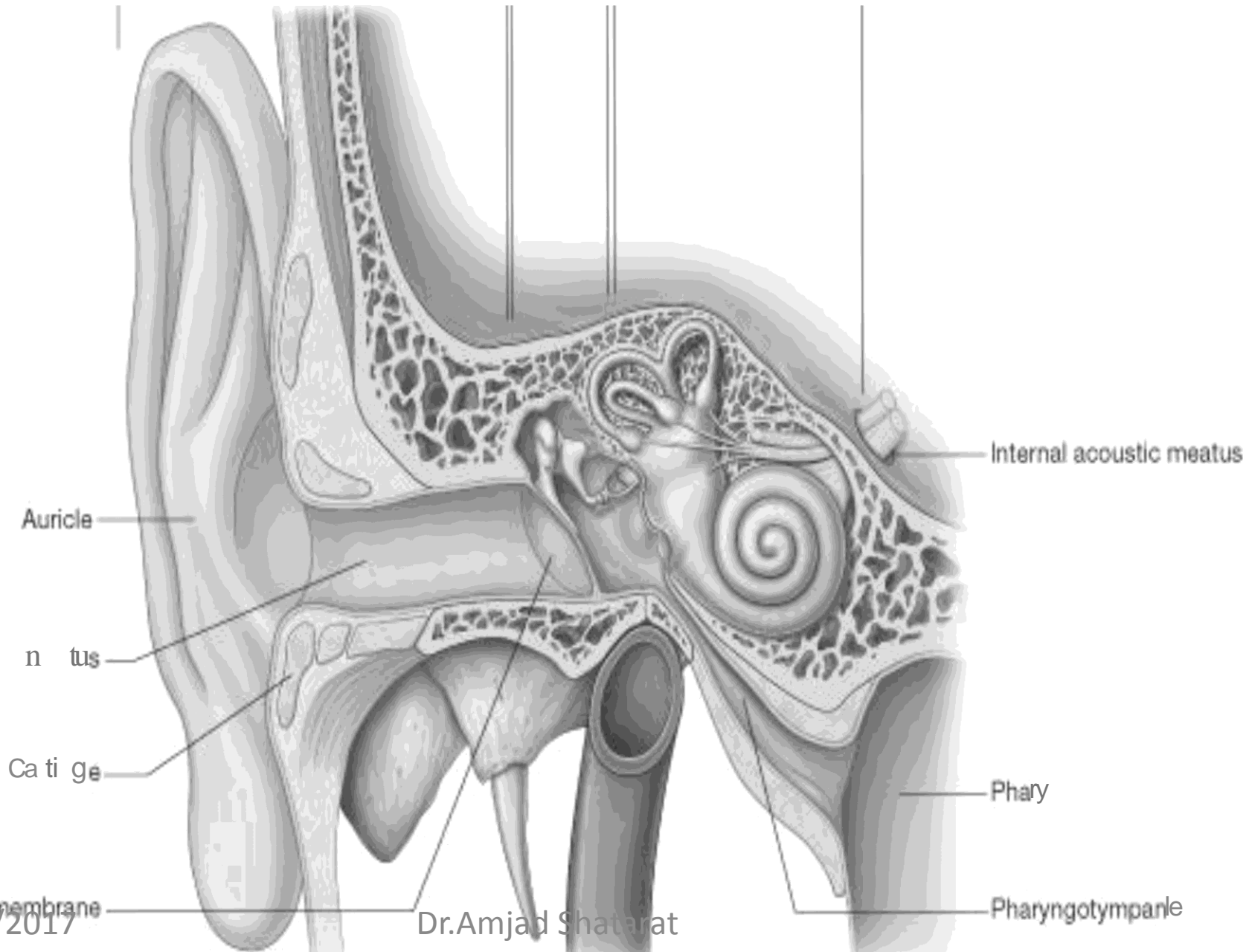


External ear

Middle ear

Internal ear



08/03/2017

Dr. Amjad Shatarat

1-THE EXTERNAL EAR

Made of

A-**AURICLE** (PINNA)

B-EXTERNAL AUDITORY MEATUS

A-AURICLE

It consists of:

A-Skin

B-a thin plate of elastic cartilage
adherent to perichondrium on lateral
surface ...risk for hematoma

*(except the lobule, which is
devoid of cartilage)...best for
earrings*

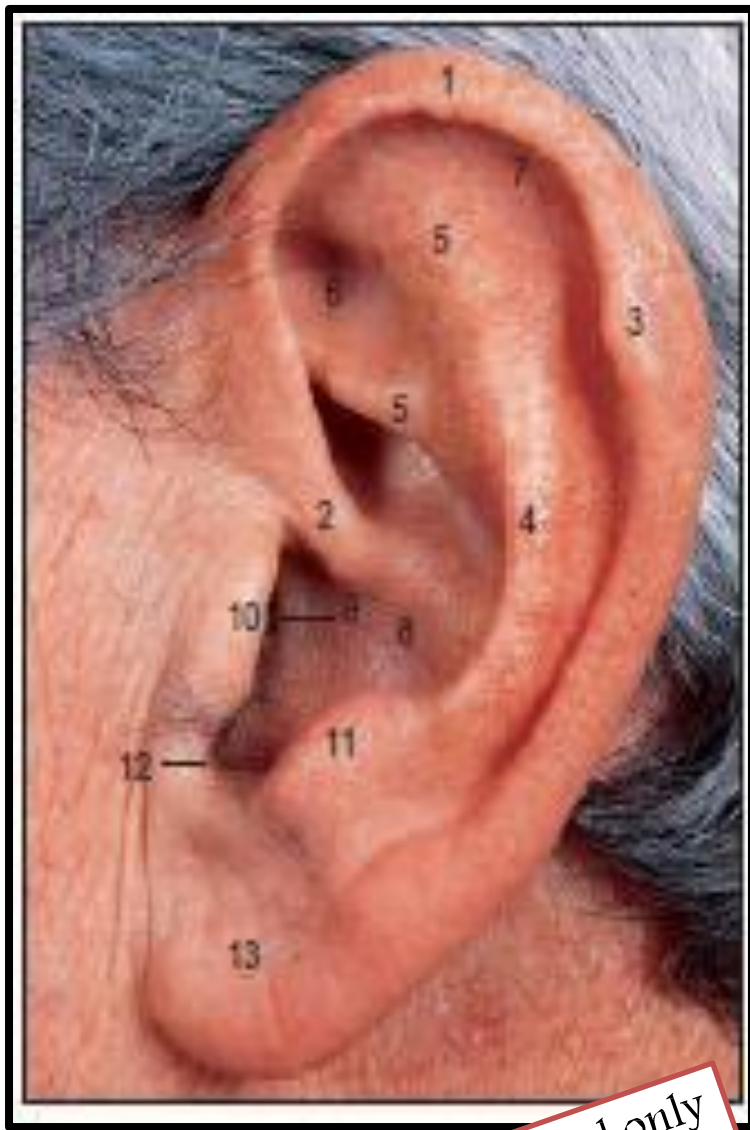
3-It possesses both extrinsic and
intrinsic muscles, which are

supplied by

the facial nerve.

Important names





1. Helix.
2. Crus of helix
3. Auricular tubercle.
4. Antihelix.
5. Crura of antihelix.
6. Triangular fossa.
7. Scaphoid fossa.
8. Concha of auricle.
9. External acoustic meatus.
10. Tragus.
11. Antitragus.
12. Intertragic notch.
13. Lobule of auricle.

Prominent ears (also known as 'bat' ears) are caused by the absence or inadequacy of an antihelical fold.

Read only

Anotia is complete absence of the external ear, and is most likely caused by a developmental disturbance between the seventh and eighth gestational week.

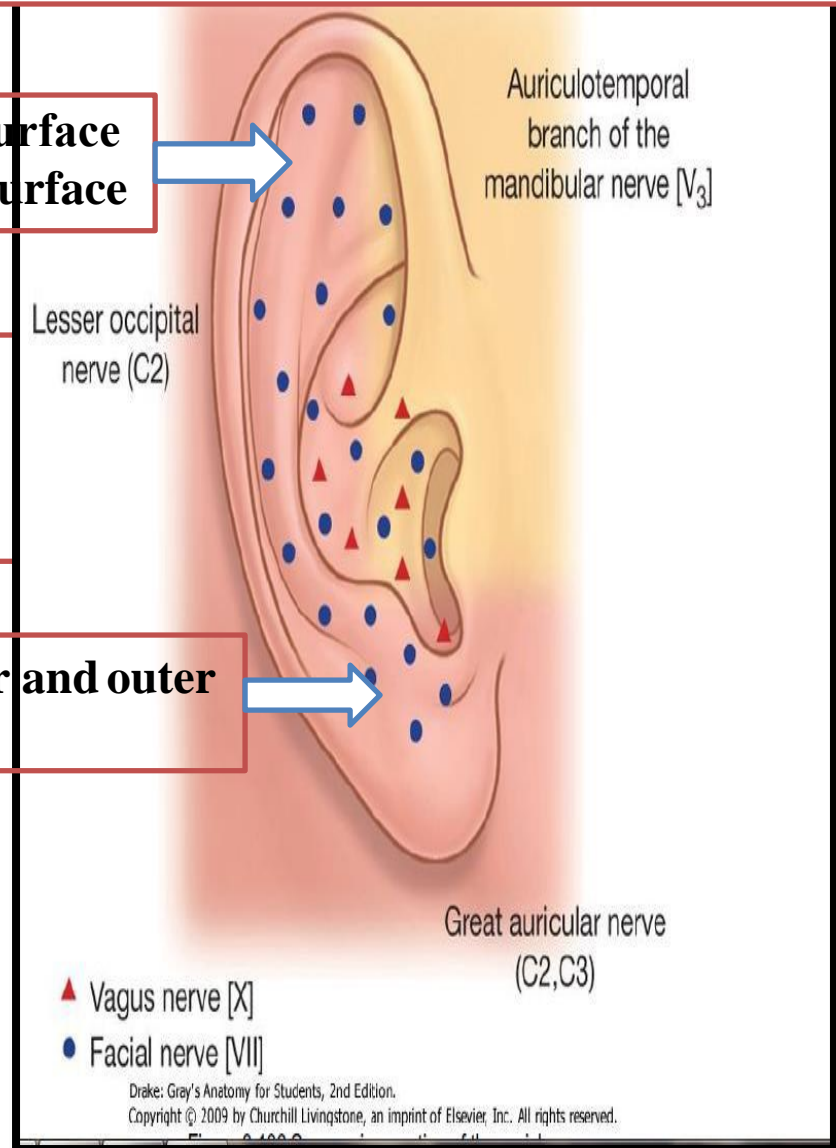
The sensory innervation of the auricle is **complex** and not fully determined. This is perhaps because the external ear represents an area where skin originally derived from a **branchial** region meets skin originally derived from a **postbranchial** region.

