An engraved representation of the anatomy of the human ear. To which are added surgical remarks ... and a synoptic table of the diseases of the ear. Exhibiting in one view the external and internal parts of that organ in situ / [Thomas Buchanan].

Contributors

Buchanan, Thomas, 1782-1853.

Publication/Creation

Hull [England] : T. Topping, 1823.

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AN

ENGRAVED REPRESENTATION

OF THE ANATOMY

OF

THE HUMAN EAR,

EXHIBITING IN ONE VIEW THE

EXTERNAL AND INTERNAL PARTS OF THAT ORGAN

IN SITU.

ACCOMPANIED WITH A PLATE OF OUTLINES AND REFERENCES,

WITH COPIOUS EXPLANATIONS.

TO WHICH ARE ADDED

SURGICAL REMARKS ON INTRODUCING THE PROBE AND CATHETER INTO THE EUSTACHIAN TUBE BY THE NOSTRIL—ON THE OPERATION OF PUNCTURING THE MEMBRANA TYMPANI—AND A SYNOPTICAL TABLE OF THE DISEASES OF THE EAR, THEIR CLASSIFICATION, SEAT, SYMPTOMS, CAUSE, AND TREATMENT.

THE WHOLE DESIGNED AS

A GUIDE TO ACOUSTIC SURGERY.

By THOMAS BUCHANAN, C. M.

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HULL:

PRINTED BY THOMAS TOPPING, LOWGATE.

SOLD BY LONGMAN, HURST & CO. PATERNOSTER-ROW, AND JOHN CALLOW, PRINCESS-STREET, LONDON; A. CONSTABLE & CO. EDINBURGH; AND BY THE BOOKSELLERS IN GENERAL.

1823.

TO

THOMAS MARSHALL, M. D.

DEMONSTRATOR OF ANATOMY

TO

THE UNIVERSITY OF GLASGOW;

THIS WORK

IS DEDICATED,

AS

A TOKEN OF ESTEEM AND GRATITUDE,

BY

HIS LATE PUPIL,

THE AUTHOR.

TO

THOMAS MARSHALL, M.D.

PROFESSOR OF ANATOMY

IN

THE UNIVERSITY OF CHICAGO;

THIS WORK

IS INSCRIBED,

AS

A TOKEN OF FRIENDSHIP,

BY

THE AUTHOR.

INTRODUCTION.

Of the many Plates of the Human Ear that have been published, there are few, if any, which give a correct representation of the relative situation of the parts.

Those of the late Mr. J. C. Saunders are the best: but even these shew only parts of the organ detached. This mode of information sometimes puzzles the Student, and by no means conveys so clear and accurate an idea of the Anatomical arrangement of the parts, as if the whole had been delineated in one view.

Aware of the great defect in the best Plates of the Ear, and to form a model for my future dissection, I cut a cranium so as to admit of an oblique view, from the Temple to the Tympanum; and with great care and perseverance was enabled to shew the whole of the organ, both externally and internally, from this aspect, and in connection with the surrounding parts.

This being attained, I procured the head of a male adult: after injection I proceeded to form a preparation on the model of the Cranium, and when finished took the drawing which is here represented.

In this Plate, part of the left side of the Frontal bone is taken away, with the greatest part of the squamous portion of the Temporal, and left of the Spheroid, with a considerable part of the Superior Maxillary and Ethmoid bones; forming an irregular section down to the Nostril.

From thence a horizontal section is formed, by cutting away all the parts between it and the lower edge of the Auricle, reaching as far back as the Eustachian Tube and Tympanum.

A considerable portion of the Pars Petrosum is cut off, to bring the Tympanum, Cochlea, Vestibule and Semicircular Canals into view. A section is likewise made of the Eustachian Tube and corresponding Nostril, and also of the Meatus Auditorius Externus; in order that the relative position of the parts may be as connected and distinct as possible.

The Portio Mollis and Portio Dura are thrown rather backwards, forming a very prominent figure when contrasted with the dark cavity of the interior of the Cranium. The excision likewise exposes part of the Mastoid Cells; thus giving a section of every part of the organ.

To render the two passages to the Tympanum as conspicuous as possible, a probe is shewn introduced through the left Nostril and Eustachian Tube, into the Tympanum; shewing the direction in which the instrument ought to be introduced. An instrument is also shewn passed through the Meatus Auditorius Externus, in the act of perforating the Membrana Tympani.

Collating the observations of the first Anatomists who have written on the subject, with upwards of 300 preparations of the organ now before me, I have endeavoured to give such a connected view of the parts, as I trust will not only be of advantage to the Student of Anatomy, but serve as a guide to the Young Practitioner in some of those operations which require an accurate knowledge of the parts, as well as precision and delicacy in the execution.

PART FIRST.

Containing Illustrations of the Plate of Outlines of the Anatomy of the Human Ear.

Authors who have written on the Anatomy of the Human Ear, have in general given a description of that organ under three heads, viz.

External,
Middle, and
Internal.

This arrangement seems to be warranted by the natural appearance of the parts on dissection, and is the one to which I shall adhere in the description of the annexed Plate.

CHAP. I.

A description of the External Division; comprehending the Auricle, Meatus Externus, and the Ceruminous Glands.

1. The External Ear, or Auricle of the Human subject, is of an oval shape, firmly attached to the Temporal bone, and projects upwards, backwards, downwards, and a little outwards.*

It is composed of cartilage, covered with the common integuments, supplied with blood by the Posterior Auris, a branch of the External Carotid Artery, and with sensation by the Auricular Nerve, a branch of the Inferior Maxillary, or third division of the fifth pair of Nerves.

* The Auricle is partially moved by three muscles, viz. the

Attolens Aurem,
Anterior Auris, and the
Retrahentes Aurem.

The Attolens, or Superior Auris is of a triangular figure; the broad and circular part of which arises from the tendinous part of the Occipito-frontalis muscle, and runs downwards to be inserted into the inner part of the Anti Helix. Its use is to elevate the Auricle.

The Anterior Auris is a delicate muscle arising near the Zygoma, runs backwards and is inserted a little above and behind the Helix. Its use is to draw the Auricle upwards and forwards.

The Posterior Auris is composed of three slips which run forwards, and is inserted into the inner part of the Concha. The use of this muscle is to draw the Auricle backwards and elongate the Concha.

It was thought needless to shew these muscles in the plate, as they are so well known to every Tyro in Anatomy.

The well-shaped Auricle is strongly marked with prominent ridges, and deep circular grooves, which communicate with the Concha, or central cavity. There is, however, considerable diversity in the shape and projection of the Auricle.

In some subjects we find the Fossæ and Eminences strongly marked, and the Auricle itself projecting so as to catch the sonorous rays, and convey them into the Concha; while in others we find it almost flat, with scarcely any depression, except around the Meatus. Persons whose Auricles are of this configuration are generally not so acute in hearing as those who have them more strongly grooved and elevated.*

The following are the ridges and depressions of the Auricle.

2. The Helex, or outer ridge may be traced from near the middle of the Concha, upwards and forwards, and then descending with a circular sweep, until it is lost in the lower part of the Auricle.

3. The Anti Helex, in figure, resembles the letter y, the crura of which are overlapped by the inner edge of the Helex, and forming a sweep downwards, (after the junction,) is lost in the Anti Tragus.

4. The Tragus is a prominence situated on the anterior part of the Concha, the base of which is on a line with the face.

It lies directly over the Meatus Auditorius Externus, and forms the anterior boundary of the Concha. It projects a little outwards, and in the male adult is usually full of strong hairs, which stretch across the cavity of the Concha.

* I have frequently met with cases of considerable diminution of hearing arising from the Auricles being tightly bound to the sides of the head,—it is almost needless to add that the patients were old females. In one or two cases the inner part of the cartilage of the Concha was depressed so as to choke up the Meatus. Hearing was partially restored by pulling the Auricles upwards into their proper situation. Tubes were proposed, but rejected from prejudice.

