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# TINNITUS AURIUM:

OR,

## SINGING IN THE EARS.

REMARKS ON ITS CAUSES AND TREATMENT

BY

W. DOUGLAS HEMMING, M.D.

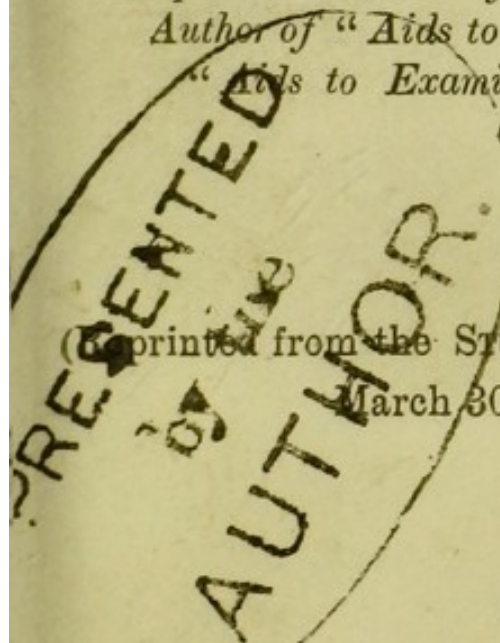
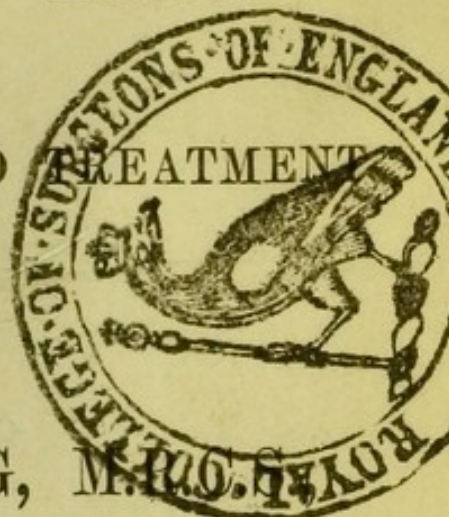
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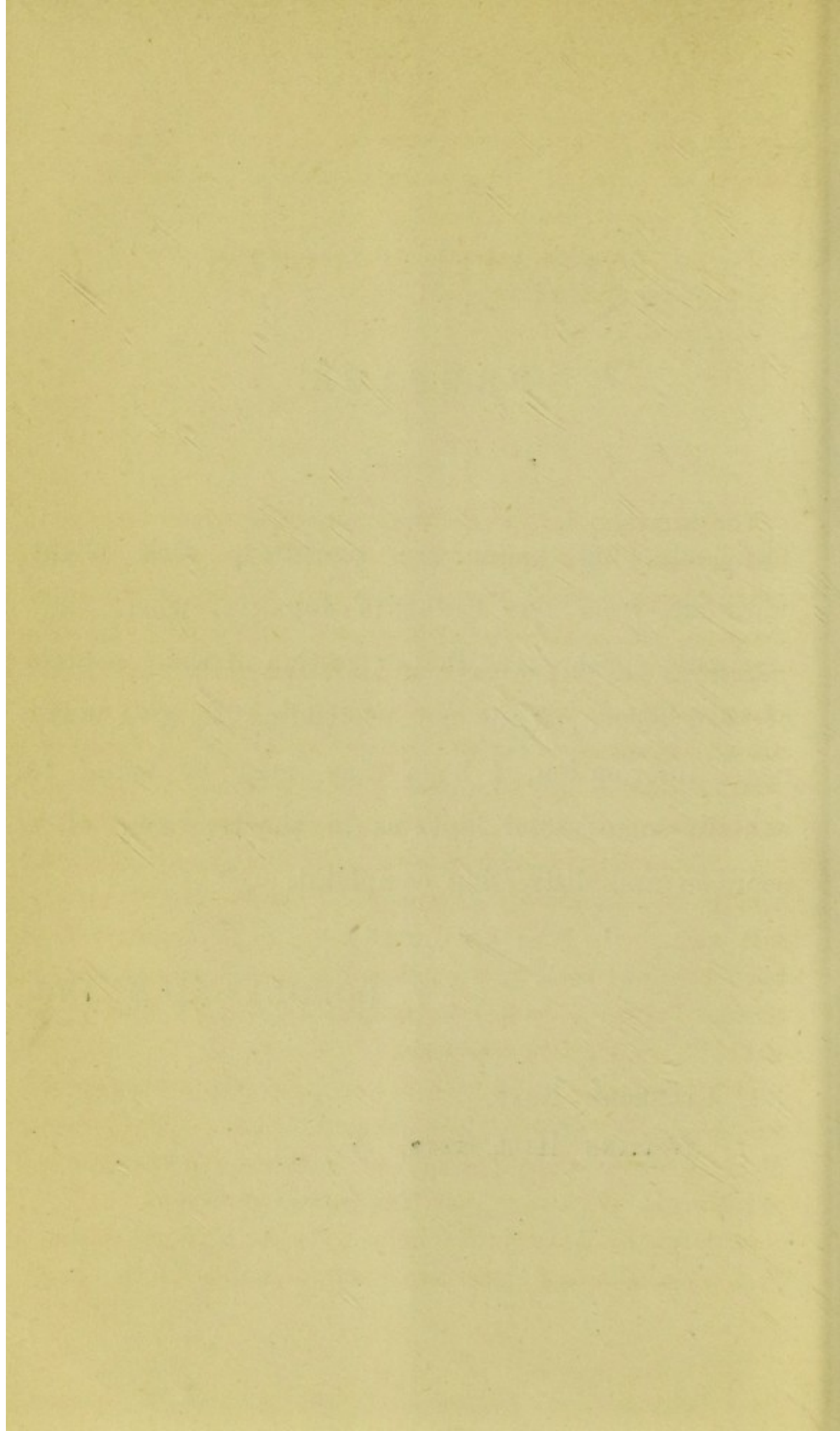
## P R E F A C E.

