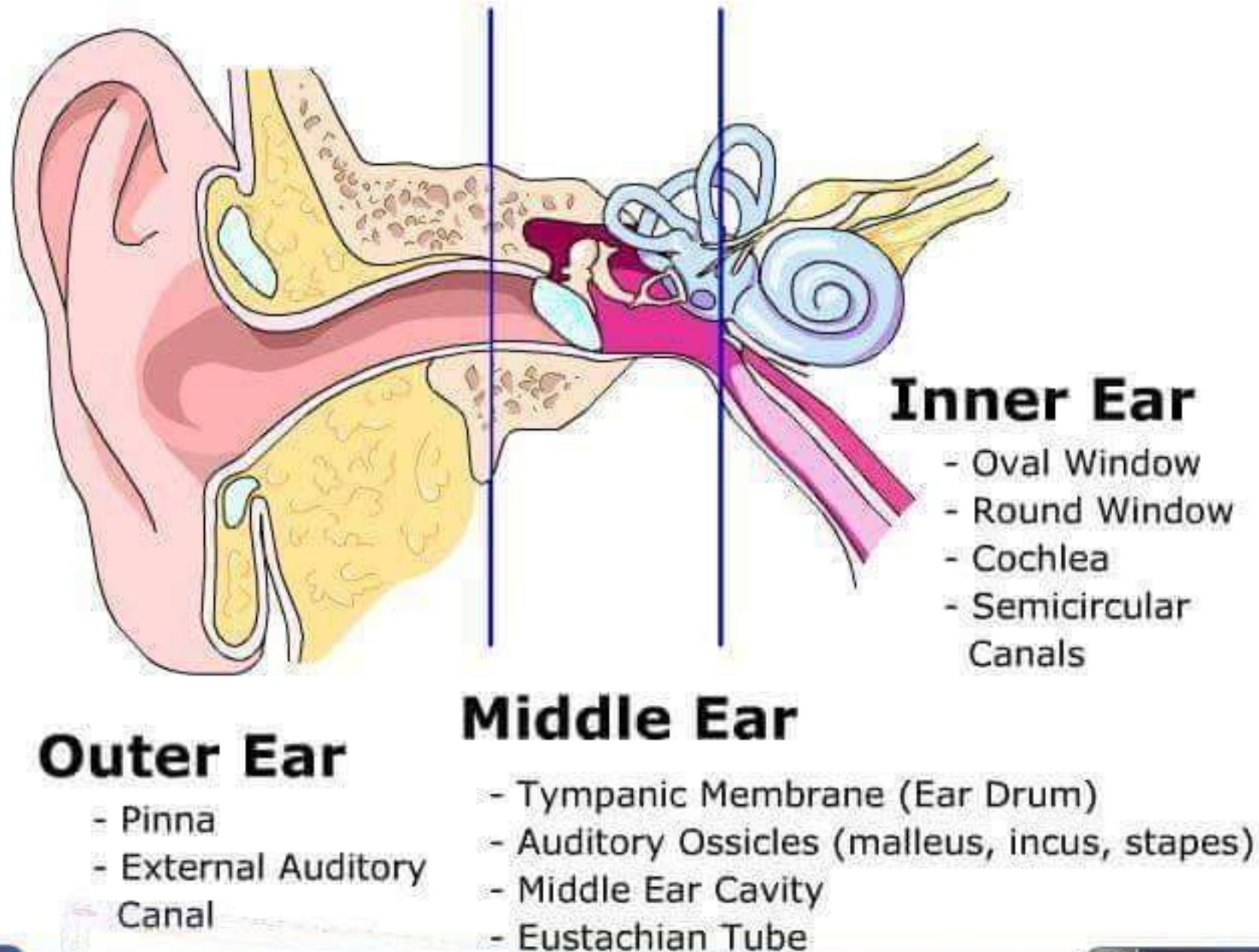


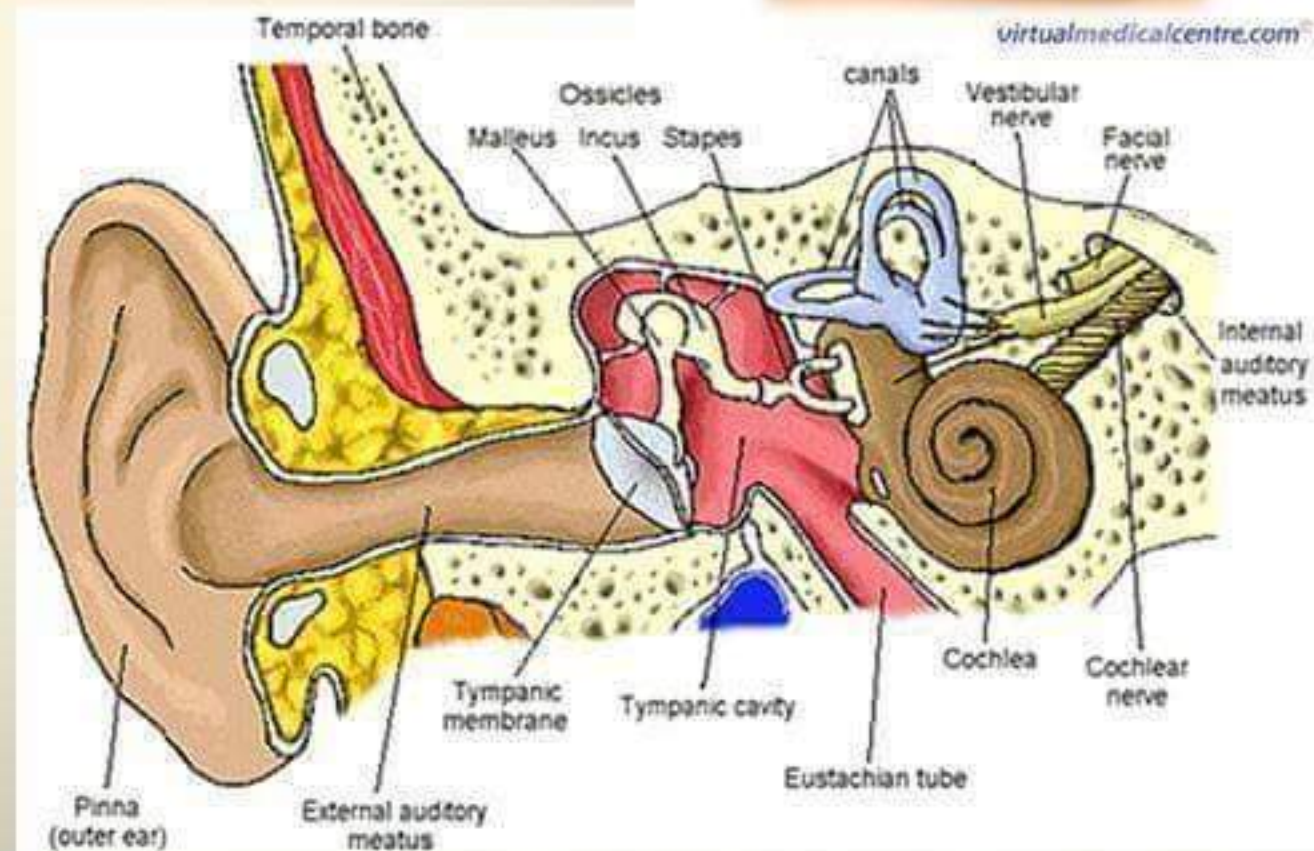
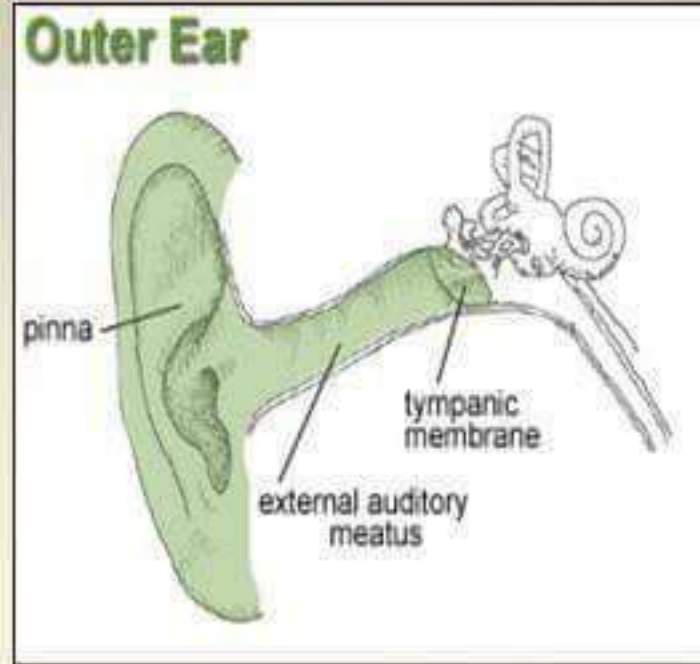
Anatomy of the Ear

Three Main Sections



The External Ear

- Consists of:
 - **Auricle (pinna)**
 - Made of elastic cartilage
 - Helix (rim)
 - Lobule (ear lobe)
 - **External auditory canal**
 - Lies within temporal bone & connects to ear drum (tympanic memb)
 - Contains ceruminous glands which secrete ear wax
 - **Tympanic membrane**
 - Epithelial & simple cuboidal
 - Changes acoustic energy into mechanical energy
 - Perforated eardrum = tear



The Middle Ear

- Auditory Ossicles (smallest bones in body)

