

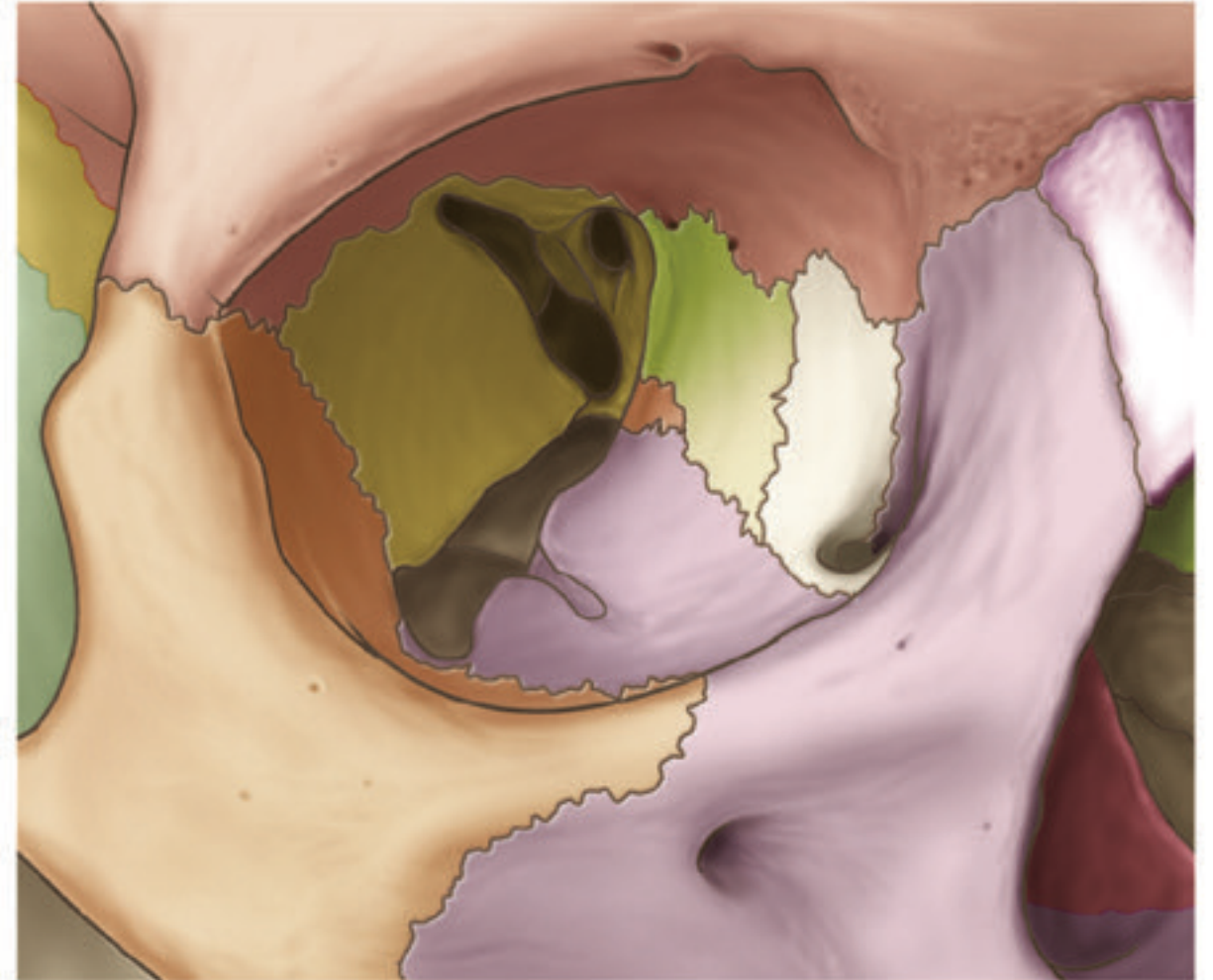
Oculus – oko – eye



Illustrations – Gray's Anatomy for Students, Thieme Atlas of Anatomy

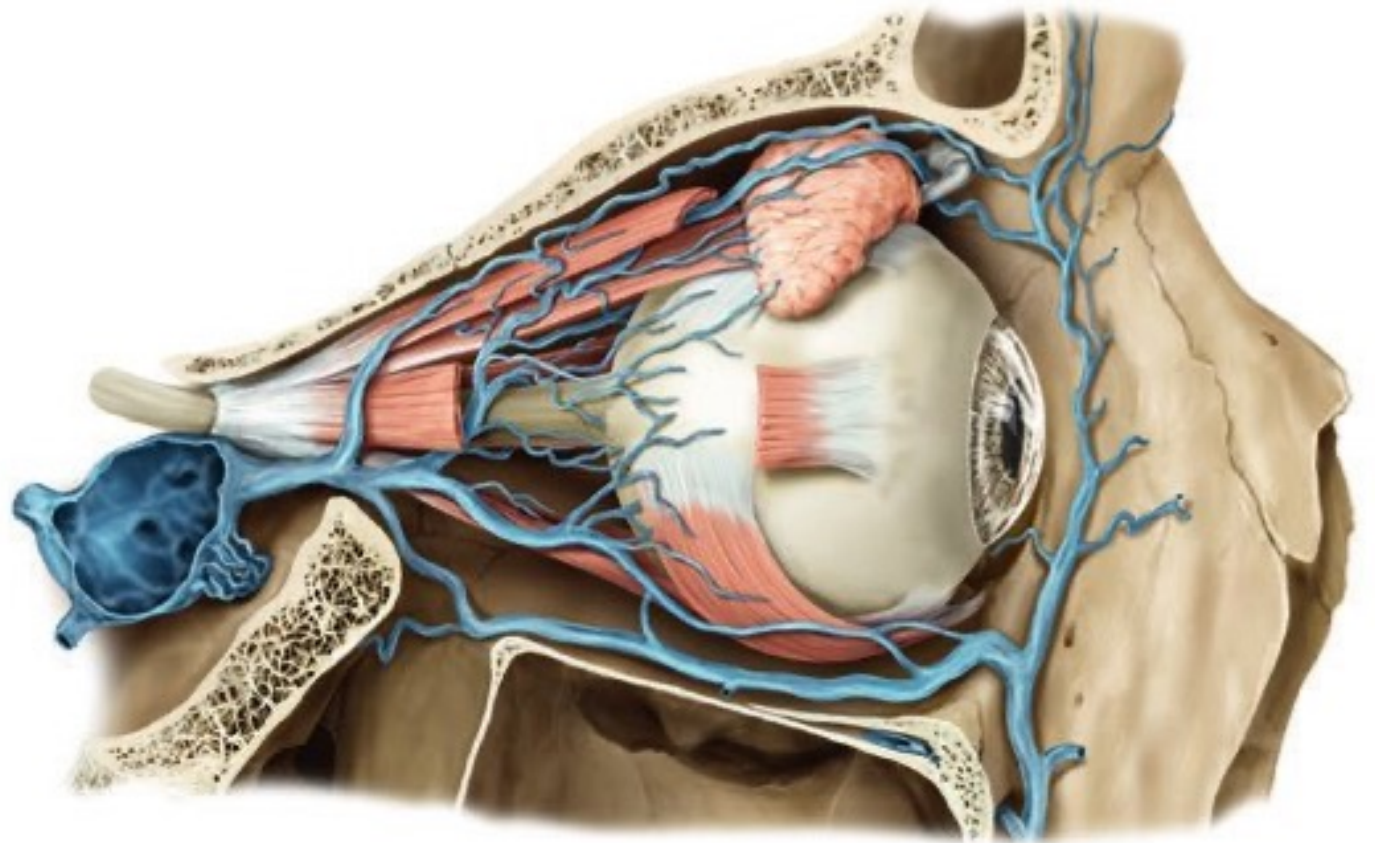
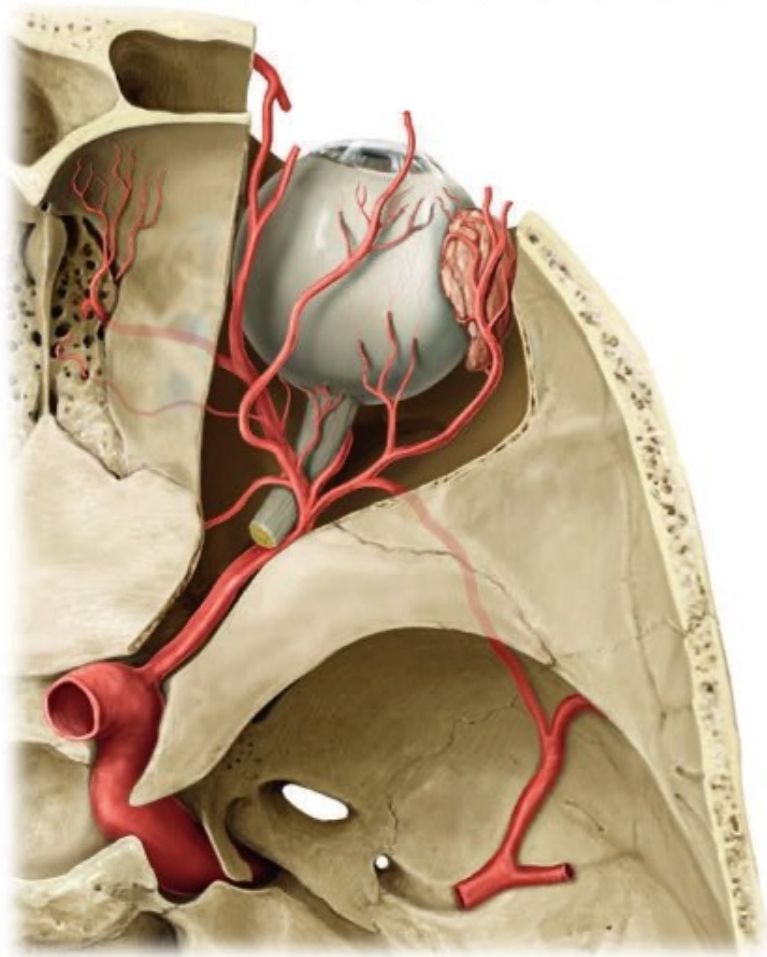
Orbita

- ♦ **Os frontale**
- ♦ **Os sphenoidale**
 - ♦ Canalis opticus
 - ♦ Fissura orbitalis superior
- ♦ **Os zygomaticum**
- ♦ **Maxilla**
 - ♦ Fissura orbitalis inferior
 - ♦ Canalis infraorbitalis
 - ♦ Sulcus lacrimalis
- ♦ **Os lacrimale**
- ♦ **Os ethmoidale**
- ♦ **Os palatinum**



Orbita

- ♦ **Canalis opticus:** *nervus opticus, a. ophtalmica*
- ♦ **Fissura orbitalis superior:** *v. ophtalmica sup., nn. oculomotorius, trochlearis, abducens, ophtalmicus*



Fissurae et foramina orbitae

♦ **Canalis opticus**

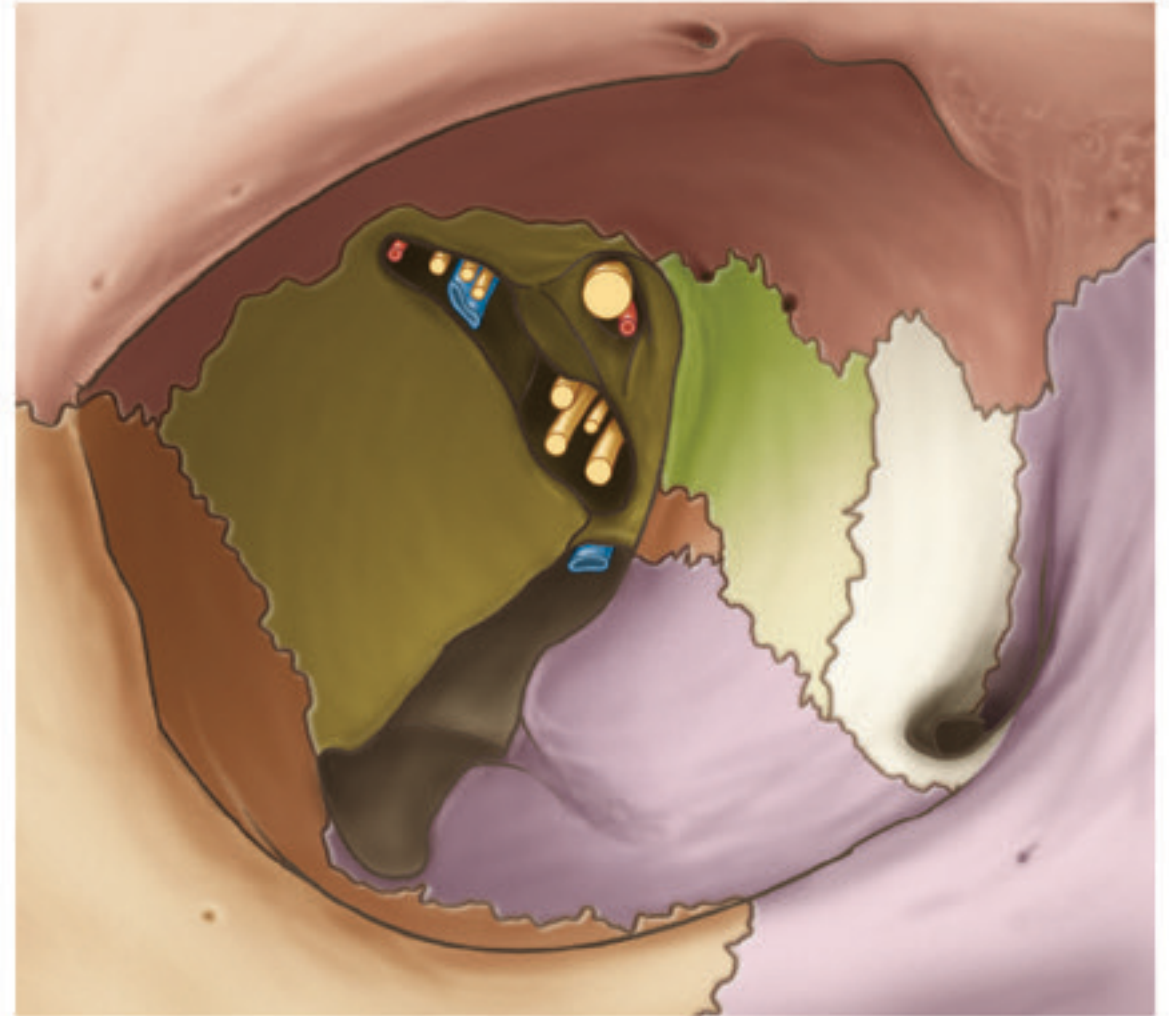
- ♦ N. opticus (II)
- ♦ A. ophtalmica

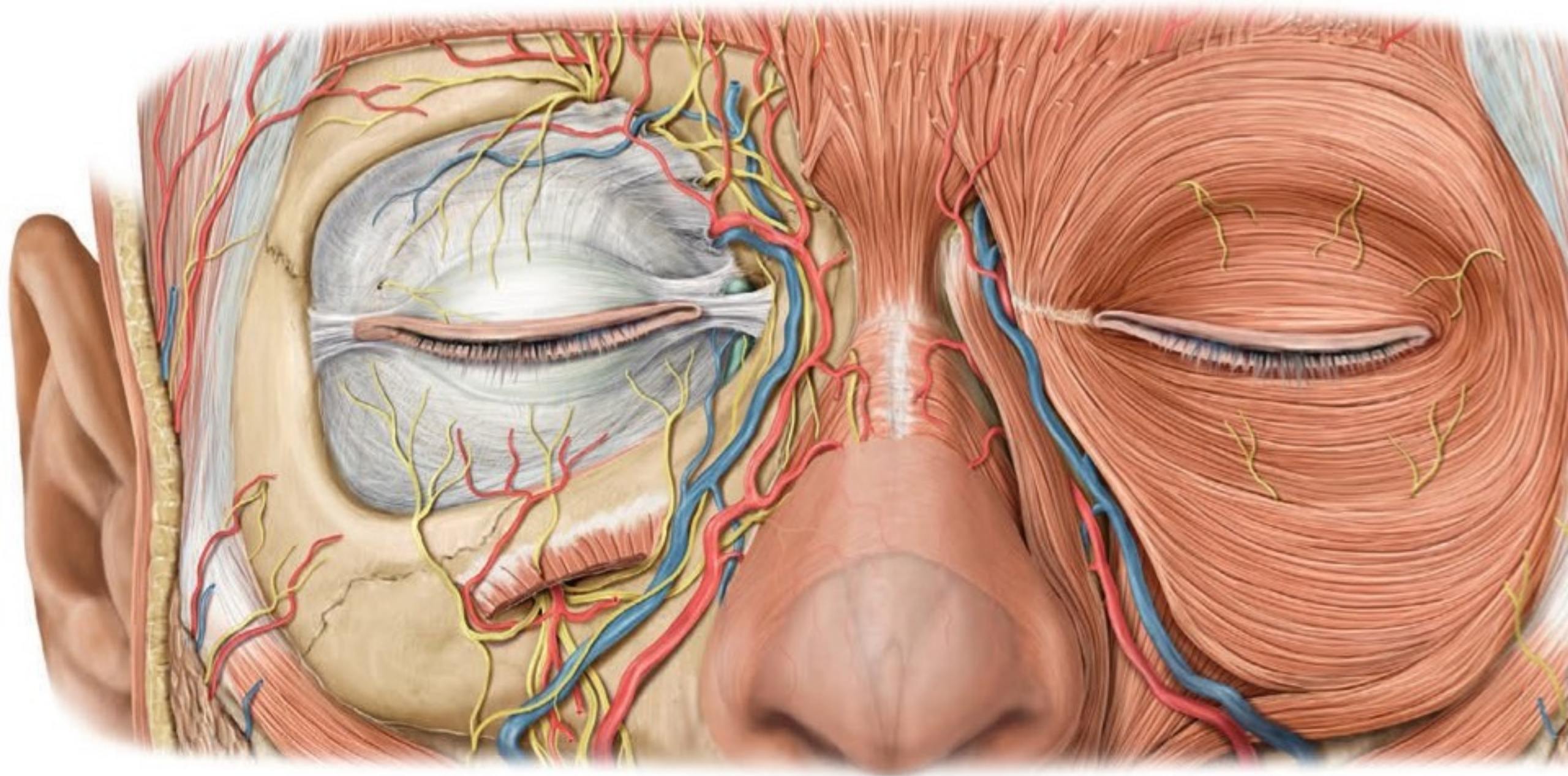
♦ **Fissura orbitalis superior**

- ♦ A. orbitalis superior
- ♦ N. lacrimalis (V1)
- ♦ N. frontalis (V1)
- ♦ N. trochlearis (IV)
- ♦ V. ophtalmica superior
- ♦ N. oculomotorius (III) ramus superior
- ♦ N. nasociliaris (V1)
- ♦ N. abducens (VI)
- ♦ N. oculomotorius (III) ramus inferior

♦ **Fissura orbitalis inferior**

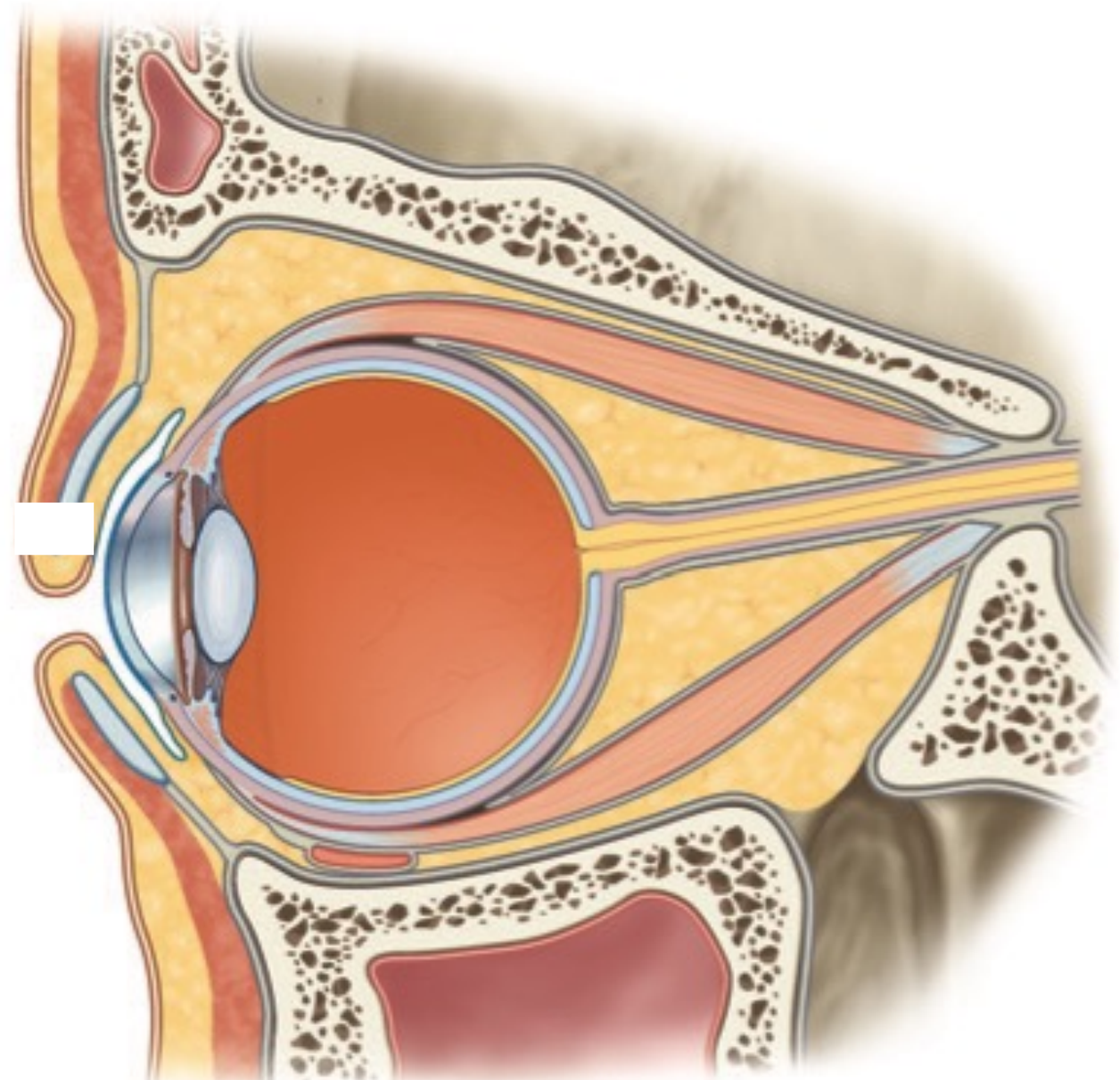
- ♦ V. ophtalmica inferior



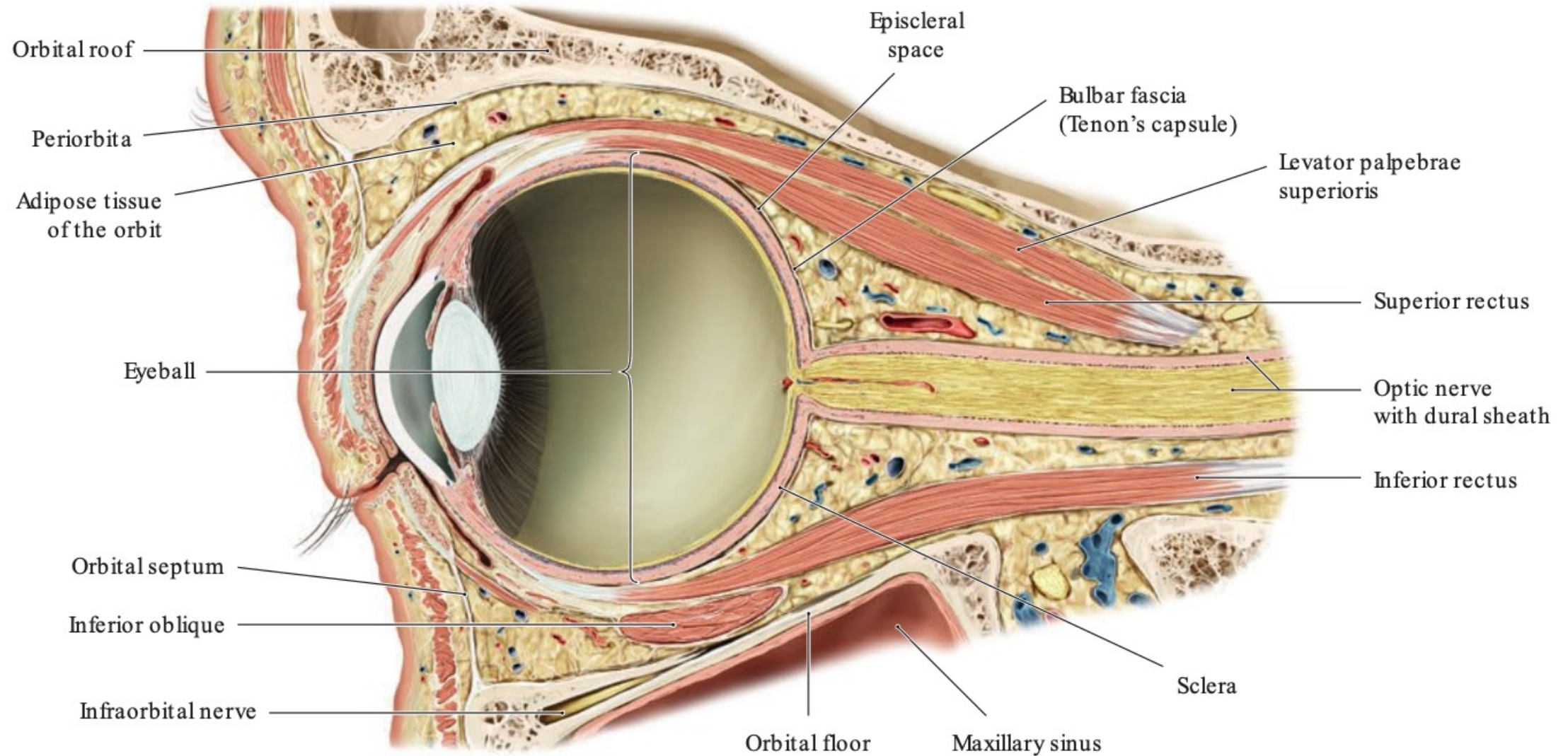


Orbita

- ♦ **Periorbita – periosteum orbitae**
 - ♦ Anulus tendineus oculi – apikální zesílení
 - ♦ M. orbitalis
 - ♦ Smooth muscle in fiss. orbitalis inf.
 - ♦ sympatheticus
- ♦ **Dura mater**
- ♦ **Septum orbitale**
- ♦ **Corpus adiposum**
- ♦ **Musculi orbitae**
- ♦ **Nervus opticus**
- ♦ **Bulbus oculi**
- ♦ **Fascia bulbi – vagina bulbi (Tenoni)**
 - ♦ Fasciae propriae musculorum
 - ♦ Ligamenta suspensoria

