Organ of hearing and equilibrium

Classification

Types of sensory organs:

I 1. Organ of vision

2. Olfactory organ

II 1. Organ of hearing

2. Organ of equlibrium

3. Organ of taste

III Non-free nerve endings

Hearing and Equilibrium

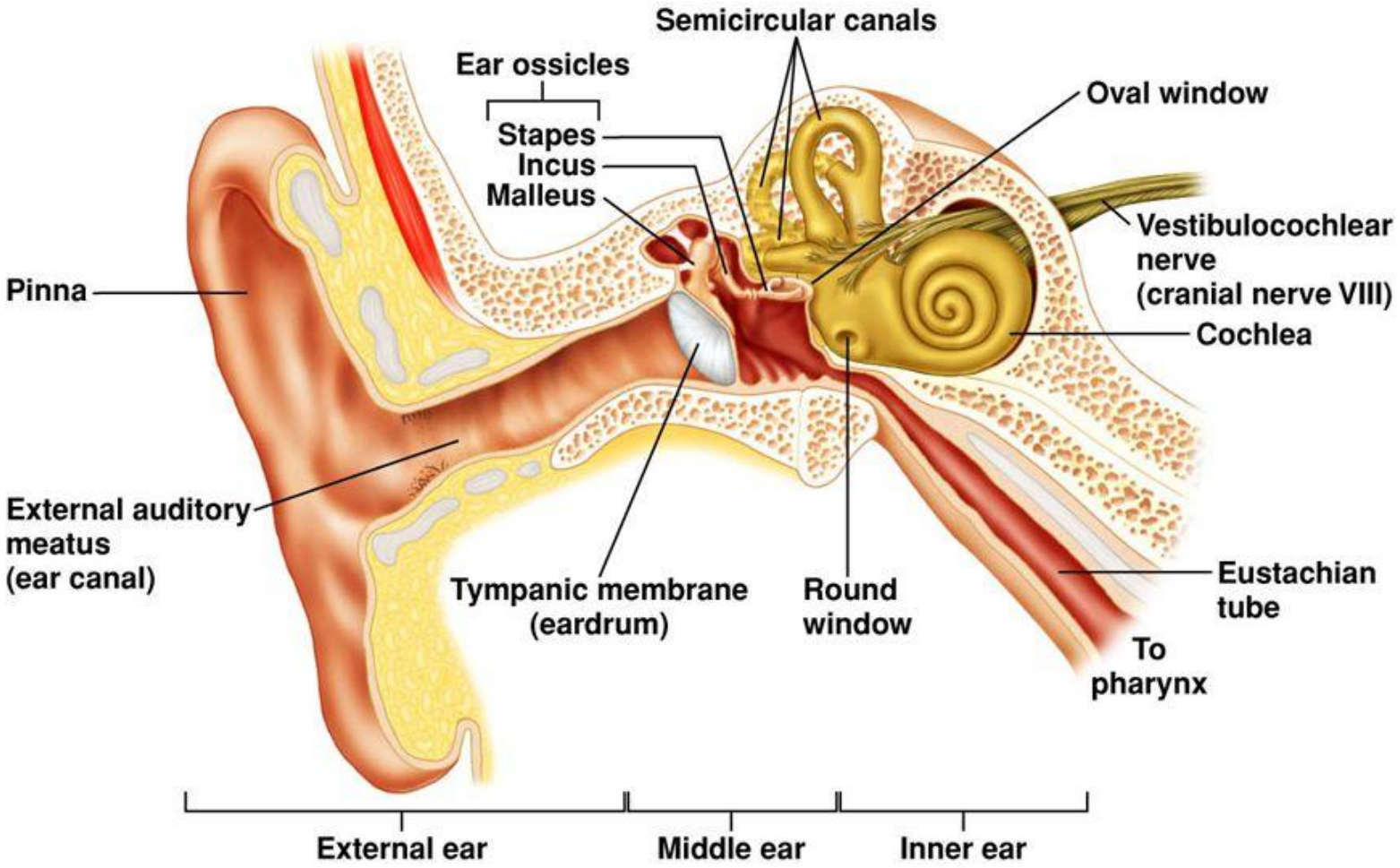


Figure 10.37

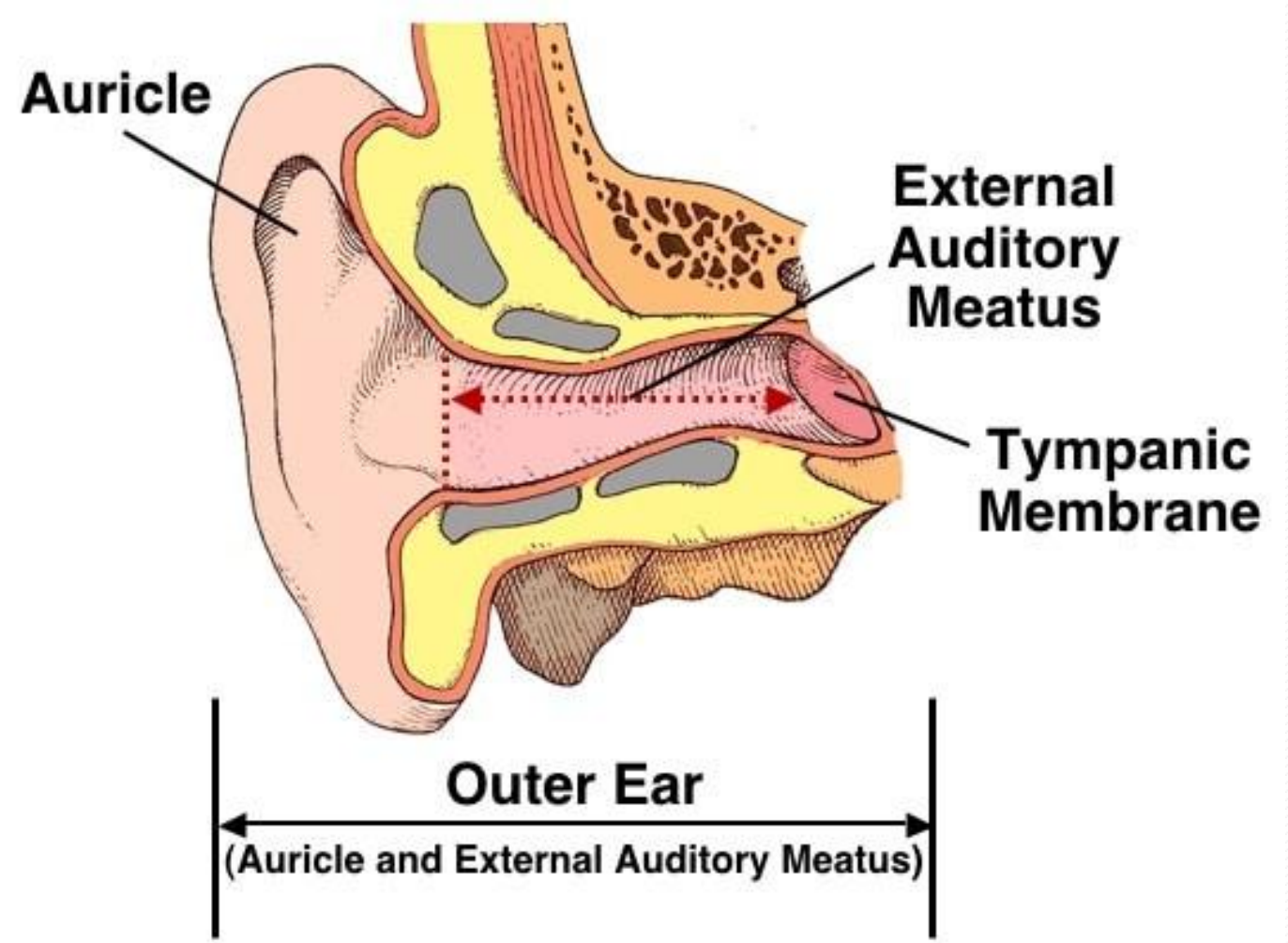
The external ear

- **Auricle** consists of elastic cartilage
- **External acoustic meatus** - air-filled tubular space. The lateral one third wall is a continuation of elastic cartilage of the auricle, the middle two third is formed by bone tissue.

