

**Kharkiv National Medical University,
Department of Human Anatomy**

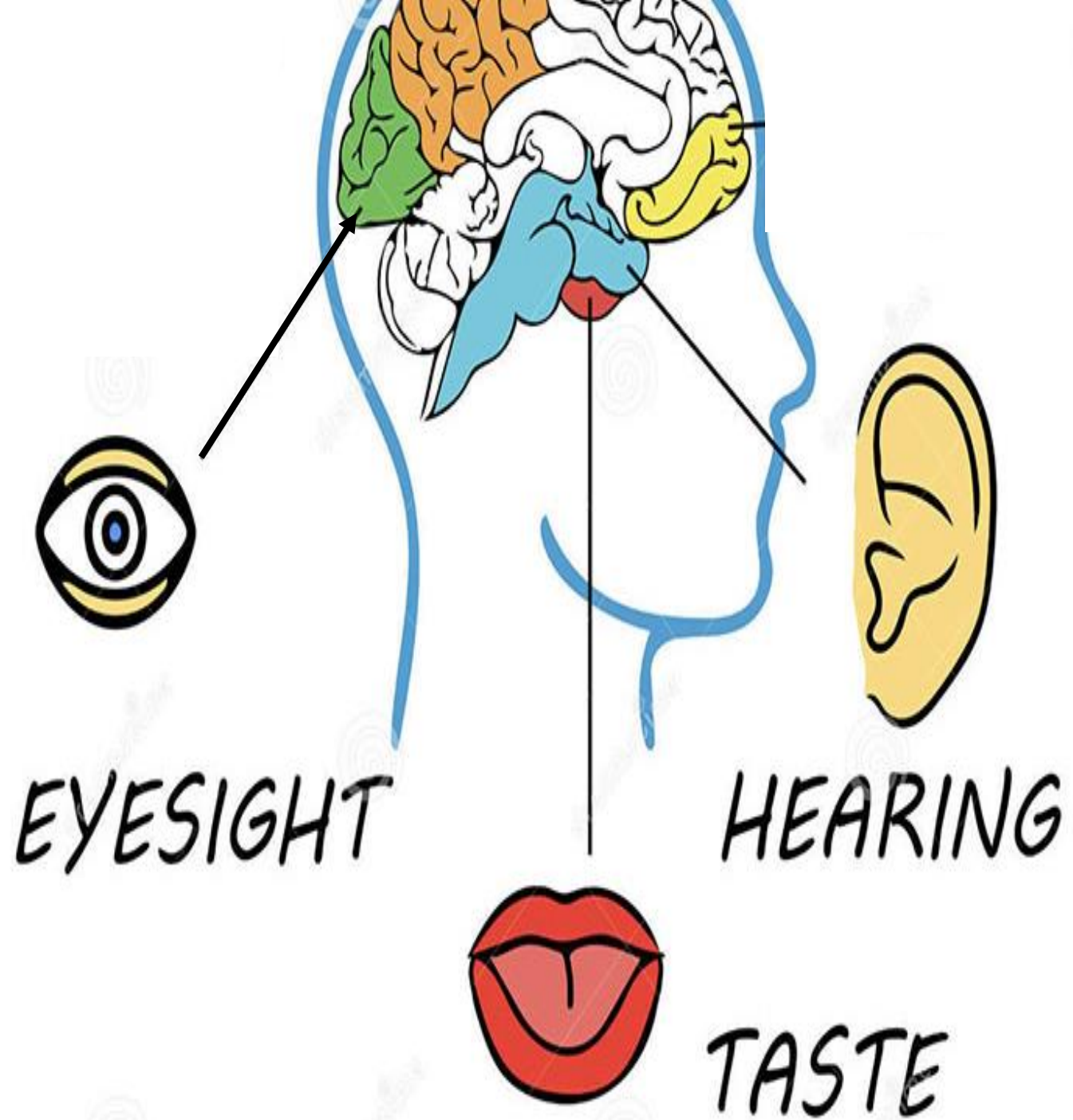


SENSORY ORGANS.

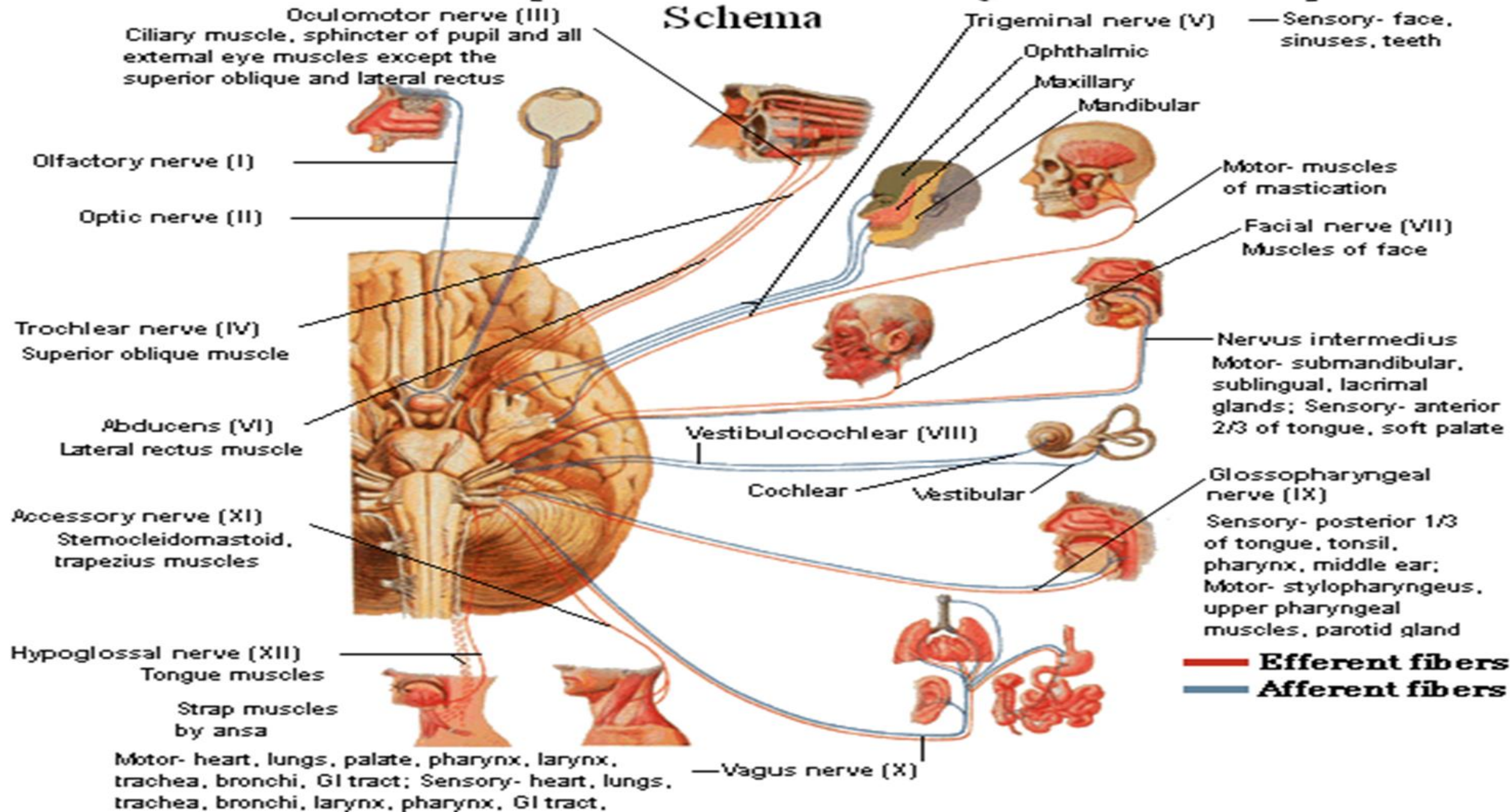
Associate professor, PhD, Hordiichuk Daria

Plan of lecture:

- Organ of vision.
- Organ of hearing and gravitation.
- Organ of taste.



Cranial Nerves [Motor and Sensory Distribution]



THE ORGAN OF VISION

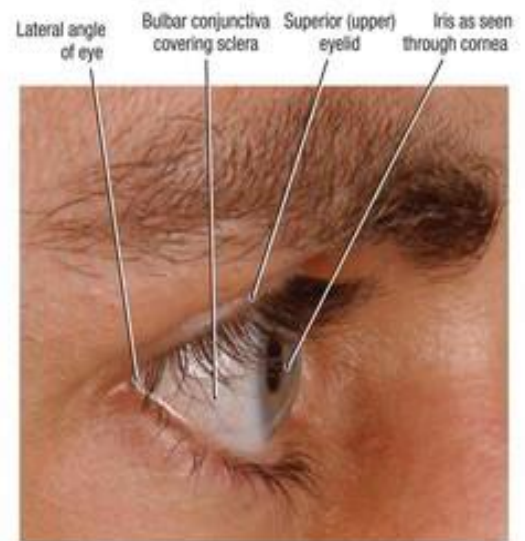
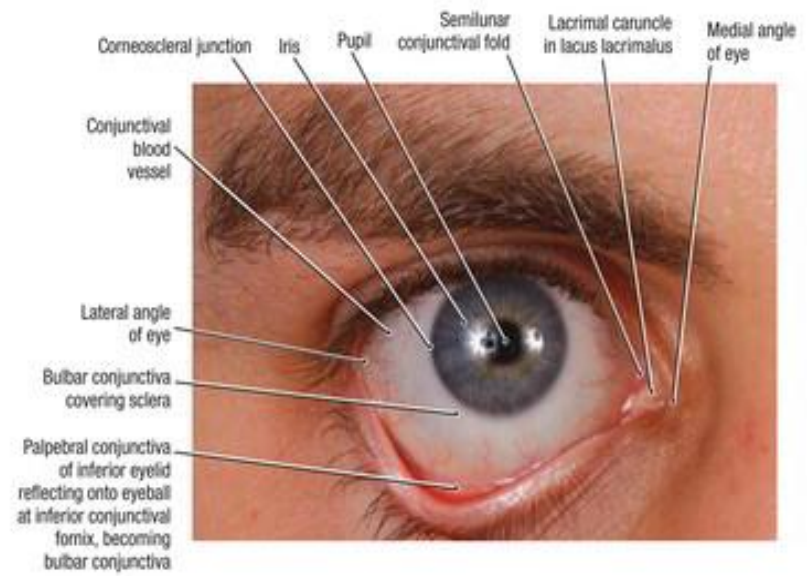
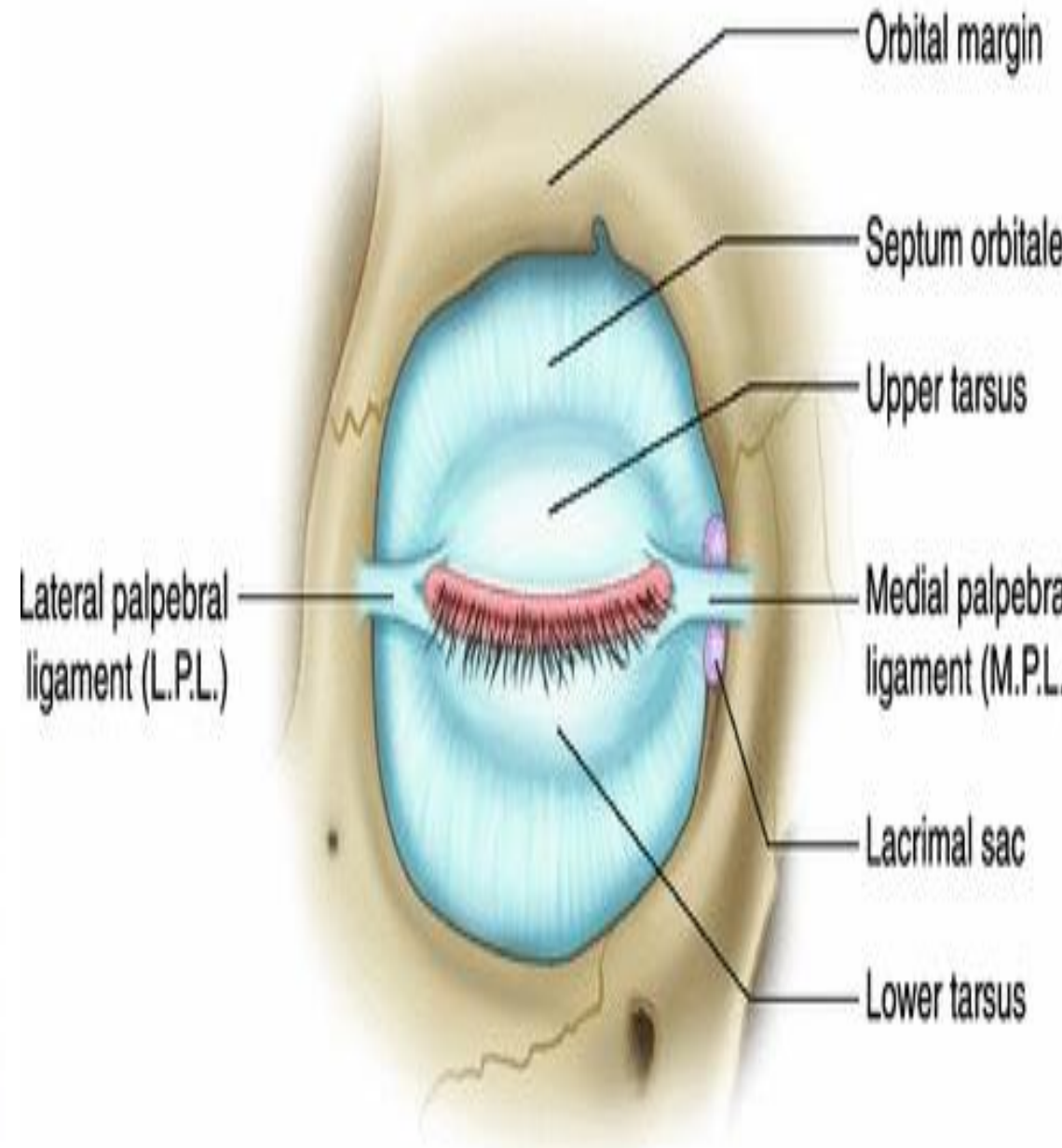
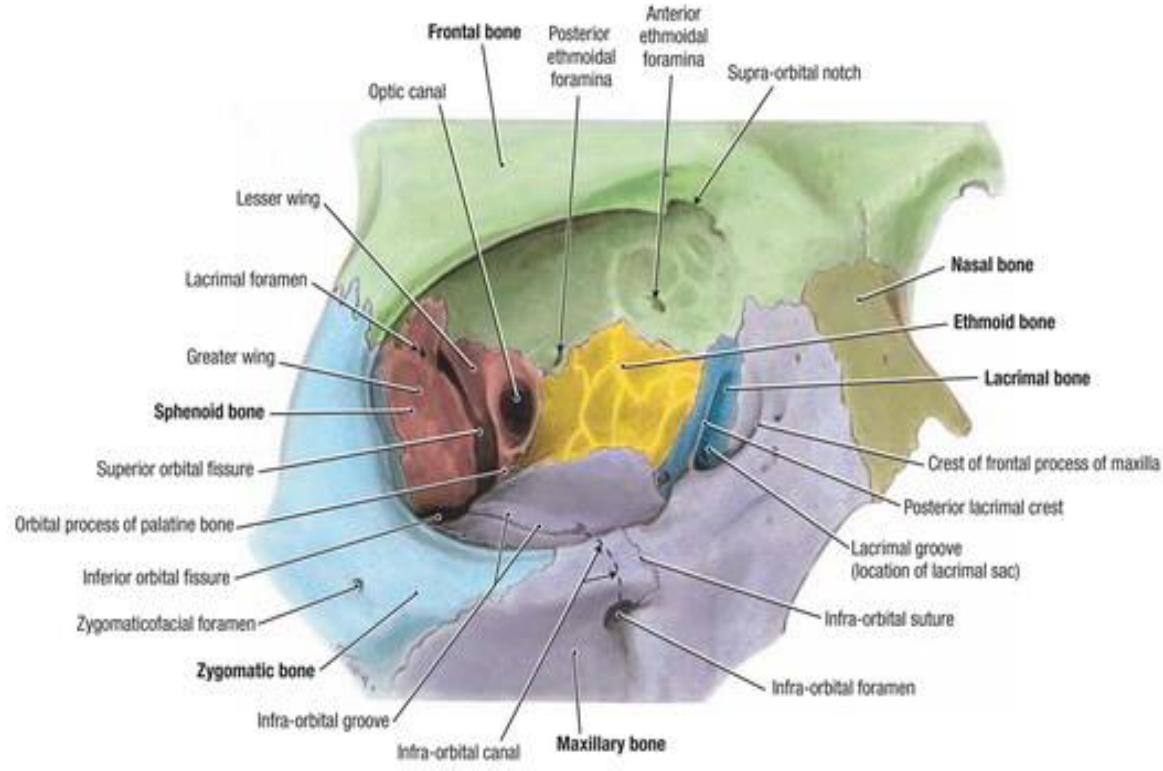
- I. The accessory visual apparatus:
 - the eyelids, the lachrymal apparatus,
 - and motor apparatus.
- II. Eyeball.

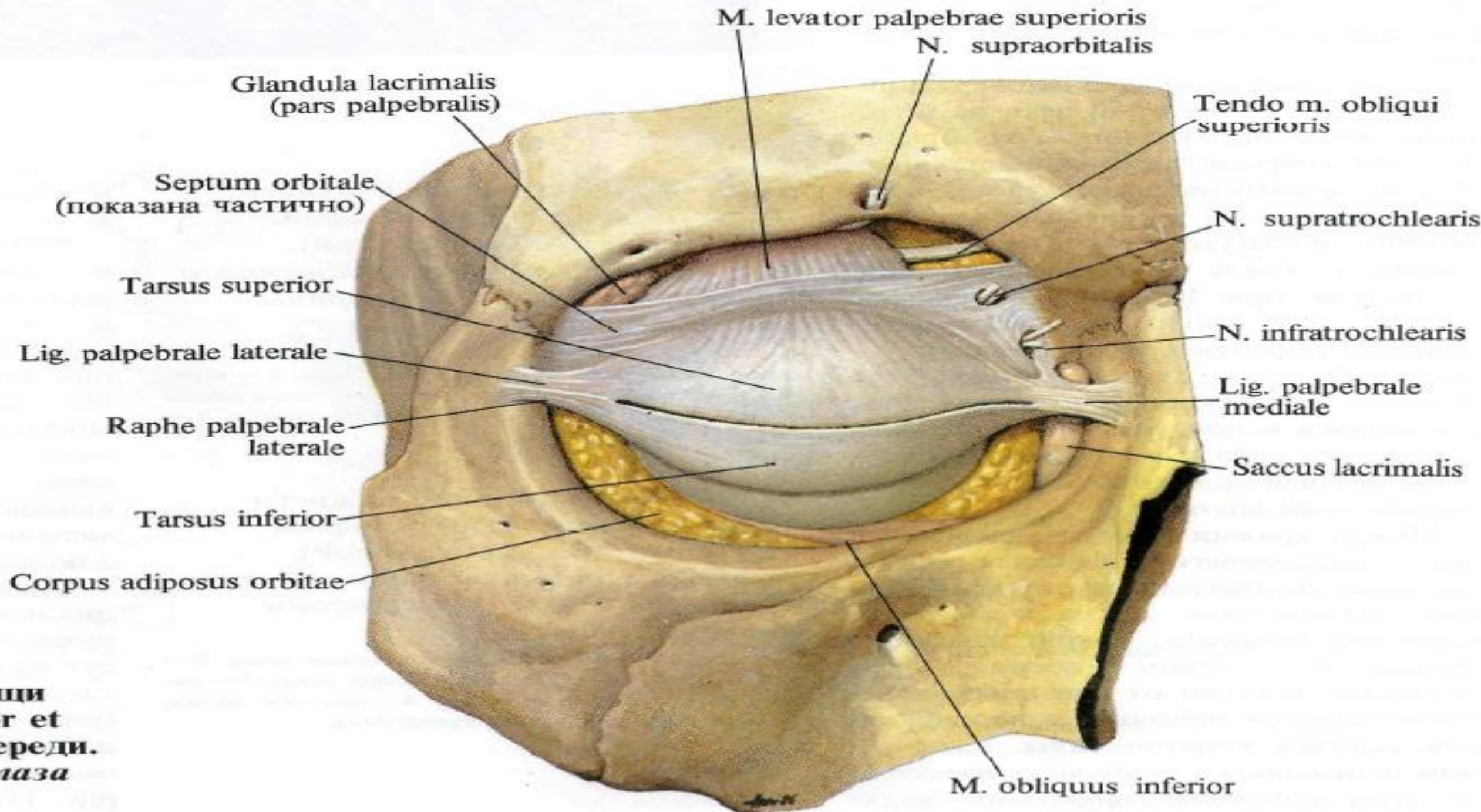
The organ of vision.