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THE following pages are reprinted, with slight additions, from THE STUDENTS' JOURNAL, where they originally appeared, at the suggestion of some readers of that paper. While not pretending to give much novel information, I hope they may be found to contain some useful hints as to the treatment of a common and distressing complaint.

W. DOUGLAS HEMMING.

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## TINNITUS AURIUM.

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The symptom known as tinnitus aurium, which consists in the presence of abnormal sounds in the ear, is one of the most frequent which comes under the notice of the aural surgeon, and is also one of the most troublesome. By some authors it has almost come to be looked upon as a distinct disease; this, however, it can scarcely be considered, as it is almost invariably caused by, or, at any rate, associated with, a diseased or abnormal condition of some portion of the auditory apparatus, of which derangement it is a symptom. Cases occasionally, however, occur, in which no morbid condition is discernible in any part of the organ of hearing, and such cases have been considered as idiopathic. Even here, however, there is, if not any local lesion, some deranged condition of the body interfering with the circulation or innervation of the auditory apparatus.

My object in this paper is not to go exhaustively into the subject, but to give a short account of the principal forms of tinnitus, the causes giving rise to them, and the methods of treatment which have been found most efficacious.

With regard to the various kinds of noises, and the descriptions given of them by patients, it will generally be found that



the account varies with the occupation of the patients, and with the sounds with which they are most familiar. As the late Sir W. Wilde says, "persons from the country, or rural districts, draw their similitudes from the objects and noises by which they have been surrounded, as the falling and rushing of water, the singing of birds, the buzzing of bees, and the waving or rustling of trees; while, on the other hand, persons living in towns, or in the vicinity of machinery, or manufactories, say that they hear the rolling of carriages, the hammerings, and the various noises caused by steam engines. Servants almost invariably add to their other complaints that they suffer from the ringing of bells in their ears; while, in the country, old women, much given to tea-drinking, sum up the category of their ailments by saying that, "all the tea-kettles in Ireland are boiling in their ears,"

A careful examination of these various descriptions, however, will show that noises in the ears may be reduced to some four or five classes; thus, we may have:—1. Constant rushing noises; 2. Bubbling or gurgling noises; 3. Tidal, or "to and fro" noises; 4. Pulsating noises; and these various kinds of noises may be differentiated as to their causes, and so appropriately treated.