Auriculotemporal nerve: upper ½ of the outer surface
Lesser occipital nerve: the upper ½ of the inner surface

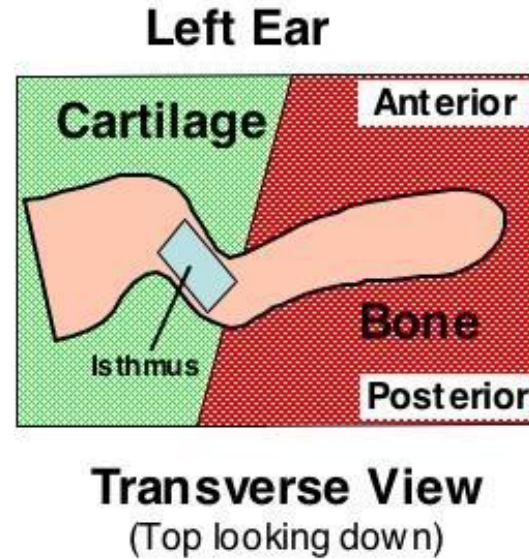
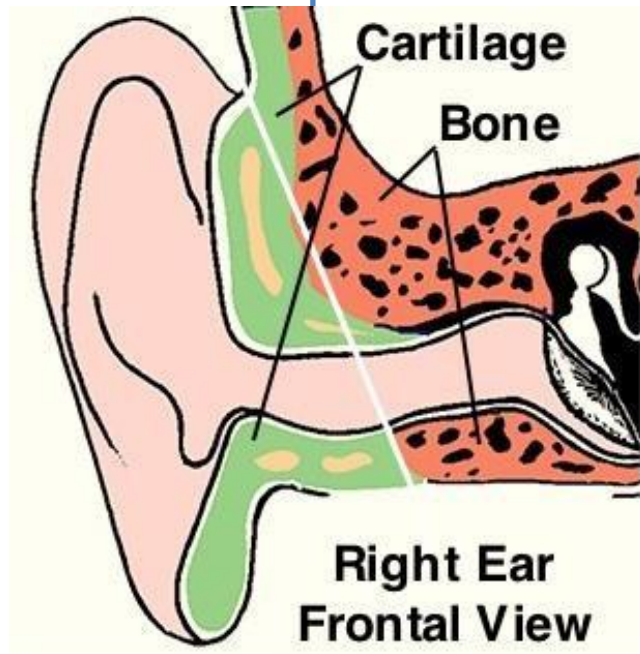
Auricular branch of vagus
supplies an area on the inner
surface

Great auricular nerve: the lower ½ of both inner and outer surfaces

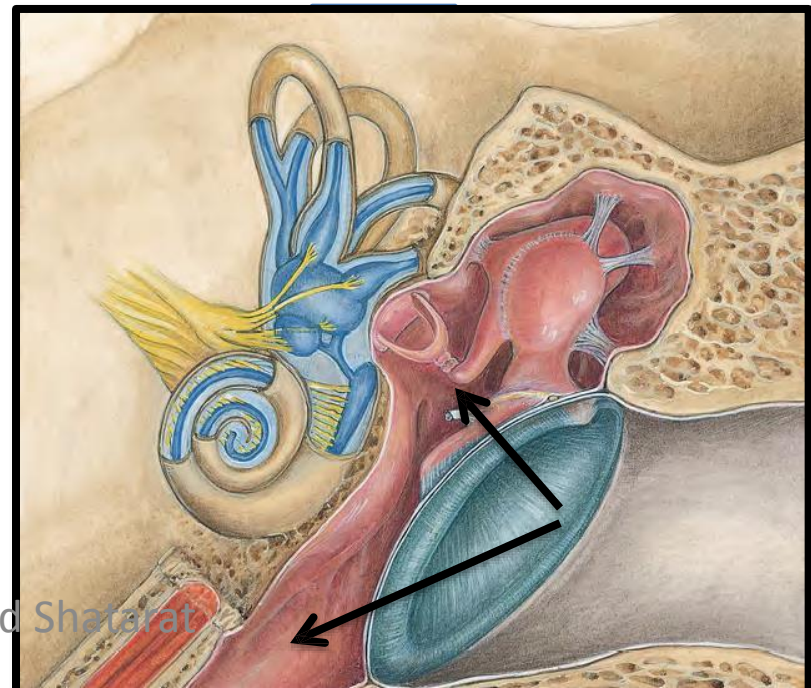
Notice the involvement of the cranial nerves (vagus and Auriculotemporal branch of mandibular nerve) in the innervation of the Auricle



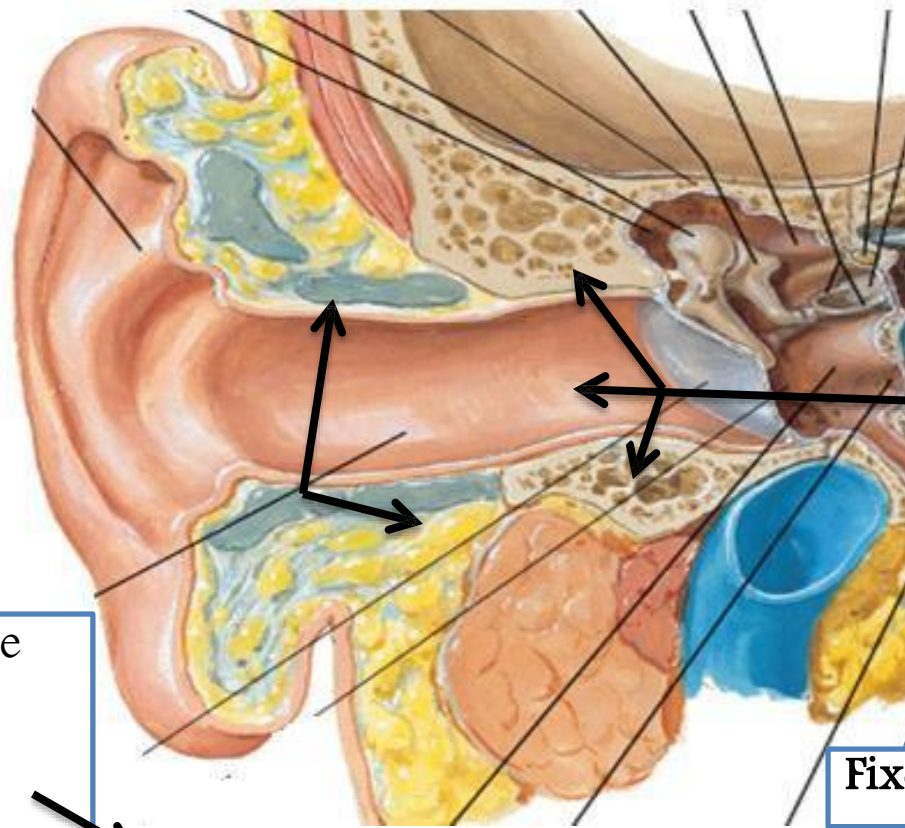
B-The external auditory meatus



the adult the external meatus is about 1 in. (2.5 cm) long and is narrowest about 0.2 in. (5 mm) from the tympanic membrane



The meatus is lined by skin,
and its outer third is provided with hairs and sebaceous and ceruminous glands. secrete a yellowish brown wax



➤ The outer third of the meatus is **elastic cartilage**
) directed upwards and backwards

Mobile

➤ The inner two thirds is **bone**
formed by the tympanic plate)directed downwards and forwards).

Fixed

Opposite

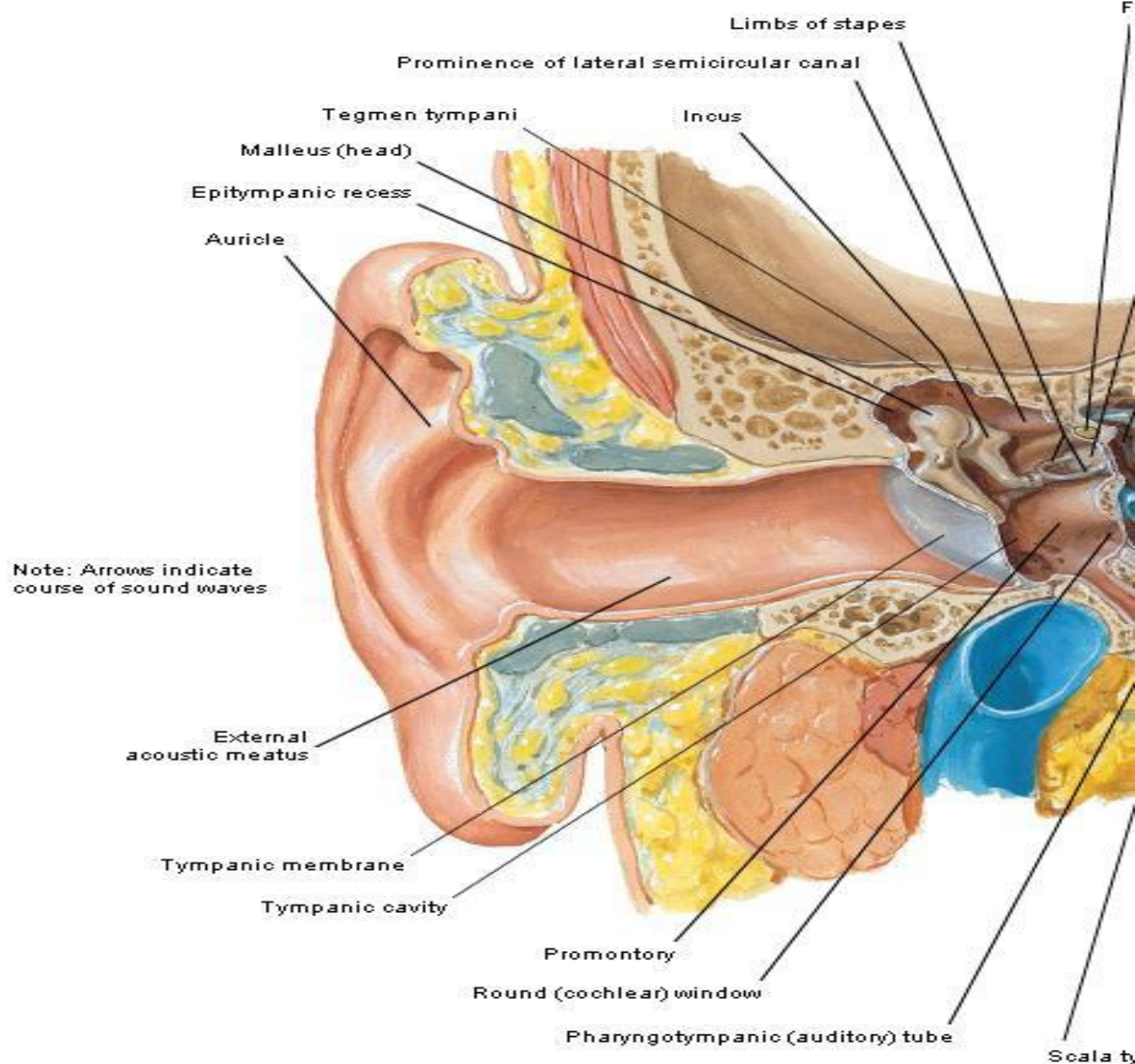
Move the mobile part to make meatus straight

