



THE ORGANS OF SPECIAL SENSES



“Equipped with his five senses, man explores the universe around him and calls the adventure Science”– [Edwin Hubble](#)

ORGAN OF VISION

The coats (layers) of the wall of the eye

1. Corneoscleral (fibrous) coat:

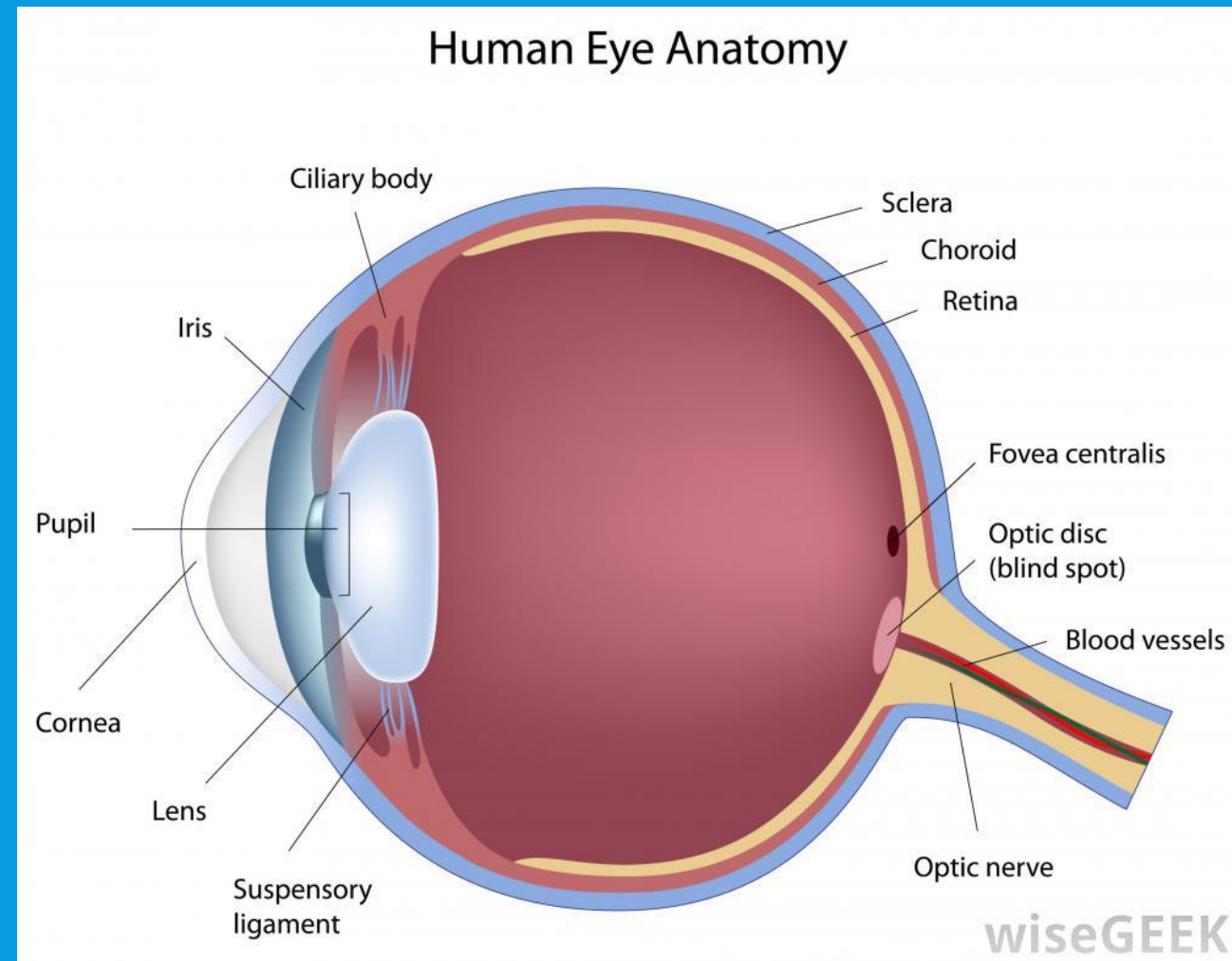
- white sclera
- transparent cornea

2. Vascular coat (uvea):

- choroid
- stroma of the ciliary body and iris

3. Retina

