those from the pars anterior will be blue, while those from the pars posterior will be unstained.

4. *Examination with Sounds and Bougies.*—In a large proportion of cases of chronic urethritis stricture in some form is present, and in an instrumental examination of the urethra is the first thing to be searched for. A detailed description of instruments and methods used for this purpose is given in the discussion of *Stricture*, and is not repeated here.

When no stricture can be found, other forms of local lesions that may be present can often be located accurately by means of the steel sound or the rubber bougie. It is always well to begin with a blunt steel sound of the largest size that will easily pass the meatus. This larger sound, warmed and oiled, causes less pain than smaller ones, and will often answer every purpose. The sensations of the patient on the first passage of any sound should not be relied upon for the location of diseased areas, as the entire mucous membrane is often so sensitive that the patient, usually nervous and apprehensive in this his first experience with a sound, cannot tell definitely at what points the passage of the instrument causes him the most pain. In most cases all decided pains disappear when the sound ceases to move, and it should be held quietly in the urethra for from one to five minutes until the sensitiveness of the membrane is lessened and the fears of the patient are overcome, when it should be withdrawn gently and at once reintroduced, gently and slowly. Its second introduction will cause the patient comparatively little uneasiness except when the tip of the instrument comes in contact with areas of disease (inflamed follicles, granular patches, or superficial ulcers). At these points he will probably experience the

sensation of burning or sharp, sticking pains. With the sound held in the urethra with one hand, the fingers of the other hand may explore the pendulous portion and accurately locate areas of thickening and sensitive points.

In disease of the pars posterior or of the prostate gland passage of the sound through the deep urethra may be accompanied by great pain and violent tenesmus. If relief does not quickly follow when the sound is held still, it should at once be withdrawn from this part of the urethra. In neurasthenics and in cases of urethral hyperæsthesia the first attempts to sound the urethra may be very painful, the muscular fibres of the urethra contracting about the instrument, forming spasmodic strictures which interfere with the passage of the sound. In these cases patience, gentleness, and repeated examinations are often required before the limited areas of disease can be located or before the sound can be passed fully into the bladder.

In less sensitive urethras, when the blunt sound fails to accurately locate the urethral lesions, the bulbous bougie or the urethrometer may be used. The largest sized bulbous bougie that can readily be introduced is oiled and passed to the deep urethra. It is then slowly withdrawn, and as the shoulders of the bulb come in contact with granulating and other sensitive areas the patient experiences sharp pains or sticking sensations. If on repeated examinations the patient complains of pain at the same points, the lesions are thus located.[1]

5. *Endoscopic Examination.*—Some few conditions of the urethra, such as tumors, polypi, granular patches,

[1] For a description of sounds and bougies, and the technique of their use, see *Stricture.*

and ulcerations, are best recognized and treated by means of the endoscope. This instrument has a somewhat restricted field of usefulness, since its successful employment calls for much experience and practice on the part of the operator, and the introduction of the straight endoscopic tubes is attended by much more pain and irritation of the urethra than is caused by the passage of sounds. The endoscope should never be used during acute, or even subacute, stages of urethritis, for fear of aggravating the existing inflammation. It is of service chiefly in those cases of chronic urethritis in which other methods of diagnosis and treatment have proved insufficient. It is always well to postpone the use of the endoscope in any case until the sensitiveness of the urethra has been tested and lessened by the use of sounds.

(*a*) *Description of Instruments.*—Since Desormeaux first made practical use of the endoscope in 1853, numerous modifications of his instrument have appeared, as well as some entirely new devices for exposing to view the mucous membrane of the urethra. The method recommended by Gruenfeld, and the one most frequently employed, is the simplest, the endoscopic tubes being separate from the illuminating apparatus. Gruenfeld's original tubes have been modified by Steuer, and again by

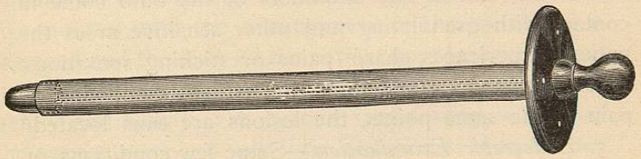

FIG. 18.—Klotz's endoscope (Tiemann).

Klotz (Fig. 18). Either of the two modifications is probably better than the original tube, since the flat disk

prevents painful distention of the meatus when the tube is forced back upon the glans, thus shortening the penis and allowing inspection of the entire urethra by a tube much shorter than the urethra itself. Tubes should be of metal or of hard rubber. In many respects the Klotz tube of coin-silver is best, since it is light, easily cleaned, and has thin walls, which allow a wider bore for the same size of tube.

