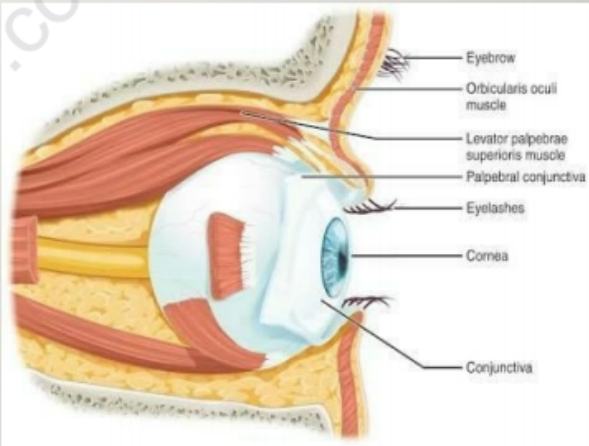
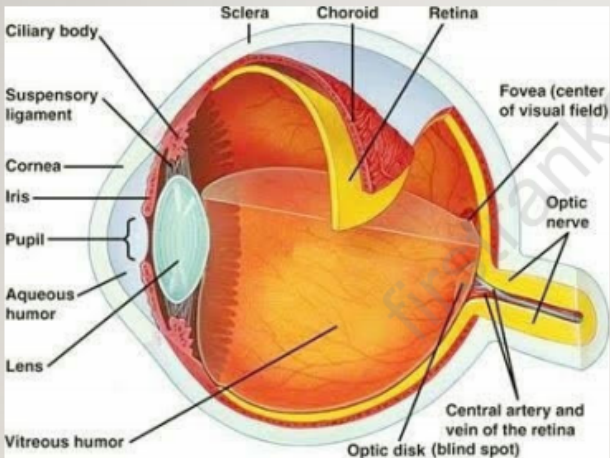


ANATOMY

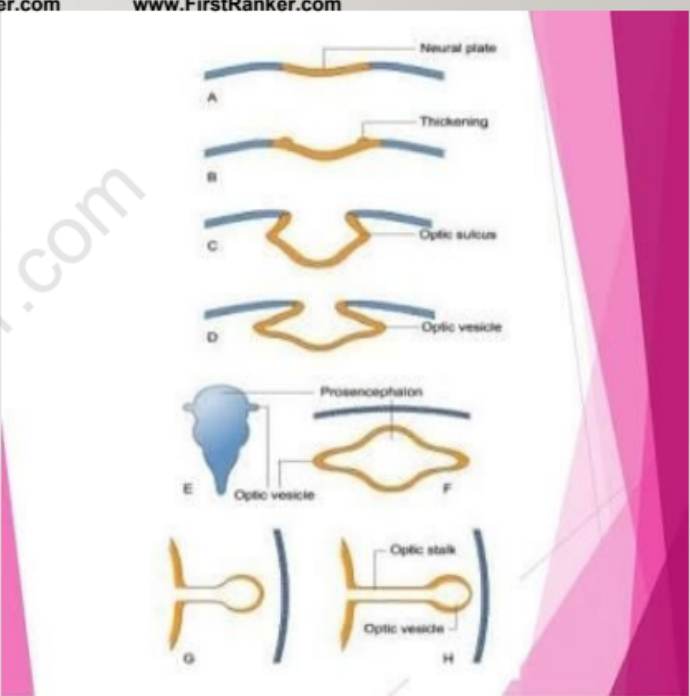
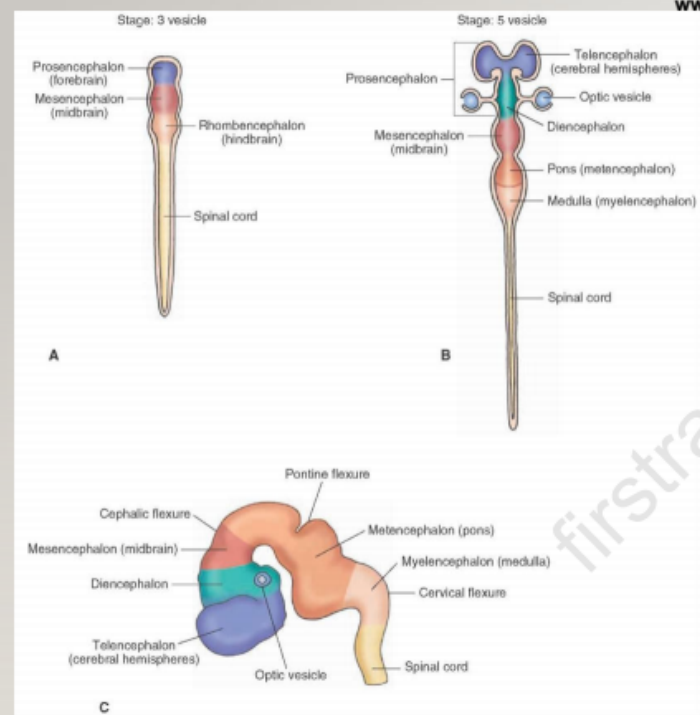


