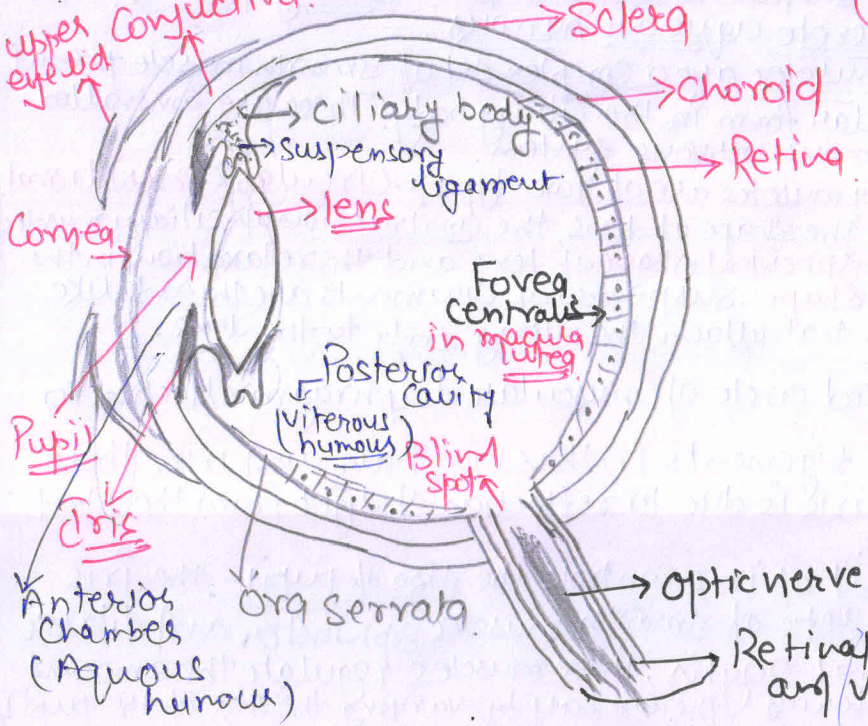
Human Eye

⇒ The organ of sight are a pair of eyes in humans. The eyes are situated in deep protective bony cavities called the **orbits** or **eye sockets** of the skull. The study of structure, function and diseases of the eye is called **Ophthalmology**.

Structure of the Eye:→ Human eyes are spherical structures present in the bony sockets of the skull, each eye is about 2.5 cm in diameter and consists of tissues present in three Concentric layers:→ (I) outermost fibrous layer consists of **Sclera** and **Cornea**.
(II.) Middle vascular layer (also called **Uvea**) consists of **Choroid**, **Ciliary body** and **Iris**.
(III) Inner most nervous layer consists of **Retina**.

(A) Fibrous Coat:→ It is the outer most layer consists of **Sclera** and **Cornea**.

(i) Sclera:→ It is an opaque, fibro-elastic collagen capsule that forms the outermost covering.
⇒ It is opaque bluish white in appearance except in front where it forms the transparent Cornea. ⇒ It forms the posterior 5/6 part of the eyeball. ⇒ It maintain the shape of eye ball and protect all inner layers of the eye.
⇒ The eye muscles (smooth fibres) for the movement of the eye ball are also inserted into the sclera. the movement is controlled by III, IV and VI Crawial nerves.



(ii) Cornea:→ It is the thin transparent, front part of Sclera.
⇒ It forms a slight bulge (called Conjuctiva) at the front and covers about 1/6th part of the sclera.
⇒ It lacks blood vessels but is rich in nerve endings, chiefly of pain type.
⇒ Stimulation of nerve endings reflexly causes blinking and tear flow. This part of eye absorbs oxygen from the air.
⇒ The Cornea is kept moist by tears and mucous from Conjuctival glands.
⇒ As Cornea is avascular so its living materials like epithelium, Corneal Corpuscles, and endothelium get nutrition from aqueous humour and from super marginal plexus of blood vessels. Therefore Corneal transplant is easiest over 90% success.
⇒ Transitional b/w the Cornea and the adjacent sclera and conjuctiva there is zone of about 1mm wide. This zone is called **Limbus**. The superficial marginal plexus which nourishes the Cornea are present in the limbus.
⇒ Cornea allows the light to pass into the eye.