The tubes needed will vary in diameter from 16 to 30, French scale, and in length from three to five and a half inches. As a rule, a tube of the largest diameter that will pass the meatus should be used, in order to give the best illumination and the largest view possible. In the pendulous urethra specula (Figs. 19 and 20) may be used instead of tubes. They have an advantage

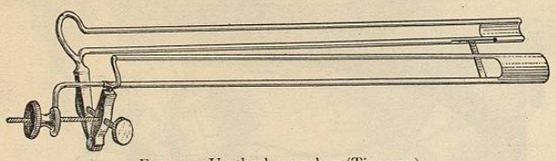

FIG. 19.—Urethral speculum (Tiemann).

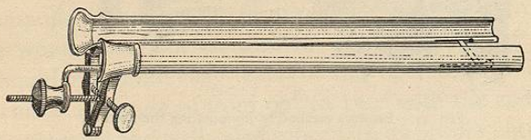

FIG. 20.—Urethral speculum (Tiemann).

over the latter in displaying larger areas at a time, but the pressure produced by the sides of the instrument causes more or less anæmia of the mucous membrane, and consequently modifies its appearance.

Illumination is obtained by means of an ordinary mir-

ror such as is used in examinations of the larynx. This may be fastened to a handle or, better, to a head-band. The source of light, in order of desirability, may be direct sunlight, bright diffused daylight, electric or gas light, or a kerosene lamp. If an artificial light is used, it should be mounted on a freely movable and adjustable bracket. The addition of a condenser will improve the illumination. An excellent apparatus is that devised by Dr. F. Tilden Brown (Fig. 21).

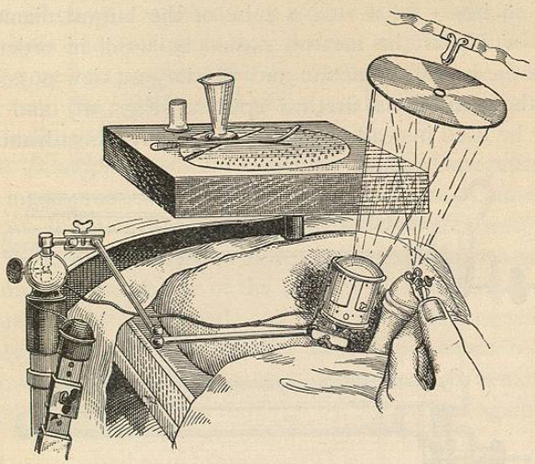

FIG. 21.—Brown's method of illuminating the urethra.

In another type of endoscope the tube is directly connected with an electric illuminating apparatus. The Leiter electro-endoscope, used and recommended by Finger, has been modified by several operators in America. The Otis electro-urethroscope (Fig. 22) is probably as serviceable as any endoscope of this type. It has the

great advantage of being but one-sixth as heavy as Leiter's instrument.

(*b*) *Method of Examination.*—For endoscopic examination of the urethra the patient should be placed on a table or an operating-chair that will bring the genitals on a level with the eyes of the operator, who sits in front. If a separate reflector is used, the rays of light should come from a little to one side of the patient, and should so strike the reflector that the best possible illumination of the urethra may be obtained. Cotton, tampons, and

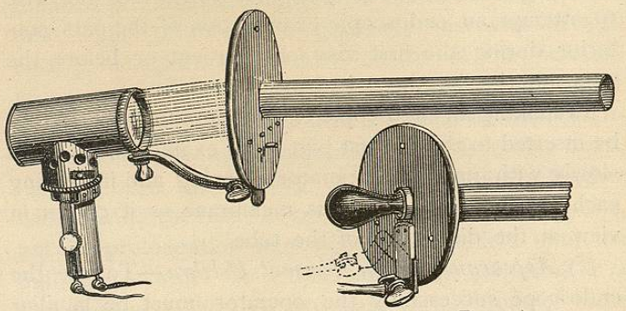

FIG. 22.—W. K. Otis's "perfected" urethroscope (Tiemann).

tampon-carriers (in the form of long wires or thin strips of wood, that can be thrown away after using once) should be within easy reach of the operator. With the penis at an angle of from 90° to 130° with the abdomen, the warmed and well-oiled tube, with its proper obturator, is directed along the upper wall of the urethra to the bulb, where it meets with resistance. The tube is now in position to begin examination of the pars anterior.