The accessory visual apparatus.

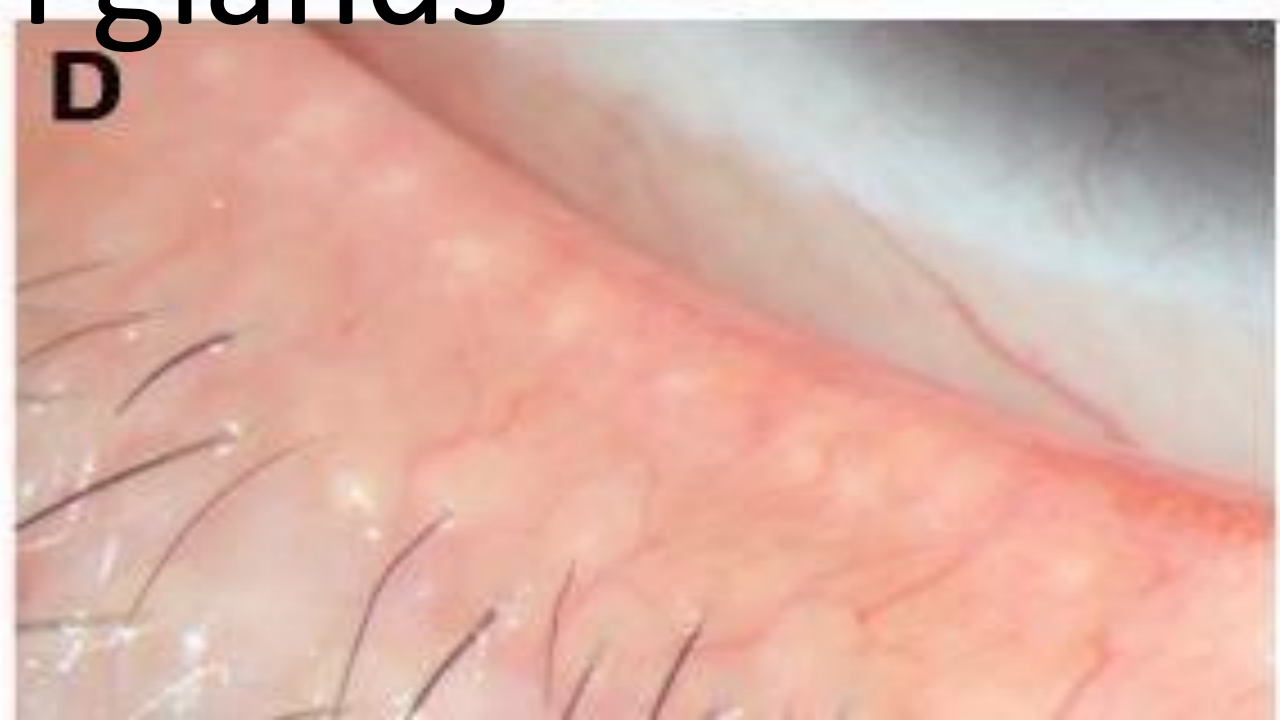
- **1- two eyelids:** skin, orbicularis oculi muscle, tarsus (tarsal glands), conjunctiva (palpebral and ocular parts, superior and inferior fornices).
- **2- the lachrymal apparatus:** lachrymal glands, lachrymal streams, lachrymal lake, lachrymal canaliculi, lachrymal sac, nasolachrymal duct.
- **3- the motor apparatus:** four recti mm., two oblique mm., mm. levator palpebral superiorioris.

Anatomy of lid

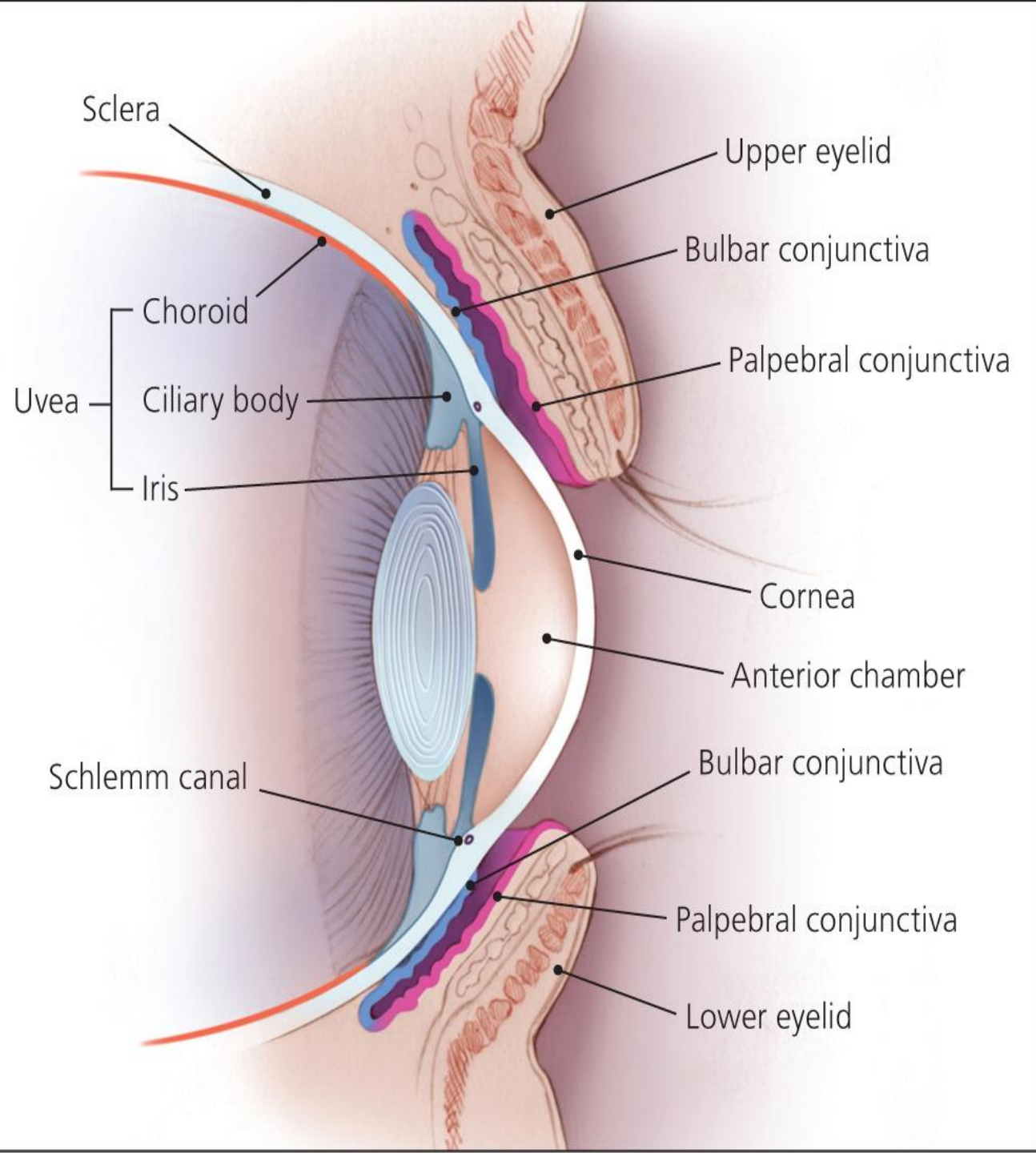
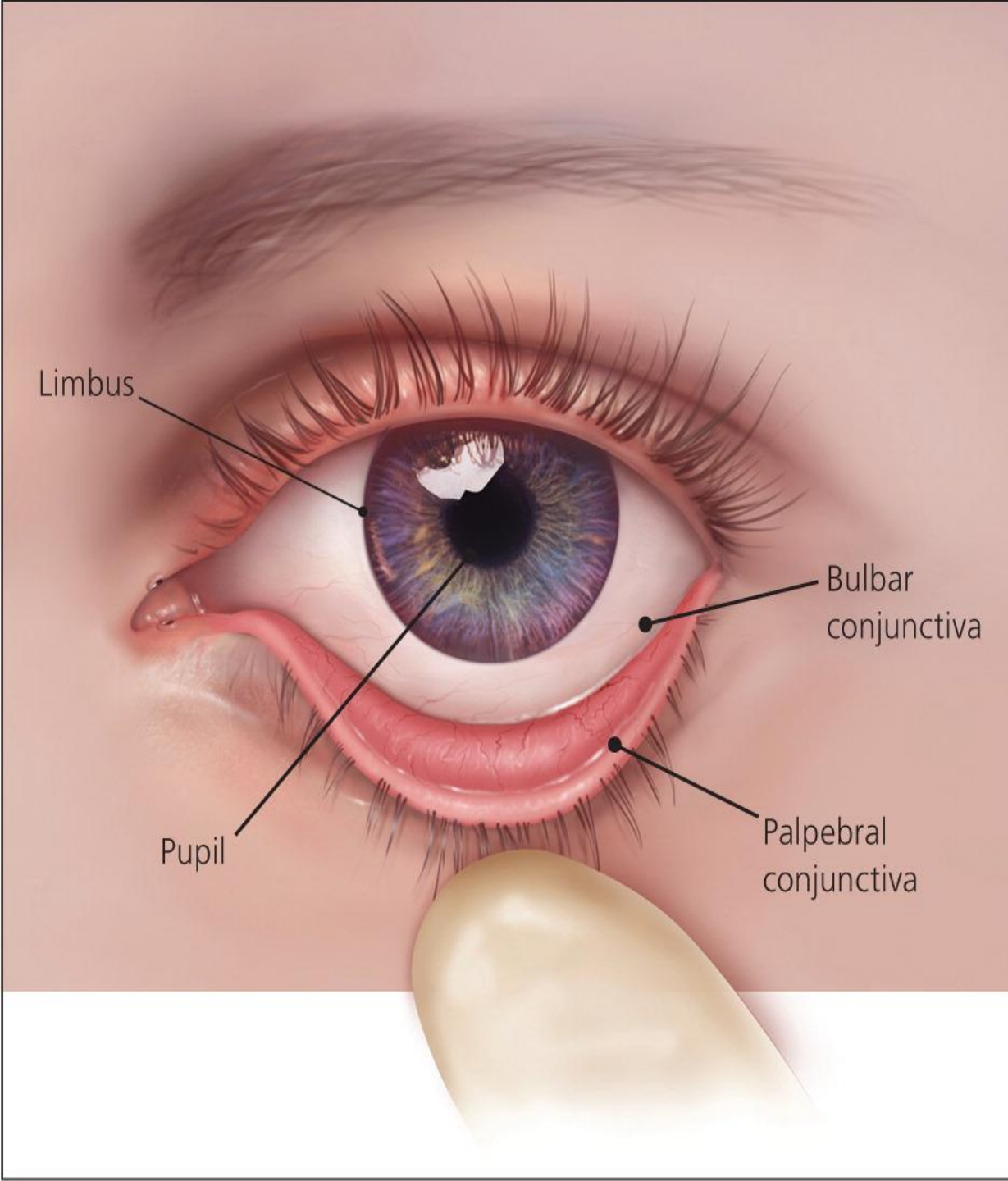


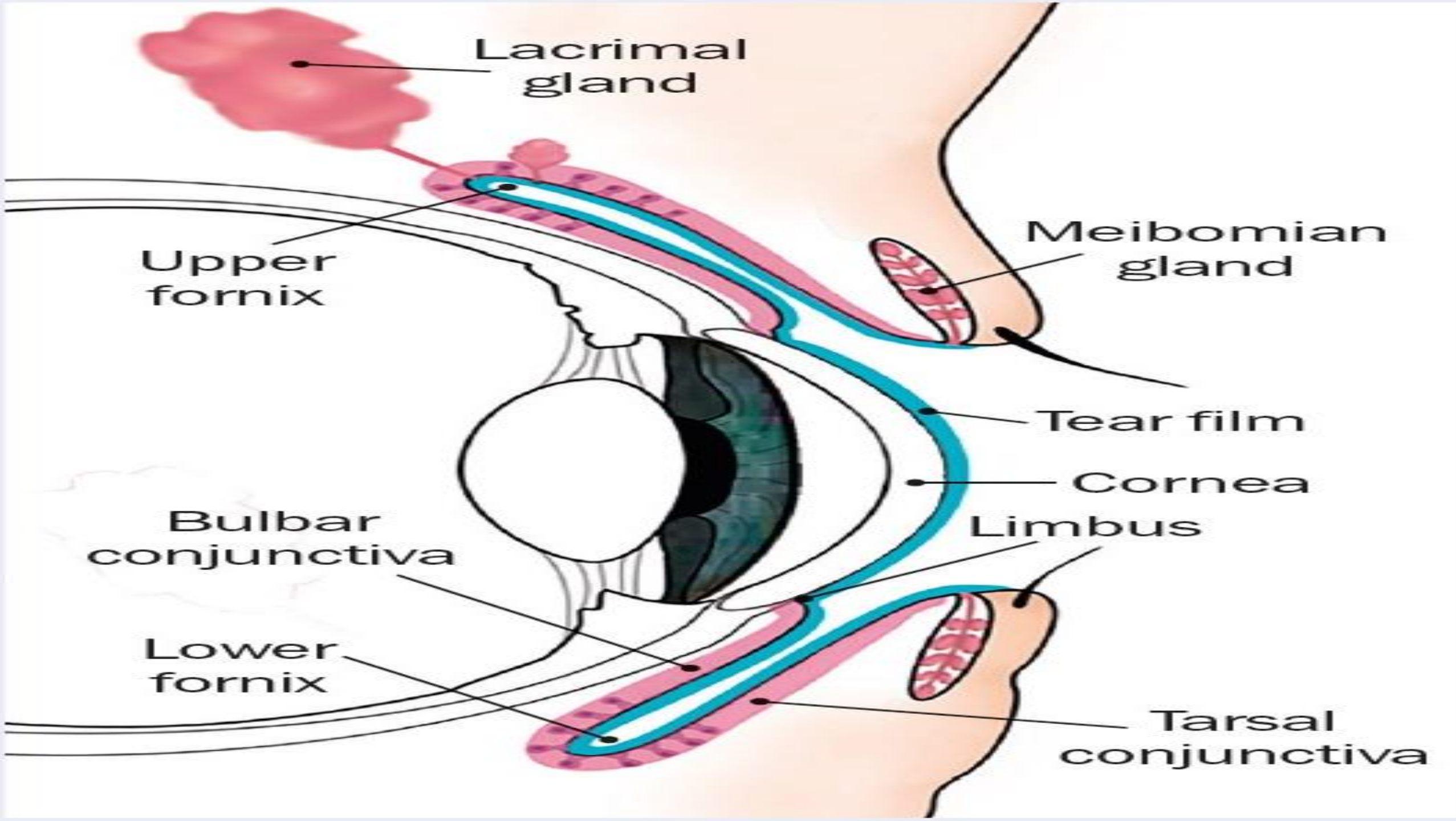


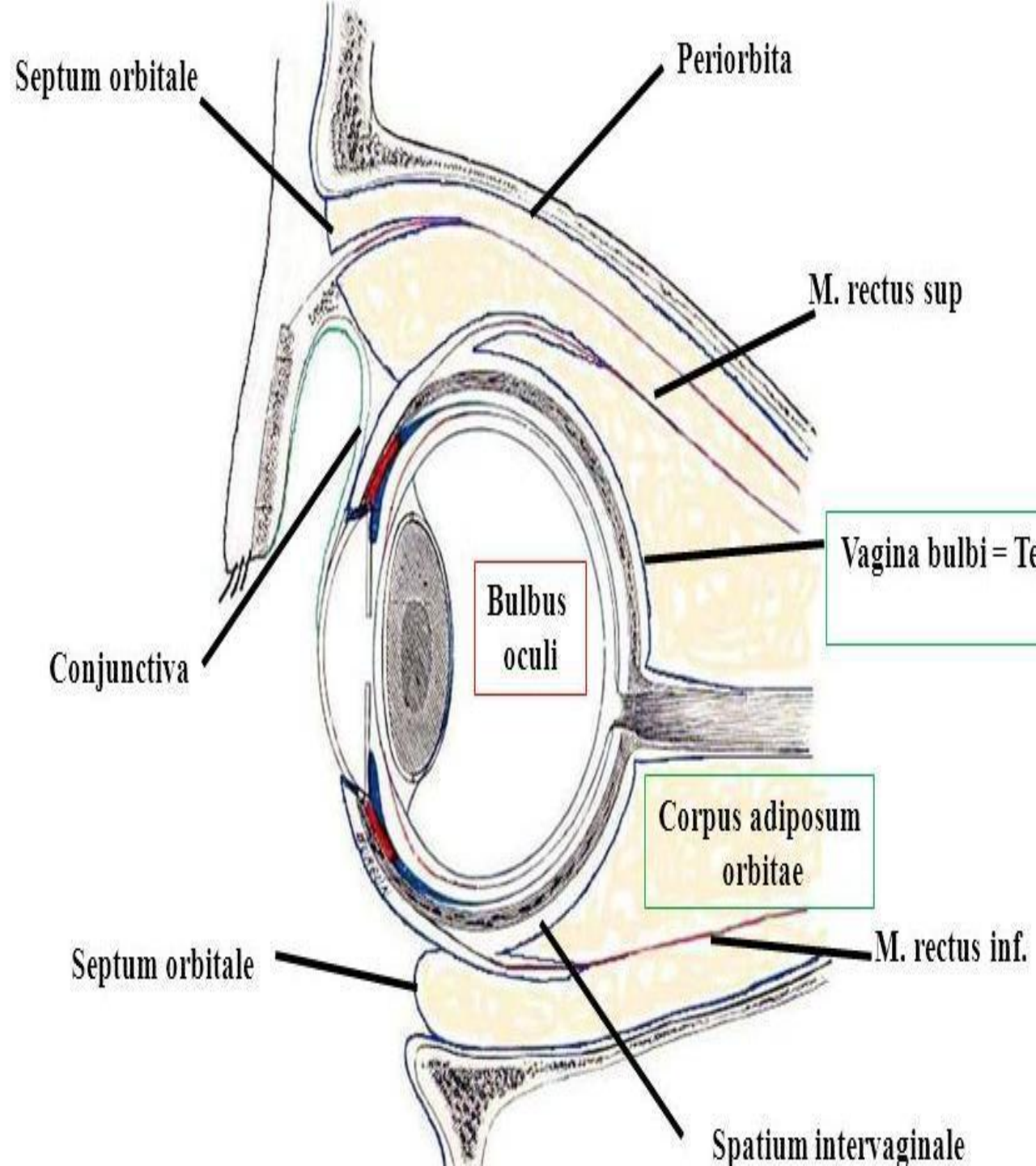
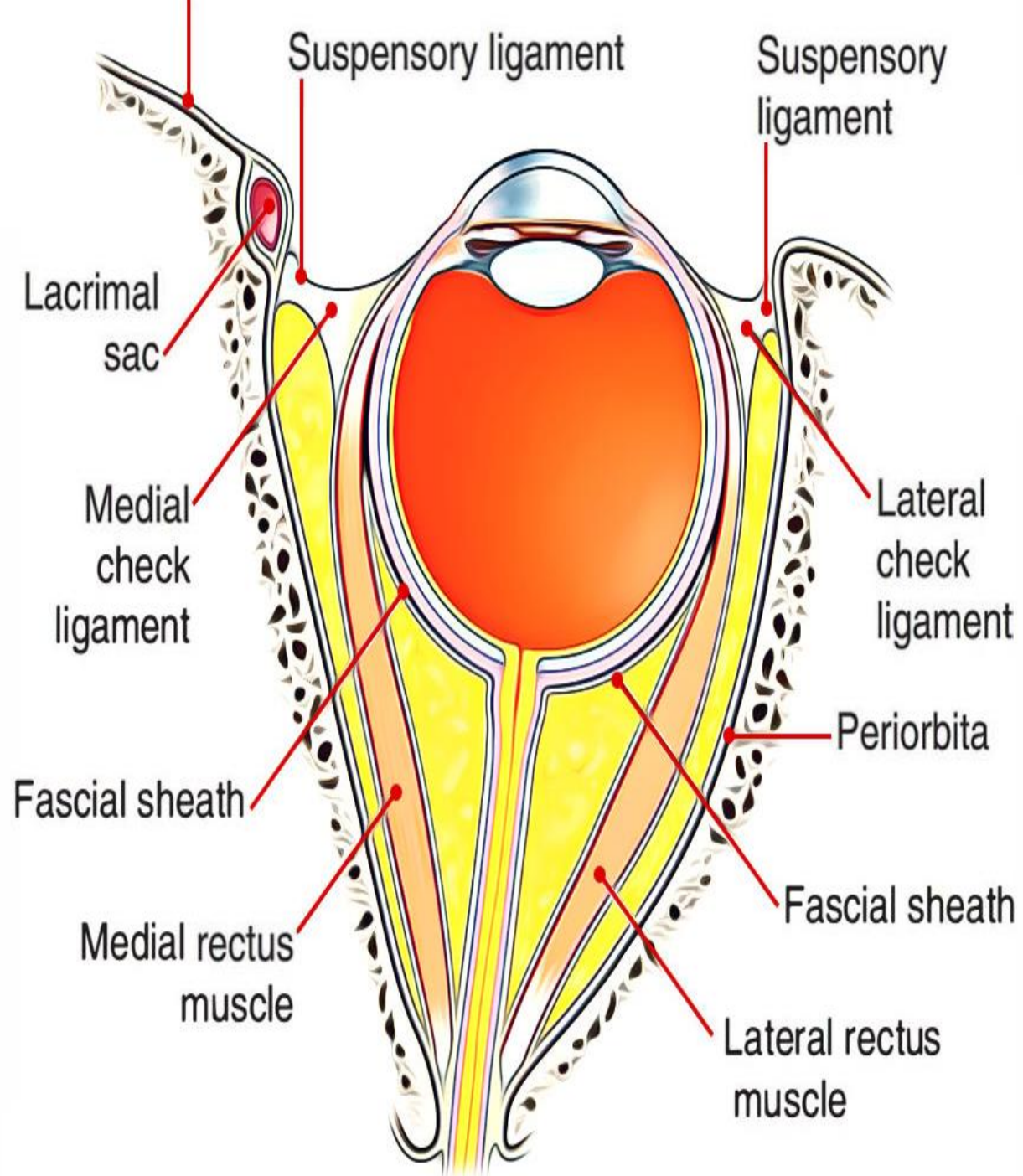
мускулы
 медиальной
 стенки
 орбиты
 и
 передних
 отделов
 глазницы

