ANATOMY AND PHYSIOLOGY OF THE EYE

BY
BENARD NYIRENDA
CLINICAL OFFICER OPHTHALMOLOGY

THE EYE

- An eye is a sensory organ
- Provides a sense of seeing
- It has many small parts, each vital to normal vision
- Good vision depends on how well these parts work together.
- It is 25.0mm diameter and 24.5mm anterior-posterior

ANATOMY AND PHYSIOLOGY

LEARNING OBJECTIVES:

- Describe and Recognize parts of the visual system and understand how they work
- Describe the contents that fill the spaces of the eyeball
- Explain the functions of the contents of the eyeball
- Identify the structures which constitute the ADNEXIA (Eye lids, Extra-ocular Muscles, Lacrimal Apparatus and the Orbit)
- Describe the functions of the ADNEXIA

ANATOMY OF THE EYE

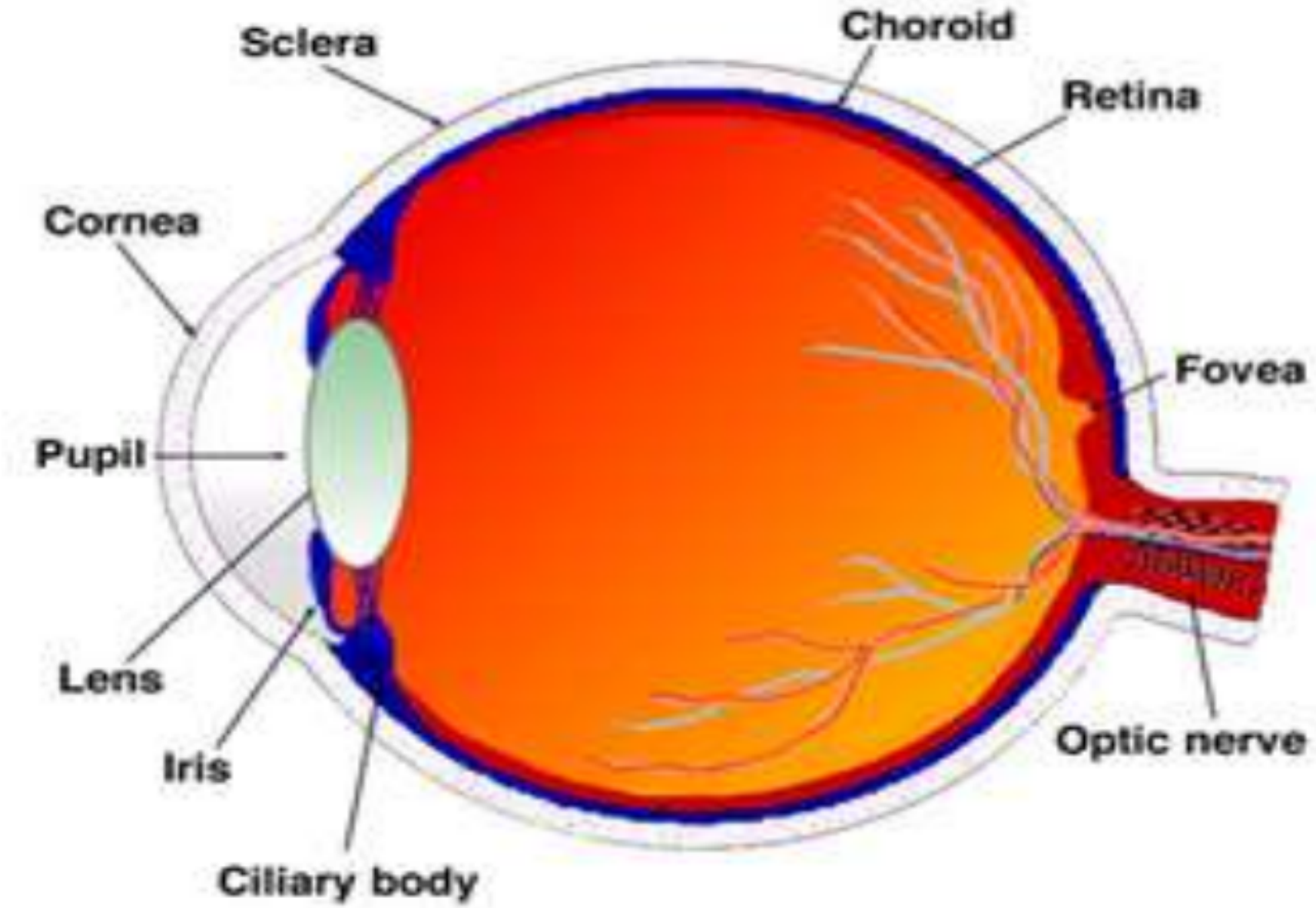


Fig. 6. Vertical sagittal section of the adult human eye.

ANATOMY AND PHYSIOLOGY OF THE EYE

The eye has three coats as follows:

- The outer coat– cornea and sclera
- The middle coat– Iris, Ciliary body and Choroid
- The innermost coat– Retina

ANATOMY AND PHYSIOLOGY OF THE EYE

- **OUTERMOST COAT :** Also known as the Protective layer

CORNEA: 1/6th of the globe and has the following characteristics:

- It is transparent
- It is about 12mm horizontally and 11mm vertically
- It has no blood vessels
- It is supplied by branches of 5th cranial nerve
- It is bordered by the limbus

