

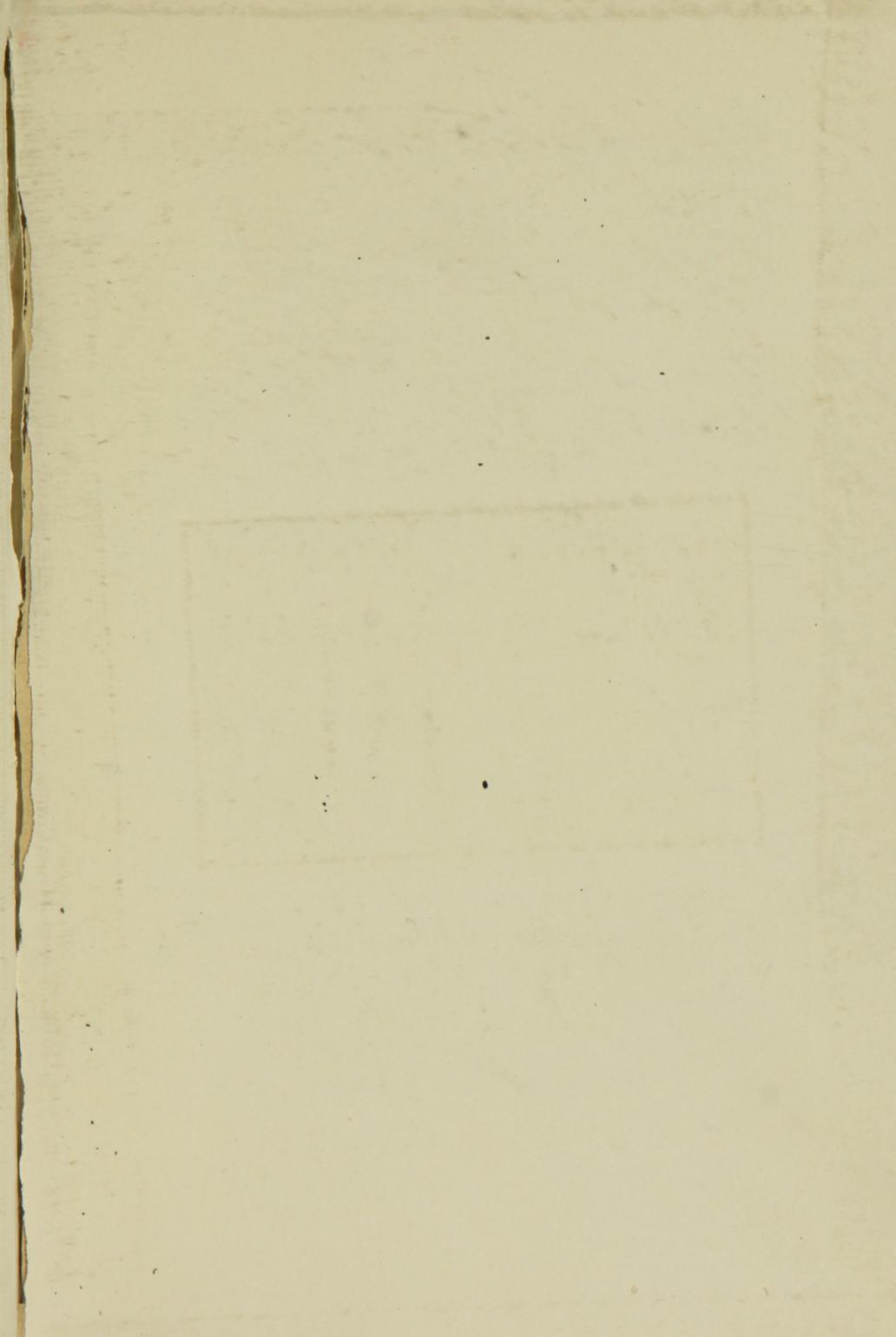
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No. 124752



The Diseases of the Ear

AND THEIR

HOMŒOPATHIC TREATMENT,

WITH A BRIEF OUTLINE OF THE

Anatomy, Physiology and Pathology.

DESIGNED AS A MANUAL

FOR THE

Student and General Practitioner,

BY

CHARLES FREDERICK STERLING, M. D.—O. et A. Chir.

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D E D I C A T I O N .

T O T H E

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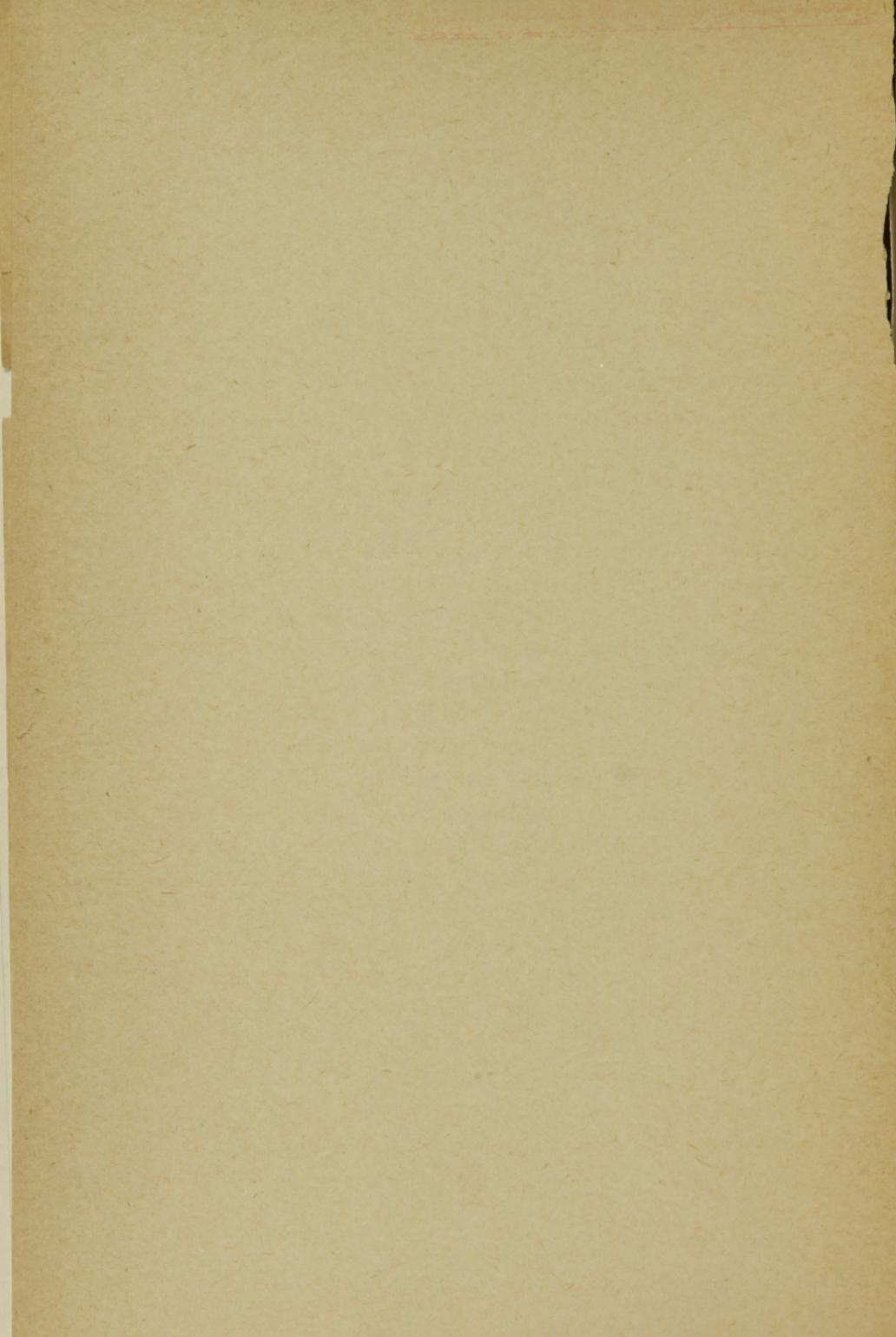
A N D T O M Y

A S S O C I A T E S O N I T S S T A F F ,

T H I S M A N U A L I S

— D E D I C A T E D —

In recognition of the opportunities afforded for experience in special work, and in memory of pleasant intercourse with my co-workers.



P R E F A C E.

This little work is the outgrowth of a want felt by myself when first commencing the practice of medicine, for a small handy treatise on the examination and diagnosis of the more common diseases of the ear, and their homœopathic treatment. None such was at hand. The classical works of Roosa, Von Troeltsch, and Politzer were to be had, but they were expensive, more elaborate than I then cared for, and they contained no help for me as a homœopathist. Dr. Winslow's book has since made its appearance, but while excellent, it is also elaborate and expensive, so that it seemed to me a little aid might perhaps be given to those who were similarly situated to myself, and possibly to another class; i. e.: those physicians, who in practice before otology had reached its present development, wished for practical directions, and concise statement, without theory. This aim I have kept carefully in view. Sufficient of anatomy has been given to render the physiology plain and make intelligible the effect of lesions; more has been purposely withheld, as tending to confuse. This is not designed to take the place of the larger works in any respect.

In regard to treatment, I am firmly convinced that we are not yet in a position to dispense with local measures; our therapeutics are still too meagre in this department. The indications given for remedies, are

the results of the experience of Homœopathic aurists in this city and elsewhere, gathered from various sources in our literature, as they have made their appearance. They have not been compiled from the *materia medica* on theoretical grounds. The authority for their use and results can be given in nearly every instance. Every statement made in regard to treatment, unless otherwise qualified, has been verified time and time again by my colleagues and myself, both in private practice and the clinics of the New York Ophthalmic Hospital.

I take pleasure in expressing my thanks to those who have kindly assisted me in the preparation of this work by their advice and suggestions: Drs. Liebold, Geo. S. Norton, Leal and MacBride. To Dr. Houghton I am under many obligations for valuable information, and practical points in treatment, given during several years.

In conclusion let me say, I do not doubt that there are many who could have done this work better than myself, but they did not do it. It is my humble effort towards bringing about a better appreciation of the importance of diseases of the organ of hearing.

C. F. STERLING, M. D.

152 West 34th St., NEW YORK.
Feb. 28, 1885.

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CHAPTER I.
ANATOMY OF THE EXTERNAL EAR
AND
MEMBRANA TYMPANI.

An intelligent treatment of the diseases of the ear, must be based upon an intelligent knowledge of its anatomy and physiology.

The ear is technically divided into three parts, known respectively as the external, middle, and internal ear. The external portion comprises the auricle, and the canal, known as the meatus; the middle includes the air chamber, or drum, with its adjacent portions of mastoid cells and eustachian tube, while the internal ear or labyrinth includes the vestibule, the semicircular canals, and the cochlea, within which portion is the ultimate distribution of the auditory nerve.

It may be definitely accepted that the auricle has a certain function in the collection and direction of sound waves. This is accomplished both by its outline, and the numerous foldings and irregularities of its surface, each of which has its appropriate name. These are maintained

in shape by the material of which the auricle is formed, which is cartilage of the reticular variety. This is absent in the lobe, which is made up skin and cellular tissue, but forms about one-third of the canal. The names of the various eminences and depressions are unimportant, and can be readily learned from Gray.

The skin of the auricle is a continuation of that of the face, and differs from it in no important particular. The inner two-thirds of the canal is bony, but at birth this is entirely membranous, the only bone in the canal being a small incomplete ring at its inner end, and known variously as the tympanic bone, the auditory process, or annulus tympanicus. This small bone, in shape somewhat like a diminutive hyoid bone, commences its ossification at about the third month of foetal life, and it is from this developing outwards after birth, that the anterior and inferior, and a part of the posterior wall of the osseous meatus is formed. This bone at birth exists entirely independent of the other portions of the temporal bone, to which it becomes united during the first year of life.

The superior wall is formed from the squamous portion of the temporal bone, growing outwards in the same manner as the other walls do from the tympanic ring, to which it in due time becomes united, thus giving the perfect bony meatus.

Sometimes there is a failure of bony development in this wall, leaving gaps or fissures, the importance of which will be referred to later on. The posterior wall as before said, is developed partly from the tympanic ring, and partly from the mastoid portion of the temporal bone.

This completed meatus is not perfectly straight, but slightly twisted and bent, the most constant feature of which is an elevation near the middle, pointing upwards and backwards, so that on the introduction of the speculum, the auricle must be drawn upward and backward to straighten the canal and obtain a view of the membrane. At about the central portion of the canal, there is a slight constriction, making it narrower at this point than at either extremity. In the inferior wall are slight depressions filled with fibrous tissue, and called the incisuræ Santorini. There is a difference in the length of these various walls, of which the superior and posterior are the shortest, and the inferior and anterior the longest.

The canal is lined with a continuation of the skin of the auricle, in which are found hair follicles, sebaceous and ceruminous glands. The skin grows outward from the membrana tympani as the nails grow outward from the matrix, and in this manner assists in the removal of the wax and other material in the canal. Attached to

the auricle and within it, are various small muscles, which are the rudimentary analogues of muscles in various animals, but as they have no function in man, they will not be discussed.

The relations which the external auditory canal bears to certain structures, are so important that they must be briefly described.

The superior wall growing outwards from the squamous portion of the temporal, is formed of two plates of exceedingly thin bone. The upper one is a portion of the floor of the middle fossa of the skull, while the lower one is the roof of the canal. Between these two thin plates are cellular spaces varying in size and number. Thus it is seen that this slight osseous lamina is the only division between the canal and a portion of the brain, and in cases where a failure of bony development has occurred, the only separation is the soft tissue of the canal lining, and the brain membranes. The posterior wall is the only division between the meatus and the transverse sinus and it is also in close relation to the mastoid cells. The anterior and inferior walls are in relation to the parotid gland. The importance of these statements as well as similar ones concerning the middle ear, will be seen when discussing suppuration.

THE MEMBRANA TYMPANI.

This membrane is the boundary between the

external and middle ear, and possesses relations to both. Preceding its description, must be given that of the annulus tympanicus in which it is set. This small bone forming the junction between the temporal bone and osseous meatus is U shaped. It is grooved for the reception of the membrane. Its anterior and posterior extremities are important topographical points, and have received the names respectively, of the major and minor spines. A line drawn from one to the other represents the superior boundary of the true membrane. The groove in which the membrane is received, is lined with cartilage, and known as the sulcus tympanicus; the deficiency in the superior portion is called the segment of Rivinius.

The membrana tympani or drum head, is the vibrating membrane at the bottom of the the auditory canal, which receives the impressions of the sound waves, and passes them on toward the internal ear. It is a delicate structure, of an ellipsoidal shape, the long diameter of which is on the average from 9 to 10 m. m. Its transverse diameter is a little less, the proportion between the two being about 4. 3. ''' to 4. 0. ''' Its boundary lines are those of the canal, at the bottom of which it stands, except at the superior border, which corresponds with a line drawn from the major to the minor spine. Above this line there is still a certain space, occupied by a membrane

of different texture, filling up and completing the elliptical area at the end of the meatus. This membrane is known as Shrapnell's, or from its looseness, as the *membrana flaccida*.

The true membrane, or that portion lying below the line between the two spines, is the part principally concerned in the transmission of sound. This is made up of three separate and distinct layers, yet its total thickness is but 1-250 of an inch. Its outer layer is a continuation of the skin of the canal, which is here modified in its structure, possessing neither hair follicles nor glands. Its inner layer is mucous membrane, continuous with that lining the middle ear, but so intimately adherent to it that it cannot be separated from it, as can the outer layer. The middle layer is the one upon which the function of the membrane depends, hence it must be firm, capable of being made tense without stretching, and also possessed of a certain degree of toughness. These qualities are given to it, both by the material out of which it is formed and the manner in which this material is used. This material is fibrous tissue, arranged in lamellae, so that in its composition the fibres run in different directions. There are two principal sets of these fibres, an outer one next the epidermal side, of radiating fibres, and an inner one next the mucous membrane side, of circular or concentric fibres, so that the

two together bear some resemblance to the web of the geometric spider. By this arrangement, strength, firmness and inextensibility are given to the membrane. This fibrous layer is called the membrana propria, and when a portion has been destroyed by suppuration is never replaced by the same substance, but by cicatricial tissue. At the periphery all these various fibrous lamellae becomes closely united and reinforced, and form what is called the annulus tendinosus, which is attached by periosteum to the groove in the annulus tympanicus. Shrapnell's membrane, or that portion above the line of the two spines, is destitute of this middle layer, which gives it a much looser character.

It will be remembered that mention was made of the varying lengths of the walls of the canal. From this it follows that the membrane closing up the end, does not stand in a vertical plane, but must possess a certain obliquity. The superior and posterior wall being the shortest, the upper and posterior portion of the membrane must be nearer the orifice, hence nearer the eye of the observer, while its lower and anterior portion, to meet the longer inferior and anterior wall, must be farther away, which fact must be borne in mind when examining an ear. The angles which the membrane makes with the superior and inferior walls respectively, are 140 and

50 degrees. As every ear is subject to individual variations, the measurements given here are only an approximation to an average.

Not only does the membrane possess the obliquity above described, but there are certain peculiarities of its surface with which we must become familiar. Passing downward and backward through the membrane to its centre, is seen an elevated ridge terminating in a whitish or yellowish spot. This ridge is the handle of the malleus, the manubrium, and its yellowish extremity, the umbo. At its upper extremity is seen a more marked projection like a pimple, which is the short process of the malleus. From the tip of the manubrium, extending downward and forward to the periphery of the membrane, is a triangular white spot, its apex at the umbo and its base at the periphery. This is the light spot, or triangle of light, produced by reflection from the surface of the membrane. These three features in the normal ear must be well studied, as it is upon their variations in pathological conditions, that much of diagnosis and prognosis depends.

Besides the obliquity and the three points just mentioned, the membrane has another peculiarity. It is depressed at the umbo, as if slightly drawn in at that point, which is the case, while the radii from the umbo to the periphery are

arched, with the convexity outward. This is because of the resisting influence of the circular fibres, to the indrawing influence at the tip of the manubrium. This degree of depression should also be made familiar, as in the chronic catarrhal process it is much increased with consequent distortion of the other features. The general color of this membrane is a grayish lustrous opacity, very similar to the false Roman pearls, except at the light spot, which is a brilliant white. It varies within certain limits in different individuals. The blood supply will be given in discussing congestions.

CHAPTER II.

ANATOMY OF THE MIDDLE EAR.

The middle ear demands close consideration, not only because much the larger proportion of aural diseases are found here, but because an intelligent comprehension of its character, which is not difficult, will enable the general practitioner to successfully care for many of its troubles, which too often are neglected, either through ignorance or carelessness.

The primary function of the middle ear is not to confuse students, as I was once told by one of mine, but that of a protection to the internal ear. Interposed between the external and internal ears, it must have a special adaptability to facilitate the transmission of sound waves, while performing its office as a guard. Let us see how this is accomplished. It is a cavity hollowed out in the temporal bone, containing air furnished by way of the eustachian tube. It is wedge shaped, the thick part at the top, narrowing to a mere chink at the floor. Its lateral edges are known respectively as the anterior and pos-

terior walls, its top as the roof or tegmen tympani, the surface covered by the membrane as the outer wall, while that next the internal ear, as the inner or labyrinthine wall.

In this cavity hang three little bones, the ossicles, the outer one of which is attached to the membrane, while the inner one communicates directly with the internal ear. Vibrations of the membrane are communicated to and through these bones, making ultimately an impression on the fluid in the internal ear, in which float the receptive filaments of the auditory nerve. The first one, known as the malleus, has a rounded upper extremity called the head, and a long tapering inferior extremity, the manubrium. Between the two is a constriction called the neck. This is suspended from the roof by a short round ligament, while the lower extremity is received into a sort of sac in the membrane between the two fibre layers, the tip only being firmly adherent. From the neck ligamentous fibres spring forward and backward towards the two spines, known as the anterior and posterior ligaments, and serve as guys. Between these two the malleus swings, and these guys are together called the axial ligament. It has other attachments which serve merely to limit its motion.

