

Special Senses: The Ear

A nervous system lab activity using
Visible Body's Anatomy & Physiology

**Cynthia Harley, Assistant Professor of
Biology, Metropolitan State University**

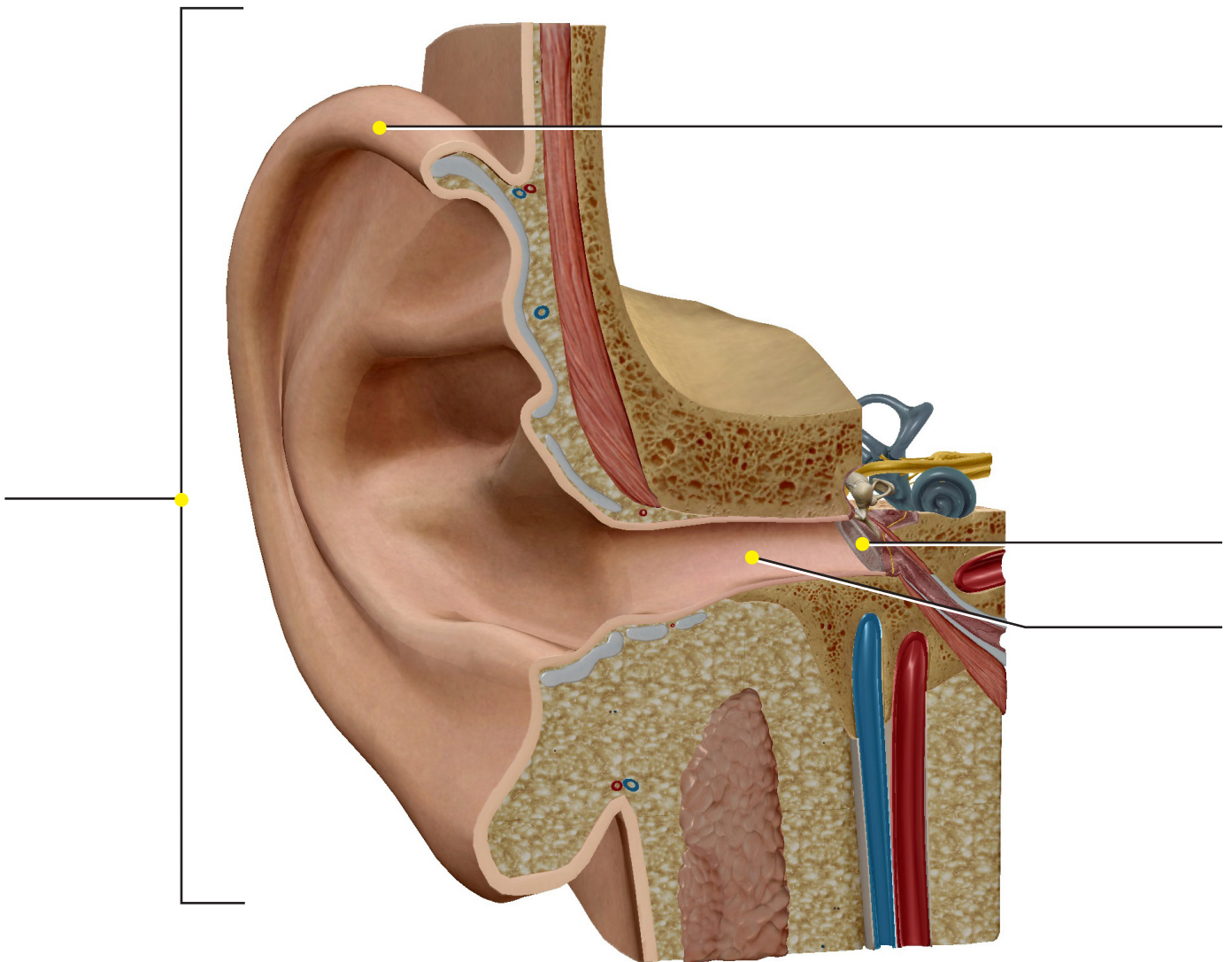
PRE-LAB EXERCISES

Use the modules to guide your exploration of the anatomy and physiology of the parts of the ear. Be sure to use the book icon to learn more about the structures you are exploring.

You are responsible for the identification of **all bold terms**.

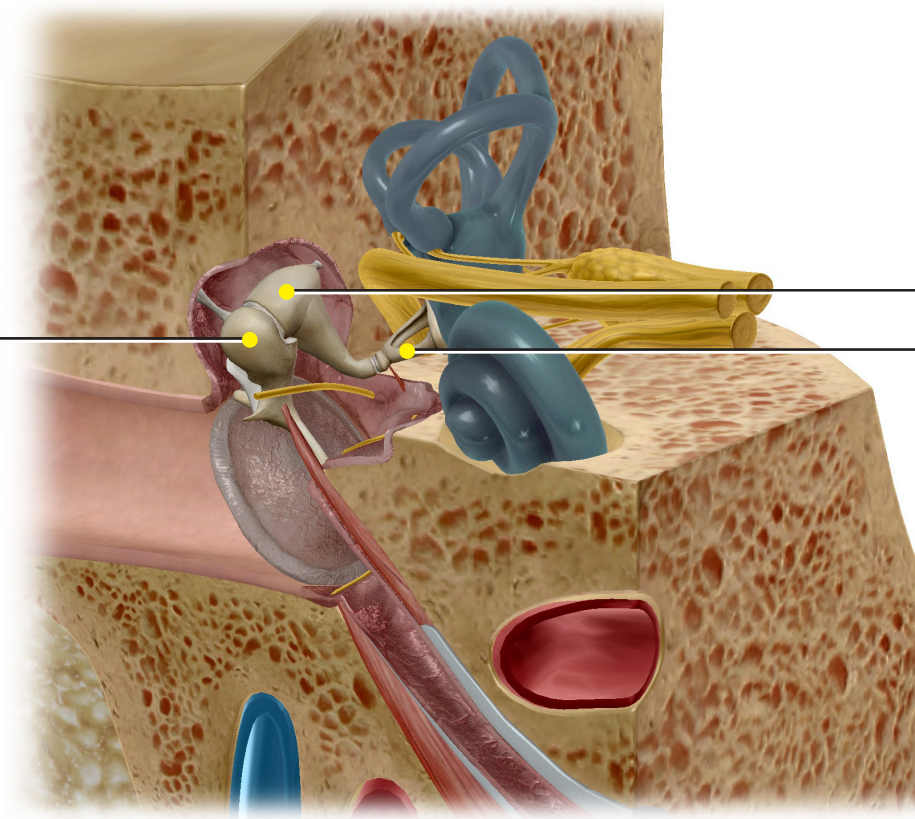
A. Use Modules 23.19 Ear and 23.20 Outer Ear to guide you as you label all the structures in the image below.

