

THE HUMAN EAR

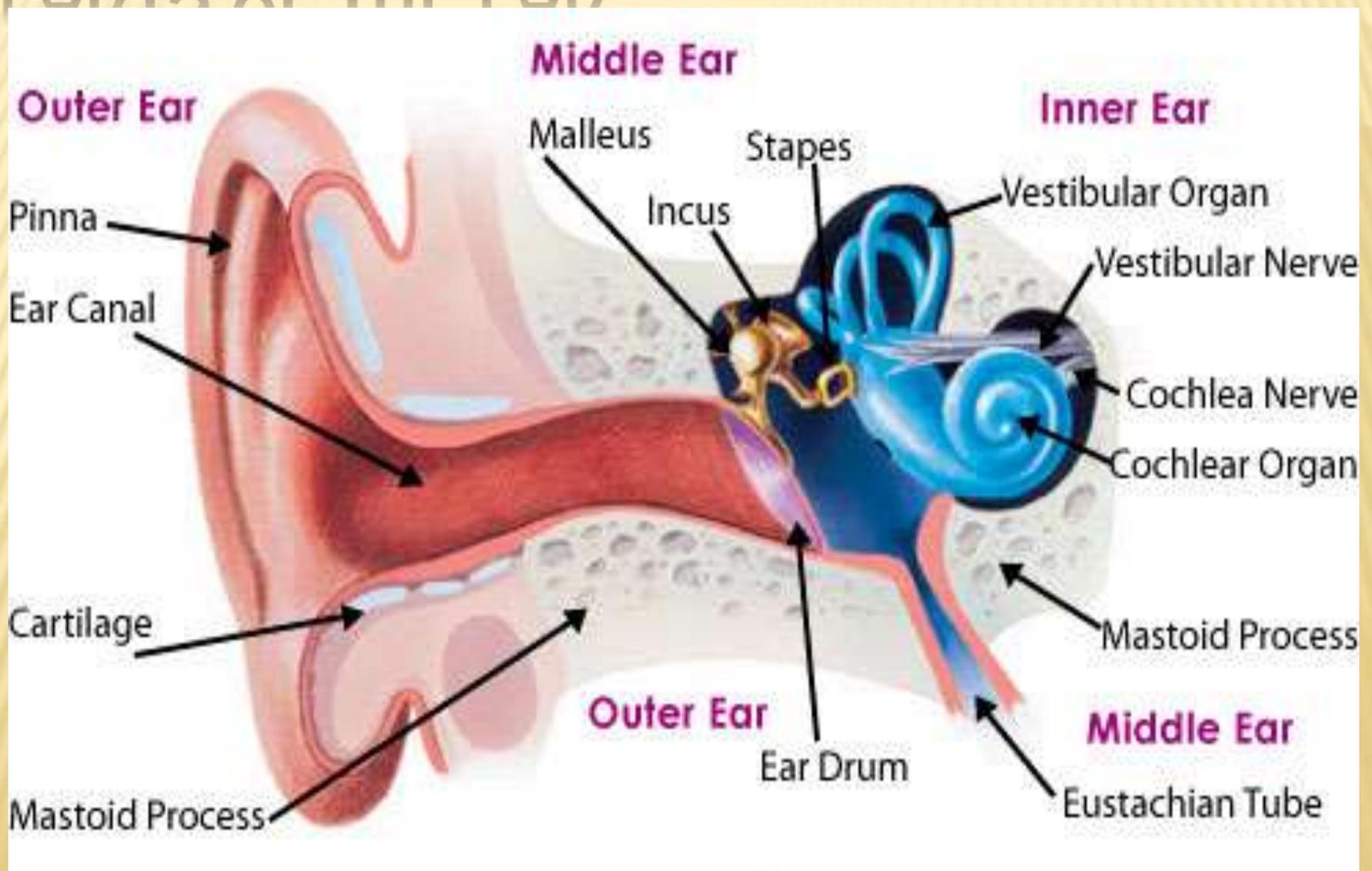


Humans are provided with two important organs for sensing information carried by waves--- the ears and the eyes.

