

tion,—“repeated gatherings” as the sufferer naturally calls them,—if not a persistent discharge with exacerbations, until some serious accident occurs or the surgeon forestalls it by operation. No branch of surgery has made greater advance within the past active decade than has otology in dealing with these cholesteatomatous conditions and their results. It is a subject for most earnest congratulation that we are growing into a better comprehension of the pathological principles which underlie these cases, and while our diagnostic skill is increasingly efficient in bringing them to recognition and clearing the mystery which often enshrouded them, we are also more prompt and rational in combating them. For a long time to come, however, we may expect to see cases in which, owing to neglect (on the part of the patient rather than on that of the physicians), these cholesteatomatous masses continue to exert their injurious effects unchecked. I have repeatedly seen the entire mastoid hollowed out into one huge cavity filled with such a laminated mass, with absorption or caries of the inner table and serious pressure on the dura and brain. Knuckle-like portions may invade the cranial cavity and give all the pressure symptoms of brain tumor, or the whole mass, with the pus which it has induced, may enter the cranial fossa as an extra-dural abscess and make its way outward through the squama. In this, or in one of many other ways, which will be set forth in detail in other articles of this group, cholesteatomatous masses may involve extensive portions of the temporal bone and set up a variety of pathological processes of the most serious character.

Caries of the ossicles is to be expected in many of these cases; in some of them, indeed, it may have already led to their dislocation or exfoliation before the patient is first seen. If the disease has not advanced as far as this it may often be stayed and the ossicular chain restored to usefulness or at least to innocuousness. It is often most surprising how perfect the hearing may be with the attic full of pus and the ossicles bare or clearly carious. The most vulnerable because least vascularized portion is the shank or descending process of the incus, and its destruction sets the stapes free of hindrance, as well as of help, from the rest of the ossicular chain. The neck of the malleus, where Prussak's pouch holds infective material in contact with it, is next in the frequency of its involvement; yet it may be eaten through and the head loosened or lost without great impairment of function. These and



Fig. 1750.—Extensive Destruction of Membrana Tympani, Partially Replaced by a Retracted and Pleated Cicatrix. The malleus handle greatly thickened and apparently truncated, with its short process covered with granulations. The incus seems to be lost and the stapes is exposed to view, covered by an almost invisible membrane through which its dimpled head shows perfectly. The promontory is rough, and there is a red streak posteriorly of uncertain nature.

many other carious portions are after all almost microscopic in size, and operative interference on a very minute scale may prove adequate for securing resolution. Thus, for example, rubbing the bare surfaces with a bare or cotton-tipped probe may not only reveal but at the same time sufficiently curette the caries, and a speedy and lasting cure has frequently rewarded this procedure in my experience. Persistent polyps or granulations justify suspicion of the integrity of some portion of the bony structure, even when it wholly eludes careful probing; but painstaking, and if need be painstaking, search and minutely thorough use of the measures elsewhere detailed will bring most of these cases to an apparent cure. This, however, should be regarded as a mere truce, and minute crusts should be searched for at intervals; and when found they are often best removed dry, so that we may see if the under surface is wet with recent discharge.

When the ossicular chain is broken, as by loss of the incus or its shank, any remains of the damaged larger ossicles are of interest only as possible maintainers of suppuration, and if not soon brought to healing should

be removed; but when the chain is unbroken, more can generally be accomplished for the improvement of the hearing by judicious mobilization and massage than by excision. Adhesions, after being cut, often unite more firmly than before; but the blunt probe may stretch them so as to afford lasting relief. When the dimpled head of the stapes comes to view (Fig. 1750) we know that the incus is disarticulated, if not lost, and we should confine our intervention to freeing the oval and round windows.

B. Alexander Randall.

EAR DISEASES: ARTIFICIAL AIDS TO DEFECTIVE HEARING.—When, in the course of disease, either of the sound-conducting or of the sound-perceiving apparatus, pathological changes have become so pronounced as to render ordinary conversation, or even that of a higher pitch, unintelligible to the unfortunate individual, and when all of the well-recognized methods of treatment have proven unavailing, then it may become necessary, for his comfort and convenience, and that of his friends as well, to resort to the adaptation of one of the mechanical devices which experience has shown to be useful in such conditions.

