tion associated with epithelial proliferation is of frequent occurrence. Dermoid cysts are very often found in association with cystadenomata arising from the germinal epithelium, usually those of the smooth-walled variety.

In the majority of ovarian cystadenomata the chief symptoms arise from pressure upon the neighboring organs. The uterus and tubes are pushed out of their normal positions, and in the case of very large tumors the abdominal organs may suffer a similar displacement. Pressure atrophy may result. Local or general peritonitis, inflammatory adhesions, ascites, hemorrhages, gangrene following torsion of the pedicel, purulent infection of the tumor through aspiration, etc., are among the important sequelæ of the development of these tumors. The treatment is wholly surgical.

Parovarium. — Cystadenomata of the parovarium are of much less frequent occurrence than those of the ovary. They arise through proliferation of the small canals of this organ, are intraligamentous, and seldom reach a large size; very rarely they grow around the tube. Their walls are smooth and lined with ciliated epithelium. They are benign in manner of growth. Occasionally they may rupture, but this event is, as a rule, not attended by serious consequences.

Uterus.—Cystadenomata of the wall of the uterus arising from remnants of the Wolffian duct have been described. They are not infrequently associated with myofibromata, and this association is at times so intimate that they may be designated cystadeno-myofibromata. Cystadenomata of the endometrium develop out of adenomatous polyps, but rarely reach a large size. They may become carcinomatous. Polypoid growths from the cervix, of the nature of cystadenomata, are much more common. They usually follow the glandular hyperplasia resulting from ectropion and laceration of the cervix, but may be of congenital origin. Carcinoma may develop from them.

Mammary Gland.—Next to the ovary the mammary gland is the organ most frequently affected by cystadenoma. The adenoma of the mamma is one of the most common tumors, and its gland spaces show an especial tendency to cystic dilatation. With the formation of new glandular tissue there is usually at the same time an excessive proliferation of the connective tissue of the stroma so that the resulting tumor has been called cystadenofibroma or cystofibroma. The walls of the cysts may be smooth, but are usually more or less papilliferous. The papillæ are characteristic in that they usually take the form of broad, rounded growths into the gland spaces whose lumen they almost entirely fill. On cross-section the cyst cavities appear as narrow tortuous canals lined with epithelium; many of the papillæ may be cut in such a manner that they appear as islands of connective tissue surrounded by epithelium (intracanalicular cystofibroma). Very frequently the stroma of the papillæ becomes myxomatous in character, and occasionally it shows such marked tendency toward proliferation that such growths have been designated as cystosarcomata. The cystadenomata of the mammæ are more malignant than the adenomata. The papilliferous forms may break through the skin and form surface growths. They very often become carcinomatous, and the present tendency with many pathologists is to class these growths with the malignant tumors.

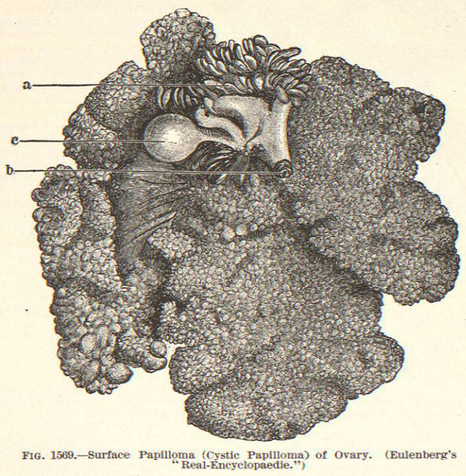

FIG. 1569.—Surface Papilloma (Cystic Papilloma) of Ovary. (Eulenberg's "Real-Encyclopaedie.")

Cystadenomata occur less frequently in the *liver* and *kidneys*. Their origin is either in adenomata arising from the bile ducts or kidney tubules or in cysts arising through some congenital disturbance of development. Cystadenomata of the *pancreas* are rare. They arise from the acini or collecting ducts. Cystadenomata of the *thyroid, prostate, testis, salivary glands, lachrymal gland, skin glands*, etc., are all of infrequent occurrence. Further, cystadenomata may arise from teratomata containing glandular tissue or from fœtal inclusions of glandular type. The cystic growths found very rarely in the mediastinum and abdominal wall near the umbilicus belong to this class. The latter arises from remains of the omphalo-mesenteric duct.