- Malleus

- Attaches to ear drum
- Articulates with incus

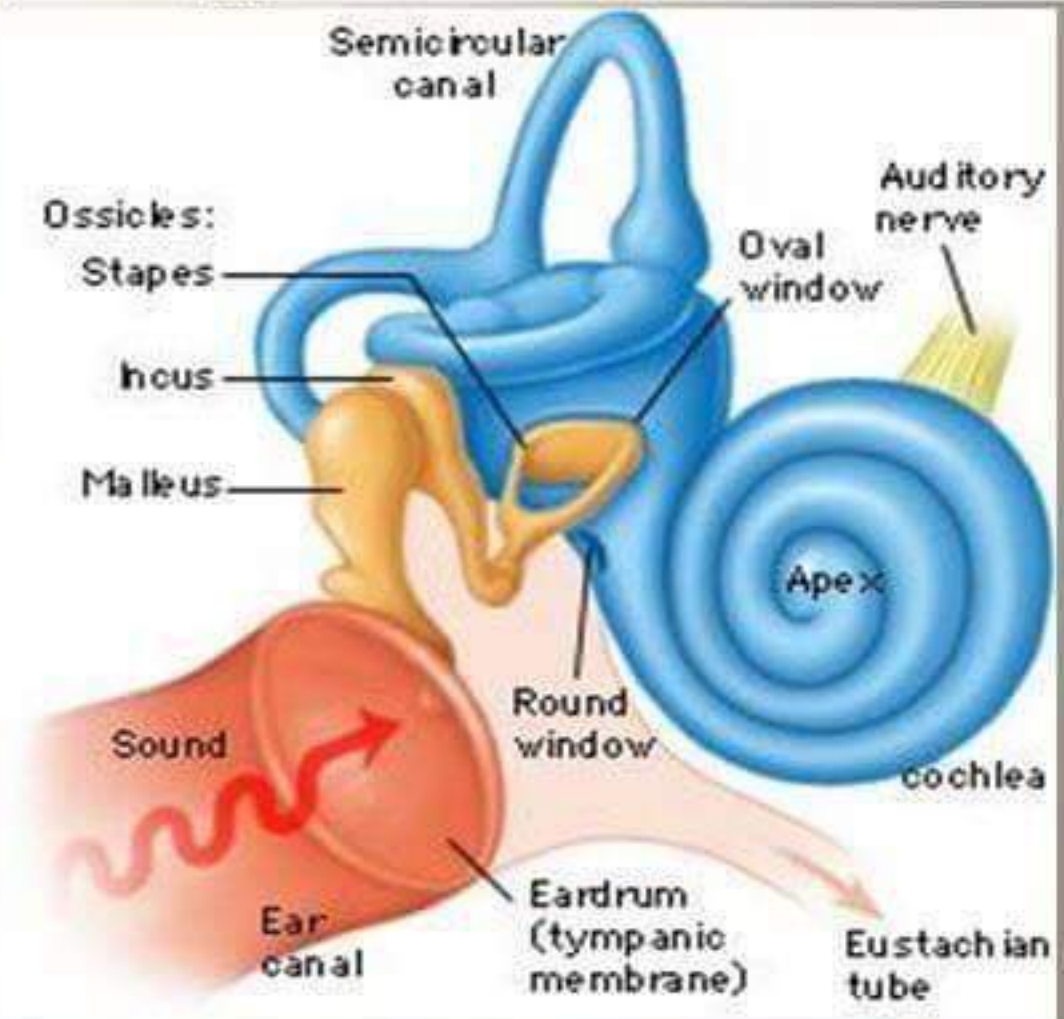
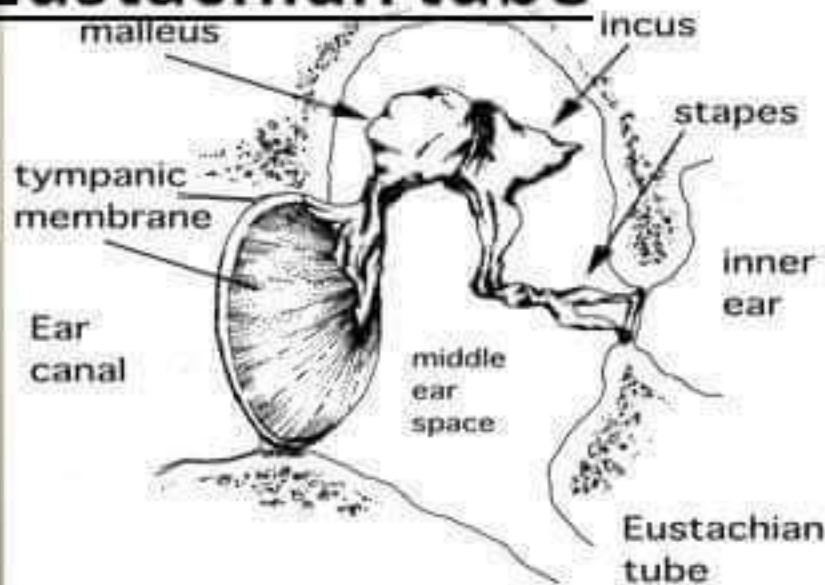
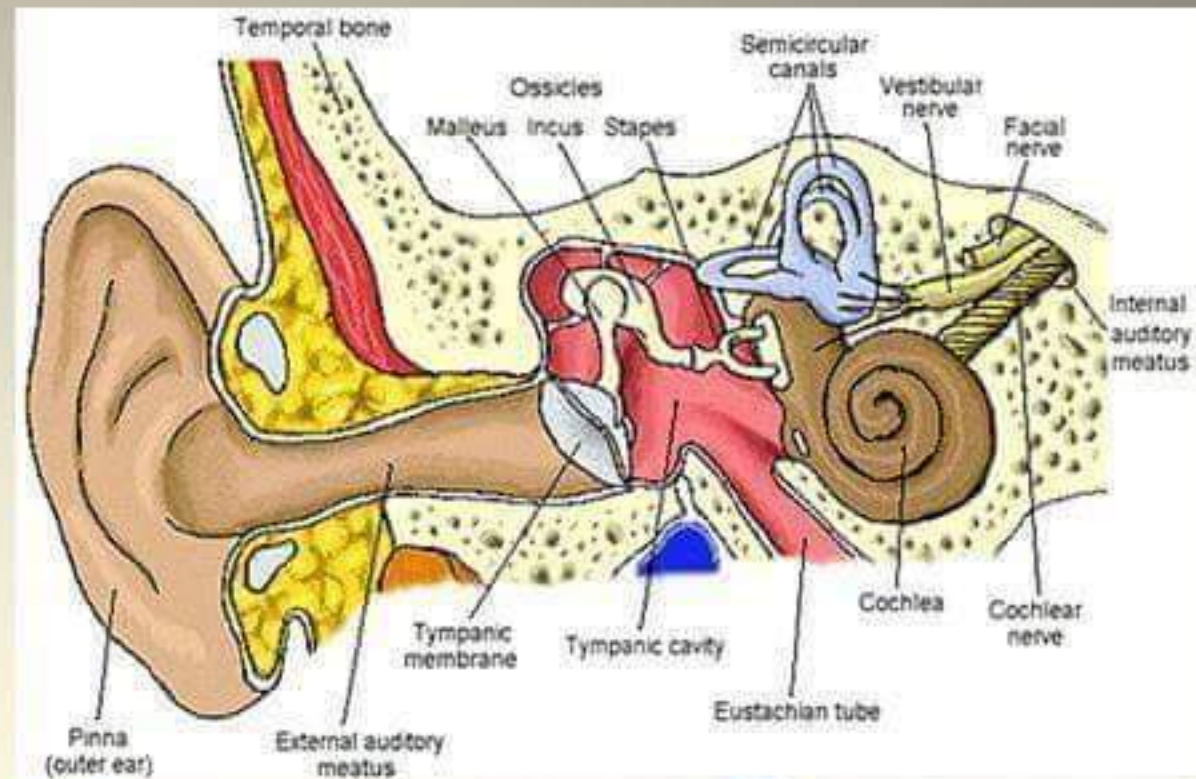
- Incus

- Articulates with stapes

- Stapes (stirrup)