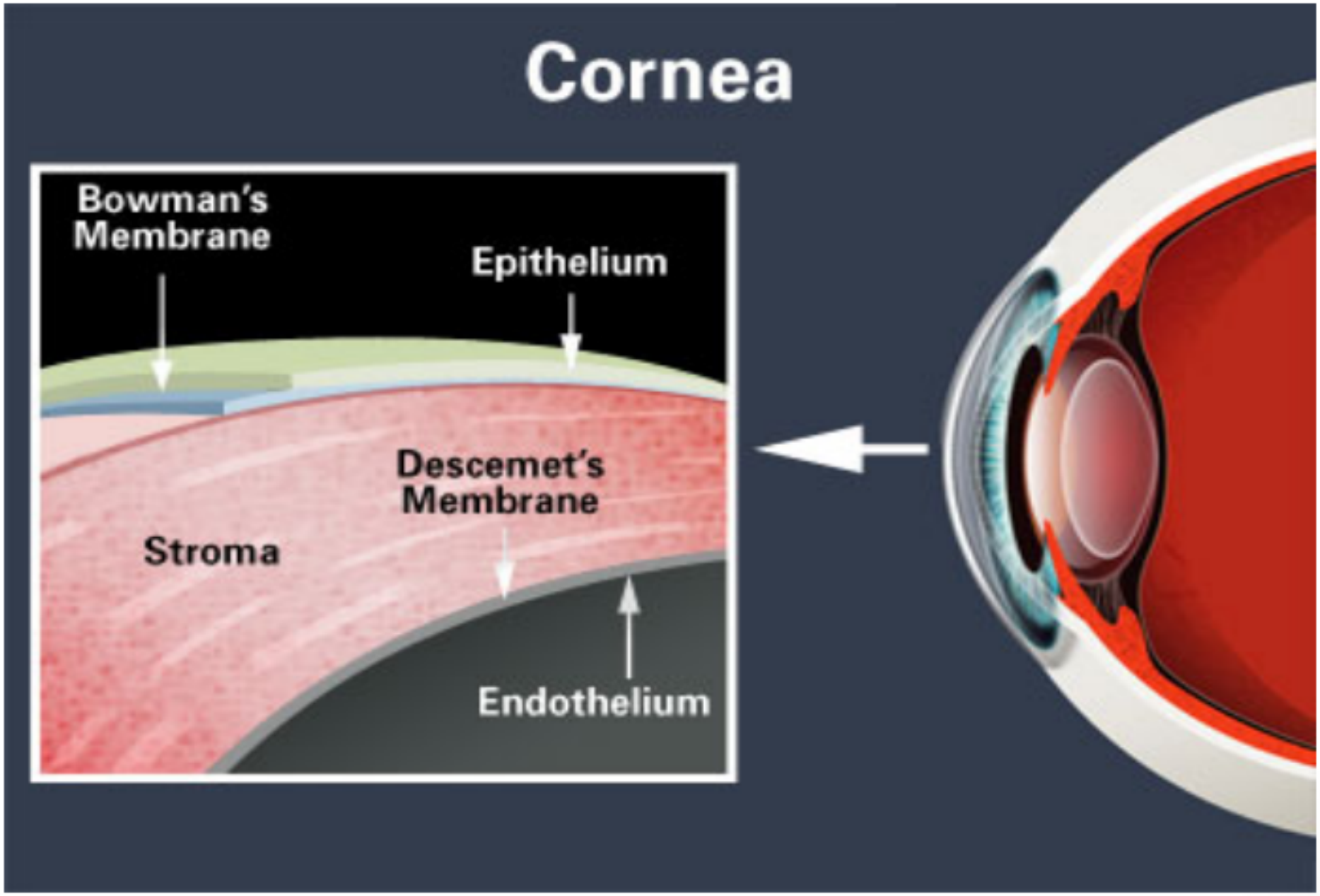
ANATOMY AND PHYSIOLOGY OF THE EYE

HISTOLOGY OF THE CORNEA

The cornea has the following histological layers:

- Epithelium – 4 to 5 cell layers thick
- Bowmans Membrane
- Stroma: - made up of collagen lamella (Keratocytes) and ground substances
- Descemets Membrane
- Endothelium – single layer of cells

ANATOMY AND PHYSIOLOGY OF THE EYE
HISTOLOGY OF CORNEA



FUNCTIONS OF THE CORNEA

The Cornea has the following functions:

- Refraction
- Protection

ANATOMY AND PHYSIOLOGY OF THE EYE

SCLERA

- It contributes 5/6th of the outmost coat
- It is opaque(not transparent)
- It is tough
- It also border the limbus
- There the limbus links the sclera and cornea