Suspended in the middle of the cavity is the second ossicle, the incus or anvil. On the side

toward the malleus is a depression in the body of the bone into which fits the side of the malleus head. This is furnished with articulating cartilage and a capsular ligament. This joint has a peculiar modification, by which in the act of hearing, the malleus and incus become firmly locked at this joint, and motion communicated to the malleus by vibrations of the membrane is partaken in by the incus, which also has limiting and suspensory ligaments. On the side of the incus opposite the malleus is a long curved descending process, which unites at its tip with the third ossicle, the stapes or stirrup. This is exactly like a very diminutive stirrup of a riding saddle. Its broad base lies against the inner wall of the cavity over an oval foramen, covered by a thin membrane, which prevents the fluid of the internal ear, lying upon the other side of this membrane, from pouring out into the middle ear. This base is fastened over this oval window by a species of capsular ligament, allowing a certain degree of motion. The small head of this stirrup is articulated with the descending process of the incus.

Thus we find nature's method of establishing communication between the external and internal ear, through the protecting middle ear. Vibrations of the *membrana tympani* move the malleus, which in turn moves the chain, and the various

degrees of movement are impressed upon the fluid containing the sensitive nerve filaments, which receive and differentiate these impressions into intelligible sound—from the wooed maidens whispered 'yes'—to the crash of the liberated lightning. Conduction then is the second function of the middle ear.

That this may be perfectly accomplished certain adjuvants are necessary. These are found in sundry muscles, the eustachian tubes, and the mastoid cells. The most important of the muscles is the tensor tympani. On the anterior wall in its upper portion is seen the orifice of a small canal, from which emerges a tendon. This passes across the cavity to the malleus, being inserted near the neck, on the inner and anterior side of the manubrium. Its muscular portion is confined within its canal from which it arises. Just below the point where this tendon emerges is a large opening, the mouth of the eustachian tube, which runs from the middle ear downward, forward and inward, to the lateral wall of the nasopharynx. It is about one inch in length. The third towards the tympanum, is hollowed out of the petrous portion of the temporal bone. The two-thirds towards the pharynx is of cartilage and soft tissue, the walls of which are flattened and approach each other very closely. This is lined with mucous membrane. The function of the

eustachian tube is to convey air to the middle ear, and serve as a drainage tube into the throat for its secretions.

On the posterior wall, directly opposite the eustachian tube, are the openings of the mastoid cells. These are all situated in the mastoid process, and are supposed to serve both as a safety chamber to modify dangerously loud sound shocks, and also as a reverberating or resonance chamber to intensify weak sounds.

The mastoid cells and the cavity of the tympanum are lined with a continuous mucous membrane which has certain peculiarities. That portion of it lying next the bone performs the function of periosteum, while the more superficial layers possess the properties of both mucous and serous membranes. Upon the outer wall, this forms the inner layer of the *membrana tympani*.

At the upper portion corresponding to Shrapnell's membrane, this lining reaches to the roof, and returning upon itself forms a fold or pouch. This is divided by the malleus into the anterior and posterior, of which the latter is the most distinctly defined. These are known as the pockets of *Troltsch*.

On this same outer wall, one in front of, and the other behind the membrane, are two openings in the bone, from the posterior one of which emerges the *chorda tympani* nerve, which passes

forwards just beneath the malleo-incudal joint, and makes its exit through the anterior one. These two openings are known as the iter chordae anterioris and posterioris. This nerve, a branch of the facial, has nothing to do with the ear, merely passing through it, as a short cut through a neighbor's yard.

These are the principal points in the anatomy of the middle ear. There is very much more detail that is purposely omitted as it would only tend to confuse. Therefore after a brief consideration of the size of this little cavity which contains many wonderful things, and its relations, we will pass to the next division. It was compared to a wedge standing vertically. Its width is about half an inch ; its height varies from half to three-fifths of an inch in different portions. From the membrane to the inner wall it is only about one-twelfth of an inch. Later on will be seen what an important factor this is in certain pathological conditions, in interfering with the free vibrations of the drum head.

The relations which various parts of this cavity bear to important structures must not be forgotten. The roof is directly under the middle fossa of the skull. When the bone fails to be completely developed, there are often gaps or fissures here, and the only barriers between this and the cranial cavity are the respective linings of each.

The anterior wall lies close to the carotid canal, and is also occasionally deficient. The inferior wall lies directly above the jugular fossa and so in close relation to the bulb or sinus of the jugular vein. The posterior wall and mastoid are in a correspondingly close relation to the transverse sinus ; so we see in how close proximity to important structures is this little cavity, and how serious the consequences may become if a purulent process passing to necrosis remains uncared for.

CHAPTER III.

ANATOMY OF THE INTERNAL EAR.

It is not in accordance with the plan of this work to discuss the internal ear and its diseases at length, but a few remarks upon it are appropriate.

It is the seat of the ultimate distribution of the auditory nerve, situated in the most protected portion of the petrous part of the temporal bone. It has three general divisions, known as the vestibule, the semicircular canals, and the cochlea. The three together are called the labyrinth. Various filaments of the auditory nerve are distributed to these different parts, for the performance of special functions. Those in the vestibule and semicircular canals are supposed to represent sound as such, not its particular character or quality. The semicircular canals are thought to have the added function of aiding in maintaining the equilibrium of the body, or as it is termed, the function of orientation. The cochlea is the most highly specialized portion, and to it is referred the differentiation of sound into articular speech,

different tones in the scale, chords of music, and the like.

The anatomy of the internal ear is most minute and complex. The vestibule, as its name implies, is the entrance chamber to the semicircular canals on the one side, and to the cochlea on the other. This, as well as the canals and cochlea, is filled with a serous fluid called the perilymph, in which float the nerve filaments. This perilymph is supposed to be in communication by a minute opening with the arachnoid fluid of the brain. Within the vestibule are two little membranous bags, known as the saccule and utricle, distended by a fluid called the endolymph. These serve as a support to certain portions of the vestibular branch of the auditory nerve. The communication of the vestibule with the middle ear, as before said, is by the fenestra ovalis, which is closed by a membrane, against which rests the footplate of the stapes.

The semicircular canals are of bone. Inside of them is a membranous expansion, taking the same shape as the bony canals, and known as the membranous semicircular canals. These also are distended by endolymph, and like the saccule and utricle, afford support to another portion of the ultimate nerve filaments. The utricle, saccule and membranous canals, are together known as the membranous labyrinth, along with certain

membranes in the cochlea serving a similar purpose.

The cochlea is a tube, wound two and one-half times about a central pillar. This tube is subdivided into two by a partly bony, partly membranous division, reaching from the central pillar across the middle of the tube. One of these smaller tubes starts from the vestibule, winds around the central pillar to the top, and winds down again on the other side of the bony and membranous division, ending at what is called the round window, on the inner wall of the middle ear. This round window is tightly closed by a fibrous membrane, which serves as in the fenestra ovalis, to prevent the perilymph from running out into the middle ear. The central pillar is perforated at its base, and receives the cochlear branch of the auditory nerve. The trunk of this branch ascends the pillar which is hollow. The walls of this hollow center are perforated by numerous foramina, through which emerge the terminal filaments of this cochlear branch, resting upon the bony and membranous division of the cochlear tube. Upon this division is built a wonderfully intricate little structure called the organ of Corti. It is upon this little organ of Corti that the ultimate receptive nerve filaments finally rest, and the duty devolves of differentiating impressions received by the fluid into the various tones which we perceive.

CHAPTER IV.

INSTRUMENTS AND METHODS OF EXAMINATION.

In an examination of the ear we are obliged to use certain specially adapted instruments. Goethe says: "He who some results intends, must use the tools that best are fitting."

It is not necessary in such examinations and treatment of the ear, as this little book is designed to aid, that the practitioner should possess a complete specialists outfit. All that is necessary can be purchased for twenty or twenty-five dollars. The following list is sufficient for all ordinary purposes of diagnosis and treatment.

Aural mirror with head band.

A set of three specula.

A cotton holder.

One or two looped probes, known as Buck's cures.

A small pair of dressing forceps.

A pair of angular forceps.

A Politzer bag, tube and nose piece.

A pneumatic speculum known as Siegle's.

A hard rubber syringe.

INSTRUMENTS AND METHODS

One or two eustachian catheters, hard rubber.

Two rhinoscopic mirrors.

A powder blower.

Tuning fork.

The aural mirror is concave with a metal backing, to which is attached by a universal joint the head band. This mirror is perforated in the center to allow direct vision in the axis of the returning rays. The best average size is three and a half inches in diameter, which is large enough to be used also for laryngoscopic examinations.

Ear specula come in sets of three sizes. Metal ones are the best. These come both in solid silver, and plated, which are just as good. There is a most decided choice in the selection of these specula according to their shape. Those with an oval extremity are greatly to be preferred as more nearly fitting a cross section of the meatus, and thus gaining the greatest available area. Toynbee's modification of Wilde's speculum meets all the requirements.

The cotton holder is a slender steel shaft, made tapering from the handle to a very delicate roughened extremity, upon which a tuft of cotton is twisted. This should be quite stiff for two-thirds of its distance from the end of the handle, but quite malleable and flexible in its other third. A cotton holder that is slender and springy near the handle is a nuisance.

The Buck's curette is similar to the cotton holder but has a looped end. Two sizes are desirable. These are frequently made too thick and clumsy. They are also made perfectly straight. I prefer one in which the extremity is made quite delicate, and anneal it for about one inch from the end. This permits of a very slight bending of the looped end, not more than 5° or 8° from the axis of the shaft, but it is of great assistance in removing foreign bodies, etc.

The dressing forceps will be of great assistance in removing soiled cotton from the holder, etc. The angular forceps commonly on sale will answer most of the purposes for which they are needed, but a much better form though a trifle more costly, is the scissor jointed and handled angular forceps. There is less spring in the blades, and a firmer grasp. A pair bent on the flat and opening horizontally is preferable to those bent on the edge and opening vertically.

The politzer bag needs a short description. This is made of soft rubber, in the shape of a balloon, with a valve opening inward at the large end, and a hard rubber or ivory nozzle at the other, to which may be attached a long gum tube with a nose piece. This is used to force air through the nostril and eustachian tube into the middle ear.

The pneumatic speculum is an important in-

strument. This consists of a small hard rubber cylinder with a glass end. To the other end is screwed a hard rubber speculum. From the side is a small opening to which is attached a piece of gum tubing ending in a mouth piece. The speculum being inserted in the canal, and suction made on the mouth piece, the membrane can be seen to move under the exhaustion. The degree of mobility is an important factor in diagnosis and prognosis. The instrument also has a direct value in treatment.

The rubber syringe may be of most any size ; one or two ounces is the most convenient. It should be a one hand syringe. I have found the most convenient form of nozzle to be a tapering cone, over which I slide the large end of a eustachian catheter. The reasons will be shown when speaking of the use of the syringe. A couple of eustachian catheters, two rhinoscopic mirrors of different sizes, a powder blower and tuning fork complete the list.

Now having our instruments we will proceed to examine a patient. The first requisite is a good light. I have made satisfactory examinations with a candle, but a good argand gas burner is the best. Where gas is available, no more convenient and simple arrangement can be found than what is known as the "parallel bracket." This is made by Mitchell, Vance & Co., of this

city, and is a bracket attached to the gas pipe in the wall, possessing a universal motion. Its cost is between five and six dollars. Next to this comes the drop light. Where gas is not in use the ordinary student lamp gives an excellent illumination. The patient should take his seat with the light behind him, and a piano or other revolving stool much facilitates his turning. Suppose we desire to examine the right ear; let him turn his right side to you, the light being an inch or two above the level of his head, and a little in front of it. This allows the rays to fall on the mirror placed on your head without obstruction, which reflects it on the ear. Taking a suitable sized speculum you gently introduce it into the meatus. Take the ear between the first and second fingers of the left hand and draw it upward and backward. This straightens the canal, and with the free thumb, gently press the speculum in as far as necessary. Learn to do all this with one hand, and in this way. If awkward at first, it will soon be very easy, and you will have enough to occupy the other hand. Then directing the light into the speculum, study the canal and the membrane at your leisure. Then turn your patient about and study the other.

As most patients consult you for deafness, it is well to have a standard for testing. There are various ones in use by specialists, but the watch

is the most useful and handy. A person with normal hearing can hear an ordinary watch at about twenty or twenty-four feet. Whatever it may be, let it represent the denominator of a fraction. Suppose it twenty feet, and your patient hears it only at ten feet. The fraction $10/20$ represents his hearing power, or one-half of normal. This expression will be intelligible to aurists the world over.

The tuning fork is used to differentiate between diseases of the conducting apparatus and those of the nerve; in other words between the middle and internal ears. Some discussion has been going on recently as to its actual value, but its test has generally been regarded satisfactory. Sounding it, hold it near the patient's ear. Sound it again at the same intensity, and touch the tip of the handle to the teeth, the forehead or vertex, or the mastoid process. If he now hears it better, it is accepted as proof that the lesion is in the conducting apparatus, because in a normal ear the conducting power of the bone is less than that of the middle ear in response to sound waves on the membrane. This is spoken of as aerial conduction, and bone conduction.

We have now placed our patient in position, we have tested his hearing, now what pathological conditions may we find in his ears? These we will take up in their order from the outside.

CHAPTER V.

DISEASES OF THE EXTERNAL EAR.

(*Otitis Externa, Circumscripta et Diffusa.*)

In discussing the diseases to which the ear is subject, it is well to bear in mind one general fact, that diseases are limited by the character of the tissue in which they are found. For instance serous inflammations are not found in muscular tissue. So in the ear, diseases of its external portion are those peculiar to the skin, cartilage, etc. In the middle ear they are those to which mucous membranes are subject, while in the internal ear, lesions characteristic of serous cavities are found. As beneath all lies bone, so when the morbid process has become deep enough, periostitis, caries and necrosis are always possible.

The two most prominent diseases of the external ear are circumscribed and diffuse inflammations. Both of these are again subdivided into the acute and chronic forms. Taking up the acute circumscribed variety first, we find it is simply a small phlegmonous abscess or furuncle, which, analagous to styes upon the eyelids, is a

localized and very painful affection. The most frequent seat is just within the meatus, on the anterior and inferior wall, though it is found at any portion of the canal. Its most prominent symptom is pain, which often is of an exceedingly acute character. Great tenderness is another feature, so much so that traction upon the auricle often causes the patient to cry out. It is accompanied by swelling, sometimes confined to its immediate vicinity, while occasionally the whole canal partakes. If the furuncle occurs in the bony portion of the meatus, the pain is usually greater than when in the cartilaginous portion, on account of the unyielding character of the tissue. The swelling often closes the meatus, so that a view of the drum head cannot be obtained. If its location happens to be near the membrane, it also will become congested from proximity.

In the majority of cases the diagnosis is easy. Careful touching with a probe will usually reveal a circumscribed area of greater tenderness than elsewhere. From the swelling of the canal, deafness is a very frequent accompaniment. Ringing in the ears (tinnitus) is present when the boil is near the membrane. When nearer the orifice it is not so common. Constitutional disturbance, such as fever, headache, loss of appetite, etc., are frequently present. These boils, like others, are prone to successive appearances. Usually they are

single, though two may be found. Their natural duration is from eight to ten days—sometimes longer. Treatment will often abort them and prevent the recurrence of others.

The most frequent cause is a run down condition of the system, either from malnutrition, or excessive waste, such as prolonged anxiety, social dissipation, etc. They are more common in adults than children, and most frequent in the spring.

The most common method of treatment in the old school is free incision. We seldom resort to it. Certain remedies seem to possess almost a specific affinity for this affection. They are Hepar sulphuris, Picric acid, and Calcareo picrata. The pain, the swelling, and the tenderness are common to the three remedies, but in Hepar sulphuris the constitutional symptoms are more pronounced, and the swelling and infiltration greater. Itching is often felt. Picric acid, when it is more limited. Calcareo picrata, though as yet without a proving, seems to combine the qualities of both. It was introduced by Dr. Houghton, and since then (some two or three years) I hardly use anything else. In the great majority of cases, twenty-four hours relieves most of the symptoms, and two or three days suffices to bring back the ear to its normal condition. A little plug of cotton saturated with glycerine is said to greatly allay the pain in this affection.

The chronic form of circumscribed inflammation is an ulceration. It is so rare and when seen generally in connection with other troubles, that the space for its description can be more profitably employed. This may occur from inflammatory action, but is most commonly the result of syphilis, epithelioma caries or necrosis.

DIFFUSE EXTERNAL INFLAMMATION.

(*Otitis Externa diffusa.*)

The diffuse form of inflammation is a painful, sometimes obstinate, offensive disease, trying to the patient and physician as well. In the acute variety it commences with itching, followed by pain, which continues almost uninterruptedly, though it may be less intense at various times. There is congestion and swelling of the whole canal lining, in which even the drumhead partakes. With this there is fever and constitutional disturbance. Side by side with the swelling appear deafness and tinnitus. Soon the swollen and infiltrated tissue begins to break down, not at one point as in the circumscribed form, but at many, so that even the whole canal may become a suppurating sore. The discharge is at first of a serous character, sometimes tinged with blood, and usually very copious. Soon this becomes a true purulent discharge. This may gradually

diminish in quantity, and pass over into a chronic form, or the inflammatory action may go more deeply, and involving the tissues beneath, set up a periostitis, caries, necrosis, and even death, though such a course is not common. It is quite prone to assume an indolent character, the tissues becoming boggy and sodden, granulations springing up, bleeding easily, and discharging an offensive ichorous fluid that excoriates the auricle for some distance from the meatus.

Accompanying the earlier stages is frequently a swollen and tender condition of the glands about the ear, and pain on moving the jaw.

There are two varieties, known as the primary and consecutive forms. The latter is most generally secondary to middle ear suppuration, is much less painful than the primary form, and is of a chronic nature from the first.

The primary form may be purely idiopathic in its origin, but by far the greater proportion of cases are due to some local irritation. Writers dwell on, and clinical experience confirms, the danger arising from the habit of scratching the meatus with improper things, such as pins, wooden and quill toothpicks, and similar articles.

The results which may follow this disease are various. Complete restoration of course occurs in many cases. In others, strictures, adhesion of the walls, fistulæ, etc., may follow. It is much

more rare than the circumscribed form. The diagnosis is sometimes easy, sometimes not, that is as to its primary or consecutive character. If a view of the drumhead can be obtained, the question is solved at once, but in the majority of cases this cannot be seen, and we are forced to wait until it becomes visible. In such cases the history of the case must be taken into consideration. It is important, however, to ascertain the condition of the middle ear, to learn whether an inflammatory condition there is complicating the trouble. This is especially the case in children. The use of the politzer bag and Valsalva's experiment* are resorted to, to ascertain this.

This disease sometimes follows an attack of diphtheria in children, and in extremely rare cases the ulcerating tissue becomes covered with a diphtheritic membrane. Sometimes in neglected cases and poorly nourished children, this may pass into a gangrenous condition.

TREATMENT.