Module 23.19 Ear



Note that the outer ear is shaped like a funnel. This helps it to funnel sound into the middle ear. The main function of the outer and middle ear is to amplify sound. The middle ear uses the **ossicles** to amplify sound.

B. Use Module 23.21 Middle Ear to help you label the diagram below.

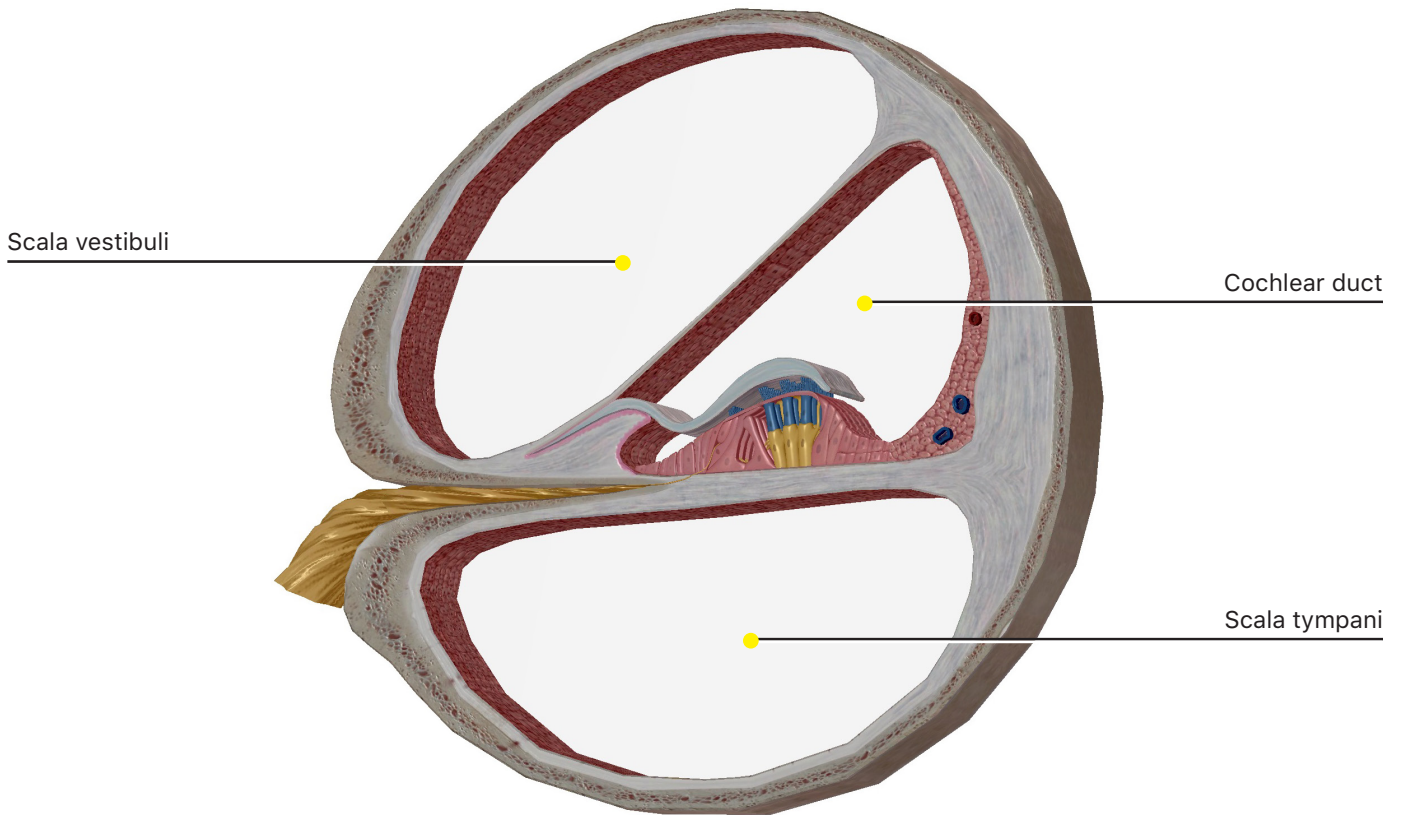


The stapes of the middle ear connects to the **oval window**, which is a membrane that allows the movement of the stapes to create waves in the fluid inside the **cochlea** of the inner ear.

