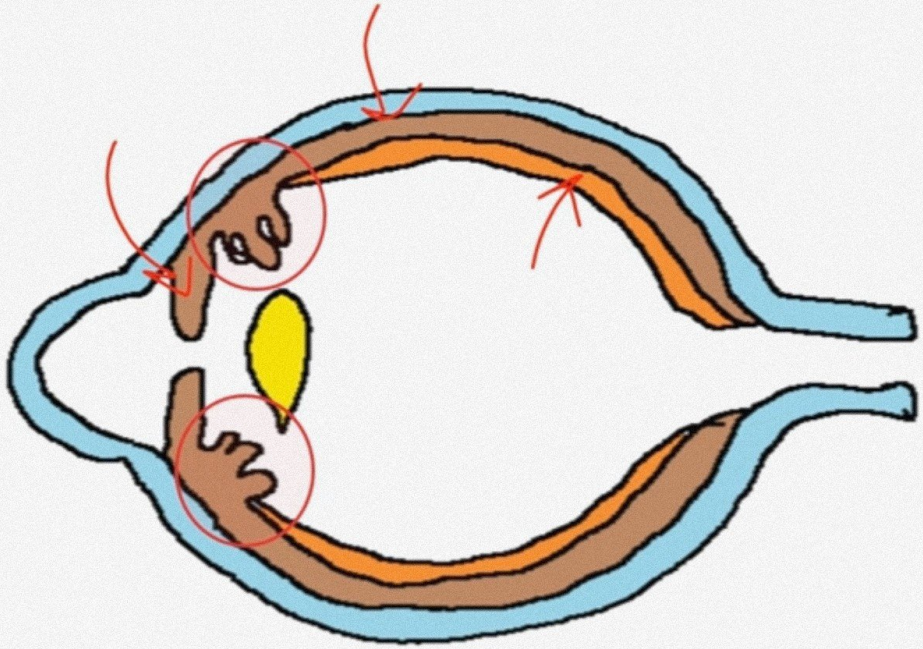
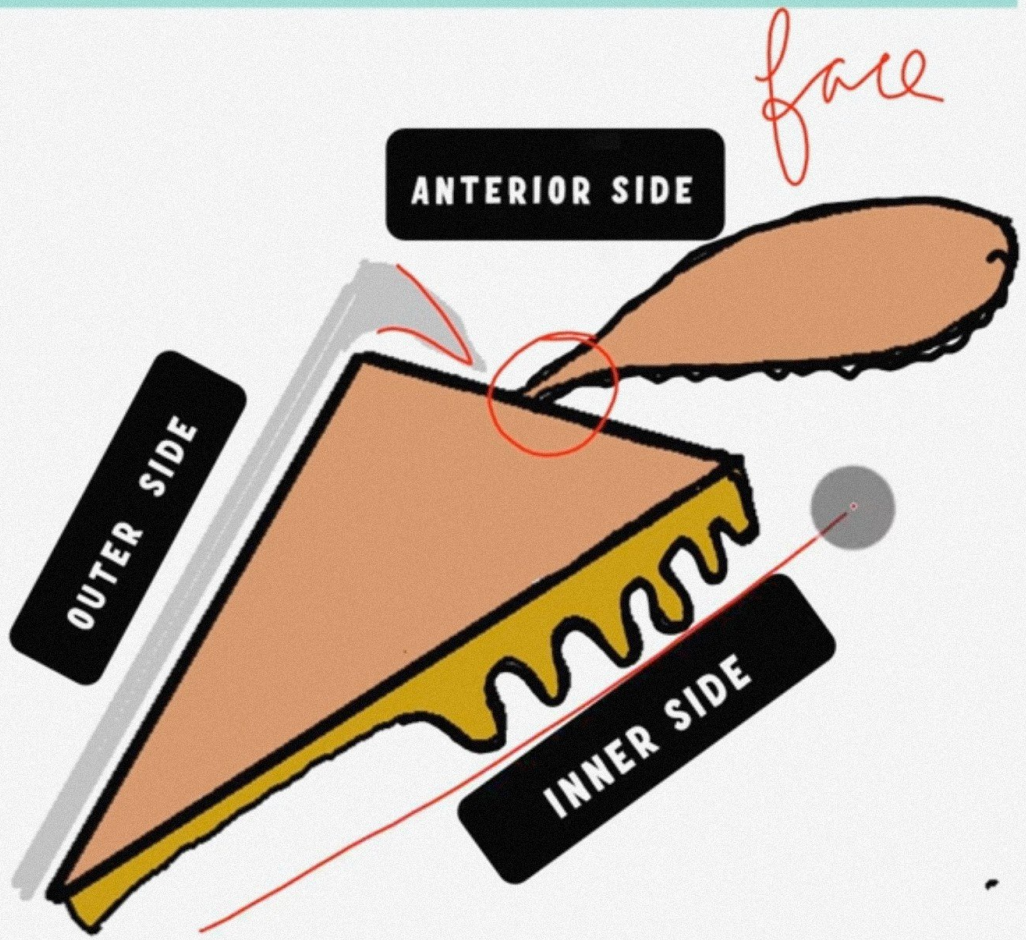
WHAT IS CILIARY BODY ?

- Middle part of the uveal tract between the iris and the choroid
- More specifically it the forward continuation of the choroid at the ora serrata



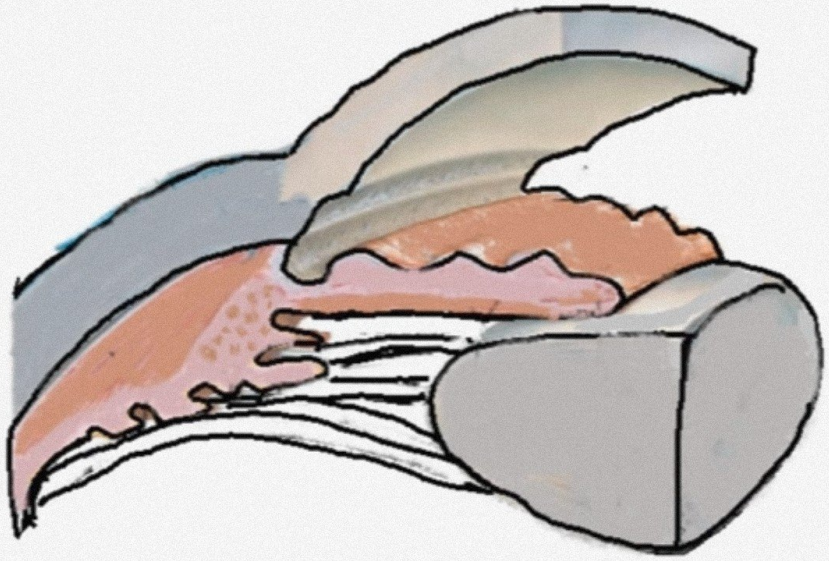
TRIANGULAR CROSS SECTION of CILIARY BODY

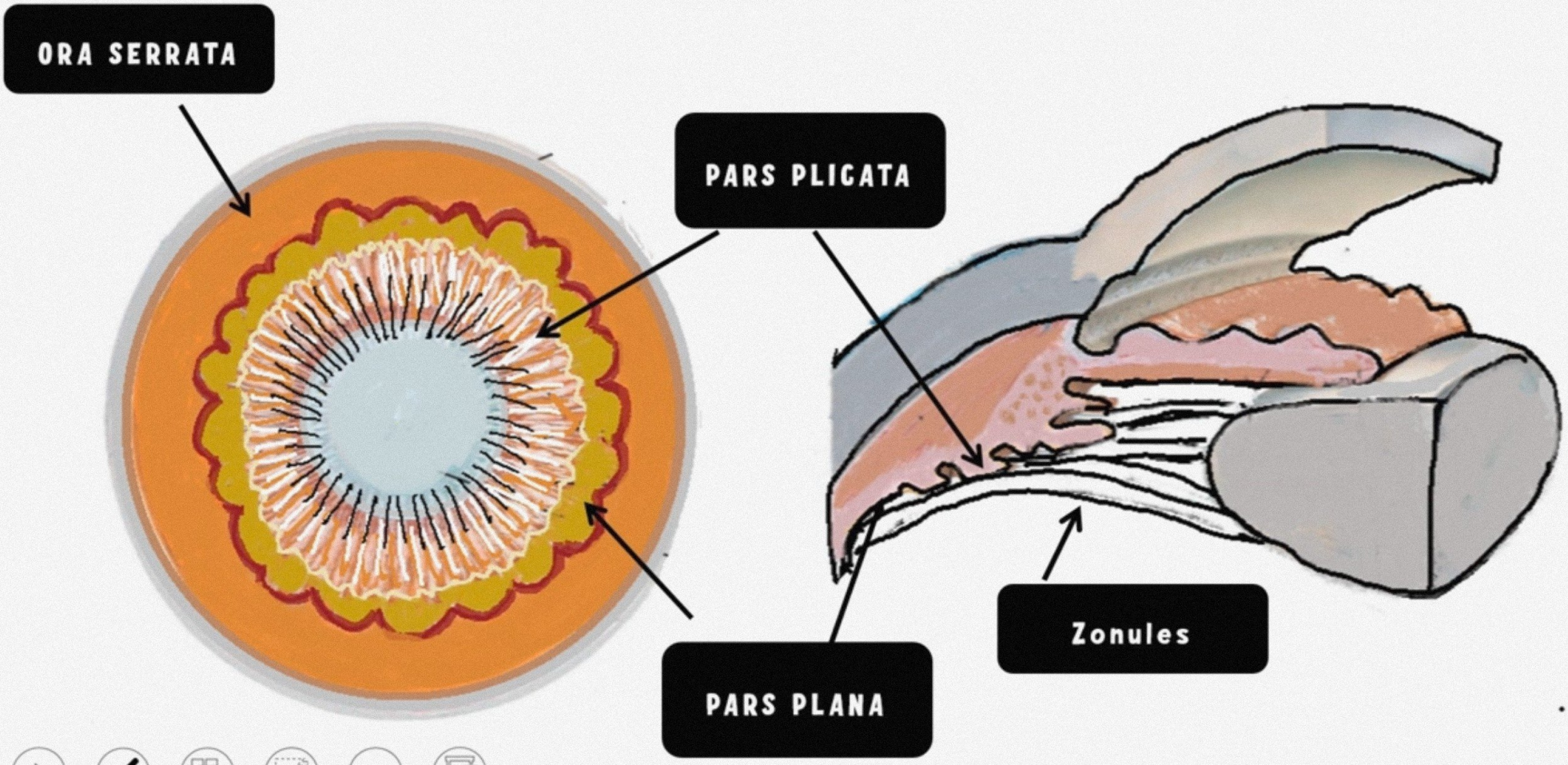
- **ANTERIOR SIDE** : forms part of the angle. In middle it is attached to the iris.
- **OUTER SIDE** : lies against the sclera with intervening supraciliary space
- **INNER SIDE** : divided into two parts – PARS PLICATA and PARS PLANA



PARS PLICATA AND PARS PLANA

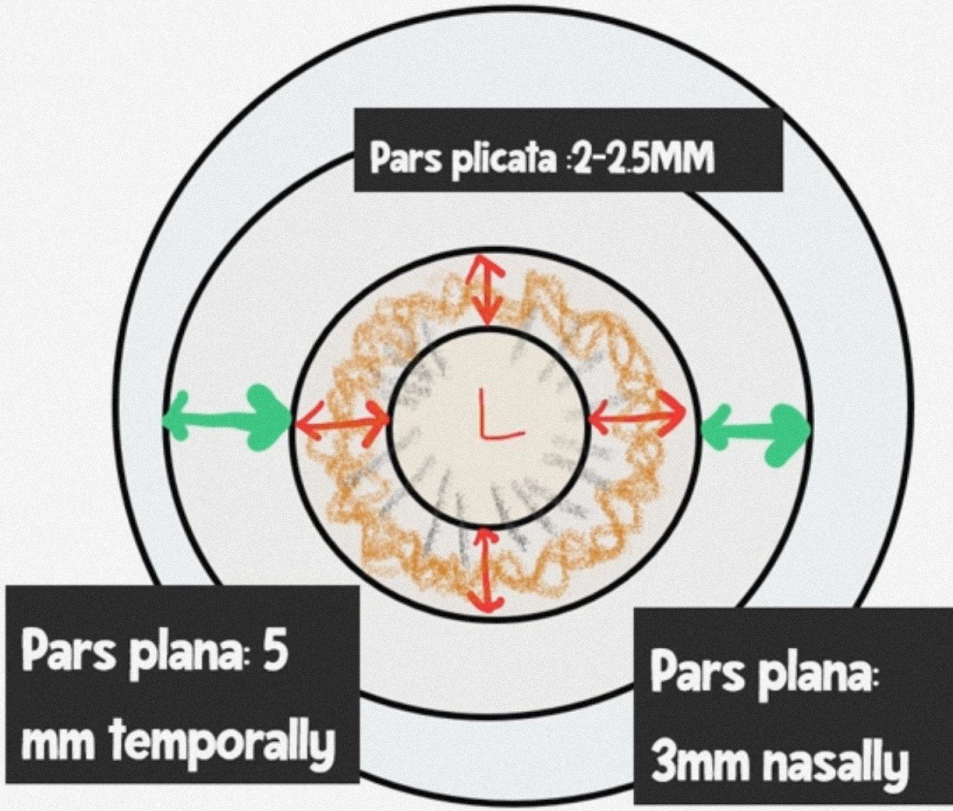
- **PARS PLICATA**: Anterior Part having finger like projections about 2-2.5mm . Also known as *pars ciliaris*
- **PARS PLANA** : Posterior part of the ciliary body relatively smoother . Also known *as pars orbicularis*