5. The Anti Tragus, is a cartilaginous eminence at the foot of the Anti Helex, and lies opposite to the Tragus.

6. The Scapha, a small depression, formed by the crura of the Anti Helix.

7. The Lobe is the soft pendulous inferior portion of the Auricle, which in all ages has been deemed worthy of decoration, especially by the females

The rude tribes who are destitute of the more precious metals, affix to it strings of the most beautiful shells, sharks' teeth, or such other ornamental articles as they can procure. Some of these gaudy Savages have by constant distention, enlarged the original puncture made in the Lobe, to an aperture of upwards of an inch in diameter.

8. The Cavitis Innominata, or furrow, which divides the Helex from the Anti Helex.

9. The Concha, the largest and most essential cavity in the Auricle.

It is said to have derived its name from its supposed likeness to the mouth of a trumpet, which in the early ages was of the figure of a shell. Into this Cavity the sonorous rays are collected, by means of the other parts of the Auricle, and transmitted from thence into the Meatus Externus.*

* Some Anatomists have described the following muscles as situate in the Auricle, viz. the

Tragicus,
Anti-tragicus,
Major Helicis,
Minor Helicis, and the
Transversus Auriculæ.

But as I have not yet been so fortunate as to discover their existence by dissection, I have omitted giving an account of their supposed origins and insertions.

10. The Meatus Auditorius Externus, or external tube of the Ear.

We have here a section of the tube, from the Tragus, to the Membrana Tympani; with a small slip of bone left to support the membrane. The tube describes part of the segment of a circle. The inferior part of the tube is nearly two lines longer than that of the superior, consequently the membrane, when in situ, reclines at an angle of nearly 45° from the perpendicular.

The cuticle which lines the passage is extremely thin: underneath the skin are numerous small glands, called the Glandula Cerumenosa, which pour their secretions into the tube. It is of a bitter, viscid quality, and has obtained the name of wax; it appears to be essential to the acute ear, as a diminution of this secretion is in general attended with a proportional diminution of hearing.

In some subjects, particularly in males, the tube is thickly set with hairs, which shoot across and defend the passage against insects and vermin. Those hairs are called the Pili Auriculares.

In the fœtus and young subject the Meatus Externus is very short; but in the well-formed adult it is of the size represented in the Plate.

11. The Osseous part of the Canal.

12. The Cartilaginous part.

13. The situation of the Glandula Cerumenosa.

14. Slip of bone left to support the Membrana Tympani.

CHAP. II.

A Description of the Middle Division, comprehending the Tympanum, Ossicula Auditus, Muscles, Mastoid Cells, Eustachian Tube, and the Foramina, situated in the Tympanum.

15. The Tympanum is of an oblong shape, and full of irregular depressions. It is lubricated by a thin secretion, furnished from a very vascular membrane, which lines the walls of the cavity, and passages adjoining.

The Tympanum communicates with the fauces by means of the Eustachian Tube, and with the Mastoid Cells, by one large, and several small openings; and is shut up from the External and Internal Divisions of the Ear, by the several membranes which will afterwards be described.

It is supplied with vessels by two small branches given off by the Internal Carotid Artery, by a branch of the Posterior Auris of the External Carotid, but chiefly by the Stylo Mastoidia, which enters by the Aqueduct of Fallopius and supplies the greater part of the cavities of the Internal Ear, besides sending numerous branches to the Tympanum.

As I have endeavoured to represent all the parts in their natural size, it is superfluous to state the measurement.

The use of the Tympanum is for the lodgment and security of the Ossicula Auditus, and muscles attached to these bones.

16. The Membrane of the Tympanum. It is composed of two layers of muscular fibres, which concentrate towards the point of the Malleus. It is covered with a reflection of the membrane which lines the Tympanum,---is concave externally, and convex internally. The manubrium of the Malleus is attached to the inner surface of the Membrane, nearly two-thirds of its diameter.*

17. The Eustachian Tube, or, Iter a palato ad aurem, is situated in the anterior part of the Tympanum and runs forwards, downwards, and inwards, into the fauces.

It is formed of osseous and cartilaginous substance, the extent of each is shewn in the Plate, by a single line of demarcation: the osseous part of the Tube being next the Tympanum. It is very narrow towards the extremity of the osseous portion, but enlarges gradually towards the fauces.†

18. The mouth of the Tube, which is situated almost on a line with the nostril, is considerably thickened and forms a labia around the orifice. The use of the Tube is to admit of the vibrations of the Membrana Tympani, by affording a passage to the air confined in the Tympanum when propelled by the vibratory motion of the Membrane.

19. The Mastoid Cells are numerous cavities chiefly situated in the Mastoid process.

* In several preparations of this Membrane, with minute injection, particularly one just now before me; it is encircled with a tolerable large Artery, which sends minute branches towards the centre, in the direction of the fibres.

† The Eustachian Tube,—first described, about the Year 1564, by the celebrated Bartholomew Eustachius, Professor of Anatomy to the Roman College; and hence its name.

They communicate with the Tympanum by one large and several small apertures, which are situated a little behind the Incus.

The Cells are lined with a reflection of the delicate membrane which supplies the walls of the Tympanum.

The size of the Cells are various; from one-tenth of a line, to nearly three lines in diameter.

The Ossicula Auditus, or bones of the Ear, are four in number, *viz.*

The Malleus,
Incus,
Os Orbiculare, and the
Stapes.

20. The Malleus, so called from a fancied resemblance to a Maul, is the small bone which is attached to the Membrane of the Tympanum.

This bone consists of the following parts, *viz.*

The Head,
Neck,
Processus Gracilis,
Processus Obtusus, and the
Manubrium.

The Head is of a globular figure, with an irregular surface on one side, where it is secured to the Incus.

The Neck is small, being scarcely a line in length, and joins the Head to the Manubrium.

The Gracilis is a long delicate process, which has its origin from the Neck, and when in situ, points horizontally, outwards, and forwards, and is secured by ligament to a small groove in the Temporal bone.*

This ligament has been described as a Laxator Muscle of the Membrana Tympani.

The Manubrium, or handle, forms part of the segment of a circle, but is rather more curved towards the point,---perhaps the frequent vibrations of the Membrane may conduce to accelerate the curvature.

The Manubrium projects a little behind the Neck, and this projection has been called the short process, or Processus Obtusus; from this process to the point, it adheres to the Membrana Tympani, to which it is secured by means of the Membrane which lines the Tympanum being reflected over the Membrana Tympani and the Manubrium; and by this means binds the handle of the Malleus to the Membrane. The head and neck is also secured by ligament to the adjoining parts of the bone.

21. The Incus derives its name from its resemblance to an anvil. The Malleus and Incus were discovered about the Year 1463, by Professor Achillini, a celebrated Physician of Bologna. The Incus consists of a body and two crura.

It has a small depression on the end of the head of the bone; into this depression part of the Head of the Malleus is received; and at the sides of the depression are two small eminences, which correspond to similar depressions on that part of the Malleus to which it is firmly secured.

The two Crura are unequal in length. The one which is short and thick stretches towards the Mastoid Cells, and is secured by a ligament

* This process was first discovered by Rau, and was from that circumstance called the Processus Ravianus.

in a small depression of the Tympanum, near the entrance of these cavities. On this short crus of the Incus, and the Gracilis Process of the Malleus, the Ossicula Auditus perform their motions.

The other crus, which is the longest, is more delicate and slender, runs downwards and inwards, becomes rather flattened, and is bent upwards towards the extremity, where there is a kind of fibular head, to which the Os Orbiculare is attached.