On the whole, cystadenomata are more malignant growths than adenomata. They cause greater local disturbance from their great size, give rise to secondary inflammatory changes, and are likely to rupture. The papilliferous forms may give rise to implantation metastases, and in all forms of cystadenomata there is a decided tendency toward the development of carcinoma. Recurrence after removal is also more common in the case of the papillary forms than with adenomata. The differential diagnosis is based chiefly upon the presence of an elastic, fluctuating tumor. Aspiration may be of aid in diagnosis and also as a means of decreasing the size of very large cysts so as to admit of their removal. The treatment is wholly surgical. The prognosis after removal of the growth is, on the whole, very favorable, but the tendency of papilliferous cystadenomata to recur must be borne in mind. When rupture of the cyst has occurred implantation metastases should always be looked for, and the same precaution should always be taken in the case of papilliferous growths of the ovary even if rupture into the abdominal cavity has not taken place. The tendency of the cystofibromata of the mammary gland to become carcinomatous makes their early removal desirable.

Aldred Scott Warthin.

CYSTICERCUS CELLULOSÆ. See *Cestoda*.

CYSTICERCUS CELLULOSÆ CUTIS. — Multiple cysts of the skin due to cysticerci have been recognized by many observers. This disease consists of small-sized subcutaneous tumors due to the invasion of the cysticercus cellulosæ telæ (the cystic stage of the Tænia solium).

Most of the cases occur in countries where half-cooked pork is eaten. It is stated that five per cent. of the cases of Tænia solium affect the skin. The reason that few cases have been recorded is probably due to the fact that their presence causes no symptoms, and consequently the integument is not examined.

The tumors range from the size of a pea to that of a hazelnut, and may be single, but are usually multiple. They occur chiefly on the back and sides of the trunk, less frequently on the extremities. They are subcutaneous, but raise the skin into an oval-shaped tumor of a cartilaginous firmness, but withal elastic. The surface is smooth and the skin normal, unless injured by trauma or suppuration of the underlying tissues. While the animal is alive the tumor retains its elasticity, but becomes calcified into a hard nodule after its death. The differential diagnosis practically includes all subcutaneous swellings and growths.

Cysticerci also often involve the brain, and in the diagnosis any encephalopathic affection present (*e.g.*, giddiness, headache, torpor, fits), and the absence of any syphilitic history, should strengthen the suspicion as to the nature of the skin affection.

The *diagnosis* can always be confirmed by microscopical examination of one of the tumors or of the fluid, which may be obtained through puncture. Such an examination will disclose the hooklets.

William A. Hardaway.

CYSTINURIA. See *Auto-Intoxications*

CYSTOMA. See *Cysts*.

CYSTOSCOPY. — Cystoscopy may be defined as a method of inspecting the interior of the bladder by means of an instrument introduced through the urethra. This became possible for the male bladder only when, in 1879, Nitze, of Dresden, perfected an instrument by which he could illuminate the interior of the bladder by a platinum wire heated to a white heat by electricity and prevented from burning the bladder wall by a constant current of cold water. The complications of this instrument, however, were such that the white hot wire soon gave place to a small Edison incandescent lamp, which greatly simplified the process and improved the illumination.

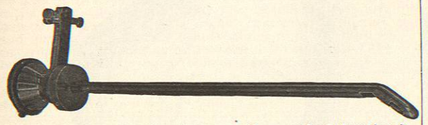

FIG. 1570.—Fenwick-Leiter Cystoscope. Lamp and windows for observation on the concave side of the instrument. Arm attached at a right angle to the handle is the movable switch to which wires from a battery are attached. (Original.)

The instrument now in use retains the essential features of Nitze's cystoscope, and consists of the following parts: a shaft, a beak, a light, a window through which the bladder wall is seen, and an optical apparatus contained in the shaft, by means of which the image is corrected and brought to the eye. The shaft is a hollow metal tube, from eight to nine and one-half inches in length, and usually of the calibre No. 22 of the French scale. At the outer end of the shaft is a funnel-shaped enlargement which contains the eyepiece of the optical apparatus and by which the instrument can be held (see Fig. 1571). The beak is three-fourths of an inch in length, and is fastened to the shaft at an angle of 145°. This beak carries the lamp, and has an aperture through which the light shines. The window, through which the bladder wall is seen, is situated on either the convex or the concave side of the angle, between the beak and the shaft. When placed on the convexity of this angle it is in the axis of the shaft and admits of a direct view of the bladder wall toward which it is pointed. When the window is on the concave side of the angle the image of the bladder wall is received by a prism which turns it at a right angle into the axis of the shaft of the instrument.