These cases should receive a certain amount of local treatment. Cleanliness is very important. This may be done by gently removing the dis-

* Valsalva's experiment consists in closing the nostrils with the thumb and finger, and directing the patient to attempt to blow, the mouth being closed. The air is thus forced into the middle ear if the eustachian tube is open, and a hiss or whistle is heard as it escapes through the perforated membrane.

charges with the cotton holder, or by a gentle stream of water. Prolonged use of water quite hot from a sponge or fountain syringe relieves both pain and congestion, but no forcible stream should be used. Afterwards the canal should be thoroughly dried with the cotton holder. Powdered boracic acid may then be dusted in. Fluid vaseline is an excellent emollient if it is pure. Occasionally I have seen it produce great aggravation, but upon changing for another maker's preparation have found its beneficial qualities. It also seems to possess some therapeutic value. Animal and vegetable oils should never be used. To quiet the great pain, Magendie's solution may be dropped upon the surface.

In the new local anæsthetic, hydrochloride of cocaine,* I think we will possess a very valuable agent. I recently used it upon a case of consecutive diffuse otitis, which had resisted treatment most obstinately and given intense pain for days. The pain was instantaneously relieved, and after a day or two's treatment with this, resolution set in with amazing rapidity. Further experience with it however, is necessary to determine its exact value. The local use of eucalyptol* is many times followed by much benefit.

* This name is given in preference to the muriate or hydrochlorate upon the advice of Dr, Leal, Prof. of Chemistry in the N. Y. Homœopathic Medical College.

In sluggish cases with sodden oozing tissues, the pneumatic speculum is of great value. It relieves them of their engorgement, exerts a stimulating effect, and brings about a much more desirable condition of things. The treatment should be directed towards reducing the inflammation and relieving the pain. If seen at the commencement, the old school recommend the application of leeches to the tragus, but we rarely have occasion to use them.

HOMŒOPATHIC REMEDIES.

The homœopathic remedies applicable to this disease are the following :

Arsenicum album.—There is much burning and itching ; scratching makes it worse ; heat relieves it. The tissues are red and infiltrated. Sometimes watery vesicles are present. The discharge is thin, clear, watery, and excoriating.

Arsenicum iodatum.—The symptoms for this drug are very similar to *Ars.*, but more intense. Cases resisting *Ars.* when it seems indicated ; no remedy is more frequently used with benefit than this.

Calcarea carbonica.—Suitable in fair, fleshy children. Scrofulous subjects. The diseased tissues are firmer than in *Ars.* The granulations

are cellular in their structure. The discharge is thick and cheesy. Cases where there is little pain.

Calcareo phosphorica.—This is useful in the later stages of the disease, after the system has become prostrated. The ear still remains hot, red, sore and swollen. The discharge is rather excoriating. The pains are worse at night, and aggravated by heat or cold. In anemic and delicate children, also in cases after the bone has become affected.

Calcareo picrata.—This remedy I have used in cases in which there is a great deal of aching pain, much tenderness to the touch, a scanty discharge, and a general irritability of the tissues. It seems to work better in cases in which there is a tendency to confine the morbid process to a more limited area.

Ferrum phosphoricum.—A very valuable remedy at the beginning, before breaking down has occurred. Congestion, swelling and pain. Of less use after the discharge has commenced, but invaluable during the febrile stage.

Hepar sulphuris.—With the well known symptoms of this remedy. Constitutional disturbance, swelling, tenderness, free discharge of laudable pus.

Kali muriaticum.—To be used after Ferrum phos., when exudation has commenced.

Psorinum.—The discharge is very offensive. The tissues are raw, red and oozing : “nasty” cases.

Silicea.—When the affection is more pronounced at the inner end of the meatus over the bone. Pus thick and yellow ; tendency to close over on top with extending ulceration beneath.

CHAPTER VI.

OTHER DISEASES OF THE EXTERNAL EAR.

The external ear is subject to many other diseases which affect the skin and cellular tissue elsewhere, such as erythema, erysipelas, intertrigo, cancer, etc. These demand no special consideration, being treated upon the same principles as when occurring in other places.

In intertrigo and the moist forms of eczema, I have had uniformly good results from prohibiting all washing, and keeping them well dusted with corn starch, meanwhile giving the proper constitutional remedy, such as Sulphur, Psorinum, Graphites, etc.

Perichondritis is very rare; I have seen but one case. This yielded promptly to Belladonna, but I was fortunate in seeing the case early.

Othaematoma is a peculiar tumor of the auricle, most frequently met with in the insane; generally of traumatic origin. In the N. Y. Med. Record, Vol. xxvi, Dr. Sexton has a series of able articles upon it.

IMPACTED CERUMEN.

Among the most frequent cases of trouble with the ear, are those in which the cerumen has become packed in the meatus. This is the result either of some anomaly of the secretion, or to efforts at excessive cleanliness, by which it has been firmly wedged there. Sometimes with the forceps or the curette this may be easily dislodged, but first and foremost as a means of relief stands the syringe.

In hospital practice I generally give the patient a small bottle of fluid vaseline, with instructions to drop in three to five drops every night, and return in three or four days. This penetrates and softens the mass better than any other agent, but in private practice I generally remove it at once.

The appearance of hardened cerumen is unmistakable. Upon looking into the ear is seen a black solid mass often reaching clear up to the orifice. It is not of the yellow color of ordinary cerumen, but in the drying and hardening process it has become very dark. Though it may have been for some time accumulating, its effects are often noticed quite suddenly, some accidental circumstance having forced the mass upon the drumhead. The patient experiences sudden deafness, tinnitus, and often dizziness and pain.

Having made your diagnosis, you proceed to

remove it. This may seem a simple matter, but it is really quite a little art. First ascertain if the plug fills the canal from side to side, or has a little play. If tight, take your curette and with great care and gentleness insert its loop between the plug and the wall of the canal. If you do not in this manner make a small passage way for the stream of water beyond the face of the mass, you may frequently syringe all day, and simply drive it more tightly upon the membrane. Having thus made a little chink, take your syringe and fit upon its end a eustachian catheter. Directing its point towards the opening made, throw in one or more streams of warm water. I usually do it very gently at first, to accustom the patient to the sensation, then more forcibly. The stream dissects its way along the opening made for it, and soon its retroactive force dislodges the ceruminous mass which appears either at the orifice, or falls into the vessel receiving the discharges held beneath the lobe of the ear. This should set up snugly to the junction of the auricle with the face, to prevent the water from trickling down the neck.

There are various specially contrived basins and receptacles for the returning water. The most perfect I have ever seen is a device of Prof. Liebold's, which he has kindly shown me.

This consists of an open tin spout, one end of

which fits in behind the lobe, and the two sides of which extend perhaps half way up the auricle, flaring enough to be a little wider than the ear. The other extremity is a blind end. Attached to the point behind the ear is a spring wire which extends over the head and as low on the other side as the ear, when it returns upon itself and the other end of the wire is soldered to the point of the spout in front of the ear. In other words this is a wire hook hung upon the head with a tin spout which comes beneath the ear.

In the floor of this spout near the blind end is an aperture with a short tin tube, perhaps half an inch long, pointing directly downwards, and about two inches from the ear. On one side of this tube is a short pin which fastens by a bayonet catch, a rubber bag with a vulcanite neck to this short tin tube. The apparatus is hung upon the head, and the spout coming directly beneath the ear, conveys all the discharges into the bag suspended below it. This is the most perfect and cleanly apparatus I have ever seen.

Two finger bowls, one to contain the warm water and the other for the patient to hold beneath the ear, will answer all purposes however.

Caution should be observed at the first use of the syringe. Many persons become very dizzy, and I have seen patients faint when the stream

was first applied. A little patience, however, is all that is necessary.

As a rule the removal of ceruminous accumulations can be accomplished at one sitting. Now and then a peculiarly hard case will require more. I recently was consulted by a gentleman, who had been so deaf for many years, that conversation was carried on with great difficulty. He was supposed incurable. The plug was so hard, and the canal so sensitive, it took three sittings to remove it, but his relief was complete.

One word as to why I recommend the catheter on the end of the syringe. In the first place not to obstruct the illumination and view, on the principle that angular instead of straight forceps are used in ear work. In the second place you can direct the stream with greater accuracy to the precise point you desire, and the beak being at right angles, your hand and person are out of the way of the returning stream, which sometimes manifests a disposition to seek your face and shirt bosom, instead of the receptacle prepared for it. Many times I have been deluged in this way, when using the straight, short nozzled catheter. Burnett in his work objects to a sharp or slender elongated nozzle, as liable to do injury. Care and common sense must be used. If a man will not exercise them he had better burn his diploma, certainly not attempt to meddle with

the ear, which is too delicate an organ to permit of careless handling.

It is well to mention another form of obstructive plug which forms in the ear, simulating cerumen. It is made up of modified epithelium, derived from the skin of the canal, gradually filling the meatus. Its character is horny and hard, nor unlike the corns upon ones toes. It is very obstinate and difficult to remove. Syringing alone has no effect. It has to be removed by careful and patient picking, several days being often necessary. It is called keratosis obturans. Fortunately it is quite rare.

FOREIGN BODIES.

Analogous to collections of altered secretions in the ear, is the presence of foreign bodies, which from some cause or another have made the canal their resting place. These are so various, I sometimes think I can tell a man's occupation by the articles I may find there. Grains of barley, wheat, and corn, shoe and shirt buttons, pieces of slate pencil, cherry pits, coffee beans, beads, bits of coal, and insects, are among the commonest things the surgeon is called on to remove. The length of time which these have been there may be very great. Cases are recorded of over sixty years having elapsed between the impaction and removal. Children often put these things in their own

or playmates' ears, from sport, ignorance, or malice. The syringe is the means for their removal. Of course there are special cases where it is not practicable, as in the case of a small cork wedged in the ear by a child. In such instances, the physician is called upon to exercise his ingenuity, but the great majority are easily and safely removed by syringing. Proceed exactly as in the case of wax plugs. Sometimes the meatus is swollen and sore. A little fluid vaseline used for some days lubricates the canal, reduces the congestion, and permits its easy removal. As a rule avoid all attempts at extraction by the forceps, or other instruments, as nine times in ten it drives it further into the canal. Sometimes in the case of insects, they retain their life for some time, and by their mandibles seize the tissues and hold on. A preparation of one part of sulphuric ether to two parts of fluid vaseline, will soon deprive them of life and allow of their dislodgement.

PARASITIC GROWTHS.

When the conditions of heat and moisture are present, the canal may become the site of parasitic growths. The most frequent are vegetable or fungi. The general term given to this condition is Otomycosis. The heat and moisture essential to their development are found in suppurations, either

in diffuse external otitis, or chronic of the middle ear. The symptoms are pain, heat, fullness, itching, dizziness and deafness. The growth usually commences at the fundus of the canal, upon the membrane, and gradually grows outwards, forming a complete cast of the meatus. There are a number of varieties, each having their specific technical designation, which does not concern us. The appearance is varied, according to the species, a blackish brown, yellowish, greenish, grayish black, etc., similar to the mould growing upon a piece of bread left in a damp place. They multiply with great rapidity. They cannot be removed with the syringe, forceps, or cotton holder until they have been killed. Various parasitocides are in use, but none is superior to alcohol. This instilled several times a day will destroy them, after which the syringe easily removes the debris.

With this brief reference to the growth of parasites in the meatus, we will dismiss the subject of the external ear, and pass to the consideration of lesions of the conducting chamber or middle ear.

CHAPTER VII.

CATARRHAL DISEASES OF THE MIDDLE EAR.

(*Otitis Media Catarrhalis.*)

ACUTE CATARRHAL INFLAMMATION.

(*Otitis Media Catarrhalis Acuta*)

The diseases to which the middle ear is liable are divided into two grand classes, catarrhal and suppurative. Perhaps a word of explanation in regard to the use of the terms catarrhal and suppurative may not be out of place. It was the custom among the older English writers, and to some extent among the German, to class all affections of the ear as catarrhal, thus using the terms mucous catarrh, purulent catarrh, etc. By common consent, the later writers, Roosa, Burnett, Politzer, etc., have limited the term to specific forms of disease, the word otitis being used to designate a lesion of the ear, in whatever portion it may occur. Following this custom, the use of the term catarrh is limited to those affections of the middle ear, not characterized by the formation of pus, while the word suppuration is con-

fined to that process where the affection has passed the catarrhal stage, and a genuine purulent secretion has become established.

HYPEREMIA.

Preceding acute inflammations of the middle ear, and not infrequently accompanying lesions of the canal, is a hyperemia of the drumhead. As the blood supply was omitted in the anatomical description it will be given here. On its outer surface there is a vascular ring about the periphery, derived from the auricular arteries. On the inner or mucous surface there is a similar one, formed by the anastomosis of a branch of the stylo mastoid artery, and the tympanic branch of the internal maxillary. These two rings are united by capillaries. From the internal ring one larger branch reaches the manubrium, and descends along that process. Projecting from the peripheral ring towards the center of the membrane, and from the manubrial vessel towards the periphery, are minute capillaries. None of these vessels are visible under normal conditions, but as soon as any exciting cause tends to produce a hyperemia, such as touching the membrane with a tuft of cotton, syringing, etc., these vessels spring into view as a red ring about the periphery, and a red line descending the handle of

the malleus. A certain portion of the membrane between the two is free from redness at first, but if the congestion continues for any length of time, the whole surface becomes of a uniform red color. I had the pleasure of showing the class in the New York Homœopathic Medical College this winter a beautiful instance of such a partial congestion, produced by a violent effort of blowing the nose.

ACUTE CATARRHAL INFLAMMATION.

Acute catarrh of the middle ear is accompanied by pain, tinnitus, a sense of fulness, deafness, fever, and occasionally delirium. At first the hearing may be even more acutely sensitive than normal, so that ordinary sounds seem painfully loud, but this soon passes over into a dulled condition, and sounds ordinarily distinct become only a confused murmur.

If seen at the very commencement, inspection may show the membrane with only the peripheral and manubrial congestion, but this lasts but a short time, the vascular engorgement filling the capillaries to their greatest capacity, and the membrane becoming a uniform red throughout its whole extent. The pain is usually quite severe. If a child old enough to talk, he continually moans, "my ear, my ear." If too young to

talk, it will roll its head about, and bore it into the pillow, every now and then giving vent to a scream, as an unusually sharp twinge of pain is felt. Sometimes even in grown persons this pain is so acute, that they show evidence of extreme suffering. Such a condition in children is often mistaken for an affection of the brain, and treatment directed with reference to such a diagnosis, and to ward off an attack of supposed oncoming convulsions. The attacks are sometimes sudden, sometimes giving premonitions of their occurrence by a certain uneasiness, and slight pains now and then felt in the ear, which gradually increase in frequency and severity. It is not an uncommon thing for a child to go to bed perfectly well, and be awakened from sleep by the pain of an attack. Many cases are without febrile movement, but it often is present.

As in every disease there are mild and severe cases, so in this, they not infrequently occur (perhaps are the most frequent) with much less intensity than above described, last a day or two, and pass off, coming on again in a week or month. These cases, which often do not consult a physician, are important in their after effects, as we shall see when discussing the chronic catarrhal forms.

The causes which underlie these attacks are various. Most frequently it is exposure to cold or wet. I have been able to trace it in children

in many cases, to sitting while at play upon a cold stone step. Riding in the cars with a window open and the air striking the ear will produce it. Bathing is a very common cause. Not a summer passes, but that after the water becomes warm enough to permit of bathing at the various beaches near New York, case after case makes its appearance with the statement that the attack came on after bathing at Manhattan Beach or some other place. Some persons are peculiarly sensitive to the air striking their ears when riding, and even in mild weather, if they do not take the precaution to protect them, are sure to suffer from earache. The sport of children washing each others' ears and face with snow sometimes causes it. It often accompanies a catarrhal cold. Whooping cough and scarlet fever are very prone to produce it, though in these instances it is but too often a stage in the onward march to suppuration.

The pathology of the condition is as follows: From whatever cause it may spring, as a rule the affection commences at the pharyngeal mouth of the eustachian tube. Following the congestion comes a swelling of the walls, which it will be remembered are in quite close apposition. From the swelling a closure of the tubes occurs, and their function of ventilation and drainage is temporarily impaired. The tympanic cavity thus

becomes deprived of its supply of air (that already there being rapidly absorbed by the tissues), and the natural secretions of the cavity are retained. On account of the vacuum thus caused in the tympanum, there is a rush of blood through the tympanic vessels to supply the deficiency, and the first step of congestion is established. This in itself, with the atmospheric pressure on the membrane, is enough to produce an earache, and these cases are known among specialists as tubal catarrh, when the process goes no further. But we have other factors. It will be remembered that the lining of the tube and tympanum is continuous, and it is well known how rapidly inflammatory action spreads over mucous surfaces. Here we have direct continuity of tissue, and the inflammation passes directly on to the tympanic lining. Here the normal secretion of mucous is very largely increased, from the activity induced in the tissues by the greater blood supply and inflammatory irritation. The tubes being swollen so that they are not readily pervious, this increased secretion is also retained and added to the natural secretion of the parts. This soon fills the little cavity, and we recognize on looking through the speculum that the membrane appears pushed out or bulging into the canal. This bulging is much more prominent in the superior portion of the drumhead, which we called Shrapnell's

membrane, for from the looser character of its texture, it more readily yields under the pressure. In this highly organized little cavity, richly endowed with sentient nerves, is it any wonder that we get pain with such a state of things?

In the cases of tubal catarrh spoken of a moment ago, it is often the case that the pain remits during the day and comes on again at night. This is readily understood. Following the rule which obtains in most acute diseases, during the day the inflammatory action is less, there is a subsidence of the tubal swelling, and both air may enter and secretions drain out, thus relieving the pressure. But at night, added to the common exacerbation, the prone position changes the direction of the tube to a more nearly horizontal plane, thus retarding the ease of drainage. Moreover, lying down increases the determination of blood to the part, with a consequent increase of congestion, and the tube becoming more tightly closed, all the factors of pressure are at work again.

Now having learned what the conditions actually are, what appearances do they present by which we may recognize them; in other words what do we see?

As before said, if examined through the speculum at an early stage, we will see the congestion about the periphery and along the manubrium.

The general color and outline of the membrane will not be changed, though some of its lustre may be absent and the light spot deprived of its brilliancy. In a short time however, the congestion spreads over the entire surface, and it becomes a uniform red. Its outlines are lost so that we are not able to detect its junction with the walls, from lack of the distinctive color. Next, from the absorption of air within the cavity, the atmospheric pressure from without bears in upon its surface, driving it towards the inner wall, and showing a much increased concavity or depression. This, as is readily seen, produces pressure on the stapes, which bearing upon the labyrinthine fluid, gives the patient a sensation of noise, i. e. tinnitus.

Meanwhile secretion has commenced to accumulate, and sometimes through the membrane can be seen the exact line indicating its height. While this atmospheric pressure is the greatest, the manubrium stands out more prominently on account of the depression of the membrane on either side. As, however, the secretion continues to accumulate, the pressure, from its confinement, commences to be exerted from within outwards, and overcoming the atmospheric pressure, the membrane commences to bulge outward. This is first noticed at Shrapnell's membrane, in the region of the pockets of Troeltsch, as before said

and explained. From this point the course of the disease is in one of three ways. Either resolution sets in, the congestion and swelling lessens, the tympanic cavity becomes cleared of its accumulations, and things resume their normal state; or the inflammatory process proceeds to a still greater height, the products assume a purulent form, and the membrane breaking down, the discharge is poured out through the meatus; or, and this is the most frequent result, a partial resolution sets in, the congestion and swelling diminish to a certain extent, and a subacute form takes its place, ultimately passing into that most obstinate of troubles, a chronic catarrhal otitis media.

Now in these acute forms of tubal and tympanic catarrh, it is possible for the process to be cut short at any stage by judicious treatment. This is both local and constitutional. The local will be first discussed, and the remedies with their indications be given later.

TREATMENT.