22. The Os Orbiculare is the smallest bone in the human body, being no larger in diameter than the thickness of a small pin. It is of a spherical figure though considerably flattened in some subjects.

Several eminent Anatomists deny the existence of this bone, and consider it as only a process of the long crus of the Incus.

This bone or process is situated between the Incus and the Stapes.

23. The Stapes, the base of which is inserted into the Finestra Ovalis, is broad, flat and oval, and rather concave on one side, to suit the inferior edge of the above Foramen.

From the base arise two crura, which, approximating in a circular manner, unite and form an exact representation of an inverted stirrup.

In no animal is the Stapes so elegant as in the human subject, the inside of the crura being beautifully grooved so as to unite strength with delicacy.

It is attached to the Os Orbiculare by ligament, and to the Finestra Ovalis by a membrane, which retains it in the aperture and at the same time admits of considerable motion.*

* This bone was first discovered by John Philip Ingrassias, a native of Sicily, and Professor in Naples; he graduated at Padua in 1537, and died in 1580, at the advanced age of 70.

The motions of the Ossicula Auditus, are effected by the vibrations of the Membrana Tympani, and regulated by the action of two muscles, *viz.*

The Tensor Membrana Tympani, and the
Stapedius.

24. The Tensor Membrana Tympani arises from the cartilaginous part of the Eustachian Tube,---the muscular part is concealed in a bony canal which runs in a line with the Tube, becomes tendinous as it enters the Tympanum, and is inserted into the upper part of the Manubrium of the Malleus.

When this muscle is in action, it pulls the Manubrium towards its origin, and by that means the Membrana Tympani is rendered more concave and tense.

25. The Stapedius. It arises from a cavity in the Petrous portion of the bone, and sends a small tendon through a little aperture to be inserted into the posterior part of the Stapes, a little below the junction of the crura.

The action of this muscle is to draw the Stapes obliquely towards its origin, and to modify the vibrations of the Ossicula Auditus.*

26. The Fenestra Ovalis is an irregular oval aperture leading into the Vestibule, and is destined for the reception of the broad plate of the Stapes: part of it is cut away. It is situated opposite to the Membrana Tympani.

* Some Anatomists have added two other muscles, *viz.* the
Externus Mallei, and the
Laxator Tympani.

The Externus Mallei is said to derive its origin from the spinous process of the Sphenoid Bone, and is inserted into the whole length of the Gracilis Process.

The Laxator Tympani is said to arise from the posterior and superior edge of the bony ring of the Tympanum, and is inserted into the handle of the Malleus.

The Fenestra Rotunda in the Human subject is an aperture considerably smaller than that of the Ovalis. It forms the entrance of the Scalæ Tympani, and in the recent state is closed by a membrane.

27. The Chorda Tympani may perhaps with propriety be termed a nerve of communication between the Portio Dura and the Lingualis.

It is given off by the Portio Dura in its passage through the Aqueduct of Fallopius, and enters the Tympanum through a small foramen in the upper and inner part of that cavity, it then crosses over the Manubrium of the Malleus to which it is attached near the junction of that process with the neck; and passing forwards, makes its exit from the Tympanum by the Fissura Glaseri and joins a branch of the Lingualis, which is a branch of the Inferior Maxillary, one of the divisions of the Fifth Pair of Nerves.

CHAP. III.

A description of the Internal Division, comprehending the Vestibule, Semi-circular Canals, Cochlea, and expansion of the Auditory Nerve.

The Internal Ear is frequently called the Labyrinth, from the intricate windings of its cavities.

It is situated in the centre of the petreous portion of the Temporal Bone, and has only two apertures leading into the Tympanum, the Fenestra Ovalis, and Fenestra Rotunda.

The Cavities are, the

Vestibule,
Semi-circular Canals, and the
Cochlea.

28. The Vestibule or Porch, is the centre of communication with the other parts of the Labyrinth, being situated between the Cochlea and the Semi-circular Canals.

It is of an irregular spherical form, and has two slight depressions, the one in the superior and the other in the inferior parts of the cavity. The inferior depression is called the Fovea Hemespherica, and the

superior one the Fovea Semi-elliptica,---They are separated by a small process or spine, which has been called Pyramis. In the Fovea Semi-elliptica there is an oblong transparent membranous bag, which is called theAlveus Communis. It is from this sac that the membranous semi-circular canals derive their origin.

The Fovea Hemespherica is filled with a globular sac, which contains its own proper fluid. Half of this globular sac lies in the Fovea, while the other half projects into the Vestibule to be attached to the Alveus Communis. This globular sac has been called the Saculus Sphericus.

There are eight Foramina in the Vestibule, *viz.* the

Fenestra Ovalis,
Scalæ Vestibuli,
Aquaductus Vestibuli, and the
Five Apertures leading into the Semi-circular Canals

The superior part of the Vestibule is extremely thin, formed chiefly by a cribriform plate of bone, through which the Fascicula of the Portio Mollis is transmitted.

The other parts of the parietes of the Vestibule are remarkably strong and thick, being situated in the centre of the Pars Petrosum; scarcely any blow short of destruction to the life of the individual can injure these parts so necessary to the existence of the Organ of Hearing.

The Semi-circular Canals are three in number, *viz.* the

Superior or Vertical,
Posterior or Oblique, and the
Exterior or Horizontal.

The Canals receive their respective names from their relative situation to the Vestibule.

29. The Superior Canal laid open, and shewn running over the Pars Petrosum.

30. The Exterior Canal entering the body of the same bone.

The Posterior Canal cannot well be shewn from this aspect, but the student may have a tolerably correct idea of its situation, when he is informed that its anterior entrance into the Vestibule forms one aperture in common with the Superior Canal, and that the Posterior Canal forms almost a circle instead of a semi-circle.

The other two canals form each nearly three-fourths of a circle, but the whole have received the name of Semi-circular Canals.

At the entrance of each of these canals there is a considerable enlargement, which is greater at one end of the canal than the other. It is called the Ampulla.

These three canals have only five apertures into the Vestibule, (the Oblique and Vertical having one entrance common to both,) although they are the largest. In the inside of the Osseous Canals are membranous tubes, arising from the Alveus Communis and attached to the Parietes by a delicate cellular membrane, which secures them in their situations and affords lodgment to the vessels that nourish these tubes or Membranous Semi-circular Canals.

At the commencement of the Membranous Semi-circular Canals the Tubes are considerably enlarged or dilated, and this enlargement has been termed the Ampulla.

Near the common opening of the Superior and Posterior Canals there is a small foramen which opens on the petreous portion of the bone, outwards and downwards from the Meatus Internus. It is called the Aqudæuctus Vestibuli.

31. The Cochlea,---so called from its resemblance to the shell of a snail. It is of a pyramidical shape, the base lying opposite the Meatus Auditorius Internus, and the apex pointing obliquely, downwards, outwards, and a little forwards.

The Cochlea consists of the Modiolus, Spiral Lamina and the Zona Mollis, which two last divide the cavity (which has been called by some the Spiral Tube) into the Scala Vestibuli and Scala Tympani.

32. The Modiolus is the osseous pillar, situated in the centre of the Cochlea, and arises from a thin concave cribriform plate of bone which forms part of the bottom of the Meatus Auditorius Internus.

It points downwards in the direction of the Cochlea, and consists of bone perforated with numerous tubes which gradually diminish in number towards the apex, on which is placed a hook-like process.

33. The Spiral Lamina is formed of two thin plates of bone which arise from the inside of the Vestibule, unite at the margin, and wind around the Modiolus, making two turns and a half around it and ending in the Humili or hook-like process, thereby forming a small hole or foramen of communication between the Scala Tympani and Scala Vestibuli.

The Spiral Lamina may be termed with propriety a process of the Modiolus, there being no line of separation between the two.