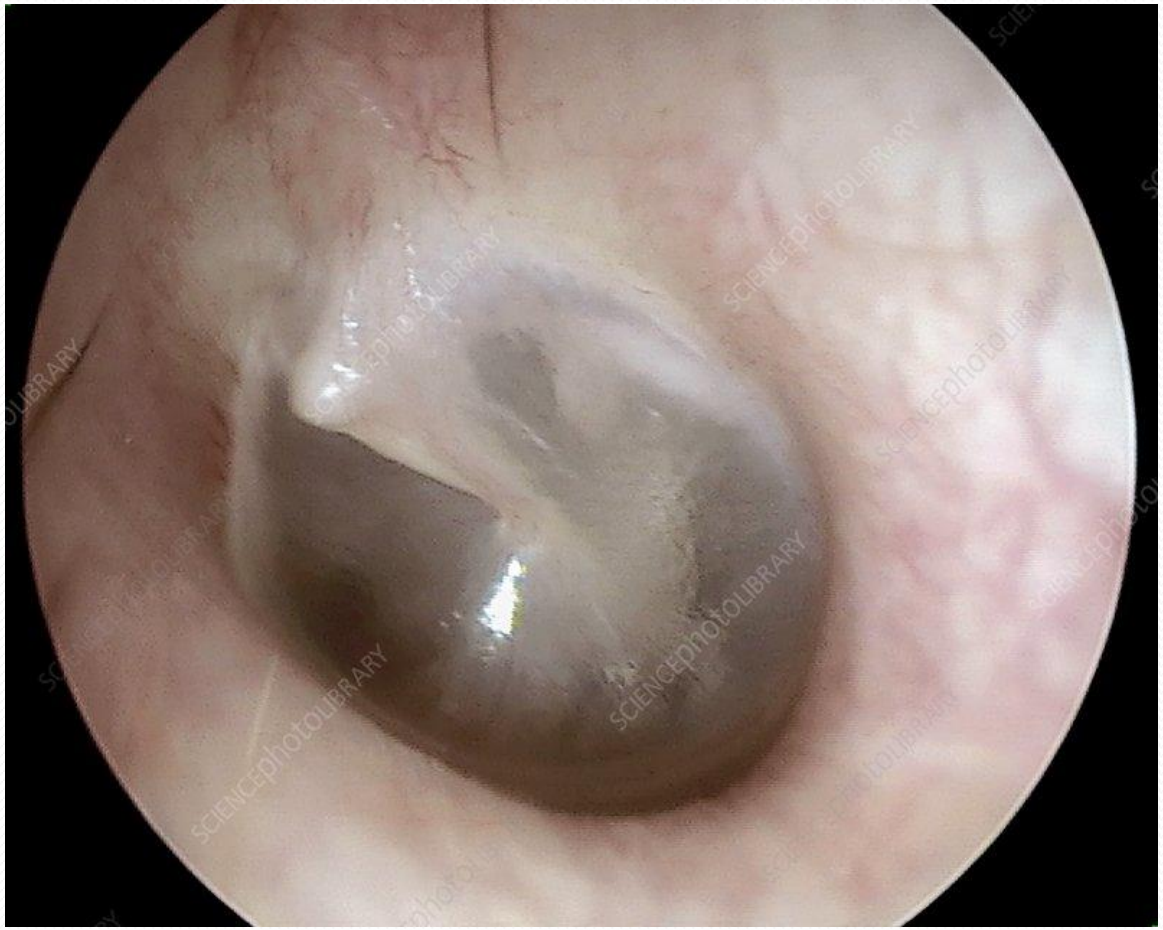
The canal is lined by skin epithelium containing hair follicles, sebaceous glands and ceruminous glands producing earwax.

- **Tympanic membrane** –thin membrane that is covered by skin epithelium from the external acoustic meatus and simple squamos epithelium from the middle ear.

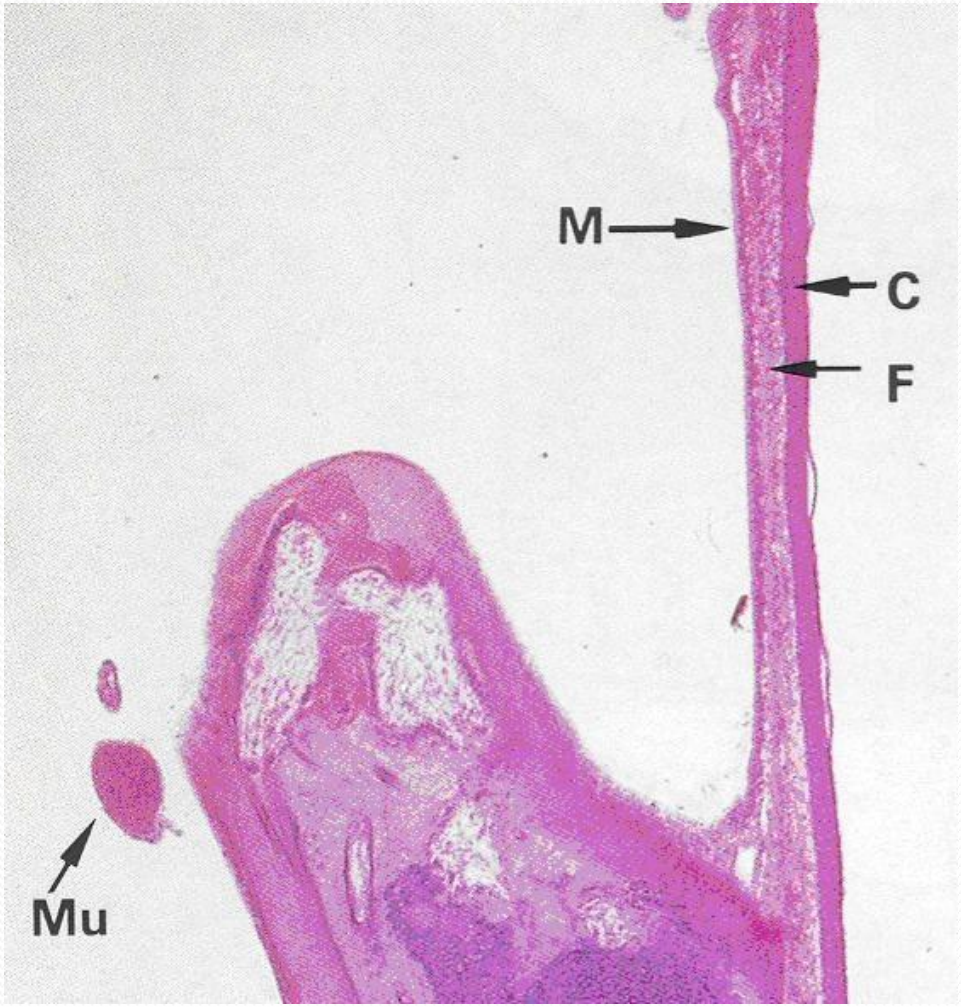
The external ear



The tympanic membrane



The tympanic membrane



The middle ear

- **Tympanic cavity** -air-filled space that is covered by simple squamous epithelium.

In the middeil wall are found two openings: oval and round windows.

- **Auditory ossicles: maleus, incus, stapes.**

The bones form the movable chain and transmit the vibrations from the tympanic membrane to the oval window.

- **Auditory tube** connects the middle ear with nasopharynx. The tube is lined by pseudostratified epithelium

