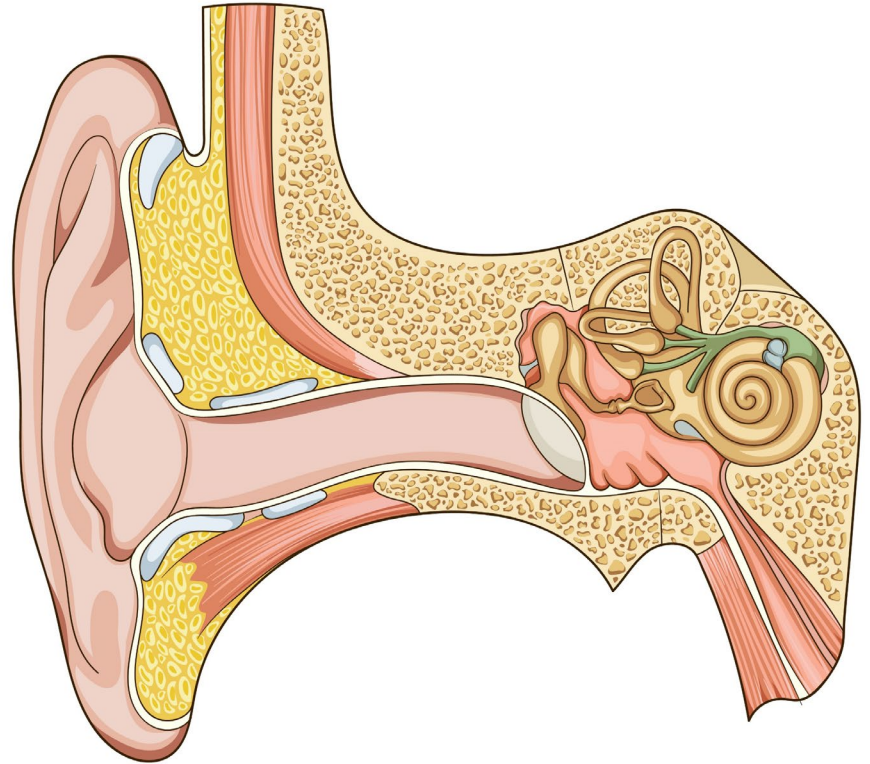


The Structure & Function of the Human Ear



Helping deaf children
learn to listen and talk

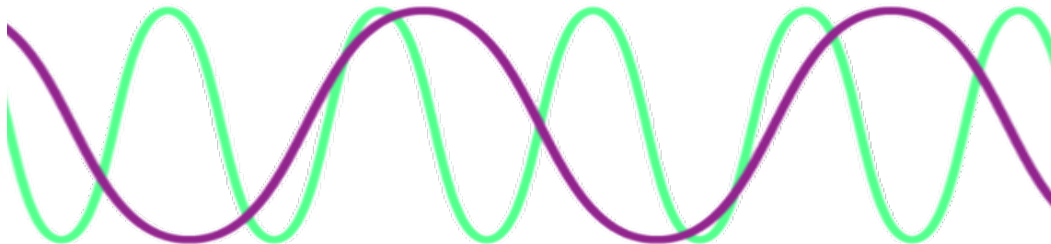
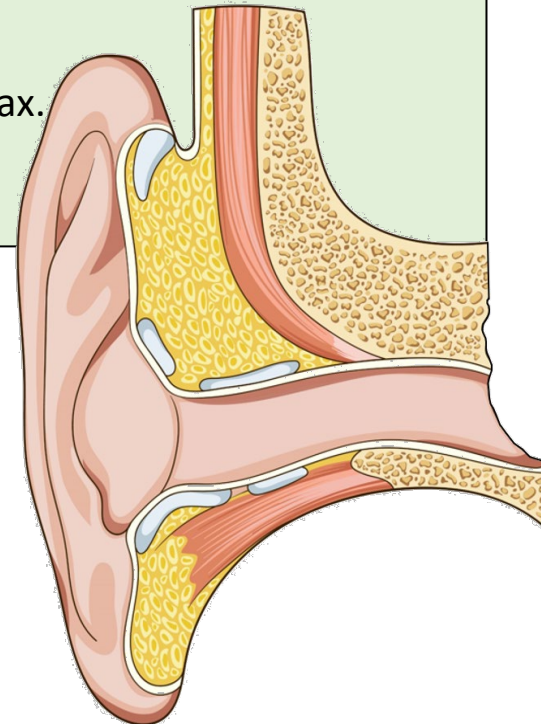
www.elizabeth-foundation.org



