ANATOMY OF ORBIT

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By

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Intended Learning Outcomes (ILOs)

1. Outline the bony wall of the orbit.
2. Describe the contents of the orbit.
3. Explain anatomy of the eye ball, including muscles, vessels and nerves.

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Agenda

1. The bony wall of the orbit.
2. Contents of the orbit.
3. Anatomy of the eye ball, including muscles, vessels and nerves.

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Boundaries of bony orbit

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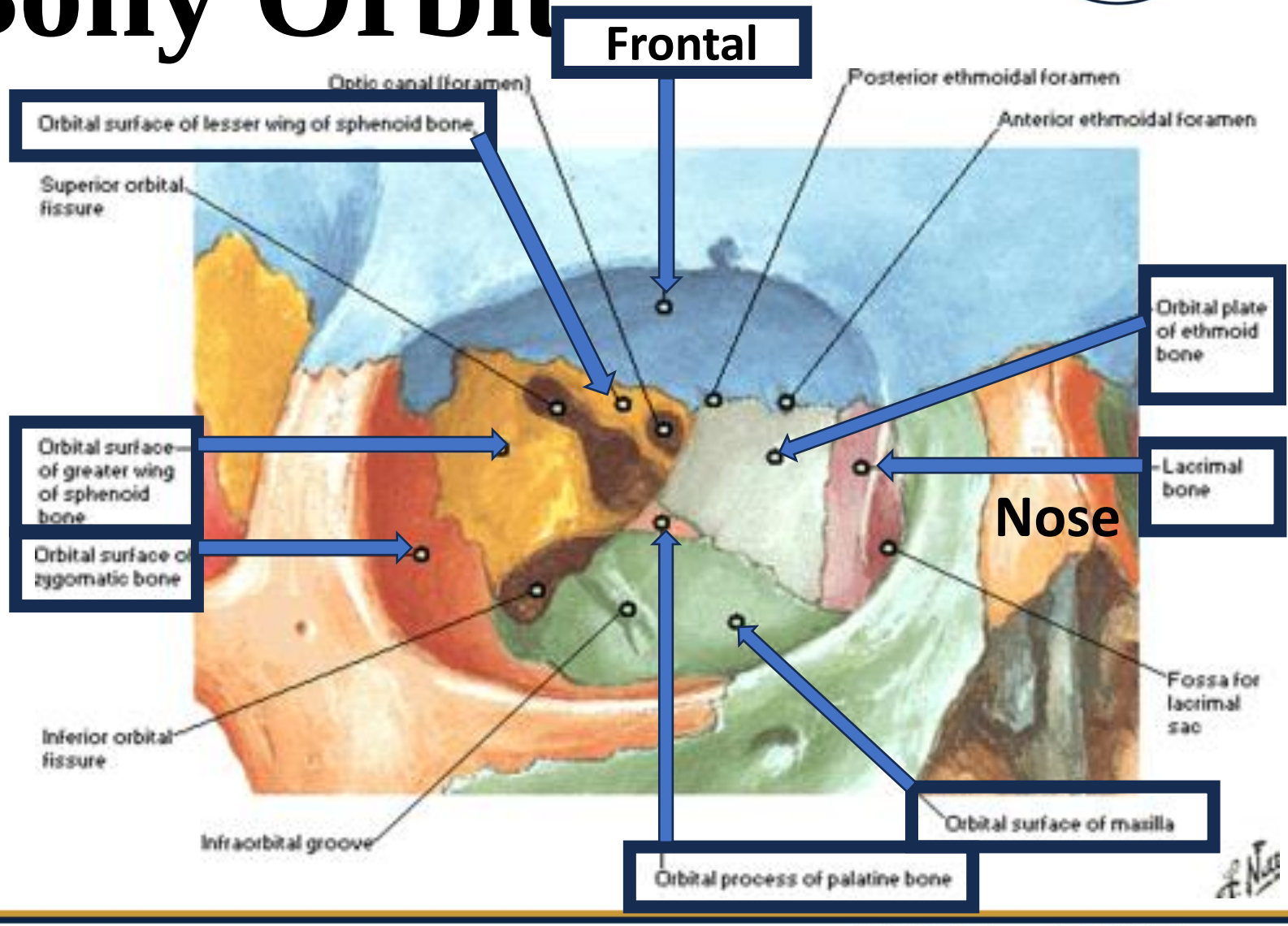
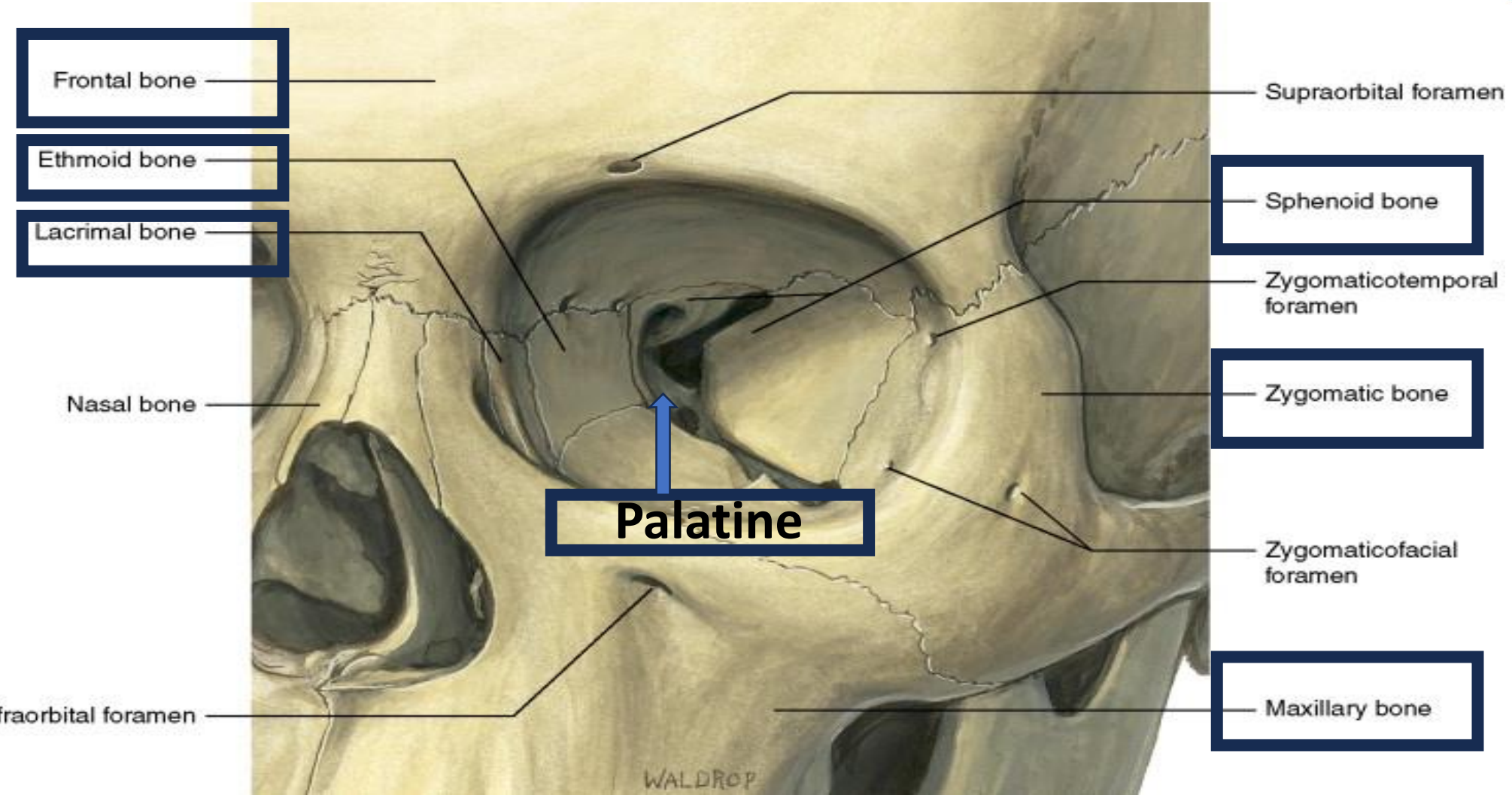
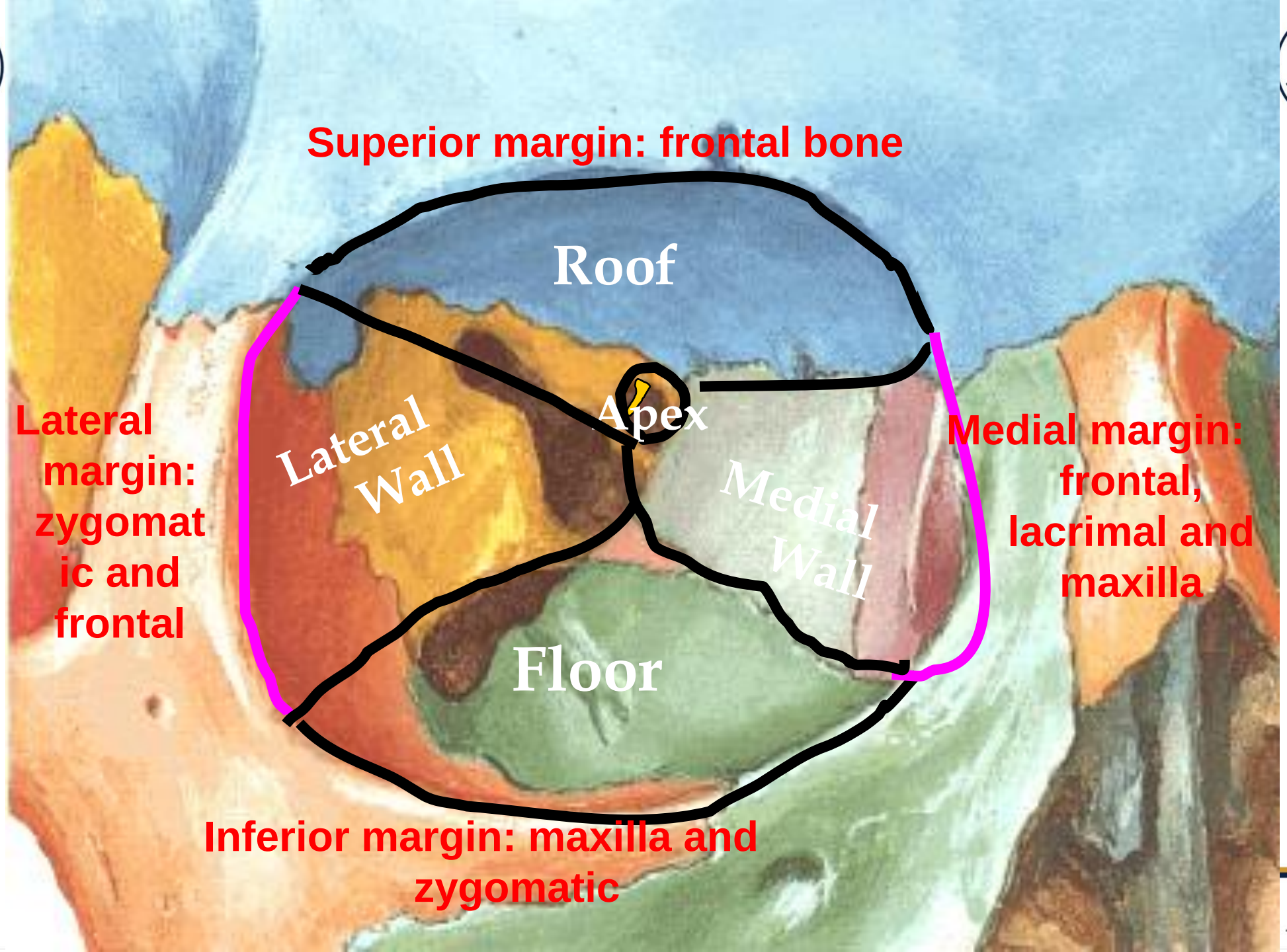
Bony Orbit

Made by 7 Bones:-

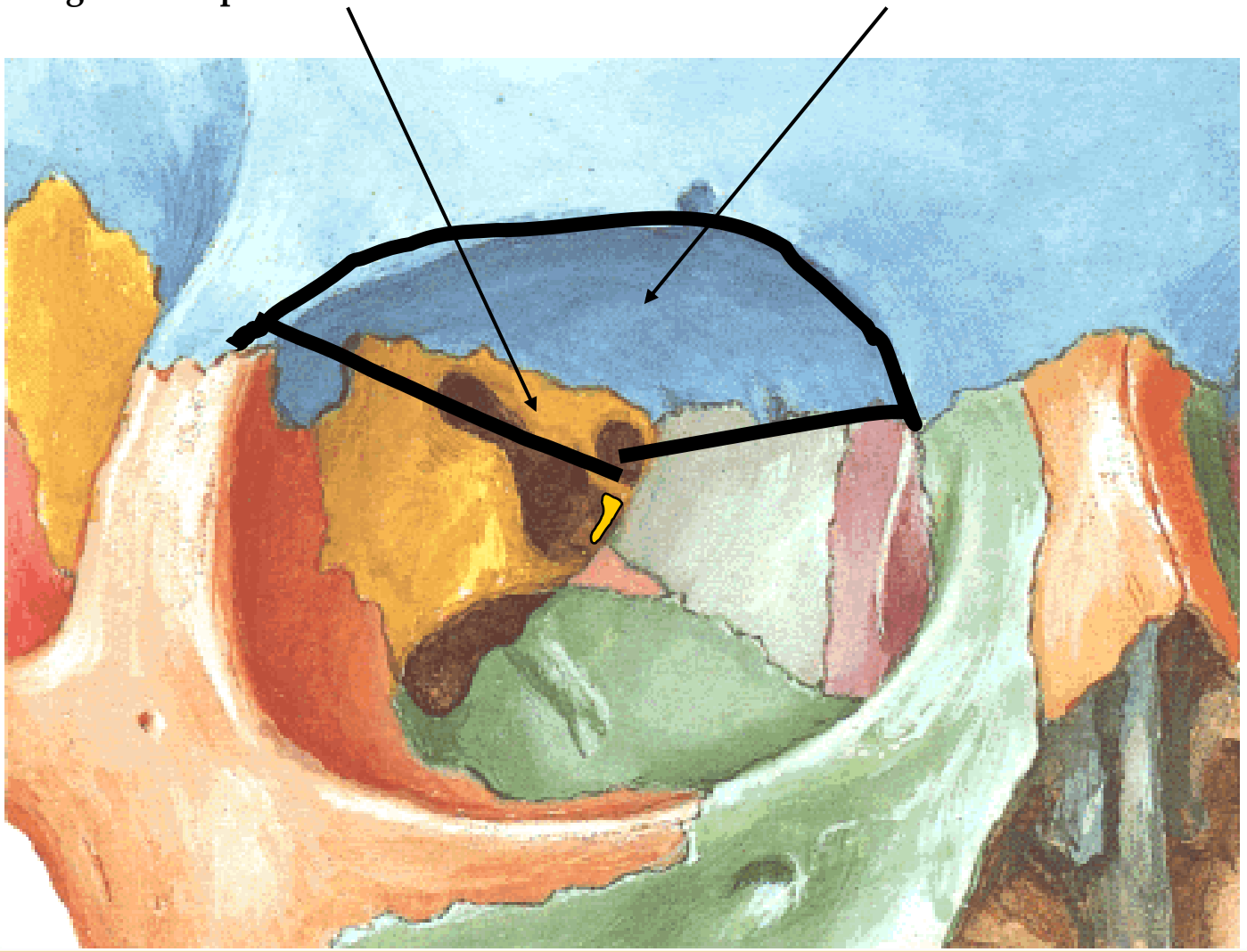
1. Frontal
2. Zygomatic
3. Maxilla
4. Lacrimal
5. Ethmoid
6. Sphenoid
7. Palatine




Frontal bone
Ethmoid bone
Lacrimal bone
Nasal bone
Infraorbital foramen
Supraorbital foramen
Sphenoid bone
Zygomaticotemporal foramen
Zygomatic bone
Zygomaticofacial foramen
Maxillary bone
Palatine
WALDROP

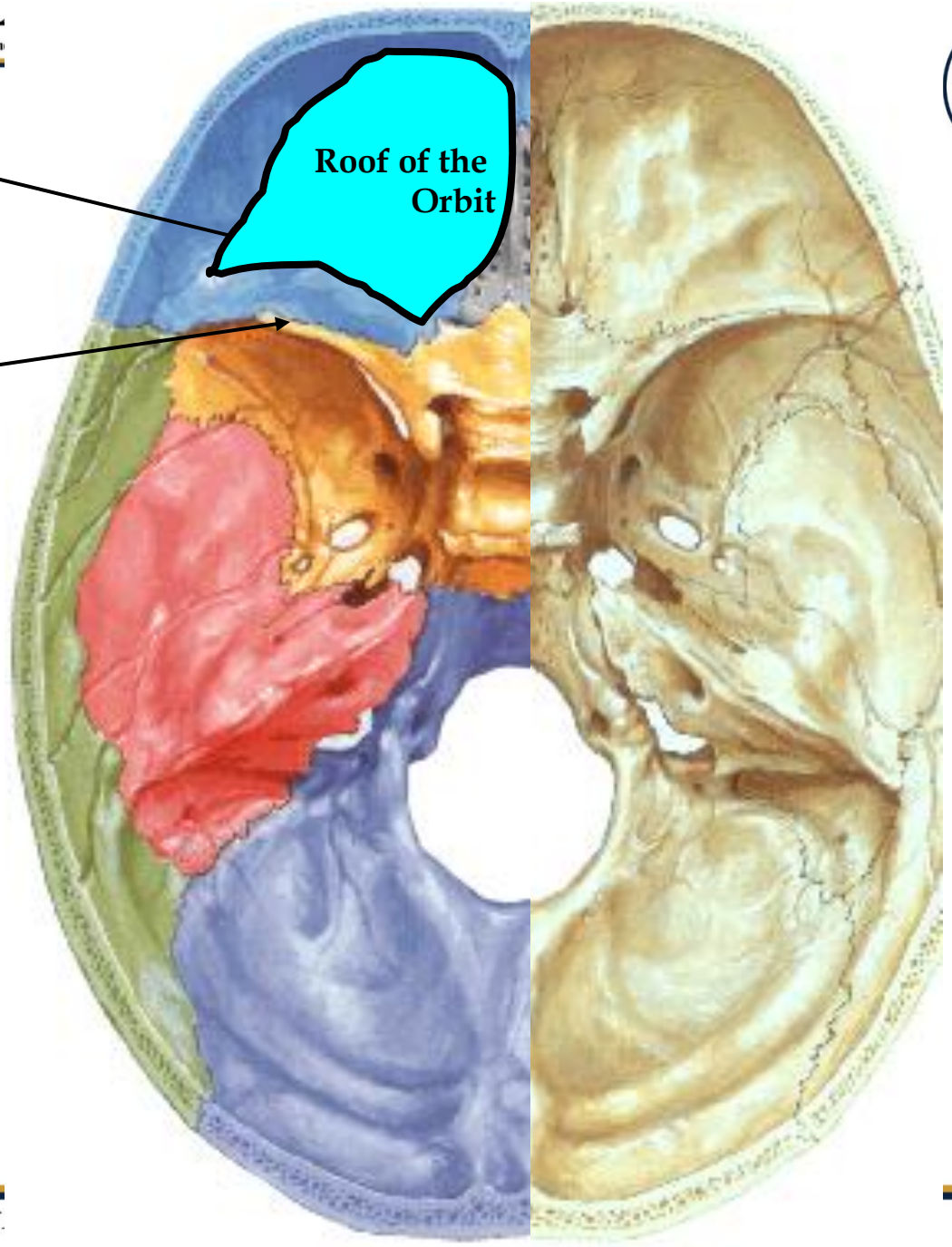

Superior margin: frontal bone
Roof
Lateral margin: zygomatic and frontal
Lateral Wall
Apex
Medial Wall
Medial margin: frontal, lacrimal and maxilla
Floor
Inferior margin: maxilla and zygomatic