- Footplate of stapes fits into oval window

- Opening to Eustachian tube



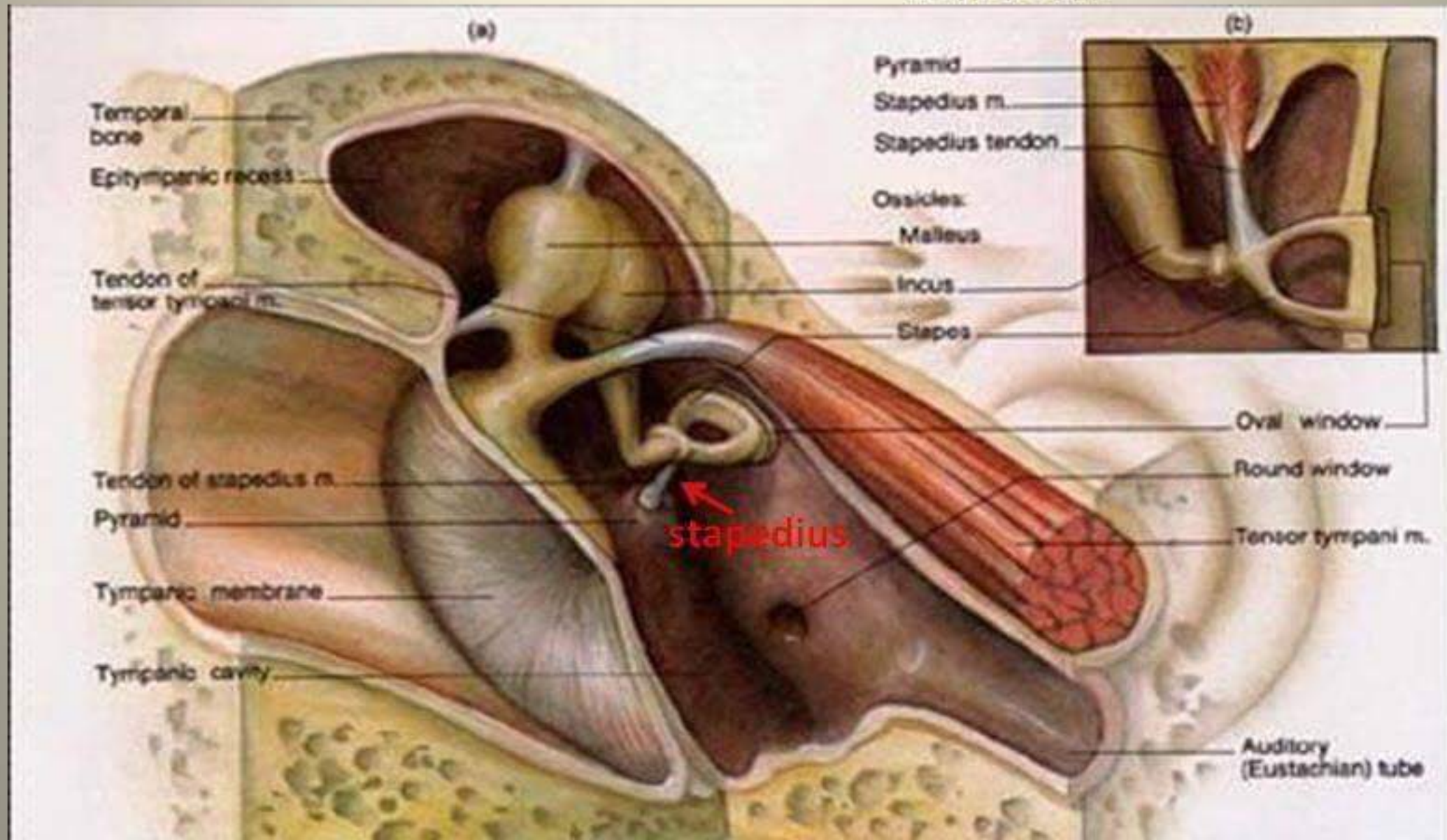
Protection by Two Tiny Muscles

- Tensor Tympani

- Attaches to Malleus to increase tension on ear drum & prevent damage to inner ear.

