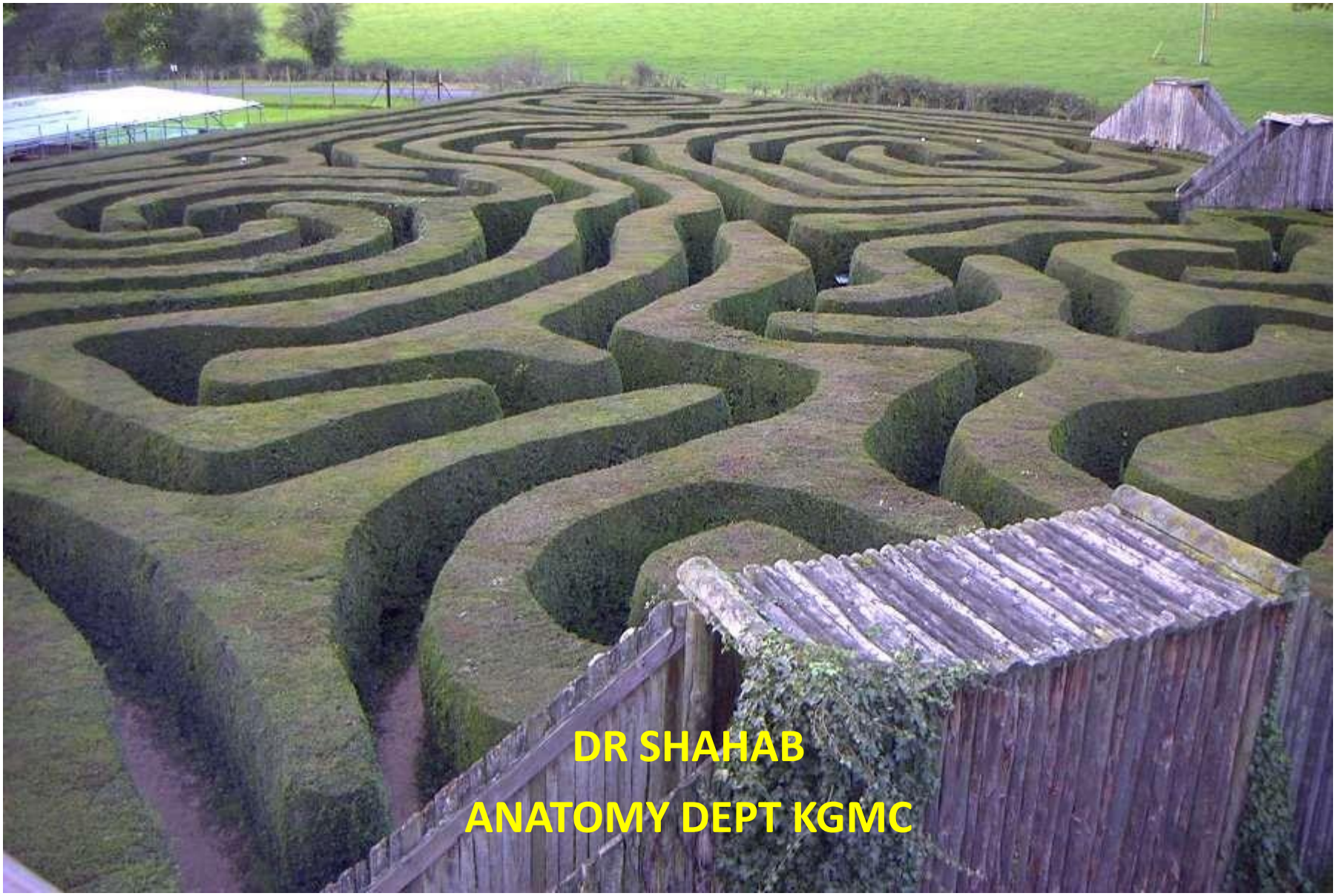
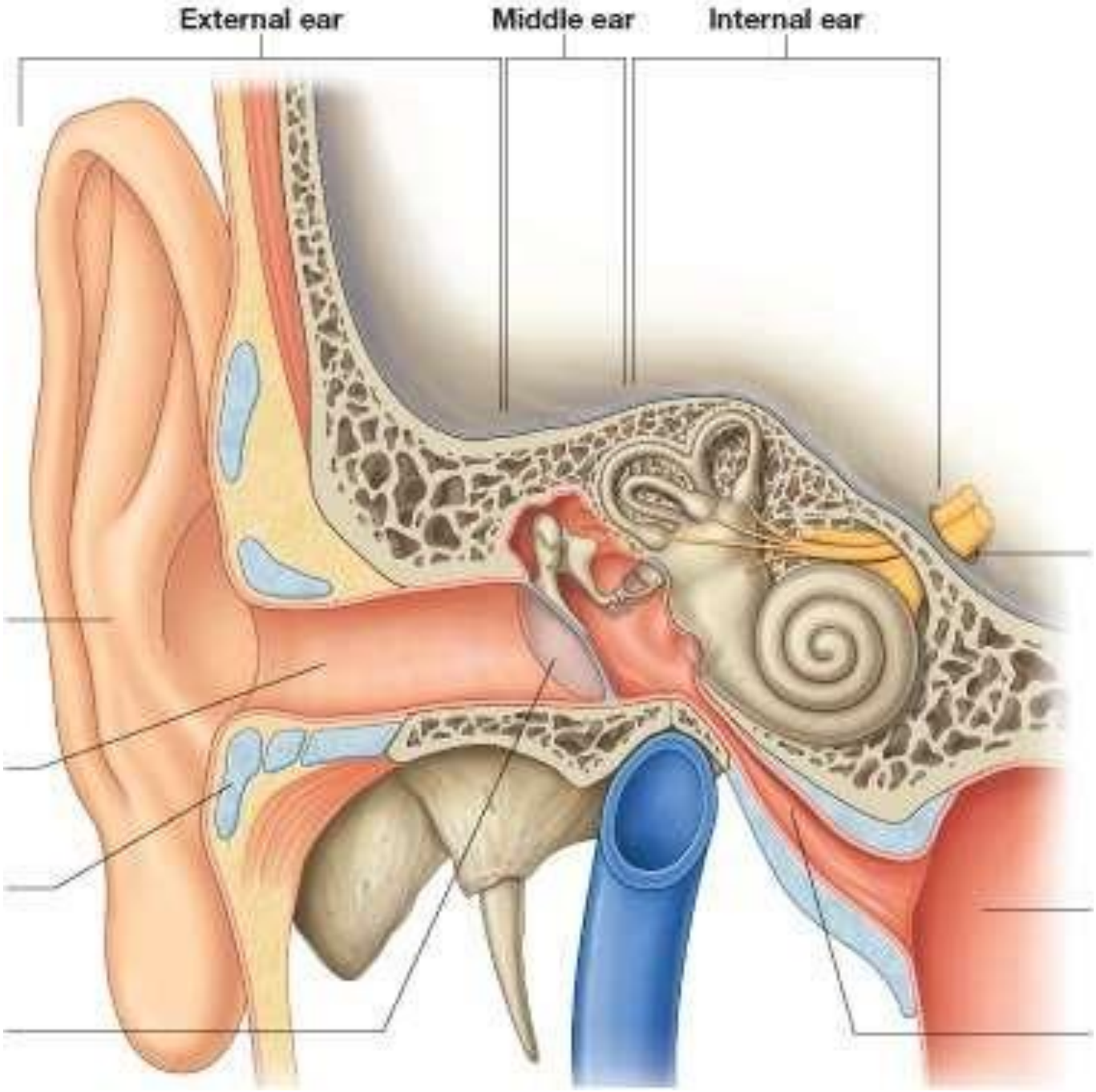
Development of Ear