DEVELOPMENT

- Development of eyeball commenece around day 22
- Eyeball & associated structures are derived from
 - Optic vesicle
 - Lens placode
 - Mesoderm sarrounding optic vesicle

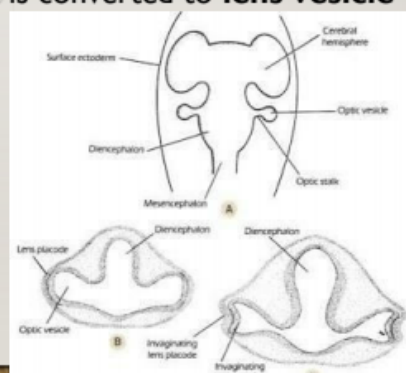
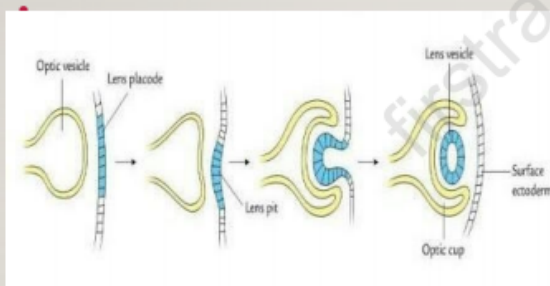
OPTIC VESICLE

- A linear thickened area is formed on the either side of neural plate which is destined to form the prosencephalon
- **Optic sulcus**- formed by the depression of the thickened area
- When nural plate get converted to procencephalic vesicle ,the optic sulcus deepens & the wall overlying the sulcus bulg outwards ,this forms the **optic sulcus**
- Proximal part of optic vesicle gets constricted to form **optic stalk**



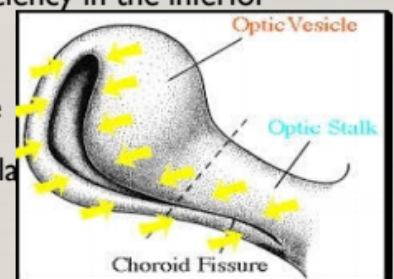
LENS PLACODE

- Optic vesicle grows laterally & comes in contact with the surface ectoderm
- An area of ectoderm overlying the vesicle thickens to form **lens placode**
- Lens placode soon sinks into the vesicle & is converted to **lens vesicle**



OPTIC CUP

- When lens vesicle is formed , the optic vesicle gets converted to optic cup
- This happens due to differential growth of wall of optic vesicle around the lens
- The margins of cup grow over the upper & lateral sides to enclose the lens
- Such growth does not take place in the inferior margin causing a deficiency in the inferior part **coroidal or fetal fissure**
- The mesoderm conering the neural tube also covers the optic vesicle
- The mesenchyme differentiate into an outer fibrous & inner vascular la



