ally forms in cases of long standing; but may be absent altogether in those of less than two years' duration. The *endosmotic* theory of diabetic cataract, suggested by the production of opacity of the lens in frogs by immersion in a saccharine solution, or by injecting the same into the cellular tissue, is of doubtful application. Objections to it are the temporary nature of the saccharine cataract in the frog, the occasional occurrence of diabetic cataract in one eye only, and the late period at which the symptom occurs in the disease.

Morbid Anatomy and Pathology.—Much remains to be done before the pathology of diabetes can be said to be ascertained. In only about half of the cases some degree of renal alteration is found. Physiological facts and experiments, in regard to the "glycogenic function of the liver," point to that organ as the probable seat of the disorder. Other observations, as to the production of diabetes in animals by injuring the medulla oblongata or the base of the brain, are also suggestive. But, although in some instances autopsic inspection has agreed with such expectations, in many other cases it has failed to confirm them. The true theory of diabetes therefore remains for the future to discover, or, at all events, to complete.

The most plausible hypothesis, certainly, is that under disturbed innervation, the liver modifies its ordinary assimilative process so as to confiscate (to use a bold figure) most of the carbo-hydrogenous material derived from the alimentary canal through the portal vein, and convert it into glucose or diabetic sugar, which is then eliminated by the kidneys.[1]

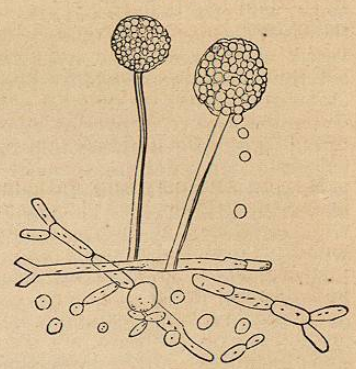
Diagnosis.—The detection of sugar in the urine, not temporarily, but for a considerable time, is of itself sufficient to make out the case. The principal modes of testing saccharine urine have been given in another part of this book. (See *Semeiology.*)

Prognosis.—Recovery is not impossible in diabetes; but a large majority of cases end in death. *Amelioration*—keeping the disease in abeyance—is often an attainable end. The younger the patient in whom the disorder begins, the less the ultimate hope. In old persons glycosuria seems more often compatible with tolerable health for a long time. Cases traced to mental emotion or to injuries are somewhat more hopeful than those of indistinct origin.

Amblyopia, cataract, and albuminuria, as well as phthisical symptoms, mark the case as incurable. Considerable diminution of the sugar, or of the water passed, is always a favorable prognostic. But the diabetic patient is much more liable than others to those inflammatory complications which, on slight exposure, may hasten the termination of life.

[1] It seems to be established that a natural product of the liver is an amyloid material (hepatin, liver dextrin, glycogen); whether Bernard's view of the normal destiny of this being its constant conversion into sugar (and subsequent combustion by oxidation in the blood) be correct, or rather that of Pavy, that such conversion is always morbid, or post mortem. *Artificial* glycosuria may be produced in animals by puncturing the floor of the fourth ventricle of the brain, impeding respiration, thrusting needles into the liver, obstructing the abdominal venous circulation, injecting acid into the veins, poisoning with strychnia and woorara, and chloroform or ether inhalation. Dr. McDonnell has proposed the theory that "glycogen" normally in the liver combines with nitrogenous matter derived from food, to make plastic material for tissue; and that this process is interrupted or arrested in diabetes. Schiff caused glycosuria by merely inducing mechanical hyperæmia of the liver. Excision of the spleen in animals has produced the same effect.

Fig. 83.



Sugar fungus.

Treatment.—No direct control over the sugar-forming process in the body has yet been obtainable by medicine. But, although it would seem that simply diminishing the formation of sugar by withholding material for it ought not to be *expected* to do much good, it does prove beneficial. At the same time Dr. Harley has shown that the *weight of the patient*, not the amount of sugar passed, is the true test of improvement or the reverse. The most generally approved measure in the management of diabetes, is the prohibition of sugar and starch, and of everything which can yield them, as food. Bread, except bran bread, which contains but little starch, potatoes, and nearly all vegetables and fruits, must be excluded. The safe exceptions are the cabbage, broccoli, onions, spinach, celery, and lettuce. Of animal diet, milk and liver are forbidden articles. All meats, eggs and butter, and jellies, are allowable. *Gluten bread* is made in France, on Bouchardat's plan, without starch, inflated by machinery with carbonic acid or compressed air. Tea or coffee may be sweetened with glycerin (chemically pure, as Bower's or Price's). Spirits, wines, and beer should be avoided unless called for by positive weakness; if that exist, the least saccharine should be preferred, as sherry, claret, or whisky, in minimum quantities. There is no advantage in restricting the amount of water taken to quench thirst. *Variety* of diet, of course, within the prescribed limits, is important to prevent disgust and loss of appetite.