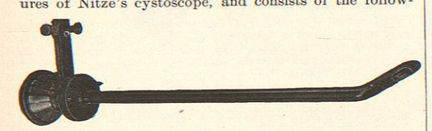

FIG. 1571.—Fenwick-Leiter Cystoscope, Second Variety. Window and lamp on the convex side of the instrument. (Original.)

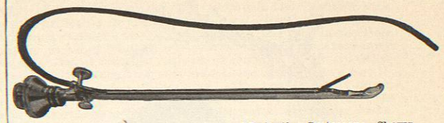

FIG. 1572.—Albarran's Catheterizing and Irrigating Cystoscope. Shows catheter in position and elevated to its full extent by the screw in the handle. (Original.)

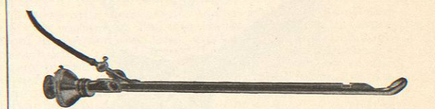

FIG. 1573.—Albarran's Catheterizing and Irrigating Cystoscope. Irrigating attachment. Water is injected into the bladder by the channel previously occupied by the catheter. (Original.)

The optical apparatus contained in a tube within the shaft has a lens just at the window in the bladder, and another at the end toward the observer.

The convergent rays which enter the little window within the bladder are deflected and carried up the axis of the tube to be received by the lens at the upper end; this lens again disperses them and presents to the eye an image equivalent to that received by the first lens. Thus a portion of the bladder wall much larger than the aperture is presented to the eye. The effect is much the same as if the eye were carried down to the lower opening and directly inspected the bladder through it.

In order to connect the lamp with the battery, the shaft is made of two tubes, one within the other, which are separated from each other by insulating material. Through them the current is carried and may be turned on and off by a switch attached to the handle. These tubes take up space and diminish the lumen of the instrument. To obviate this difficulty Otis has recently devised an instrument in which the electricity is conveyed through very fine wires.

While the principle of the cystoscope has not been altered, it has undergone many modifications to enlarge its usefulness. Thus it has been found that one of the most common causes of failure to get a good view of the bladder is the presence of blood or pus in the solution with which the bladder is filled. This may be obviated in a measure by the arrangement of an extra tube in the shaft, connecting with a stopcock in the handle, through which the fluid in the bladder can be changed from time to time without disturbing the instrument or turning off the light. Instruments thus equipped are known as irrigating cystoscopes, and the improvement is in some cases of value.

The success which attended the efforts to catheterize the ureter in the female bladder, and the information obtained in this way, naturally led to similar attempts in the male. To this end various modifications of the cys-

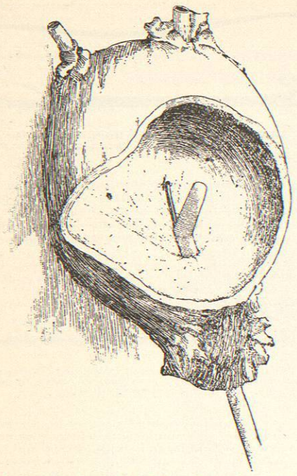

FIG. 1574.—Showing the position of a catheterizing cystoscope with window on convexity at the moment when a catheter is being introduced into the left ureter. (From F. Tilden Brown.)

toscope have been devised to enable the operator to introduce an ureteral catheter under the guidance of the eye.

The operation of cystoscopy is not difficult, but for its thorough performance some skill and patience are required. The interpretation of the conditions seen is by no means easy, and considerable experience is needed for the correct understanding of them.

The patient may be placed horizontally on his back, or in the lithotomy position, according to the individual preference of the operator. The bladder should be washed out, and the irrigation should be continued until the wash water returns clear.

If cocaine is to be used as the anæsthetic it should be introduced at this time, but the fact must be borne in mind that, while the mucous membrane of the bladder in health absorbs slowly and imperfectly, an ulcerated or diseased bladder may absorb with great rapidity. When ether or chloroform is used, the patient should be fully anæsthetized before the cystoscope is introduced.

The bladder should be distended with four or five ounces of a two-per-cent. solution of boric acid. In case of an over-distended and atonic bladder, even more than this amount of solution may be introduced. The instrument, lubricated with glycerin or other clear lubricant which will not cloud the window, is then passed in the same manner as a sound, care being taken not to start up bleeding. After the instrument has thoroughly entered the bladder, the light may be turned on, and at the same time the room should be darkened. By using the cystoscope that looks out posteriorly, the floor and fundus of the bladder, and also the sides for a considerable distance above the ureteric orifices, may be examined. Now by changing the instrument and taking the one which looks out anteriorly, the operator may inspect the front wall of the bladder and the parts above the urethral orifice. This examination should be systematic in order that no part of the bladder may be overlooked.