⇒ Due to its curvature, it helps in focusing a real inverted image of the object on retina. The cornea also serves as a filter, screening out some of most damaging ultraviolet (UV) wavelength in sunlight. Without this protection, the lens and retina would be highly susceptible to injury from UV radiation.

⇒ At the junction of sclera and cornea there is structure called the canal of Schlemu. The aqueous humour is drained off into this canal and then into the blood.

Conjuctiva :→ It is a thin transparent layer present over the cornea and it continuous with the skin over the eye.

⇒ It is composed of a stratified epithelium and is continuous with the epidermis that lines the eyelids.

⇒ The conjuctiva is thin, little cornified and richly supplied with free nerve endings. It is nourished by tiny blood vessels that are nearly invisible to the nacked eye.

⇒ The conjuctiva thus has 2 parts :- Ocular conjuctiva that covers the front of eye and palpebral conjuctiva which lines the eyelids.

⇒ In sore or "pink" eyes, the conjuctiva gets inflammed causing Conjuctivitis.

⇒ It protect the cornea and also secretes oils and mucous that moisten and lubricate the eye.

(B) Vascular Coat :→ middle layer consists of choroid, ciliary body and iris.

(i) Choroid :→ It is a pigemented layer present beneath the sclera. It is composed of connective tissue and is of dark brown colour. It is homologous to pia-arachnoid of the brain.

⇒ It contains numerous blood vessels and nourishes the retina

⇒ The pigementation prevents reflection within the eye.

⇒ It also acts as conduit for vessels traveling to other parts of eye.

⇒ The regulation of blood flow in the choroid may also influence intraocular pressure by effecting perfusion rates of the ciliary processes.

(ii) Ciliary body :→ The ciliary body extends towards the inside of the eye from the choroid coat.

⇒ This part of eye is less vascular, thick and less pigemented.

⇒ Its inner surface is folded to form ciliary processes the latter secrete aqueous humour.

⇒ Ciliary muscles are a complex set of smooth muscle present in a circular form in the ciliary body. These are controlled by autonomous nervous system.

⇒ The Cilary muscles are of two types :- circular & meridional, they alter the shape of lens, the contraction of ciliary muscles results in spherical shape of lens and there laxation in the flattened shape. Suspensory ligaments are thread like ligaments that attach the ciliary body to the lens.

(iii) Iris :→ It is the most anterior part of uvea. It forms a pigmented circle of muscular diaphragm attached to the ciliary body in front of the lens.

⇒ Its pigment gives eye its colour (depending upon the amount of pigement present) like a black, blue or green.

⇒ If the pigement is dense, the iris is brown, if there is little pigement the iris is blue. In some cases there is no pigement at all, so the eye is light.

⇒ Albinos lack pigements in the skin, hair and iris. there pink colour of iris is due to reflection of light from the blood vessels of iris.

⇒ The movement of iris controls the size of pupil, the iris contains two sets of smooth muscles sphincter and dilator of ectodermal origin. these muscles regulate the amount of light entering the eye ball by varying the size of the pupil.

⇒ The sphincter muscles (innervated by parasympathetic fibres) are arranged in rings. Their contraction makes the pupil smaller in bright light so that less light enters the eye. As light to the retina is reduced, the ability to see colour decreased.

⇒ Thus iris controls the amount of light entering into the eye by controlling the size of pupil. It also ↑ the depth of focus.

⇒ Pupil in woman is larger than that in man.

⇒ The dilator muscles innervated by sympathetic fibres are arranged in a radial manner. Their cotraction widenes the pupil in dim light to ↑ the amount of light enter into the retina.

⇒ If the two pupils are unequal then the condition is described as anisocoria.

(C) Nervous Coat: Retina :→ It is delicate, inner light sensitive coat of the eye ball which is differentiated into three parts optic, ciliary and iridial.

⇒ Ciliary and iridial parts are nonsensory and formed of a single layer of pigmented cells that line the ciliary body and iris respectively.