C. Use Module 23.22 Inner Ear to guide you as you label all the structures in the image below.

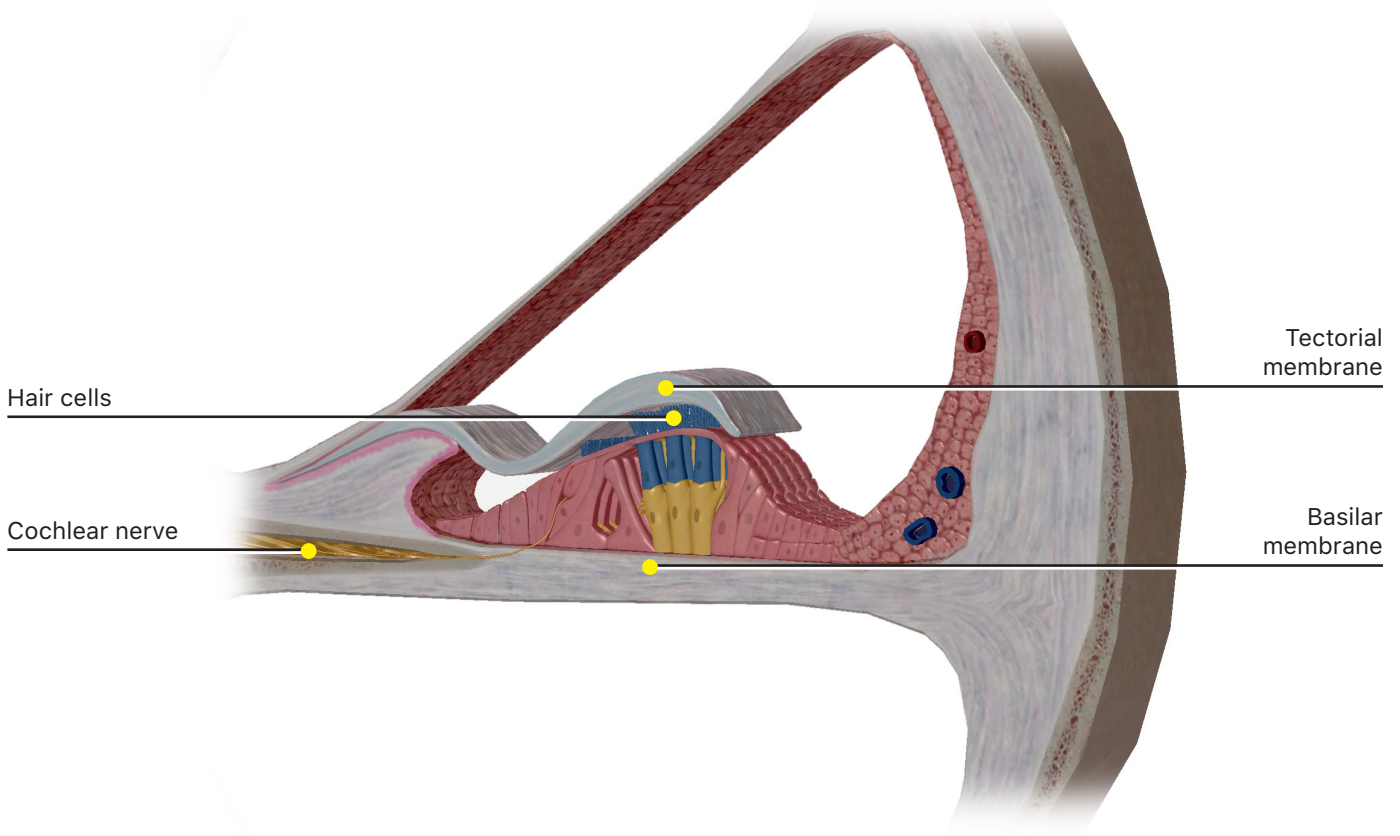


D. View Module 23.23 Cochlea Cross Section.



E. View Module 23.24 Organ of Corti and answer the question below:

Inside the cochlear duct is the organ of Corti, which contains the sensory receptors needed for hearing.



1. Note where the **tectorial membrane** is relative to the **hair cells**. This membrane moves when there is fluid movement. What does this do to the hair cells?

This opens cation channels, depolarizing those cells and resulting in the release of neurotransmitters onto cells of the **cochlear nerve**.

TIME TO PRACTICE!

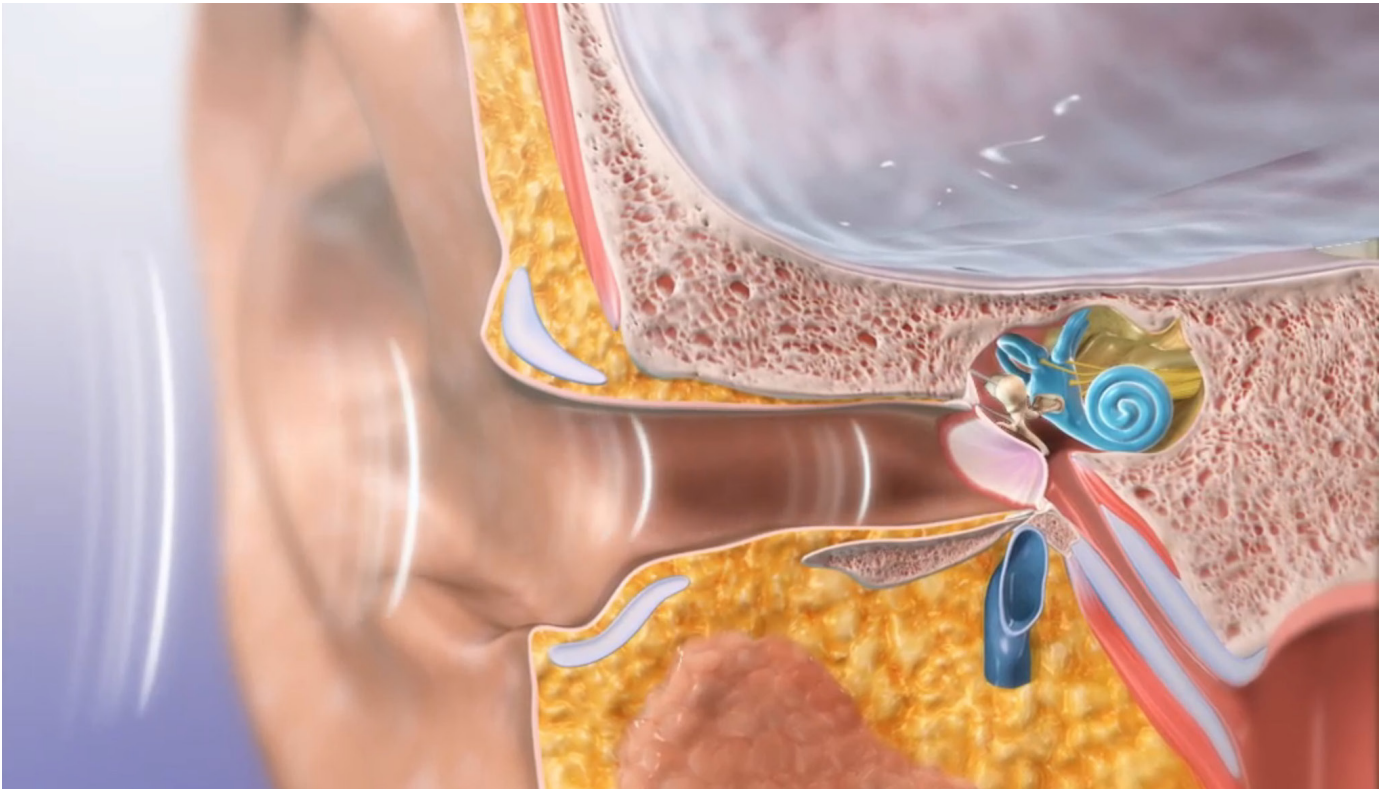
TAKE QUIZ 23.C EAR DISSECTION AND QUIZ 23.D COCHLEA DISSECTION.