The ear is the organ for hearing. It is divided into three parts:

- Outer Ear (pinna/auricle, auditory canal)
- Middle Ear (eardrum, ossicles, eustachian tube)
- Inner Ear (cochlea, vestibule and semicircular canal)

PARTS OF THE EAR



THE HUMAN EAR IS DIVIDED INTO THREE SECTIONS.

outer
ear

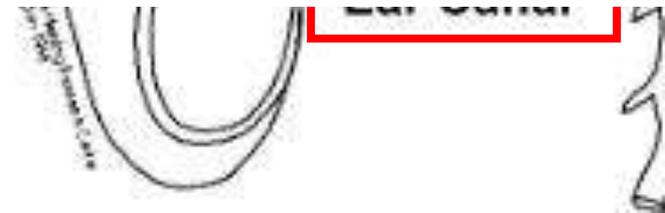
middle
ear

inner
ear



THE OUTER EAR

- ✗ Picture a satellite dish that collects radio waves.
- ✗ The outer ear is similar!
 - + The curved formation on the outside (the pinna) helps funnel sound down the ear canal to the eardrum.



THE OUTER EAR

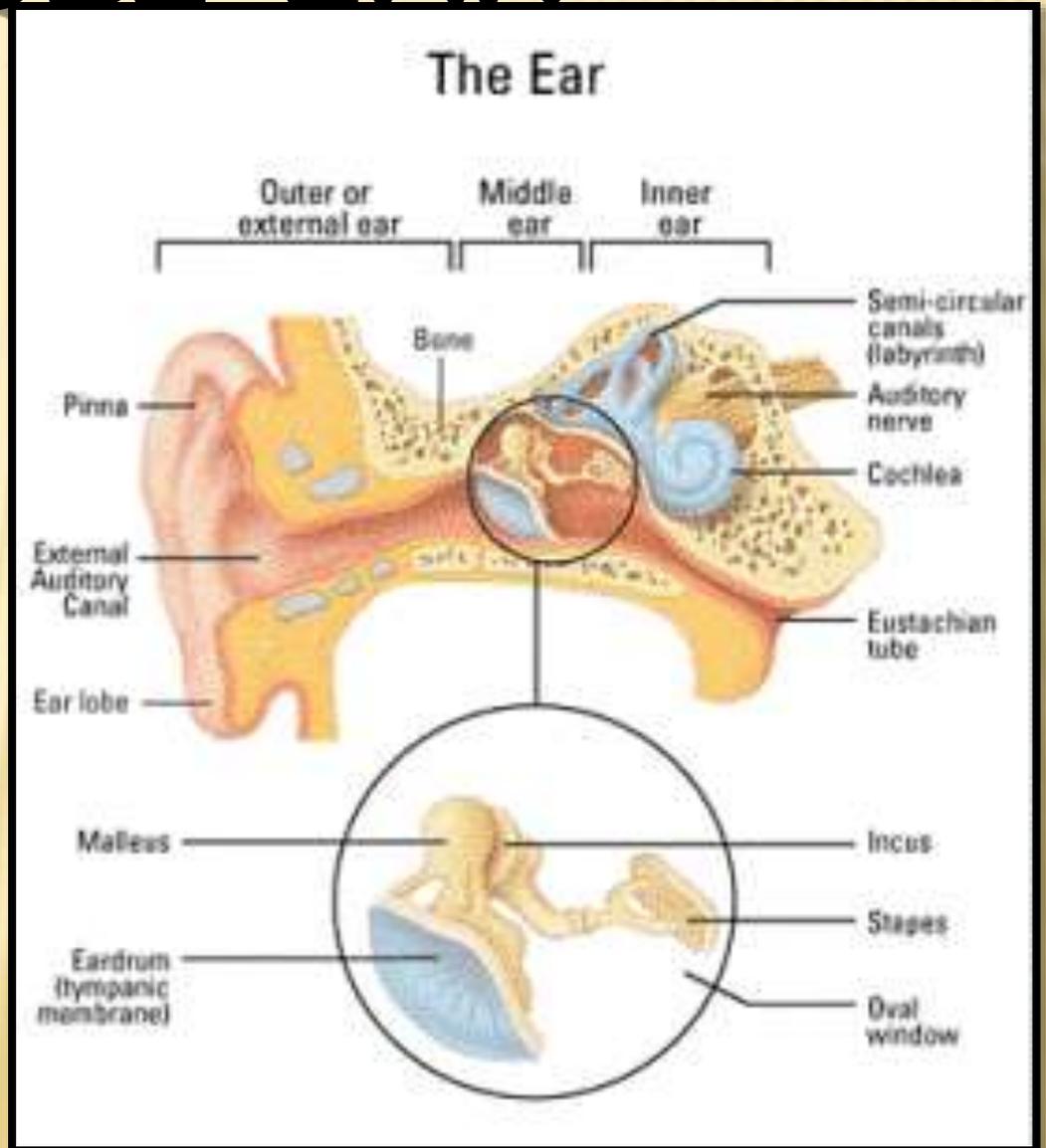
Pinna (auricle)- receives sound waves that travel through the auditory canal or ear canal.