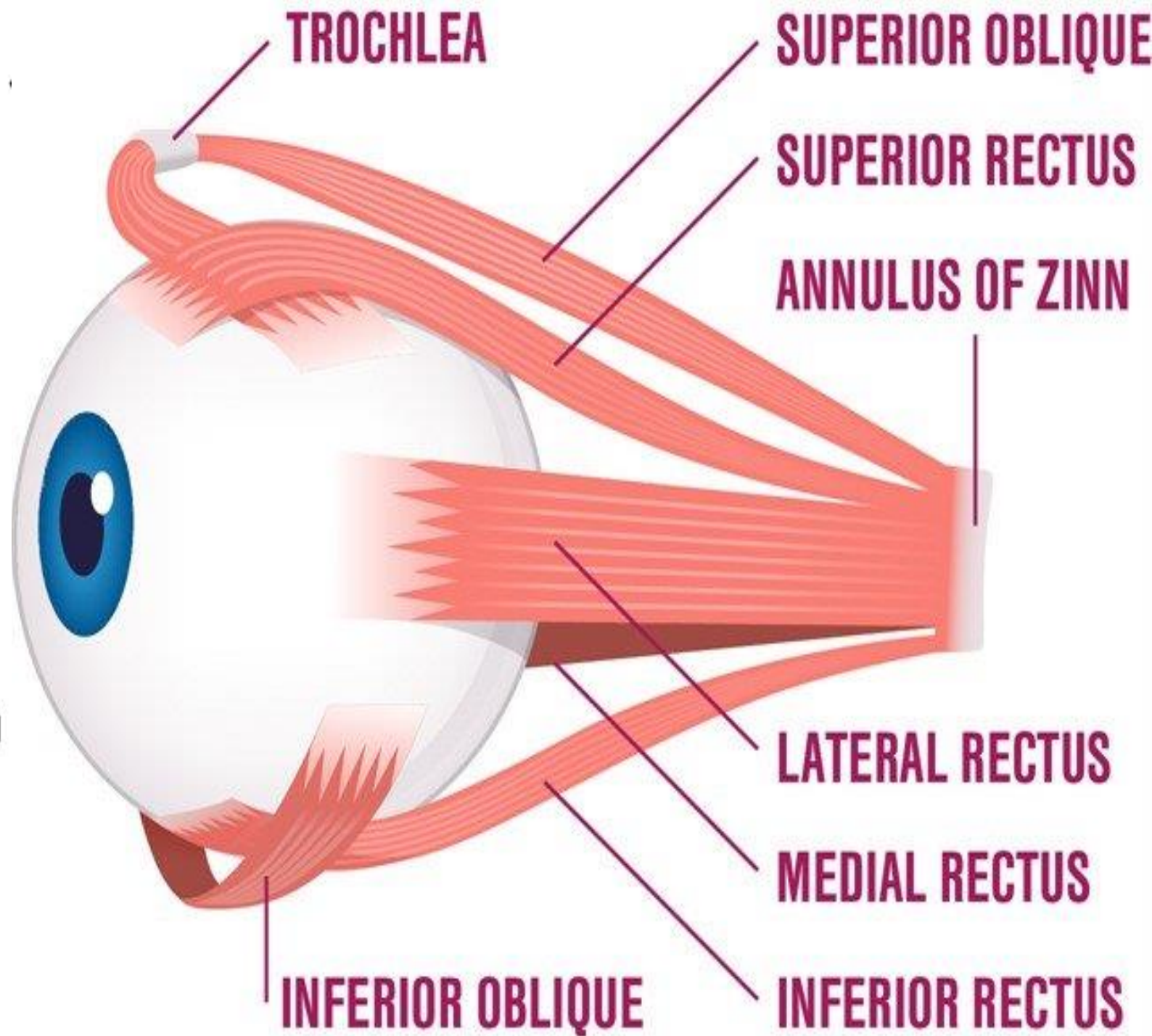
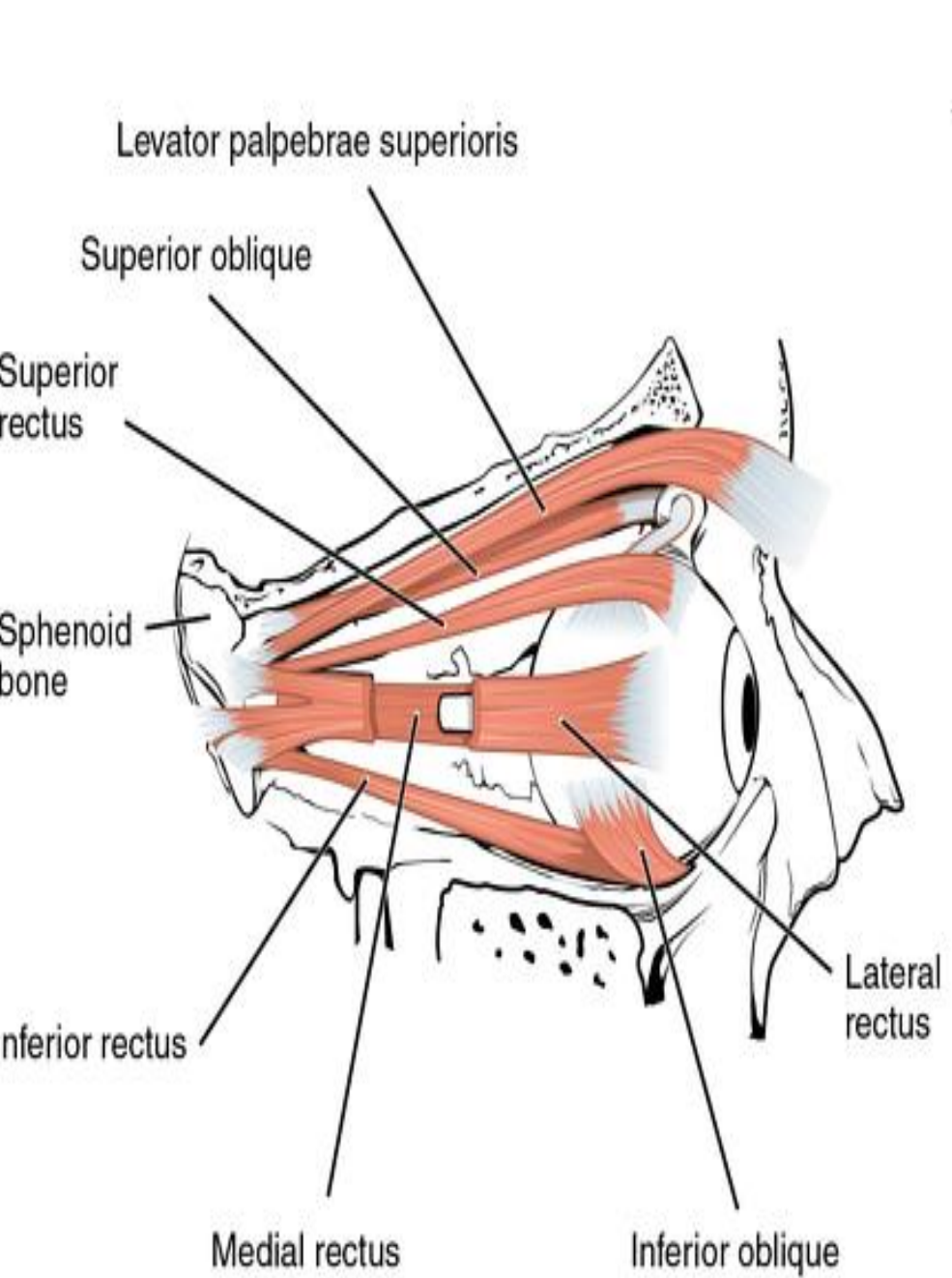


