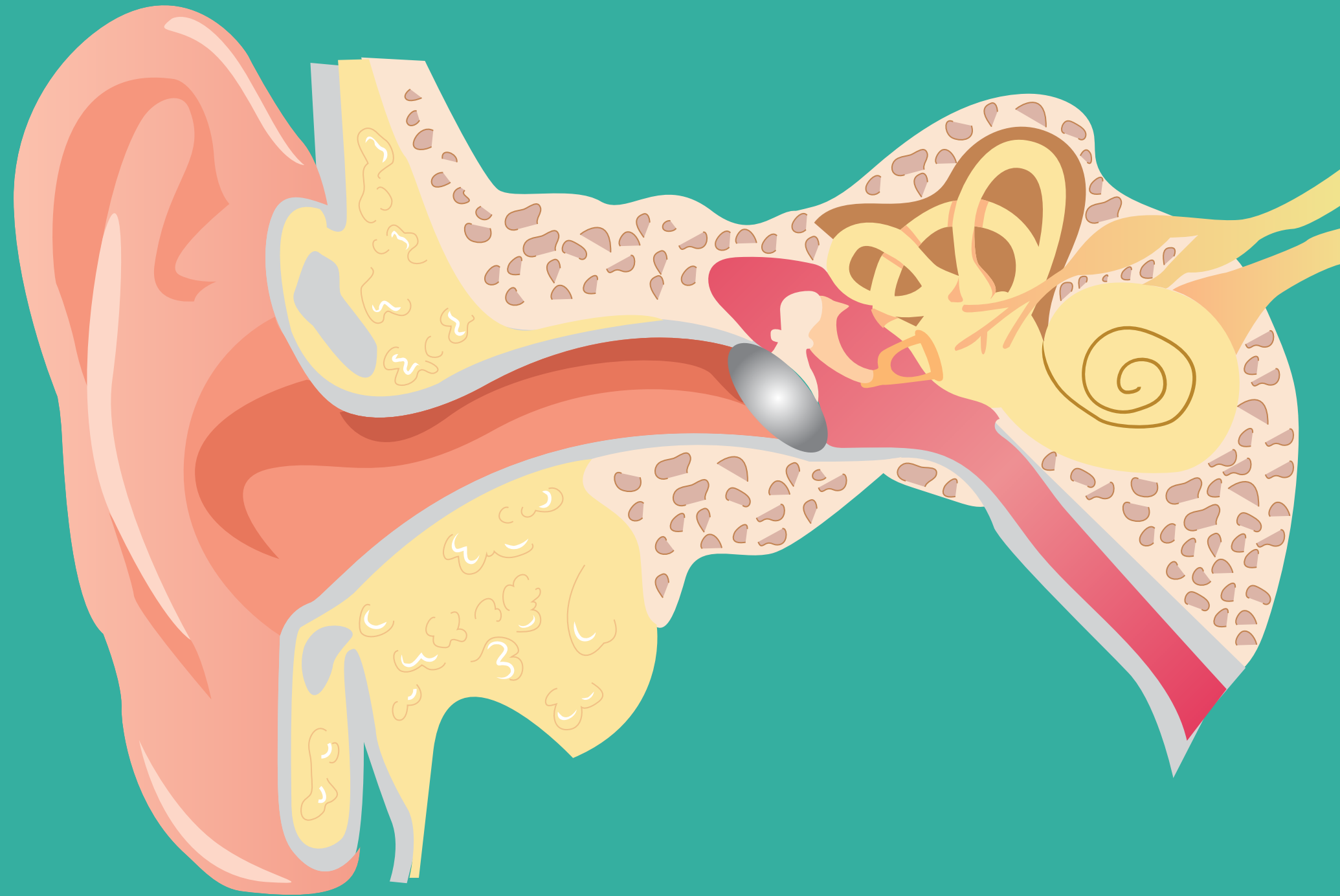


**GRADE 12: LIFE  
SCIENCES  
THE HUMAN  
EAR**



**Scholarly**  
Network

# OBJECTIVES

- The human ear is a complex organ responsible for our sense of hearing and balance.
- It consists of three main parts: the outer ear, middle ear and inner ear. In this tutorial we will explore each part and discuss their functions in more detail.