The Human Ear – The Outer Ear

Outer Ear

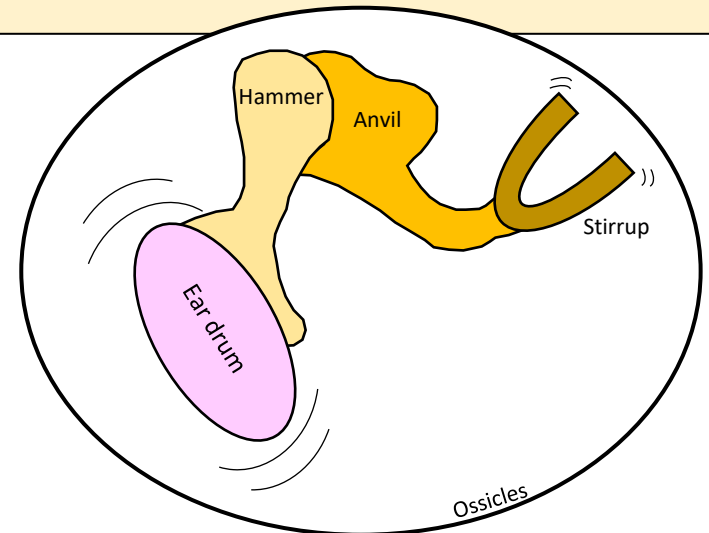
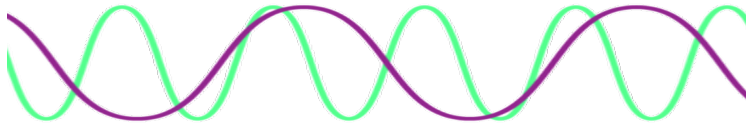
- The visible part of the ear is called the Pinna or the Auricle. The pinna is made of cartilage.
- The outer ear is concerned with the transmission of sound.
- The outer ear consists of the Pinna, the ear canal and the outer layer of the eardrum, also called the Tympanic membrane.
- The ear canal is filled with air and is about 2.5cm long.
- The skin surrounding the ear canal contains glands that secrete ear wax.
- Ear wax is part of the ear's protection mechanism.



The Human Ear – The Middle Ear

Middle Ear

- The middle ear is a small air filled space connecting the outer and inner ear.
- The Primary function of the middle ear is to conduct sound waves through the tympanic membrane to the cochlea via the ear bones.
- The 3 smallest bones in the body are in the middle ear, they are called the hammer (malleus), anvil (incus) and stirrup (stapes).
- These bones are collectively known as the ossicles. Sound waves cause them to vibrate.
- The eustachian tube is also inside the middle ear. The eustachian tube controls the pressure within the ear.