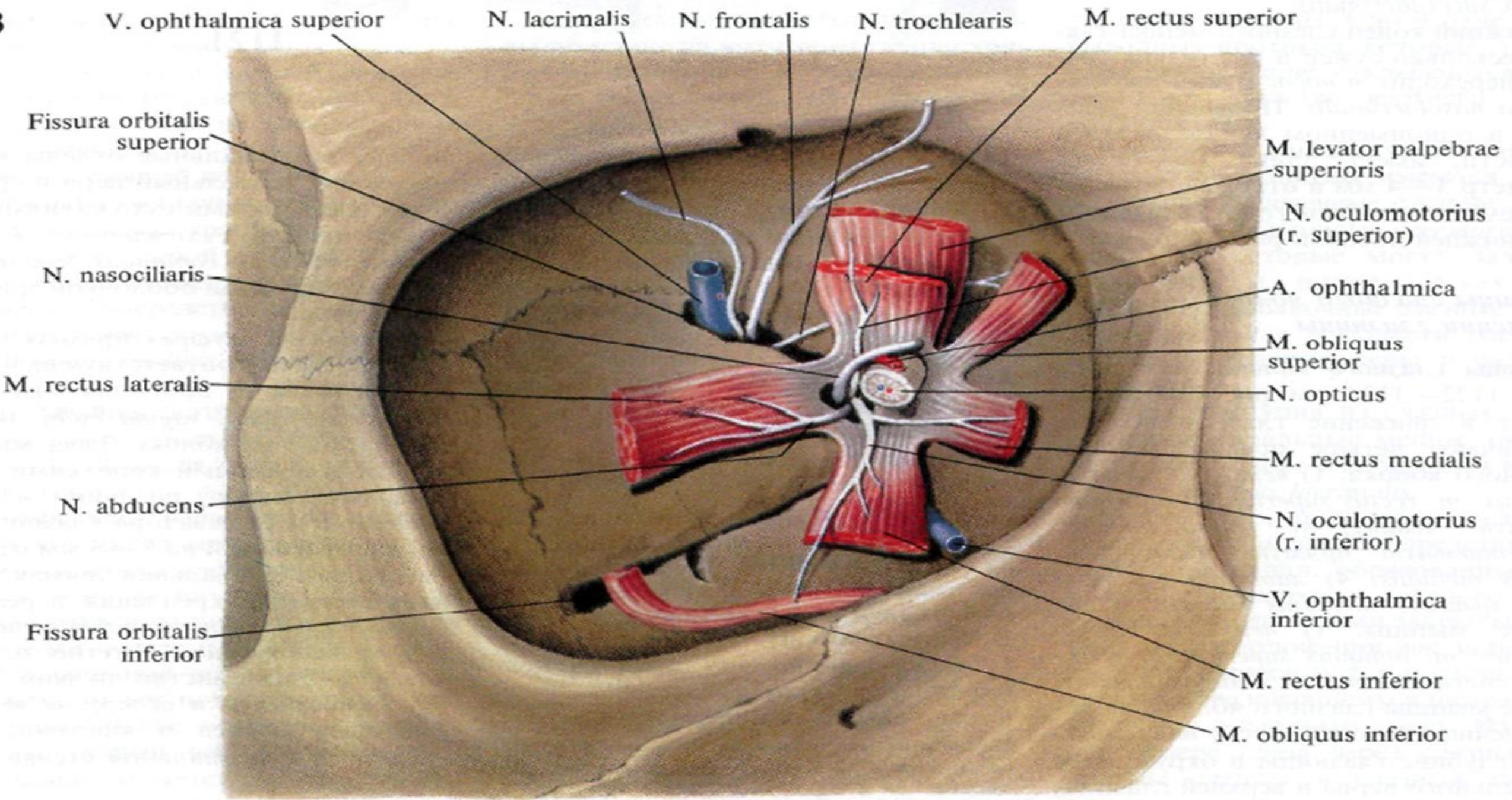
Meibomian glands

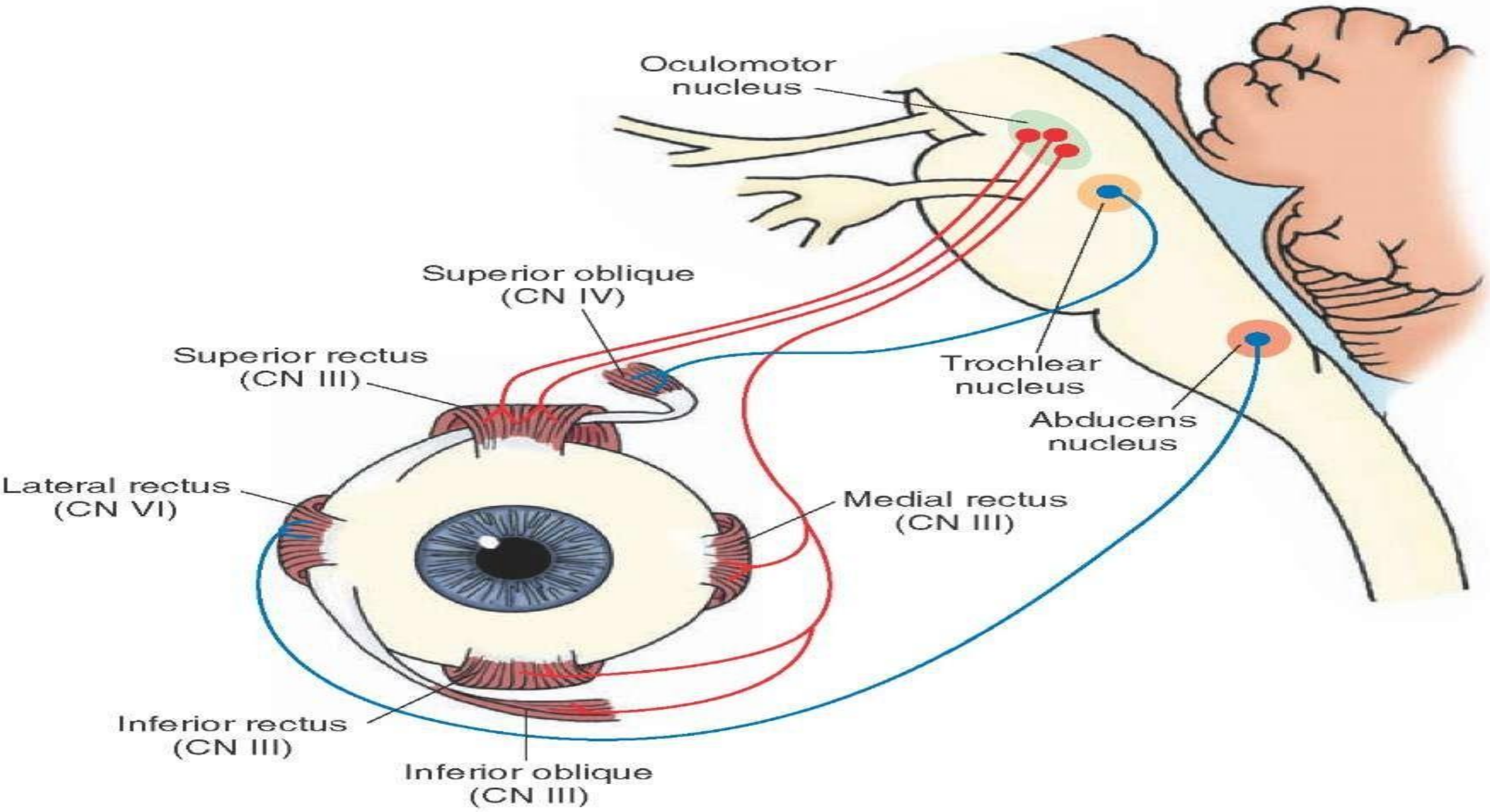


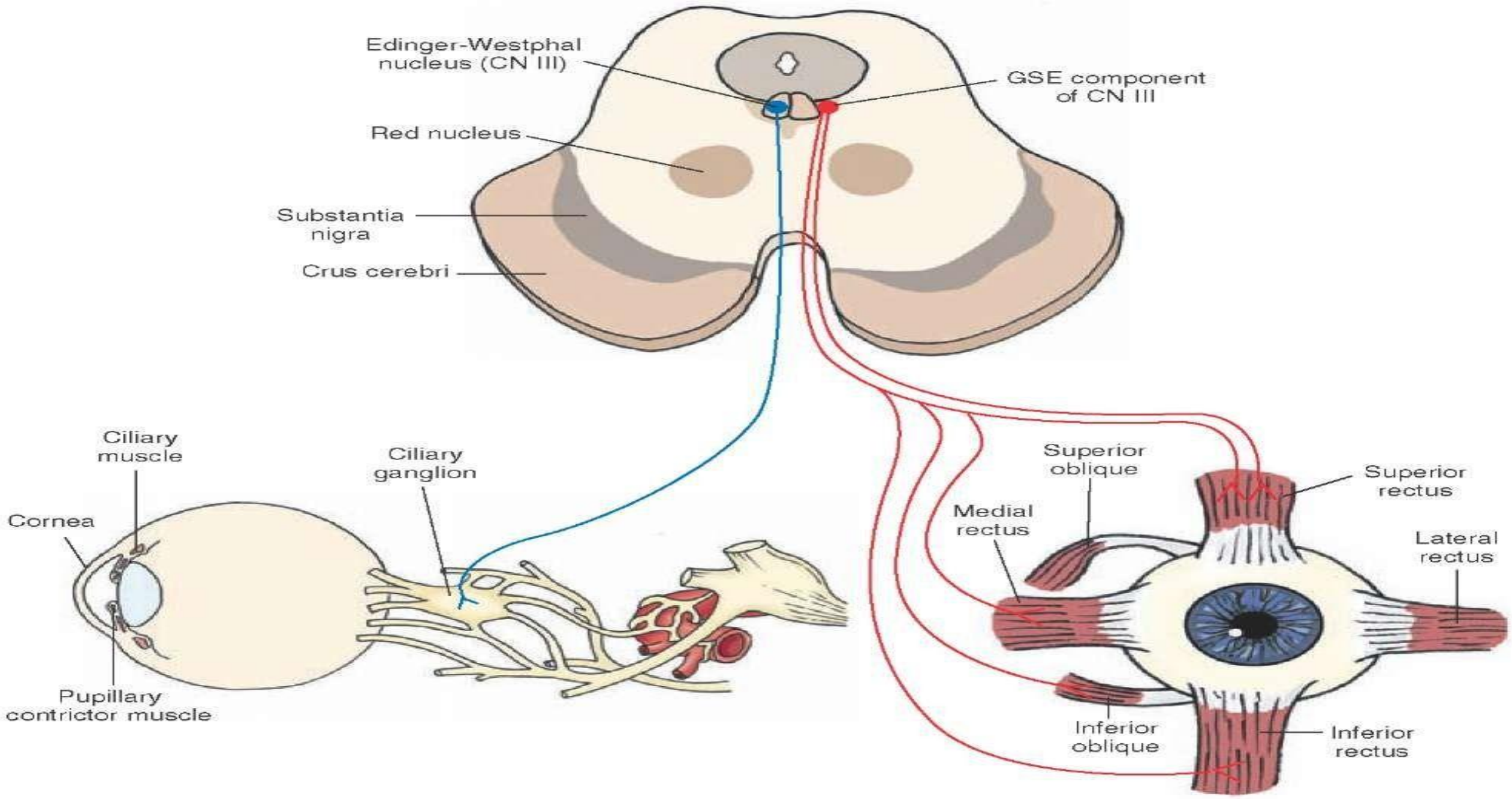










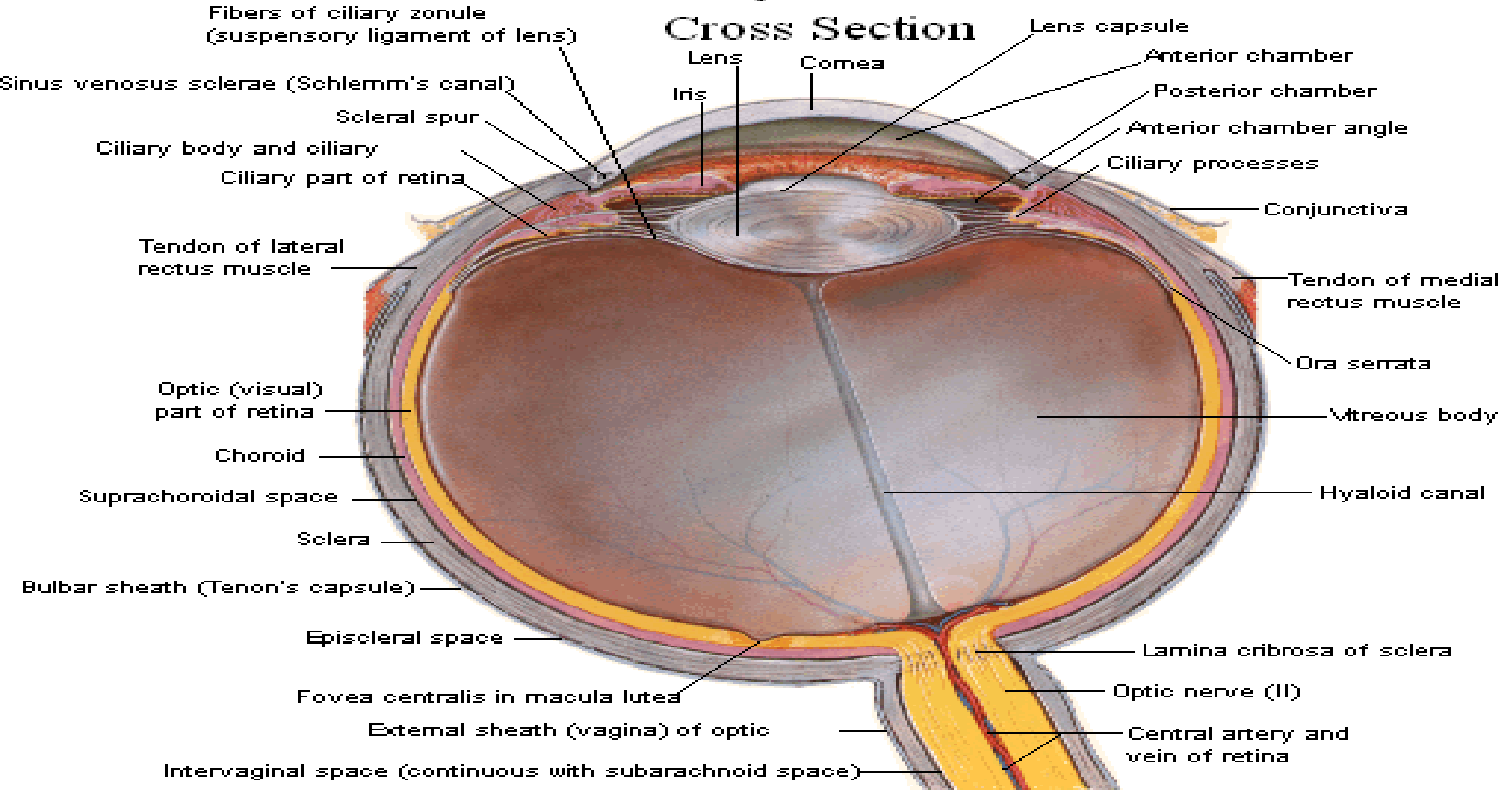


Organ of vision: The coats of the eyeball

- **Three coats:**
 - **1 – fibrous coat:** sclera, limbus cornea, cornea.
 - **2 – vascular coat:** chorioidea, corpus ciliare: (m.ciliaris, ciliary ring, ciliary processes and folds), iris: (mm.sphincter and dilator pupilla).
 - **3 – nervous coat (retina):** optic and blind parts.
- The refracting media or inner nucleus of the eye: vitreous body, lens, fluid (aqueous humour).**

Eyeball

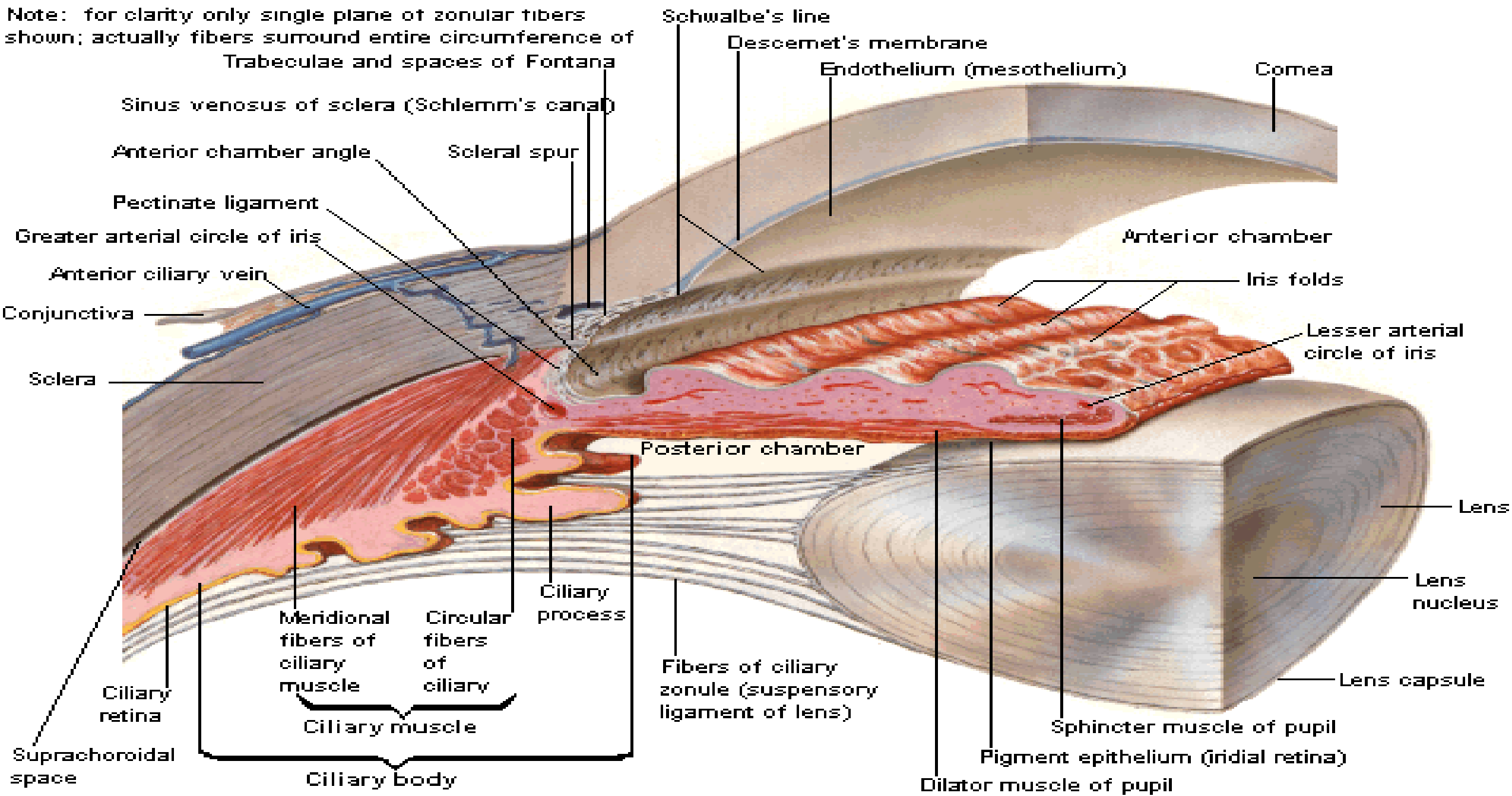
Cross Section



Horizontal section

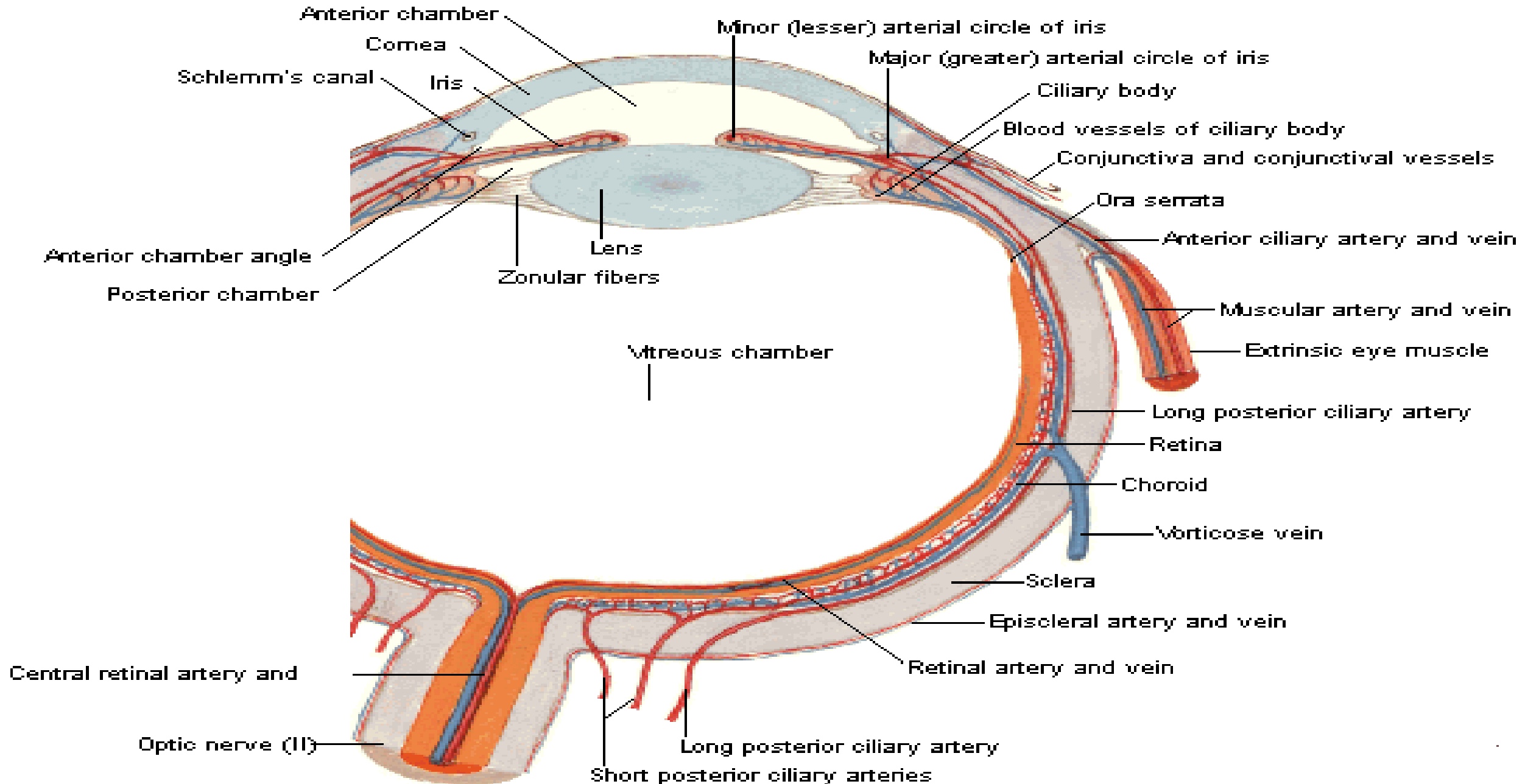
Anterior and Posterior Chambers of Eye

Note: for clarity only single plane of zonular fibers shown; actually fibers surround entire circumference of Trabeculae and spaces of Fontana