The middle ear

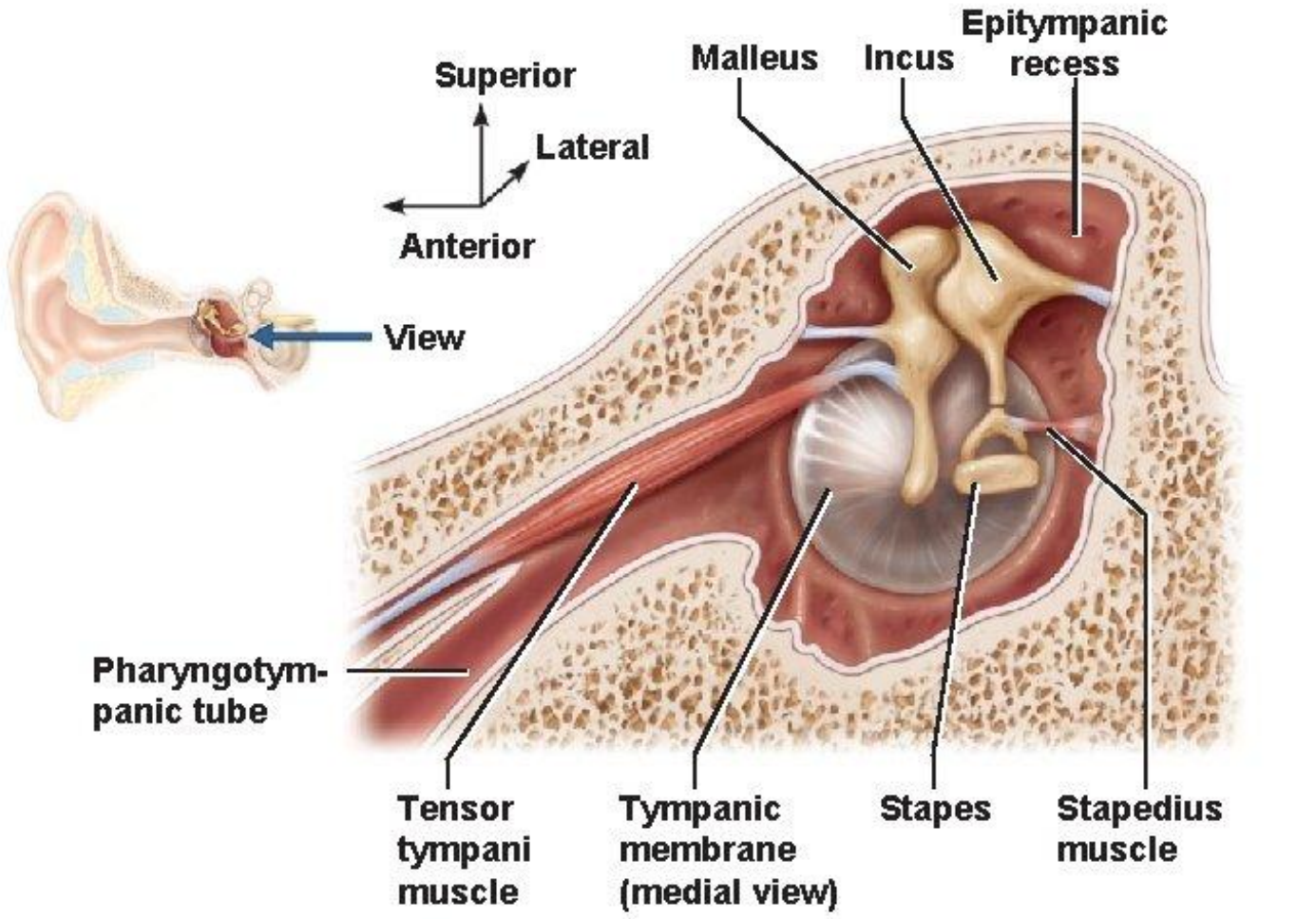
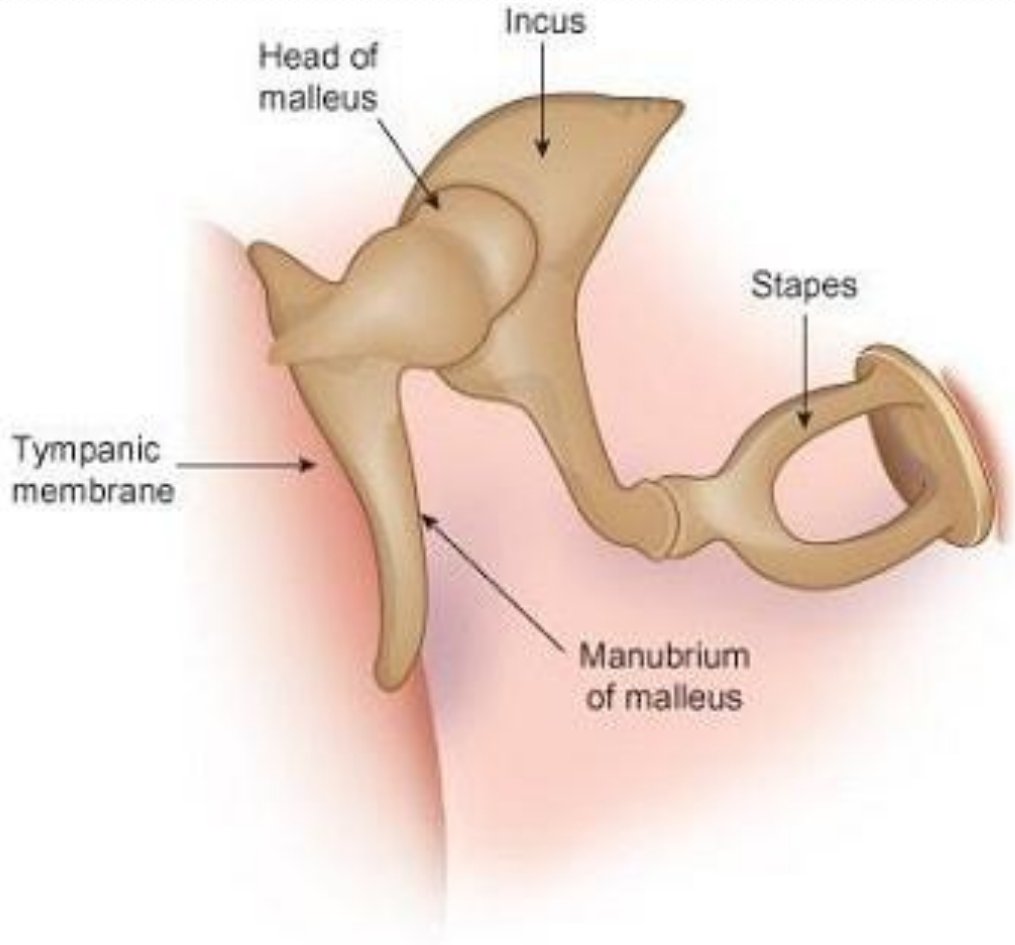
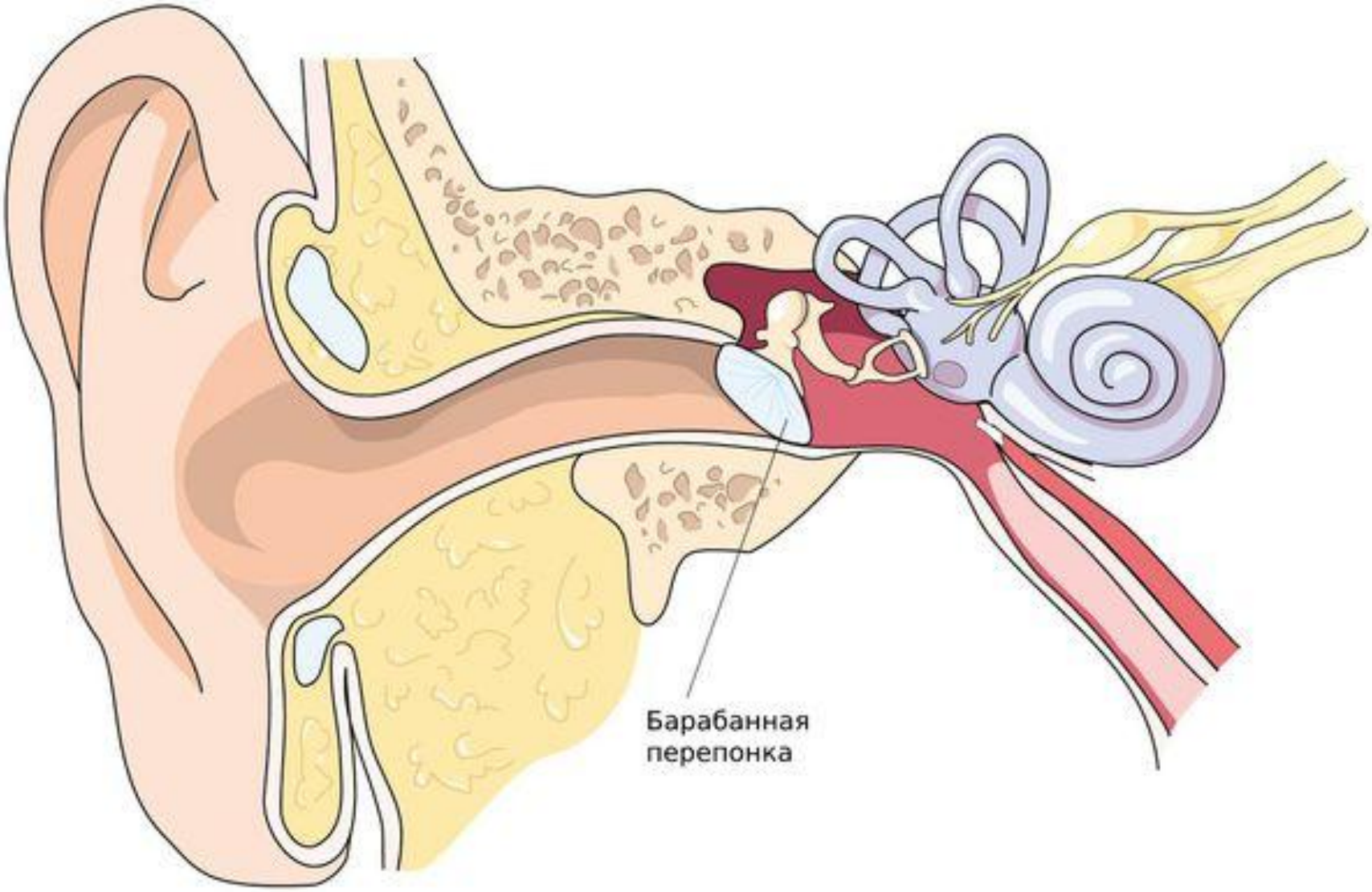
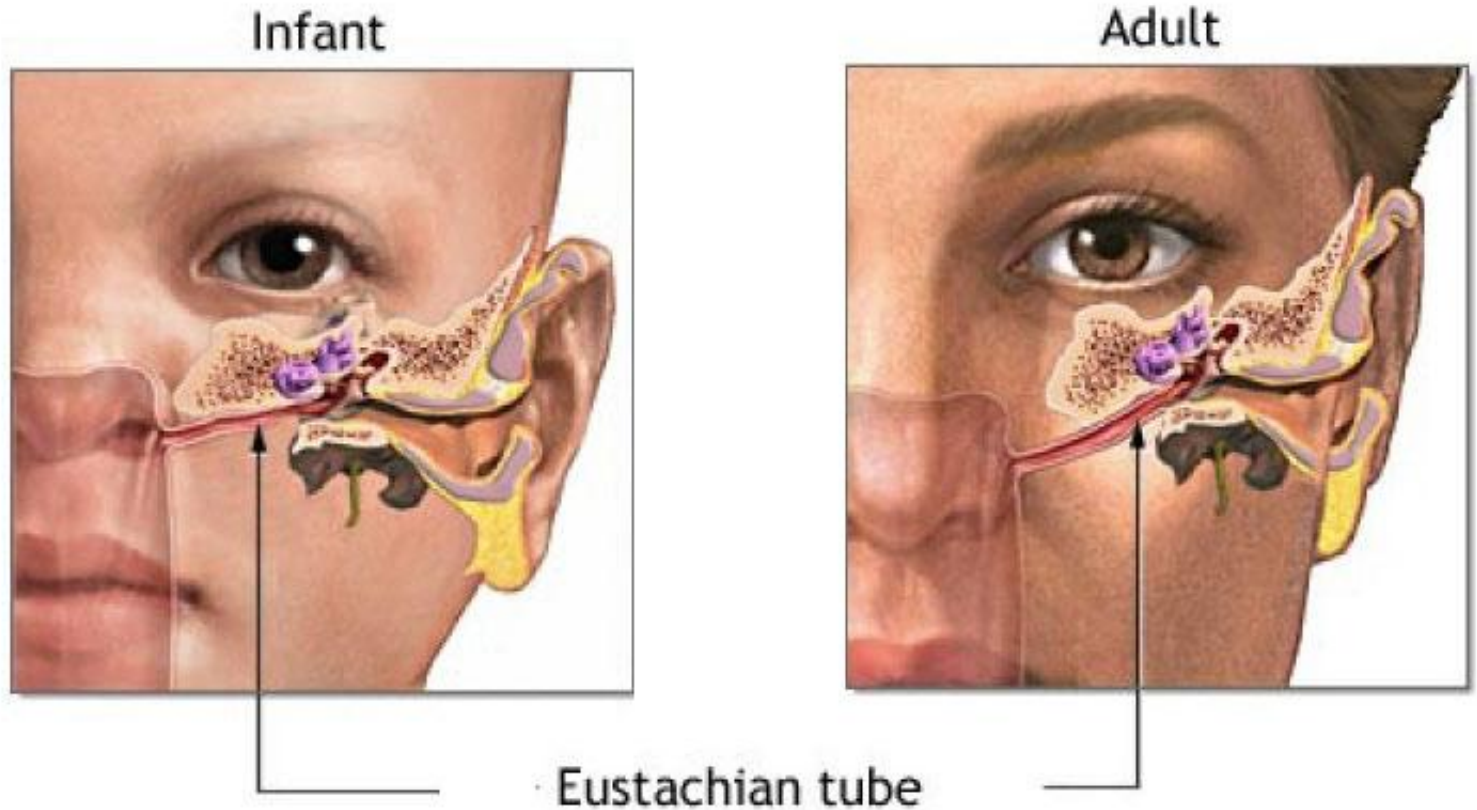