- retinal pigment epithelium (RPE)
- neural retina



FUNCTIONAL APPARATUS

1 Dioptric

- Cornea
- Anterior, posterior aqueous chambers
- Lens
- Vitreous body

2. Accomodative

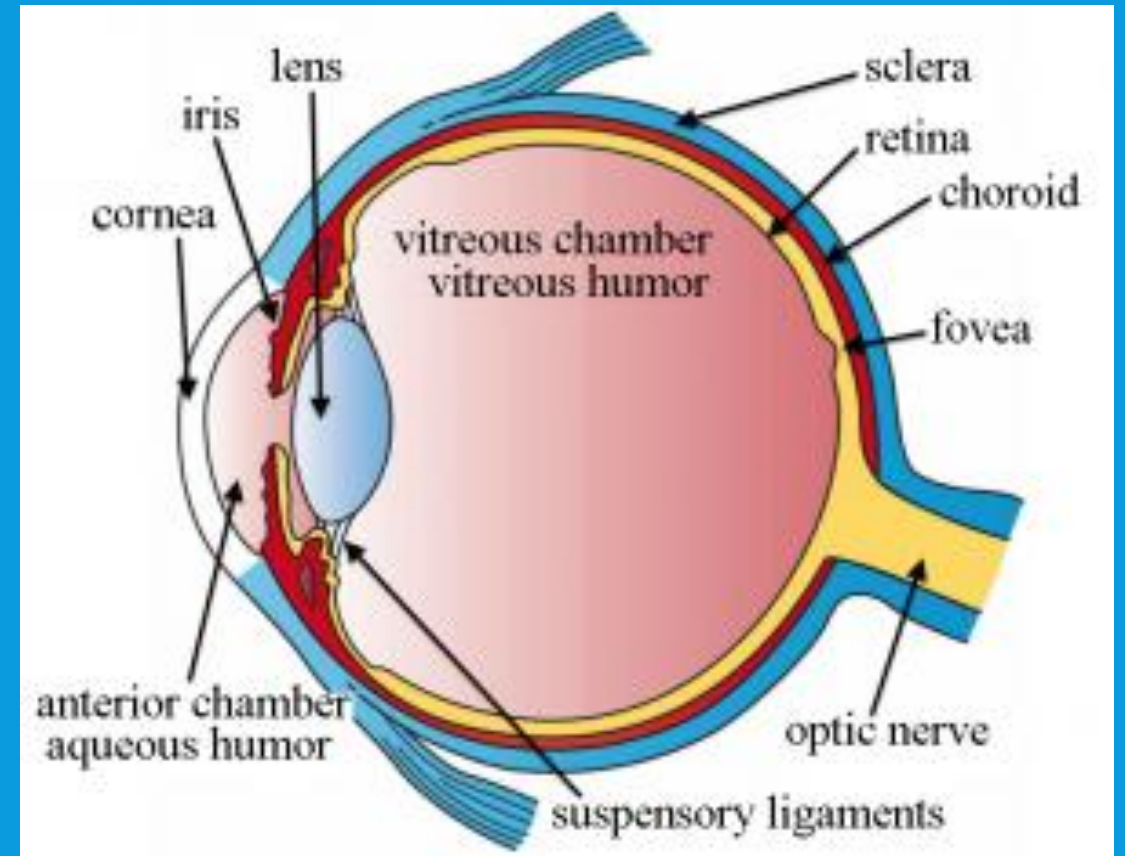
- Iris
- Ciliary body

3. Receptive apparatus

- Retina

DIOPTRIC APPARATUS OF THE EYE (REFRACTILE MEDIA COMPONENTS)

- Cornea
- Aqueous humor –fluid located in anterior and posterior chambers
- Lens
- Vitreous body