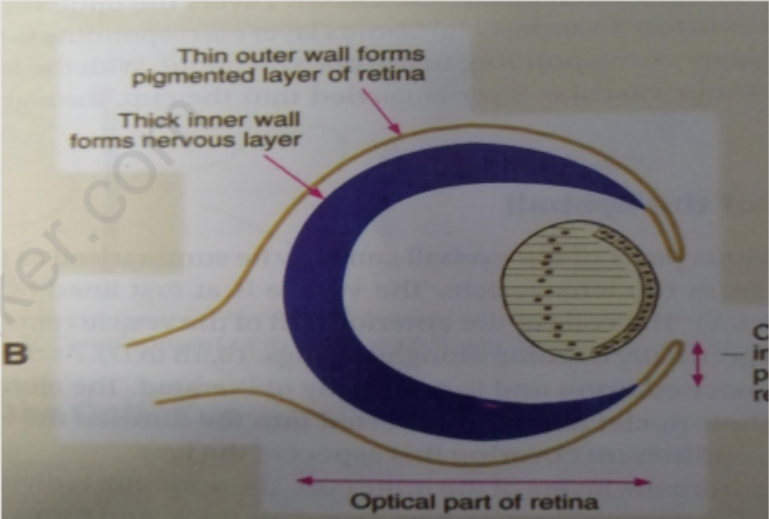
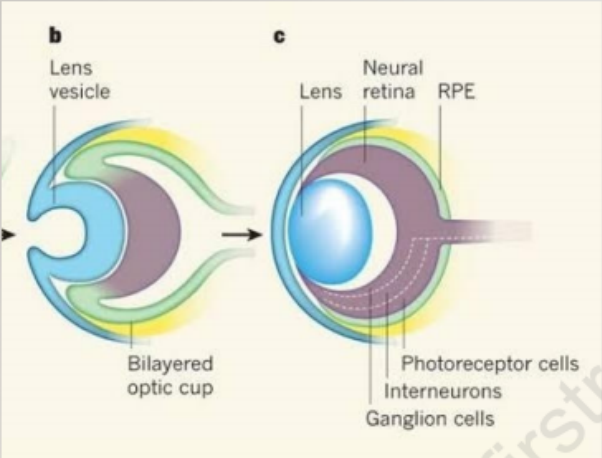
DERIVATION OF PARTS OF EYEBALL

- **RETINA**

- Optic cup is divided into anterior & posterior part
 - Anterior part forms epithelium covering for ciliary body & iris
 - Posterior part is divided into
 - Thin outer wall ---pigmented layer of retina
 - Thick inner wall --- nervous retina
 - Matrix layer ---rods & cones
 - Mantle layer- bipolar cells ,ganglion cells other supporting cells
 - Marginal layer -- the axons of bipolar cells grow into marginal layer to form a layer of nerve fibres