Roof of the Orbit



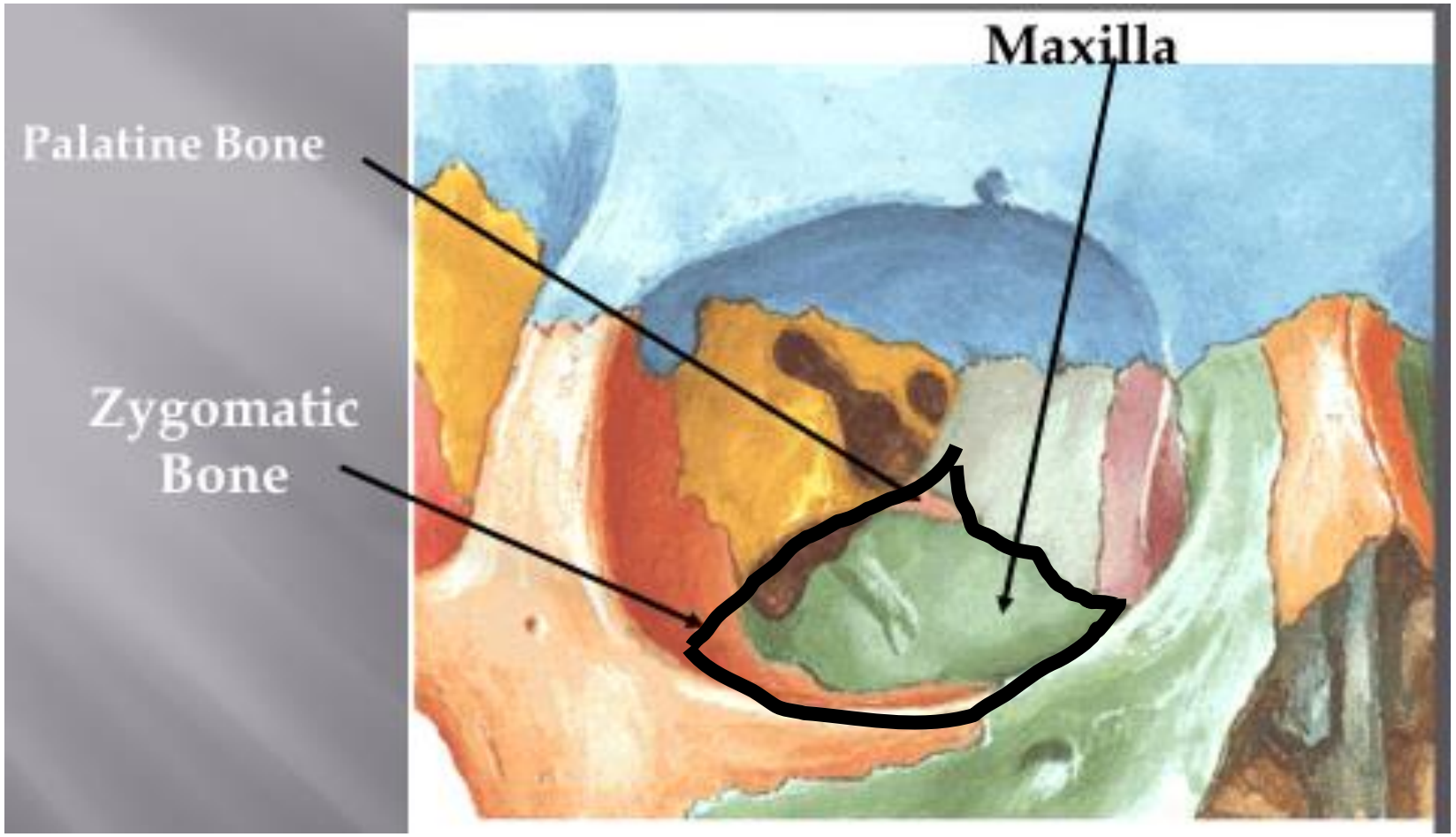
Orbital Plate of Frontal Bone

Lesser Wing of The Sphenoid



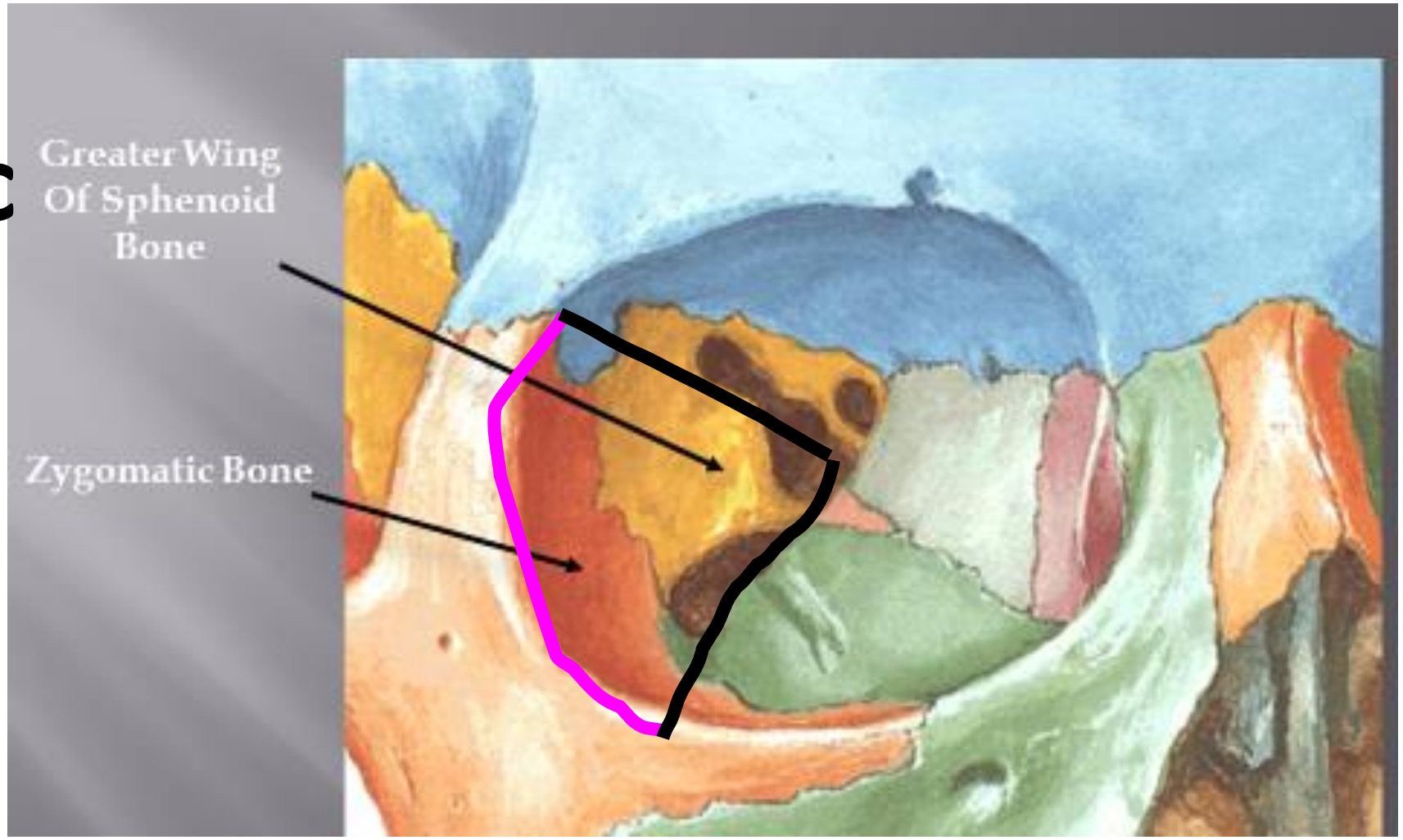
Floor of the Orbit

1. Maxilla,
2. Zygomatic bone
3. Palatine bone



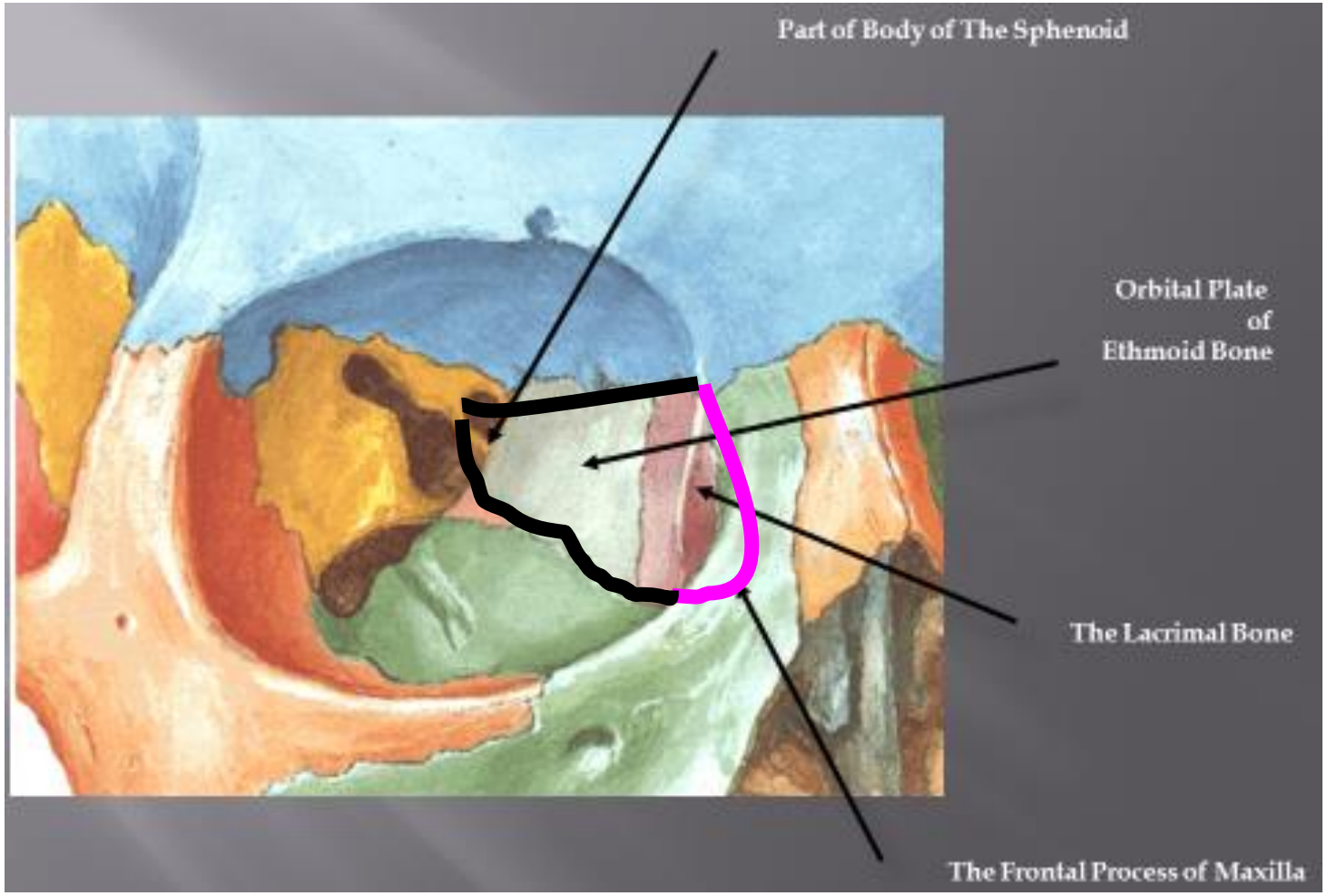
Lateral wall of the Orbit

1. Zygomatic
2. Greater wing of sphenoid.



Medial wall of the Orbit

1. Maxilla
2. Lacrimal bone
3. Ethmoid
4. Sphenoid



Contents of bony orbit

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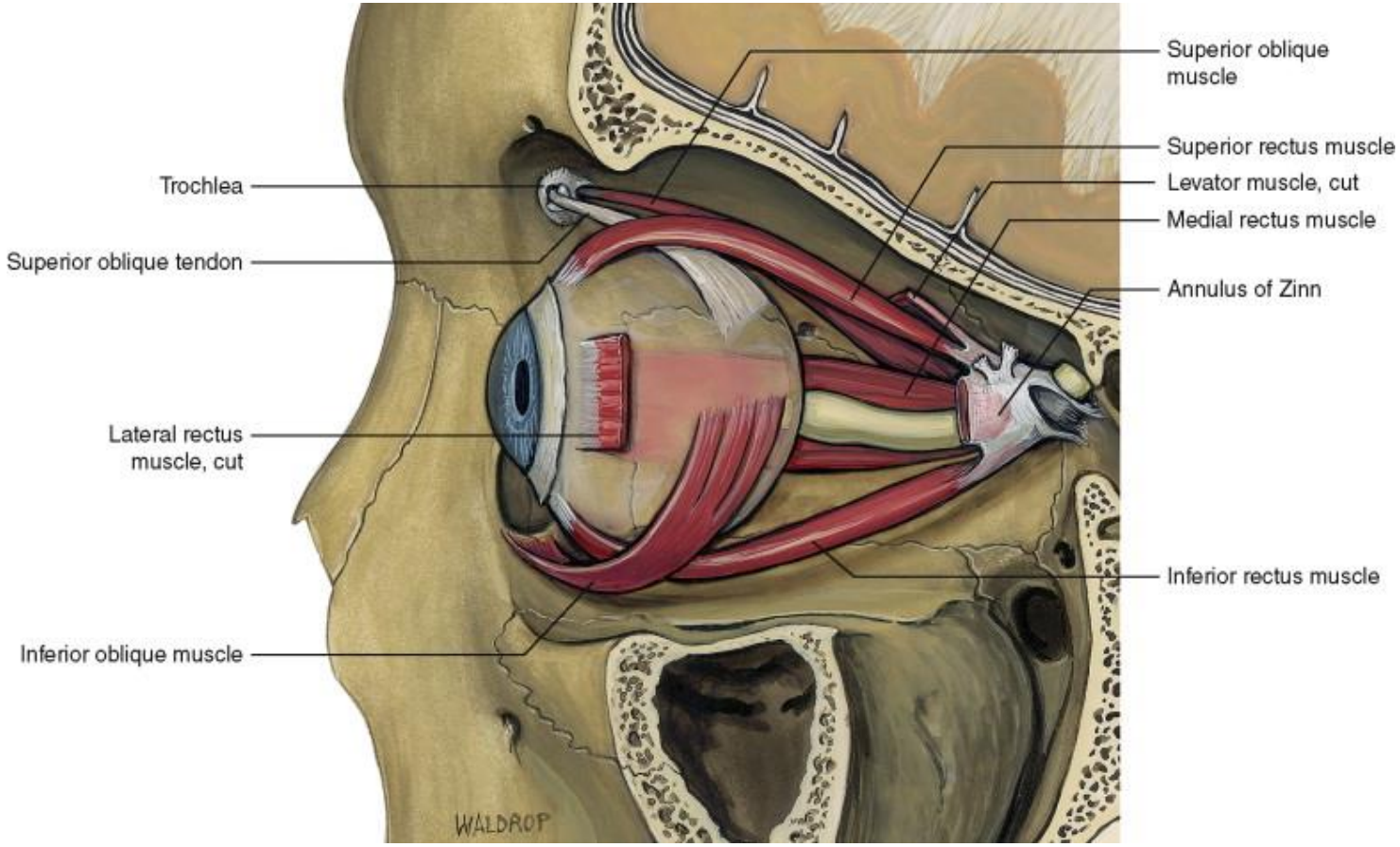
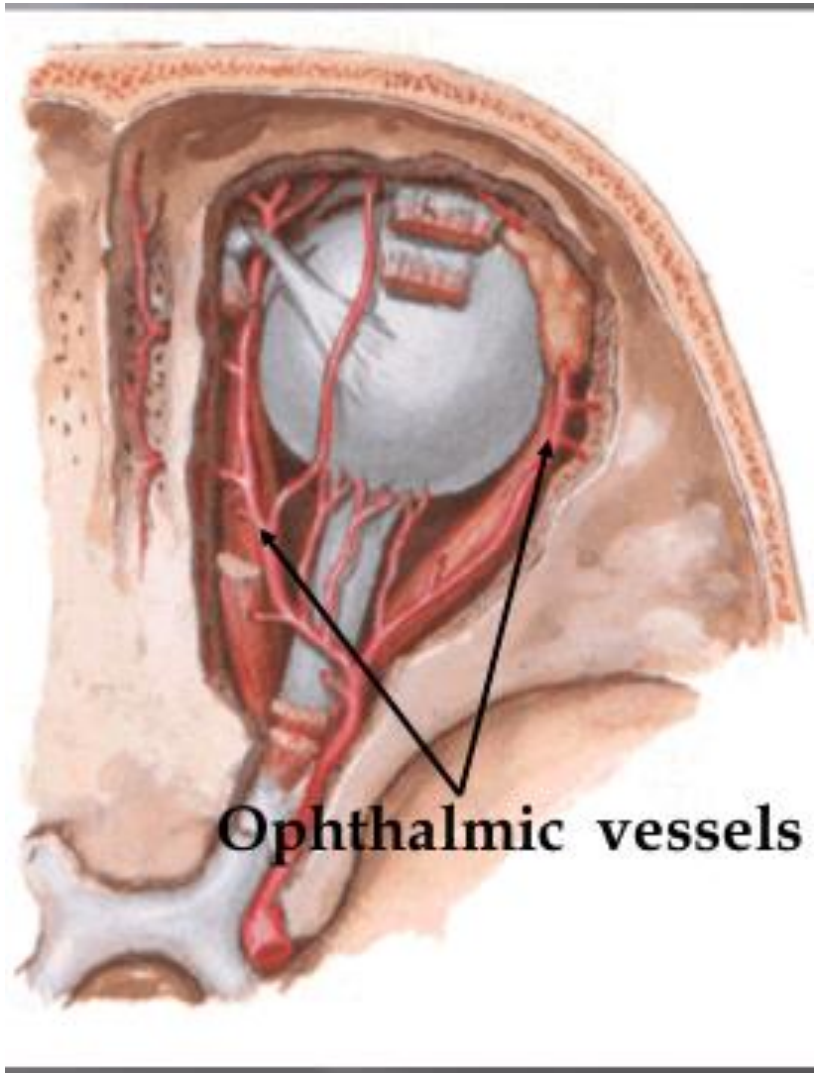
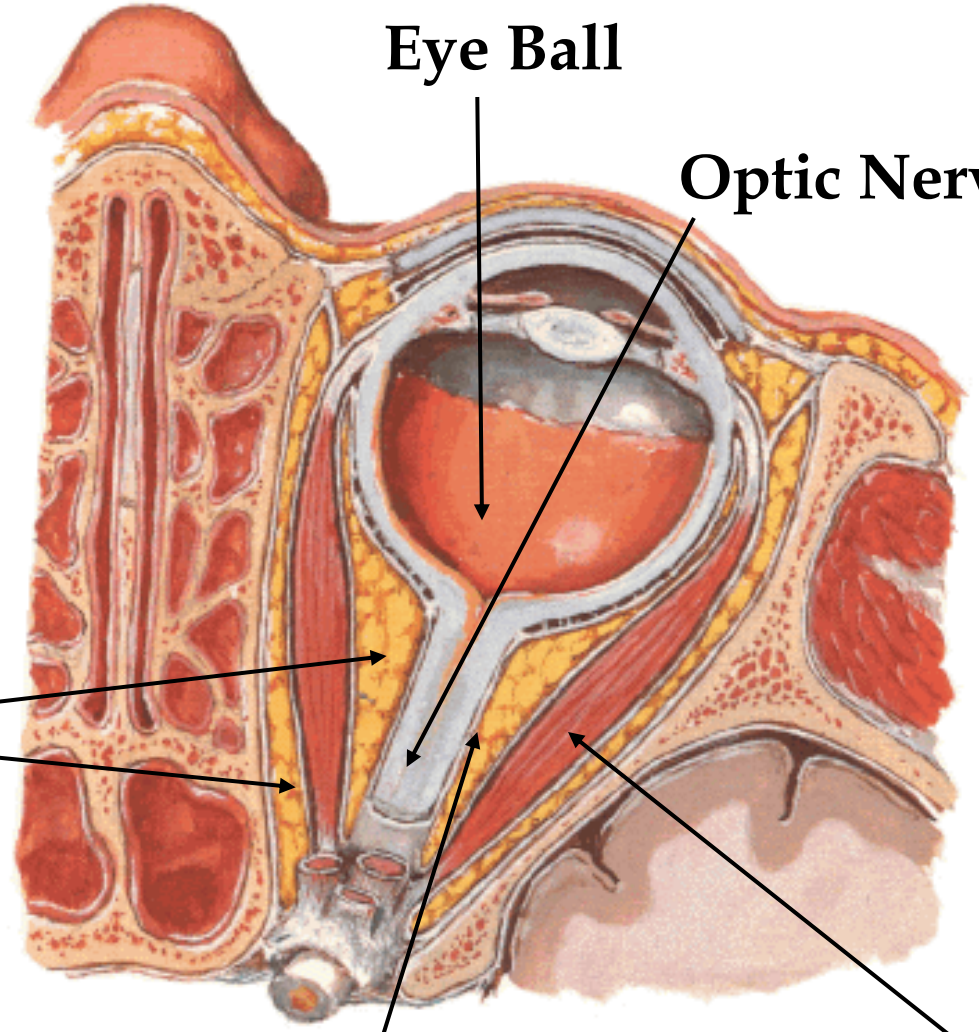
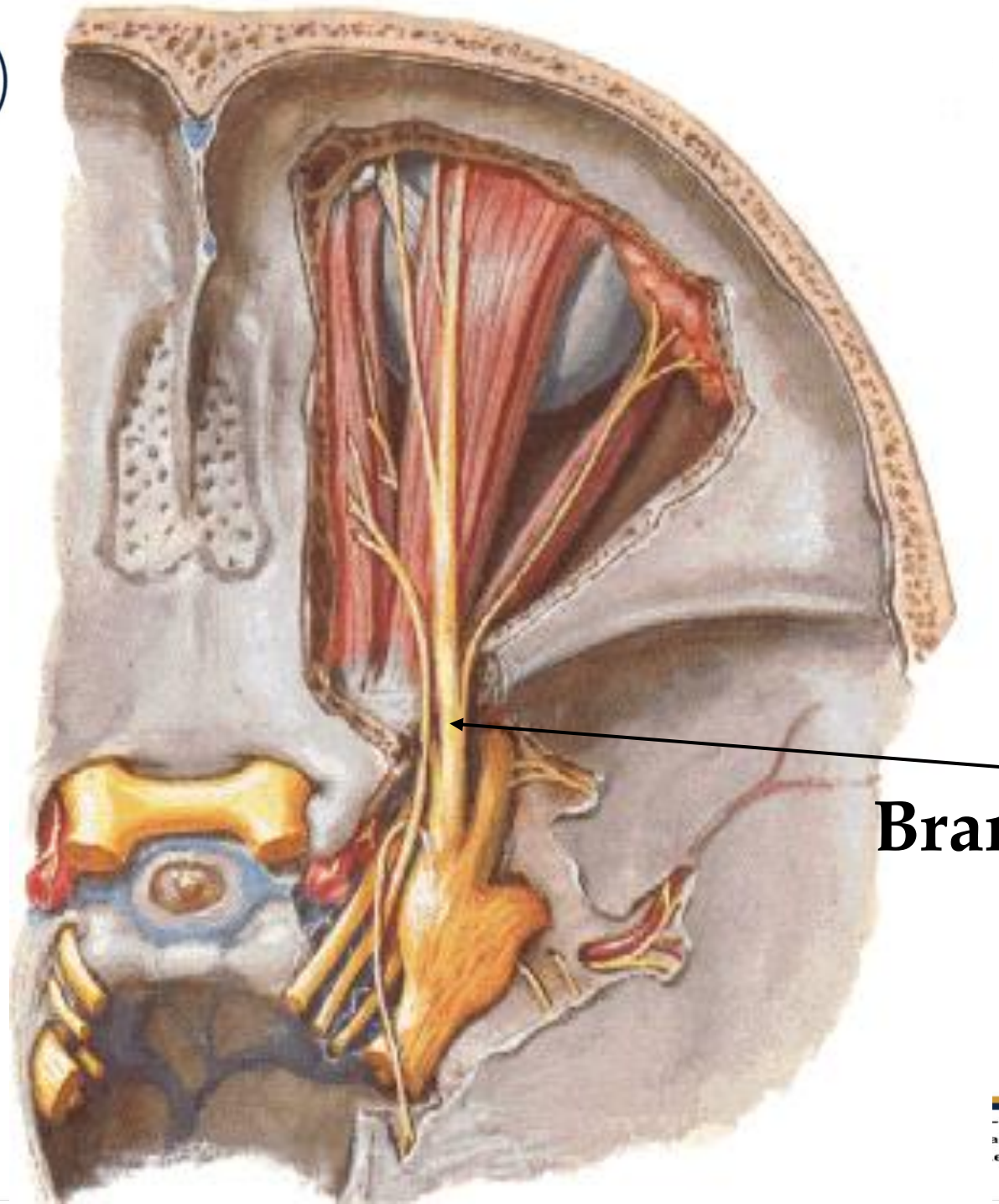
1. **Eyeball**
2. **Fasciae: Orbital, Bulbar**
3. **Extraocular muscles (Levator Palpebrae Superioris, Superior, Inferior, Lateral and Medial Rectus muscles, Superior and Inferior Oblique Muscles)**
4. **Nerves: cranial nerves II, III, IV, V1, and VI**