- Stapedius

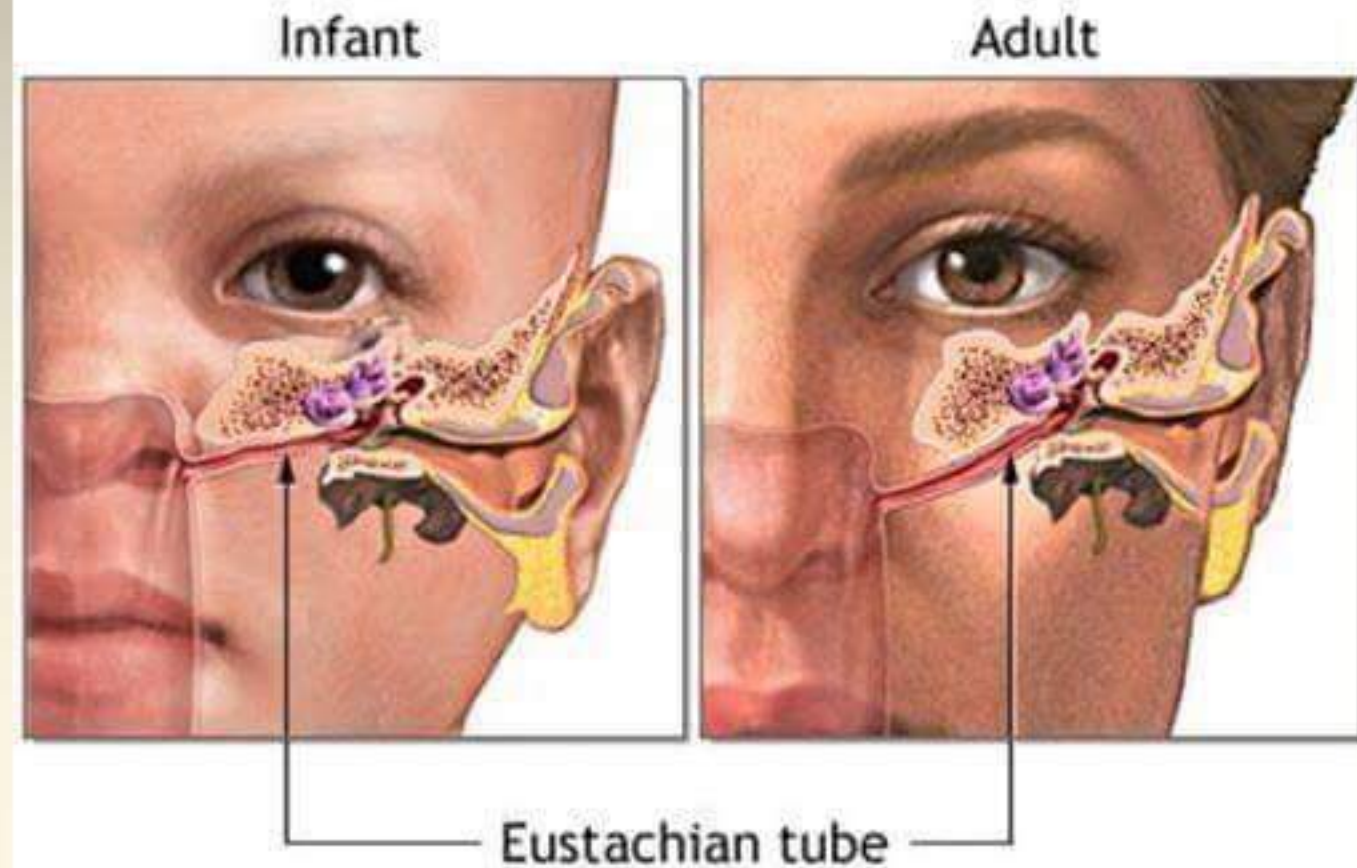
- Smallest skeletal muscle
- Dampens large vibrations of stapes to protect oval window.