IN-LAB EXERCISES:

Use the modules to guide your exploration of the anatomy and physiology of the parts of the ear. Be sure to use the book icon to learn more about the structures you are exploring.

You are responsible for the identification of **all bold terms**.

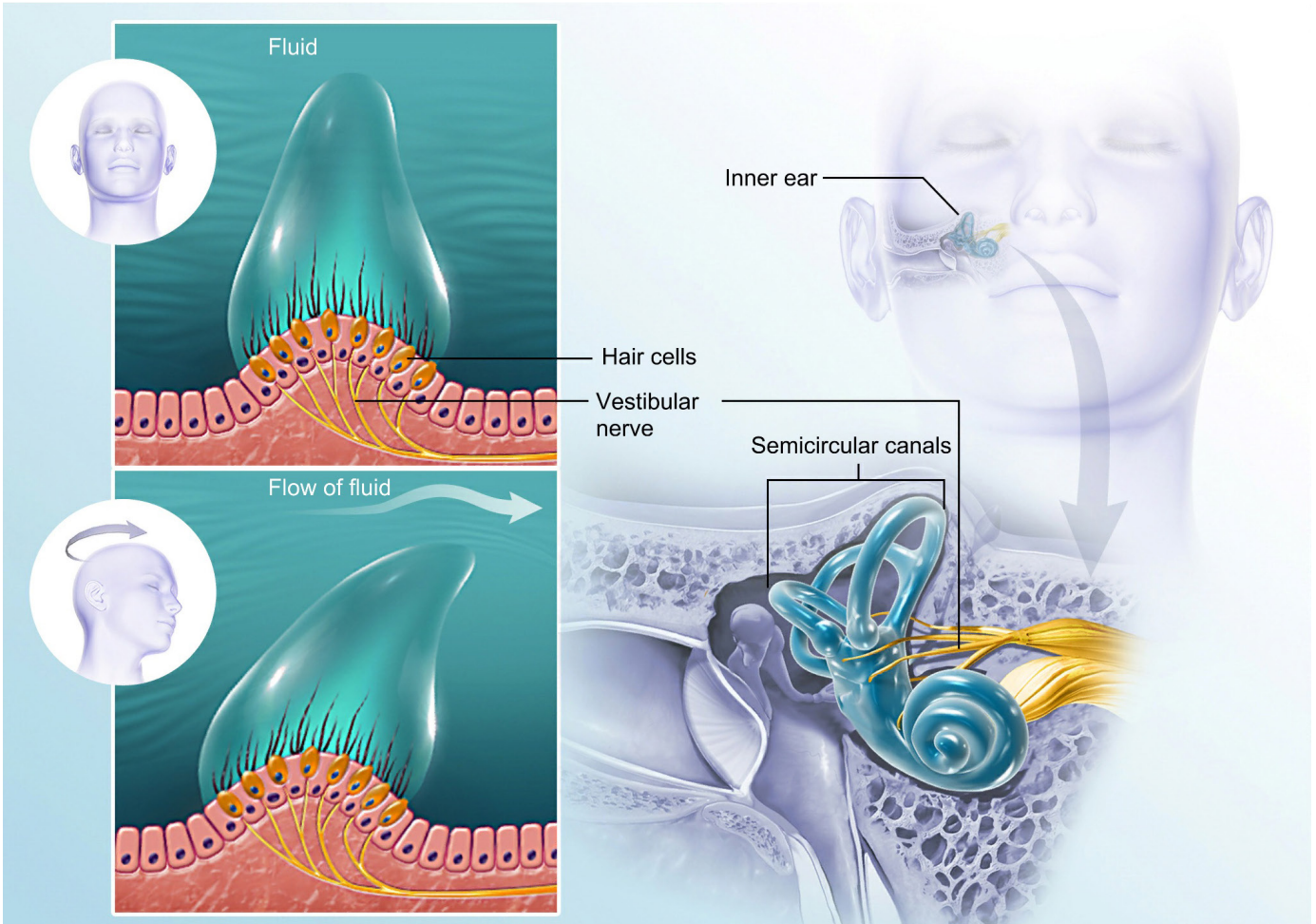
A. Watch the video in Module 23.25 Hearing and complete the following exercise:



Order these items from 1 (first in the sequence) to 9 (last):

- ___ The **incus** moves.
- ___ Sound waves move the **tympanic membrane**.
- ___ The **temporal lobe** interprets the neural signal as sound.
- ___ Sound enters the **external acoustic meatus**.
- ___ The **cochlear nerve** receives a signal.
- ___ The **malleus** moves.
- ___ **Hairs** on hair cells move.
- ___ The **stapes** moves.
- ___ The **tectorial** membrane moves.

