

# Special Senses

## The Eye

M&M, fig. 16.4

Site where  
conjunctiva  
merges with  
cornea

Palpebral  
fissure

Lateral  
angle  
(canthus)

Iris

Eyelid

Eyebrow

Eyelid

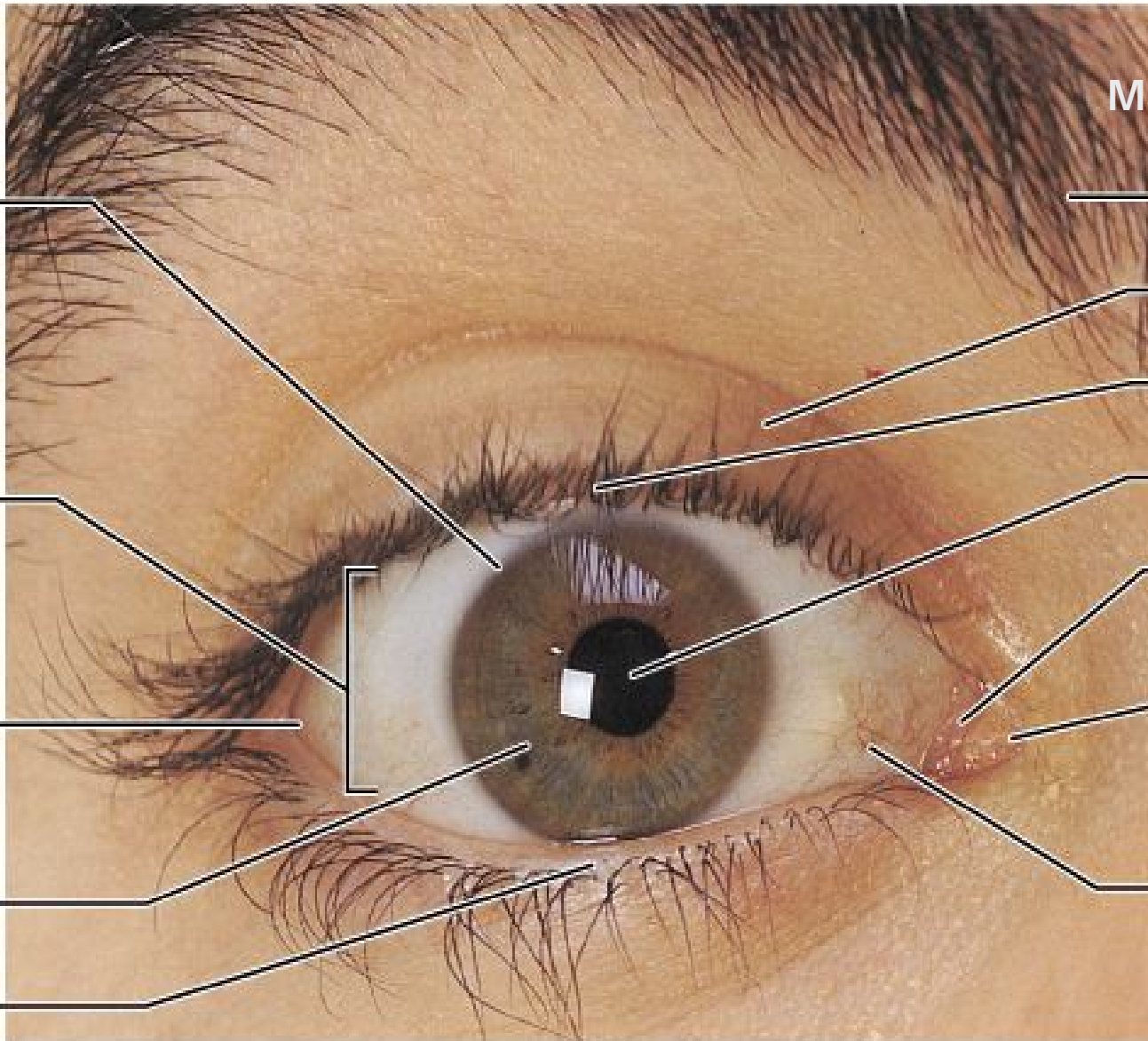
Eyelashes

Pupil

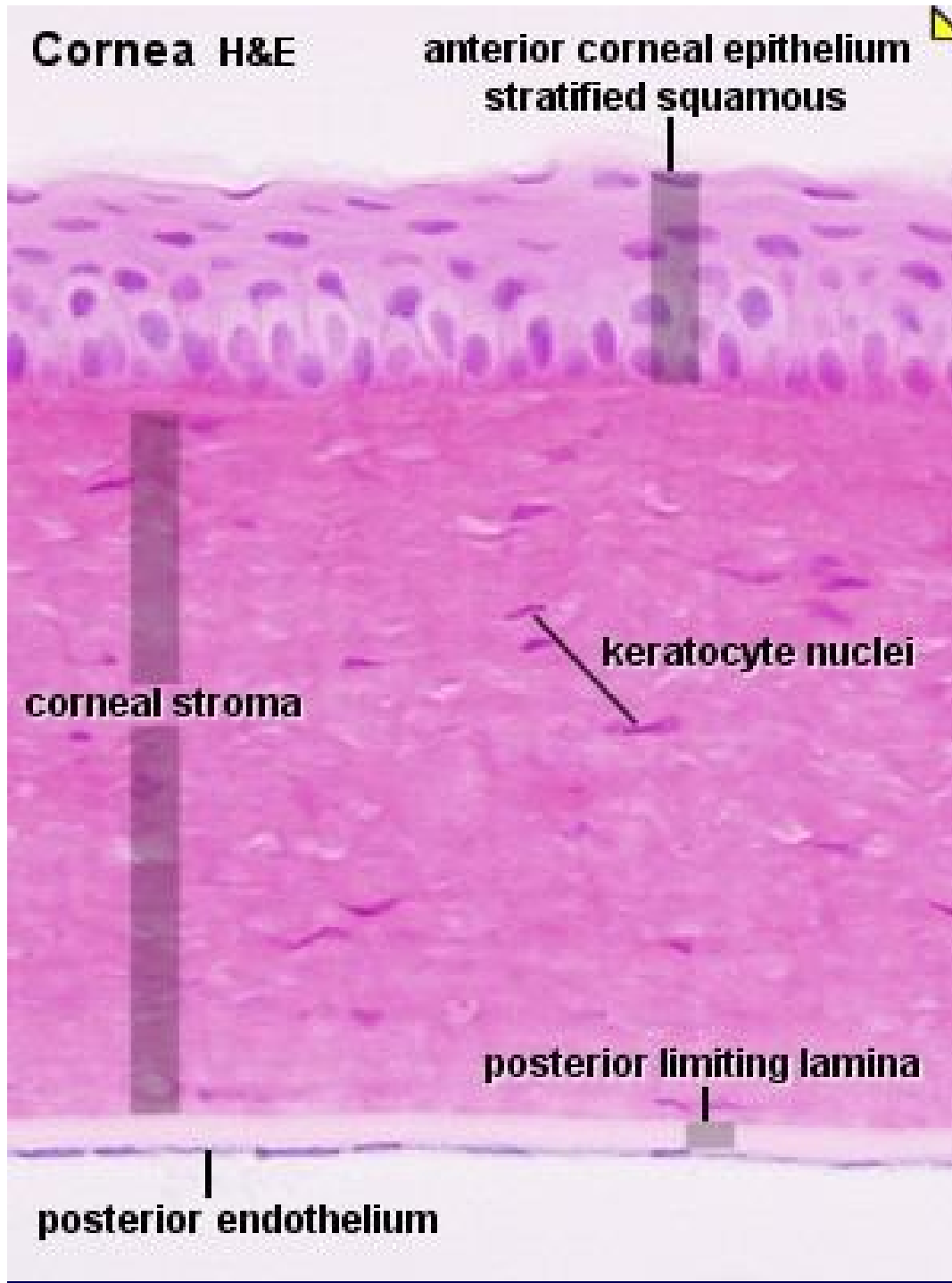
Lacrimal  
caruncle

Medial  
angle  
(canthus)

Sclera  
(covered  
with  
conjunctiva)



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The eye is formed by three layers, or tunics. From the outside to the inside of the eyeball the three tunics are the

**fibrous tunic**, which forms a capsule enclosing and protecting the other components of the eye. It is subdivided into the sclera, with primarily structural functions, and the cornea, which is part of the optic apparatus.

**vascular tunic**, which forms **the choroid, ciliary body and iris**. This tunic is also called **the uveal tract**. The choroid has primarily nutritive functions.

The ciliary body generates the aqueous humor of the eye, but the ciliary muscle also functions in the optic apparatus. The iris is part of the optic apparatus in which it functions a contractile diaphragm, i.e. the aperture of the eye. neural tunic consists of the retina.

The retina proper forms the photoreceptive layer of the eye. As a double-layered epithelium, the retina also covers the ciliary process and the posterior surface of the iris, where it has both nutritive and structural functions. The ciliary and iridial parts of the retina are described together with the ciliary process and iris.