Of medicines, *none* have been yet shown to do much service in checking the disease. The most positive influence in diminishing the diuresis and secretion of sugar (Pavy), belongs to opium; but this does not appear to interfere much with the progress of the disease. Dr. Buttura reports the cure of a case by a seton in the neck. Sir T. Watson speaks well of the relief afforded by the *hot-air bath.* Various drugs have been tried, and lauded greatly by different users; but their effects will not bear scrutiny without disappointment. Among them the most prominent are alkalies, yeast, rennet, pepsin, iron, quinine, creasote, carbolic acid,[1] alum, iodine, nitric acid, turpentine, citrate of sodium (half a drachm to a drachm daily), arsenic, and the inhalation of oxygen. Even free ingestion of *sugar* has been fairly experimented with. Dr. Wadham found,

[1] Ernstein and Muller, Berlin Klin. Woch., Dec. 8, 1873.

in one case, that using *bread* as food increased the sugar in the urine, while white *sugar* did not. No cure resulted, however, from the use of sugar. The remedy for diabetes remains to be discovered. Cod-liver oil and other *analeptics* are indicated, to counteract the tendency to debility and emaciation. Rubbing with oil (Inman) may perhaps do good in the same way. Drs. Donkin and Greenhow report recoveries upon an exclusive diet of skimmed milk.[1] Professors Cantani and Primavera,[2] of Naples, assert great success under an exclusive meat diet, with the administration, at each meal, of ℈ij–iv of lactic acid, in water f℥vj, and also f℥ss of alcohol in water f℥vj. The purpose of the lactic acid and alcohol is to substitute the saccharine and farinaceous constituents of food, without any material for the formation of sugar. M. Lefort obtained improvement in a case by the *constant* galvanic current: one pole being applied to the back of the neck, and the other over the region of the liver (*Gazette Médicale de Paris*, April 13, 1872).

HYDRONEPHROSIS.

Definition.—Renal dropsy; dilatation of the kidney from obstruction of the ureter.

Causation.—Quite a number of the cases recorded have been congenital, from anatomical malformations. Calculus in the ureter is the most frequent post-natal cause; but other mechanical obstructions from pressure may occur.

Diagnosis.—Intumescence of the abdomen, usually upon one side, in the hypochondriac, umbilical, and iliac regions, with a soft undulating feel, an outline often lobulated, and fluctuation, as well as dulness upon percussion, can, in the male at least, only indicate either hydro- or pyonephrosis. The *symptoms* may be almost null if only one kidney be affected. When both are so, uræmia finally results. The tumor is commonly quite painless, and not tender upon pressure. This affection is, however, quite rare. It may be fatal by uræmia, or by bursting of the sac into the abdomen; but it has in a number of cases existed for many years.

Treatment.—*Manipulation*, kneading gently, day after day, has sometimes succeeded in dissipating the renal distension. Nothing else should be attempted, unless life be endangered by the pressure of the tumor or by uræmia. If it be so, tapping is justifiable; and it has been repeatedly performed with success.

PYONEPHROSIS.

This differs from the last-named affection in the production, under similar circumstances, with more or less inflammation, of *suppuration* of the kidney. The symptoms are therefore more active and the prognosis more grave. Rupture of the sacculated kidney into the colon, duodenum, or peritoneal cavity, is common, and is nearly always fatal. Renal abscess may occur also from "purulent infection" and from embolism. Such an abscess *may* find escape for its contents externally; any appearance of such a

[1] Brit. Med. Journal, June 7, 1873.
[2] New York Med. Record, May 1, 1873.

tendency should be encouraged by poulticing, and, in fit cases, by incision and evacuation.