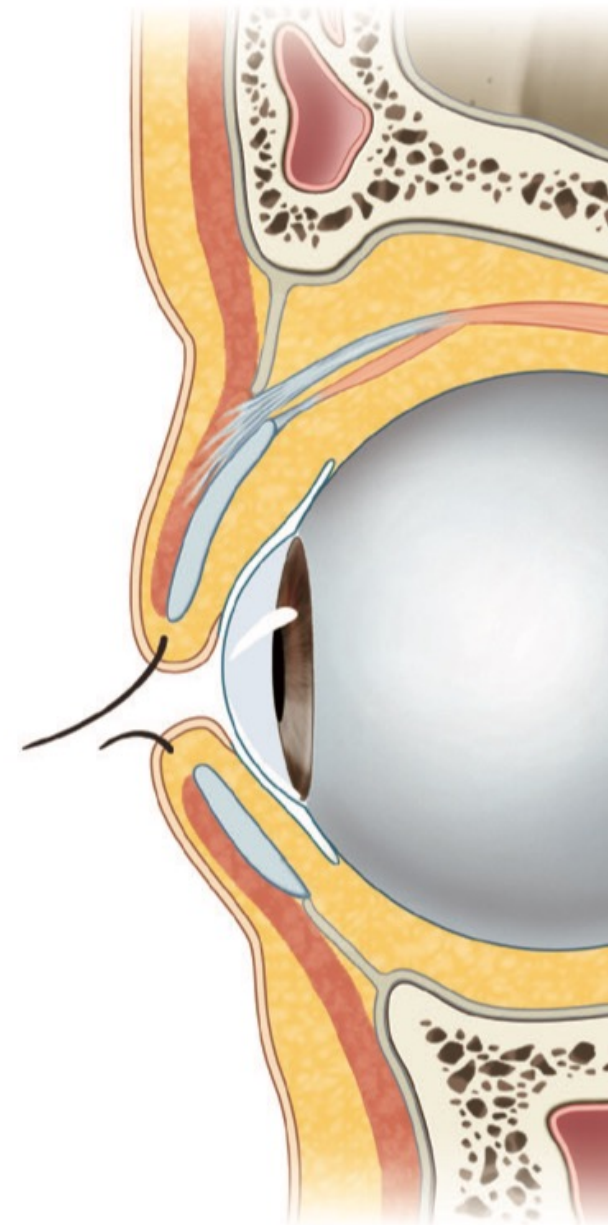


Orbita



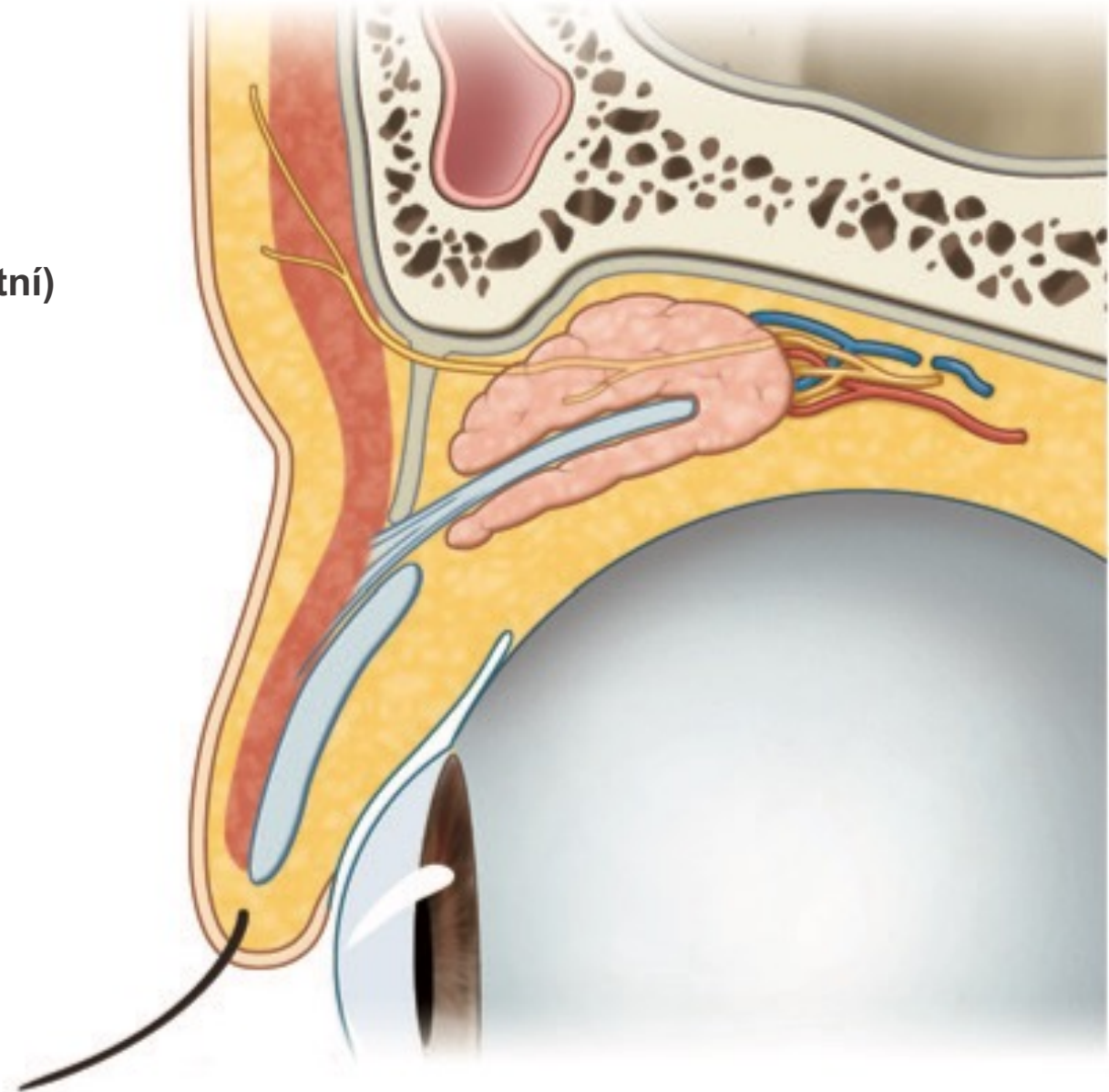
Palpebrae - eyelids

- ♦ Rima palpebrarum
- ♦ **Palpebra superior et inferior**
 - ♦ Commissura palpebrarum medialis et lateralis
- ♦ Cutis – facies anterior
- ♦ Tela subcutanea
 - ♦ Loose connective tissue – edema of eyelids
- ♦ M. orbicularis oculi
 - ♦ Pars orbitalis
 - ♦ Pars palpebralis
 - ♦ Medially inserted into crista lacrimalis
 - ♦ N. facialis (VII) – closes eyelids
 - ♦ Lig. palpebrale mediale et laterale
- ♦ Tarsus superior et inferior
 - ♦ M. levator palpebrae
 - ♦ M. tarsalis superior
- ♦ Tunica conjunctiva – facies posterior
 - ♦ Tunica conjunctiva palpebrarum
 - ♦ Tunica conjunctiva bulbi
 - ♦ Fornix superior
 - ♦ Fornix inferior



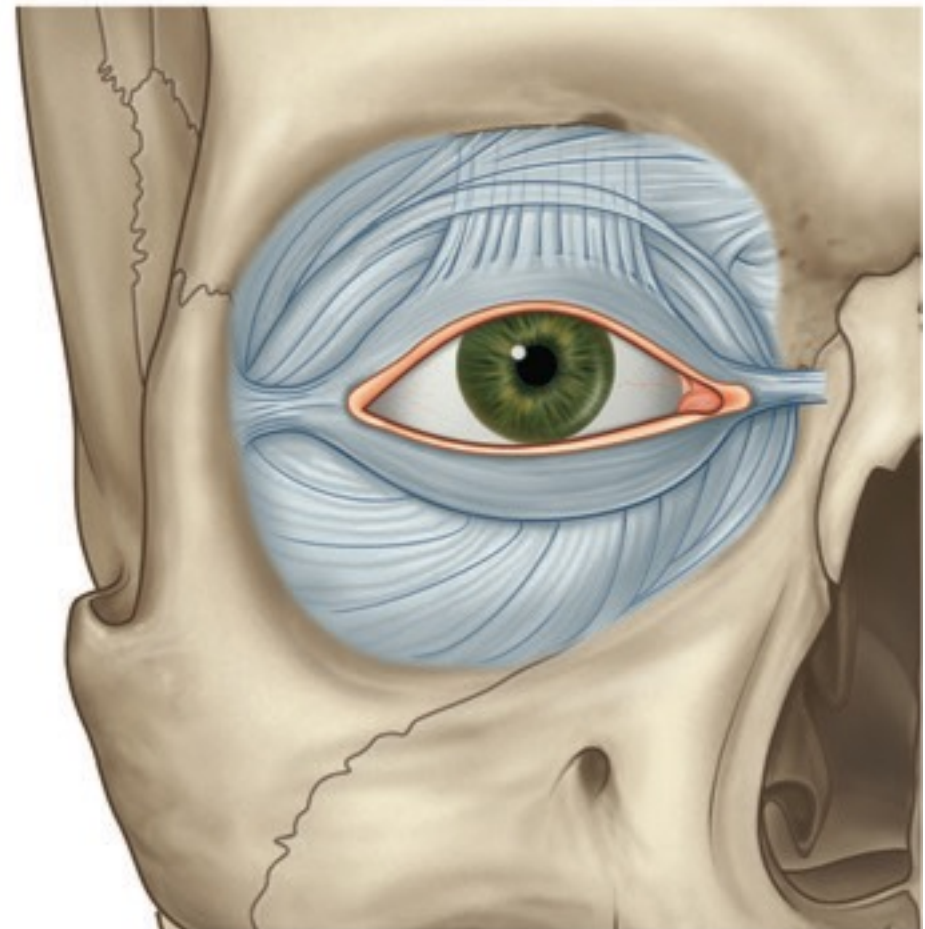
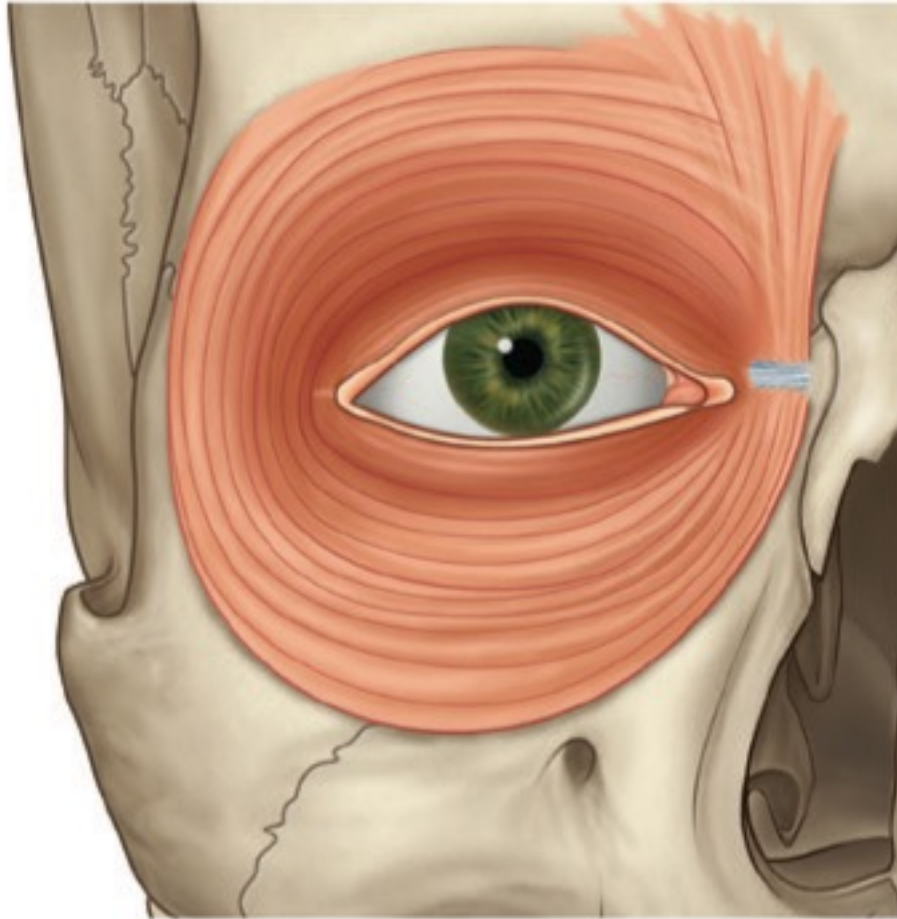
Palpebra - eyelid

- ♦ Supercilia
- ♦ Limbus anterior
- ♦ Cilia
 - ♦ Glandula sebacea ciliai (Zeis), glandula ciliaris (Moll) (potní)
 - ♦ Obstruction and inflammation – stye,
- ♦ Tarsus superior - fibrous plate
 - ♦ Glandula tarsalis (Meibom) - chalazion
- ♦ Septum orbitale – navazuje na periorbitu
- ♦ M. levator palpebrae superioris
 - ♦ *stripped*
 - ♦ *N. oculomotorius (III) - ptosis*
- ♦ M. tarsalis superior
 - ♦ *smooth*
 - ♦ *Sympatheticus – cervical symp. Impairment - ptosis*
- ♦ Limbus posterior
- ♦ Conjunctiva



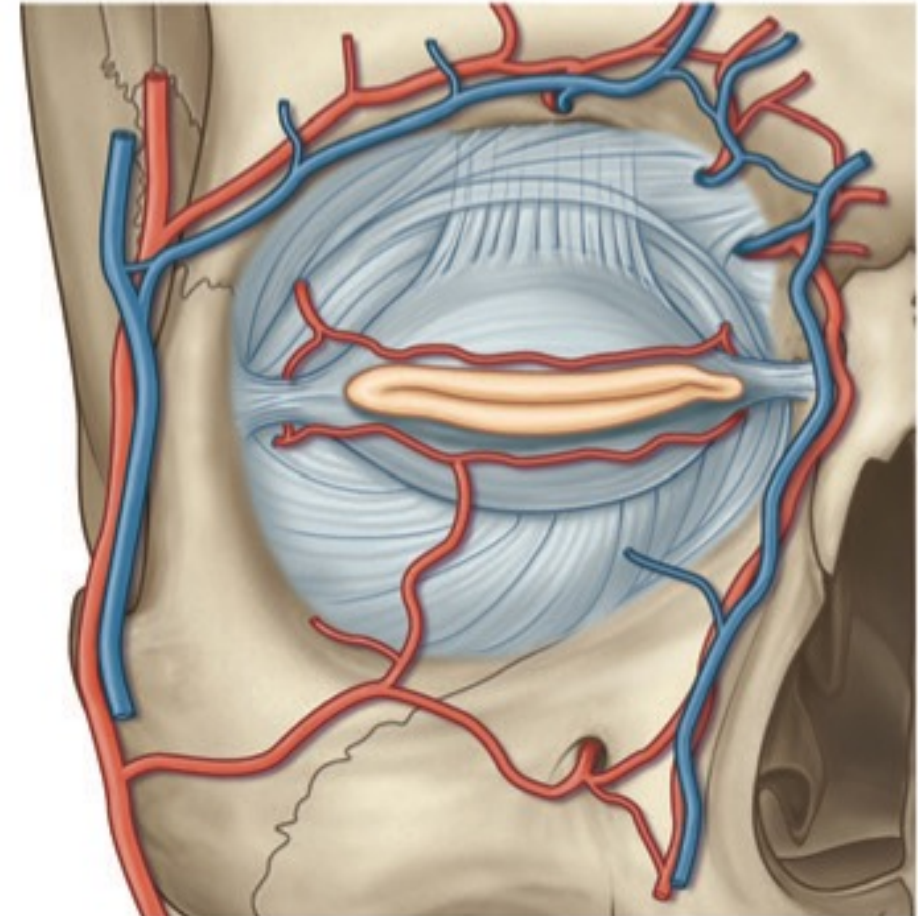
Palpebrae

- m. orbicularis oculi, septum orbitale, tendo m. levator palpebrae sup., ligg. palpebralia



Vasa palpebrarum

- ♦ **A. ophtalmica**
- ♦ A. supratrochlearis
- ♦ A. supraorbitalis
- ♦ A. lacrimalis
- ♦ **A. temporalis superficialis**
- ♦ A. transversa faciei
- ♦ A. infraorbitalis
- ♦ **A. facialis**
- ♦ A. angularis
- ♦ **veins**
 - ♦ Accompanied to arteries
 - ♦ Connection tov. retromandibularis
 - ♦ Sinus cavernosus
 - ♦ Infection spread



Nervi palpebrarum

♦ Sensoric innervation

♦ Upper eyelid – n. ophtalmicus (V1)

- ♦ Rami supraorbitales
- ♦ Rami supratrochleares
- ♦ Rami infratrochleares
- ♦ Rami lacrimales

♦ Lower eyelid – n. maxillaris (V2)

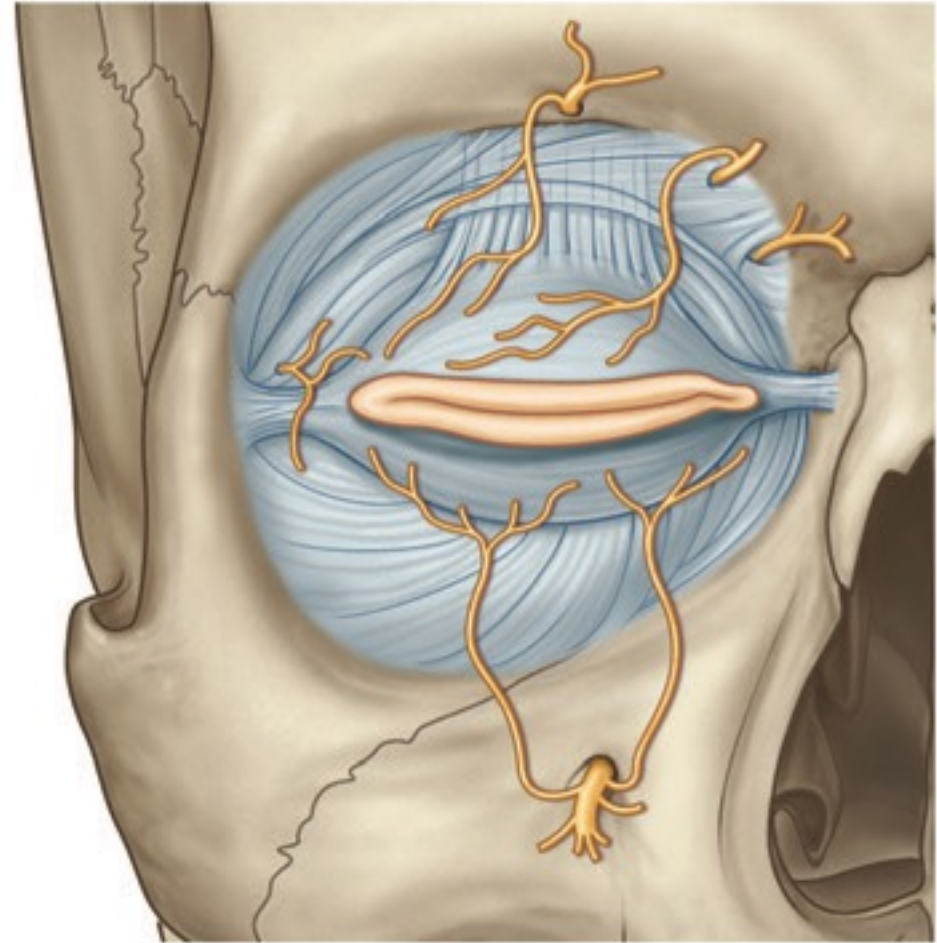
- ♦ Ramus infraorbitalis

♦ Motor innervation

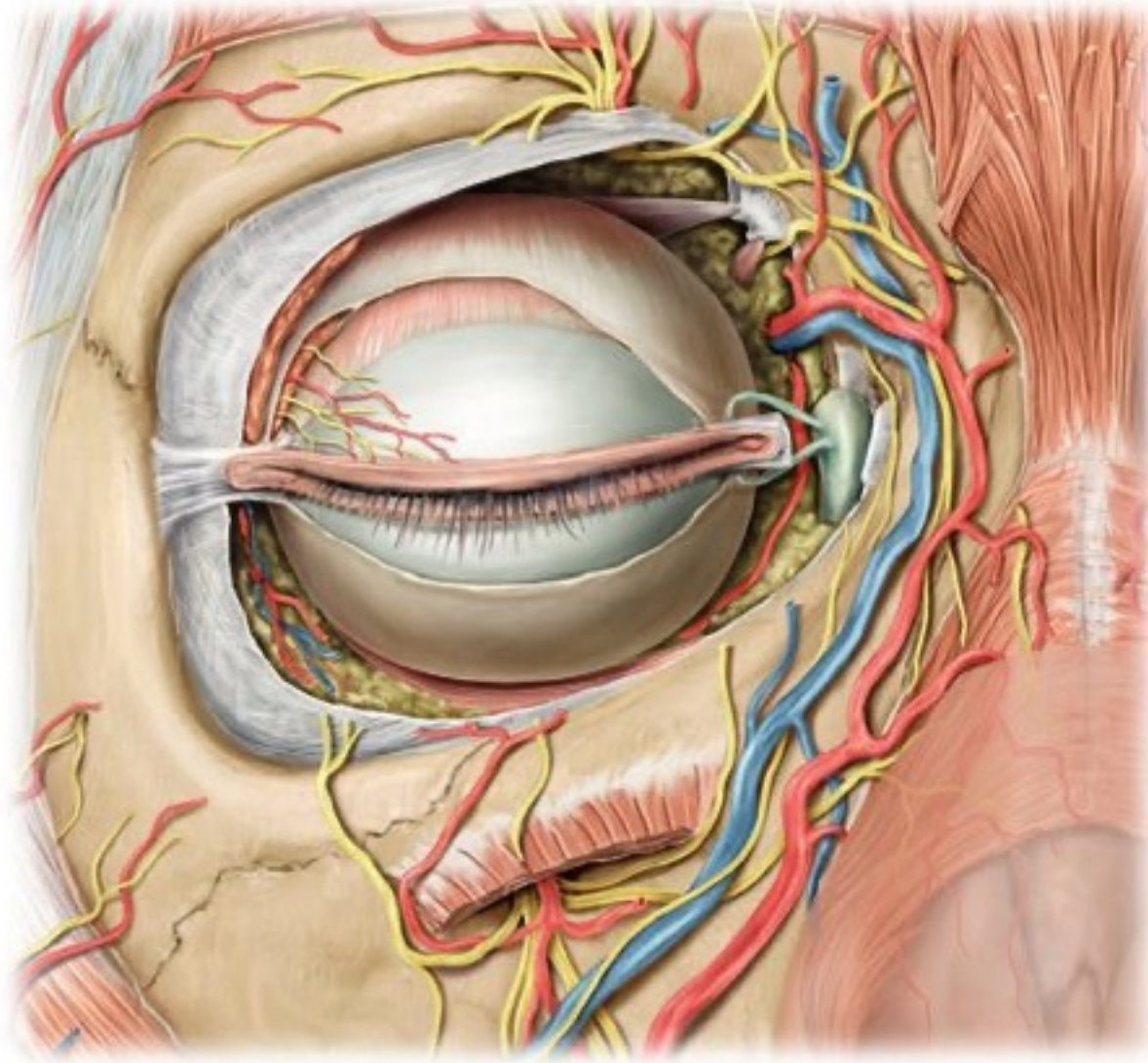
- ♦ N. facialis (VII) – m. orbicularis oculi
- ♦ N. oculomotorius (III) – m. levator palpebrae
- ♦ Rami sympatici – m. tarsalis superior

♦ Horner syndrome

- ♦ *Cervical sympatheticus impairment*
- ♦ *Pupillary constriction - miosis – paresis m. dilatator pupillae*
- ♦ *Upperlid ptosis*
- ♦ *Lack of sweating on ipsilateral half of face and neck*



Apparatus lacrimalis



Apparatus lacrimalis

- ♦ **Glandula lacrimalis**

- ♦ Pars orbitalis
- ♦ Pars palpebralis – splitted by tendon of m. levator palpebrae superioris
 - ♦ Glandulae lacrimales accesorii

- ♦ **Rivus lacrimalis, lacum lacrimale**

- ♦ Papilla lacrimalis

- ♦ Punctum lacrimale

- ♦ Canaliculi lacrimales

- ♦ Saccus lacrimalis

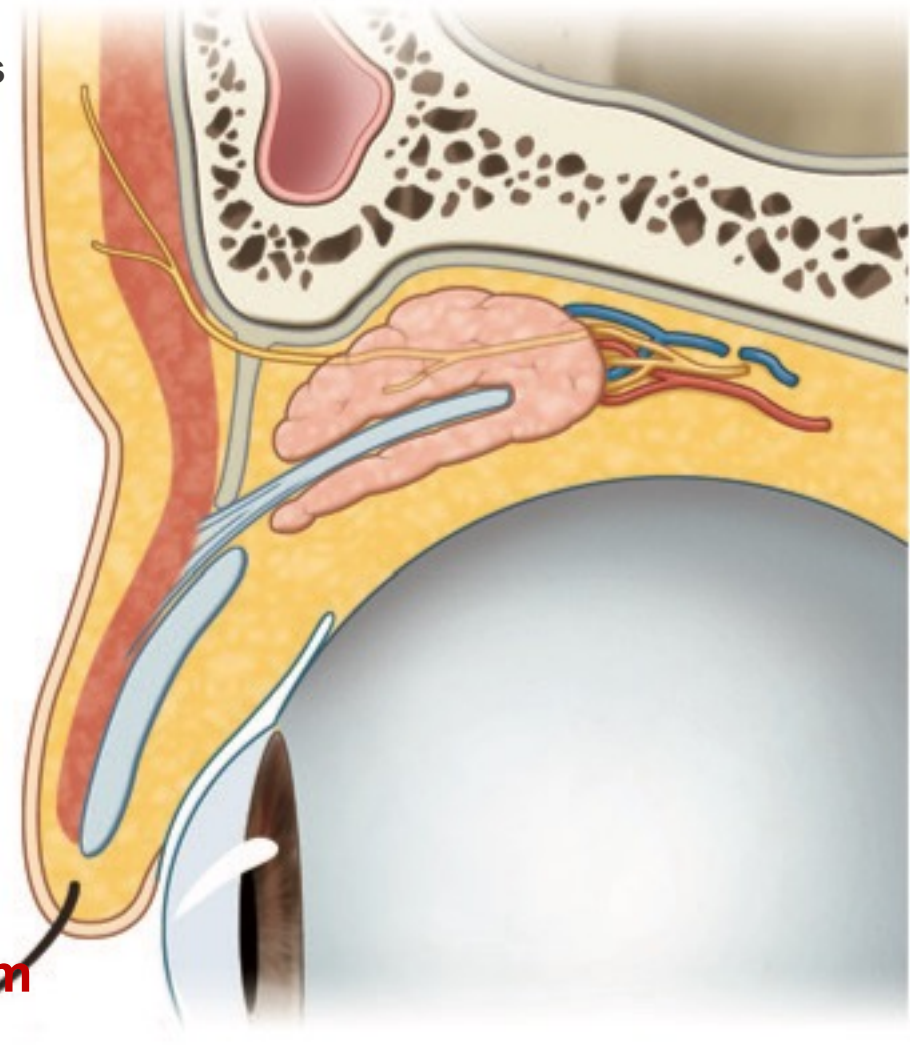
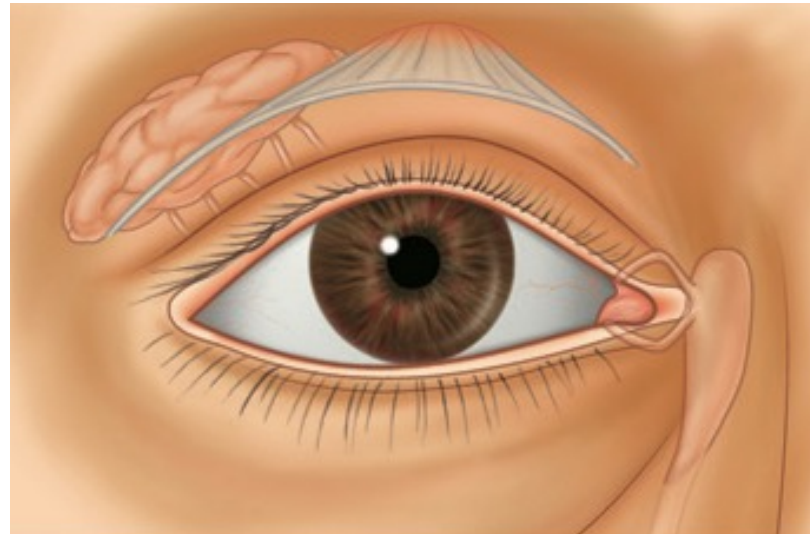
- ♦ Fornix
- ♦ In-growing to priosteum