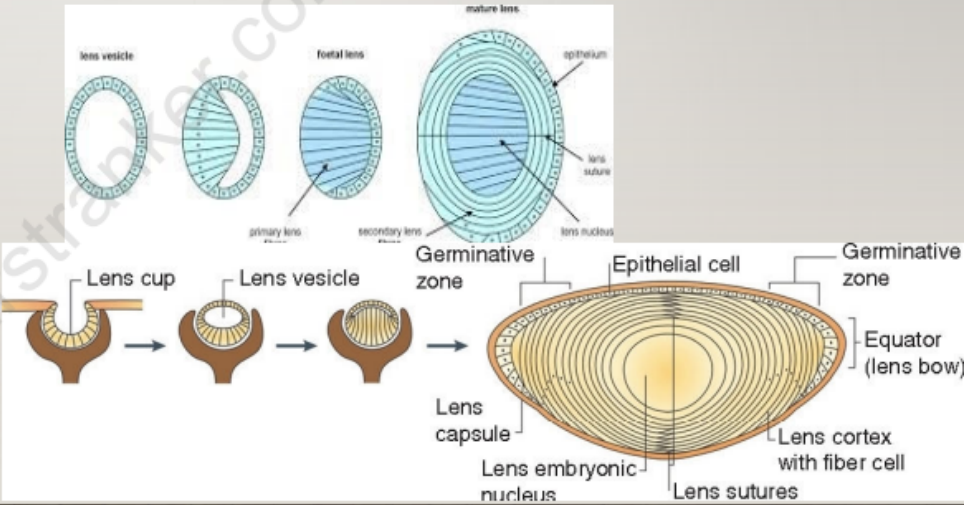
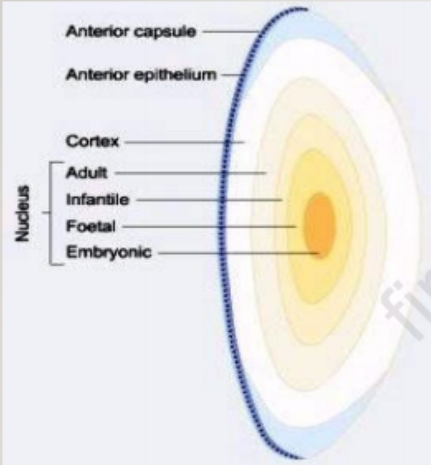
- **OPTIC NERVE**

- The nerve fibres grow into optic stalk & form optic nerve



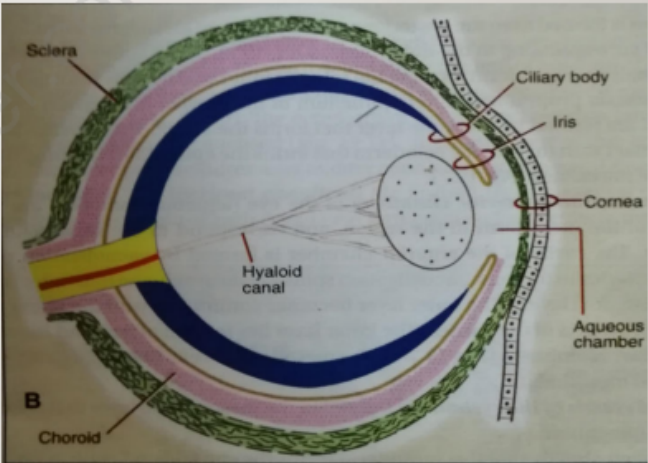
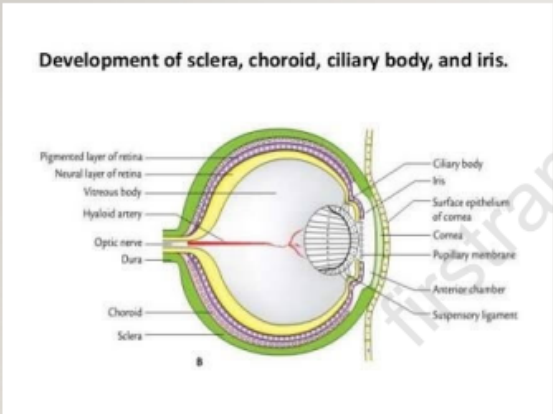
- Crystalline lens

- Lens is formed from lens vesicle
- Cells in the posterior layer elongate & obliterate the cavity inside, they will lose the nucleus & form lens fibres (primary lens fibres)
- Primary lens fibres form the embryonic nucleus
- Secondary fibres are formed from the equatorial cells of anterior epithelium which remain active throughout the life
- Depending on the period of development secondary fibres are named **fetal nucleus** (3-8 months), **infantile nucleus** (last week of fetal life – puberty), **adult nucleus** (after puberty), **cortex** (adult lens)