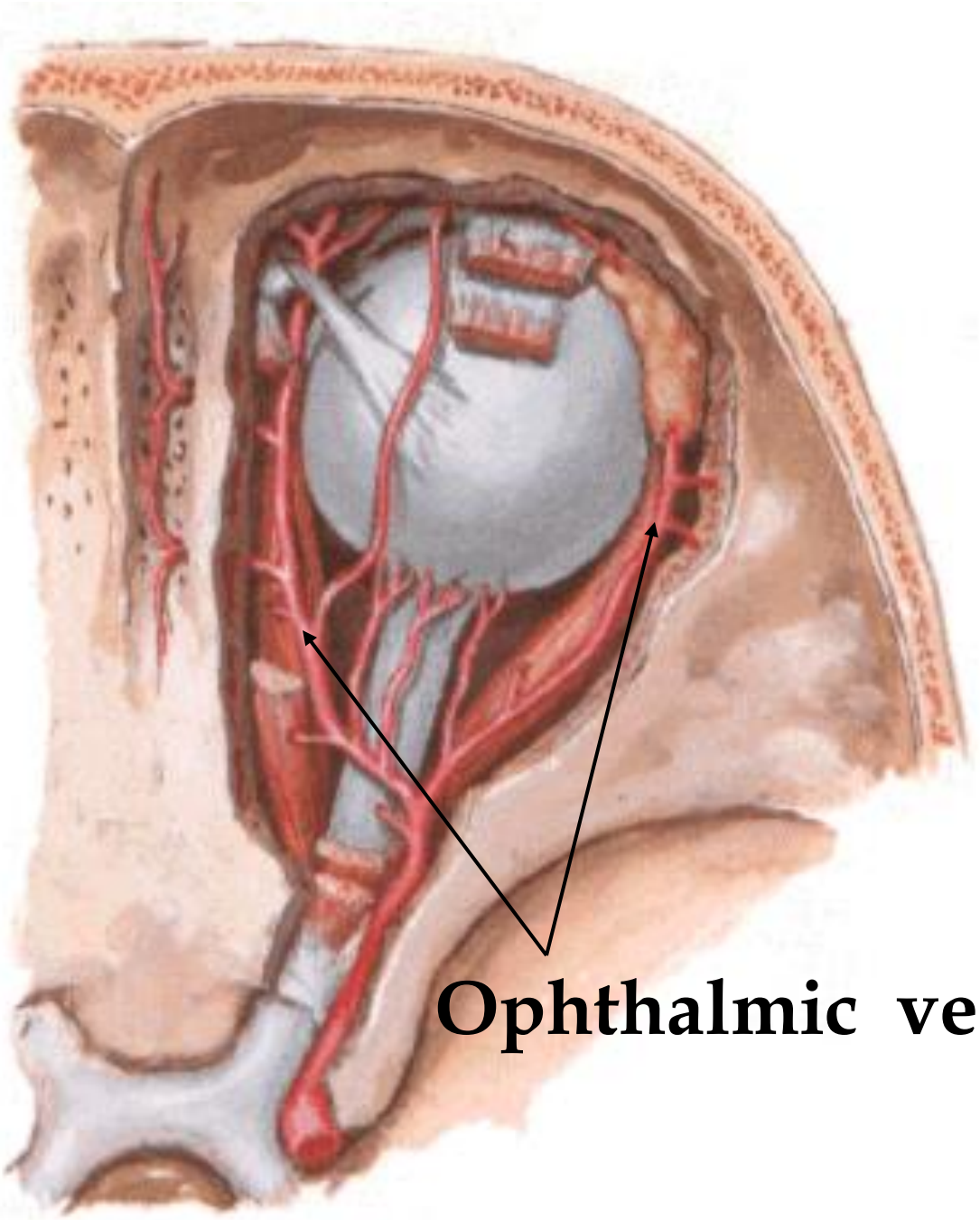
5. Blood vessels
6. Suspensory ligament of the eyeball
7. Conjunctiva
8. Trochlea of superior oblique
9. Orbital septum
10. Ciliary ganglion and short ciliary nerves
11. Extraocular Fat
12. Lacrimal gland, Lacrimal sac & Nasolacrimal duct
13. Eyelids
14. Medial palpebral ligament and Lateral palpebral ligament
15. Medial and Lateral Check ligaments



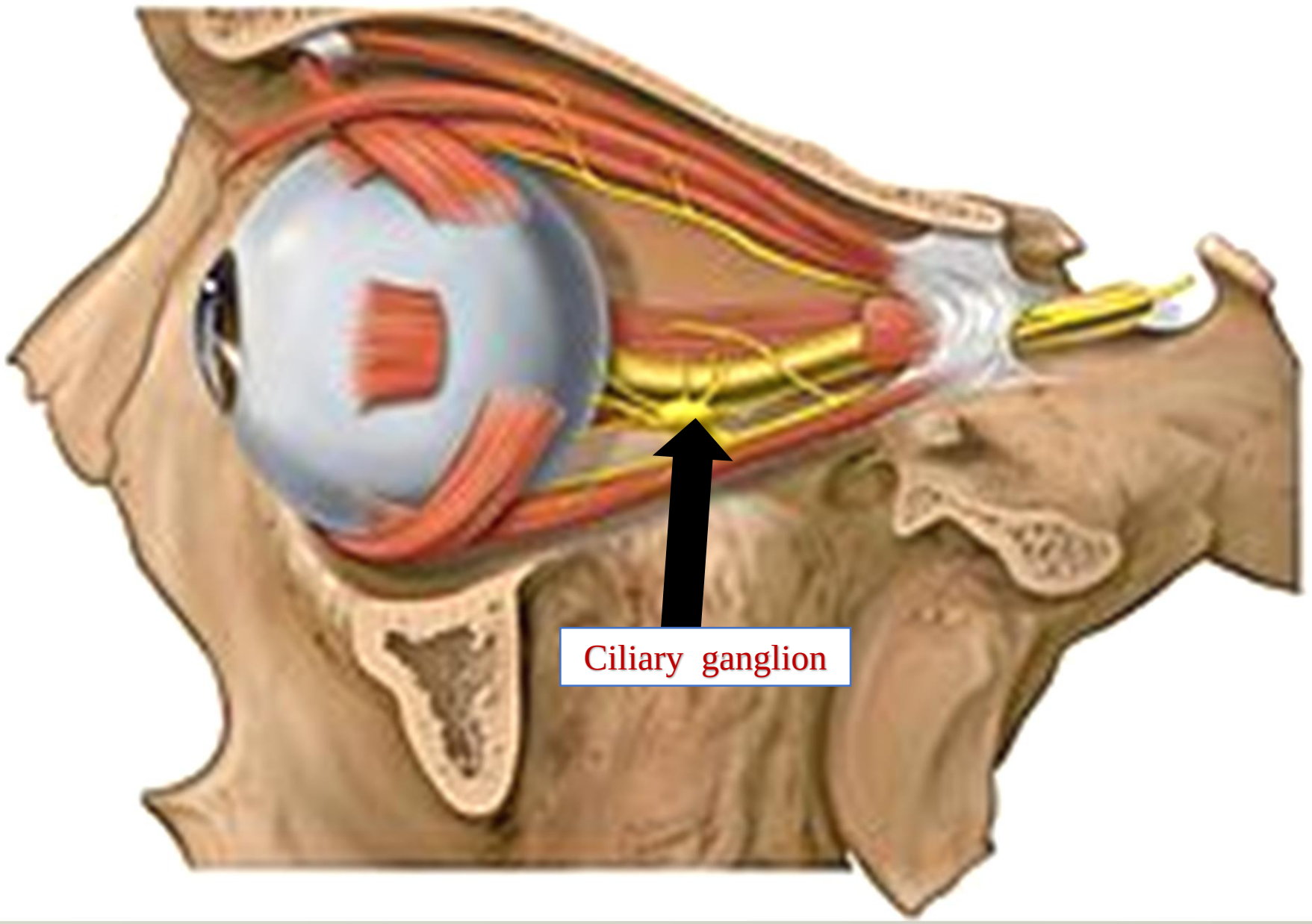

Eye Ball
Optic Nerve
Fat
Tenon's Fascia
Muscles



Branches of ophthalmic nerve



Ophthalmic vessels


Ciliary ganglion

Foramina of bony orbit

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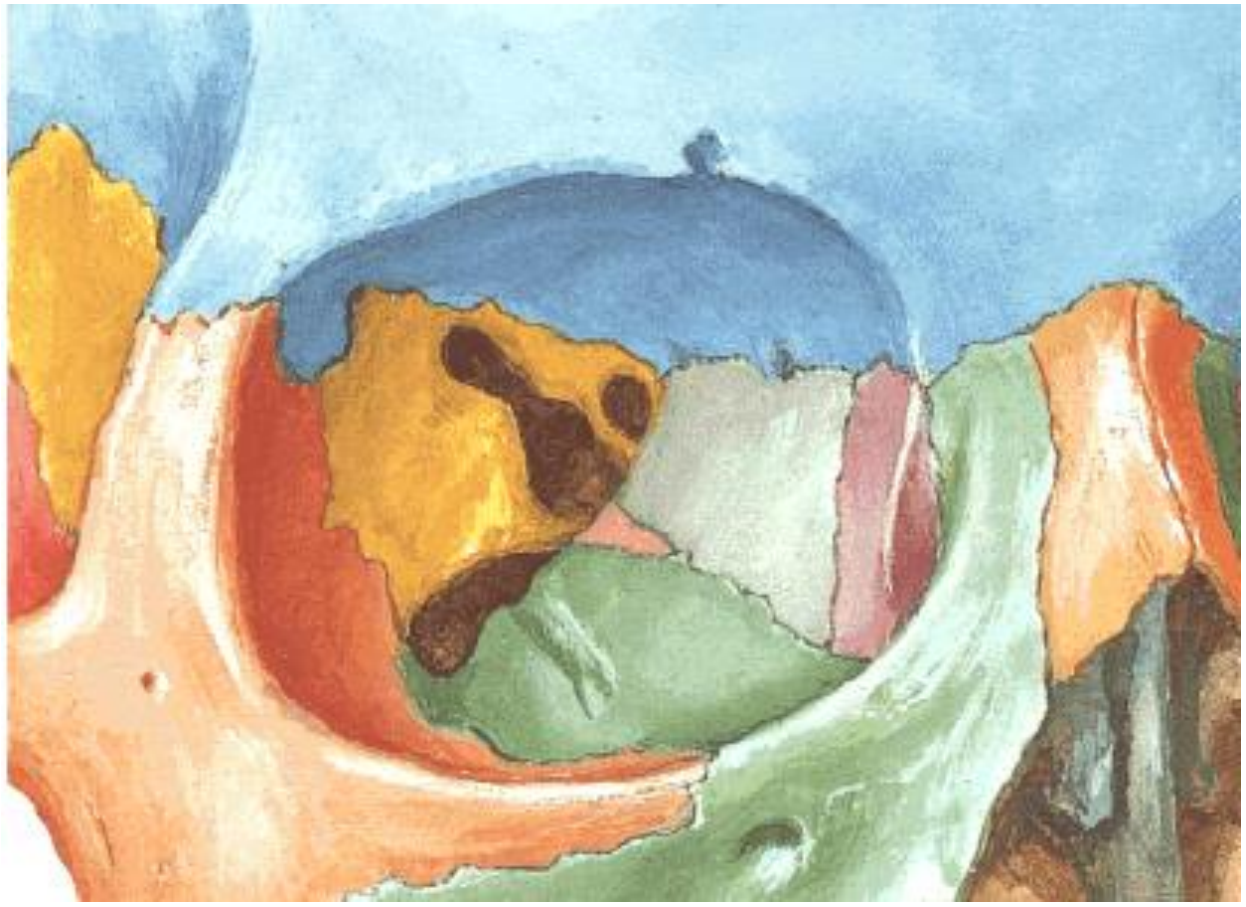
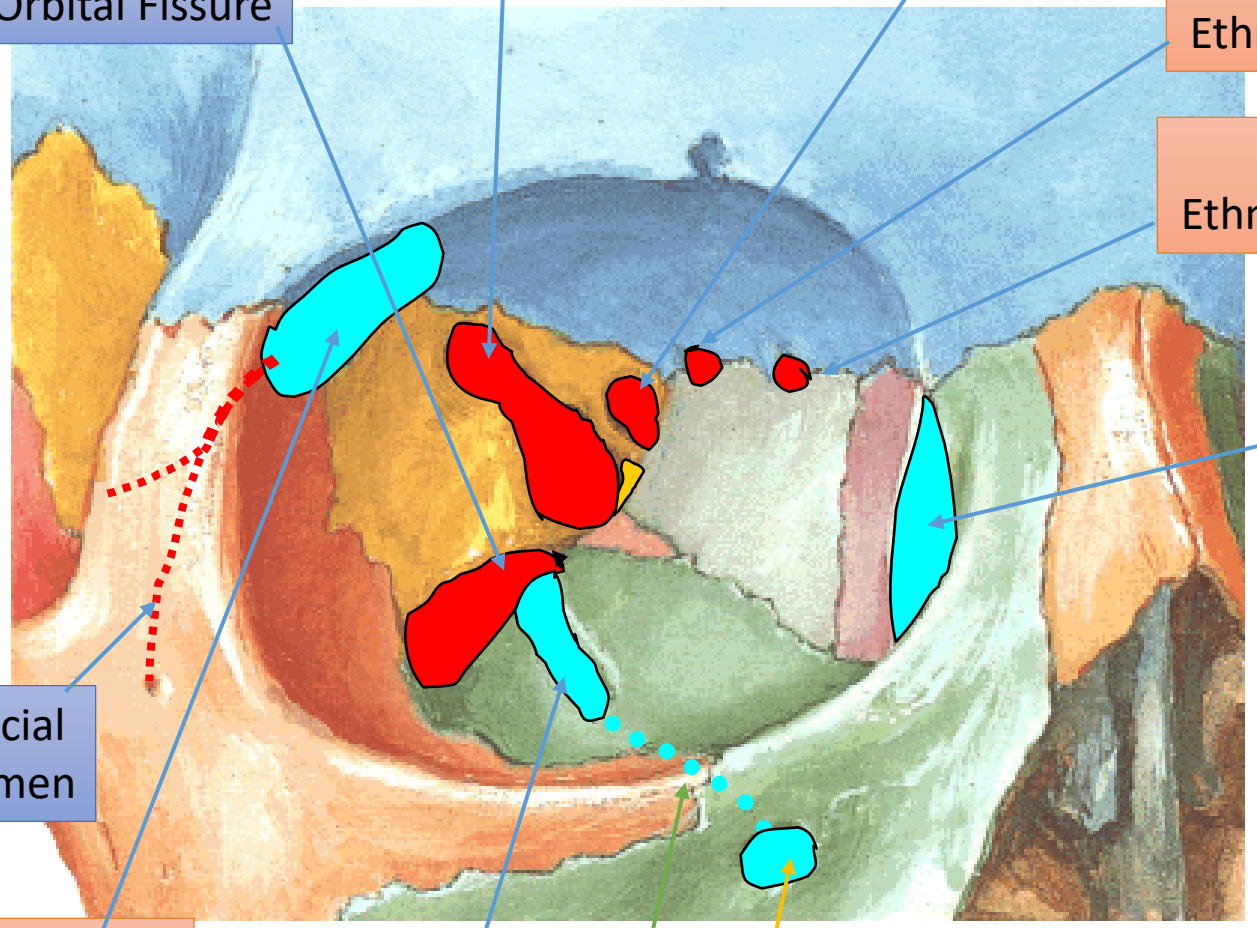
1. Optic canal
2. Superior orbital fissure
3. Inferior orbital fissure
4. Anterior ethmoidal foramen
5. Posterior ethmoidal foramen
6. Infraorbital foramen
7. Supraorbital foramen
8. Naso-lacrimal canal opening
9. Zygomatic orbital foramen