One of the first indications is to relieve the tympanum of pressure. This is done by the forcing of air into the middle ear by way of the eustachian tube. The politzer bag is the readiest means of accomplishing this. In its absence there are certain substitutes. The method of using it is as follows. The patient is directed to

hold a sip of water in his mouth. The nose piece is inserted into one nostril so that it fills the orifice, the other nostril being closed by pressure of the thumb and finger, while the other hand holds the bag. At a given signal the patient swallows the water. At the same moment pressure is made upon the air bag, forcing an air current through the nostril. The act of swallowing shuts off the lower from the upper pharynx, and the air finding no escape downwards, and being prevented from returning through the other nostril, is forced to seek a vent through the eustachian tube. When this is accomplished, it has entered the tympanum, the equilibrium is restored, the pressure removed, and the contents have an opportunity to drain off through the temporarily dilated tube. Sometimes several attempts are necessary to accomplish this. The tubes may be partially glued together and do not open readily, or pressure may not be made at the right moment. A little patience overcomes all this. Whistling, blowing, or crying on the patient's part brings about the same result of shutting off the lower pharynx. In case you have no air bag, a common soft gum tube inserted into the nostril (the other being closed), the free end of the tube being in your own mouth, and a forcible blow being given through the tubing, will accomplish the same result. Very often relief

will be felt at once, but of course it is but temporary, and this will have to be frequently repeated. Moreover it has a therapeutic value, for with the relief of the vacuum and pressure, one factor in congestion is removed.

Sometimes the adhesion of the tubal walls is so close, air cannot be forced through it. In such case the pressure must be relieved from the outside. This is done by puncturing the membrane and allowing air to enter from, and the contents escape into the meatus. The relief is immediate and great. Fortunately, we comparatively rarely have to resort to this. Occasionally after puncture, there is no discharge but a little blood, though the same relief is experienced.

The point chosen by preference for the puncture is the posterior portion of Shrapnell's membrane, though some recommend the posterior inferior quadrant of the drumhead. The advantage of this last point is its lower elevation, allowing more complete drainage. The operation should be done with a paracentesis knife or needle, which is a small lance shaped point, on the end of a slender malleable shaft, attached to a handle. The flexible shank allows it to be bent at an angle, so that the hand does not obstruct the view. A mere prick is all that is necessary. It is a perfectly simple and safe operation.

There are many local applications which are of great value, but perhaps I am justified in saying that all which have a domestic reputation are uniformly harmful or useless, except heat. Avoid all fats and oils except fluid vaseline. Heat may be applied either dry, or by irrigation with quite warm water. An excellent plan, and one I always use, is to cover the whole head with a large night cap, lined with cotton wool at least one inch thick. Over the affected side I place another loose layer of cotton directly against the ear and face, moderately saturated with fluid vaseline. This is worn night and day. Of course the patient is to be confined to the house, and great care taken against exposure, for in this affection there is unusual susceptibility. In the way of local applications, the fluid extract of *Plantago major*, either pure or diluted half with water, warmed and dropped into the ear, many times exerts a wonderfully soothing effect. I very frequently use the following, which scarcely ever fails to give relief.

R

Fl. Ext. Plant. Maj.,	-	-	3 iv.
Tinct. Bellad,	-	-	gtt. xv.
Tinct. Acon. Rad.,	-	-	gtt. x.
Magendie's Sol. Morphia,	-	-	gtt. xx.
Aqua Dest., q. s. to make	-	-	ʒ j.

Misc.

Of this, I apply by a dropping tube four or five drops warmed, in the ear, at intervals varying from five or ten minutes, to once in two or three hours. I also, between the applications, put in the ear a small pledget of cotton saturated with the solution. The case is a rare one in which relief is not obtained after three or four applications, and not infrequently after the first. The hydrochloride of cocaine before spoken of, has relieved the pain in a marvellous manner, but the cases of course have been very few upon which I have had any opportunity to try it. Magendie's solution alone, is recommended by old school authorities, but I prefer to use it in the above formula, for the relief is as prompt, and the therapeutic action greater. As a rule avoid all poultices. In rare cases they may be called for, but their tendency is to break down the membrane, and bring about the very condition you are striving to avert, viz., the passing over into a suppuration.

The introduction of steam into the ear is an excellent method of applying heat. In those houses where steam is used for heating purposes by means of radiators, this can be very easily done, by attaching a piece of india rubber tubing to the check valve on the radiator, and holding it near the ear, let a jet of steam pass into it. Of course care must be taken that too hot steam

be not used, but in the ordinary house warming apparatus, the pressure is not more than three or four pounds, and there is little danger.

In regard to remedies, they must be selected from the whole materia medica, as in other diseases, each one being of more importance than all the rest when specially indicated, as was said by Prof. T. P. Wilson, when writing on this subject for the World's Convention in 1876.

Nevertheless we have a few which deserve especial mention, as being most commonly called for, and rarely disappointing us.

HOMŒOPATHIC REMEDIES.

Aconite.—In the earliest stage of the complaint, when the hyperemia is first visible. The pains are sharp and tearing especially in the left ear. Fever runs high; much nervous excitement; *excessive sensitiveness of hearing and intolerance of every noise*. Dryness and scraping in the throat; skin dry and hot; cheeks red. When traceable to exposure from direct cold. In the practice of the surgeons at the New York Ophthalmic Hospital, Ferr. phos. has largely taken the place of Aconite, but there are cases now and then in which Aconite is the remedy beyond all question, if given at a sufficiently early stage. Ferr. phos. is applicable

to an acute inflammatory condition, lasting a little longer than a typical Aconite case.

Bryonia.—From the relation of *Bryonia* to inflammations of serous membranes, this remedy would seem to be called for in cases in which the serous character of the secretion in the tympanum predominates. The sharp sticking or stitchlike pains characteristic of this remedy, with painful sensitiveness of the ear, are cases in which it should be useful. I have had little occasion to use it, but there are most certainly cases occurring in which its use would seem to be emphatically indicated.

Belladonna.—In those cases in which the throat is sore, red and swollen ; the tonsils are infiltrated and swollen ; pulsation of the carotids ; headache ; face flushed, with heat in head ; cold hands and feet ; throbbing pain in ears, worse towards night and when stooping ; pains shoot through and depart suddenly.

Chamomilla.—"Pains very severe, causing hot perspiration about the head, patient cannot endure it ; is very restless and screams ; cold aggravates." (W. P. Fowler).

Ferrum phosphoricum.—Fever more marked at evening or earlier part of the night ; general heat ; apathetic ; depression and anxiety ; head dull, heavy, full, with flashes of heat ; dull beating headache ; pulse felt in brain ; beating in the ears

with a dull roar, or humming sound ; face flushed, feels swollen ; respiration labored. Heart's action increased, later diminished, and volume of pulse increased.

Redness of meatus, and hyperemia of drum-head. Marked congestion of membrane. Pain steady and aching ; rushing sounds, as if could hear the blood coursing through the vessels. Pages and pages would fail to relate all the wonderful things which this drug has accomplished in cases of acute inflammatory earache in my experience and that of my colleagues. If used in time, before much secretion has caused the membrane to bulge, it will rarely disappoint. I generally use it in the 6^x trituration.

Gelsemium.—In the cases of so-called serous catarrh. Occasionally a case is met with in which the exudation is nearly pure serum, and under the inflation of air through the eustachian tubes, this bubbles or effervesces, which can be plainly seen through the membrane. In such cases *Gelsemium* must not be forgotten.

Hepar sulphuris.—Darting pains in the ears ; worse at night, and not relieved during the day. Warmth, either by application of heat, or wrapping head, relieves. Later in the case when supuration threatens.

Kali muriaticum.—The remedy to finish up your case with. No matter what medicines you

have given through the acute stage, after the pain has subsided and resolution has set in, no remedy finishes up the work, clears out the tissues, prevents the adhesions and general consequences equal to Kali muriaticum.

Magnesia phosphorica.—This remedy is often valuable in cases in which there seems to be a neuralgic element present, in addition to the pain in the ear. The pain shoots in flashes into the head and around the face. In such cases a few doses of *Magnesia phosphorica* given in connection with the other remedies will generally allay this feature. Schussler says it has a more soothing effect if taken in hot liquids.

Mercurius.—Tearing pains, worse at night in bed ; perspiration which does not relieve. The various forms of *Mercurius* are all valuable in certain conditions. The solub. is highly recommended by Dr. Fowler of Rochester. The dulcis or vivus is more frequently used by myself.

Pulsatilla.—This remedy is particularly called for in children rather than adults. The cases are not of the severest type, though the pain may be acute and lancinating during the night, the child playing through the day. Febrile symptoms slight.

I cannot consider this subject as finished, without calling especial attention to the necessity of closely watching the ears in cases of scarlet fever

and diphtheria. All the exanthemata are liable to ear complications, but in none are they so common, and the results so distressing if neglected, as in these two. One other thing. After your case is relieved of pain and fever, and you have discharged your patient from daily attendance, your work is not finished. These acute catarrhs leave results. What these results are will be seen under chronic catarrh, but your duty is to prevent them. How? By using the politzer bag and the pneumatic speculum, two or three times a week for a fortnight or more. This prevents the organization of bands of dried mucus, etc., closing the tubal aperture and limiting the freedom of the drum membrane, and mobility of the ossicula.

Many times you will be consulted for an earache, but upon examination you will see no congestion, no bulging, no apparent cause for the pain. *Look at the teeth.* Nine times in ten you will find a carious tooth, the seat of the trouble, though the patient may deny ever having had the toothache. The relation of the dental nerves through the otic ganglion, to the sentient nerves of the ear, is the cause of the pain being referred there—i. e. reflex. Rubbing the gums with plantago extract and water, and plantago internally will generally temporarily relieve it, but the dentist is the best remedy.

CHAPTER VIII.

CHRONIC CATARRHAL INFLAMMATION OF THE MIDDLE EAR.

(*Otitis Media Catarrhalis Chronica.*)

Chronic catarrhal inflammation of the middle ear is an insidious, protracted, obstinate disease. Its treatment is often unsatisfactory, disappointing to the patient, and discouraging to the physician. Nevertheless, it is very important to understand what it is and how it is caused, for if it is generally known what are its primary stages, and the importance of attending to those conditions which lay the foundation for it, very much may be done in the way of preventive treatment, and thus in the end, reducing the frequency of this affection, which now seems to be the lot of a very large proportion of those who arrive at middle life.

The symptoms of chronic catarrh are many and varied, but there are two which stand out prominently before all others, and are common to almost every case, viz. deafness, and a noise in the ear or head. This latter symptom in many cases

is so distressing, that those suffering from it have been driven to insanity, and even in some instances sought refuge in suicide to escape the intolerable annoyance.

This is often the growth of years before patients are forced to seek the physician's advice, and then it is found, that either it is too late to help them, or not realizing the condition present, he gives them a few powders or pellets, which are worth absolutely nothing.

Now let us see with what we have to deal, and how we are to meet it. This is the outgrowth of several things. Either cases of earache have been neglected, or a naso-pharyngeal catarrh having existed for some time, the eustachian tube first, and the cavity of the tympanum in due time, from direct continuity of tissue, participate in the process.

When speaking of acute catarrhal inflammation two things were referred to; the frequently repeated mild attacks of earache, passing off in a day or two, and receiving no attention, and the dismissal of other cases more severe in their character, with no after treatment.

In these milder attacks there is usually a predisposition to catarrhal affections of the mucous membranes. The least exposure to cold brings on a certain amount of congestion and increased secretion. Before the tissues have fairly recov-

ered, though all acute symptoms may have disappeared, another attack occurs, going through the same process. I have known repeated instances where persons commenced with catarrhal colds early in the fall, and were free from them at no time till well into the following summer, to go through with the same history the next season. At various intervals there may have been slight pains in the ears, or there may have been none. These repeated attacks finally leave their traces in a hypertrophied condition of the mucous membranes in the whole region of the nasopharynx, or rhinoscopic space, as that portion above the plane of the palatal arch is called. The pharyngeal mouth of the eustachian tube necessarily takes part in this process, and so on up, towards the tympanum.

Of a similar character in their results, but more pronounced, are the chronic naso-pharyngeal catarrhs, from which so many in this country suffer. This will be spoken of more fully.

The severer cases of acute tympanic catarrh are another fruitful source of chronic middle ear disease, from the habitual neglect of after treatment. It was shown in discussing these cases, how the tympanic cavity became the seat of very much increased secretion. It was mentioned when speaking of the anatomy of the middle ear, that the lining membrane possessed both mucous

and serous properties. Now the secretion thrown out from this structure varies in its composition. Schwartz divides the catarrhs which do not eventuate in pus, into mucous and serous. That such well defined cases do exist, most every aurist can testify to. My colleague Dr. Houghton has shown me very interesting cases of undoubtedly nearly pure serous exudations in the tympanic cavity. These fine clinical distinctions do not come within the scope of this work to discuss, but I wish to refer to the fact of their existence, and again refer to Schwartz as authority for the statement that most cases are of a mixed character. Now the mixed character of this secretion is one of the important factors in producing the result known as chronic catarrhal otitis media. Schwartz says in speaking of these acute cases, "the very highest degrees of catarrhal swelling of the tympanic mucous membrane, are capable of complete retrogression. The cellular infiltration of the subepithelial connective tissue, disappears by fatty degeneration and decay, and possibly in part by absorption into the lymph vessels. For this process weeks are necessary. In many cases however, retrogression remains incomplete, and there remain projections and duplicatures of the mucous membrane, in the form of pseudo-membranes, or synechia, by which different parts of the ear (middle) are abnormally adherent, or the

tympanic cavity is permanently affected in size and form. * * * The cavity is partially or wholly filled with thick adhesive mucus, mingled with a few cell elements, epithelium, etc. * * * The consistence of the mucus may be such as to require a regular dissection with forceps and knife, in order to free the walls and ossicles."

These are the conditions present at the time a case of acute tympanic catarrh is ordinarily dismissed. Is it any wonder that persons can trace their deafness to a severe attack of earache, when such a state of things is left to complete its work in the delicate structure of the middle ear? What this work is I will soon proceed to show.

The naso-pharyngeal catarrhs recently referred to, are a third cause at work in the production of the abnormal condition we are studying. I do not propose to describe this disease, but simply remark that the swollen and hypertrophied mucous surfaces in the pharyngeal space, necessarily include the faucial extremity of the eustachian tube. This either becomes closed by swelling of the tissues at its mouth, or by becoming plugged with tough mucus, or the the hyperplastic process includes the tubal walls themselves, and passes to the tympanum. Most usually all these features are present in greater or less degree. Heredity undoubtedly has an influence.

There is one form of this middle ear trouble in

which these causes above detailed do not seem to have a share ; at least we meet cases where we cannot find sufficient evidence of their existence to warrant us in assigning them the predominating influence. These cases are the so called 'dry catarrhs' or 'proliferous' forms. This form is more insidious in its march than the other. The patients gradually grow deaf, but so quietly is the process conducted, that when they really awaken to the fact, it is quite late in the disease. The process seems to be one of atrophy, or drying up, rather than of hyperplasia and increased secretion. In practice however, they are classed under the chronic catarrhal forms.

Now let us see what is the actual condition of the tissues, that the causes we have been relating bring about. There is thickening of the mucous membrane from the prolonged inflammatory action. The small joints in the chain of bones become covered with an adhesive mucus which clogs their free movement. The secretions which have been poured out, finding no exit by way of the eustachian tube, become deprived of their moisture by absorption, and the dried remains cover more or less of the cavity. Sometimes there are enough cell elements in this mass to produce organization, and a low grade of connective tissue is formed, both lessening the space, and obstructing by its presence the function of that remaining.

Again, it may be found in the shape of small bands or fibres running from one point to another, and binding the various points to each other more or less firmly. There are two or three where this is very apt to be the case, and especially injurious. These are attachments of the membrana tympani to various points, limiting its motion; the same attachments to the stapes, and the joint between the malleus and incus, and adhesions of the bones to the walls of the cavity. Contraction takes place in these various false connections, which makes them tense, and still further impairs the motility of the conducting apparatus, as well as forcing them into abnormal positions. The eustachian tubes are either tightly closed by swelling, or their calibre filled with obstructive plugs of tenacious mucus.

In the dry or proliferous form there is a slightly different state of things. Here, doubtless in many cases, there is a deficiency of secretion from the start. The mucous surfaces become covered with a dense fibrous tissue; the stapes becomes firmly fastened in the fenestra ovalis; the malleus and incus are ankylosed at their articulation, and there are various degrees of bony enlargement, both in the walls of the cavity, and the ossicular chain. The tendon of the tensor tympani often becomes contracted or atrophied. The changes which occur in the drumhead are also character-

istic. It becomes dense and thickened, even to five times its normal dimensions. Its shape is materially altered, being forced out of position, both by the traction of adhesive bands, and the atmospheric pressure on the outside.

Now let us see what changes these morbid processes produce in the appearance. Some we distinctly see, others are inferred. On looking at the drumhead, we notice that its position is altered, being very much cupped or retracted. The light spot is either distorted, or absent altogether. This distortion differs in different individuals. Sometimes the angle at which it stands is changed, and its base is thrown upward. Sometimes there is a mere white line in the place of the triangle. Again, all there is to be seen is a mere speck at the apex, as if its lower two-thirds had been wiped out. Occasionally it is divided into two portions. Now and then in the proliferous variety, there are irregular patches of dull white upon its surface. These are of various shapes, and may be either single or multiple; I have seen the whole of one side so changed. One form now and then met with, is a crescent rounding the end of the manubrium. These white spots are called opacities, and are due to the deposition of limy material in the substance of the membrane. Of course its lustre and polish are wanting. The short process of the malleus is

unusually prominent, while the manubrium stands out like the ilium in a cadaver dead of phthisis. There are various other irregularities on its surface. On applying the pneumatic speculum, it may be so firmly bound down by adhesions on its inner side, that no motion is perceptible, or certain parts may spring forward under the suction, while others remain stationary. It is not infrequently the case that the canal in these cases is very large and straight, so that the membrane can be distinctly seen without the speculum, even at some distance. Whether this is due in any way to the morbid process, I am not prepared to state, but that there is a connection in some way, I have little doubt, for such a canal is rare in a healthy ear.

On examination of the throat, characteristic changes will be seen there. The posterior wall of the pharynx is often studded with minute granular elevations, either dry, or secreting a gummy fluid. Sometimes the wall has a dry, glistening appearance. In some cases it is of a deep red ; in others, so pale as to appear anemic. Frequently a thick mass of greenish yellow mucus hangs down from the posterior nares, covering more or less of the posterior pharyngeal wall. On introducing the small mirror and examining the reflection of the superior space, the tissues will be found thickened and hypertrophied. The

adenoid development may be such, as to entirely occlude and prevent a view of the mouth of the eustachian tube. If visible, frequently a plug of tenacious mucus will be seen hanging from it. Now and then cases will be met in which large polypoid growths are present in this space, and pass up through the posterior nares. In these instances the breathing space being largely diminished, air is taken through the mouth. Many cases of naso-pharyngeal catarrh also contract this habit, which is a very bad one, rapidly evaporating the moisture from the mucous surfaces, leaving them dry and parched, and still further complicating the difficulty.

Such is a brief picture of what you can see. Now of what does the patient complain?