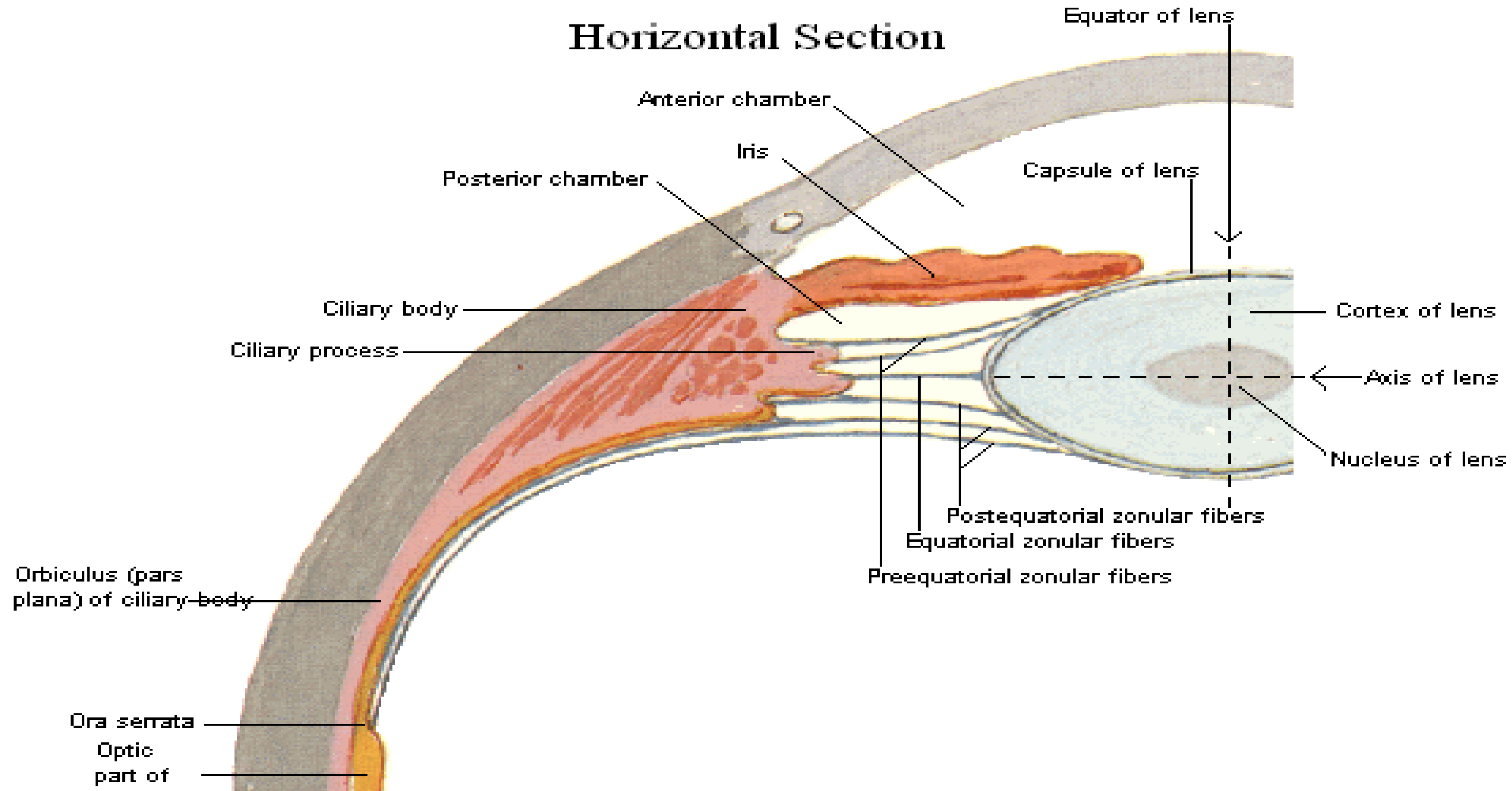
Intrinsic Arteries and Veins of Eye

Horizontal Section



Lens and Supporting Structures

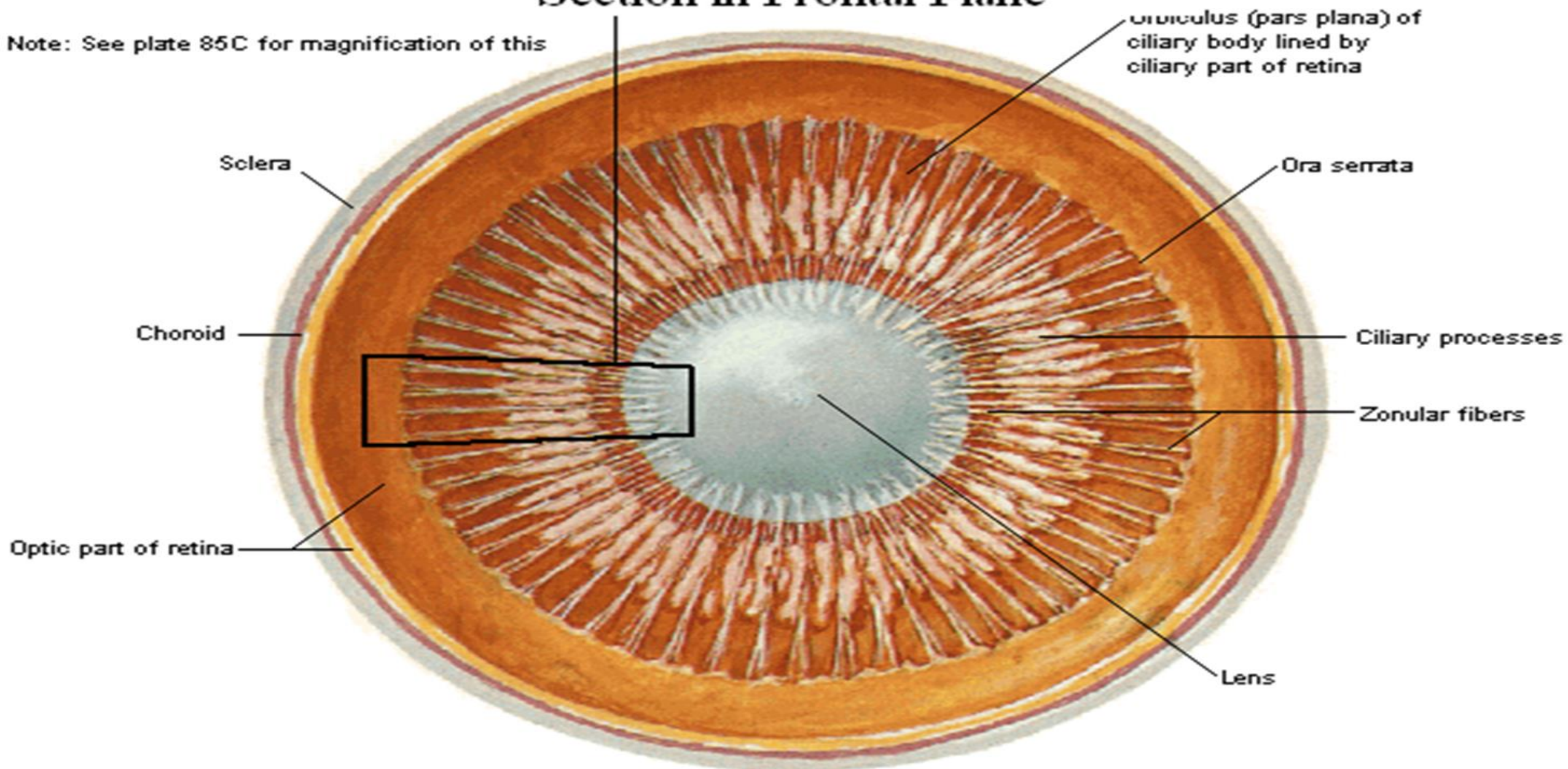
Horizontal Section



Lens and Supporting Structures

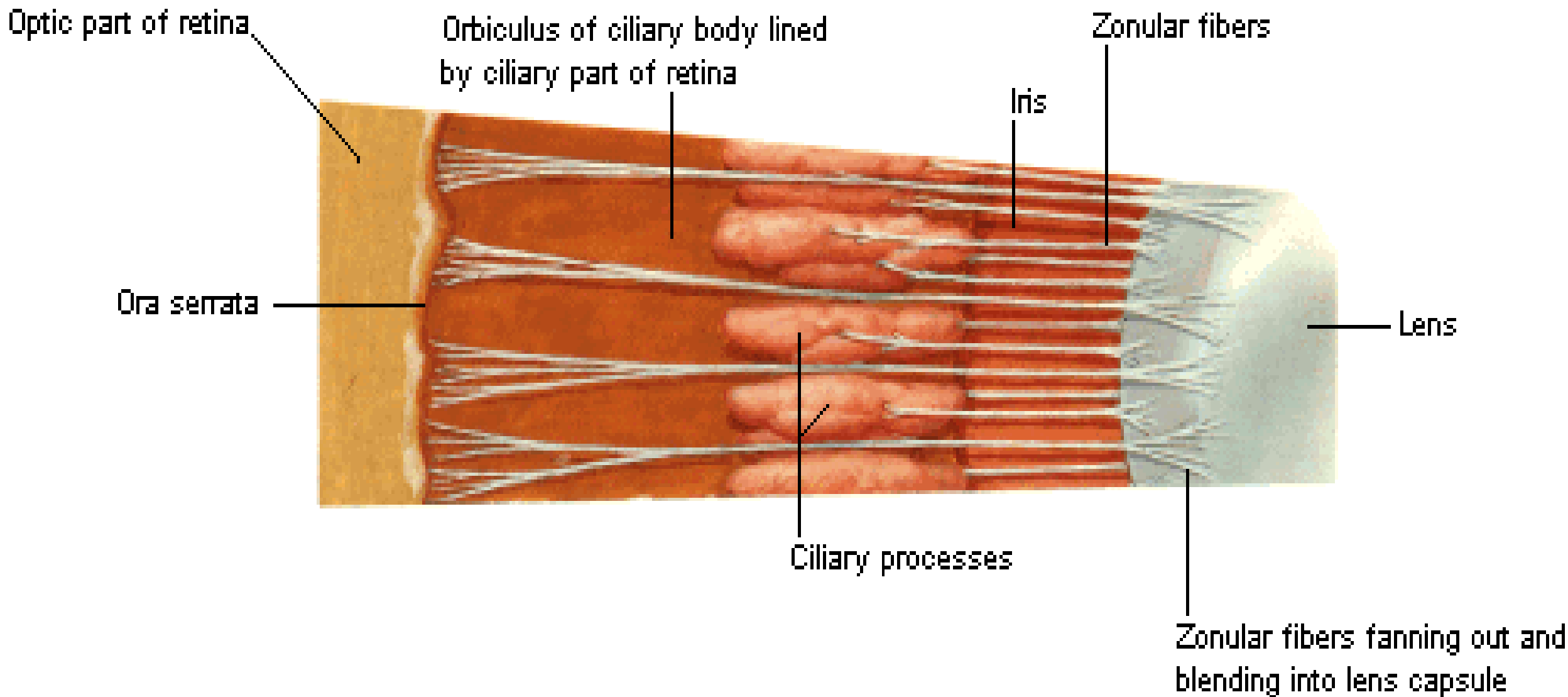
Section in Frontal Plane

Note: See plate 85C for magnification of this



Bulb of eye: anterior segment viewed from behind

Lens and Supporting Structures



Magnified to ultramicroscopic scale (semischematic)

The refracting media of the eye

- **The vitreous body**
- **The lens**
- **The chambers of the eye (they are filled with aqueous humor)**

Ciliary body
Produces aqueous
humor

filling the **posterior chamber** (space
between the iris and the lens.)

flows through the pupil into
the anterior chamber
(between the cornea and the iris.)

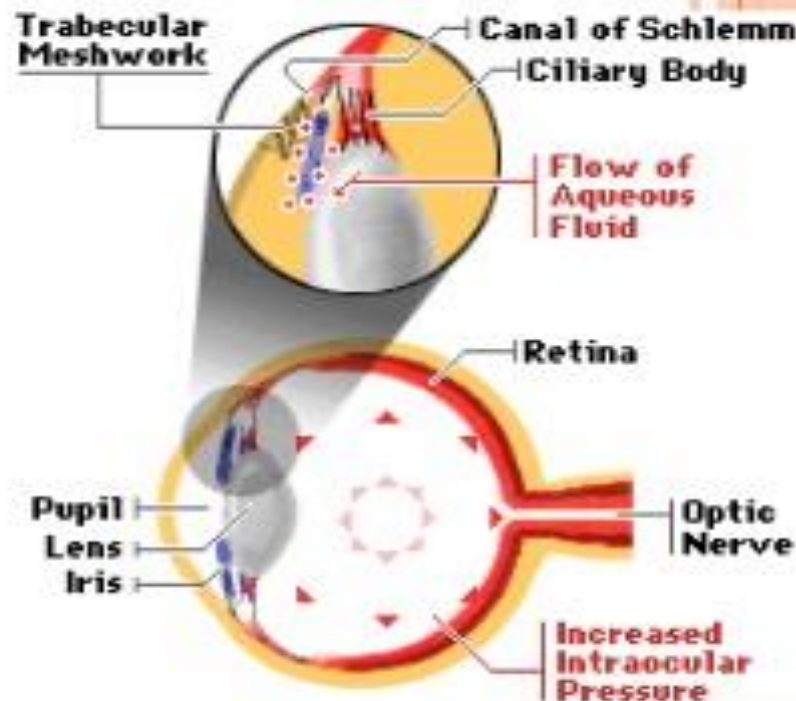
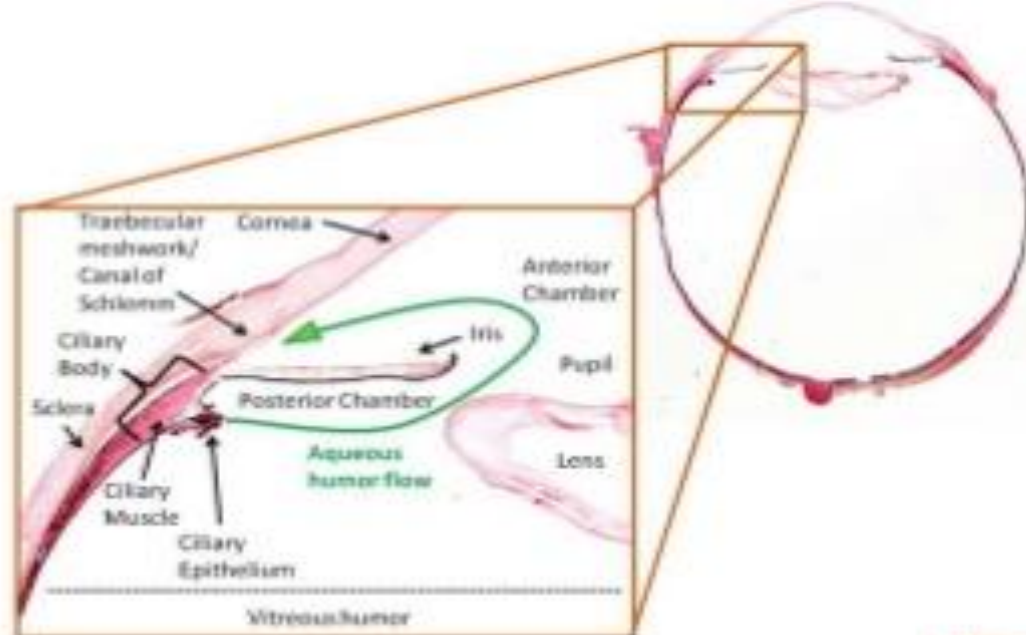
outwards into the angle
(**formed by the iris and cornea.**)

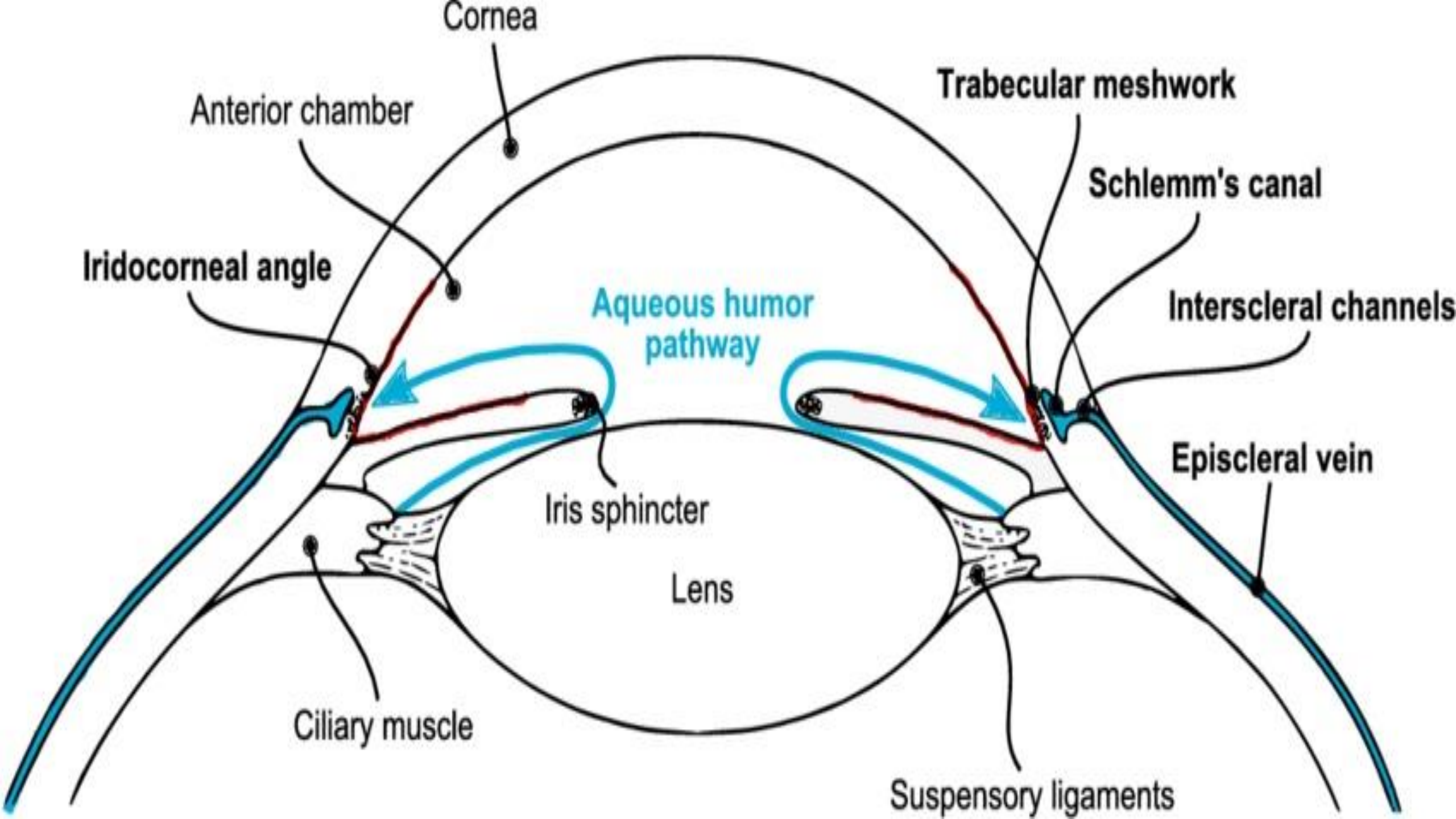
Filtering through the trabecular
meshwork

Pass through Canal of Schlemm

returns back into the blood circulation.

Ciliary body Drainage system





Optic Nerve [Visual Pathway]

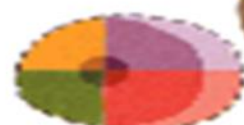
Central darker circle represents macular zone

Lighter shades represent monocular fields

Each quadrant a different color

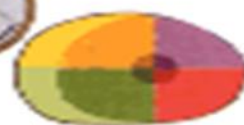
Overlapping visual

Projection on left retina



Optic nerves

Projection on right retina



Optic chiasm

Projection on left dorsal lateral geniculate nucleus



Optic tracts

Projection on right dorsal lateral geniculate nucleus

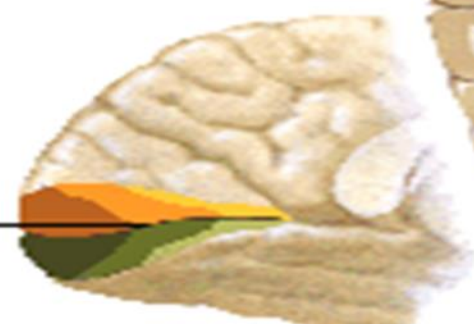


Optic radiation

Optic radiation

Lateral geniculate bodies

Calcarine sulcus



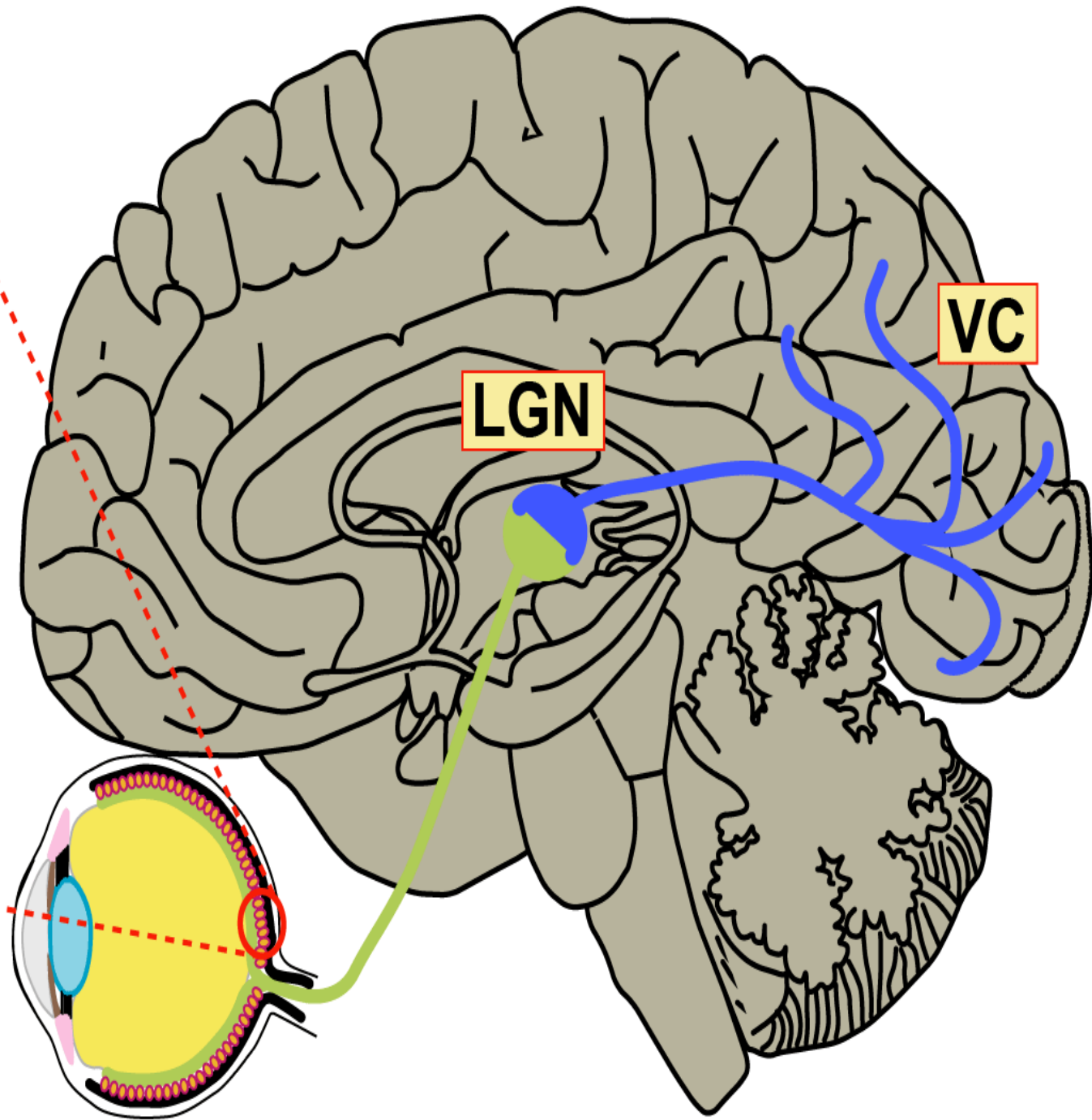
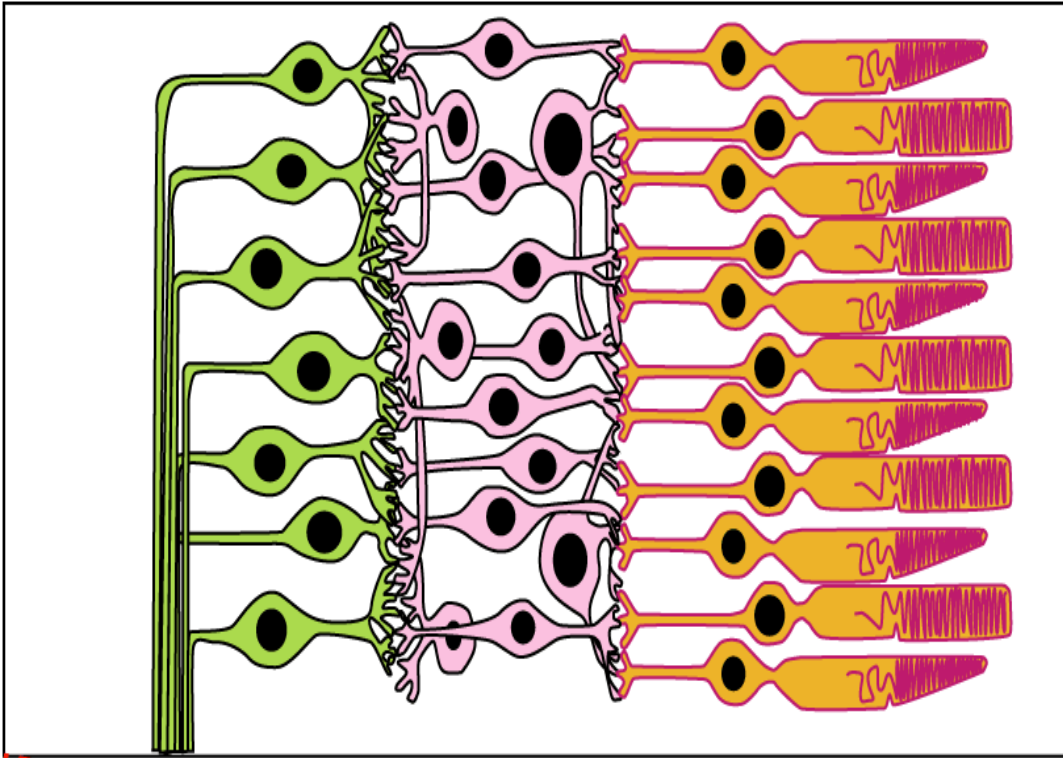
Projection on left occipital lobe



Calcarine sulcus

Projection on right occipital lobe

retina



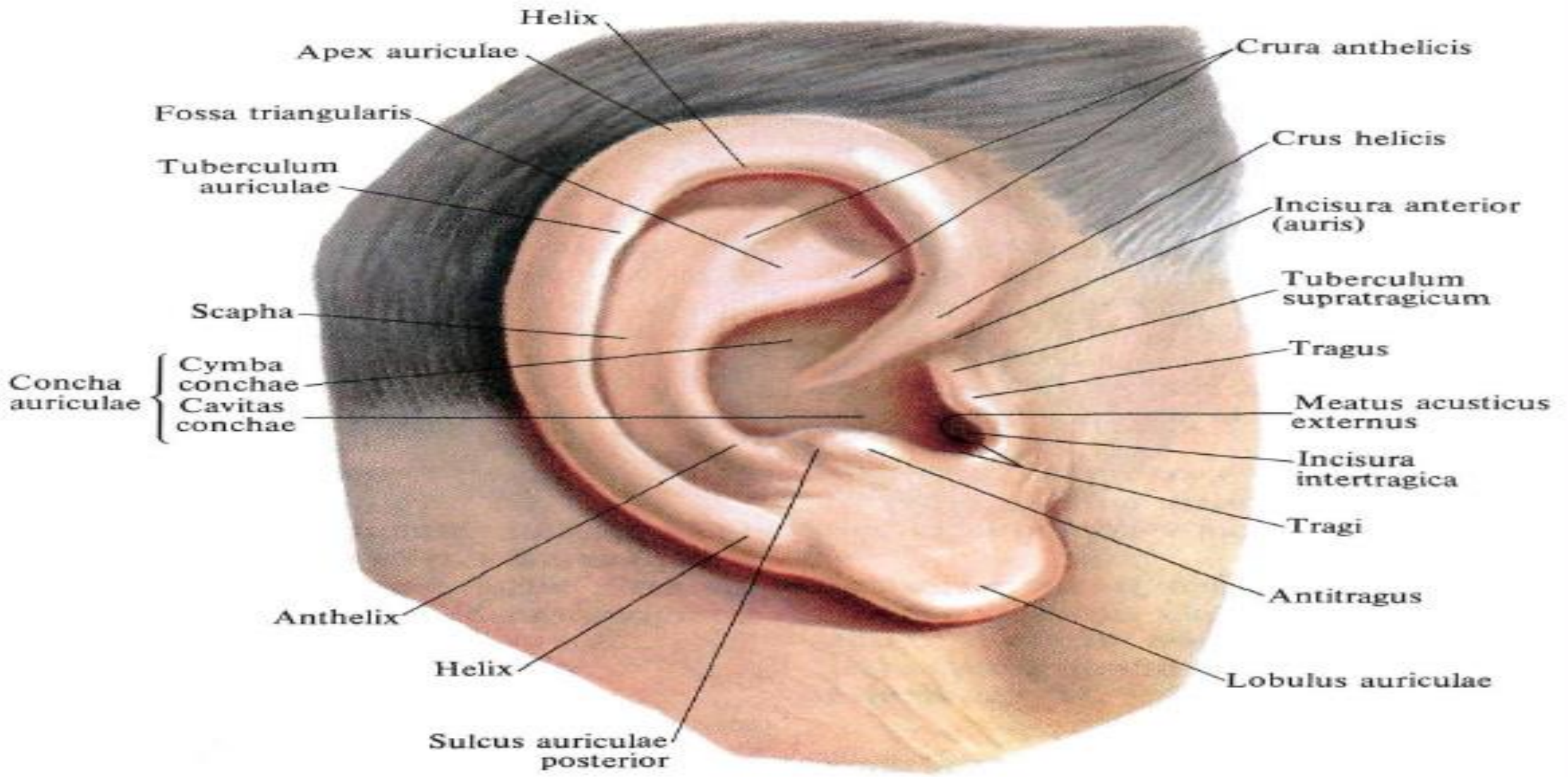
THE ORGAN OF HEARING AND GRAVITATION.