Figure 15.26


Incus
Head of
malleus
Stapes
Tympanic
membrane
Manubrium
of malleus


Барабанная
перепонка

Pharyngotympanic (Auditory) tube



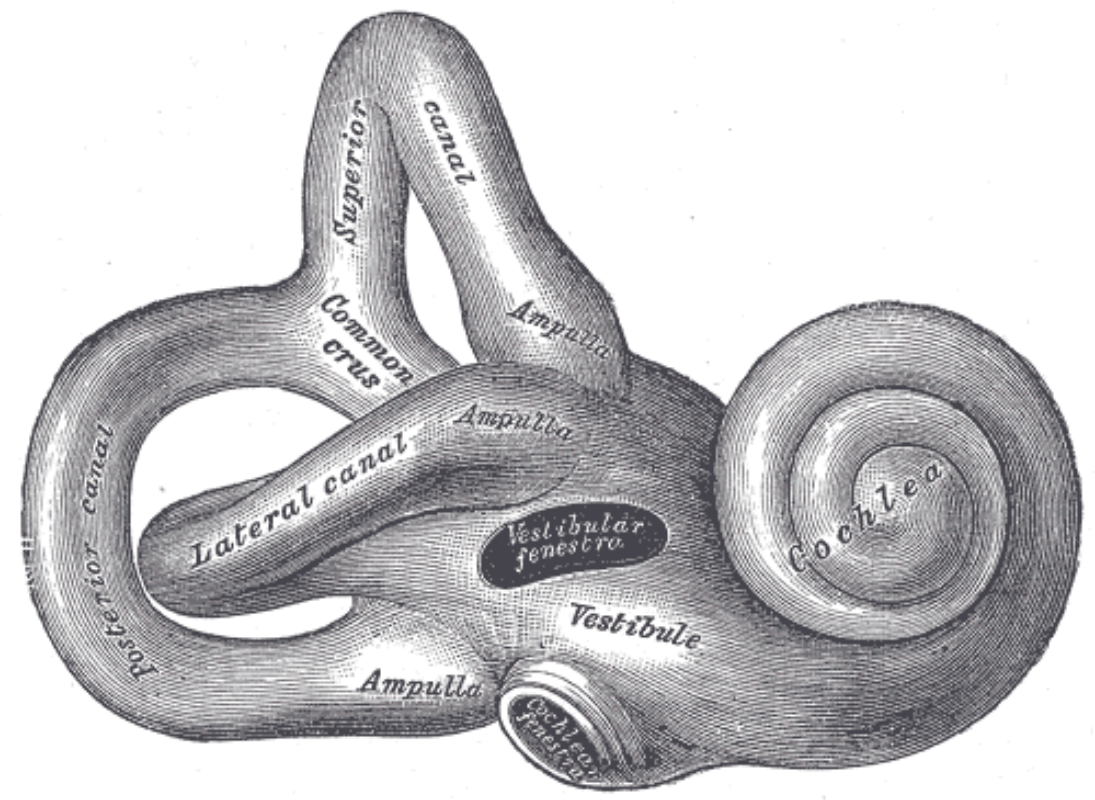
The inner ear

The inner ear is represented by two compartments where one contained within the other: **bony labyrinth and membranous labyrinth.** The perilymphatic space is filled by perilymph. The space within membranous labyrinth – endolymph.

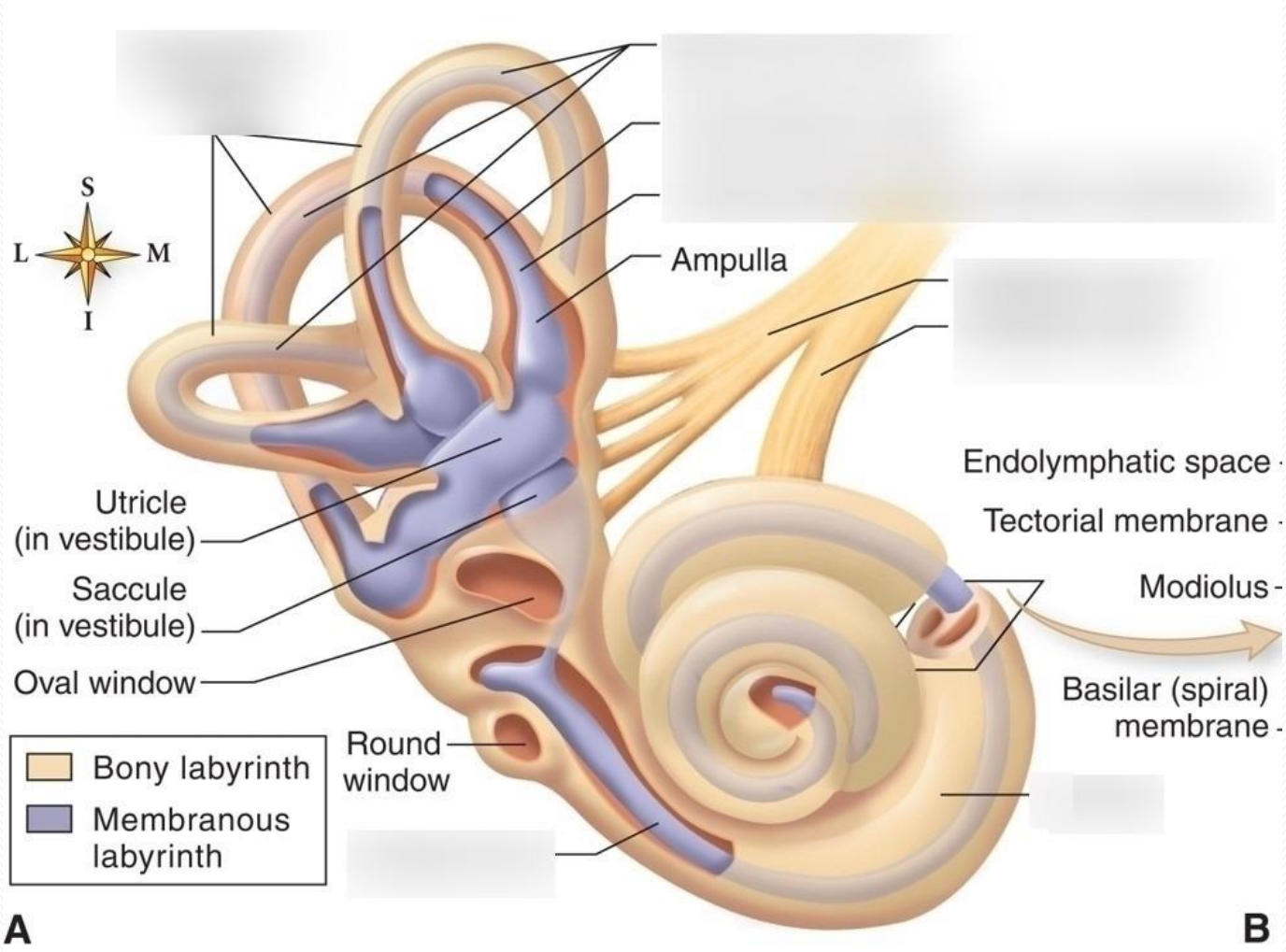
The bony labyrinth parts: vestibule, three semicircular canals, cochlea.