Superior Orbital Fissure
Inferior Orbital Fissure
Optic canal
Posterior Ethmoidal Foramen
Anterior Ethmoidal Foramen
Fossa for Lacrimal Sac
Zygomatico-facial Foramen
Fossa for Lacrimal Gland
Infra-orbital Groove
Infra-orbital Canal
Infra-orbital Groove

Muscles of the orbit

Extra-ocular Muscles

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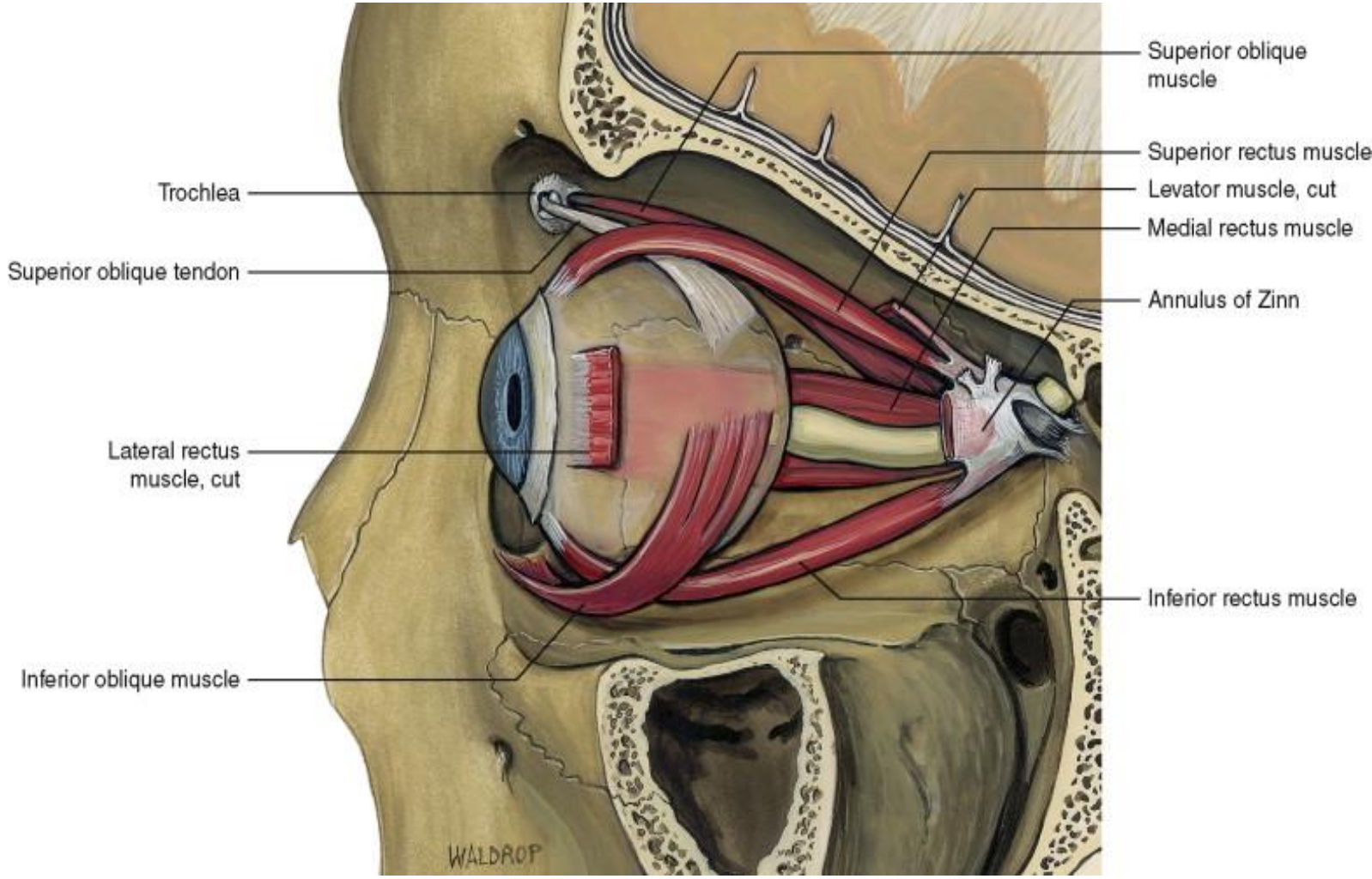
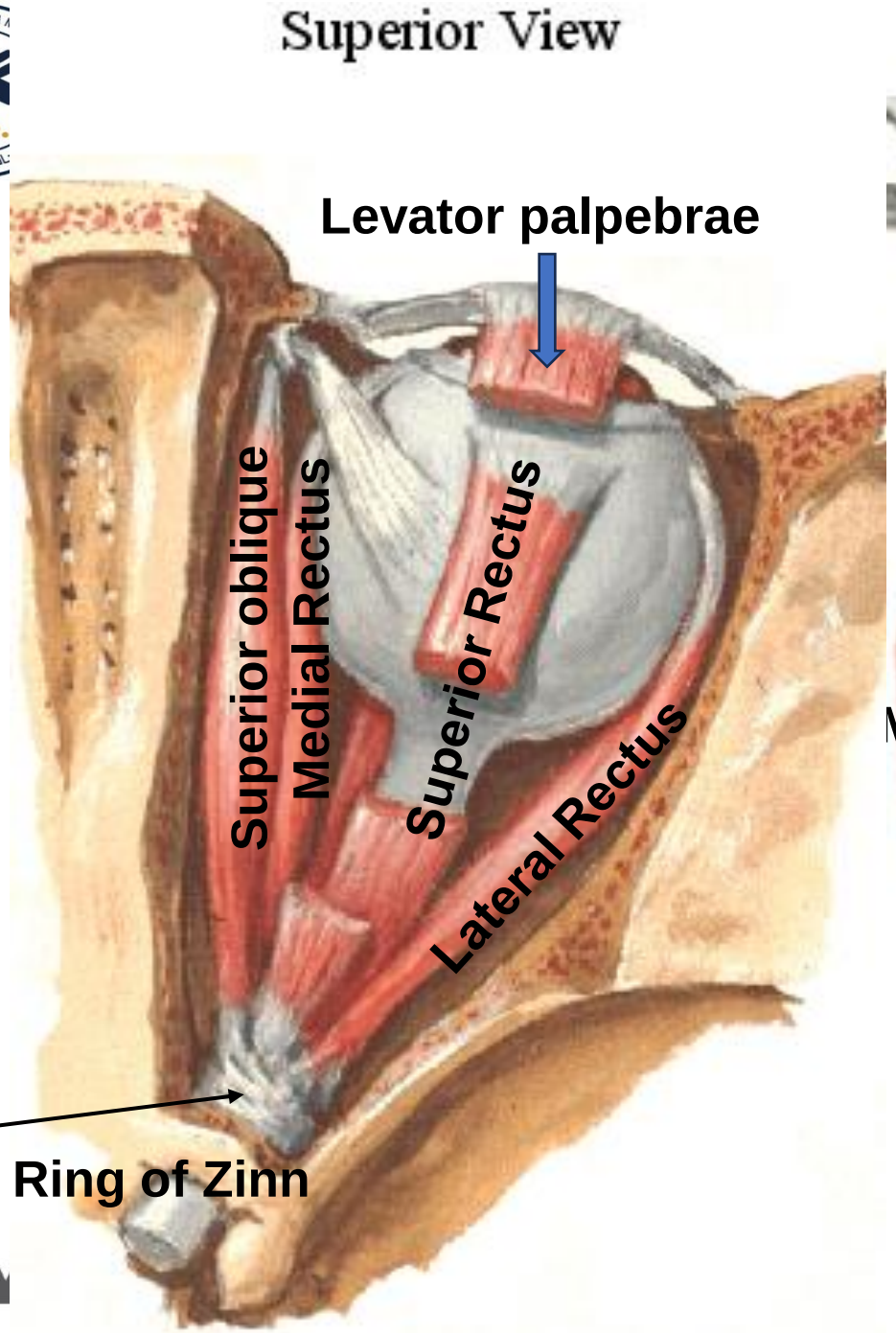
I. Recti muscles

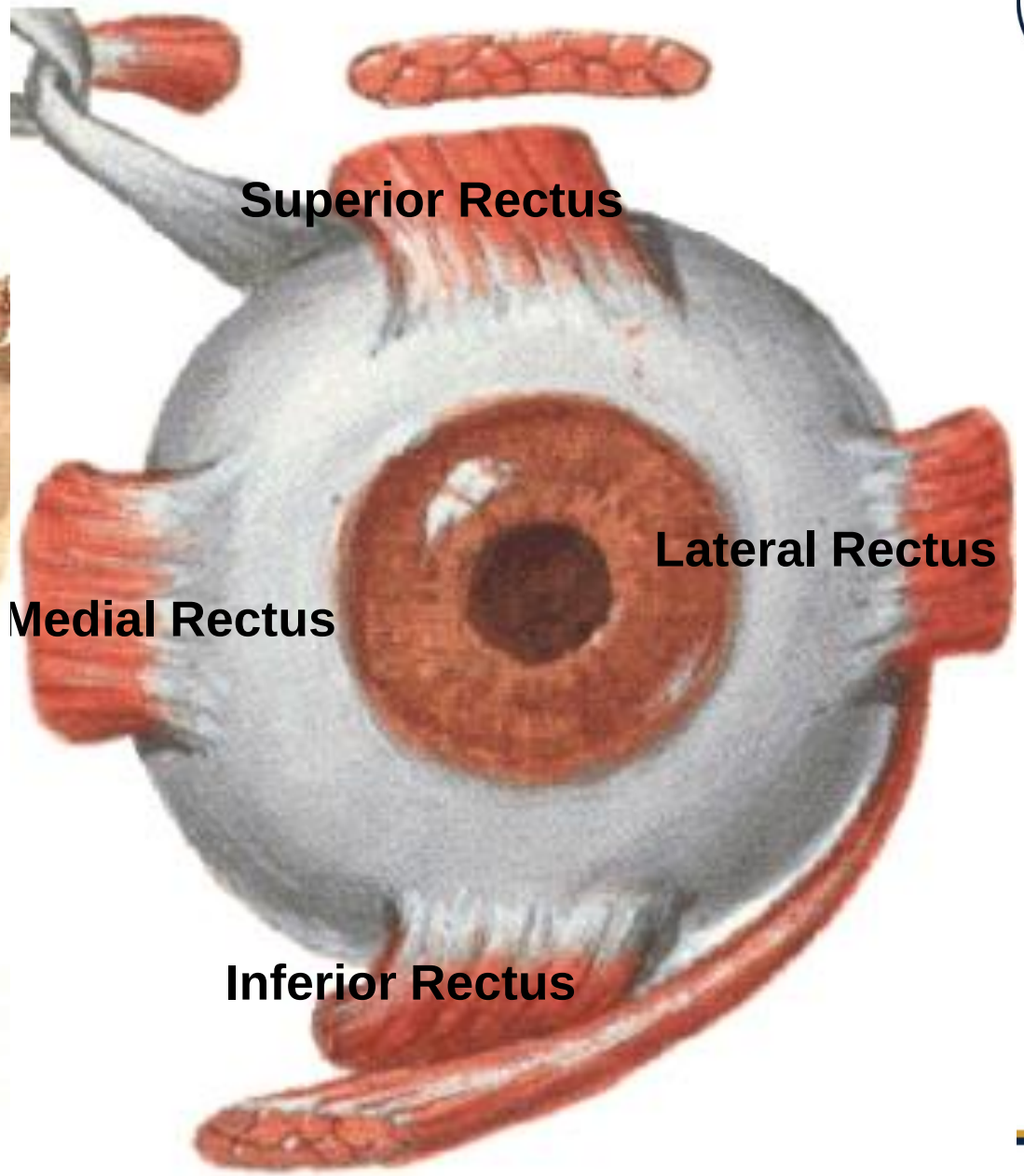
1. Superior
2. Inferior
3. Medial
4. Lateral

All are supplied by Oculomotor n. except lateral rectus (Abducent n.)



Muscle	Origin	Insertion (Sclera)	Nerve	Action
Superior	annulus of Zinn at the orbital apex	superior to the corneal limbus	oculomotor nerve	elevates, adducts, and rotates medially the eye
Inferior	annulus of Zinn	inferior to the corneal limbus	oculomotor nerve	depression and adduction
Medial	annulus of Zinn	medial to the corneal limbus	oculomotor nerve	adducts the eyeball
Lateral	annulus of Zinn	temporal to the corneal limbus	Abducent nerve	abducts the eyeball

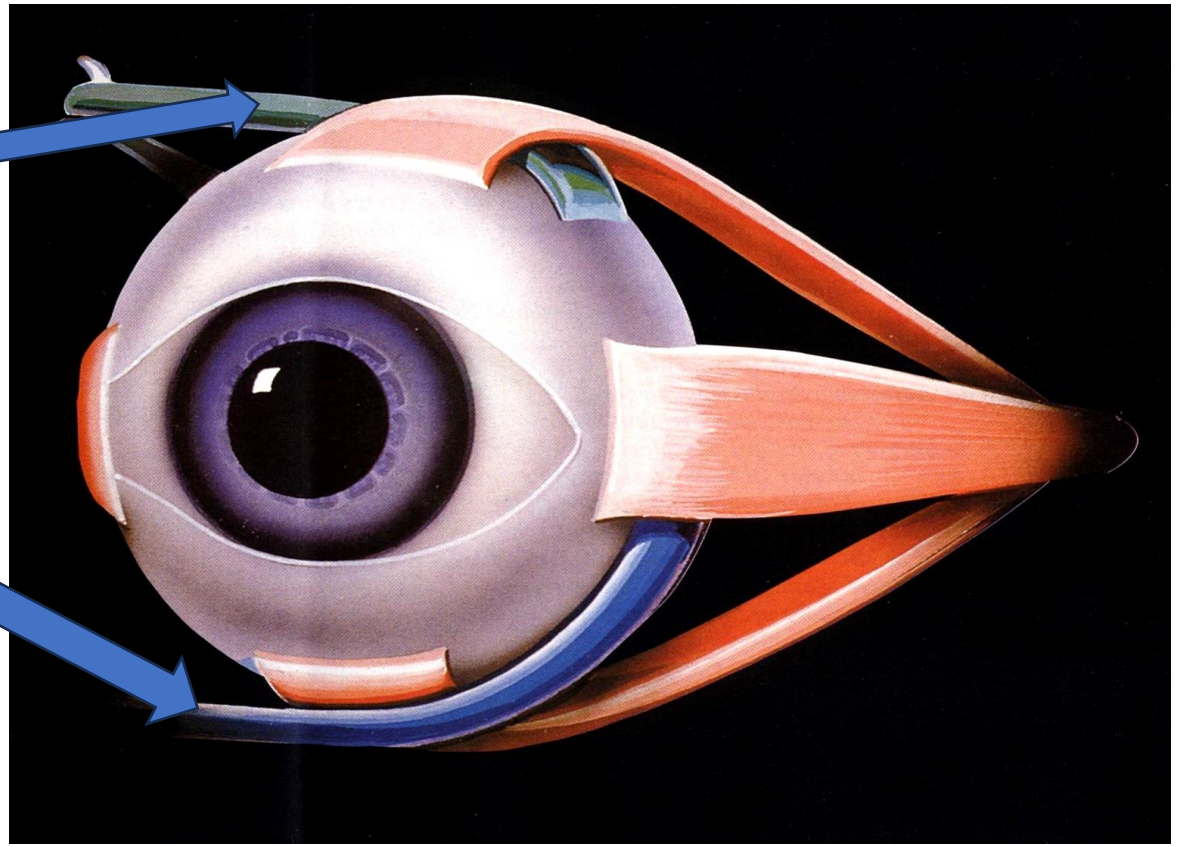

Superior View
Levator palpebrae
Superior oblique
Medial Rectus
Superior Rectus
Lateral Rectus
Annulus Ring of Zinn


