The Ear

The ear consists of :

1-THE EXTERNAL EAR

2-THE MIDDLE EAR, OR TYMPANIC CAVITY

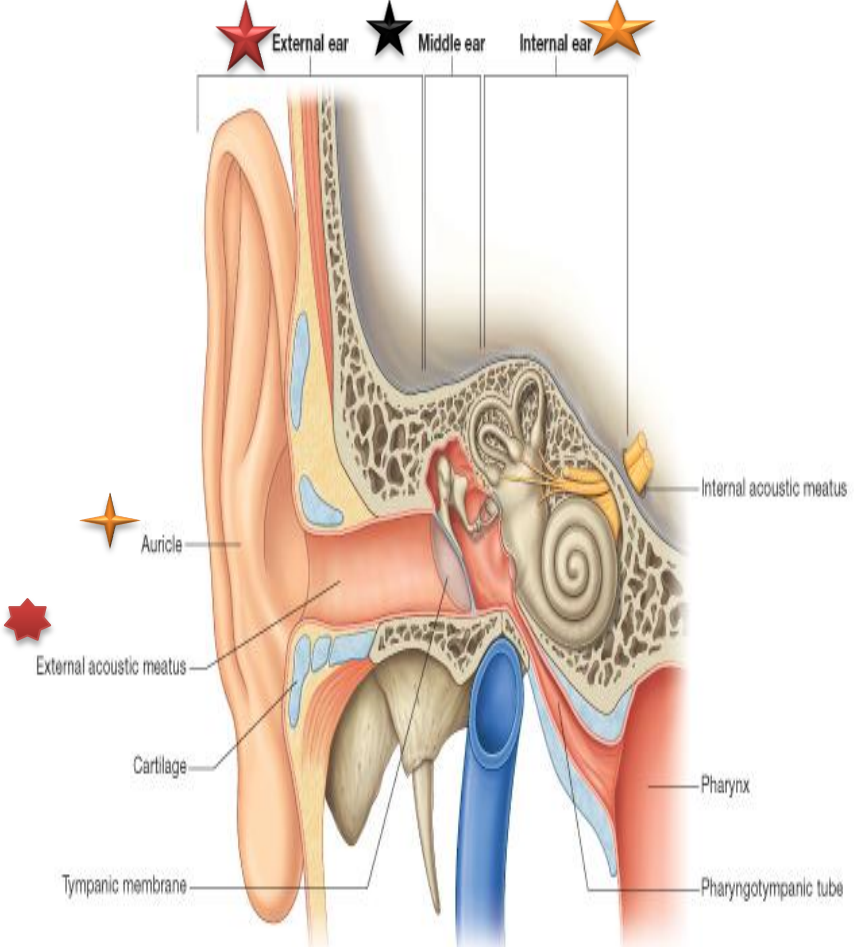
3-THE INTERNAL EAR, OR LABYRINTH

1-THE EXTERNAL EAR

Made of

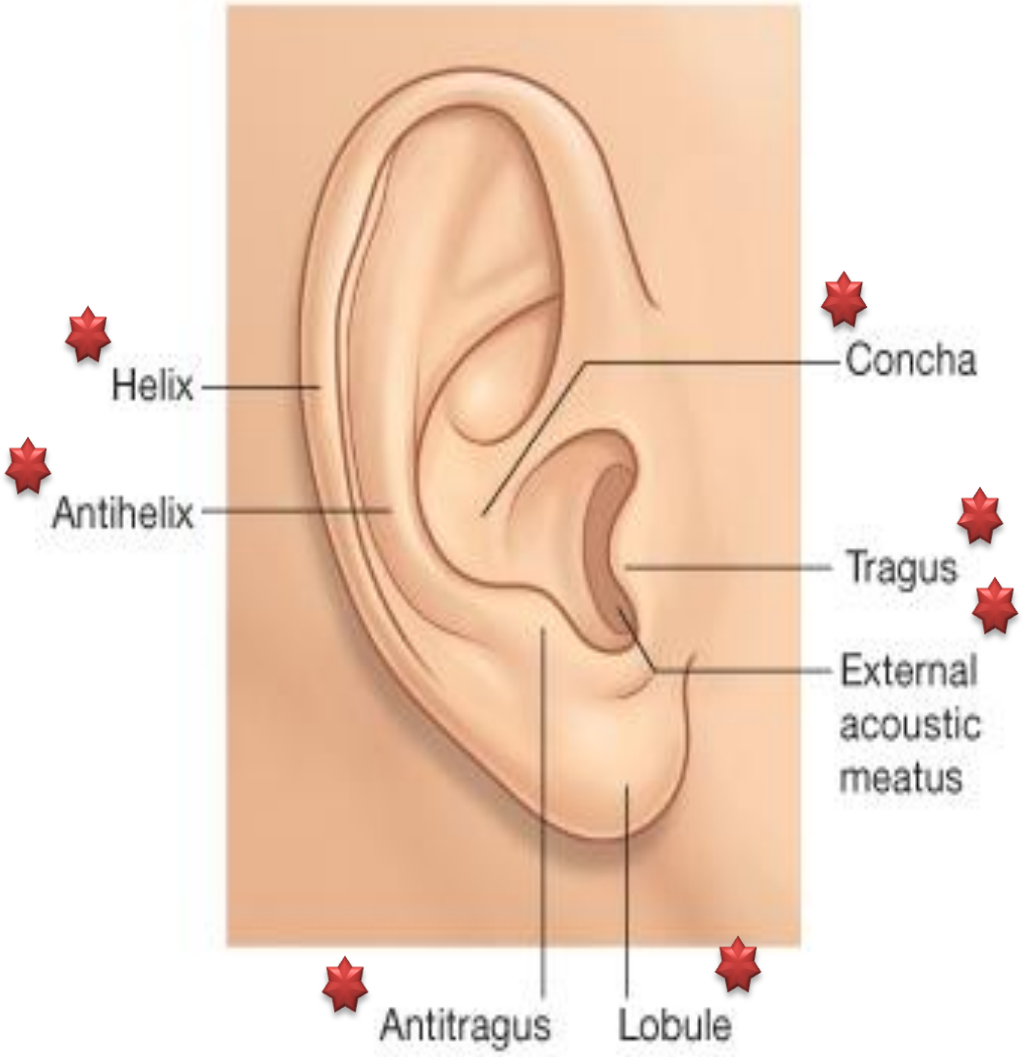
A-AURICLE

B-EXTERNAL AUDITORY MEATUS



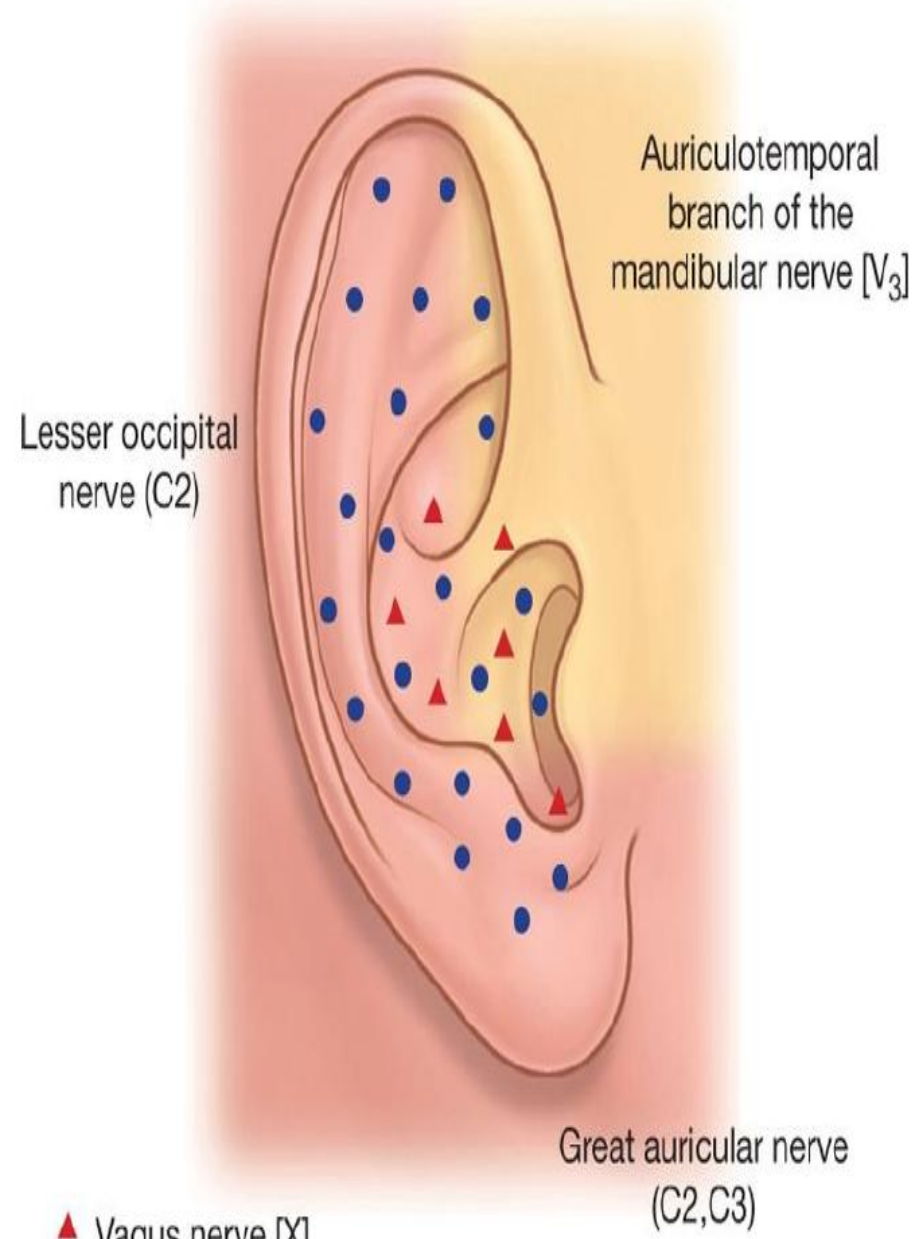
A-AURICLE

It consists of:
a-Skin
b-a thin plate of ***elastic cartilage (except the lobule, which is devoid of cartilage)***
3-It possesses both extrinsic and intrinsic muscles, which are ***supplied by the facial nerve.***



Important names

a) **Auriculotemporal nerve: upper ½ of the outer surface**
b) **Lesser occipital nerve: the upper ½ of the inner surface**
c) **Great auricular nerve: the lower ½ of both inner and outer surfaces**