The causes of tinnitus may be either intra-aural—that is to say, they may depend upon some morbid condition of the auditory apparatus; or, extra-aural—that is, due to derangement of a neighbouring part, or of the system generally. According to Galen, tinnitus was due either to exhalations from the stomach, or to increased sensitiveness of the ears.

The intra-aural causes may be present in the external, middle, or internal ear, or in the eustachian tube, which must be considered as an extension of the middle ear.



The conditions of the external ear which may give rise to tinnitus are:—1. Impacted cerumen. 2. Deficiency of cerumen. 3. Hairs in the meatus, or lying upon the membrana tympani. 4. Dried pus pressing upon the membrane. 5. The presence of a vegetable fungus (*aspergillus*) in the meatus. 6. Any other foreign body in the canal pressing on the membrane.

All these causes are easily discernible on examination by means of the speculum.

Impacted cerumen causes, in addition to tinnitus, sudden impairment of hearing, pain, and sometimes vertigo; examination will show the canal to be filled more or less completely with a dark mass of a greater or less degree of hardness in different cases.

Deficiency of wax will cause “dry rustling sounds in the ear, particularly during mastication, and sometimes ringing noises.” (Harvey). Examination will show the meatus red, with patches of dried wax upon it, the membrana tympani being generally opaque. This condition results sometimes from bathing.

The hairs in the meatus may become elongated and, passing across, interlace with cerumen, or epithelial scales. In these cases, the sounds will frequently resemble those of an *Æolian* harp. A single hair will sometimes be found resting upon the surface of the tympanic membrane.

A particle of dried pus may be present in the same situation, and give rise to tinnitus.

The vegetable fungus, which is not unfrequently found growing in the meatus, causes a feeling of fulness in the ear, a dull heavy pain, and constant tinnitus, and it is a sequel of some form of diffuse otitis, usually of an eczema. One of its principal features is the pain which it causes, which differs from the severe pain of a boil, or of acute middle-ear catarrh. Examination shows the ear blocked up,



more or less completely, with whitish or blackish flakes, which are adherent to the walls of the canal, as well as to the outer surface of the membrane. The syringe will not remove them, but the use of forceps will be necessary. Microscopic examination will make the diagnosis certain. The appearances of the fungus under this instrument will be found well illustrated in Roosa's work on the ear, or in a pamphlet by Dr. Cassells on "*Myringomycosis aspergillina*."

Any foreign body which presses upon the membrane will, by altering the tension of the labyrinth, give rise to abnormal sounds.

The conditions of the middle ear, which give rise to tinnitus, are:—1. The presence of adhesive mucus on the inner surface of the membrane, in the middle ear, or at, or near, the orifice of the eustachian tube. 2. A foreign body in the eustachian tube. 3. Contraction of the tensor tympani muscle. 4. Acute catarrh of the middle ear.

The presence of mucus in the tympanum, or eustachian tube, which is due to catarrh of the middle ear, or to post-nasal catarrh, gives rise to tinnitus of a gurgling or bubbling character.

In some rare cases a foreign body finds its way into the eustachian tube, and may cause suppurative catarrh and much severe tinnitus. In one case, recorded by Fleischmann, the tinnitus was of a continuous character, and the cause was not discovered until after death.

As the result of a chronic non-suppurative inflammation of the middle ear, there may be undue contraction of the muscles, especially of the tensor tympani; this contraction moves the malleus, the membrana tympani, and the whole chain of ossicles, thus causing pressure of the stapes in the fenestra ovalis and intra-labyrinthal pressure. This gives rise to noises of a tidal



character. The appearances of the membrane caused by this condition are thus described by Dr. Turnbull,\* of Philadelphia: "The handle of the malleus appears broader, the membrana tympani is twisted, the axis band of the malleus becomes more conspicuous, and the membrana tympani returns more or less rapidly, by retraction, into its former abnormal position after the application of the air-douche had caused it to bulge outwards."