34. The Zona Mollis, a thin transparent membrane which connects the edge of the Lamina Spiralis to the parietes of the Spiral Tube forming a complete septum.

The one division of the Tube is called the Scala Tympani, and the other the Scala Vestibuli, which have no communication with each other except at the Apex, by means of the foramen formerly mentioned.

35. The Scala Vestibuli arises from the Vestibule, the superior part being formed by the Lamina Spiralis and Zona Mollis. A small foramen opens in the inside of the Scalæ, and piercing through the bone terminates just below the Meatus Internus. It is called the Aquæductus Cochleæ.

36. The Scala Tympani arises from a foramen in the Tympanum, called the Fenestra Rotunda. In the recent subject it is closed by a membrane, which is concave towards the Tympanum and convex towards the Cochlea, and by some authors is called the Tympano-Cochlear Membrane, and its use, they say, is to concentrate and transmit to the Cochlea the vibrations that are lost to, or may escape from the Ossicula Auditus.

May not the principal use of the Tympano-Cochlear Membrane be, to allow of vibratory motion in the Stapes; by yielding outwards from the Scalæ when the impulse of sonorous rays is given by the broad plate of the Stapes to the Liquor Labrinthi.

When the Membrana Tympani and the Malleus and Incus have been destroyed, the Tympano-Cochlear Membrane may then officiate as a substitute for the Membrana Tympani.

37. The Meatus Auditorius Externus, partly cut away; and the remainder seen filled with the Portio Dura and Portio Mollis. This

foramen is about four lines in length, and rather of an oblong circumference; especially at its entrance, where the greatest diameter is about two lines, and the lesser, about one line and a quarter. It runs outwards, and a little backwards; and at the bottom where it terminates in numerous foramina, is divided horizontally by an osseous ridge or spine, more prominent in some subjects than in others. In the superior division which is considerably smaller than the inferior, there are two small foramina and the beginning of the Aquæductus Fallopii,* which is destined for the reception of the Portio Dura. This nerve separates from the Portio Mollis near the ridge, and follows the course of the Aqueduct.

The parts of the Meatus that are inferior to the spinous ridge are pierced with numerous foramina, for the transmission of the Fasiculi of the Portio Mollis to the Vestibuli, Semi-circular Canals, and Cochlea.

38. The Portio Mollis and Portio Dura, seen entering the Meatus Auditorius Internus.

The Portio Mollis, or proper Auditory Nerve, derives its origin (according to Spurzheim) from the medullary streaks on the surface of the fourth Ventricle, and in its course towards the Temporal bone, is joined by the Portio Dura or Facial Nerve.†

They are united by a delicate cellular substance, which has received the name of Neurilema, and which binds also the fibres together; so that when they enter the Meatus Auditorius Internus, they appear to be only one nerve.

* So called from Gabriel Fallopius, Professor of Anatomy at Pisa, in the year 1548.

† The Portio Dura, according to the above Author, derives its origin from an angle formed between the Pons Varolii and Corpus Retiforme. In its passage through the Aquæductus Fallopii, it gives off two small branches, one to the Tensor Membrana Tympani, the other to the Stapedius, and then gives off the Chorda Tympani.

When the Portio Mollis arrives near the bottom of the Meatus, it separates from the Portio Dura and divides into several bundles of fibres. One of the largest of these bundles penetrates the cribriform plate of bone (which, covering the Vestibule, forms part of the bottom of the Meatus) and is divided into two portions; one of which first surrounds and then penetrates the Alveus Communis, and is expanded in a beautiful manner on the inside of the sac.

The other division of the fasciculus, penetrating in like manner the Ampulla of the superior and exterior canals, is lost in pulpy expansion before it reaches the more contracted parts.

One of the smaller bundles or portions of the nerve enters a small foramen, which is likewise furnished with a cribriform process, through which the fibres enter the Vestibule, and after embracing the Ampulla of the Posterior Canal, is expanded on the inside of the Membrane.

Another fasciculus or portion enters the Vestibule by a distinct foramen, and supplies the inside of the Spherical Sac with nervous pulp.

A very large bundle of Fibres enters the Modiolus, and penetrating this central pillar of the Cochlea, radiate outwards between the plates of the Lamina Spiralis until they reach the Zona Mollis, on which they are lost in a soft pulpy substance similar to the Retina.

The whole of the cavities of the Labyrinth are lined with a reflection of the membrane which is found in the Tympanum and Mastoid Cells.-- It seems to be of a peculiar texture and supplies the place of Periostum. It is supposed to secrete a clear pellucid fluid with which the Vestibule, Semi-circular Canals, and Cochlea are filled, and for that reason called the Liquor Labyrinthi.

This fluid preserves the sensibility of the delicate pulpy expansion in which the fibres of the Auditory Nerve terminate. It likewise preserves the tubes from collapsing, and must tend to accelerate the pulses of sound through the various intricate windings of the Labyrinth.*

*These illustrations are chiefly taken from the manuscript of my Lectures on the Anatomy and Physiology of the Organs of Vision and Hearing, delivered at Glasgow during the Session of 1815—16.

PART SECOND.

Surgical Remarks on introducing the Probe and Catheter into the Eustachian Tube by the Nostril, and on the operation of Puncturing the Membrana Tympani; and a Synoptical Table of the Diseases of the Human Ear, with their Symptoms, Cause, and Treatment.

It has been usual when describing the Anatomy of the Human Ear, to add, as a supplement, the general mode of Treatment of the diseases incident to the parts.

But there have been published of late, so many works on this subject, that it might be reckoned superfluous in me, to enlarge on all the various complaints to which this organ is liable; especially if nothing new could be adduced either in prevention or cure.

I have therefore in place of repeating the usual routine of practice, made only a few remarks on the mode of introducing the Probe and Catheter into the Eustachian Tube by the Nostril; and on the operation of Puncturing the Membrana Tympani; and have also added a Table of most of the Diseases which are known to affect the Ear, with their Symptoms, Cause, and Treatment, where the young practitioner may comprehend in *one view* the whole system of Acoustic Surgery.

CHAP. I.

Surgical Remarks on introducing the Probe and Catheter into the Eustachian Tube by the Nostril.

Before you attempt to introduce the Probe or Catheter through the Nostril into the Eustachian Tube, it would be advisable to make the experiment on the dried preparation, and then, if possible, on the recent subject; when you could give it the necessary curvature preparatory to its introduction into the *living subject*.

The experiment ought to be made on the same nostril and ear of the preparation or recent subject, as that on which you intend to operate.

When the Probe is just entering the mouth of the Tube, the operator ought to mark it slightly in a line with the tip of the Nose, and from this mark, measure off the length of the Tube outwards, and mark it likewise. These measurements will be of great use when you operate.

It would likewise be advisable to keep several Probes ready curved and marked, some for the *right* and others for the *left* ear; and they should be of various assortments, to suit the age or size of the head of the patient.

The great difficulty of introducing the probe into the Eustachian Tube through the nostril, is, the excessive irritability of the Schneiderian Membrane with which it is lined.

To overcome the disagreeable sensation produced by the introduction of foreign substances, it might be advisable to inject tepid water into the nostril, and at the same time dip the probe into Ol. Amygd. warmed to the temperature of the blood.*

Having got the patient seated conveniently, introduce the probe into the nostril, and when you approach with the first mark towards the tip of the nose, cautiously endeavour to find the mouth of the tube, by directing the knob on the end of the probe outwards, and rather upwards, until it has entered the labia.

Having entered the Tube, observe the distance of the second mark, and proceed in the same cautious manner until it is in a line with the tip of the nose, and feeling no resistance made to the probe you may conclude that it has entered the Tympanum.

But beware of farther introduction; for by rashly pushing the probe into the Tympanum, you might injure the mechanism of the Ossicula Auditus, which, besides putting your patient to great pain, would throw discredit on the operation.