## Retina methylene blue

layer of optic nerve fibres

ganglion cell layer

inner plexiform layer

inner nuclear layer

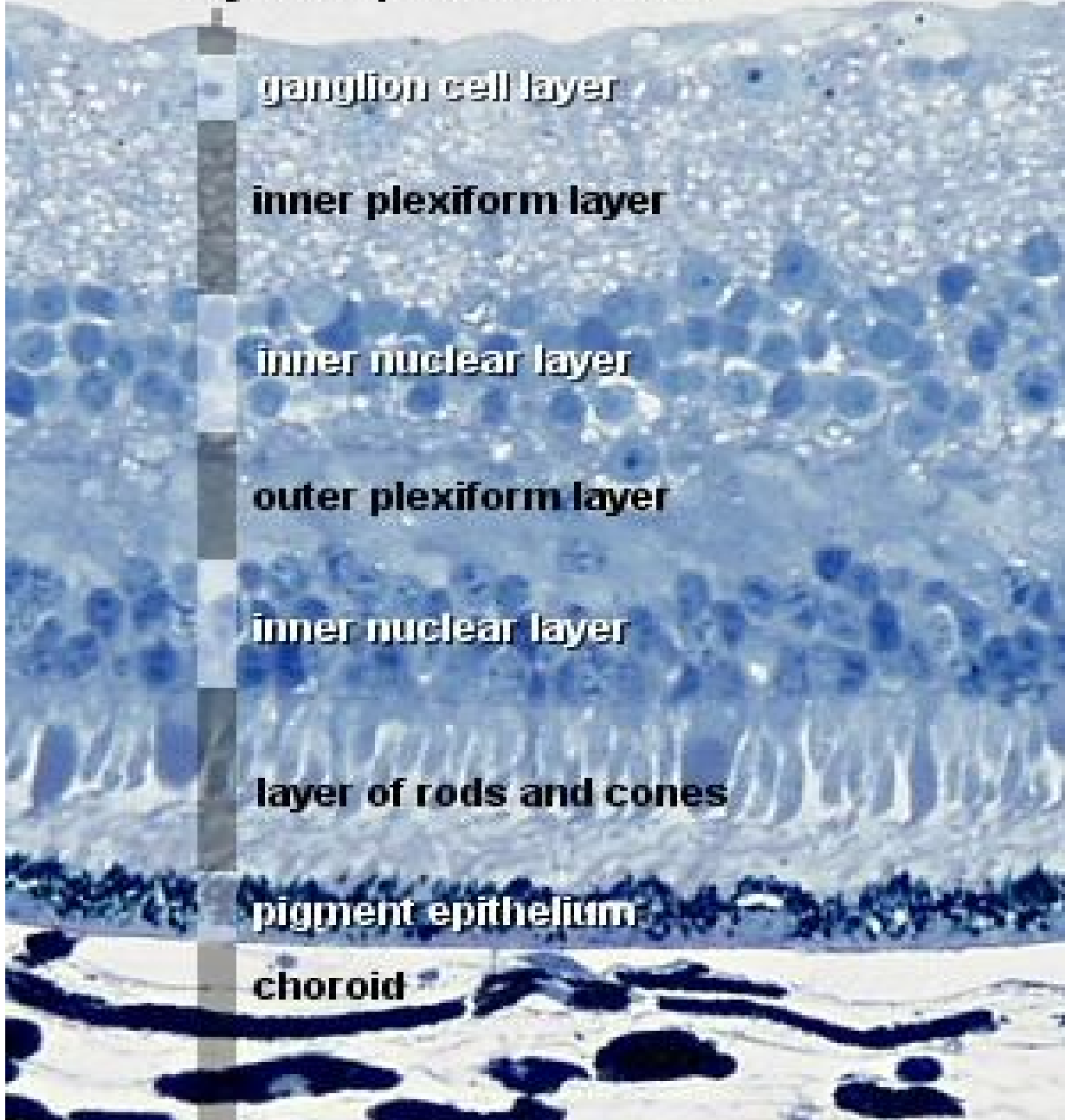
outer plexiform layer

inner nuclear layer

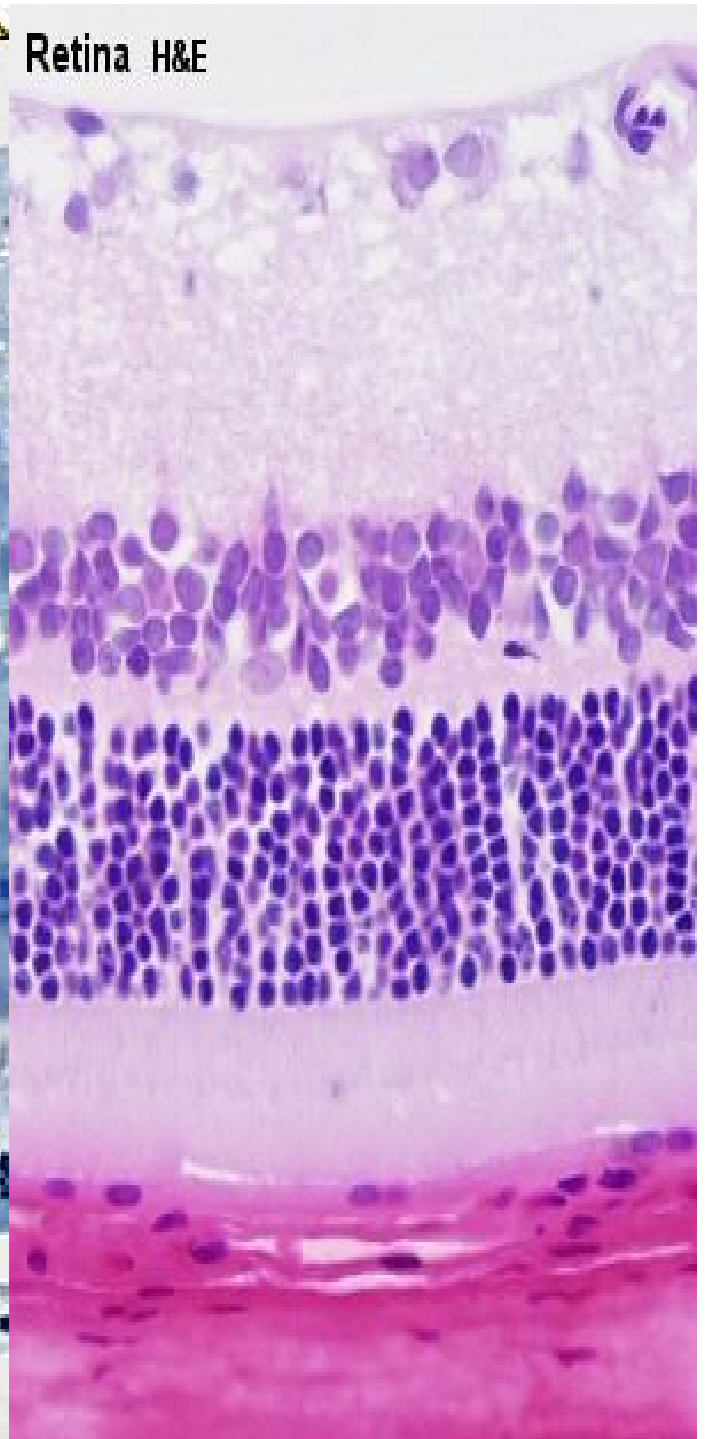
layer of rods and cones

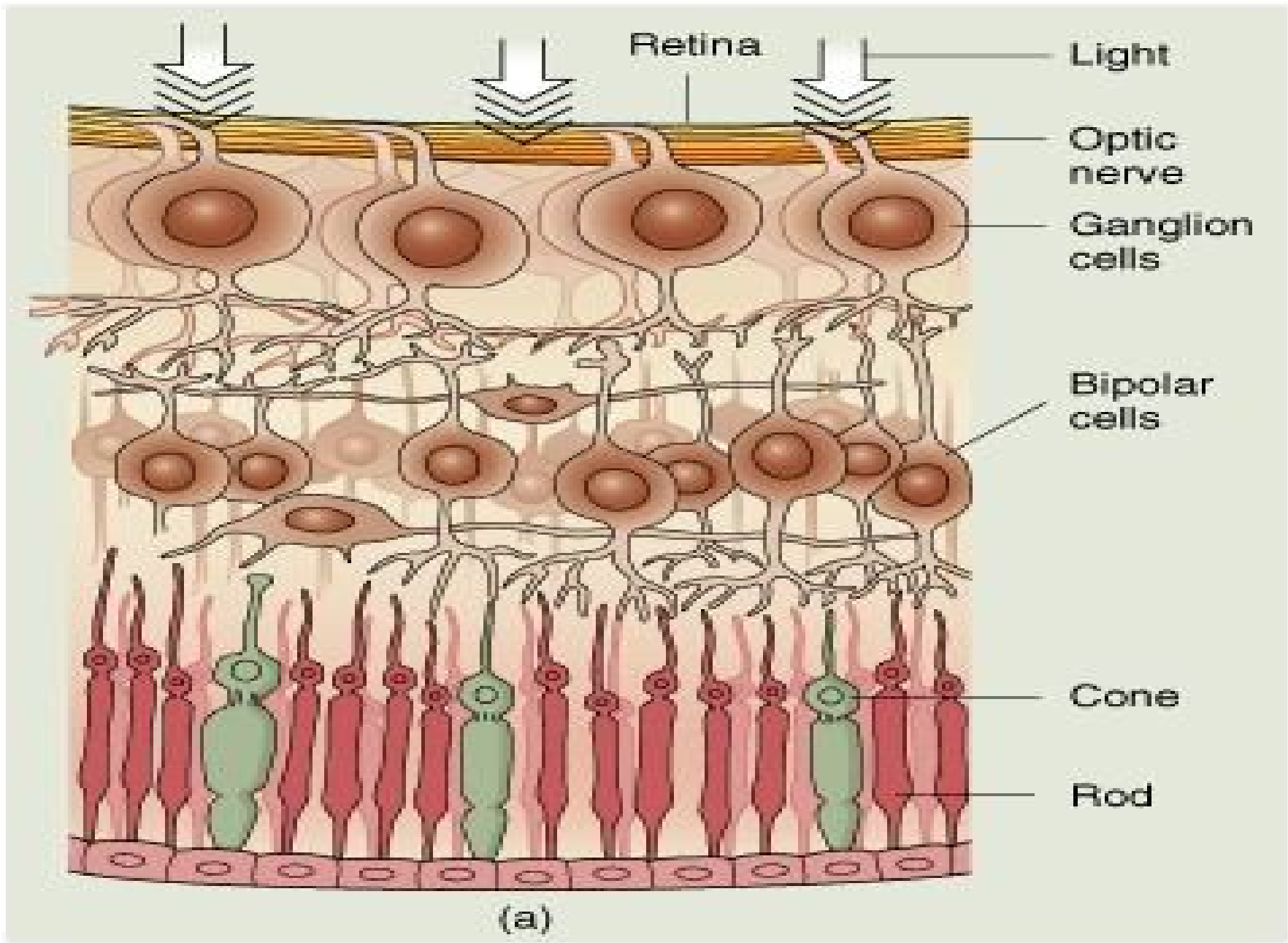
pigment epithelium

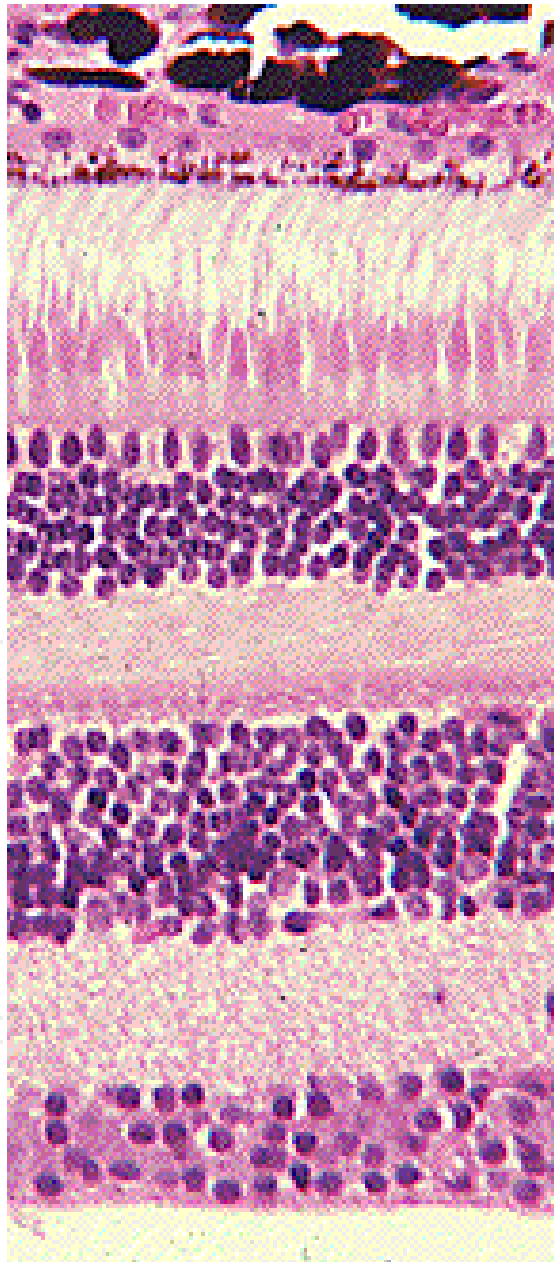
choroid



## Retina H&E

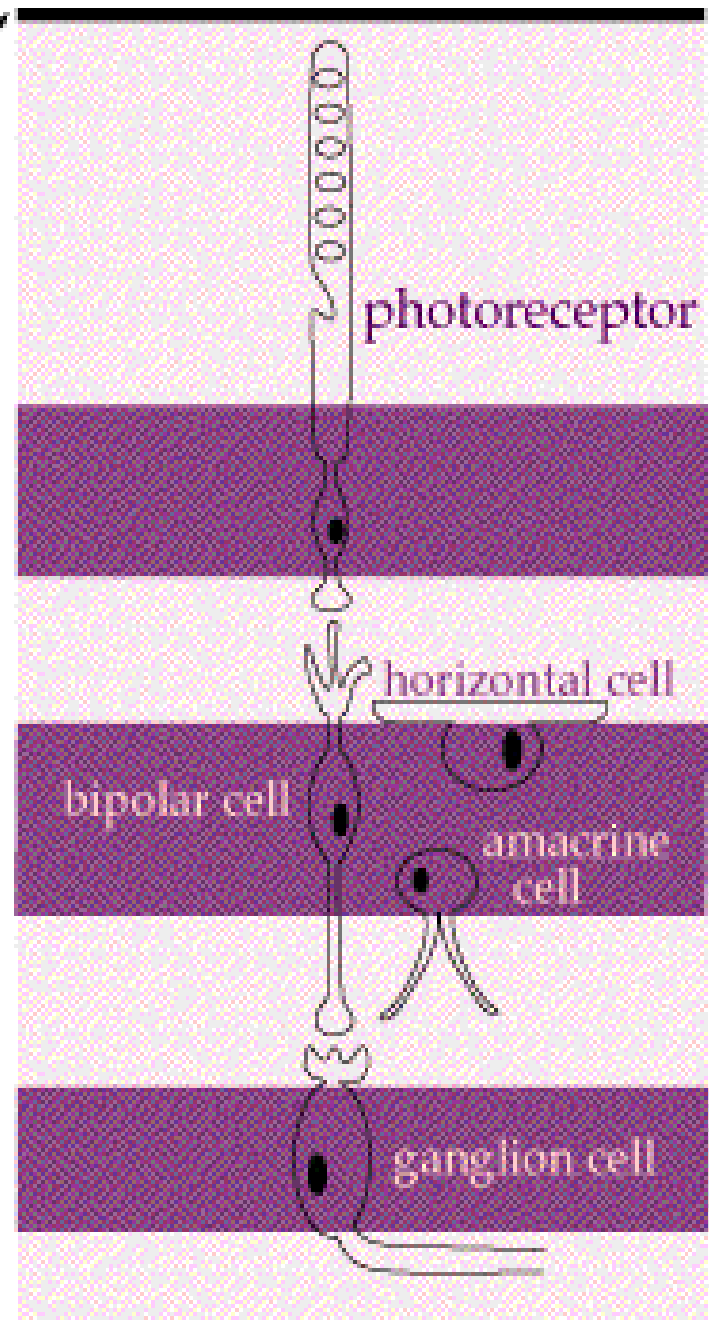




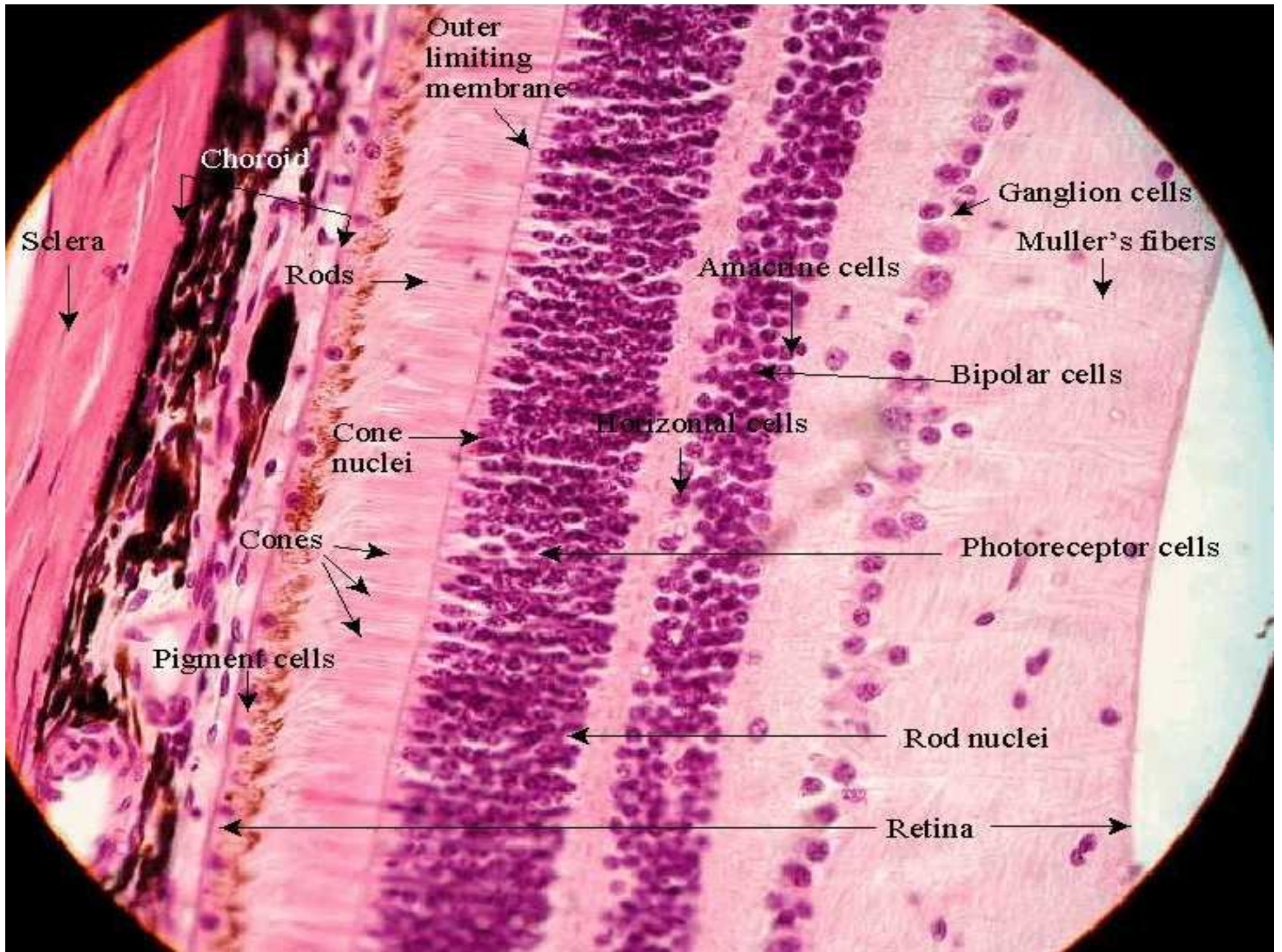


LIGHT ↑

choroid  
pigment epithelium  
outer segments  
inner segments  
outer nuclear layer (ONL)  
outer plexiform layer (OPL)  
inner nuclear layer (INL)  
inner plexiform layer (IPL)  
ganglion cell layer (GCL)  
optic fiber layer (OFL)

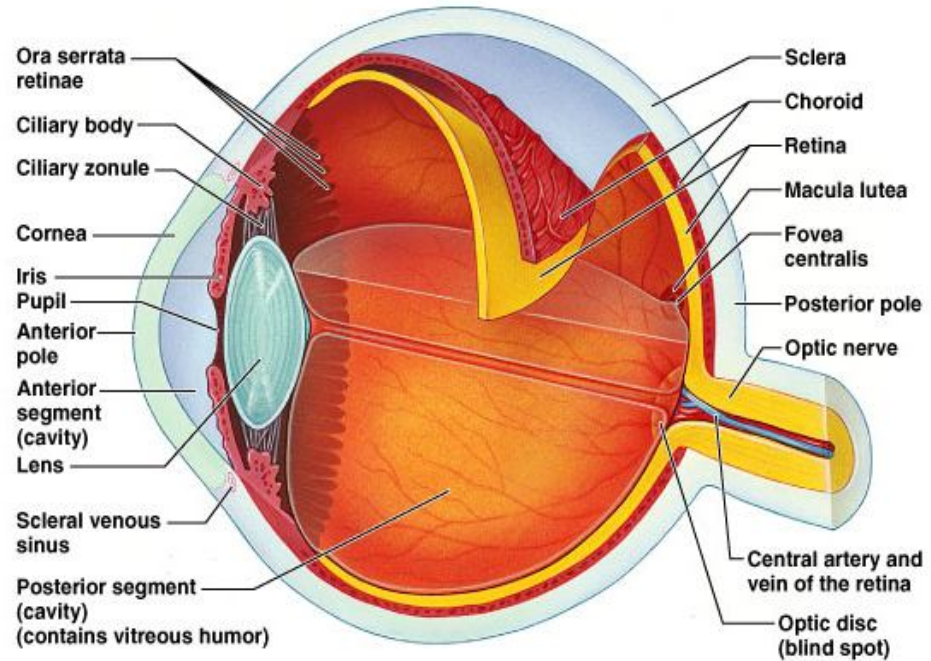
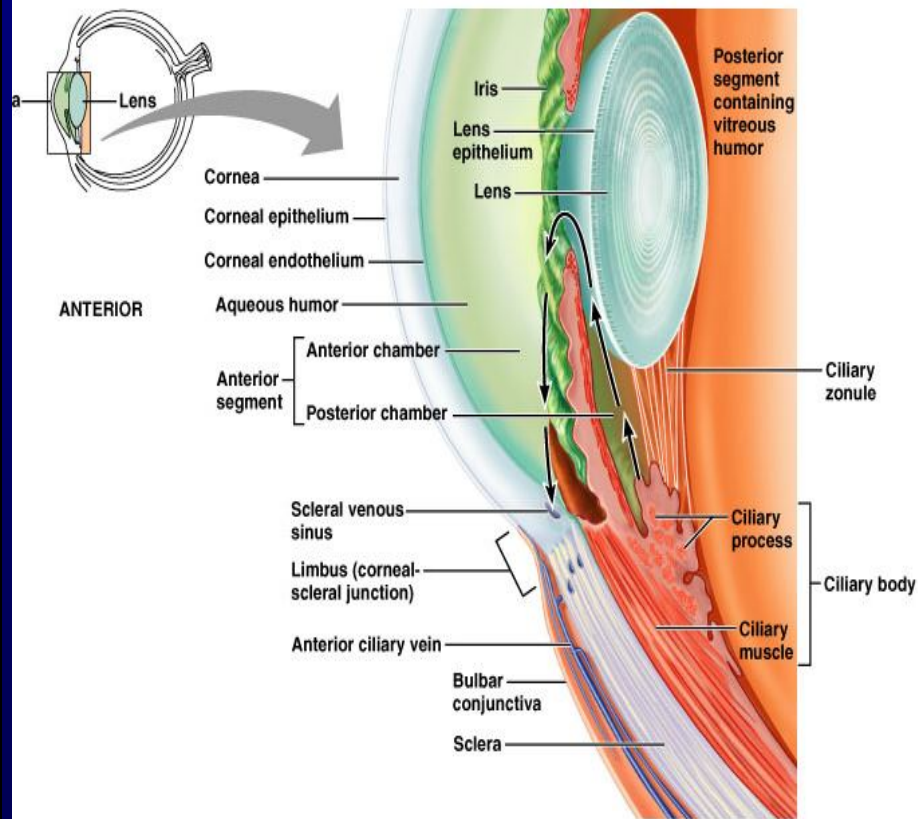