ORA SERRATA
PARS PLICATA
PARS PLANA
Zonules

IMPORTANT MEASUREMENT :

PARS PLICATA – **2-2.5** mm wide
PARS PLANA – **5** mm temporally,
3 mm nasally

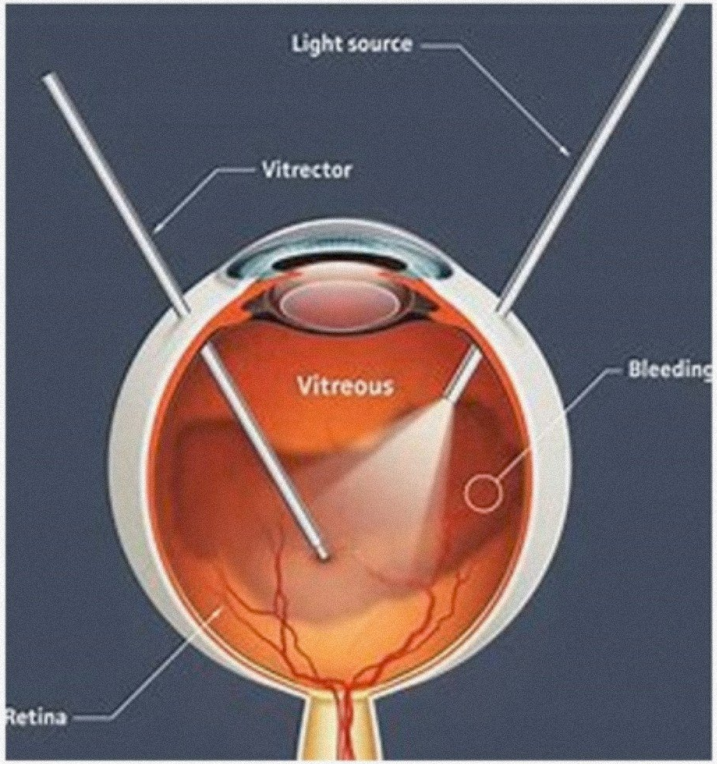


CLINICAL NUGGET

- **PARS PLANA** is relatively avascular
- Therefore this route is utilised to access the vitreous cavity

❖ PARS PLANA VITRECTOMY

❖ INTRAVITREAL INJECTIONS



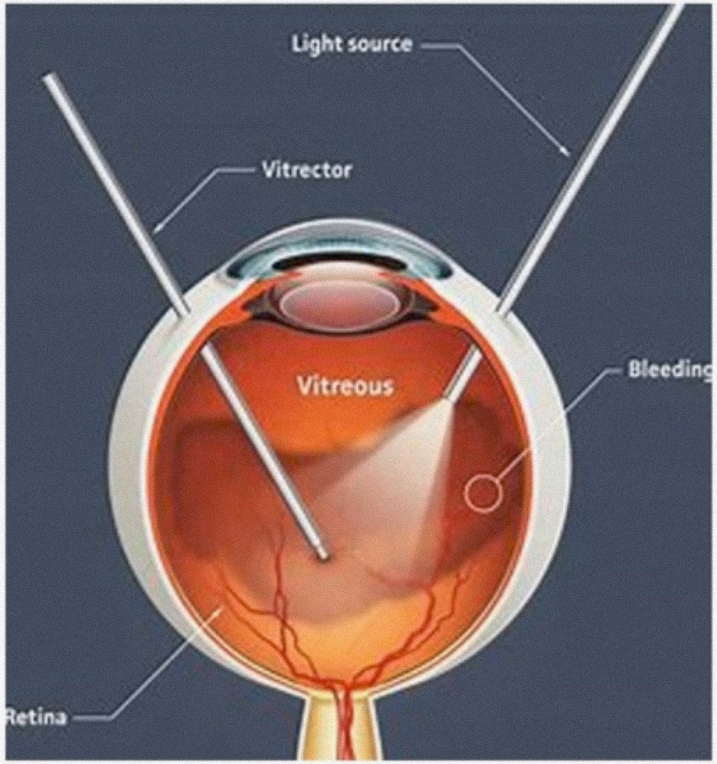
CLINICAL NUGGET

- **PARS PLANA** is relatively avascular
- Therefore this route is utilised to access the vitreous cavity

❖ **PARS PLANA VITRECTOMY**

❖ **INTRAVITREAL INJECTIONS**

Pars Plana : 4 mm from limbus is phakic
3.5 mm from the limbus in pseudophakic/aphakic

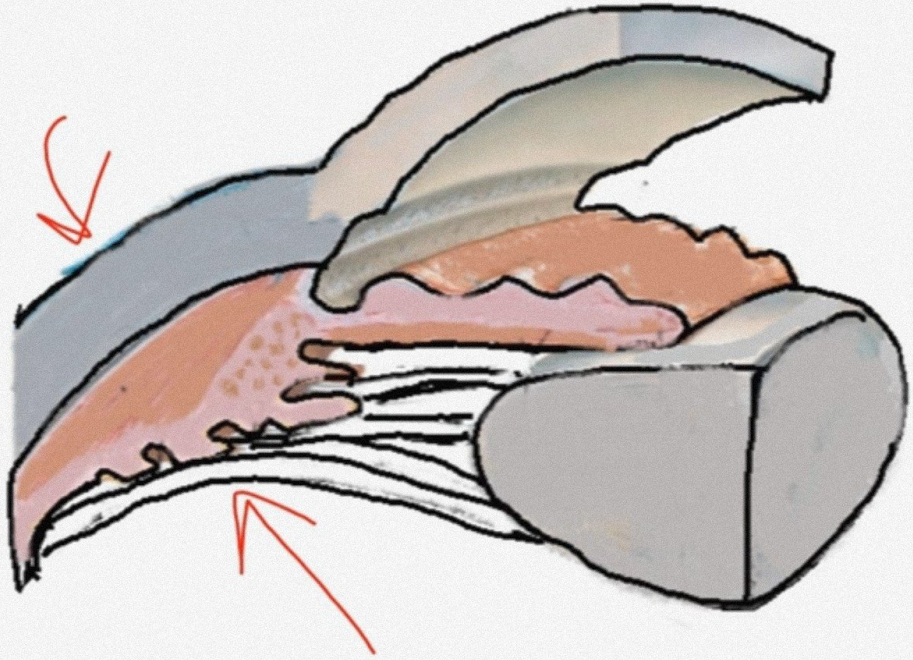


LAYERS OF CILIARY BODY

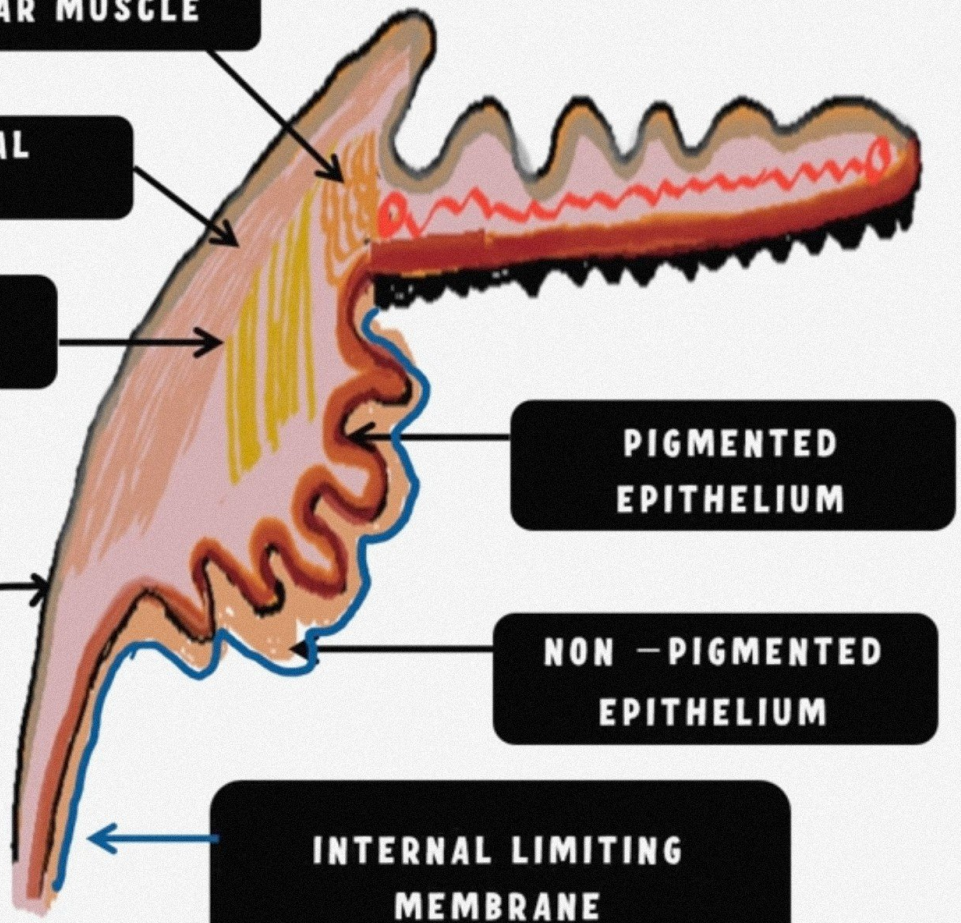
LAYERS OF CILIARY BODY

From outside to inside :-

1. **Supraciliary Lamina**
2. **Stroma Of Ciliary Body**
3. **Layer Of Pigmented Epithelium**
4. **Layer Of Non Pigmented Epithelium**
5. **Internal Limiting Membrane**