⇒ The irregular interior margin of the pars optica of the retina, lying internal to the junction of choroid and ciliary body is called ora serrata retinae.

⇒ Optic part is thick and composed of four layers of cells, begining from the choroid side, it has a layer of pigmented cells, a layer of receptor cells, a layer of bipolar nerve cells and a layer of ganglion cells.

⇒ The receptor cells are called photoreceptors or visual cells.

⇒ They are of two types :- rod cells and cone cells, named after their shapes. Both have light sensitive pigements. Specific wavelength of light breakdown the light sensitive pige ments and this stimulates the receptor cells to set up nerve impulses.

Major cells types of the retina :→

1) Rod photoreceptor cells are specialized for reception in dim light.
2) Cone photoreceptor cells are specialized for sensing bright light and for color vision, there are different cone cell types (each with a different photo pigment) for each of the 3 primary colors.
3) Horizontal cells interconnect groups of photoreceptor cells.
4) Bipolar cells (at least 4 types, one for the rod cells and one for each type of cone cells) interconnect photoreceptor cells with ganglion cells.
(5) Amacrine cells interconnect groups of ganglion cells and bipolar cells. They are unusual neurons because they have no true axon.
(6) Ganglion cells possess long axons that extend through the nerve fibre layer of the retina and then come together to form the optic nerve. They are the only cell type in the retina possessing long axon (which bundle together to form the nerve fibre layer) and exhibiting self-propagated action potential.
(7) Muller cells are large glial-like cells that extend from the internal limiting membrane (basement membrane) to the external limiting membrane (a region of junction between the muller cells and the photoreceptor cells). The glial cells are very rich in glycogen.

Histological layers of retina :→

These histological layers are described (listed) in order moving from the outside of the eye towards the interior of the eye.

(i) Retinal pigement epithelium (RPE) Contains pigemented cells with phagocytic properties and ion transport properties. The RPE also functions in regeneration of bleached retinal and is also the storage site of vitamin A.

(ii) Layer of rods and cones Contains the inner and outer segments of the rod and cone photoreceptor cells.

(iii) External limiting membrane is defined by a series of junctional complexes b/w Muller cells and rod and cone photoreceptor cells.

(iv) Outer nuclear layer Contains the cell bodies and nuclei of rods and cones.

(v) outer plexiform layer contains synapses of the processes of rods and cones with dendrite of bipolar cells. Processes of horizontal cells also take part in the formation of these synapses.