- ♦ Ductus nasolacrimalis

- ♦ Plica lacrimalis

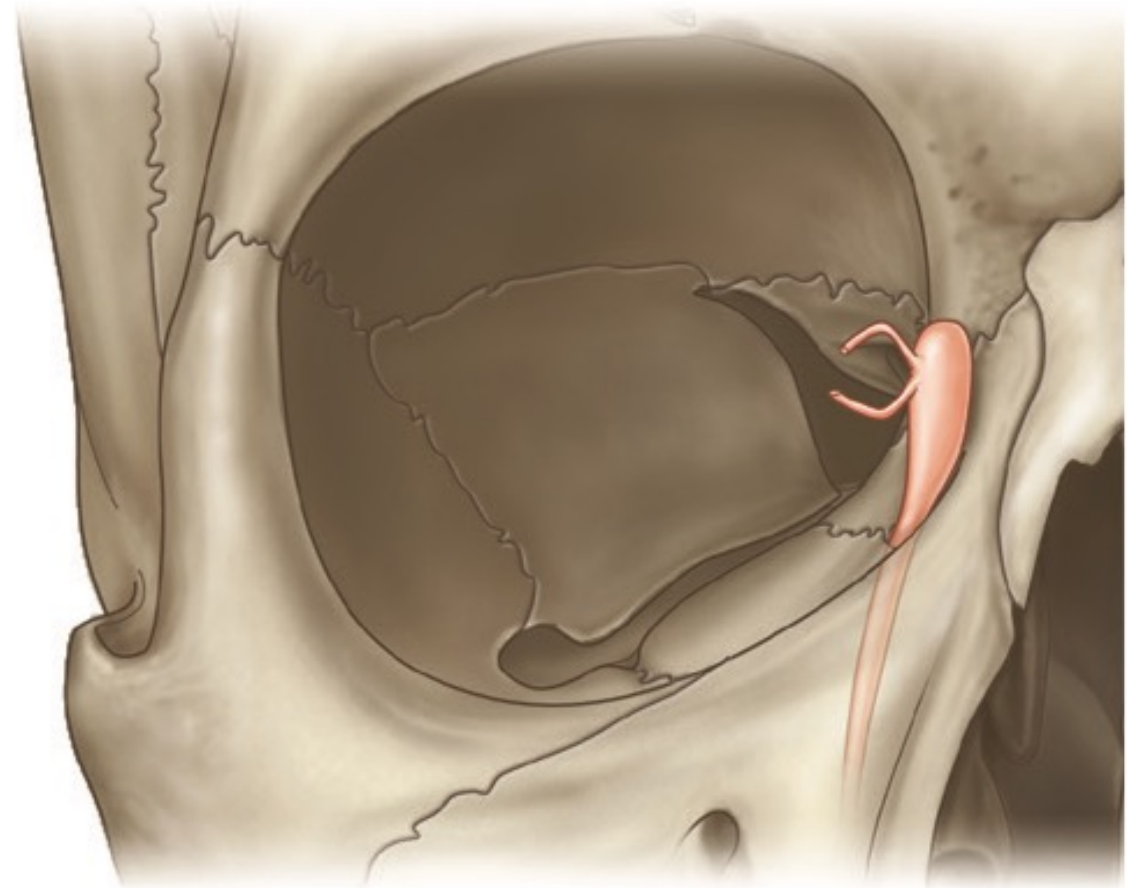
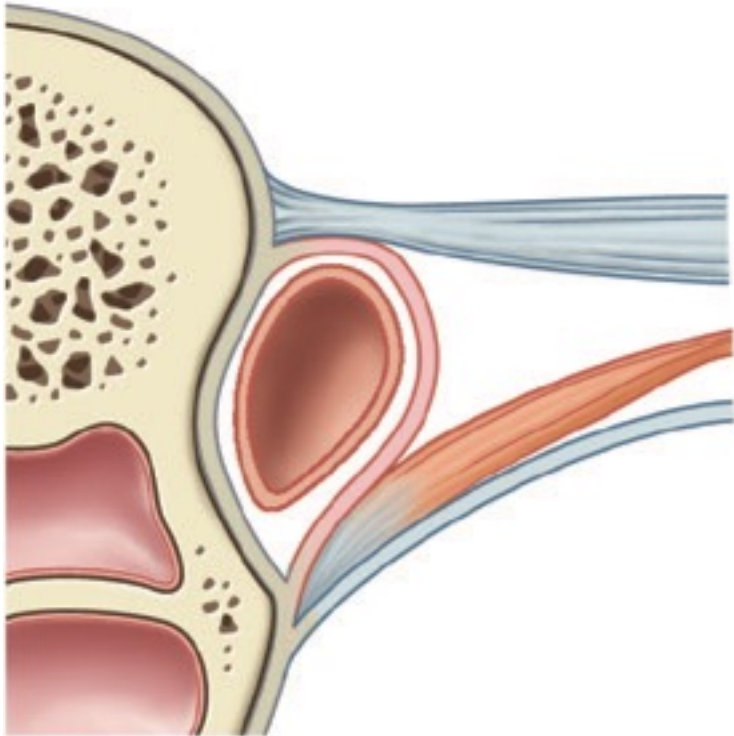
- ♦ Below lower concha

- ♦ **innervation – n. VII, n. petrosus maior – ggl. pterygopalatinum**

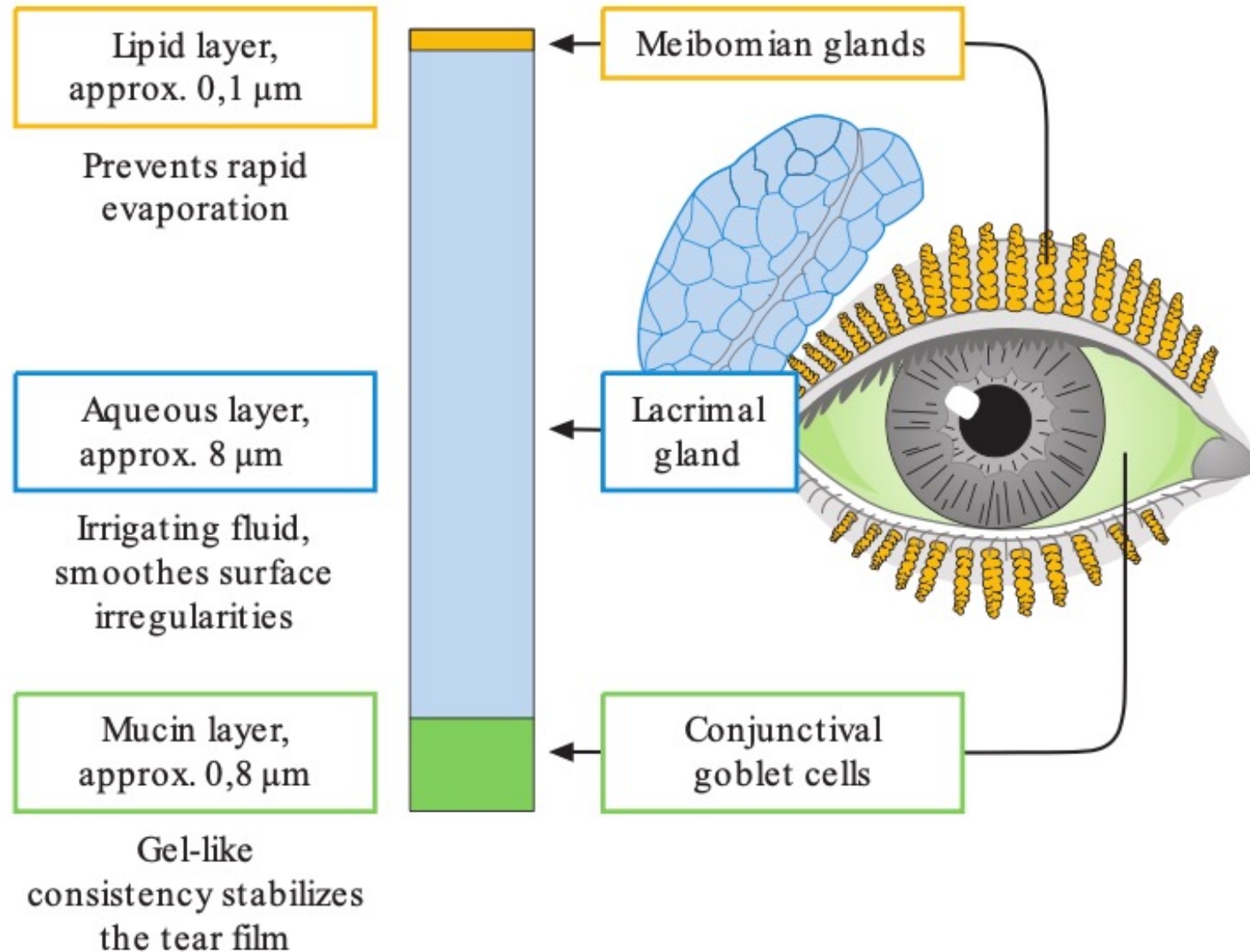


Apparatus lacrimalis

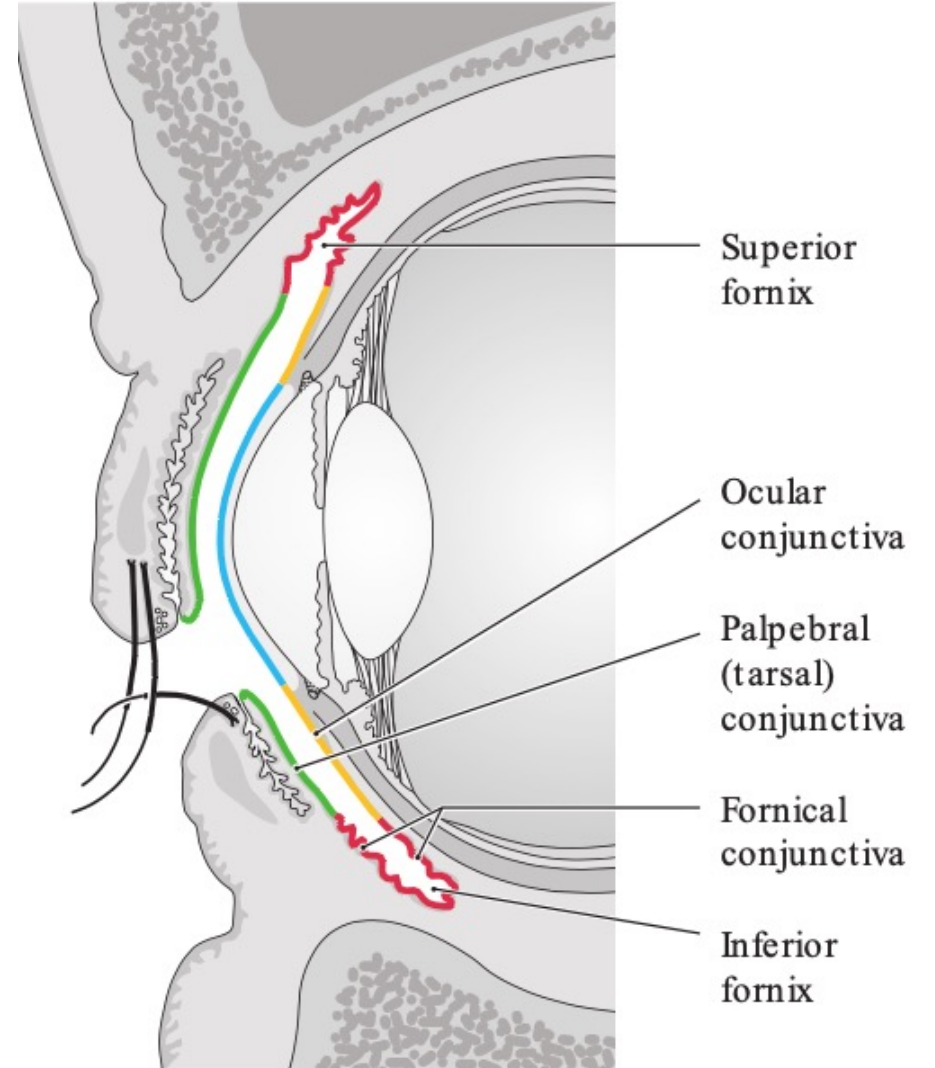
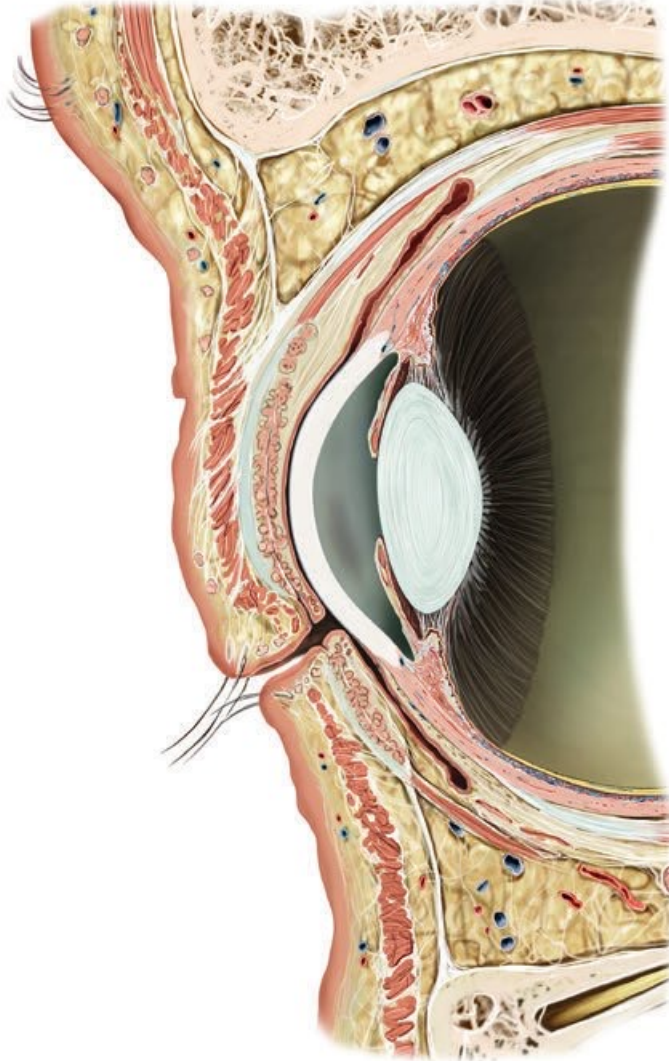
- ♦ **Saccus lacrimalis**
- ♦ **Fundus sacci lacrimalis**
- ♦ **Pars lacrimalis m. orbicularis oculi**
- ♦ **Septum orbitale**



Lacrimalae- slzy - tears

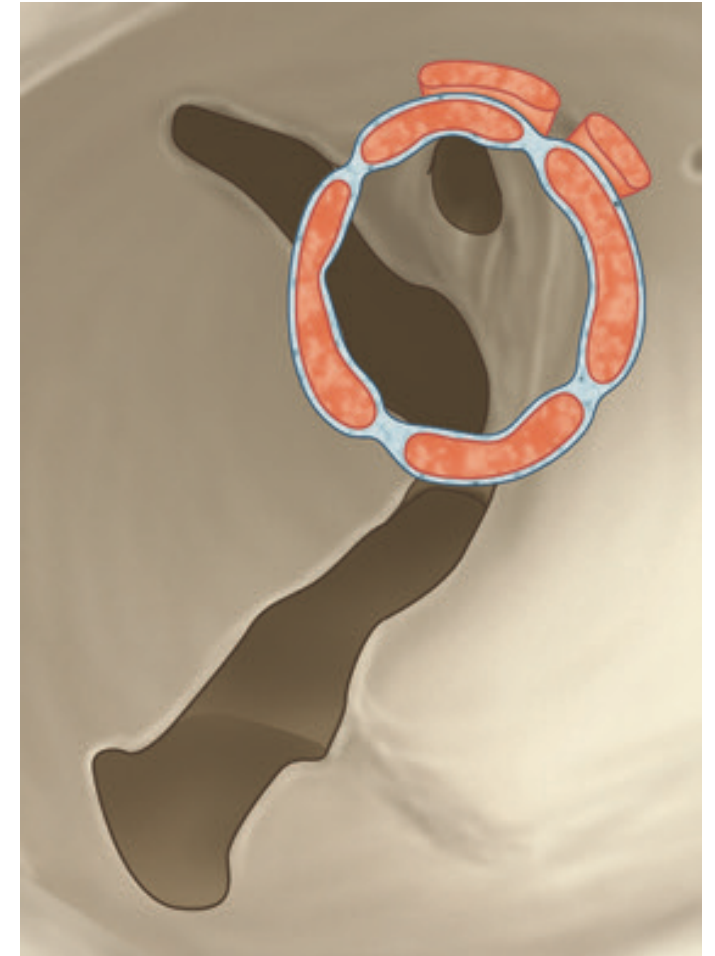
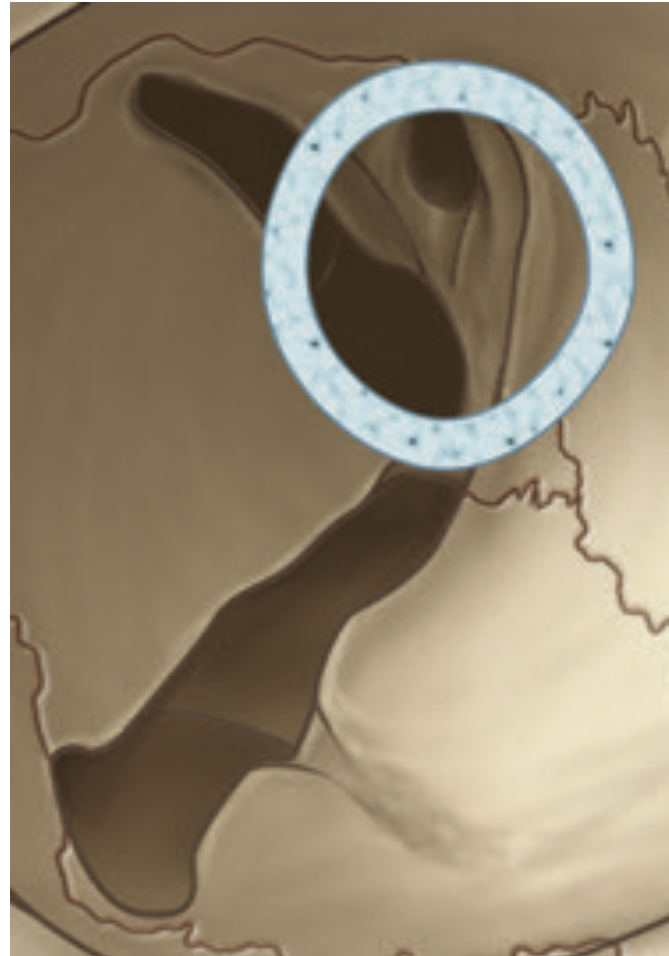


Conjunctiva



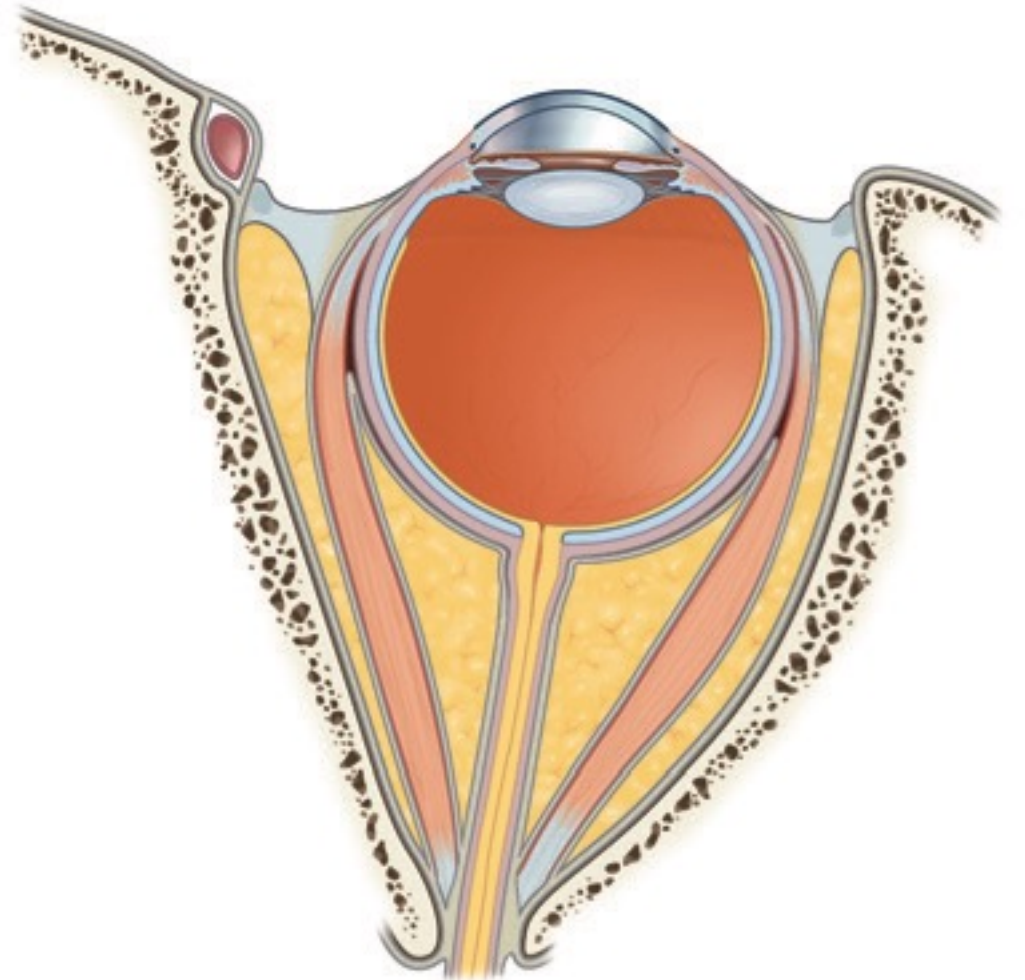
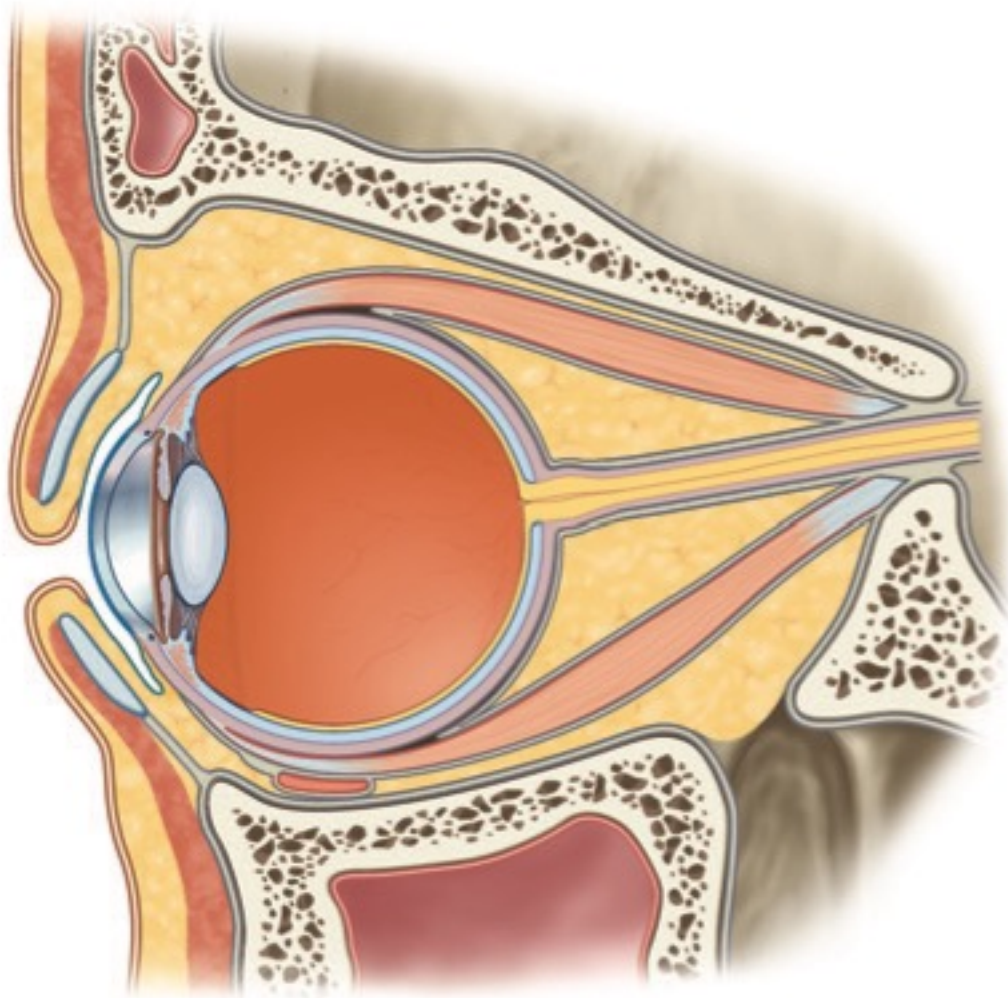
Annulus tendineus communis Zinni

- ♦ Orogen on anulus tendineus
- ♦ M. rectus superior
- ♦ M. rectus medius
- ♦ M. rectus inferior
- ♦ M. rectus latralis
- ♦ **Mimo anulus tendineus**
- ♦ M. levator palpebrae
- ♦ M. obliquus superior
- ♦ M. obliquus inferior