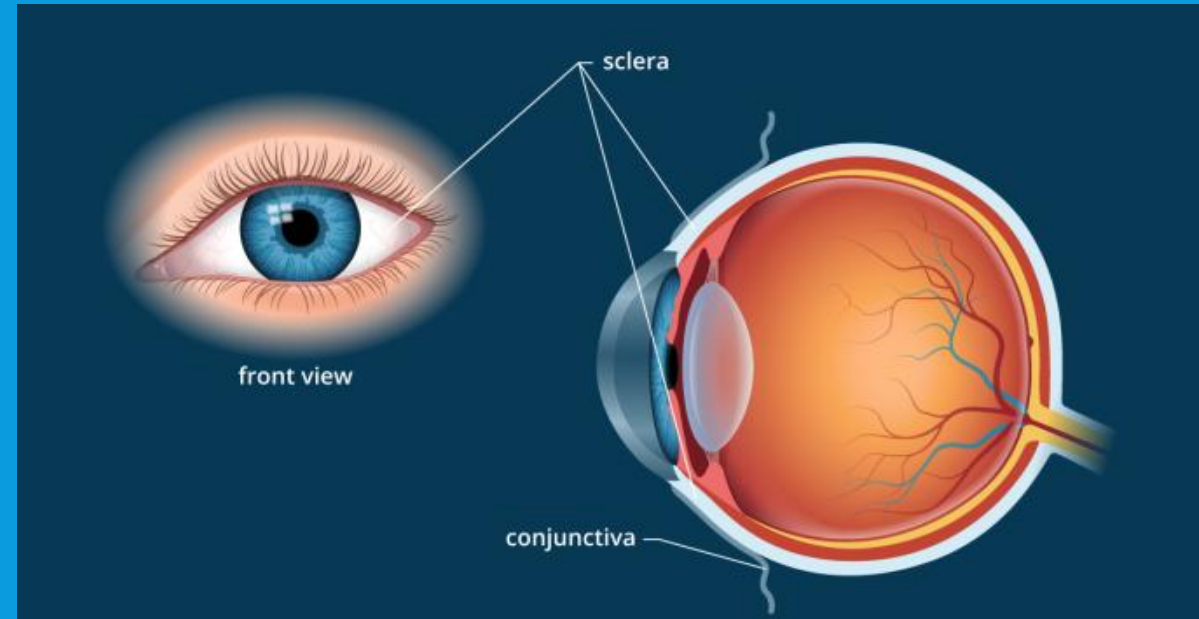
FIBROUS COAT. CORNEA

- Corneal epithelium – stratified squamous nonkeratinized
- Anterior basement membrane (Bowman's)
- Corneal stroma – dense regular connective tissue, the arrangement of collagen fibers is responsible for transparency
- Posterior basement membrane (Descemet's)
- Corneal endothelium – simple squamous epithelium