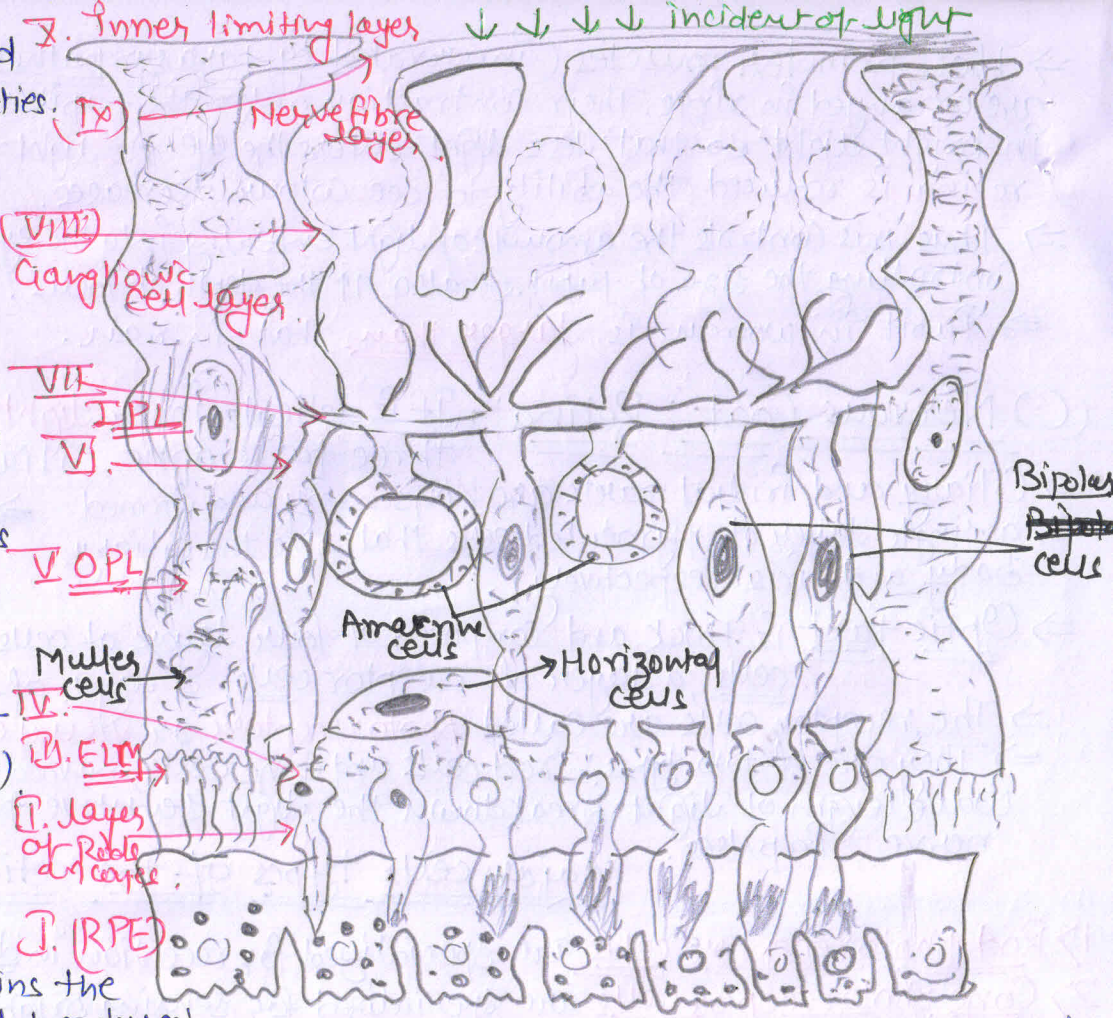
(vi) Inner nuclear layer Contains cell bodies and nuclei of bipolar cells, amacrine cells and horizontal cells (neurons)

(vii) Internal plexiform layer this layer consists of synapsing nerve fibres of bipolar cells, ganglion cells and amacrine cells.

(viii) Ganglion cell layer Contains the cell bodies of ganglion cells, Ganglion cells are also of two types!-
(i) Diffuse type that connects with many bipolar cells (ii) Monosynaptic or individual ganglion cells which connects synaptic connection by way of midget (small) bipolar cells with only one or two cone cells. Only seen in foveal region. Hence foveal vision is very accurate.

(ix) Nerve fibre layer Consists of the axons of ganglion cells along with blood vessels. the nerve fibre layer is continuous with the optic nerve.

(x) inner limiting membrane is a basement membrane for the muller cells and is apposed (near or against another thing) to the viterous body.



Rod cells! → The rod cells contain a purplish pigement called visual purple // rhodopsin. Rhodopsin has 2 components :- Scotopsin a protein moiety and 11-cis retinal a carotene derivative. When both of these combine they create the conjugated ~~retinal~~ rhodopsin molecule. They function in dim light and at night they produced poorly defined images.
⇒ The total number of rods in the human reting has been estimated at 110 to 125 million.

⇒ Rhodopsin undergoes a cyclic decomposition (called bleaching) and reconstitution in response to the presence of light. This cycle is the basis for the absorption of light and its transduction into the nervous signal.

⇒ In the dark, rhodopsin is resynthesized from scotopsin and retinal. This process is called "dark adaptation". It makes the rods functional. It takes some time for rhodopsin to be reformed. This is why on entering a dark room at night, we feel blind for a while, when we go from darkness to bright light, we feel difficulty in seeing properly for a moment till rhodopsin is bleached and cones become functional.

⇒ Bleaching and regeneration of photosensitive pigments are independent of nerves, but occur only so long as the rods remain in contact with the stratum pigment.