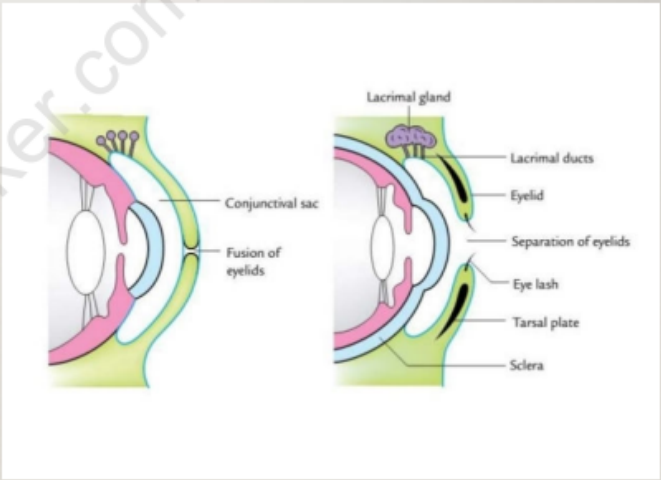
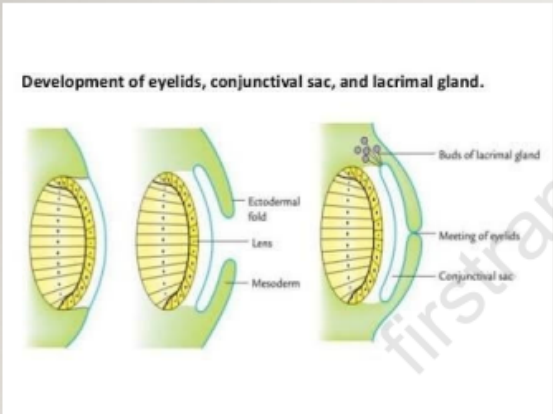


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- cornea
 - Epithelium – formed from surface ectoderm
 - Other layers are developed from mesenchyme lying anterior to optic cup
 - Sclera
 - From fibrous layer of mesenchyme surrounding optic cup
 - Choroid
 - From inner vascular layer of mesenchyme surrounding optic cup
 - Ciliary body
 - The two layers of epithelium develop from anterior part of optic cup
 - Stroma develop from vascular layer of mesenchyme surrounding the optic cup

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- Iris
 - Epithelium derived from marginal region of optic cup
 - Sphincter & dilator pupillae from the anterior epithelium
 - Stroma & blood vessels from vascular mesenchyme
 - Vitreous
 - Primary vitreous – mesenchymal origin & is vascular with hyaloid system of vessels
 - Avascular secondary vitreous replaces the primary vitreous, which is secreted by neuroectoderm of optic cup



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- **Eyelids**
 - Formed by reduplication of surface ectoderm
 - Two folds are formed & the folds enlarge and meet in midline
 - The fold cut some space called conjunctival sac which entrap some mesoderm, which forms the muscles of lid & tarsal plate
 - Tarsal glands & cilia also develop from the surfac ectoderm
 - **Conjunctiiva**
 - Develop from ectoderm lining the globe & lids
 - Conjuntival glands also develop as growth of basal cells in upper & lower fornix



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- Lacrimal apparatus
 - Lacrimal gland develop as epithelial buds by the 2nd month of fetal life in the superolateral side of conjunctival sac
 - Lacrimal sac, nasolacrimal duct & canaliculi develop from ectoderm of nasolacrimal furrow at the medial angle of the eye
 - Extraocular muscles
 - Develop from the mesoderm around the optic cup

SUMMARY

- surface ectoderm
 1. Lens
 2. Epithelium of cornea
 3. Conjunctiva
 4. Lacrimal apparatus
 5. Eyelid epithelium, cilia, tarsal glands, conjunctival glands
- Neural ectoderm
 1. Retina
 2. Epithelial layer of ciliary body & iris

-
- Sphincter & dilator pupillae
 - optic nerve
 - Secondary vitreous
 - Mesenchyme
 1. Blood vessels of choroid, iris, ciliary vessels, retinal artery, & other vessels
 2. Primary vitreous
 3. Sclera, ciliary muscles, extraocular muscles
 4. Sheath of optic nerve
 5. Connective tissue