ward and downward into the peritoneal cavity. Pyelitis with tumor is distinguished from perinephritis by the condition of the urine.

Treatment.—With the first symptoms, leeches may be applied to the lumbar region, followed by ice. Purgatives should be administered. If there is much pain, morphine is necessary. Large doses of quinine (ten grains every four hours) should be given with the view to check the migration of the white corpuscles, and preferably with morphine, although the pain may not be great. As soon as suppuration occurs, supporting measures are required. Malt liquors, a generous diet, alcoholic liquors, and quinine are the most appropriate means. A free incision should be practiced as early as possible, and drainage established.

SOME DISEASES OF THE BLADDER AND URETHRA IN THE MALE.

CLINICAL EXAMINATION.

[Note.—Diseases of the bladder and urethra are usually considered surgical maladies, and do not appear in a medical treatise; but as they so often come into relations purely medical, and demand the kind of consideration which a practical physician gives to all his work, I have decided to incorporate some account of them in this edition].

I have already given (page 503) an outline of the modes in which urine is studied for clinical purposes. It is necessary to add, however, some special points in respect to vesical troubles.

When disease of the bladder is supposed to exist, the urine of twenty-four hours should be collected, and its appearance compared with known specimens of the normal fluid.

There being simultaneous disease of the urethra, a drop of the urethral discharge should be compared with a drop of the urinary sediment coming from the bladder. In this way valuable information is got as to the source of a given specimen of urine in disease of the urinary passages.

In catarrh of the bladder, whether acute or chronic, the action of extraneous causes must be taken into account. A gonorrhœa, recent or that has suddenly ceased to flow, some obstructive difficulty as an urethral stricture, enlarged prostate, etc., or some reflex irritation, as hæmorrhoids, etc., may be the source of the mucous inflammation, rather than any intrinsic trouble.

It is necessary, therefore, to be provided with means for investigating the condition of the urethra. For this purpose, bulbous sounds *

* From Van Buren and Keyes's "Treatise." Published by D. Appleton & Co.

are necessary if the lesion is a stricture. These were at first graduated according to the French scale, and extended from No 1 (·03 in diameter) to No. 40 (in diameter, 13·33). At present, chiefly through the

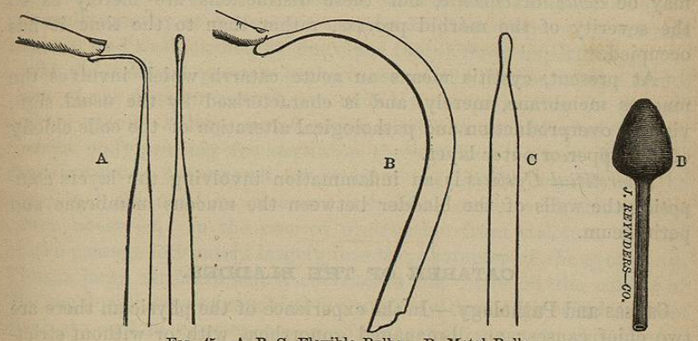

Fig. 45.—A, B, C, Flexible Bulbs. D, Metal Bulb.

remarkable work and practical demonstrations of Dr. Otis,* we have an American scale, the sounds graduated in the metric system, and increasing *one millimetre in circumference*, up to No. 40, the maximum size.

To determine the normal size of any urethra, it is necessary to make use of a measuring instrument, graduated in the same scale. This introduced and gradually expanded up to the proper point will necessarily give an approximation to the proper measure of the canal, but it must be remembered that this tissue is extensile, and too great force will furnish an abnormal result.

If the canal be narrowed by any thickness of deposit, a catarrh of the bladder will be produced ultimately. Hence it follows that the stricture must be removed.

Enlarged prostate so often figures as a cause of vesical catarrh that grievous errors are sometimes committed—errors of opinion and errors in the treatment. The age of the subject must be taken into account. Enlarged prostate may exist without changing the caliber of the urethra, it has been proved, and much obstruction may be due to changes in the isthmus of the prostate so situated as to narrow the caliber of the canal at the very entrance of the bladder, and yet not cause any demonstrable change in the body (in the two lobes) of the gland.