Cone Cells:- The cones contain a pigment called visual violet or iodopsin. They function in daylight and artificial bright light and produce detailed images and give colour vision. The cone cells are not as sensitive as the rod cells and do not respond to dim light. This is why we can't see colours clearly at night.

⇒ The cone cells give colour vision (based on trichomatic theory) because they contain 3 different pigments, each absorbing light in different wavelengths (colours), one pigment porpyrosin is sensitive to red light, another Idopsin to green and the third Cyanopsin to blue.

⇒ Individual cone cell has one type of pigment. The green and red cones are concentrated in fovea centralis and the blue cones are mostly found outside the fovea and have the highest sensitivity.

⇒ The colour others than the above 3 are perceived by the simultaneous stimulation of 2 or all the 3 types of cones. Yellow light for example stimulates the green and red cones to an approximately equal extent, and this is interpreted by the brain as yellow colour.

⇒ Equal stimulation of all types of cones produces the colour sensation of white.

⇒ The protein in cone pigement is called photopsin.

⇒ Light changes the cone pigment chemically and this setup nerve impulse.

⇒ Lack of one or more types of cone cells causes Colour blindness.

Blind Spot:- It is an area of retina from where the optic nerve leaves the eye. It does not have any rods and cones and so is not light sensitive.

⇒ Optic nerve leaves the eye at the blind spot, no image is formed at the blind spot.

Optic Nerve:- It contain the fibres of the sensory neurons and leaves the eye ball from the back side.

⇒ It carries visual impulses from the retina to the brain.

Macula lutea (Yellow spot):-

⇒ A small area of optic part of the retina lying exactly opposite the centre of the cornea is called the macula lutea or yellow spot.

⇒ It is about 5mm in diameter and has a yellow pigment (xanthophyll) which protect the photoreceptors from blinding effect of bright light.

Visual Acuity:- It is the power of the eye to resolve two stimuli separated in space. It depends upon the sensitivity of retina to light, illumination of the surface, the time of exposure and ability to recognise the distance of parallel rays. It is found to be maximum at the fovea centralis where there are large number of cones and minimum at the peripheral part of the retina where the cones are very few.

Fovea Centralis:→ It is shallow depression present in the middle of macula lutea. The centre of the fovea is called "foveola", it lacks blood vessels and rods.

⇒ The eye's sharpest and most brilliantly colored vision occurs when light is focused on the fovea centralis. This region has exclusively cones (some around 30,000) and they are smaller and more closely packed than elsewhere on the retina.

⇒ From the fovea to the periphery cones diminish and rods increases ↑↑ in numbers. Hence in periphery only twilight vision occurs, and no colour vision.

⇒ Because the fovea has no rods, small dim objects in the dark cannot be seen if one looks directly at them; for this reason to detect faint stars in the sky, one must look just to the side of them so that their light falls on a retinal area containing numerous rods outside the macular zone.

⇒ Fovea Centralis is the most sensitive part of retina.

Lens:→ It is transparent, elastic and a biconvex solid structure held in position by suspensory ligaments which extends from the equatorial edge of the lens to the ciliary processes. It is made up of non-nucleated, transparent and elongated cells having elastin protein.

⇒ It undergoes a change in thickness and brings the adjustment for focussing of light on retina probably by elastin protein function.

⇒ It separates the eye into 2 chambers anterior and posterior.

Chambers of eye ball:→ The lens and suspensory ligament divide the cavity of the eyeball into two chambers:- the anterior small aqueous chamber and the posterior large Vitreous chamber.

(I) **Aqueous chamber**:→ the aqueous chamber itself consist of two cavities:- large anterior in front of the iris and behind cornea (i.e. b/w iris and cornea) and small posterior b/w the iris and the lens. Both the parts of aqueous chamber are filled with a clear, watery fluid the **aqueous humour**. secreted by the ciliary processes of the ciliary body into the posterior cavity hence it passes into the anterior cavity.

⇒ It contains most of the diffusible substances of the plasma.

⇒ The aqueous humour is continuously secreted and drained into the venous system via the canal of Schlemm.