ANATOMY AND PHYSIOLOGY OF THE EYE

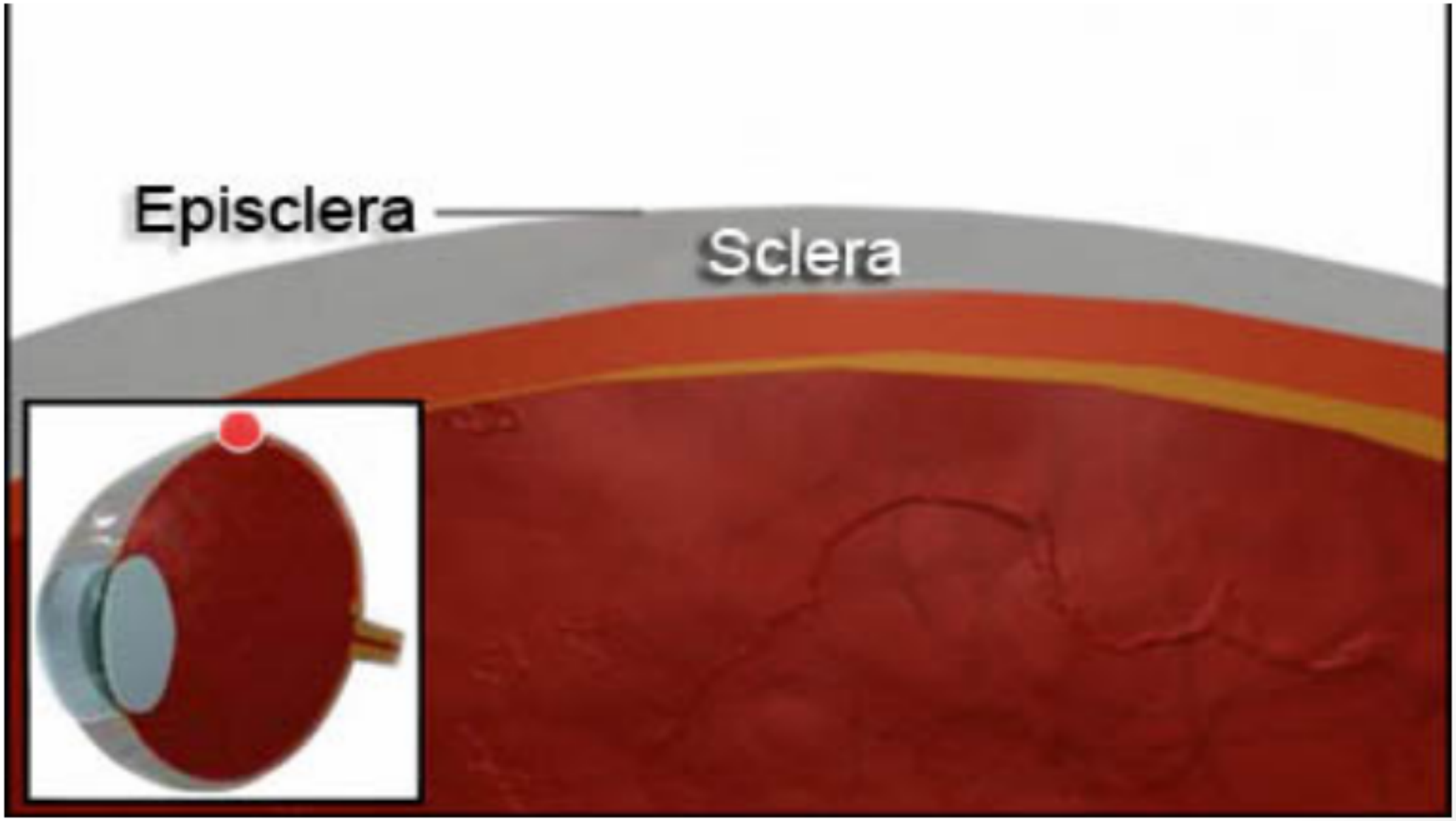
HISTOLOGY OF SCLERA

The sclera has three histological layers which are not as defined as the cornea.

- Episclera: Loose connective tissue with numerous blood vessels
- Stroma which forms the bulk of the sclera
- Lamina fusca

ANATOMY AND PHYSIOLOGY OF THE EYE

RETINA



ANATOMY AND PHYSIOLOGY OF THE EYE

FUNCTIONS OF SCLERA

The sclera has the following functions:

- The main function is protection of the inner tissue of the globe
- It also provides entry and exit of blood vessels and nerves.

ANATOMY AND PHYSIOLOGY OF THE EYE

2. MIDDLE COAT OR LAYER

This layer is also known as the Uveal Tract or Vascular Coat or Nourishment layer.

It is made up of the following tissues:

- Iris
- Ciliary Body
- Choroid

ANATOMY AND PHYSIOLOGY OF THE EYE

FUNCTION OF THE MIDDLE COAT

Generally speaking, the main function of the middle coat is to provide nutrition to the tissues inside the globe (lens, retina and sclera)

However, each tissue of the uvea has specific functions as follows:

ANATOMY AND PHYSIOLOGY OF THE EYE

IRIS

Consists of sphincter and dilator muscles which form the pupil.

FUNCTION

- Controls the amount of light that enters the eye through the pupil.