- **Auditory Tube**

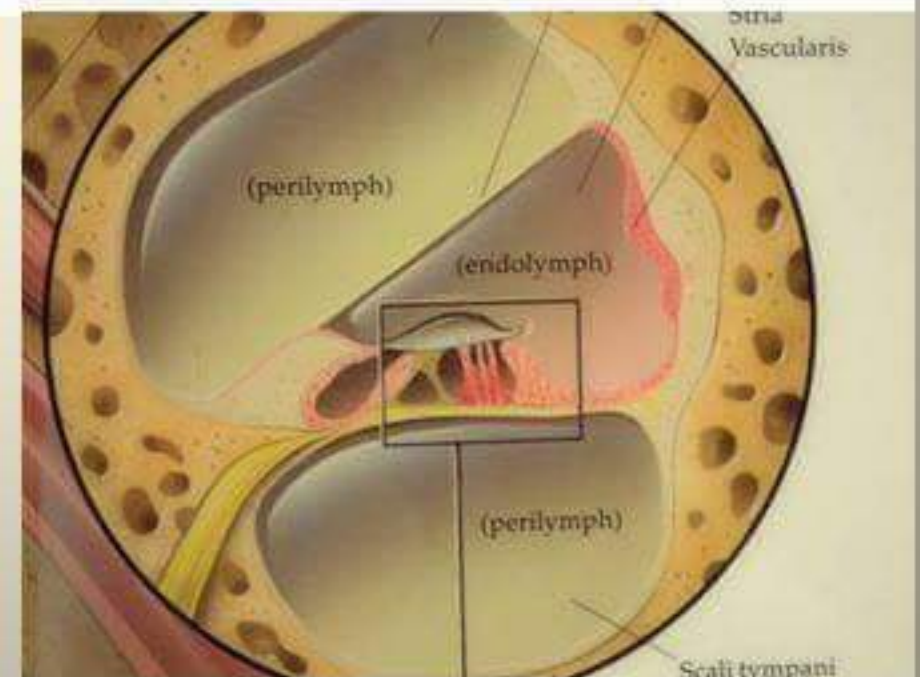
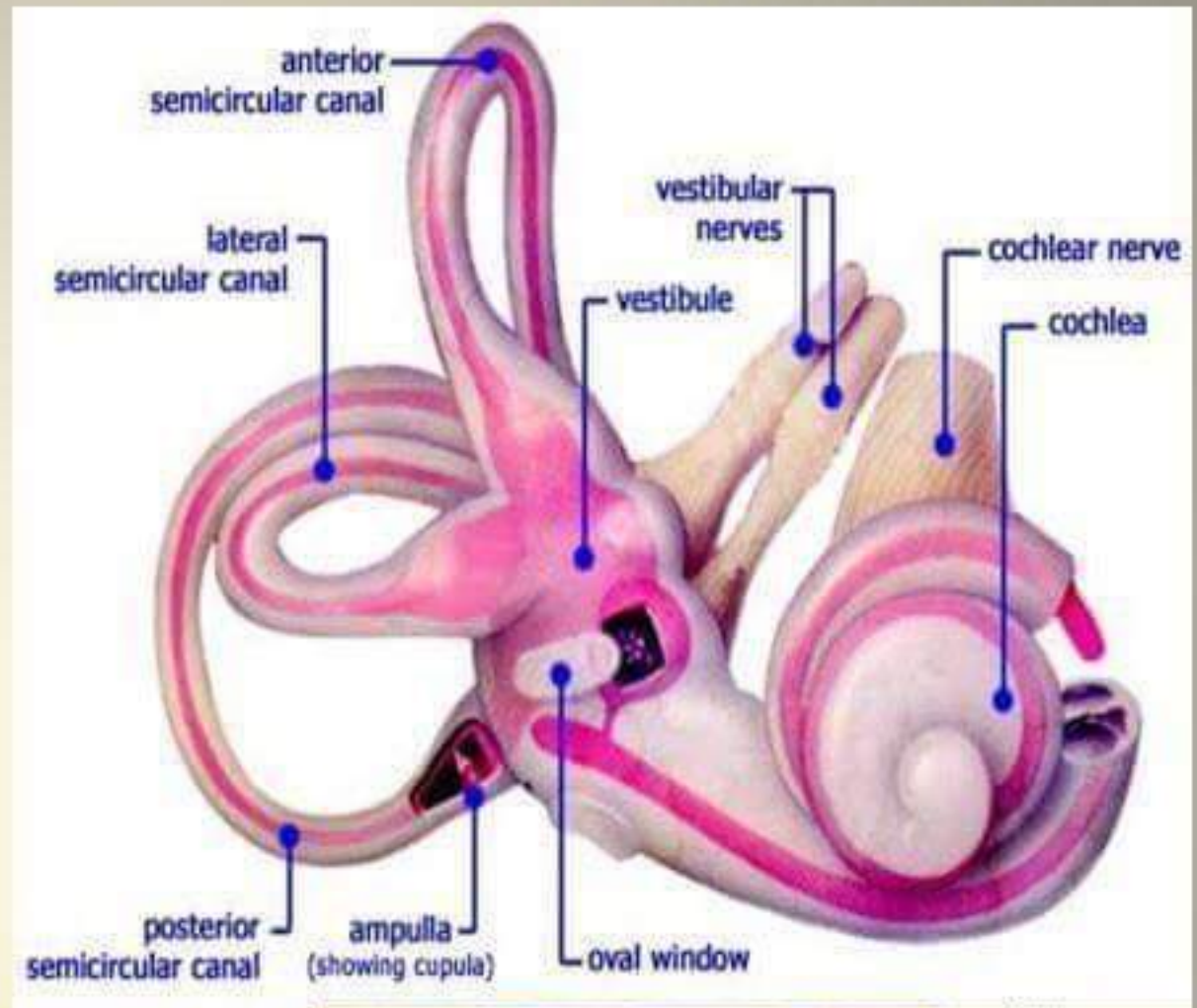
(Eustachian tube)