Auditory canal (ear canal)- acts as a funnel with an approximate length of 2.5cm and leads to the ear drum.

- also protects the eardrum from shock and intrusion by external objects.

THE MIDDLE EAR

- ✘ The middle ear transfers the energy of a sound wave by vibrating the **three bones** found there.



THE MIDDLE EAR

Eardrum- is a cone-shaped piece of skin about 10mm wide.

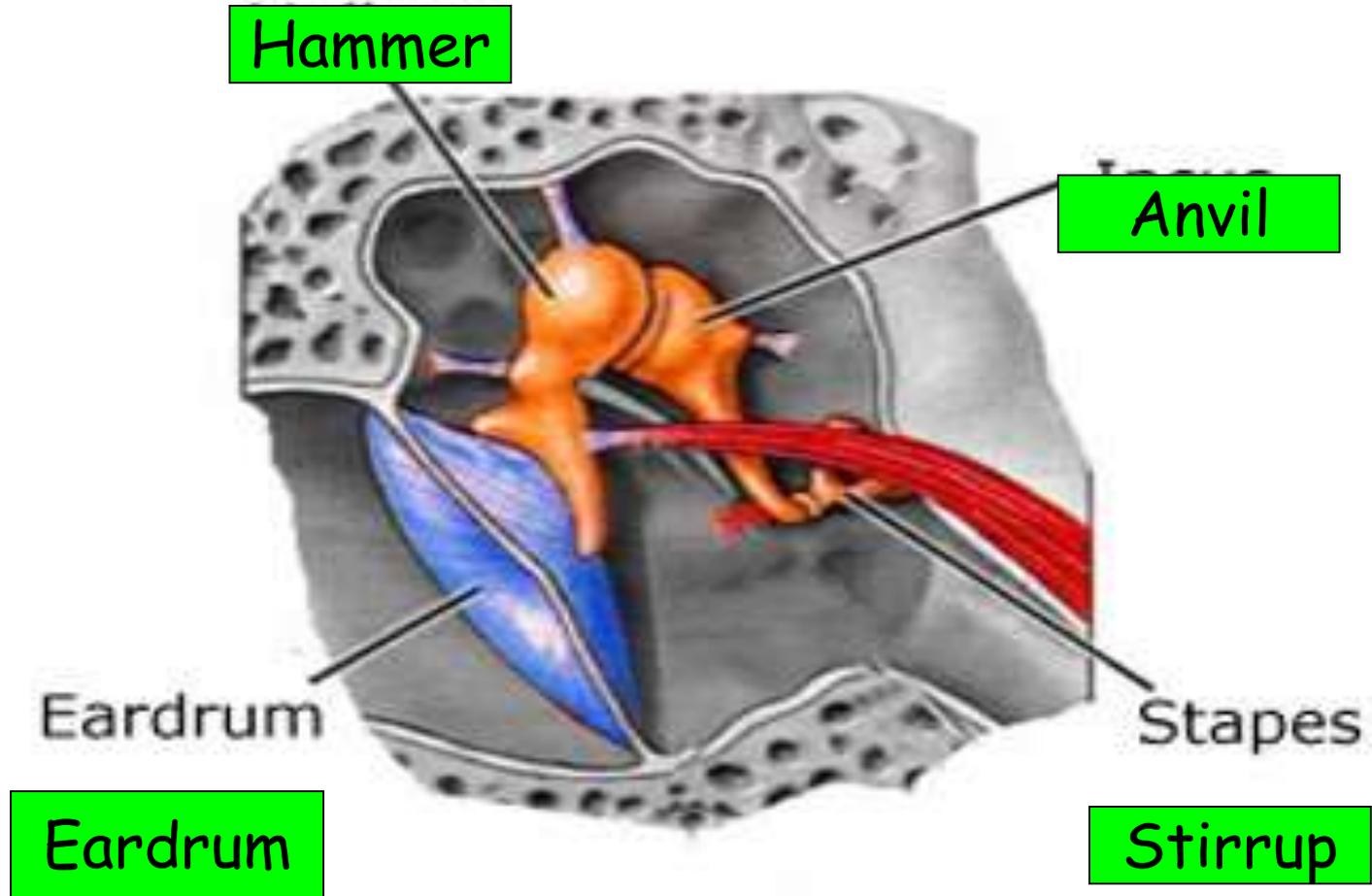
- it is very sensitive
- even the slightest pressure variation will cause it to vibrate.
- separates the outer ear from the middle ear

