**Ss2 third term**

**WEEK ONE**

**TOPIC: POLLINATION IN PLANTS**

specific objective: at the end of the lesson, I should be able to:

1. state the types of pollination

2. recognize the agentws of pollination

3. discuss the conditions or devices whih aid self and cross pollination

Meaning of pollination inplants

 pollination is the transfer of mature pollen grains from the anters of a flower to the matujre stigma of the same flower or another flower of the same plant or closely related species.

Types of pollination

1. Self Pollination: this is the transfer of mature pollen grains fro mthe anters of a flower to the stigma of the same flower or to that of another flower e.g pea, cotton, totmato. Only one parent plant is involved in self pollination.

2. Cross Pollination: this is the transfer of mature pollen grains from the anters of a flower to the stigma of a flower of another plant of the same or cosely related species e.g Morning glory, Hibiscus, Pride of Barbados. Two parent plants are involved.

Agents of Pollination (Pollinators)

1. Wind like snails, birds, bats and man and insects like butterfly, moth, bees.

Conditions or Devices which aid self pollination

1. Monogamy: the ripening of the anthers and stigma of a bisexual flower at the same time.

2. Cleistogamy: the ripe pollen grains are deposited on the stigma which ripen at the same time. This occurs among closed bisexual flowers which never open at all.

Advantages of self pollination

1. Pollination is sure to occur especially in bisexual flowers

2. It may not waste pollen grains.

Disadvantages

1. Repeated or continuous self pollination leads to th production of weak offspring.

2. The offspring produced are less adapted to the environment.

**Conditions or Devices swhich aid cross pollination**

1. **Dichogamy:** ripening of the anthers and stigmas of a bisexual flower at different times.

2. **Unisexuality:** a situation in which plants bear only male or female flowers and not both on the same plant e.g pawpaw, oil palm tree, maize plant.

3. **self-sterility:** it is a situation in which some plants smake themselves sterile. The presence eof pollen on their stigmas is injurious to further development of the plant.

**WEEK TWO**

**TOPIC: POLLINATION IN PLANTS**

specific objective: at the end of the lesson, I should be able to:

1. state the advantages and disadvantages of cross pollination

2. differentiate between self and cross pollination

3. state the characteristics of insect and wind poolinated flowers

**Advantages of cross pollination**

1. it leads to the production of healthieroffspring than self pollination

2. it also produces viable seeds

3. incividuals produced are more adapted to the environmental consitions

4. it leads to the formation of new varieties witgh good characteristics

**Disadvantages**

1. It relies on external agents such as wind and insets whose presence at the right time cannot be guaranteed

2. It wastes pollen grains especially pollination by wind.

**Diffences between self and cross pollination**

**Self Pollination Cross Pollination**

1. takes place only in bisexual flowers. takes place both in unisexual and bisecual flowers.

2. one parent is involved. Two parents are involved.

3. pollination may occur without Requires external agents e.g

an external agent. insects and wind.

4. it does not ensure new varieties. it results in the formation of new varieties.

5. pollen grains are effectively utilised. Much of the pollen grains are wasted.

**Characteristics of insect pollinated (entomophilous) flowers**

1. They have large conspicuous petals/sepals.

2. Flowers ae brightly colured.

3. Possession of scent.

4. Presence of nectar

**Characteristics of wind pollinated (anemophilous) flowers**

1. They have small, inconspicuous petals/sepals

2. Flowers are dull coloured

3. Absence of nectar

4. Absence of scent

**WEEK THREE**

**TOPIC: FERTILISATION IN FLOWERING PLANTS**

**S**pecific objective: at the end of the lesson, I should be able to:

1. define fertilisation in flowering plants and an ovule and state the parts

2. state the functions of ovule

3. define fruit, differentiate the strucure of a fruit differentiate between a seed and a fruit and the classification of fruit

Meaning of Fertilisation in flowering plant

Fertilisation is the union of two sex cells or gametes to form a zygote. In flowering plant fertilisation occur in the ovule after pollination.

The Ovule

This is the part of a flowering plant that contains the female gametes.

parts of Ovule and theri functions

1. Hilum: is the point of attachment of the ovule to the placenta

2. Integuments: are the two coverings of the ovule

3. Embryo sac: is the tissue that produces the female gamete

4. Nucellus: is enclosed by the integuments. It is nutritive in function.

5. Micropyle: is an opening into the ovule through which air and water get into the embryo of the seed

6. Synergids: it supoort the ovum andd directs the male gamete to the ovum.

Meaning of Fruit

A fruit is a mature fertilised ovary of a flowr containing seeds (the ovules).