The conditions of the internal ear which originate tinnitus are naturally somewhat obscure, but the most usual and obvious cause is congestion of the labyrinthine circulation. This may be either:—1. Venous, or 2. Arterial. The tinnitus in the case of venous congestion of the labyrinth, will be of a rushing character, similar to the sounds produced by taking large doses of quinine. In arterial congestion, on the contrary, the tinnitus is of a pulsating or knocking character, and is compared to "hammering on an anvil," "loud ticking of a clock," "ringing of bells," &c. The beats will frequently be found to be synchronous with the pulse of the patient, thus showing clearly that the symptom is dependent upon the circulation.

In numerous cases of tinnitus the cause is extra-aural. It may be situated in the immediate vicinity of the ear, and may be due to an enlargement, or a narrowing of the vessels; as in a branch of the temporal, the posterior auricular, or, the carotid. In the carotid especially, passing so close as it does to the auditory apparatus, any abnormality of circulation is likely to produce subjective aural symptoms. In other cases, the cause may be more remote; for example, it may be an aneurism in one of the branches of the aorta, or in that vessel itself.

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\* Tinnitus Aurium, or Noises in the Ears. Philadelphia, 1875.



Another very frequent cause of noises in the ears is anæmia, which produces the well-known "bruit de diable," and this propagated from the carotid, causes the tinnitus. The sounds in anæmia and aneurism are usually of a pulsating character.

Other general causes of tinnitus are by no means uncommon. Such are : bathing (which, as has been said, may cause a deficient secretion of cerumen), mental excitement, overwork of the brain, depression of spirits, exposure to blasts of cold air, and the effect of explosions or of artillery practice.

Child-bearing and lactation are very frequently accompanied by troublesome singing in the ears, which is also by no means uncommon about the time of the menopause. In these instances the tinnitus is probably dependent upon the anæmic condition of the vascular system from the drain upon it in the former cases, and upon the generally disturbed condition of the nervous system in the latter.

The over use of tobacco is a cause of tinnitus which is more common than is generally supposed, and in any case where the origin seems obscure, it is well to inquire whether the patient indulges in the "weed," and if so, to suspend its use for a time, to see whether or not it is the cause of the symptom.

The infantile diseases, as mumps, whooping-cough, and the exanthemata, frequently produce deafness, which may or may not be accompanied by tinnitus. In the case of mumps, the patient may, on recovery, be found perfectly deaf in one or both ears without there having been the slightest symptom to call attention to the hearing apparatus, and such deafness may be permanent, though unaccompanied by tinnitus.

In very many cases it will be found that two or more of the above-named causes will coexist. For example, a chronic catarrh, and an overworked condition of the brain, may be found together, or the abuse of tobacco may be combined with one or



other of the above causes. In such cases, all the causes will have to be carefully enquired for and treated. The removal of the chronic catarrhal affection will not cure the noises unless rest be at the same time given to the overwrought brain.

In those instances in which causes producing different kinds of noises are present together, the coexistence of the two classes of sound may facilitate the diagnosis, but it will often be found exceedingly difficult to trace the tinnitus to its causes in these complicated cases.

Hysteria, hypochondriasis, gout, dyspepsia, obstructed portal circulation, may all give rise to tinnitus, which may, or may not, be accompanied by deafness.

Cerebral disease is a very frequent concomitant, if not a cause, of tinnitus; while, on the other hand, the noises in the head have been known to produce aberration of intellect, and even to drive the sufferer to suicide. In the case of insane patients, however, tinnitus must be carefully differentiated from the hallucinations of hearing, to which they are so frequently subject, though both often coexist.

