



Property of:

Learning Resources Center
Bio-Information Center
CREIGHTON UNIVERSITY
28th & Burt Street

The Organ of Hearing

(*Organon auditus*)

The hearing apparatus as a whole is divided into external, middle, and internal ear.

The external ear consists of the auricle, the external auditory meatus and the drum membrane.

To the middle ear belong the tympanic cavity, the cells of the mastoid process and the Eustachian tube.

The internal ear consists of the osseous and the membranous labyrinth.

The external Ear

Auris externa

The auricle, consisting mainly of cartilage, and covered by skin, forms the infundibular entrance to the external auditory meatus, which is closed internally by the drum membrane.

I. Auricle, *Concha auricularae*

1. **Helix**, *Helix*
2. **Scaphoid cavity**, *Scapha*
3. **Anthelix**, *Anthelix*
4. **Crus of the anthelix**, *Crura anthelicis* and between them
5. **Triangular fossa**, *Fossa triangularis*
6. **Tragus**, *Tragus*
7. **Antitragus**, *Antitragus*
8. **Intertragical incision**, *Incisura intertragica*, between 6 and 7
9. **Lobule of the ear**, *Lobulus auricularae*
10. **External auditory meatus**, *Meatus acusticus externus*, which consists of a cartilaginous and an osseous portion, containing the ceruminous glands.
11. **The drum membrane**, *Membrana tympani*, closing up the external auditory meatus, forms the septum between external and internal ear. It is stretched over
12. **the tympanic annulus**, *Anulus tympanicus*, which is separated before birth only, and grows together soon after with the other bones.
13. **Arteries of the drum membrane**, branches of the deep auricular artery,

Arteria auricularis profunda. The middle and the internal ear are hidden in the petros portion of the temporal bone – one part of the temporal bone, *Pars petrosa*. In order to make it visible, the bone has to be chiseled up.

On the surface of the petros portion of the temporal bone are to be seen:

14. The arcuate eminence, *Eminentia arcuata*, which is situated in the upper semicircular duct of the labyrinth.
15. The pyramid
16. The internal carotid artery, *Arteria carotis interna*, appearing in the carotid canal, *Canalis caroticus*.

On the backside of the petros portion of the temporal bone:

17. The internal auditory meatus, *Meatus acusticus internus*

On the lower side of the petros portion of the temporal bone:

18. The stylo-mastoid foramen, *Foramen stylomastoideum*
19. The styloid process, *Processus styloideus*
20. The jugular fossa, *Fossa jugularis*
21. The internal carotid artery, *Arteria*

carotis interna, entering the lower orifice of the carotid canal.

After removing the upper part of the petros portion of the temporal bone

The middle ear

Auris media
can be seen.

22. The tympanic cavity, *Cavum tympani*, is lined with mucous membrane.
23. Position, where the Eustachian tube, *Tuba auditiva*, enters the tympanic cavity
24. Ostium of the Eustachian tube, *Ostium tympanicum tubae auditivae*
25. Malleus, *Malleus*
 - a) Head of the malleus, *Caput mallei*
 - b) Manubrium, *Manubrium mallei*
 - c) Lateral process, *Processus lateralis*
26. Anvil, *Incus*
 - a) Short crus, *Crus breve*
 - b) Long crus, *Crus longum*
27. Stapes, *Stapes*
 - a) Head of the stapes, *Caput stapedis*
 - b) Crus, *Crus*
 - c) Base of the stapes, *Basis stapedis*

28. **Lentiform nodule of incus**, *Processus lenticularis*
29. **Cord of the tympanum**, *Chorda tympani*, nerve fibre connecting the facial and the lingual nerve.
30. **Tensor tympani muscle**, *Musculus tensor tympani*, passing to
 c) **the malleus**.

The internal ear or Labyrinth
Auris interna, Labyrinthus osseus

The most important part of the auditory organ consists of a bony capsule and of a membranous structure, the so-called membranous labyrinth. The bony labyrinth which is enclosed in the petros portion of the temporal bone, consists of 3 parts: the vestibule, the semicircular canals, and the cochlea.

31. **The vestibule**, *Vestibulum*, opened, forms the union of the semicircular canals and the cochlea.
32. **The oval window**, *Fenestra vestibuli*, which is closed by the stapes, leads into the vestibule.
33. **Promontory**, *Promontorium*
34. **The cochlear window**, *Fenestra*

- cochleae*, is closed by a delicate membrane, the second drum membrane, and leads to the cochlea.
35. **The external semicircular canal**, *Canalis semicircularis lateralis*, with entrance a
 36. **The upper semicircular canal**, *Canalis semicircularis anterior*, with entrance b
 37. **The posterior semicircular canal**, *Canalis semicircularis posterior*, with entrance c.

The entrances a, b, and c are enlarged and are called ampullae.

38. **The cochlea**, *Cochlea*, is a spiral passage of 2 ½ turns:
 - a) **Basal turn**
 - b) **Middle turn**
 - c) **Top turn**
39. **The osseous spiral lamina** *Lamina spiralis ossea*, separates the cochlear duct into 2 *scalae*.
40. **Scala of the tympanum**, *Scala tympani*, which is connected with the tympanic cavity by the cochlear window.
41. **Scala of the vestibule**, *Scala vestibuli*, which is connected with the

vestibule.

The inner surface of the osseous labyrinth is loosely connected with the membranous labyrinth by fine connective tissue strands, enclosing a small amount of liquid, perilymph, *Perilympa*, which surrounds the membranous labyrinth. Inside the membranous labyrinth there is also a liquid, the endolymph, *Endolympha*. The membranous labyrinth consists of 2 small sacs, lying in the vestibule:

42. **The saccule**, *Sacculus*
43. **The utricle**, *Utriculus*, wherein a small amount of ear-stones, otoliths, *Otolithi*, is visible.
44. **The semicircular ducts**, *Ductus semicircularis*, are connected with the utricle, ending in **membranous ampullae**, *Ampullae membranaceae*.
45. **The acoustic nerve**, *Nervus stato-acusticus* (*Nervus octavus*) coming from the brain, passes through the internal auditory meatus (17) to the labyrinth.
46. **One branch**, the vestibular branch, *Pars vestibularis*, passes around the vestibule and the auditory canals,
47. **The other**, cochlear branch, *Pars*

cochlearis, penetrates the cochlea in several branches.

48. **The facial canal**, *Canalis facialis*, continues over the labyrinth and the tympanic cavity to the exit at the stylo-mastoid foramen (18).