No mistake is more common than confounding stricture with the triangular ligament, through which the urethra passes, and against which it doubles up when a sound or catheter is hastily and indiscreetly passed.

* "Practical Clinical Lessons in Syphilis and Genito-Urinary Diseases," New York, 1883, p. 437.

FORMS OF CYSTITIS.

The term *cystitis* means an inflammation of the bladder, which may be *acute* or *chronic*, but these distinctions are merely as to the severity of the morbid process, rather than to the time it has occupied.

At present, cystitis means an acute catarrh which involves the mucous membrane, merely, and is characterized by the usual sign, viz., an overproduction and pathological alteration of the cells chiefly of the upper or outer layer.

Interstitial Cystitis is an inflammation involving the layers composing the walls of the bladder between the mucous membrane and peritoneum.

CATARRH OF THE BLADDER.

Causes and Pathology.—In the experience of the physician there are two chief causes: an ill-managed gonorrhœa, with or without stricture; disease—rarely tuberculosis—especially obstructive conditions affecting the isthmus or body of the prostate gland. It sometimes happens that suppurative pyelitis extends downward, and ultimately the bladder takes on the catarrhal process. There is reason to believe that persistent excess of uric acid may also start an irritation that ultimately becomes catarrh of the bladder. The agency of calculi and other foreign bodies are well-known causes in the experience of surgeons.

More frequently than uric acid, does the phosphatic condition determine attacks of vesical catarrh. It must be understood, however, that the production of alkaline urine is usually the result of pre-existing disease of the urinary passages, especially of retention of urine and decomposition, whereby ammonia is formed from the urea. The alkaline state of the urine changes the appearance and condition of the mucus, which becomes semitransparent, tough, glutinous, and "stringy."

Symptoms.—Catarrh of the bladder, when secondary to a chronic urethritis, may come on insensibly to the patient. There is at the outset little more than increased irritability of the bladder—frequency of discharge—but of the same character as before. Soon, however, especially if the case takes on more of an acute character, the vesical irritability is accompanied by a deep-seated soreness felt in the perineum, rectum, and along the course of the ureters. The calls to urinate become more frequent and urgent, the flow is accompanied by straining, burning pain, and only a few drops may slowly distil out, as it were, or only muco-pus is forced out, it may be, and this streaked with blood. The sense of relief experienced when the bladder is emptied, becomes shorter in duration, and presently is no longer felt, the

vesical tenesmus continuing present all the time. At length rectal tenesmus comes on, hæmorrhoids—large, sensitive, and bleeding—may form and contribute materially to the sufferings of the patient. The urine is acid or alkaline, the latter in cases of long duration, is voided in small quantity at a time—it may be drop by drop—with extreme anguish, and so thickened by muco-pus that it flows imperfectly.

If the enlarged prostate is the cause of the disease, to the symptoms of the bladder catarrh are added those pertaining to the enlarging gland—a deep-seated soreness with a sensation of a large foreign body pressing for expulsion through the rectum. If gonorrhœa has set up the catarrh, the onset of the bladder trouble may be silent, and not until an excessive irritability comes on is the complication observed. In the case of obstruction from stricture, the size of the passage left enters largely into the character of the symptoms. Thus, a large stricture which encroaches but little on the caliber of the canal will be accompanied by a gleety discharge which proves obstinate, and in consequence of the attention given to this, the occurrence of a catarrh of the bladder may be unobserved, until an unwonted frequency and slowness of the urinary discharge demands treatment. When the stricture is a tight one, the increased embarrassment attending the flow of urine at once is recognized by the patient.