Clinical Notes

Tympanic Membrane Examination **Otoscopic**

examination of the tympanic membrane is facilitated by first straightening the external auditory meatus by gently pulling the auricle **upward and backward in the adult,**

And



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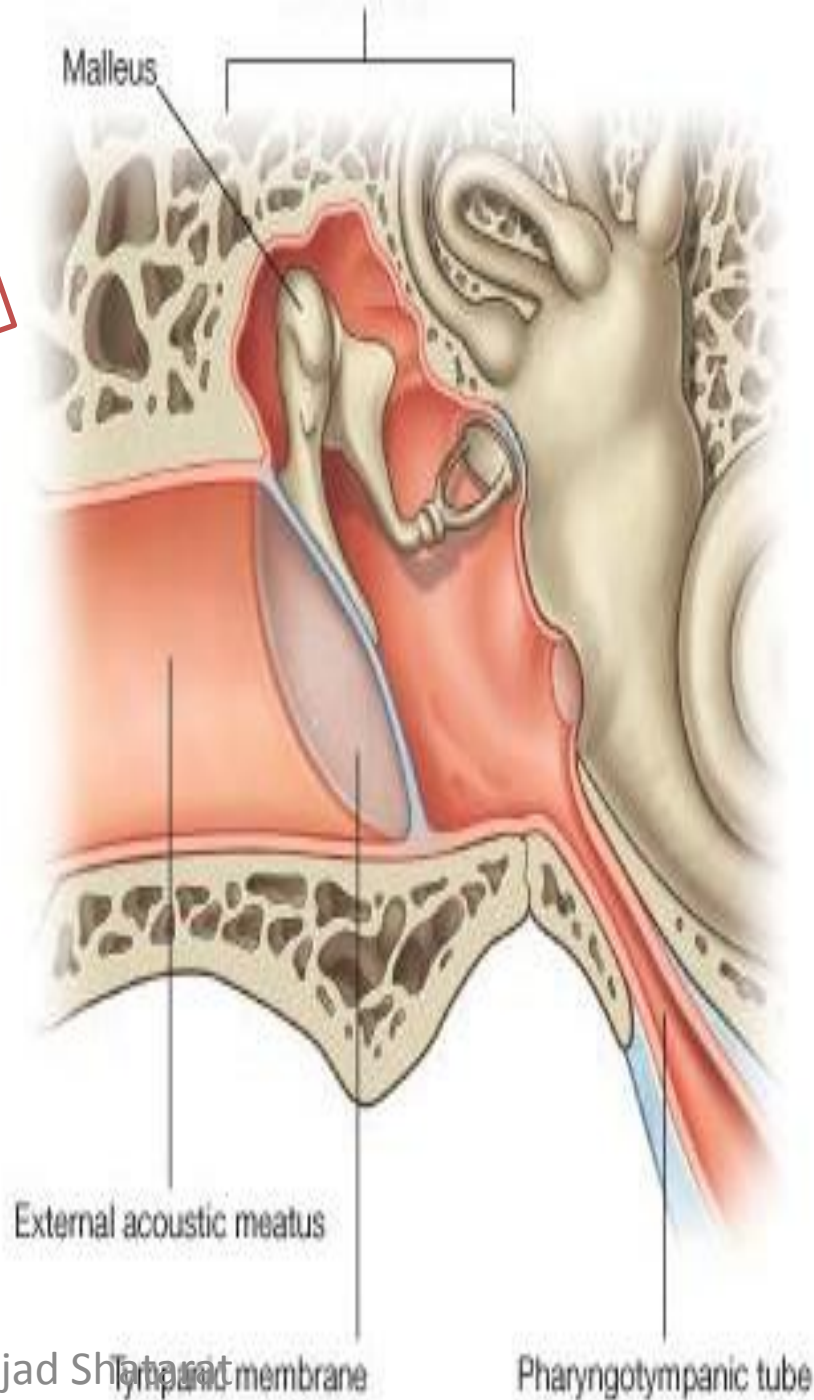
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straight backward or backward and downward in the **infant**

Middle Ear (Tympanic Cavity)

It is a narrow, oblique, slitlike cavity whose long axis lies approximately parallel to the plane of the tympanic membrane.

- The middle ear has
 - ROOF
 - FLOOR
- ANTERIOR WALL
- POSTERIOR WALL
- LATERAL WALL
- MEDIAL WALL



The lateral wall

Is a thin, **fibrous membrane**

➤ The membrane *is obliquely placed, facing downward, forward, and laterally*

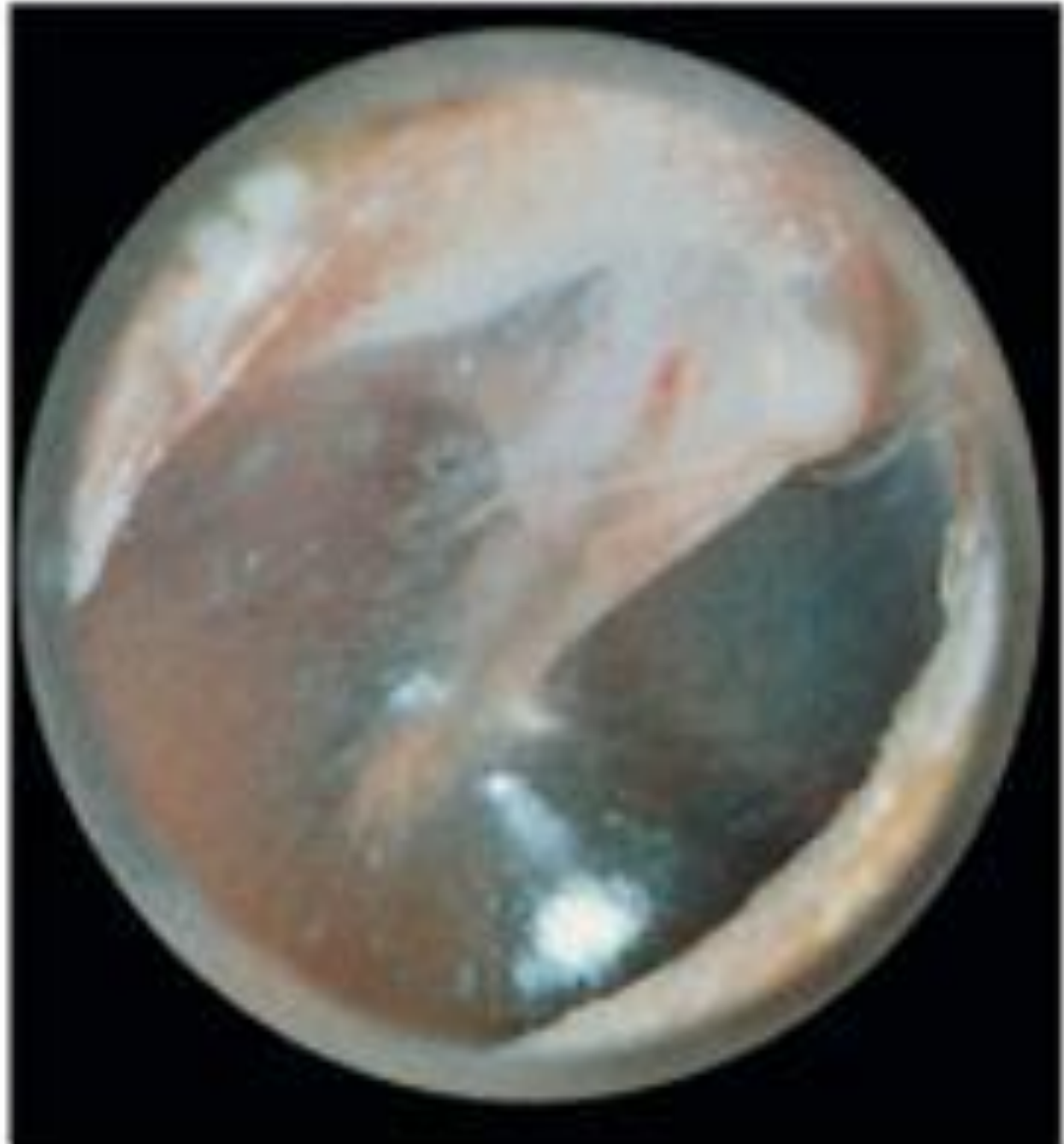
➤ Is formed of:

1-An outer layer;
skin

2-Middle layer;
fibrous tissue

3-Inner layer ;
mucous membrane

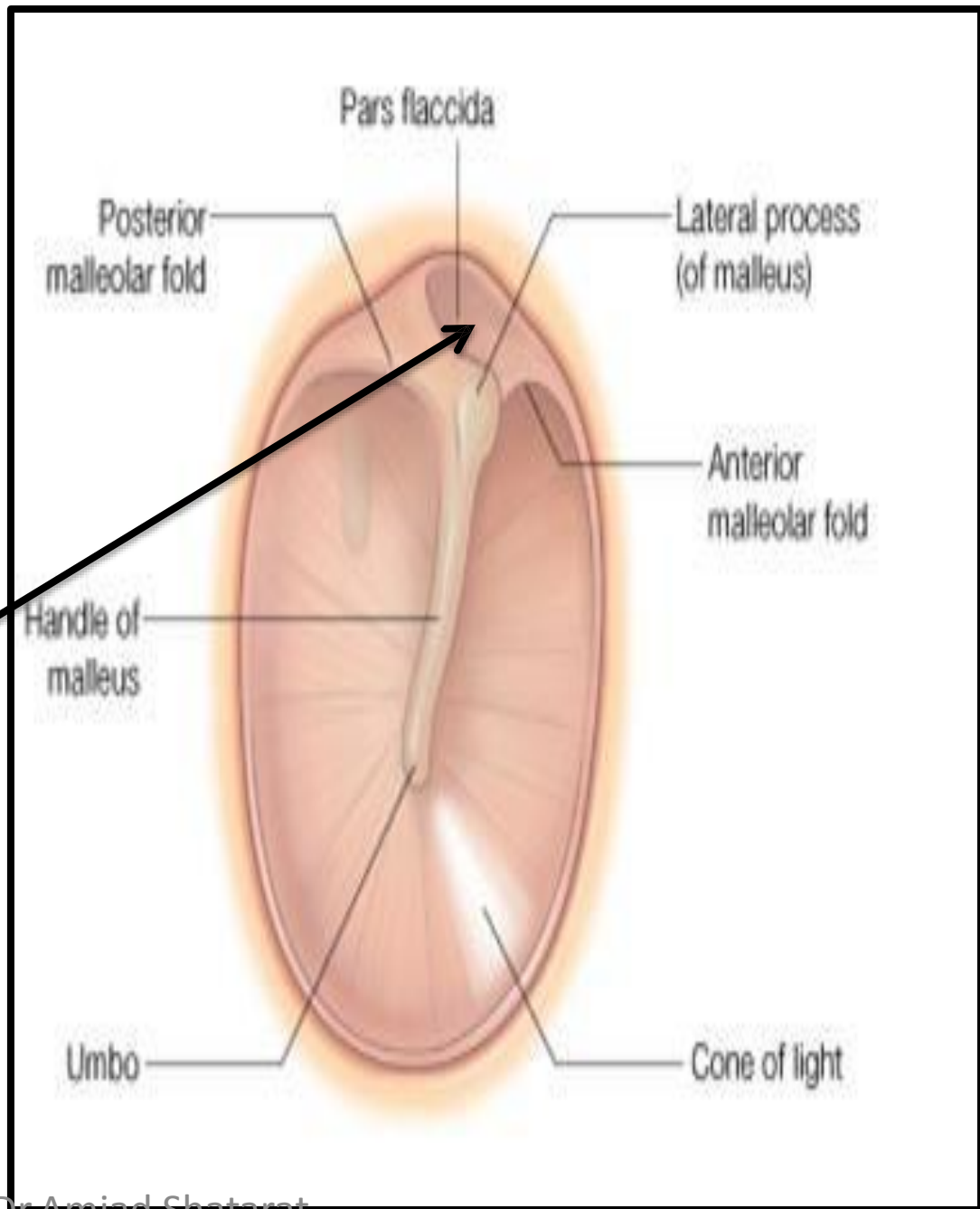
The tympanic membrane (ear drum)



Remember that **the middle fibrous layer is present in the major parts of the ear drum which called *pars tensa*.**

However, this layer **is** **absent** in the upper part of the ear drum which is called *pars flaccida* Shrapnell's membrane (also known as Rivinus' ligament)

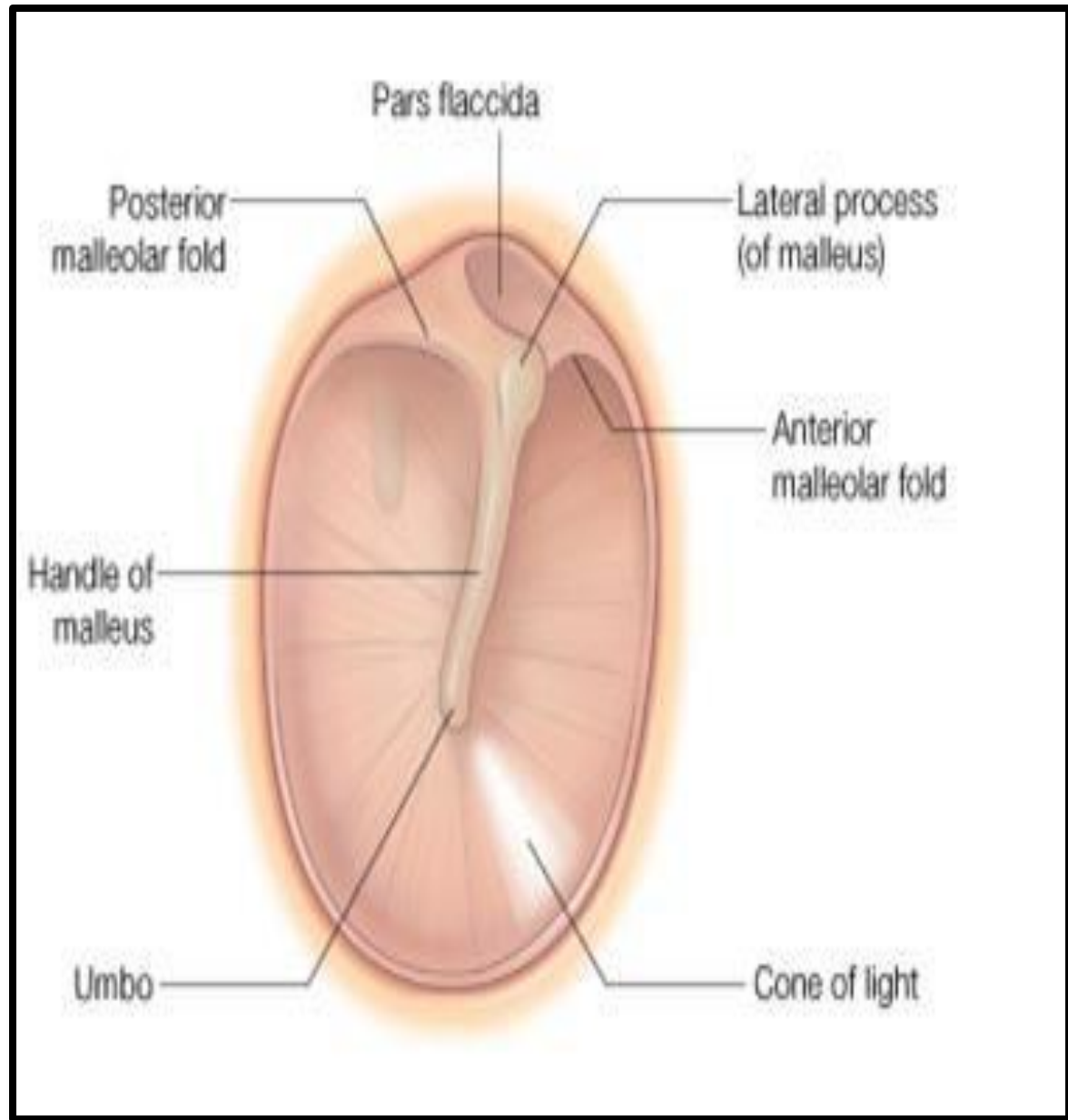
The pars tensa and flaccida are separated from each other by two folds called ***the anterior and posterior malleolar folds***



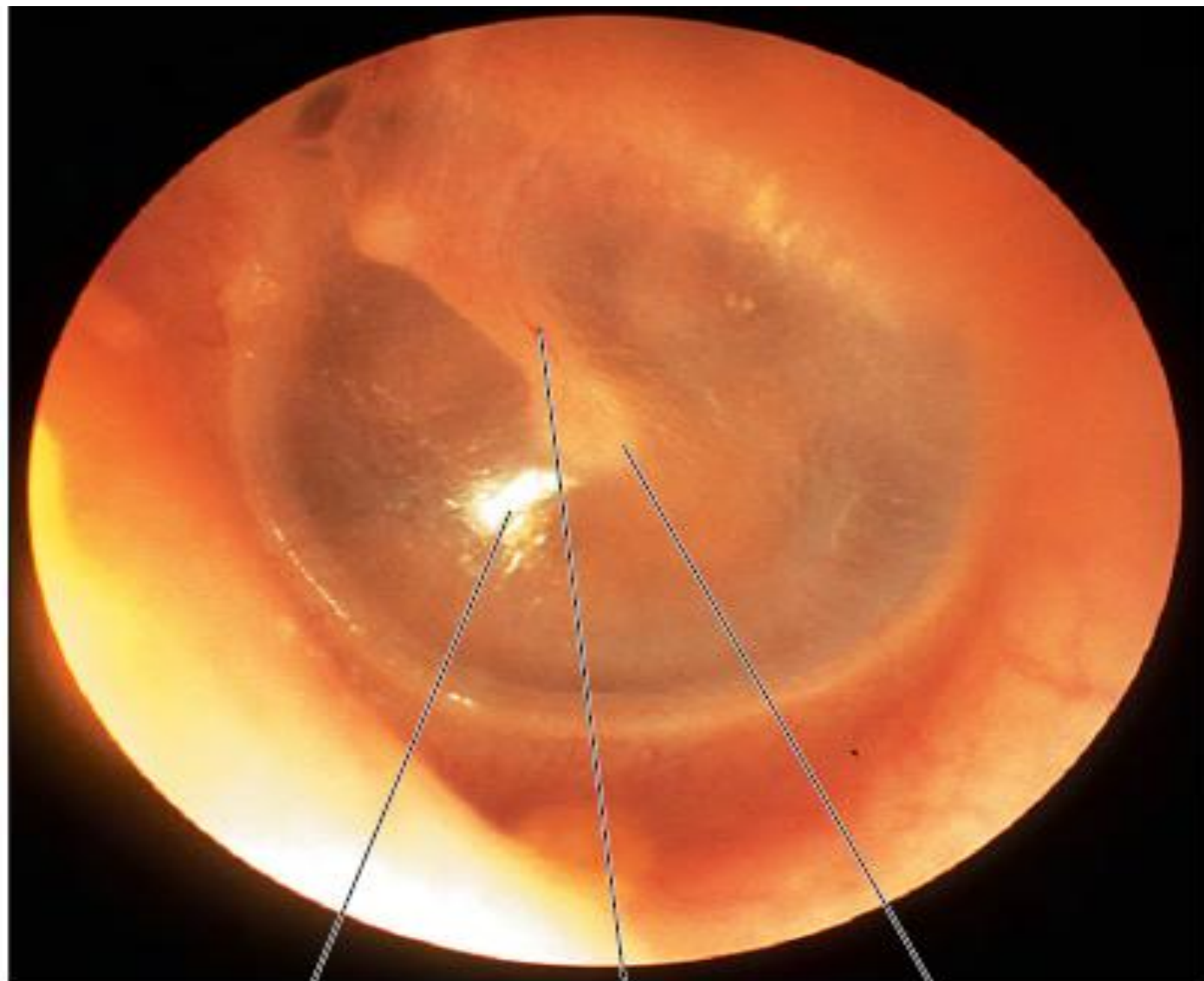
The tympanic membrane is
extremely sensitive to pain
and is innervated on its outer
surface
**by the auriculotemporal
nerve and the auricular
branch of the vagus**

In otoscopy (TM
examination)
The antero-inferior quadrant
of the ear drum is called
**The cone of
light**
(because it reflects the light
coming from the otoscope)

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Cone of light

Handle of malleus

Position of umbo

Auroscopic view of left tympanic membrane. Note that a bright cone of light is seen in the anteroinferior quadrant of the membrane when it is illuminated. (By courtesy of Mr Simon A Hickey.)