d) **<u>Auricular branch of vagus supplies an area on the inner surface</u>**



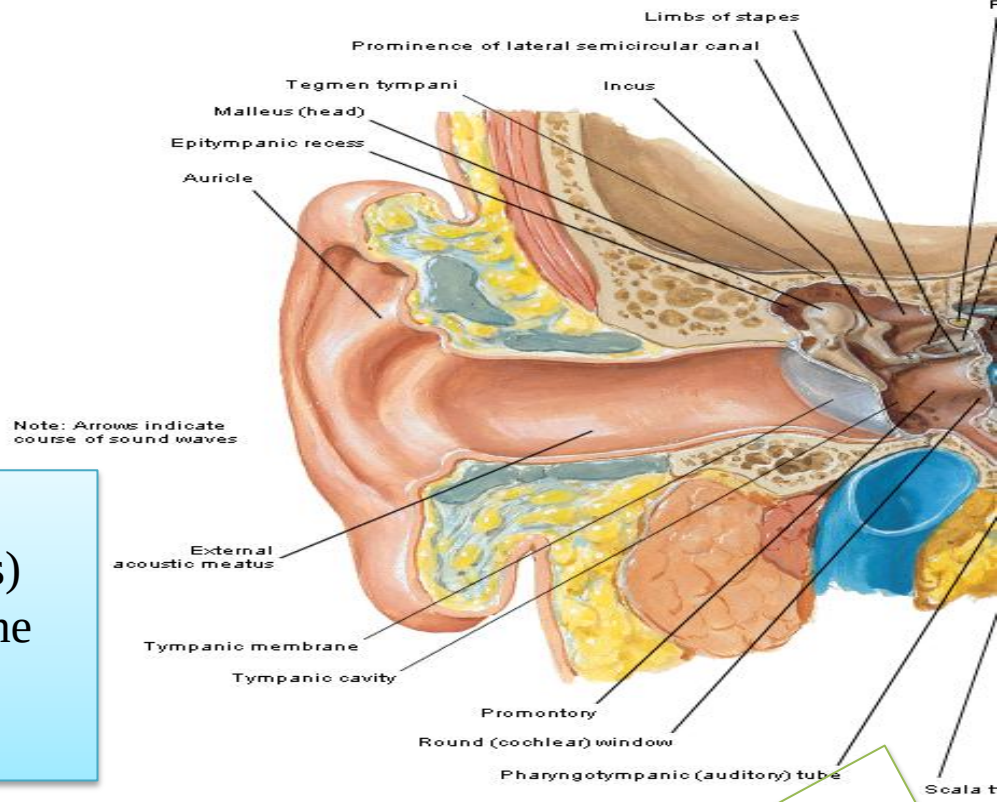
The external auditory meatus

Outer 1/3

Upwards & backwards

Inner 2/3

Downwards & forwards



- The outer third of the meatus is elastic cartilage (directed upwards and backwards)
- The inner two thirds is bone formed by the tympanic plate (directed downwards and forwards).

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

Remember that in 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 sensory nerve supply of the lining skin is derived from

1-The auriculotemporal nerve

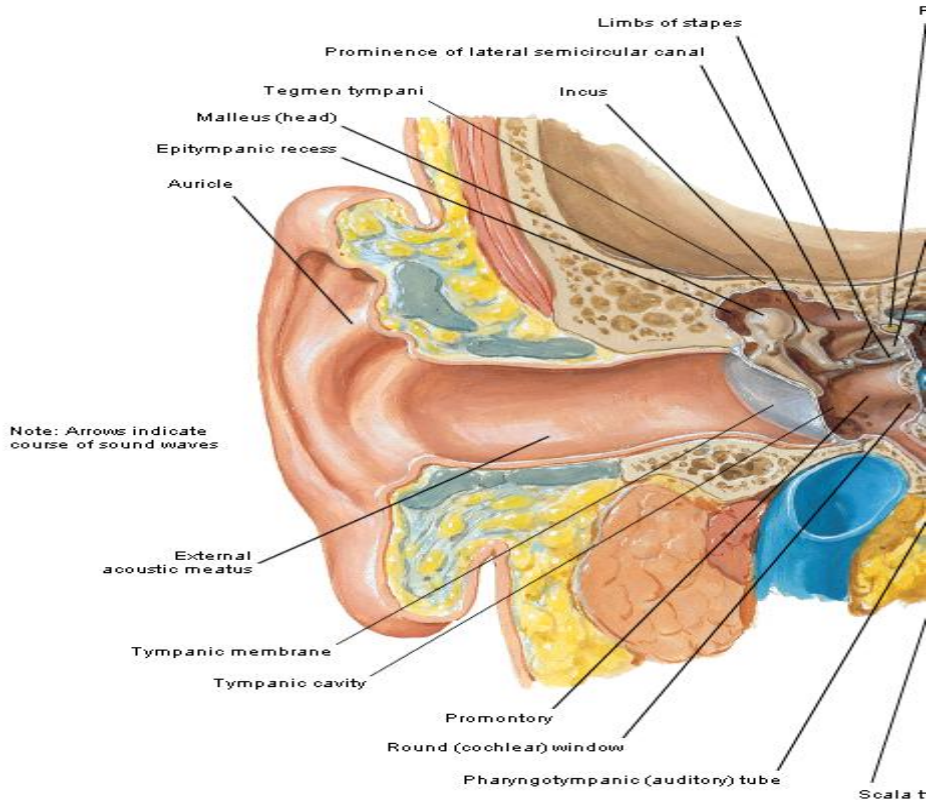
2-The auricular branch of the vagus nerve.!!!!