The first symptoms are usually tinnitus, and gradually increasing deafness. Of these the first is complained of the most. "I don't care so much about the deafness, Doctor, if you can only stop this everlasting ringing in my ears," is a frequent statement. This seems to vary at different times, occasionally almost dying away, then coming on louder than ever. It is particularly noticeable at night, when everything is quiet. I have one patient now under treatment however, who says that when everything is quiet, and she herself calm and tranquil, the noise subsides, to appear with renewed violence when she is active or ex-

cited. There are doubtless, nervous elements in this case. The character of this noise varies greatly. Patients are apt to liken it to sounds with which they are familiar, the humming of bees, the escape of steam, the distant roar of the sea, the rumbling of a railroad train, etc. Wilde's description has become classical; "as if all the teakettles in Ireland were boiling in their ears." Frequently a cracking or snapping noise is heard. This occasionally is audible to the physician. Now and then is seen a case in which in spite of deafness, there is hyperesthesia in regard to noise. Even ordinary sounds produce pain. A sense of plugging or fulness in the ears is often felt, similar to that experienced when swallowing with the mouth and nose closed. Not only this fulness in the ears is complained of, but a fulness in the throat or sensation as of a foreign body there. This is most frequent in those cases with exudative naso-pharyngeal catarrh. Vertigo is occasionally felt. This is not constant but comes on at irregular times. A not infrequent symptom is the hearing better in a noise. These patients may be so deaf that ordinary conversation is carried on with difficulty, yet in a street car or stage they hear with surprising ease.

Almost all of these symptoms have an explanation, too long to be given here, but in general

terms depending on the altered conditions resulting in increased labyrinthine pressure, or stiffness of the conducting apparatus.

There is one objective symptom which should have been mentioned, viz., the altered secretion of cerumen in the external meatus. In very many of these cases, the ceruminous glands seem to cease their action and the canal becomes entirely deprived of its wax. In other cases there seems to be an increased amount, resulting in the wax plugs spoken of. Though I have not made an exhaustive study of this, my observation would lead me to differentiate these cases in this way; that the obstructive plugs are formed in the earlier stages of the true catarrhal process which is characterized by increased secretion, while those cases of diminished secretion are found in the dry or proliferous forms, and the later stages of the other. What we can do for these cases will be discussed in the next chapter.

CHAPTER IX.

TREATMENT OF CHRONIC CATARRHAL INFLAMMATION.

In many cases of chronic catarrh unfortunately little aid can be rendered. But again there are many cases where undoubted benefit can be given. From what has been said, it is clearly seen how important it is that treatment should be continued in acute cases for some time after the suffering is relieved. By the use of remedies the retrograde process is materially assisted, and by the frequent use of the air bag, the tube is kept open, and the tympanic cavity supplied with air. The use of the pneumatic speculum also serves to assist, by exercising the *membrana tympani*, and the chain of bones, preventing the formation of contractile false bands, and pseudo ankylosis of the ossicular joints.

The use of these two instruments is also important in the treatment of the chronic forms. Most of these are progressive, and the persistent infla-

tion of the drum, and the exercise of the membrane serves to retard its progress, and at least prevent the case from becoming worse. In some cases it is of very decided benefit.

Applications to the eustachian tube and cavity of the tympanum are quite generally used by the old school, and by some of the Homœopathic school. Dr. Winslow expresses himself emphatically in their favor. For myself I rarely use them, and they are not commonly applied by my colleagues either in hospital or private practice. I believe, with rare exceptions, we can accomplish by internal medication wonderful changes in the pathological conditions of the middle ear. For the benefit of those who fully believe such things must be done, I give a few formulæ, which are highly recommended by those who use them. They are applied through the eustachian catheter. The method of introducing this instrument is as follows :

After the nose has been thoroughly cleansed, take the catheter in the right hand by the ring end, and insert its beak into the nostril, on the side you desire to treat, the shaft of the instrument standing vertically. The upper lip should be drawn down slightly by gentle pressure against it with a finger of the other hand. Gradually raising the right hand, the beak slides along the floor of the nasal fossa, enters the post nasal

space, and finally strikes the posterior pharyngeal wall. The instrument now is horizontal, and but a small portion of it visible. Now elevate the right hand slightly, turn the instrument so that the ring points directly towards the desired side, and gently withdraw it a short distance. The beak then slips by the fossa of Rosenmuller, over the posterior lip of the tube (which projects slightly into the pharyngeal space), and enters the mouth of the tube. It then remains quietly in position without being held. It should be remembered that the ring is always the index of the beak, and whichever way the ring points the beak does the same. All manipulations should be made with the utmost gentleness, no force being used. When in position it should give neither pain nor discomfort. Its introduction is disagreeable to some, though it should never be painful. Sometimes it may be necessary to use the inflation bag through the catheter, as the lips of the tube may be so glued together that the air current through the nostril will not force it open. Its frequent use however, is to be deprecated, as I am positive it excites more or less irritability of the tissues, and in some cases has produced extensive laceration.

For various conditions, the following formulæ are given by Dr. Winslow in his book, and recommended by him.

For dislodging and clearing away inspissated mucus in and at the mouth of the tube,

℞
 Potassii hydras, - - - gr. j.
 Aqua dest., - - - f. ʒ j.
 or,

℞
 Sodii bicarb, - - - gr. v.
 Aqua dest., - - - f. ʒ j.

Warm a few drops of either in a dropping tube, empty it into the catheter when in place, and drive it through the catheter by the air bag.

For congestion and swelling of the mucous lining of the tube,

℞
 Sodii biboras, - - - gr. v.
 Aqua dest., - - - f. ʒ j.

Use in the same way.

For a stimulating injection after the last,

℞
 Tr. Picis liq., - - - M. xx.
 Aqua dest., - - - f. ʒ j.

For an astringent injection,

℞
 Zinci sulph., - - - gr. ij
 Aqua dest., - - - f. ʒ j.

He recommends the use of this in obstinate cases once every day.

The use of electricity in this disease has its advocates and opponents. Dr. Roosa doubts its utility. I make very little use of it. On the contrary some of my colleagues use it frequently and claim excellent results from it. I believe it to be of more value in some of the lesions of the internal ear, than those affecting the middle ear.

In those cases affected with naso-pharyngeal catarrh, this condition should receive attention. The use of the posterior nasal syringe is excellent for cleaning out this cavity. I frequently make use of the following: to about one-half pint of warm water, add two tablespoonfuls of a saturated solution of sea salt, and ten or twenty drops of the fluid extract of Hydrast. Can. This thoroughly cleans the space, the mouth of the eustachian tubes as well, and seems to exert a directly beneficial effect.

Sometimes it is desirable to apply astringent or stimulating lotions to the pharyngeal surfaces. The following preparations will be of service.

℞

Potassii iod.,	-	-	-	-	gr. x.
Iod.,	.	-	-	-	gr. v.
Glycerine,	-	-	-	-	℥ j.

Misce.

Use a very hot mortar, mixing first the iodine

with a little glycerine, then adding the iodide of potassium.

R̄

Tannic acid,	-	-	-	-	3 ss.
Glycerine,	-	-	.	-	ʒ j.

R̄

Alum pulv.,	-	-	-	-	3 ss.
Glycerine,	-	-	-	-	ʒ j.

R̄

Fl. Ext. Hydrast. Can.,	-	-	-	-	3 j.
Glycerine,	-	-	-	-	ʒ j.

R̄

Pinus Canad.,	-	-	-	-	3 j.
Glycerine,	-	-	-	-	ʒ j.

These are to be applied with a brush after a cleansing of the surfaces. The tannin and alum preparations will be found useful in acute aggravations of the throat with tendency to ulcerations. The iodide glycerate in old staggers, with glandular enlargements.

The use of dry powders to the throat is many times of great benefit. Dr. MacBride kindly informs me that he has had excellent results from the following. In subacute, or mild cases, verging toward a more deeply seated and chronic condition, the use of one part of iodoform in one-

hundred of sugar of milk. In real bad cases, exuding an offensive discharge,

℞

Iodoform, - - - - -	gr. x.
Tannic acid, - - - - -	gr. j.
Sach. lac. - - - - -	3 jss.

These can be applied by means of an atomizer, fitted with a rubber tip like a posterior nasal syringe. Those who can afford it will find the application of sprays and powders to the nasopharynx rendered very much easier and pleasant by the use of Dr. Sass' apparatus, which consists of a metal receiver, and air pump, by which air is forced into the receiver to any desired pressure. From the receiver issues a rubber tube fitted with stopcock, etc. To this is attached the vessel containing the preparation you desire to use. The confined air forces the preparation through the application tube, on the principle of the hand atomizer. With the apparatus come a number of vessels and tips arranged to throw any variety of spray in any direction.

Of course in these cases personal hygiene is to be attended to. The avoidance of undue exposures the wearing of flannels, etc., is to be advised. One very frequent cause of the continuance and persistency in these cases, especially among men and boys, is the habit of dampening the hair every

time it is brushed. This keeps the head continually moist, and materially aids the catarrhal process. Many have been very greatly benefited after stopping this habit, who had resisted treatment before. For this practical fact I am indebted to Dr. Houghton.

Another thing I learned from him which has been of great benefit in many cases, and that is the local application to the naso-pharynx of the same remedy in a lower trituration, that you may prescribe internally. For instance if you are using Kali mur. in the sixth or twelfth internally, liberally dust it on the naso-pharynx in the third.

In regard to the use of local applications to the membrane, there is not much to be said. In dry cases, fluid vaseline seems to lubricate and soften a little. A little plantago in some glycerine sometimes seems to stir up the tissues in some instances, and relieve both tinnitus and deafness. We have been using this in a good many cases recently at the New York Ophthalmic Hospital, but are not as yet positive as to its action. One thing I must speak of as a reprehensible habit in patients. No matter from what the ear may be suffering, they crowd the meatus full of cotton. Now in painful cases, or when there is a discharge, it is all very well to protect the sensitive portion from exposure, but in the old chronic dry

forms it is a positive injury to habitually wear cotton plugs in the ears, except when great sensitiveness to atmospheric influences is present.

The local treatment which I have been describing is all excellent as far as it goes, but he makes as great an error who thinks it all that is necessary, as he who thinks all suppurative cases can be cured by internal medication alone. Remedies are our main reliance in this disease, and the rest, though very important, must be looked upon merely as adjuvants. In none of these lists do I claim the indications to be complete, or the lists full, but they are a few of the more prominent, which clinical experience has served to verify.

Before dismissing this part of the subject, I must call attention to one thing of importance in these cases. Many of these conditions occur in persons who wear false teeth. It has been a favorite practice with dentists to make these false teeth on red gum plates, in which there is a large amount of mercury. In persons who are sensitive to the action of this drug, the parts of the mouth covered with the plate will frequently be found extensively ulcerated. When such a condition exists, it is absolutely imperative that these mercury plates be removed, and one substituted that does not possess such noxious properties. Treatment is useless until this is done. Case after case has been seen resisting all therapeutic measures,

the reason for which has then been found to be the wearing of these cheap false teeth, and upon their removal improvement was at once manifest.

A few words are proper to be added with reference to various operative procedures which have been practiced upon these catarrhal cases, to overcome the mechanical difficulties which interfere with conduction. These are not given as instructions, for such work strictly belongs to the specialist, but for information.

Paracentesis of the membrane has been often done, but it is almost impossible to make the opening permanent. The removal of a small portion is followed by the same result. Eyelets have been inserted in the opening made, with but temporary results. Excision of the malleus handle, and removal of the whole or various portions of the ossicles, have been resorted to without success. Tenotomy of the tensor tympani tendon when it has become contracted, has been performed many times with a partial diminution of the tinnitus. Division by a small, specially constructed knife, of the various adhesions in the tympanic cavity, has been resorted to, but unsuccessfully.

The object of most of these has been to relieve the pressure on the labyrinthine fluid exerted by the stapes, whether atmospheric or mechanical. When a device shall have been formed which will

serve to maintain a permanent opening in the membrane, then these various procedures will be of use. In these old thickened cases, there is less objections to the entrance of outside air through the meatus and membrane, as they resist much more energetically the atmospheric influences, which in a normal or suppurative ear would be followed by more or less inflammatory action. The difficulty in maintaining the permanent opening lies in the fact, that the thickened mucous lining has a much stronger tendency to the development of connective tissue or hyperplasia, for closing the orifice, than in any other condition.

HOMŒOPATHIC REMEDIES.

Arsenicum.—Dr. J. H. Buffum gives several cases in the N. Y. State Trans. for 1882, in which he has successfully used this remedy. The conditions seem to be those with much naso-pharyngeal catarrh. His most marked case has sensitiveness on right side of nose; tissues in nostrils much swollen, and dark red color; middle turbinated bone tumefied, to occlusion of the nostril; burning pain in nose. Discharge from nostrils, slight, watery and acrid; hypertrophy of tissues in pharyngeal vault, and at openings of eustachian tubes.

Argentum nitricum.—A distant ringing in the ears. The ears “open and shut;” whizzing sounds; feels as if a splinter in the throat; (Hepar). The fauces and uvula are dark red. Tenacious mucus in the throat and posterior nares. The distant ringing in the ears with the sticking as of a splinter, are the marked features in Arg. nit.

Aurum muriaticum.—The chronic cases of naso-pharyngeal catarrh; offensive odor from the mouth; ozæna. The nasal bones have become affected from the catarrhal process. Cases with specific history after much mercury. Depressed anxious, melancholy state of mind.

Baryta muriatica.—With severe buzzing; bubbling or cracking in one or both ears when swallowing, sneezing, etc.; reverberation in the ear on blowing the nose violently. In children with intermitting deafness, and in damp weather, with occasional earaches and deafness following. The characteristic features of Bar. mur. cases are the crackling and buzzing, and aggravation from damp weather. Its especial sphere of action is on the eustachian tubes. (Rounds).

Belladonna.—Useful in both acute and chronic cases. The tinnitus in chronic cases is of a ringing character. The throat has a dry glazed look, as if coated with varnish, and is of a brighter red than normal. In catarrhs and colds brought on

by wetting the hair or after cutting it. Its prolonged use is rarely called for.

Calcarea carbonica.—In the usual calcarea cases. Deafness following wetting the feet, exposure to slight drafts; pain in the ear on blowing the nose. Head is cold; perspiration on head evenings. The noise in the ears is of a knocking, roaring, buzzing character. If pains are present, they are of the pressing, pulsating type, often one-sided. A cracking in the ears on moving the jaws. Pains may extend from throat to ears.

Calcarea phosphorica.—In the chronic catarrhs of children.

Causticum.—Ears stuffed; whole side of head feels dull and numb; reverberations of voice to the patient; seems as if talking in a barrel, or out through the ears. Itching along tube to ears as if an insect were crawling.

China.—The tinnitus in the ears is pitched upon a high key. A “quinine buzzing.” After the use of quinine in quantities, china in high potencies has many times relieved the symptoms.

Ferrum phosphoricum.—In the acute earaches which sometimes occur in the chronic cases from unusual exposure, Ferr. phos. will nearly always give relief. Sometimes Merc. will relieve when this fails.

Ignatia.—Hering gives the symptom, “hard hearing for everything but speech.” It has also

been used where everything was heard well but speech. (Phos.) The contradictory character of Ignatia symptoms in general, would indicate either of these symptoms. Personally I have used it very little.

Graphites.—Dry cases ; hearing improved in a noise.

Hepar sulphuris.— This is a remedy which perhaps thoughtlessness prevents our using as frequently as it might be done with benefit, from the habit of associating it with pus formation. Dr. Park Lewis gave at the O. and O. meeting in Milwaukee, 1880, the following indications.

Especially children. Drumhead looks dull, like glass breathed upon ; cracking sounds on moving the jaw ; congestion in throat, but without granular pharyngitis ; nasal catarrh and secretions from posterior nares ; feels as if splinter in throat. When we consider the readiness with which we think of Hepar in catarrhal troubles outside of the ear, it is but consistent to expect its beneficial action on the mucous lining of the tubes and tympanic cavity.

Hydrastis Canadensis.—Thick tenacious mucus in the posterior nares ; ropy secretion ; with the dull, heavy frontal headache from the catarrhal process in the frontal sinuses. Excellent internally, when used locally on the throat.

Kali iodatum.—Used in old tough cases ; in

chronic proliferous forms; burning, scraping, roughness of the throat; expectoration is greenish, stringy, and salty. Also in specific cases with throat symptoms after mercury. A very important remedy in old intractable cases, and the main reliance of many colleagues in this class of cases.

Kali muriaticum.—No remedy in the materia medica meets so many cases as Kali mur. It is useful in recent cases and in old cases. Its especial sphere of action seems to be in the catarrhal cases without pain, in which there has been secretion, hypertrophy, and accumulations. In the true proliferous cases it is of less use. It seems to lessen the secretion, clear out the accumulated mucus, and reduce the chronic swelling of the mucous membrane in the throat, tubes and tympanum.

The particular indications for its use are a palish anemic throat, more or less thickened conditions of the mucous membranes, and membrana tympani. Closure and stoppage of the eustachian tubes, and adhesions of the drumhead. In many cases in which I could neither force air into the tympanum, nor find free movement under the Siegle speculum, after two or three weeks use of this remedy, the tubes became open, the drumhead became more mobile, the tinnitus lessened or ceased, and even the retraction of the membrane

was less pronounced. Following this has come a marked improvement in the hearing. Many times its use must be persisted in for weeks or months, but in hundreds of cases I can testify to its excellent effects. I prefer to use it in the 6^x, but many times it works better even lower.

Kali phosphoricum.—This remedy finds its special affinity in cases accompanied by many nervous symptoms, tendency to hypochondria, etc. Always a new story to tell, or a new symptom discovered. In elderly people. The noises are constantly changing their character; now a roaring, next a hissing, then a buzzing, etc.

Mercurius dulcis.—A remedy of almost equal value to Kali mur. The particular indication for its use is the character of the throat. Where this is red and congested, with swelling of the tubes, it will remove the hyperemia and its accompaniments. The deafness and noise in the ears increase at every cold. A sense of fulness. The tinnitus is often a pulsating roaring. There is a sore, raw feeling in throat, extending up the tube, and the patient feels as if he were about to have an earache. Useful in a moist throat more frequently than in a dry one, though often a sense of dryness. The pharynx and uvula look thick, flabby and infiltrated. Often this remedy used in similar cases to the above, and followed by Kali mur. when the redness disappears, works

wonders. A benumbed, dull feeling between the throat and ear ; a pressure in the ear from without. Also in cases when an acute condition with pain worse at night, is added to the chronic process.

Phosphorus.—In nervous women. Often after the use of Merc. dulc. in acute catarrhs. Voice sounds unnatural, as though a veil were before the ear. Tinnitus worse when lying down, as well as the deafness. The deafness is accompanied with a rush of blood to the head, and all sounds are heard better than the human voice. Sometimes when Phos. fails, Phos. acid will benefit with similar symptoms.

Muriatic acid.—Dryness of the mucous linings in the head, and *dryness of the ear*. Rawness, dryness, and emptiness in the throat.

Nitric acid.—Similar to muriatic acid. The differentiation between the two is in the general system ; muriatic acid having especial relations to the digestive tract, while “nitric acid deserves preference if there are also complaints in the respiratory tract.” The relations of muriatic and nitric acid to the chronic catarrhal process, and their indications, were given by Dr. Liebold, at the Am. Inst., 1882. These two remedies are of great value and importance in many cases.

Mercurius vivus.—This remedy, like Ferrum phos., is frequently valuable both in chronic

catarrhal and suppurative cases, when an acute exacerbation is present, with intense pain, worse at night. Sometimes as said before, the Merc. dulc. relieves this condition, but there are cases of considerable intensity which the dulcis fails to relieve, that the vivus meets the condition and gives the sought for relief.

CHAPTER X.

SUPPURATIVE INFLAMMATION OF THE MIDDLE EAR.

(*Otitis Media Suppurativa, Acuta et Chronica*).