In some plants, e.g banana and pineapple, fruits ae foremd without fertilisation. Such fruits are called parthenocarpic furits and they are seedless.

 Difference between a fruit and a seed

Fruit Seed

1. Fruit develops from an ovary. Seed develops from an ovule.

2. has a fruit stalk or scar Has a scar (hilum) formed by

(due to receptacle). attachment of funicle.

3. Bears sthe remains of style Does not bear the remains of style.

**WEEK FOUR and FIVE**

**TOPIC: CLASSIFICATION OF FRUITS**

**FLAME OF THE FOREST= DELONIX REGIA**

**Dry dehiscent fruit**

In a dry dehiscent fruit, the fruit wall breaks open to liberate the seeds, e.g balsam, bean, rubber, oil bean, okra (lady’s fingers).

**TYPES OF DRY DEHISCENT FRUITS:**

a. **Follide:** In this, the fruit dehisces longitudinally on one side only; e.g silk cotton and kola.

b. **Legume (pod):** A legume is a simple dry fruit which when ripe, the pericarp dehisces longitudinally along both sides to liberate the seeds e.g flamboyant pride of Barbados, cassia, cowpea, crotalaria, e.t.c.

c. **Capsule:** Here the pericarp many dehisce longitudinally at more than two places, e.g castor oil, para rubber, okra fruit and cotton.

d. **Schizocarp:** In schizocarp the ripe fruit breaks up into a number of small one-seeded parts called mericarps; e.g desmodium, cassia, mimosa pudica (a sensitive plant).

**Dry indehiscent fruits:** Are fruits with dry pericarps that are indehiscent or non-splitting.

**TYPES OF DRY INDEHISCENT FRUITS:**

a. **Achene:** Is a small, one-chamberedand one-seeded fruit, e.g strawberry and sunflower.

b. **Cypsela:** Is similar to achene, e.g tridax fruit and Emilia.

c. **Caryopsis:** In caryosis, the pericarp and the seed coat are fused to form a covering over the entire seed. E.g maize, grain, rice, millet, guinea corn, e.t.c

d. **Nut:** In the nut, the pericarp is hard and woody and it is separate from the seed coat. E.g the cashew nut where the actual fruit, the nut is on a fleshy edible receptacle.

e. **Samara:** Is a dry indehiscent one or two seeded winged fruit. E.g combretum and pterocarpous ( African rose wood).

**FRUITS AND SEEDS WITH PLACENTATION:**

Placentation is the arrangement of the ovules (seeds) within the ovary (fruit). The ovules ate attached to the ovary by placentae through short stalks called funicles.

**TYPE OF PLACENTATION:**

**1. Marginal** **placentation:** Here the ovules ate attached to the placenta along one margin of the ovary. Eg beans, cowpea, pride of Barbados, flamboyant, cassia, crotalatia and delonix.



**DRAW THE DIAGRAM:** (5 Lines)

**2. Patietal placentation:** The ovules are attached to the sides of syncarpous ovary having a single chamber,



**DRAW THE DIAGRAM** ( 5 Lines)

**3. FREE-CENTRAL PLACENTATION:** In this the ovules ate borne on a knob which projects from the base of the ovary e.g. Canalily

**DRAW THE DIAGRAM:**



**4. Axile placentation:** In an axile placentation the carpels of a syncatpous ovary meet in the center to form the placenta to which the ovules ate attached e.g. tomato



**5. Basal placentation:** The ovules ate attached to the base of a syncarpous ovaty e.g. sun flower



**REPRODUCTIVE SYSTEM IN PLANTS:**

A flower is an organ of sexual reproduction in a flower plant

**DRAW THE LONGITUDINAL:**



 SECTION (L\s) OF A FLMBOYANT FOLWER: (12 Lines)

The four floral whorls (parts) of a flower (using a flam boyant flower as an example ate: the calyx the corolla, the androecium and the gynoecium

 **THE CALYX:**

Is made up of the sepals free sepals ate Said to be ploysepalous while fused sepals ate called gamosepalous.

 **FUNCTIONS:**

1. The sepals protect the flowers while in the bud stage

2. The sepals ate green in colour and so catty out photosynthesis

 **THE COROLLA:**

It is made up of the petals. Fused petals and sepals are called perianth.

 **FUNCTIONS:**

1. The petals are brightly coloured and attract insects for pollination.

2. The petals produce scent for attracting insects for pollination.

3. The petals produce nectary or sweet juices for the insects.

 The sepals and petals are the non-essential parts of the flower, white the stamens and carpels (pistils) are essential parts.