If you wish to inject tepid water into the Tympanum, provide a slender silver catheter, which should not exceed in diameter from the point to the first mark,† that of the diameter of the knob of the probe.

It should gradually increase in size from the first mark, for about a quarter of an inch, in length, to the thickness of a crow quill, and then

* I have used this mode frequently, with great success; causing little or no irritation to the patient.

† The catheter is supposed to be marked and curved similar to the probe.

be of an equal diameter to the end. This equal portion of the catheter to be made with a male screw on the outside, to fit a round flat piece of silver with a female screw in its centre.

This flat piece of silver, which has been called a frontlet,* ought to have five or six holes in its edges, so that it may be secured in a proper position by means of a ribbon passed round the head and through two of the holes of the frontlet, the ends of the ribbon to be then brought backwards and tied behind.†

If the end of the catheter were made to fit the little silver syringe used in Fistula Lachrymalis, it would be both useful and economical.

Introduce the catheter in the same manner as the probe, and when the point has entered about half an inch into the tube, screw on the frontlet close to the tip of the nose; fasten it with the ribbon, and then inject the water through it with the syringe. The water used ought to be distilled, and by this means the pus or mucus in the Tympanum, will be held in solution, and be more easily evacuated than when precipitation takes place. It ought likewise to be heated to 94° Fahrenheit, but if a thermometer cannot be conveniently got, dip the hand into the water, and its temperature may be easily judged by the sensation produced on the back of the hand.

After the operation a saline purgative ought to be given, and if considerable irritation arise, venesection with antiphlogistic regimen to be

* When engaged with this part of the work, I was so fortunate as to read an excellent criticism on M. Itard's Acoustic Surgery, in the Edinburgh Medical and Surgical Journal; and the mode of preventing the catheter from slipping into the Tympanum by means of a frontlet, is taken from that valuable work. It is recommended there, to secure the frontlet, and *then* introduce the catheter; but I should prefer the above method. It is but justice however to mention, that in the original drawing which is the subject of this publication, taken before the announcement of M. Itard's work, the probe is shewn introduced as in the *Plate*.

† Or, an assistant might prevent the catheter from slipping into the Tympanum, and at the same time secure the head of the patient during the operation.

prescribed; and the patient confined to his room until all symptoms of inflammation have been subdued.

We have hitherto supposed that the case has terminated favourably; but if the operation should not succeed from some cause or other, and there is reason to suppose that the closure of the tube is not permanent, but merely from tumefaction or stricture of the parts arising from recent exposure to cold; the patient should then be bled with leeches near the Mastoid Processes, take Sulph. Magnes. in small doses, and afterwards be put on an alterative course, with blisters behind the Auricles. In the first instance the medicine might not have the desired effect, but, by persisting in this mode of treatment, tumefaction will decrease; the probe may again be tried, and if adhesion has not taken place to almost the length of the tube, it may with care and perseverance be rendered pervious.

CHAP. II.

Surgical remarks on the Operation of Puncturing the Membrana Tympani.

We will suppose that the attempt has been made to introduce the probe into the Eustachian Tube, through the nostril; but owing to stricture, adhesion, or other causes, the operation has repeatedly failed. That the patient is unable to inflate the Membrana Tympani, and remains deaf, or nearly so, and both patient and surgeon anxious to restore the organ to its healthy action, the operation of Puncturing the Membrana Tympani is then admissible.

For this purpose the surgeon ought to have an instrument (which I have called a Perforator) of the following description:---

The blade to be about three inches in length, of a quadrangular shape for about a quarter of an inch near the point; the other parts of the blade round, and increasing a little in thickness.

The sides of the quadrangular part to be ground equally and brought to a point; the shoulders of the edge, as they are called, to taper gradually, so as to be rather more than a line in length. The diameter of the quadrangular part should not exceed one fourth part of a line, but the

rest of the blade, especially near its insertion into the handle, to be about two-thirds of a line in diameter.

The handle to be octagonal, and made of mahogany stained black; about four inches in length, one line and a half in diameter near the blade, and increasing in thickness to about one line and two-thirds in diameter at the end.

If the blade were shorter the handle would require to be proportionably advanced towards the Meatus, which would almost block up the tube, or at least obscure the view of the Membrane, so that the surgeon would have to operate under considerable disadvantages: whereas, when the blade is of the above length, it will be in his power to observe the progress of the point of the perforator, and to act accordingly.

A room with a window fronting the south should be chosen for the place of operation; and the patient placed on a low seat, so that the rays of the sun may fall into the Meatus.

The Manubrium or handle of the Malleus will then be distinctly seen pointing downwards and inwards; occupying the superior half of the Membrana Tympani.

The surgeon being seated on a high chair, should lay his left hand on the head of the patient,* and with the right take hold of the instrument in the same manner as he would a pen when writing; he should then, cautiously and steadily, enter the point of the perforator into the Membrana Tympani, about half-way between the centre and its lower edge, and with the thumb and index finger give the instrument half a turn one way, and then half a turn the other, and in this manner gently push the point about a line through the Membrane.

* The head of the patient ought likewise to be secured by an assistant.

The operation will be performed with greater precision if the surgeon bring the thumb and index finger of his left hand nearly over the Meatus, and slightly grasp the perforator about the middle of the blade; by this means the point of the instrument will be kept steady, that is to say, from describing a circular evolution during the rotary motion necessary to *this mode* of puncturing the Membrana Tympani.*

It would be advisable to give a saline purgative immediately after the operation, and if painful sensations are felt in the parts, take sixteen ounces of blood from the arm, confine the patient to his room, and place him under antiphlogistic regimen, until the inflammatory symptoms are subdued and the parts restored to healthy action.

The *mode* of operating has been looked upon by many, as of little, or no moment; so much so, that there are no directions given in any modern system of Surgery, shewing in what manner the puncture ought to be made; and yet, it is the *mode alone* which has brought the operation into disrepute.

It is thought sufficient to introduce a sharp pointed instrument through the Membrana Tympani, that no injury is done to any of the Ossicula Auditus; and if the surgeon has been so fortunate as not to wound the Vascular Membrane of the Tympanum, he considers the operation as having been performed in a very superior manner. The patient connected again with the moral world by means of the *puncture*, is overjoyed at being so suddenly restored to hearing with so little pain or danger.

* If any objections are offered to this mode of operation, as being too complex and difficult to execute, owing to the unsteadiness of patients in general. The surgeon might then have a Perforator made of the same length and thickness as the above, but spear pointed similar to a lancet; the shoulders not to exceed $\frac{1}{40}$ of an inch in breadth; the handle ivory, with two or three black spots inserted, corresponding to the flat sides of the instrument. The operation might then be performed by a simple puncture, by the surgeon keeping the flat side of the Perforator opposite to the centre of the Membrana Tympani when he operates, and by this means the fibres will be cut across; but there will be more risk of the closure of the puncture than in the mode described above.

But in a little time his former complaint returns; which is at first attributed to cold, and this supposed indisposition he endeavours to get rid of as soon as possible,---but medicine has little effect;---the Meatus is then inspected, and *adhesion* of the sides of the *puncture* is found to have taken place.

The operation is again proposed, to which the patient perhaps submits.

The surgeon is now determined that the wound shall be large enough this time, and great havoc is made in the Membrane.

The *puncture*, or what may with propriety be now termed the *laceration*, is indeed rendered permanent; but the aperture is so large that the Membrana Tympani is injured for ever.

All this time the surgeon is perfectly satisfied with himself, that he has done all that can be done, and that however the Membrane may be injured and hearing partially lost, all came in a fair way, and no blame can be attached to him.