Ossicles- smallest bones in the body

- eardrum
 - malleus (hammer)**- long handle attached to the - a tiny bone that passes vibrations from the eardrum to the anvil.
- **incus (anvil)**- a tiny bone that passes vibrations from the hammer to the stirrup.
- **Stapes (stirrups)**- a tiny, U-shaped bone that passes vibrations from the stirrup to the cochlea. -This is the smallest bone in the human body (it is 0.25 to 0.33 cm long).

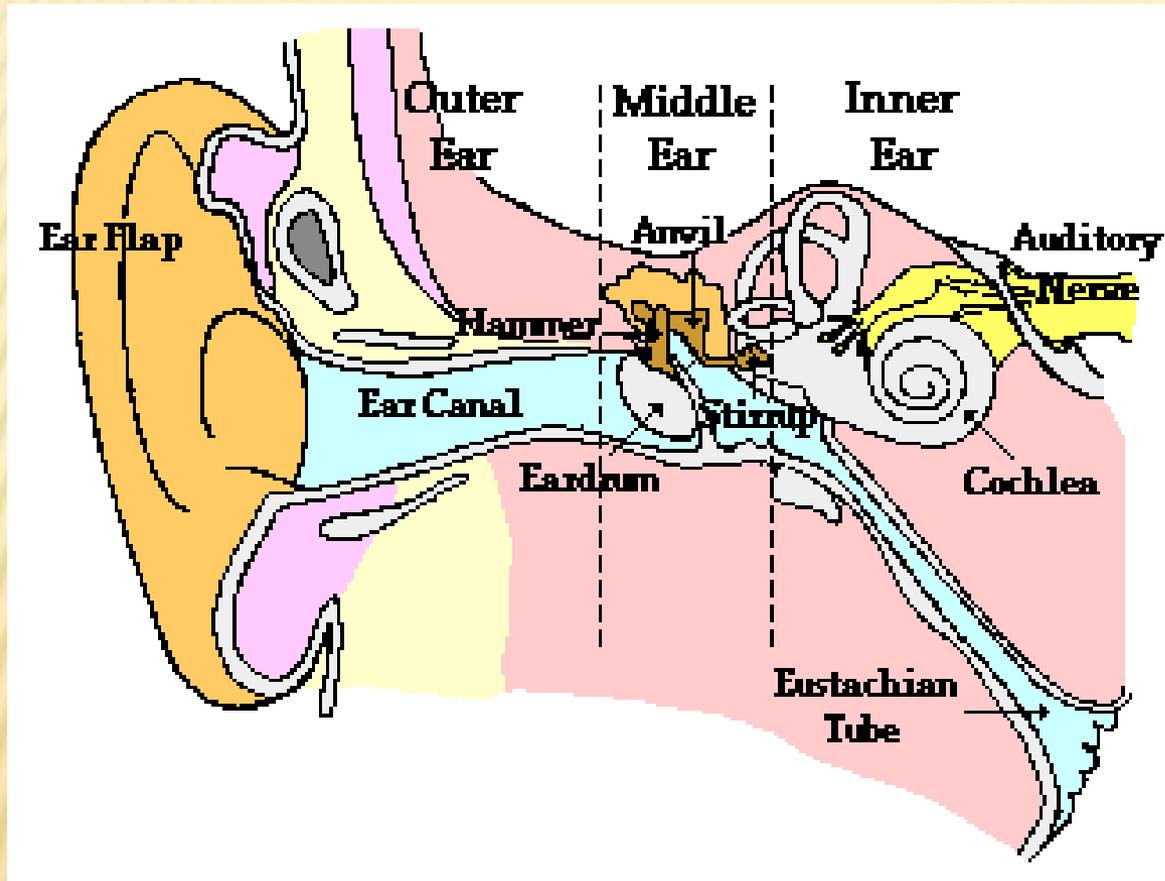
BONES OF THE MIDDLE EAR

- ✘ These are the smallest bones in your body



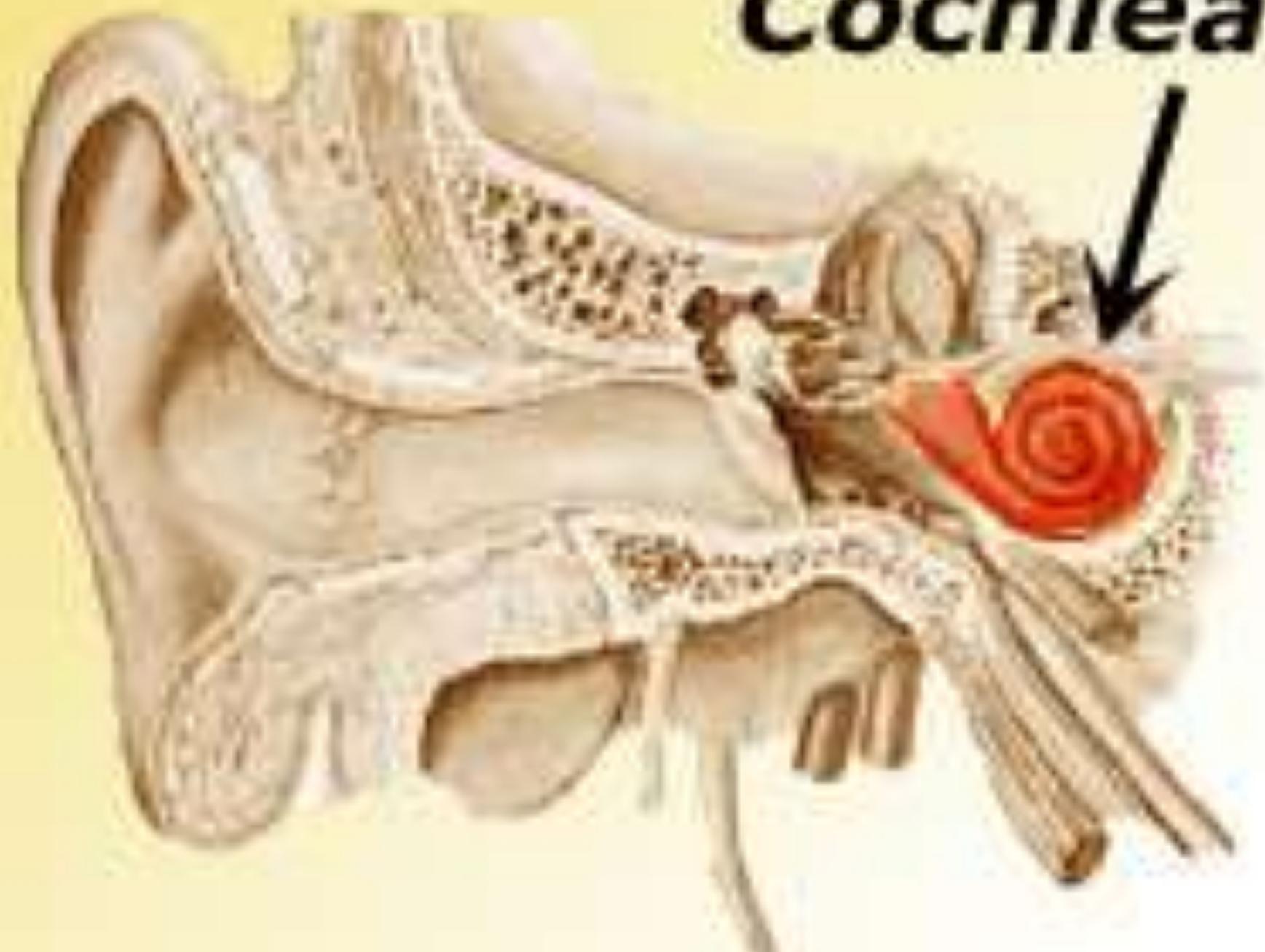
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- × **Eustachian tube** - a tube that connects the middle ear to the back of the nose; it equalizes the pressure between the middle ear and the air outside.