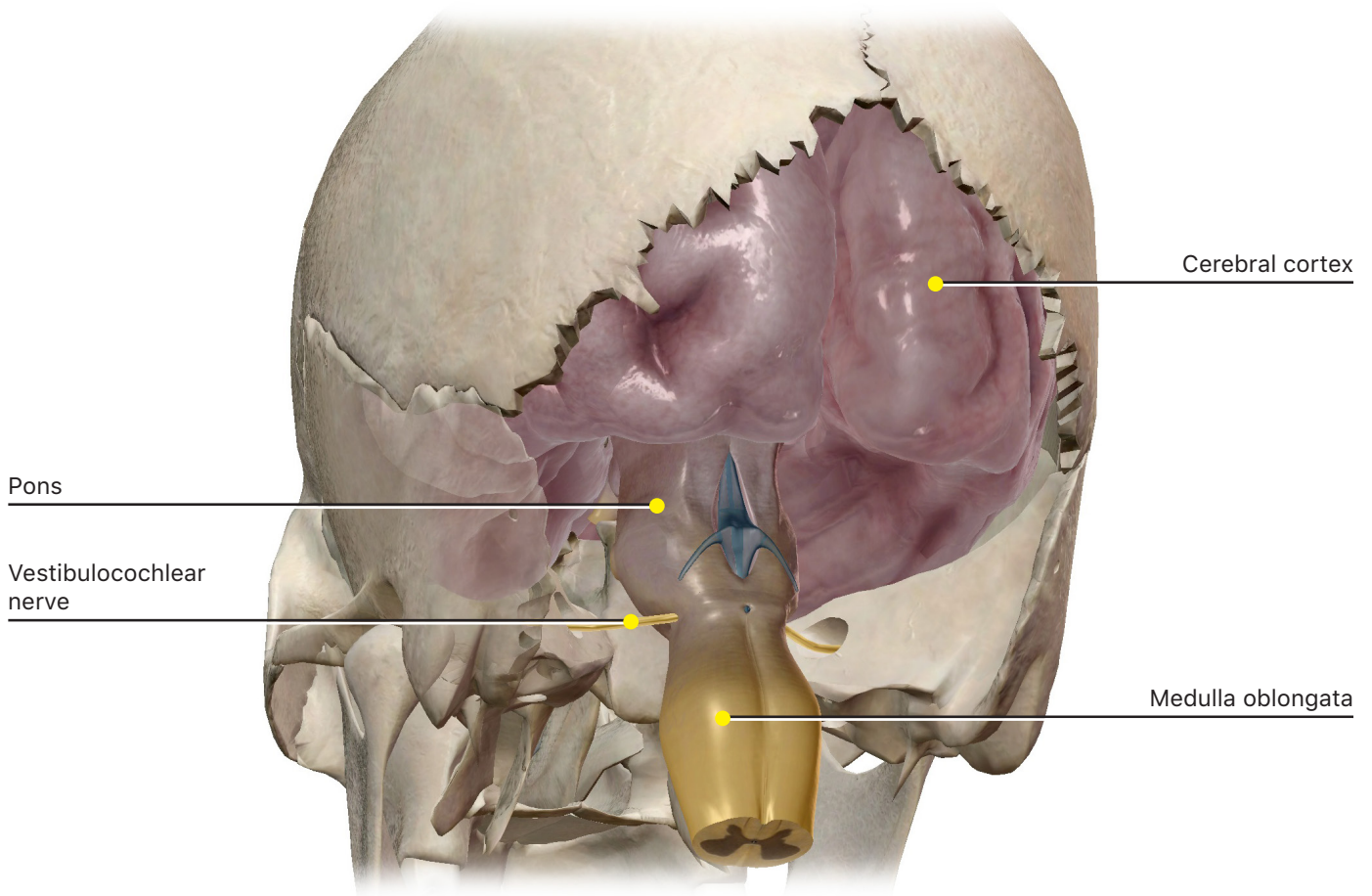
B. View Module 23.27 Equilibrium and answer the following questions:



Equilibrium gives you your sense of balance. It is the ability to sense changes in position, such as acceleration or rotation.

1. Examine the **semicircular canals** of the inner ear. Which plane(s) are they in?
2. Why would the plane location of the semicircular canals be important to sensing the position of your head?
3. When fluid in these canals moves, it causes hair cells in the canals to bend. This signal is then sent to the brain through the _____ nerve.

C. View 23.28 Equilibrium Pathway and answer the question below:



1. Is your sense of equilibrium entirely conscious? Justify your answer and state the regions of the brain that are involved.

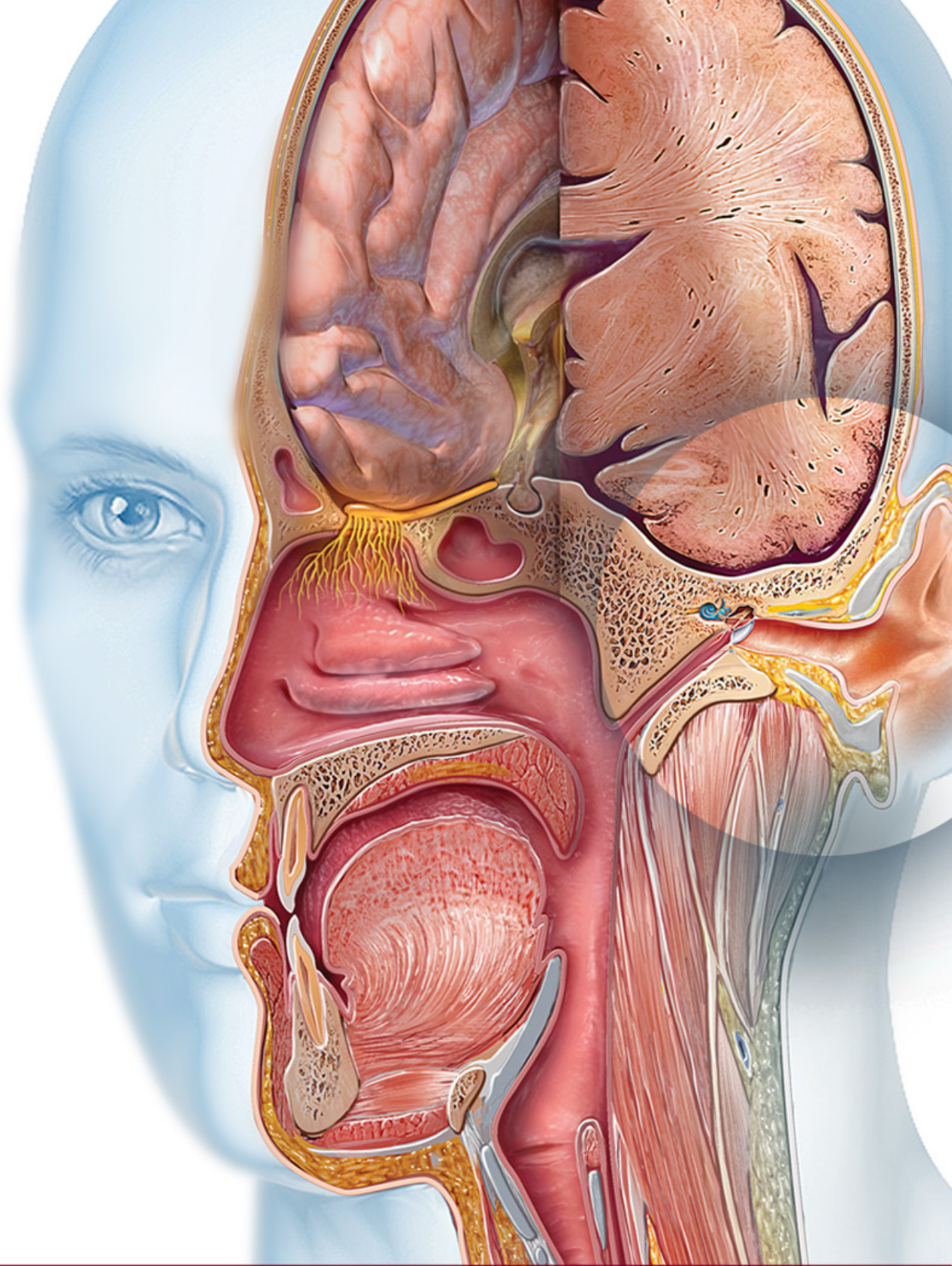
PUTTING IT ALL TOGETHER

A. Watch Module 23.25 Hearing and answer the following questions:

1. Discuss how sound travels through the structures of the ear to become a neural signal.
2. What is the role of the ossicles in this process?
3. Once a neural signal has been created, what is the path that auditory information takes to get to the brain?