With regard to the ultimate cause of the sounds; this is, no doubt, some irritation of the auditory nerve. Dr. Theobald, of Maryland, gives the following as his views on this point. (*London Medical Record*, March 15, 1876, from *Chicago Medical Journal*.) He thinks, in the first place, "that the tinnitus is invariably due to an excitation of the terminal elements, (not the trunk) of the auditory nerve; and after a careful consideration of the facts which seemed to have any bearing on the subject, he has been led to the conclusion that, in almost all cases, tinnitus aurium, whether associated with aural affections, cerebral diseases, or constitutional disorders, is to be attributed to the existence of vibrations excited in the walls of the blood-vessels of the labyrinth by the friction attending the



*circulation of the blood*, which are capable of imparting to the labyrinthine fluid, and thence to the terminal fibres of the auditory nerve, impulses similar in character to those which are produced by the vibrations of the stapes, and hence, like them, capable of giving rise to the sensations of sound.

The vibrations of these vessels can produce a sensible impression on the auditory nerve in two ways. First, the intensity of the vibrations may be increased. Second, the vibrations remaining unaltered, their effect upon the nerve may be magnified by reflection and contraction, or by resonance. The first condition will obtain, whenever the natural and easy flow of blood is perturbed, as in hyperæmia and anæmia of the labyrinthine vessels, by partial compression of the vessels by inflammation and other causes; especially by an incursion of the stapes, by which the tension of the labyrinthine fluid is increased. By the second mode—resonance or reflection—the tinnitus is produced which accompanies the affections of the middle and external ear. The conducting apparatus of the ear is defective; therefore sonorous undulations from without fail to reach the auditory nerve, and, on the other hand, sonorous vibrations arising in the ear are not allowed to escape; they are reflected, concentrated, and their sound magnified.” A very similar view of the nature of the stimulus which produces singing in the ears is advanced by Dr. Aigre (*Medical Examiner*, February 28th, 1878,) and this explanation seems, to the author, the correct one.

We now come to the consideration of the treatment of the various forms of tinnitus, and I shall take them in the same order in which they have been previously mentioned.

First, in cases of impacted cerumen; the remedy is obvious, viz., the removal of the offending substance, and the restoration of the meatus and membrane to their normal condition. For



the removal of wax the use of the syringe and warm water, if properly applied, is almost always sufficient; if the cerumen have become very hard, the application of some solvent agent for a few hours may be necessary. For this purpose a solution of carbonate of soda (one drachm to the ounce) will be found efficacious. In some rare instances the use of a probe, or some form of pick, may be necessary, but these should never be employed without a thorough illumination of the meatus, nor by those unaccustomed to manipulation within the ear. I have elsewhere insisted strongly on this point when treating of "Foreign Bodies in the Ear."\* After the wax has been removed, the membrana tympani should be carefully examined, and, if it be pressed inward, inflation by Politzer's or Valsalva's method should be employed. This having been done, it will usually be found that the tinnitus will cease; if it do not, some other cause is probably present, and must be sought for.

Where there is a deficiency of ceruminous secretion, the condition of the other secreting functions of the body must be enquired into. There will frequently be found a concomitant torpid condition of the alimentary canal, which will require correction. Tonics may also be necessary, and they may be advantageously combined with aperients. Deficient cerumen is by no means uncommon in connection with the rheumatic and gouty diathesis, or it may often follow cold bathing. Locally, weak astringent solutions, such as nitrate of silver, or of acetate of lead, may be dropped into the ears night and morning. Special attention must be given to the condition of the throat, and any relaxation of the mucous membrane, or enlargement of the tonsils, treated promptly. The author's connection with a hospital where diseases of both the throat and ear are

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\* STUDENTS' JOURNAL, Feb. 2, 1878.



treated, has led him to observe especially how frequently derangement of the auditory apparatus is dependent upon disorder of the throat, and he scarcely ever in practice omits to examine the throat in a case of aural trouble.