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

straight backward or backward and downward in the infant

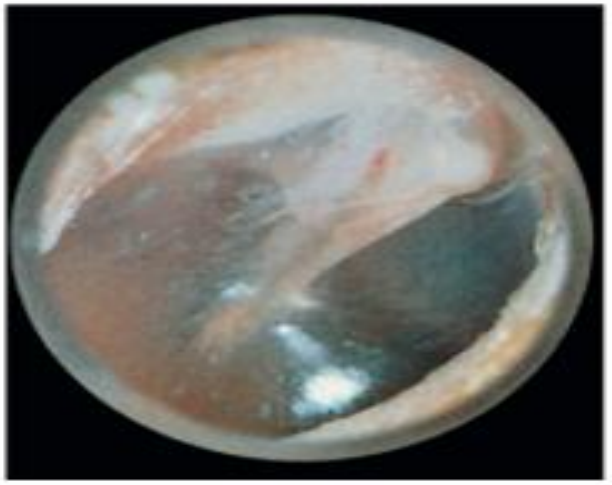
The tympanic membrane (ear drum)

- Is a thin, **fibrous membrane**
- The membrane ***is obliquely placed,*** **facing** ***downward, forward, and laterally***
- **Is formed of:**

1-An outer layer; skin

2-Middile layer; fibrous tissue

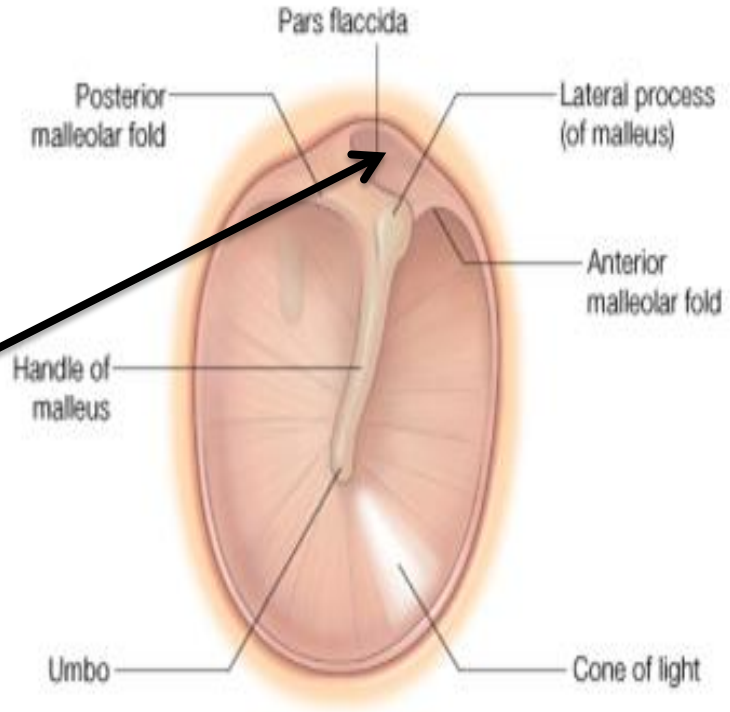
3-Inner layer ; mucous membrane



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

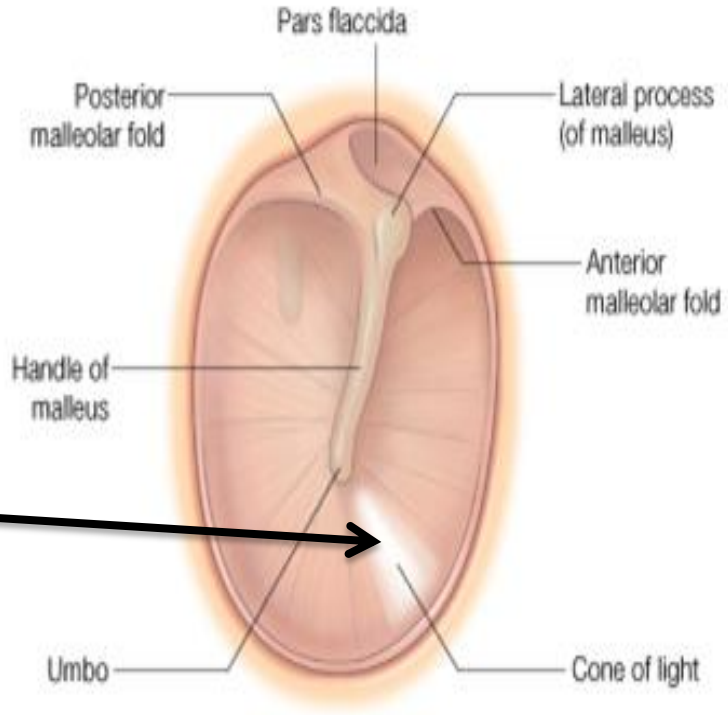
However, this layer **is absent** in the upper part of the ear drum which is called ***pars flaccida*** **Shrapnell's membrane (also known as Rivinus' ligament)**

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**

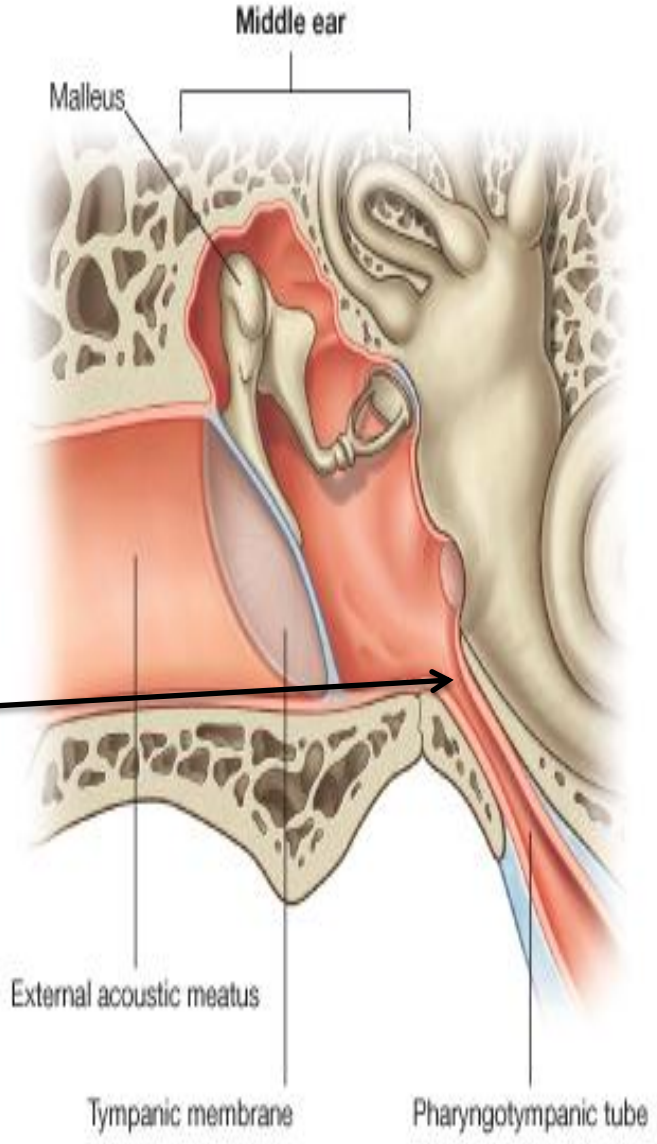
The antero-inferior quadrant of the ear drum is called **The cone of light** (because of it reflects the light coming from the otoscope)