THE INNER EAR



- ✗ Two main parts:
 - + Cochlea
 - + Auditory Nerve

Cochlea



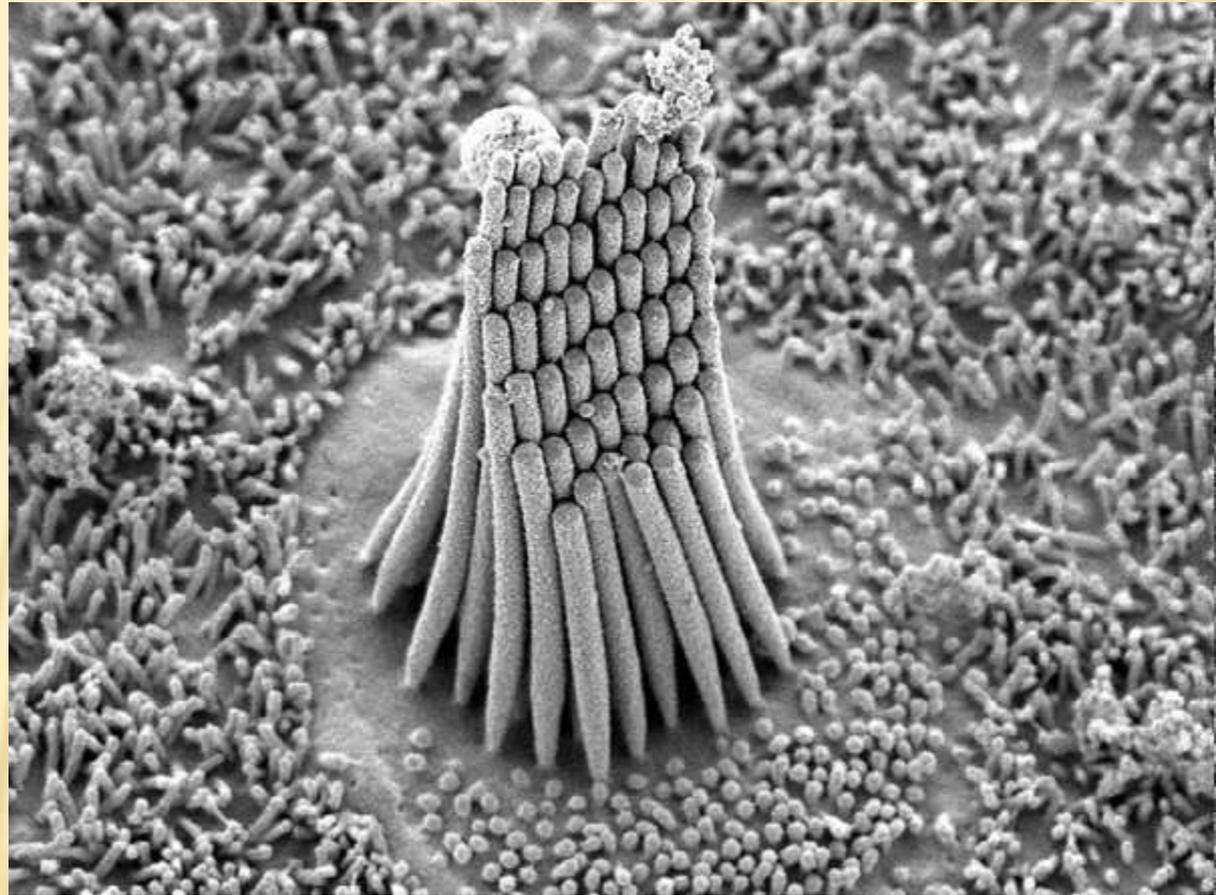
THE INNER EAR

Cochlea- This is a spiral tube that is covered in a stiff membrane.