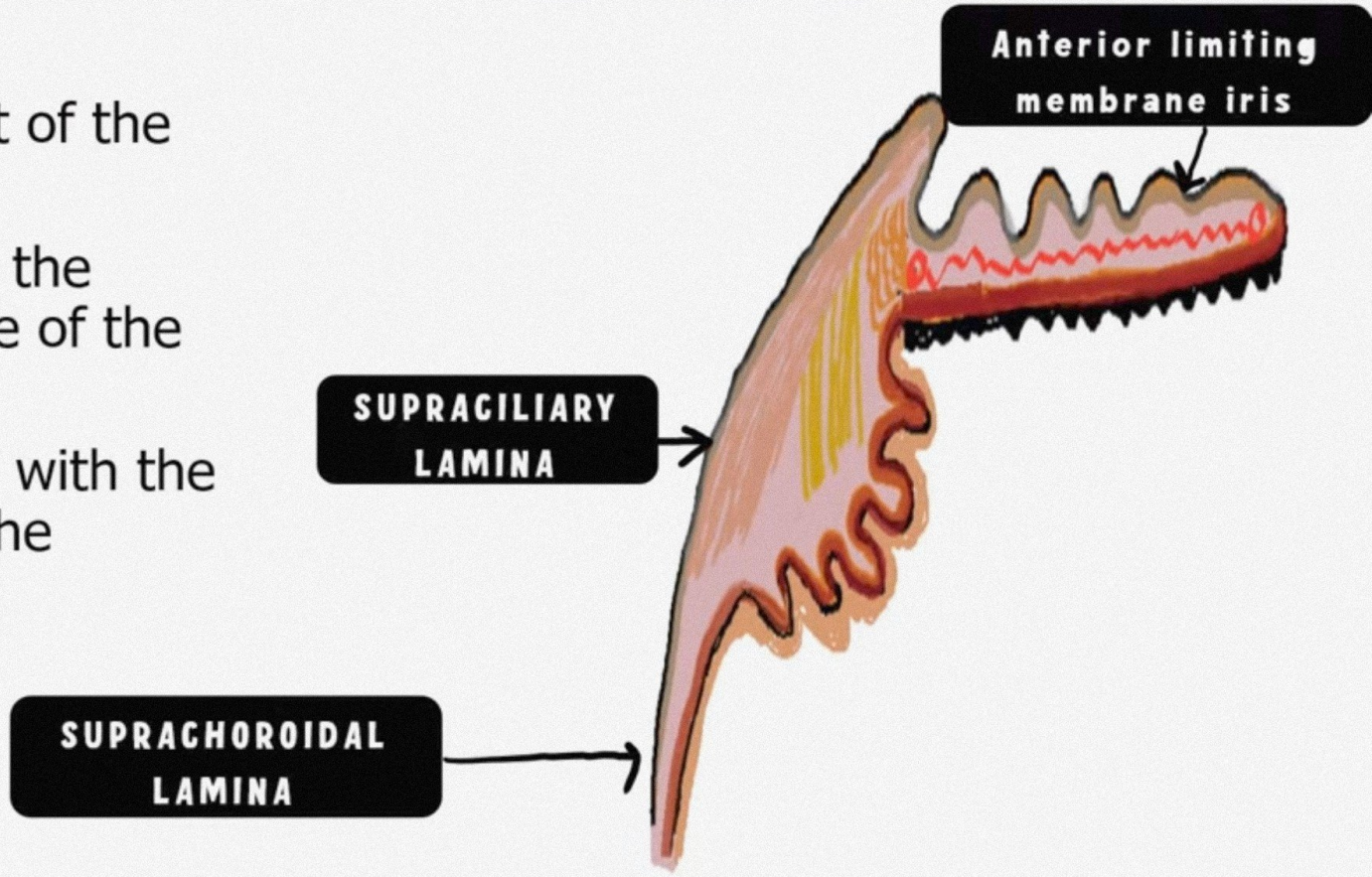


CILIARIS MUSCLE IN STROMA



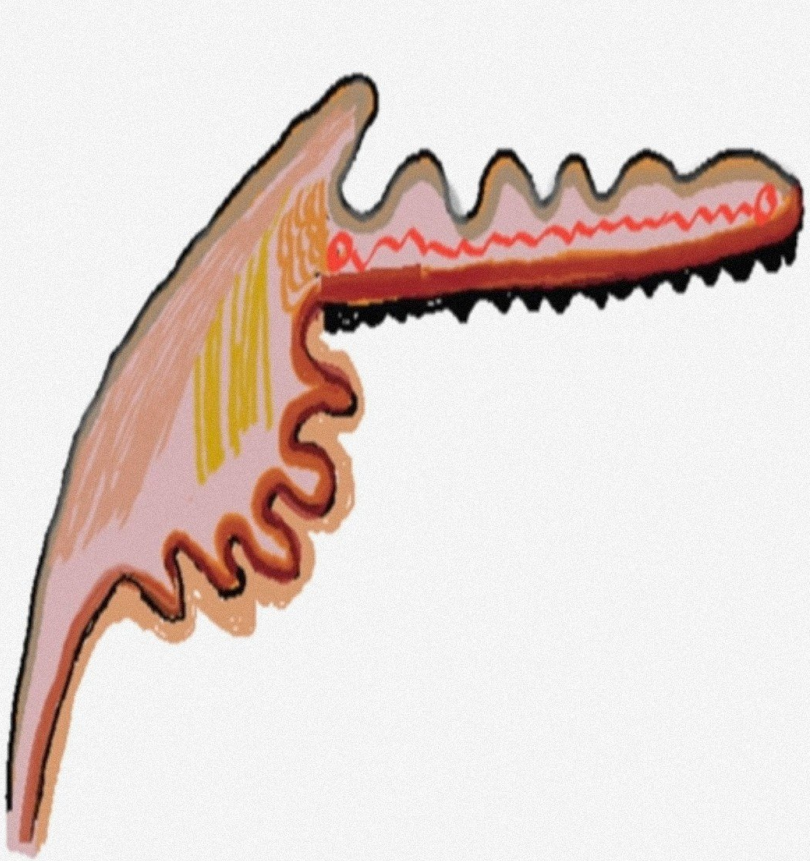
SUPRACILIARY LAMINA

- Outermost condensed part of the stroma of the ciliary body
- Anteriorly continuous with the anterior limiting membrane of the iris
- Posteriorly it is continuous with the suprachoroidal lamina of the choroid.



STROMA OF THE CILIARY BODY

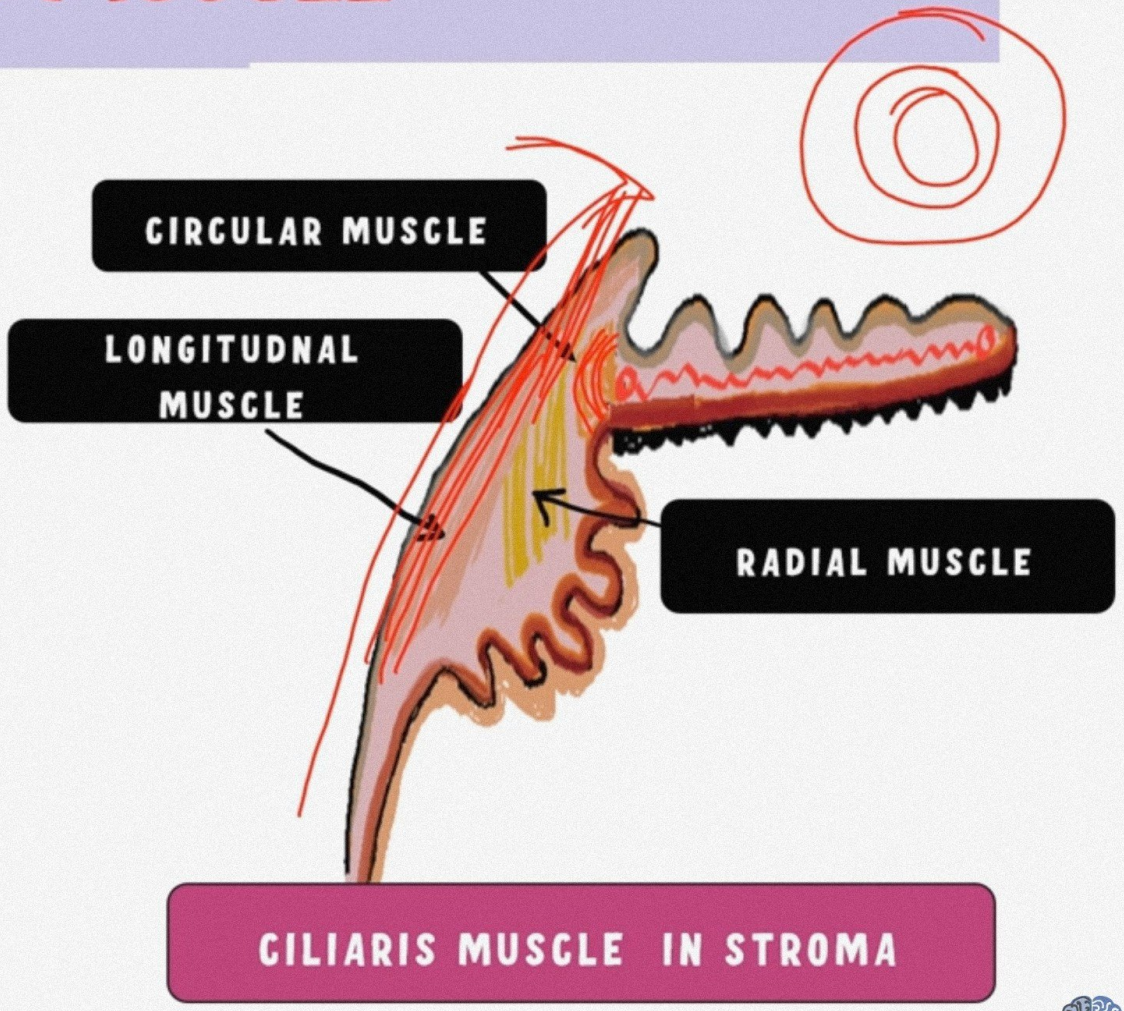
- Made of the connective tissue and collagen
- Consists of the **CILIARIS MUSCLES** , nerves, vessels , pigmented cells and other cells



CILIARIS MUSCLE

- Non striated/ involuntary muscle of the ciliary body.
- In cross section it is triangular in shape
- Three parts :-

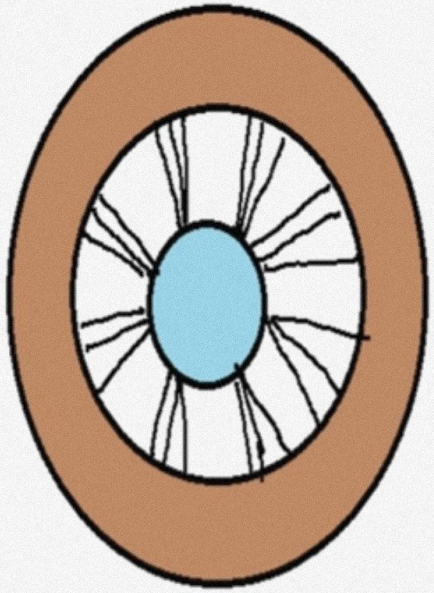
1. **LONGITUDINAL / MERIDIONAL MUSCLE FIBERS**
2. **CIRCULAR MUSCLE FIBERS**
3. **RADIAL/ OBLIQUE MUSCLE FIBERS**



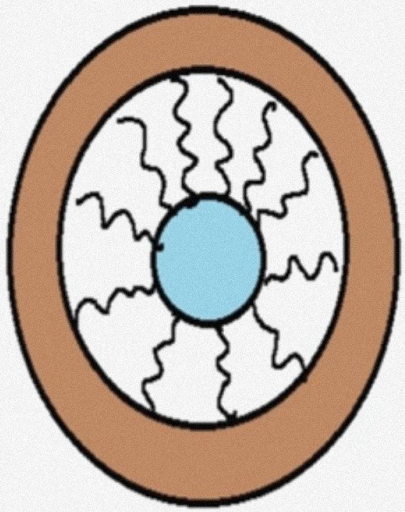
ACTIONS OF THE CILIARY MUSCLE

- Contraction of the ciliary muscle→ Slackening of the zonules→ Increase in the anterior curvature of the lens **ACCOMMODATION**