# THE EARS

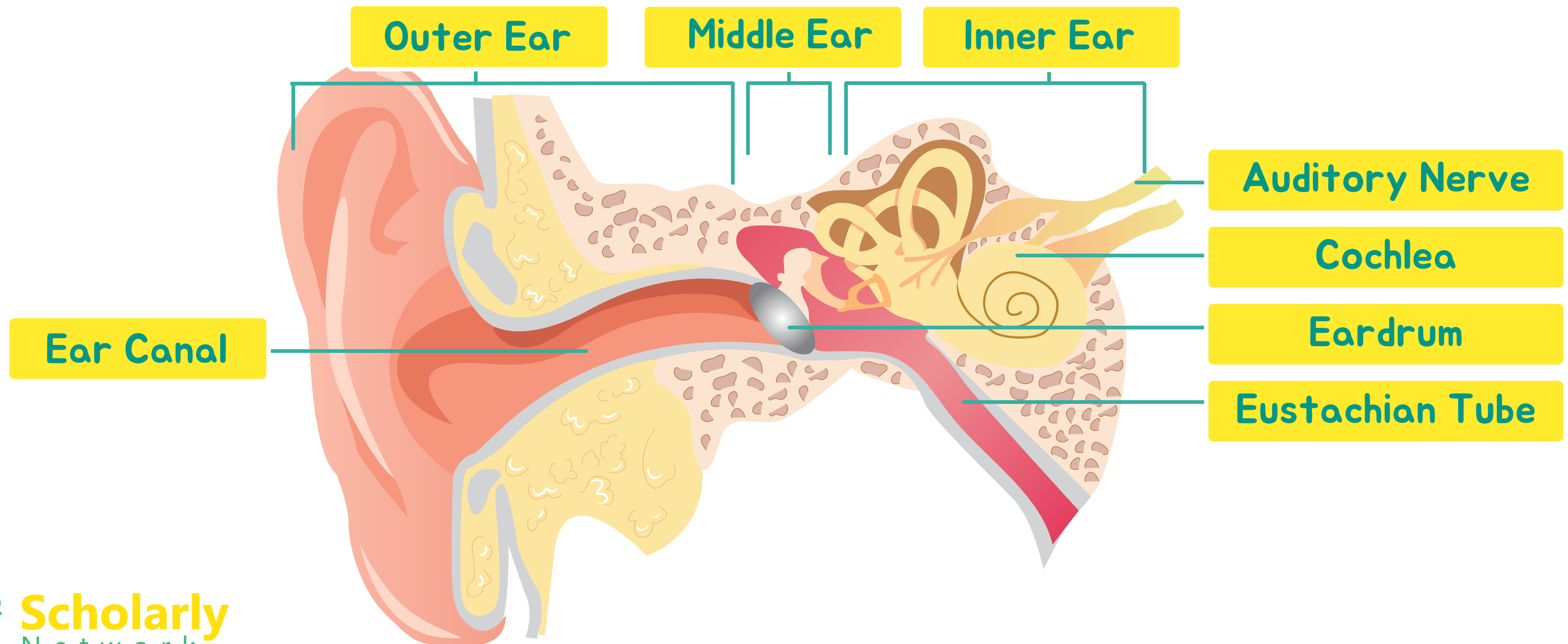


The ears are paired sense organs, located on each side of your head.

They are organs of hearing and balance.



# PARTS OF THE EAR

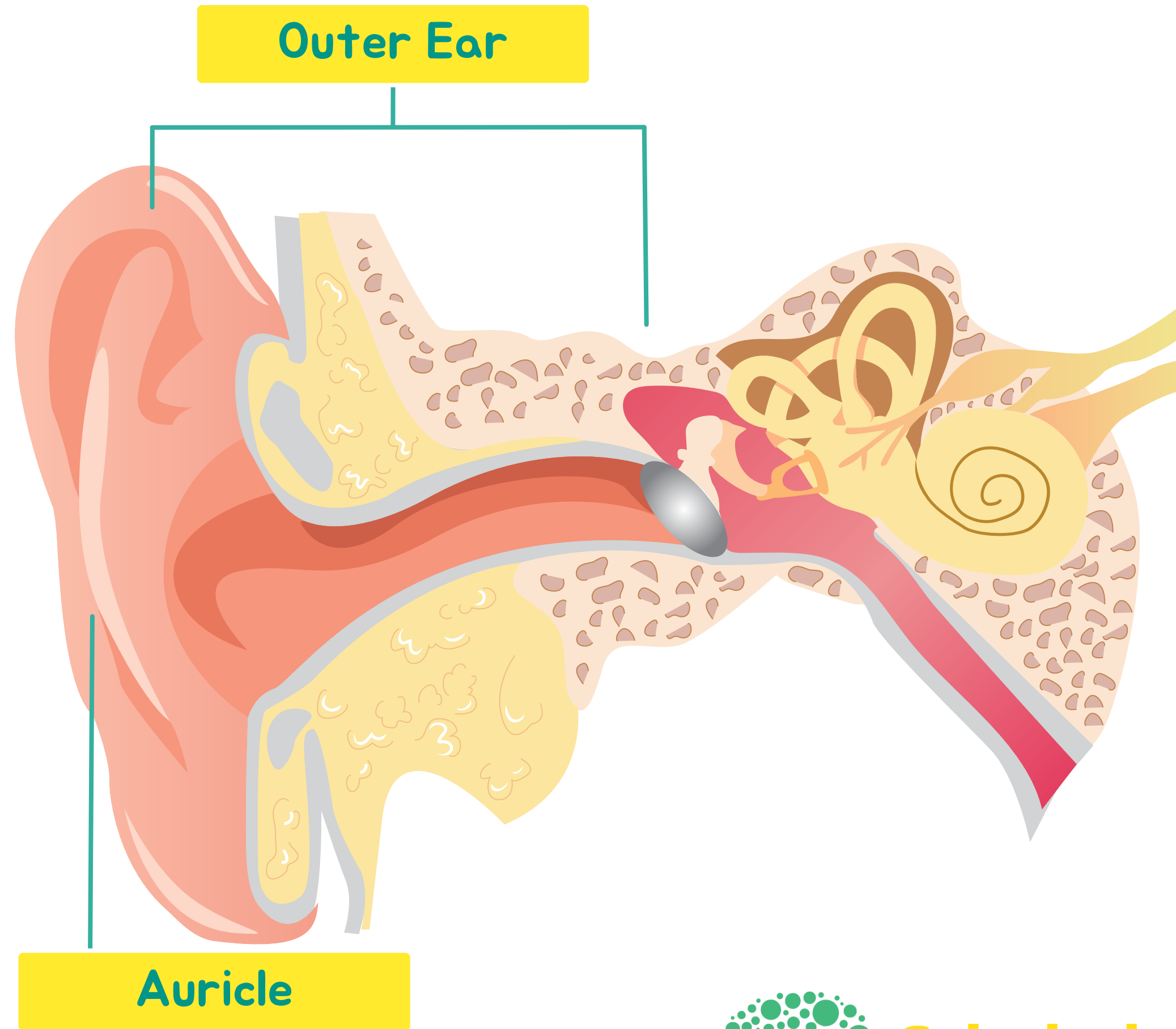


# OUTER EAR

The outer ear is made up of cartilage and skin.