Middle Ear (Tympanic Cavity)

- **It contains the auditory ossicles, whose function is to transmit the vibrations of the tympanic membrane (eardrum) to the perilymph of the internal ear.**
- **It is a narrow, oblique, slitlike cavity whose long axis lies approximately parallel to the plane of the tympanic membrane.**

- It communicates in front through the ***auditory tube with the nasopharynx*** and behind with **the mastoid antrum.**



The middle ear has

ROOF
FLOOR
ANTERIOR WALL
POSTERIOR WALL
LATERAL WALL
MEDIAL WALL

THE ROOF

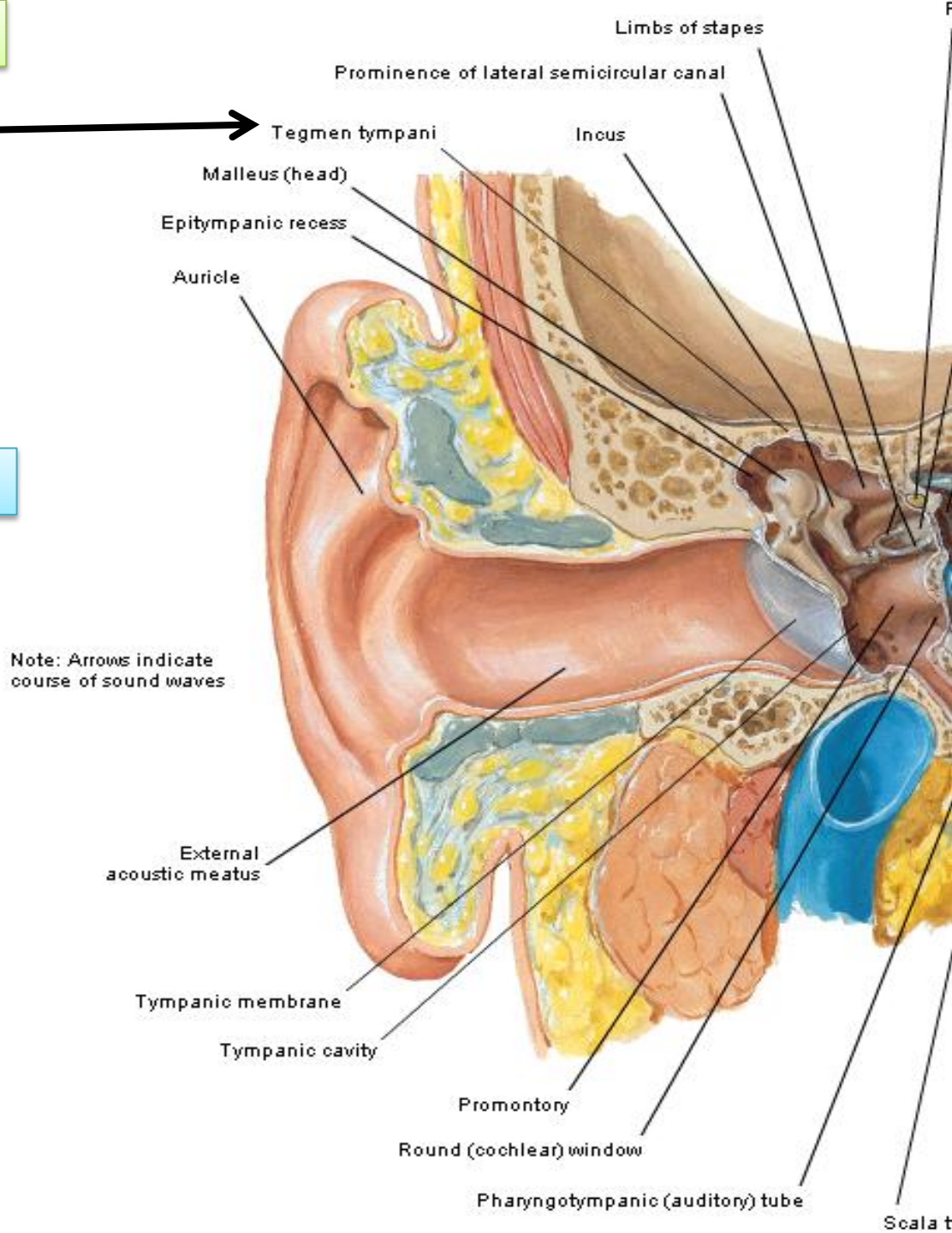
TEGMENTAL WALL