ACCOMMODATION



CILIARY MUSCLES RELAXED
→TAUT ZONULES

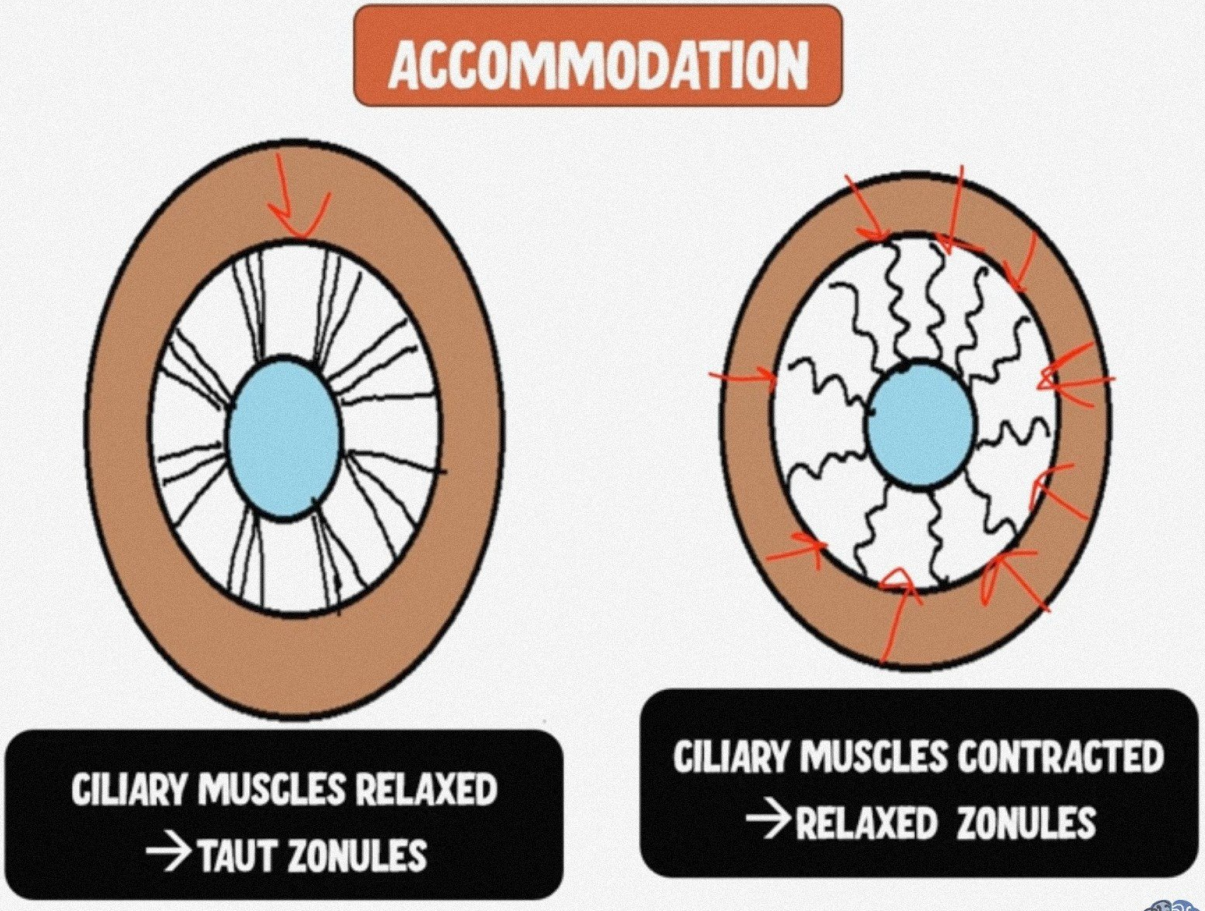


CILIARY MUSCLES CONTRACTED
→RELAXED ZONULES

ACTIONS OF THE CILIARY MUSCLE

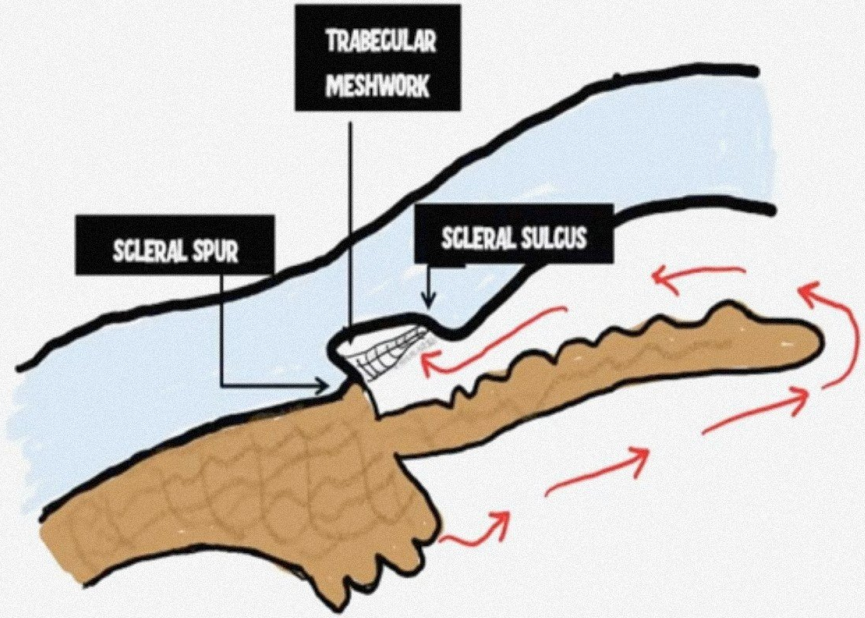
- Contraction of the ciliary muscle→ Slackening of the zonules→ Increase in the anterior curvature of the lens **ACCOMMODATION**

- Circular muscles mainly help in accommodation.



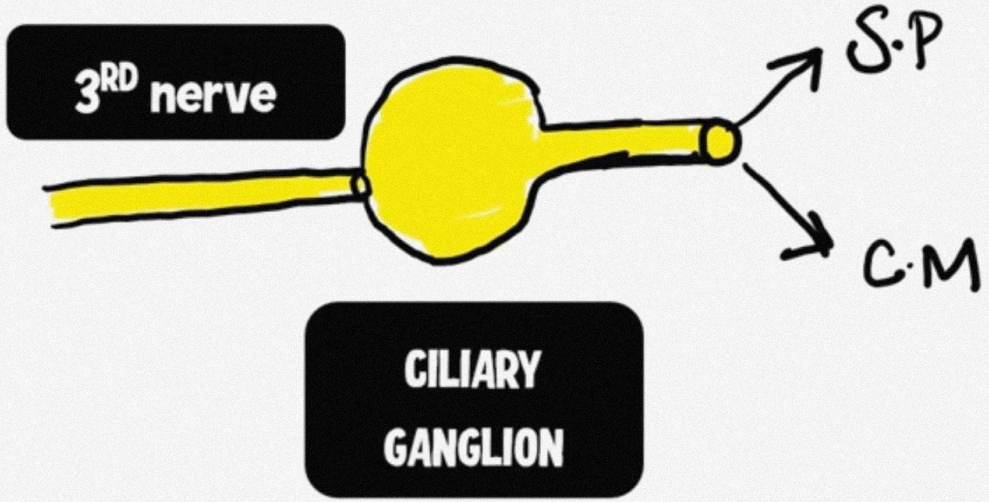
ACTIONS OF THE CILIARY MUSCLE

- The longitudinal muscle fibers due to attachment to scleral spur→ **DRAINAGE OF AQUEOUS HUMOUR**



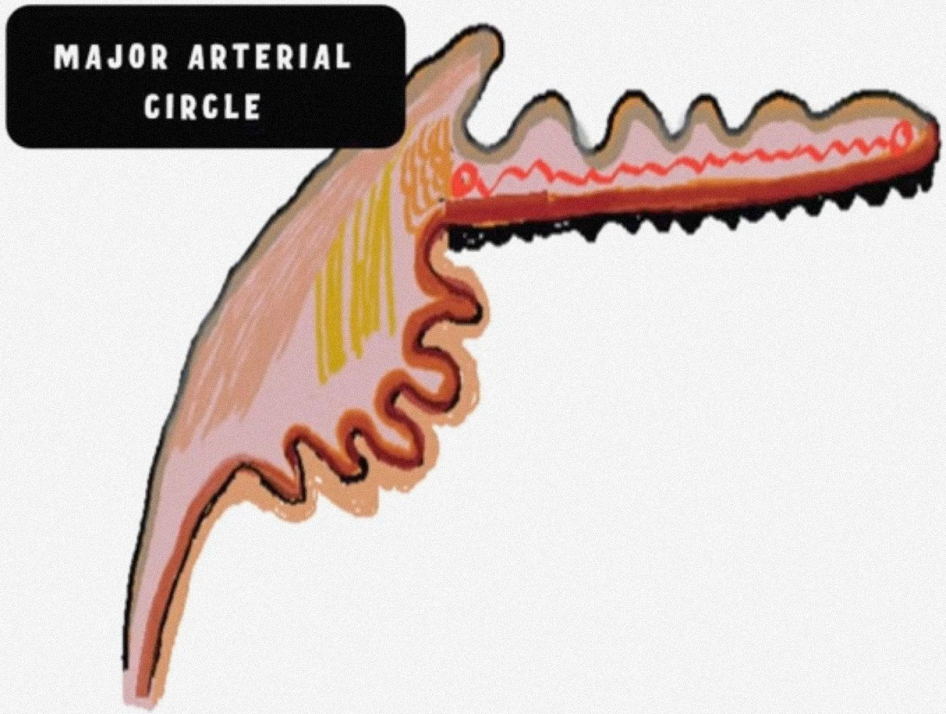
NERVE SUPPLY OF CILIARY MUSCLE

- **Parasympathetic innervation** from the third nerve postganglionic fibers
- The postganglionic fibers of the ciliary ganglion form short ciliary nerves that supply the ciliaris muscle and the sphincter pupillae.



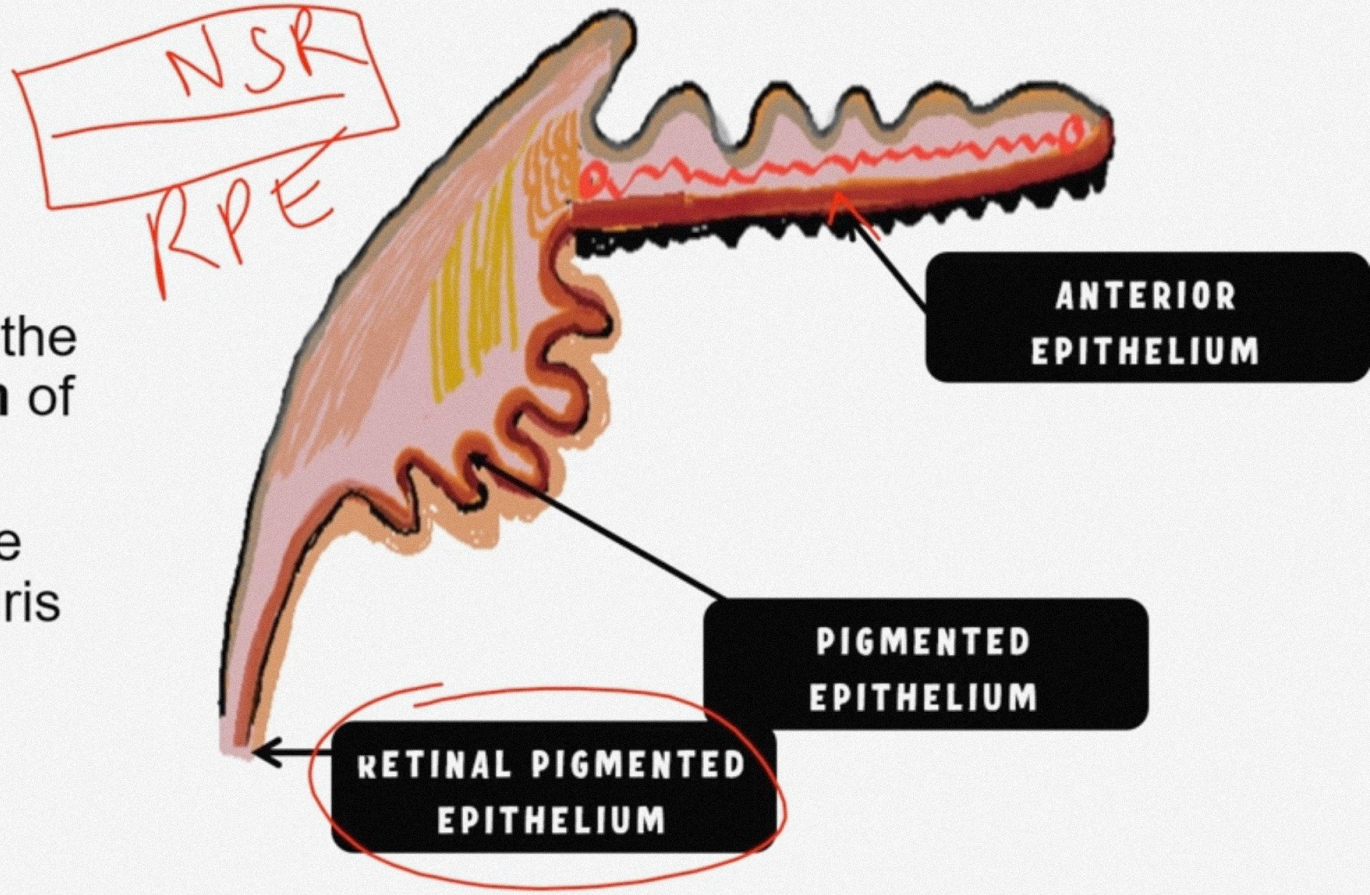
VASCULAR STROMA OF THE CILIARY BODY

- Consists of the **major arterial circle**
- Formed by the long posterior ciliary arteries and the anterior ciliary arteries .
- Send radial branched to the iris stroma
- Is situated just **anterior** to the circular muscle of ciliary body