 **The Androecium:**

 Is the reproductive organ of a flower made up of the stamens.



**Draw the stamen: (7 lines)**

A stamen consist of a stalk (the flaments) bearing the anthers. The

anther contains the pollen grains which are similar to the sperume in

animals.

**The Gynoecium:**

 Is the female reproductive organ of a flower made up of the carpels (pistils).

**DRAW THE PISTIL (CARPEL):**

 At the base of the carpel is the ovary is the containing the ovule. On top of the ovary is a long style with the stigma. The carpels many be free (apocarpous) as in bryophyllum and rose in flower, or fused (syncarpous) as in hibiscus.



 **SOME TERMS USED IN DESCRIBING FLOWERS:**

 **1. COMPLETE OR INCOMPLETE FLOWER:**

A complete flower has all the four floral whorls (parts) (sepals, and roecium, and gynoecium). E.g a flamboyant flower while an incomplete flower does not have one of the floral parts, e.g euphorbia hirta.

**2. UNISEXUAL AND HERMAPHRODITE FLOWER:**

 A unisexual (dioecious) flower is a flower with the only the pistils or stamens, e.g paw-paw. A flower with both pistils and stamens is referred to as a (monoecious) hermaphrodite, e.g a hibiscus flower.

**3. PERFECT AND IMPERFECT FLOWERS:**

A flower with both the androecium and gynoecium is called a perfect flower, e.g a flamboyant flower. A flower that has only the androecium or gynoecium is an imperfect flower, e.g the flower of guinea grass.

**4. REGULAR AND IRREGULAR FLOWER:**

 A regular or actinomorphic flower can be cut vertically into two

Similar halves along any plane. E.g allamander, cassia and tomato flower can be cut vertically into two similar halves only along one plane, e.g crotalria flower.

**5. HYPOGYNOUS FLOWER:**

 This is a flower with a conical receptacle with the ovary located on top of the cone. Other floral parts are arranged below the ovary. Such an ovary is said to be superior, e.g the hibiscus flower.

**6. PARIGYNOUS FLOWER:**

 Is a flower with a cup-shaped receptacle with the ovary located at the centre of the cup. Other floral parts are arranged slightly above it or almost at the same level with it. Such an ovary is said to be half inferior e.g the rose flower.

**7. EPIGUNOUS FLOWER:**

 Is a flower in which the ovary is sunken into and fused with the receptacle. The position of the ovary is below those of the floral parts. Such an ovary is said to be inferior. E.g the flower of guava.

 **GERMINATION OF SEEDS:**

Germination is the gradual development of the embryo of the seed into a seedling after a period of dormancy.

 **TYPES OF GERMINATION:**

1. Epigeal Germination.

2. Hypogeal Germination.

**EPIGEAL GERMINATION:** Is germination in which the cotyledons (seed leaves) are carried above the soil surface. It is common in dicotyledomelon, mango, e t c.

Draw the stages of germination in cowpea seed.(10 lines).

 **HYPOGEAL GERMINATION:**

Is germination in which the cotyledons, remains below the soil surface . It is common in monocotyledonous plants , E .g maize, oil palm, guinea corn , millet, wheat, e.t.c.

……………………………..............................................................................

**WEEK EIGHT, NINE AND TEN**

**NERVOUS CO-ORDINATION:**

Co-ordination is the process by which different parts of an organism work together for proper effectiveness. The two communication systems that brings about this co-ordination are:-

1. The endocrine system (hormones)

2. The nervous system.

 **NERVOUS SYSTEMS IN MAMMALS:**

 The nervous system of a mammal consists of two parts:

1. The central nervous system **(CNS)** made up of the brain and the spinal cord.

2. The peripheral nervous system **(PNS)** made up of the rest of the nervous system tissues in the body. It consists of the somatic nervous system. The autonomic nervous is made up of parasympathetic and sympathetic nervous system, summarized thus;

 Nervous System

 Central nervous peripheral nervous

 System system

 brain spinal somatic autonomic nervous

 Cord nervous system

 system

 parasympathetic sympathetic

 nervous system nervous system

 **COMPONENTS OF THE BRAIN:**

 DRAW A SECTION THE MAMMALIAN BRAIN (8 LINES)

The brain which is formed as a result of the enlargement of the anterior region of the neural tube at the end of the development of the embryo is the most highly specialized organ. It is protected by the skull or cranium and consists of three main parts:

1. Forebrain

2. Midbrain

3. Hindbrain

 **The main parts (regions) of the brain and their functions:**

**1. THE FOREBRAIN:**

 Is made up of two main parts: cerebrum and olfactory lobes, while the minor parts are

1. Thalami.

2. Hypothalami.

**(i) THE CEREBRUM:** Is the largest part of the brain made up of the right and the left hemispheres which are partially separated by median fissure. Both hemispheres are joined by the corpes, a structure that is absent in reptiles and birds.