- Is a route for pathogens to travel from nose and throat to ear causing **Otitis Media**
- During swallowing and yawning it opens to equal pressure in middle ear.



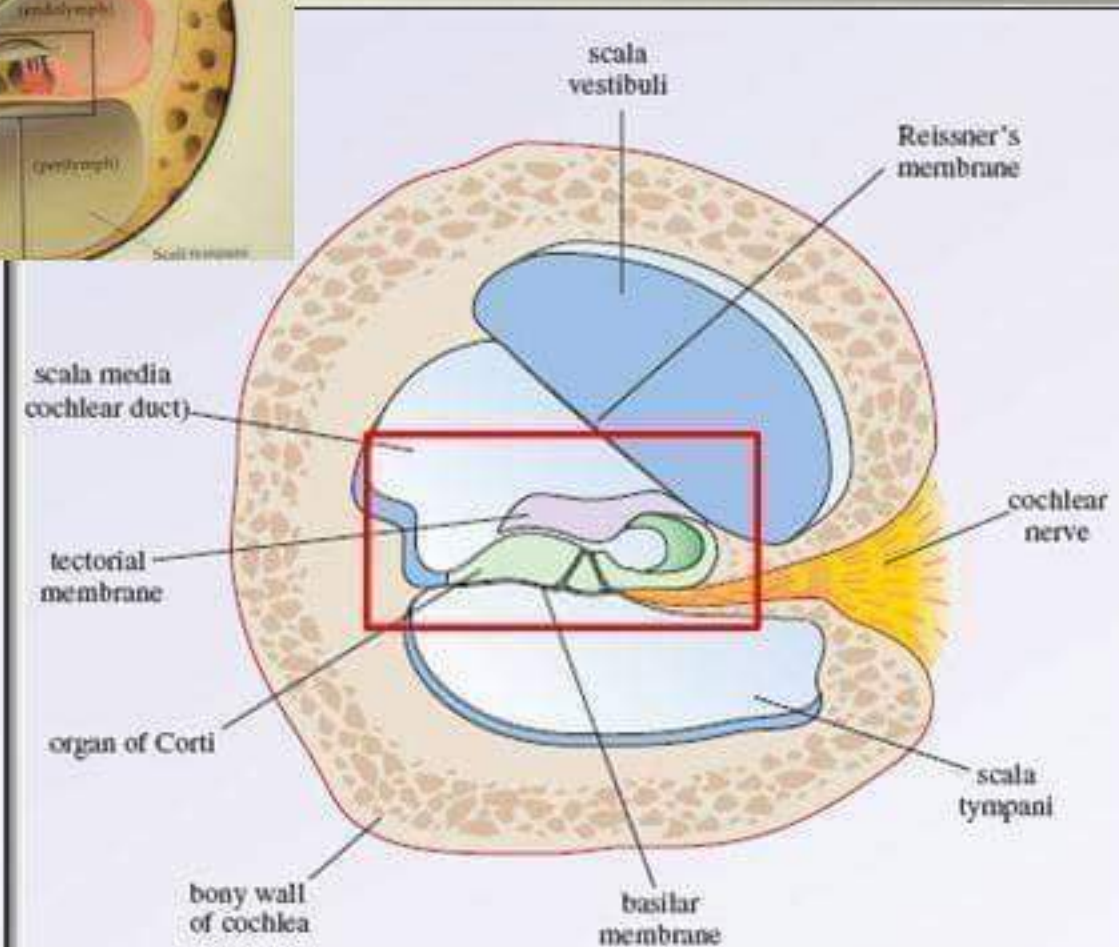
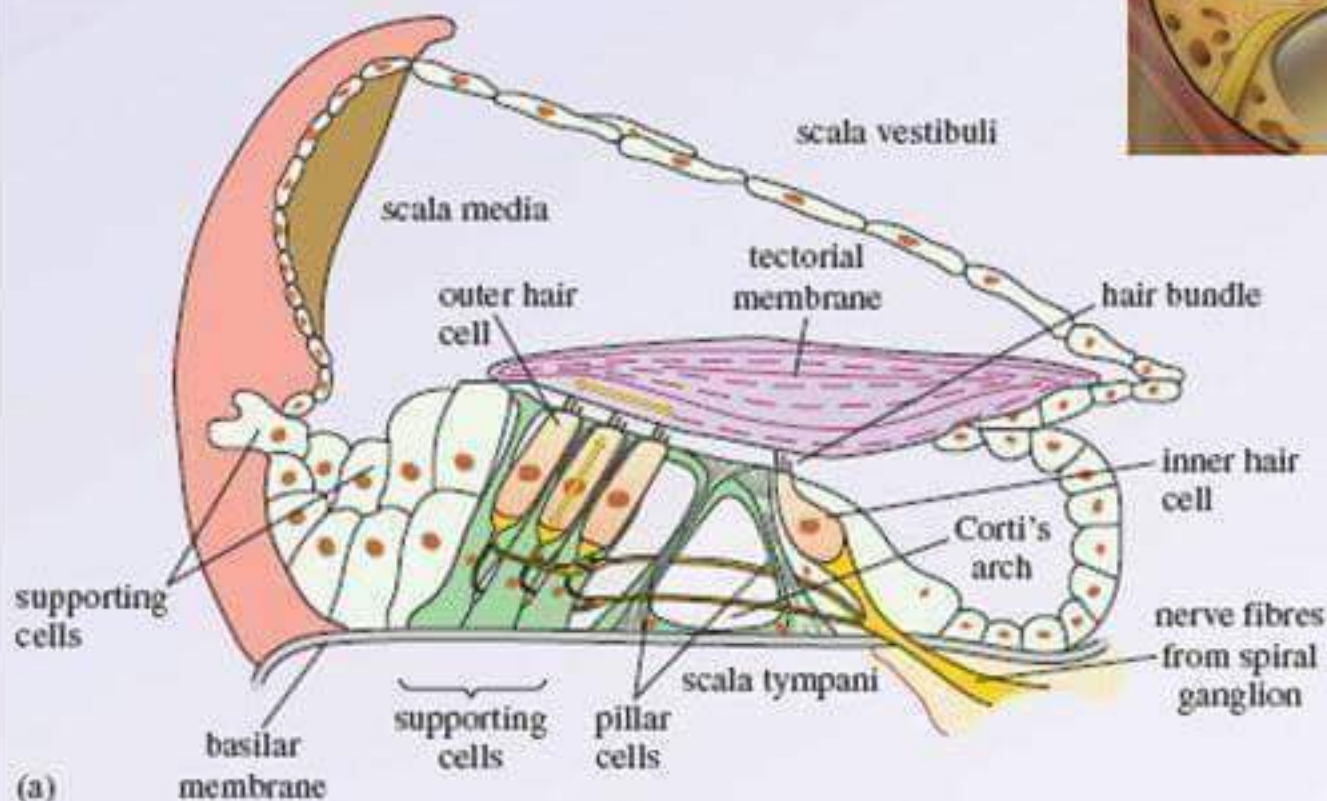
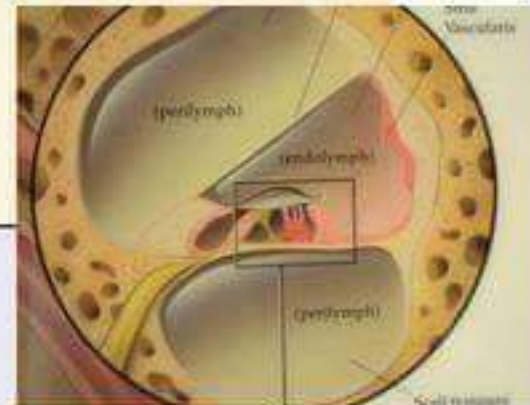
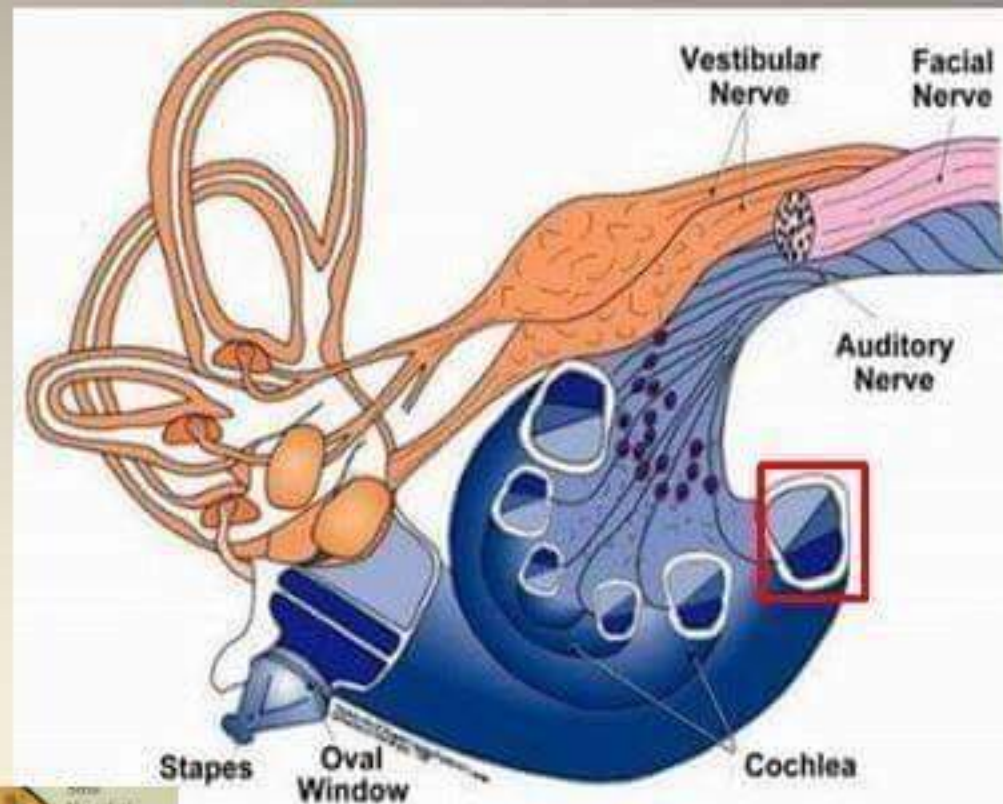
The Inner Ear (Labyrinth)