But in case the reader should suppose that this statement is overcharged, and that none but surgeons who have seldom an opportunity of dissection would treat the operation so slightly, I shall quote the opinion of the celebrated Mr. Saunders on this subject, and in his own words.*

'The operation' says he, 'is performed by passing an instrument into 'the Meatus, and *pushing* it through the anterior and inferior parts of 'the Membrana Tympani.'

And again, 'The only obstacle to the complete success of this punc-'ture is its tendency to close. For this reason it is often necessary to make

* See his Treatise on the Anatomy and Diseases of the Human Ear, page 43, edit. 1806.

'rather a large hole in the Membrane before you can insure the patient 'against the recurrence of the deafness. But a large hole diminishes the 'perfection of the sense. Tension is the state essential to the Membrana 'Tympani.'

'This tension is not diminished by a small perforation. But if the 'Membrana Tympani is much lacerated or detached at its circumference, 'the tension will be lessened; yet even then the patient receives a stri- 'king benefit. To this imperfection we must however submit, and I am 'inclined to think a larger opening expedient than what can be made by 'a *simple perforation* with the instrument proposed by Mr. Cooper.'*

There is no mention made here of cutting the fibres of the Membrana Tympani across, it is only a *simple* perforation, the same as might be produced by the puncture of a pin or common needle. But let us trace the sequel of this *simple* perforation.

'The following case which came under my own care,' says this celebrated Aurist, 'will illustrate what has been advanced respecting the '*closure* of the puncture.'

'Mr. G. K. had been deaf for thirty years. I could scarce make him 'sensible of what I addressed to him, even when I spoke directly into 'his ear in the loudest tone of voice. The deafness had succeeded the 'loss of a part of the palate by Syphilis. I had no doubt from the 'manner in which he became deaf that this was a case of obstructed 'Eustachian Tube. I placed him in the sun, and passing a probe to the 'anterior part of the Membrana Tympani, made a *simple perforation*.'

'A crack immediately ensued, and in the space of a few seconds

* Now Sir Astley Cooper.

'he heard distinctly the chirping of sparrows on a tree at a great 'distance.'

'In a word, his hearing was perfectly restored. In the space of three 'days his deafness returned, and at the end of a week I again punctured 'the Membrana Tympani with the same result. Before the end of a 'week the deafness recurred, and at the end of a fortnight I pierced the 'Membrana Tympani a third time with equal success.'

'The opening was now somewhat larger; but the deafness relapsed in 'a fortnight. I did nothing for a few weeks. Seeing no amendment, 'I passed a probe through the Membrana Tympani and *extended the* '*opening to the circumference.* He was again restored, but *not so perfectly* '*as before.* This opening I believe remains perfect at the present time.'*

Thus far Mr. Saunders in his valuable work on the Anatomy and Diseases of the Ear gives the result of a *simple puncture.* But, let us examine the structure of the parts to be operated upon, and we shall find that the Membrana Tympani is of an oval shape, and muscular,---and not only so, but that the fibres run in a peculiar direction from those of any other muscle,---from the circumference to the centre.

Hence it is, that when the operator thought he was *cutting*, he was only *separating* the fibres by the mechanical power of the instrument; and that the union which took place afterwards, was an effort of nature to restore the fibres to their original position and tone. To render this still more plain, let the muscle of a living animal be laid bare, and an incision made into it, in the direction of the fibres; and the parts afterwards left to nature.

Adhesion will take place in almost every instance. But let a muscle in a similar situation be cut across, and the fibres will immediately *retract* to an extent corresponding to the size of the wound.

* 1806.

The peculiarity of the mode of operation which I would recommend, is, to *drill* the perforation, and by means of the quadrangular point of the Perforator the fibres of the Membrana Tympani will be *cut across*---retraction take place---the wound assume an oval figure, and there will be less danger of a union of the parts taking place than in the common mode of operating by a simple puncture.*

It is for this reason I have been so particular in describing the Perforator and the manner of using it, in order that an operation the mode of which has hitherto been accounted of little or no moment, but which is of the utmost importance to the Patient,---should be performed in a manner agreeable to the *true* principles of Surgery.

* I have in several cases introduced the Probe through the Nostril and Eustachian Tube into the Tympanum, in the manner described in Chap. I. and likewise Punctured the Membrana Tympani with a quadrangular Perforator similar to the above, with success. The patients belonged to the Hull Dispensary for Diseases of the Eye and Ear.

I intend to lay the history of these cases before the public at some future opportunity.

A

SYNOPTICAL TABLE

OF

The Diseases

OF

THE HUMAN EAR,

WITH THEIR

CLASSIFICATION, SEAT, SYMPTOMS, CAUSES,

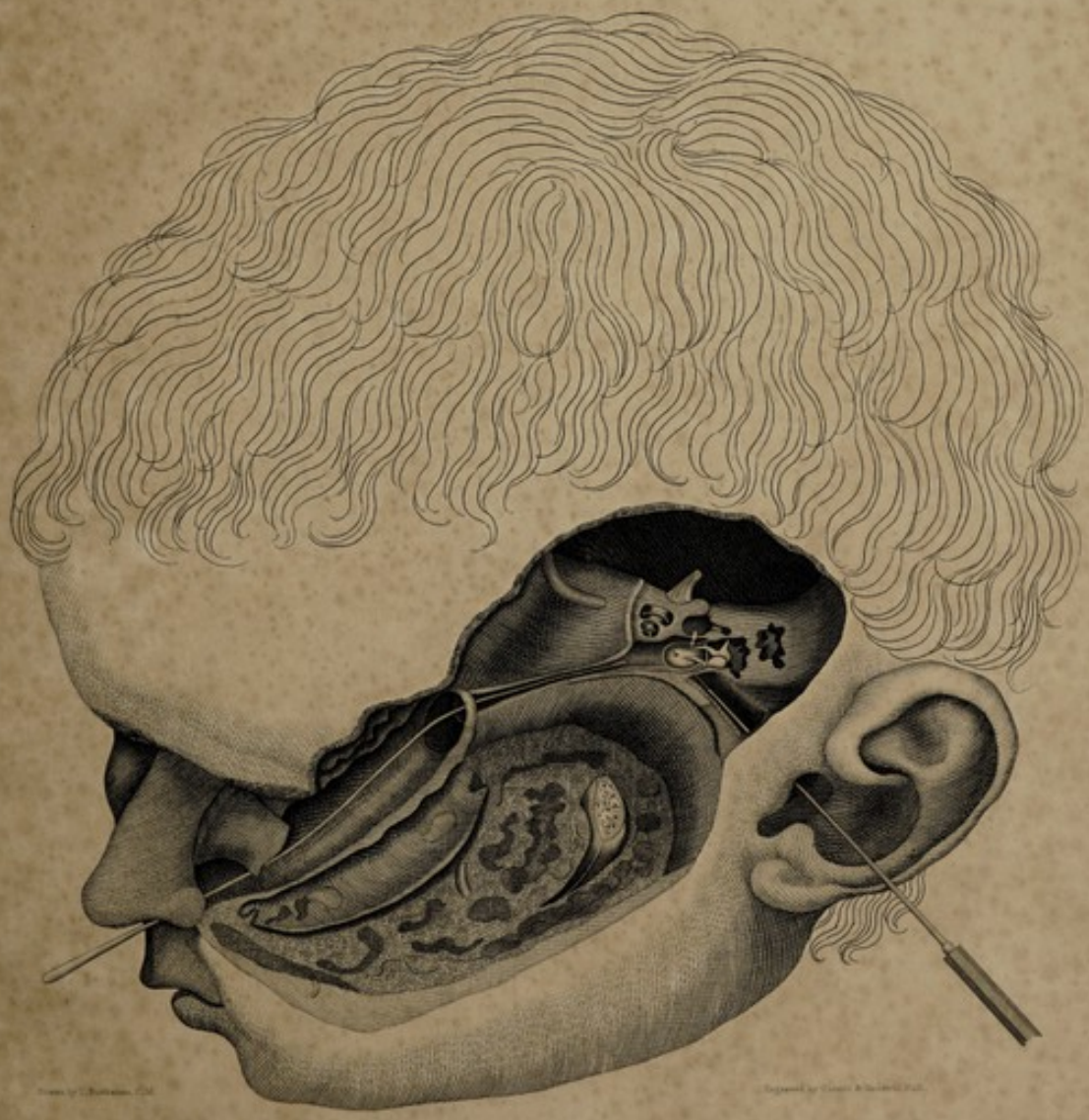
AND TREATMENT.