B. Review modules 23.27 Equilibrium and 23.24 Organ of Corti.

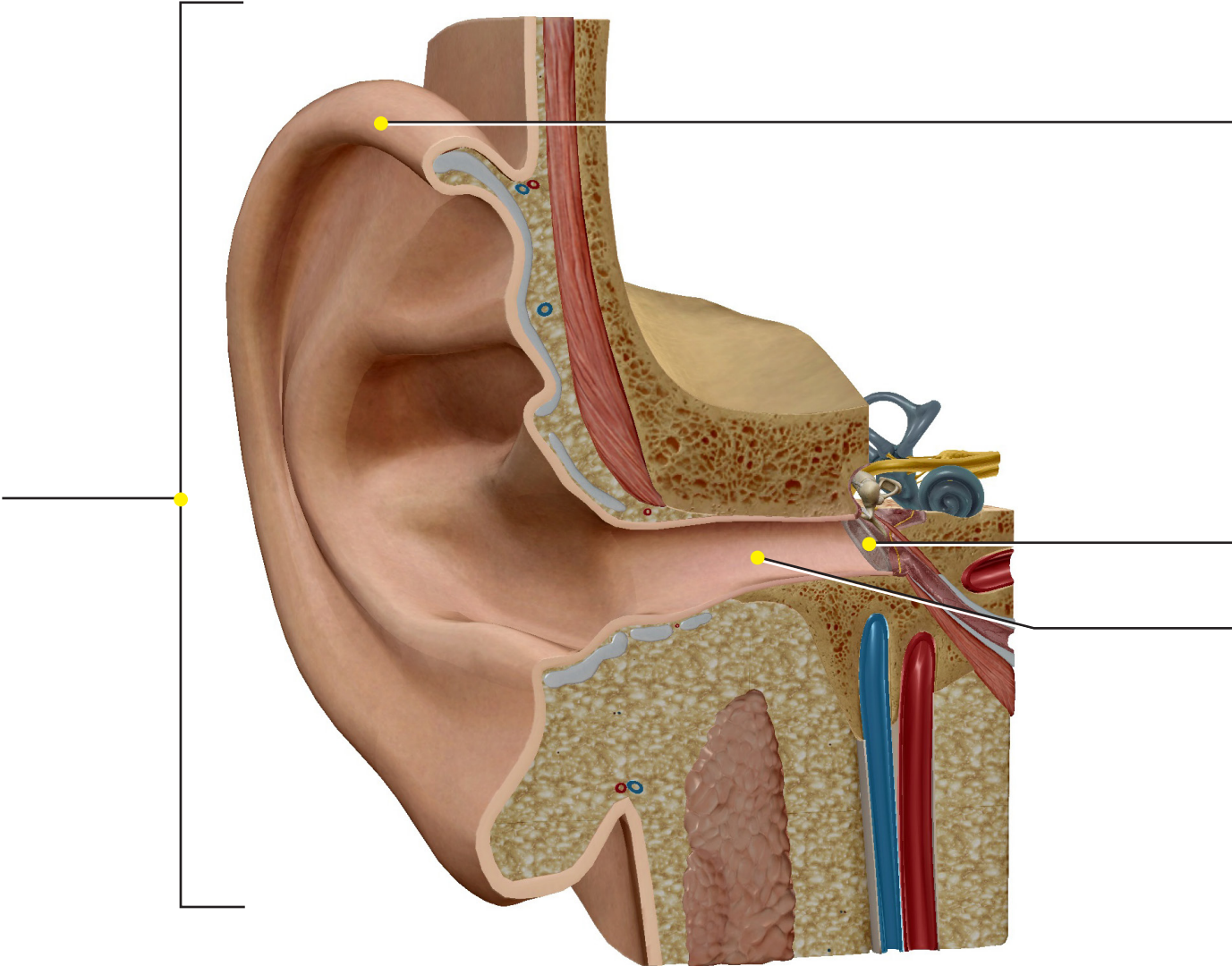
1. Compare and contrast hearing and equilibrium (the vestibular sense).



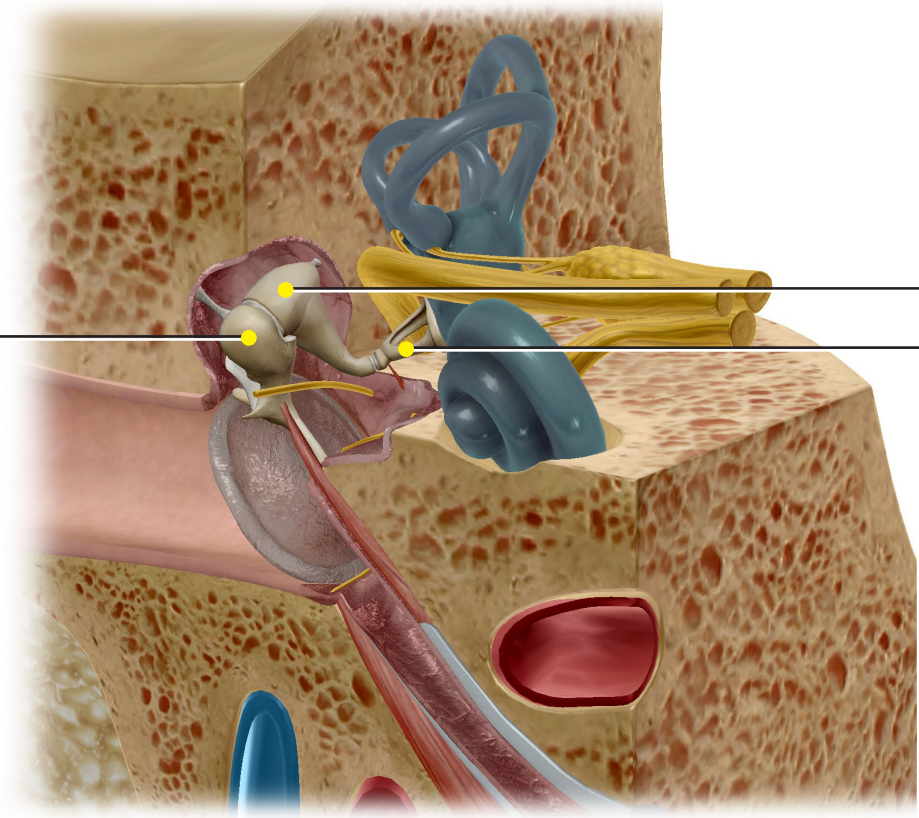
Student Practice

Label the structures in the following figures.