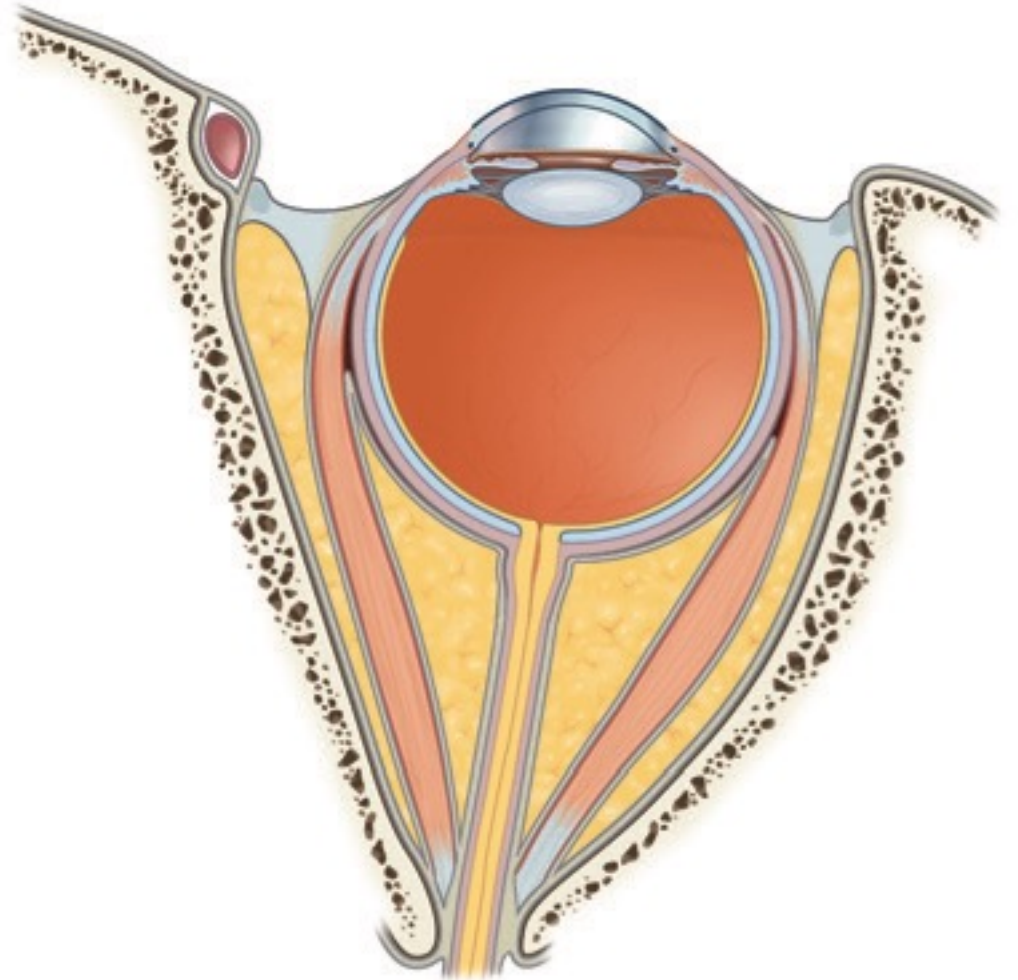
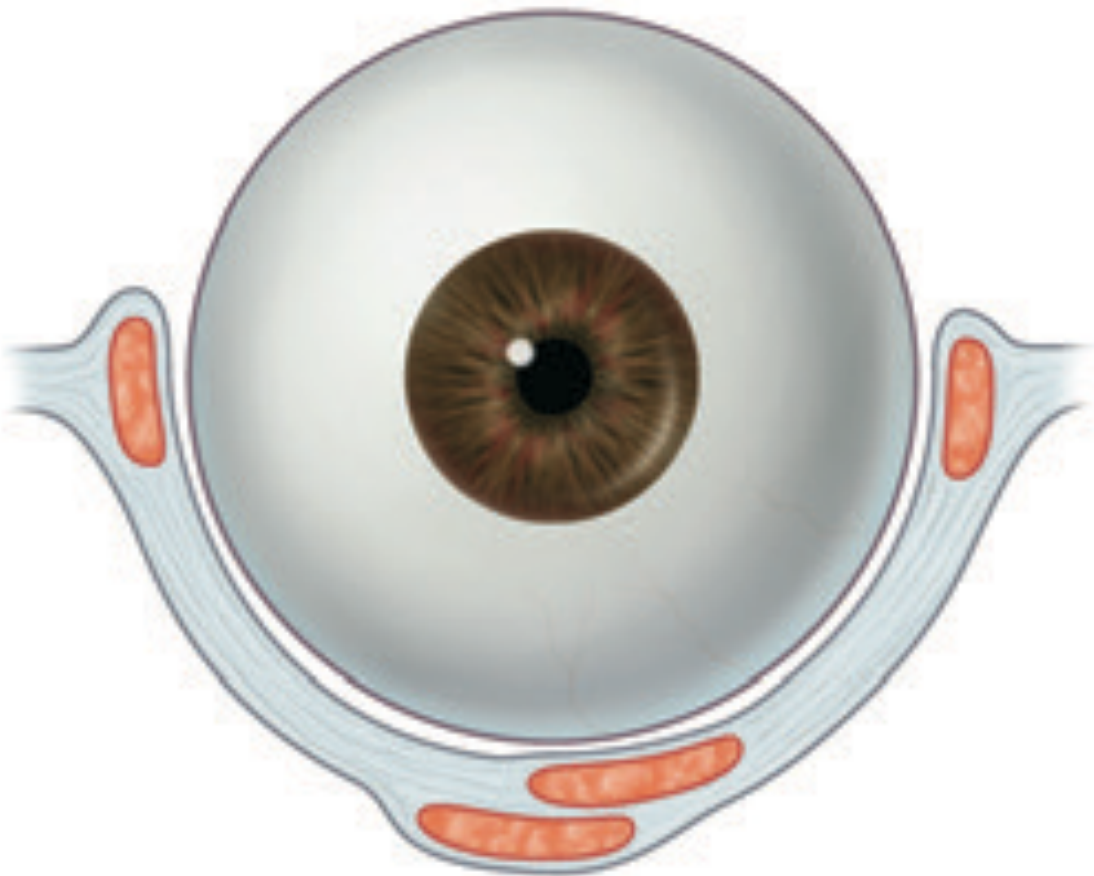
Orbital spaces

- Extraconal and intraconal spaces



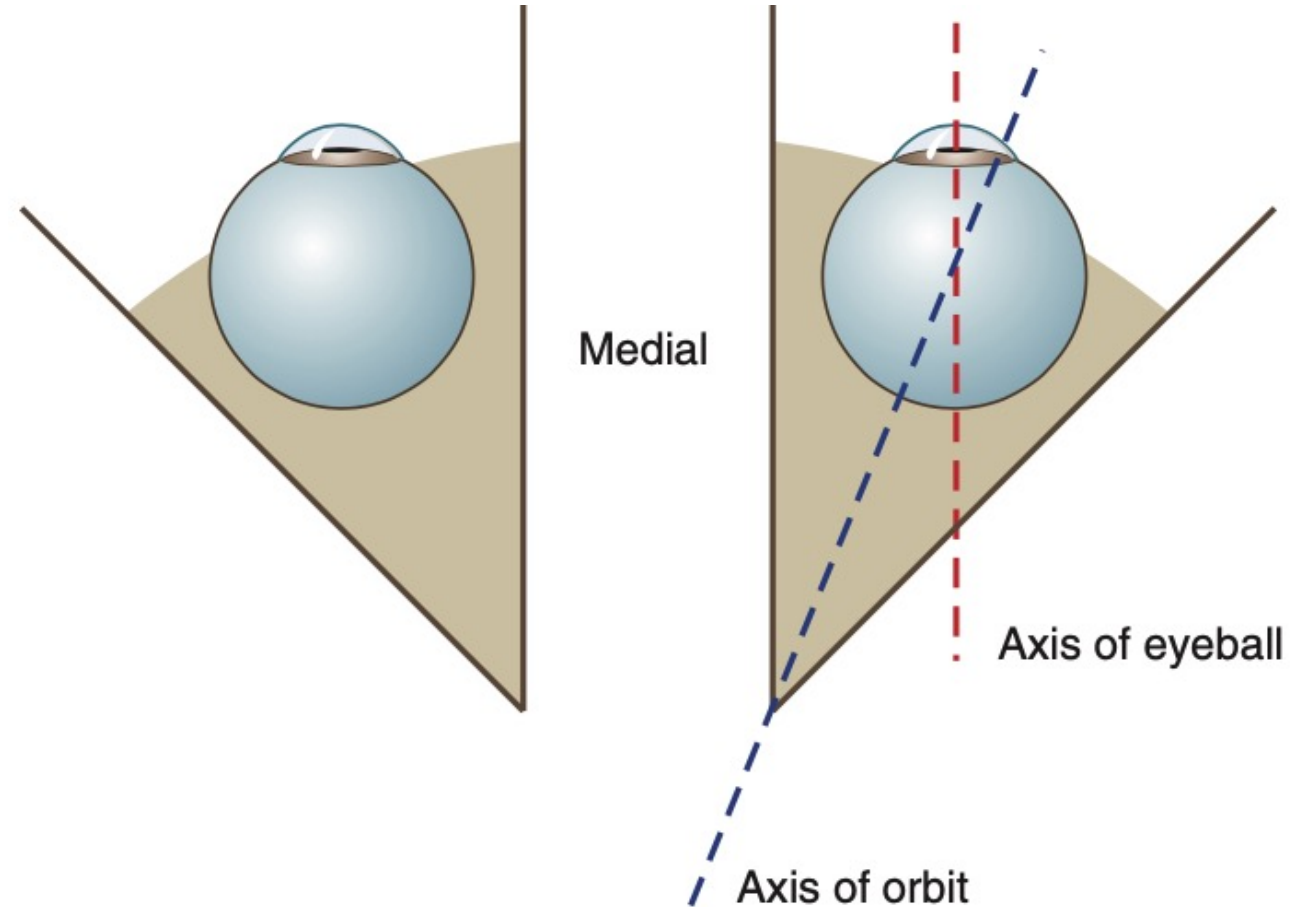
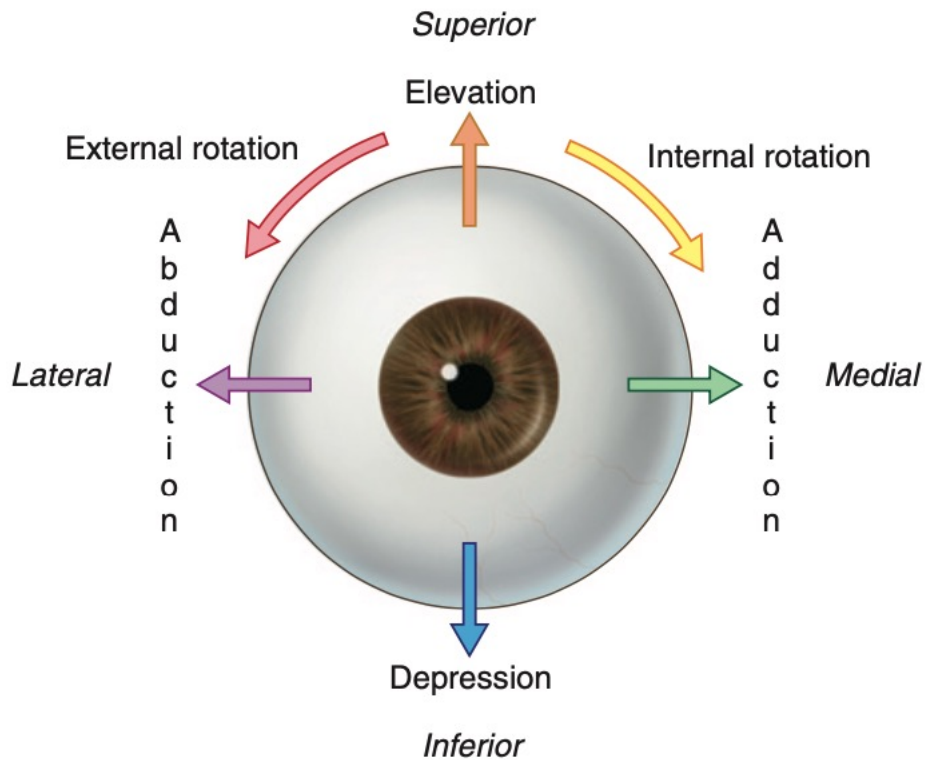
Ligamenta bulbi

- ♦ hanging ligamenta „suspensoria“
- ♦ „braking“ ligamenta
- ♦ Spatium episclerale

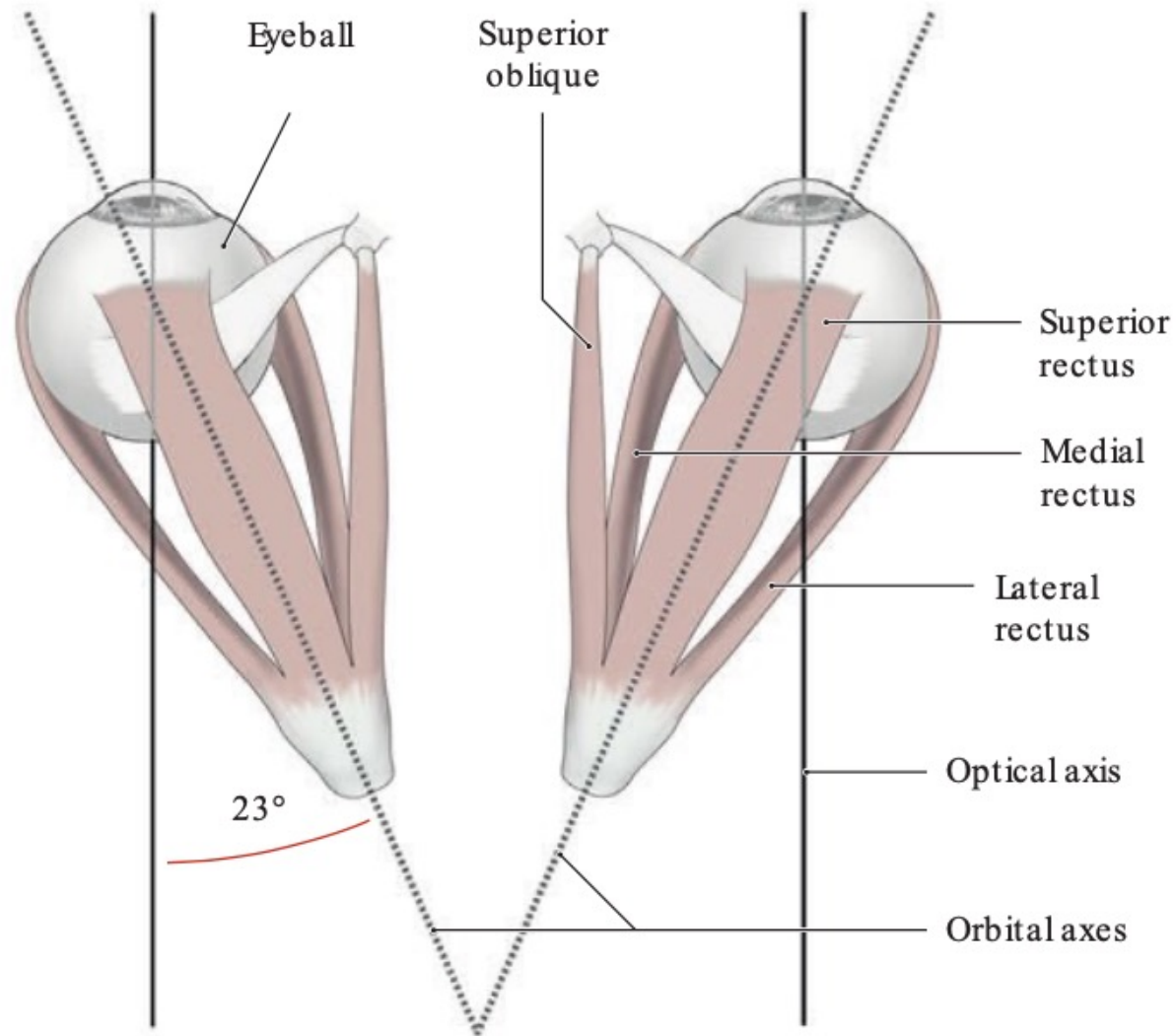


Pohled – visus - gaze

- Bulbar motions
- Axis bulbi
- Axis orbitae



Optical and orbital axis



Musculi bulbi

- ♦ **Recti** – inserted in the front of equator moving towards themselves

- ♦ *Upper and lower have also medial part*

- ♦ **Obliques** – insertion dorsally to equator – contralateral motion of bulb – not so strong

- ♦ **M. rectus superior (III)**

- ♦ **M. rectus medialis (III)**

- ♦ **M. rectus inferior (III)**

- ♦ **M. rectus lateralis (VI)**

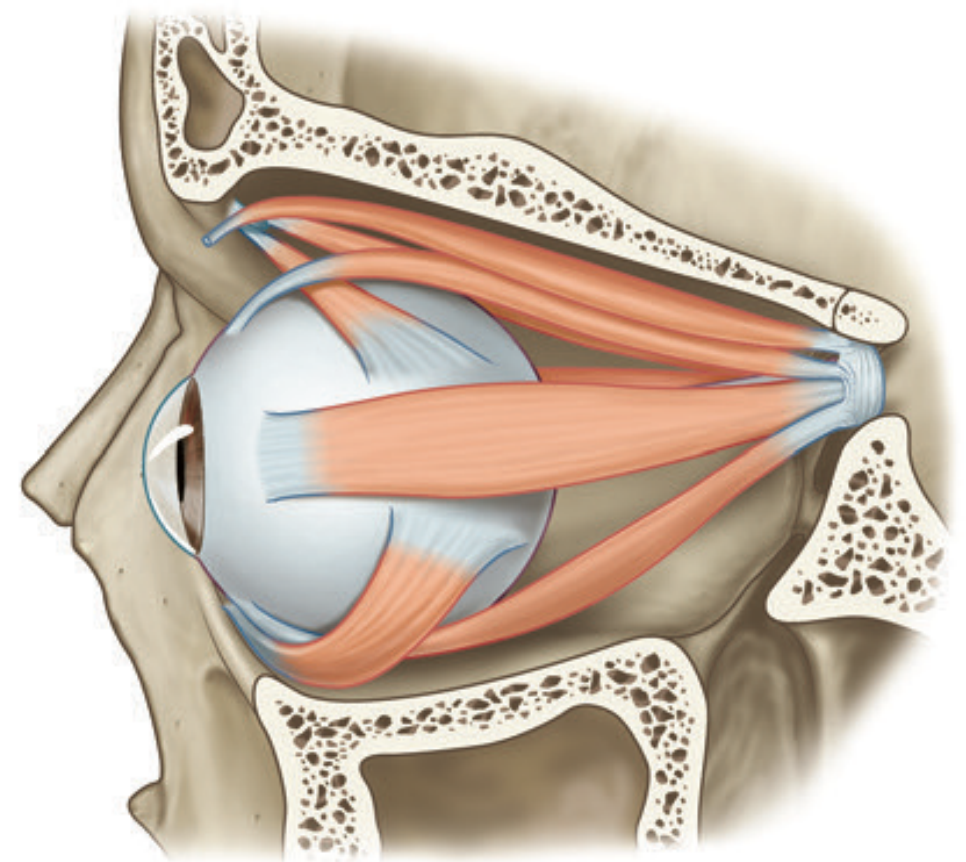
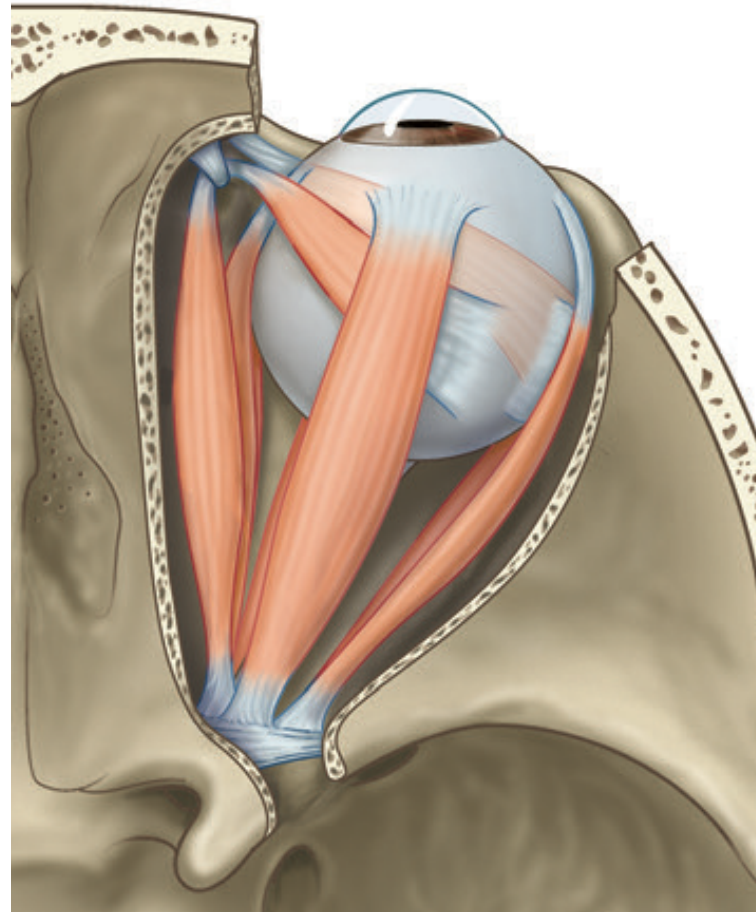
- ♦ **M. obliquus superior (IV)**

- ♦ *trochlea*

- ♦ **M. obliquus inferior (III)**

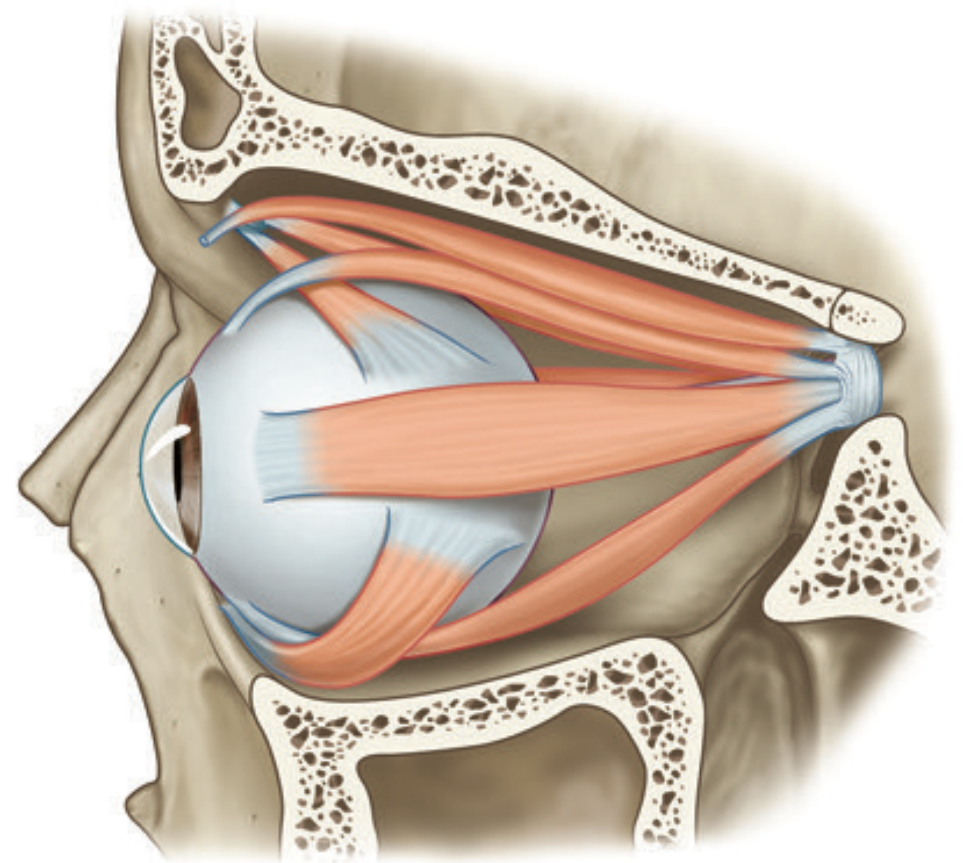
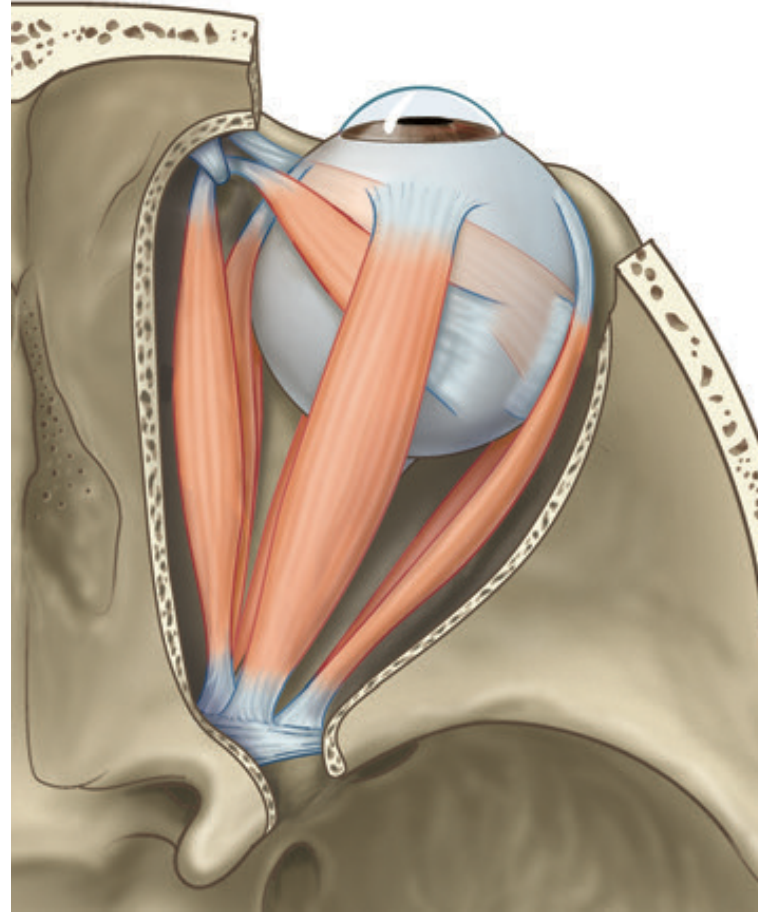
- ♦ *origin maxilla*

- ♦ *Dorsaly to sulcus lacrim.*



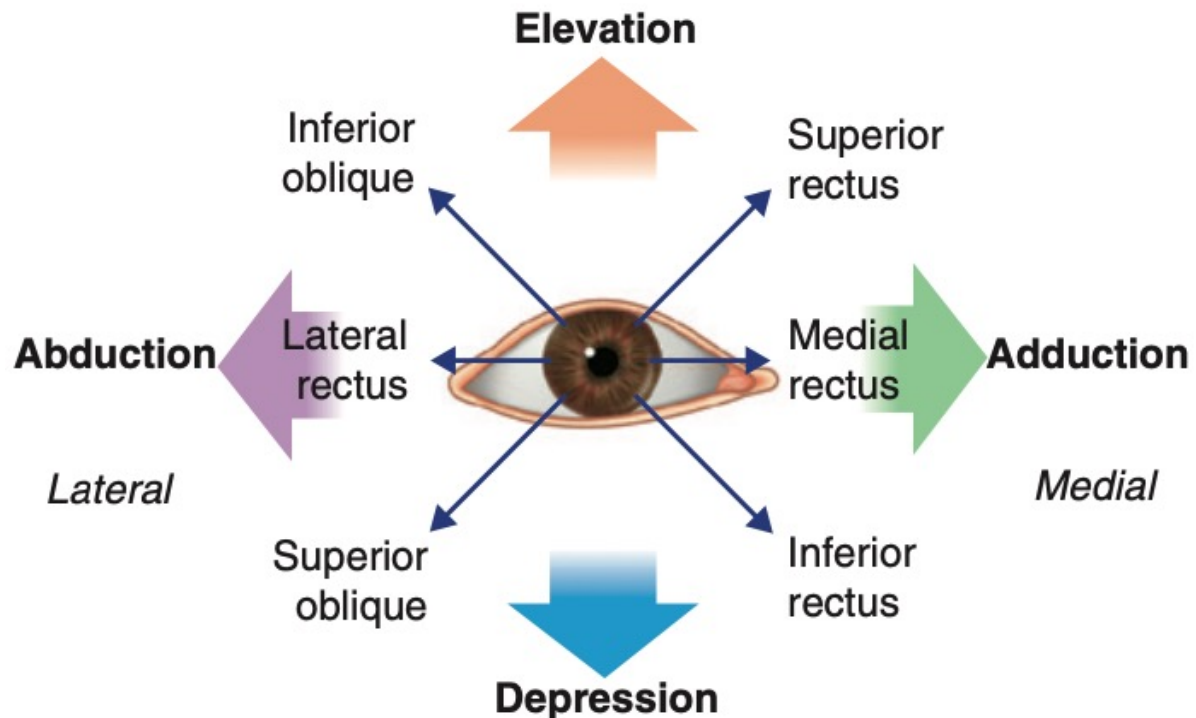
Musculi bulbi

- ♦ **Recti** – inserted in the front of equator moving towards themselves
 - ♦ *Upper and lower have also medial part*
- ♦ **Obliques** – insertion dorsally to equator – contralateral motion of bulb – not so strong



Musculi bulbi

- ♦ **Muscular coordination**
- ♦ **Rotation motion – slow, gaze direction**
- ♦ **Sakkadic motion – fast searching**
- ♦ **Muscular test**



Muscle tested		Direction to move eye when testing muscle
Superior rectus		Look laterally and upward
Inferior rectus		Look laterally and downward
Lateral rectus		Look laterally
Medial rectus		Look medially
Inferior oblique		Look medially and upward
Superior oblique		Look medially and downward