For convenience of description these appliances may be divided into three classes:

1st. Those for use within the auditory canal and tympanic cavity and which are concealed from view, or nearly so.

2d. Those in which the bulk of the instrument is exposed to view and the sound waves are transmitted by means of a conveniently shaped tip introduced into the meatus.

3d. Instruments which are brought into use by simply placing the proximal end against the auricle and the distal end in the direction from which the sound waves emanate.

The ideal instrument in all respects, did it but sufficiently contribute to the augmentation of the sound waves, would be one of the first class, for they are of necessity very small, being limited in size to the diameter of the meatus and auditory canal, and hence could be worn unobservedly. But, unfortunately, they can aid only by affording support to the remnant of drum membrane which may be present or to the ossicles, and by directing or concentrating upon the sound-perceiving apparatus such aerial vibrations as are collected by the auricle for transmission into the meatus. Could a small instrument be devised that would render the same service as one of the larger kind later to be described, the ideal would be reached. The problem has not yet been solved and will not be easily.

Marcus Banzer (1640) suggested the introduction into the auditory canal of an ivory tube, over the end of which was stretched a portion of pig's bladder. Leischevin (1763), Antereith (1815), and Lincke (1840) used similar devices in cases of perforation of the drumhead, but seemingly with the only object in view of protecting the exposed delicate structure of the tympanic cavity, as we have no account of any attempt on their part to improve the hearing. It is well known to those familiar with otological literature that the first account of a device worn within the ear, for the purpose of improving the hearing, was recorded by Dr. Yearsley, of London, in 1848. He was informed by a patient from this country who consulted him that he could, by placing a rolled strip of paper in the auditory canal, markedly improve his hearing. Tests made at the time proved the statement to be true beyond question.

Dr. Yearsley was quick to take advantage of the discovery, and subsequent experimentation led him to substitute pellets of cotton for the twisted paper, since frequent trials of the latter had invariably failed on other patients.

Toynbee in 1853 introduced his artificial tympanic membrane (Fig. 1751), which consists of a disc of vulcanized rubber of the size and thickness of the normal membrane, and to the centre of which is attached a wire about an inch in length, terminating in a little ring to

enable the thumb and finger more readily to grasp it for the purpose of introduction and removal. Modifications of the original membrane of Toynbee are numerous, and, as sold in the shops of to-day, it consists of a thin circular disc of india-rubber tissue, to the centre of which is attached a gold wire. Politzer invented for use among the poor an artificial membrana tympani, the manufacture of which is, as he states, very simple. A piece is cut from the side of an india-rubber tube 2 to 3 mm. thick, and to the lower end of this is fixed a strong piece of wire as indicated in Fig. 1752.

Gruber, on account of the liability of the Toynbee disc to become detached from the wire, the conspicuousness of the latter when in position in the canal, and the liability of the deeper parts to be injured if a blow should fall upon the ear, substituted for the wire a thread passed through the centre of the disc, and then provided for its introduction by specially devising for the purpose an instrument which is nothing more than a wire with a small ring at its end and bent at right angles to the shaft. The thread is passed through the ring, and then, after the disc has been introduced, the wire is thread is left lying in the canal with one end protruding from the meatus—an arrangement which renders it easy for either the surgeon or the patient to remove the disc. A small piece of soft lint has been used instead of the india-rubber. Again, an india-rubber tube, cemented at the end to the disc, has been employed instead of the wire.

It matters not whether the original Toynbee drum or one of its modifications be used, it will be found advantageous to moisten it before introduction, either with warm water, an antiseptic solution, or vaseline, to cut and trim it until the desired size is secured, and, finally, to change its position until the right spot has been found, and the improvement in hearing—if in any way attainable—has been obtained. Frequent changes are often found to be necessary before the contrivance can be worn comfortably by the patient, while at the same time rendering efficient service. If the use of this device improves the hearing, the patient can readily be taught to introduce and remove it, and soon he becomes so expert as to be better able to judge when it is in the proper position than the surgeon.

The Yearsley pellet of cotton (Fig. 1753), is probably more often used at the present day than any other intraural device, and, as stated by Dr. Thomas Barr, it has the following advantages over Toynbee's artificial membrane: “(1st) It is softer and excites less irritation; (2d) it is a convenient medium for applying medicaments to the interior of the ear; (3) it does not cause disagreeable

devices when the drum membrane is intact, but it is only in those cases in which continuity of the ossicular chain has been broken, or in those in which extreme relaxation of the parts exists, that we can hope, by making pressure against the manubrium mallei or against the stapes, appreciably to improve the hearing.