ANATOMY AND PHYSIOLOGY OF THE EYE

CILIARY BODY

FUNCTIONS:

- Production of aqueous humour which provides nutrition to the lens and cornea
- Accommodation
- Control of Intra-ocular Pressure

ANATOMY AND PHYSIOLOGY OF THE EYE

CHOROID

HISTOLOGY OF THE CHOROID:

- Suprachoroid Layer
- Large choroidal vessel layer
- Small choroidal vessel layer
- Choriocapillaris layer
- Bruchs Memrane

ANATOMY AND PHYSIOLOGY OF THE EYE

FUNCTION OF THE CHOROID

- To provide nutrition to the upper layer of the retina, sclera and the rest of the uvea

ANATOMY AND PHYSIOLOGY OF THE EYE

3. THE INNERMOST COAT

This coat is also referred as visual layer or receptor layer

It is 0.5mm thick and has tissue known as Retina

The retina consists of photo-receptors cells– rods and cones

It is these cells which are capable of converting light into nerve impulse and transmit to the brain

ANATOMY AND PHYSIOLOGY OF THE EYE

HISTOLOGY OF THE RETINA

The retina has **ten (10)** recognized layers but condensed them as follows:

- The Pigment Epithelium
- Rods and Cone layer
- Bipolar layer
- Ganglion Cell layer

The collection of axons of ganglion cells form the optic nerve as they exit at lamina cribrosa

ANATOMY AND PHYSIOLOGY OF THE EYE

FUNCTION OF RETINA

PHOTORECEPTOR– CONES: found on the macula

- Cones provide visual acuity and colour vision
- Cones function better in light hence the name **Photopic Vision**

ANATOMY AND PHYSIOLOGY OF THE EYE

PHOTORECEPTOR– RODS:

found in the peripheral of the retina

- Function of the rods is to provide night vision, hence scotopic vision

ANATOMY AND PHYSIOLOGY OF THE EYE

CONTENT OF THE GLOBE (EYE)

- Aqueous Humour
- The Lens
- Vitreous Humour

ANATOMY AND PHYSIOLOGY OF THE EYE

AQUEOU HUMOUR

- It is a fluid produced by ciliary body
- It fills both anterior and posterior chambers
- Flows from ciliary processes to the posterior chamber and through the pupil to the anterior chamber
- Exits through the angles (trabecular Meshwork) Schlemm's canal to the episcleral blood vessels back into general circulation

ANATOMY AND PHYSIOLOGY OF THE EYE

AQUEOUS HUMOUR– FUNCTION

- Provides nutrition to the lens, endothelium of cornea and iris
- Control of intra-ocular pressure
- Refraction of light

ANATOMY AND PHYSIOLOGY OF THE EYE

THE LENS:

- It is biconvex
- It has two attachments:
- Vitreous body— Hyalo- capsular ligament
- Ciliary Body– Zonular fibres
- It has no blood vessels