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***

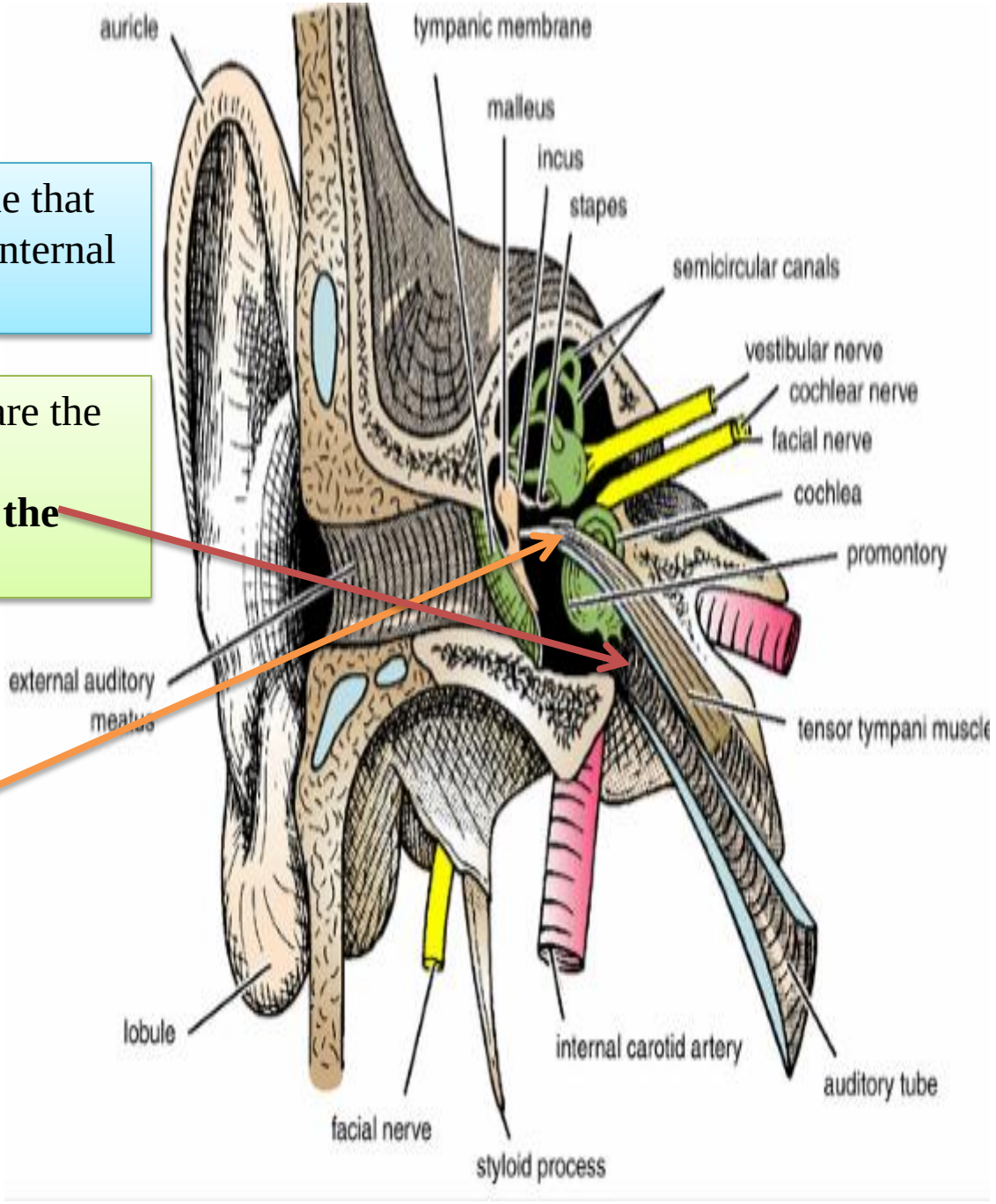


THE ANTERIOR WALL

➢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

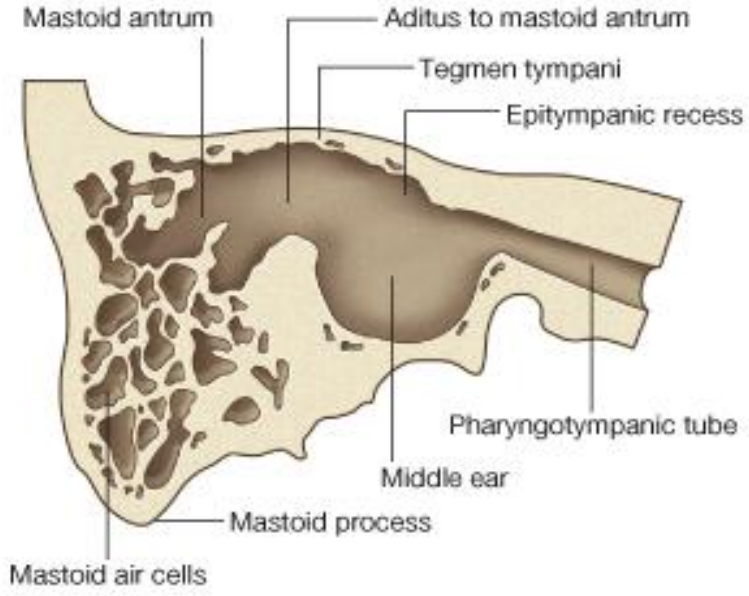
1-has in its upper part a large, irregular opening, the

aditus

to the mastoid

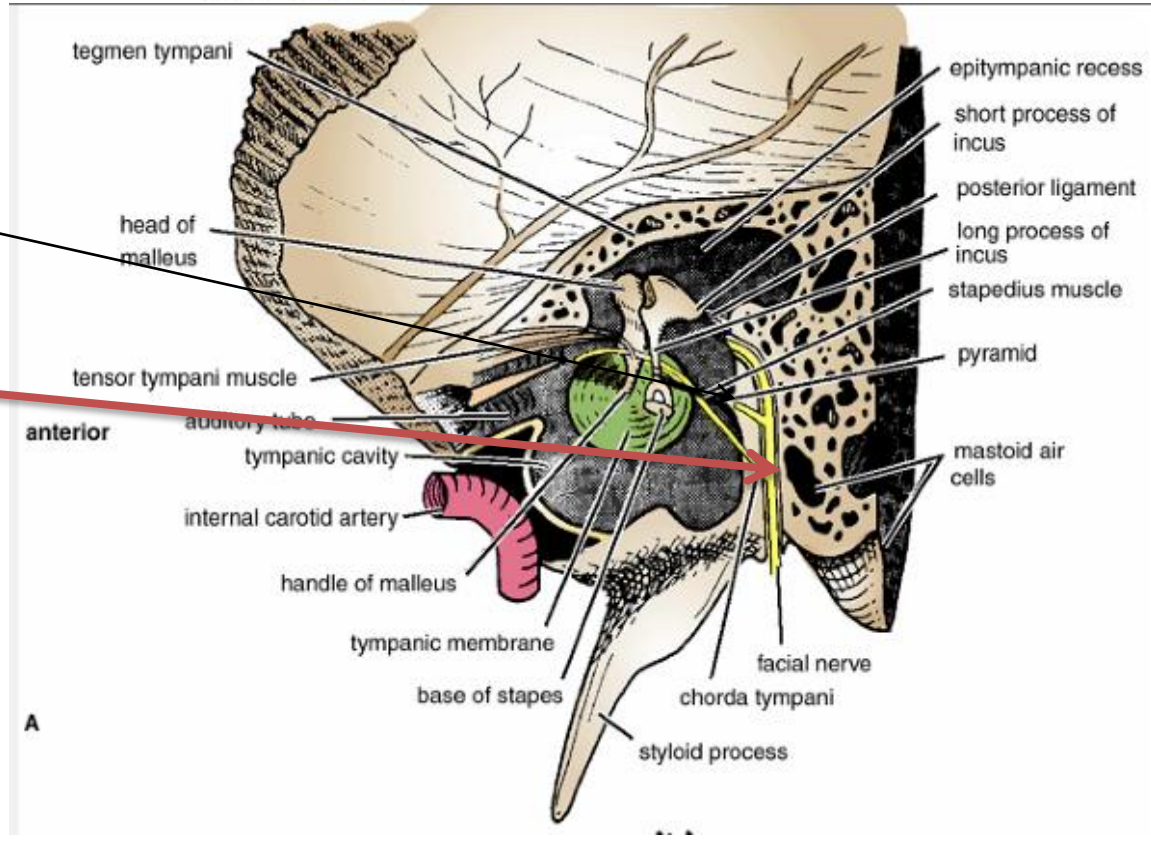
2-Below this is a small, hollow, conical projection, the **pyramid**, from whose apex emerges the tendon of the stapedius muscle.

3-The **vertical part of the fascial nerve**



THE LATERAL WALL

is largely formed by the **<u>tympanic membrane</u>** .