Vasa orbitales

♦ A. ophtalmica

- ♦ A. lacrimalis
- ♦ A. centralis retinae
- ♦ Aa. ciliares breves
- ♦ Aa. ciliares longes
- ♦ „scleral piercing“
- ♦ A. supraorbitalis
- ♦ A. supratrochlearis
 - ♦ Aa. ethmoidalis post. et ant.
 - ♦ A. nasalis dorsalis

♦ Vv. ciliares

♦ V. ophtalmica superior

- ♦ Sinus cavernosus

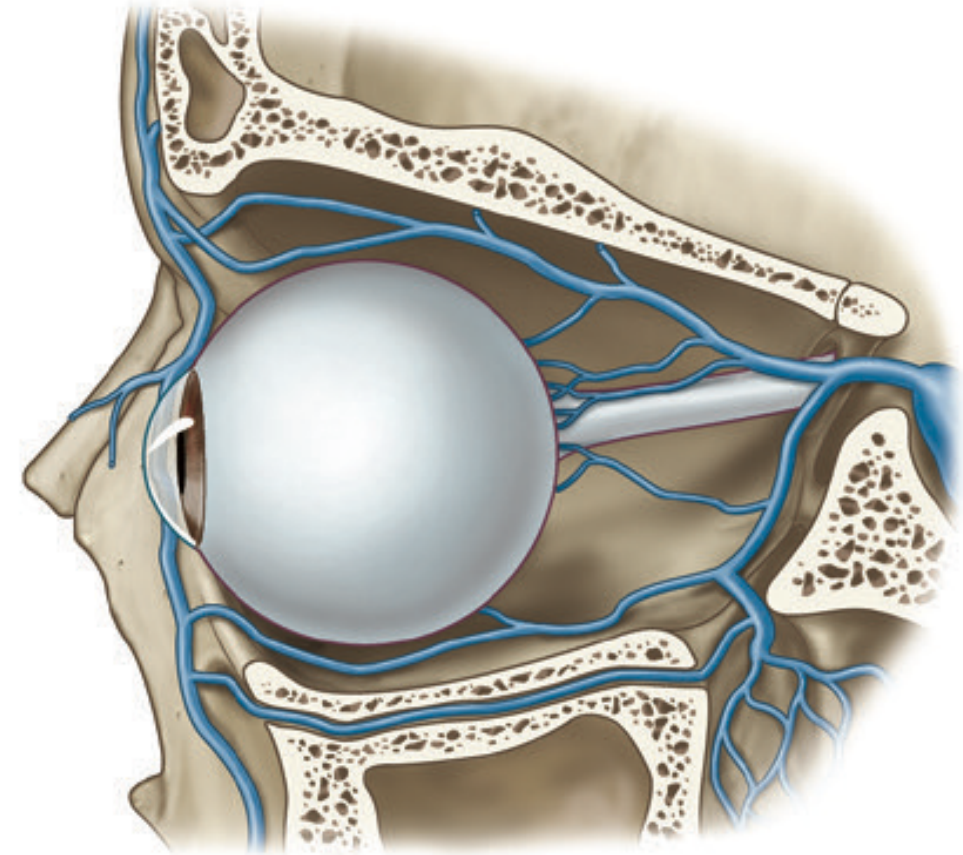
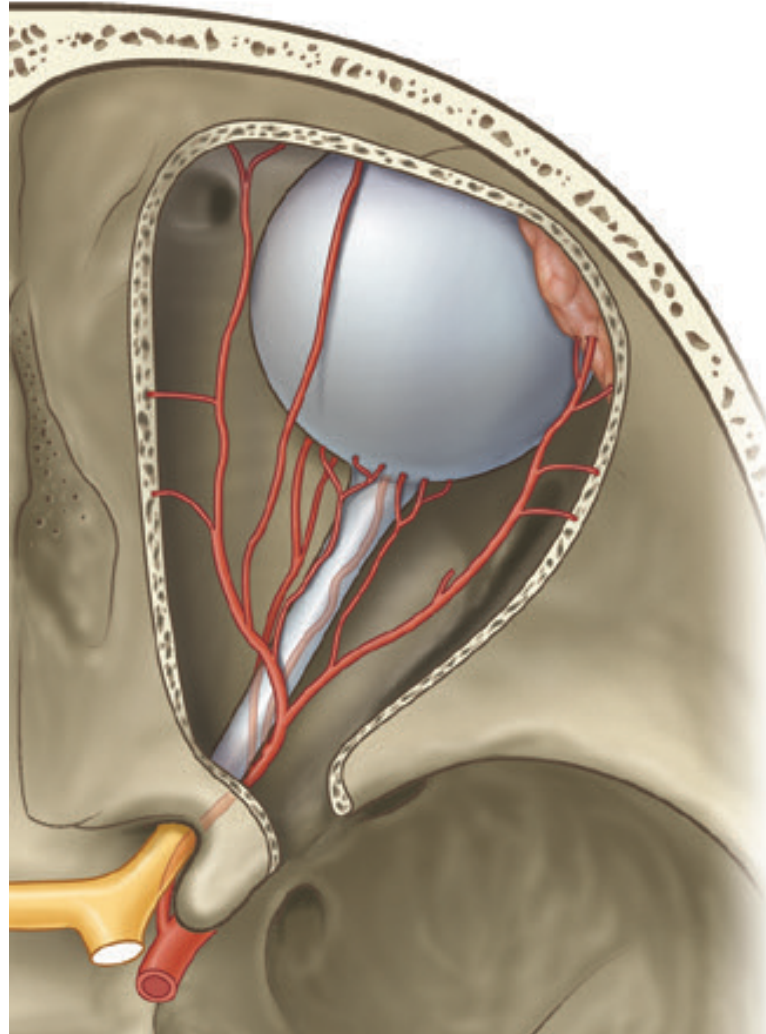
♦ V. ophtalmica inferior

- ♦ Plexus pterygoideus

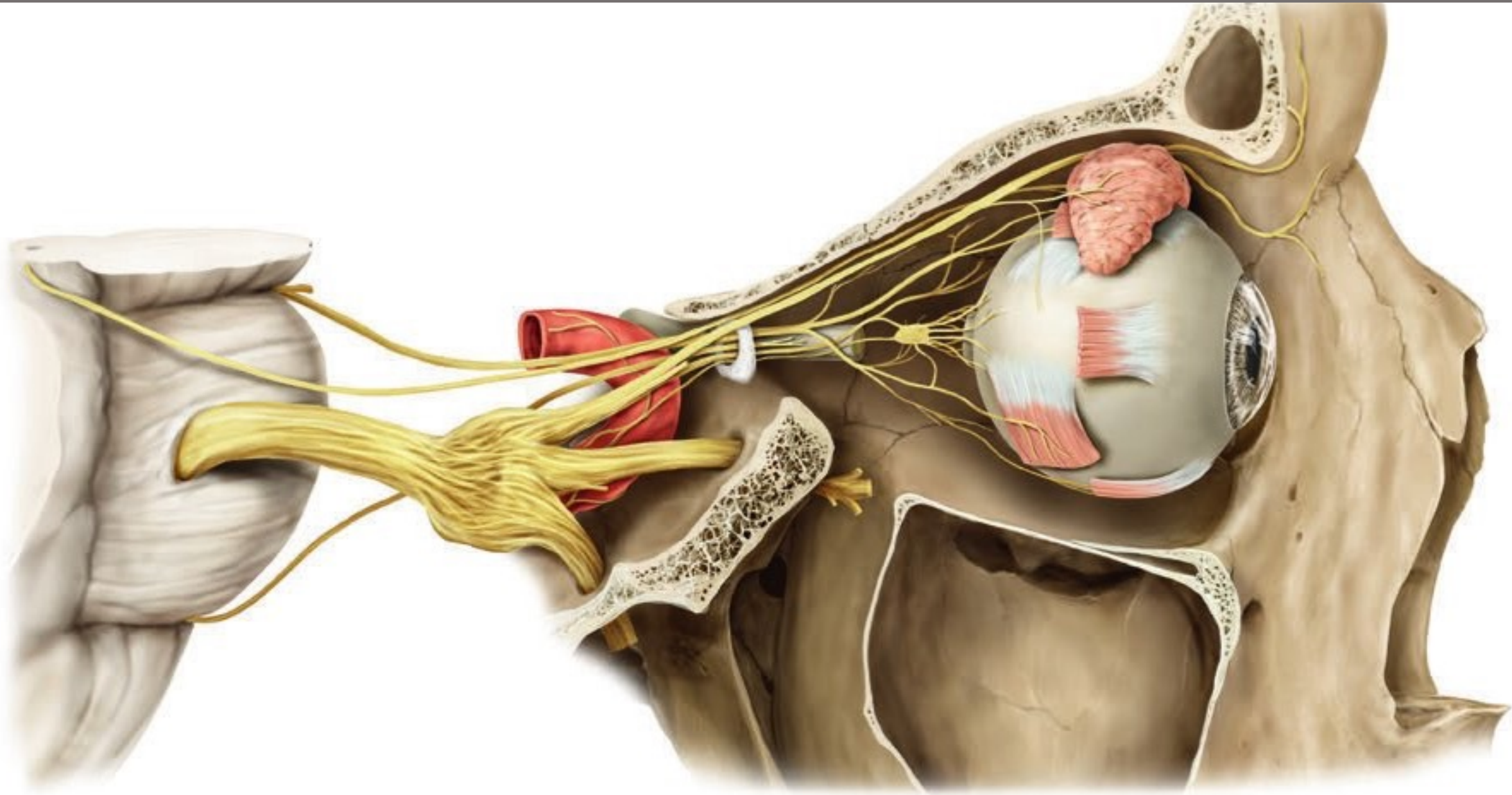
♦ V. supraorbitalis

♦ V. angularis

♦ V. infraorbitalis



Nervi orbitae

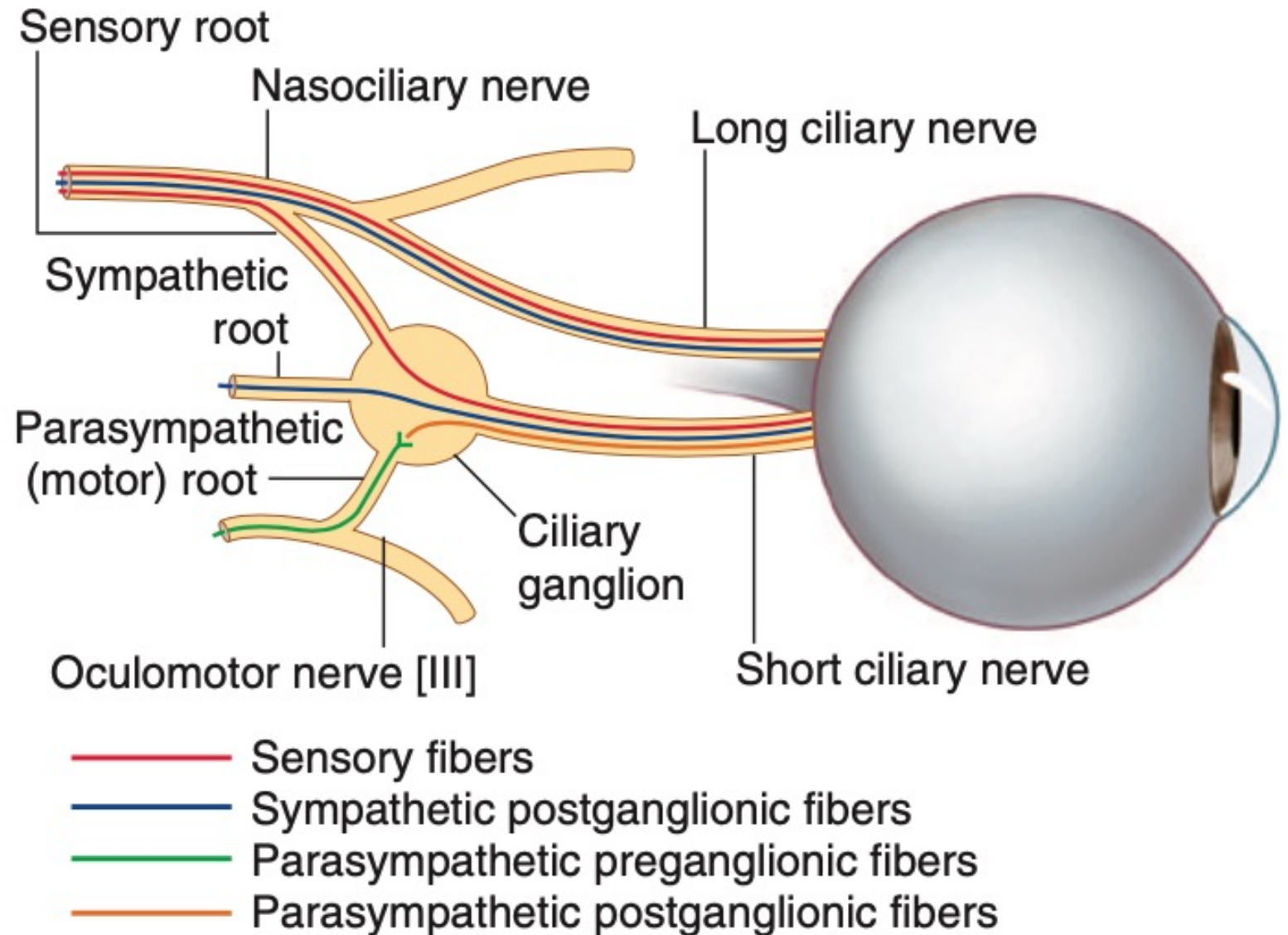


Nervi orbitae



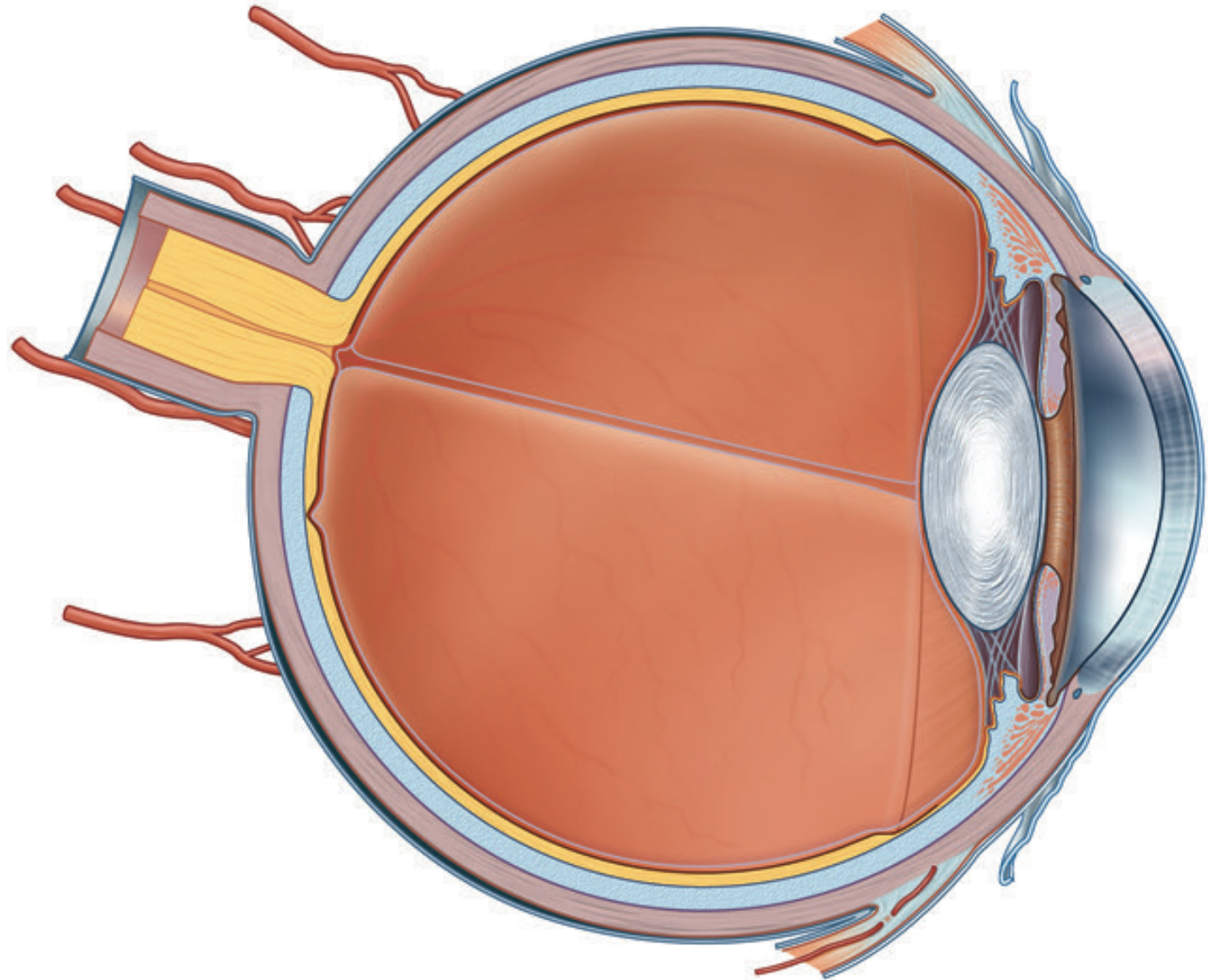
Nervi bulbi

- ♦ **Parasympathicus**
- ♦ **N. oculomotorius**
- ♦ **Ganglion ciliare**
 - ♦ N. ciliaris brevis
- ♦ **Sympathicus**
- ♦ **Plexus carotideus**
 - ♦ Sinus cavernosus
- ♦ **N. nasociliaris**
 - ♦ N. ciliaris brevis
 - ♦ N. ciliaris longus
- ♦ **sensoric**
- ♦ **N. nasociliaris (V1)**
 - ♦ N. ciliaris longus
 - ♦ N. ciliaris brevis

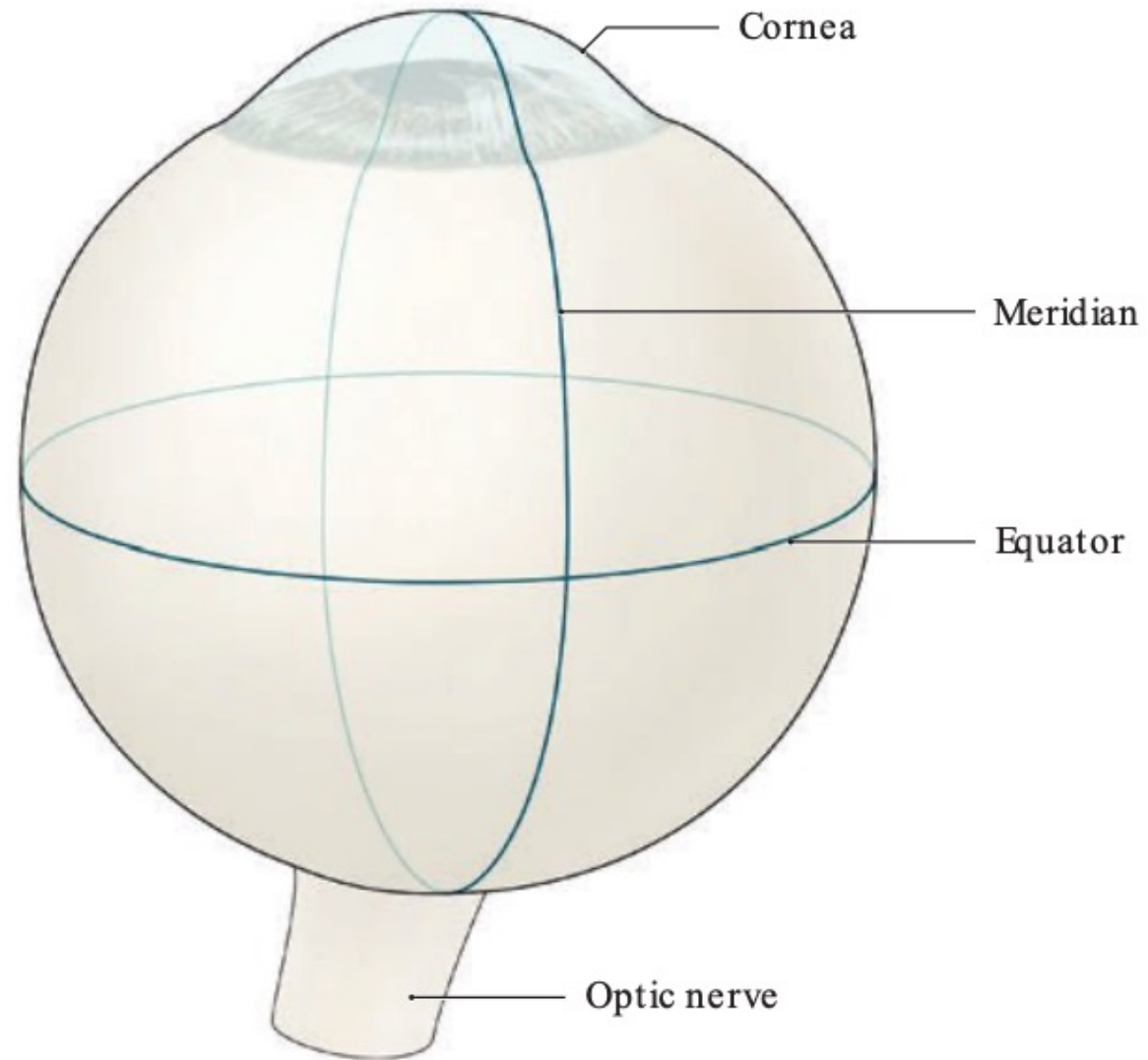


Bulbus oculi - eyeball – oční koule

- ♦ Two spheres with different diameters
- ♦ Sclera – 11 – 12 mm
- ♦ Cornea - 7 – 8 mm
- ♦ Polus anterior = vertex corneae
- ♦ Polus posterior
 - ♦ Laterally to exit of n. opticus
- ♦ Axis bulbi internus
- ♦ Axis bulbi externus
- ♦ Linea visus
- ♦ Meridiani bulbi
- ♦ Aequator bulbi
- ♦ *Canalis hyaloideus*

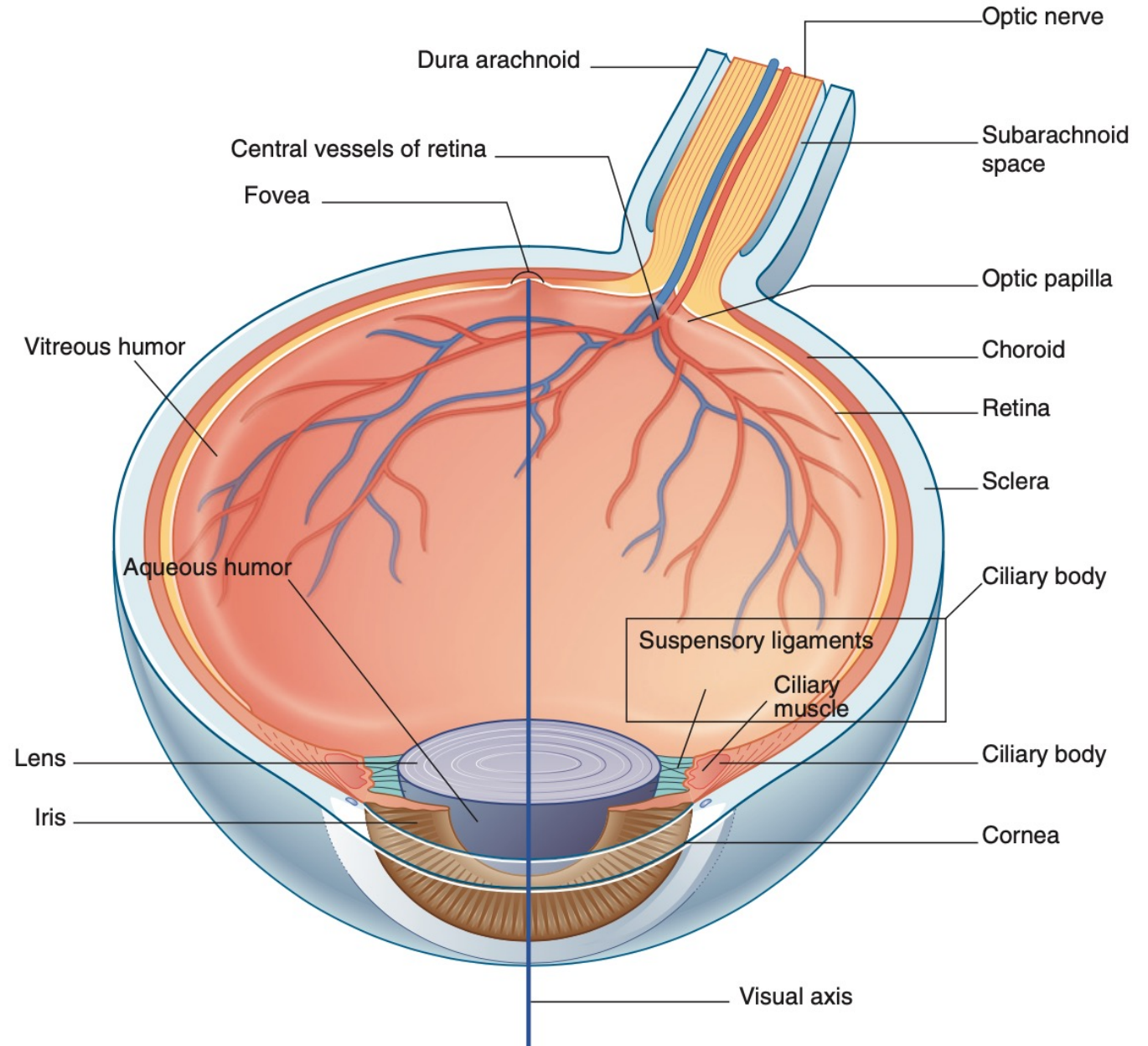


Equator, meridiani



Bulbus oculi

- ♦ Tunica fibrosa bulbi
 - ♦ Cornea
 - ♦ Sclera
- ♦ Tunica vasculosa bulbi - uvea
 - ♦ Choridea
 - ♦ Corpus ciliare
 - ♦ Iris
 - ♦ pupila
- ♦ Tunica interna bulbi
 - ♦ Retina
 - ♦ *Pars optica retinae*
 - ♦ *Pars caeca*
 - ♦ Pars ciliaris
 - ♦ Pars iridica
- ♦ Corpus vitreum – canalis hyaloideus
- ♦ Lens
- ♦ Humor acquosus
 - ♦ Camera oculi anterior
 - ♦ Camera oculi posterior



Camerae oculi

- ♦ **Cornea**

- ♦ Limbus corenae

- ♦ **Camera anterior**

- ♦ **Iris**

- ♦ Dilator pupillae – sympathicus – plexus caroticus
- ♦ Sphincter pupillae – parasympaticus – n. III