The outer ear consists of two parts the pinna and the ear canal

**Pinna (Auricle):** The visible part of the ear that helps collect sound waves from the environment and direct the sound waves into the ear canal.



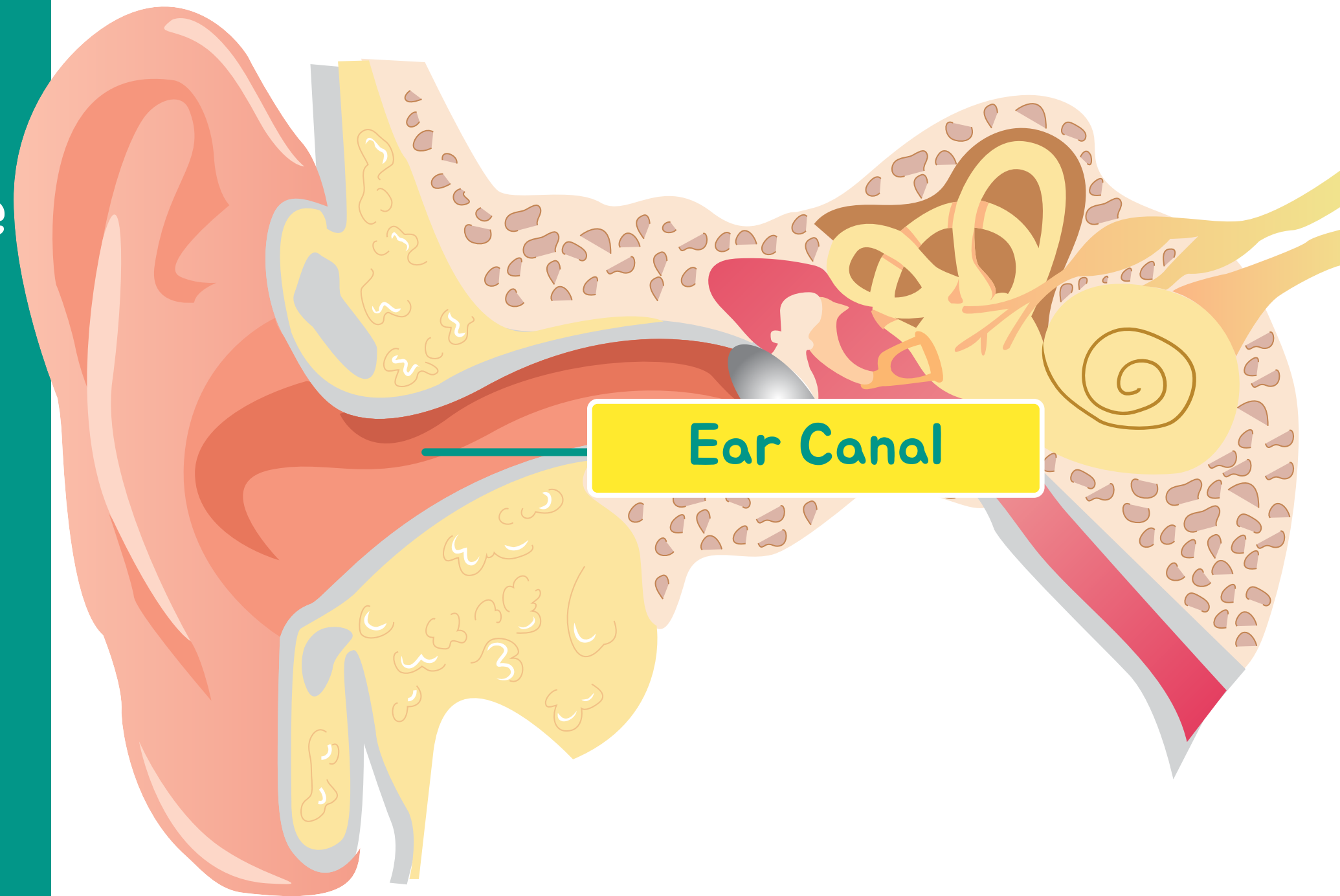
# EAR CANAL

**Ear Canal:** A tube-like narrow structure that leads from the pinna to the middle ear.

The ear canal helps amplify and direct sound waves towards the eardrum in the middle ear. It helps transmit

sound waves to the eardrum.

It is lined with hairs and glands that secrete wax. The wax traps dusts and bacteria.