The limits of this article will not permit of any detailed description of the cystoscopic pictures, but will confine us to a brief consideration of the conditions in which cystoscopy may be of use.

Tumor of the Bladder.—The cystoscope affords often the most perfect opportunity for making an early and positive diagnosis of tumor. As the use of the instrument becomes more and more common it is to be expected that tumors will be detected early, before they have outgrown the possibility of thorough and radical removal. The pictures presented by tumors are often characteristic and easily understood. On the other hand, the examination is often very difficult, or indeed impossible, by reason of the hemorrhage which entirely prevents a clear picture.

It is well to remember that in a bladder not very fully distended the folds of mucous membrane may present misleading pictures closely simulating some forms of tumor. A mistake from this cause may usually be avoided by fully distending the bladder, and it is one which is but little likely to occur in the hands of an expert. With an irrigating cystoscope a jet of water may be thrown into the bladder during the examination, thus making a pedunculated tumor move in such a way that the operator may judge of the nature and extent of its attachment to the bladder wall.

Examination of an Hypertrophied Prostate.—The portions of the prostate which project back into the bladder

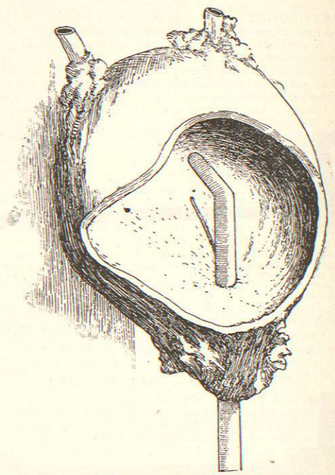

FIG. 1575.—Showing the process of catheterizing the left ureter through a cystoscope having window on the concavity. (From F. Tilden Brown.)

can be quite thoroughly and satisfactorily examined through the cystoscope. The knowledge thus obtained may be of decided value in determining the operative procedure appropriate to each case.

Sacculated Bladder.—There are certain cases of sacculated bladder in which the cystoscope is a great aid in

diagnosis. The pockets may contain stones or give rise to conditions resulting in the formation of stone, and in such cases an early and accurate diagnosis is difficult or impossible without the aid of the cystoscope. A more frequent use of this instrument might lead to a more intelligent treatment of the obscure conditions.

Ulceration of the Bladder Wall.—It is rare to see the bladder wall ulcerated except as the result of malignant disease or tuberculosis. It is usually possible to make the diagnosis of tuberculosis without the aid of the cystoscope; and this is fortunate, for the manipulations of a thorough cystoscopic examination often greatly aggravate the discomforts of a tuberculous patient and in some cases even seem to hasten the course of the disease. This is especially due to the danger of adding a mixed infection to the existent tuberculous process.

Examination of the Ureter.—Inspection of the ureteric orifice is possible through the cystoscope and may afford valuable information as to the condition of the kidneys. In hæmaturia or pyuria, for example, a cloudy jet of blood or pus from the ureter convicts the corresponding kidney of being the seat of the hemorrhage, or of some inflammatory process. The desire to extend the examination further and to get still more exact information as to the condition of each kidney has led to the use of ureteral catheters, through the cystoscope. Brenner, Caspar, Albarran, Otis, Brown, and others have devised a modification of the cystoscope which makes this procedure possible. For a more complete discussion of this subject the reader is referred to the article on *Catheterism*.

Detection of Foreign Bodies.—The cystoscope is occasionally useful in demonstrating the presence of foreign bodies in the bladder. In this way pins, silver-wire sutures, and silk sutures which were working their way into the bladder have been seen and removed.

Arthur T. Cabot.
Hugh Cabot.