The medial wall

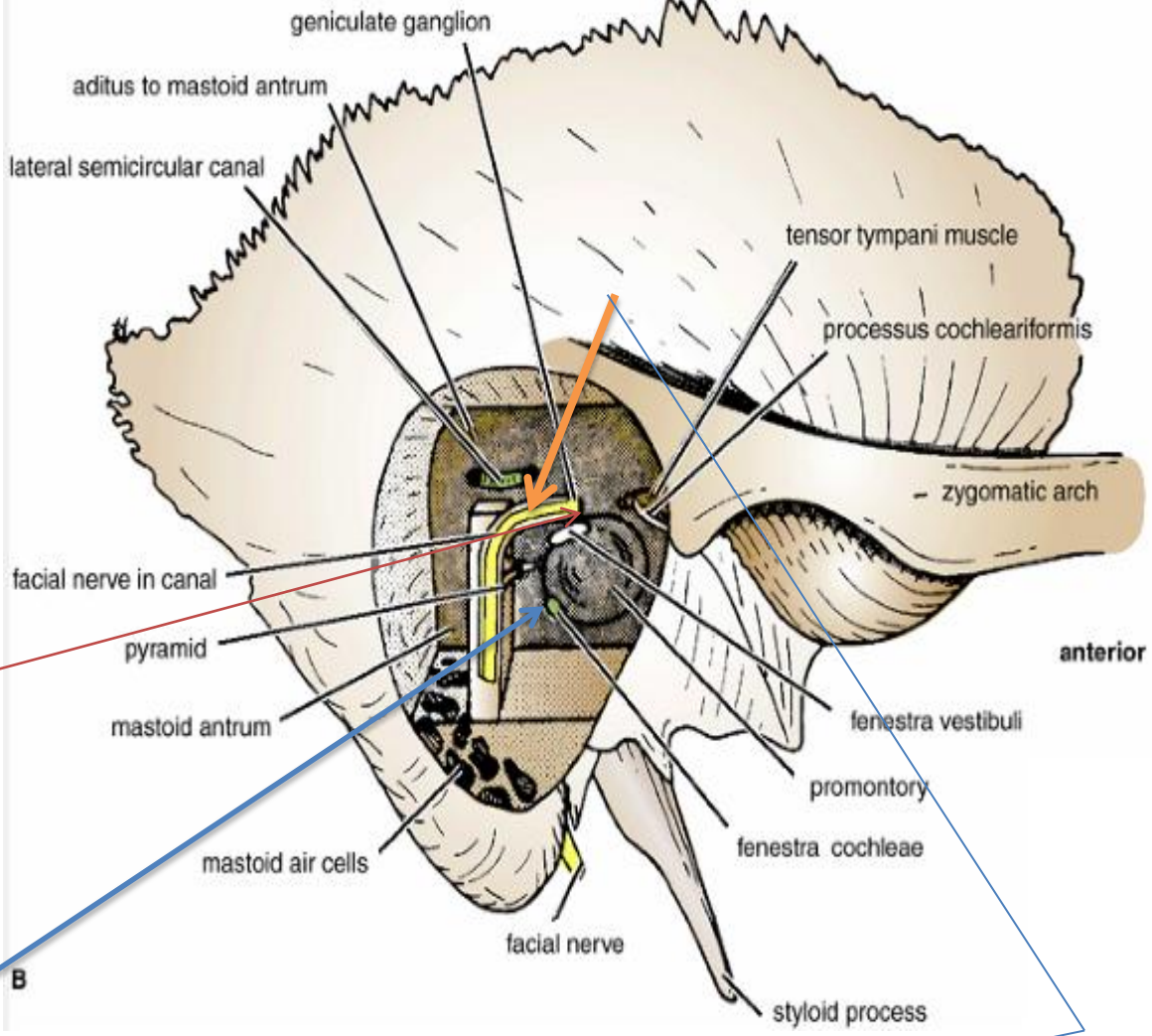
Is formed by the lateral wall of the inner ear.

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



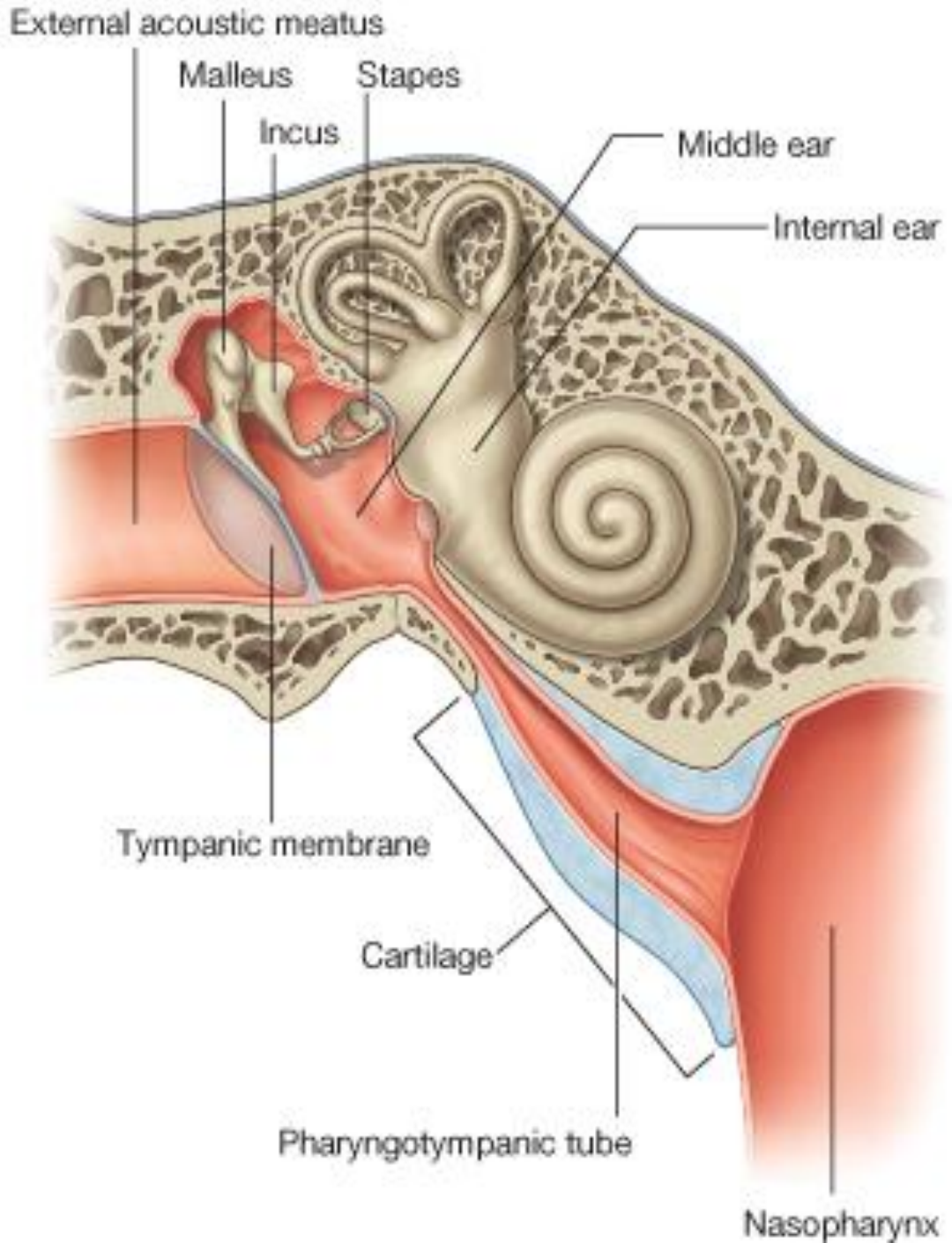
Auditory Tube

The auditory tube connects : The anterior wall of ***the tympanic cavity to*** the ***nasal pharynx***

- Its posterior third is bony,
- its anterior two thirds is cartilaginous.
- As the tube descends it passes over the upper border of the superior constrictor muscle
- It serves to equalize air pressures in the tympanic cavity and the nasal pharynx.

