

# THE EAR

## Outer Ear

1. **Pinna/Auricle "Ear"**
2. **External auditory (or acoustic) canal:** infection may lead to "swimmer's ear"
3. **Tympanic membrane:** tympanic means "drum" and this tough membrane vibrates when sound waves hit it. Converts sound waves into a mechanical movement.

## Middle Ear

4. **Auditory tube/eustachian tube/tympanopharyngeal tube:** equalizes pressure between the middle ear and the outside of the body.
  - a. Susceptible to middle ear infections if the tube is short (as in children) or not very straight (some people have different anatomy in this regard). Pathogens from the back of the throat can travel to the middle ear.
  - b. "tubes" in the ears refers to tubes that are punched through the tympanic membrane to alleviate the pressure of middle ear infections. These tubes apparently come out on their own in a few weeks to a few years, leaving a scar on the tympanic membrane.
5. **Hammer (malleus):** The first of the three middle ear bones. The hammer is attached to the tympanic membrane and moves when the tympanic membrane moves.
6. **Anvil (incus):** Attached to the hammer; moves when it moves.
7. **Stapes (stirrup):** Attached to the anvil; moves when it moves.
8. **Oval window:** membrane that the stirrup presses on, causing fluid in the inner ear to move.

**Inner Ear:** A series of fluid and gel-filled chambers (all nestled within the temporal bone) that transmit the movements of their fluid that then trigger receptors to send a nerve impulse (action potential) to the brain. All of these action potentials leave the ear by way of their axons that travel in cranial nerve VIII, the **vestibulocochlear nerve**.

9. **Vestibule: "Static equilibrium"** receptors in this area are stimulated by the position of the head, firing action potentials that inform the brain whether the head is upright or not.
10. **Semicircular canals: "dynamic equilibrium"** There is a semicircular canal in each of the three planes, so action potentials from these chambers inform the brain of the position of the head even while actively moving.
11. **Cochlea: "snail"** This snailshell-shaped chamber fires action potentials in response to the wiggling of the stirrup on the oval window. The stirrup transmits its motion into the fluid of the cochlea. Receptors at the beginning of the snailshell fire action potentials for high-pitched sounds. The farther into the cochlea the wave travels before it meets a receptor that responds to that wave frequency, the lower the pitch. Since loud noises damage the parts of the cochlea closest to the oval window, hearing loss usually begins with higher frequencies.