External ear
Middle ear
Internal ear

External ear- **sound collection**

Pinna, EAM and outer layer of TM

Middle ear- **sound conduction**

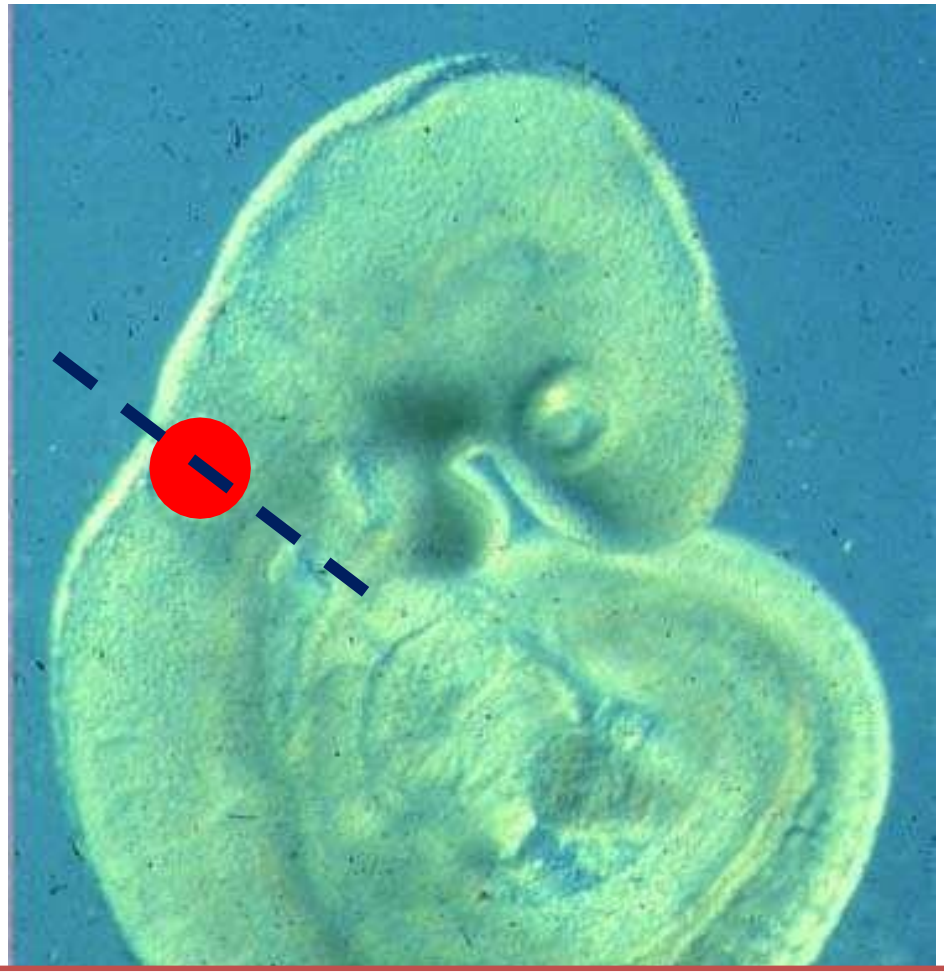
Ear ossicles and inner layer of TM

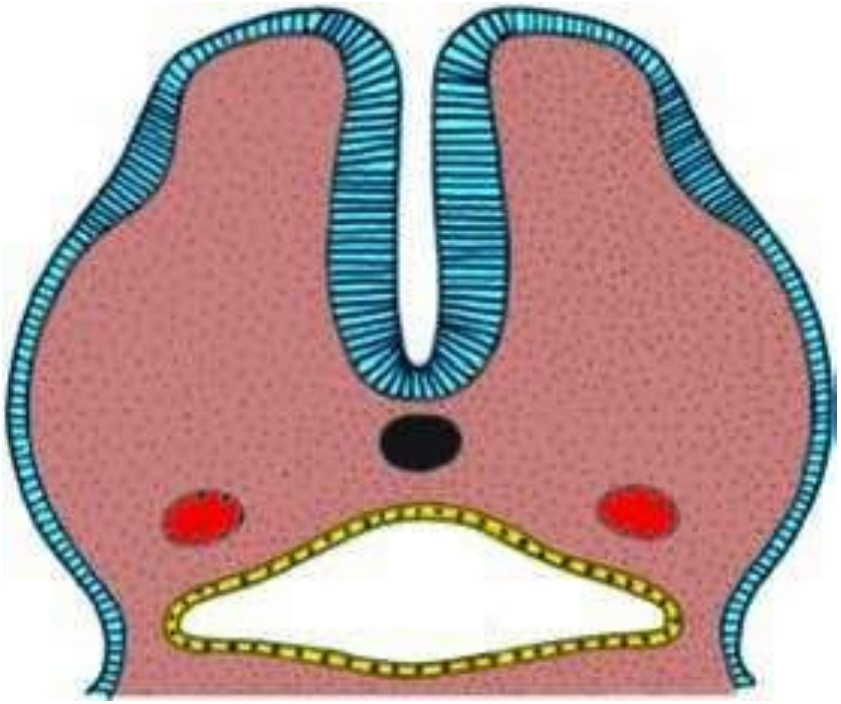
Internal ear

- **Sound wave to nerve impulse**
- **Equilibrium**

***Labyrinth (bony and membranous*)**

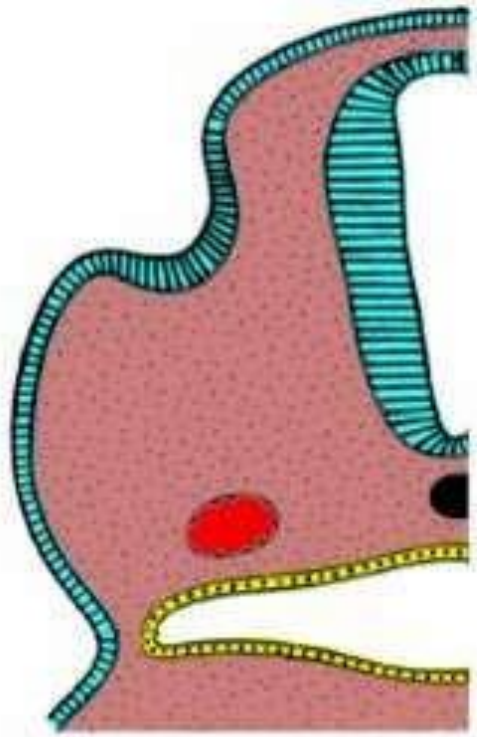
Development of Internal Ear



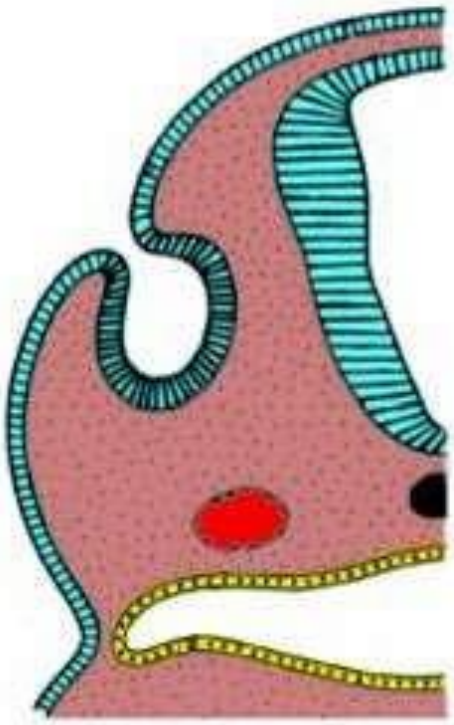


Otic Placode @22nd day

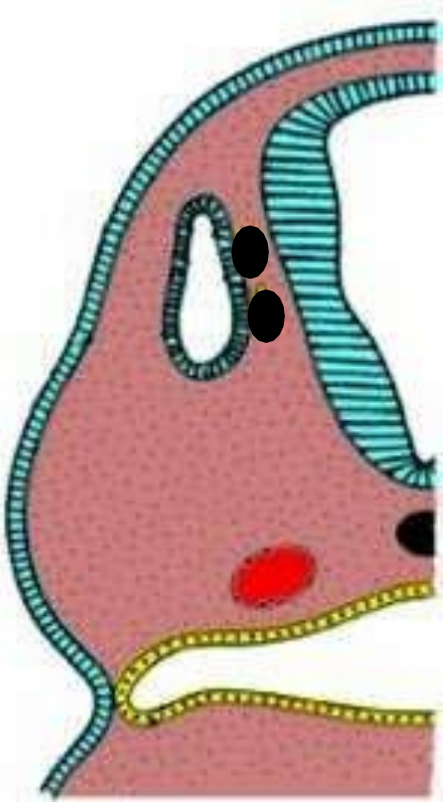
On each side of hindbrain



Invaginating placode

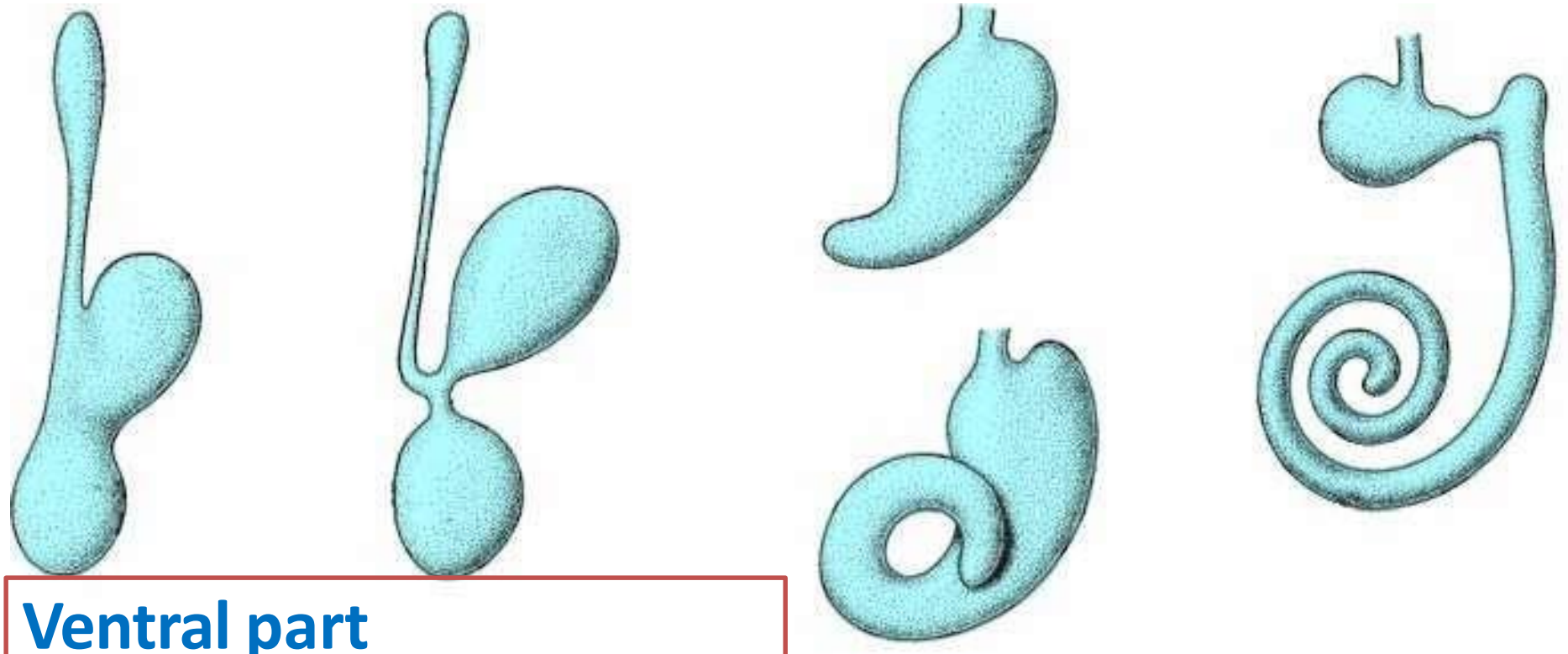


Otic pit



Otic vesicle