Where the tinnitus is of an Æolian harp-like character, and appears to depend on the abnormal growth of hairs in the meatus, these should be removed. To effect this, it is not advisable to pluck them up by the roots, as such a procedure may cause the formation of an abscess at the hair follicle ; it is better to cut them off quite close by means of curved scissors, removing each one when cut.\* If a hair has become detached, and lies upon the membrane, giving rise to tinnitus, it may be removed, either by gentle syringing or by means of a camel-hair brush, moistened with a mixture of equal parts of water and glycerine. Dried pus on the membrane may be removed by the syringe.

Where the meatus is obstructed by vegetable fungus this must be removed. As has been said, the syringe will be found insufficient for this purpose, and it will be necessary to employ forceps, under good illumination. On the removal of the growth, the skin beneath will be seen to be tender and red, and the fungus will probably re-appear in a few hours. The process of removal will generally require daily repetition, and after each removal the canal may be pencilled with nitrate of silver to subdue the inflammation. (Roosa). Other authors recommend the injection of spirits of wine, warm saturated solution of sulphite of soda, hypochlorite of lime (gr. 2 to 1 ounce), Fowler's solution, &c. In most cases, however, warm water, thoroughly applied, will effect all that is necessary for the prevention of the recurrence of the parasite. As the growth of the aspergillus

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\* Turnbull. *Loc : cit.*



fungus is probably, in most cases, secondary to some form of diffuse otitis, or to eczema, any such co-existent affection will, of course, require appropriate treatment.

A foreign body in the external meatus will, by pressing on the membrane, or even without exercising such pressure, cause tinnitus. In any such case the obvious remedy consists in removal. For the removal of foreign bodies, nothing but the syringe should be employed. Careful syringing will, in almost every case, effect the object. There are some cardinal principles with respect to the removal of foreign bodies, which I have previously laid down,\* but which, from their importance, I make no apology for reiterating. In the first place, it should be remembered that a hard substance, if left in the meatus, will do no harm, and may remain for years even without causing any injury. It is only insects, or vegetable substances, which swell by the absorption of moisture, that can do harm by being left alone. Secondly, there is a golden rule never to be departed from, and that is, *no attempt should be made for the removal of a foreign body which cannot be seen.* Thirdly, force must never be used for the extraction of substances. To effect removal by the syringe, the body having been seen, "the fine nozzle, known as Toynbee's, should be employed, and the auricle being drawn backwards and upwards so as to straighten the meatus as much as possible, the jet of water should be directed along the upper wall of the canal. In this manner the water will frequently get behind the body and force it out. In some cases removal may be facilitated by turning the patient on his side, with the affected ear downwards, the syringe being applied from below." A smooth, round substance, as a marble, which fills the canal, may sometimes be removed by the use of a brush dipped in glue, which,

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\* Foreign Bodies in the Ear. STUDENTS' JOURNAL, Feb. 2, 1878.



being placed in contact with it, is allowed to harden and adhere, and then brush and body are withdrawn together. Dr. George Gray, of Castlewellan, Co. Down, in a communication to the *British Medical Journal*, and in a letter with which he was good enough to favour me, considers that the cement known as "coaguline" is preferable to glue, as it hardens more quickly. I have not yet had an opportunity of trying it.

We now come to the treatment of those cases in which the tinnitus is dependent upon some affection of the middle ear.

Where the noises are of a bubbling, gurgling character, there is most probably some adhesive mucus present in the tympanic cavity, lying against the membrane, or in or about the orifice of the eustachian tube. Such conditions as these are usually attendant on catarrh, either acute, sub-acute, or chronic in its character. Collections of mucus about the pharyngeal orifices of the eustachian tubes are generally found when the patient is suffering from post-nasal catarrh, which is one of the most common causes of non-suppurative middle-ear catarrh and its consequent tinnitus.