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TEGMENTAL WALL

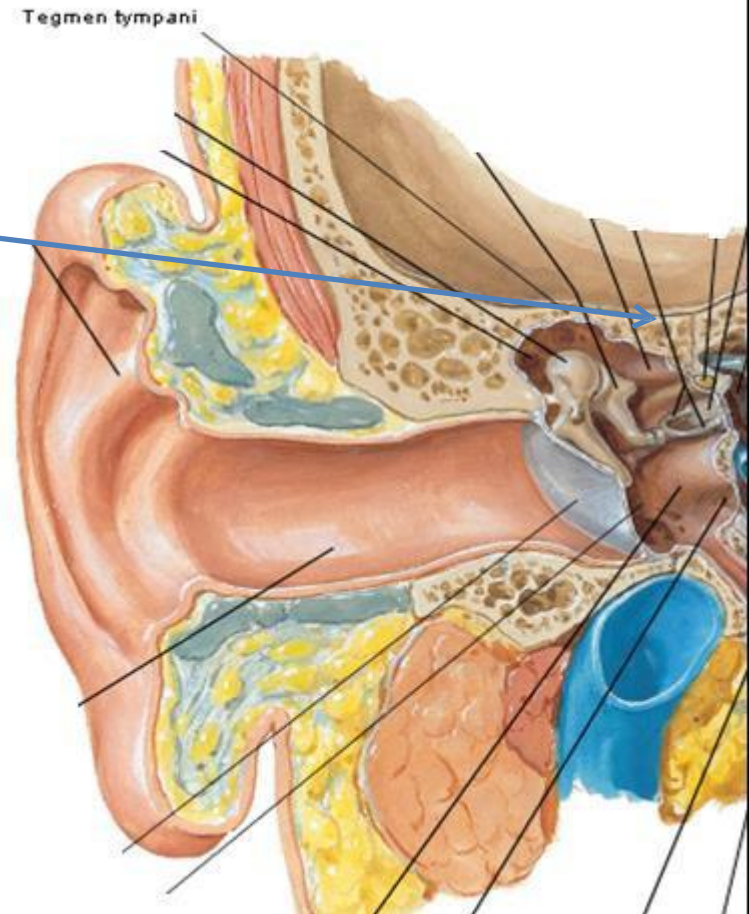
Is formed by a thin plate of bone, the tegmen tympani, which is part of the petrous temporal bone

It separates the tympanic cavity from the **meninges and the temporal lobe** of the brain in the middle cranial fossa.

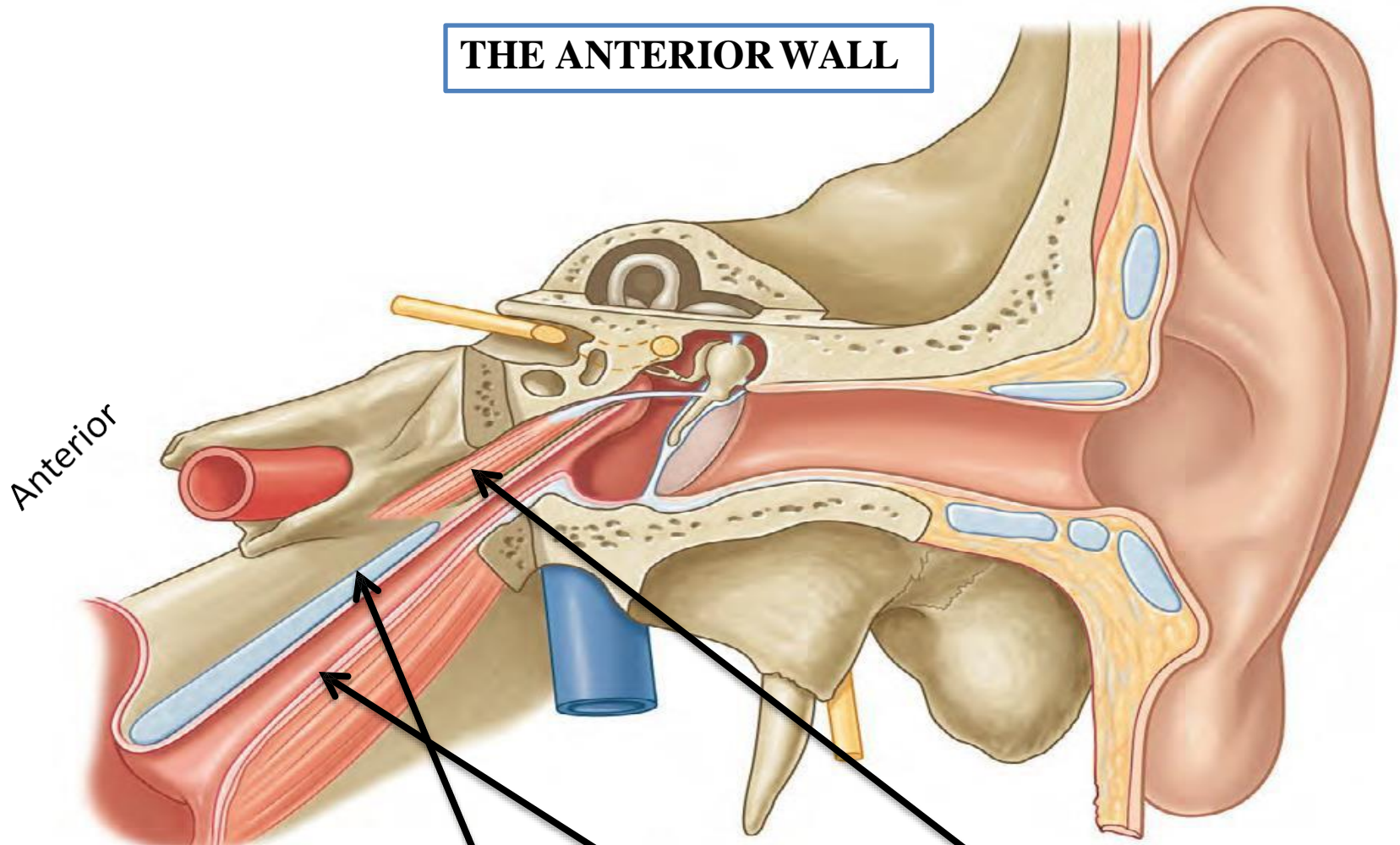
THE FLOOR

JUGULAR WALL

is formed by a thin plate of bone, which may be partly replaced by fibrous tissue. It separates the tympanic cavity from the superior bulb of **the internal jugular vein**



THE ANTERIOR WALL



➤ is formed below by a thin plate of bone that separates the tympanic cavity from the internal carotid artery

➤ At the upper part of the anterior wall are the openings into two canals.
The lower and larger of these leads into **the auditory tube**

the upper and smaller is the entrance into **the canal for the tensor tympani muscle**