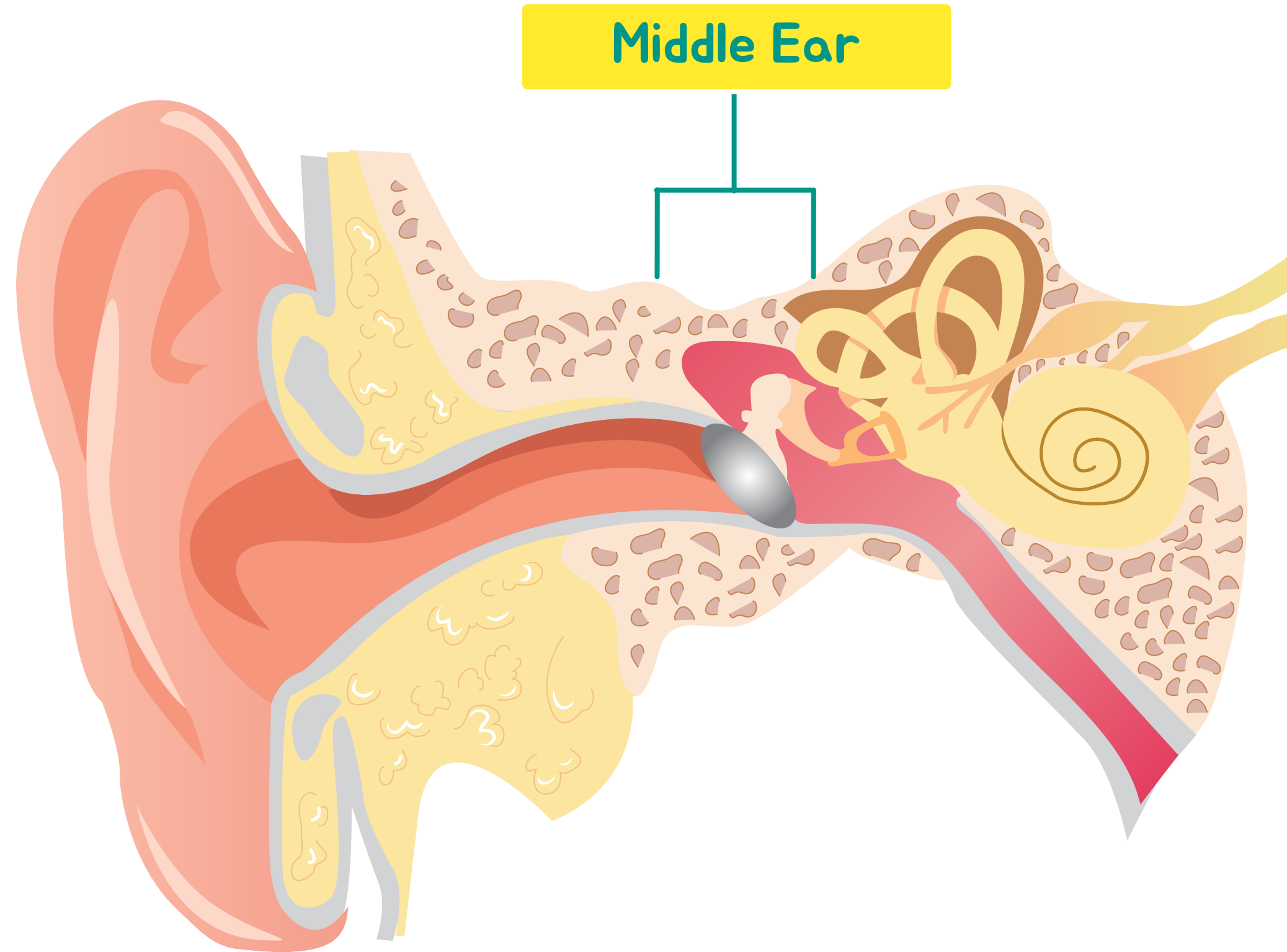




# MIDDLE EAR

The middle ear is an air – filled space located between the eardrum and the inner ear.

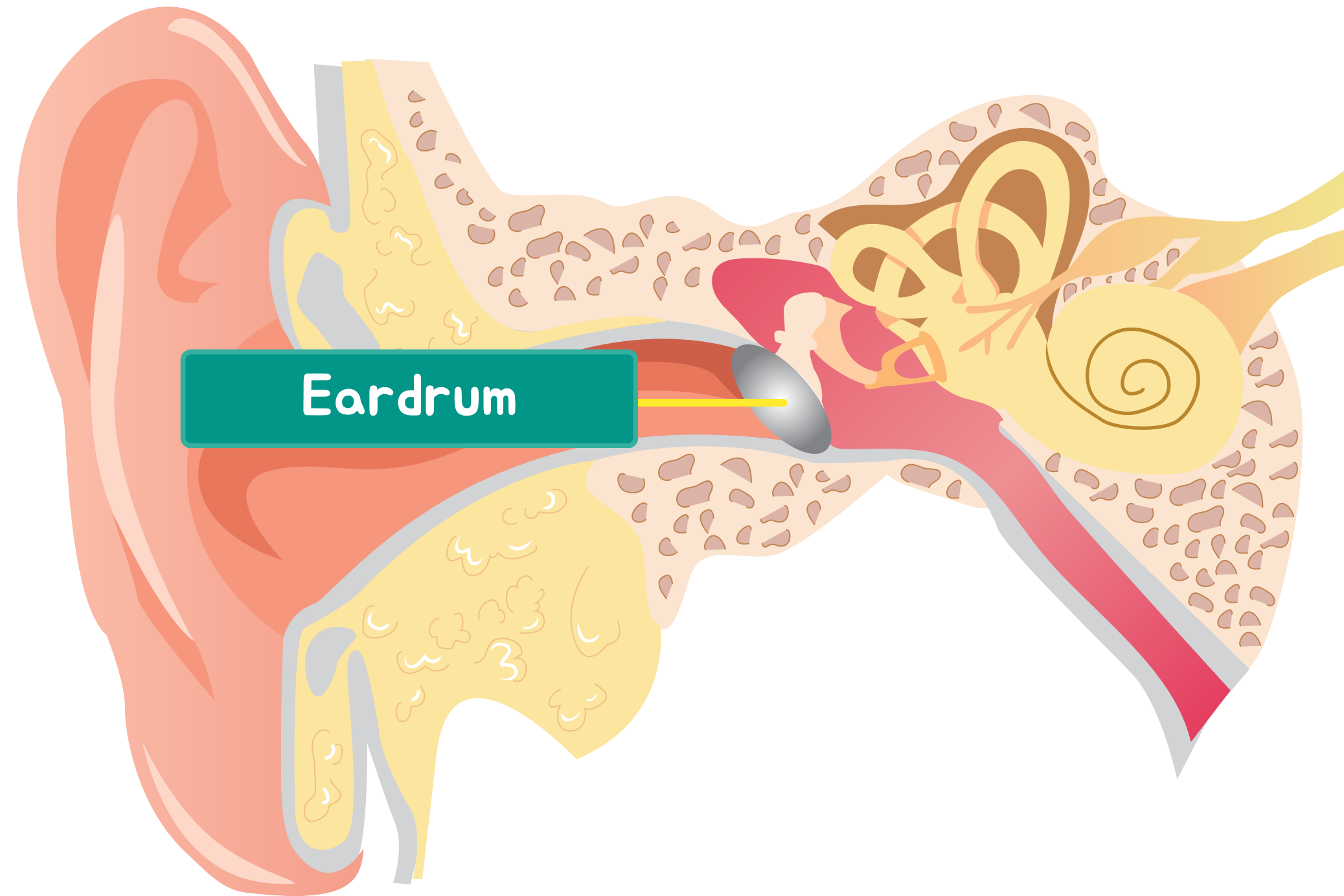
It consists out of the Eardrum, Ossicles and Eustachian Tube.