Mastoid Antrum

The mastoid antrum lies behind the middle ear in the petrous part of the temporal bone
It communicates with the middle ear by the **aditus**



Infections and Otitis Media

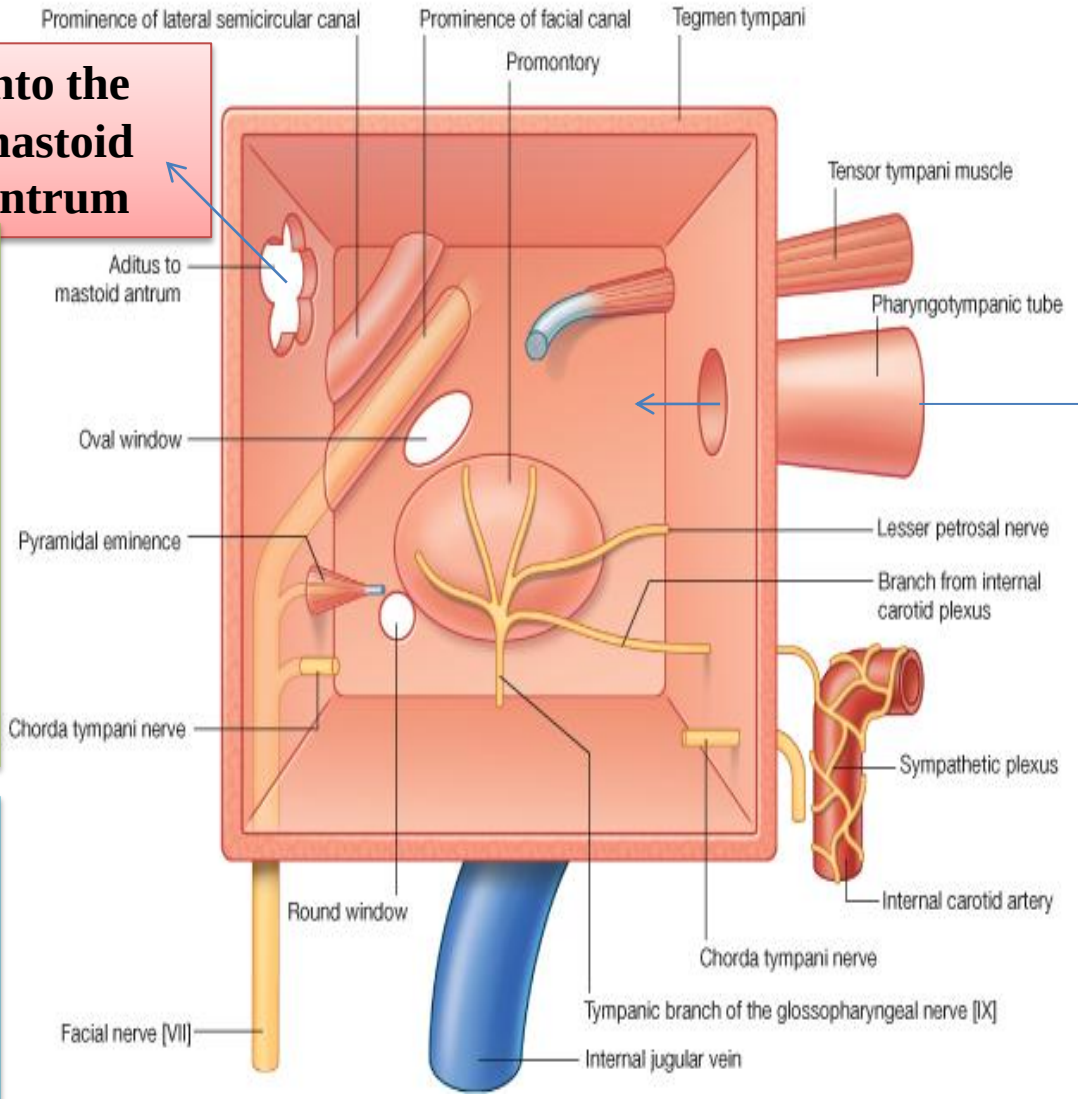
The meninges and the temporal lobe of the brain lie superiorly meningitis and a cerebral abscess in the temporal lobe.

(acute mastoiditis)

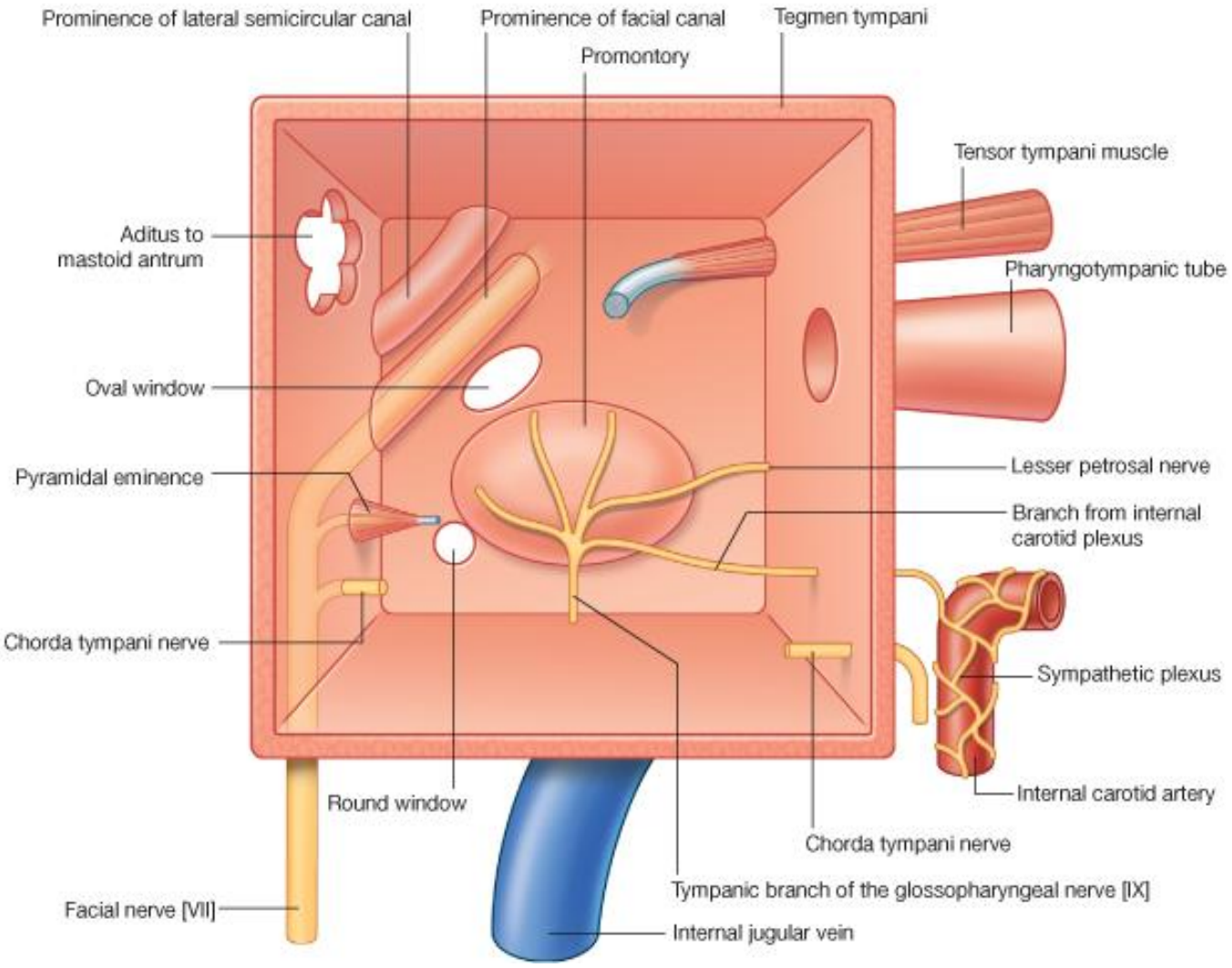
into the mastoid antrum

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.