CYSTS. (See also *Cystadenoma.*)—A cyst is a circumscribed cavity containing a more or less fluid substance, or in rare cases gas, shut off from the neighboring tissues by a more or less independent wall, and owing its origin to pathological processes. To this definition there are, however, a number of exceptions. Pericardial, pleural, and peritoneal effusions, tuberculous cavities, abscess caverns, sinuses, etc., as well as simple dilatations of the hollow organs of the body (stomach, colon, bladder, etc.), in which the normal wall as well as the form of the organ is preserved, are not as a rule designated as cysts. A distinction is also made by some writers between cysts possessing a well-defined wall and those whose wall consists only of the surrounding tissue, the latter being termed cystoid. On the other hand a distinction must be made between the true cysts and the cystic neoplasms. The latter are to be classed as cystomata or cystadenomata. It is very difficult, however, to fix the boundary line between the cyst and the cystoma. In the development of every cyst a certain degree of proliferation of its wall must take place to compensate for the increasing size of its cavity, else defects in its wall would result. This tendency of the cyst wall to proliferation is more marked in some cases of cyst formation than in others, consequently it sometimes becomes very difficult to fix the exact nature of the cyst. As a general point of differentiation it may be taken that all cystic growths which through the proliferation of the elements of their walls constantly form new cysts are to be classed with the cystomata. In connection with such growths there is usually a pathological formation of new gland tissue to which the cystic change is almost always secondary. The character of the growth is therefore more properly expressed by the term cystadenoma. In the true cyst the proliferation of the cyst wall is confined to that of the original cyst and there is no progressive formation of new glandular tissue. It must, however, be borne in mind that cystomata very frequently take their origin from simple cysts.

Cysts may vary in size from a pinhead to a man's head and occasionally much larger. They may consist of but one cavity (simple or unilocular cyst), or they may be many-chambered (compound or multilocular cysts). The chambers of a multilocular cyst are usually very irregular in size and shape, and may or may not communicate with each other. Communication between the cavities may occur primarily in cases in which an entire acinous gland becomes changed into a cyst, as may happen in the case of the salivary glands. Secondary communication may be established through rupture or atrophy of the partition walls. Complete destruction of these transforms a multilocular cyst into a unilocular. On the other hand, a cyst of a single cavity may through proliferation of its walls become changed to one of several or many chambers. Obliteration of a cyst cavity may result from organization or solidification of its contents, or rupture of the cyst may be followed by its collapse and subsequent union of its walls through fibroblastic adhesions. The inner wall of the cyst cavity may be smooth (simple cyst), or may be papillary (papilliferous or proliferous cyst). Cysts in their occurrence may be single or multiple. Multiple cyst formation in a number of adjacent cavities may assume the appearance of a multilocular cyst through the atrophy of the intervening tissues.

The essential elements of the cyst are the cyst wall and the cyst contents. The latter must be different in nature from the former, but both bear certain definite relations to each other. Either one or the other may be the primary agent in the formation of the cyst. In the case of the liquefaction of necrosed tissues or in the formation of a capsule around a parasite the wall is developed secondarily to the contents, while in other forms of cysts the contents are the result of secretion by the elements of the cyst wall. In these cases, however, the retention of secretions and the consequent stretching of the wall are the factors which excite further proliferation in the elements of the wall.

As a rule the cyst wall consists of a connective-tissue membrane of greater or less thickness separating the cyst contents from the neighboring tissues. It may be thick enough to be visible to the naked eye, or may be evident under the microscope as a very delicate fibrous layer, or only as a thickened layer of the surrounding tissues, while in other cases the cyst contents may lie in direct contact with these without any proper intervening membrane. Very frequently the cyst wall is so independently developed as to render it possible for the cyst to be easily shelled out from the surrounding tissues. In other cases the wall may become thickened through inflammatory processes and so intimately adherent to the neighboring structures that its separation from them becomes difficult or impossible. In a general way the thickness of the cyst wall will depend both upon the age of the cyst and upon the degree of pressure within it. In the early stages of formation the cyst may possess no definite wall, while later a thick fibrous capsule may gradually develop. On the other hand an originally thick capsule may be thinned from a great increase of pressure within the cyst. Deposits of fibrin, lime salts, etc., upon the inner surface of the wall may cause its apparent thickening. The connective-tissue capsule of the cyst may have either an epithelial or an endothelial lining, or the cyst contents may lie in direct contact with the connective tissue of the wall or with the surrounding tissue. This will depend chiefly upon the anatomical origin of the cyst, the character of the inner lining of the capsule being the same as that of the cavity from which the cyst arose. Epithelium will be found only in those cysts which arise from spaces originally lined with epithelium, and from the character of the epithelial cells lining the cyst it is possible within certain limits to tell its origin. Many changes, however, take place in the character of the lining cells: originally tall columnar cells may become cuboidal or flattened, ciliated cells may be changed to simple columnar or flattened, while a single-layered epithelium may become stratified through proliferation. Increase of pressure within the cyst is the chief factor in producing these changes. For this reason the true character of the lining