Forms membranous labyrinth



Ventral part

Saccules

Cochlear duct

Dorsal part

Semicircular duct

Utricle

Endolymphatic duct

Utriculo-saccular duct

Cochlear duct

Ductus reunions

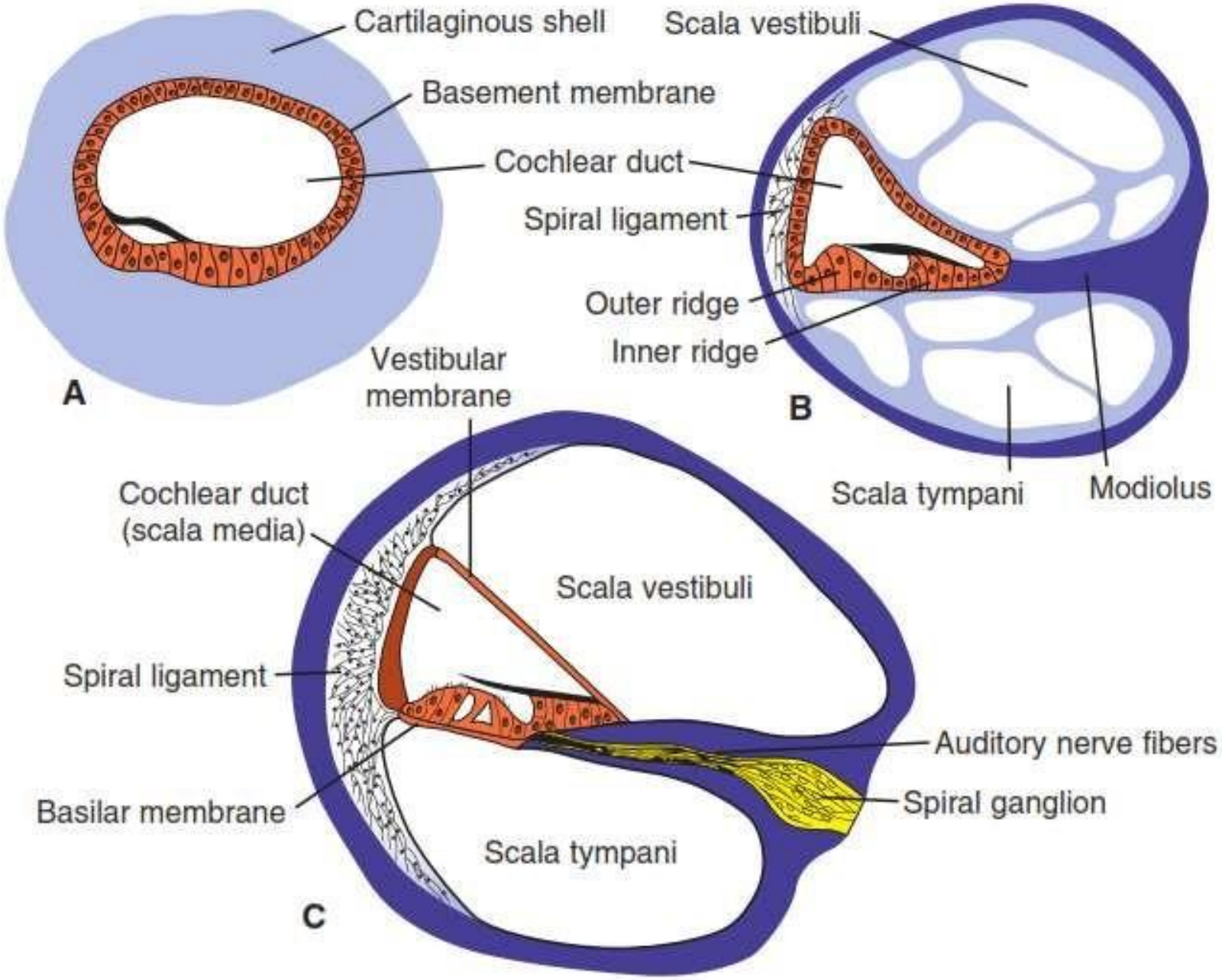
Development of Utricle and SCD
(Dorsal Part of Otic vesicle)

SCDs appear as flat out pocketing of Utricular portion of Otic vesicle.

•Three pairs of SCD are formed –**Ant/Post/Lat**

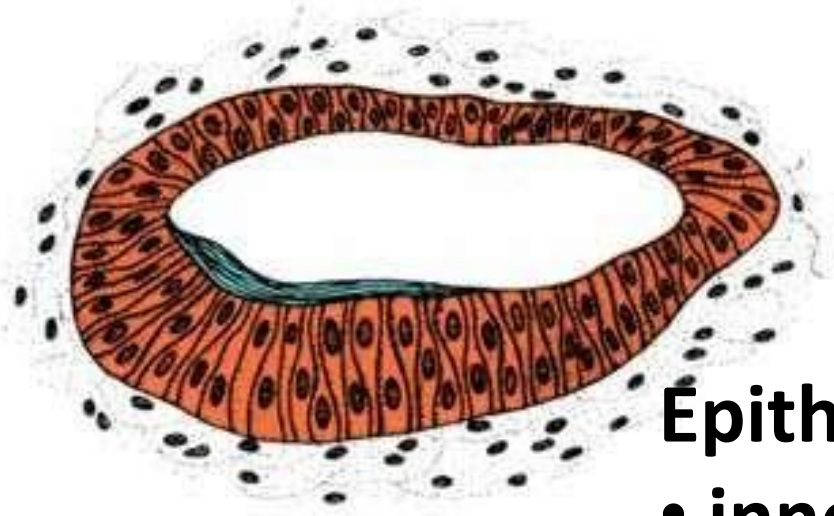
One end of SCD form dilatation (**Crus Ampullare**) and the other does not widen (**Crus Nonampulare**)

❖Because two crus nonampullare fuse, there will be 3 crus ampullare and 2 crus nonampullare