# EARDRUM

Eardrum (Tympanic Membrane):

A thin, cone-shaped membrane that vibrates in response to sound waves. It separates the outer ear from the middle ear.





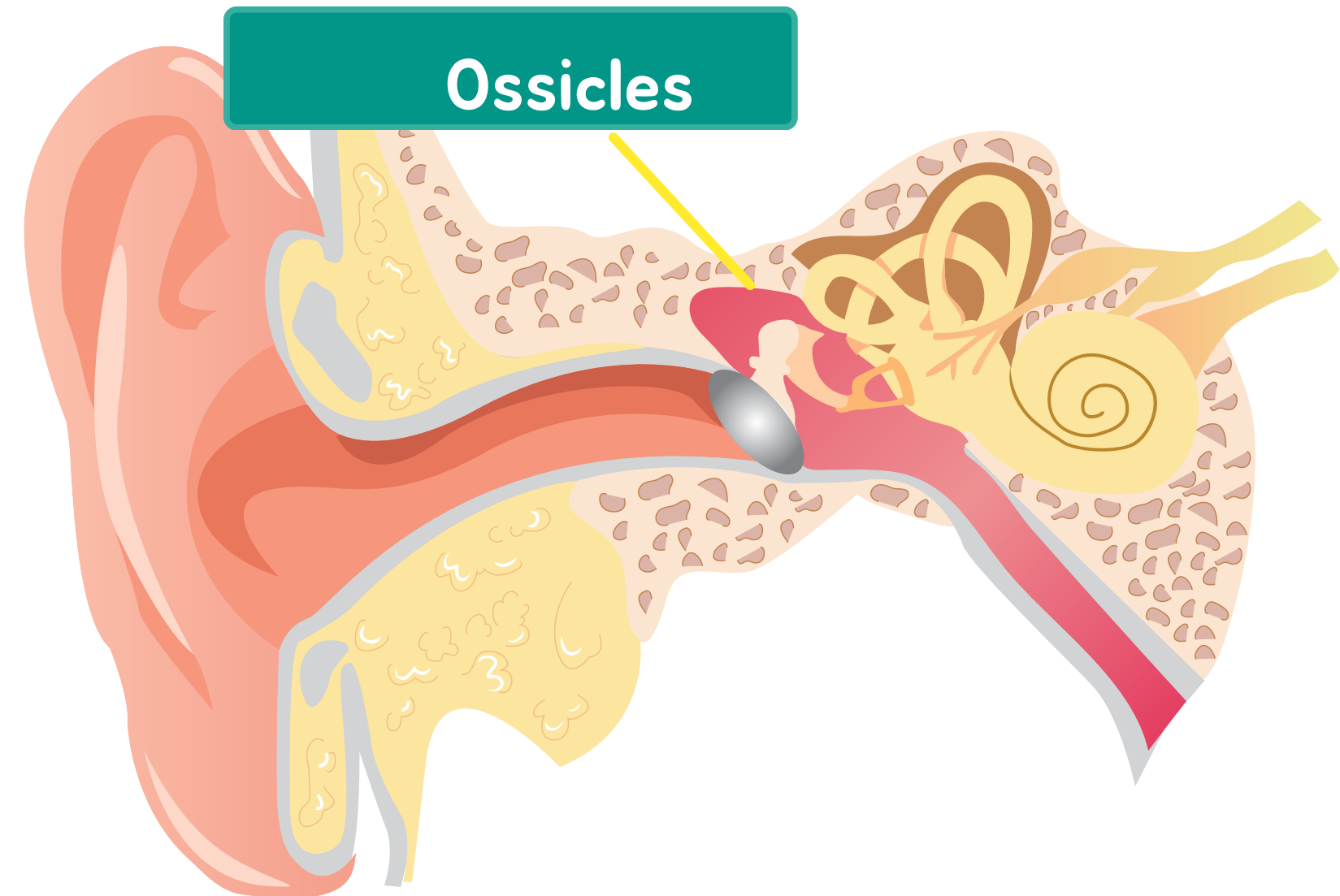
# OSSICLES

**Ossicles:** Three small bones (malleus, incus, and stapes) located in the middle ear. They amplify and transmit the vibrations from the eardrum to the inner ear.