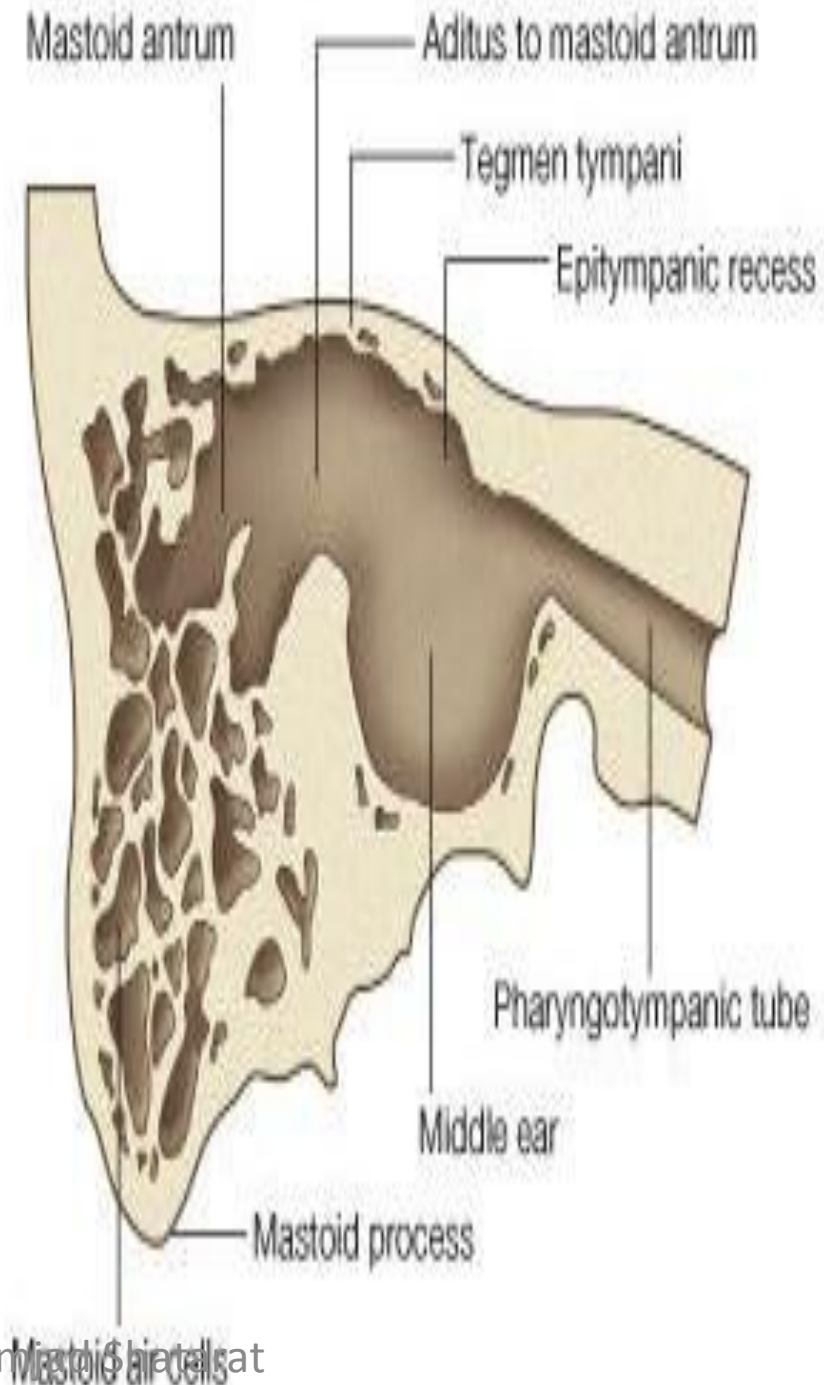
THE POSTERIOR WALL

1-has in its upper part a large, irregular opening, the

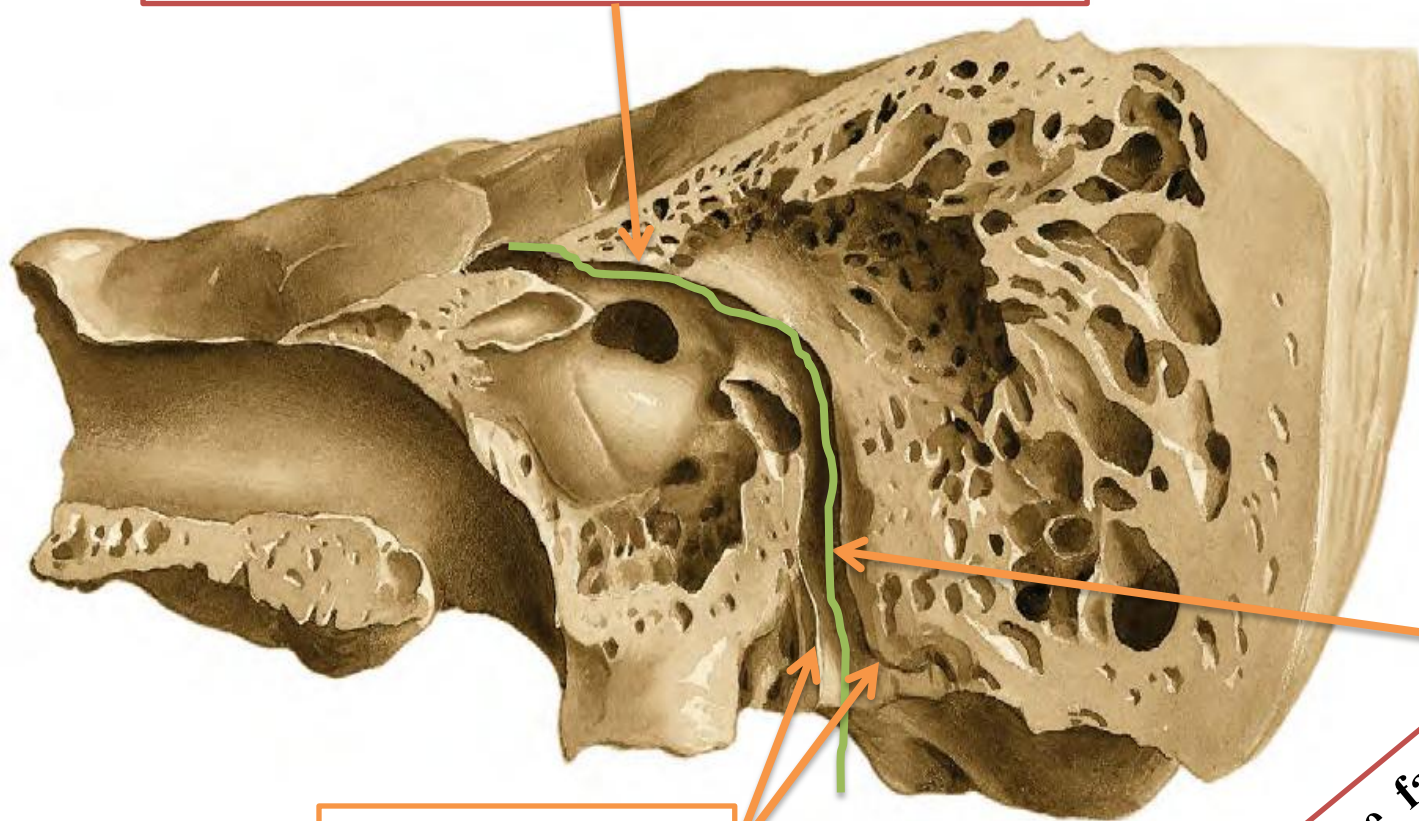
aditus

to the mastoid

2-Below this is a small, hollow, conical projection, the **pyramid**, from whose apex emerges the tendon of the stapedius muscle.



3-The horizontal part of the facial nerve



Stylomastoid foramen

3-The vertical part of the facial nerve

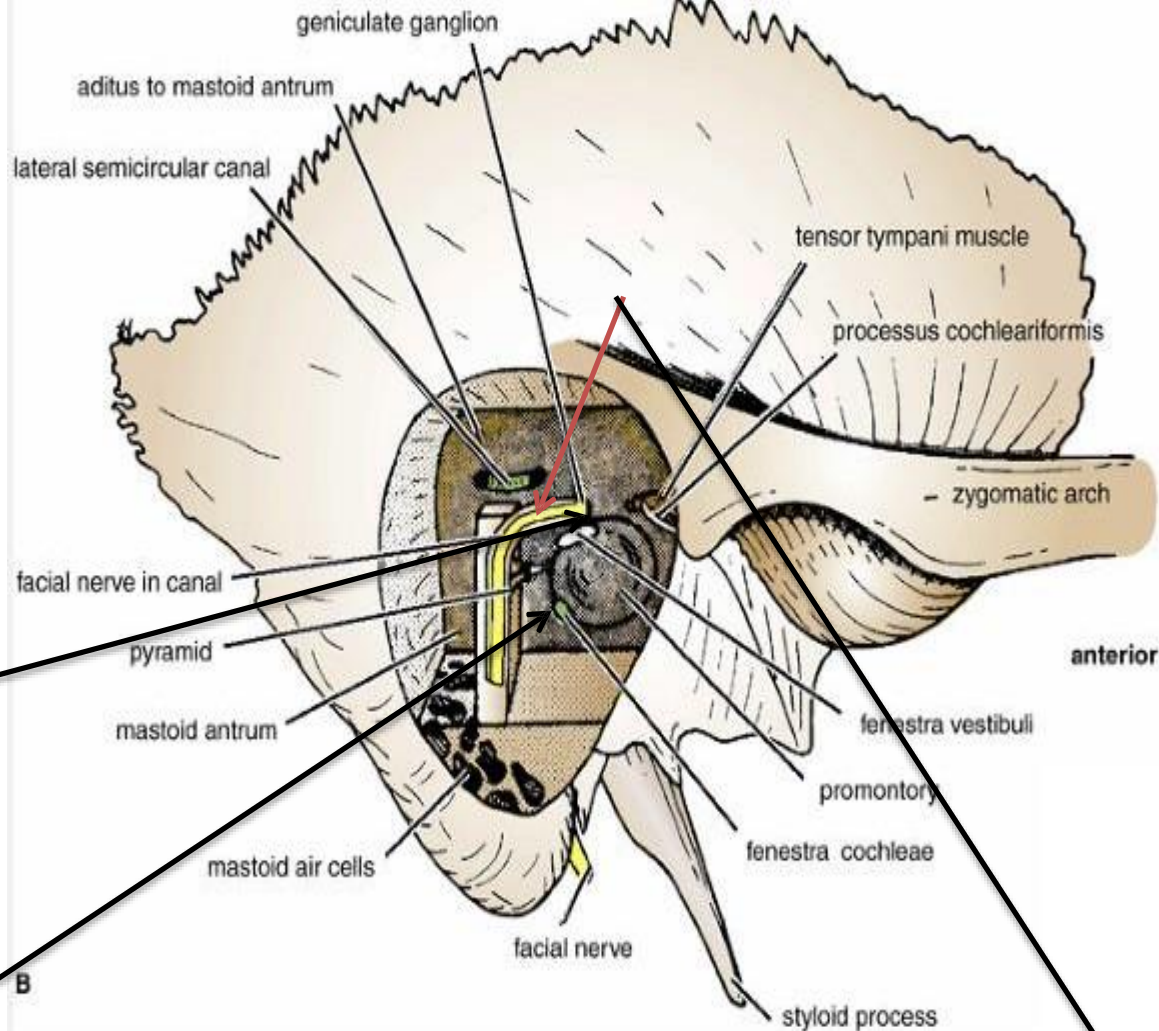
The medial wall

Is formed by the lateral wall of the inner ear.

The greater part of the wall shows a rounded projection, called the **promontory**, which results from the underlying first turn of the cochlea

Above and behind the promontory lies the **fenestra vestibuli**, which is oval shaped and closed by the base of the stapes

Below the posterior end of the promontory lies **the fenestra cochleae**, which is round and closed by the secondary tympanic membrane.