For the treatment of these conditions, in the first place, the catarrh must be combated by appropriate remedies. Inhalations of a stimulating character, such as those of benzoin, benzole, or kreasote, should be ordered, and the patient should be directed to force the vapour through the eustachian tube into the middle ear. This may be done in accordance with the Valsalvian method of inflation, as follows:—The patient inhales a mouthful of the vapour, then closes the mouth and nostrils, and makes a moderately forcible attempt at expiration. The frequent use of the Politzer bag will also be necessary to clear away the mucus, and if the passages are much obstructed, the eustachian catheter will be required. The condition of the throat will always require attention, and astringent and siala-



gogue lozenges will here be found useful. Of these, few are more efficacious than the compound eucalyptus lozenges, made originally at the suggestion of my colleague, Mr. Lennox Browne, which, while acting as astringents, at the same time relieve the dryness, and assist expectoration.

To clear away the secretion from the nasal passages, the posterior nasal syringe will be found the most efficacious instrument. Its value has been thoroughly tested by Mr. Lennox Browne, who embodied the results of his experience in a paper read before the *British Medical Association* in 1876, and afterwards published in pamphlet form.\* I am indebted to this paper for many of the details of treatment here given, and would refer those of my readers who see much of these troublesome cases, to Mr. Browne's valuable pages.

The posterior nasal syringe will be found preferable to the use of the anterior nasal douche of Weber and Thudichum, which, in itself, as has been clearly shown by Roosa and others, is not uncommonly the cause of aural trouble. For employment with the posterior nasal syringe, a tepid solution of carbolic acid, (a grain to the ounce,) will be found very generally useful. If the use of the Politzer bag, and of the catheter, is found insufficient to cause the dislodgment of the mucus from the tympanic cavity, it will be necessary to puncture the membrana tympani, and wash out the middle ear with a weak solution of bicarbonate, or sulpho-carbolate, of soda. Internally, the hydrochlorate of ammonia (grs. 20,) will be found very useful in purely catarrhal cases, and was much em-

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\* Practical Remarks on Throat and Ear Diseases: III. Treatment of Post-nasal Catarrh, in Relation to Deafness, by Lennox Browne, &c., &c. London: Baillière, Tindall, & Cox.



employed for the relief of tinnitus, dependent on this condition, by the late Mr. Hinton.

General constitutional treatment will be required in most catarrhal cases, and its nature must depend on the constitutional disposition of the patient.

The presence of foreign bodies in the eustachian tube is extremely rare. Their removal may, perhaps, be effected by reversing the action of the air-bag, and withdrawing air from, instead of forcing it into, the tube. Mr. George Field (*Medical Times and Gazette*, February 16, 1878), relates a case of a pin in the eustachian tube, which was got rid of by causing the patient to eat a quantity of bread and swallow it in large pieces.

The contraction of the tensor tympani and other intrinsic muscles of the middle ear, which so frequently results from long standing and neglected chronic catarrh, causes noises of a tidal character, due to "reflex irritation of the tensor tympani nerve, from the otic ganglion." (Woakes, *Lancet*, February 9, 1878). In these cases, as I have elsewhere remarked,\* "Faradism is a really valuable agent. Many cases have been treated in this way at the Central London Throat and Ear Hospital, by means of Stohrer's battery, with very marked good results. The current may be applied either direct to the membrane, or over the mastoid process. According to the experience of all practising at the Hospital, the latter method is quite as efficacious as the former, and much more agreeable to the patient. There cannot be the slightest doubt, that the application of the rheophore direct to the mem-

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\* The Treatment of Certain Forms of Tinnitus Aurium. *Medical Press and Circular*, August 1, 1877.



brane, be the current ever so weak, often causes very acute pain." Should the application of the current be found ineffectual in overcoming the inactivity of the muscles, the contracted tensor tympani must be divided, according to the method proposed and carried out by Weber-Liel.

When the tinnitus accompanies acute aural catarrh, and is combined with severe pain deep-seated in the ear, impairment of hearing, bulging of the membrane and vascular injection, with fever, the treatment must be antiphlogistic in its character. The continuous application of warm water poured into the ear, (not syringed) is one of the most efficient means of reducing the inflammation. Leeches to the tragus are also most valuable, and afford great relief to the pain. Poultices, if used, should be small enough to go into the canal, but they should not be employed if their use can be avoided. As soon as the acute symptoms have subsided, the middle-ear should be inflated by means of the eustachian catheter and Politzer's bag.