MORBI AURIS. DISEASES OF THE HUMAN EAR.

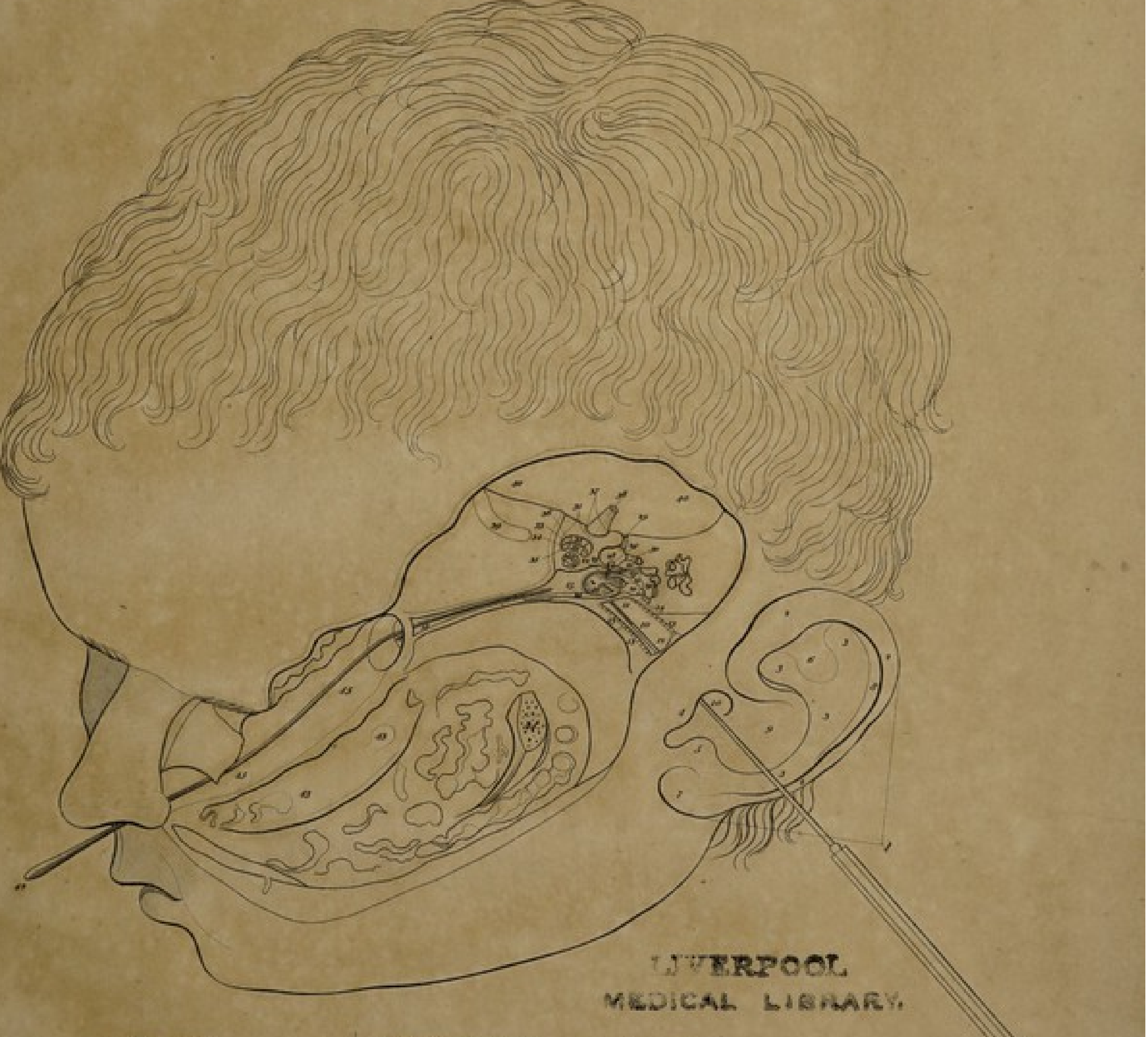
CLASSIFICATION.	SEAT OF DISEASE.	S
ORDER I. MORBI EXTERNI. Diseases of the External Division.		
GENUS I. DEFECTUM. The Auricle defective. Species—1. *Auricula Egena*, auricle wanting. 2. *Auricula Plana*, auricle flat and thin.	Auricle.	To h
GENUS II. IMPERFOSSUM. Imperforated Meatus Auditorius Externus. Species—*M. Deficiens*, meatus wanting.	Meatus Auditorius Externus.	The Meatus Aud which seldom occu
GENUS III. DEFORMATUM. Faulty shape of the Meatus Auditorius Externus. Species—1. *M. Perminutus*, meatus very small. 2. *M. Peramplus*, meatus very large. 3. *M. Tumidus*, cerumenous glands and integuments tumid and thickened.	Meatus Auditorius Externus.	Diminution of h tus very large—in parts.
GENUS IV. IMPEDITUM EXTERNUM. Obstruction of the Meatus Auditorius Externus. Species—1. Imped. *Extraneum*, from extraneous substances. 2. Imped. *Induratum*, from indurated wax. 3. Imped. *Polyposum*, from polypi. 4. Imped. *Excrescens*, from excrescences.	Meatus Auditorius Externus.	Sense of fulness, during mastication clashing noises—sc no acute pain—for polypi, when prese
GENUS V. IMPERFECTUM. Imperfect secretion of wax. Species—1. Im. *Quantitate*, in quantity. 2. Im. *Qualitate*, in quality. 3. Im. *Utrisque*, in both.	Meatus Auditorius Externus.	Diminution of h if deficient in quan cation.
GENUS VI. INFLAMMATUM EXTERNUM. Inflammation of the parts comprehended in the external division. Species—1. Inflammatio, *Auditu Permanente*, pain without diminution of hearing. 2. In. *Diminuta*, pain with diminution of hearing. 3. In. *Suppurata*, pain with diminution of hearing accompanied with discharge, from ulcerous eruptions.	Meatus Auditorius Externus.	Uneasy sensation pain—diminution noises—meatus son ed by a yellowish, discharge.
ORDER II. MORBI INTERMEDII. Diseases of the Middle Division.		
GENUS VII. INFLAMMATUM INTERMEDIUM. Inflammation of the parts comprehended in the middle division. Species—1. Inflammatio Internedia *Simplex*, pain, without diminution of hearing. 2. In. In. *Febrilis*, pain, with diminution of hearing and fever. 3. In. In. *Febrilis et Clausa*, pain, with diminution of hearing, fever, and closure of the Eustachian Tube. 4. In. In. *Purulenta*, painful sensations with puriform discharge from the Tympanum, great diminution of hearing and fever, sometimes accompanied with polypi or fungi.	Tympanum, sometimes Mastoid Cells.	Painful sensation cation—diminution —weight in the he na tympani, sometim ing of the membran fauces around the E the tonsils—Meatu ral state—obstruct ceration of the Me discharge—polypi the Tympanum—gr ceration of the M bloody purulent m
GENUS VIII. SPASTICUM. Spasmodic pain felt suddenly in the Tympanum. Species—Spasmus *Subitus*, sudden acute pain in the Tympanum.	Tympanum.	Severe pain fel
GENUS IX. IMPEDITUM INTERMEDIUM. Obstruction of the Eustachian Tube. Species—1. Im. In. *Ulcerosum*, from ulceration. 2. Im. In. *Adhæsum*, from adhesion. 3. Im. In. *Arctum*, from stricture. 4. Im. In. *Induratum*, from induration. 5. Im. In. *Polyposum*, from polypi.	Eustachian Tube.	Inability to infl deafness in the E companied with d
ORDER III. MORBI INTERNI. Diseases of the Internal Division.		
GENUS X. INFLAMMATUM INTERNUM. Inflammation of the parts comprehended in the Internal Division. Species—1. Inflammatio *Labyrinthi*, pain in the Labyrinth, deafness and fever. 2. Inflammatio *Labyrinthi, et Cerebri*, pain in the Labyrinth, Cerebrum, and its membranes, accompanied with total deafness and fever.	Labyrinth and sometimes extending to the Cerebrum.	Deep seated pain Auditus—shooting the Ear affected— strength—fever— delirium.
GENUS XI. INFIRMATUM. Debility of the Auditory Nerve without inflammation. Species—1. Infirmatum *Casum*, from decay. 2. Infirmatum *Violatum*, from injury (previous)	Portio Mollis.	Great diminutio ringing, rustling, noises—Membran inflate the membr
GENUS XII. INHABILE. Incapability of the Auditory Nerve for sensation. Species—1. Inhabile *Juvene*, congenital accompanied with dumbness. 2. Inhabile *Senile*, from decay, chiefly in very old subjects. 3. Inhabile *Violatum*, from injury.	Portio Mollis. sometimes also the Labyrinth and its membranes.	Deafness long co can be observed in injury, ulceration Tympani and Os followed by the Li