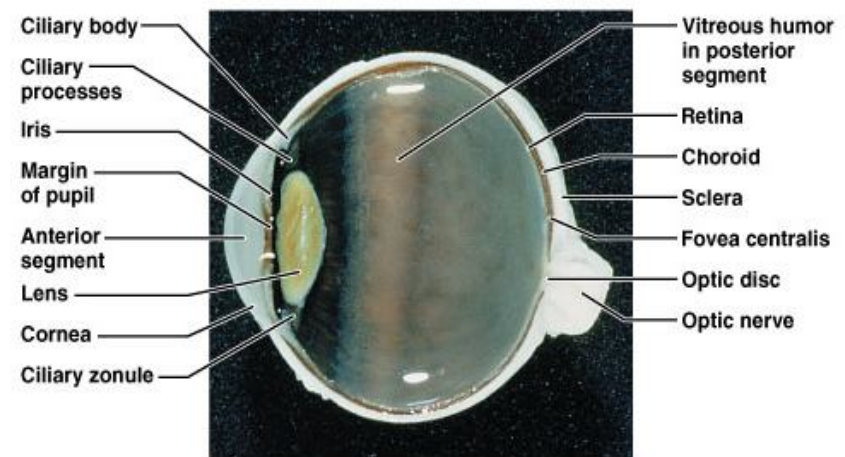




# some pictures...

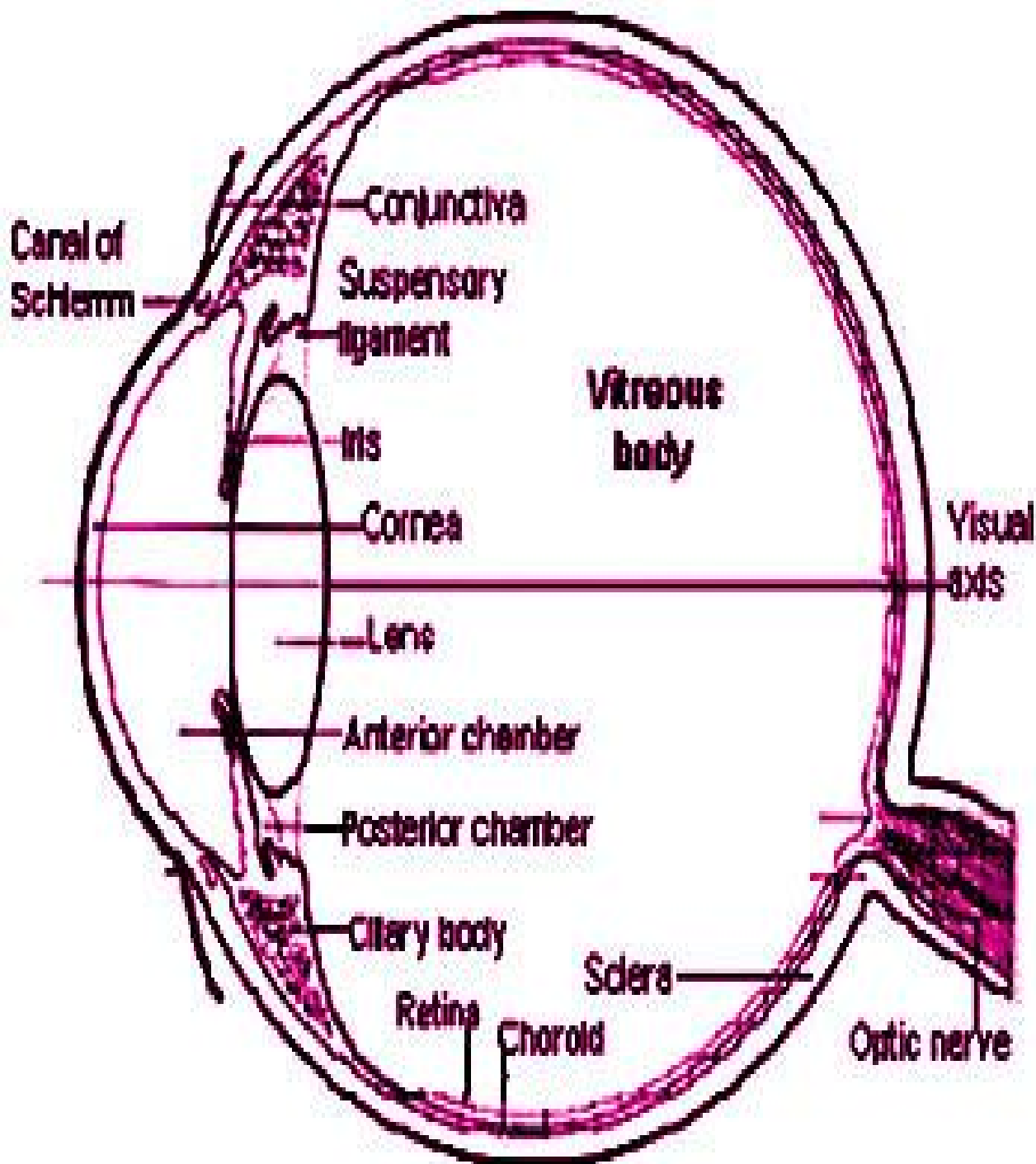


(a)



(b)

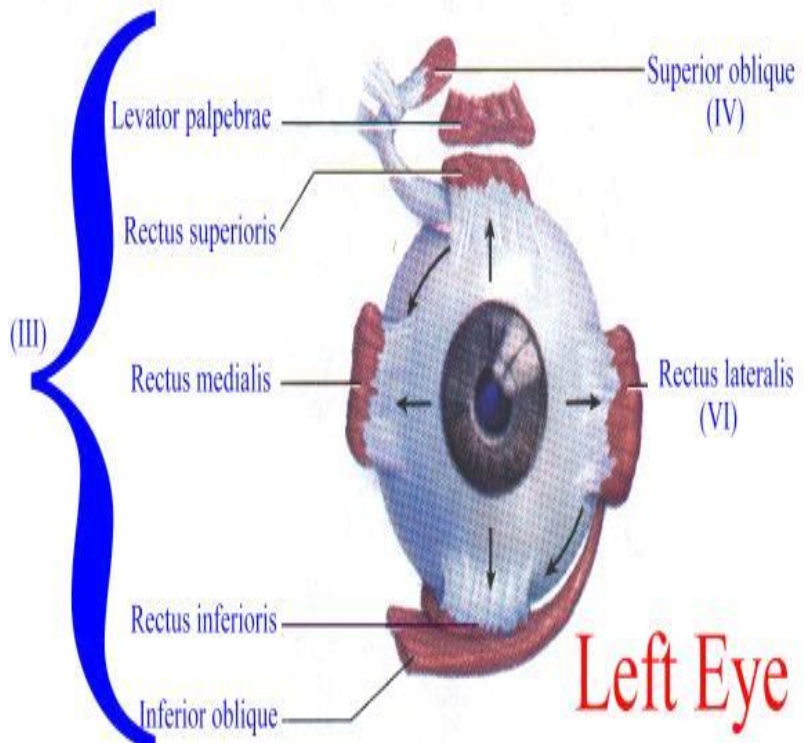




**Eye ball consists of three layers:**

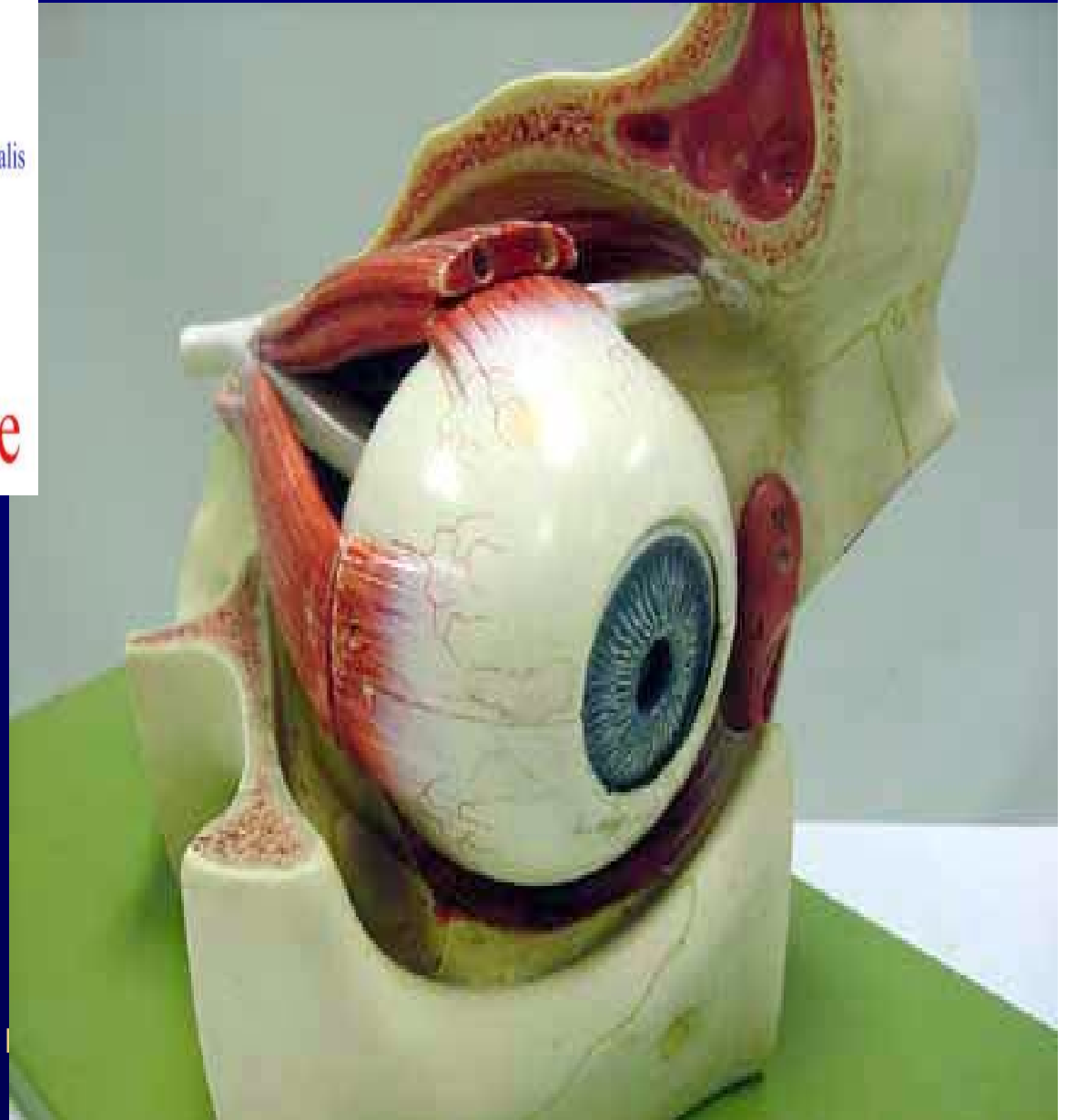
- 1. External layer- Sclera ;**
- 2. Middle layer- Choroid ;**
- 3. Innermost layer- Retina ;**

# Movement of eye

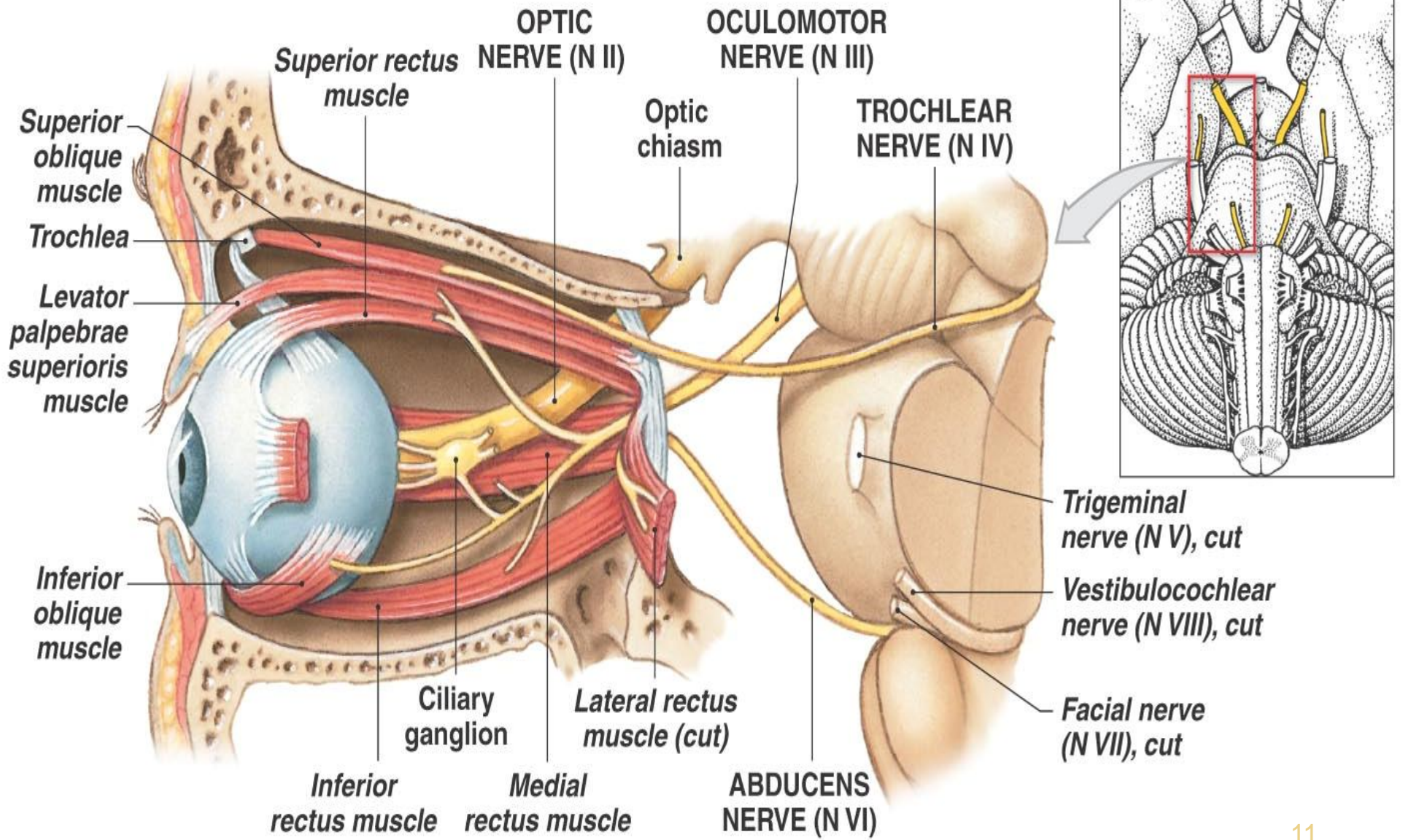


**Eye movement  
simulator**

**([http://cim.ucdavis.edu/  
eyes/version1/eyesim.ht  
m](http://cim.ucdavis.edu/eyes/version1/eyesim.htm))**



# Innervation



# Extrinsic eye muscles

Muscle	Movement	Nerve
Superior oblique	Depresses eye, turns laterally	IV (Trochlear)
Lateral rectus	Turns laterally	VI (Abducens)
Medial rectus	Turns medially	III (Oculomotor)
Superior rectus	Elevates	III (Oculomotor)
Inferior rectus	Depresses eye	III (Oculomotor)
Inferior oblique	Elevates eye, turns laterally	<b>III (Oculomotor)</b>