Cartilaginous shell
Basement membrane
Cochlear duct
A
Scala vestibuli
Spiral ligament
Outer ridge
Inner ridge
B
Scala tympani
Modiolus
Vestibular membrane
Cochlear duct (scala media)
Scala vestibuli
Spiral ligament
Auditory nerve fibers
Basilar membrane
Spiral ganglion
Scala tympani
C

Formation of Cochlea

- Mesenchyme surrounding CD Differentiate into cartilage.
- Cartilage undergo vacuolization and form **Scala vestibuli** and **scala tympani.**
- Lateral part of CD attached to the cartilage by **Spiral ligament** and medial edge is attached and supported by **modiolus**.



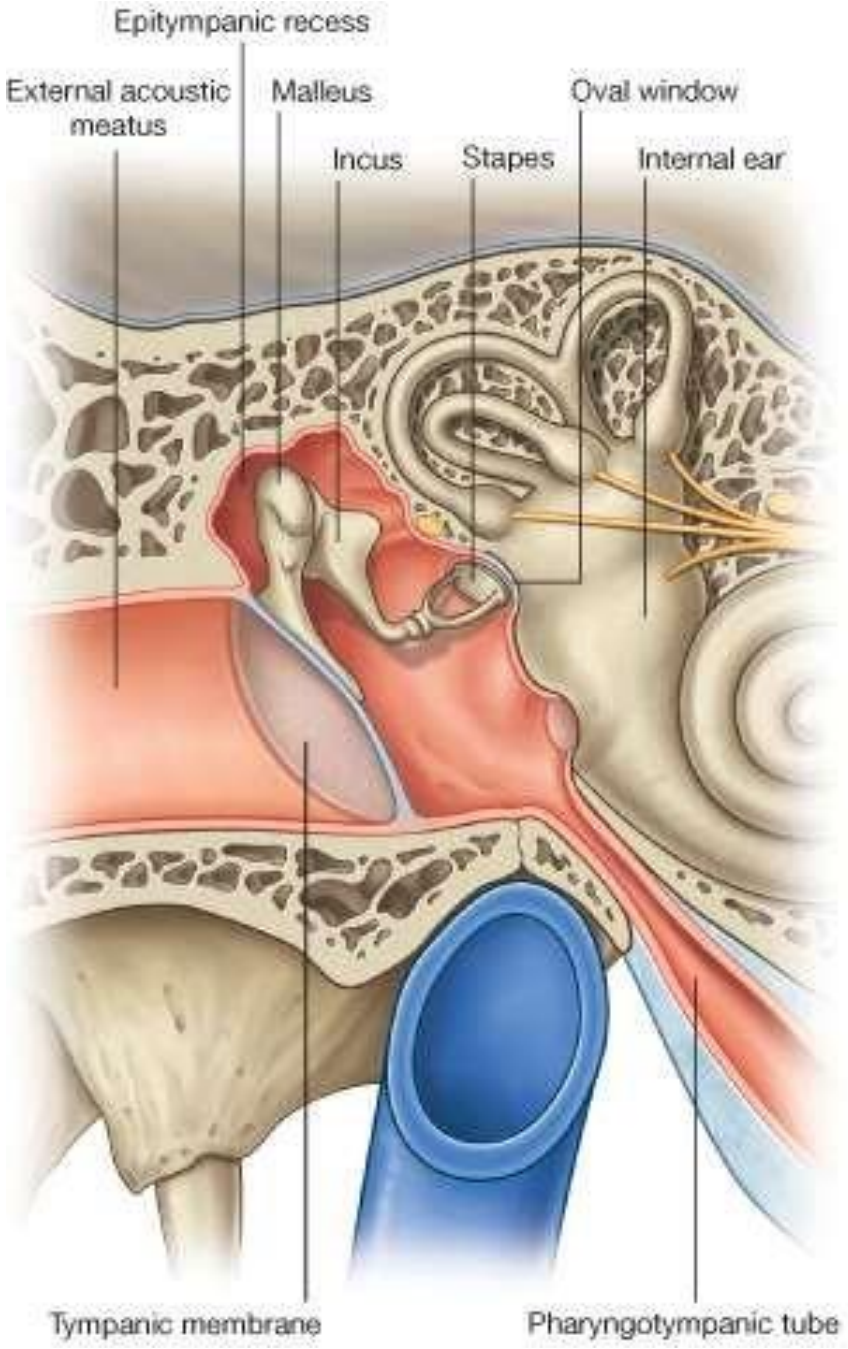
Epithelium of CD form two ridge.