When there is acute inflammation in the ear, or when there is profuse suppuration, or when the wearing of the

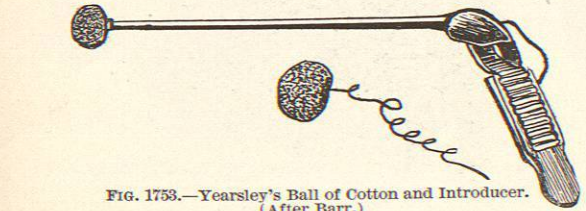


Fig. 1753.—Yearsley's Ball of Cotton and Introducer. (After Barr.)

noises when the wearer is chewing, as does the wire of Toynbee's membrane; (4) it has the advantage of being entirely concealed.” Its cheapness and convenience cer-

tainly recommend it in clinical practice, and it is doubtful if the disc would be useful where the cotton pellet fails.

While the cotton pellet may be used dry, better results will be obtained by moistening with glycerin, or with a suitable antiseptic, if suppuration still exists. The cotton is easily introduced with a delicate forceps or by an instrument such as is shown in Fig. 1754, or by one made for the patient's use, like that shown in Fig. 1755.

The method which should be followed by the patient in introducing the cotton pellet is so well shown in Fig. 1755 that no further explanation is needed. The piece of thread which is attached to the ball of cotton and which lies in the canal, enables the patient to remove it at his pleasure.

Hassenstein's device consists of a small hard-rubber stem (split throughout a part of its length and provided with a sliding metal ring) which holds the cotton plug firmly and is intended to remain with the plug in the canal. Hartmann recommends a substitute for an artificial membrane a small thin rod of whalebone enveloped by cotton wool. Leichtenberg suggested the application of flexible collodion to cover over the perforation in the membrane. Blake has had marked success in some cases by the application of sized paper to the perforation in the membrana tympani. This not only enables the patient to hear better, but contributes as well to the permanent healing of the opening. Gruber states that he has tried various materials for use as an artificial membrane and that those made from linen or silk, as suggested by Czarda, sometimes accomplish more than the others.

In all of these devices, it matters not which may be used, success depends upon so placing the appliance as to induce pressure on the stapes or the long process of the incus, and as a rule the proper location can be found only by repeated trials. In rare instances it is possible to improve defective hearing by means of one of these

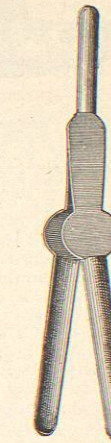


Fig. 1754.—Forceps for Patients to Use in Introducing Cotton Pellets into the Ear. (After Barr.)



Fig. 1755.—Patient Introducing Disc of Cotton into his Own Ear. (From Barr.)

devices when the drum membrane is intact, but it is only in those cases in which continuity of the ossicular chain has been broken, or in those in which extreme relaxation of the parts exists, that we can hope, by making pressure against the manubrium mallei or against the stapes, appreciably to improve the hearing.

When there is acute inflammation in the ear, or when there is profuse suppuration, or when the wearing of the

artificial drum causes tinnitus and vertigo, or when the patient has one good ear, no attempt should be made to use an artificial membrane. Neither should it ever be



FIG. 1756. — Politzer's Metallic Horn, to be Worn as an Aid to Defective Hearing. a, End which is to be introduced into the orifice of the external auditory canal; b, larger flaring end which is to be directed toward the hollow of the concha.

It is needless to say that the canal and the device, whatever it may be, should be rendered aseptic before the latter is introduced, and the appliance should be changed as often as need be to keep the parts in a perfectly healthy condition. Such precautions should be taken as to not induce suppuration where none already exists. The appliance should be worn but a short time at first, and the periods should be gradually increased from day to day until the instrument ceases to cause any discomfort, and even then it is best to remove it on retiring for the night.