- ♦ **Camera posterior**

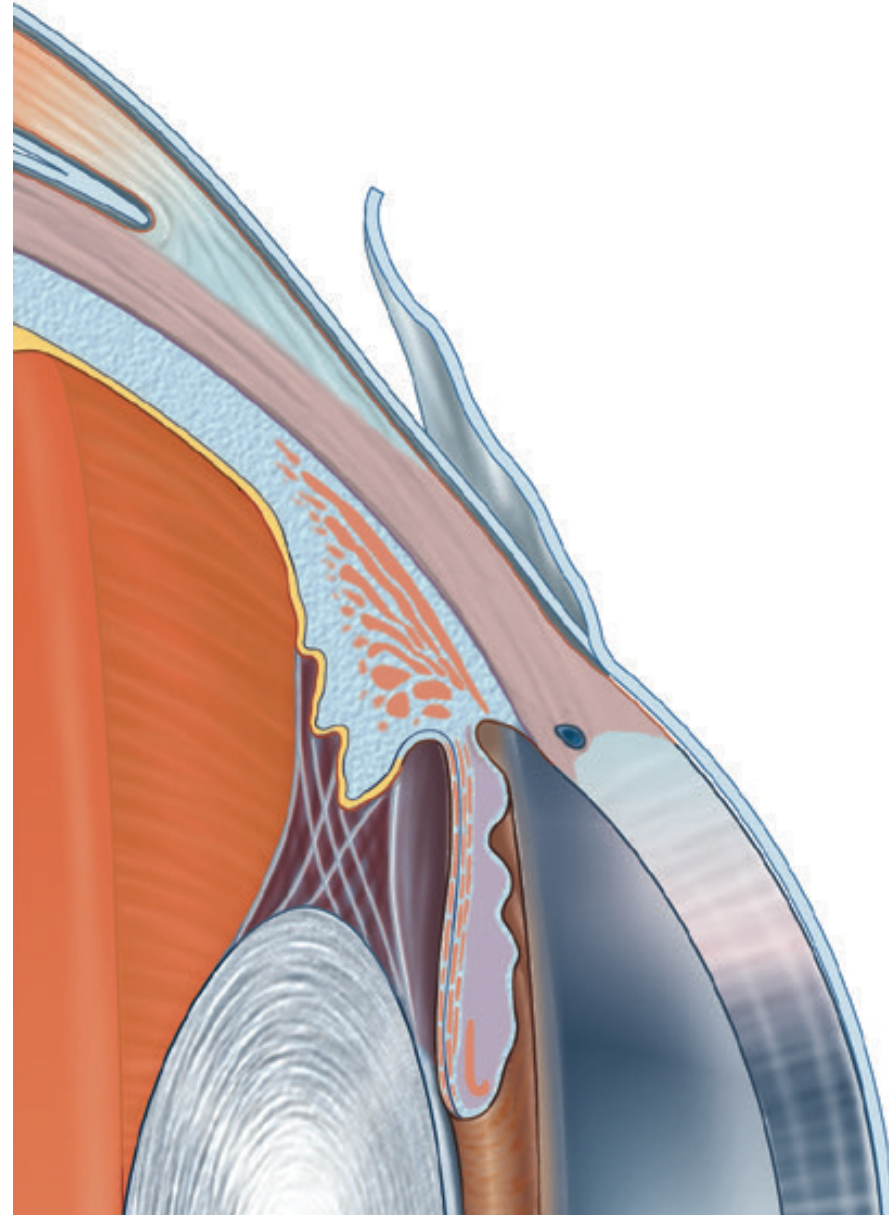
- ♦ Ligamenta suspensoria, zonulae fibrae

- ♦ **Corpus ciliare**

- ♦ Parasympaticus – n. III
- ♦ Sympaticus – plexus caroticus, plexus ophtalmicus

- ♦ **Lens oculi**

- ♦ Nucleus - fibrae
- ♦ Pars embryonica
 - ♦ Pars fetalis
 - ♦ Pars infantilis
 - ♦ Pars adulta
- ♦ Cortex



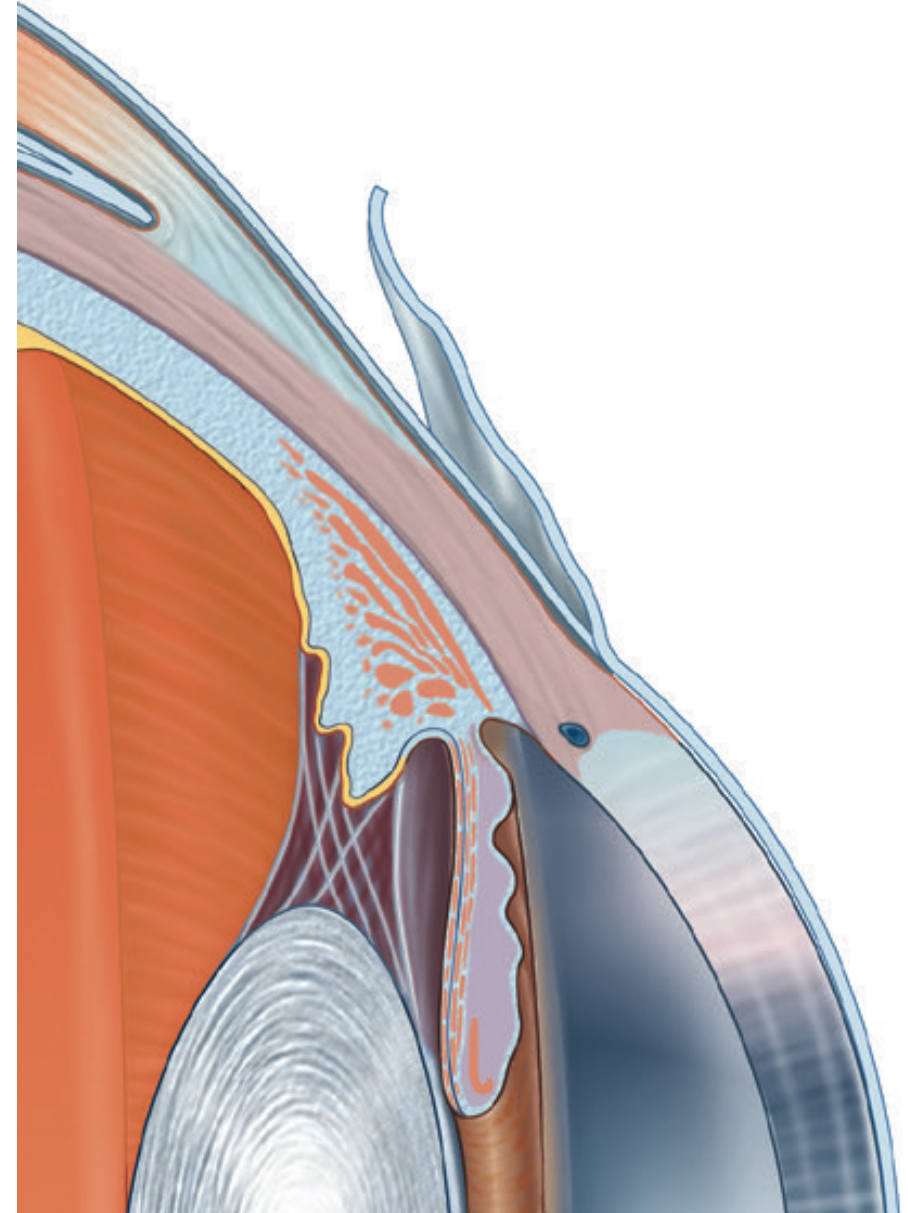
Sclera et cornea

♦ Sclera

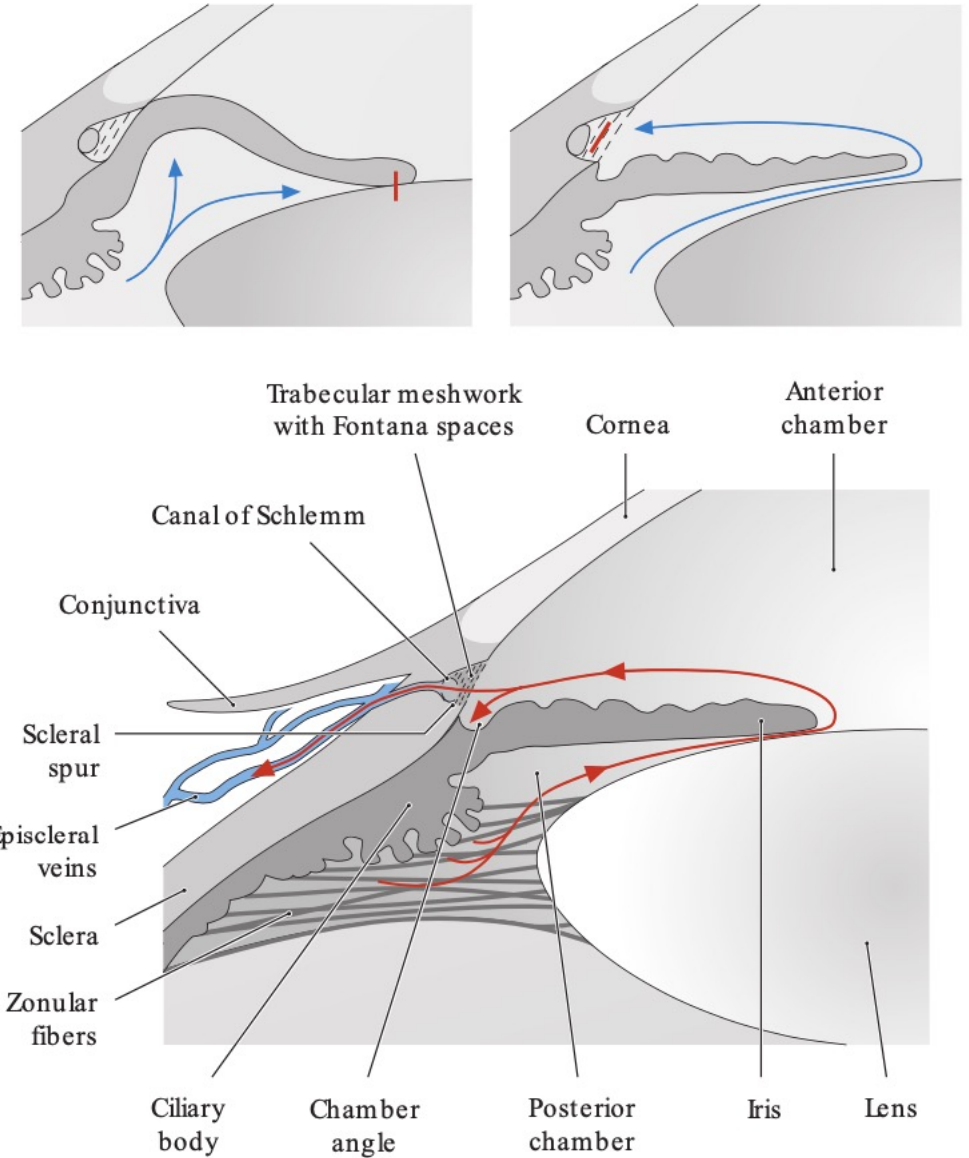
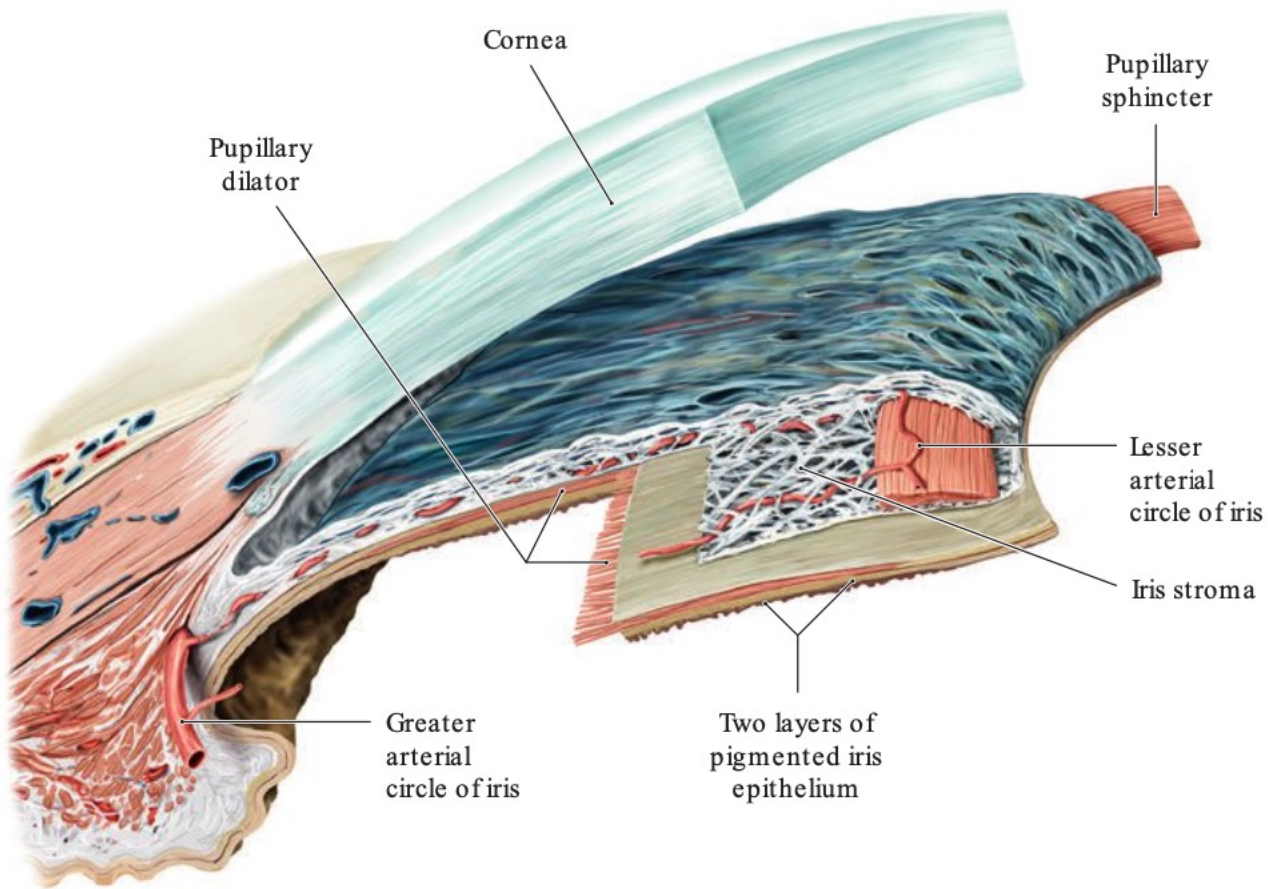
- ♦ 80% surface , dense fibrillary connective tissue, no vessels
- ♦ Inervace nn. ciliares
- ♦ Lamina cribrosa – fibers of n. II
- ♦ Vagina fibrosa oculi
- ♦ Spatium episclerale
- ♦ Spatium perichorioideum
- ♦ Tunica conjunctiva (bulbi)

♦ Cornea - rohovka

- ♦ Limbus corneae - outer rim
 - ♦ Sklera covering rim of sclera
 - ♦ Cornea in groove
- ♦ Bowing horizontal 12 mm, vertical 11 mm
 - ♦ Physiological astigmatismus 0.5 dpt
- ♦ Angulus sclerocornealis
- ♦ Sinus venosus sclerae – canalis Schlemmi
- ♦ Angulus iridocornealis
- ♦ Reticulum trabeculare – spongium anguli iridocornealis
 - ♦ Resorption of aqueous humor to sinus iridocornealis



Humor aquosus - circulation



Uvea

♦ Choroidea

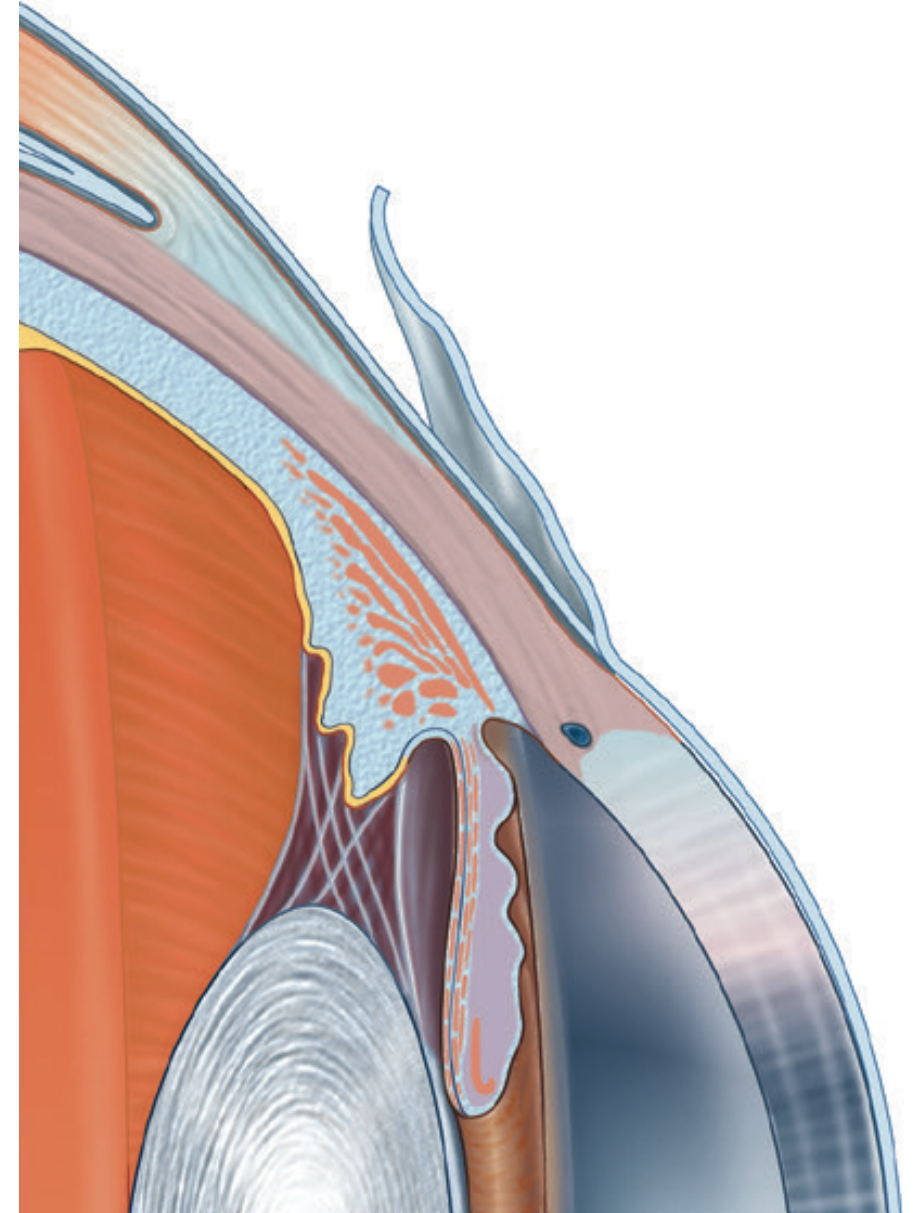
- ♦ 0,2 - 0,4 mm
- ♦ Lamina suprachoroidea
- ♦ Spatium perichoroideum
 - ♦ For veins chorioideae
- ♦ Vyživuje hlubší vrstvy retiny, napíná závěsný aparát čočky

♦ Corpus ciliare

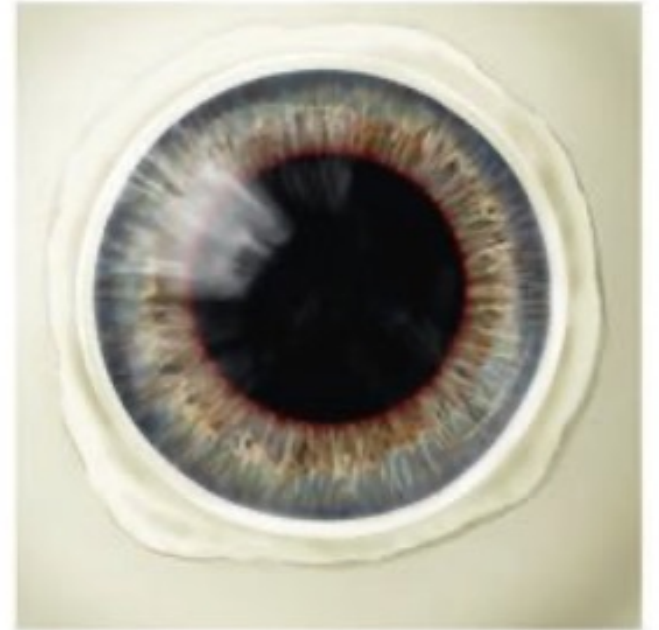
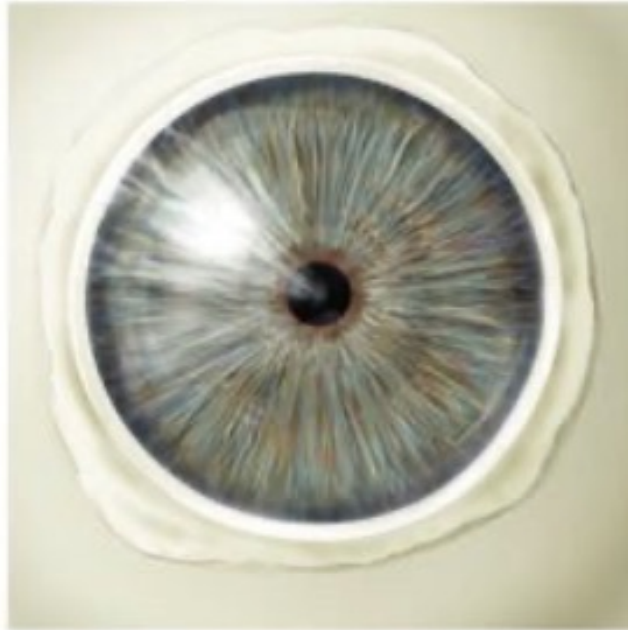
- ♦ Processus ciliares – 70 – 80 , 2 – 3 mm
 - ♦ From rugae arisin
- ♦ Fibrae zonulares
- ♦ Plicae ciliares
 - ♦ Corona ciliaris
 - ♦ Orbiculus ciliaris
 - ♦ Continuing topars caeca retinae, ora serrata – interface to pars optica
- ♦ M. ciliaris
 - ♦ Fibrae meridionales (musculus Brücke), circulares (musculus Mülleri), radiales

♦ Iris

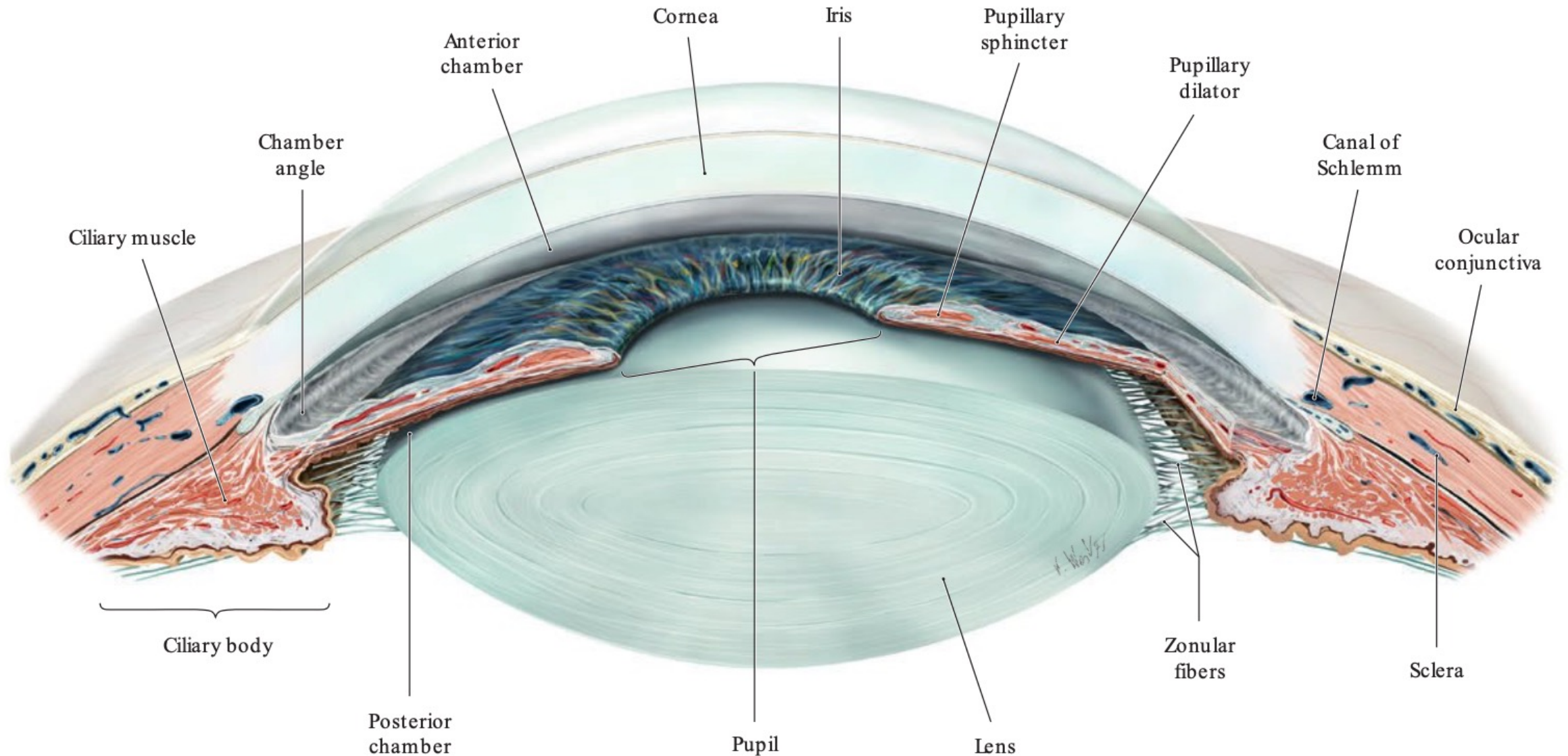
- ♦ Margo pupillaris, margo ciliaris
- ♦ M. sphincter pupillae, m. dilatator pupillae
- ♦ Annulus iridis minor, annulus iridis major



