of limiting the progress of the disease. Diabetic patients seem to have a special tolerance for this drug. Codeia is preferred by Pavy, and has the advantage of being less constipating than morphia. A patient may begin with half a grain three times a day, which may be gradually increased to six or eight grains in the twenty-four hours. Mitchell Bruce, from a series of elaborate observations, concludes that morphia is decidedly more powerful. In a patient at the University Hospital, Philadelphia, on whom I made a large number of observations on the comparative value of these drugs, morphia appeared to be much more potent. Patients take with benefit up to five or six grains in the twenty-four hours. The expense, too, must sometimes be taken into consideration: the cost of six grains of codeia daily would be twenty-five cents, whereas the same amount of morphia would cost only ten cents. Not much effect is noticed unless the patient is on a rigid diet. When the sugar is reduced to a minimum, or is absent, the opium should be gradually withdrawn. The patients not only bear well these large doses of morphia, but they stand its gradual reduction. Potassium bromide is often a useful adjunct. The arsenite of bromine, a solution of arsenious acid with bromine in glycerin (dose, three to five minims after meals), has been very highly recommended, but it is by no means so cer-

tain as opium. Arsenic alone may be used. Antipyrin may be given in doses of ten grains three times a day, and in cases with a marked neurotic constitution is sometimes satisfactory. The salicylates, iodoform, nitroglycerin, jambul, lithium salts, strychnine, creasote, and lactic acid have been employed.

Of the complications, the *pruritis* and *eczema* are best treated by cooling lotions of boric acid or hyposulphite of soda (1 ounce; water, 1 quart).

The *coma* is an almost hopeless complication. Inhalations of oxygen have been recommended, and lately the intravenous injections of a saline solution, as practised by Hilton Fagge. The three per cent solution of the sodium bicarbonate has generally been employed. The treatment has not, however, been satisfactory. Of seventeen cases, collected by Chadbourne, in only one was it successful; in seven there was temporary improvement; and the best that can be said for it is that it may give the patient a few hours of complete consciousness. Injections should be made as soon as possible after the appearance of the coma.

VIII. DIABETES INSIPIDUS.

Definition.—A chronic affection characterized by the passage of large quantities of normal urine of low specific gravity.

The condition is to be distinguished from diuresis or polyuria, which is a frequent symptom in hysteria, in Bright's disease, and occasionally in cerebral or other affections. Willis, in 1674, first recognized the distinction between a saccharine and non-saccharine form of diabetes.

Etiology.—The disease is most common in young persons. Of the 85 cases collected by Strauss, 9 were under five years; 12 between five and ten years; 36 between ten and twenty-five years. Males are more frequently attacked than females. The affection may be congenital. A hereditary tendency has been noted in many cases, the most extraordinary of which has been reported by Weil. Of 91 members in four generations, 23 had persistent polyuria without any deterioration in health. Injury to the nervous system has been present in certain instances, and the disease has followed sunstroke, or a violent emotion, such as fright. Traumatism has occasionally been the exciting cause. The injury may have been to the head, but in other cases the lesion has been to the trunk or to the limbs. The disease has followed rapidly the copious drinking of cold water, or a drinking-bout; or has set in during the convalescence from an acute disease. Tumors of the brain and lesions of the medulla have been met with in a few instances. Cases of polyuria have been accompanied by paralysis of the sixth nerve. Maguire has seen an instance after meningitis in which paralysis of the sixth pair occurred with it. Bernard, it will be remembered, discovered a spot in the floor of the fourth ventricle