We now come to the second class of appliances — those designed so to collect the sound waves as to enable the very deaf to hear, or those moderately deaf to hear at a greater distance. The proximal end of the instrument is, by means of a conveniently shaped tip, introduced into the meatus. Small devices, which are sufficiently small to escape notice, and yet which possess the power to increase one's hearing power, are being constantly sought for by persons who, while deaf, are naturally anxious to

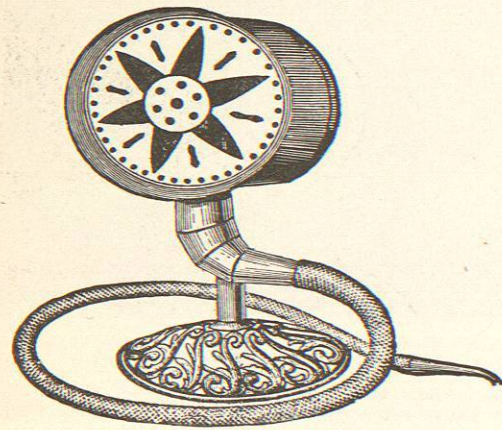


FIG. 1758. — Ear of Dionysius.

conceal their infirmity. Many of them are on the market, but as a rule they are worthless, except where the defect in hearing is due to collapse of the walls of the canal,

which is a rare condition and seen only, so far as I know, in very old people.

Poltzer has introduced an instrument the shape of a hunting horn (Fig. 1756), and about an inch in length. The narrow end is introduced into the meatus and the mouth directed to the hollow of the concha. The object of this instrument is to increase the normal effect of the inner surface of the tragus in reflecting the waves of sound coming from the concha into the external canal. Poltzer noted improvement in three-fourths of his cases from the use of this instrument. Other surgeons have not met with the same degree of success.

For use in hearing a person speak at only a short distance, the best instrument of this class is probably Currier's conico-cylindrical tube (Fig. 1757). This instrument, which is often termed a "conversation-tube," consists of a tube three and one-half feet long, which has a bone or hard-rubber tip at one end, while the other end is a bell-shaped mouthpiece made of the same material. The tip and mouthpiece are connected by an elastic spiral wire tube covered with rubber and over-spun with either silk or mohair. The tube is conical, thus forming a gradually decreasing channel from the mouthpiece to the ear. The lips should be placed close to the mouthpiece, and the speaker should at first modulate

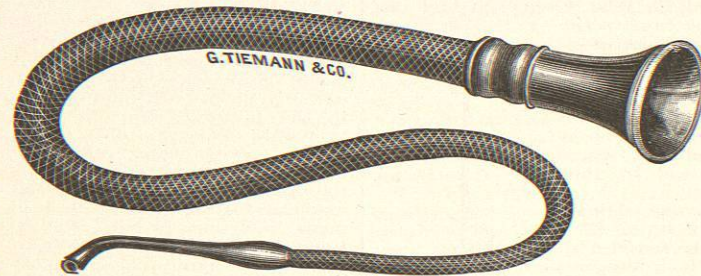


FIG. 1757. — Currier's Conico-Cylindrical Tube.

his voice, as loud tones are often very distressing to the listener. It may be worn around the neck under the coat or cloak or rolled up and carried in the pocket. It is use-



FIG. 1760. — Acoustic Cane.

less for listening to a public speaker or for general conversation. The best appliances for this purpose are the ear trumpets. They are more efficient for general use owing to the greater diameter of the bell-shaped mouth-piece. The larger the size and the greater the length of the conical tube the more powerful is their sound-con-

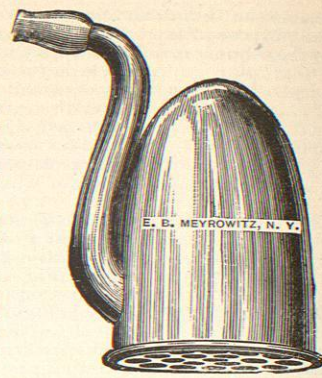


FIG. 1759. — The London Hearing Dome.

veying capacity. An instrument not designed to carry about is such an one as is represented in Fig. 1758, which may be placed on a stand or any convenient place and is useful in listening to general conversation.

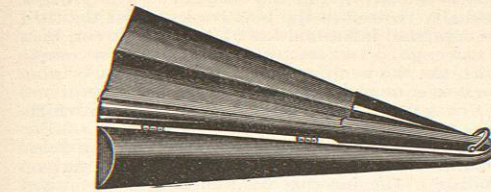


FIG. 1761. — Folding Fan Ear Trumpet.