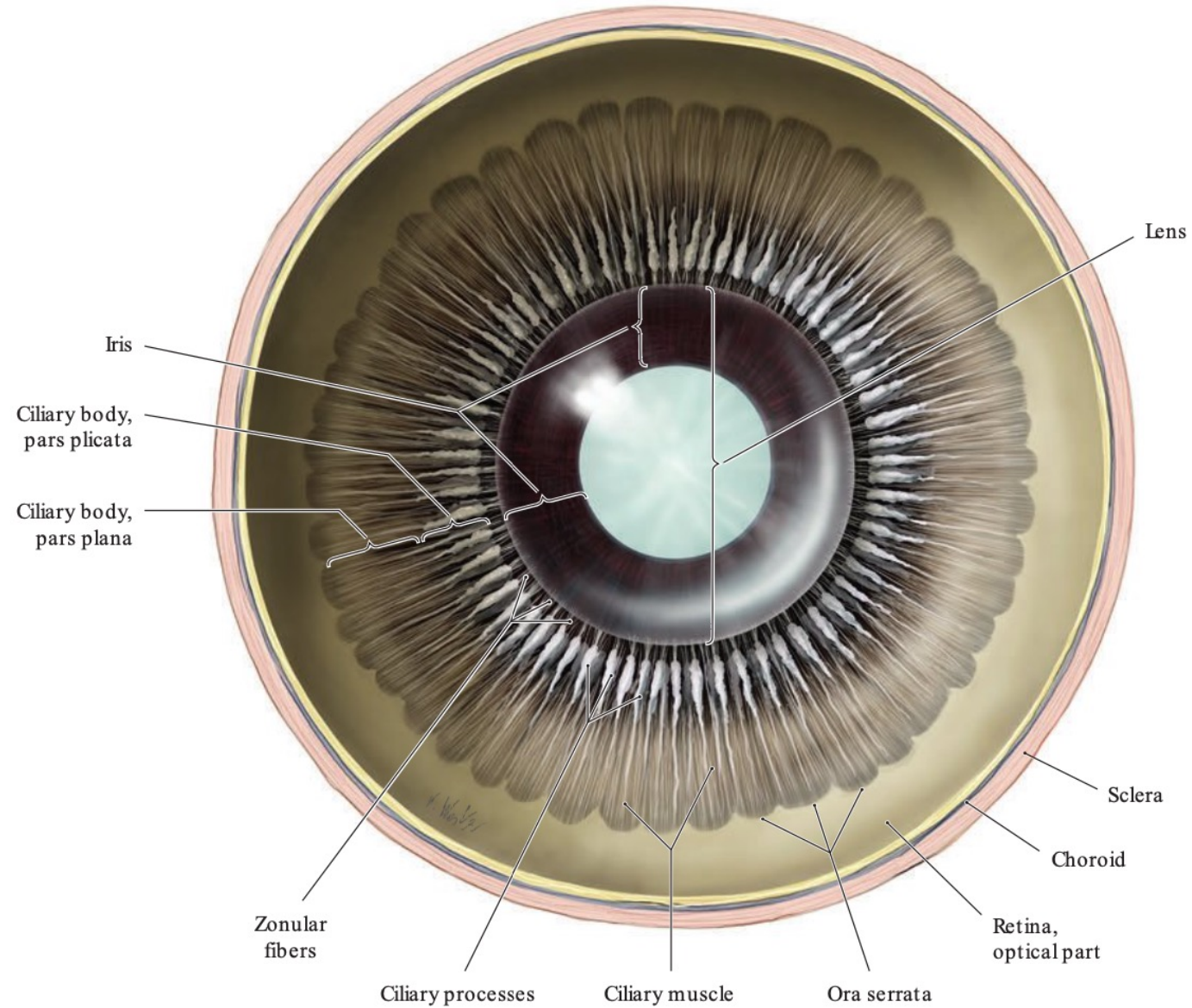
Pupillar reaction



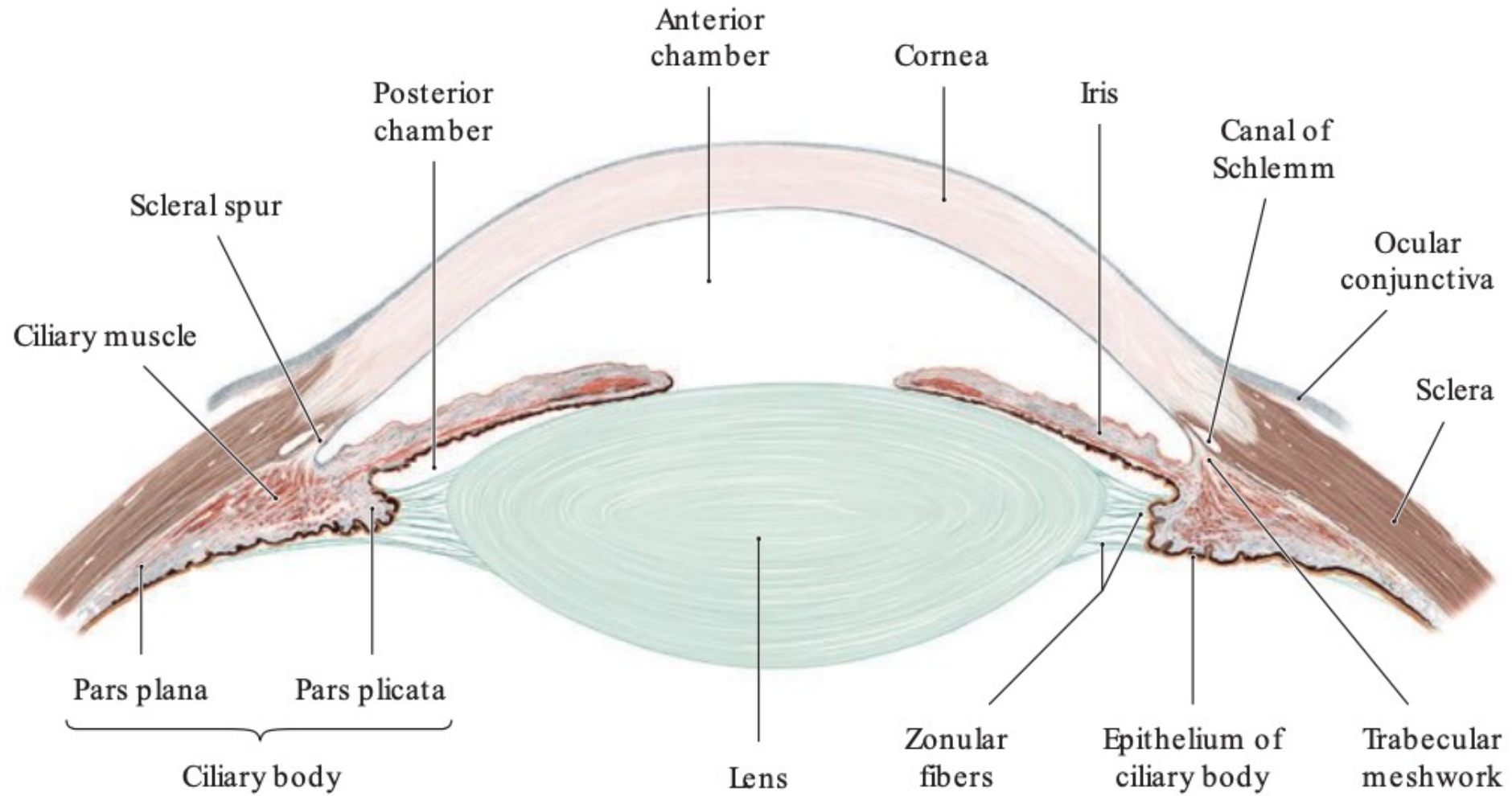
Iris, sphincter pupillae, dilatator pupillae



Corpus ciliare

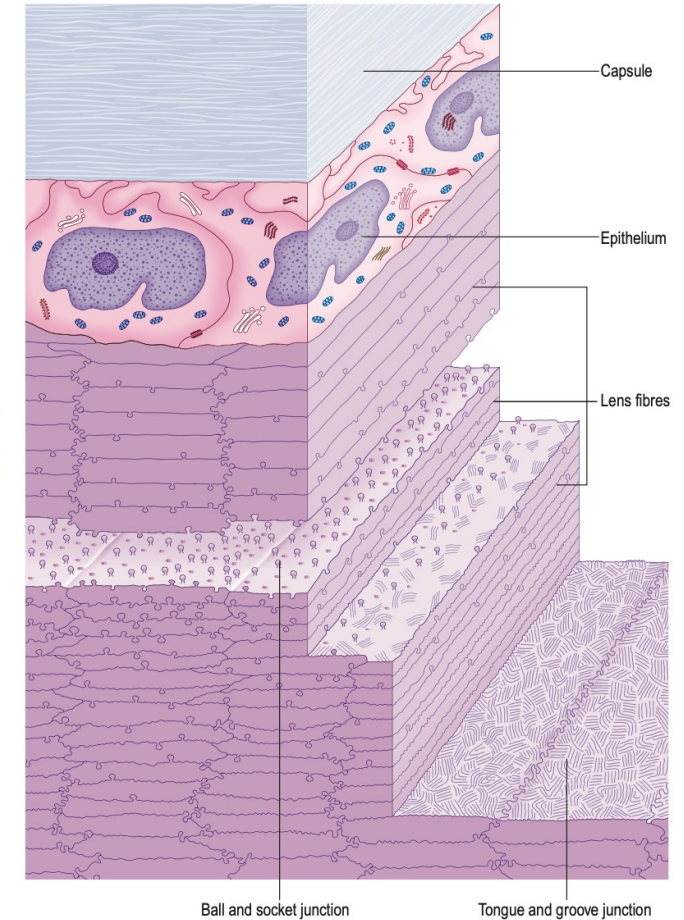
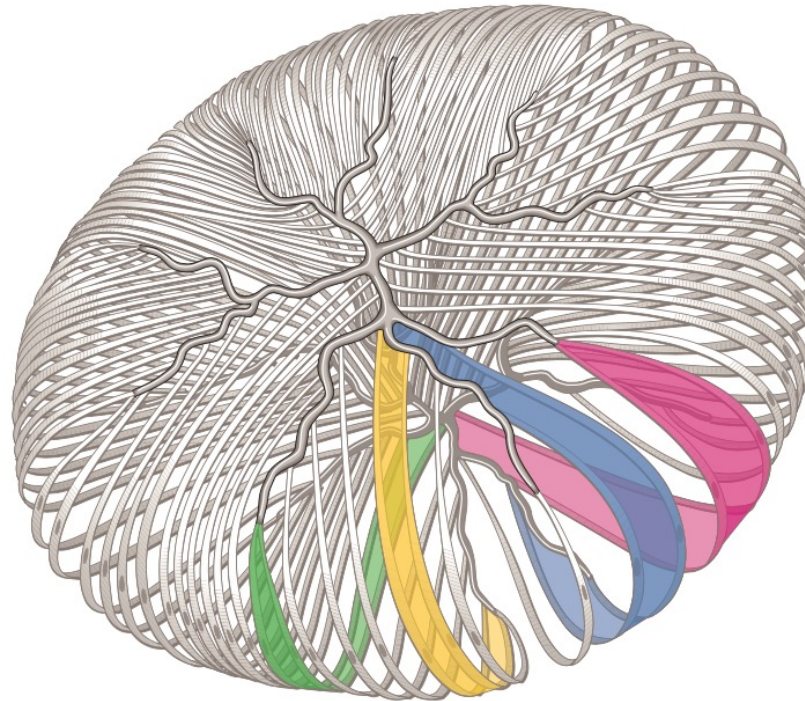
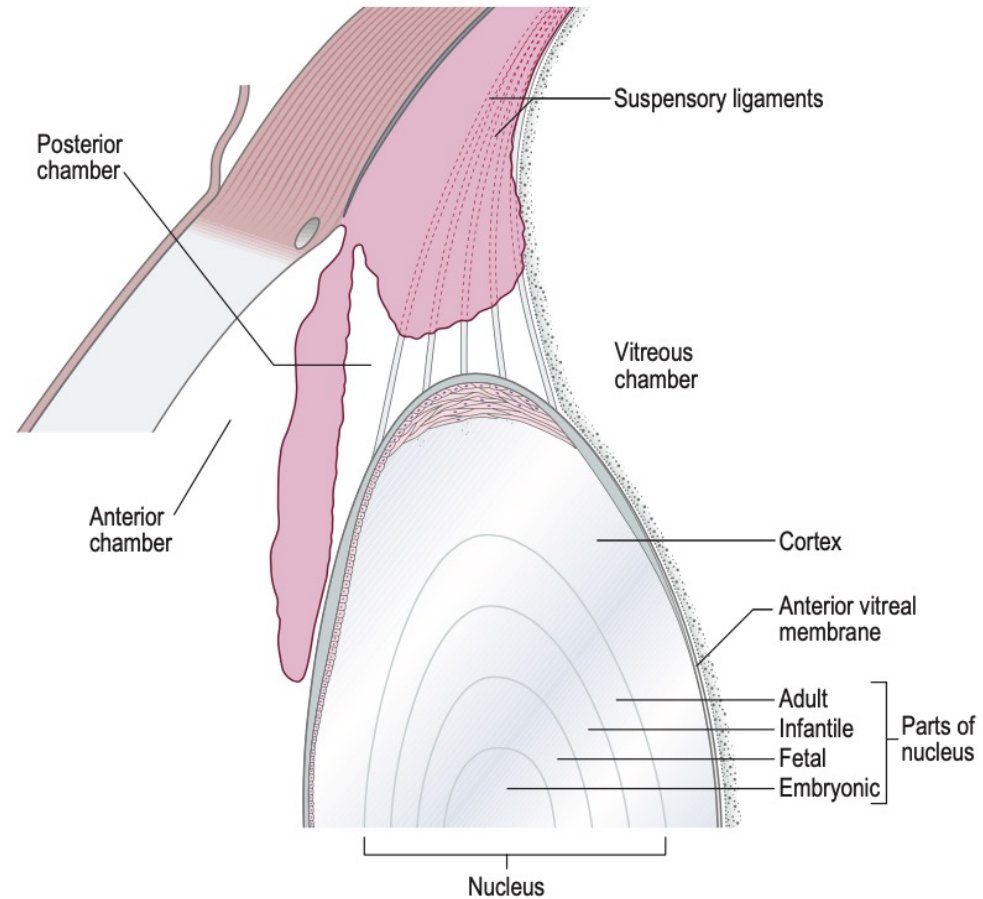


Corpus ciliare

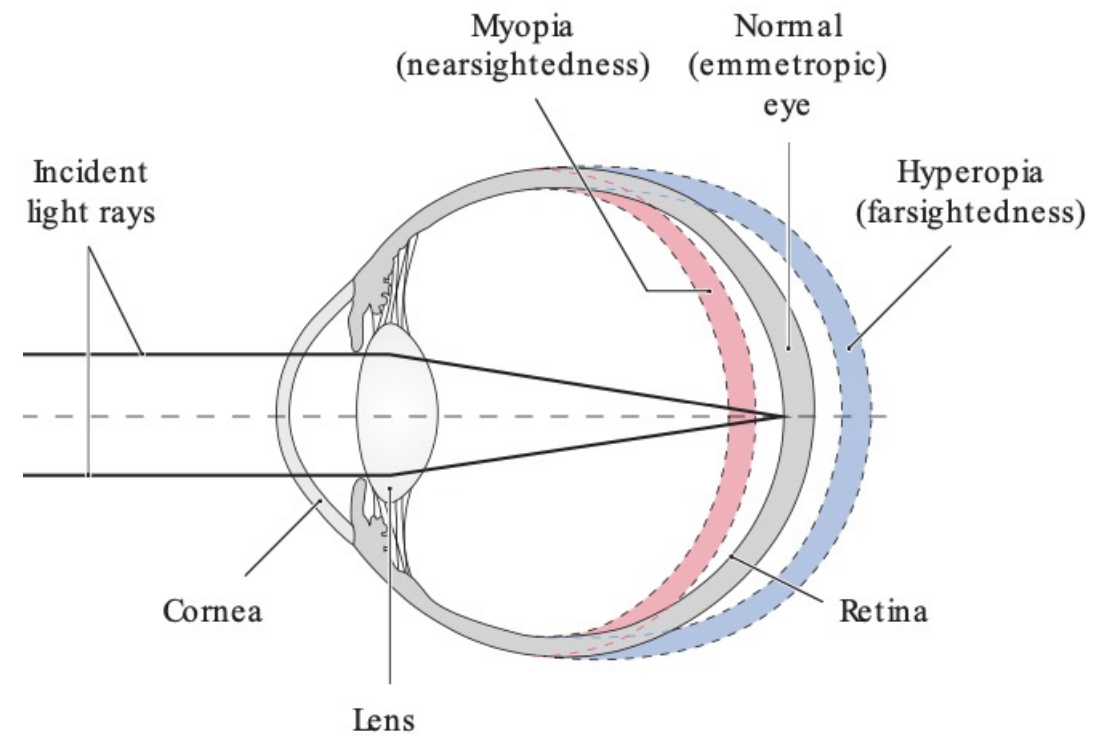
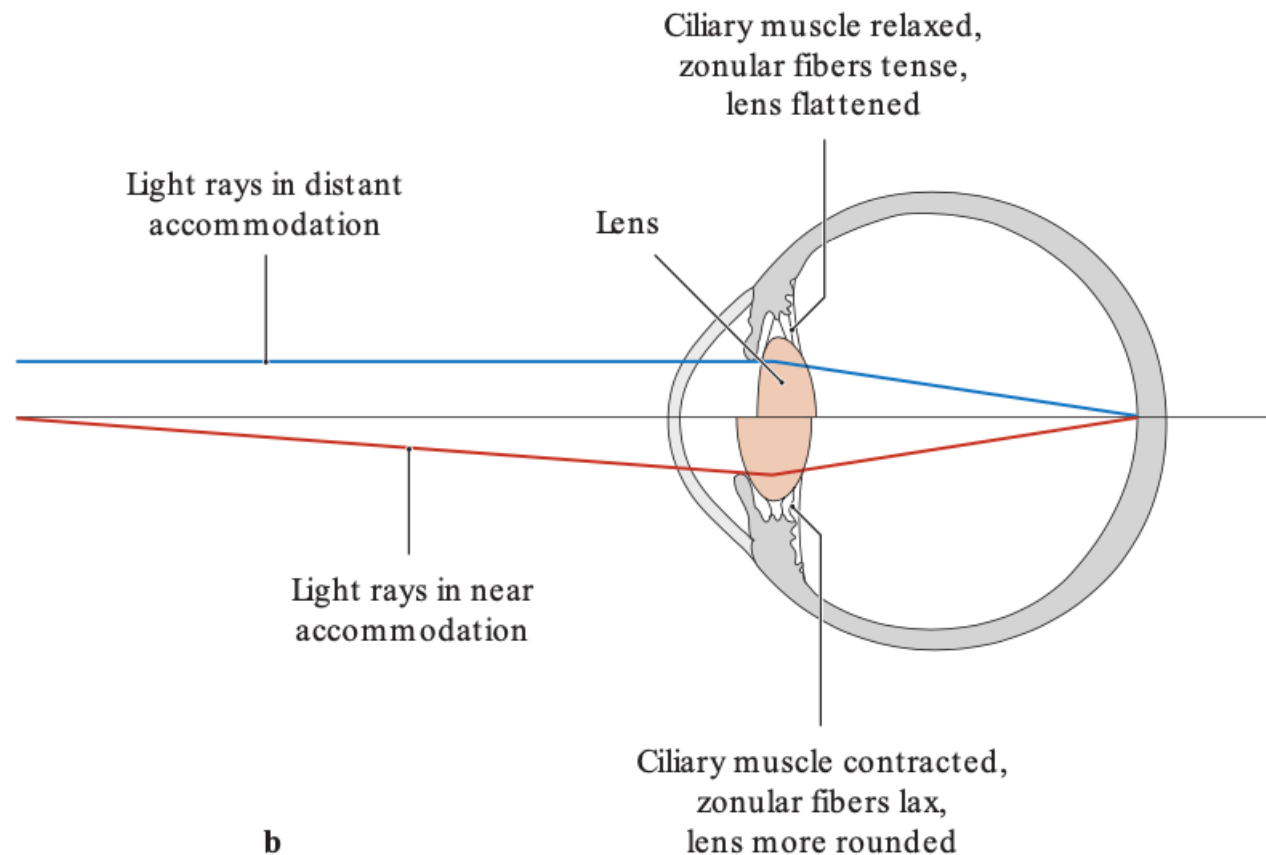


Lens oculi

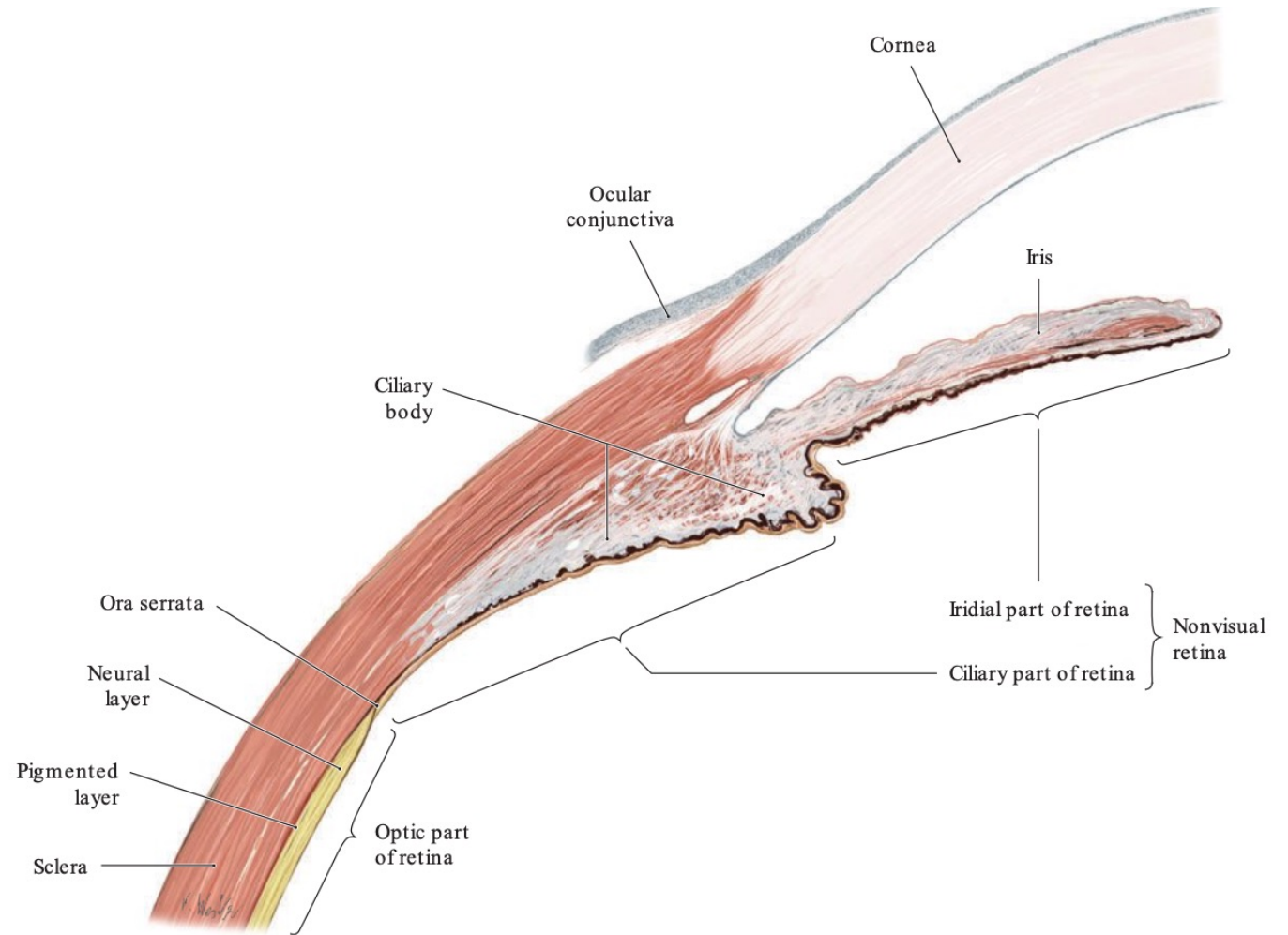
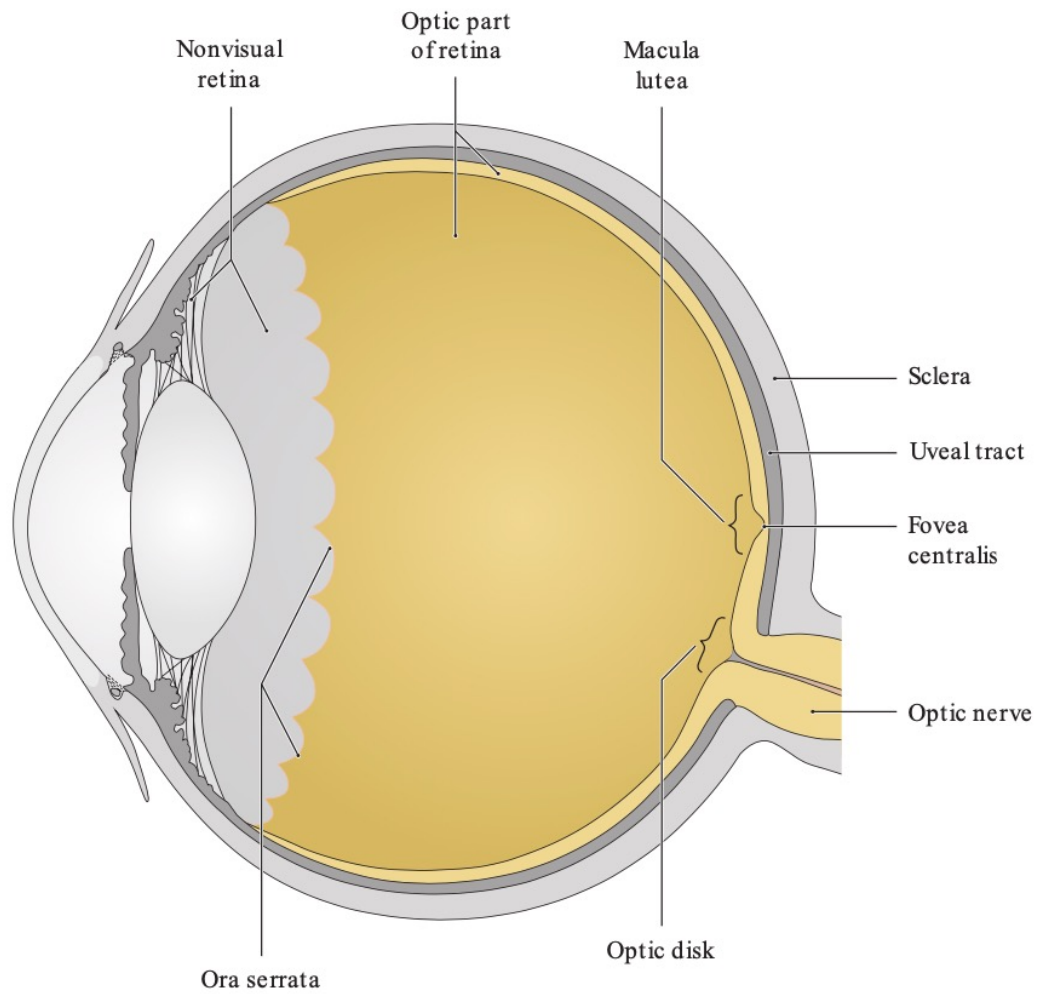
- 🔴 Nucleus
- 🔴 Epithelium
- 🔴 cortex



Accommodation, diffraction



Retina



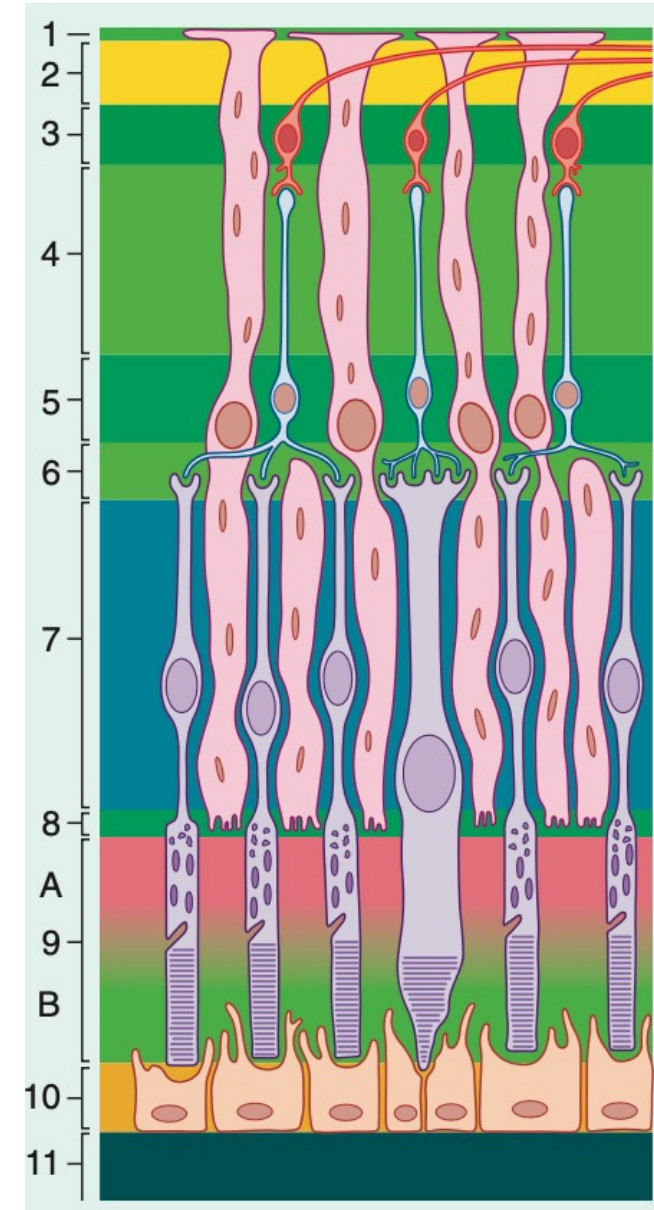
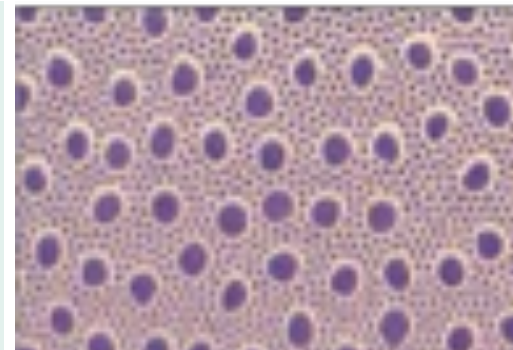
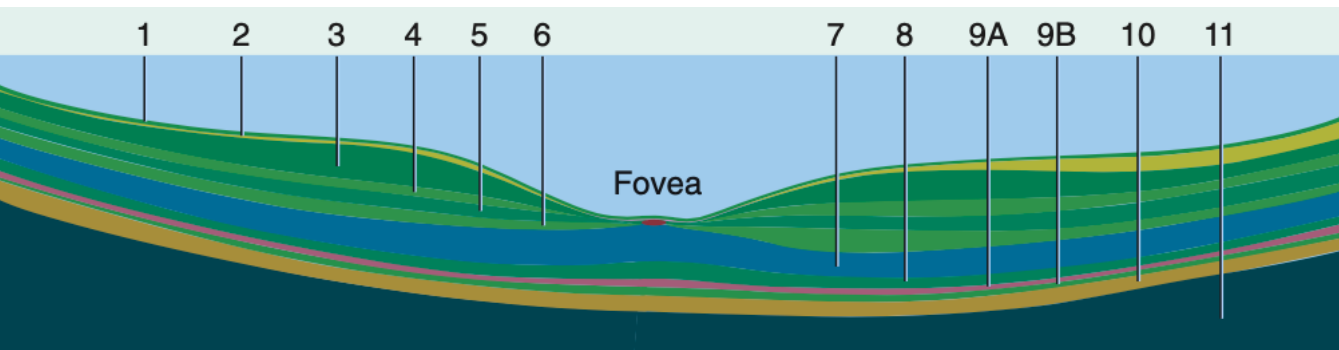
Retina