**Malleus (hammer)** Attached to the eardrum receives sound vibrations and transfers them to the other ossicles.

**Incus (anvil):** Connects the malleus to the stapes.

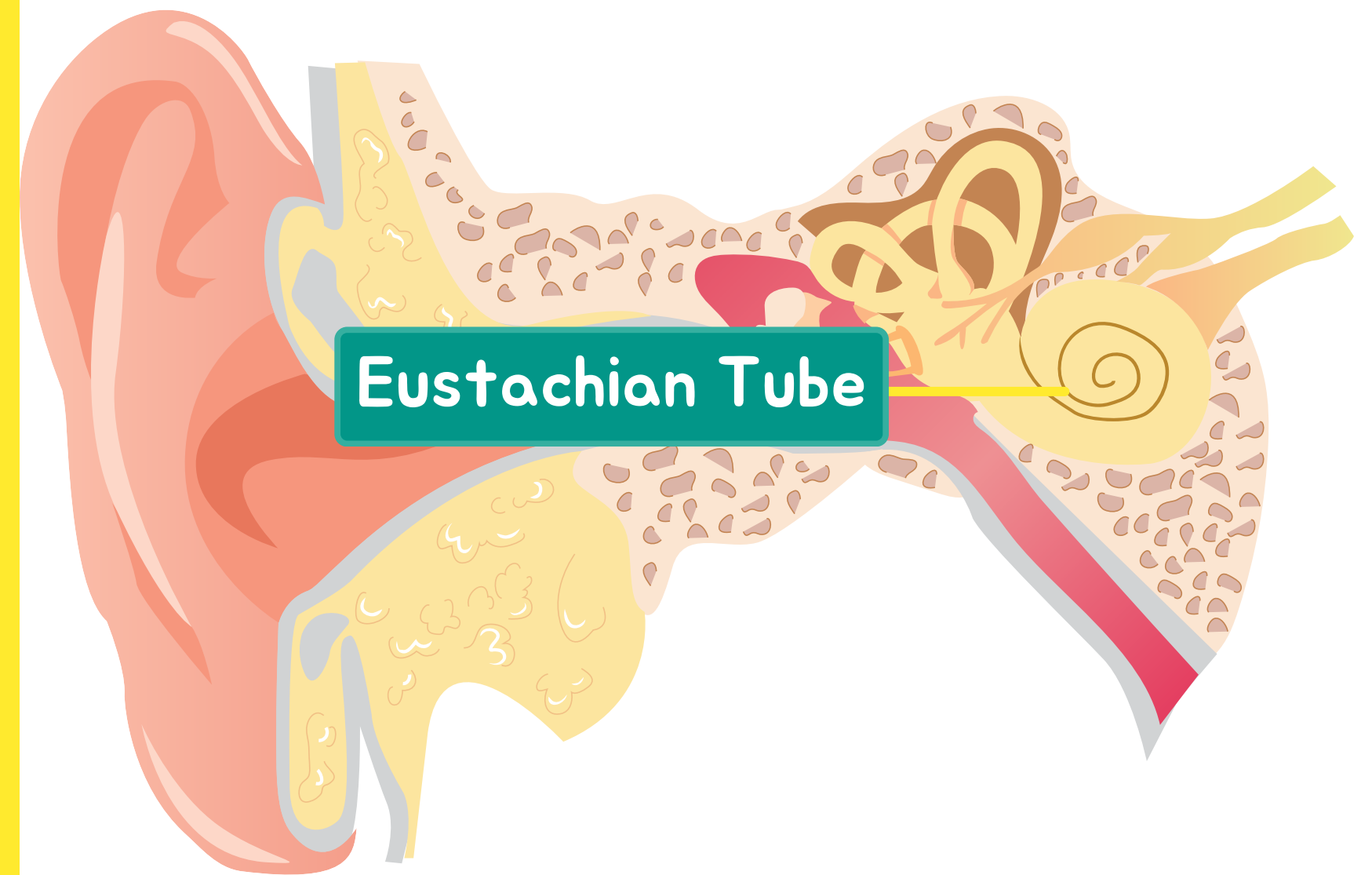
**Stapes:** The smallest bone in the human body, it connects to the oval window of the inner ear.



# EUSTACHIAN TUBE

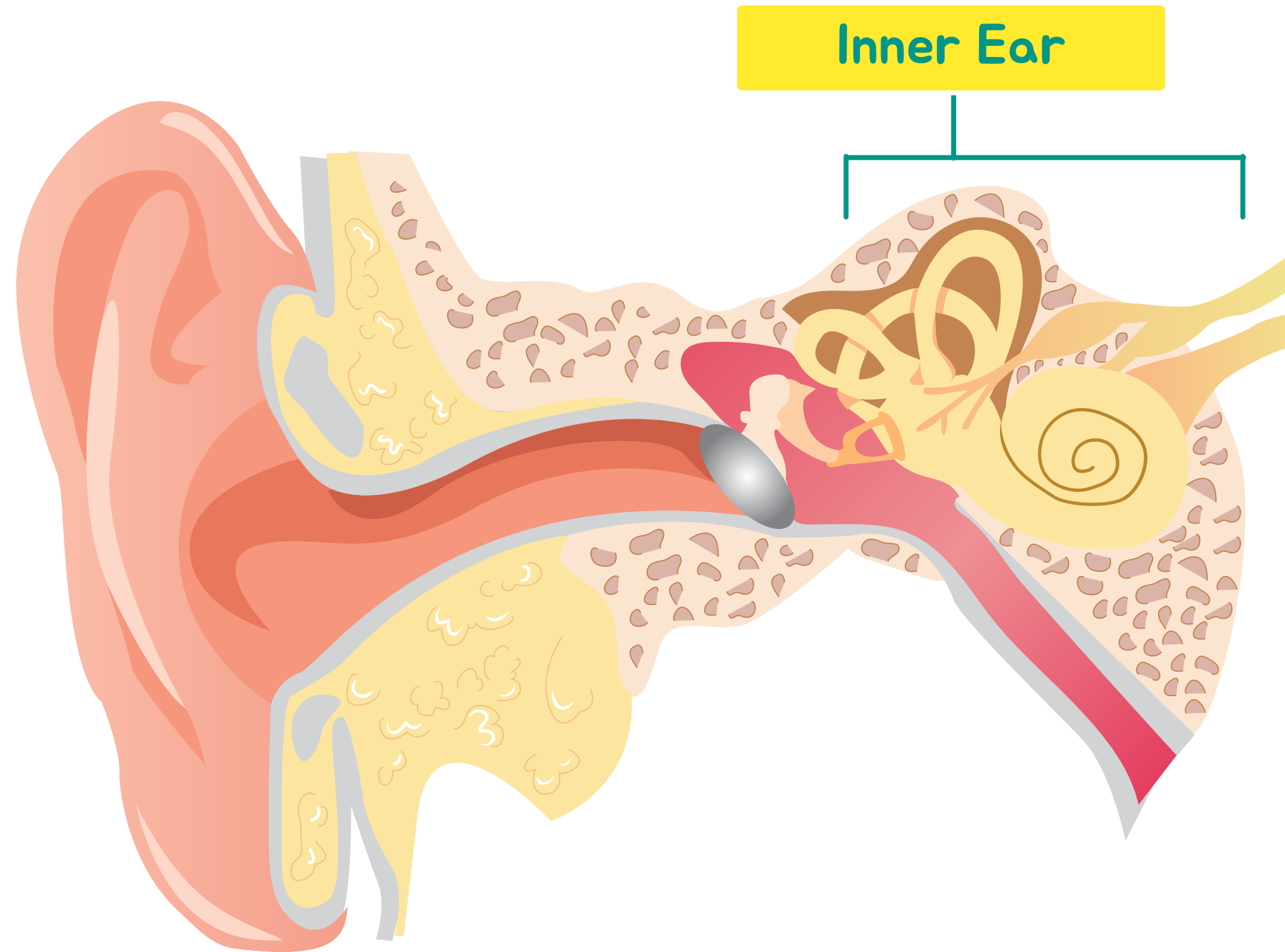
A narrow tube that connects the middle ear to the back of the throat.