(II) **Vitreous chamber**:→ largest chamber which is full of thick, transparent, jelly-like substance **Vitreous humour** or **vitreous body**.

⇒ It consists of water (99%), protein vitrein hyaluronic acid and collagen fibres. It is apparently secreted by the retina during development of the eye.

⇒ Vitreous humour is not replaced.

⇒ It maintains the shape of eyeball and contributing to maintain intraocular pressure.

Extrinsic Eye muscles and their nerve supply:→ the eye is moved within the orbit by 6 ocular muscles attached to the eye ball. They are:-

(1) Superior Rectus (2) Inferior Rectus (3) Median Rectus (4) Lateral Rectus (5) Superior Oblique (6) Inferior Oblique

Supplied by cranial nerve:- III (Oculomotor) III VI (Abducens) IV (Trochlear) III

Modified glands of eyelids :→

(I) Glands of Moll are modified sweat glands that open in b/w the bases of eye lashes.

(I) Glands of Zeis are Sebaceous glands which opens into the follicles of eye lashes. Infection of one of these glands causes Sty or hordeolum.

(II) Meibomian or tarsal glands are modified sebaceous glands which open on the free margins of eyelids for lubricating them as well as covering Cornea with oil for frictionless blinking, holding over Cornea catching dust particles and keeping away rain drops.

(IV) Tear gland (lacrimal = lacryma gland) :→ is an almond shaped racemose gland lying in the upper part of orbit that secretes a watery fluid or tear having antibacterial lysozyme (+water + sugar + amino acids + proteins + mineral + salt + urea).

⇒ The lacrimal secretion or tear moistens and cleanses the eye ball and eye lids, provides protection from microbes and nourishes the Cornea. Tear is drained out by two lacrimal canaliculi (superior and inferior) each canaliculi arising from inner angle of eye through an opening called punctum.

⇒ The two lacrimal canaliculi join to form a lacrimal sac. A nasolacrimal duct arises from the sac for passing tear into nasal cavity. The lacrimal sac undergoes contraction and relaxation during blinking.

⇒ The functions of tears is to bathe the front of the eye, washing away any dust, grit and microorganisms. Lysozyme destroys microorganisms present on the front of the eyeball.

⇒ In emotional states the secretion of tears may be increased and if the nasolacrimal duct cannot carry them all into the nasal cavity they overflow. Gland cells in the Conjuctiva also secrete a mucous substance that is a component of tears.

⇒ A layer of fatty Connective tissue surrounds the eyeball in the orbit. It serves as a soft, shockproof pad.

Working of the eye :→

The human eye is sensitive to light wavelengths ranging from 380 to 760 nano-meters. It has two functional parts :- dioptric / focusing part and receptor part.

(i) Focussing part :→ It consists of Conjuctiva, Cornea, aqueous humour, lens and vitreous humour. These parts are transparent and act as lenses. They refract the light rays passing through the eye to bring them to a focus on the retina. Maximum refraction is caused by the Cornea, which places the image approximately on the retina.

(ii) Receptor part :→ It comprises the retina. The image formed on the retina is inverted and smaller. It converts the energy of specific wavelengths of light into action potentials (sensory impulses) of nerve fibres. The nerve impulses are carried by the optic nerve to the visual areas of cerebral hemispheres where the real sensation of sight arises and one sees the object upright.

Accommodation :→ The adjustment of the eye to enable it to focus on objects at various distances is called accommodation. Human eyes have remarkable power of accommodation by changing the convexity of the lens.

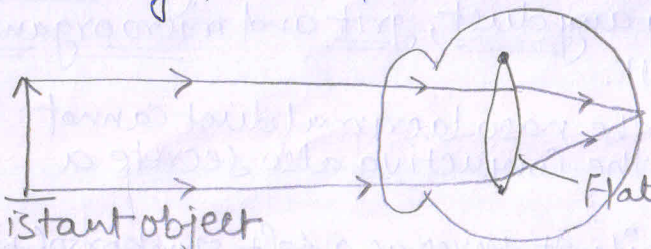
⇒ The changes in the curvature of the lens i.e. the increased convexity of the lens during accommodation can be determined by the phakoscope of Helmholtz.