The membranous labyrinth parts: cochlear labyrinth, vestibular labyrinth (semicircular ducts, the utricle, the saccule)

The bony labyrinth



The membranous labyrinth



Organ of hearing

The sensory cells are found in the spiral organ of Corti that is located in the cochlear duct.

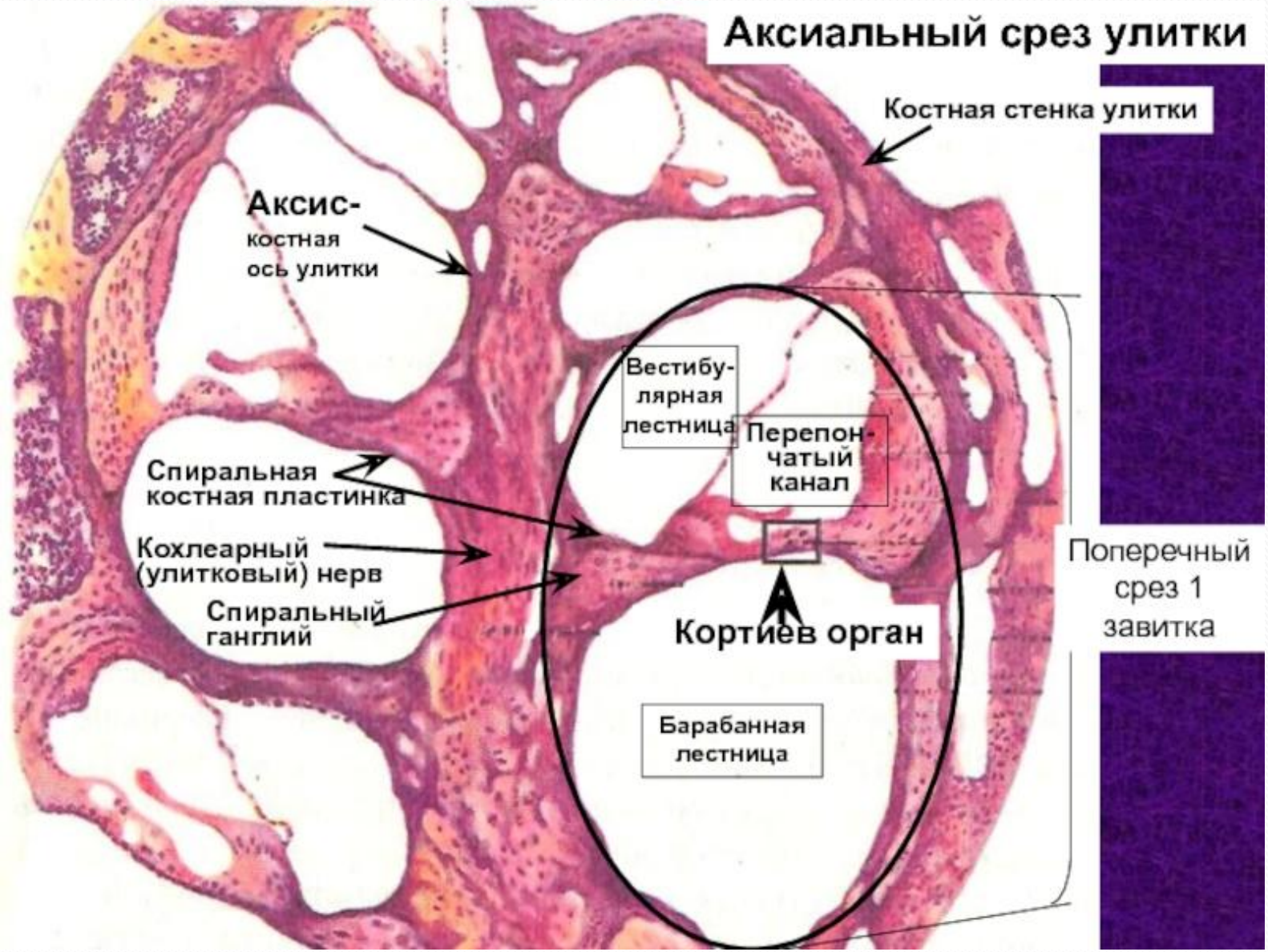
Cochlear duct-spiral canal with triangular lumen.

The compartments of the cochlear duct:

-scala media

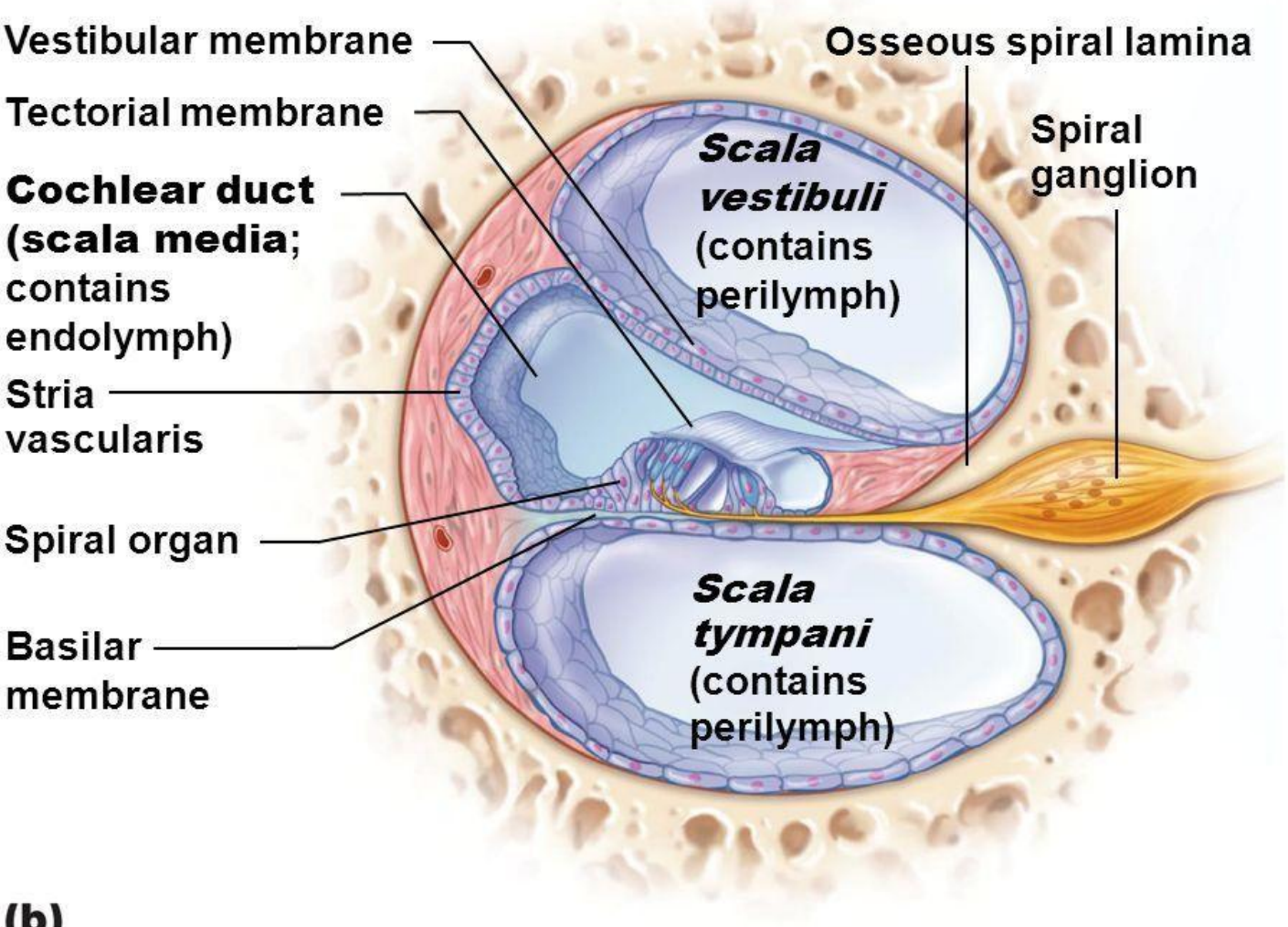
-scala vestibuli

-scala tympani


Аксиальный срез улитки
Костная стенка улитки
Аксис-
костная
ось улитки
Вестибу-
лярная
лестница
Перепон-
чатый
канал
Спиральная
костная пластинка
Кохлеарный
(улитковый) нерв
Спиральный
ганглий
Кортиев орган
Барабанная
лестница
Поперечный
срез 1
завитка