The horizontal part of the facial nerve arching above the promontory

Auditory Tube (EUSTACHIAN TUBE):

It connects

The anterior wall of *the tympanic cavity* to the *nasal pharynx*

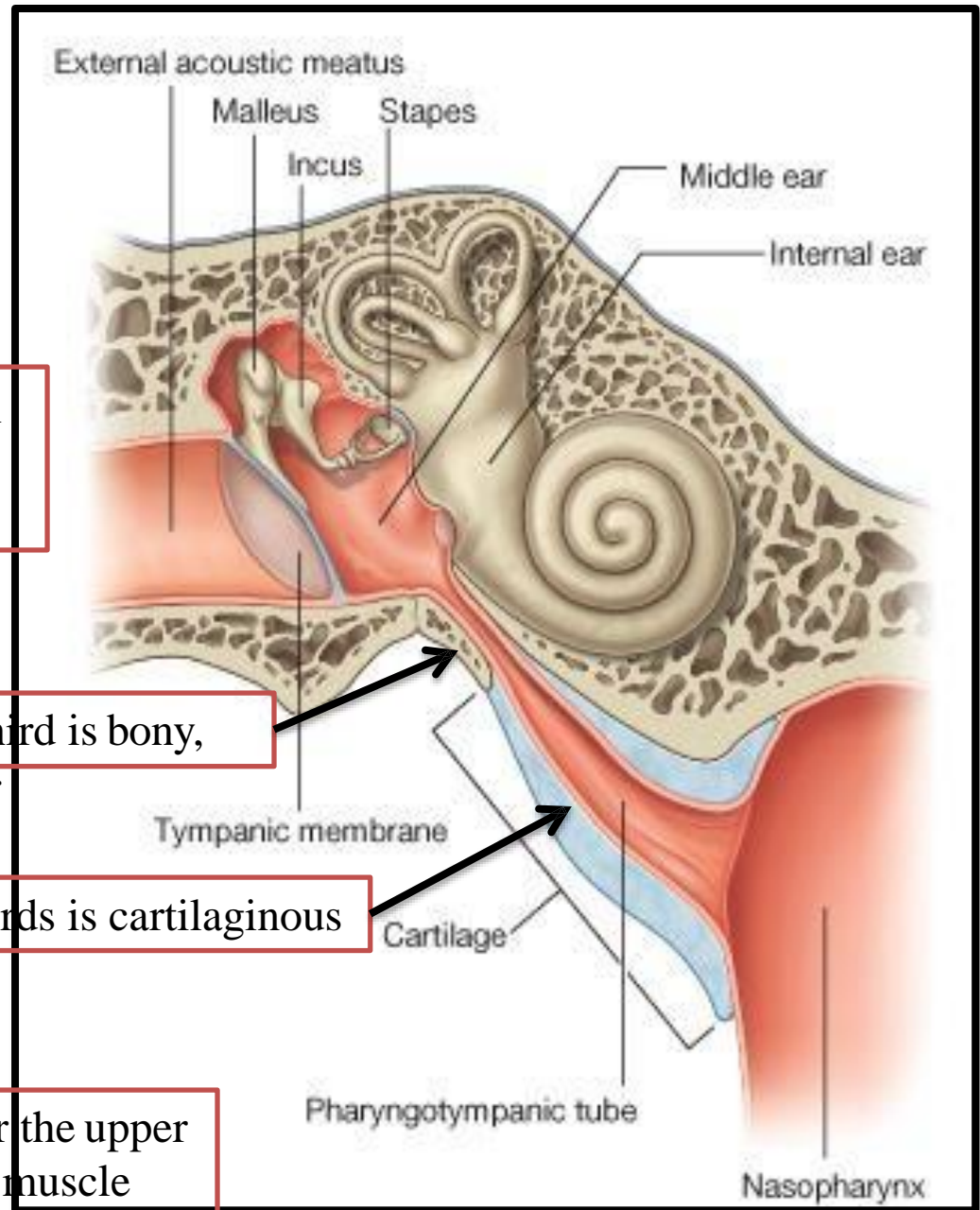


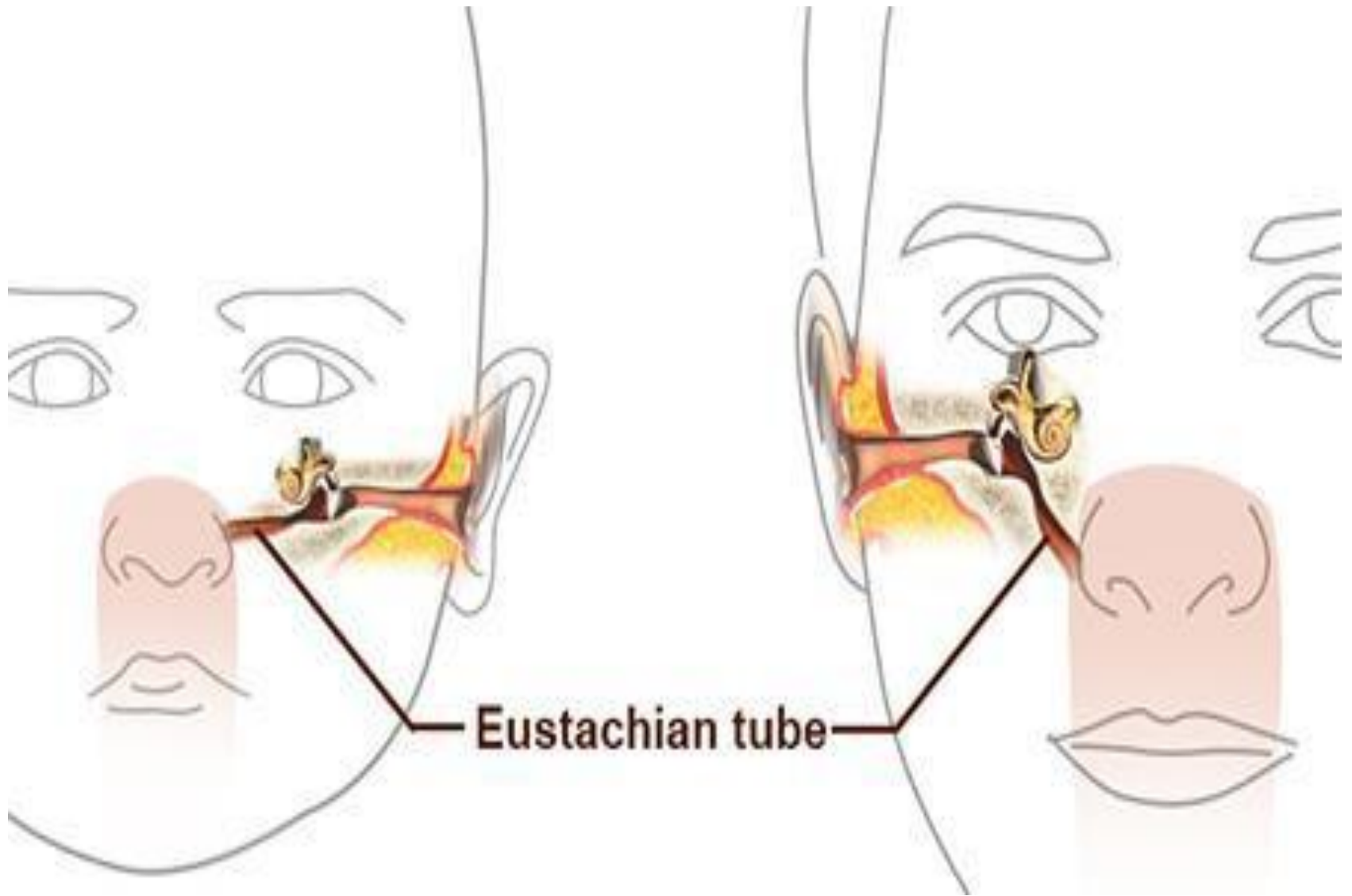
It serves to equalize air pressures in the tympanic cavity and the nasal pharynx

➤ Its posterior inner third is bony,

its anterior two thirds is cartilaginous

➤ As the tube descends it passes over the upper border of the superior constrictor muscle





Pharyngotympanic tube blockage in children

The pharyngotympanic tube serves to ventilate the middle ear, exchanging nasopharyngeal air with the air in the middle ear, which has been altered in its composition via transmucosal gas exchange with the haemoglobin in the blood vessels of the mucosa. The tube also carries mucus from the middle ear cleft to the nasopharynx as a result of ciliary transport.

Read only

In children, the pharyngotympanic tube is relatively narrow. It is prone to obstruction when the mucosa swells in response to infection or allergic challenge: obstruction results in a relative vacuum being created in the middle ear secondary to transmucosal gas exchange, and this in turn promotes mucosal secretion and the formation of a middle ear effusion. Because of the collapsibility of the pharyngotympanic tube, the vacuum thus created can overcome the distending effect of the muscles of the tube and 'lock' the tube shut. The resultant persistent middle ear effusion, otitis media with effusion (glue ear), can cause hearing loss by splinting the tympanic membrane and impeding its vibration. It can also provide an ideal environment for the proliferation of bacteria, with the result that an acute otitis media may develop. It is possible to relieve the vacuum and unlock the tube, and then remove the effusion by myringotomy, i.e. by surgically creating a hole in the tympanic membrane. This hole will generally heal rapidly and it is common practice to insert a flanged ventilation tube (a grommet or tympanostomy tube) to keep the hole open. Migration of the outer squamous layer of the tympanic membrane eventually displaces the ++tube and the myringotomy heals.

The meninges and the temporal lobe of the brain lie superiorly
meningitis and a cerebral abscess in the temporal lobe.