It helps equalize air pressure between the middle ear and the environment.



# INNER EAR

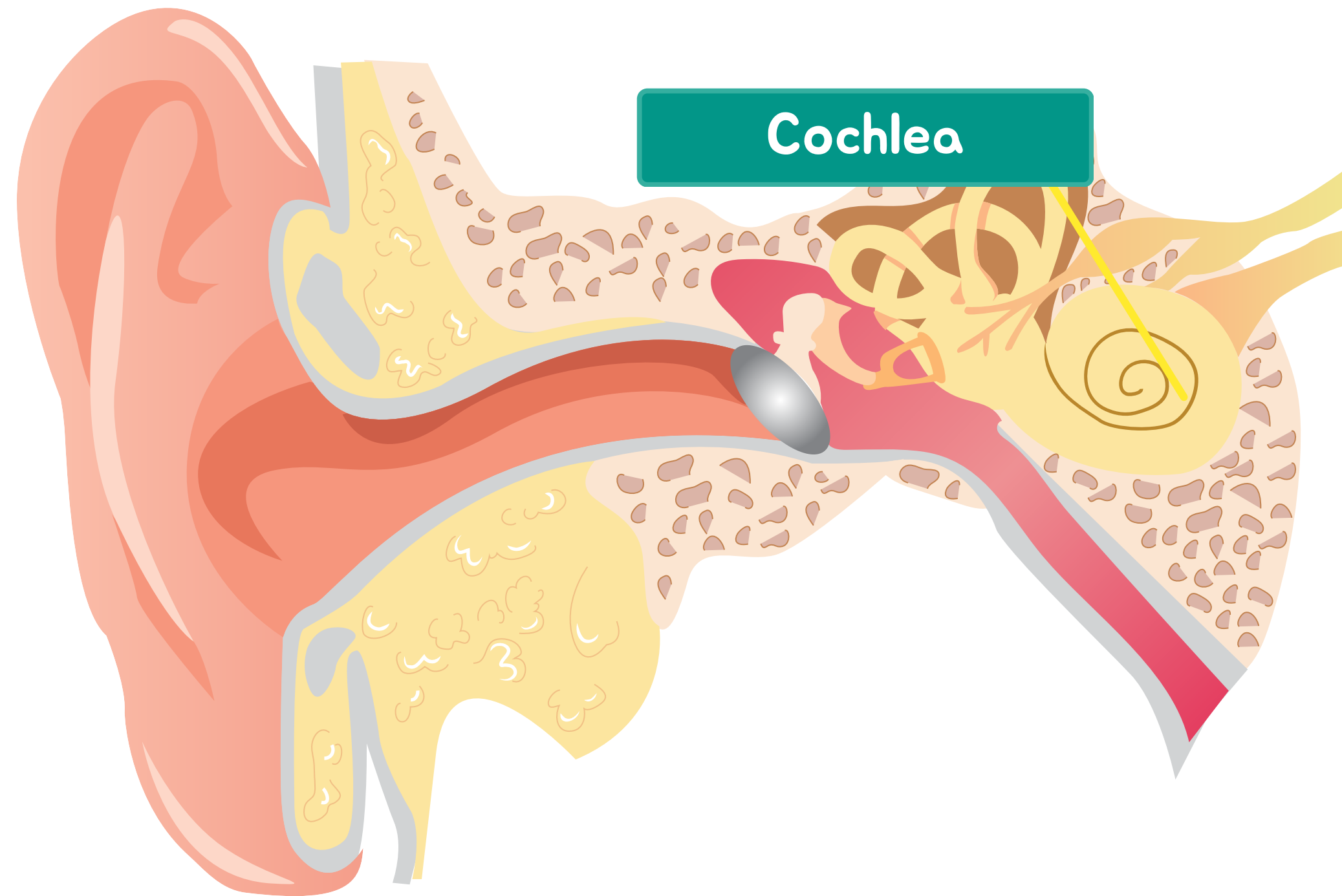
The inner ear is a complex structure responsible for converting sound vibrations into electrical signals that can be interpreted by the brain. It consists of the cochlea and vestibular system.