- **inner ridge**
- **Outer ridge**

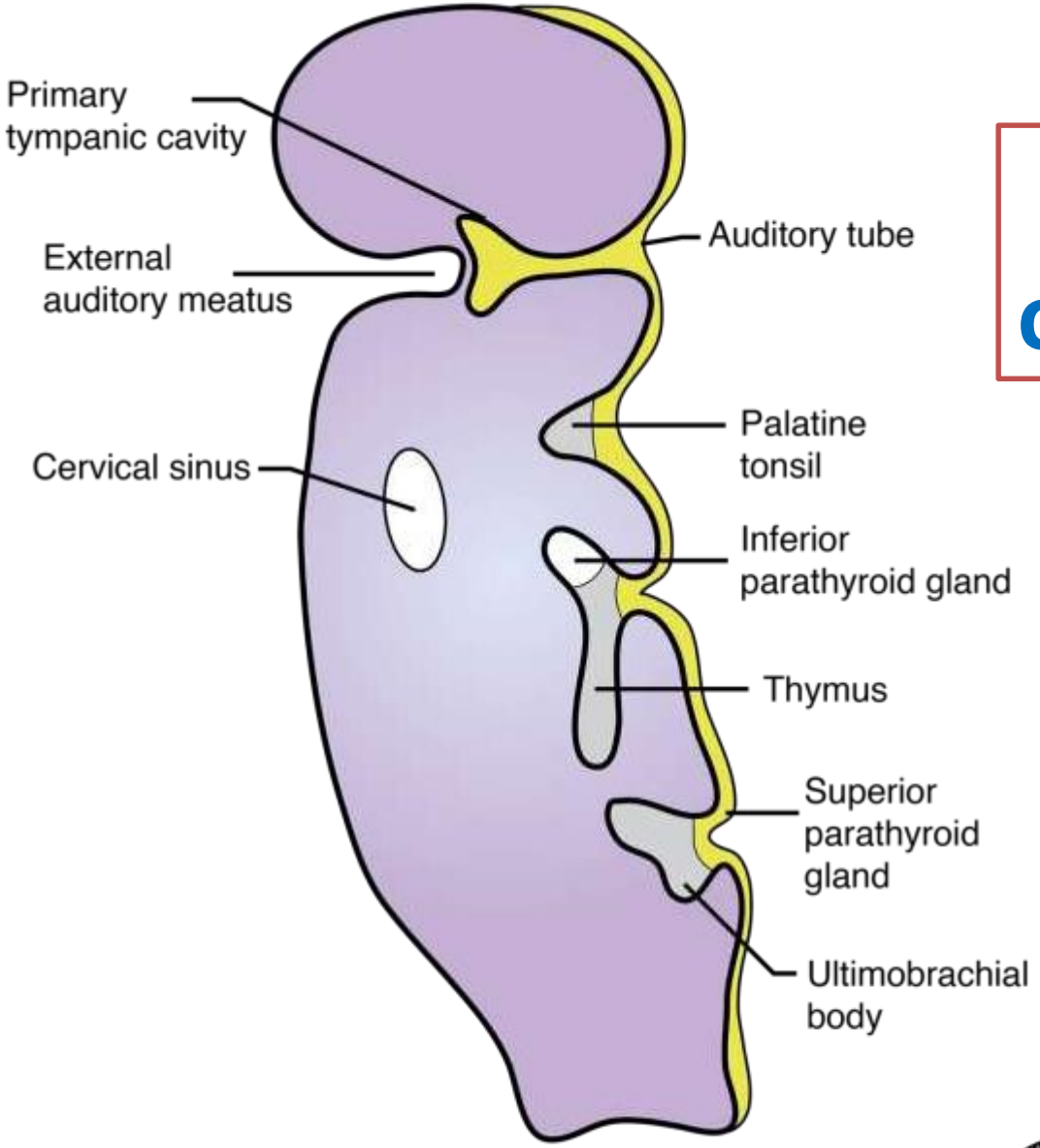
The inner ridge, the future spiral limbus.

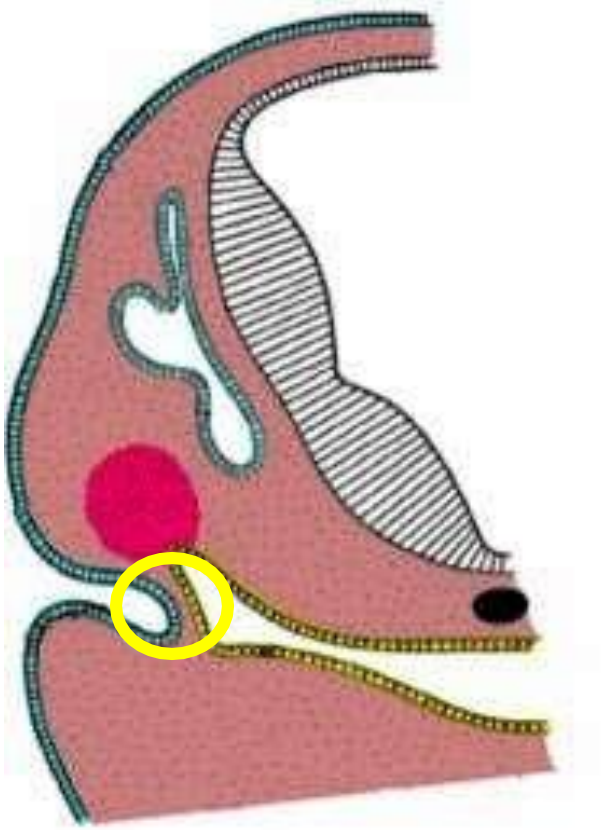
Outer ridge forms inner and outer rows of hair cells covered BY tectorial membrane by Organ of Corti