Perinephritic abscess has been described as a rare affection by Rayer, Trousseau, Bowditch,[1] and others. Its signs are pain and swelling in the lumbar region, chills and fever, emaciation and debility, with some lameness of the lower limb on the side affected. Pleuritic or pulmonary complication may occur. In three cases treated by Dr. Bowditch, recovery took place, after incision for the discharge of pus, in a few weeks or months. Dr. F. D. Lente, of Cold Spring, N. Y., has also succeeded in obtaining recovery, after cutting down upon the kidney through the *quadratus lumborum* muscle, and effecting drainage by means of a tube or canula.

CANCER OF THE KIDNEY.

Primary cancer of the kidney is, though rare at any age, *most* frequent in early childhood. Of adults, males have been the most numerous subjects of it. **Secondary** renal cancer may attend any case of the cancerous cachexia, without materially modifying its history.

The kind of cancer affecting the kidney is nearly always the **encephaloid**; called, when highly vascular, fungus hematodes. It always begins in the cortical substance. The tumor is generally large, and sometimes enormous; reaching in one case (Roberts) 31 pounds. It is exceedingly rare for both kidneys to be affected.

Diagnosis.—An abdominal tumor, with copious hæmaturia repeated at irregular intervals, is almost certain to be cancer of the kidney.

Beginning between the ribs and crest of the ilium on one side, the tumor grows forwards, upwards, and downwards, so as to fill in some cases the whole belly. The colon in this, as in all renal tumors, lies in front of it; as does also sometimes a part of the small intestine. Except over the intestine, percussion-resonance is dull.

The swelling is smooth or irregularly lobulated; now and then a sort of fluctuation, and in one instance pulsation, have been observed in it. It is *fixed* in its position.

Bloody urine, usually profuse hemorrhage, is present in about half the cases. No other tumor has this symptom attending it:[2] its occurrence is therefore pathognomonic. The discovery of cancer-cells in the urine by the microscope is of course still more positive; but this sign is very often absent, and the cells are not at all easy of identification when they occur.

Pain mostly, but not always, attends cancer of the kidney; it is sometimes of great severity, shooting down the ureter to the thigh. Tenderness on pressure seldom exists. *Variable* symptoms are those of disorder of the stomach and bowels. Emaciation and anasarca show the exhaustion which precedes death.

The **duration** of cancer of the kidney in children averages seven

[1] Boston Med. and Surg. Journal, July, 1868.
[2] Roberts mentions one case of great enlargement of the spleen with hæmaturia.

or eight months; in adults over two years. This is a longer period than that of any other visceral cancer.

In **treatment**, as with other malignant diseases incapable of safe extirpation or cure, the judicious management of *regimen* and *anodynes* is all that is possible.

TUBERCLE OF THE KIDNEY.

This may be either primary or secondary. Of all tuberculous subjects, the kidney is found to contain such deposits in only from five to six per cent. Among tuberculous children, in from fifteen to sixteen per cent. *Most* of these, however, were *secondary* cases.

The **symptoms** of primary renal tuberculization are, dull lumbar pain, frequent micturition (the urine being at first turbid or slightly bloody, afterwards purulent), emaciation, and hectic fever. Almost always other organs, especially the lungs, become also tuberculous; merging the case into one of complicated phthisis. The bowels are very frequently implicated. Death occurs mostly from exhaustion. If both kidneys are affected, it may take place from uræmia.

The **duration** of the affection varies from a few months to two or three years.

Diagnosis.—Only after softening of the tubercle can it be positively proved to exist. Then the abundantly purulent urine is found upon microscopic inspection to contain also "granular debris, sometimes with tuberculous matter (insoluble in acetic acid), shreds of connective tissue, and beautiful meshes of elastic fibres from the cast-off patches of disintegrated mucous membrane." Great debility and emaciation, with hectic fever, confirm these signs. The absence of tumor and of hæmaturia distinguishes renal tuberculization from cancer.

Treatment.—Here, again, we must confess the deficiency of our present therapeutics. Indications exist, essentially the same as in phthisis pulmonalis, to the consideration of which we may refer the reader.

HYDATIDS OF THE KIDNEY.

These are more rare than hydatids in the liver or lungs; but more frequent than in other parts of the body.[1] The left kidney is most often affected.