ANATOMY AND PHYSIOLOGY OF THE EYE

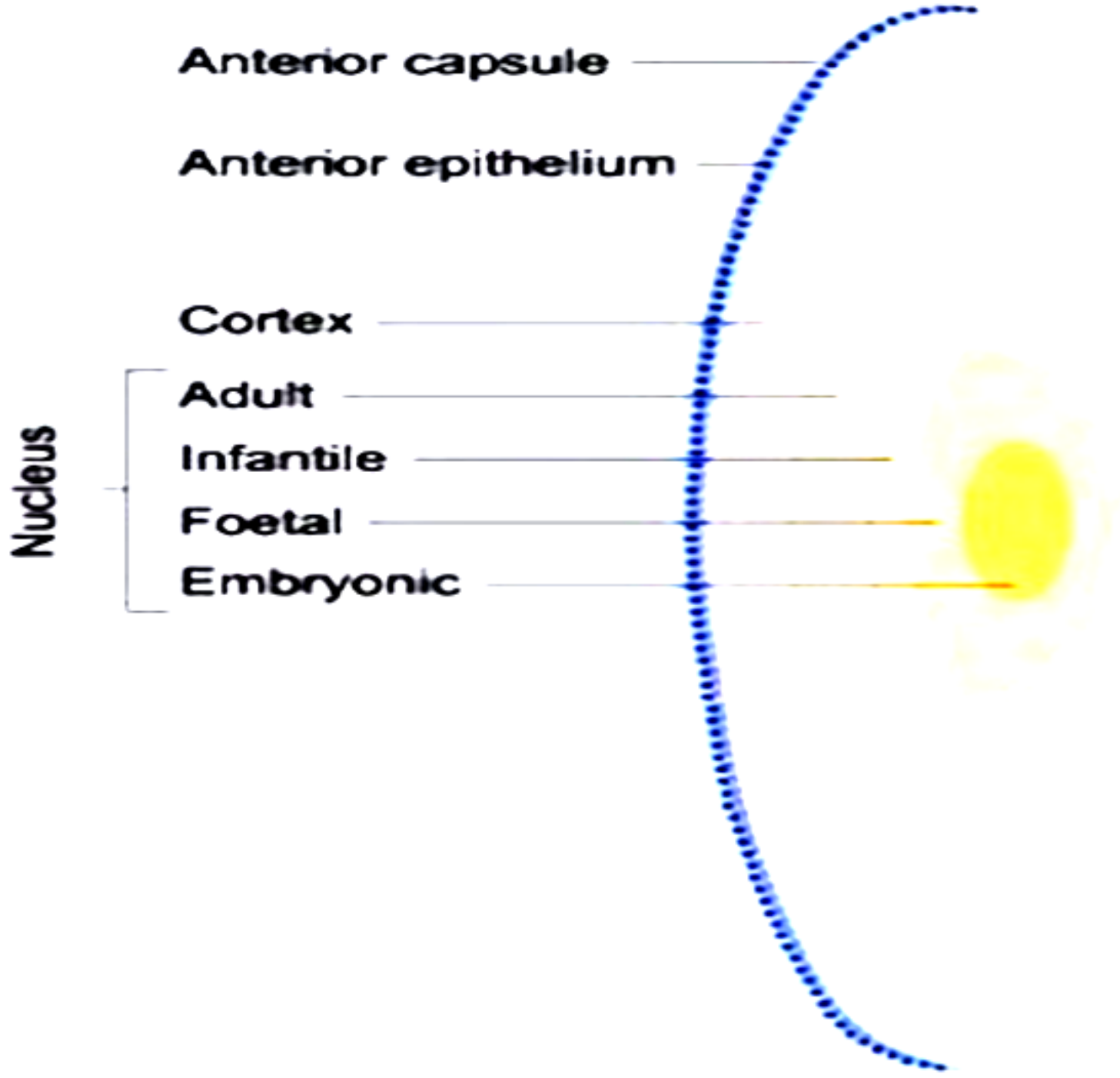
HISTOLOGY OF THE LENS

Histologically, the lens has the following layers:

- Capsule– covers whole lens and on its equator provides attachment for zonules
- Epithelium is only on the anterior surface
- Cortex
- nucleus

ANATOMY AND PHYSIOLOGY OF THE EYE

HISTOLOGY OF THE LENS



ANATOMY AND PHYSIOLOGY OF THE EYE

FUNCTIONS OF THE LENS

The main functions of the lens are:

- Refraction: it provides 20 dioptres of the refractive power of the eye
- Accommodation: through the Zonular attachment with the ciliary muscles

ANATOMY AND PHYSIOLOGY OF THE EYE

VITREOUS HUMOUR

Is a jelly-like fluid which fills the posterior part of the globe

It is attached at the optic disc, posterior part of the lens and ciliary body

It is transparent and has no blood vessel

ANATOMY AND PHYSIOLOGY OF THE EYE

FUNCTION OF THE VITREOUS HUMOUR

The vitreous body has the following functions:

- Refraction
- Support of the globe
- It prevents the globe from collapsing