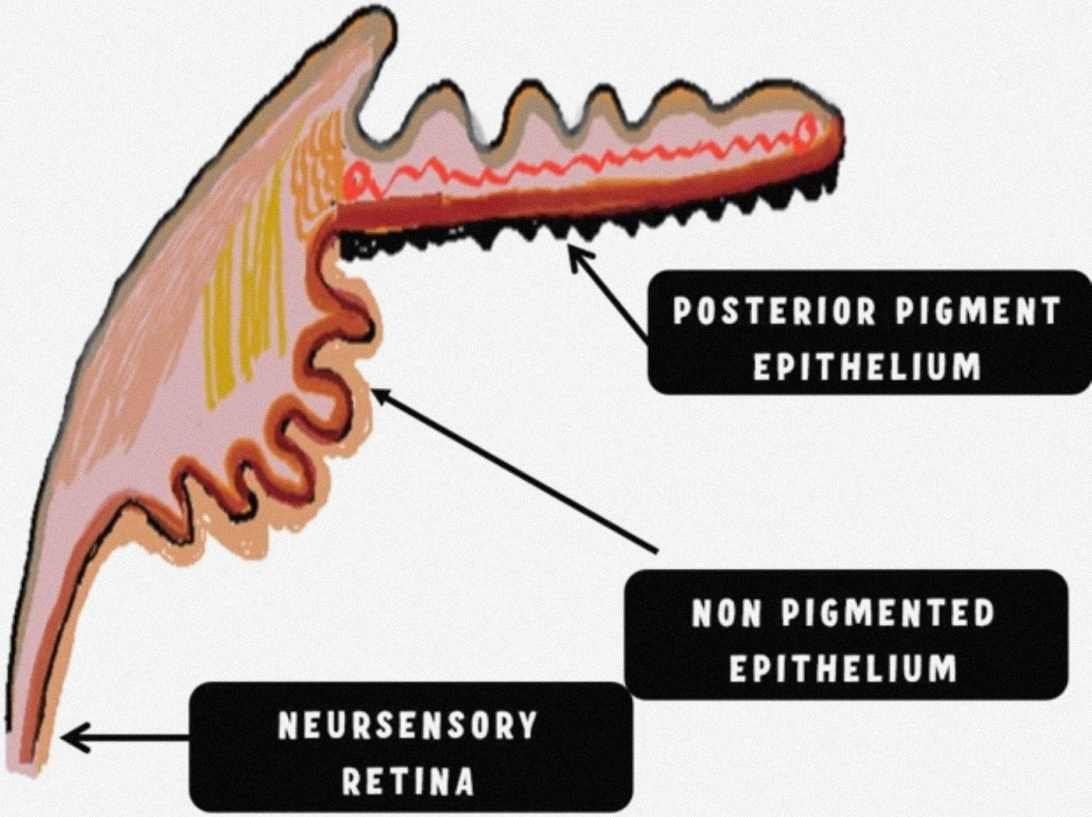
LAYER OF PIGMENTED EPITHELIUM

- Also known as the outer epithelium.
- It is forward continuation of the **retinal pigment epithelium** of the retina
- Continues anteriorly with the **anterior epithelium** of the iris



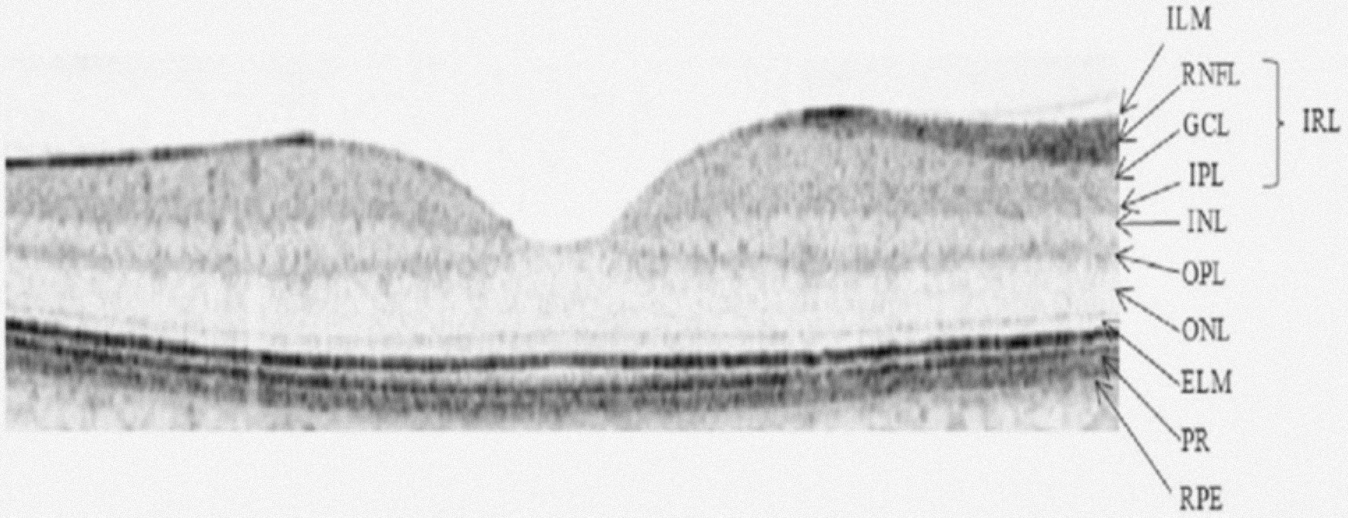
LAYER OF NON -PIGMENTED EPITHELIUM

- Also can be called as the **inner** layer of epithelium
- Forward continuation of the **neurosensory retina**
- Continues anteriorly with the **posterior pigmented epithelium** of the iris