Suppurations of the middle ear are among the most important lesions of this organ that you will meet. I consider them by far the most important, for the following reasons. They are among the most common. They are the most neglected. They are the most offensive. They impair the function of the ear equally with other forms, and even more. There are wide spread errors among profession and laity in regard to them, and they are a constant menace to life.

This latter assertion may seem a strong statement, but any aurist of experience can relate cases by the score almost, where a neglected suppuration, "something that would cure itself," has ended in death, or a very near approach to it.

Last year I had the honor to present to the N. Y. State Homœo. Soc., a paper* on the relation of certain diseases of the ear to the brain.

* Published in Hahnemannian Monthly, Oct., 1884.

Those who took the trouble to read it, will, I think, acknowledge that a suppurating ear is always a source of danger, even to the extent of the above remark. Those who have the patience to follow this, will, I am sure, admit that it is not a trifling thing.

Suppurative disease, like most others, has an acute and a chronic form, each with their characteristic features. Where the acute ends and the chronic begins, it is not always easy to decide, but for convenience sake, and in deference to the usual custom, they will be thus separately considered.

ACUTE SUPPURATION.

The earlier symptoms of an acute suppuration, are those of an acute catarrhal otitis media, but more intensified. There is the same fulness and itching in the throat and ears, the same hypersensitiveness to sound, deafness, tinnitus and pain. But these symptoms succeed each other much more rapidly, and appear with greater severity. The pain steadily increases from a slight twinge to unendurable agony. It remits neither night nor day. The countenance gives evidence of the excessive pain endured, looking haggard and worn. Fever is generally present, and the patient often seems in a condition of profound prostration. Severe as the pain is in the day

time, it is much worse at night. The sufferer is deprived of sleep, his appetite fails, his tongue is coated, and he bears every mark of a severe illness. This continues till the membrane becomes ruptured, and the evacuation of the pus gives ease and comfort. Undoubtedly many of these cases are of a purely catarrhal form at first, and proceed to the formation of pus, either through neglect or added exposure. Others without question, are of a suppurative type from the beginning. These latter are apt to experience the intense pain at an earlier period than the former. In children this may be a very serious disease. Burnett says, "upon its timely recognition may depend the life of the little patient. Certainly much suffering would be avoided, perhaps many lives saved, if the ear were even once thought of as the possible cause of an apparently obscure disease, in those too young to tell where the seat of their pain is. Not only in children, but in adults, this disease is one of the *most important* the physician meets. The importance of treating it properly in its acute stage cannot be too fully appreciated. *Yet, it is lamentable to state, that it is usually entirely disregarded.*" From every author of treatises on the ear, the same views could be quoted. General practitioners *do not realize* how much of the future happiness and prosperity of an individual may depend upon

the results of an acute suppuration of the ear. In no case of a child taken suddenly ill, with pains apparently in the head, should an examination of the ear be neglected.

The objective symptoms are also similar to those in a severe case of acute catarrh. The redness however, is of a duskier hue. The bulging of the membrane is more pronounced, and from the soaking in the pus behind it, often seems sodden and boggy. These attacks seem to occur more frequently in a healthy ear, than in one in which the chronic catarrhal process has been present, as the thickened and hypertrophied lining resists the tendency to purulent inflammation.

Its course and results are in one of three directions. After rupture of the drumhead, the inflammation may rapidly subside, the discharge cease, the membrane repair itself, and things seem as before, but in these cases as in the acute catarrhal cases, there are products and changes left in the tympanic cavity which need subsequent treatment, for if neglected, they lay the foundation for after troubles.

The second and most common course, is for the more acute symptoms to disappear, but the discharge continues, finally passing over into a chronic form, and becoming that most unpleasant object, a "running ear," with all its unfortunate consequences.

The third way in which this may end is in death. Fortunately this is not common. The wonder is that it is not more so, when we consider the anatomy of the part, and the near relations of vital organs. As the manner in which this can occur will be referred to when speaking of the dangers arising from chronic suppuration, it will not be dwelt upon here.

Like other forms of suppurative inflammation in different parts of the body, its tendency is to the destruction of tissue. This is first manifested in the breaking down of the *membrana tympani*. In the great majority of cases, this gives great relief to the patient, and the acute symptoms rapidly subsiding, the physician too commonly deems his duty ended. In a recent discussion on this subject, a gentleman of great experience in general practice, mentioned a case of intense ear-ache in a little patient of his, finally ending in suppuration, with the great relief following, and implying in his remarks that the serious part of the malady had been overcome by the remedies bringing about a discharge, and not much more attention was needed. I took emphatic issue with him, claiming that from my standpoint, that then was the most urgent time for treatment. As a rule, in cases of acute suppuration, the rupturing of the membrane is the end of the destructive process in the acute stage, but sometimes much

more damage is done. The destruction consequent upon the chronic form, I am not now referring to. This further involvement may be a carious and necrotic process of the bony walls of the cavity, passing directly to the brain, setting up a meningitis, and sometimes abscess of that organ. The mastoid may become involved and more or less destruction of that portion occur. Sometimes the inflammatory process passes to the sinuses in the immediate vicinity, and a fatal phlebitis follows. The possibility of such an unfortunate ending should always be borne in mind.

The causes which produce this disease are the same as those given for acute catarrh, but there is a difference in the frequency of the proportions. Cold and exposure as in the other, bring it about, but by far the most frequent source is scarlet fever. Following in its wake come diphtheria, measles, whooping cough, typhoid fever, and the various exanthemata. Cold sea bathing brings about the purulent as well as the catarrhal variety. Direct violence of course may produce it, if a sharp instrument, like a tooth-pick, for instance, be accidentally driven through the membrane, while scratching the meatus, but blows upon the ear, and loud explosions near it may also induce it. The manner of their action is two-fold. By the sudden impact the column

of air in the canal may be driven against the drumhead with such force that it bursts, or if it does not break, the shock of the concussion may be so great upon the delicate tissues within the drum, that the reaction may bring about an inflammatory condition with the formation of pus. The introduction of fluids through the eustachian tube may also induce a suppuration. This may occur either accidentally, as in an irresistible desire to cough at the moment of swallowing, thus forcing the fluid from the mouth and nostrils, and at the same time into the tube, or deliberately at the hands of the surgeon when using the eustachian catheter. This is another reason why I object to its habitual use as a method of treatment.

Now how are we to differentiate an acute suppuration from an acute catarrh, before the rupture of the membrane and discharge makes the diagnosis for us? Frequently this is impossible, but there are some characteristic differences which will usually aid us. In the suppurative form as said before, the symptoms succeed each other much more rapidly, and with greater intensity. The pain, which many times is severe enough in the catarrhal variety, becomes unendurable in the purulent. In the latter it continues through the day as well. The cause also is to be considered. A history of a blow, the presence of a severe con-

stitutional disorder (scarlet fever, etc.), is to be taken into account. The apparent effect on the patient's general system, the fever, prostration, haggard look, etc., all aid in the differentiation. The membrane seems more generally involved. Its congestion is more intense, and in my experience seems of a dusker red. The bulging is more pronounced. With an equal amount of pus or mucus behind the membrane, the bulging will be greater in the former case. This bulging also is most always in the posterior half of the membrane.

Bearing in mind what has been said about the possibility of farther complications, the prognosis should be more guarded than in the catarrhal form. An indication of deeper lesions is to be found in the fact, that after rupture of the membrane and evacuation of pus, the pain still continues. These should be carefully sought for, as materially modifying the result.

There are certain local measures which it is important to adopt in the care of this affection. The old school unhesitatingly recommend the withdrawal of blood in the earlier stages, preferably by leeches. These, if used, are to be applied either at the tragus, or if the mastoid region is painful and tender, directly over it, or in the hollow behind the ear. There are few cases however, in which our remedies will not avail to do away

with blood letting, if judiciously selected. The membrane should be carefully watched, and if any bulging appears in spite of treatment, it should be punctured at once. This often arrests the disease at this stage. This incision is to be made in the posterior inferior quadrant, for the reasons given when speaking of paracentesis in the acute catarrhal form. The cotton night cap as also there recommended is to be used. The patient should be confined to the house, and in a warm room, care been taken to prevent drafts or changes of temperature. The solution of Acon. Bell. Plantago and Magendie's solution, the formula for which was given on page 71, is an excellent local application for relieving pain. The use of hot water irrigation is also of great comfort in many cases. One thing must be borne in mind, viz., that the use of poultices will tend very strongly to bring about the exact condition we are striving to avoid, viz., the breaking down of the membrane, and suppuration. To prevent this, is the aim of all our treatment in the earlier stages. Moreover, the continued heat and moisture produced by a poultice, macerates the tissues, and favors the springing up of granulations, which become a complication of great annoyance. If in spite of all your endeavors, the inflammatory action continues, and the membrane breaks, you have then the first stage of the chronic suppurative

tion, which will now be considered as next in order. The remedies for the acute form and their indications, will be given with those applicable to the chronic condition.

CHRONIC SUPPURATION.

With chronic suppuration of the middle ear, we enter upon a phase of aural troubles, that is at one and the same time the *bete noir* of the physician, and one of the most important, while one of the most common and neglected diseases that come under his professional observation. I make no apology for the frequent references to its gravity. The error is so widely spread among both physicians and laymen, that too much stress cannot be laid upon it, and if in the smallest degree, the perusal of these pages will lead to the recognition of the place it should occupy in the minds of the profession, they will not have been written uselessly. If anyone who doubts this fact, will take the time to visit the aural clinics of the New York Ophthalmic Hospital, or any of the larger special hospitals in this city, for a few days or weeks, I think he will be convinced of his error.

Otitis media suppurativa chronica is usually the sequel of the acute condition we have just been studying. Its causes are the same, requiring no recapitulation. But there are some cases

in which the tendency to assume a chronic type seems present from the beginning. Noticeable among these, are those originating from scarlet fever and diphtheria. In the latter disease, the pus forms and the membrane breaks down frequently, with very few of the acute symptoms as recently detailed. The ear seems to simply commence discharging, and continue discharging. I have very little question that the impaired nutrition of the tissues, from the low quality of the blood in this affection, is one prime reason. In both scarlet fever and diphtheria, the constitutional symptoms are so severe, that the ear trouble may be entirely overlooked, until it is brought to notice by the presence of the discharge. How these affections induce ear disease, a moment's reflection will show. They both, by preference, produce severe manifestations in the throat, and the relation of the throat to the ear, we have already dwelt upon at length.

The symptoms of this disease are as in other aural troubles, deafness, tinnitus, more or less pain in different instances, with the added one of a discharge from the ear. The appearances are various, but there are two which are very uniformly present, the pus, and upon cleansing the canal, a perforation of the membrana tympani. The character of the discharge assumes all the forms of which pus is capable. Frequently it is

of a creamy yellow, bland, and of the consistence of laudable pus. In fact it is laudable pus in every respect. From this it varies to a white, watery fluid, or a thick, yellowish granular mass, like soft cheese. It may be, and often is in old cases, of a dark brown color. Sometimes it is mixed with blood, sometimes of a decided greenish hue. Occasionally it may be so bland that no irritation of the adjacent tissues is produced, and again it may be so acrid and excoriating, that every spot touched by it becomes red, raw and sore. Cases are frequent in which this condition is present, not only in the meatus, but way down on the auricle. Sometimes it is of a very copious character, pouring out in profuse quantities, and dropping from the ear ; in other instances it is so scanty, that there may be but a drop in the meatus. Most frequently, inspection shows the canal more or less full. Its odors are various and indescribable. Of course there are cases where the odor is not perceptible, and in the earlier stages there is apt to be little or none, but in the older and neglected cases it "smells to Heaven." Decaying fish, aged eggs, sulphuretted hydrogen are perfumes, to some of the cases met. Will a physician's common intelligence and sense, permit him for a moment to admit that such a "condition is trifling," "that the patient will outgrow it," "that it will cure itself?" Certainly in no

other portion of the human system, could such a state of affairs be present, without receiving the closest attention.

Upon cleansing the meatus, our attention is directed to the membrana tympani, to see how that has fared in consequence of this process. Unless we have been able to diagnose a diffuse external otitis, we shall expect to find this perforated, but how much of it has been destroyed? Sometimes but one perforation is present, sometimes two, and rarely, multiple perforations are seen. The perforation may be small, or it may involve nearly the whole of the membrane, leaving but a small falciform border. The shape usually is round or oval, though it may assume different ones. Any part of the membrane may be the site of a perforation, but according to Schwartze, they are most common in the lower anterior quadrant. The central portion involving the manubrium, is usually the last to go. Accompanying this destruction of the drumhead, is not infrequently a loosening and detachment of some of the ossicles. The malleus I have seen discharged through the meatus in the process of cleaning, though one is rarely fortunate enough to see it in the act. Still, cases where it is absent are quite commonly met with. Sometimes the handle alone, of the malleus, is either absorbed or necrosed. Not infrequently it is twisted out of

sight from the distortion of the parts. The incus also may suffer a like fate with the malleus, any portion of it, from a process to the whole bone, being destroyed. One portion of the stapes usually resists the destructive action, viz., the footplate closing the oval window. Both of its arms may be lost, but this usually remains firm.

The condition in the external canal varies from a mere redness or hyperemia induced by the moisture, to an extensive ulcerative process. When this occurs, it is in the state known as consecutive diffuse external otitis, and was described before. There are some constitutions with a "psoric" taint, or diathesis, that seem peculiarly prone to an involvement of the meatus.

If the external canal be free, and the perforation large enough, we can see within the cavity of the tympanum. There are certain specially contrived little mirrors for examining the roof and walls, which are introduced through the perforation, but with these we have nothing to do. They belong to the specialists outfit. What we can see without such aids, is what concerns us. Of course the only portion visible, is the inner wall directly opposite the drumhead, and from the condition in which we find this, we infer as to more or less of the condition beyond the range of vision. This is generally quite red and hyperemic, as is to be

expected. Sometimes it seems studded with minute glistening points. These are either at the normal distance from the membrane, or appear near to, and even projecting through it. They are granulations, which occasionally become so exuberant, that they project way into the meatus, and occasionally fill it. These not infrequently organize into polypoid structures, even projecting beyond the orifice of the meatus. The portion seen varies in shape and appearance. Some are smooth and club-shaped at the end, others have branching papillae, looking like condylomata. These polypi are not uncommon. They are mostly of the class known as mucoid, being developed from the mucous lining. Fibrous polyps are comparatively rare.

Of course the instances are many, where the perforation is so small that no portion of the tympanic cavity can be seen through it. There are numerous instances where it is so minute that cannot it itself be seen, and yet there is pus in the canal. To decide this point, we use either the pneumatic speculum, or request the patient to "perform Valsalva." In the latter case if the eustachian tube be open, the air is forced through the aperture with a combined whistling and sputtering sound. If the Siegle speculum is used, we can see the pus oozing from one point in the membrane, which solves our diagnosis. In

rare instances the pus may burrow beneath, and forming a channel for itself, makes its appearance at some point in the meatus wall, usually through one of the Santorinian fissures. I have such a case now under observation. It is not a rare thing to meet cases, in which upon inspection of the membrane, a drop or two of pus being upon it, a regular pulsation is observed, synchronous with the radial pulse. Such a case was shown the class to-day. There are many other features which can be seen in suppurating ears, but enough has been said to indicate the general appearances they present. We now proceed to describe the course and possible consequences they may lead to.

CHAPTER XI.

COURSE AND CONSEQUENCES OF SUPPURATIVE INFLAMMATION OF THE MIDDLE EAR.

In speaking of the course and consequences of chronic suppuration, I shall dwell more particularly on the issues which may be fatal, for one of the prime objects in these pages is to enforce upon the attention, even at the risk of iteration, the danger of their neglect, and it is eminently proper that in any disease which rises to the gravity of frequently endangering life, the way and manner of its occurrence should be made plain.

The duration of this affection is of indefinite length. I do not know that any statistics are available which would throw light upon it. I see cases nearly every day of adults, who say they have suffered from it since infancy or childhood, and cases are by no means infrequent, in which after a discharge of a few weeks, it seems to disappear with no particular treatment. This last class though not rare, is by no means the common course. Suppuration running from weeks

into months, and months into years, is by far the most frequent history. In those cases in which the disease has not been more than a few weeks or months duration, and then ceasing, the membrane often repairs itself, and though some impairment of hearing may be the result, the case may be considered to have a satisfactory termination. In the shorter cases, viz., a few weeks, repair is often followed by fairly good hearing.

The capacity of the membrane to renew itself, or make good, inroads in its structure, is a very remarkable feature. After incision it frequently heals in a few hours, and even when there has been extensive destruction, it is astonishing how large a proportion may be renewed, even upwards of two-thirds, having been replaced by new tissue in well authenticated cases. The rapidity with which this is accomplished sometimes is very interesting. In a case sent me by my friend, Dr. Cheney of New Haven, Ct., in Oct., 1883, I found a chronic suppuration of some eight months duration. There was a large mucoid polyp projecting from a perforation, and occluding the canal for one-third from the membrane. In the outer third was a fibrous polyp hanging from the superior wall of the meatus. It was the second of November before I could be sure that the ear was free from discharge, and no traces of the polypoid growths, or granulations left. The perforation at

that time involved from one-quarter to one-third of the membrane, in its posterior half. On the nineteenth of that same month, the membrane had entirely healed. This patient visited my office twice a week, and it was possible to watch the progress of this repair from visit to visit.

This reparative material is connective tissue, growing from the edges, and finally meeting, leaving a well marked cicatrix on the site of the former perforation. The middle fibrous layer of the membrane is never renewed. In various portions of the membrane, calcareous deposits are frequently seen appearing as white spots. Many of these cases possess remarkably good hearing during the suppuration, even when a large portion of the drumhead is gone, and no trace of the ossicles visible. It is a very common error to suppose the membrane essential to hearing. This is not strictly the case. As said before, the middle ear is primarily a safeguard to protect the internal ear, and the membrane but a factor in the mechanical arrangements for carrying sound vibrations to the labyrinth. When this is ruptured or destroyed, the sound waves are still received by the footplate of the stapes, or by means of the round window (another foramen with membranous closure, on the inner wall, connecting the middle ear with the cochlea). The theories as to how this is accomplished are in-

teresting, but too lengthy for discussion here.

After suppuration has ceased, and the membrane repaired, hearing is often much worse than during the discharge. This is due to two or three reasons. In the retrograde process, there is usually more or less cicatricial contraction, affecting the mobility of the conducting apparatus similarly to that in chronic catarrh. This may affect the union of the stapes with the labyrinth, where a very slight ankylosis suffices. How slight may be necessary is seen, when it is remembered that the normal excursions of the stapes are only from the eighteenth to the fourteenth part of a millimetre. Again, the moisture present in a suppuration is succeeded by a certain dryness after its cessation, thus losing a possible lubricating element. It is a common thing for patients to say, "Yes, doctor, the child's ears have stopped running, but he does not hear nearly so well." This however, is the lesser of two evils. It is infinitely better to have an impaired hearing, than to allow a condition to remain, which at any time may endanger life, and is quite certain to impair hearing as well at a later stage.

There are a number of nervous phenomena, which may accompany or follow middle ear suppurations, but they will be merely referred to, as epileptic seizures, paralysis of the facial nerve, alterations in the sense of taste, and other pecu-

liar sensations in the tongue, an altered gait, vertigo, etc. In general terms, these are all due to nerve irritation in different localities, depending upon the purulent process going on in the ear. In the larger works they are dwelt upon quite at length, to which the reader is referred if he desires to study them.

One very common accompaniment of this disease has already been spoken of, the development of granulations, and subsequent modification into polypoid structures. These must be removed as one of the first steps in treatment. They have a very strong tendency to return, and treatment must continually be directed toward their suppression. The methods in vogue will be spoken of later.