Superior Rectus
Lateral Rectus
Medial Rectus
Inferior Rectus

I. Oblique muscles

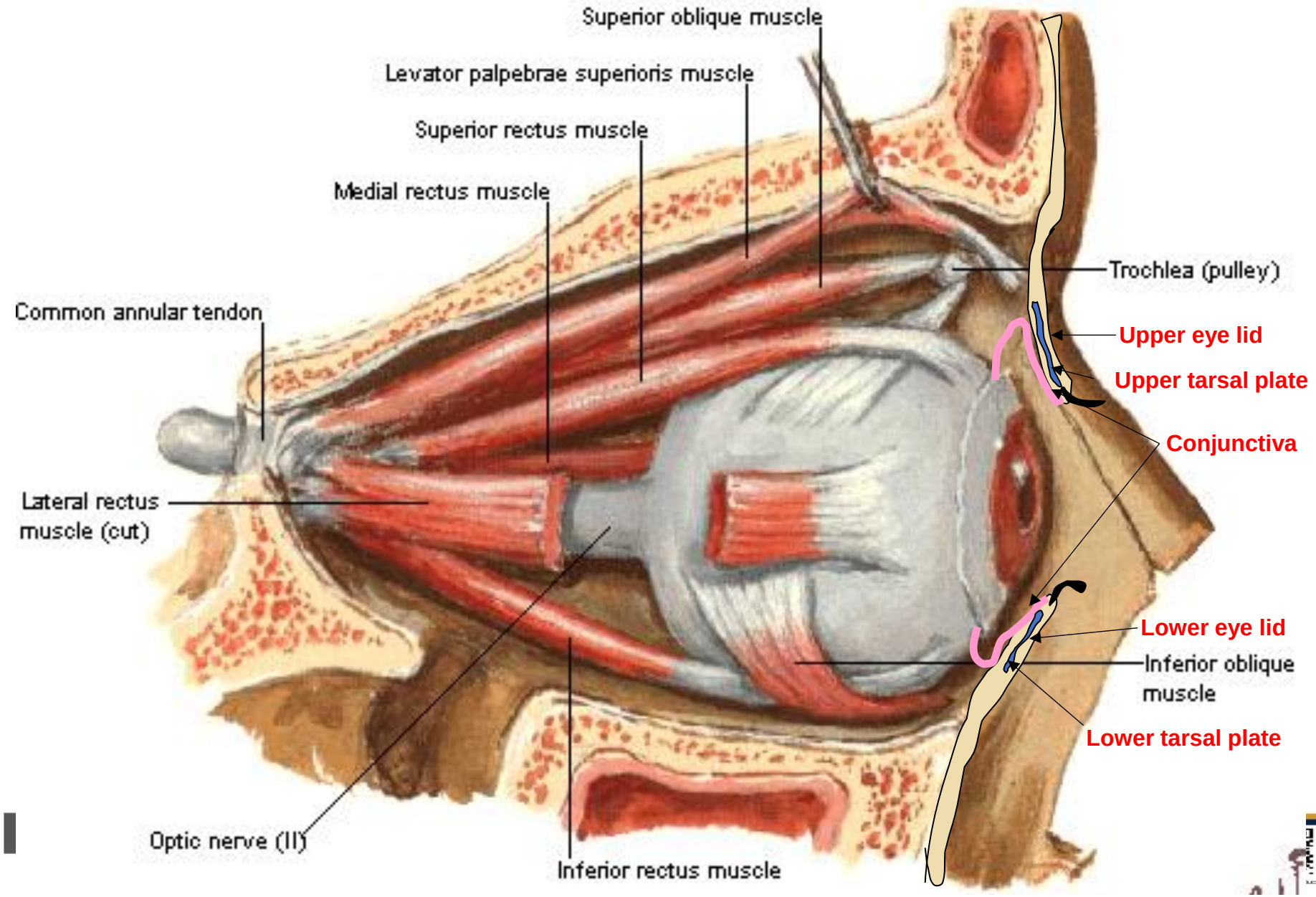
Two oblique muscles:

1. Superior oblique (Trochlear n.)
2. Inferior oblique (oculomotor n.).



Muscle	Origin	Insertion (Sclera)	Nerve	Action
superior	annulus of Zinn	Outer posterior quadrant of the eyeball	trochlear nerve	intorsion, abduct and depress the eyeball
inferior	maxilla, lateral to the lacrimal groove	laterally onto the eyeball, deep to the lateral rectus.	oculomotor nerve	extorsion, elevation, abduction

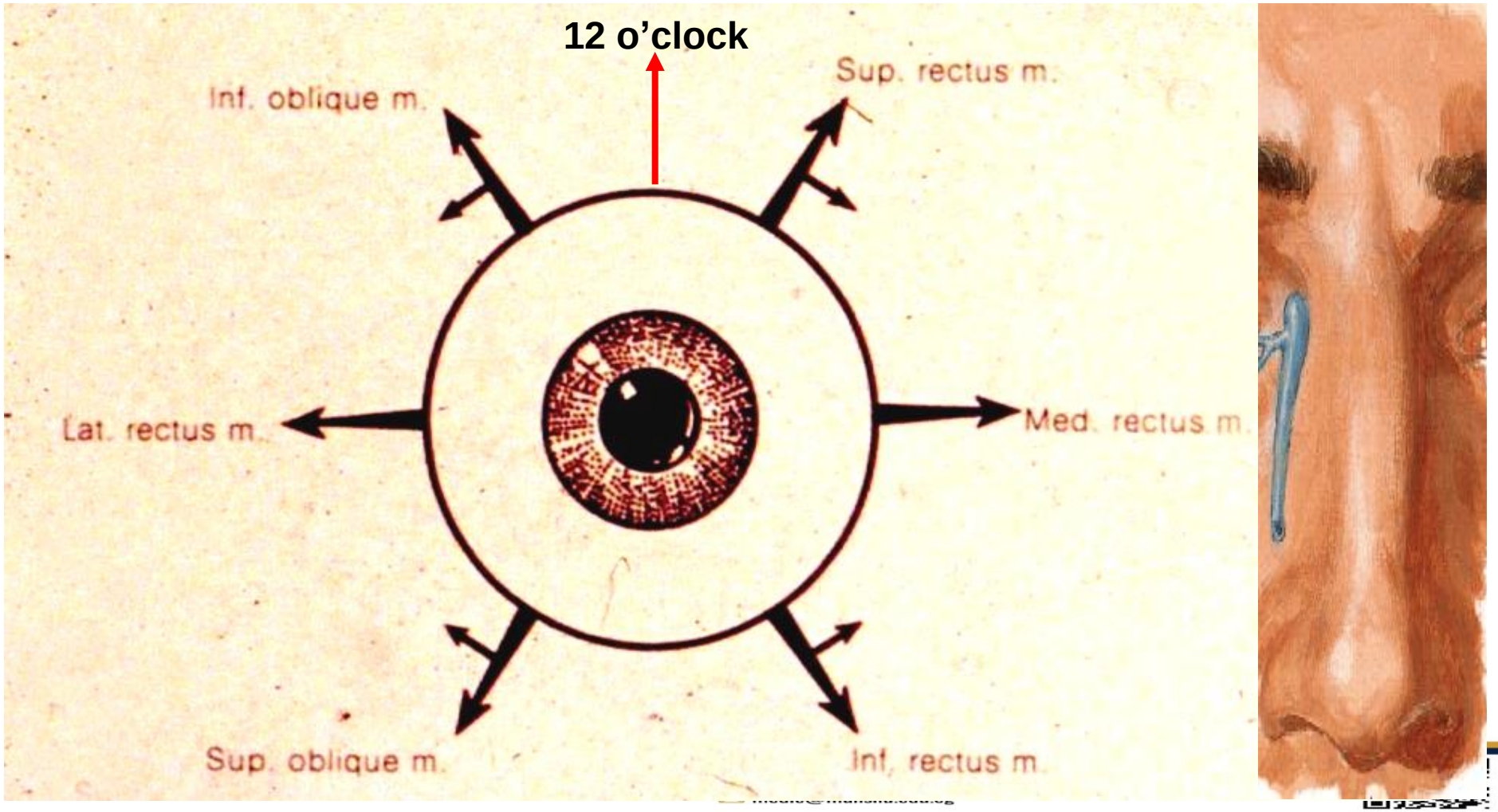
Right Lateral View



Inferior Oblique
Inferior Rectus
Superior Rect
Superior Oblique
Lateral Rectus

Medial Rectus

The Primary Position



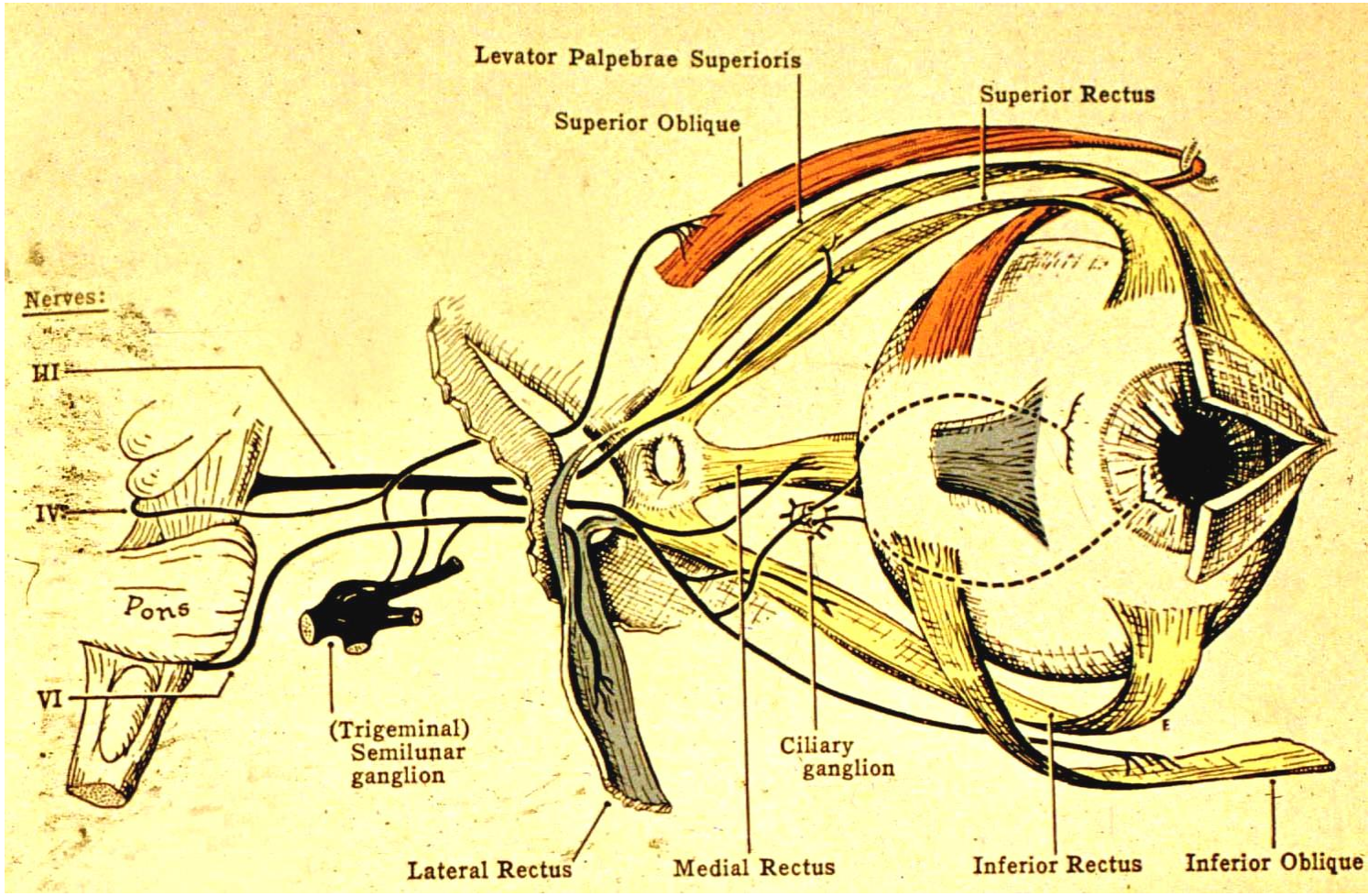
Lateral rectus paralysis

Medial Squint

3. Levator Palpebrae Superioris

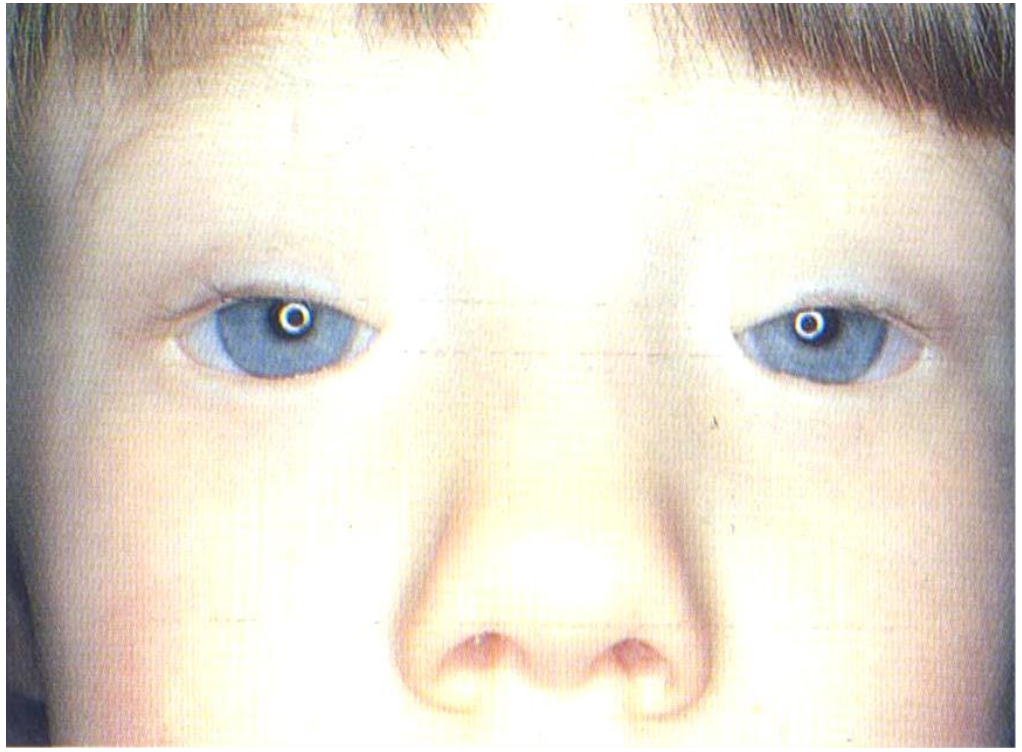
Action: raises the eyelid

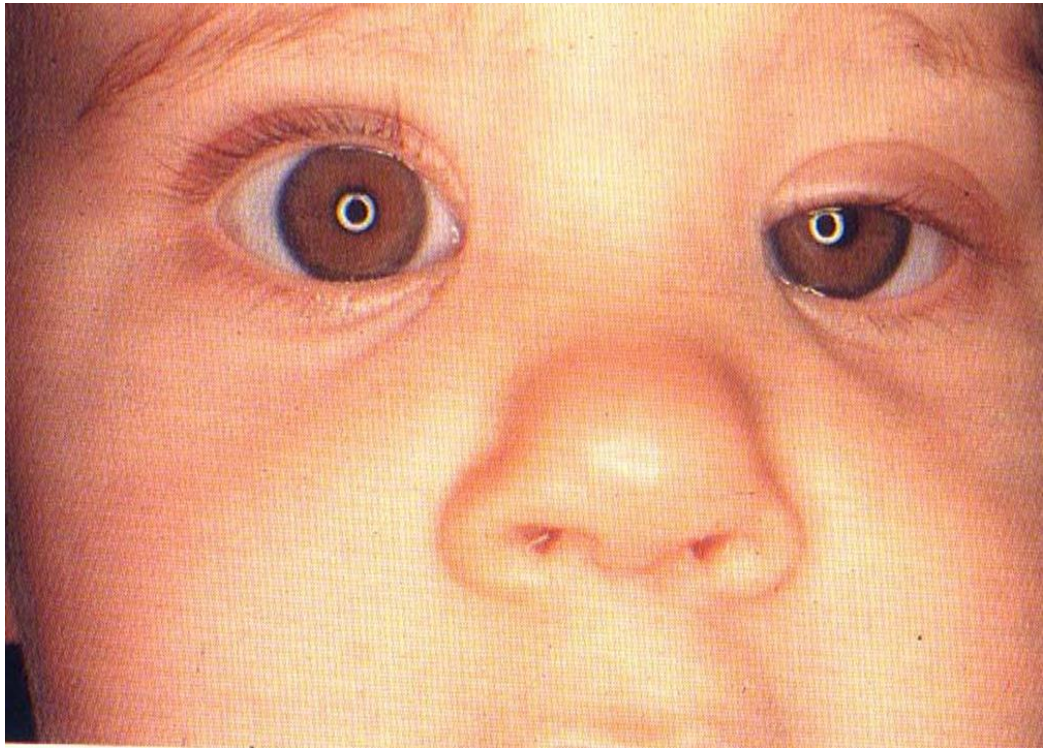
Nerve supply: Supplied by oculomotor nerve



Levator Palpebrae Superioris paralysis

Ptosis





Exophthalmos

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Vessels of the orbit

Ophthalmic vessels

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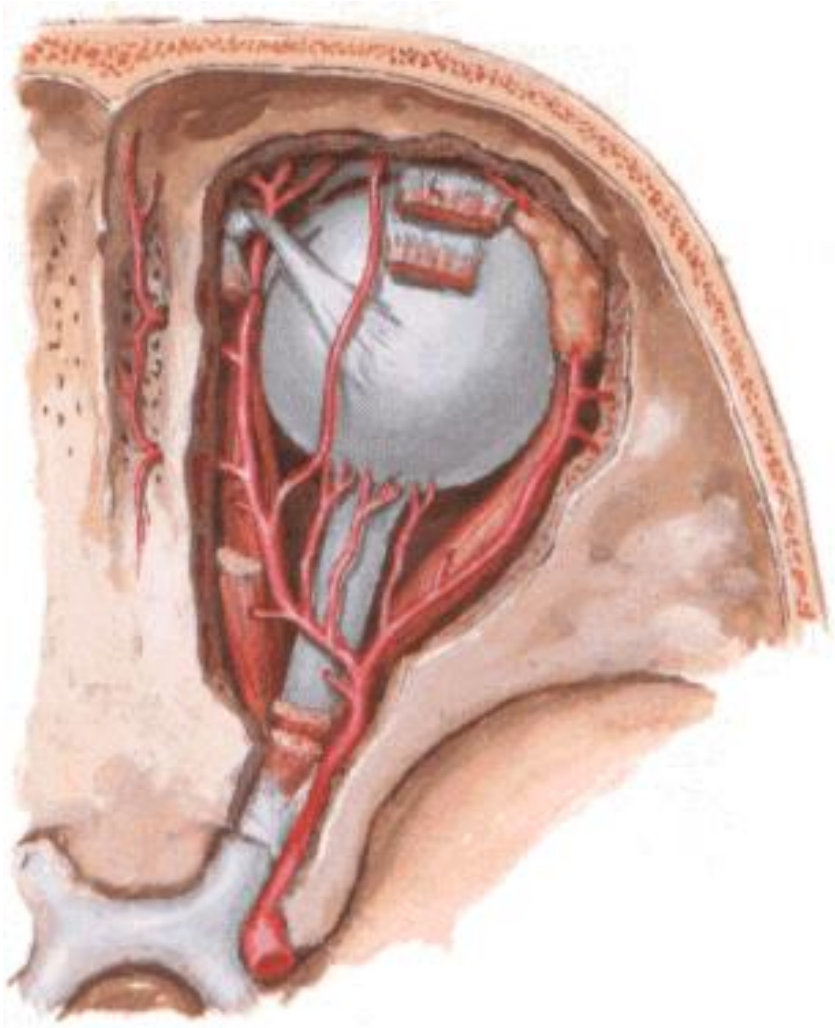
Ophthalmic Artery