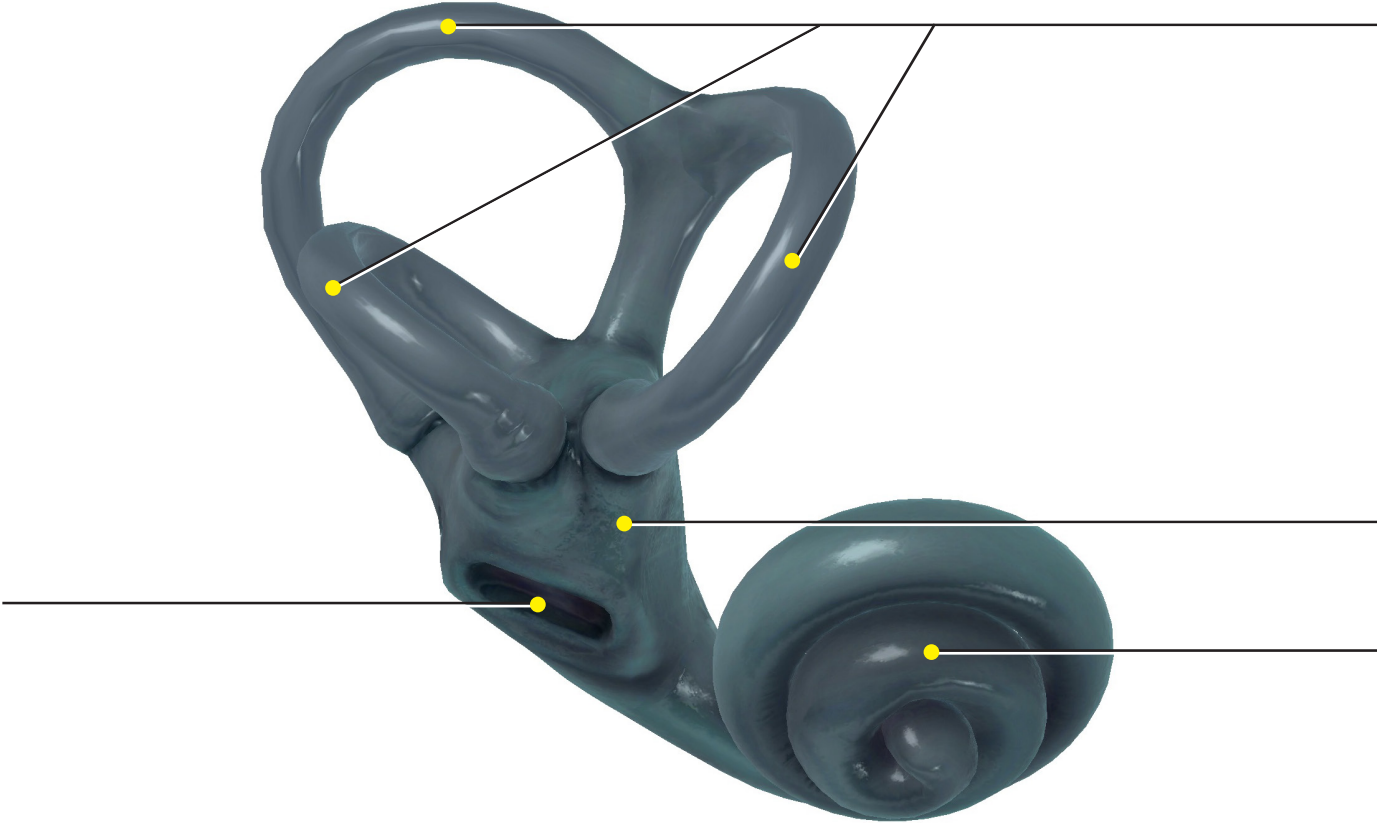
Module 23.19 Ear



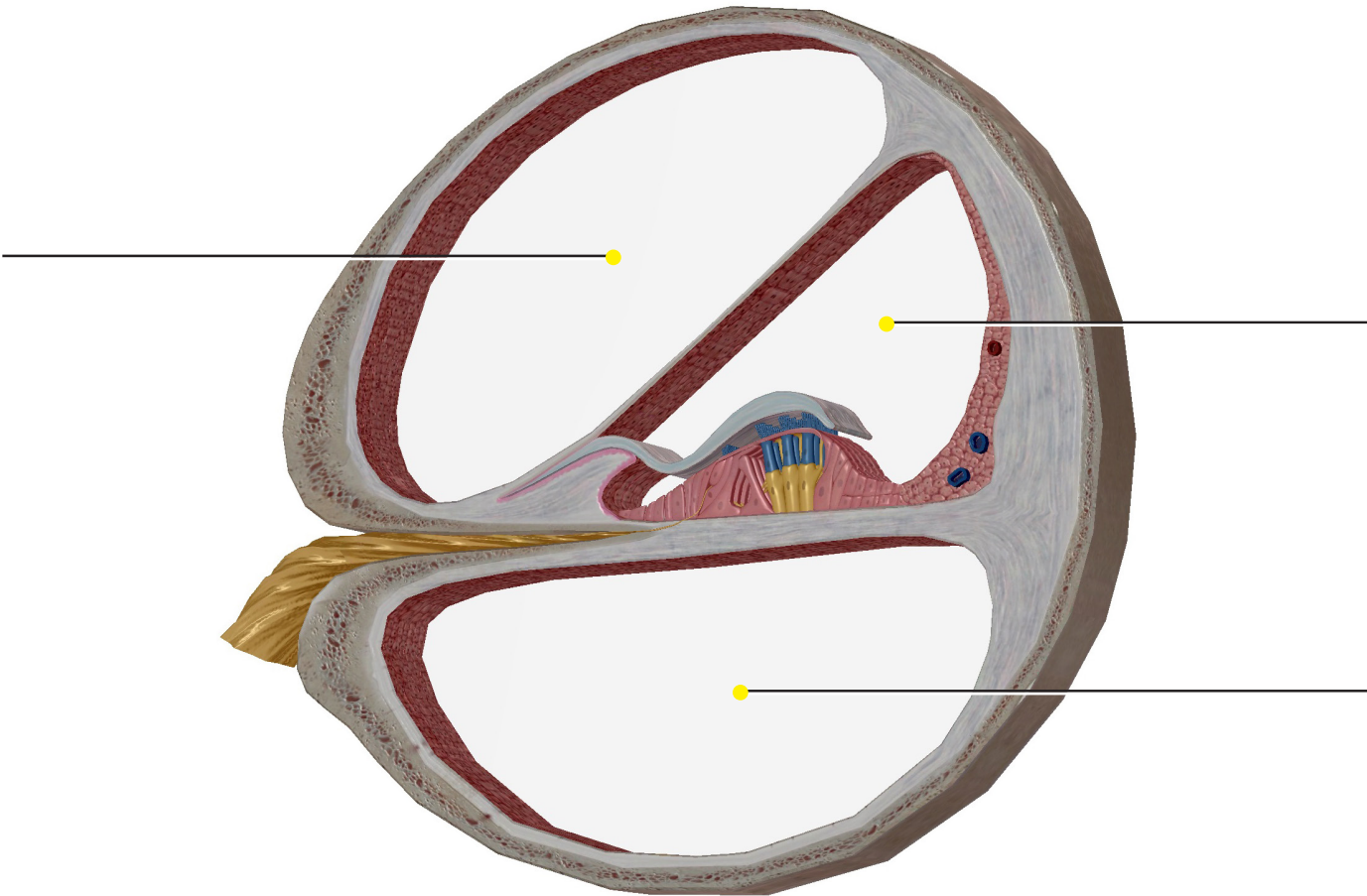
Module 23.21 Middle Ear



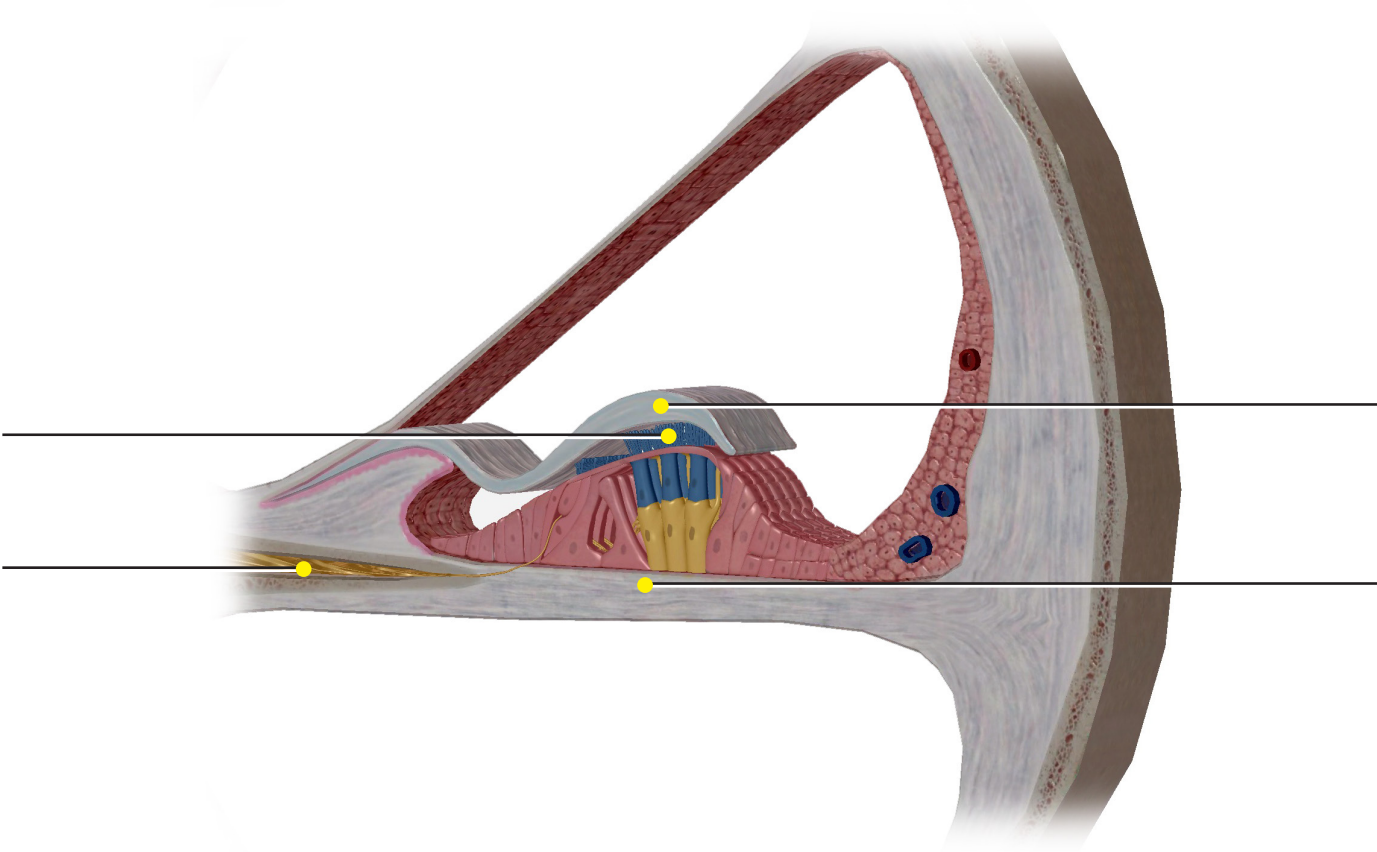
Module 23.22 Inner Ear



Module 23.23 Cochlea Cross Section



Module 23.23 Cochlea Cross Section (close up)



Module 23.28 Equilibrium Pathway