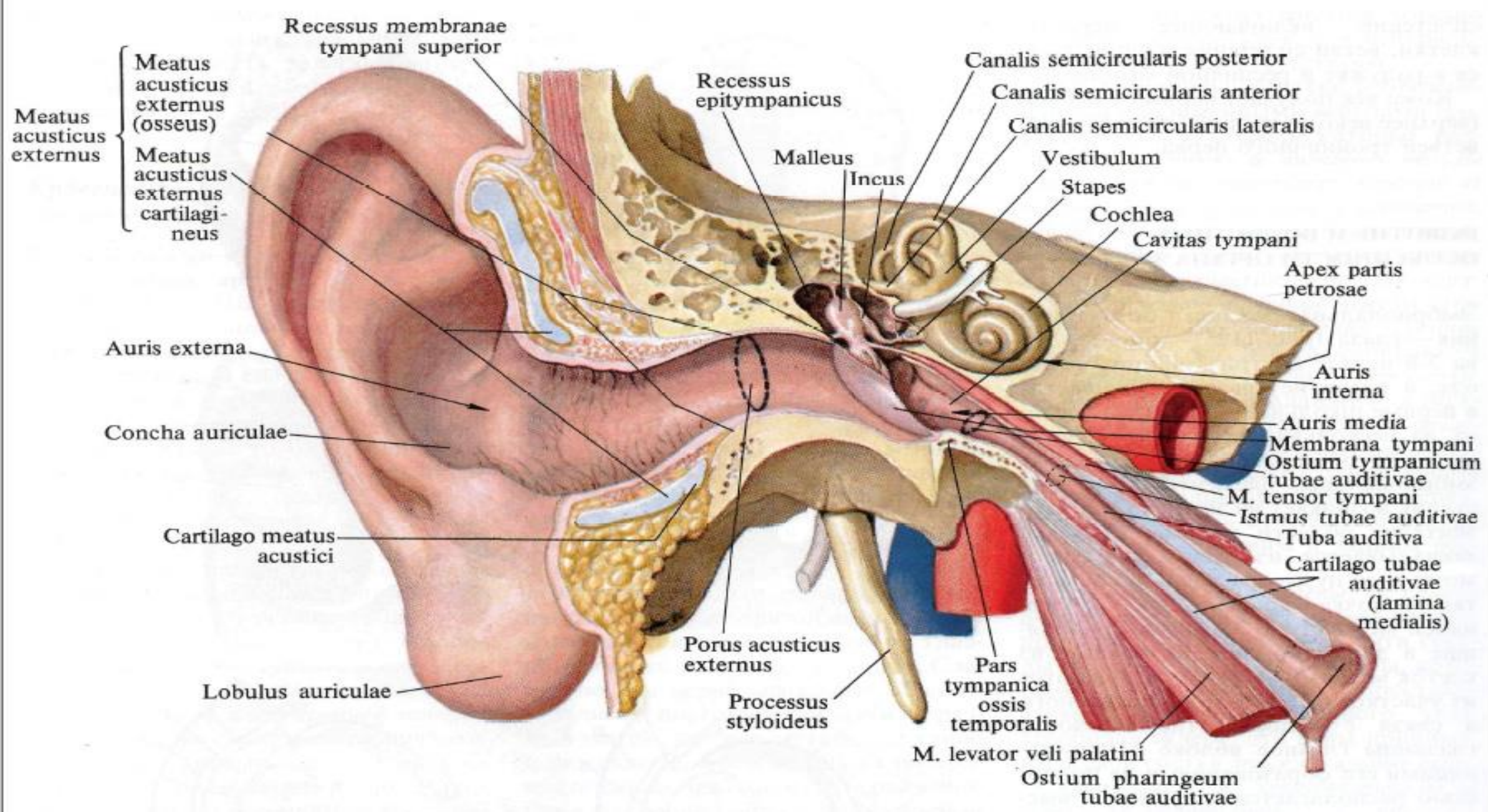
▶ **THE EXTERNAL EAR :** 1 – the auricle (ear).

▶ 2 – the external auditory meatus (“S”-shaped- cartilaginous and bony parts). The tympanic membrane— skin, fibrous tissue, mucous. Umbo, tensed and flaccid parts .

▶ **THE MIDDLE EAR :** 1 – the tympanic cavity (6 walls, 3 openings, 3 auditory ossicles: malleus-hammer, incus-anvil, stapes-stirrup). 2 – the auditory tube (bony and cartilaginous parts).

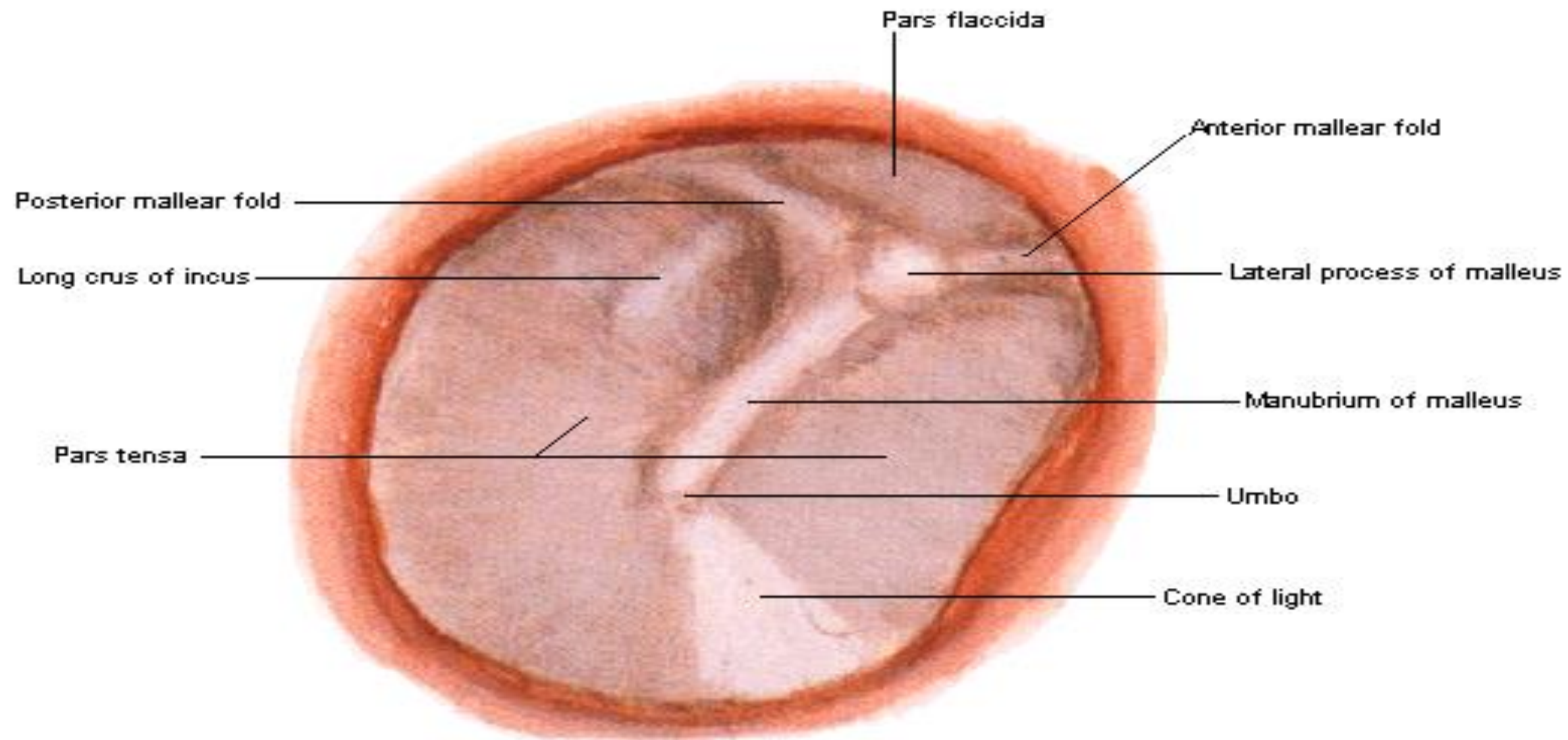
▶ **THE INTERNAL EAR :** 1 - the bony labyrinth (the vestibule, 3 semicircular canals, cochlea). 2 – the membranous labyrinth (vestibule –utricle,saccule; 3 semicircular ducts, cochlear duct).





External Ear

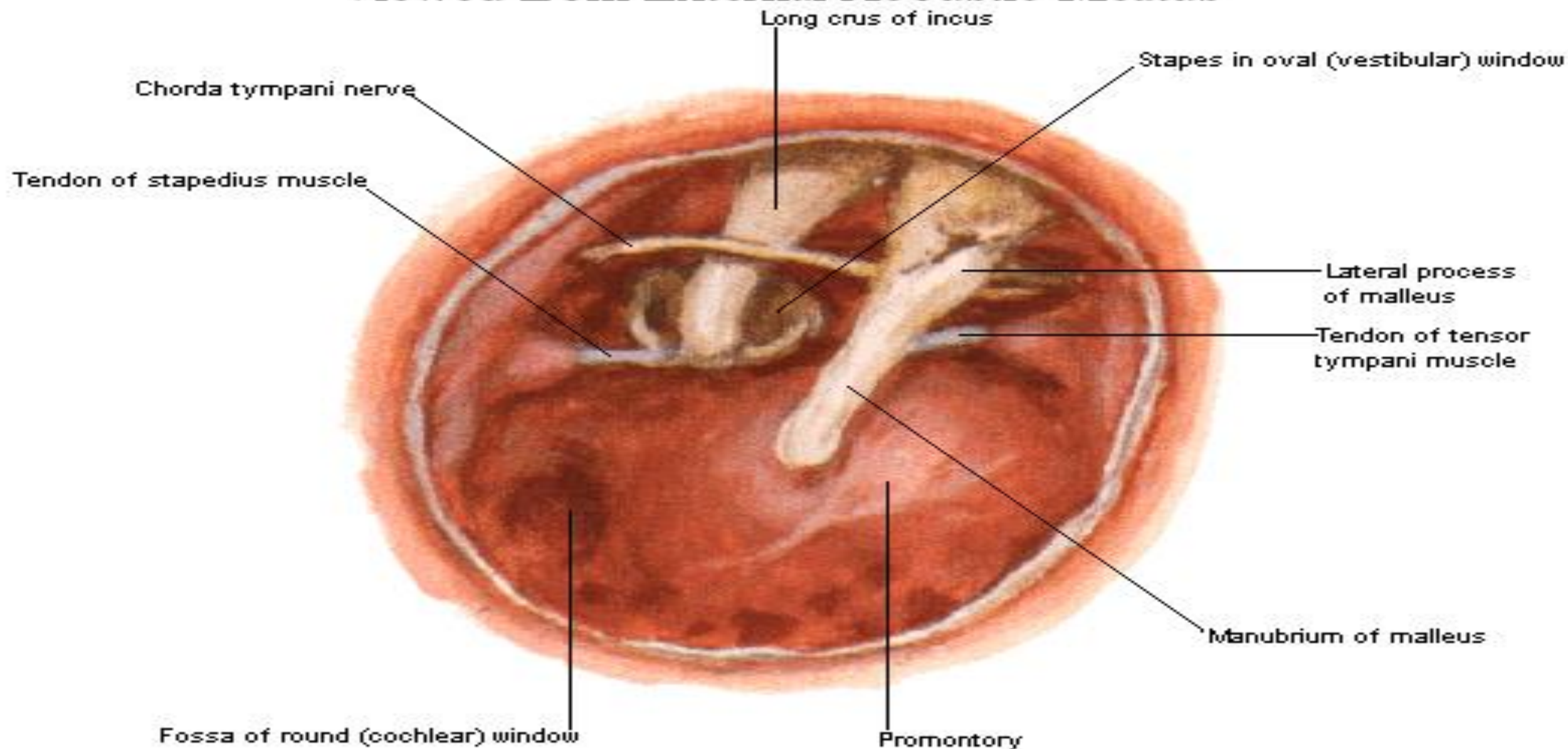
Right Tympanic Membrane



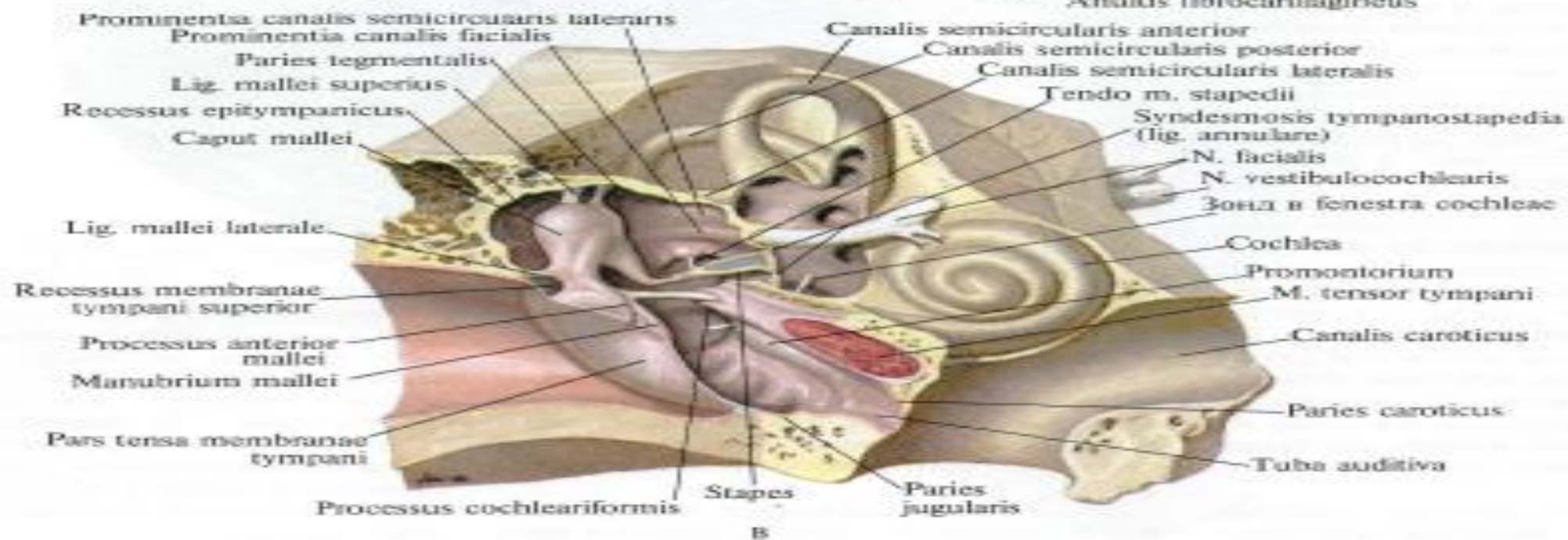
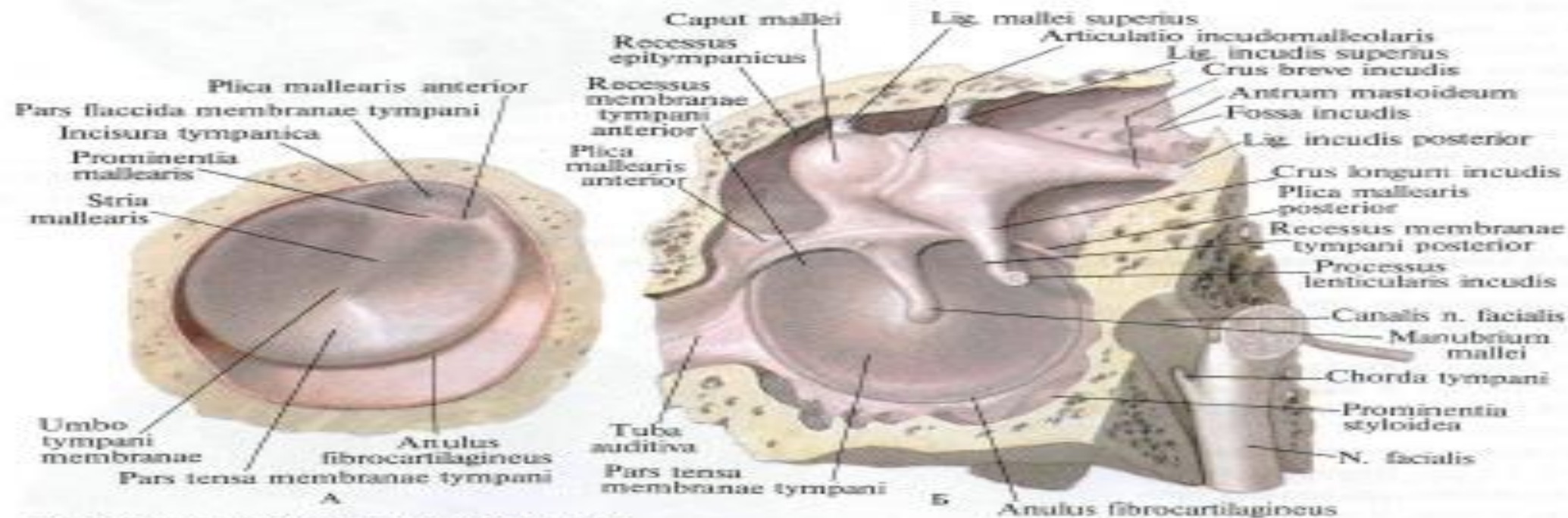
Viewed through speculum