From the beginning of a vesical catarrh the discharge of urine becomes troubled, but when serious obstruction exists in the urethra, such an active catarrhal process is set up that soon the flow is started with difficulty; but a part of the contents of the bladder is discharged, and in consequence the residual urine constantly increases, decomposition goes on, the contents of the organ become highly alkaline and offensive, and the muco-pus is produced in enormous quantity. The mucous membrane, also, excretes phosphate of lime in such a large amount that it forms with the muco-pus a thick adhesive coating which has become an immovable lining of the whole interior.

When it has attained advanced proportions, catarrh of the bladder affects the general state to a greater or less extent. A septicæmic fever may occur. The paroxysms have a characteristic irregularity in the time of occurrence, but in the manner of acting bear a close resemblance to intermittent fever. A severe chill, followed by fever (temperature, 102° to 105° Fahr.), and a profuse sweat, which is apt to be prolonged, even to twelve hours or more, are the symptoms that constitute the complexus of the septicæmic fever. The frequency with which these paroxysms occur depends on the severity of the catarrh, and on accidental circumstances. Malarial infection, acute indigestion, irregularities of conduct, and exposure to cold and damp, are among the accidents that most frequently cause a recurrence of the paroxysms. The close resemblance of the septicæmic to the malarial fever

is shown in the behavior to the action of certain remedies, as well as in symptoms—in the reactions under quinine especially.

Course, Duration, and Termination.—Catarrh of the bladder manifests no disposition to spontaneous cure. If permitted to continue undisturbed, the catarrhal inflammation increases in area and depth, and spreads widely by contiguity of tissue. The most serious complication that ensues by reason of contiguity is an extension to the kidneys, the development of pyelitis, and subsequently of multiple abscesses. When catarrh of the bladder is produced by obstruction, obviously its subsequent behavior is determined by the changes in the obstructing causes. A stricture may be cured, and when this is accomplished, the catarrh can be managed easily and effectively, but when chronic enlargement of the prostate is the source of mischief, only amelioration can be expected ; but that amelioration has a high degree of value, and is only short of cure in the comfort wrought.

In the study of catarrh of the bladder, the actual state of the urethra, or prostate, must be ascertained. Although, properly speaking, a surgical procedure, every medical practitioner should be prepared to sound the urethra and bladder. Three instruments only are essential : bulbous sounds of various sizes, a curved metal sound, flexible catheters of vulcanized India-rubber or caoutchouc, and prostatic silver catheter. The bulb-sound is indispensable for ascertaining the situation and caliber of a stricture. Rendered aseptic, and lubricated with prepared vaseline, the sound first tried having the size of the healthy urethra, is passed gently down the canal ; when a narrowed part is reached the fact is recognized by the resistance felt in passing through, but especially by the resistance and sudden jerk combined, felt when the sound is drawn back through the stricture. If stone is present, the silver prostatic catheter will probably disclose it.

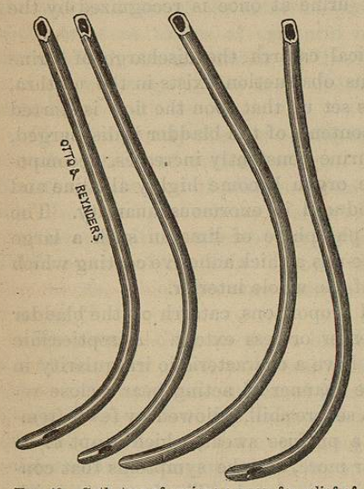

Fig. 46.—Catheters of various curves, for relief of bladder.

The course of treatment in various cases has much to do with the result. Appropriate local and systemic management is largely efficacious in certain kinds of cases. If the disease pursues its own way unaffected by treatment, various secondary troubles arise. Extension by contiguity of tissue takes

place along the ureters, and thus serious changes are slowly set up in the kidneys.

In course of time, extension of the malady takes place through the other layers of the bladder, and serious pathological changes occur.

Treatment.—It must be admitted here that the methods of treatment pursued by the surgeons are more efficient than those employed by physicians ; but it will be found, I think, that a combination of the two is better. Remedies that can effect the vesical mucous membrane only by passing through the system, are shorn of much of their power by diffusion, yet they accomplish undeniable good.