The London hearing dome answers in many instances remarkably well for those who are moderately deaf. It can be easily carried in the pocket and is concealed in the hand when in use.

It consists of a small cup-shaped bowl, provided with a mechanism peculiarly adapted for sound-wave concentration and conduction. A perforated diaphragm over the mouth of the trumpet admits the sound waves, while a curved tube, extending from the base of the bowl, conducts them to the ear. This is shown in Fig. 1759.

The acoustic cane (Fig. 1760) consists of a walking stick with a conical, curved, hollow metal handle, open at the end to receive the sound waves, and an ear tube at the side below the handle. It is convenient for gentlemen's use.

The fan ear trumpet (Fig. 1761), answers a like purpose as an aid for ladies. It consists of a folding fan of black silk, one side of which is formed into a trumpet with an ear tip at the handle, making an appliance which can be carried and used without attracting much attention.

All these appliances, together with many others similar in construction, which have not been referred to, have a conical-shaped tip for introduction into the meatus and canal. They are liable to cause irritation and sometimes furuncles. Again, in many instances, the unnatural augmentation of sound and the reverberations are confusing and distressing to the individual.

The third class of instruments are of a newer type and to a marked degree have overcome the objections named in connection with the others. They do not permit the column of air to strike against the drum membrane. The sound waves are intercepted by means of a diaphragm, and it is claimed for them that they transmit only proper voice tones. The instrument is placed against the auricle, thus avoiding all danger of irritation to the meatus. The



FIG. 1763. — The Otophone (No. 2.)

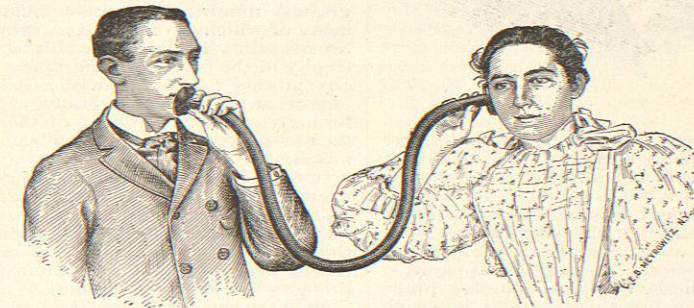


FIG. 1762. — The Otophone (No. 1.)

best appliance of this type for near conversation is probably the otophone (Fig. 1762), which consists, as described



FIG. 1764. — Otophone with Handle.

by Dr. Charles H. Burnett, of Philadelphia, "of a flexible tube, three and one-half feet long and one inch in diameter, with a mouth-piece of convenient arrangement for the speaker. The aural end has the great advantage and comfort of terminating in a disc, resembling the receiver of a telephone, which is held to the ear. By an arrangement of diaphragm in this piece of the otophone the disagreeable resonance prominent in the entirely open instrument is prevented, and it seems to convey sound to the deaf more completely than any other instrument as yet offered."

The otophone No. 2 (Fig. 1763) is made in three sizes, and this style of instrument is particularly adapted for church, concerts, lectures, and general conversation. Its use for such purposes may be rendered more convenient by the application of a handle such as is used in connection with opera glasses, and as is shown in Fig. 1764.

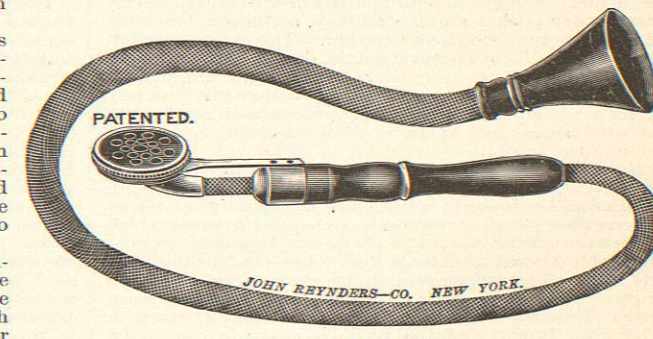


FIG. 1765. — The Audiclare.

Another instrument similar to the otophone first described is the audiclare (Fig. 1765), which provides a protection for the diaphragm, so that the earpiece can be

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pressed tightly against the auricle without in any way interfering with its vibrations. The spring connection between the disc and handle gives to the user control over the matter of degree of contact. If the patient is very deaf the diaphragm should be pressed firmly against the ear. Another form of this instrument is useful for hearing at a distance and for general conversation.