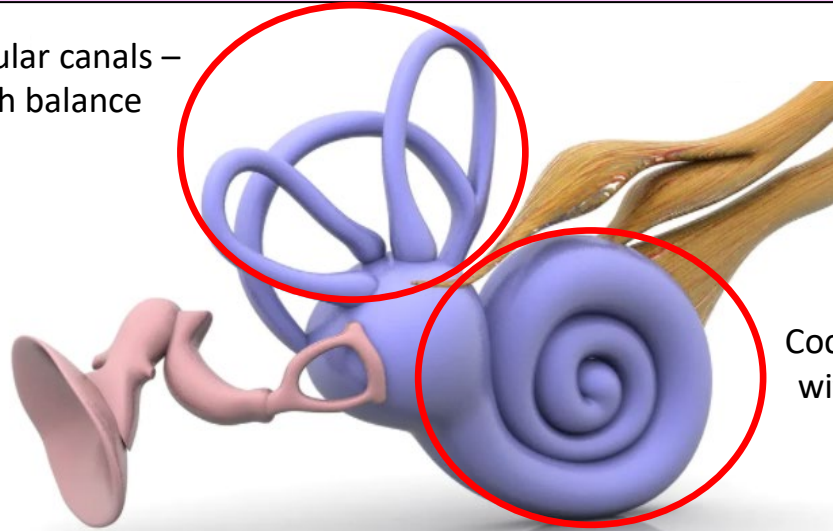


The Human Ear – The Inner Ear

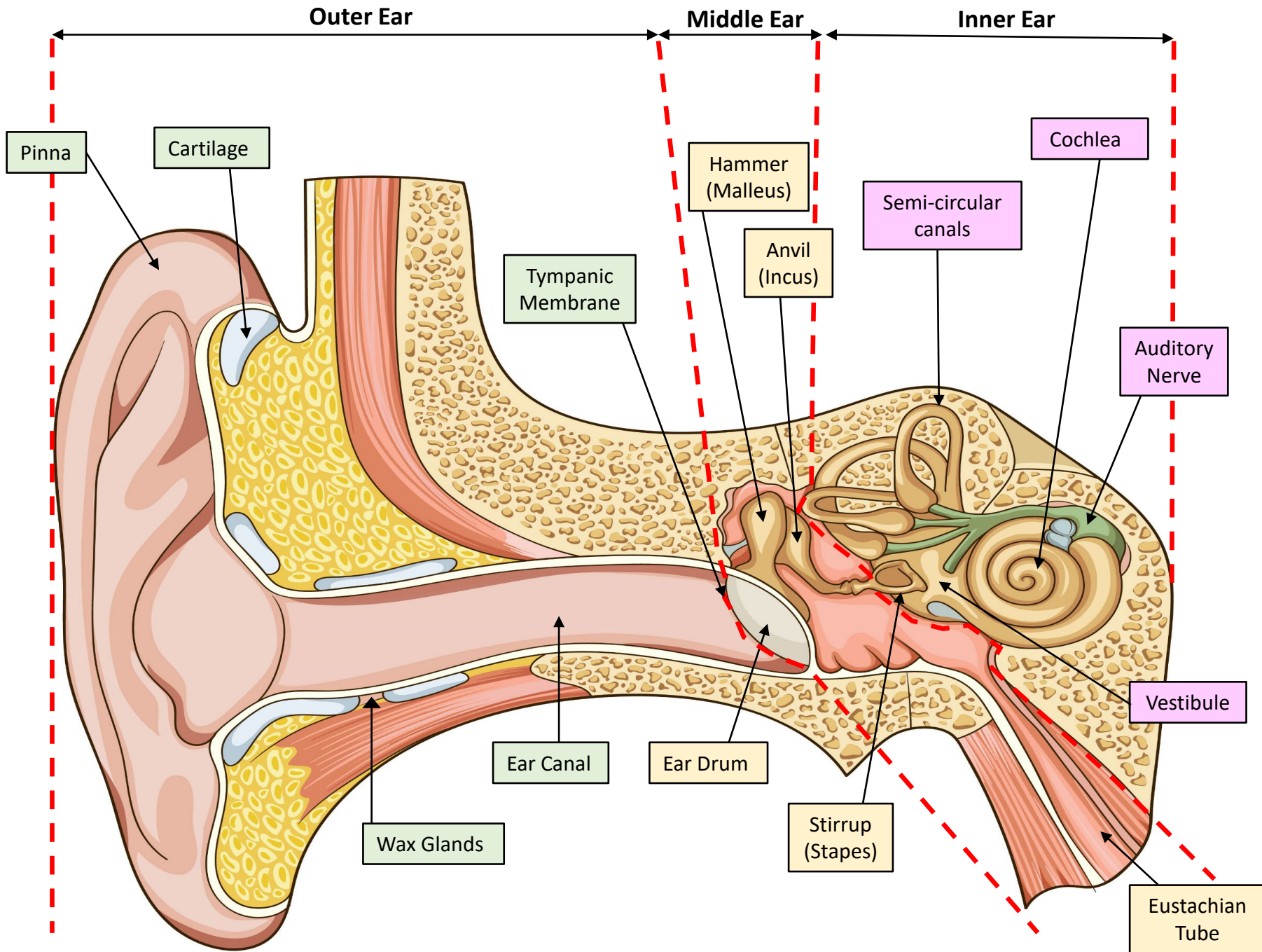
Inner Ear

- The Inner Ear has 2 main functions: to convert sound waves into electrical signals for the brain and to maintain balance by detecting position and motion.
- The inner ear has 3 main parts: the cochlea, the semi-circular canals and the vestibule.
- The cochlea is filled with liquid and acts like a microphone, converting sound waves to nerve impulses that travel to your brain via the auditory nerve.
- The vestibule and semi-circular canals both help you to balance.

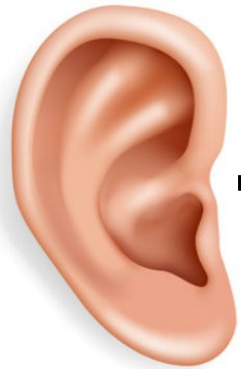
Semi circular canals –
aid with balance



Cochlea – aids
with hearing



How Do We Hear?



Sound waves are funnelled into our ear canal by the pinna.

The sound waves make our ear drum vibrate.