If the pars posterior is to be examined, the proximal (ocular) end of the instrument is depressed and gently pushed on until the visceral end enters the neck of the

bladder, when partial removal of the obturator will allow some escape of urine if the bladder be moderately full, and the position of the tube is thus easily demonstrated. The tube is then withdrawn slightly, to the prostatic urethra, and the examination is begun. The passage of the straight instrument through this portion of the urethra is painful, and is also difficult of execution—sometimes impossible. In some men it will be necessary to depress the ocular end of the tube but to a horizontal line, while in others it must be carried much lower and considerable force must be employed. As a rule, it is not wise to attempt an endoscopic examination of the pars posterior during the first visit of a patient or before the pars anterior has been inspected carefully.

In making an endoscopic examination the tube should be inserted to the deepest part to be examined, and then slowly withdrawn, the operator cleaning and inspecting each portion of the mucous membrane as it comes in view at the distal end of the tube.

(*c*) *Appearance of the Normal Urethra.*—To use the endoscope successfully the operator must be familiar with the appearances of the different portions of the normal urethra. Such knowledge can come only through much experience, and cannot be gained solely from written descriptions, or even from plates. In the normal condition the urethra is not a tube with a definite calibre, but is a closed valve, the walls being in contact and lying in longitudinal folds. The introduction of the endoscopic tube separates the walls and smooths out the folds. A short distance from the end of the tube, however, the walls again come together in the form of a funnel, the folds radiating to a central point or a short line which has much the appearance of a

sphincter and is called the "central figure." As the tube is slowly withdrawn the funnel follows, but if the tube be pushed backward, or if the one employed be too small for a given urethra, the folds of mucous membrane will fall together directly at the end of the tube, or will even project into it.

In the posterior portion of the prostatic urethra the tunnel is short and the surface is smooth or but slightly ridged and of a dark-red color. As the tube is withdrawn the membrane becomes paler, and a flat or rounded protuberance appears at the lower edge of the tube. This protuberance gradually increases in size until it occupies about three-fourths of the field of vision, and the funnel above appears in the form of a crescent. The protuberance is formed by the colliculus seminalis, on the summit of which, in favorable cases, may be seen the opening of the utricle. On further withdrawing the tube the colliculus gradually disappears, but its prolongation may remain in the field until the bulb is reached. On either side of the colliculus is a deep furrow. The tube may pass through one of these furrows, so that the colliculus is not seen at all or appears at one side. The picture obtained in the prostatic urethra is a complicated one, and differs greatly in different individuals.

In the membranous urethra the mucous membrane is paler in color than in the prostatic portion, and the funnel is short and regular, the "central figure" being a point. In passing to the bulbous portion the picture may change gradually and but slightly, though more frequently the funnel becomes shorter and the folds much larger. The latter may push into the tube in the shape of two external ridges which touch in the centre and

give the central figure the form of a vertical line or fissure. The contractions of the bulbo-cavernosi and ischio-cavernosi muscles may render it difficult to keep the tube in the bulb. This object can be accomplished by the use of force or by elevating the ocular end of the instrument as in the removal of a sound.

In the pendulous urethra the funnel is again regular, the folds uniting in a central figure in the form of a horizontal slit. The color of the membrane is pink or pale red. Along the upper wall may be seen small, pin-point-sized depressions. These are the lacunæ Morgagni. In the glans the central figure is triangular, except in the fossa navicularis, where it is vertical. The membrane loses some of its red color and adds a bluish tint. At the meatus it is of almost a slate color.

(*d*) *Appearance of the Urethra in Disease.*—The shape and size of the funnel will be modified variously, depending upon the nature and extent of the infiltration and thickening present in the urethral walls. If the mucous membrane is œdematous, the natural folds will be increased in size and will come together nearer the end of the tube, forming a short, narrow funnel; or if this swelling be soft and considerable, the membrane will bulge into the end of the tube. In this condition the folds and the funnel re-form rapidly after moving the tube. If there be firmer and deeper infiltration of the tissues than in the condition just described, the walls of the urethra will not come together so readily, the funnel is longer and larger and more rigid, and the changes occur slowly. In either form of infiltration and swelling, if the process be unilateral, unequal, or irregular, the funnel will be unsymmetrical, the central figure will be variously distorted, and irregular folds may bulge into the tube.