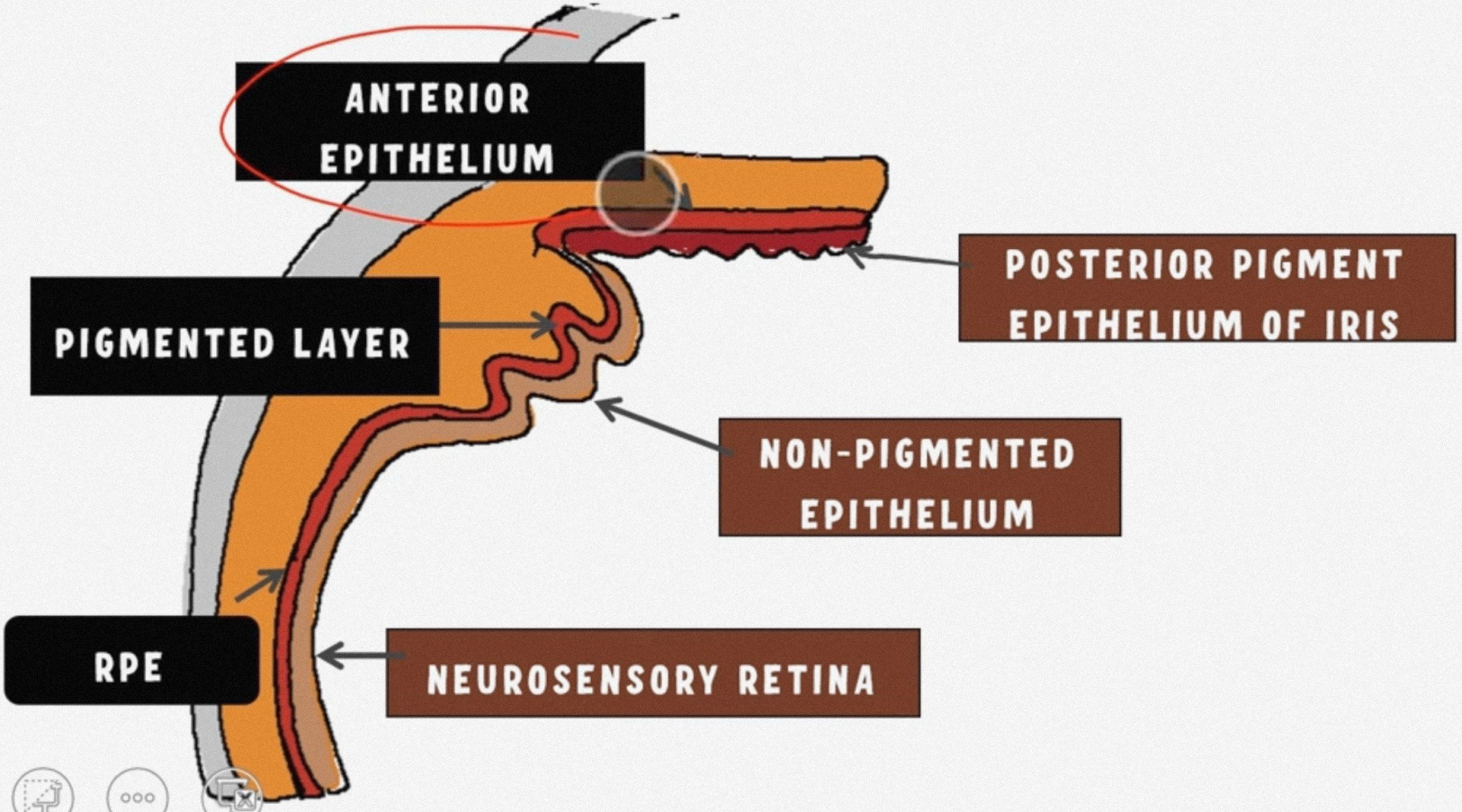


LAYER OF INTERNAL LIMITING MEMBERANE

- Forward continuation of the internal limiting membrane of the retina

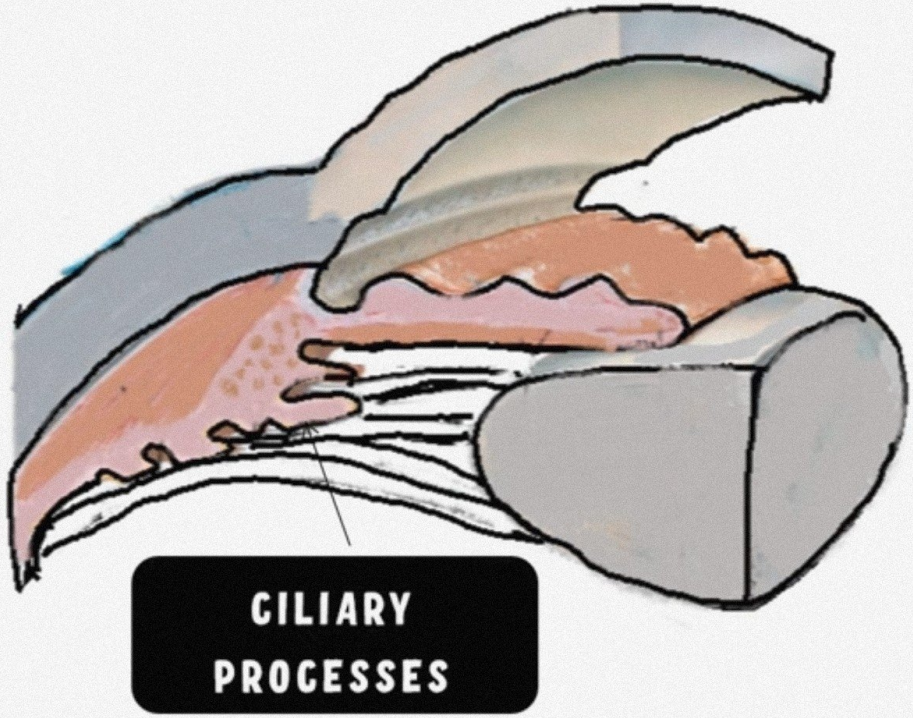


LET US SUMMARISE



MICROSCOPIC ANATOMY OF THE CILIARY PROCESS

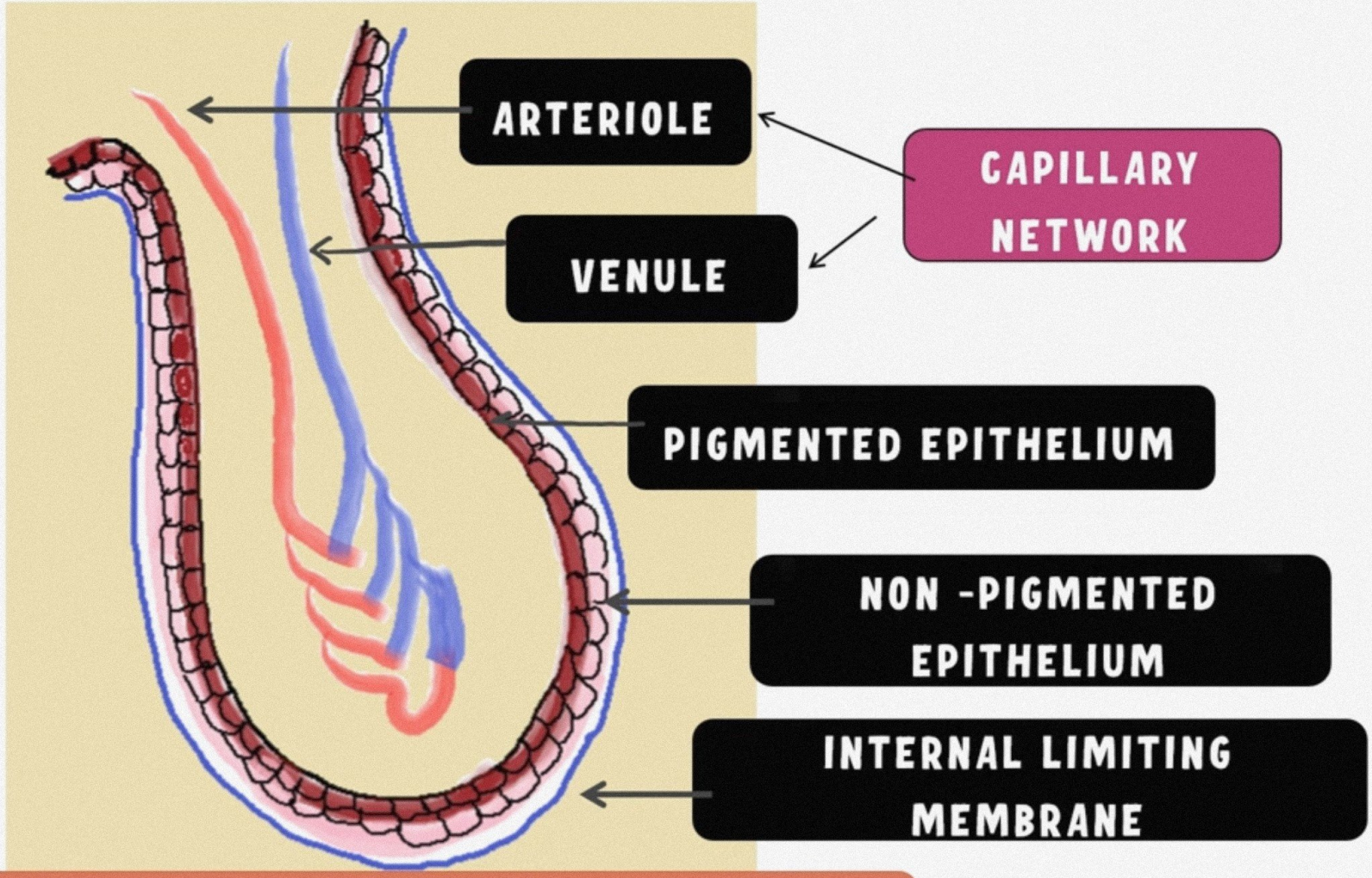
- Fingers like projections from the pars plicata part of the ciliary body
- About **70-80** in number
- Each is about 2 mm in length



ULTRASTRUCTURE OF THE CILIARY PROCESS

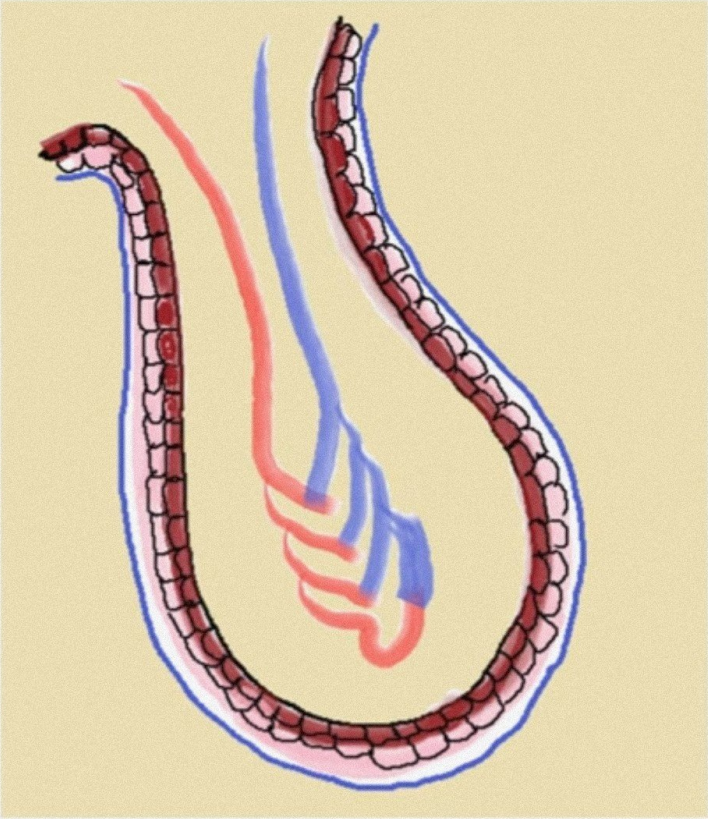
- Each ciliary process basically is composed of :-

1. **THE CAPILLARY NETWORK**
2. **THE CILIARY STROMA**
3. **TWO LAYERS OF EPITHELIUM** : Pigmented And Non pigmented epithelium



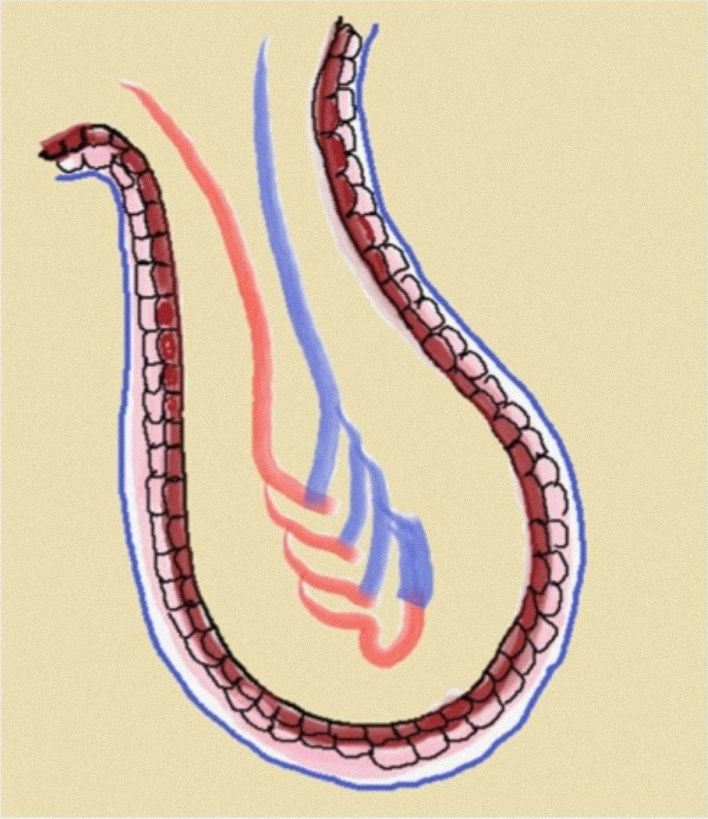
MICROSCOPIC STRUCTURE OF THE CILIARY PROCESS

Network of Capillaries

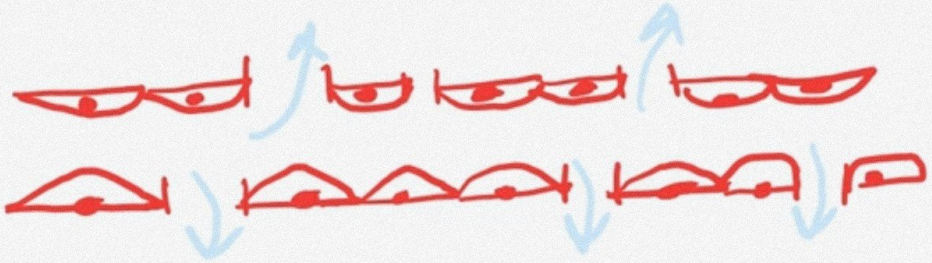


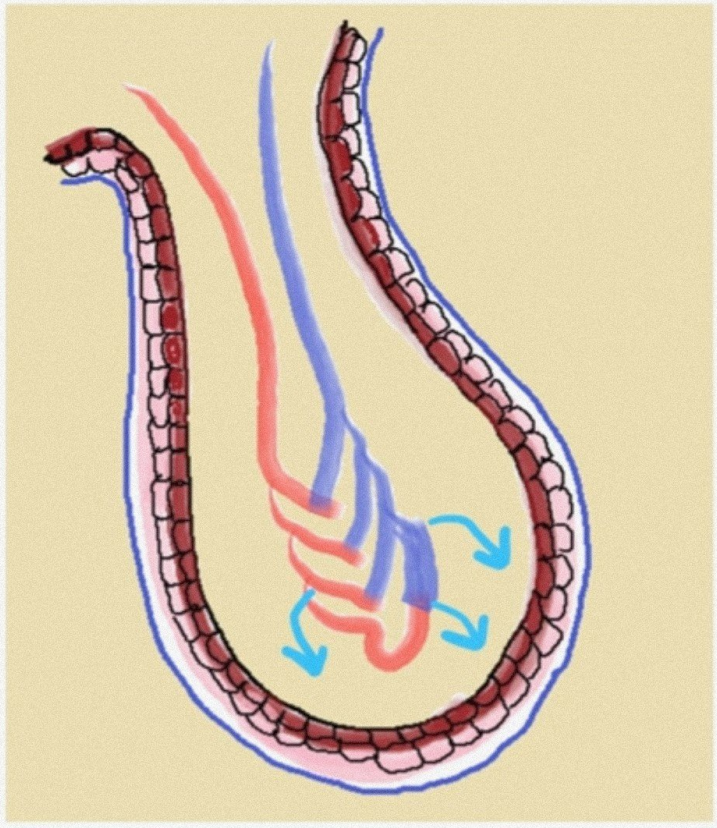
- Each process consists of the network of capillaries
- The arteriole enters each ciliary process, forms a capillary network and ends in a venule .
- These arterioles come from the **major arteriolar circle**.

Network of Capillaries



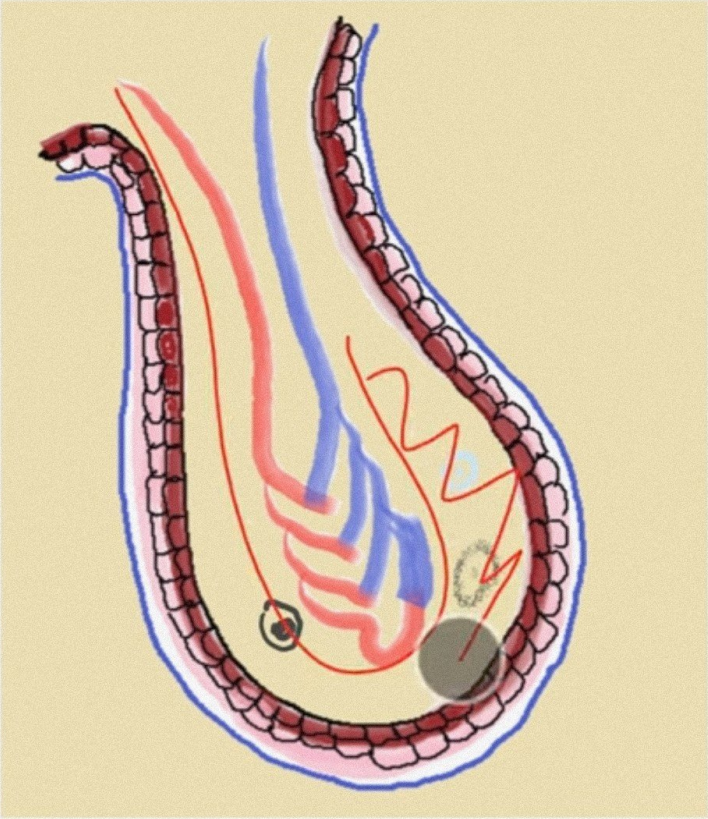
- They have very thin endothelium
- With lots of **fenestrations**
- These fenestrations are covered by a diaphragm
- Therefore , these are sites of increased permeability





- Facilitates ultrafiltration of water and ions into the adjacent stroma
- Also allow larger plasma-derived proteins, such as myoglobulin or gamma globulin, to enter the stroma,
- This leads to a **high oncotic pressure** in the ciliary process stroma.