⇒ By the action of Iris muscles the size of pupil can be increased or decreased.

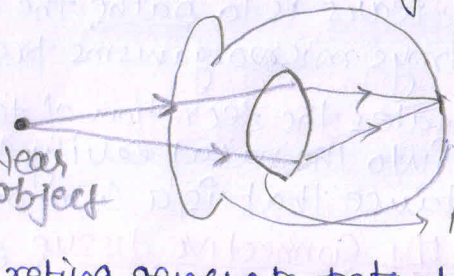
⇒ In bright light the pupil is constricted, in dim light it is dilated. Due to the action of the muscles of ciliary body and suspensory ligament, the focal length of the lens can be changed, then the objects can be focused in different intensity of light from varying distances.

Mechanism of accommodation :→

⇒ When the eyes are accommodated for distant vision, the ciliary muscle is relaxed and the choroid, due to its elastic property, recoils and pulls the suspensory ligament peripherally. Due to peripherally directed traction of the suspensory ligament, the anterior surface of the lens is flattened and the object is correctly focussed on the retina.



⇒ When the eyes are accommodated for near vision contraction of ciliary muscles draws the choroid inward, causing relaxation of the suspensory ligaments. As a result there is relaxation of the capsule of the lens. as a result lens assumes a more convex form. The anterior surface bulges more than posterior because it is prevented by the vitreous humour.



Biochemistry of vision :→ The light rays focussed on the retina generate potential (impulses) in rod and cones. Light splits photosensitive pigment rhodopsin (visual purple) into retinene and opsin (protein) resulting in changes in the three-dimensional (3D) structure of the opsin.

⇒ The changed structure of opsin leads to activation of a regulatory protein called transducin. the activated transducin activates an enzyme called phosphodiesterase. activated phosphodiesterase converts cGMP (which binds to Na^+ channels) to 5'-GMP (which does not bind to Na^+ channels).

⇒ The influx of Na^+ ions into the outer segment of rod cells occurs mainly because of cGMP present in the cytoplasm of the cell.

⇒ The Na^+ influx maintains a slight depolarization upto -40mv. the potential is constant and K/as **dark current**.

⇒ Because of conversion of cGMP to 5'-GMP the conc^n of cGMP reduces in the rod cell. It is due to light which lead to rapid ↓ in cGMP level in the photoreceptor cells which results in the closure of the Na^+ channels.

⇓

The sudden closure of Na^+ channels prevents the entry of Na^+ ions, as a result the photoreceptor cells become **Hyperpolarised**.

⇐ The hyperpolarization of the cell membrane produces a signal that generates action potential (impulses) in the Ganglion cells.

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⇒ The axons of all retinal ganglion cells in one eye from optic nerve, the action potential (impulses) generated in the retina are transmitted by the optic nerve to the visual cortex in the occipital lobe of the cerebral hemisphere of the brain where the neural impulses are analyzed and the image formed on the retina is recognized.

Types of vision :-

I. Binocular or monocular vision :- Human beings have binocular and stereoscopic (3-dimensional) vision for this both the eyeball have to be moved to focus on the same object by means of external muscles. The phenomenon is called convergence. It gives clear image with better idea of distance.

⇒ Primates and predatory animals, such as owl and cat have binocular vision. In some animals such as rabbit, birds, each eye is focussed on a separate object. This is termed monocular vision.

(iii) Peripheral vision :- It is blurring and often colourless because the image is focussed away from the fovea where more rods are present as compared to cones.

II. Colour vision :- It is the ability of some animals to detect colours in an object. Humans, apes, monkeys, cats, birds, lizards, turtles, snakes, frogs, fresh-water fishes, insects and cray-fishes have. Colour vision in vertebrates, colour vision results from the activity of cone cells. Most domestic mammals and shark lack colour vision. They probably see objects in shades of grey (monochrome vision).

(IV) Nocturnal and diurnal vision :- Man has both day and night vision as he has both rods and cones in considerable numbers in the retina. Most birds have only day vision as their retina contains mainly cones. Owls have much better night vision than day vision for they possess a large number of rods and few cones in their retina.