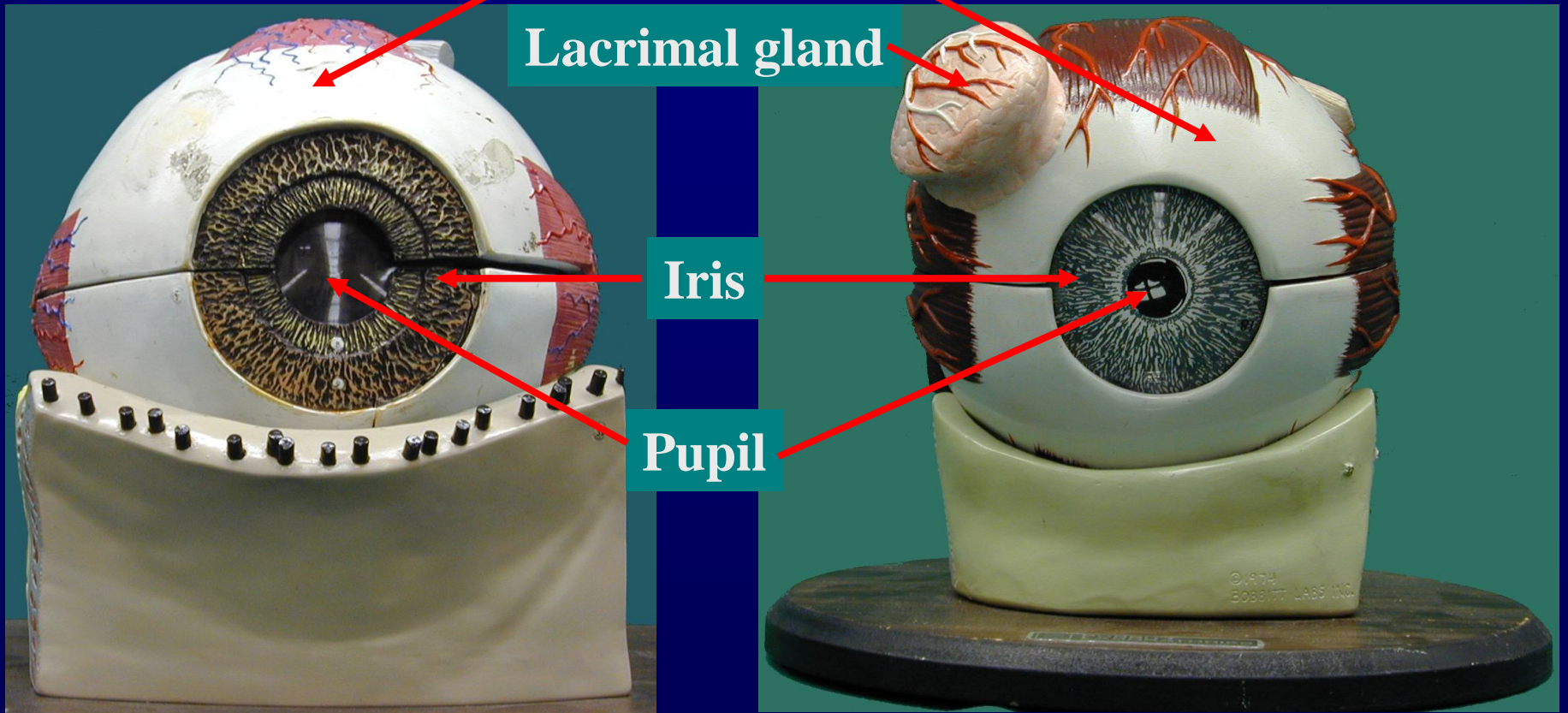
# Large Models - Anterior Structures

Sclera

Lacrimal gland

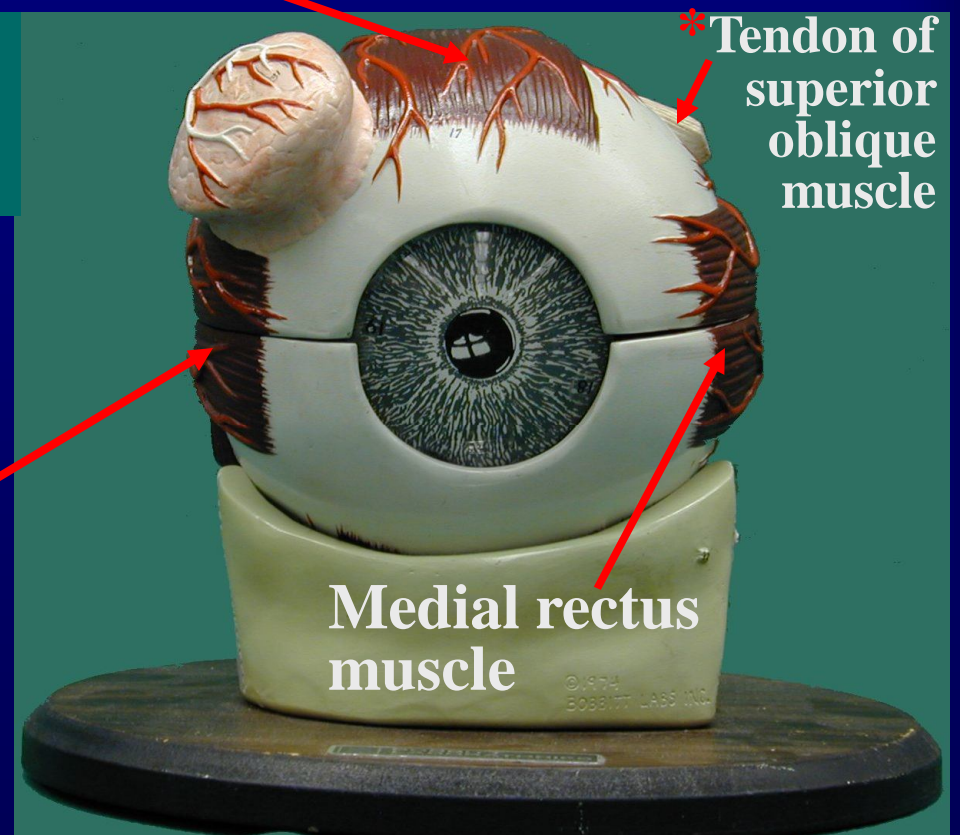
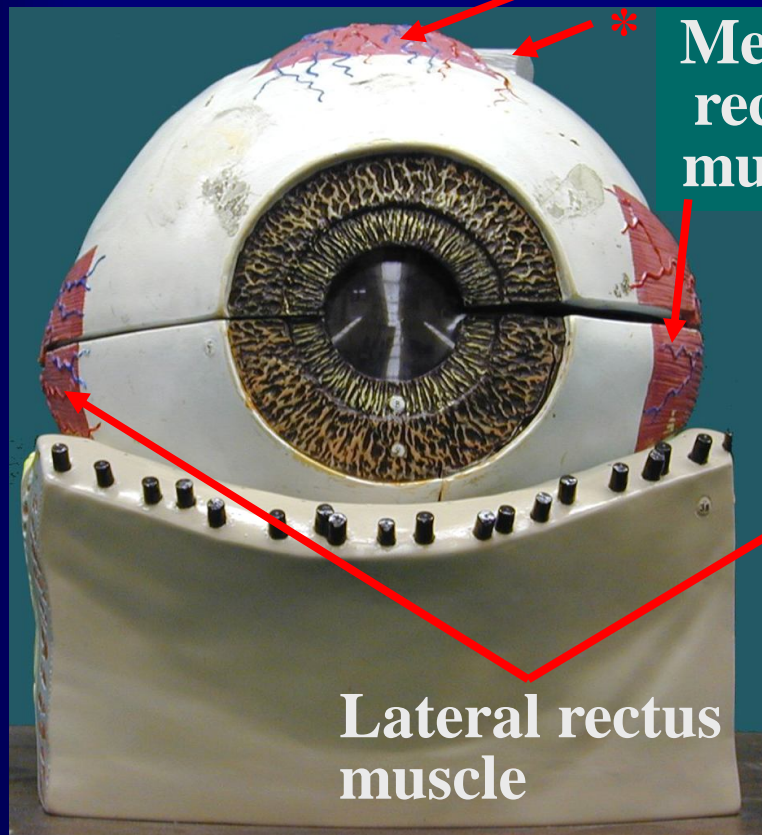
Iris

Pupil



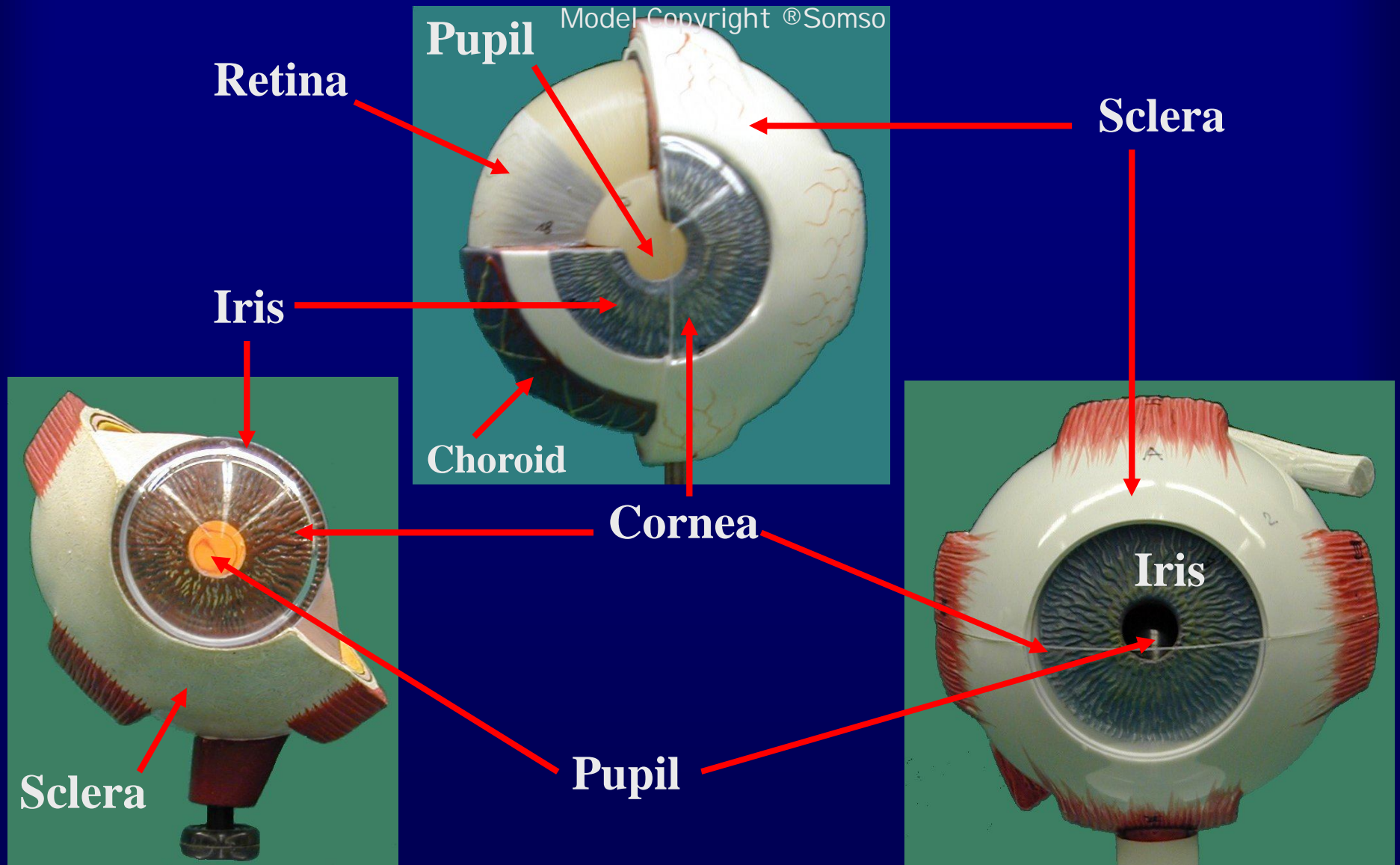
# Large Models - Muscles (Anterior)