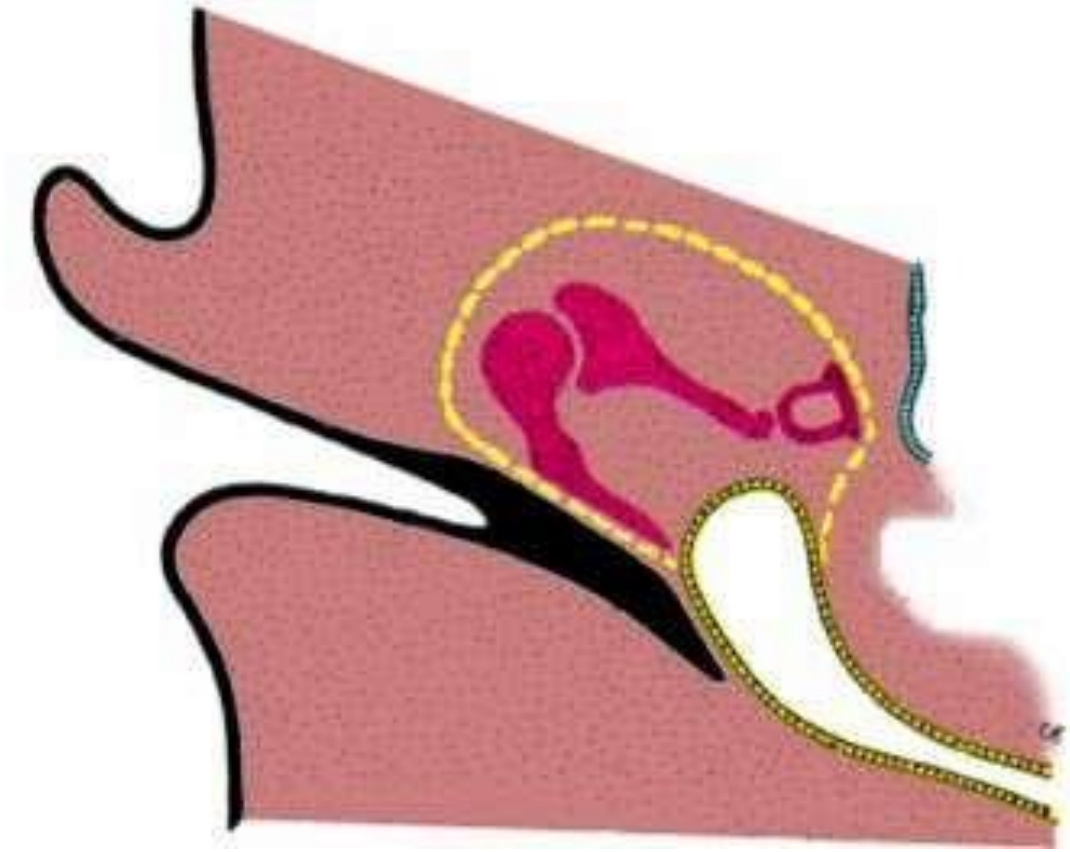
Impulses received by this organ are transmitted to the spiral ganglion and then to the nervous system by the **auditory fibers of cranial nerve VIII.**


Epitympanic recess
External acoustic meatus
Malleus
Oval window
Incus
Stapes
Internal ear
Tympanic membrane
Pharyngotympanic tube