Vibrations of the ear drum cause the 3 small bones in the ear, collectively called the ossicles, to move.

As the last bone in the chain, the stapes, vibrates this causes wave like movements to be generated in the fluid inside the cochlea.

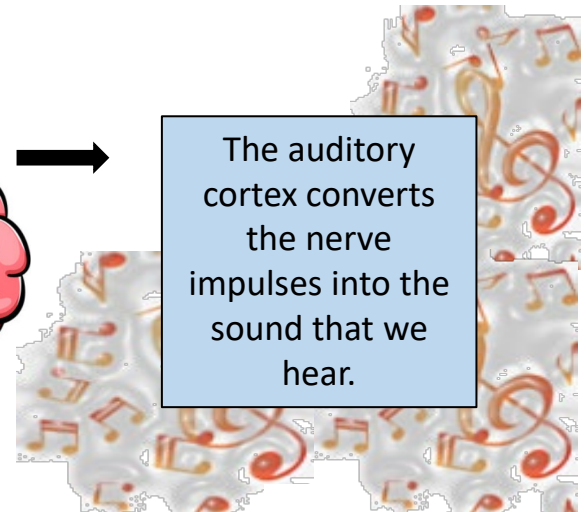
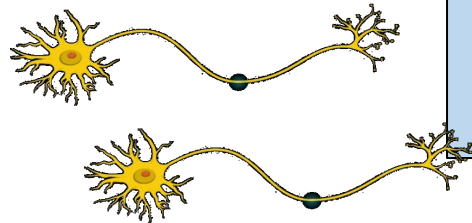
These waves stimulate microscopic hairs inside the cochlea.

The hairs in the cochlea are tuned to respond to differences in sound intensity and frequency/pitch.

When stimulated these hair cells generate nerve impulses that are transferred to the auditory nerve.

The nerve impulses travel along the auditory nerve into the hearing centre of the brain, called the auditory cortex.

The auditory cortex converts the nerve impulses into the sound that we hear.



Video Resources

- Cognito video Physics #73 from



- TedED Science of Hearing