Prominence of lateral semicircular canal
Prominence of facial canal
Promontory
Tegmen tympani
Tensor tympani muscle
Aditus to mastoid antrum
Pharyngotympanic tube
Oval window
Pyramidal eminence
Lesser petrosal nerve
Branch from internal carotid plexus
Chorda tympani nerve
Sympathetic plexus
Round window
Internal carotid artery
Chorda tympani nerve
Tympanic branch of the glossopharyngeal nerve [IX]
Facial nerve [VII]
Internal jugular vein

CONTENTS OF THE MIDDLE EAR

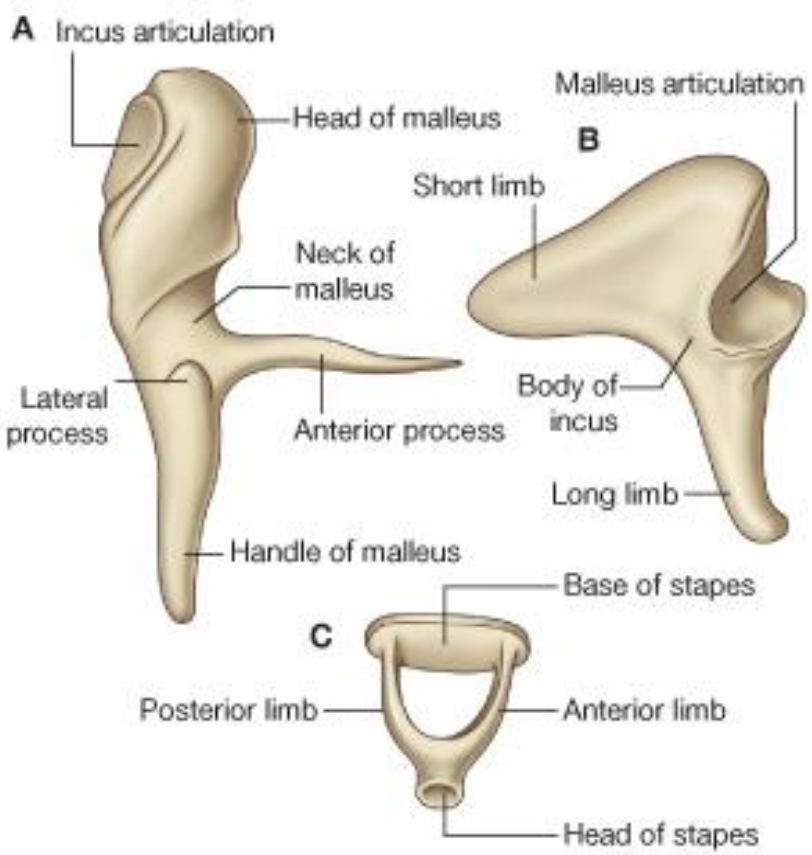
A-3 Auditory Ossicles
B-2 muscles
C-2 nerves
D-air

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.



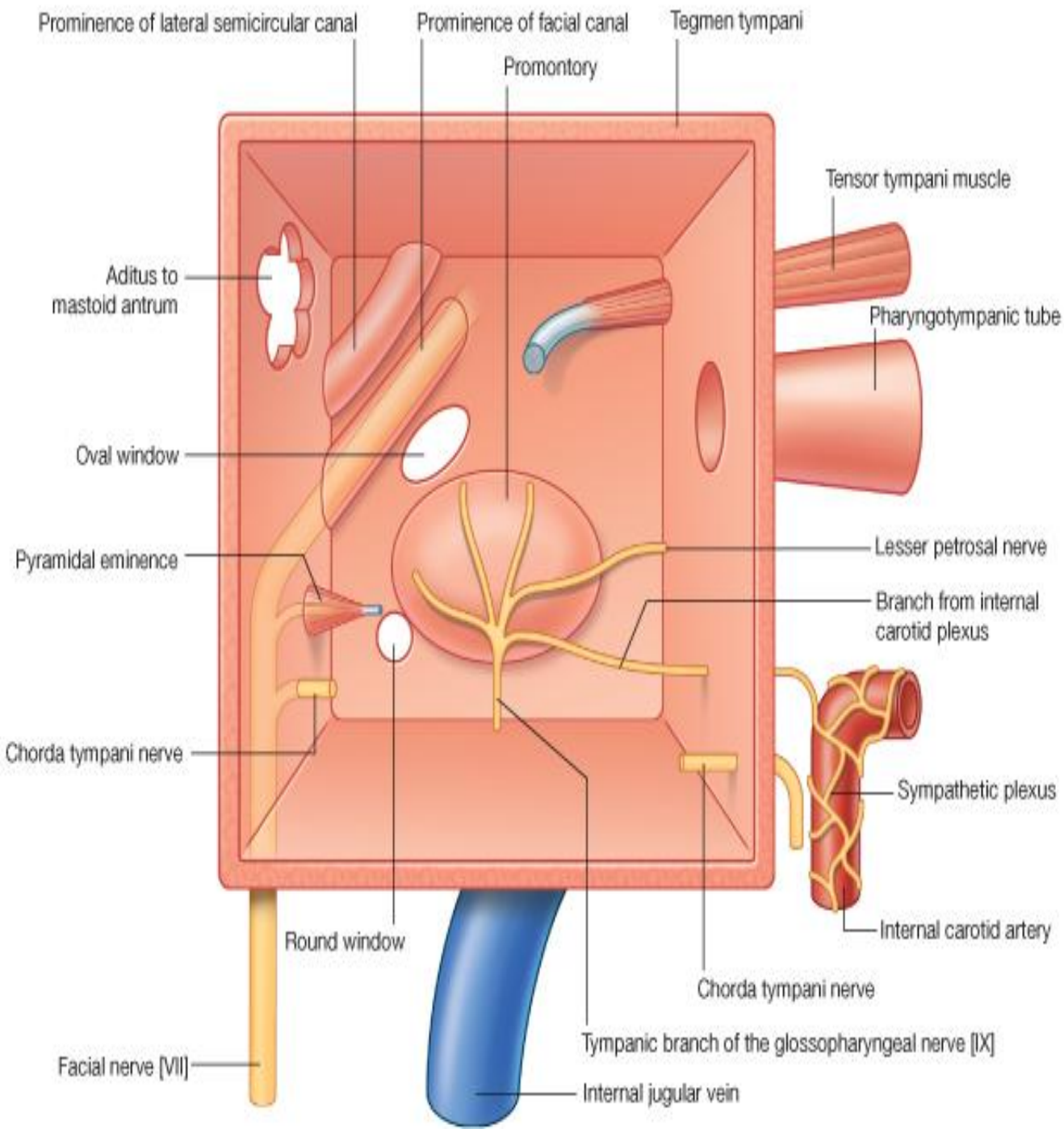
The stapes has a head, a neck, two limbs, and a base
The head articulates with the long process of **the incus.**
The neck is narrow and receives the insertion of the **stapedius** muscle.
The two limbs diverge from the neck and are attached to **the oval base** which closes **the oval window** of the 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.