Superior rectus muscle





# Small Models - Anterior Structures



# Small Models - Muscles (Anterior)

Superior rectus muscle

Tendon of superior oblique muscle

Medial rectus muscle

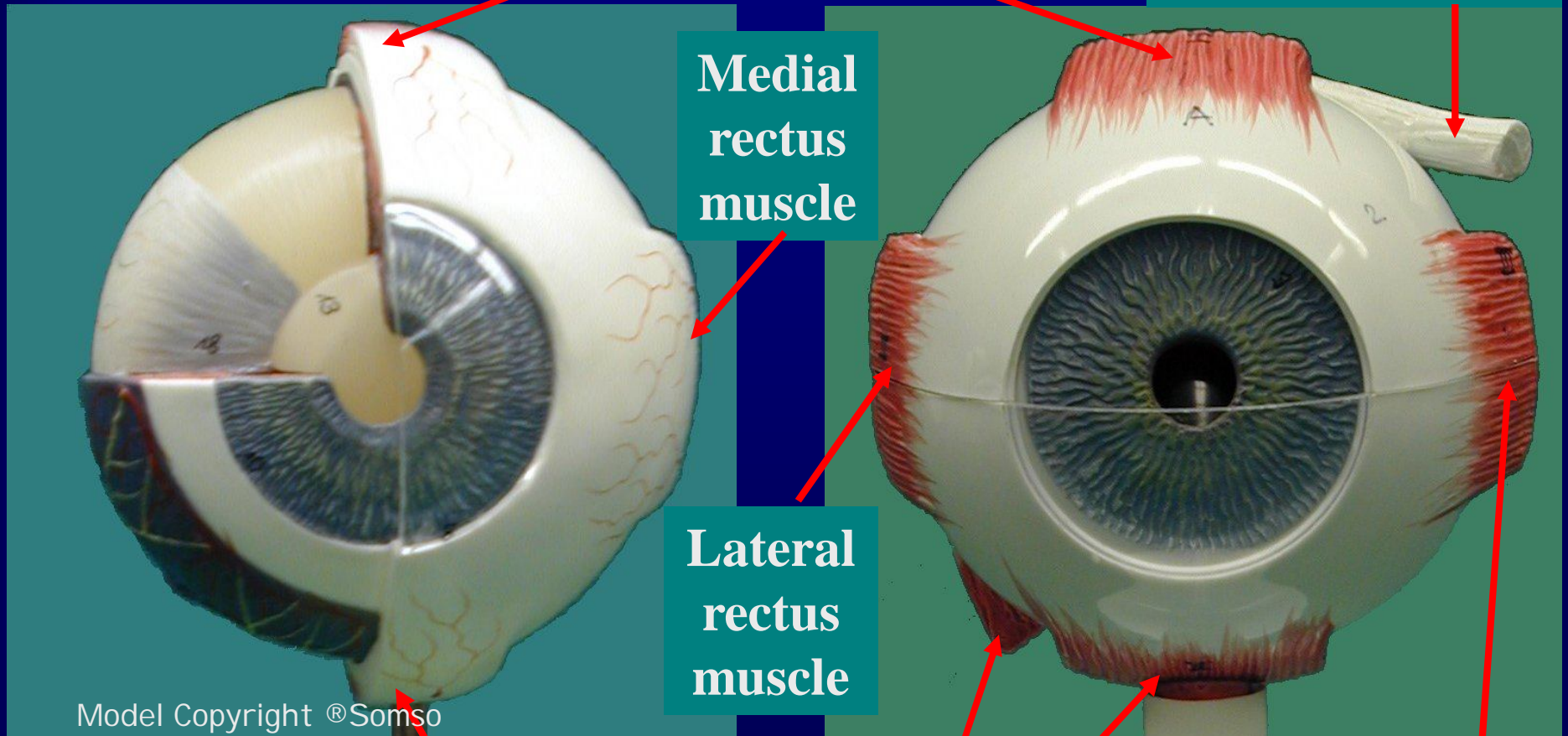
Lateral rectus muscle

Inferior oblique muscle

Inferior rectus muscle

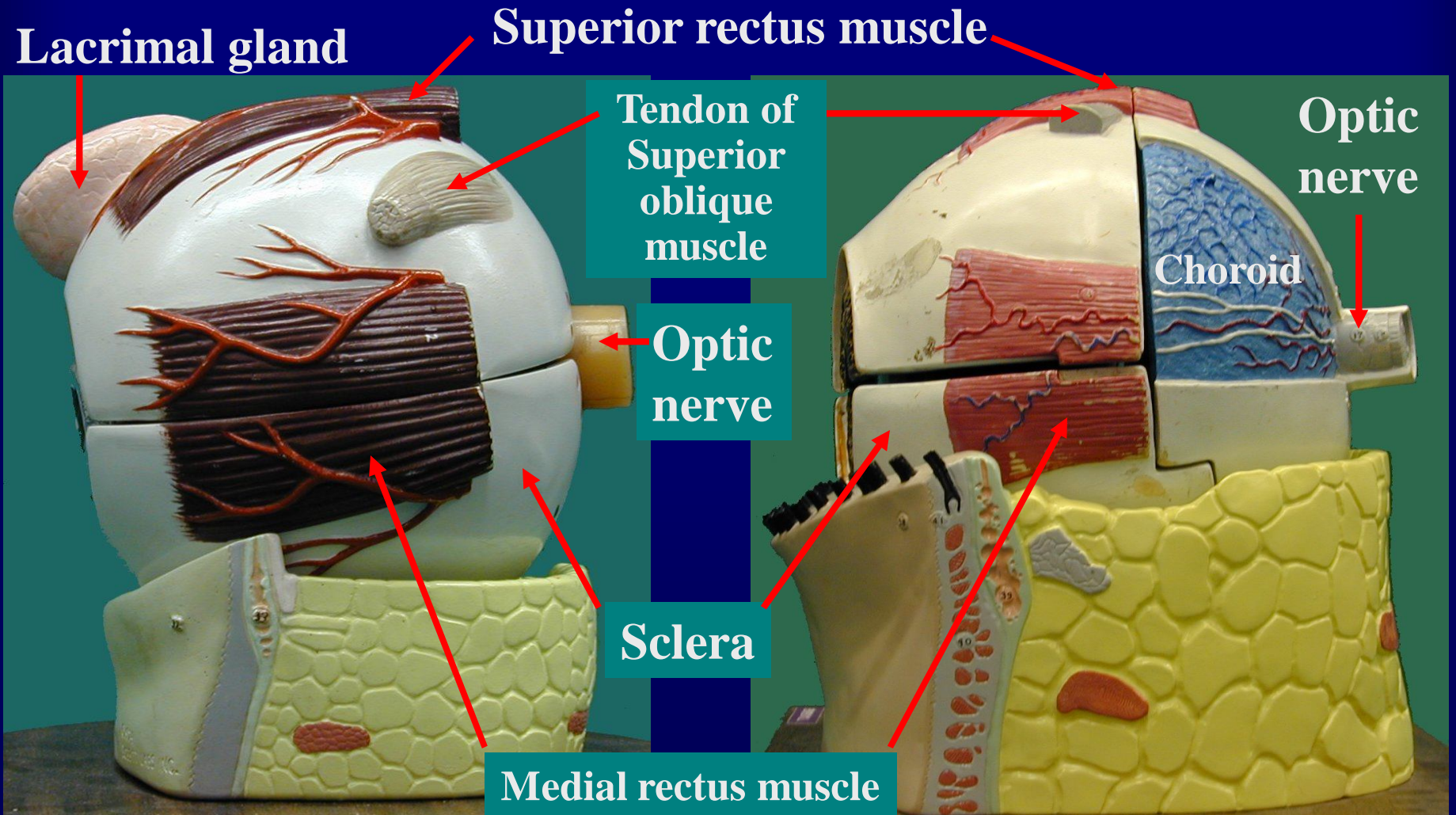
Medial rectus muscle

Model Copyright © Somso

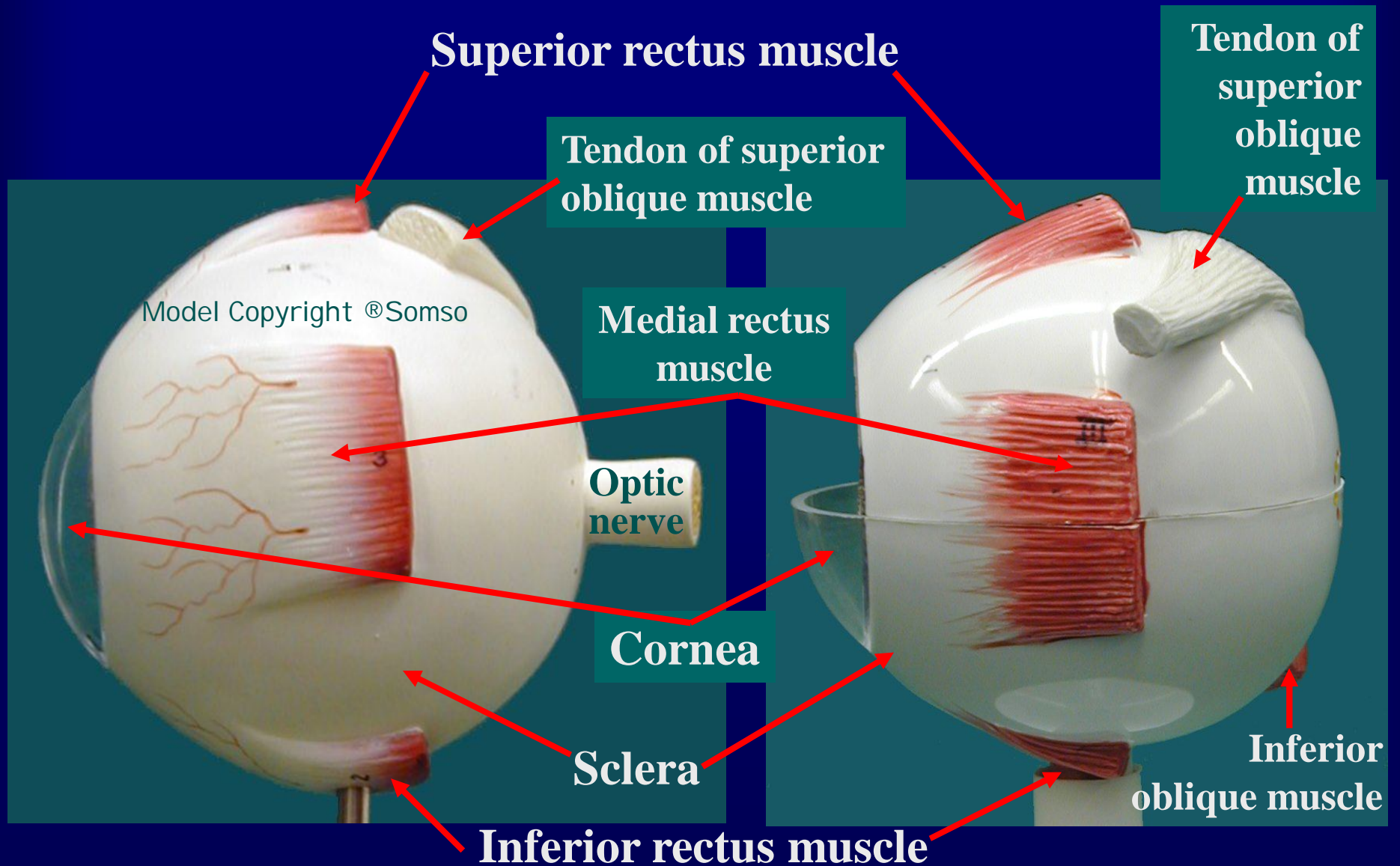




# Large Models – Medial View

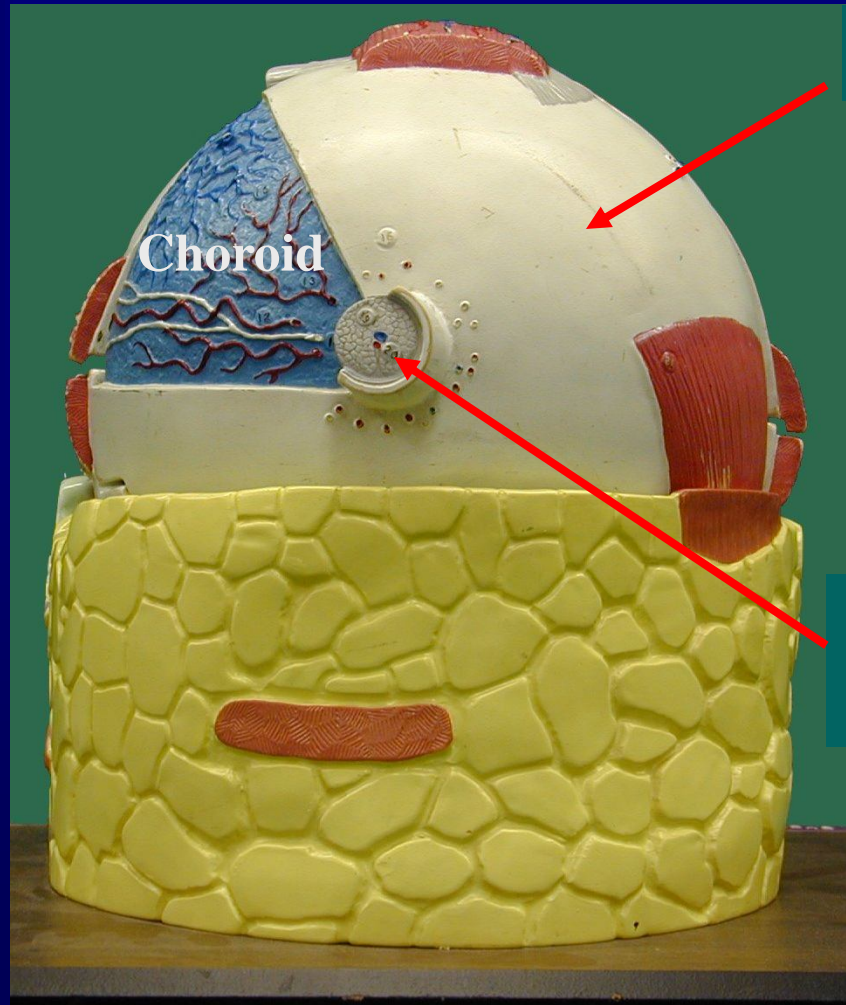