ical Table.

SYMPTOMS.	CAUSES.	TREATMENT.
seen on inspection.	Malformation—accident.	Acoustic Instruments.
torius Externus wanting: a case	Malformation—adhesion.	Sometimes remediable by operation, and wearing a tube until the parts are healed.
ring—meatus very small—mea- uration and thickening of the	Malformation—irritation—exposure to cold—scrophula.	If large, acoustic instruments to form artificial contraction—if small, dilatation, with tents or tubes to promote absorption—alterative course—decoction of sarsaparilla.
istention, and confused sounds partial diminution of hearing— times deafness—when from wax gn substances, excrescences, and can be seen on inspection.	Exposure to cold—irritation—scrophula —scurvy—injury done to the parts.	Extraneous substances to be extracted—if the obstruction be from wax, syringe with tepid water so as to force the wax outwards—if polypi extract—injections of nitras argenti—sulph. zinci—alterative course—extirpate the excrescences, and use astringent injections.
ring—dryness of the meatus— ty, rustling noise during masti-	Exposure to cold—scurvy—scrophula—languid or defective circulation in the parts.	Warmth—stimulants—blisters behind the auricles —alterative course.
n the meatus—sometimes acute hearing—herpetic eruptions— times red and swollen—succeed- riform, fetid, sometimes bloody	Exposure to cold—inflammation—injury done to the parts—scrophula—extraneous bodies—irritation.	Saline purgatives—leeches around the auricles—alterative course—blisters behind the auricles—injections of tepid water, astringents—suppositories in the meatus—decoctions of quassia—antiphlogistic regimen.
f tension, aggravated by masti- f hearing—hemicrania—noises —inflammation of the membra- es succeeded by chronic thicken- —tickling rough sensation in the Eustachian Tube—enlargement of Auditorius Externus in its natu- in the Eustachian Tube—ul- orana Tympani—puriform fetid fungi—ulceration of part of at diminution of hearing—ul- toid Cells, with discharge of er—deafness—fever.	Exposure to cold—scarlatina maligna—inflammation of the membrane lining the Tympanum and Mastoid Cells—violent noises, such as of a cannon, &c.—external injury—sometimes concussion.	Venesection—saline purgatives—leeches around the auricles—seton in the neck—alterative course very necessary when chronic thickening of the membrana tympani shall have taken place—blisters behind the auricles—injections of tepid water into the tympanum—extract the polypi or fungi—weak astringent injections—diaphoretics—antiphlogistic regimen from the beginning of the complaint—when considerable injury is done to the Ossicula Auditus, acoustic instruments are necessary.
uddenly in the Tympanum.	Exposure to cold—tooth ache—Neuralgia.	Venesection—saline purgatives—diaphoretics—suppositories in the Meatus Auditorius Externus—injections of tepid water—antiphlogistic regimen.
e the Membrana Tympani— affected—when congenital ac- bness.	Exposure to cold—inflammation—ulceration of the fauces—induration—polypi pressing on the mouth of the tube.	If the adhesion, induration, or stricture be only partial, or the effect of recent exposure to cold—venesection—sulph. magnes.—alterative course with blisters behind the auricles—then introduce the Probe through the Nostril and Eustachian Tube into the Tympanum. On repeated failure of which—puncture the Membrana Tympani with the Perforator in the manner described in Chap. II. Part II. of this work —extract the polypi.
deafness—discharge of Ossicula ains in the deep seated parts of naciation—great prostration of inclination to sleep—sometimes	From inflammation of the Middle Division improperly treated—from external injury—or concussion.	Apply the same treatment as in Inflammatum Intermedium, especially, seton in the neck, saline purgatives, venesection, leeches around the auricles, and antiphlogistic regimen.
of hearing—frequent noises— urmuring, beating, or hissing ympani whole—patient able to .	Exposure to cold—congestion from irregular circulation of the vessels of the auditory nerve—compression by tumour—effusion of blood or serum—concussion—distention by enlarged blood vessels.	Alterative course—blisters behind the auricles often repeated—saline purgatives long continued—seton in the neck—decoction of quassia and valerian—galvanism—stimulants—electricity.
nued—sometimes no alteration External Division—when from destruction of the Membrana ula—discharge of the Stapes r Labyrinthi.	Exposure to cold when under the influence of medicine—ulceration of the tympano-cochlear membrane—malformation of the labyrinth—alteration of the liquor labyrinthi—escape of the liquor labyrinthi—disorganization, sometimes induration, of the Portio Mollis.	Endeavour to alleviate distressing symptoms, for the Disease is INCURABLE.



An External and Internal View of the Organ of Hearing in Situ



1. The Auricle.
2. Helix.
3. Anti Helix.
4. Tragus.
5. Anti Tragus.
6. Scapha.
7. Lobe.
8. Cavitis Innominata.
9. Concha.
10. Meatus Auditorius Externus.
11. Osseous part of the Tube.
12. Cartilaginous part D^o.
13. Ceruminous Glands.
14. Slip of Bone.
15. Tympanum.
16. Membrana Tympani.
17. Eustachian Tube.
18. Mouth of D^o.
19. Mastoid Cells.
20. Malleus.
21. Incus.
22. Os Orbiculare.
23. Stapes.
24. Tensor Membrana Tympani.
25. Stapedius.
26. Fenestra Ovalis.
27. Chorda Tympani.
28. Vestibule.
29. Superior Semi-Circular Canal.
30. Exterior D^o.
31. Cochlea.
32. Modiolus.
33. Lamina Spiralis.
34. Zona Mollis.
35. Scala Vestibuli.
36. Scala Tympani.
37. Meatus Auditorius Internus.
38. Portio Mollis & Portio Dura.
39. Internal Carotid Artery.
40. Cavity of the Cranium.
41. Perforator.
42. Probe.
43. Part of the Superior Maxillary.
44. Cervix of the Inferior D^o.
45. Left Nostril.

Hull, Published as the Act directs, by the Author T. Buchanan, C.M. 1823.