- contains thousands of hair cells attached to the end of the organ of the auditory nerve called **Organ of Corti.**

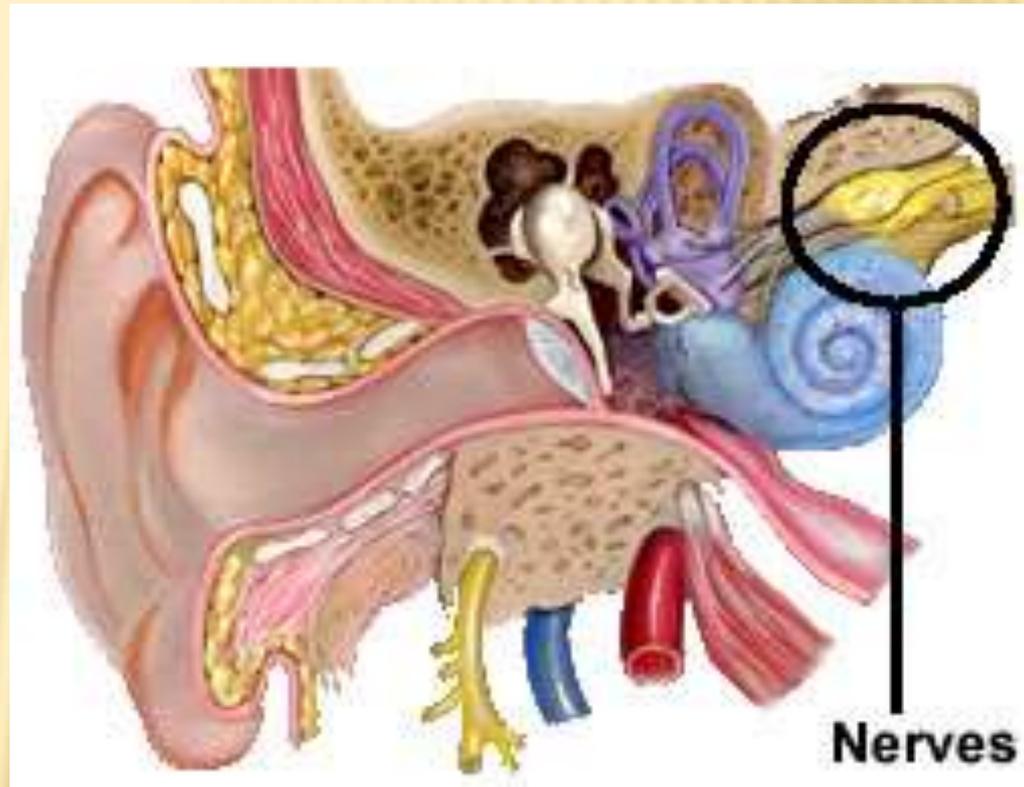
COCHLEAR HAIR CELLS

- ✘ These tiny hairs bend because of the vibrations caused by the sound waves.



THE AUDITORY NERVE

- ✗ The tiny hair cells of the cochlea are set in motion by vibrations
- ✗ The vibrations stimulate tiny nerve cells.
- ✗ The nerve cells then send signals along the auditory nerve to the brain.



Auditory Nerve- These nerves receive the electrical impulses generated by the ear and pass this information up to the brain so it can be interpreted.

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- × **Semicircular Canals**- three loops of fluid-filled tubes that are attached to the cochlea in the inner ear. They help us maintain our sense of balance.

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- ✘ The working of human ear is in such a way that sound waves travel from the outer ear to the middle ear, which are then transmitted to the inner ear in the form of compressional waves.
 - ✘ In the inner ear, the compressional waves are converted into electric impulses that are perceived by the brain.
 - ✘ This way, we can hear and differentiate various sound types.