The Rhodes audiphone (Fig. 1766), which does not come under my classification, is an appliance made of a thin plate of vulcanite which is shaped like a fan and by

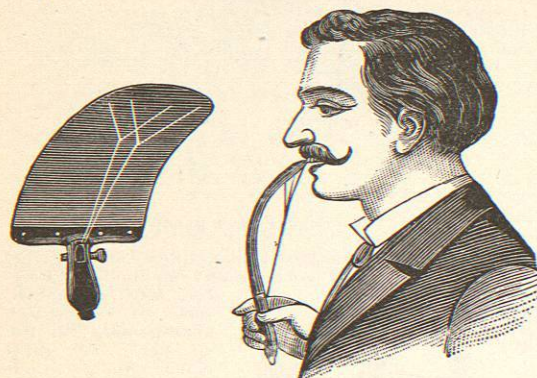


FIG. 1766.—The Rhodes Audiphone.

means of a cord may be bent to any degree of curvature. The upper margin is placed against the upper teeth and the instrument is held with convexity forward. In this invention a large convex surface is provided for the reception of waves of sound, and these are transmitted first to the teeth, and thence through the bones of the skull to the labyrinthine fluid and the auditory nerve independently of the normal sound-conducting apparatus. This instrument is very limited in its conducting property; hence waves of sound with no greater intensity than those of the human voice can affect it but slightly, and on account thereof it has proved disappointing in most instances.

The Akouphone, which has recently come into use, is perhaps attracting more attention than any instrument yet devised. It is the invention of Mr. M. R. Hutchinson, an electrical engineer, and is seemingly the best aid to defective hearing yet discovered. A most satisfactory demonstration of its usefulness was recently made before the Otological Section of the New York Academy of Medicine. The instrument consists of a receiver, an ear-piece, a dry pocket storage battery, and a small flexible cord connecting the parts together. The ear-piece is adjustable at will to conform to the degree of deafness of the person and the intensity of sound desired. The pocket storage battery can be easily recharged from any direct electric light current. Mr. Hutchinson also manufactures a desk and opera outfit to meet the indications which the names imply.

Numerous appliances which have not been referred to, both of foreign and domestic manufacture, might with advantage be brought within the scope of this article. It seems best, however, to limit description to those which experience has proven to be the best. In any given case we should try many of them and not be content until the one is found which proves to be most beneficial. The improvement in hearing which may be temporarily secured from the use of these instruments, in cases in which the function of the auditory nerve has not been destroyed, is very often indeed most gratifying to the individual, and the relief afforded his friends is by no means an unimportant consideration. Where acute inflammation exists they are never to be used. In chronic ear affections, they should be used at a sufficiently early

stage to furnish the necessary stimulus to the nerve, which is tending toward atrophy owing to the absence of its normal vibration.

Franklin M. Stephens.

EAR DISEASES: CHRONIC CATARRHAL OR NON-PURULENT INFLAMMATION OF THE MIDDLE EAR.

—ETIOLOGY.—In considering the etiology of the process which is usually treated in the text books under the title of chronic catarrhal inflammation of the middle ear, it is necessary to recognize two separate and distinct processes: one in which the thickening process is tubal in its origin, whether in consequence of nasal trouble or the result of some other pathological process; and a second in which the process begins primarily at the base plate of the stapes (primary periostitis of the labyrinthine capsule: Politzer) and is for a long time confined to that region, later extending to the internal ear and also to the other middle-ear structures.

The first series of cases are usually nasal or post-nasal in their origin, although such nasal trouble need not necessarily be organic. In these patients the first process is an acute secretory middle-ear catarrh which is neglected by the patient and which passes off leaving a certain amount of middle-ear thickening to be increased by the next attack until the resulting deafness becomes perceptible to the patient and his friends. Of all diseases, adenoid disease in the naso-pharynx unquestionably causes the greatest number of chronic middle-ear thickenings,—many of which never receive treatment until the patient reaches adult life. Next to this, acute or chronic hypertrophy of the turbinates, spurs on the nasal septum, and any process interfering with nasal respiration, have an important bearing on the etiology. The prominent part formerly assigned to disease of the faucial tonsils and of the naso-pharynx (other than adenoid) was undoubtedly a mistake.