Cochlear duct

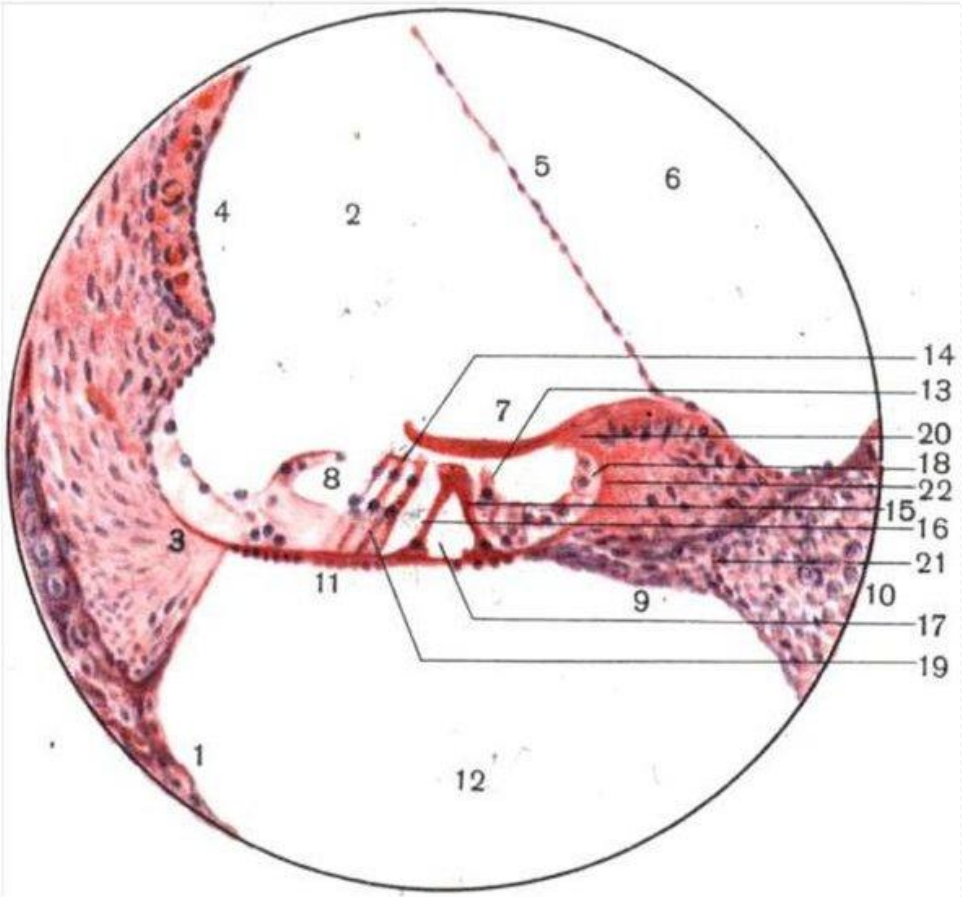
Figure 15.27b Anatomy of the cochlea.



Scala media

Walls:

- The outer wall- spiral ligament with stria vascularis
- The upper medial wall- vestibular membrane
- The lower wall –basilar membrane



Organ of Corti

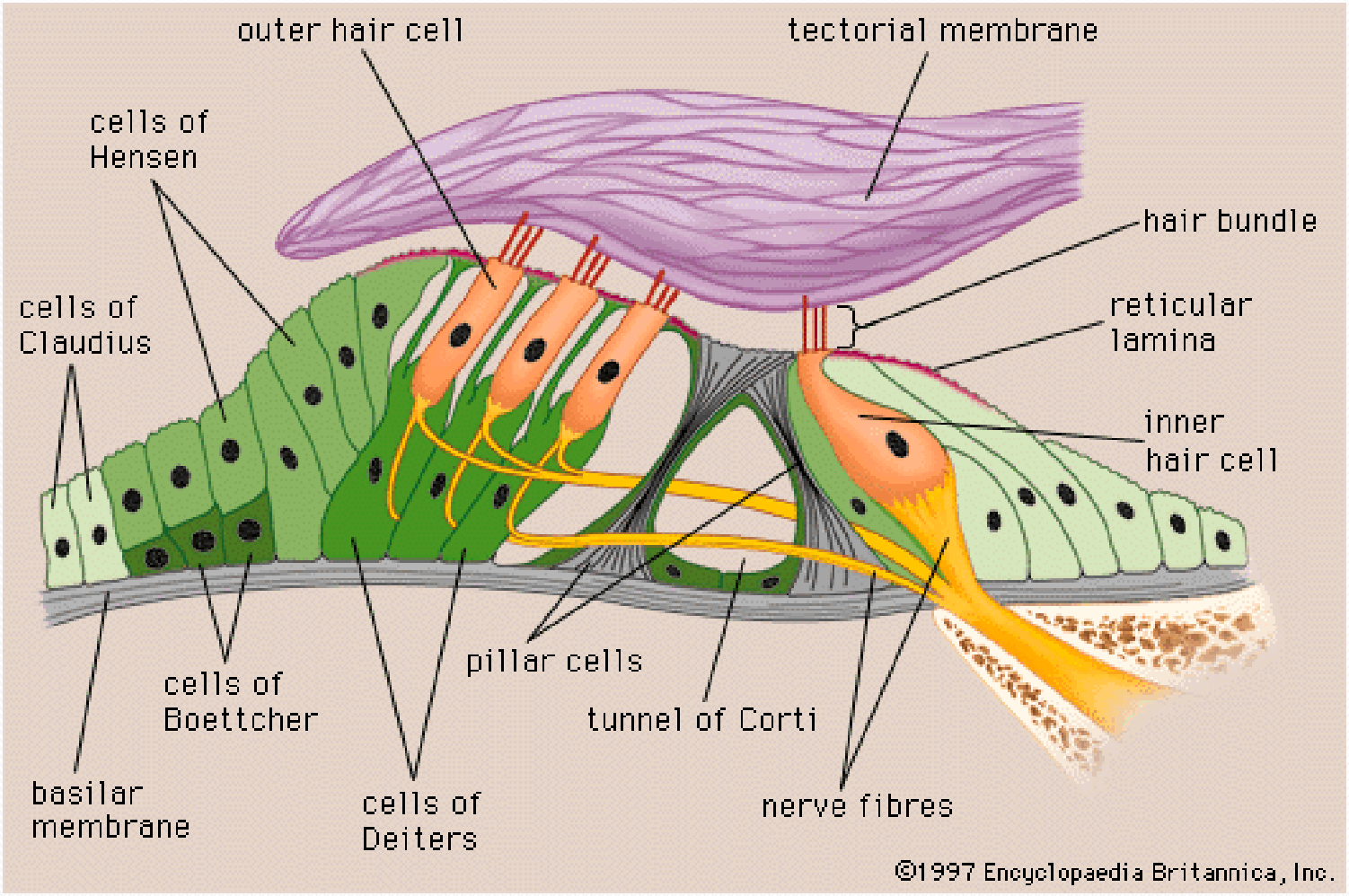
Cells

1. Supporting cells

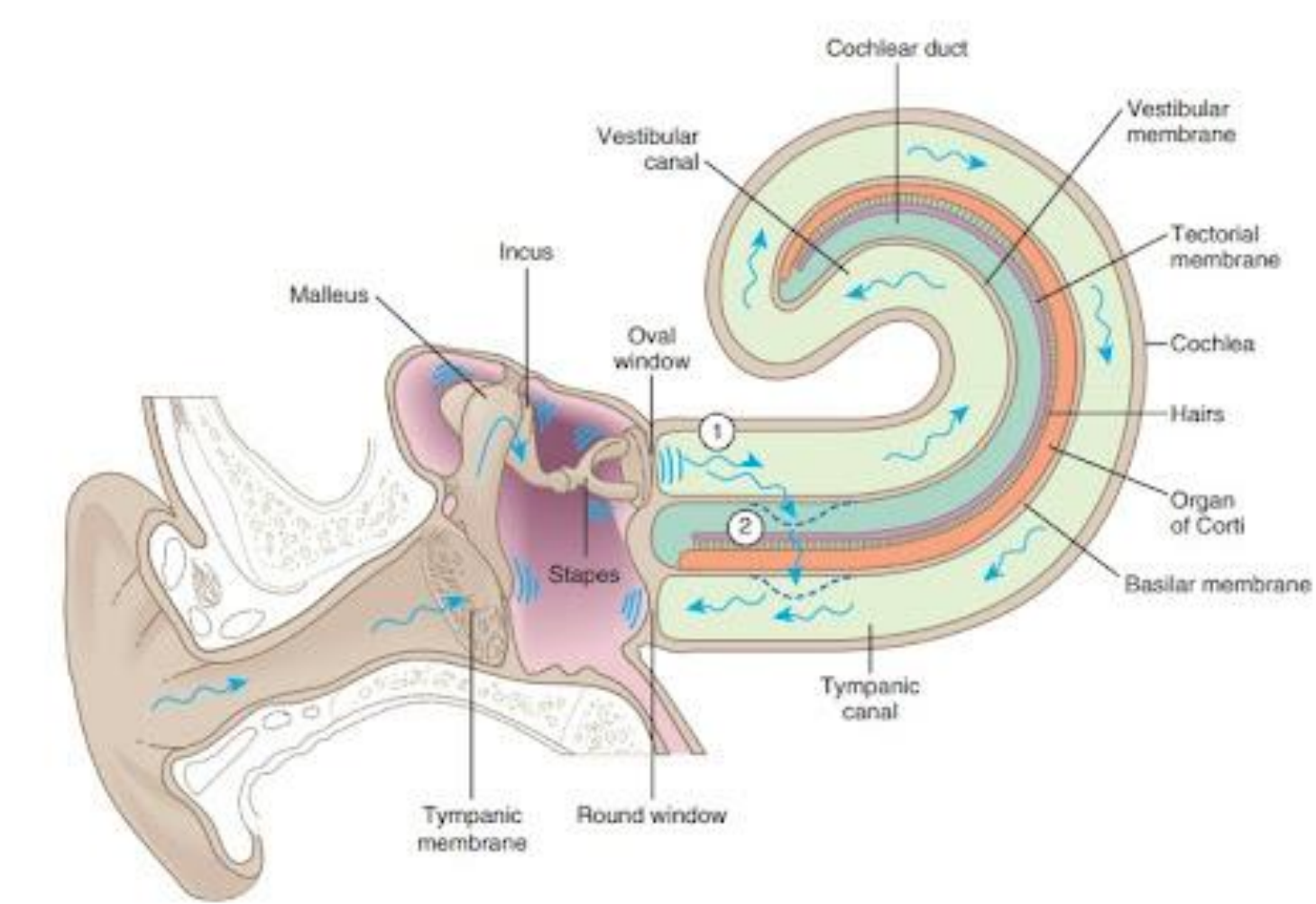
- pillar cells (inner and outer)
- phalangeal cells (Deiters cells: inner and outer)
- limiting cells (Hensen's cells: outer)
- supporting cells (Claudius cells: outer)