While pathological changes in the deeper tissues can thus be recognized, the endoscope is chiefly valuable in demonstrating and treating lesions on the surface of the mucous membrane. The color of small or even large areas may be changed from the normal pink to a bright red or to some of the darker, duller shades of bluish and brownish red or purple; or, on the contrary, it may be almost white. The normal dull lustre may be lost, and the surface may appear smooth and shining or even glistening, or rough, dull, and cloudy. Losses of epithelium give the surface a finely stippled appearance. Areas of granulation are of frequent occurrence and are readily recognized. Morgagni's lacunæ are often involved in chronic urethritis, and appear as circumscribed reddened and swollen areas, or as sharply defined pin-head-sized or larger pits or depressions. Small areas of superficial ulceration may be found. These areas are very sensitive, may appear depressed, and lack the smoothness and lustre of the normal membrane. Occasionally tumors may be present in the urethra and be the cause of slight persistent discharge or disturbances in urination. These tumors are recognized by the endoscope in the form of smooth polypi or more frequently as small warts or papillomatous growths. The latter are usually situated near the meatus.

The above-described pathological changes are found chiefly in the bulbous and pendulous portions of the urethra. In the pars posterior they are found less frequently and are not so well understood. Endoscopic examination of this region is not often called for, though it is occasionally of great service in both diagnosis and treatment. The straight tube does not readily enter the prostatic urethra without the application of some force,

and the resulting hemorrhage not infrequently is sufficient to prevent an accurate inspection of these parts.

Treatment of Chronic Urethritis.—It is difficult to lay down definite rules for the management of chronic urethritis, since so much depends on the individual, his habits and surroundings, and on the duration, character, and previous treatment of his disease. Frequently the condition of the patient, more than that of his urethra, should be considered. In cachectic individuals local treatment of the urethritis may accomplish little as compared with properly directed constitutional treatment. In cases of simple anæmia, debility, or exhaustion, rest and proper tonics will often be more effective in causing the disappearance of a urethral discharge than will any amount of local treatment. In men who have been violating the laws of sexual and general hygiene, changing the habits of living to conform with these laws may make other treatment unnecessary, and until such changes are made local treatment will do little, if any, good.

The hygiene of chronic urethritis is practically that of the acute disease, except that greater freedom is allowed the patient in matters of diet and exercise. Tobacco, alcohol, and rich or highly seasoned foods should be interdicted; sexual excitement and unrest should be avoided. For the unmarried man absolute continence, both mental and physical, is the only course. In married men moderate, unstimulated sexual relations are permissible, or even beneficial, in cases of slight, persistent discharges which the physician is satisfied are non-infectious. In the case of the unmarried man who has been tormenting both mind and body in his ceaseless efforts to remove the last traces of a catarrhal discharge from the urethra and to prepare himself for matrimony, and whose morbid mental

condition interferes with sexual hygiene by keeping the organs in a state of unrest, marriage is the best remedy. Keyes says: "A regular, moderate exercise of the sexual organs tends surely to keep down congestion and to allow that rest which is most important in effecting a cure." It is needless to add that such exercise of the sexual organs cannot be found outside of the married state; and, furthermore, the mental and moral influence upon such a man of his marriage to a pure-minded woman is a large—frequently the most important—factor in effecting his recovery. In such cases the physician will not, of course, recommend marriage until he is satisfied that the urethral discharge is non-infectious and that the man is resolutely endeavoring to live according to the laws of sexual hygiene.

The use in the urethra of strong injections, of bulbous sounds, of dilating instruments, or of the endoscope necessarily irritates the otherwise healthy portions of the mucous membrane, causing temporary inflammation of these areas. Even mild injections and the blunt steel sound are slightly irritating to the normal mucous membrane, and their use is followed by some hypersecretion of mucus. Hence the folly of continuing local treatment indefinitely in hope of removing the last drop of mucus which appears at the meatus, and hence the impossibility of making an accurate diagnosis in a case of urethritis that is being treated locally.

In undertaking the management of a case of chronic urethritis that has been under more or less constant local treatment, it is always advisable to give the urethra a rest for several weeks before again beginning topical applications. This rest gives the mucous membrane a chance to recover from the irritation produced by local

interference, and allows the surgeon at the end of this time to determine with greater accuracy the nature of the organic lesions that may be present. It also happens that the same local treatment which was ineffective when pursued constantly will, after such a rest, be followed by prompt and beneficial results. In cases in which no organic lesions are present, cessation of local treatment for a few weeks may result in complete disappearance of the urethritis. Such cases are more numerous than the majority of practitioners are willing to believe. Many of the so-called "incurable" cases of chronic urethritis, which refuse to yield after months or years of treatment, need only rest and hygiene to bring about their recovery. In stopping all local treatment it may be well at first to give small doses of sandalwood or of cubebs. The urine should be kept unirritating at all times.