Development of Middle Ear





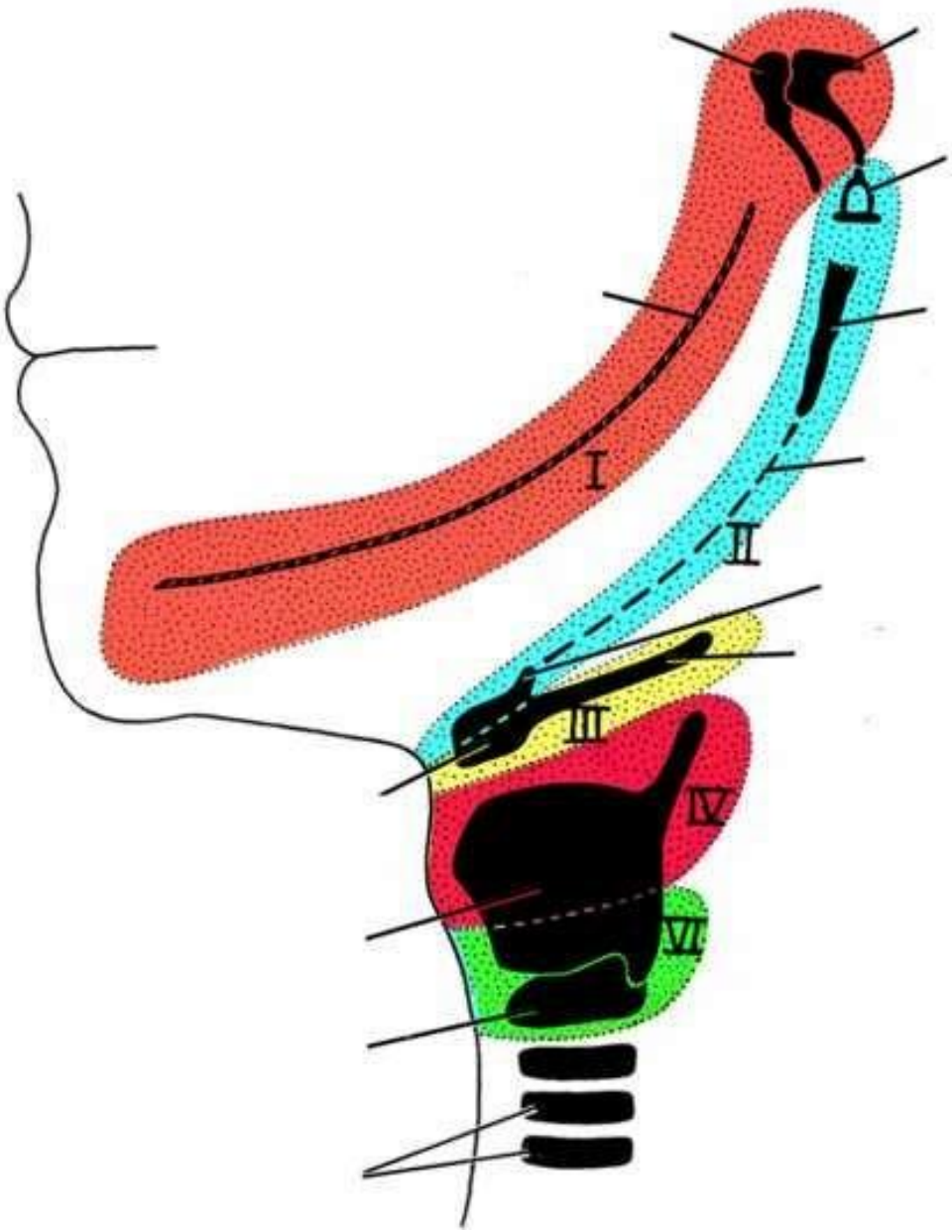


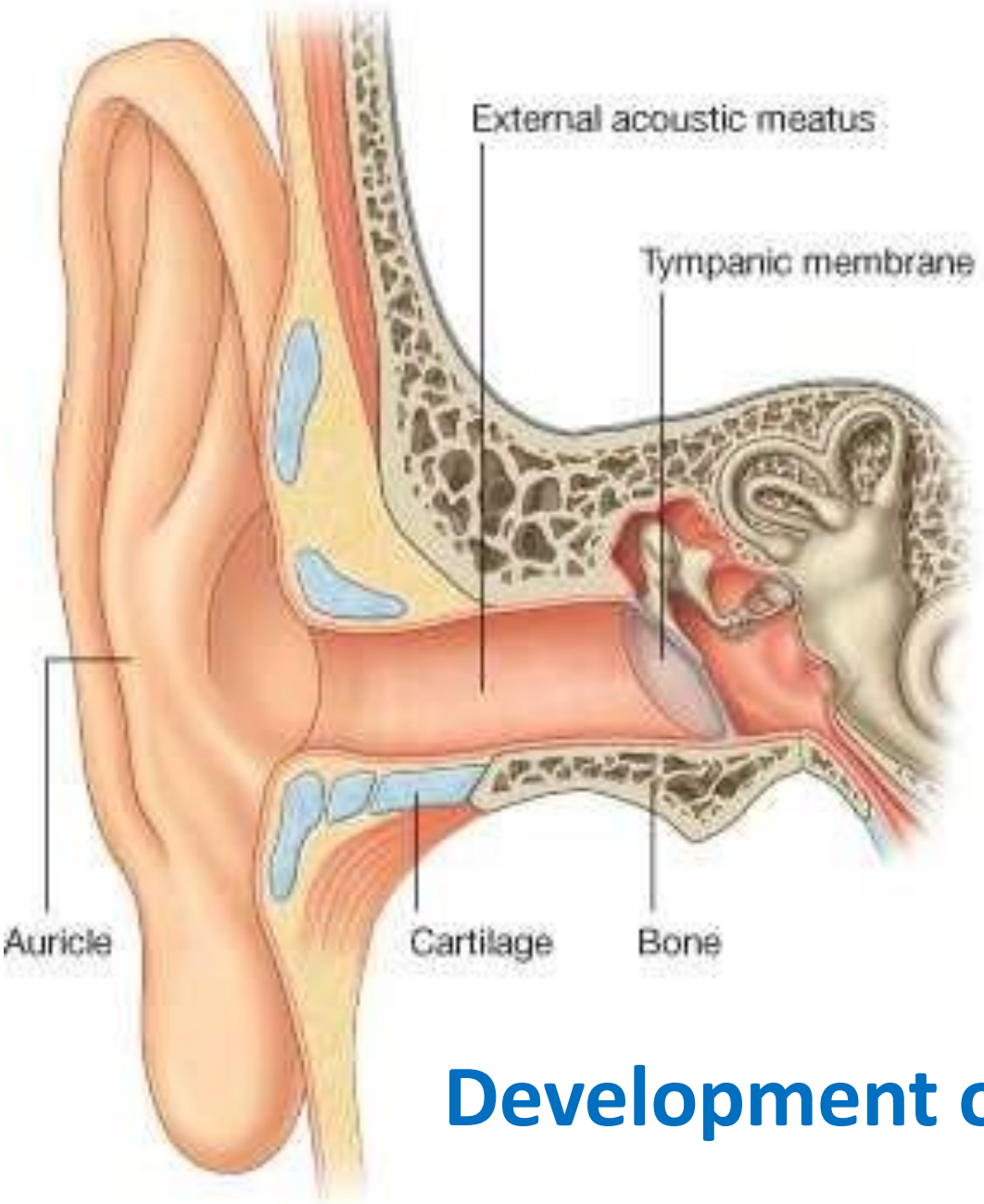
Malleus /Incus and Tensor Tympani- **1st Arch**
Stapes and Stapedius muscle- **2nd arch**