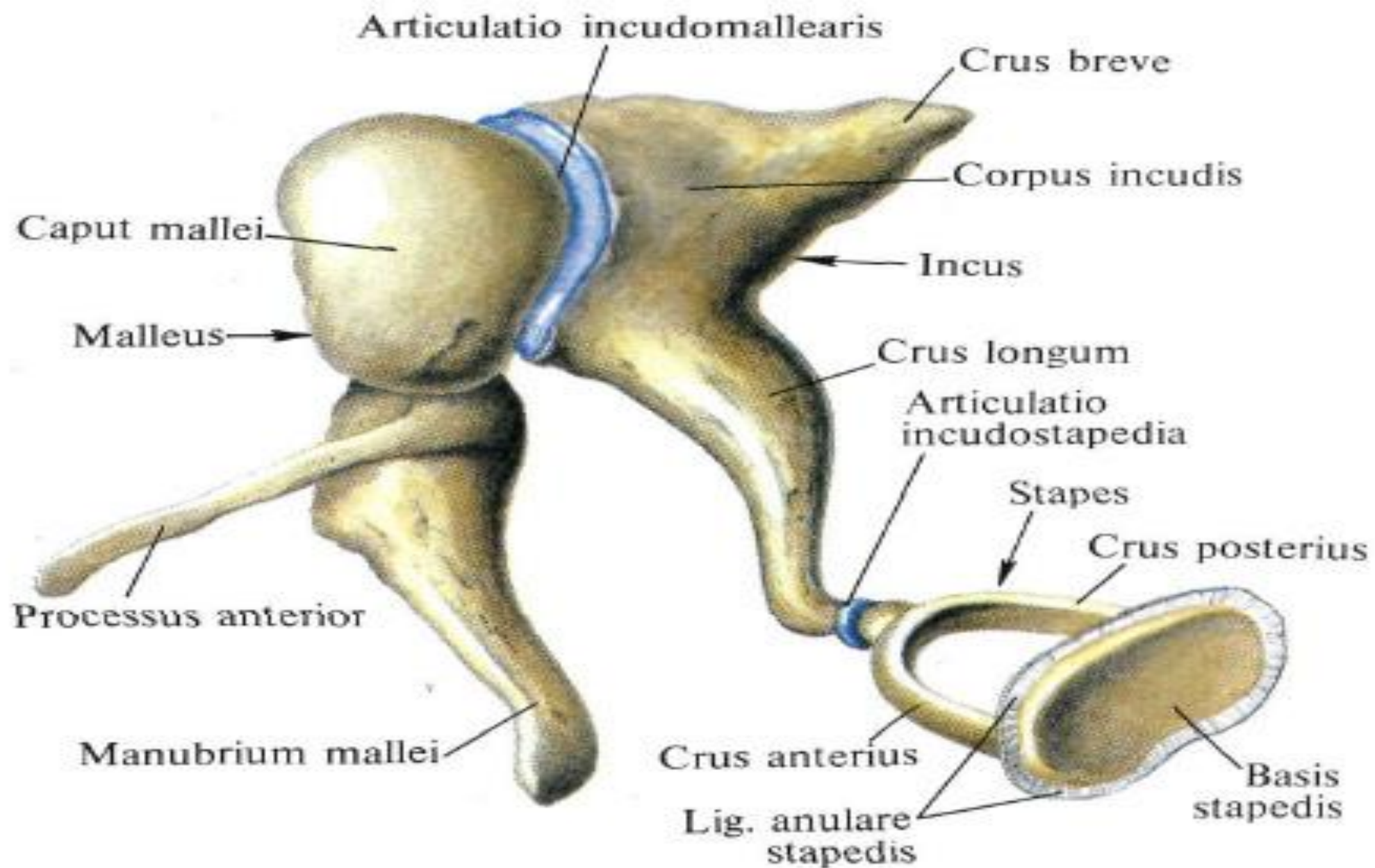
Tympanic Cavity

Viewed from External Acoustic Meatus



Tympanic Membrane Removed

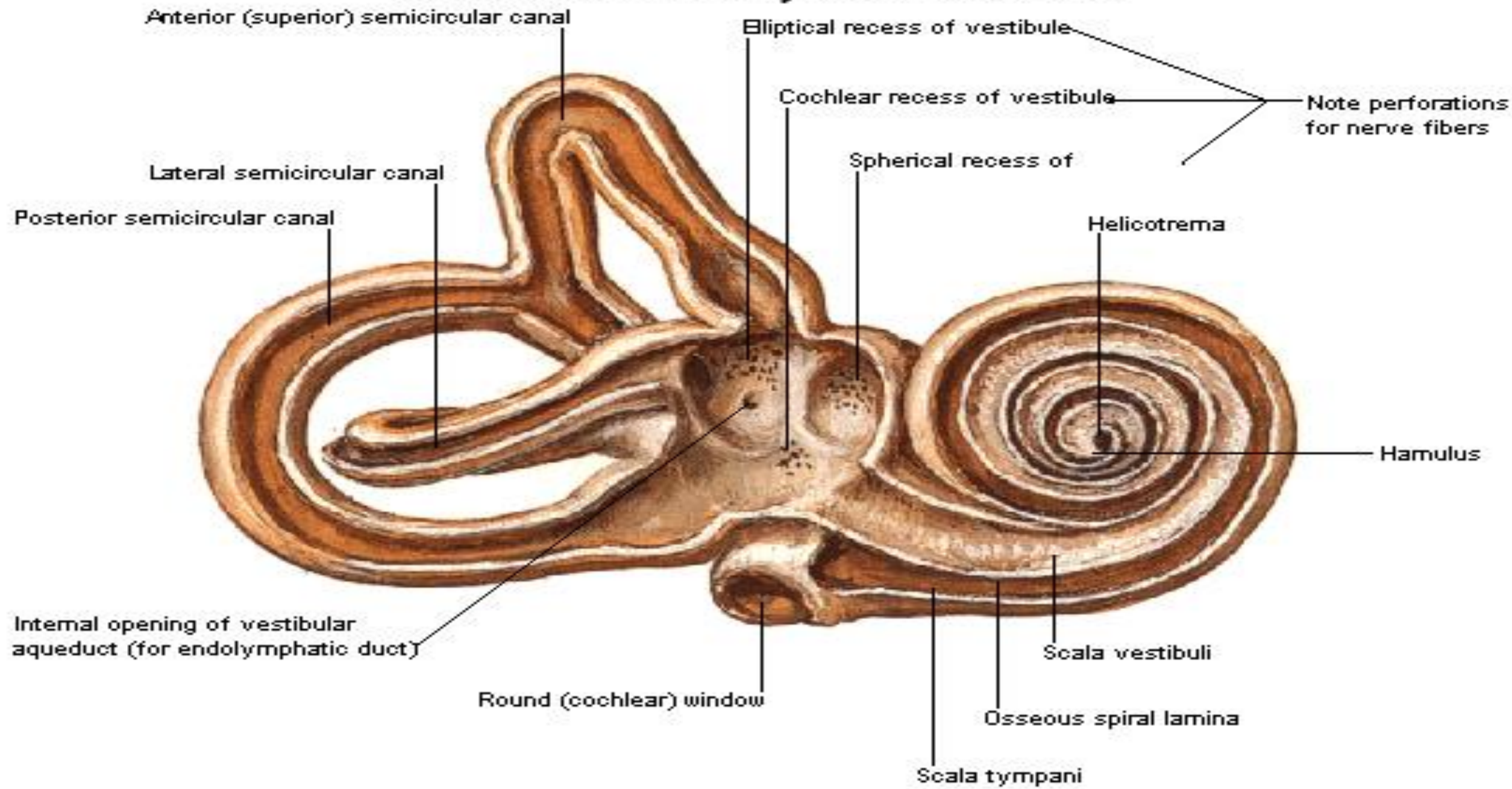


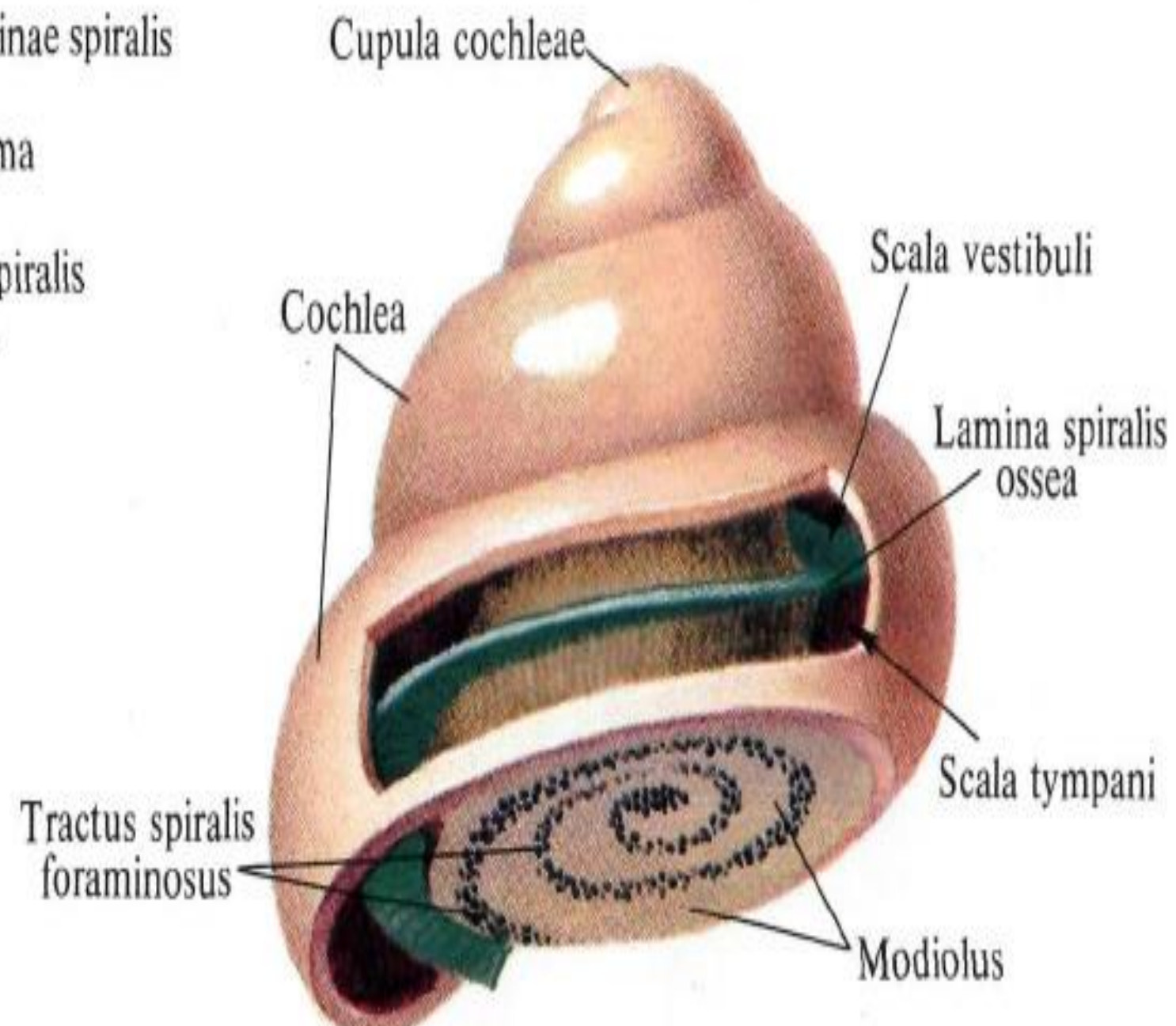
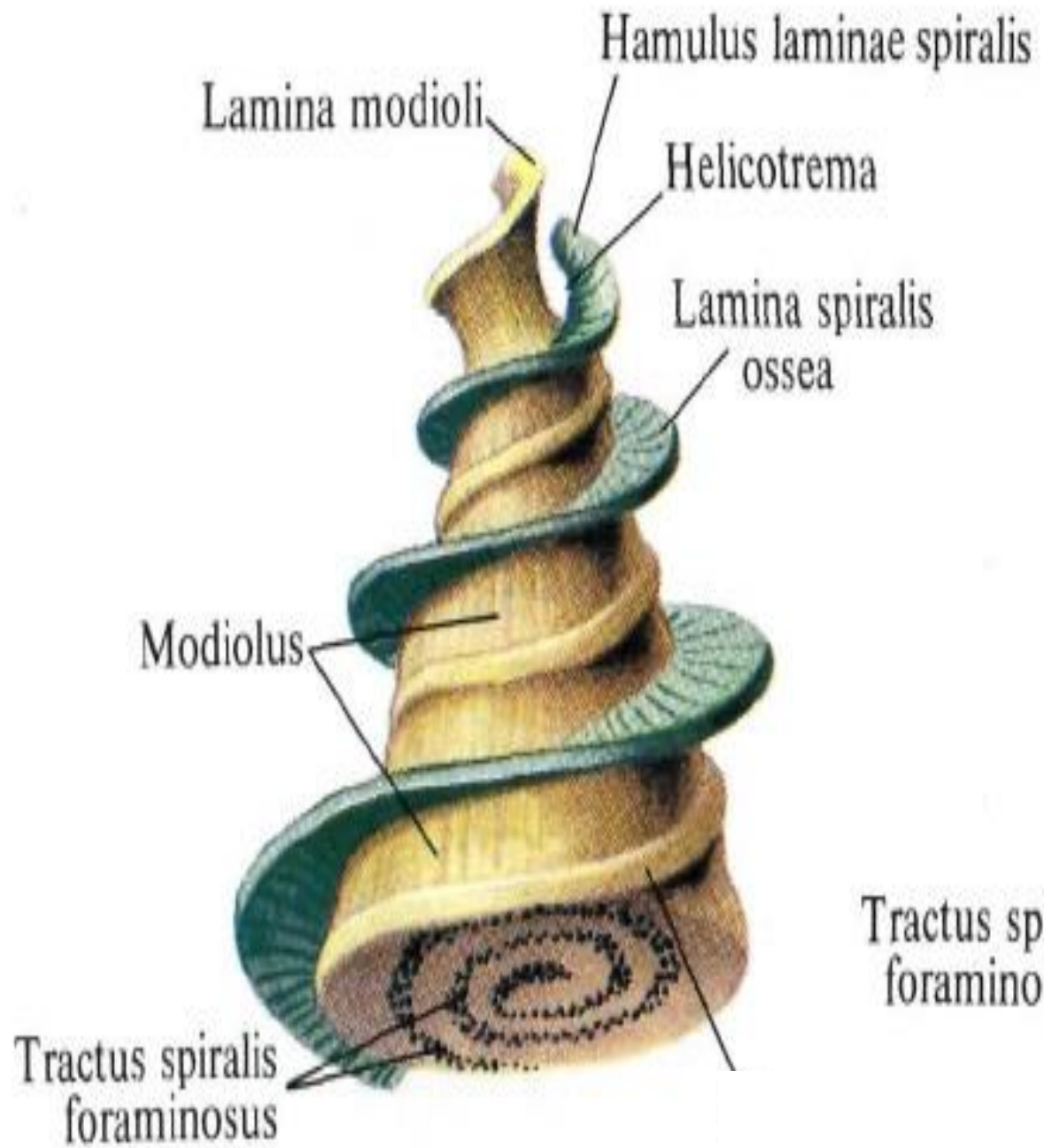


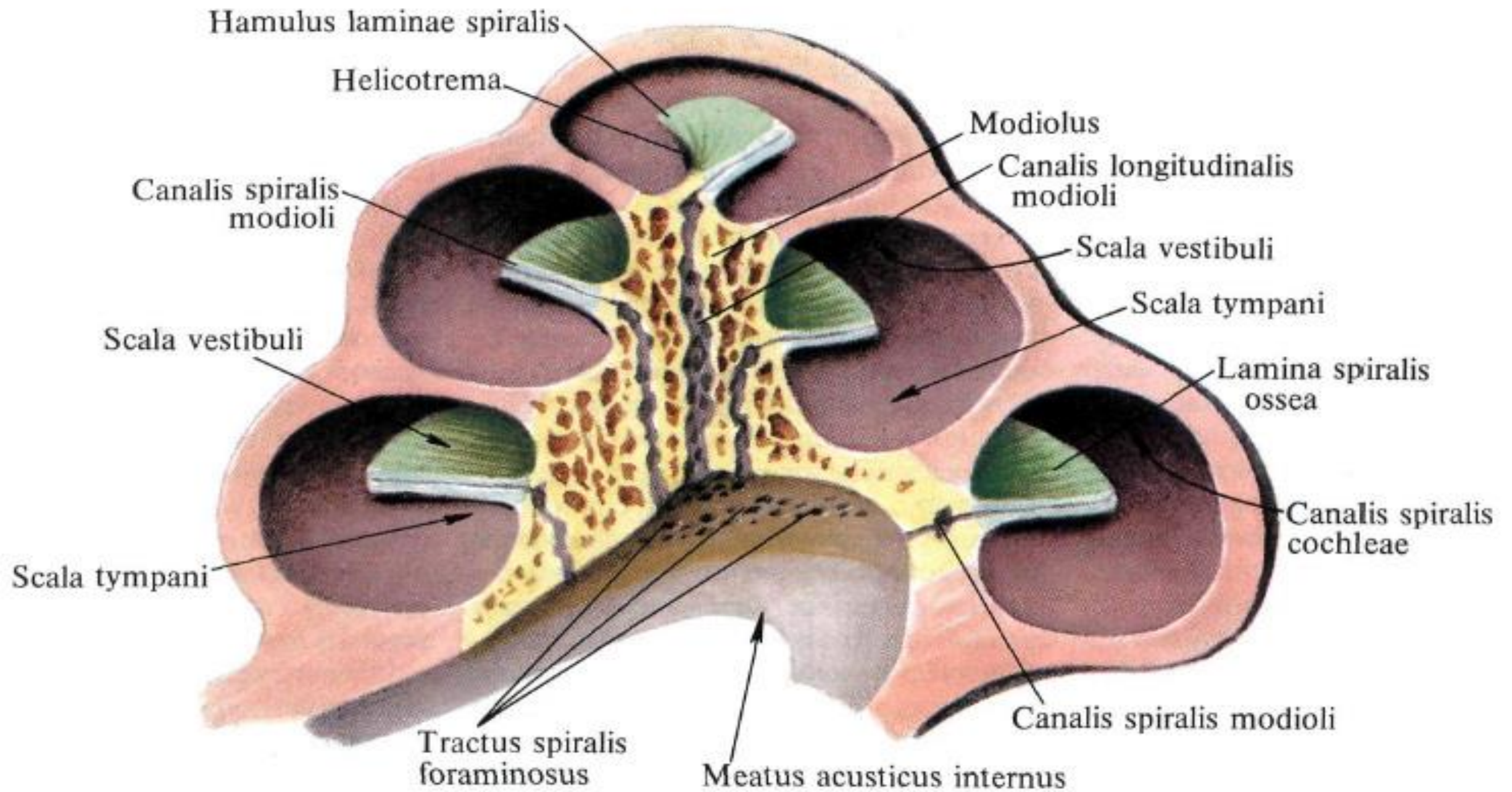
THE ORGAN OF HEARING AND GRAVITATION

- ***3. The internal ear***
- **-bony labyrinth (the vestibule, the cochlea, the semicircular canals)**
- **-membranous labyrinth**