In many persons a head cold has a decided tendency to produce an acute catarrhal middle-ear trouble and to repeat this process with each succeeding cold. Often the entire deafness can be definitely traced to a simple acute rhinitis where the ear complication was at the time dismissed with the too common remark that "it would improve as the cold grew better."

Many of the acute infectious diseases, although more frequently causing acute suppurative processes, often start a chronic catarrhal middle-ear trouble. Especially where both ears are simultaneously affected,—the one with an acute inflammatory process, the other with an acute catarrhal process,—the pain of the former is apt to cause the patient completely to overlook the existence of the latter. When the catarrhal process occurs as a complication of influenza or of typhoid it is apt to be disregarded, while, on the other hand, a painful ear disease would, under these circumstances, be at once recognized.

Infections of the middle ear are apt to terminate in a chronic catarrhal process; this being especially likely to occur in influenza, typhoid, and measles.

A large number of middle-ear thickenings come from certain constitutional diseases, particularly rheumatism, gout, and syphilis.

Certain occupations are important factors: those in which the patient is exposed to draughts, dust, or other conditions tending to cause an acute rhinitis; and those in which the ear is subjected to the jar of loud sounds, particularly boiler working, nail making, the shuttle rooms in mills, etc. Also the constant use of the telephone certainly plays the part of a cause in a number of cases. It has been the writer's experience that where the ear is healthy when the patient enters an occupation such as that of a telephone operator or a mill operative, no trouble will be experienced, but this is not true of boiler making and nail working.

Those cases in which the disease process begins primarily in the neighborhood of the stapes base plate are rarely tubal in origin and not catarrhal in nature. The process is apparently a vaso-motor one in many instances and often a sequel of neurasthenia. In many individuals it is clearly hereditary. In other cases syphilis, gout, and

rheumatism are prominent factors, as are also debilitating diseases or severe anaemias.

PATHOLOGY.—The pathological conditions found in chronic catarrhal middle-ear disease are either local—*i. e.*, confined to the neighborhood of the stapedo-vestibular articulation—or diffuse throughout the middle ear, according to the type of disease present. In the first form, the Eustachian tube, mastoid process, and membrana tympani are unaffected. The stapes may be fixed by a union of the base plate only or by union of the crura to one or more sides of the fenestra ovalis, or the rigidity may be due to a general membranous or bony fixation, the latter often in extreme cases projecting into the vestibule and cochlea. The pathological lesion here was well understood and studied very early by Toynbee and carefully described by him, but his observations seem to have been too long neglected. In an examination of 1,149 cases he found 53 in which there was a membranous ankylosis of the base plate of the stapes without any enlargement of the base or of the articular surface. In 49 cases there was ankylosis from enlargement of the base plate with no alteration of the structure. Twenty-nine cases showed an osteoma of the base of the stapes, hypertrophy of the normal bone tissue, firm ankylosis, and the enlarged base plate projected into the cavity of the vestibule. New bony tissue beyond the limit of the oval window was found in 85 cases. In 4 cases there was firm adherence to the inferior portion of the oval window, and in 13 cases the entire circumference was ankylosed. In 12 cases the circumference and vestibular surface were affected and the rest of the stirrup was normal.

In the second form of chronic middle-ear catarrh we may find the stapes ankylosed, but such ankylosis is associated with other pathological changes in the tympanum. Often the fenestra rotunda is filled with connective tissue and greatly thickened; some cases of calcification at this point have been reported; at other times the tympanic mucous membrane over the oval window is greatly thickened. Ankylosis of the malleo-incudal articulation is occasionally seen, but that of the incudo-stapedial joint is rare—Toynbee reports only two cases in his 1,149 dissections.

In beginning cases the mucous membrane of the tympanum is swollen and infiltrated, so that the depressions in the attic, the round and oval windows, and the promontory are obliterated and the normal mucous membrane folds are much swollen. At a later stage organization takes place, the mucous membrane is much thicker than normal, and the folds of the tympanum as well as the capsules of the joints of the ossicles are consequently much more rigid.