# Small Models – Medial View





# Large Models – Posterior Structures



Choroid

Sclera

Optic  
nerve



Lacrimal  
gland

# Large Models – Muscles (Posterior)

**Superior rectus muscle**

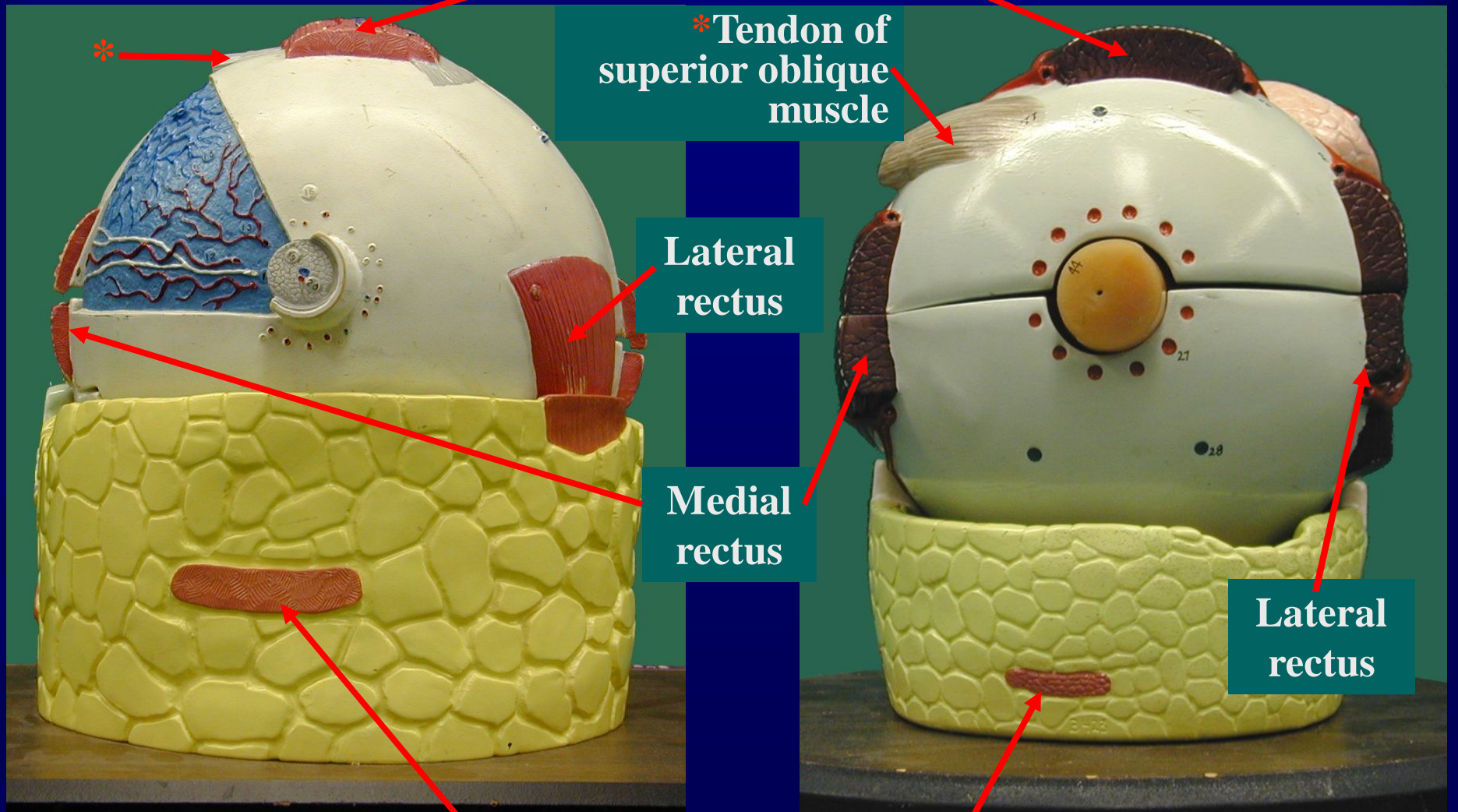
\*Tendon of superior oblique muscle

**Lateral rectus**

**Medial rectus**

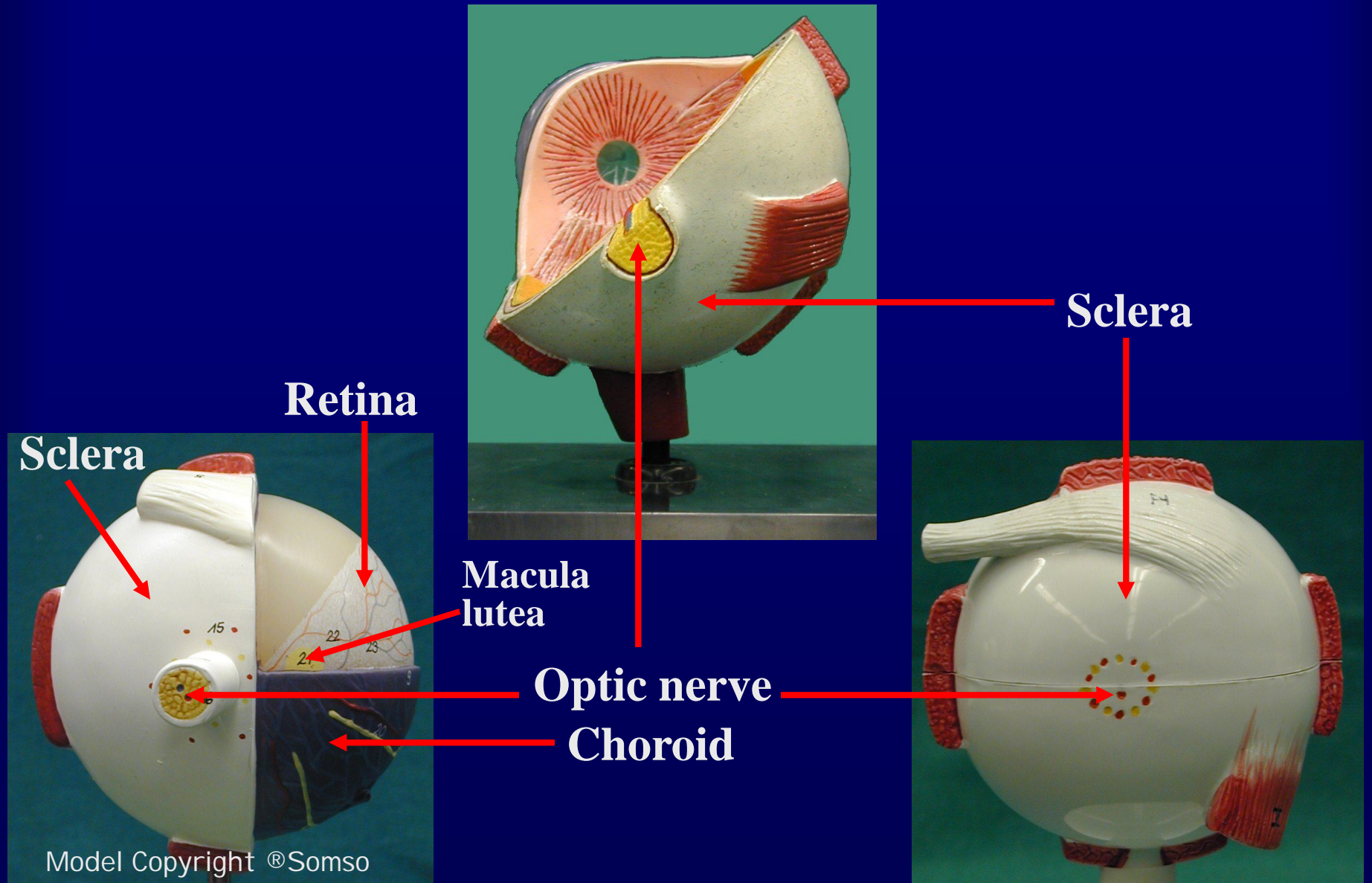
**Lateral rectus**

**Inferior rectus muscle**

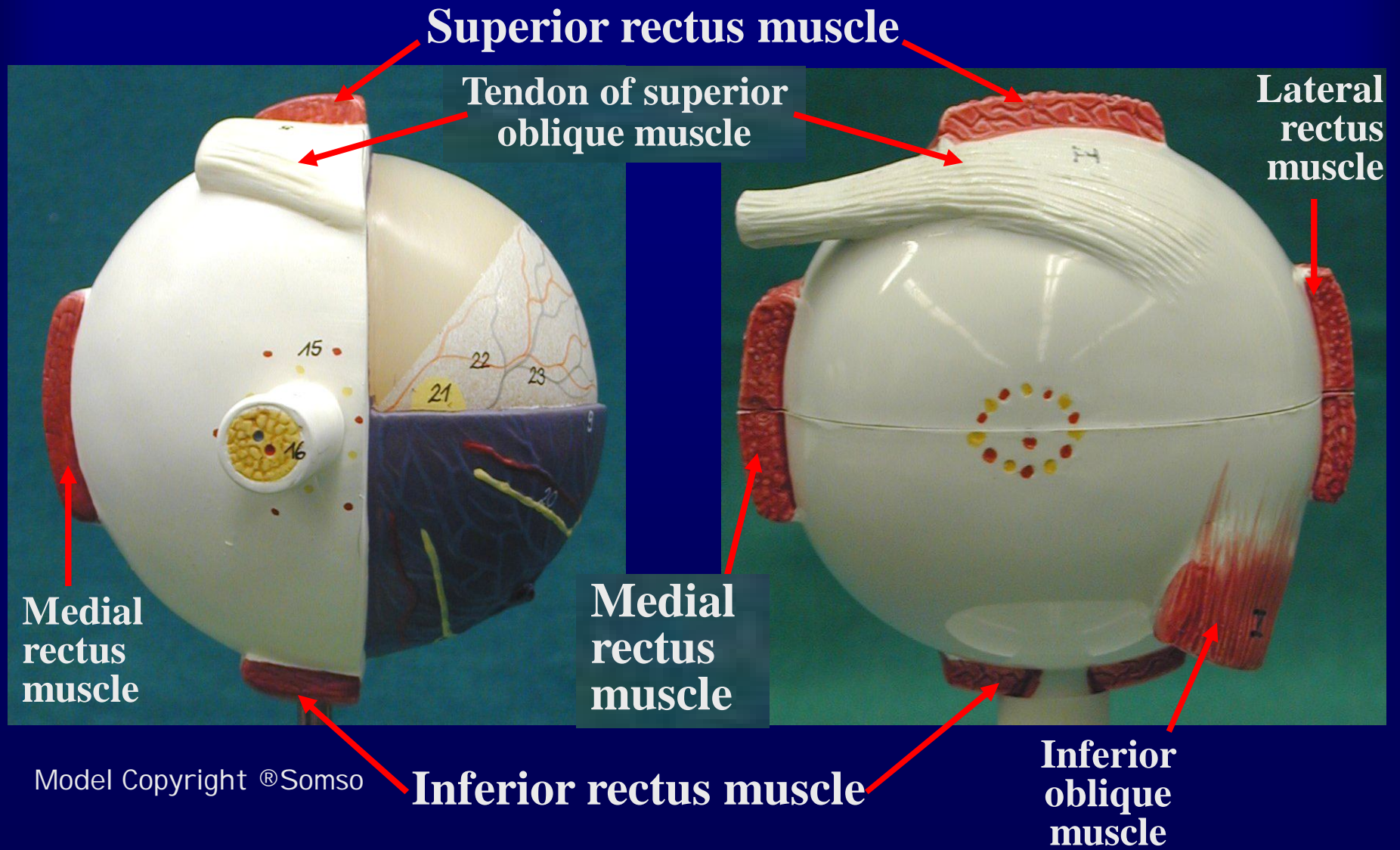




# Small Models – Posterior View



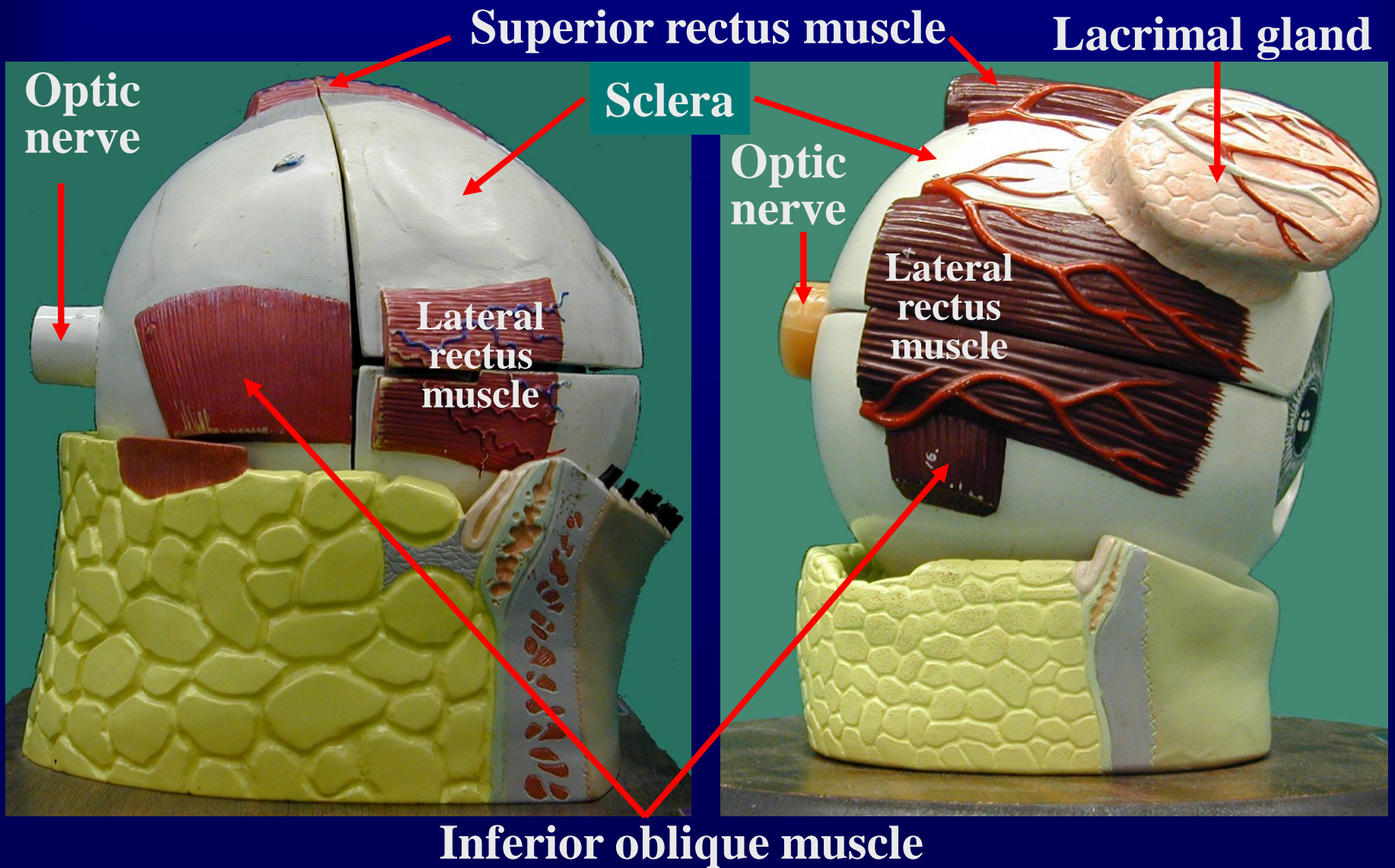
# Small Models – Muscles (Posterior)