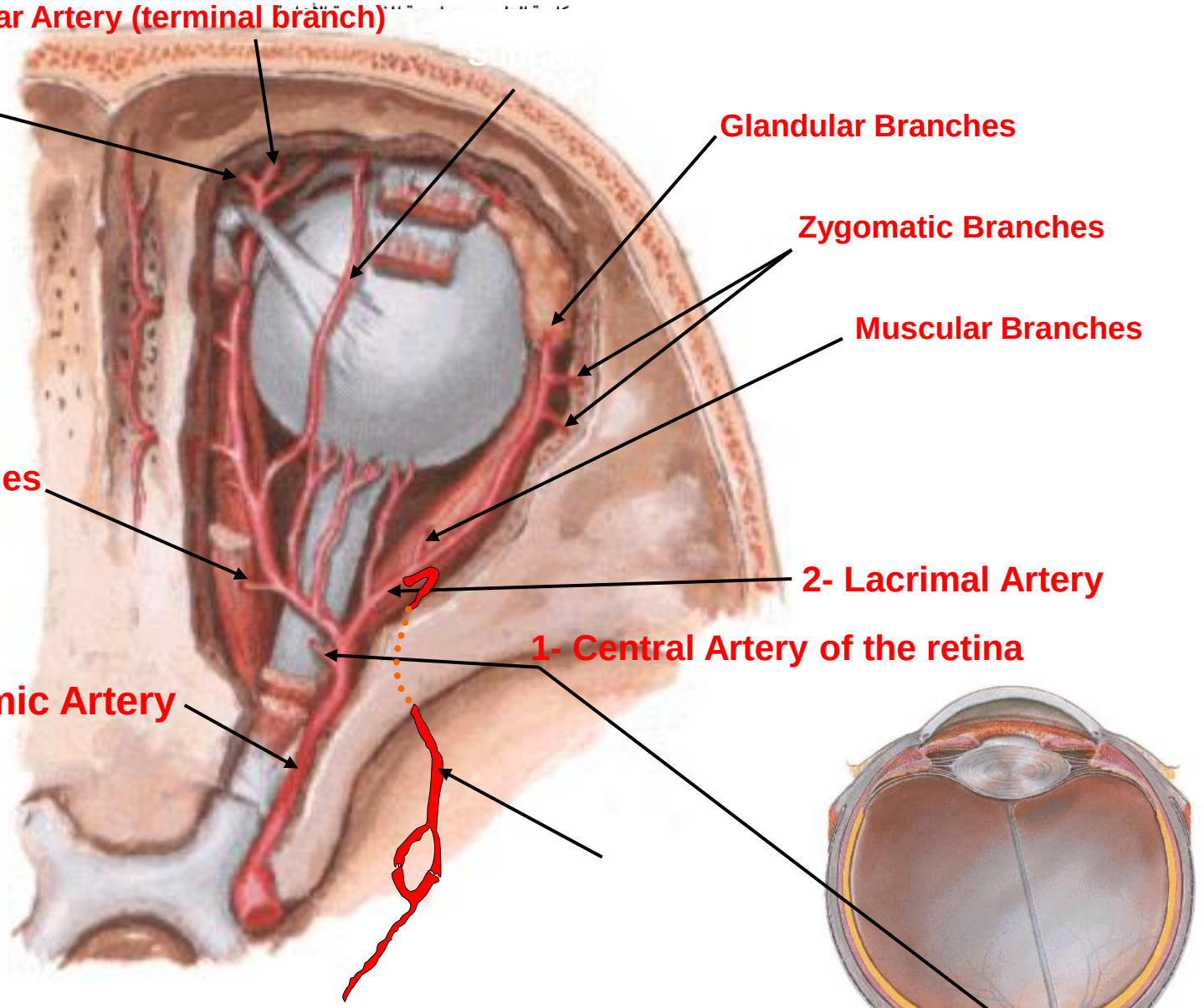
Origin: internal carotid artery

Termination: supratrochlear & dorsal nasal

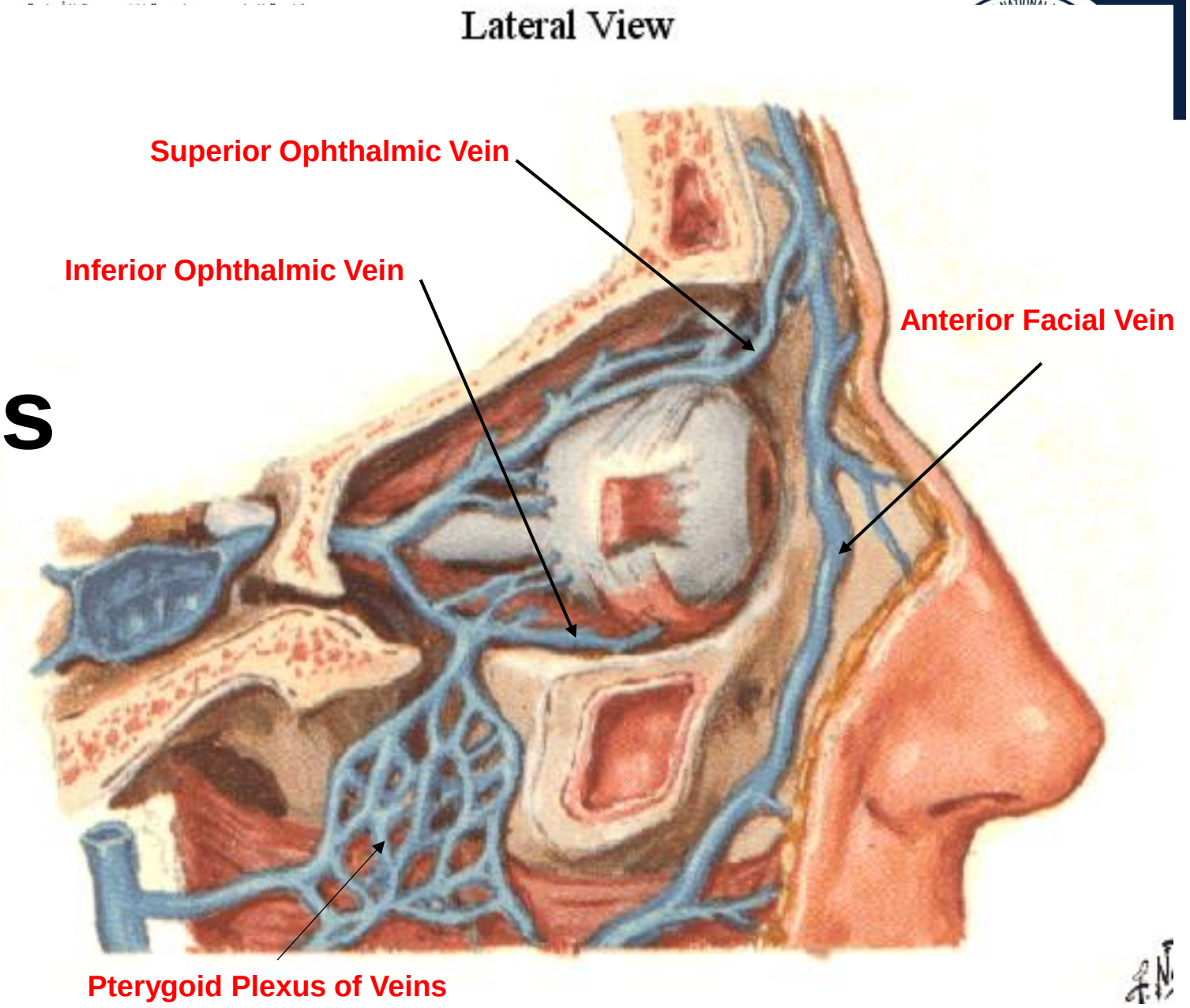
Branches:

1. Lacrimal
2. Frontal
3. Central artery of the retina
4. Zygomatic
5. Glandular
6. Supraorbital
7. Supratrochlear (terminal)
8. Dorsal nasal (terminal)




Supratrochlear Artery (terminal branch)
Dorsal Nasal Artery (terminal branch)
Glandular Branches
Zygomatic Branches
Muscular Branches
3- Muscular Branches
2- Lacrimal Artery
1- Central Artery of the retina
Ophthalmic Artery

Ophthalmic Veins



Nerves of the orbit

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INNERVATION OF ORBIT

1]=Motor nerves:- [all ms are supplied by 3rd except LR & SO]

1)-3rd (**principal**) 2)-4th for **LR** 3)-6th for **SO**

2]=Sensory nerves:-

1)-General:- Ophthalmic division of trigeminal nerve

2)-Special [vision]:- Optic nerve.

3]=Para-sympathetic ganglion [autonomic nerve]:-

1)-Ciliary ganglion:- sphincter & ciliary muscles.

2)- S.P.G.:- lacrimal gland.

Lacrimal Apparatus

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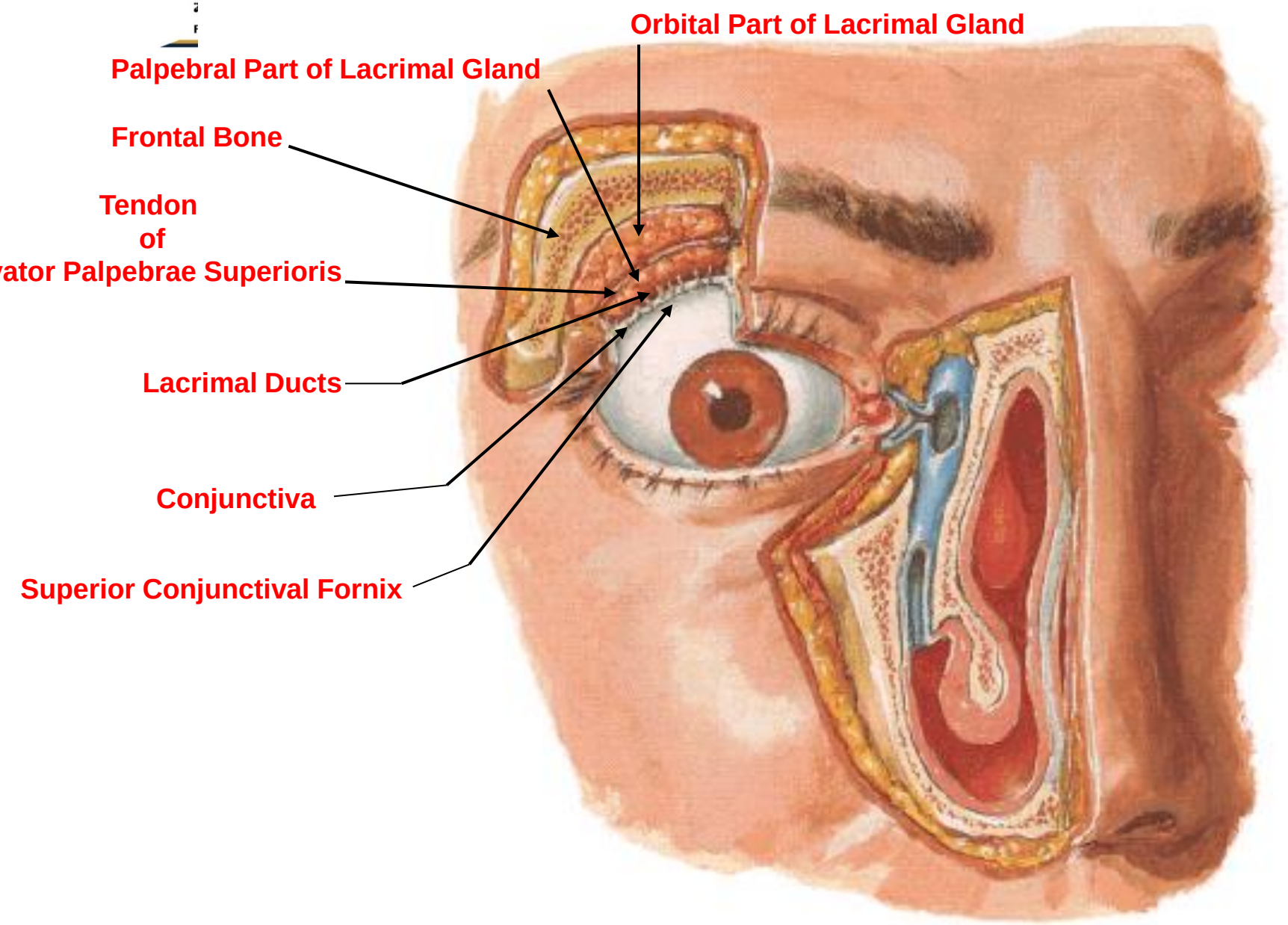
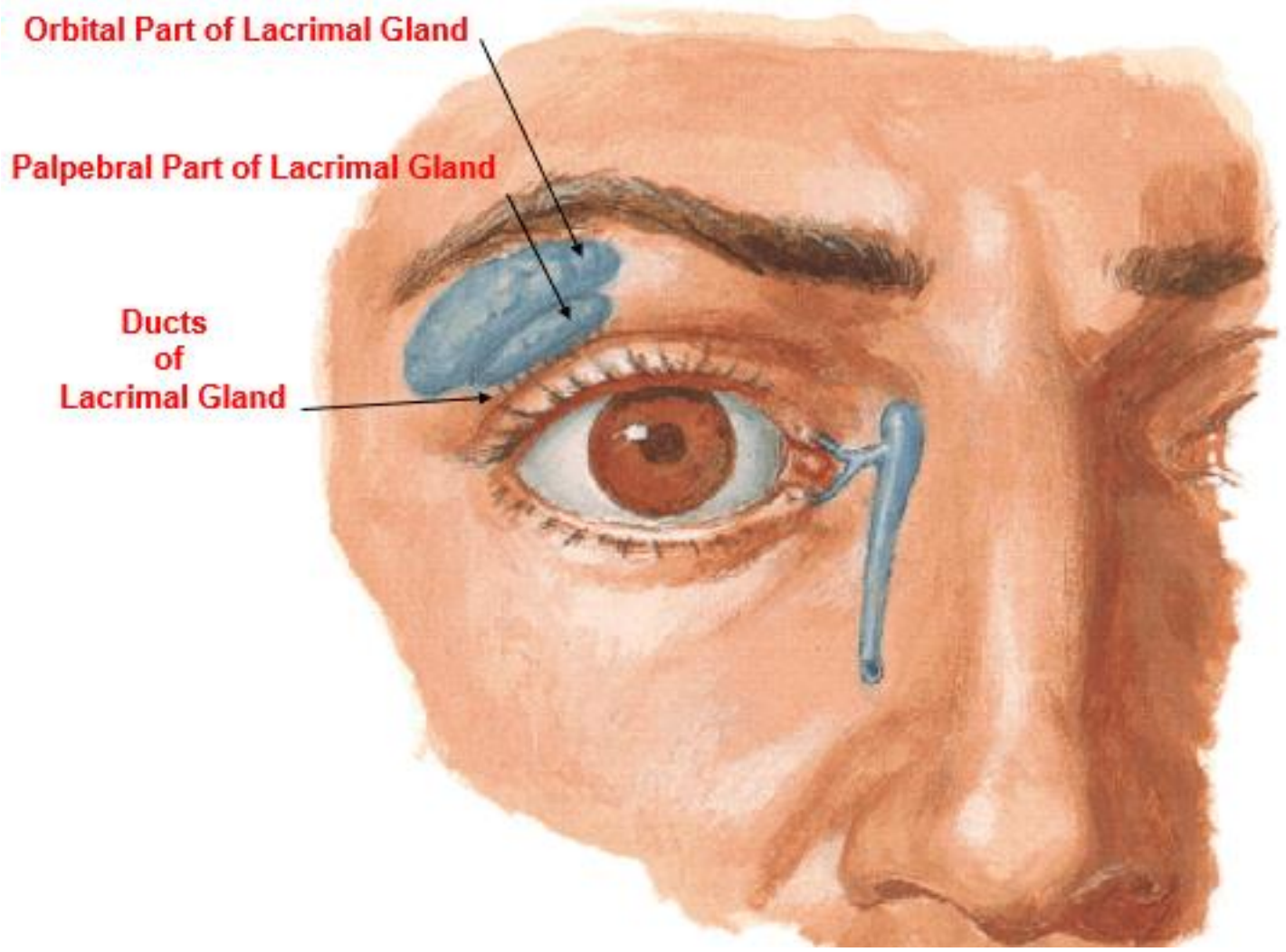
The Lacrimal Gland



- The lacrimal glands are paired almond-shaped glands, one for each eye, that secrete the aqueous layer of the tear film.
- They are situated in the upper, outer portion of each orbit, in the lacrimal fossa of the orbit formed by the frontal bone.