- Bony labyrinth
 - Contains perilymph
 - Semicircular canals
 - Anterior, posterior, and lateral
 - Lie right angles to each other
 - Vestibule
 - Oval portion
 - Cochlea
 - Looks like a snail
 - Converts mechanical energy into electrical energy
- Membranous labyrinth
 - Contains endolymph, high in K^+ ions



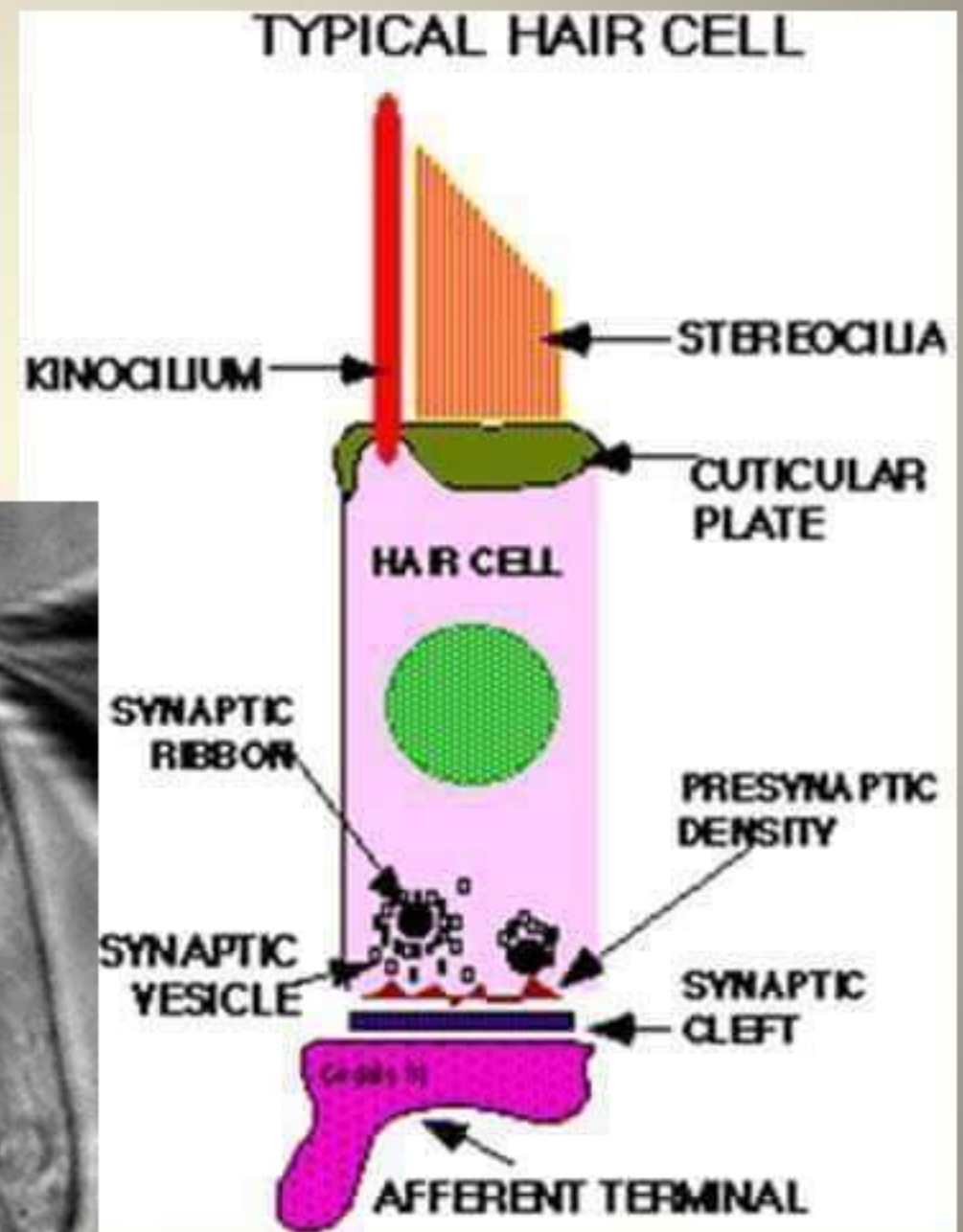
The Cochlea

- Divided into 3 channels
 - Cochlear duct (scala media)
 - Contains the Organ of Corti
 - Scala vestibuli
 - Ends at the oval window
 - Scala tympani
 - Ends at the round window



Organ of Corti

- The end organ of hearing
 - Contains stereocilia & receptor hair cells
 - Tectorial and Basilar Membranes
 - Cochlear fluids
 - Fluid movement causes deflection of nerve endings
 - Nerve impulses (electrical energy) are generated and sent to the brain



Summary of How We Hear

Acoustic energy, in the form of sound waves, is channeled into the ear canal by the **pinna**. Sound waves hit the **tympanic membrane** and cause it to vibrate, like a drum, changing it into *mechanical energy*. The **malleus**, which is attached to the tympanic membrane, starts the **ossicles** into motion. The **stapes** moves in and out of the **oval window** of the **cochlea** creating a fluid motion, or *hydraulic energy*. The fluid movement causes membranes in the **Organ of Corti** to shear against the **hair cells**. This creates an *electrical signal* which is sent up the **Auditory Nerve** (**cochlear nerve**) to the brain. The brain interprets it as sound!