The consequences of chronic purulent otitis media have been concisely formulated by Roosa, as follows :

1. Polypi.
2. Exostoses.
3. Mastoid disease.
4. Caries and necrosis.
5. Cerebral abscess.
6. Pyaemia.
7. Paralysis.

POLYPI we have briefly spoken of. Their etiology and histological structure belong to more elaborate treatises.

EXOSTOSES are not common. When met with they are a serious complication, and demand treatment at the hands of a competent specialist. Congenital ones do not concern us. These acquired exostoses may appear either in the tympanic cavity or external meatus, reducing the capacity of both. They are removed when accessible by filing and drilling.

MASTOID DISEASE is a condition giving rise to serious anxiety, as it is usually the beginning of those deeper lesions which unless promptly arrested, frequently end in death. I have been at some little pains to ascertain the relative frequency of this complication. Out of 44147 cases of ear diseases of all kinds which have occurred in this city, mostly within the last ten years, there have been 14091 cases of suppuration of the middle ear, or about 30 per cent. Of these, 2647 cases are recorded as acute suppurative, and 11444 as chronic. In this 44147 cases there have been 247 recorded as mastoid disease, or about one-half of one per cent of the whole number of ear diseases, which include every form, from a pimple on the auricle to the gravest lesions of the nerve. This is a percentage of about 2 1-5 per cent to the chronic purulent cases, which is certainly a sufficiently frequent complication to have its possibility borne in mind.

I am satisfied this does not represent the true

proportion, but that it is somewhat greater, for this reason; it is the habit of many hospitals to record the diagnosis of the disease from which a patient may be suffering upon his entrance. After complications are noted in the history of the case, but do not appear as a separate diagnosis. For instance, a patient applies at the N. Y. Ophthalmic Hospital suffering from a chronic suppuration of the middle ear, and no complications; his diagnosis is entered as Otitis Media Suppurativa Chronica. After a few days treatment he disappears for a short time, undergoes some exposure, and returns with a mastoid inflammation. While a note is made of the additional trouble in his clinical history, the former diagnosis is not changed. If however, he is suffering from a mastoid trouble at his first appearance, then the diagnosis appears as such. So I am convinced that the proportion of mastoid complications is actually much greater than the above figures would indicate.*

When this portion becomes involved it is usually in one of three ways. Either the lining membrane of the mastoid cells takes part

* The above figures have been compiled by myself from the reports of the four largest special hospitals in this city—the New York Ophthalmic, the New York Eye and Ear Infirmary, the New York Ophthalmic and Aural Institute, and the Manhattan Eye and Ear Hospital.

in the general inflammatory process in the middle ear, or its outer covering, the periosteum, becomes involved, or the bone itself takes on a carious or necrotic process. Primary inflammations are exceedingly rare. It is the consecutive forms we wish to study.

When this complication is about to occur, the patient complains of an unusual amount of pain. This he may locate in the ear or behind it. Frequently he will say it is sore behind the ear. Inspection at this time may show a slight redness over the mastoid, and sometimes a little swelling. This swelling increases, the pain grows more intense, the tenderness so great, that the patient cannot bear to have it touched. The swelling may become very great indeed, extending down the neck, even to the clavicle, and to the median line behind. Sometimes the parotid becomes involved. Occasionally this swelling is very hard. In one case to which I shall refer later, upon cutting through the tissues it was like cutting cartilage. This swelling is by no means proportionate to the amount of pus that may be found, which not infrequently is none. In some instances a localized abscess makes its appearance directly over the mastoid, comes to the surface, points and breaks, accompanied by but little surrounding swelling. These are the easy cases. In certain cases in which the bone itself becomes

involved, it softens down and offers no more resistance to the knife than wet leather.

One of the marked features of the disease is a displacement of the auricle. This stands out further than the other, in some instances almost at right angles. This may be more or less at short intervals, being the most noticeable during paroxysms of pain. It is looked upon as a marked diagnostic feature. For a picture of the disease I cannot do better than quote the graphic description of Burnett. "The tendency of mastoid pain to exacerbations, chiefly at night, is worthy of note. As the mastoid symptoms increase in severity, the general appearance and condition of the patient are most striking and pitiable. The pain deep in the ear and head is most intense; the pulse often weak and slow at first, becomes very rapid; sleep is out of the question; the appetite fails, nausea and vomiting ensue, the tongue becomes dry and rough, and the face becomes peculiarly haggard and bathed in cold sweat. Though very weak, the patient may still continue to walk about, not infrequently coming regularly to his physician. But gradually, unless relief is obtained by evacuation of the products of inflammation which have accumulated in the mastoid, it is observed that the answers of the patient are becoming incorrect respecting his name and place of residence, that his intellect is

confused, and his strength is failing. Rigors and irregular fevers set in ; every movement of the body now causes almost indescribable agony in the head ; stupor and coma with alteration in the size of the pupil on the affected side of the head, are noted in rapid succession, and unless speedy relief comes, death supervenes."

Such is the condition to which a neglected suppuration, "one that the patient will outgrow," (!) but too often leads. This may occur at any time in the course of the purulent affection, but is more common after it has existed for some time. The mastoid then seems more prone to take on inflammatory action than at an earlier stage.

The exciting causes which start up the mastoiditis, may be exposures producing a sudden checking of the secretion, or accumulations within the ear preventing a free discharge of pus. Polypoid growths occluding the meatus are instances of this.

The manner in which death occurs is as follows. The inflammatory process may spread inwards to the dura mater and other coverings of the brain, producing a meningitis, or breaking through the thin inner wall next the transverse sinus, set up a fatal phlebitis, or carious destruction of the bone may occur, and permitting the escape of pus into the cranial cavity, there induce cerebral abscess. A

recent case illustrates this. Wm. B., aged 64, was admitted to the New York Ophthalmic Hospital, suffering from chronic suppuration and mastoid abscess, involving the parotid on the left side. Incision gave vent to large quantities of pus, which continued to flow freely. One afternoon he suddenly died, giving no evidence of cerebral complication till about an hour before death. The autopsy revealed a tortuous sinus exuding pus between the two tables of the skull. A carious condition on the anterior surface of the petrous pyramid was quite extensive, and at one point was an opening from which the pus had poured into the brain, softening and breaking down a large portion in the middle lobe, and extending beyond the median line.

The facility with which the purulent process may extend to the brain, without mastoid involvement, is readily seen if we recall the anatomical bearings. Reference to the earlier portion of these pages will show the relations existing, which should be borne in mind when dealing with a suppuration, for you know neither the day nor the hour when you may be confronted with something more serious than perhaps you have been accustomed to consider a running ear.

The methods of extension to the brain are formulated by Politzer as follows. He says, a fatal issue occurs in suppuration of the middle ear :

A. When caries of the temporal bone extends to adjacent vital organs, thus :

(1). By purulent meningitis, or by the formation of cerebral abscesses, the surface of the petrous bone which is directed toward the cranial cavity, being fenestrated in one or more places, and the suppuration spreading to the meninges and the brain.

(2). By septic phlebitis, thrombosis, embolism, and septicaemia, consequent upon the extension of the purulent process to the venous sinuses on the petrous bone, or the sinus of the jugular vein.

(3). By bleeding from the ear; the internal carotid artery on the anterior section of the temporal bone, or the lateral sinus on the inner side of the mastoid process being eroded.

B. Without bursting of the suppuration into the cranial cavity :

(1). By phlebitis of the cerebral sinuses; more rarely by meningitis and cerebral abscess.

(2). By the reception of septic matter into the blood, from cavities in the temporal bone (pyæmia), or by a general cachexia proceeding from the local disease, especially tuberculosis.

A case reported by J. Orne Green* illustrates very clearly the first subdivision of the first general class, as well as the case just cited. In this instance there was large loss of bone from

* Transactions of American Otological Society, 1871.

caries, and a general meningeal inflammation supervened, with the deposition of various morbid products in the cranial cavity.

In the second class, Dr. Houghton's report of a case* is typical. From carious loss, the suppurative inflammation had involved the internal jugular vein by direct continuity, and the resulting phlebitis ended in death.

The third class of fatal cases, viz., by erosion of a vessel wall is much rarer, but thirteen cases having been described. Politzer says, the portion of the anterior wall adjoining the carotid artery, in every case has been defective or carious to a certain extent. The carotid arterial wall being bathed in pus, inflammatory softening occurs, and in time the impact of the blood wave against it, causes it to give way. The duration of the purulent disease lasted from seven to eleven years. The diagnosis of this disaster is of course by the hemorrhage which is profuse, of a bright red color, and cessation on the compression of the carotid. Death occurred in every case.

In the second general division, a case of wonderful interest occurred in the practice of Dr. Wreden of St. Petersburg. This was followed by recovery, but it illustrates the course a fatal inflammation can take, as perfectly as if death had been the result. In this case a general inflamma-

* New York Journal of Homœopathy, March, 1873.

tion of the cerebral sinuses ensued from exposure during intoxication, while suffering from an acute attack of otitis media. This can be found at length in Knapp's Arch. O. and O., vol. iv., p. 52.

Enough perhaps, has now been said to show the importance of attending to these suppurative cases, so we will now proceed to discuss the treatment.

CHAPTER XII.

TREATMENT OF SUPPURATION OF THE MIDDLE EAR.

Local measures are indispensable. One might as soon attempt to treat a sloughing ulcer by medicine alone, as to think most of these cases can be cured by a few powders or pellets.

Cleanliness is the first requisite. In the majority of cases this is best accomplished by means of the cotton holder. It is astonishing how much pus will sometimes be found in the ear, and the number of cotton tufts required to remove it. The cotton used is preferably the absorbent cotton, on account of its great capacity for taking up liquids. Now and then a case is found in which the pus has become so inspissated, that it is like a soft paste, and resists the cotton, which in fact only serves to pack it more tightly. In such an instance it will be necessary to resort to the syringe. The method of its use has been previously described.

Some aurists recommend the use of the syringe altogether as a means of cleansing. Sometimes,

as just remarked, it is indispensable, but since the so-called "dry treatment" has been in vogue I use it as little as possible. Patients frequently say, "I keep the ear as clean as I can, doctor, syringing it every day." Such practice I consider radically wrong, for in many instances I am convinced it serves to aid in keeping up the discharge. As a method of treatment, though formerly very generally used by aurists, it is now almost universally discarded.

As an agent in removing these masses of inspissated pus, I have used for some time a 12 per cent solution of peroxide of hydrogen. This agent was first recommended by Landolt of Paris, in purulent and croupous conjunctivitis. To Dr. Liebold belongs the credit of first applying it to the cleansing of purulent secretions in the ear. It cuts and dissolves the pus wherever it may exist in the middle ear. I apply a few drops by a dropping tube. Soon it commences to effervesce and run out of the meatus, subsiding in a few minutes. I apply it several times until little or no effervescence follows, then thoroughly dry the ear with cotton. Two other excellent applications for cleansing the ear, and also possessing decided healing properties, are solutions of silicate of potash, and silicate of soda, prepared by Merck of Darmstadt. These, diluted, one part to twenty-five of water, may be used in the same

way. As the patient becomes accustomed to their slightly stimulating effect, they may be used stronger, one to ten. Dr. Liebold, to whom I am indebted for a knowledge of these preparations, speaks of them very highly. He also uses them in a dilution (3rd or 4th) internally in those cases in which potash, silicea, etc., would be indicated. Many times I use the Siegle speculum. This draws the pus from the remote parts of the middle ear, so that the cotton holder can remove it. This method of using the pneumatic speculum is of excellent service in drawing out pus, and establishing a free flow in threatened mastoid complication.

Patients should be instructed to clean their own ears every day with a bit of cotton twisted on a match, wooden toothpick or similar article. I usually give them a two drachm vial of this peroxide of hydrogen, telling them to use it twice a day. It is perfectly limpid, and transparent as water, and produces no pain or irritation. It also seems to possess antiseptic properties, frequently removing the disagreeable odor in a short time. After thoroughly cleansing the ear and being assured that it is perfectly dry, I proceed to the next step, which is the application of various agents.

The articles which are next applied to the cleansed and dried surface are various. The

most universally used article at the present time is powdered boracic acid. There are several ways in which this is used, both in the matter of proportion, and in combination with other things. The pure, 90 per cent, 75 per cent, and 50 per cent, are employed by different physicians. In my private practice I use the pure. At the hospital we are using the 90 per cent. This is blown into the meatus through a powder blower, covering all the secreting surfaces.

Dr. Houghton has called my attention to the superior efficacy in some instances of boracic acid when mixed with the tincture or fluid extract of Plantago. It is prepared in this way. Take of sugar of milk half the quantity you wish to prepare. Moisten it quite thoroughly with the Plantago. Triturate this in a mortar, adding gradually as much boracic acid as you have milk sugar. Triturate until dry. The result is a brownish powder. With this he claims to have had better results in some cases than with the acid alone. I have tried it to some extent and it certainly did nicely. Another excellent preparation is the following, in this proportion.

R

Iodoform, - - - - -	gr. ix.
Tannic acid, - - - - -	gr. j.
Sach. lac., - - - - -	gr. xc.

Thoroughly triturate.

This, in certain profusely discharging, obstinate cases, has worked like a charm, but in the vast majority the boracic acid alone will accomplish all that the various mixtures will.

It is a very desirable thing to have your patients come every day at first, until the disease is to a certain extent arrested. Then the intervals may be longer. Treatment given at long intervals is unsatisfactory, because between the visits the effect of the local measures has passed off, and you have to commence where you were at the previous time. When patients will come every day, an excellent plan of applying the boracic acid is as follows, for which I am indebted to Dr. G. S. Norton. After cleaning and drying the ear, make a small pellet of cotton that can easily pass into the meatus. Smear this with vaseline, then cover it with the acid. Taking it in the forceps, carry it carefully to the drumhead and leave it there. The next day remove it, and apply another in the same way. The advantage of this method is that the secretions do not wash the pellet out of the ear, as they are very apt to do with the loose powder. If your patients will come every day, this is an excellent method, but if they remain away a week at a time it is not wise to leave the cotton in, as it becomes very offensive.

I have been using for a little time past among other things, a preparation of eucalyptol, the es-

sential oil of the *Eucalyptus Globulus*. This reduced with fluid vaseline, in the proportion of one part of eucalyptol to eight parts of the vaseline ($3 \text{ j. ad } \bar{3}$), I either apply on a twisted bit of cotton, or direct patients to use three or four drops in the ear at night. It possesses antiseptic and stimulating properties, and I have been very well satisfied with its use, especially in the offensive cases. Dr. Warner first introduced this to my notice.

Various astringent preparations are in use by aurists, chief among which are alum powder, and solutions of the acetate or sulphate of zinc, and nitrate of silver. The zinc is used in strengths varying from one to five grains to the ounce; the nitrate of silver from twenty or thirty grains to the ounce, to saturated solutions ($480 \text{ gr. ad } \bar{3}$). I have little to say about them. I rarely use them and I know their use is very limited among my colleagues. The preparations I have previously named are efficacious in the great majority of cases.

As said before, one of the annoying complications that is frequently met with, is the presence of granulations in the suppurating ear. If they are small and within the tympanic cavity, do not attempt instrumental interference with them, until you have had some experience, and more familiarity with the treatment of diseased ears

than this little book is designed to give. In many cases they will disappear under the measures given above. If however, they are larger, projecting into the meatus, you will have to take cognizance of them. There are various devices for their extraction, special forceps, hooks, scissors, snares, etc., but a better way is to kill them. Removing them, they will grow again, but persistently attacking them with suitable agents will finally tire them out, so to speak, and they succumb. I have found no preparation so useful as a saturated solution of the bichromate of potash. Dipping a cotton tuft on the end of the holder in this, I carry it through the meatus, and touch the end of the granular mass, being careful not to bring the solution in contact with the walls of the canal, the next visit I do this again, and keep repeating, and after a few applications, if not too long between, the discouraged polyp gives up the struggle. Care must be used, as some ears are very sensitive to this agent, and if an excess is used, and it comes in contact with the skin of the meatus, it may set up quite a violent irritation. Chromic acid is another powerful agent, and may be used in the same way but with even greater care. Crush a few crystals and moisten with water, with which moisten the cotton tuft. I have also found great benefit in some instances from the use of a saturated solution of boracic acid in equal parts

of alcohol and water. Some granulations yield very readily, while in other cases stronger agents must be used.

TREATMENT OF MASTOID DISEASE.

The local treatment of mastoid disease is essentially surgical. It varies in degree from the mere lancing of a superficial abscess beneath the skin, to extensive incisions deep into swollen tissue, and perforation of the bone with special instruments. When you are confronted with this complication, and your remedies do not allay the trouble, as many times from mechanical causes (obstructions, etc.) they cannot, you have only one resource, the knife. This, used boldly and wisely, will carry you safely through many a tight spot, where otherwise failure and criticism would be your portion. The incision should be made vertically, directly over the mastoid process, and carried down to the bone, unless in the case of an abscess which is merely subcutaneous. From the enormous swelling which sometimes is present in these cases, it is often impossible to tell where the mastoid is by the touch, but it always bears a definite relation to the external meatus. Commencing your incision at a point on a line with the superior wall of the meatus, and about one-quarter of an inch from the attach-

ment of the auricle, carry it downwards for about three-quarters of an inch, parallel with the auricle, going through the tissues until you strike the bone. The posterior auricular artery and one of its branches are near here, and one or the other may be severed, but it is of no consequence. The bleeding can usually be arrested by pressure, or if not, by torsion, and the loss of a little blood will be of benefit rather than harm. The depth to which the knife may go before reaching the bone is variable. In two cases under my observation and care during this past year, the knife was buried upwards of an inch before the bone was touched. Frequently you will get no pus, but the benefit may be just as marked, from the relief given to the infiltrated and tense tissues. The wound should be kept open, and it is an excellent plan to syringe it every day with a solution of corrosive sublimate, one part to two thousand of water, especially if there is communication through the wall of the mastoid by carious destruction. If after a day or two no relief is obtained from this incision, it will be necessary to perforate the bone. For a description of, and instructions for this operation, you must consult the larger treatises and works on surgery.

The other consequences of chronic suppuration, caries, necrosis, cerebral abscess, pyæmia and paralysis, do not come within our scope to dis-

cuss. They are to be treated on general principles, as they represent a condition beyond a lesion of the ear.

HOMŒOPATHIC REMEDIES.

Aurum.—When after suppuration has been present some time, the bone or periosteum becomes affected. Pain like a bruise, worse at night by uncovering, and at rest; better by motion, by washing, and though sensitive to cold, yet relieved by going into the open air, even in bad weather. Pus of a fetid odor, as of necrosed bone. Denudation of the osseous meatus. Sinuses in the bone. More useful for the consequences of a prolonged suppuration than in the active stage of the suppuration. The mental despondency which is characteristic of this drug, will, if present, make its selection the more clearly indicated.

Arsenicum.—The indications given under this remedy in diffuse external otitis are of equal value in the suppurative otitis media. When to these are added the constitutional symptoms of *Ars.*, thirst frequent, aggravation after midnight, and the weakness, no other remedy will be of the same efficiency.

Bryonia.—Swelling, redness, painful sensitiveness and heat of the external right ear; membrana tympani soaked and sodden. Discharge profuse of a whitish, watery character, serous in

its nature. "In acute otitis media with mastoid periostitis, but not after pus has formed in the cellular tissue"—(Lewis). In a recent case with the profuse watery serum like discharge, one prescription of Bryonia stopped the whole trouble.