For purposes of treatment all cases of chronic urethritis may roughly be divided into two classes. The first class includes those cases in which a considerable portion or all of the urethral mucous membrane is involved to a greater or lesser degree. This condition is found in cases following a recent gonorrhœa, in relapses and exacerbations of chronic urethritis, in urethras subjected to constant or excessive local treatment, and in the chronic urethritis of men who are cachectic or who are not living hygienically. The amount of secretion in these cases may be considerable, and may vary from a mere hypersecretion of mucus to a more or less purulent discharge resulting from a true inflammation of the membrane. If posterior urethritis be present, the second portion of the urine will be cloudy. The second class includes those forms of urethritis in which the larger portion of the urethral mucous membrane has returned

to its normal condition, the pathological process being limited to one or more circumscribed areas. The secretion in these cases is slight, and may not be apparent except as shreds in the urine. It is evident that a case of the second may temporarily be transformed into one of the first class, as a result of sexual or other excesses or of active local treatment.

Treatment of Cases of the First Class.—In these cases the discharge, the pus in the urine, or the subjective symptoms show that a considerable portion of the urethral mucous membrane is inflamed, or at least irritated and congested, and that all instrumentation of the urethra should be avoided. The treatment should correspond with that given for the late stages of gonorrhœa. Internally, sandalwood and cubebs give good results, though copaiba is indicated if the symptoms become at all acute. In posterior urethritis boric acid is of special value, and may be given in addition to one or more of the above-named remedies. Local treatment should be limited to the use of injections or irrigations.

The injections used may be those recommended for the declining stages of gonorrhœa, though it may be necessary gradually to increase their strength. Many other preparations are recommended, and sometimes prove serviceable in the treatment of chronic urethritis. Among them are nitrate of silver, sulphate of copper, and chloride of zinc. Each of these may be used in strengths varying from one-fourth of a grain to a grain in an ounce of distilled water. Alcohol or glycerin, or both, may be added to any of these preparations, the quantity added being small at first and gradually being increased if it does not irritate the urethra. Instead of alcohol an astringent wine may be used. The practitioner is again

warned against the folly of using too many injections. He will obtain the best results if he limits himself to two or three preparations with which he has become thoroughly familiar. He can easily vary their strength and frequency of application to suit the needs of each case. Strong injections should not be used until weaker ones, after faithful trial, fail to do good. The solutions used should always be weak at first, and if necessary gradually be increased in strength, and injections strong enough to produce decided burning or smarting sensations in the urethra should not be used.

It should be remembered that often the last drop of mucus will not disappear from the meatus until after the injection has been stopped and the mucous membrane has had time to recover from the stimulating effects of local treatment. If, after using an injection for two or three weeks, the discharge is reduced to a drop or two, the injection should be used with gradually diminishing frequency for a week or two and then be stopped, and the patient should be allowed a fortnight without local treatment. If the slight discharge or the shreds in the urine persist, the case is, so far as the anterior urethra is concerned, one of the second class, and is ready for examination and treatment with instruments.

Injections made with a gonorrhœal syringe will, of course, reach only the anterior urethra. If posterior urethritis be present in such degree that the second glass of urine is clouded with pus, the inflammation should be reduced as far as possible before beginning the use of sounds and instruments. This result can usually be accomplished by means of internal treatment, aided, in some cases, by *deep irrigation.* A number of methods of irrigating the deep urethra have

been advocated, and several instruments have been devised for the purpose, but all the apparatus necessary is a short glass or rubber tube—or, if preferred, a soft catheter—connected by means of rubber tubing with the reservoir containing the solution to be used. The reservoir, filled with the warmed solution, is held about two feet above the level of the penis, and, after allowing the liquid to flow long enough to expel the air from the tubing, the nozzle is inserted for a short distance within the meatus and is held there loosely, permitting a free outflow of the solution. The anterior urethra is thus cleansed, and pus or shreds that have been present in this portion will not be carried into the pars posterior during the subsequent steps of the operation. When the solution coming from the urethra is clear and free from shreds, the lips of the meatus may be gently closed upon the tube and the reservoir slowly and gradually elevated until the pressure thus acquired overcomes the compressor urethræ muscle, and the fluid passes over the mucous membrane of the deep urethra into the bladder.

Instead of a short tube a soft catheter may be used. After washing out the anterior urethra the tip of the catheter may be passed to the membranous or the beginning of the prostatic urethra; the fluid will then fill the deep urethra and pass into the bladder. The point is known to have entered the membranous portion by the yielding of the compressor urethræ muscle, which can generally be recognized by the operator, or by the fact that the fluid no longer escapes from the meatus; or the catheter may be passed into the bladder and slowly withdrawn until the urine ceases to flow, and the tip is thus known to be in the deepest portion of the prostatic urethra. The catheter should be lubricated with glycerin,