There are numerous remedies of merely empirical origin that have been popular, but it may well be doubted whether the good is not surpassed by the injuries inflicted on the mucous membrane by their irritating contact. Copaiba, cubeb, sandal-wood oil, and others of the same character, are the most evil of the group, and I advise my readers to prefer more enlightened methods.

Of the remedies acting on catarrh of the bladder, in acute cases, the most useful are the alkaline bicarbonates of sodium or potassium, especially of potash. The ordinary neutral mixture effervescing draughts in which bicarbonate of potassa is given in excess, lemonade made of bitartrate (cremor tartar), some lemon juice added and sweetened to the taste, are all useful by diluting the urine and lessening acidity. When the urine is alkaline, and contains much lime phosphate, the alkaline salts are hurtful, and mineral acids become appropriate remedies. When the catarrhal process is at a more advanced stage, the kind of remedy given depends on the state of the urine. If acid still, to the remedies above mentioned may be added tincture of cantharides (5 to 20 m.), and oil of erigeron (same dose), remedies that are really effective when the acuter symptoms have subsided. The exacerbations of fever that occur in the course of the chronic form of vesical catarrh are most successfully treated by antipyretic doses of quinine. They are not unfrequently mixed with malarial toxæmia, when the rule of the recurrent paroxysms is regularly intermittent. These febrile attacks are septicæmic in kind, and are due to the suppuration occurring in the bladder. Only massive doses (15 to 20 grs.) will be effective under these circumstances. Antipyrin, acetanilid, resorcin, and other members of the antiseptic group, are also used with, or as substitutes for the quinine. I am of opinion that quinine is more effective, really, than any of them, if firmly but judiciously administered. When suppurative pyelitis becomes an element in the morbid complexus, no curative result should be looked for.

As stricture of the urethra is an important factor in the causation of the vesical catarrh, so its removal comes to be an essential element in any curative process proposed. As now the most prompt and efficient means of treatment consists in electrolysis, physicians should

have a proper equipment for such purposes, a competent knowledge of the science of galvanism, and a practical acquaintance with all the details necessary in the electrolytic treatment of stricture. Without these accomplishments the operator will either fail miserably, doing more harm than good, or he will succeed by accident merely, and not know in what his success consists. The following appliances are necessary :* A galvanic battery that will furnish five to fifteen milliampères of current strength, as shown by the milliampèremeter ; insulated urethral electrodes, with button or cylinder of a shape to enter the stricture or to lie in contact with it. No pain should be caused by the application, and at the outset the current should be quite mild. The *negative pole* is connected with the urethral electrode, and the current is allowed to flow uninterruptedly from five to twenty minutes.

When the stricture will admit a sound of full size, the so-called "gleet," which is always present in these cases, will cease. The canal sufficiently dilated, the catarrh of the bladder can then be successfully treated.

ACUTE URETHRITIS—GONORRHŒA, OR SPECIFIC URETHRITIS.

Definition.—Gonorrhœa is an acute catarrh of the urethra caused by the development or *pullulation* of a parasite—a *gonococcus*. The purulent discharge containing this organism will excite the same kind of action on other mucous surfaces of the same individual or of other persons. It is therefore a contagious malady, and is most usually transferred by the sexual act.

Symptoms and Pathology.—In what mode soever the poison may be transferred the morbid process begins at the point of contact—the prepuce and entrance of the urethra. After a variable period the local action becomes more intense—a sensation of heat and irritation calls attention to the part, and then an area of redness and swelling about the meatus and neighboring mucous surface of the prepuce is seen covered with a creamy pus. A little pressure will force out of the meatus a drop or more of light purulent matter, and a feeling of soreness is developed. From the time of suspicious contact up to the actual onset of gonorrhœa is a period which varies greatly, but, it may be said, is rarely less than two days nor more than eight days ; but authentic examples of much longer periods are quite numerous.