Parts

1. The orbital portion
2. The smaller palpebral portion

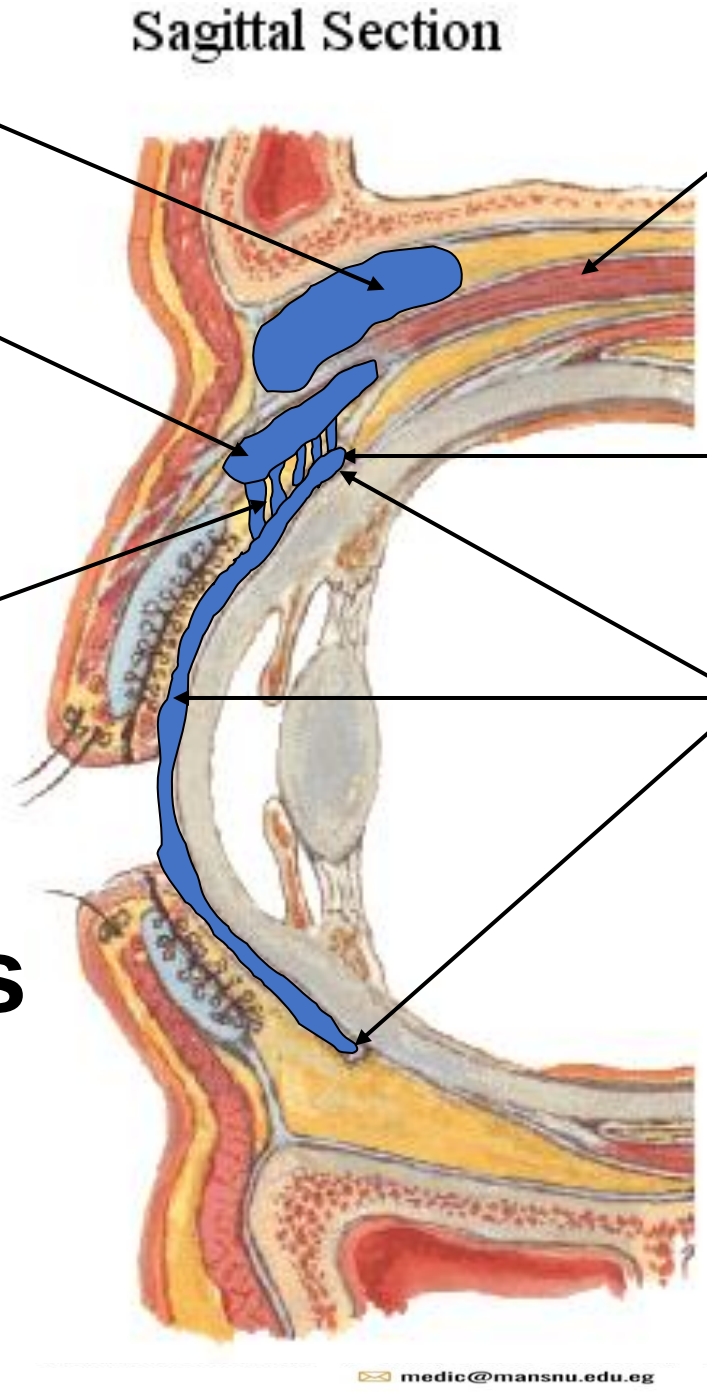


Pathway of Tears

- Tears secreted collect in the

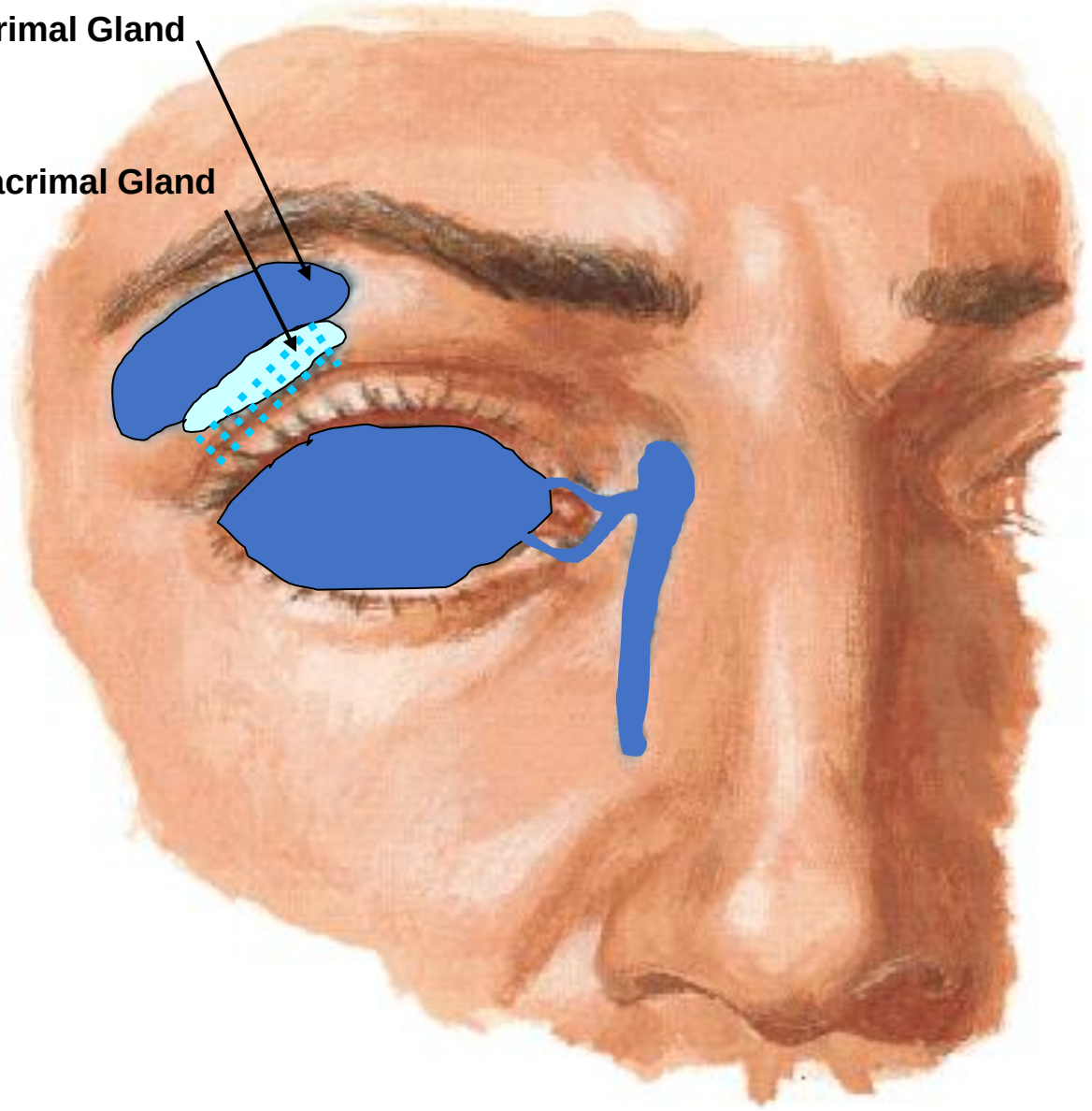
1. Fornix (conjunctiva of the upper lid)
2. Lacrimal puncta
3. Lacrimal sac
4. Nasolacrimal duct,

Pathway of Tears



Orbital Part of Lacrimal Gland

Palpebral Part of Lacrimal Gland



Parasympathetic supply of the Lacrimal Gland

- **Facial nerve through lacrimal branch of ophthalmic nerve**

Structure of the eye ball

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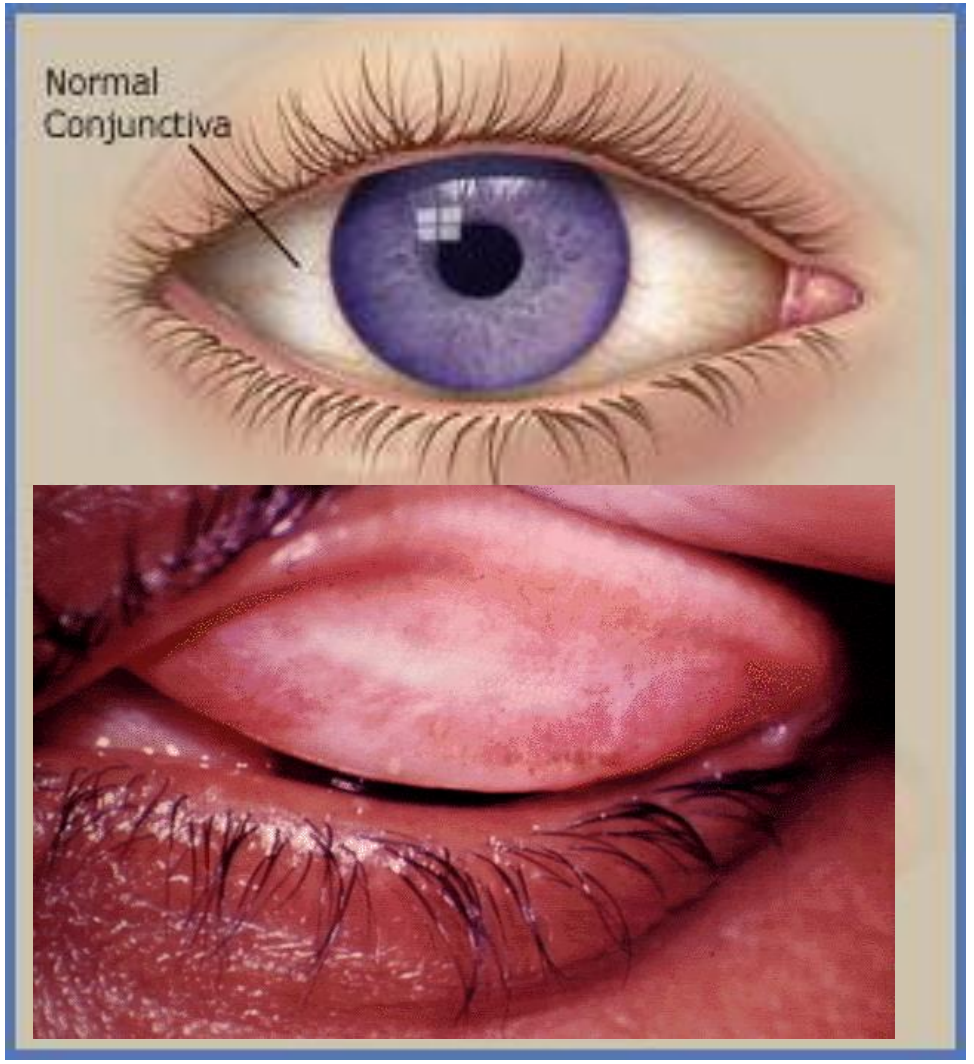
External structures of the eye: conjunctiva

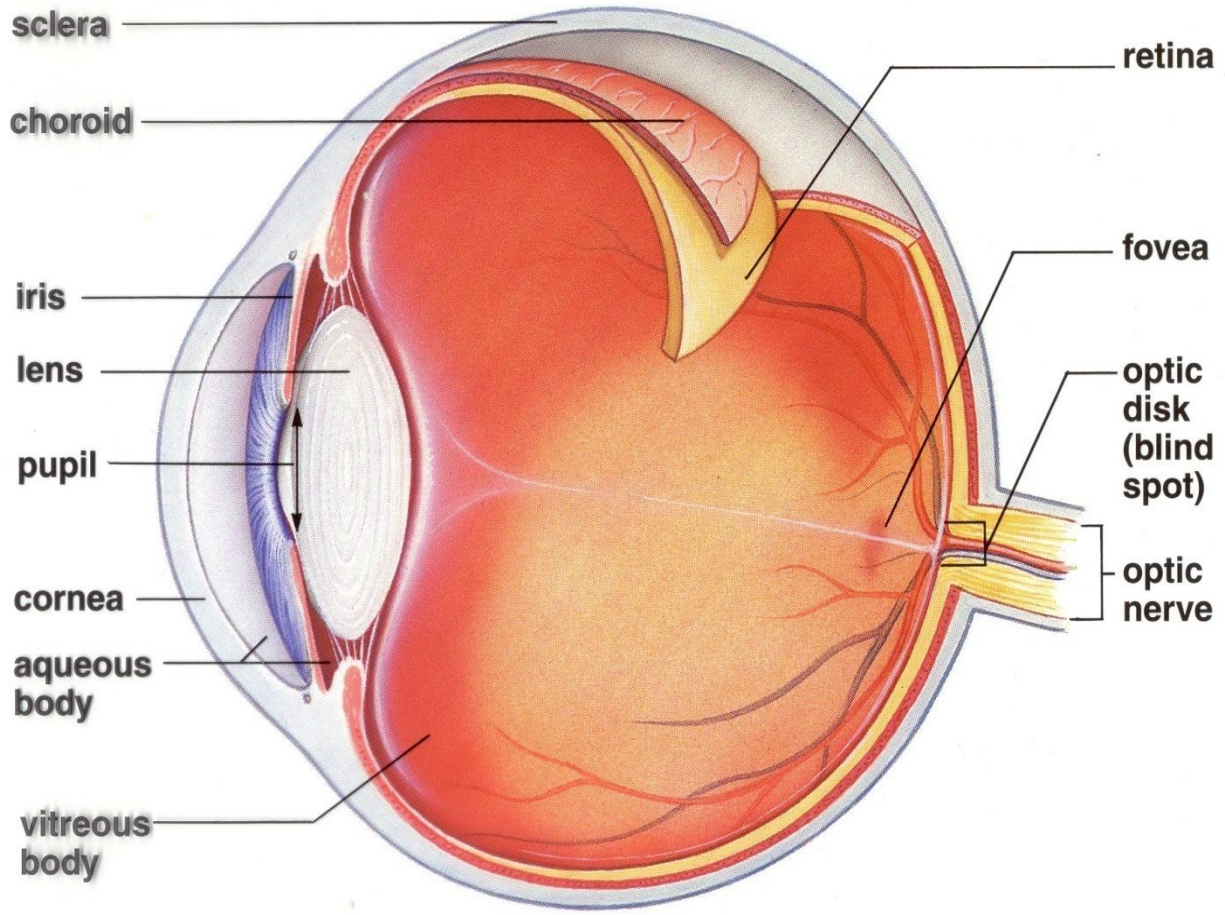
The **conjunctiva** is the lining on the underside of each eyelid and the mucous membrane over the eyeball, providing a protective covering for the exposed surface.



The coats of the eye

Three layers:

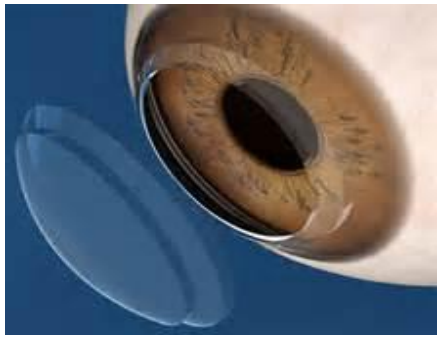
- **The outer: inelastic** coat, transparent **cornea** and opaque **sclera**.
- **The middle, vascular coat**, The Uvea: **choroid**, **ciliary body** and **iris**.
- **The inner, nervous coat: Retina**.

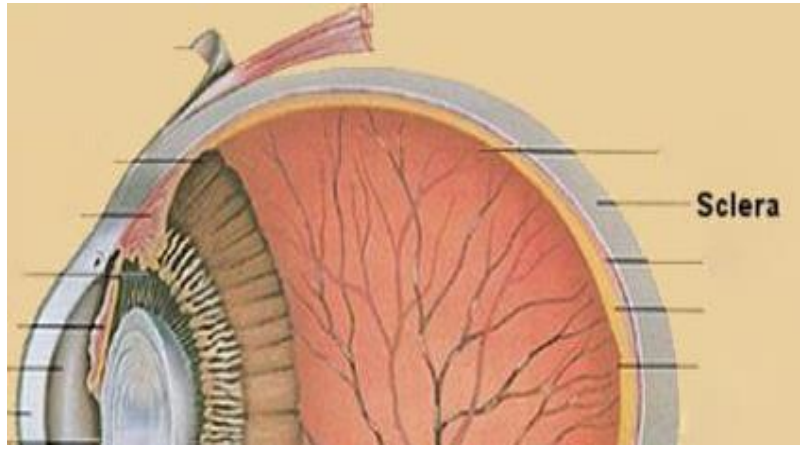


Outer layer of the eye:

The outer layer of the eye has two parts:

1. **Sclera** is the white of the eye.
2. **Cornea** is the transparent outer surface. *(clear lens in front of eye)*

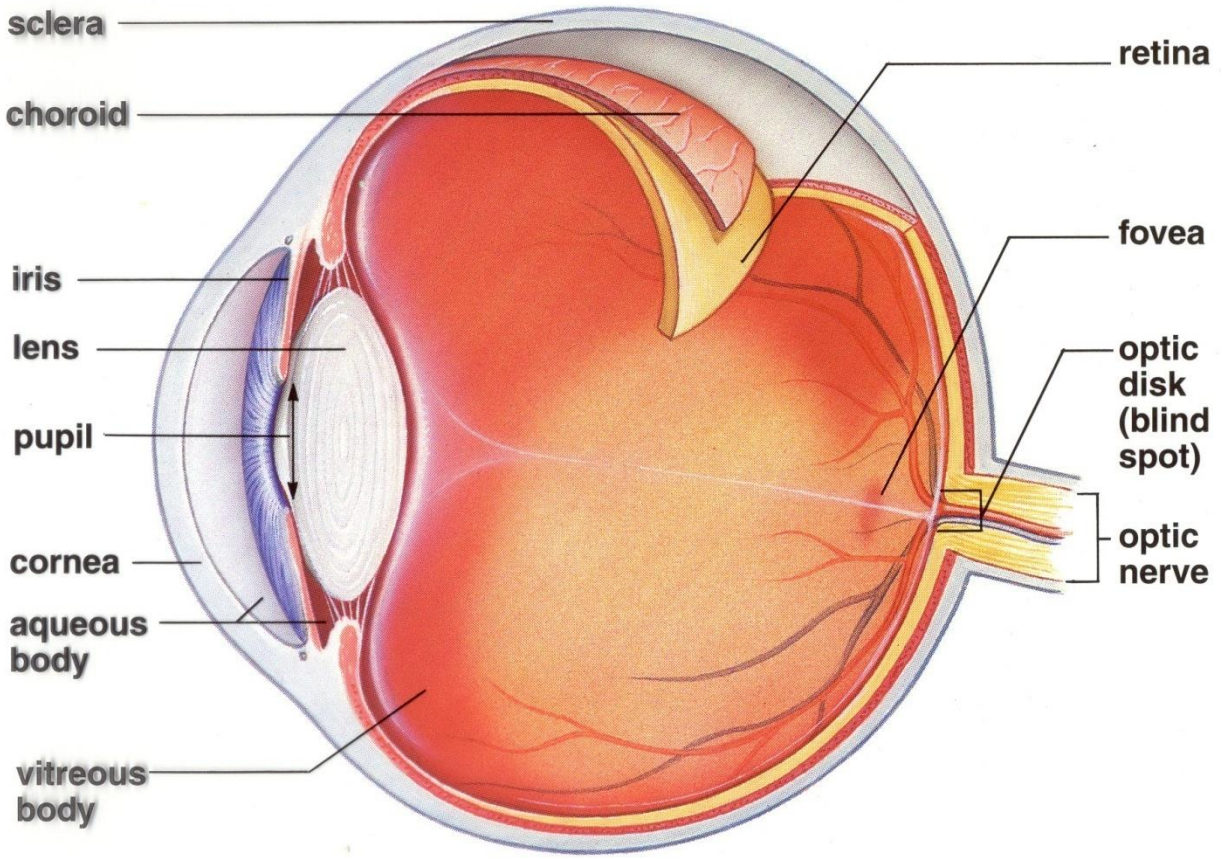




Middle layer of the eye:

The middle layer of the eyeball,

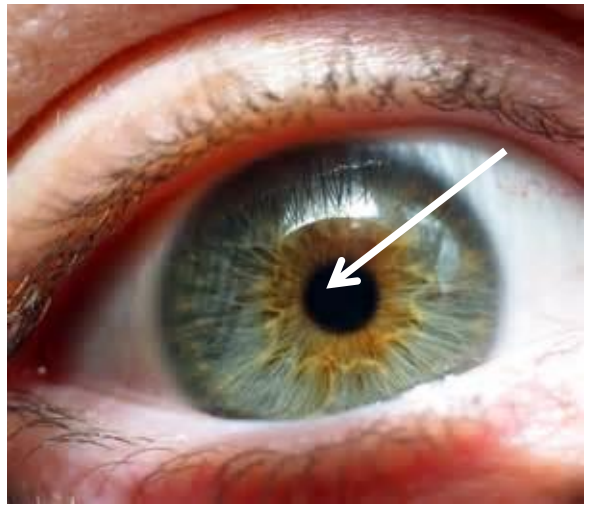
1. **Iris**
2. **Ciliary body**
3. **Choroid**



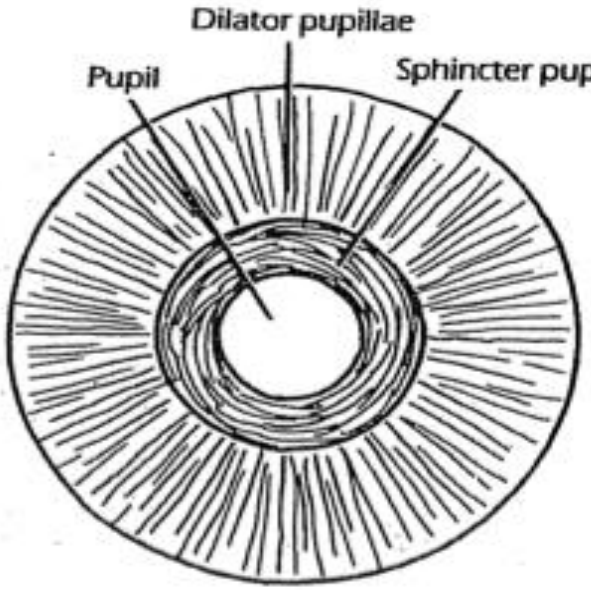
Middle layer of the eye:

IRIS *(colored part)*

- **colored** part of eye
- controls light entering the eye

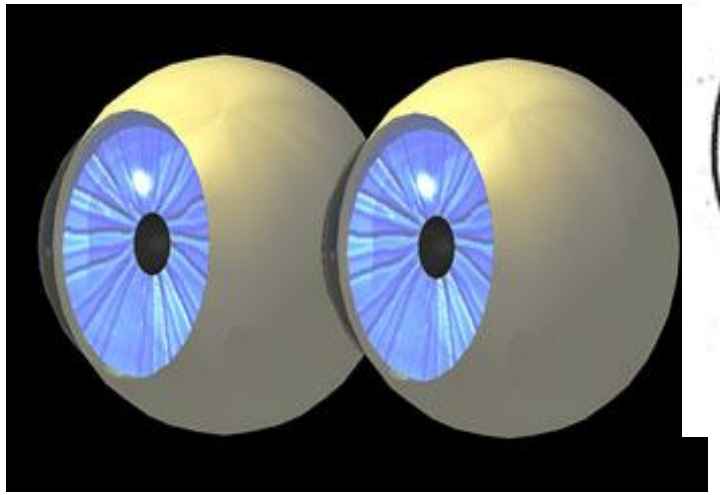


Pupil size is controlled by iris muscles



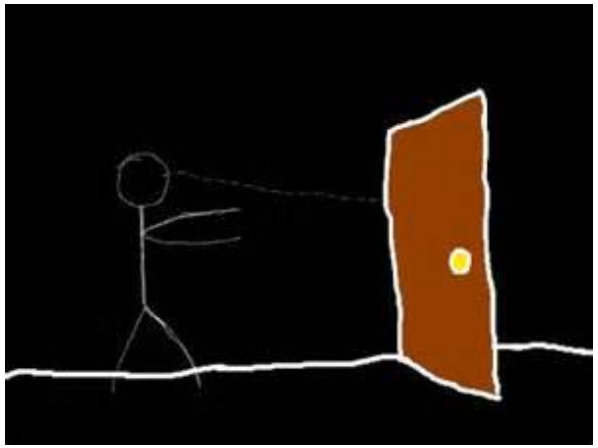
PUPIL *(black hole)*

- black **hole** in iris
- where light enters



THE EYE: PUPIL

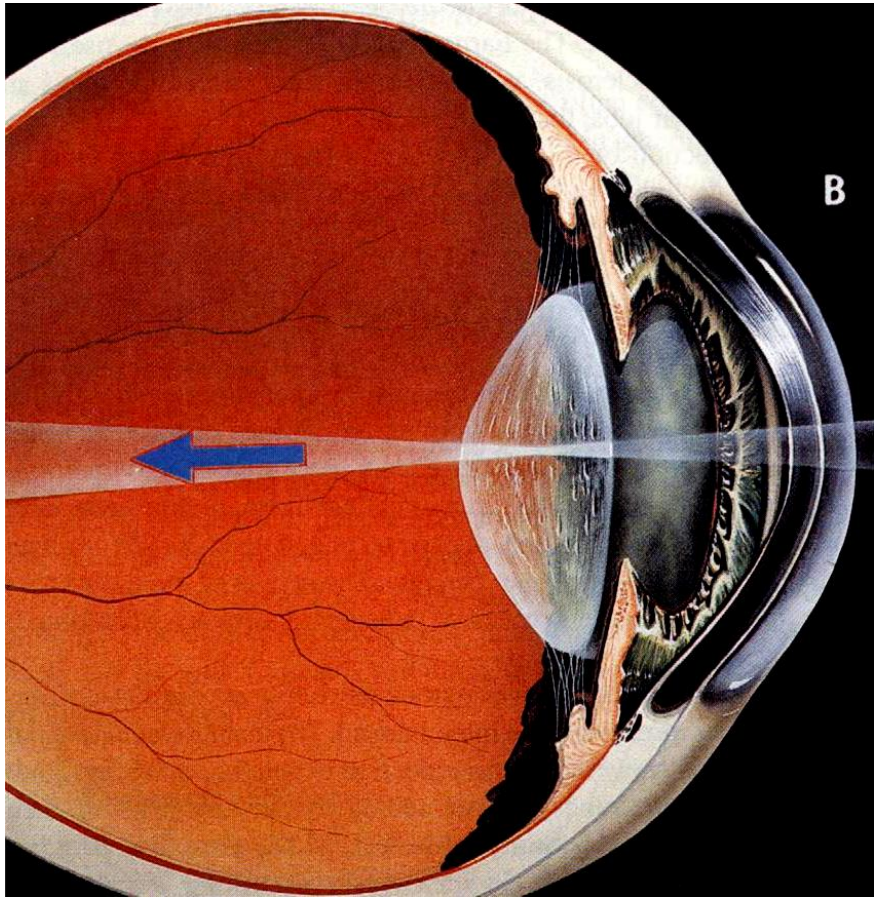
the pupils get larger in dark places allowing more light to enter the eye

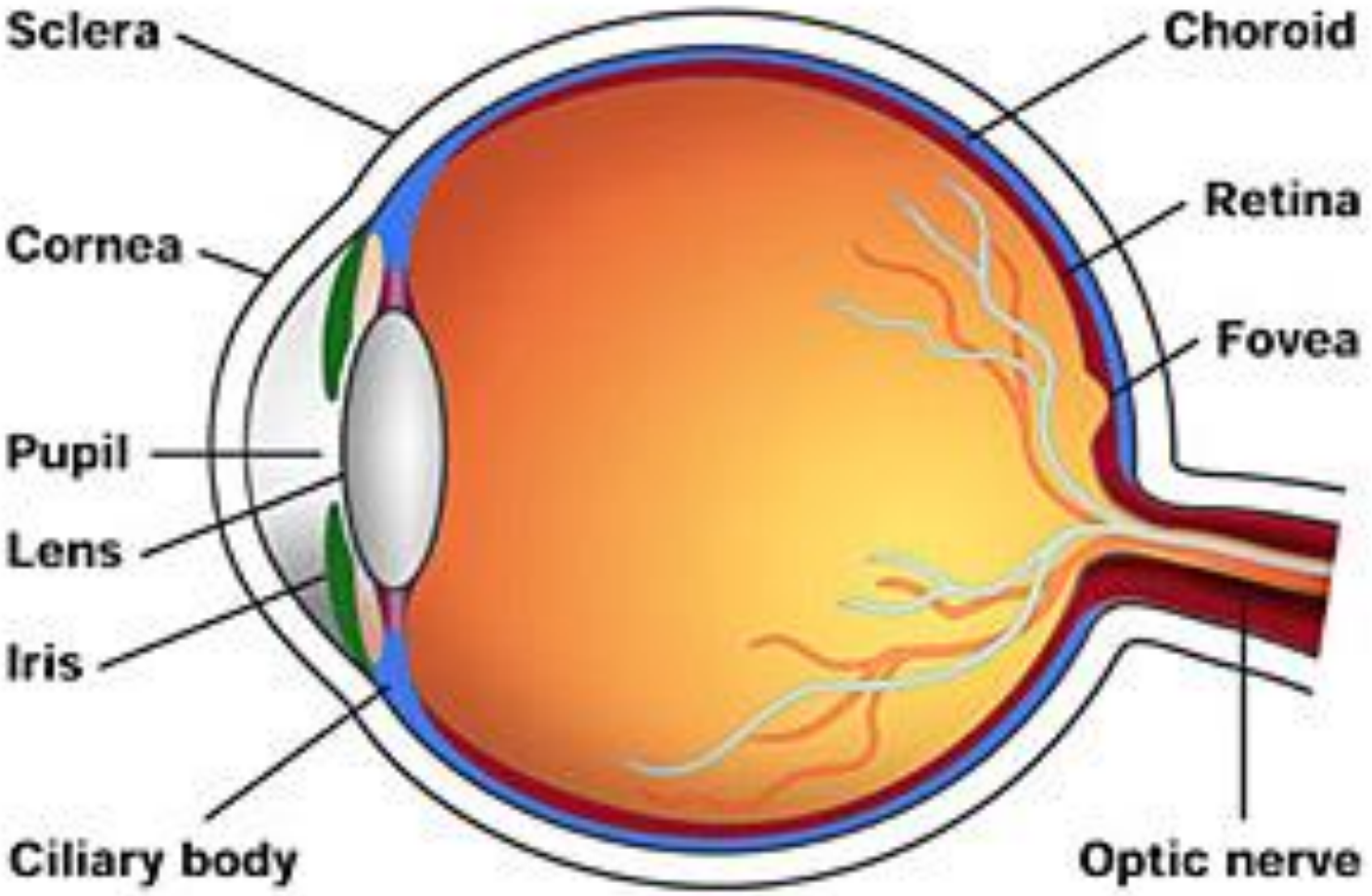


the pupils get smaller in light places allowing less light to enter the eye

Lens

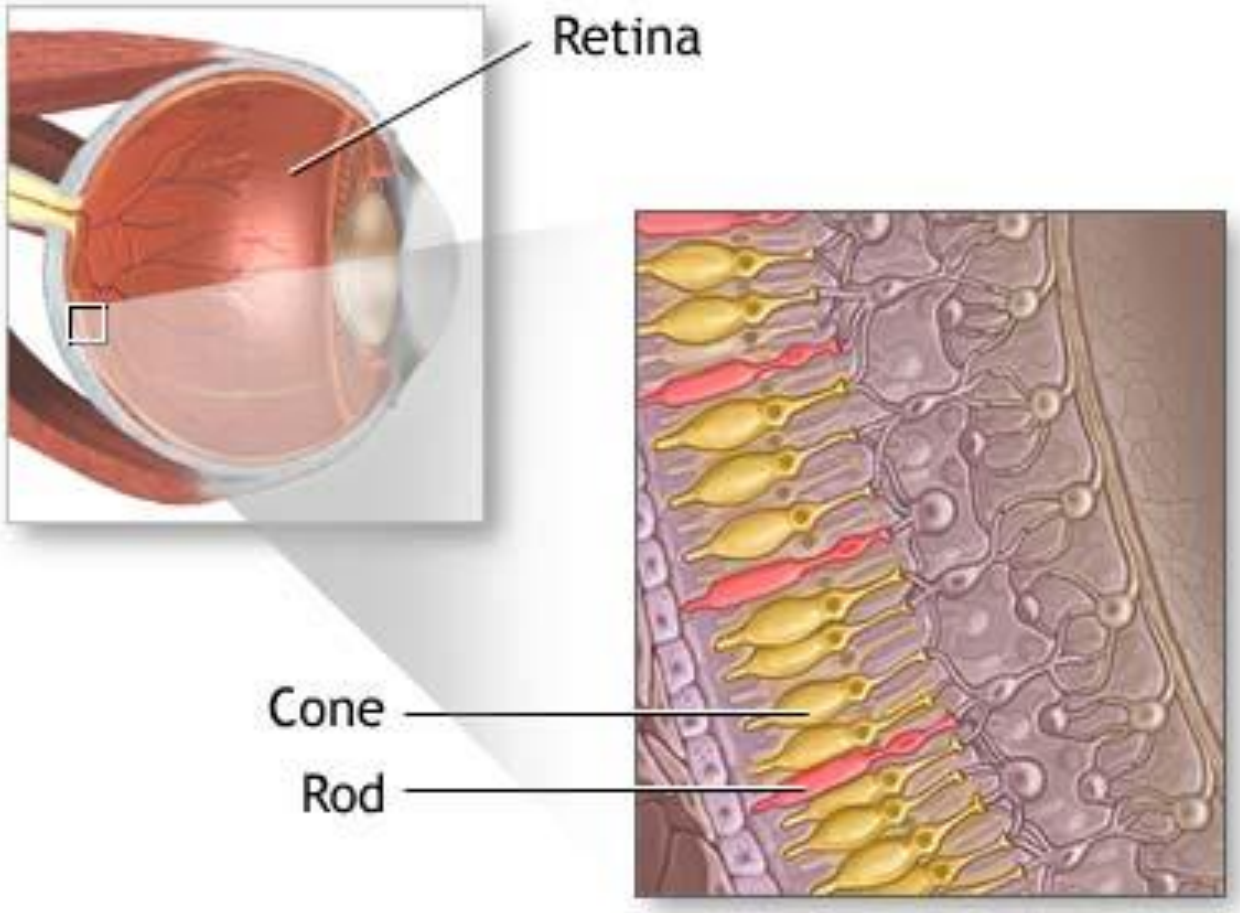
- **Lies behind pupil**
- The crystalline lens is the only structure continuously growing throughout the life.
- Changeable refractive media.
- Allows us to see objects near and far




Sclera
Cornea
Pupil
Lens
Iris
Ciliary body
Choroid
Retina
Fovea
Optic nerve

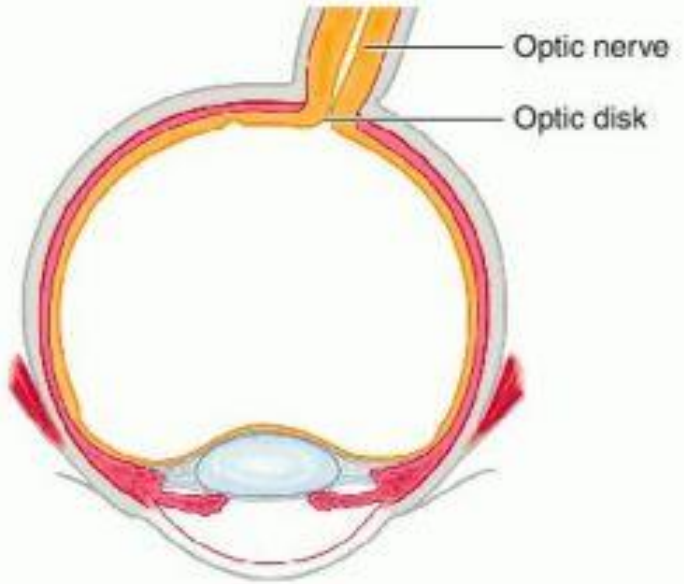
Inner layer of the eye:

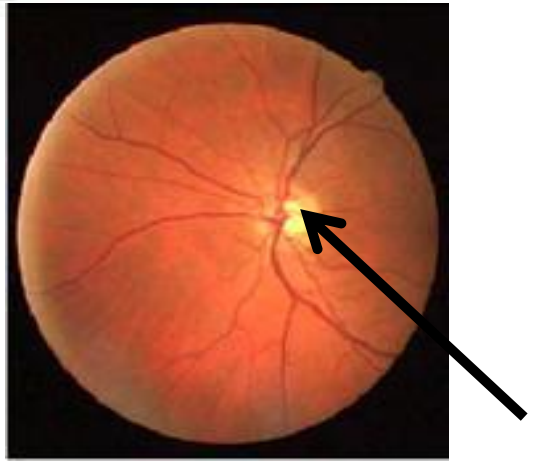
- The innermost layer of the eye is the **retina**, which is full of photoreceptive cells called **rods and cones**.
- The **rods** are sensitive to dim light and are used for **night vision**.
- The **cones** are sensitive to bright light and used for **color vision**.



Inner layer of the eye:

Nerve fibers from the retina all converge to form the **optic nerve** at a spot on the inner layer known as the optic disc. The optic nerve goes directly to the vision center of the brain. There are no rods or cones in the area of the optic disk, so it is insensitive to light and a **blind spot** is created.

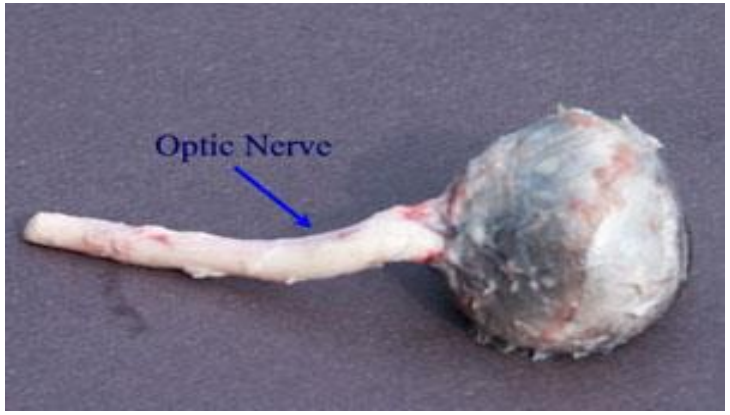


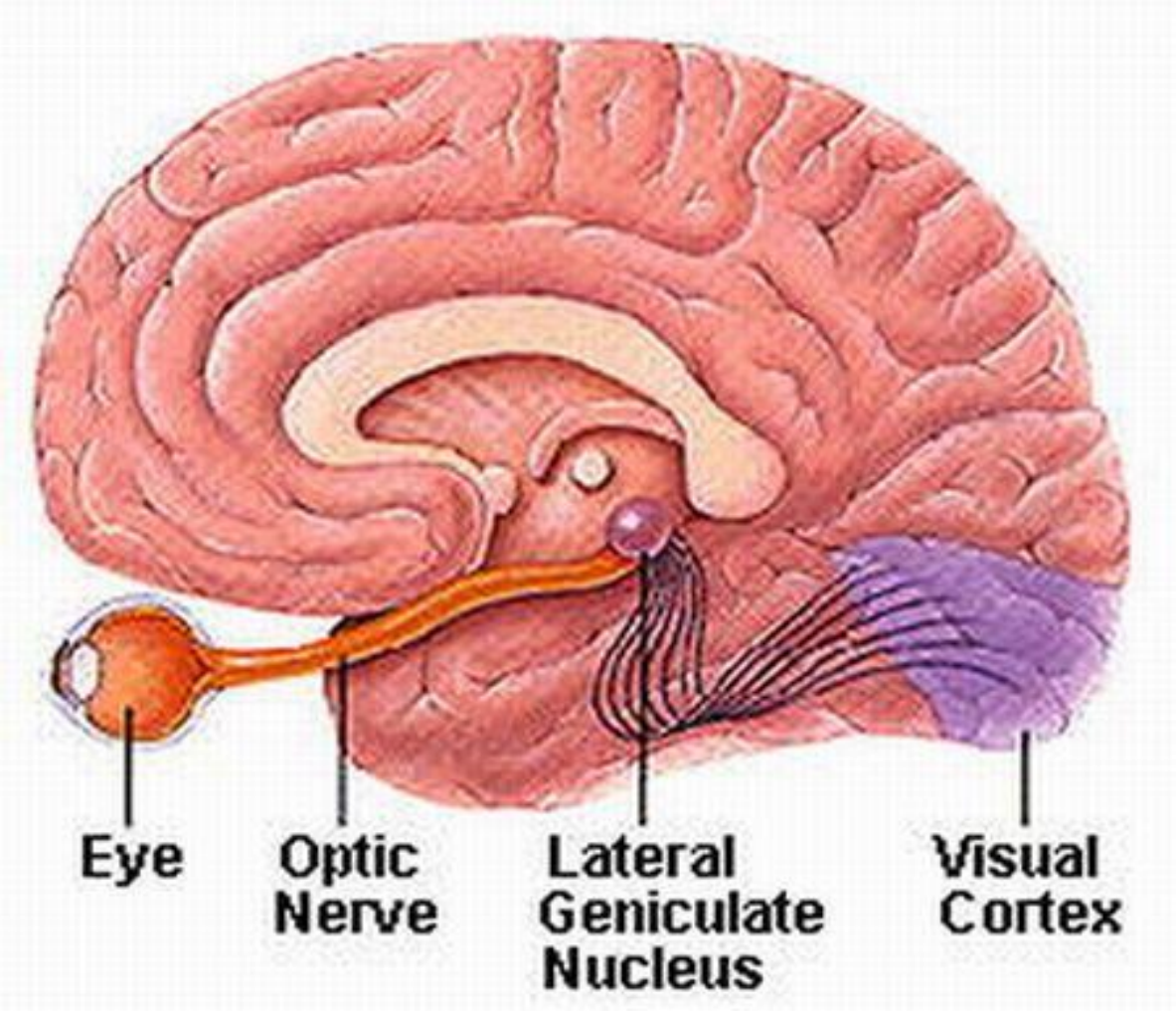


Optic Nerve

OPTIC NERVE

- Transmits electrical impulses from retina to the brain
- Brain takes inverted image and flips it so we can see





Quiz

1. Lateral squint and ptosis of left eye is caused by lesion of which cranial nerve?

A. Left 3rd
B. Left 6th
C. Right 3rd
D. Right 6th
E. Left 4th

Answer: A

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Quiz

2. Medial squint of left eye is caused by lesion of which cranial nerve?

A. Left 3rd
B. Left 6th
C. Right 3rd
D. Right 6th
E. Left 4th

Answer: D

References for further readings

- Oxford Handbook of Clinical Medicine (3rd edition).
- Gray’s anatomy for students
- The Clinical Practice Of Neurological and Neurosurgical Nursing Fourth Edition.


الحمد لله
Thank You
Thank You