Stroma Of Ciliary Process



- It is very thin.
- Separates the network of vessels from the epithelial cells
- And composed of ground substance and collagen fibres and few cells.
- The ground substance contains mucopolysaccharides , protein, and a solute of plasma

SALIENT FEATURES OF CILIARY EPITHELIUM

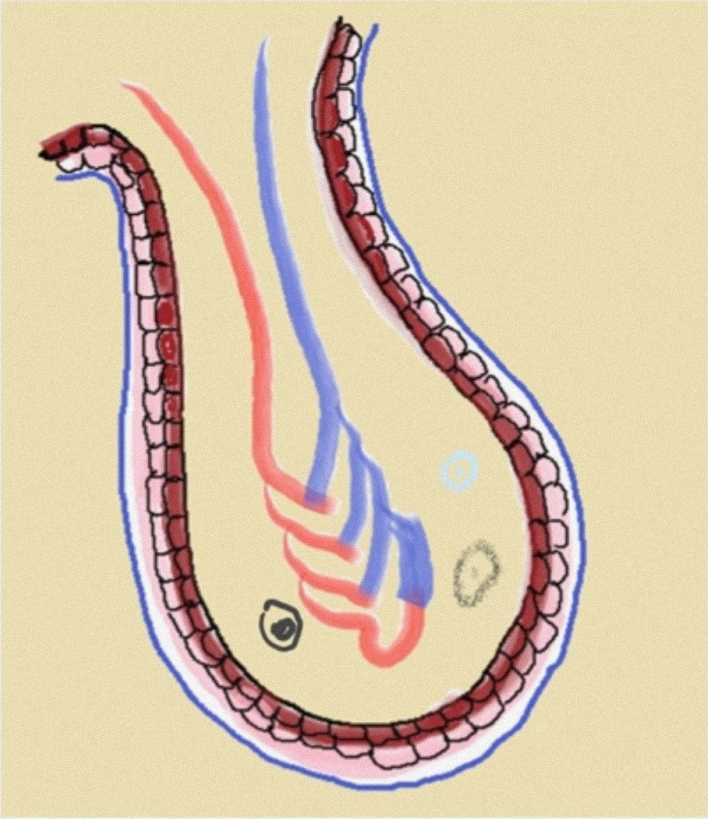
BILAYERED EPITHELIUM : Pigmented and Non pigmented Epithelium

NEUROECTODERMAL IN ORIGIN : Take origin from the anterior end s of the optic cup

ENERGY DEPENDENT TRANSPORT PROCESS

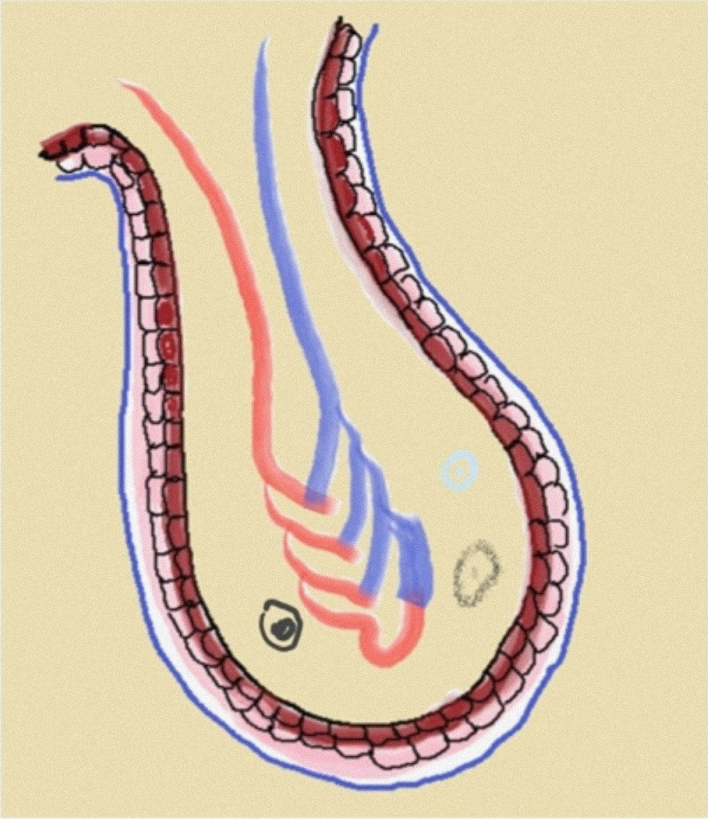
Two LAYERS ACT AS A SYNCITIUM

Pigmented Epithelial Layer

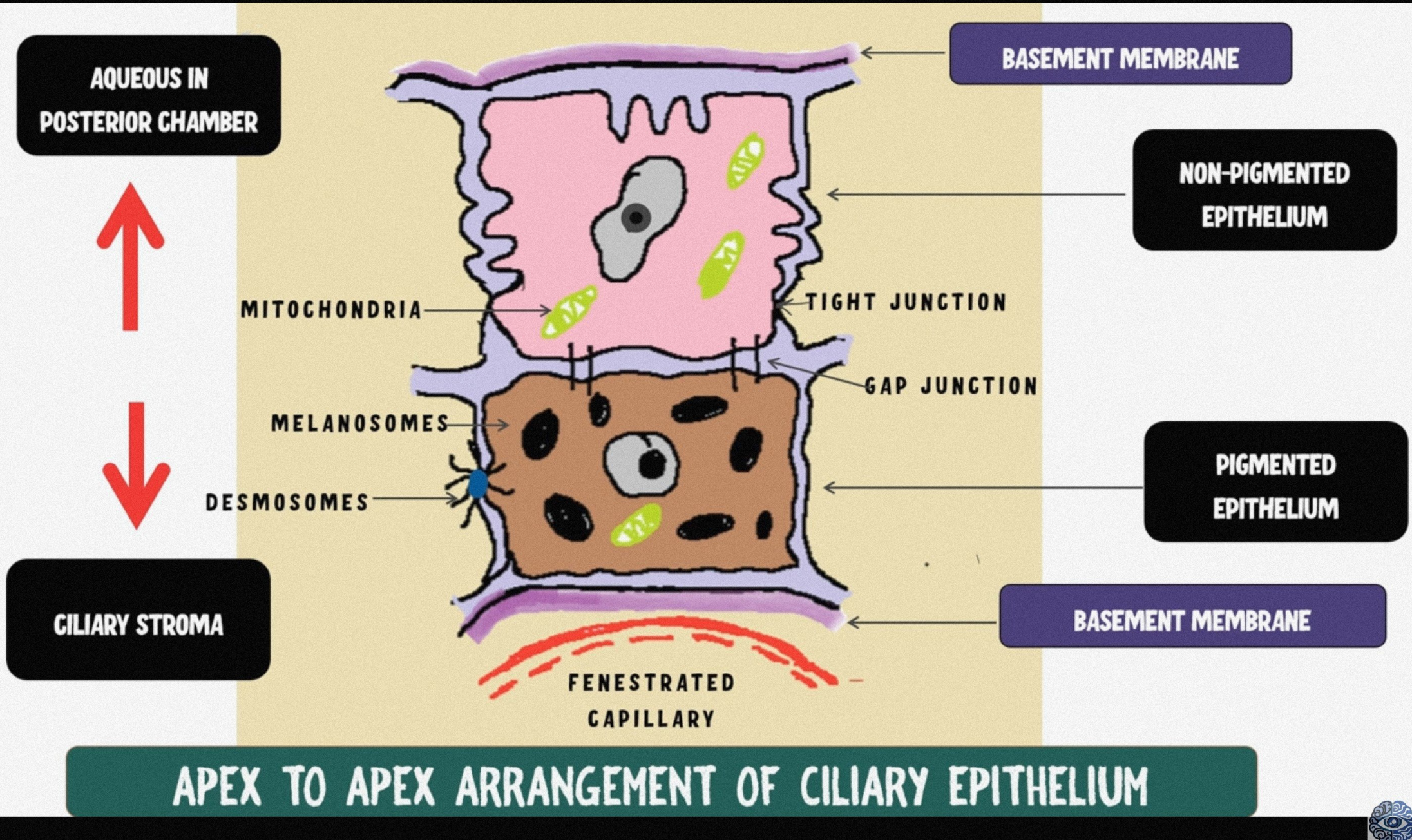


- Low cuboidal cells
- Numerous cytoplasmic melanin granules
- Separated from the stroma by an **ATYPICAL** basement membrane , thought to be a continuation of the **bruchs** membrane.

Non Pigmented Epithelial Layer



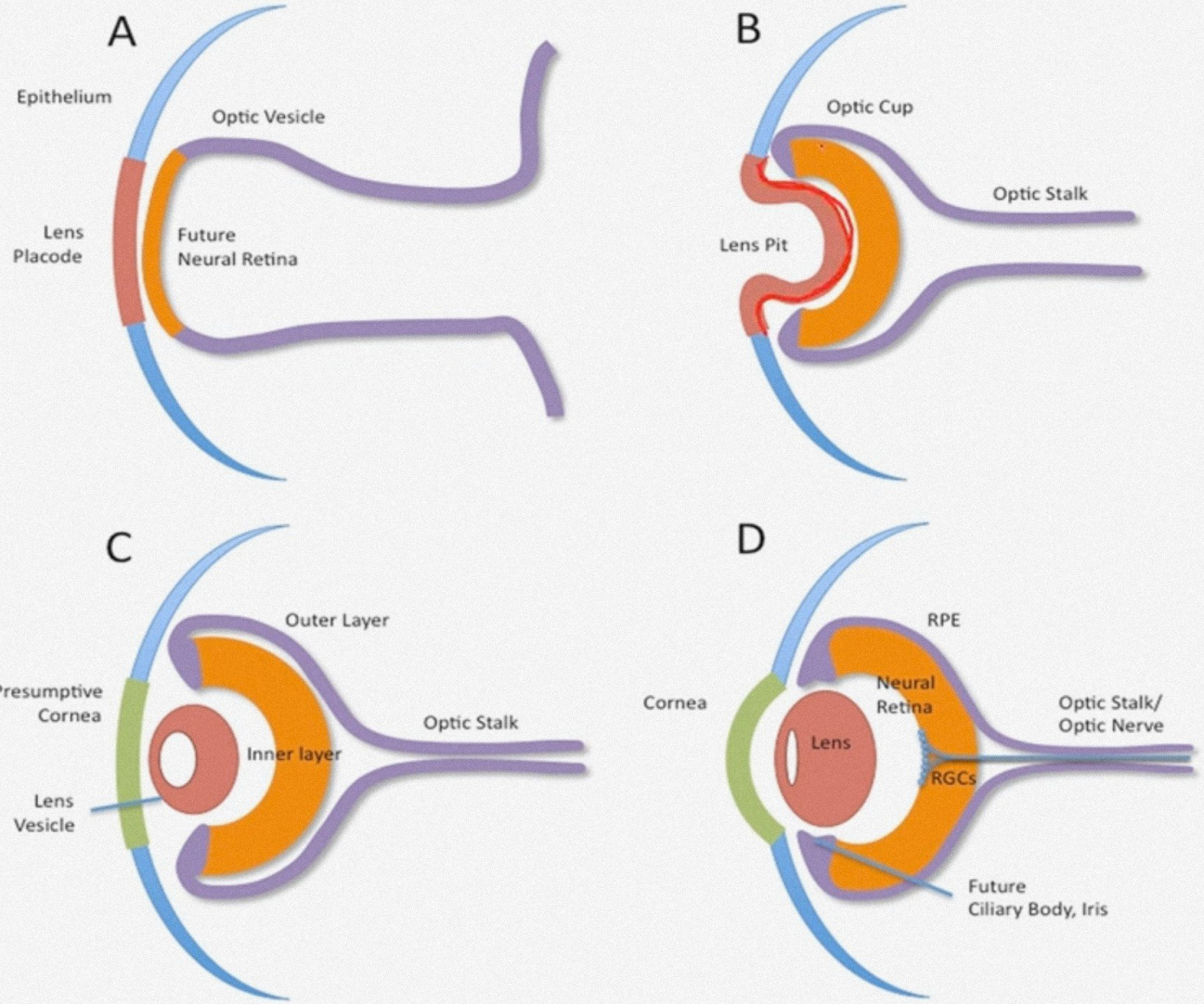
- Columnar cells
- Numerous cytoplasmic mitochondria and endoplasmic reticulum
- Separated from the aqueous by a basement membrane
- Tight junctions on apical surfaces→ blood aqueous barrier