# COCHLEA

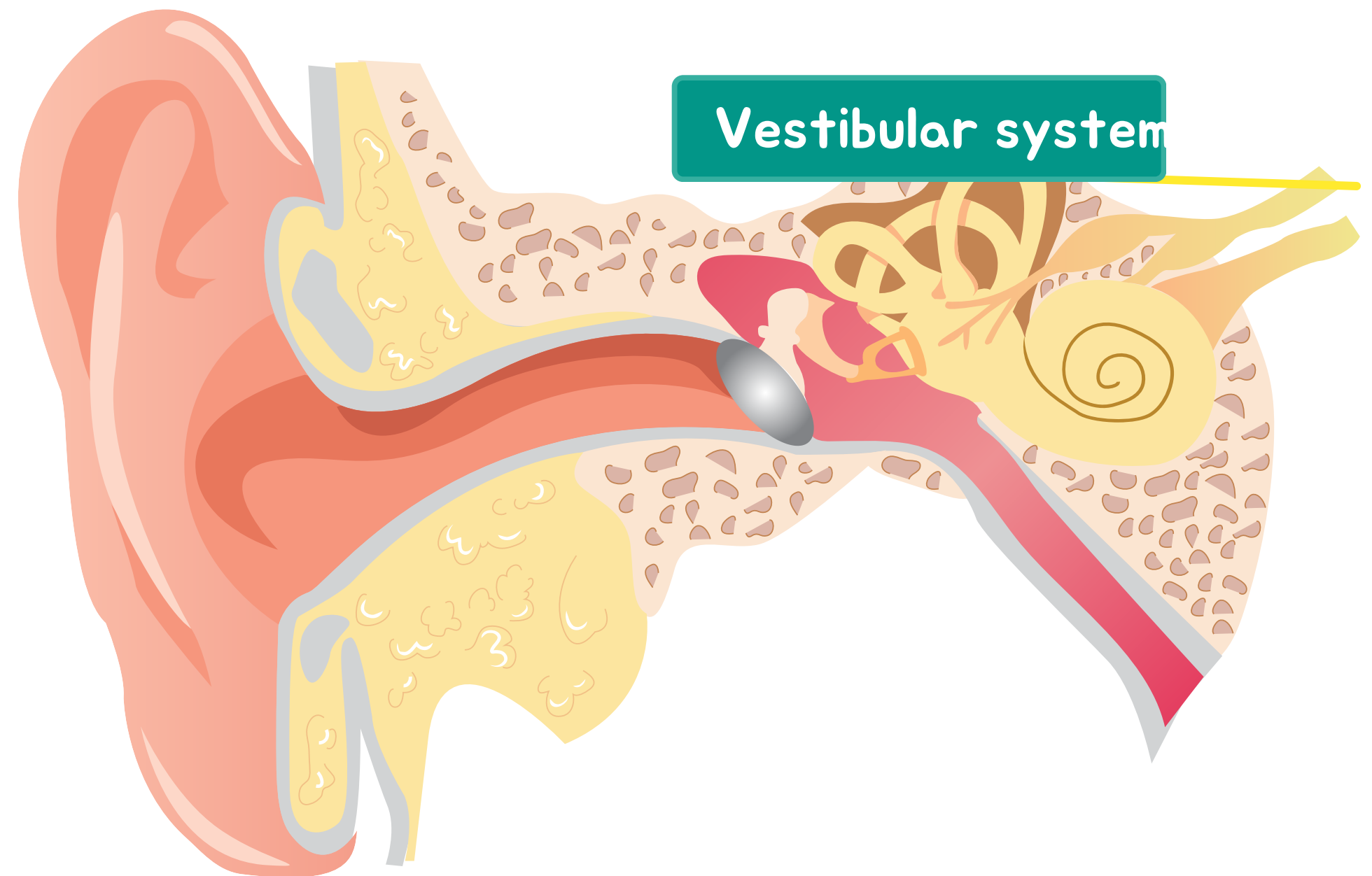
The cochlea is a snail-shaped hearing organ. It is made up of three chambers that spiral around a bony core.

-It contains fluid-filled canals and the organ of Corti, which contains tiny hair cells that convert sound vibrations into electrical signals that can be interpreted by the brain



# VESTIBULAR SYSTEM

-Vestibular System: A set of structures within the inner ear responsible for balance and spatial orientation. The auditory nerve or cochlear nerve runs from the cochlea to the brain stem. It transforms the sound vibrations into electrical impulses sent to the brain.







# AUDITORY NERVES

- The auditory nerve carries the electrical signals from the hair cells to the brain.
- The signals travel to the brainstem, where they are processed and filtered.
- The signals then pass through various regions of the brain, including the thalamus and auditory cortex, where they are further analyzed and interpreted.







# HEARING RANGE AND SENSITIVITY:

- The human ear can detect sound waves within a specific range of frequencies, typically between 20Hz and 20,000Hz.
- The sensitivity to different frequencies varies, with the greatest sensitivity occurring in the range of 2,000Hz to 4,000Hz.



# HOW WE HEAR SOUND:



1. Sound waves enter the outer ear and travel down the ear canal.
2. The sound waves cause the eardrum to vibrate.
3. The vibrations are transmitted through the ossicles in the middle ear, amplifying the sound.
4. The stapes bone pushes against a membrane called the oval window, which leads to the cochlea.
5. The vibrations in the cochlear fluid stimulate tiny hair cells lining the cochlea.
6. The hair cells convert the mechanical vibrations into electrical signals.
7. These electrical signals are transmitted through the auditory nerve to the brain.
8. The brain interprets the electrical signals as sound, allowing us to perceive and understand what we hear.



# HEARING LOSS AND DISORDERS:



- Various factors, such as aging, exposure to loud noise, infection, genetics, and medical conditions, can lead to hearing loss or auditory disorders.
- Common hearing disorders include conductive hearing loss, sensorineural hearing loss, tinnitus (ringing in the ears), and balance disorders.
- Explain causes, symptoms, and available treatment. Seek medical help regarding concerns about their ears.