Capsicum.—With strong tendency in chronic suppuration to mastoid complications. The tissues about and below the mastoid process are swollen, infiltrated, and tender way down the neck. A reddish hue is observed over the mastoid, fading away as the distance from the mastoid increases. Itching deep in the ear, and a pain just under the ear, opposite the angle of the inferior maxillary. The discharge from the ear is thick, yellow pus. Its especial value is in the first stages of mastoid complication, in *chronic* suppurations, with swelling and tenderness, before pus has formed. Thus used it will frequently abort the threatened abscess. In acute cases, i. e., very recent, it is of less use, and of scarcely any, after pus has formed *outside* of the bone. Dr. Allen first drew attention to Caps. in this connection in 1872, by pointing out to Dr. Houghton, the similarity of its pathogenesis to certain stages in mastoid disease.

China.—Meatus full of sanguineous, sanious discharge; tissues infiltrated; indolent ulceration with passive hemorrhage, rather than exuberant

granulations. In old suppurative cases, indolent in character, with frequent bleedings, it has often changed the whole face of the condition.

Calcarea carbonica.—Discharge viscid, whitish, fetid, pappy; granulations from edge of perforations on drumhead, filling canal. Dr. Houghton says, “When these enlarge and form polypi of the mucous variety, we have found these exuberant granulations yield more promptly to the Calc. iod. than to the Calc. carb.”

Calcarea phosphorica.—The indications given for this remedy under diffuse inflammation of the canal are equally applicable in the suppurative process in the middle ear. There are also many cases in which there seems to be no particularly indicated remedy. In such cases Dr. Norton informs me he often uses the Calc. phos. with excellent effect. I very frequently employ this remedy with great satisfaction, both alone and in alternation with Kali mur.

Chininum muriaticum.—In cases in which there is much pain and little discharge. Either in acute cases where there is pus in the tympanic cavity, but not enough to rupture the membrane, or having ruptured, the discharge is scanty; or in chronic cases where exposure has suppressed the discharge. Pain is great in both cases. Accompanying is a condition of profound weakness and exhaustion. Marked periodicity is another indi-

cation. A summary for its use would be, pain with suppressed exudation, prostration and periodicity. In such cases it will rarely fail to give relief. I can answer for its use only in the lower potencies. Dr. Houghton first called my attention to the value of this drug in the above conditions.

Elaps corrollinus.—Discharge offensive and yellowish green. Congestive lancinating frontal and occipital headache, made worse by motion and stooping. Especially valuable in nasopharyngeal catarrh with suppuration in children; "mouth breathers." (Houghton).

Ferrum phosphoricum.—When in the course of a chronic suppuration *pains* occur with or without a suppression of the discharge, traceable to exposure, and accompanied by feverish symptoms.

Hepar sulphuris.—"Ulceration angry; discharge small amount, sour fetid odor; tissues very sensitive, often covered with white shreds which cling to the ulcer; soreness in small spots about the ear; itching; worse at night and by cold air." (Houghton). Hepar is a remedy of immense value in the earlier stages of an acute suppuration, either before the membrane ruptures or after, if in connection with the pain and discharge there is sensitiveness to the touch. In those cases in which the patient shrinks even before he is touched, and complains how much he

is hurt, even under the gentlest manipulation, Hepar finds its especial field. It is useful with this symptom in all stages from an inflammatory earache to an involvement of the mastoid. Sometimes in its other form of Calcium sulphide it is more prompt in its action.

Hydrastis Canadensis.—In the muco purulent forms of discharge, thick, with more mucus than pus. Tenacious agglutinated discharges.

Kali bichromicum.—Similar to *Hydrastis*, but the discharges here as elsewhere in *Kali. bich.* cases, have the peculiar ductile quality in their tenaciousness, permitting them to be drawn into long strings, while in *Hydrastis* they are more sticky.

Kali muriaticum.—A standard remedy after suppuration has become well established, and the acute symptoms of the earlier stage have passed away. At the hospital clinics it has become almost a routine practice to administer this salt in cases under the above conditions, when there are no positive indications for another remedy. Frequently, as said before, it is used in connection with Calc. phos. with the happiest results. In case after case the discharge has been entirely arrested by *Kali mur.*, even with little or no local treatment.

Kali phosphoricum.—The discharge is of a dark color and offensive smell; thick, grumous or

granulous. When the external meatus is consecutively involved, and upon cleansing, the tissues appear rough, easily bleeding, or covered with small granulations. Lining of the tympanic cavity of same type; bleeds easily with most delicate touch of cotton holder. (Houghton).

Kali sulphuricum.—The character of the pus indicating Kali sulph. is a thin, yellow fluid. I have used it satisfactorily in cases tending towards an offensive condition.

Lycopodium.—In the sequela from the exanthemata. Sluggish, disinclination to heal. Pus offensive and moderate in quantity. Similar to Hepar cases, but lacking the sensitiveness of the latter. Often good as an intercurrent when an antipsoric is needed.

Mercurius vivus.—In chronic suppuration, with enlarged and sensitive cervical glands. Pus fetid, whitish or bloody. Discharge readily checked by cold, which increases pain, much worse at night, and the characteristic perspiration. In these aggravations Merc. contends with Ferr. phos. for first place in frequency of indication.

Magnesia phosphorica.—With neuralgic symptoms as given under the acute catarrhal indications.

Psorinum.—A remedy of untold value, in old foul smelling, dirty, scabby cases. The worse the case, the more the indication for Psor. This is

not the place to enter into any discussion as to the homœopathicity of this agent or its origin. Any one who has seen (as can be seen at any time) hundreds and hundreds of the foulest nastiest cases of suppurative ears in tenement house children, either relieved altogether of their disgusting otorrhœa, or its character so changed that it becomes pleasant by comparison, must indeed be prejudiced to refuse to use it. In the N. Y. Oph. Hosp. clinic it is used daily with such results. Dr. Houghton gives the symptom in addition: "Excessive itching in the ears so that children can hardly be kept from picking or boring in the meatus." I always use it in the 200th.

Silicea.—Pus scanty; when bones involved. In cases after stoppage of the discharge to repair perforations in the membrane.

"It has been our view that more repairs of the membrane occur under the use of this remedy, in chronic disease, than under any other single remedy." (Houghton).

Tellurium.—Cases similar to Psorinum. The especial indication for Tell. is the peculiar fetid odor, like decaying fish brine, and the excoriating character of the discharge, making the auricle raw and sore.

Thuja Occidentalis.—Discharge smells like putrid meat."

CHAPTER XIII.

DISEASES OF THE INTERNAL EAR.

(*Otitis Interna*).

The diseases which affect the internal ear are much less clearly understood than lesions of the other parts, for they are entirely removed from observation. There are no local symptoms or objective appearances by which we are enabled to make a diagnosis, as in catarrhal or suppurative troubles. The history of the case, and certain constitutional manifestations are the only things to suggest that we have a trouble of the auditory nerve to deal with, which we confirm by the tuning fork test, as mentioned in the earlier portion of this work.

One of the most prominent of the diseases of the labyrinth is known as Meniere's disease, because he first grouped the symptoms characteristic of the lesion. Though there has been some discussion as to the exact pathology of Meniere's disease, the weight of opinion is in favor of confining it to the effects produced by a sudden hemorrhage into the semicircular canals, and possibly into the vestibule as well. For this

reason it is sometimes known as apoplectiform deafness. Its usual symptoms are a sudden giddiness or vertigo, staggering gait, or tendency to lose one's balance, nausea or actual vomiting, sudden and great deafness, and frequently falling to the ground, without however, a loss of consciousness. Sometimes, however, there is a temporary loss of consciousness, but, although this may soon return, the other symptoms do not abate. Sometimes the deafness is not sudden, but comes on more gradually, though always quite rapidly in comparison to other forms of loss of hearing. With this there is frequently a great complaint on the part of the patient of subjective noises in the head or ears, singing, rushing, roaring, buzzing, and other forms of tinnitus.

The prognosis in this disease is usually unfavorable. It depends somewhat on its intensity. There are several cases reported in which the symptoms gradually disappeared and a degree of recovery ensued, but complete restoration is rare.

There are many cases in which vertigo occurs, consequent upon lesions of the middle ear, which are incorrectly diagnosticated as Meniere's disease. They are however, a secondary form of labyrinthine trouble, while the true Meniere's disease is a primary lesion, not dependent upon disease of the conducting apparatus.

Dr. Knapp of this city, has taken issue with some of the points as stated above. His position in brief is as follows. He claims first, that the disease is not limited to the semicircular canals or vestibule, but involves the cochlea as well, citing in evidence the loss of perception for certain tones in the musical scale. In the second place, he asserts that the exudation is not necessarily of a hemorrhagic character, but may be serous, or both. Thirdly, he claims that it is not always a primary disease, but may be secondary to affections in the tympanum. A case however, in which there had been no previous symptoms of an ear trouble, suddenly attacked with dizziness, nausea, uncertain gait, or rotatory movements, tendency to fall down, without a loss of consciousness, accompanied by impairment of hearing, might safely be diagnosticated as a case of Meniere's disease, whether the exudation were serous or hemorrhagic, or the lesion confined to the semicircular canals or involving the whole labyrinth.

There is another lesion of the labyrinth which Voltolini has described, analagous in some respects to that which has just been described, which he claims is idiopathic, and peculiar to young children. He says, "It must be regarded as a specific disease of childhood, as specific as croup." He calls it "Otitis labyrinthica." In this

affection a child in perfect health is suddenly attacked with violent vomiting, accompanied with chills and febrile movement. Soon the hearing becomes very much impaired, and finally total deafness is present. This may last for two or three weeks, when convalescence sets in. For some little time the child experiences difficulty in walking, but gradually learns to use its limbs, and all the symptoms disappear except the loss of hearing, which remains permanent. This disease simulates meningitis in many respects, and doubtless has often been diagnosticated as such, but it is accepted by aurists as an independent disease, confined to the labyrinth, for at no time has there been an impairment of the intellect or consciousness, which is a pathognomonic or diagnostic mark. Death is very rare in the disease, which is an additional feature in differentiating it from meningitis.

Cerebro-spinal meningitis itself is frequently followed by deafness which is often total. The exact conditions present are not well understood even by specialists. It is an unfortunate sequela as the prognosis is very unfavorable. It may occur as late as six months after the primary disease.

There has been a very general acceptance among aurists of late years, even those of the old school, as to the power of large doses of quinine

to produce permanent changes in the auditory nerve. This fact the general practitioner should remember.

Syphilis is accepted as among the causes which may produce alterations in the labyrinth. A sudden loss of hearing in a person with specific history should certainly be looked upon as suspicious.

The labyrinth may be the seat of occasional tumors or morbid growths which destroy hearing by pressure.

It goes without saying that direct violence may injure the nerve, as a blow upon the head, etc. The petrous bone is very difficult to fracture, and it is not common. Sometimes this is manifested by symptoms that are visible, as a serous or bloody discharge from the ear after a fall. Such a symptom gives a very bad prognosis. Sometimes no symptoms except loss of hearing are to be found in the ear.

Those exposed to prolonged loud sounds often lose their hearing. Such a condition is so frequently observed in boiler-makers that it has given rise to a definite classification known as "boiler-makers' deafness." The particular changes occurring are not known. The reader who is interested in the subject of lesions of the internal ear is referred to the larger treatises on the subject.

In considering the treatment of diseases of the labyrinth, we are met at the outset by two difficulties; one is the difficulty in recognizing many cases of labyrinthine disease, or recognizing it, we are as yet, largely in ignorance as to the actual changes occurring. The second is the comparative rarity of the disease, and from the nausea and dizziness accompanying many of its manifestations, the difficulty in deciding whether they are primary or reflex from the stomach.

Again, we are almost in total ignorance of the action of drugs upon the internal ear. Our pathogeneses have as yet to be differentiated. Therefore we are compelled almost entirely in seeking for symptomatic indications, to be confined to the statement, "In such and such a case, with such and such symptoms (frequently none), such and such a drug was given." This would be of great value, if we had enough cases, but the reported cases of otitis interna cured by homœopathic remedies, with enough symptoms to draw conclusions from, may almost be counted upon one's fingers. It is to be hoped that this feature in aural cases will receive from homœopathic specialists more attention in the future, than has been the case in the past. This must be my apology for the extreme scantiness of the indications under the drugs given.

HOMŒOPATHIC REMEDIES.

Arsenicum iodatum.—Dr. Park Lewis writes me: "A few years ago I had several cases in which *Ars. iod.* 3^x seemed to do excellent service. In two was inherited syphilis. One was cured after the hearing had been very much impaired. The other was very much improved. Unfortunately the second relapsed, and is now absolutely deaf. The other still retains good hearing. There was very little middle ear complication. The remedy was prescribed because of the characteristic eye symptoms (*keratitis parenchymatosa*). There seemed no special indications as far as the ears were concerned, except those common to disease of the auditory nervous structures. No tinnitus, no pain, eustachian tubes pervious."

Argentum nitricum.—This has relieved the following: "Staggers when walking in the dark; has to hold on to things; buzzing in the ears;" in connection with general debility.

Cinchona.—Dr. Houghton suggests for the use of this drug; "vertigo from loss of blood; giddiness from anemia; fainting, ringing in the ears, and in some cases associated with a general nervous erethism." He says it acts upon both cochlea and semicircular canals.

Gelsemium.—In acute inflammation of the internal ear. A cured case (48 hours) proved its

value. Vertigo, confusion of the head, extending from the occiput upwards and forwards. Dulness and apathetic condition generally. Pulse slow and full. Fever with little thirst or restlessness. Sudden loss of hearing, with rushing and roaring.

Petroleum.—The symptoms for which this remedy has been given, and which have been relieved by it, are especially the dizziness and deafness. Three of Dr. Woodyatt's cases were very much benefited by this drug given for the above symptoms. He used it in the 6 \times . In one case of my own now under treatment, with combined middle and internal ear lesions, the dizziness, staggering and tinnitus are relieved while taking Pet., to reappear as soon as it is discontinued.

Pilocarpine muriate.—A little four year old patient in the hospital clinic has been put upon this drug by Dr. Houghton, for deafmutism resulting from cerebro-spinal meningitis. She has been taking it now some two or three months. From an apparent unconsciousness of any sounds, she has improved so that she can hear her mother call her, in a loud tone, across the room.

Phosphoric acid.—“Phos. acid has done much in one case in which I think a general depression of the nervous tone had excited some auditory troubles, but there is slight middle ear catarrh,

and I cannot say how much the deeper structures are involved." (Lewis).

Salicylate of soda.—Dr. Houghton in his Contribution to Aural Therapeutics, at the World's convention in 1876, remarks: "We have no exhaustive proving of Salicylate of soda, but experiments on lower animals show that toxic doses cause hemorrhagic exudation in the labyrinth. It has proved curative in cases of sudden deafness in which vertigo was a marked symptom." Since that time it has been used in quite a large number of cases at the New York Ophthalmic Hospital, with good results in some cases. It has been of late used more in children with the deafness following cerebro-spinal meningitis (otitis interna secundaria). I am hardly able to speak with positiveness about them, but know that some have improved. In a number of adults where symptoms of labyrinthine disease had followed middle ear disease, they have been very much helped. This symptom especially has been relieved; viz., pitching forward. Dr. Woodyatt cured the nausea and giddiness remaining in a patient with labyrinthine disease, with this remedy in the 1^x, in connection with Strych 3^x.

Silicea and Strychnia.—Both of these remedies were used a number of times by Dr. Woodyatt but generally following or in connection with

Petrol. and Soda sal. He gave no definite indications.

Besides the remedies mentioned, the following have been suggested as bearing relations to this disease. Creasote, Carbohc acid, Alumina, Chenopodium, Hydrobromic acid, Cocculus, Nitrum.

As has been said before, the homœopathic symptomatology is full of apparent indications seemingly applicable to labyrinthine disease. These must be carefully studied, and the remedy selected for a definite reason. By thus carefully working and noting results, we shall in time, doubtless be able to possess a much more complete list of therepeutic indications. This is a department where we are compelled to rely upon internal medication alone, and for this reason, the careful prescriber in general practice has an equal chance with the specialist to verify the pathogenesis of drugs, and placing on record the results of his observations, contribute his quota to the therapeutics of labyrinthine disease.

CHAPTER XIV.

ADDITIONAL MEANS FOR THE RELIEF OF DEAF PERSONS.

It is in order to refer to a few of the the artificial aids which have been devised to assist the impaired function. These consist of artificial membranes, audiphones, dentaphones, earphones, various kinds of trumpets, conversation tubes, etc.

The artificial membrane consists of a small disc, very thin and vibratile, which is passed into the meatus in close contact with the drumhead. They are made of india rubber, sized paper, and various materials. To the center is attached a delicate wire by which they are placed in position. Their object is to take the place of the lost substance in perforated or destroyed membranes, and render support to the ossicles. *They are only to be used in cases where the integrity of the drumhead has been impaired.* From an ignorance of the principle of their application, they have been widely advertised as an aid in all kinds of deafness, and many, both physicians and

laity have accepted the idea. They are worse than useless in cases where the membrane is whole and should never be used. Very many times what is termed the "cotton pellet" can be applied with great benefit. This was a little device first used by a patient of Dr. Yearsley's of London, and by the latter given to the profession, and sometimes called after his name. It is merely the placing of a small, tightly rolled pellet of cotton against the drumhead. Sometimes a longer twisted roll is used. This may have to be applied several times to get it in the exact position where it gives the best support. Its effect is frequently quite wonderful, I have seen many patients with whom conversation was carried on with great difficulty without it, hear with perfect ease after its successful application. Patients often acquire great facility in the adjustment of it themselves, even better than the surgeon in some cases. I know one case who has been under the care at different times of several of my colleagues as well as myself, not one of whom can adjust this with the same satisfaction that he does himself.

The audiphones, dentaphones, etc., are all constructed on one of two principles, viz., either the magnification of the sound waves conveyed to the ear, or on the principle of bone conduction, by communicating sound vibrations to the nerve by

means of the bones, preferably the teeth. Of these, the most satisfactory I have seen is North's Earphone.* This comes in three sizes, at a price varying from five to ten dollars. The best aid however, I have yet seen, is a modification of the old conversation tube, recently completed by Dr. Houghton after long experiment. This consists of a flexible tube about thirty inches long, with a vulcanite cup at each extremity. This cup is so fashioned, as to imitate as nearly as possible the function of the auricle. One end is applied to the deaf ear, the other near the mouth of the person speaking. It is entirely free from the metallic quality of tone inseparable from metal instruments.

I cannot close these pages without reference to the improved methods of teaching deafmutes both to comprehend oral conversation and answer orally. This consists in teaching them close observation of the lips of the speaker, and to imitate the positions of the organs of speech. I have seen persons unable to hear the least sound, converse intelligibly with me for weeks before I learned of their infirmity, and then only by accident, speaking to them when they were not looking. This method has been brought to great perfection, and in the case of children, where some lesion of the nerve, as after cerebro-spinal meningitis, or the

* To be obtained of Meyrowitz Bros., 297 4th Ave., N. Y. city.

neglected results of scarlet fever or similar diseases have brought about incurable deafness, it is of such inestimable value, I should consider myself derelict if I did not advert to it.

Young children learn this method very rapidly, and it is important that too much time does not elapse before they are placed in a position to receive the instruction. There is no other lesion of the five senses which so impairs the intellect, dulls the perceptions, sours the temper, produces a suspicious, morbid state of mind, as loss of hearing. Our usefulness as members of society is in proportion to our intercourse with it. Though much is obtained by reading and observation, very much more knowledge in daily affairs is obtained by oral intercourse. The man shut off from this is indeed in a pitiable state. As a matter of choice in punishment for capital crime, I would personally prefer death to the judicial destruction of my hearing.

There are several institutions in this country where this method of oral imitation is taught. The one in this city is doing an excellent work, and the authorities in charge are always ready to give information and show specimens of the proficiency acquired by their pupils.