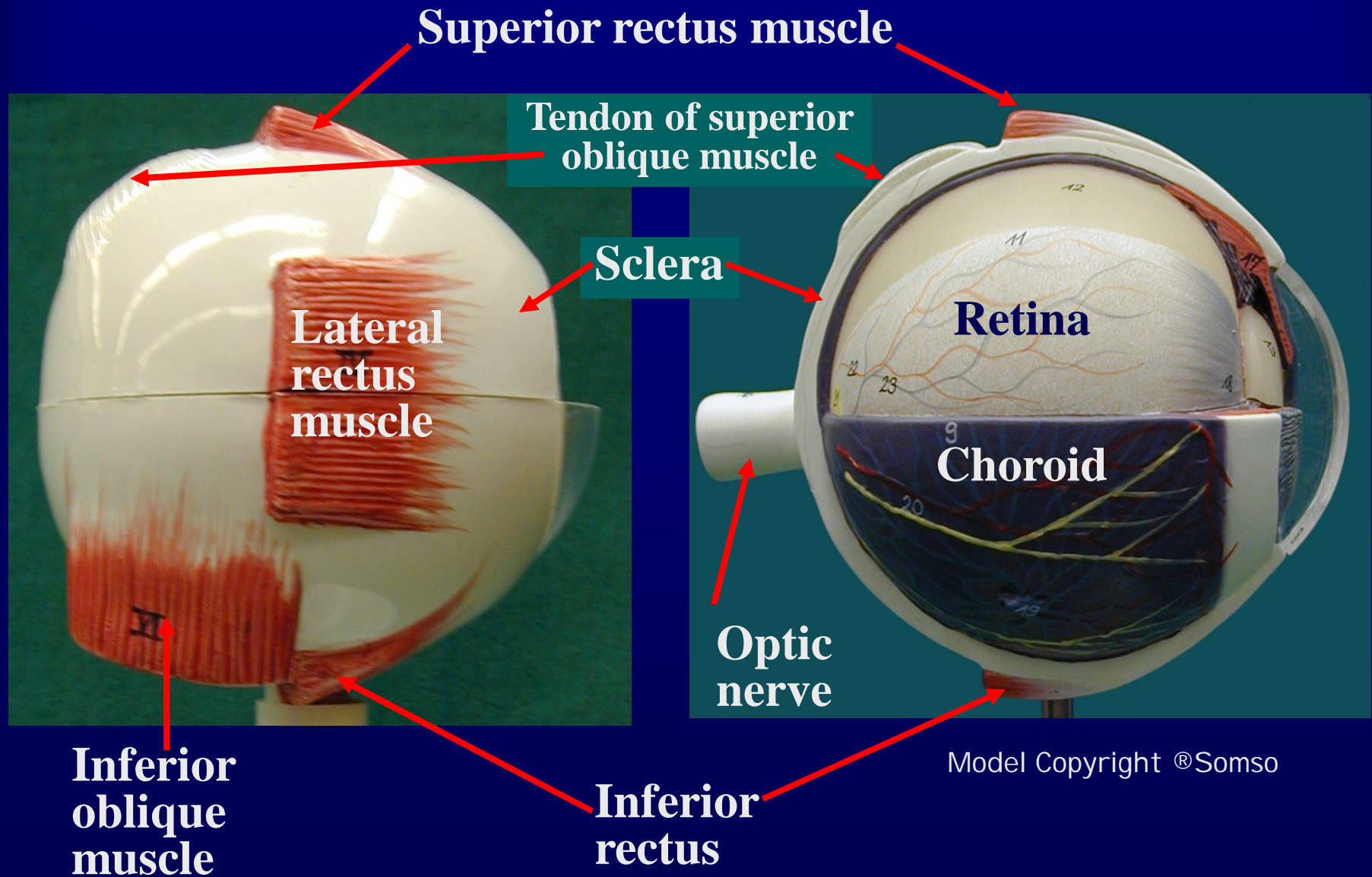
Model Copyright ©Somso



# Large Models – Lateral



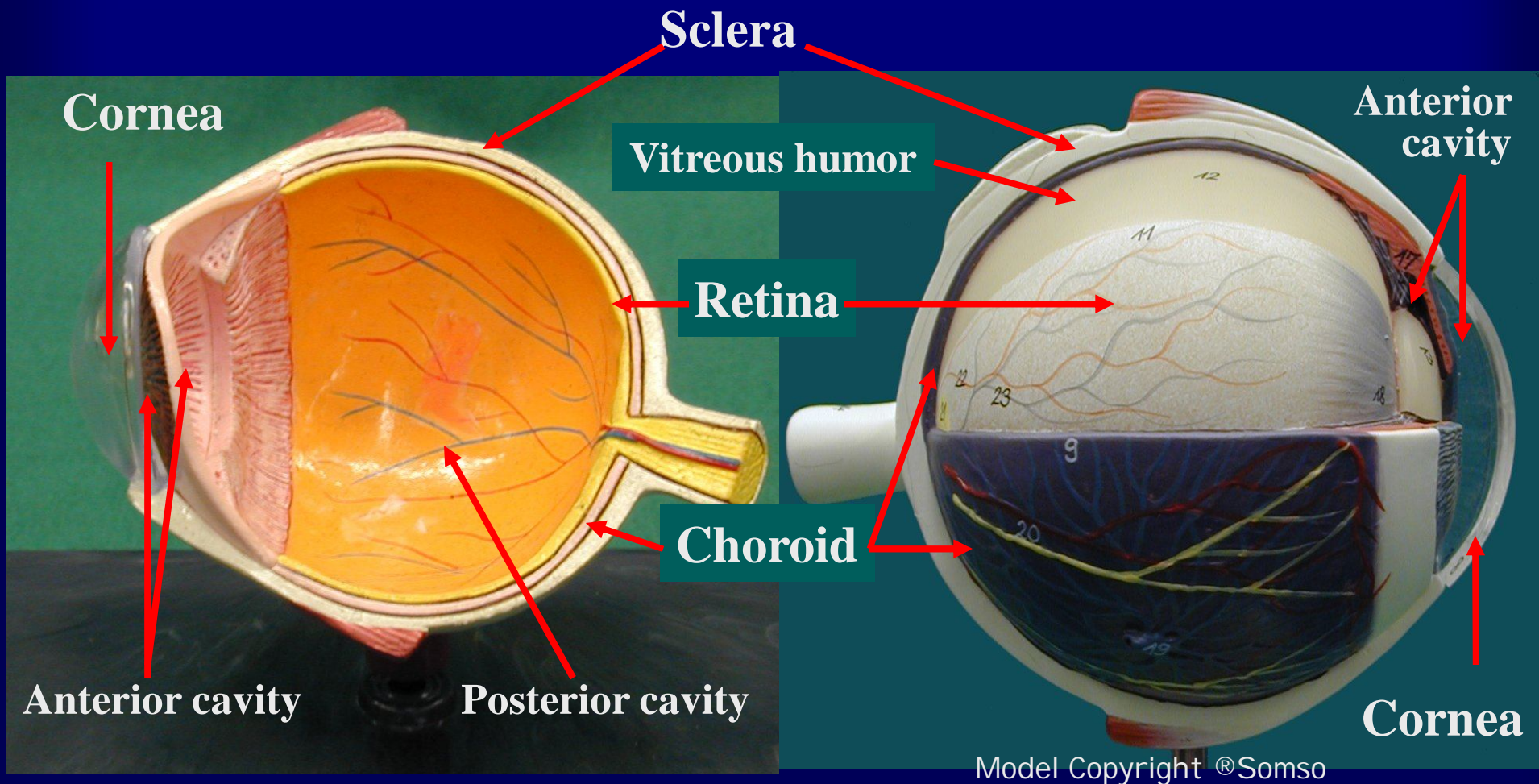
# Small Models – Lateral



Model Copyright ©Somso



# Eye Wall Layers and Chambers



# Internal Structures

**Ciliary body**

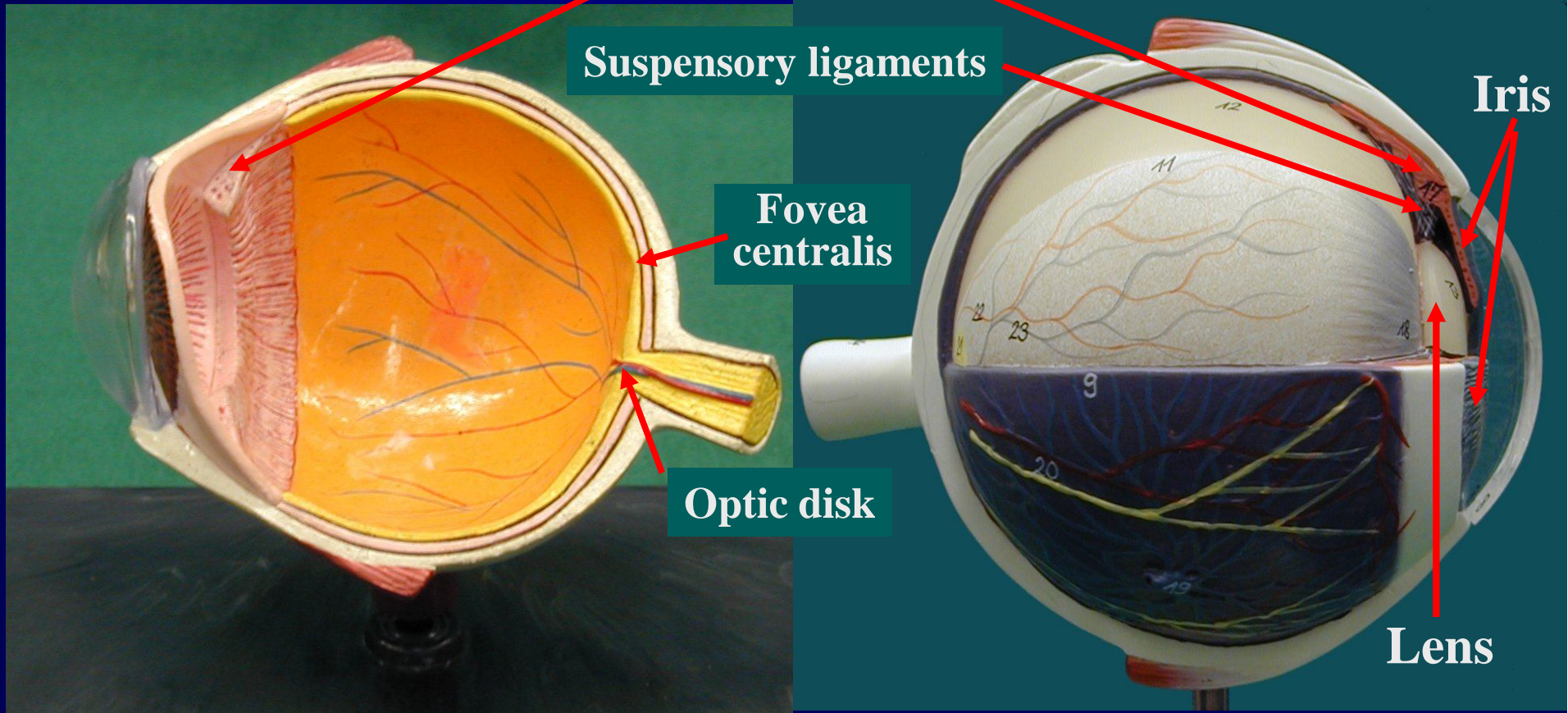
**Suspensory ligaments**

**Iris**

**Fovea  
centralis**

**Optic disk**

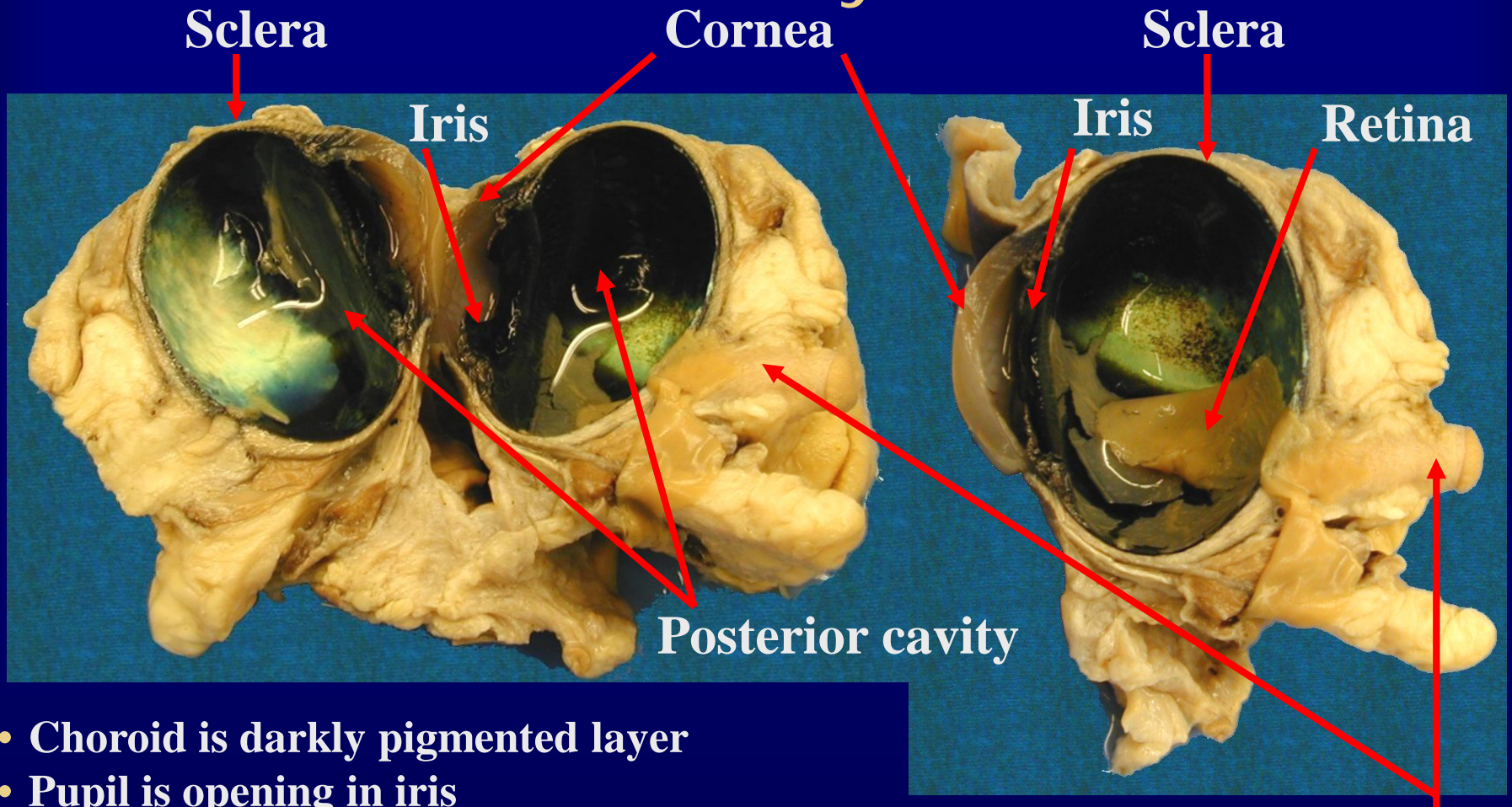
**Lens**



Model Copyright ©Somso



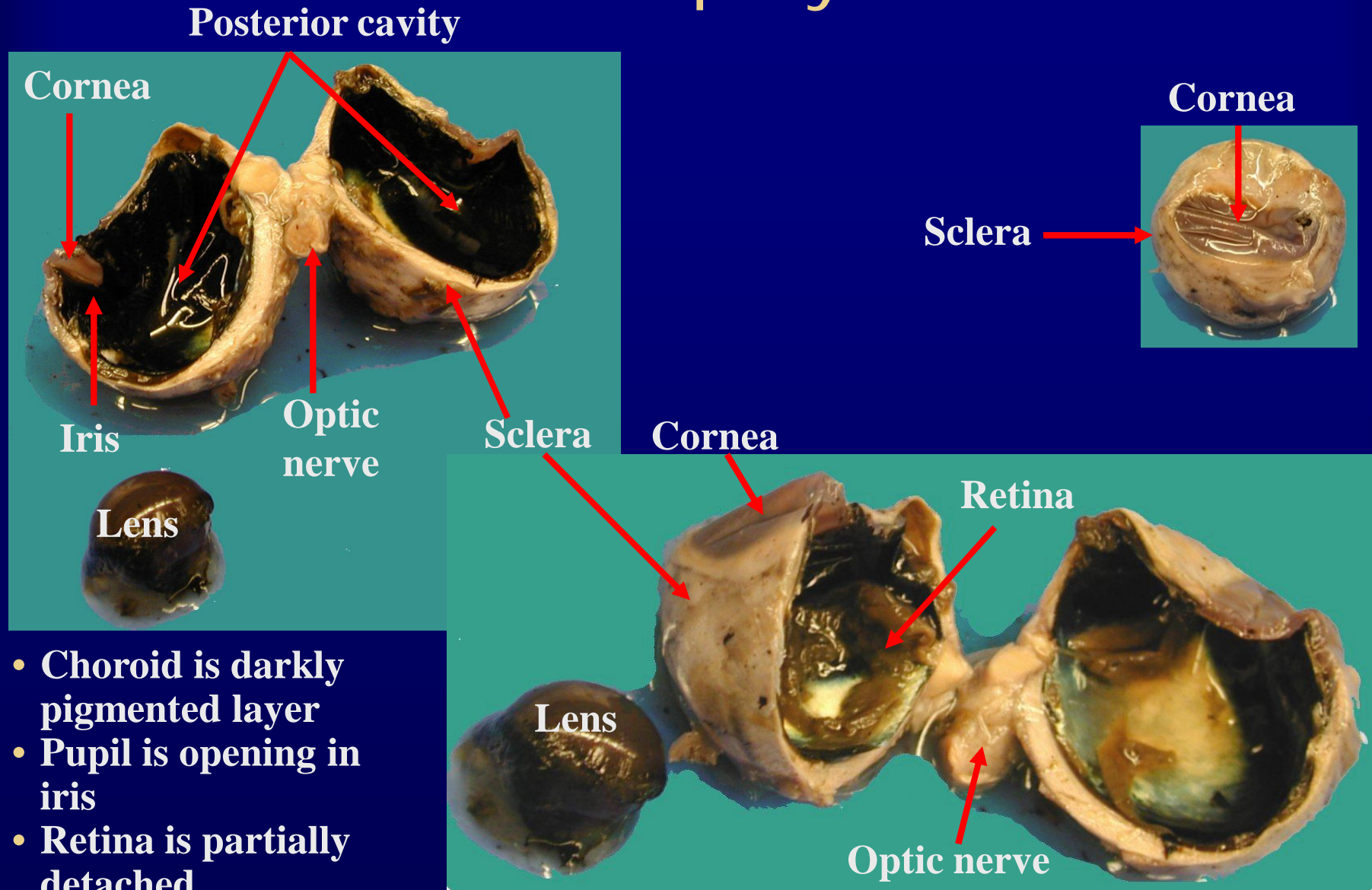
# Cow Eye



- Choroid is darkly pigmented layer
- Pupil is opening in iris
- Retina is partially detached

Optic nerve

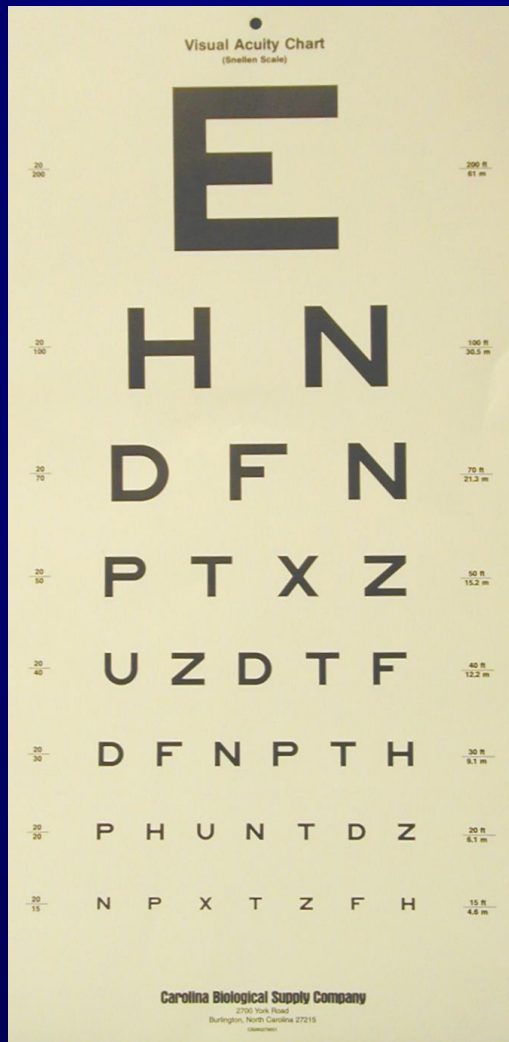
# Sheep Eye



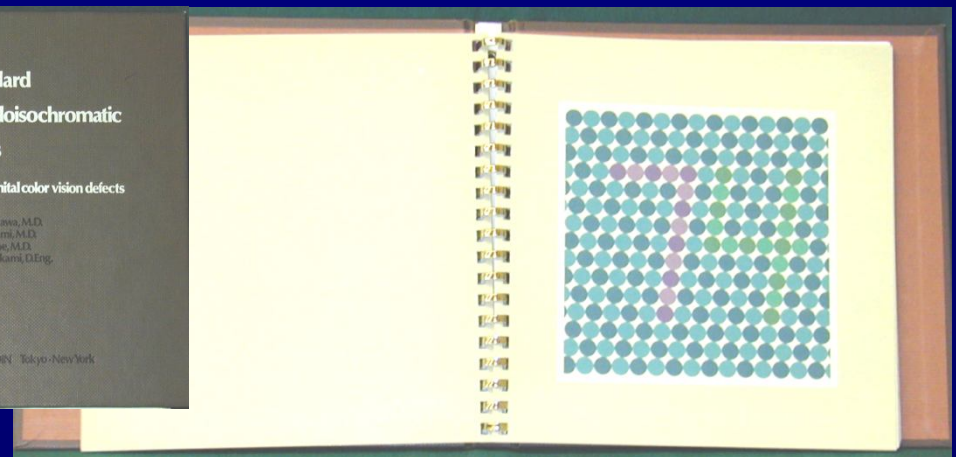
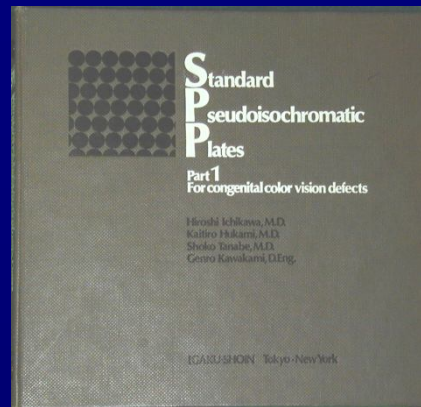
- **Choroid is darkly pigmented layer**
- **Pupil is opening in iris**
- **Retina is partially detached**



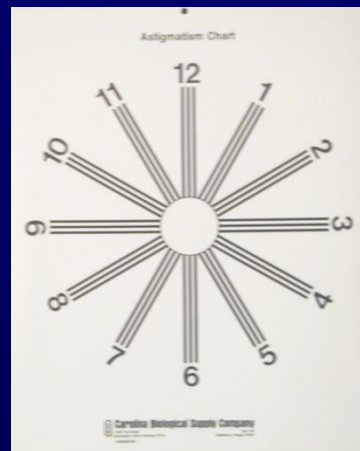
# Vision Tests



**Snellen-Visual Acuity Chart**



**Ishihara Color Plates**

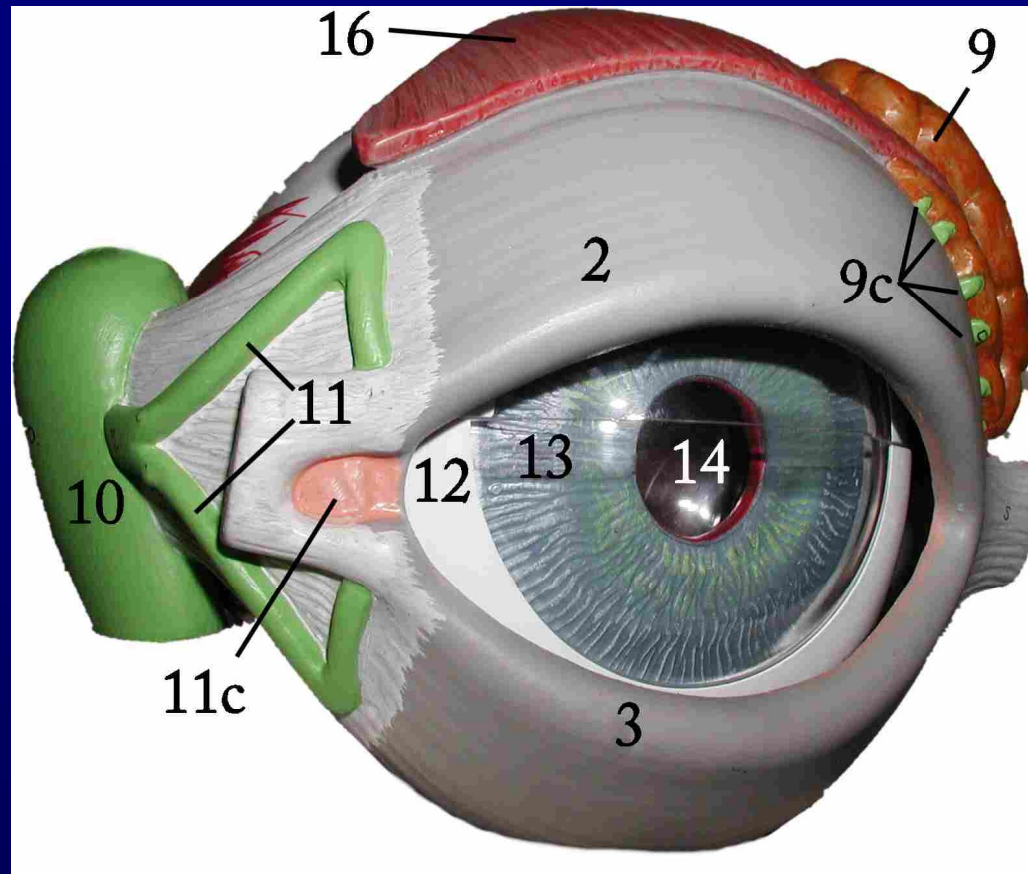


**Astigmatism Chart**



**Blind Spot Test Figure**

# Large Eye Model with Lid



[http://daphne.palomar.edu/ccarpenter/Models/eye\\_3b.htm](http://daphne.palomar.edu/ccarpenter/Models/eye_3b.htm)