🔥 Cones

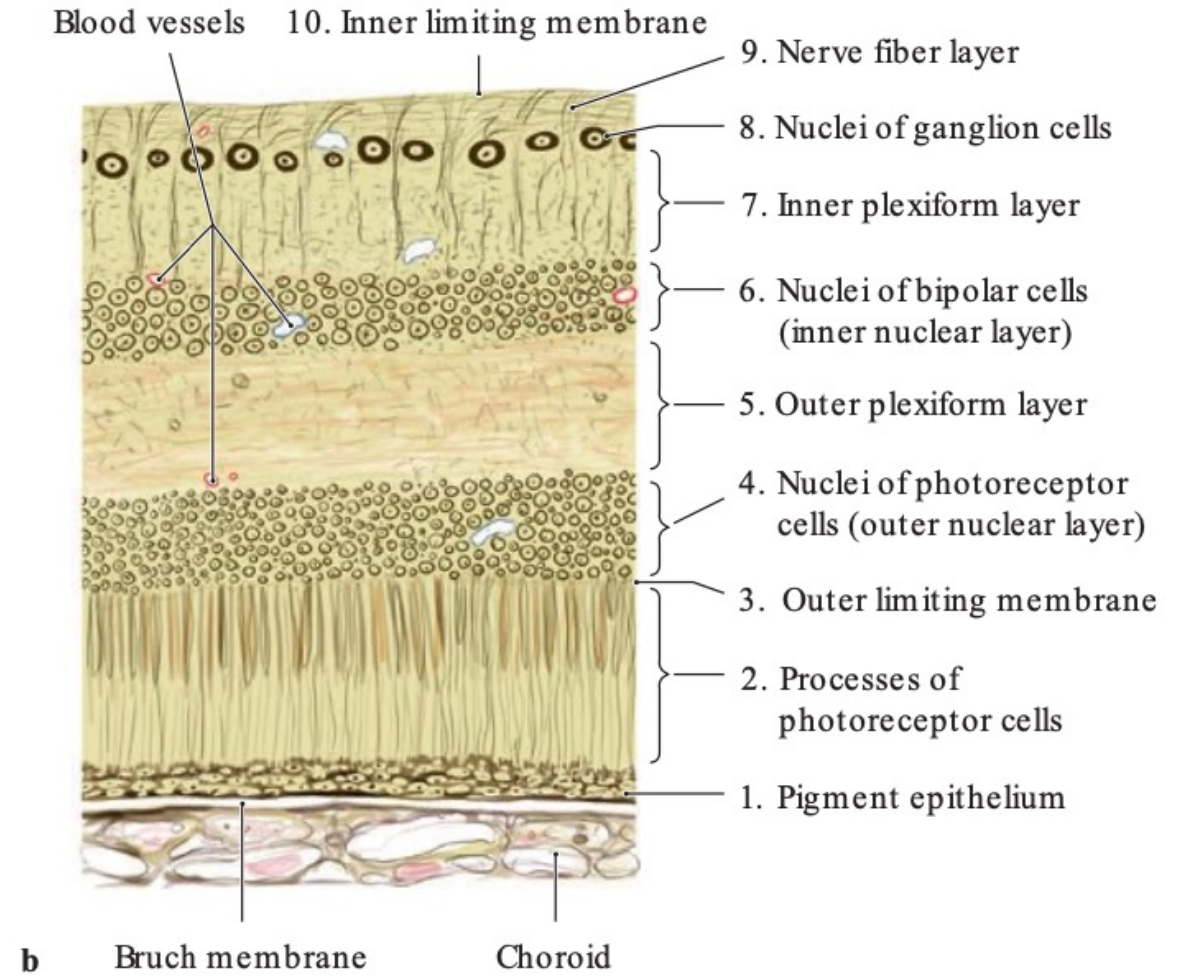
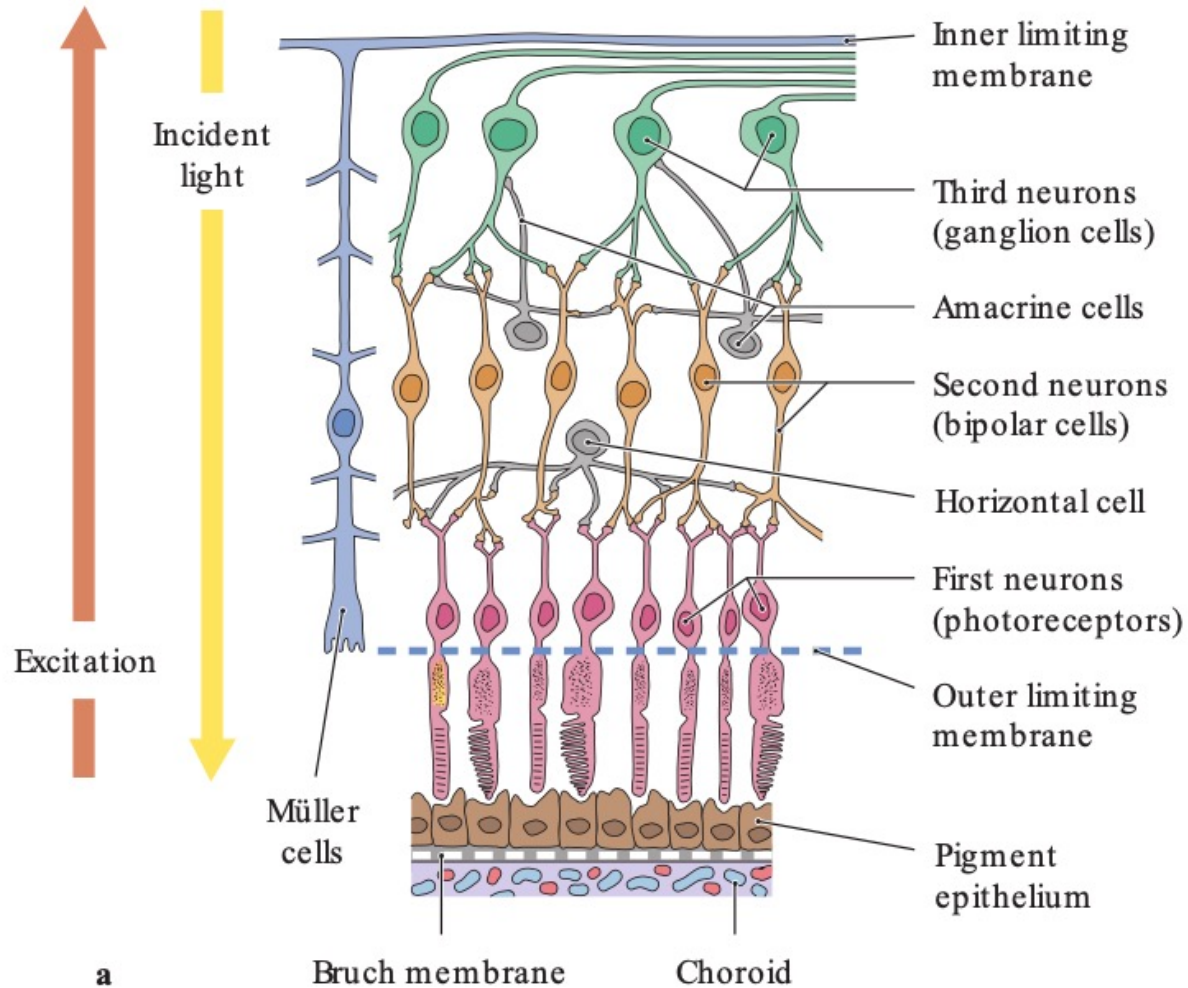
- 🔥 6 – 7 millions
- 🔥 Iodopsin
- 🔥 Three variants
- 🔥 more detail

🔥 Rods

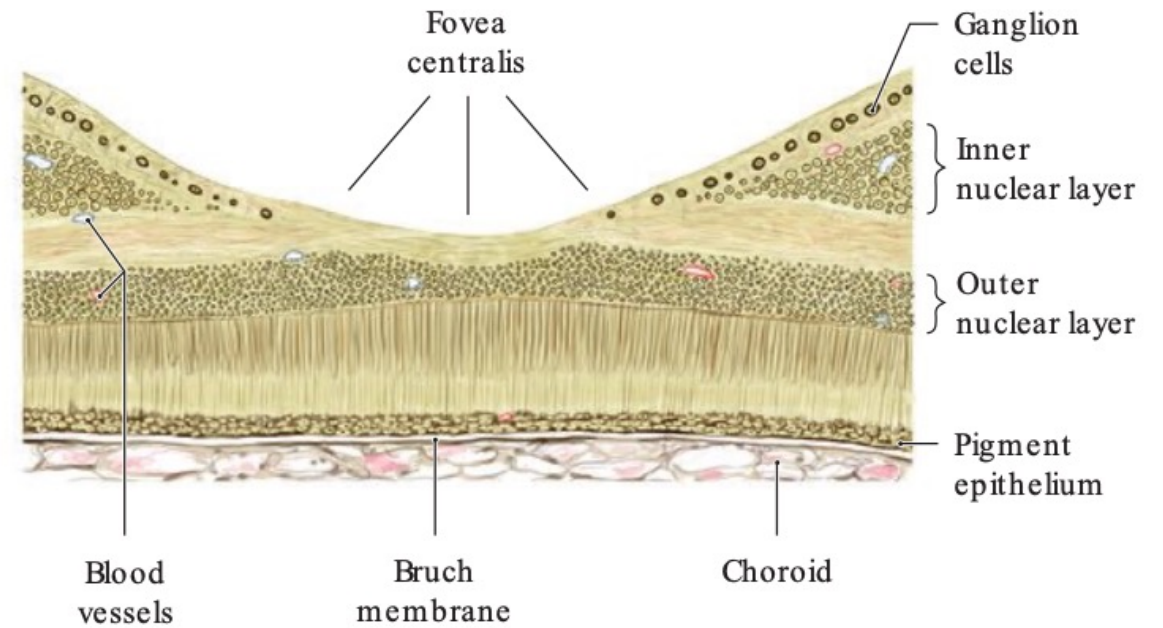
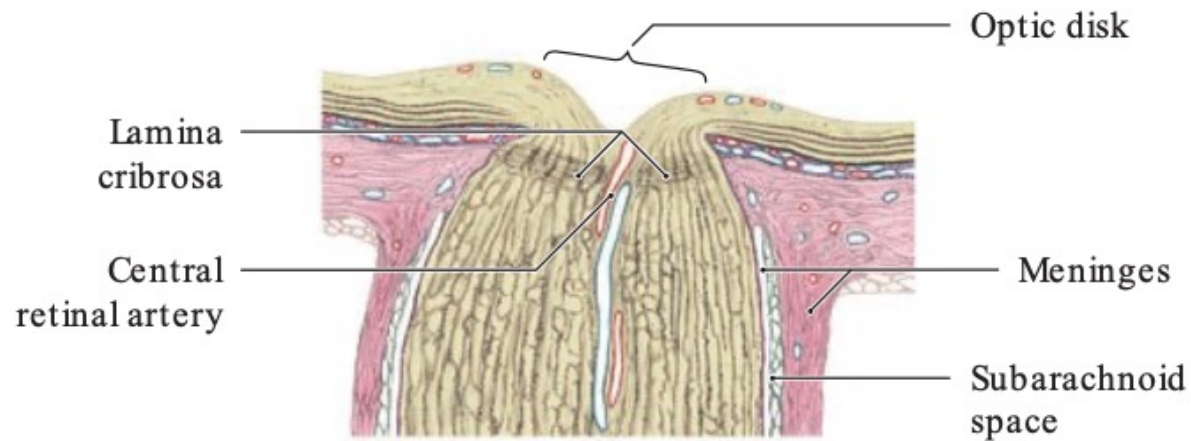
- 🔥 120 millions
- 🔥 Rodopsin
- 🔥 More sensitive, darkness
- 🔥 Lower details



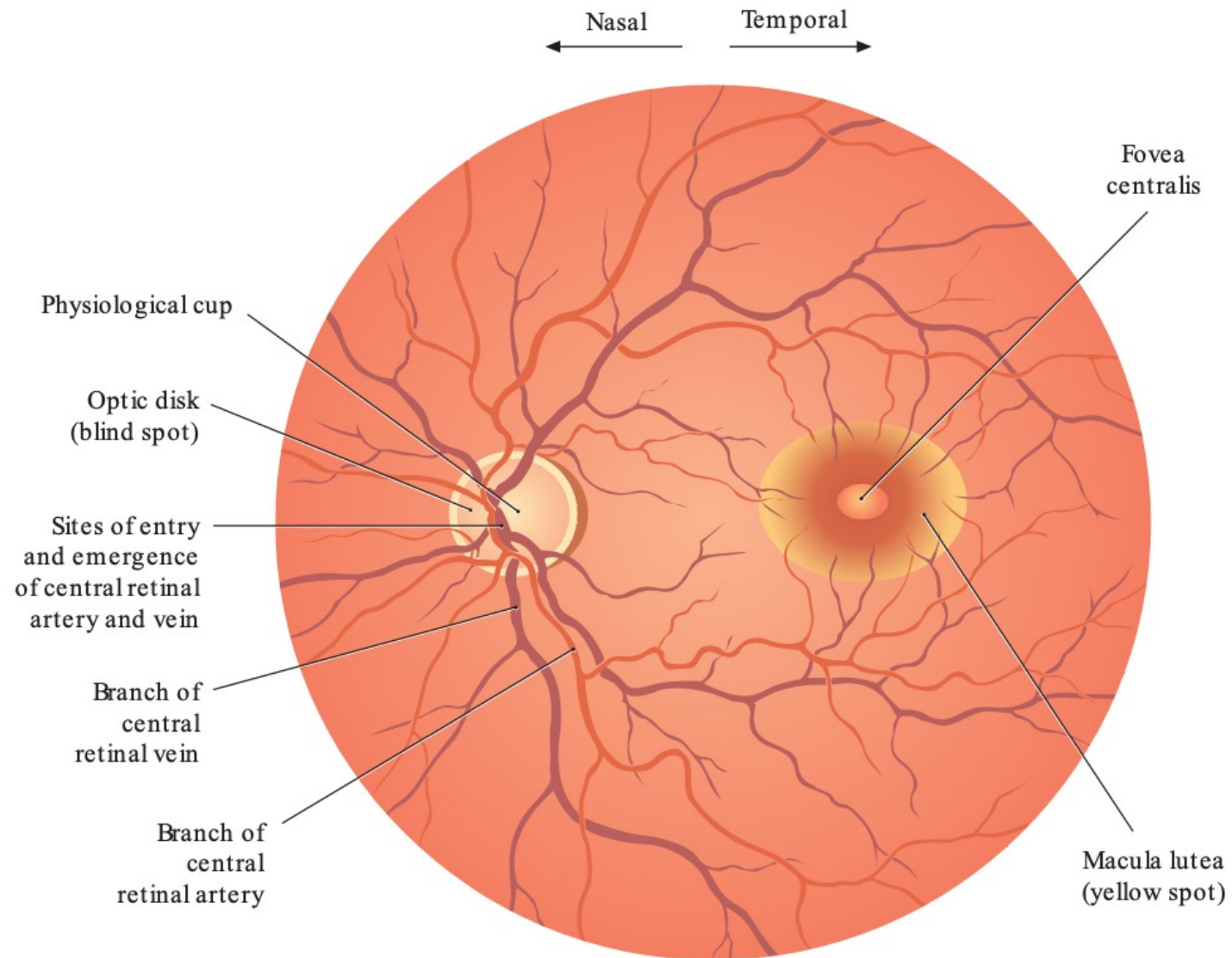
Retina



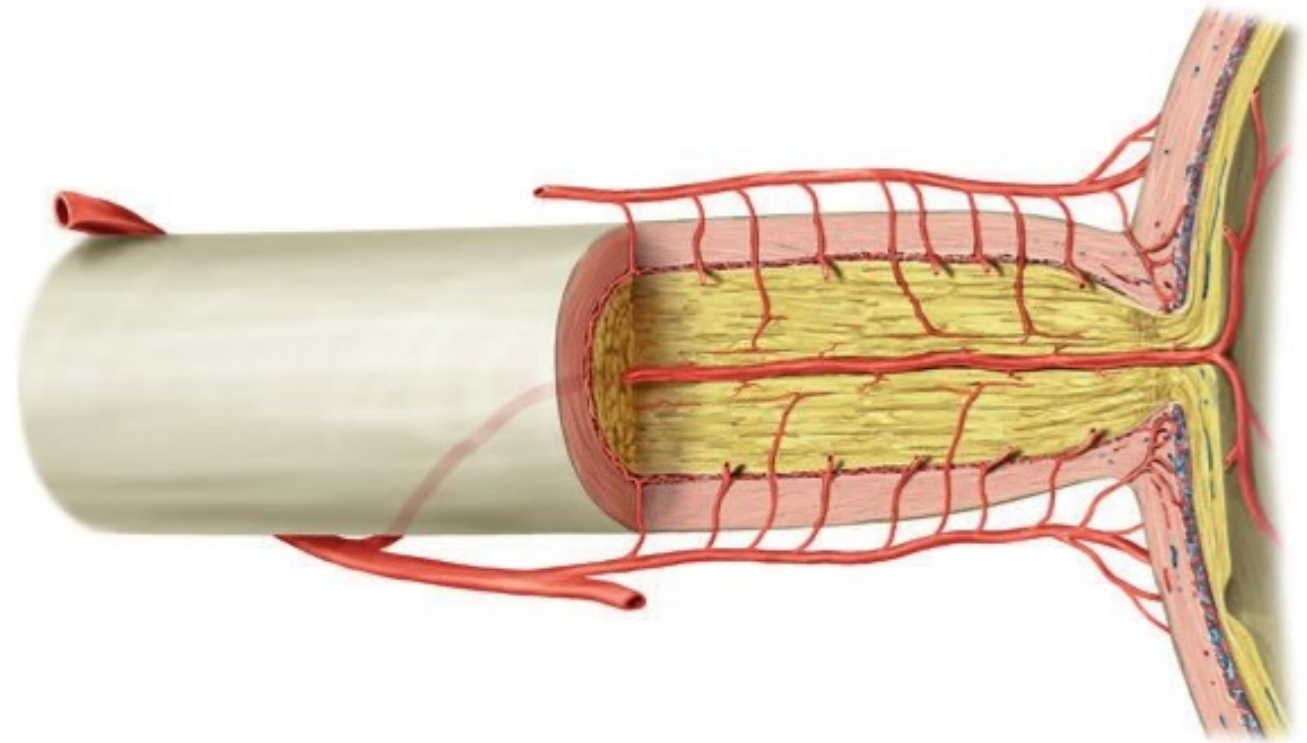
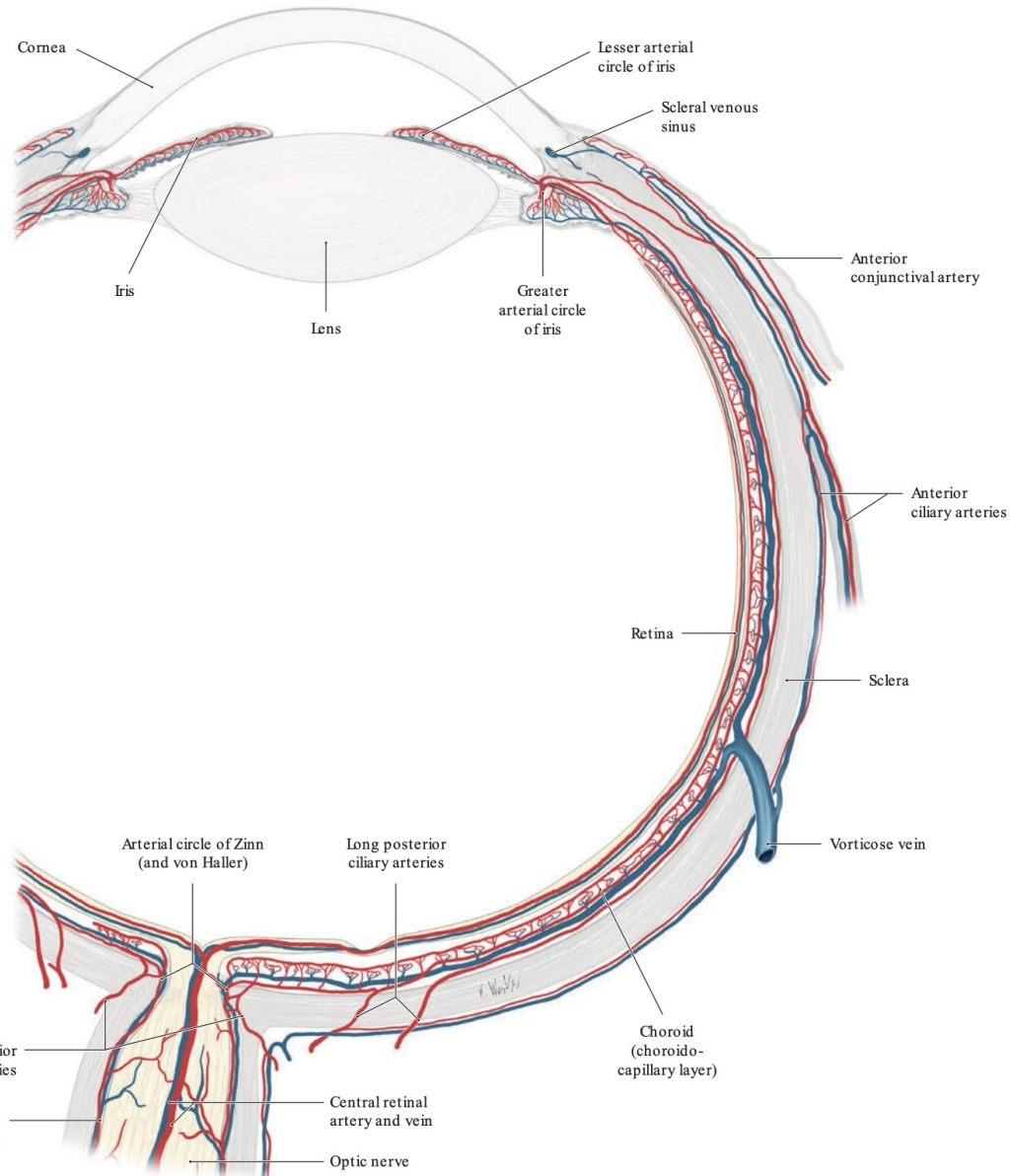
Fovea caeca, fovea lutea



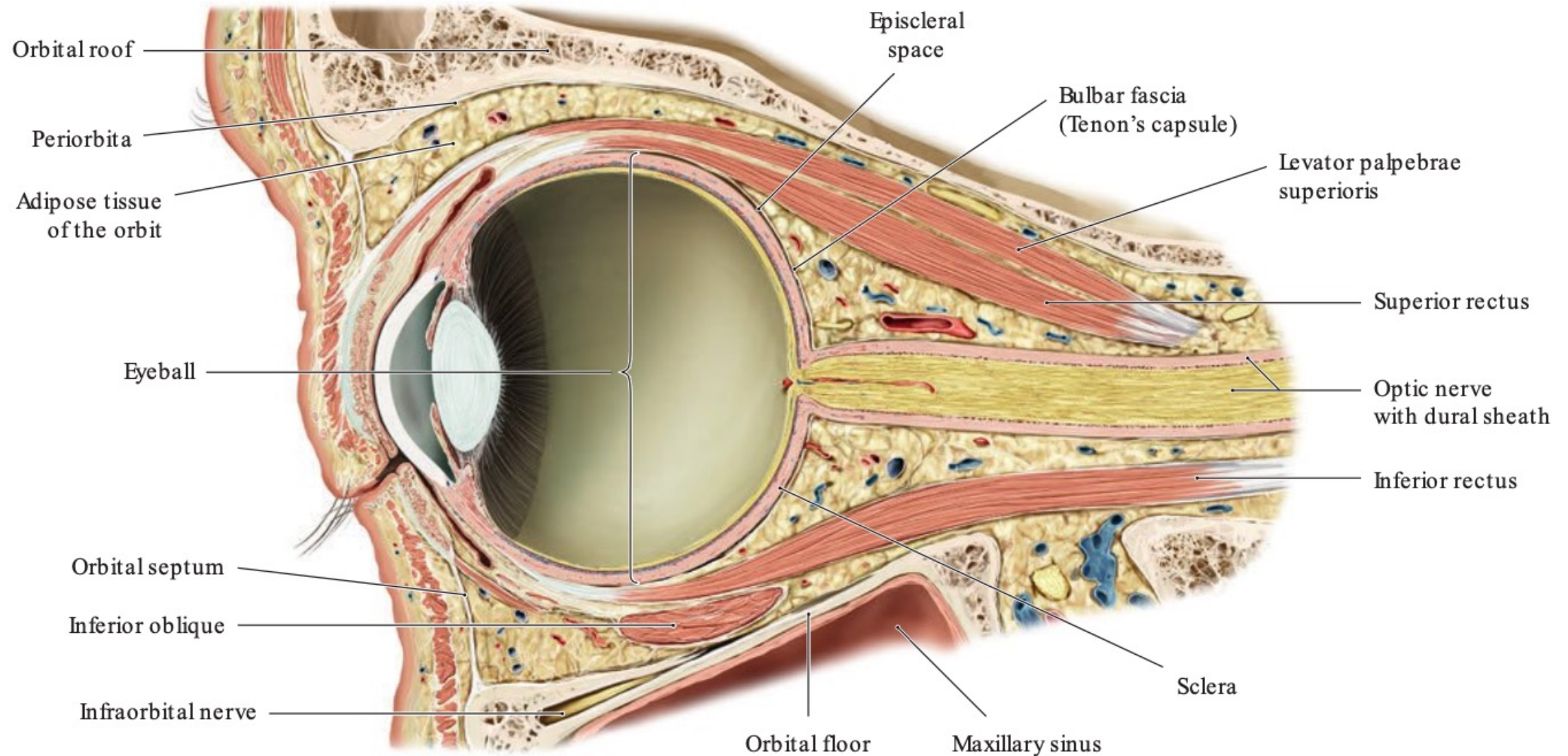
Vasa oculi



Vasa oculi



Nervus opticus



Oculus – oko – eye