First pharyngeal pouch

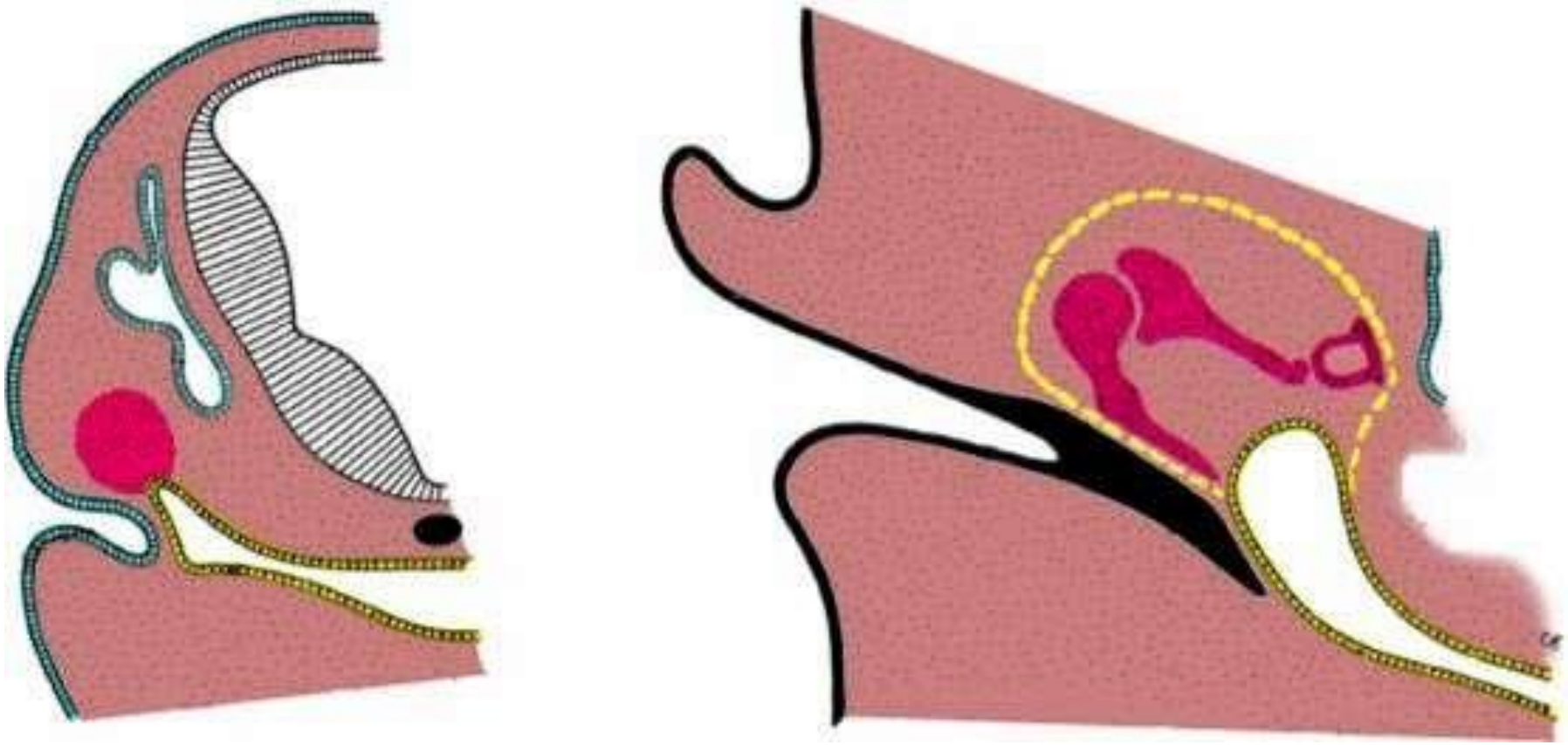
Distal part- tympanic cavity

Proximal part- auditory tube

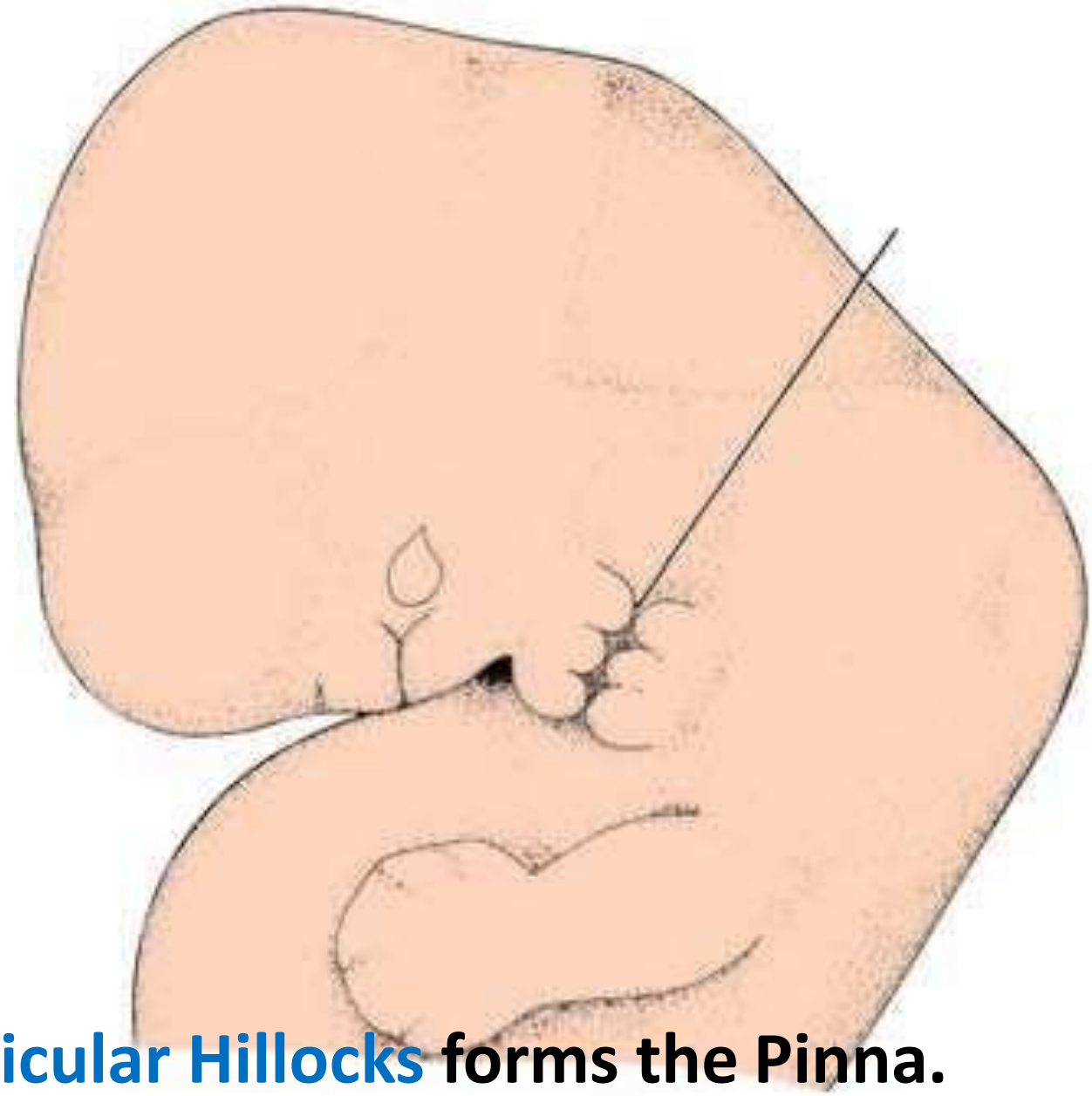

I
II
III
IV
VI



Development of ext ear



- **Six auricular Hillocks forms the Pinna.**
- **First pharyngeal cleft forms the EAM**



- **Six auricular Hillocks forms the Pinna.**
- **First pharyngeal cleft forms the EAM**

Embryonic structure	Adult derivative	
Otic vesicle Saccular portion	Saccule, CD, Spiral ganglion	Internal ear
Utricular portion	Utricle, SCD, vestibular ganglion and endolymphatic duct	
Pharyngeal membrane 1	Tympanic membrane	
Arch 1	Malleus, Incus, Tensor tympani	Middl ear
Arch 2	Stapes, Stapedius	
Pouch 1	Middle ear cavity and auditory tube	
Pharyngeal cleft 1	External acoustic meatus	Ext ear
6 auricular hillocks	Pinna	

Derangement of development

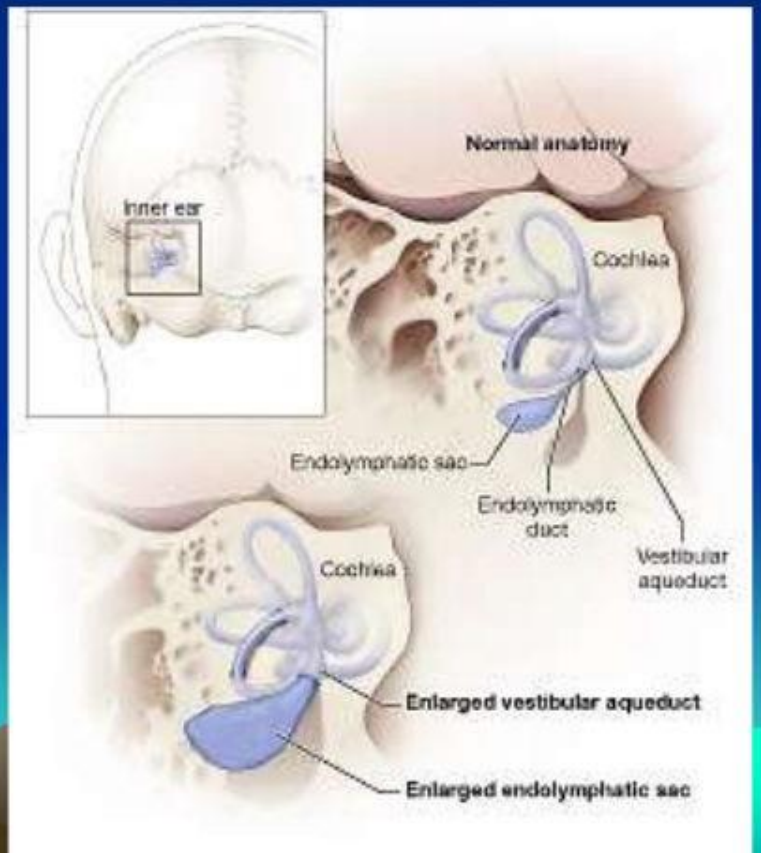
- There an exhausting list of disorders.
- lets name a few.
  - Treacher collins
  - Pendred
  - Crouzon
  - Preauricular sinus

Treacher Collins

- Atresia of external auditory canal
- malformed auricle
- Middle and inner ear anomalies
- Downward slanting eyes
- Micrognathia
- Underdeveloped zygoma.
- Drooping of part of the lateral lower eyelids

Pendred Syndrome

- Sensorineural deafness
- Widened vestibular aqueduct
- Shortened cochlea



Crouzon's disease

- Atresia of external auditory canal
- Malformation of ossicles
- Fusion of different sutures leads to different patterns of growth of the skull.

Congenital Preauricular Sinus

Failure of fusion of first and second arch tubercles

External ear malformation

Preauricual pit

External ear malformation

Microtia

External ear malformation

Preauricualr appendages

External ear malformation

Anotia


THANK
YOU
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