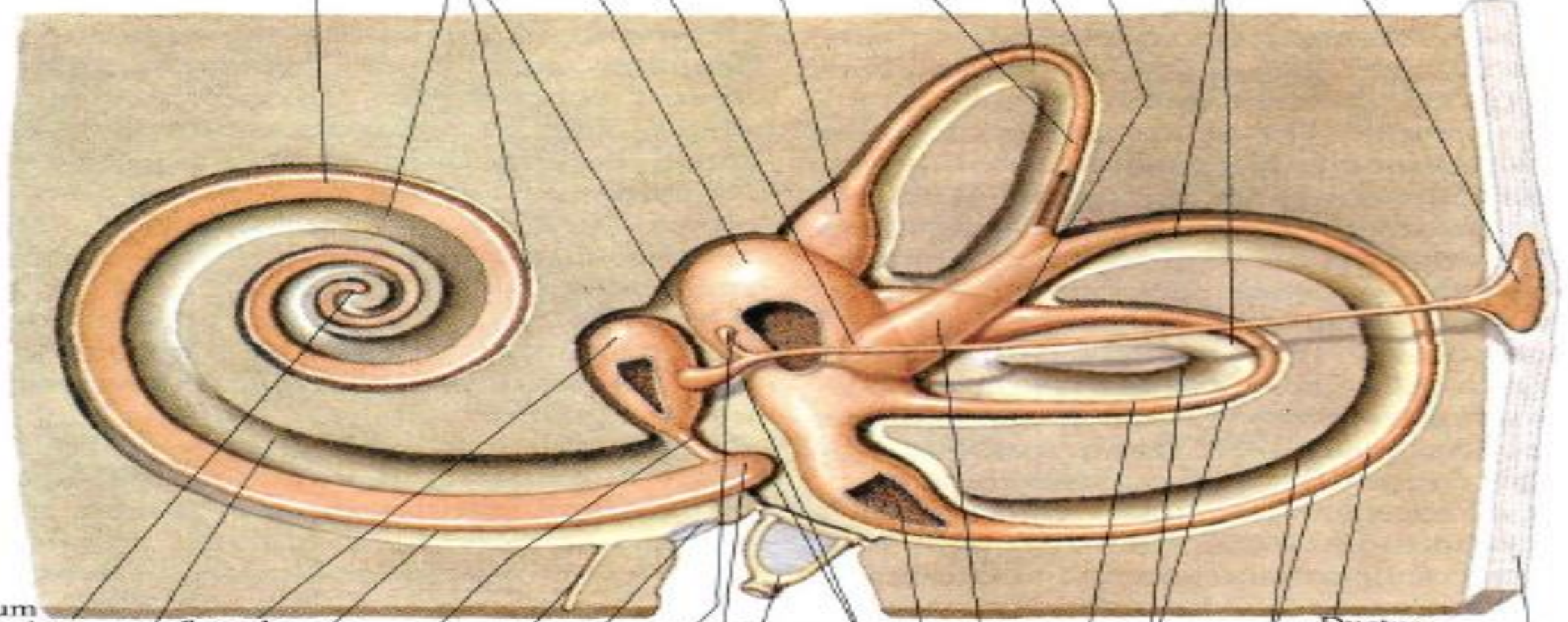
Right Osseous Labyrinth - Dissected Membranous Labyrinth Removed







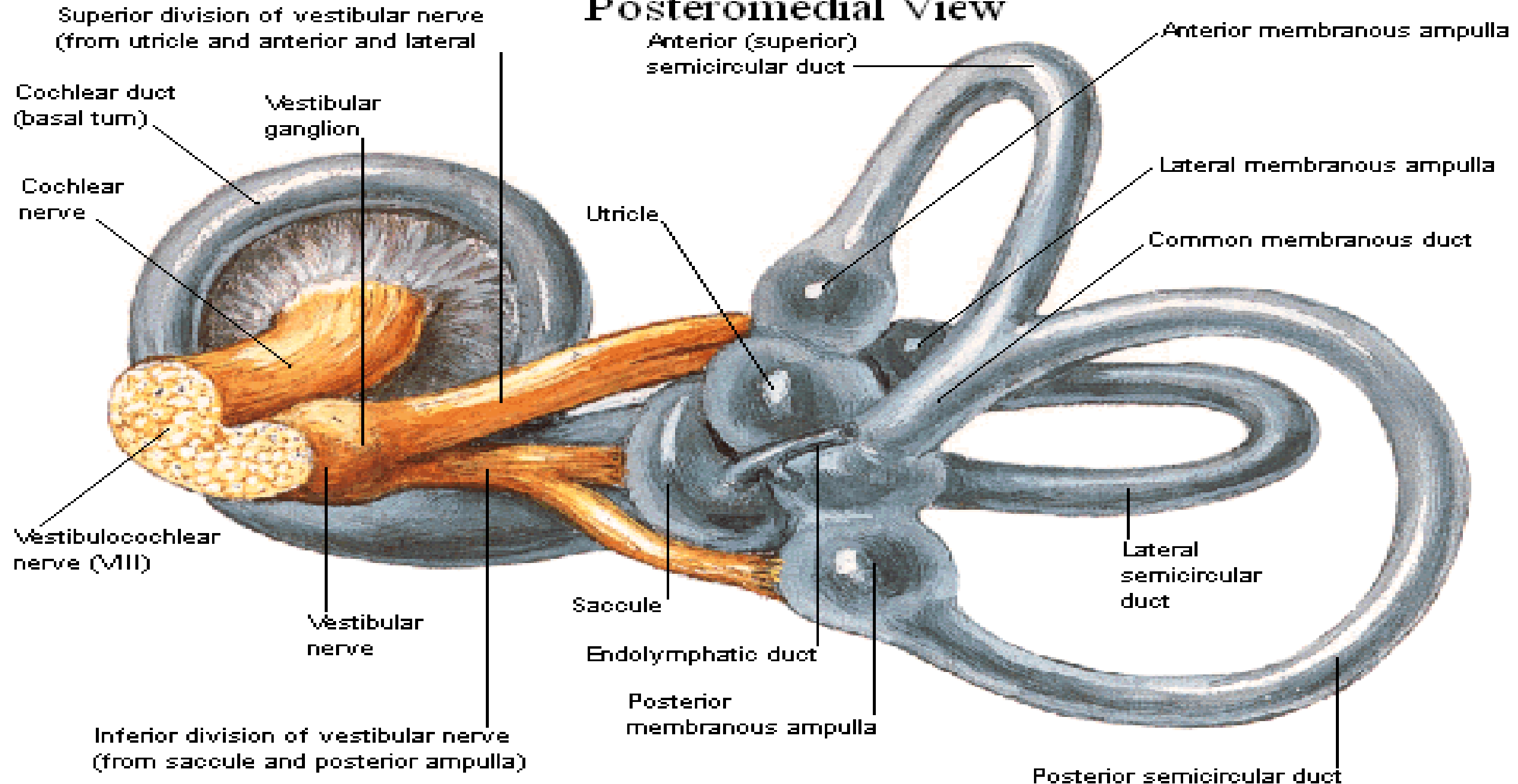
Ductus endolymphaticus
 Utriculus
 Spatium perilymphaticum
 Ductus cochlearis
 Ampulla membranacea anterior
 Ductus semicircularis anterior (частично вскрыт)
 Canalis semicircularis anterior
 Ampulla membranacea lateralis
 Spatium perilymphaticum
 Saccus endolymphaticus



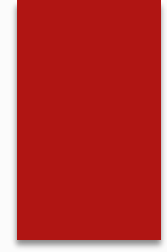
Cecum cupulare
 Sacculus
 Scala vestibuli
 Scala tympani
 Ductus reuniens
 Canaliculus cochleae (содержащий ductus perilymphaticus)
 Membrana tympani secundaria
 Ductus utriculosaccularis
 Stapes
 Vestibulum
 Ampulla membranacea posterior (вскрыта)
 Cecum vestibulare
 Ampulla membranacea anterior
 Ductus semicircularis anterior (частично вскрыт)
 Canalis semicircularis anterior
 Ampulla membranacea lateralis
 Spatium perilymphaticum
 Saccus endolymphaticus
 Ductus semicircularis posterior
 Canalis semicircularis posterior
 Canalis semicircularis lateralis
 Ductus semicircularis lateralis
 Crus membranaceus commune
 Dura mater encephali

Right Membranous Labyrinth with Nerves

Posteromedial View

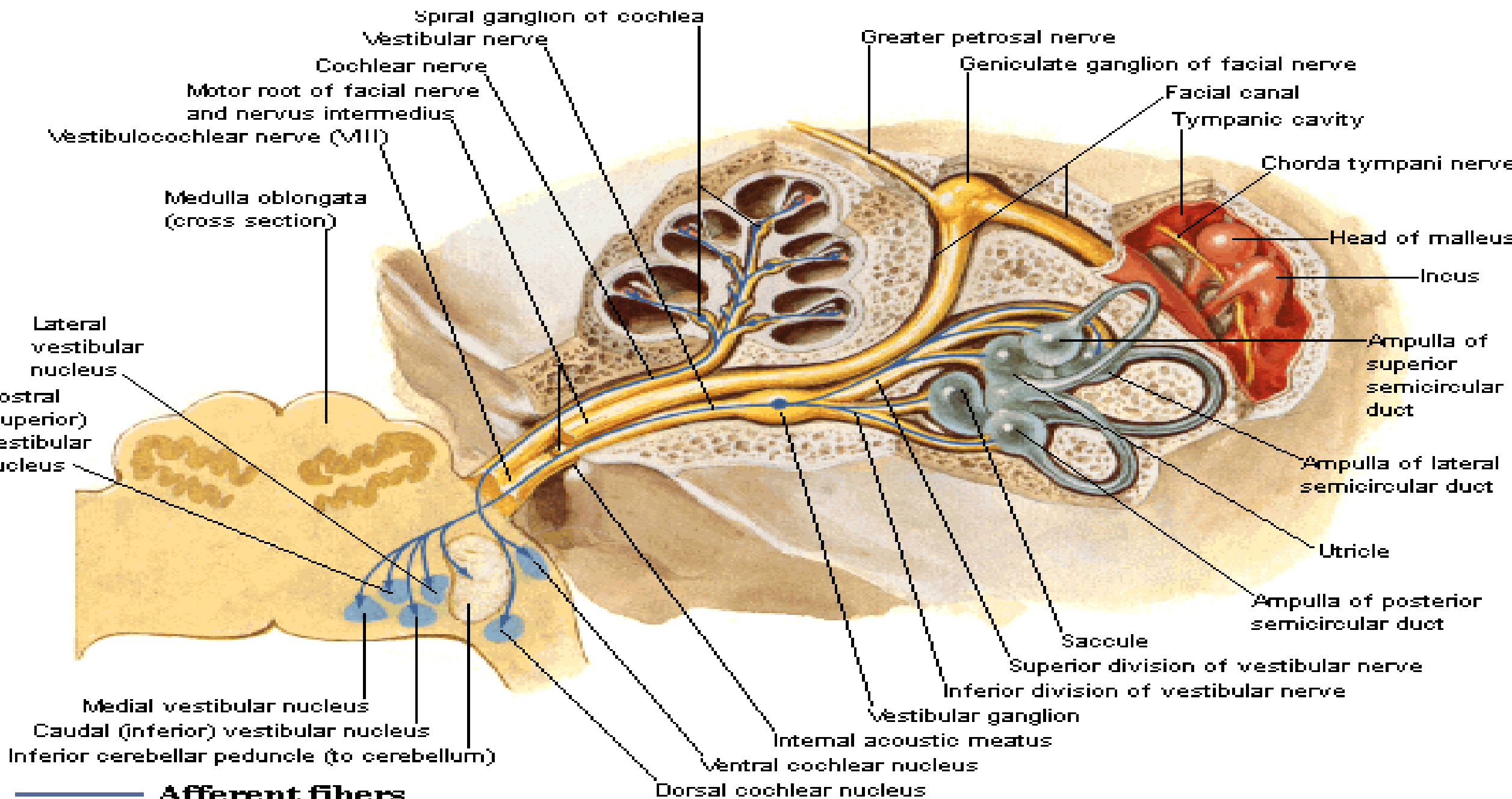


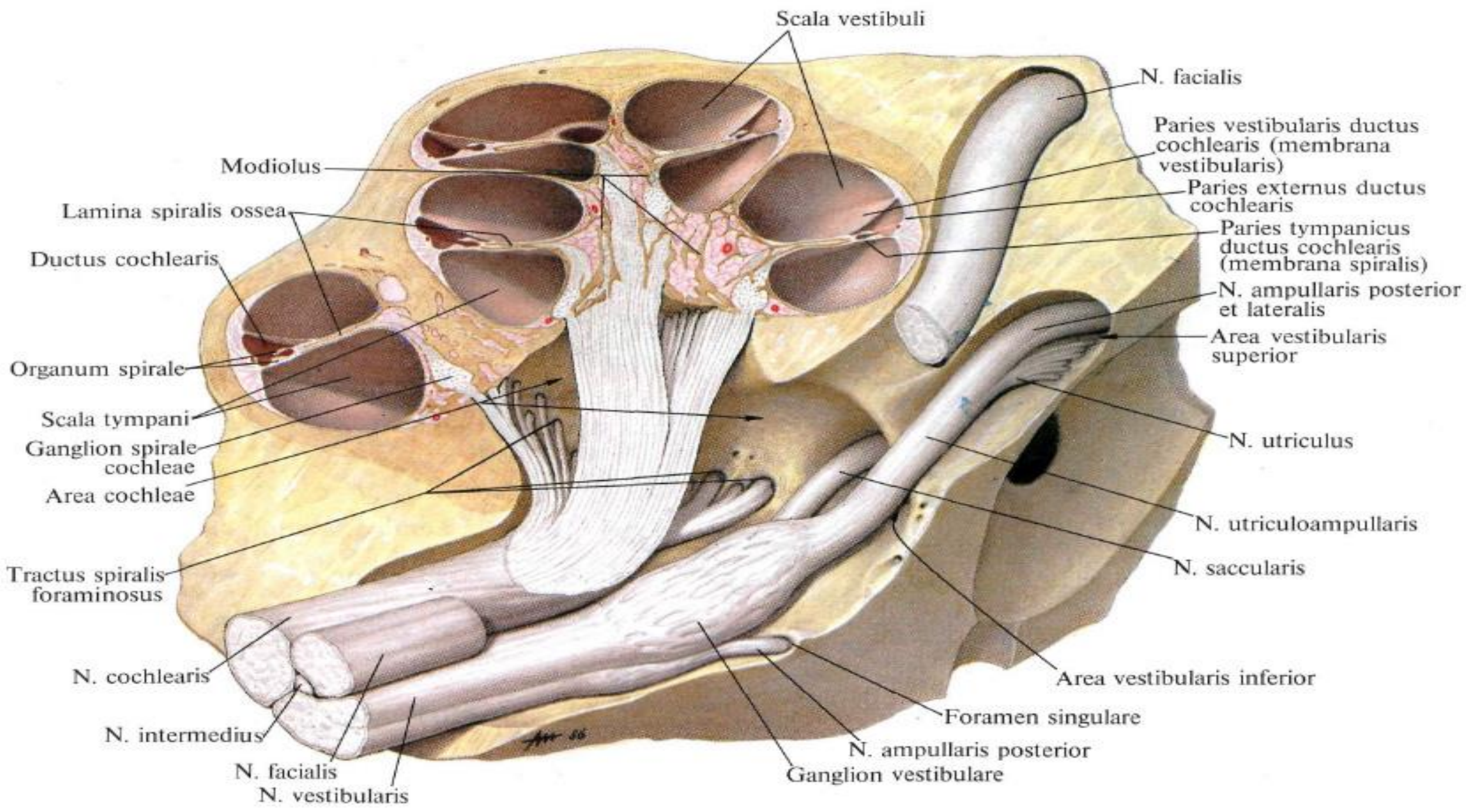
8-th(VIII) pair – the auditory (vestibulocochlear) nerve.



- ▶ **The vestibular nerve: receptors-** sensory cells of the utricle, saccule (receptors of static equilibrium) and of the semicircular canals (receptors of dynamic equilibrium).
- ▶ **I n.** – gang. vestibulare
- ▶ **II n.** -nuclei vestibulares
- ▶ **III n.**-opposite lateral thalamic nuclei. **Cortex** of the temporal and parietal lobes.
- ▶ **The cochlear nerve: receptors-**acoustic cells of the Corti organ on the walls of the membranous cochlear duct
- ▶ **I n.**- ganglia spirales
- ▶ **II n.**-nucleus dorsalis and ventralis of the pons
- ▶ **III n.**- opposite inferior colliculus of the midbrain and medial geniculate body.
- ▶ **Cortex** of the superior temporal gyrus.

Vestibulocochlear Nerve





Scala vestibuli

N. facialis

Modiolus

Paries vestibularis ductus cochlearis (membrana vestibularis)

Lamina spiralis ossea

Paries externus ductus cochlearis

Ductus cochlearis

Paries tympanicus ductus cochlearis (membrana spiralis)

Organum spirale

N. ampullaris posterior et lateralis

Scala tympani

Area vestibularis superior

Ganglion spirale cochleae

N. utriculus

Area cochleae

N. utriculoampullaris

Tractus spiralis foraminosus

N. saccularis

N. cochlearis

Area vestibularis inferior

N. intermedius

Foramen singulare

N. facialis

N. ampullaris posterior

N. vestibularis

Ganglion vestibulare

Taste (gustatory) pathway

- **1. Receptors** Taste buds on tongue, lips, palatal arch and soft palate. Each “bud” contains several cell types in microvilli (taste hairs) that project through taste pore.
- Gustatory receptor cells communicate with cranial nerve axon endings to transmit sensation to brain.
- **Cranial Nerves of taste**
- Anterior 2/3 tongue: chorda tympani → Facial nerve
- Posterior 1/3 tongue: Glossopharyngeal nerve
- Most posterior part of the tongue: Vagus nerve

Gustatory Pathway from Taste Buds

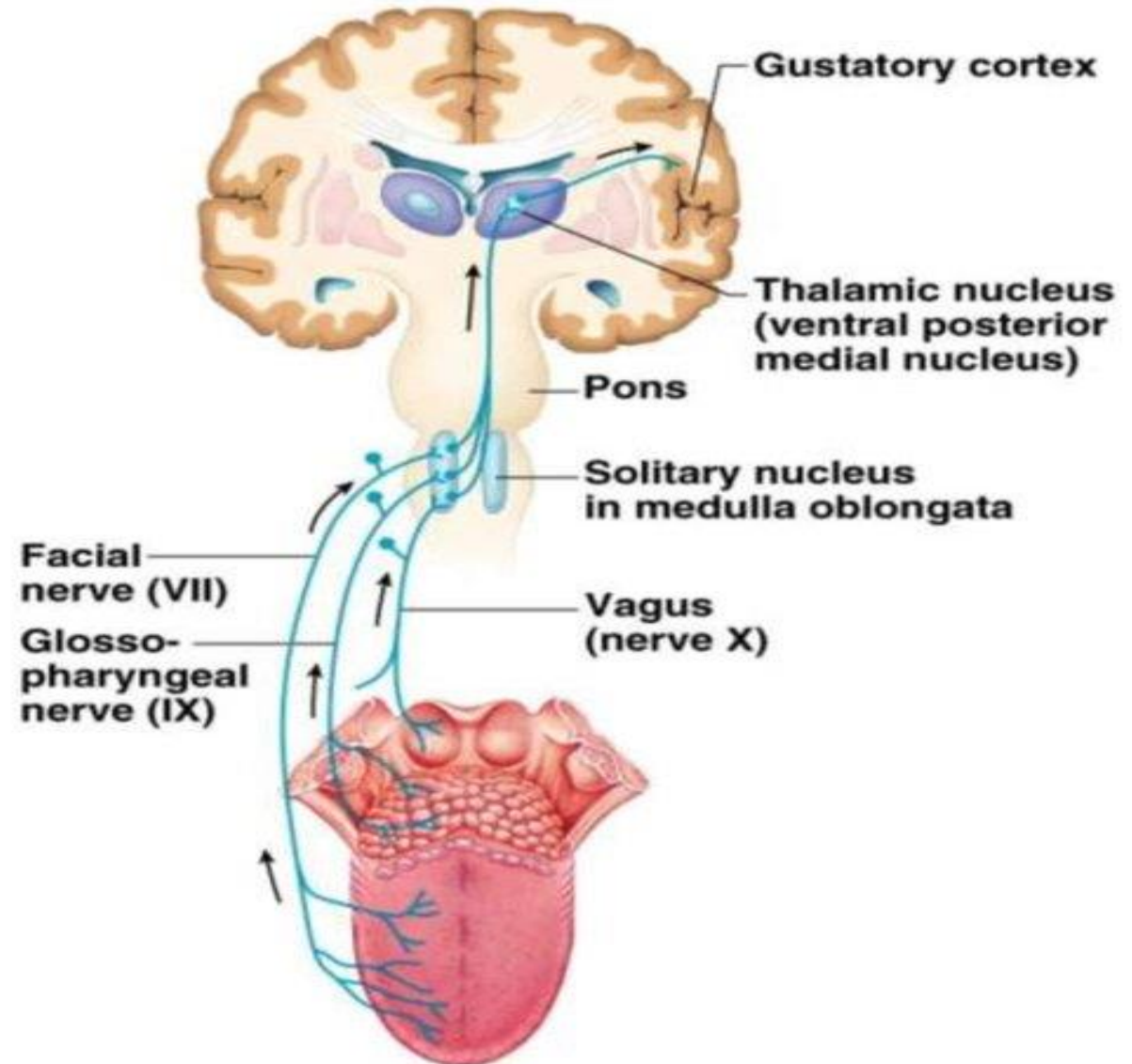
Taste information reaches the cerebral cortex

Primarily through the facial (VII) and glossopharyngeal (IX) nerves

Some taste information through the vagus nerve (X)

Sensory neurons synapse in the medulla

Located in the solitary nucleus



Thx for your attention!!!!