- Sensory (hair cells)

Organ of Corti



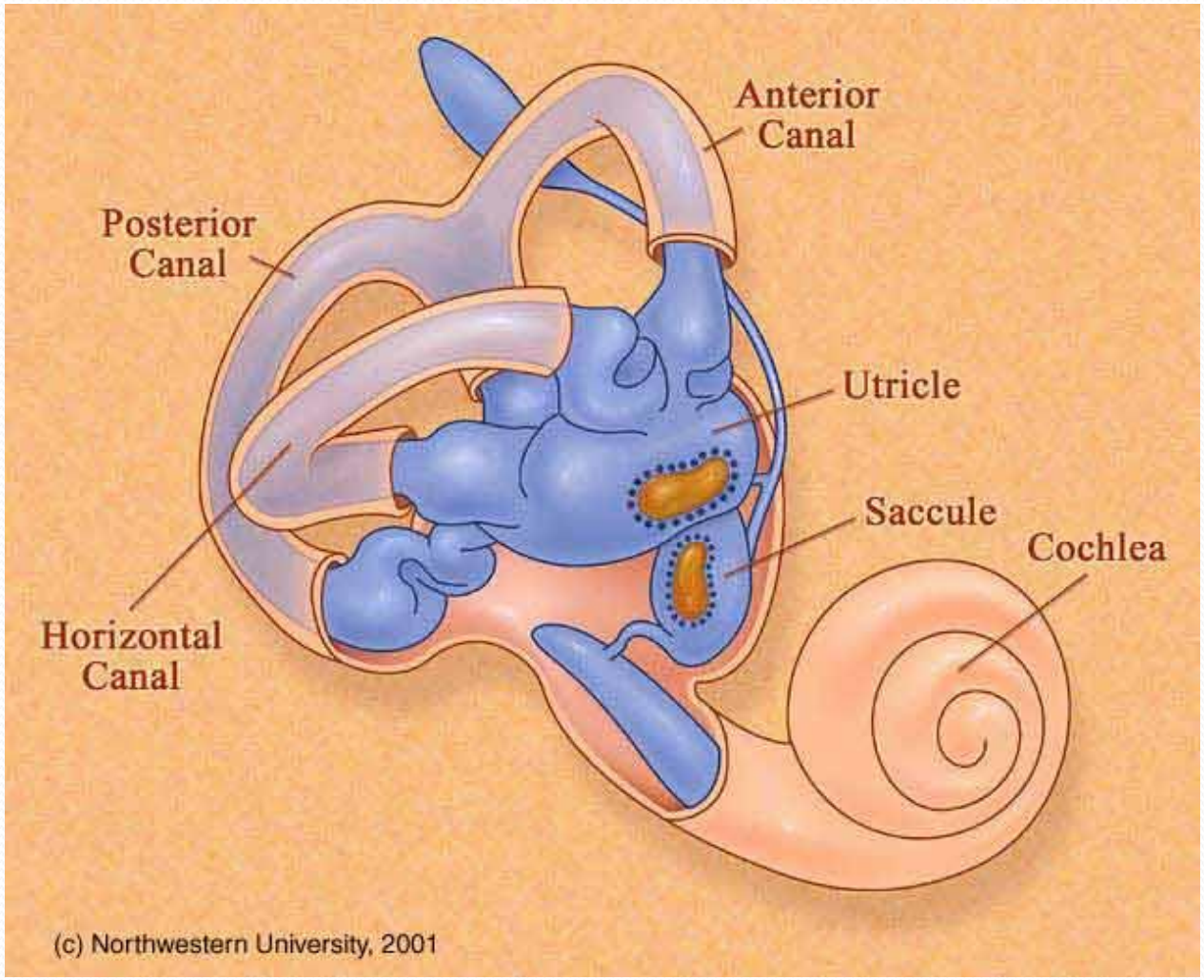
Histophysiology of the organ of hearing



The receptive zones of the organ of equilibrium

1. Maculae of the saccule
2. Maculae of the utricle
3. Ampullary crests

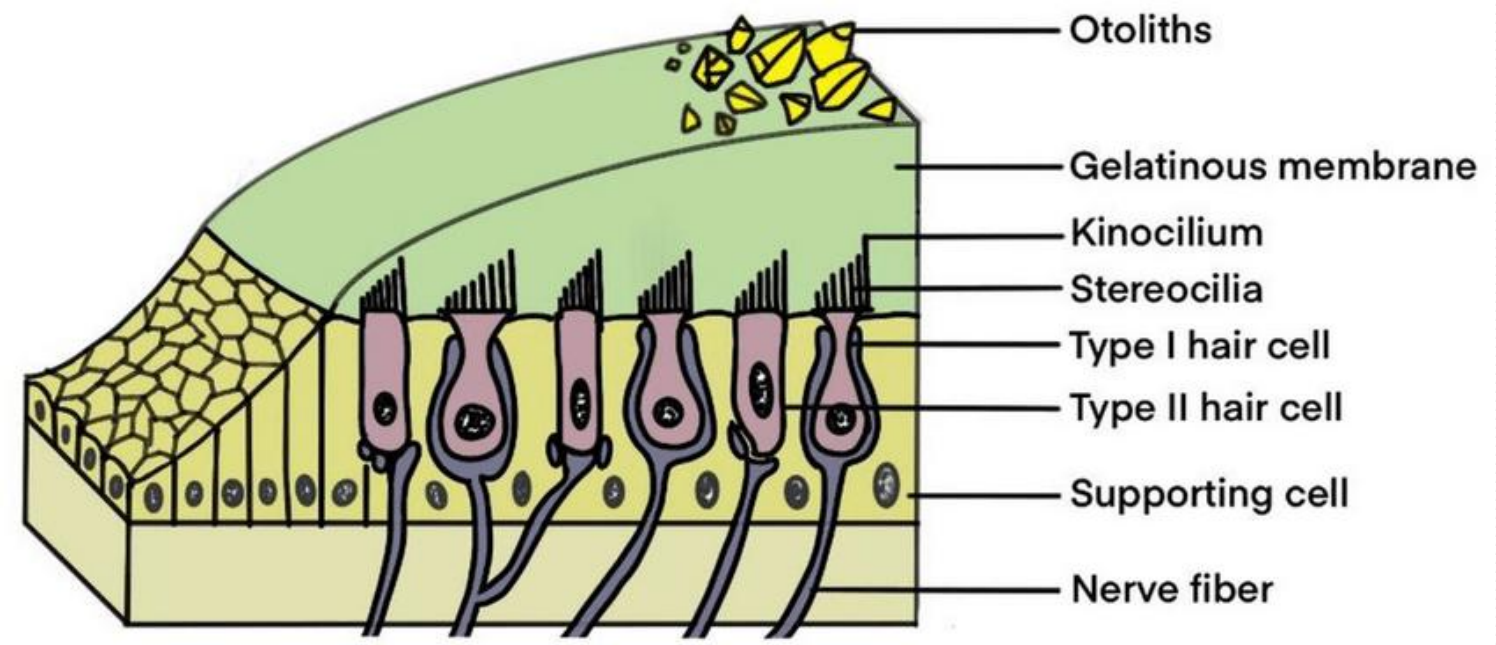
The receptive zones of the organ of equilibrium