We now come to those cases in which the noises in the ears depend upon a congested condition of the blood-vessels in the labyrinth. The treatment of these is by no means unsatisfactory, and the majority of them will be relieved, if not cured, by the administration of hydrobromic acid in doses of 15 minims and upwards. The credit of the application of this remedy to these cases is due to Dr. Woakes, who called attention to it in the *British Medical Journal*, June 23rd, 1877. Subsequent experience of himself and others has tended to confirm the favourable opinion there expressed; and, as Dr. Woakes remarks in the *Lancet*, Feb. 9th, 1878, "the drug may claim the position of a specific remedy for congestive labyrinthine conditions, providing always the auditory apparatus be first relieved of any well-marked morbid process which, by its presence, might tend to keep up excessive vascular action." Numerous



cases have been treated with this drug by the writer and his colleagues, at the Central London Throat and Ear Hospital, and almost all have been attended with very marked success. Hydrobromic acid was first brought before the profession in this country by Dr. Milner Fothergill, in a communication to the *British Medical Journal*, July 8th, 1876. In that paper, based on an extended use of the remedy, Dr. Fothergill says, that hydrobromic acid obviates the headache caused by quinine, and is very useful in forms of excited cardiac action where there is general nervous excitability and nervous exhaustion. These facts seemed to indicate, what experience has shown to be true, that the drug would be of value in those forms of tinnitus which resemble the effects of cinchonism. A convenient form for the administration of hydrobromic acid is found in the jujubes made by Mr. Byatt Walker, each of which contains five drops of the remedy.

The cases of tinnitus due to causes outside the auditory apparatus are numerous. Much need not be said here, however, with regard to their treatment, as that resolves itself into the treatment of the condition giving rise to the symptom.

Any alteration in the condition of the neighbouring blood-vessels must be appropriately treated; anæmia, which is a very frequent cause of tinnitus, from the propagation of the "bruit de diable," as previously mentioned, will, of course, require iron, tonics, &c., according to the circumstances giving rise to it. In cases of excited cardiac action, causing increased flow of blood to the carotids, digitalis will be of use. Aneurism of the aorta and its branches must, of course, be treated according to recognised principles. The use of tobacco must be interdicted, where it seems to exercise any influence on the sounds. Where two classes of sounds coexist, the treatment must be directed to combat both the causes indicated. Where there is any sus-



picion of syphilis as the origin of the disordered condition of the brain or auditory nerve, iodide of potassium must be tried.

It is always of great importance to regulate the primæ viæ and keep the digestive organs in proper order. Disorder of the portal circulation is, perhaps, a more frequent cause of tinnitus than is sometimes supposed, and must be combated with the usual weapons familiar to all practitioners.

Having now briefly noticed the causes and treatment of the various forms of tinnitus, I will bring this paper to a conclusion. Before doing so, however, it may be as well just to give a list of the different kinds of noises, and the causes to which they are due, in order that cases coming under notice may be more easily differentiated and appropriately treated :—

KIND OF NOISE.	CAUSE.
1 Tidal, to and fro noises.	Chronic non-suppurative middle-ear catarrh, ending in undue contraction of intrinsic muscles.
2. Gurgling or bubbling noises.	The presence of fluid either in (a) The tympanic cavity; (b) The eustachian tube, the result of catarrh.
3. Constant, rushing noises.	Venous congestion of the labyrinth.
4. Pulsating noises.	(a) Extra-aural causes, aneurism, anæmia, &c. (b) Arterial congestion of the labyrinth.

This table is derived in part from one by Dr. Woakes, who has done much to throw light upon this subject. It will be seen that no mention is made in it of those forms of tinnitus



dependent upon causes in the external ear, and this is because such conditions are evident and visible to the observer.

In conclusion, I trust that this brief account may be of some little value as a contribution to aural surgery, and may provide the means of relief for some who are suffering from a most distressing, and often obstinate, affection.

FINIS.