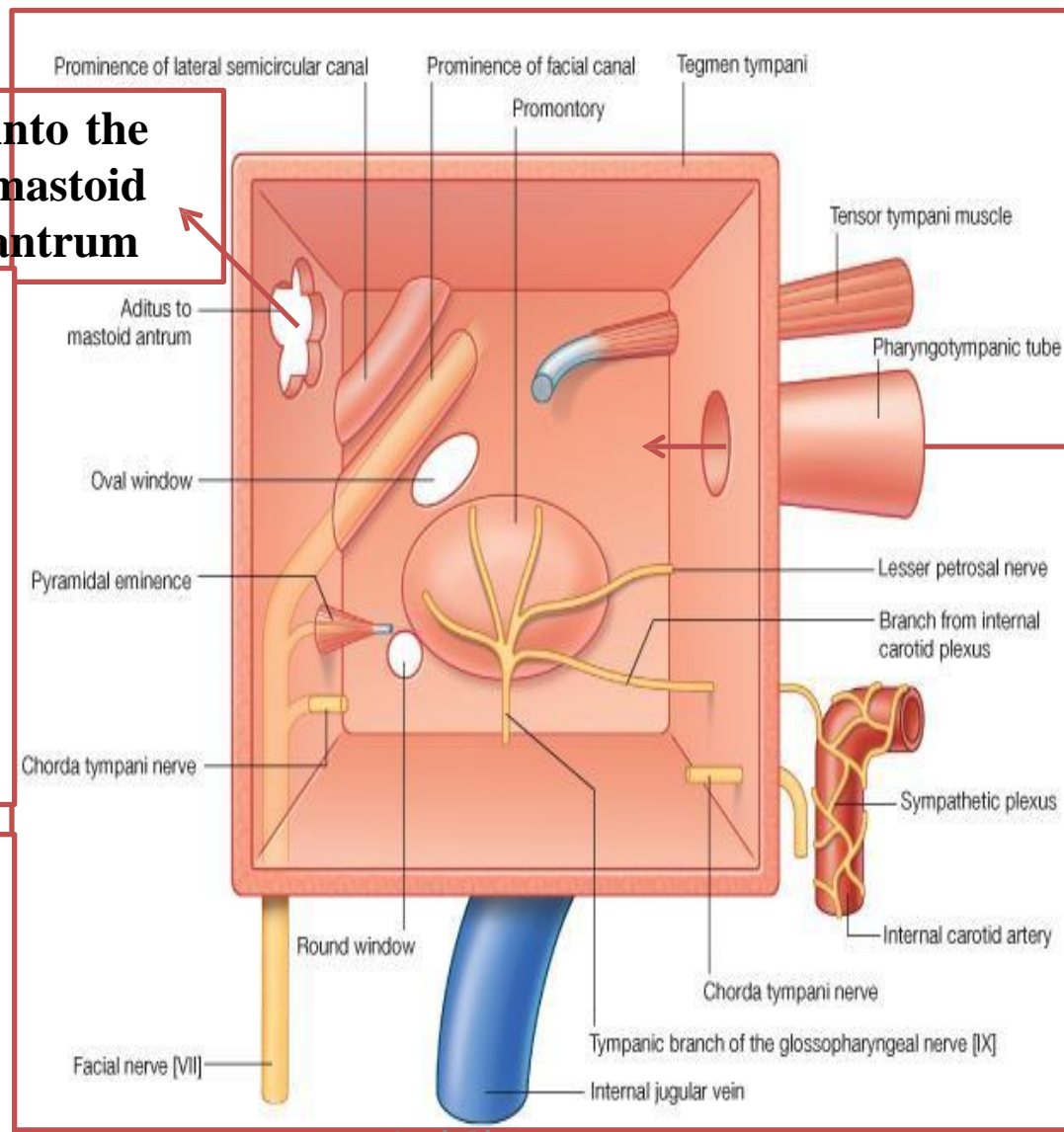
(acute mastoiditis)

into the
mastoid
antrum

The posterior wall of the
mastoid antrum is
related to **the
sigmoid venous sinus**.
If the infection spreads
in this direction, a
thrombosis in the
sigmoid sinus may
well take place

A spread of the
infection in this
direction can cause a
facial nerve palsy and
labyrinthitis with
vertigo

through
the
auditory
tube from
the nasal
part of
the
pharynx.



CONTENTS OF THE MIDDLE EAR

A-3 Auditory Ossicles
B-2 muscles
C-2 nerves
D-air

➤ It contains the auditory ossicles, whose function is to transmit the vibrations of the tympanic membrane (eardrum) to the perilymph of the internal ear.

The auditory ossicles are:
MALLEUS
INCUS
STAPES

1-The malleus is the largest ossicle and possesses head, a neck, a long process or handle, an anterior process, and a lateral process.

its head is rounded and articulates posteriorly with the **incus**.

The handle is firmly attached to the medial surface of the tympanic membrane

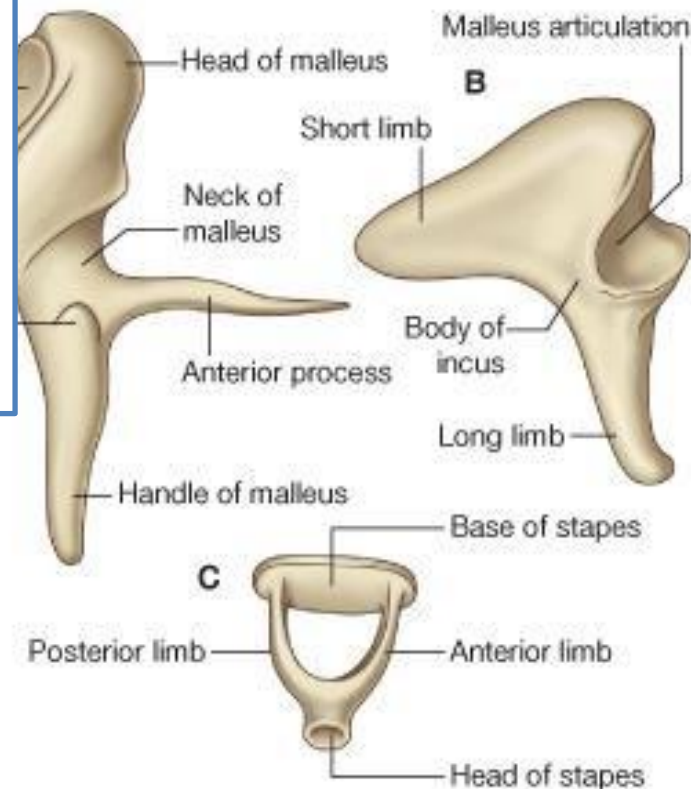
The incus possesses:

a large body and two processes:

The body articulates with the head of the malleus.

The long process articulates with the head of the stapes.

A Incus articulation



The stapes has a head, a neck, two limbs, and a base

The head articulates with the long process of **the incus**.

The neck is narrow and receives the insertion of the **stapedius** muscle.

The two limbs diverge from the neck and are attached to **the oval base** which closes **the oval window** of the internal ear

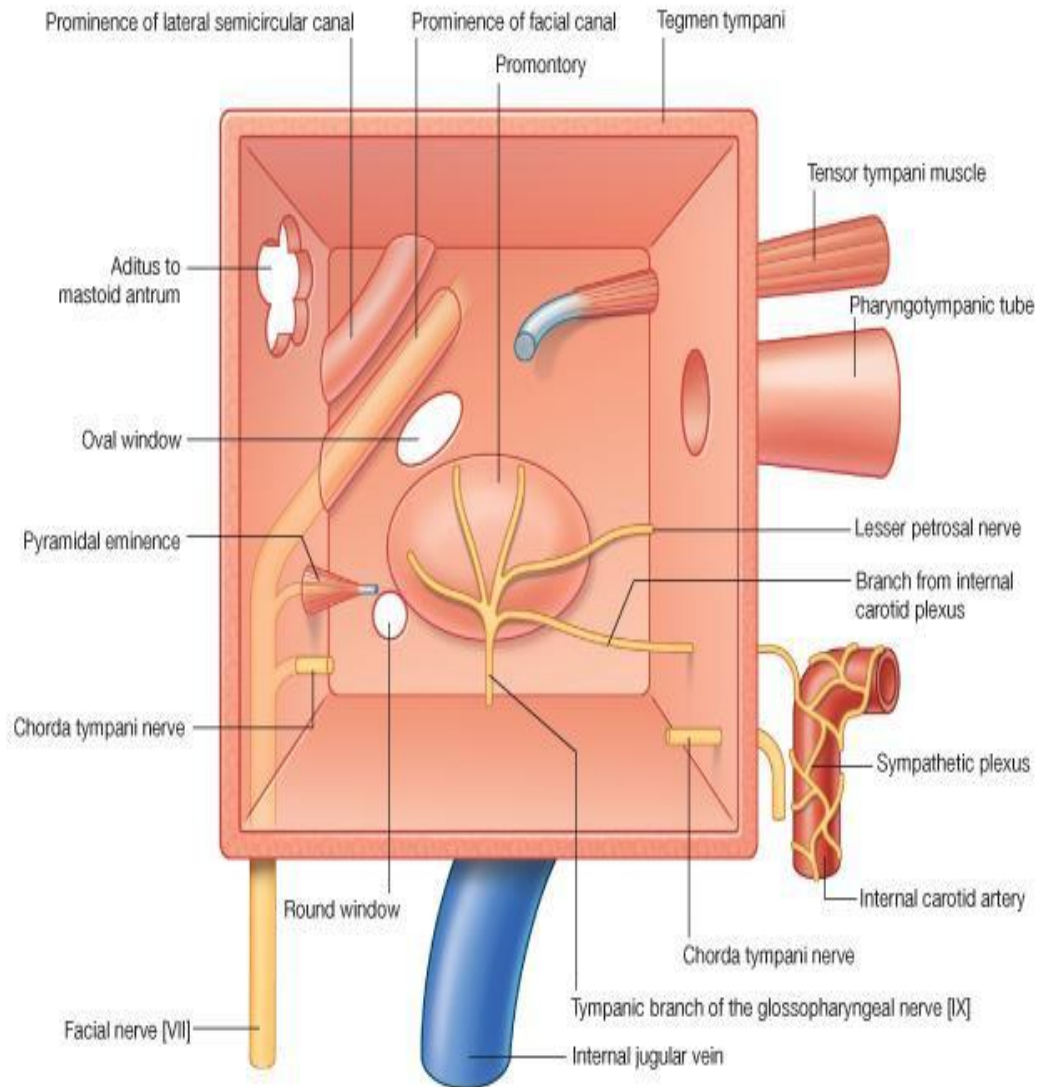
Muscles of the Ossicles

These are the tensor tympani and the stapedius muscles.

Muscle	Origin	Insertion	Nerve Supply	Action
Tensor tympani	Wall of auditory tube and wall of its own canal	Handle of malleus	Mandibular division of trigeminal nerve	Dampens down vibrations of tympanic membrane
Stapedius	Pyramid (bony projection on posterior wall of middle ear)	Neck of stapes	Facial nerve	Dampens down vibrations of stapes

Tympanic Nerve

- The tympanic nerve arises from the glossopharyngeal nerve, just below the jugular foramen
- It passes through the floor of the middle ear and onto the promontory
- Here it splits into branches, which form the tympanic plexus.
- The tympanic plexus supplies the lining of the middle ear and gives off ***the lesser petrosal nerve, which sends secretomotor fibers to the parotid gland via the otic ganglion***
- It leaves the skull through the foramen ovale



•The chorda tympani

- arises from the facial nerve just above the stylomastoid foramen
- It enters the middle ear close to the posterior border of the tympanic membrane.
- It then runs forward over the tympanic membrane and crosses the root of the handle of the malleus

• It lies in the interval between the mucous membrane and the fibrous layers of the tympanic membrane.

The nerve leaves the middle ear through the petrotympanic fissure and enters the infratemporal fossa, where it joins the lingual nerve

The chorda tympani contains:

Taste fibers from the mucous membrane covering the anterior two thirds of the tongue (not the vallate papillae) and the floor of the mouth.