The local action increases rapidly; the whole under surface of the prepuce becomes deeply engorged, much swollen, and covered with a creamy pus. Attempts to retract causes great pain and can not usually be done. When the foreskin is elongated and covers the glans penis, and covers the glans in the normal state, accumulation of pus

* The reader will find in my treatise on "Medical Electricity," third edition (Lea Brothers & Co., Philadelphia, 1886), a full account of the mode in which the treatment is carried on.

takes place beneath, the small orifice may be so obstructed that the urine is passed with difficulty, and great pain is felt even when an inspection of the meatus is attempted. The perineum and deeper parts become the seat of a heavy tensive and sore feeling, the bladder becomes more irritable, and when urination is attempted a condition of strangury comes on. The testes are somewhat sore and tender, and more or less pain is felt along the spermatic cord. At night all the distressing sensations are intensified ; erections occur in which the penis is half-filled, and bent with a sensation of desire to urinate, every movement only increasing the distress, and if any water is passed it is drop by drop with extreme anguish. These half erections are known by the French term "chordee." Nocturnal seminal losses, also, occur, but with painful erections, and increased distress follows. The inflammation and swelling may extend to the prostatic urethra and involve the *sphincter vesicæ*, causing retention of urine, or extreme irritability and frequent voiding of a few drops of bloody urine with great straining and severe pains extending through the pelvic cavity into the hips, perineum, and down the thighs. Meanwhile a copious discharge of yellow pus, often of ichorous pus, continues from the urethral orifices.

Such is a mere outline of the symptoms of a fully developed attack. It is less important, however, to enter into minute details regarding the symptomatology than to set forth the complications which arise in its course and the sequelæ that give origin to numerous troubles requiring the aid of the physician.

Course and Duration.—So much depends on the kind of treatment pursued, and on various personal and social influences to which the patient is subjected, that no fixed rules as to the course of any case can be laid down. If the patient will remain in bed, have a saline laxative and a spare diet, the case will not get nearly so severe, and will subside early and disappear in from two to three weeks.

The complications that belong to gonorrhœa, have a high degree of practical importance. During the acute attack, an extension of the morbid action to the testes is one of the most painful and serious of the lesions, for closing of the spermatic ducts may ensue, and this means inability to procreate ever after. Gonorrhœal rheumatism may supervene, and this is slow in getting well. Stricture of the urethra may be a result of the disease and injudicious treatment combined. Catarrh of the bladder may be developed by extension of the inflammation by contiguity of tissue.

Treatment.—There is no disease in which skill in treatment has more influence over the result than gonorrhœa. The curative result is much facilitated by quiet, but as in most subjects attention to business is necessary, the disease is rendered more severe and more difficult to treat. A saline laxative should be given, a suspensory bandage put on, and the parts shielded from injury. As a gonococcus is the

active agent in setting up the inflammation, the treatment should be parasiticide, and as a local affection it must have local application.

The first step consists in washing out the canal to and a little beyond the point to which the disease extends with hot water—as hot as can be borne. Before an injection is practiced the patient should pass water to clear out the canal as far as possible. A small fountain syringe and a double catheter-tube with inlet and outlet form the best mode of washing out and applying medicaments to the canal of the urethra. Adhesive materials have a special advantage in that they remain long in contact and have consequently a much greater effect. Such bland remedies as bismuth, especially the salicylates, in an emulsion of gum makes a highful effective combination for topical application. As the salicylate is not a sufficiently powerful parasiticide, for this purpose the corrosive chloride or the biniodide of mercury may be added to the injection in minute quantity. Late researches have shown that the $\frac{1}{1000}$—even the $\frac{1}{2000}$—has proved effective against the pathogenic micro-organisms and their spores. This corrosive chloride in the smallest effective quantity should be added to the injections. The inexperienced practitioner must be warned against the use of strong injections. Nitrate-of-silver solutions have done much harm, especially when the so-called abortive injections were in use. It is now the practice to use weak injections—solutions of mineral salts, lead, copper, zinc—and frequently. It is probable that the result is due to the mechanical displacement of the mucus containing the gonococcus, rather than to any direct action on the mucous membrane.