In a majority of cases the cyst formed by the *echinococcus* opens into the pelvis of the kidney. The hydatids then, in part or wholly, are discharged by the urethra. They may, however, also, or instead, burst into the stomach, intestines, or lungs.

If no such vent occurs, a tumor is formed in the side (with the colon always in front of it) which has a more or less distinct fluctuation, and sometimes the "hydatid fremitus," or vibration to the touch.

The discharge of the contents of the cyst allows the discovery, in some cases, of entire vesicles; in others, of a detritus, in which

[1] According to Davaine, the order of relative frequency is as follows: liver, lungs, kidneys, pelvis, brain, bones, parietes of the bopy, heart, and orbit of the eye.

the microscope detects echinococcus-hooks, laminated shreds, and oil particles.

This discharge is apt to be recurrent or paroxysmal; at intervals varying from a few weeks to one or more years. Before it occurs, chills, nausea, hiccough, and colicky pains often exist, relieved by the passage of the vesicles. These, while in the bladder, may cause pain, irritation, and retention of urine.

After every such an escape the size of the tumor may be lessened for a time. A vesicle detained in the ureter may, by obstruction, induce a *hydronephrosis*, adding to the hydatid tumescence.

Prognosis.—This is more favorable than in any other seat of hydatids, except the uterus, because of the comparative facility of their evacuation. When, however, no escape by the kidney and ureter is effected, the tumor may become so large as to encroach seriously upon other parts, or the cyst may suppurate (pyonephrosis) and form a large and dangerous abscess.

Treatment.—Oil of turpentine, iodide of potassium, chlorate and nitrate of potassium, taraxacum, and other medicines have been asserted by different observers to promote the death and discharge of echinococci. Whether the "post hoc" was "propter hoc" in these cases, larger experience (which ought always to be recorded) will show. Electro-puncture has been tried for the same end; but without proof of success.

Hydatic **colic** (passage of vesicles through the ureter) may be treated like that from calculus, by the warm bath and opium. Irritation of the bladder, or obstruction causing retention of urine, will require rest, demulcent drinks (flaxseed infusion), and sometimes the catheter. Even in the urethra the escape of the vesicles may be obstructed, and sometimes may require to be aided by pressure for their dislodgment.

A closed renal hydatid tumor, when clearly diagnosticated, and itself endangering life, may be (after exploration by the needle-trocar) punctured, especially if it project *behind*. When in front, Recamier's plan is preferred by some surgeons, of applying caustic potassium repeatedly to cause adhesion of the peritoneum to the sac, before making the incision. Safer than this, and in at least one case successful, is *repeated* puncturing with the needle-trocar at intervals of a few days.

CYSTITIS.

Definition.—Inflammation of the bladder.

Varieties.—Acute and chronic; idiopathic, traumatic, secondary.

Causation.—Blows or other injuries; the presence of gravel, or calculus, or hydatid vesicles from the kidney; irritating diuretics, or decomposing urine retained by stricture, may induce acute cystitis. The continuation or frequent repetition of these causes produces "chronic inflammation of the bladder."

Symptoms: Acute Cystitis.—Pain in the vesical region; frequent desire to pass water, with burning in the urethra, and *tenesmus*, or disposition to bear down or strain. There is fever, alternating with chills. The bladder may sometimes be felt as a

small round swelling, sensitive upon pressure. In bad cases there are nausea, anxiety, delirium, and cold perspirations ; the scantily passed urine becomes purulent and bloody, alkaline and fetid.

Chronic cystitis has usually much less severity of symptoms ; but it may be very distressing, from the tenderness and irritability of the bladder, and the frequent disposition to urinate, with dysuria. The urine is either mucous or muco-purulent.

Treatment.—Acute cystitis, with perfect rest, may need leeching or cupping above the pubes or (leeching) at the perineum. As a laxative, castor oil is apt to be the best. Warm hip-baths will be very soothing. Where heat is great, however, small pieces of ice introduced into the rectum will give more relief. Flaxseed tea may be taken freely. Opium, chloral, hyoscyamus or belladonna may be called for by great pain or nervous irritability. Opium or belladonna *suppositories* [F. 124, 125], or laudanum enemata, will answer best if anodynes have to be repeated often. In **chronic** cystitis local depletion is much less likely to do good. The other measures named may be suitable from time to time ; also injections of lime-water and glycerin, or *weak* solution of nitrate of silver, or of sulphate of copper, or acetate of lead, in water or in glycerin, may be serviceable. *Catheterism* may at times be indispensable, both in acute and chronic cystitis ; but it should be avoided if possible, on account of the mechanical irritation of the instrument. Even in washing out the bladder, care must be taken, as harm may be done by the forcible introduction of too large an amount of fluid ; or, still more, by too strong solutions of stimulating substances.