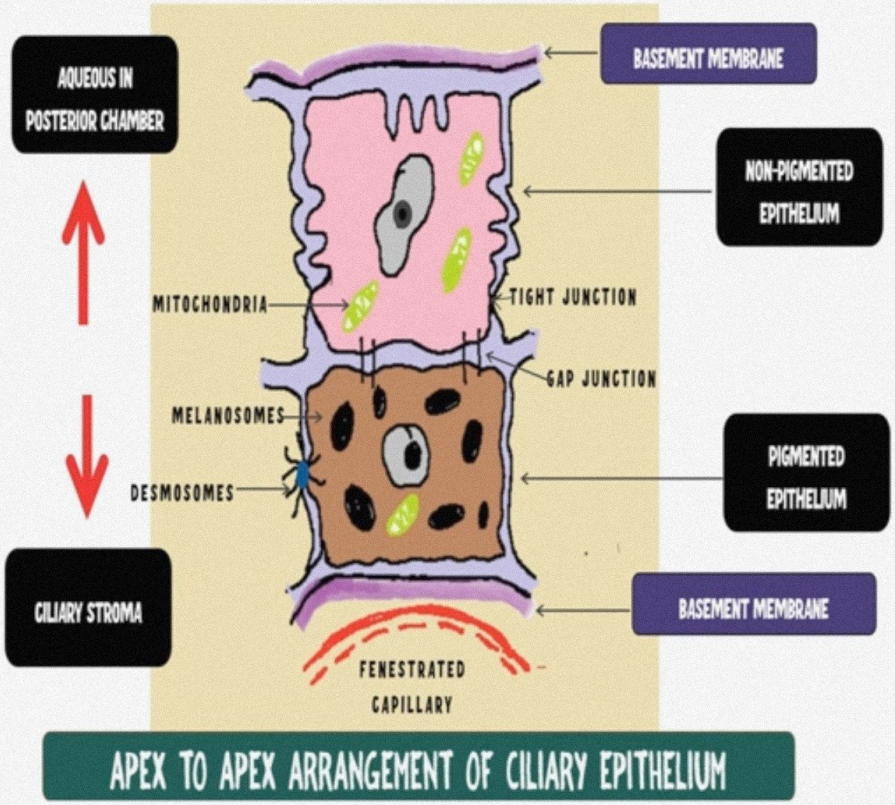


APEX TO APEX ARRANGEMENT OF CILIARY EPITHELIUM

NEUROECTODERMAL IN ORIGIN :

Take origin from the anterior end s of the optic cup


A
Epithelium
Optic Vesicle
Lens
Placode
Future
Neural Retina
B
Optic Cup
Optic Stalk
Lens Pit
C
Outer Layer
Presumptive
Cornea
Optic Stalk
Inner layer
Lens
Vesicle
D
RPE
Cornea
Neural
Retina
Optic Stalk/
Optic Nerve
Lens
RGCs
Future
Ciliary Body, Iris

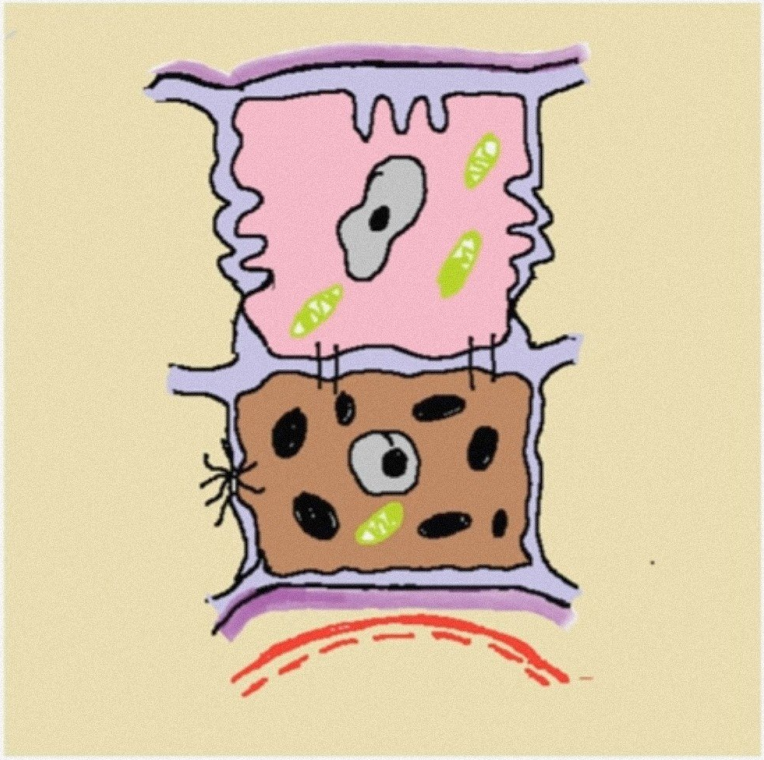


APEX TO APEX ARRANGEMENT OF CILIARY EPITHELIUM

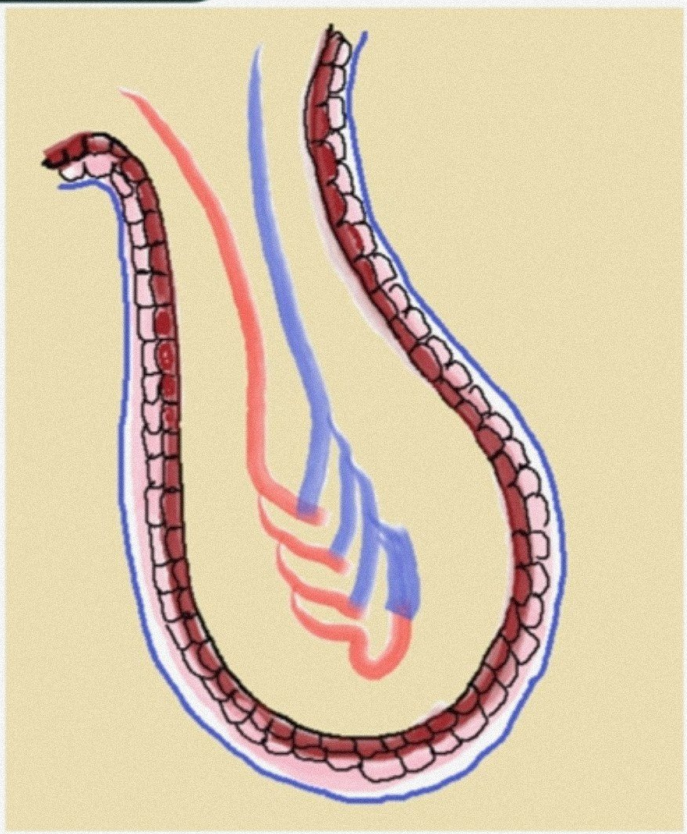
- Presence of mitochondria
- Presence of well developed rough endoplasmic reticulum
- Presence of Na-K ATPase
- Presence of carbonic anhydrase enzyme.

ENERGY DEPENDENT TRANSPORT PROCESS

Two LAYERS ACT AS A SYNCYTIUM



GAP JUNCTIONS



JUNCTIONS WITHIN THE BILAYER EPITHELIUM

GAP JUNCTION :

- Low resistance pathways between the Pigmented epithelial cells and non pigmented epithelial cells.
- Facilitate transport of ions and other molecules from one cell to another
- Two types of cells act a **functional syncytium**

IMPORTANCE OF ION TRANSPORT through GAP JUNCTIONS ?

- Ion transport between the epithelial layers appears to be critically required for secretion of aqueous.

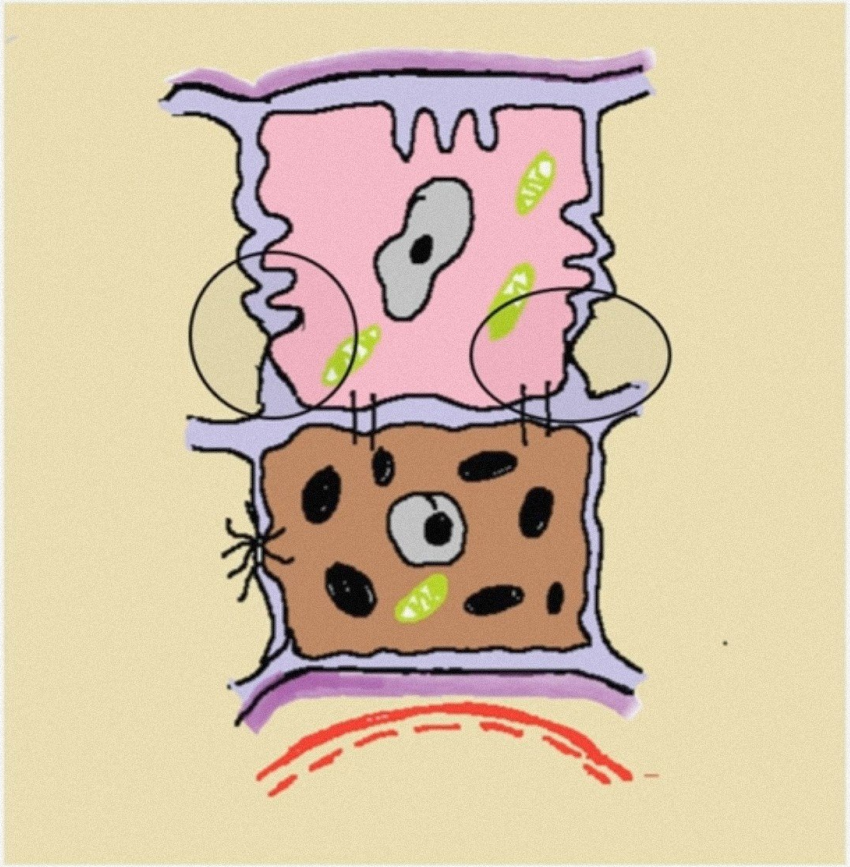
- mice with a conditional inactivation of **connexin** do not form gap junctions between both epithelial layers and show a substantial reduction in aqueous humor production.

JUNCTIONS WITHIN THE BILAYER EPITHELIUM

- Adherens and and desmosomes are **structural supports** between cell membranes.

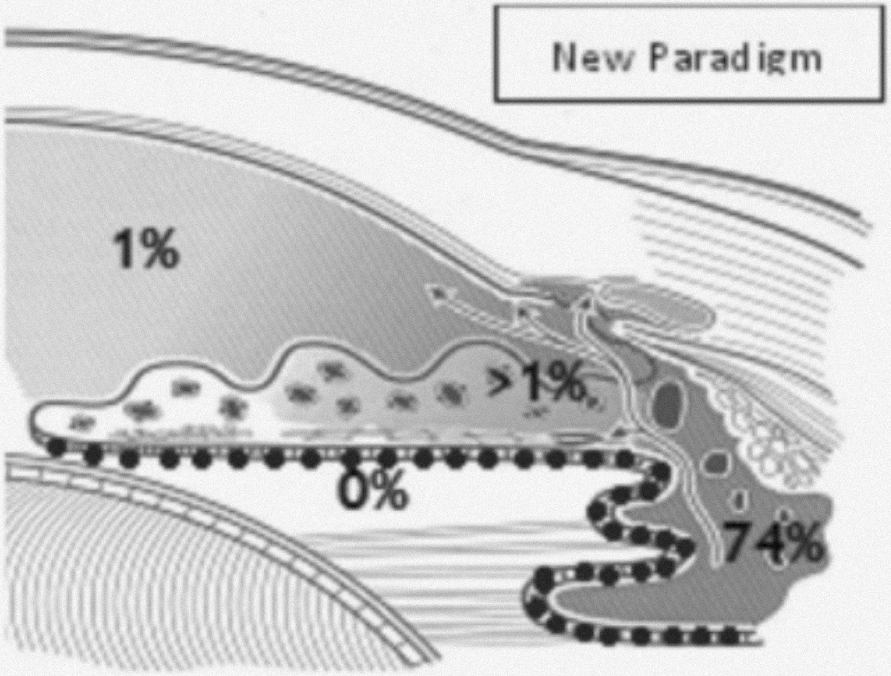
JUNCTIONS WITHIN THE BILAYER EPITHELIUM

- The non-pigmented ciliary epithelial cells are also joined at their apical membranes by tight junctions (zonulae occludentae), which are thought to be an important component of the ***blood–aqueous barrier.***



CLINICAL NUGGET : BLOOD AQUEOUS BARRIER

- The tight junctions between the cells of the non pigmented epithelium
- Tight junctions between the posterior iris pigment epithelium
- Non fenestrated Iris Vessels



CLINICAL NUGGET : CYCLITIS

- Inflammation of ciliary body → ciliary muscle spasm
- Due to irritation of nerve endings by inflammatory products

More common in HLA B27 And Sympathetic ophthalmia

TREATMENT OPTION : CYCLOPLEGIC AGENTS