Diseases of Eye :-

(I) Night blindness :- The deficiency of vitamin A leads to the decreased synthesis of rhodopsin — the pigment present in rods. Since rods cannot function without rhodopsin, the person cannot see well in dim light or at night. This is known as night blindness. (Nyctalopia).

(II) Macular degeneration :- It is a condition in which the macula (the central area of the retina) deteriorates, resulting in the loss of sharp vision. It is the leading cause of several visual loss and is the 3 leading cause of impaired vision. In addition to aging, risk factors includes atherosclerosis and hypertension. It may also be linked to nutritional deficiencies, chemical exposure and cigarette smoking.

(III) Trachoma :- Eye infection caused by Chlamydia trachomatis, It is a form of bilateral Kerato Conjuctivities, which causes Corneal Scarring. When scarring is extensive blindness result.

(IV) Strabismus :- It is commonly known as Squint. In this defect the eyeball is somewhat bent on to a side in its orbit so that the optic axes can not be directed to same object. Some extra ocular muscles become longer or shorter than normal.

(V) Colour blindness :- It is a hereditary disease and is due to the absence of a particular kind of cone or cones in retina.

⇒ Since colour vision is due to stimulation of 3 types of cones, the people lacking a particular kind of cone cannot perceive that colour. For example :- absence of red cones means person cannot distin-guish b/w red and yellow. It is of following type :-

(i) Anamalous trichromatism :- person can see all the 3 colours, but appreciation of one particular colour is subnormal.

(2) Dichromatism :- they can see two colours but fail to see one → Protanopia or red blindness.
→ Deuteranopia or green blindness.
→ Tritanopia or blue blindness. (Rarest).
(in jaundice bilirubin in eye absorb all blue colour)

(3) Monochromatism :- may be regarded as total colour blindness. Cones are absent.

Various Eye defects & their Corrective measures

Eye defect	Reasons	Corrective measures
I. Myopia/ Near Sightness In this eye defect person has difficulty in seeing distant object clearly. However the person can see near object clearly. Hence it is also called short sight.	(i) Either the eyeball is larger than normal, or antero-posteriorly elongated so that the image of distant objects is formed in front of retina. (ii) or there is high curvature of the lens. (more convex) ∥ rays from distant object get focused in front of retina	Biconcave lenses they diverge the parallel rays and bring them to focus at retina.
II Hypermetropia/ long sightness the person has difficulty in seeing near objects. However the person can see distant object clearly. Hence it is also called long sight.	(i) Either the eyeball is smaller than normal (Image is formed behind the retina). (ii) or there is low convexity of the lens. light rays converge at a point behind the retina.	Biconvex lenses these lens converge the rays so as to form a sharp image at the retina.
III. Astigmatism It is due to irregular cornea/ lens, causing the image to be out of focus, producing faulty vision.	Cornea has different curvature in different regions. Blurred image as rays get focussed at different points.	Cylindrical lenses.
IV. Presbyopia (old age long sightedness) it is a defect in accommodation occurring in advancing age.	loss of elasticity of lens after the age of 40. Failure of accommodation to focus near objects.	Reading glasses/ bifocal lenses/ trifocal or Contact lenses.
V. Cataract :- also k/a Safaid motia lens looses its transparency, more common in old age.	opacity of lens occur. Person loses the ability to see as light does not pass through the lens.	Surgical removal of lens and then either implantation of artificial lens or use of spectacles with convex lens and laser treatment of opacity.
VI. Glaucoma :- also k/a Kala motia common in old people.	↑↑ secretion of aqueous humour and ↑↑ intra ocular pressure in anterior cavity of eye to an abnormal level. ⇒ It exerts pressure on the posterior cavity and reduces the blood supply to retina, dilated pupil. ⇒ Thus lack of nutrients ultimately damages the nerve cells of retina leading to blindness.	⇒ Cured by drugs if detected in time by ↓↓ the rate of drainage of aqueous humour or the removal of a portion of iris to improve the flow of the fluid. ⇒ If the pressure is due to blockage of canal of schlemn a new canal can be created surgically.