Similar alterations take place in the Eustachian tube so that the lumen is narrowed by the swelling of the mucous membrane, but actual stricture is rare. Secondary changes take place in the intratympanic muscles, largely from their disuse; they become degenerated or atrophied. From the swelling of the mucous membrane of its inner coat, the membrana tympani becomes less and less transparent and thicker, either in whole or in part.

SYMPTOMATOLOGY.—The onset of this disease is so gradual and the preliminary symptoms are so slight that usually several years elapse before the patient presents himself for treatment. His friends have assured him for some time that he was "becoming absent-minded," and he himself has probably noticed a slight tinnitus, possibly at first only with an acute rhinitis, but later constant. For many years, in slowly progressive cases, the deafness and tinnitus remain the only subjective evidence of trouble. Then, as the stapes and the membrane of the round window become more rigid, the patient begins to have, with a marked increase of these symptoms, auditory vertigo and nausea. The latter symptoms are much more common in ear disease, and especially this particular form of ear disease, than is ordinarily supposed, and it is the experience of every aurist that the correct diagnosis is not made until the patient has been put through a long course of stomach treatment.

The amount of vertigo varies very much, but in the

middle-ear cases it is usually of a mild type and not apoplectic in character, but instances of this are occasionally seen. It varies directly with the amount of thickening about the stapes and within the labyrinth, and with the general condition of the patient. He may stagger when he walks, as if drunk, or in the apoplectic type he may fall to the ground so suddenly as to injure himself. The vertigo is usually worse in the dark and continues when the eyes are closed. In some cases the attack wakes the patient from his sleep. Pure aural vertigo is, however, never accompanied by unconsciousness or local paralysis.

The amount of nausea and vomiting is as a rule dependent on the amount of vertigo and is independent of indiscretions in diet. With some the vomiting is persistent for four or five days and requires rectal feeding.

In many cases of chronic middle-ear catarrh the patient complains of a dull, heavy pain in the depth of the ear; acute pain is, however, never caused by the disease.

In the beginning stage there is apt to be an over-accumulation of cerumen, so that once in six or eight months a large mass blocks the canal and has to be removed. In the later stages of chronic middle-ear thickening the reverse is true,—little or no wax forms, the canal is dry and glistening, and the resultant itching from the dryness of the canal is often very annoying to the patient.

It was long ago noticed that many of these patients possess the ability to hear better in a noise than persons with normal hearing (paracusis—Willis), and this often leads those engaged in noisy occupations to disregard their deafness until it has reached a high degree.

A more annoying symptom which is occasionally noticed, especially in neurotic people, is a hyperaesthesia to tones either of a certain pitch, usually high, or of a certain loudness. This presumably arises from the unnatural tension of the auditory mechanism and will be found very difficult to treat successfully.

When the membrana tympani is relaxed, and also in some cases from the simple increase of intratympanic pressure, the patient is annoyed by a sharpening or flattening of tones in the affected ear, producing a discord when a simple musical tone is sounded. This symptom is probably present in many cases, but is observed only when the patient has a knowledge of music. The middle and upper registers are most often affected. A variation of this symptom is seen in some persons when a jarring sound is heard in the ear whenever a certain note is struck.

In the beginning stages of middle-ear thickening autophony is often complained of. Either the patient's own voice or the sound of his footsteps, or outside sounds, echo in the ear as if a resonator were held to the auricle. Of all the annoyances to which this type of ear disease subjects one, the tinnitus is usually the most wearing. All sorts and varieties of sounds are heard in most cases—either vascular or from spasmodic action of the intratympanic or pharyngeal muscles; hence we have clicking, buzzing, beating, roaring, or singing sounds. In the cases of stapes fixation a very characteristic symptom, often noted one or two years before any other, is a continuous high-pitched tinnitus like escaping steam or the sound of the fields in August. All these varieties of sounds are of course dependent upon the circulation and general condition and are apt to increase when certain drugs are ingested or when certain positions of the body are assumed. Thus, for example, a beating tinnitus is usually increased by alcohol or by bending forward or lying down. As elsewhere stated, the rarefaction of air obtained at an altitude of over one-thousand feet will modify many cases decidedly.

Both the tinnitus and the deafness are apt to be worse in damp weather, and at such times the patient also notices a feeling as if the tympanum were filled with wool. Bodily fatigue also influences both symptoms to a marked degree.

DIAGNOSIS.—The diagnosis of this affection is made by the objective examination of the ear combined with a