The maculae of the saccule and the utricle

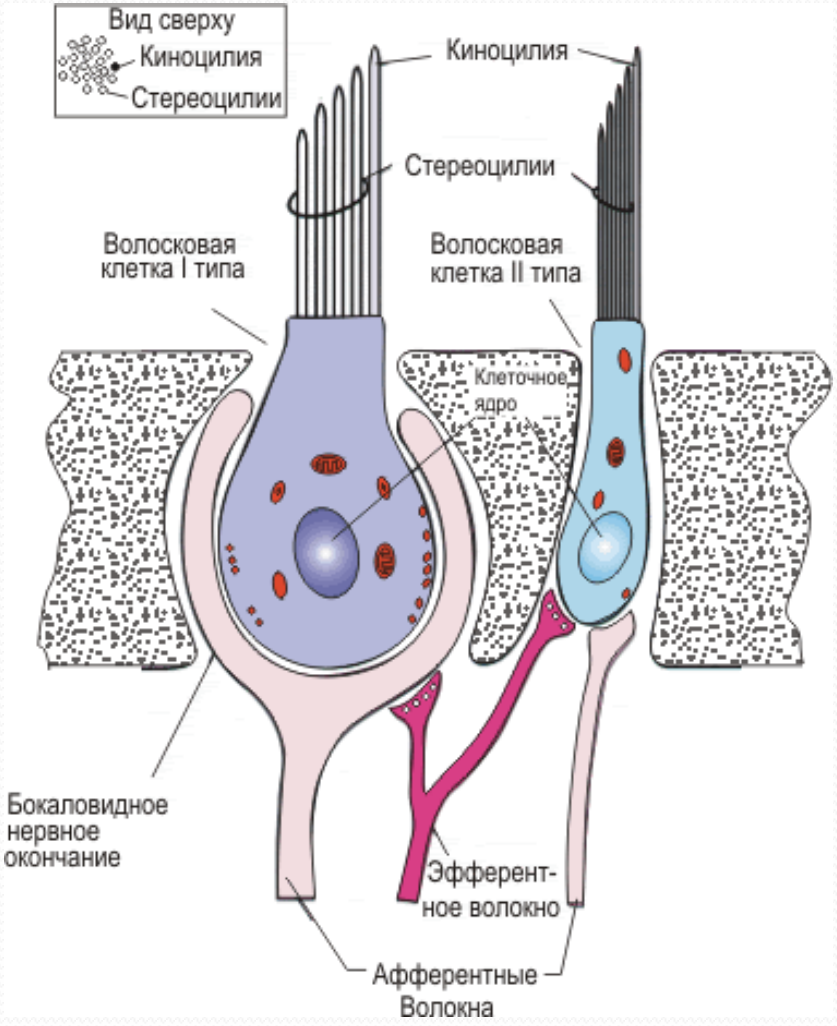
Components:

1. Cells: receptive (hair cells), supporting
2. Otholitic membrane with crystals of potassium carbonate



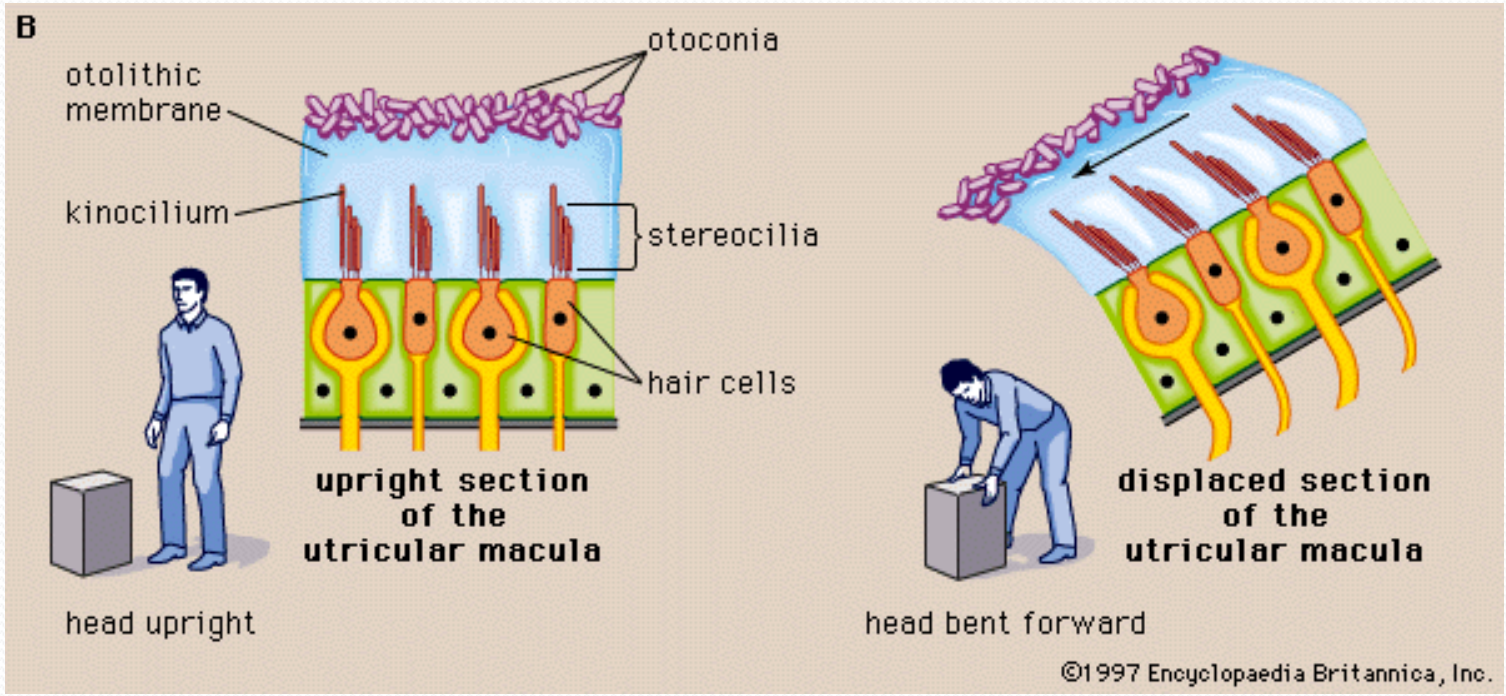
Cells of the maculae of the saccule and the utricle

Cells: receptive (hair cells), supporting



Histophysiology of the maculae of the saccule and the utricle

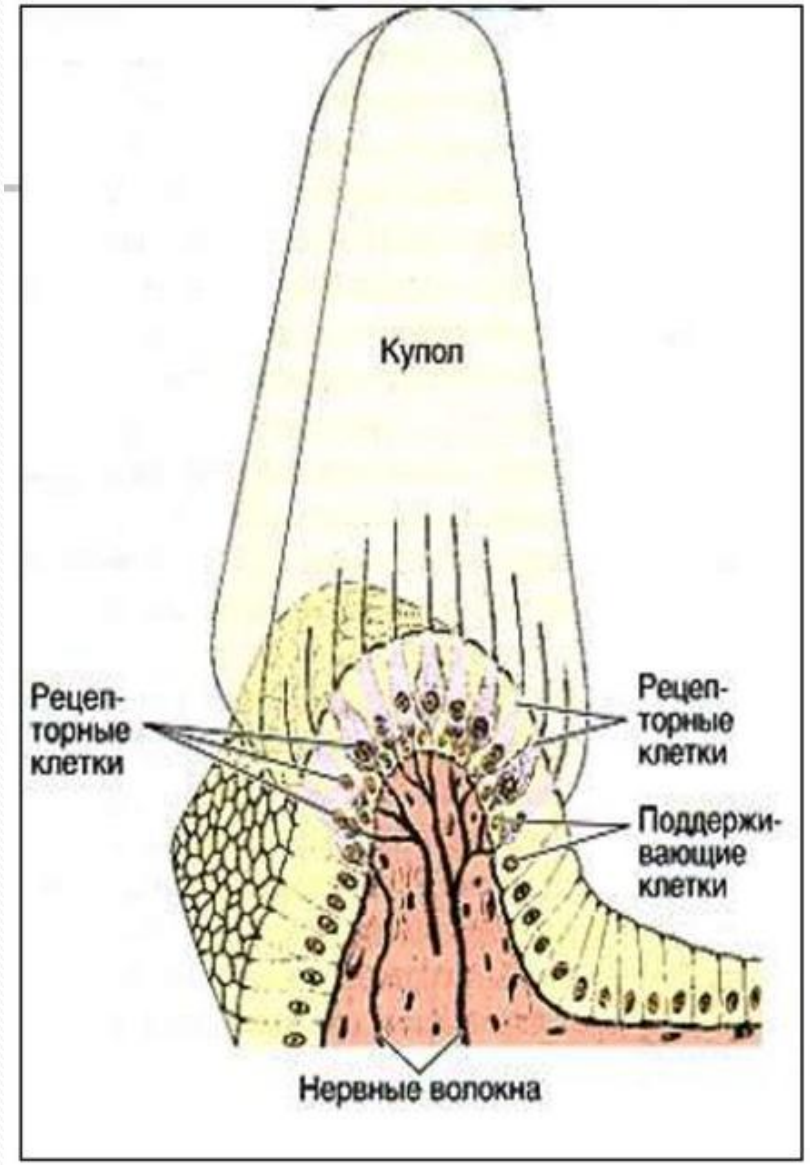
- Maculae of the utricle is a receptor of linear accelerations and gravitation;
- Maculae of the saccule is a receptor of vibration and gravitation



Ampullary crests

Components:

- Cells: receptive (hair cells), supporting
- Gelatinous dome



Histophysiology of the ampullary crests

Ampullary crests are receptors of angular accelerations