To accomplish the best results in acute gonorrhœa, the following, or, some similar combination may be used: ℞ Plumbi nitrat. *vel* bismuthi salicylat., ʒ ij; hydrarg. chlor. cor., gr. ss.; mucil. acaciæ, aquæ, āā ℥ ij. M. S. Use one or two teaspoonfuls at an injection. In this combination the proportion of corrosive sublimate is about $\frac{1}{1000}$.

Carbonate of lead, subnitrate or subcarb. of bismuth, are bland preparations, which may be used with a certainty of good results. It is important in making an injection that sufficient mucilage be added to give it such adhesiveness that it will continue long in contact with the diseased surface—until, at least, the next injection is given. The patient should also clear out the canal by passing water, if he can, before taking the injection, and also use a douche of hot water in advance.

URETHRAL FEVER, OR CATHETER FEVER.

Some of the complications to which reference has been made are more especially surgical, but the author has some observation to make on the treatment of urethral fever, inflamed testes, and stricture, from the point of view of medical practice.

Urethral fever is a name given to a febrile paroxysm having the septicæmic character—a chill, fever, and sweat—but the duration of

the seizures and their periods of recurrence are by no means regular. Such an attack may be brought on by passing a catheter, and is then called catheter fever. The passage of a sound, irrigation of the bladder, even simple operations on the outer parts of the canal, will be promptly followed by an attack in some subjects. The character of the subject has much to do with the occurrence of the seizures—for the nervous, those with an irritable nervous system, are specially susceptible, whereas the lymphatic are usually but little disturbed by these operations. It must be understood, however, that a urethra through which an instrument can be passed without evoking any sensation is not normal, and is a bad indication in cases of functional impotence.

When such a susceptible state exists, a comparatively short period supervenes before the chill begins—in some instances, at once. The chill is really a severe rigor sometimes, and profound depression ensues. Indeed, collapse ending in death has been the result in a few instances, it is true, but often enough to demand caution. Care is necessary in all cases even when there is the least probability of dangerous symptoms. A full dose of quinine (15 gr.) and of morphine ($\frac{1}{4}$ gr. to $\frac{1}{2}$ gr.) will usually prevent trouble or diminish the danger of hyperpyrexia ensuing, or, at least, lessen the extent and persistence of febrile heat. Next to this must be mentioned the recent antipyretics, such as antipyrin, acetanilid, and the salicylates.

Inflammation of the Testes.—If the gonorrhœal inflammation extends to the testes, the case is made much more formidable. Few cases of urethritis are without soreness and tenderness of the testes. This fact evident, care should be exercised to prevent the smallest injury to the organ. The cases in my experience almost always occur in boys and young men who have gonorrhœa for the first time. They try to escape detection, and play and expose themselves as if nothing were the matter. The consequence is they either bruise the organs or practice such strong injections in the hope of speedy relief, that the swelling is soon brought on.

When the inflammation begins, and before decided swelling ensues, there is felt in the lower abdomen a colic-like sensation which may mislead an inexperienced practitioner; but on closer inspection it will be found that the real site of the pain is along the course of the spermatic cord to the bladder. The actual inflammation followed by swelling usually occurs in the epididymis, which is found to be hot and very tender. This may be the sole seat of inflammation, or it may precede by several hours or days the inflammation of the body of the organ.

It should be understood that inflammation of the epididymis has a high degree of importance from the point of view of the function of procreation. It is now known that if both organs (epididymis) are so much inflamed that the spermatic duct is closed, no semen can pass from the testes, and hence if both are blocked, impotence results. The power of erection is not impaired at once, but after a time inter-

course becomes less and less complete, and is extinguished long before the time usual in the normal condition of things. When the inflammation reaches its highest point the pain is great, and any attempt to move the organs causes exquisite suffering. When the inflammation reaches the highest point, it remains nearly stationary for several days. The gonorrhœal discharge, or the gleet, usually ceases when the inflammation begins, and to its disappearance the patient attributes the development of the trouble in the testes. Professional opinion formerly acquiesced in this view, and to a limited extent this may be admitted; but it is to the migration of the gonococcus and the development of colonies of micrococci that the extension of disease is due.