RETENTION OF URINE.

Synonyms.—*Strangury*, *Dysuria*, *Ischuria*. Although the *mechanical* or *surgical* causes and history of difficult or arrested urination do not belong to this work, it will be proper to speak briefly of its occasional importance, as a symptom in the course of diseases which every medical practitioner must meet.

Retention of urine is either from *mechanical* obstruction, from *spasm*, with or without inflammatory congestion at the neck of the bladder, or from vesical atony or *paralysis*. The first occurs in cases of stricture, calculus, etc. ; the second under the influence of cantharides or turpentine, or in cystitis from any cause ; the third, in typhus, typhoid, and other low fevers and states of debility.

It is very easy in all but the last-named cases to distinguish retention from suppression of urine. In low fevers, etc., it is not at all difficult to make this diagnosis upon *examination ;* without it, the retention may be overlooked. A practitioner must never forget to *ascertain* whether his patient passes water or not. In all serious diseases, indeed, its regular *inspection* is important.

In the semi-paralytic retention of low states, catheterism is generally required ; and, when *distension and dulness upon percussion above the pubes*, with absence of urinary discharge for twelve or twenty-four hours, or only dribbling, mark the case, the instrument should be used without delay, and repeatedly ; at least once daily in most instances.

Spasmodic retention of urine, or strangury, with or without the concomitant existence of stricture or gravel, may demand other means of relief than the catheter. The warm hip-bath, prolonged for half an hour, is one of the best measures. Cloths wrung out of hot water applied to the perineum and over the pubes may assist. Leeches to the perineum, when there is local tenderness, will often promote relaxation of the part. Laudanum enemata, and opium [F. 124, 125] or belladonna suppositories, will sometimes relieve when other measures fail. Anæsthetic inhalations might be resorted to in an extreme case. Hypodermic injection of morphia has been used to give relief.

ENURESIS.

Definition.—Incontinence of urine. Except from paralysis or some local lesion, this troublesome affection is not apt to occur in the adult. In children it is common, especially at *night*.

Treatment.—Withholding fluids for some hours before bedtime, unless in very small quantities, and taking the child up to urinate after two or three hours of sleep, will generally prevent enuresis. Of medicines, those most employed (with variable success) are belladonna, benzoic acid [F. 126], and tincture of chloride of iron. *Chloral*[1] has been found useful, and so has *iodide of iron*.[2] Corrigan[3] recommends sealing up the prepuce at night with collodion.

Moral impressions, acting upon the child's sense of shame or wrong, are only proper to be made use of with great care and discretion ; but sometimes they have much power.

AFFECTIONS OF THE BRAIN AND NERVOUS SYSTEM.

INFLAMMATION OF THE BRAIN.

Synonyms.—*Encephalitis*, *Phrenitis*, *Meningitis*, *Cerebritis*. The last two are not, of course, technically identical ; but they are not clinically separable. (See *Softening of the Brain.*) Inflammation of the membranes derives its importance from the implication of the brain.

Varieties.—*Simple* and *scrofulous* encephalitis or meningo-cerebritis.

Simple Meningo-cerebritis (meningitis). **Symptoms.**—Intense headache, redness of face and eyes, an excited look, dizziness, roaring in the ears, extreme sensitiveness to light and sound, restlessness, wakefulness, wild delirium. Vomiting is common ; the bowels are usually costive. Some dangerous cases exhibit but little mental excitement even at the beginning, and very little fever ; dulness of mind, deepening into apathy, with vomiting, and general prostration, being the symptoms. Late in the attack in adults, at any period in children, convulsions may occur. Rigid-

[1] Bradbury, Brit. Med. Journal, Feb. 4, 1871.
[2] Barclay, Med. Times and Gazette, Dec. 17, 1870.
[3] Dublin Quart. Journal of Med. Science, Feb. 1870.