<http://www.highlands.edu/academics/divisions/scipe/biology/labs/cartersville/2121/senses.htm>

1. (outer layer) Fibrous: dense connective tissue

- *Sclera* – white of the eye

- *Cornea*

2. (middle) Vascular: uvea

- *Choroid* – posterior, pigmented

- *Ciliary body*

  - Muscles – control lens shape

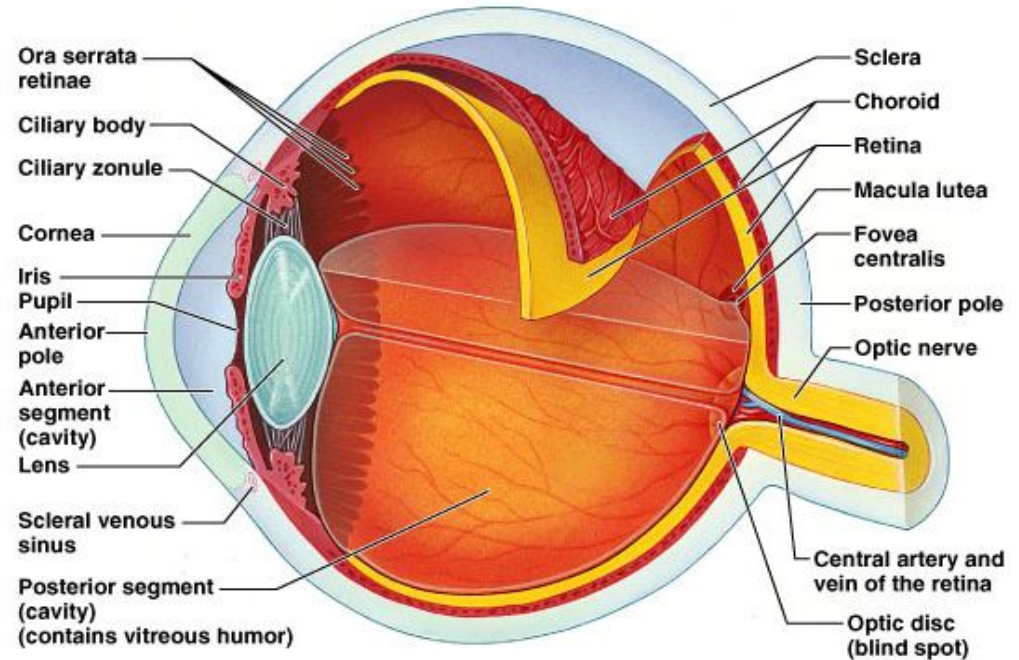
  - Processes – secrete aqueous humor

  - Zonule (attaches lens)

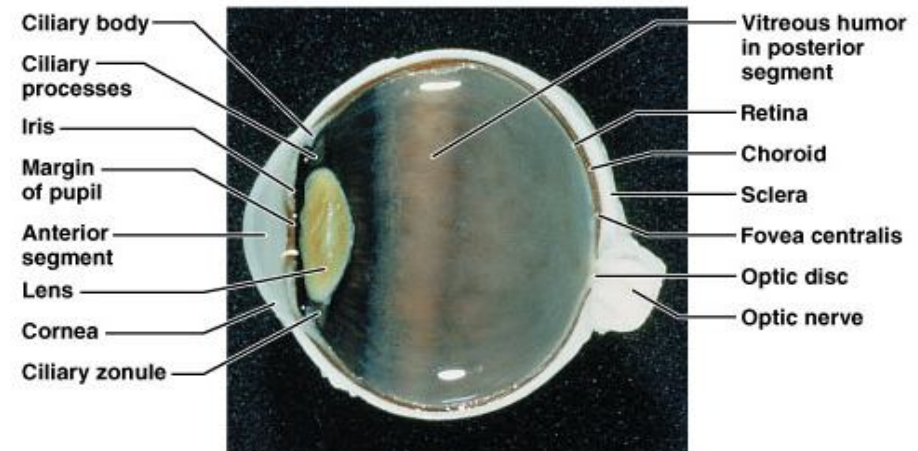
- *Iris*

3. (inner layer) Sensory

- *Retina and optic nerve*



(a)



(b)



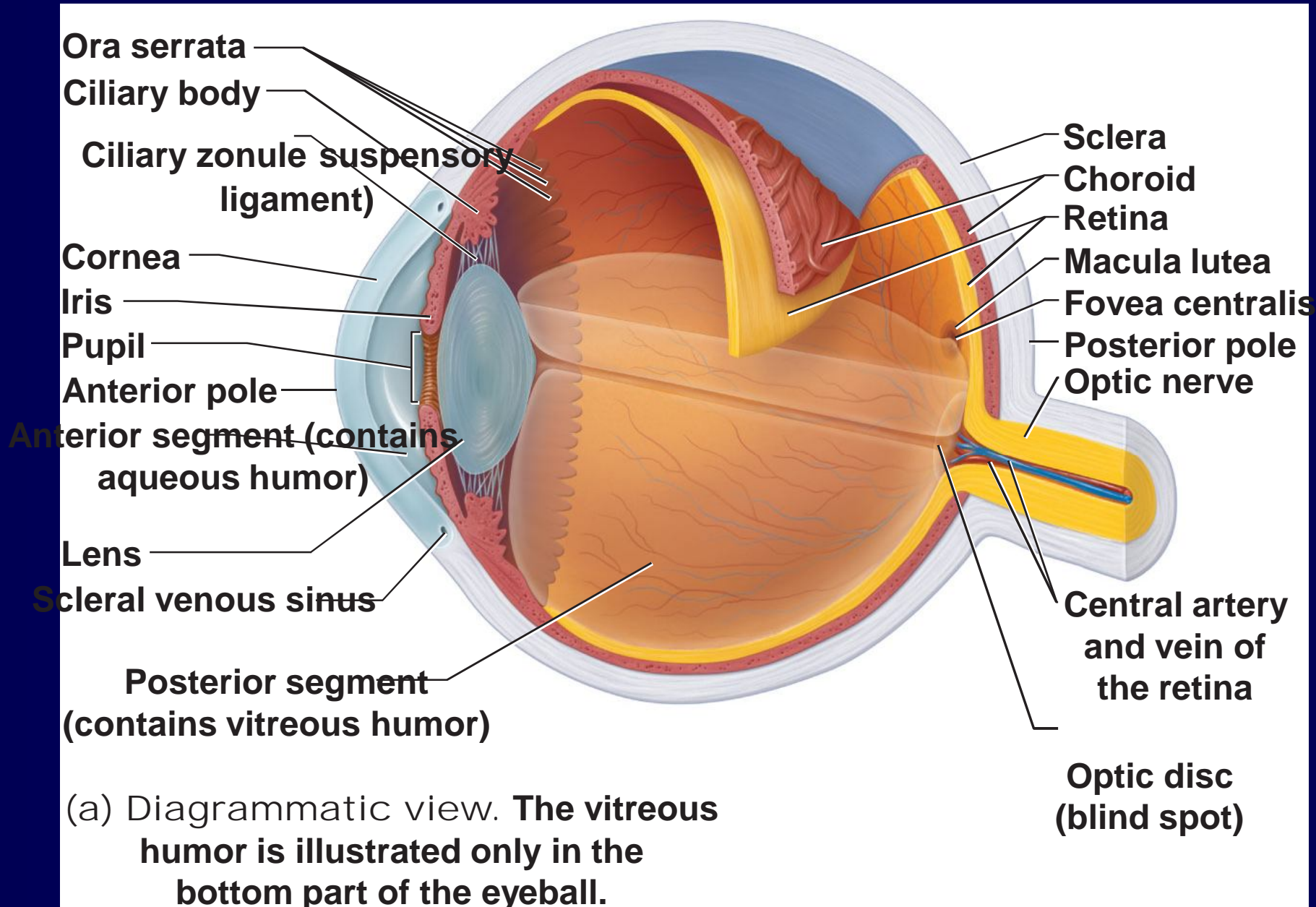
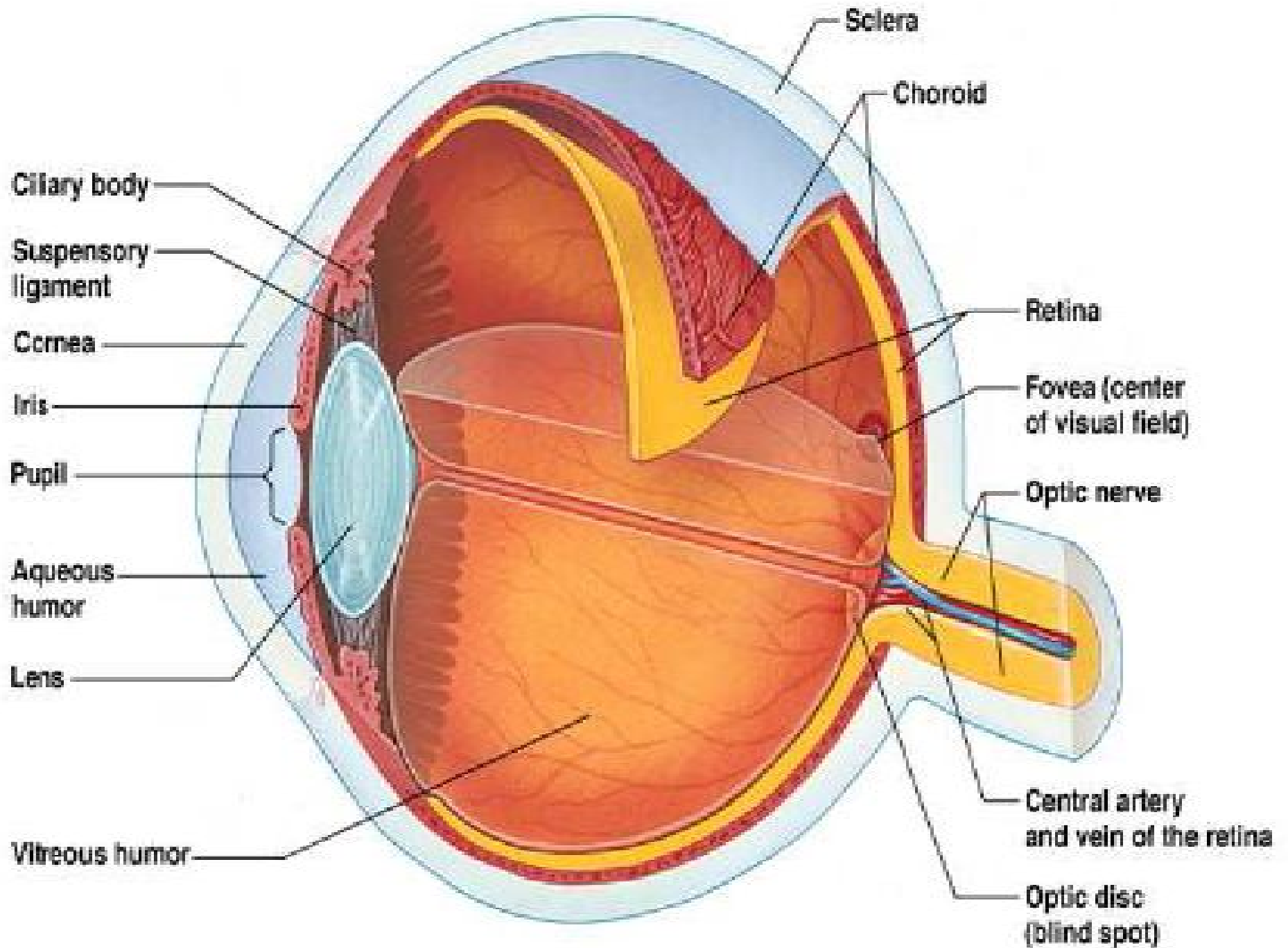


Figure 15.4a



# Posterior View of the Anterior Half

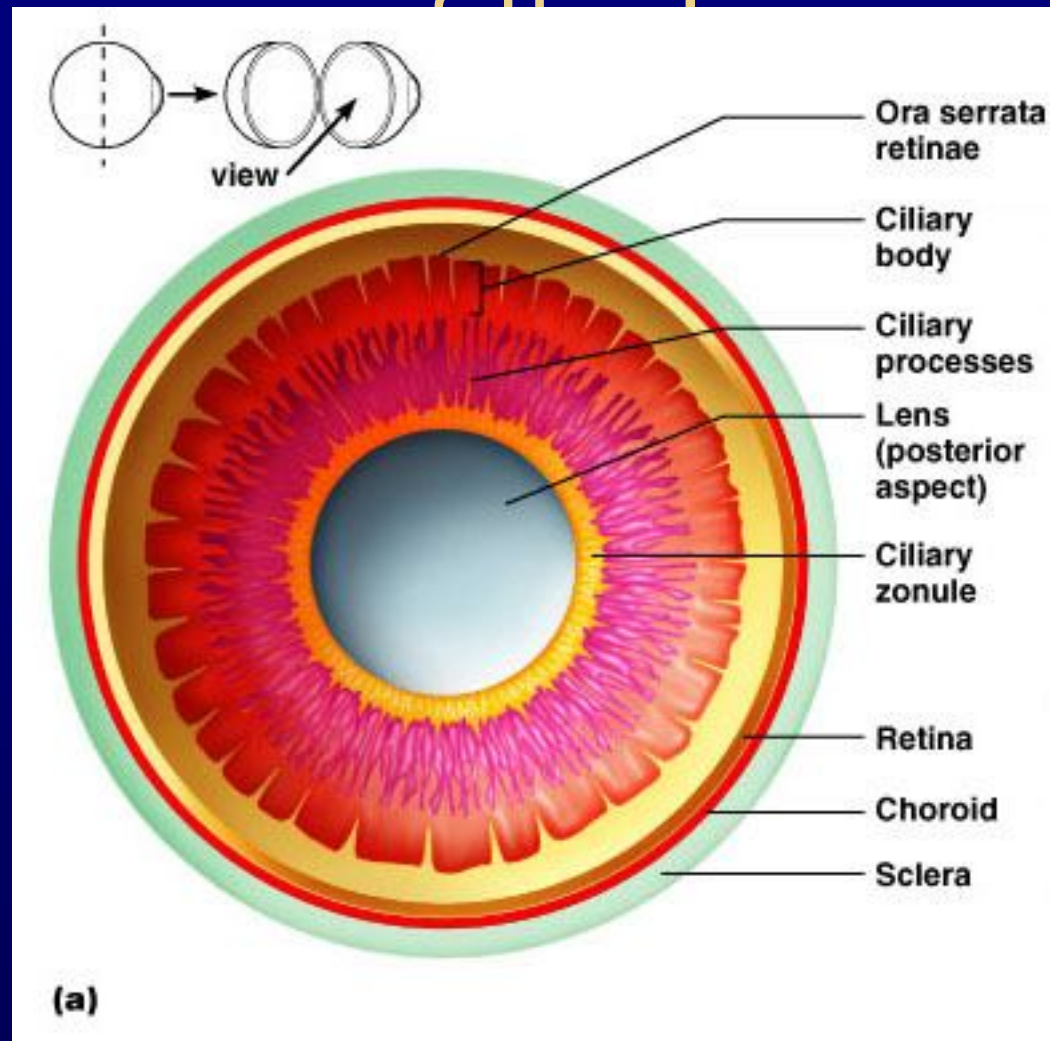


Figure 16.9a



# The Vascular Tunic