DISEASES OF THE NERVOUS SYSTEM.

CLINICAL EXAMINATION — MODES OF ASCERTAINING THE STATE OF THE NERVOUS APPARATUS.

Cerebrum.—The examination into the functions of the cerebrum includes the study of the mental condition, of the organs of special sense, and of the state of common sensibility in the area of distribution of the sensory nerves supplying the head and face.

The *intra-cranial circulation* is investigated through the facial vein, and the appearance of the membranum tympani and the retina. When an obstacle to the intra-cranial circulation exists sufficient to compress the cavernous sinus, the conjunctiva is injected, the eyelids swollen, and the nasal mucous membrane is congested and bleeds readily. These results come from the anatomical connection between the facial vein and the pterygoid plexus of veins. When there is cerebral congestion, or anæmia, the membranum tympani exhibits a more or less vivid redness, or an appearance of pallor.

Ophthalmoscopy.—The retinal circulation being a diverticulum of the cerebral, valuable information is gained by ophthalmoscopic examination. The ophthalmoscope used for this purpose should be a metal concave mirror, of ten or twelve inches focus, with a revolving disk behind it provided with ocular glasses. Loring's or Knapp's are well suited to this purpose. The observer should be provided also with two convex object glasses, having two to four inches focus, and a concave lens—the latter for the direct method of examination.

Both the *direct* and *indirect* methods of examination are to be employed, as a rule. In the former the eye-ground is illuminated by

the mirror, and the observer, seated close to the patient, looks through the pupil down on the retina, as one would look into a closed room through the key-hole of the door (upright image). In the indirect method (inverted image) the light is thrown into the eye as before, but a double-convex lens, held between the thumb and index-finger, is interposed in front of the eye under examination, the hand being supported by the little finger resting on the patient's forehead. In this way the focus can be readily adjusted.

The simplest appliances suffice for such ophthalmoscopic examination as may be required in ordinary clinical work. A small kerosene-oil lamp will furnish the light, or, in the absence of this, a candle even may be utilized for the purpose. Although such an examination will not be sufficient for any important scientific purpose, it will afford more or less valuable insight into the condition of the intracranial organs, and suggest the course for future and more accurate investigation.

The changes occurring in the retina or the "eye-ground" will be mentioned hereafter in connection with the maladies of the brain.

Impairment of vision, amblyopia, amaurosis, hemiopia, diplopia, etc., alterations of the accommodation, deviations of the ocular globe from paralysis or spasm of the eye-muscles, the size and sensitiveness of the pupil, may be symptomatic of intracranial disease, and will be discussed in their proper relations.

Otological examinations are necessary in all cases of cerebral disease, whether or not the ear appears to be directly affected. It has already been stated that the condition of the intracranial circulation may be ascertained by an inspection of the *membranum tympani*.

The hearing power can be measured by the ticking of a watch, by the tuning-fork, and by the voice. The distance from the ear the tick of a watch can be heard by the normal individual, is the standard with which the hearing power is to be compared. For example, if the watch-tick is audible by the normal ear at a distance of six feet, and by the diseased ear at one foot, the hearing power would be stated as $= \frac{1}{6}$. The voice is a more accurate measure, and the hearing should be tested by distinct tones, and by whispering at a specified distance. The tuning-fork (of the note C) is used more especially to determine the condition of the auditory nerve, and is placed in contact with the incisor teeth or forehead. If the patient is deaf to the watch-tick and voice, he may still hear the tuning-fork, showing that the difficulty is in the sound-conducting apparatus, and not in the nerve, which yet transmits the sound vibrations.

The apparatus required for the investigation of the auditory complications in cerebral diseases is, besides those mentioned above, a suitable ear speculum, and a concave mirror with a central hole, and attached to a convenient handle with a universal joint.