FIBROUS COAT. SCLERA

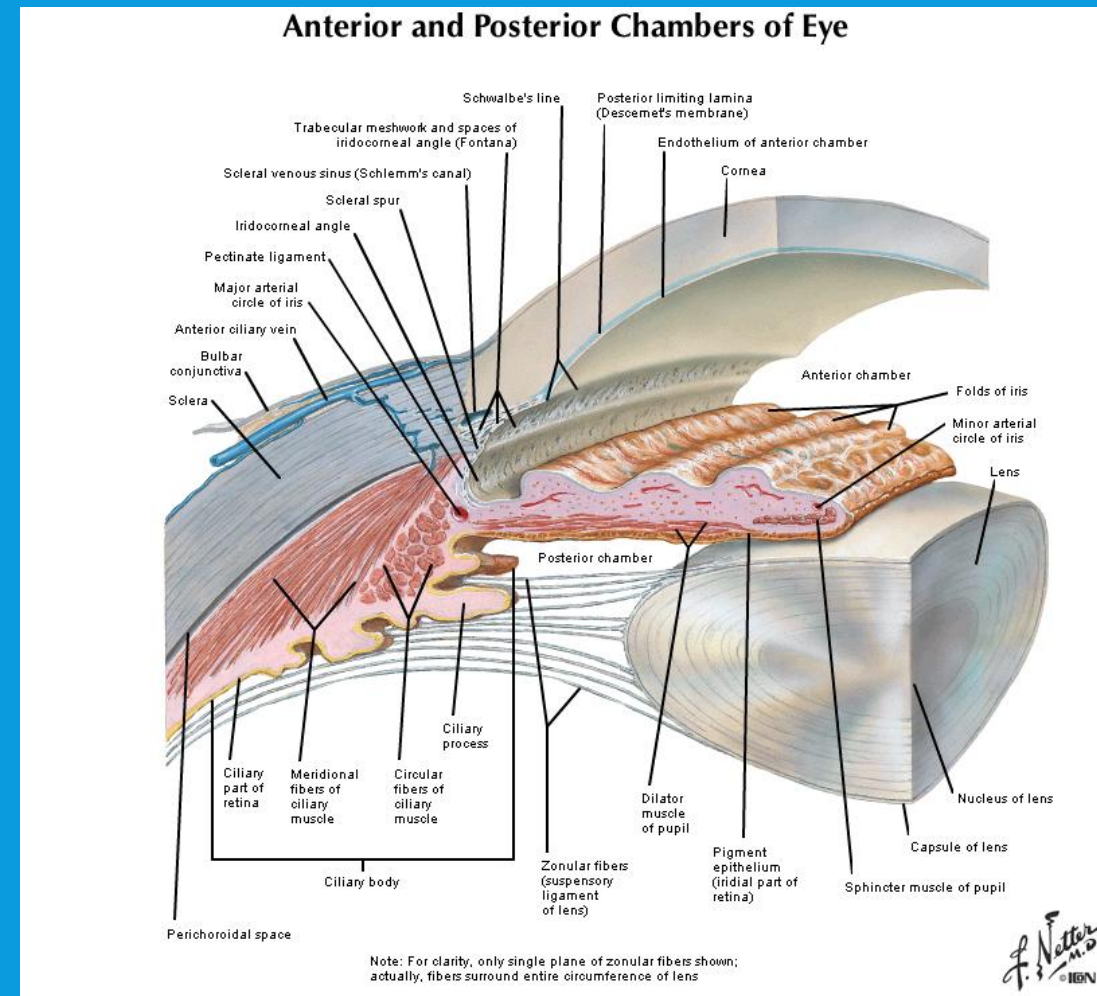
- Episclera – loose CT adjacent to the periorbital fat
- Sclera proper (substantia propria) – dense regular CT
- Suprachoroid lamina – located adjacent to the choroid, contains thinner collagen, elastic fibers, fibroblasts, melanocytes and other CT cells



VASCULAR COAT. CILIARY BODY

- The ciliary body is the thickened anterior portion of the vascular coat, located between the iris and the choroid
- Layers:
 - 1) **Outer** (ciliary ring) – ciliary muscle (smooth): longitudinal, radial (focus for distant vision), circular (focus for near vision)
 - 2) **Inner** (ciliary corona) – extends into the ciliary processes

The ciliary processes are covered by the ciliary epithelium (double layer of columnar cells), which secretes the aqueous humor, secretes and anchors the zonular fibers that form the suspensory ligament of the lens



VASCULAR COAT. IRIS

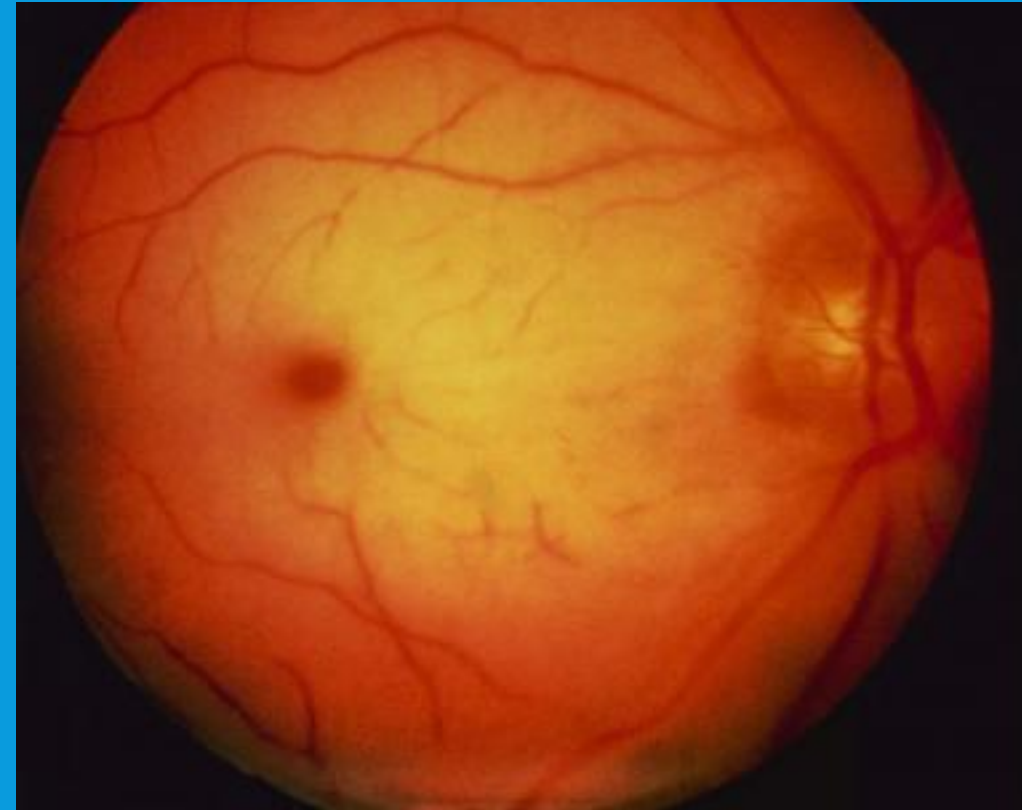
- Anterior epithelium – continuation of corneal endothelium
- Outer limiting (avascular layer) – CT with numerous fibroblasts and pigment cells (determine the color of the eye)
- Vascular layer – numerous blood vessels accompanied by loose CT, m. sphincter and dilatator pupillae
- Inner limiting layer – similar to the outer one
- Posterior pigment epithelium – continuation of the retinal pigment epithelium



VASCULAR COAT. CHOROID

- Suprachoroid lamina – located adjacent to the sclera, contains collagen, elastic fibers, fibroblasts, melanocytes and other CT cells
- Choroid lamina – arteries and veins surrounded by loose CT, containing pigment cells, and smooth muscle cells not associated with blood vessels
- Choriocapillary layer – fenestrated capillaries arranged in a single plane. Provide nutrients to the cells of the retina
- Bruch's membrane* – thin amorphous refractile layer, lies between the choricapillary layer and pigment epithelium of the retina.

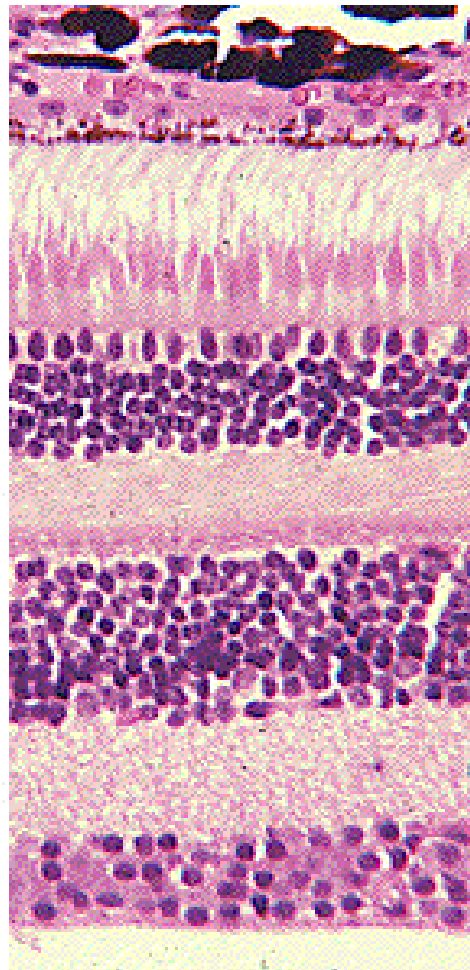
*Layers: basal lamina of endothelium of choricapillary layer, layer of collagen fibers, layer of elastic fibers, second layer of collagen fibers, basal lamina retinal pigment epithelium



CELLS OF THE RETINA

- **Photoreceptor cells**—the retinal rods and cones
- **Conducting neurons**—bipolar neurons and ganglion cells
- **Association neurons and others**—horizontal, centrifugal, interplexiform, and amacrine neurons
- **Supporting (neuroglial) cells**—Müller's cells, microglial cells, and astrocytes

RETINA



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)