 The dorsal region of the cerebrum is the neopalium which controls all types of sensory impulses and co- ordinates response through effector organs. It is well developed in man.

 **Functions of the cerebrum:**

1. It controls all voluntary action like movement of legs, arms, speech, e.t.c.

2. It is the seat of intelligence, consciousness, learning, memory, imagination, reasoning, judgement, and in morals.

3.It is concerned us the concentration and co-ordination of impulses

**(ii)**  **OLFACTORY LOBES:**

 Are a pair of small structure located anteriorly at the forebrain.

 **FUNCTION:**

They receive sensory impulses of smell thereby making the animal aware of smells in the environment.

**(iii) THALAMI:**

 These are two avoid structure attached to the back of the forebrain.

 **FUNCTIONS:**

1. Thalamus helps in experiencing sensation.

2. It is the seat of consciousness.

3. It receives impulses from the midbrain, hindbrain and spinal cord.

**(iv) HYPOTHALAMUS:**

 Is found below the thalami plays an important role in homeostasis.

 **FUNCTIONS:**

1. Hypothalamus control sleep and alertness

2. Control appetite (feeding)

3. controls body temperature

4. Control the amount of water in the blood (osmoregulation).

5. Controls the secretion of hormones from the pituitary gland.

**2. MIDBRAIN:**

 Is a very short region consisting of optic lobes,pineal body and pituitary gland.

 **FUNCTIONS:**

1. The optic lobes is the site of vision as it receives sensory impulses from the eye.

2. It connects the forebrain to the hindbrain and so transmits impulses.

**3. HINDBRAIN:**

 This together with the co-ordinate the body’s automatic involuntary activities. It is made up of the cerebellum, the pons varolii and the medulla oblangata.

**(i) CEREBELLUM:**

 This is a thick and convoluted portion of the hindbrain made up of two cerebellar hemispheres; the form of the cerebellum varies in vertebrates.

**FUNCTIONS:**

1. Balancing and motor co-ordination.

 2. It receives impulses from auditory organs (semi-circular canals of the ear) and skin.

3. It is concerned with the co-ordination of muscle actions in involuntary responses.

**(ii) PONS VAROLII:**

Consists of broad band of fibers that connect the cerebullar hemispheres.

**(iii) MEDULLA OBLANGATA:**

 This is the posterior of the brain that continues into the spinal cord. At this point, the central form a cavity known as the ventriole. The medulla is the region where the majority of the cranial nerves take their origin.

**FUNCTION:**

1. The medulla oblangata controls many involuntary actions such as respiration, heartbeat and digestion.

2. It controls the constriction and dilation of the blood vessels.

 **DRAW THE BRAIN OF RABBIT (DORSAL VIEW, AND THE TRANSVERSE SECTION (T/S) OF THE SPINAL CORD (14 LINES)**

 **THE SPINAL CORD:**

It consists of soft tissue that runs from the medulla oblangata to the tail region. it is protected by the neural archs of the vertebrate but passes through the neural canal.

 The spinal cord is enveloped within three membranes; the meninges for support and protection of the cord, the spinal canal is filled with a fluid called cerebrospinal fluid in which the spinal cord flows and bounces against the bone of the skull.

 Meningitis is a disease in which the meninges become infected and inflamed. In transverse section (T/S), the central region of the spinal cord is grey, and is called the grey matter. The outer part that surrounds the central region is light and is called the white matter.

 **FUNCTION OF THE SPINAL CORD:**

1. It co-ordinates simple reflex actions such as the knee jerk, and automatic reflexes such as sweating.

2. It is the pathway between the spinal cord nerves and the brain.

 **THE PERIPHERAL NERVOUS SYSTEM:**

 The peripheral nervous system (PNS) includes all spinal cord. The peripheral nervous system consists of the somatic nervous system (SNS) and the autonomic nervous system (ANS).

 **SOMATIC NERVOUS SYSTEM:**

 Control voluntary activities. It deals with external stimuli and their responses.

 The somatic nervous system is made up of 12 parts of cranial nerves in the head and 31 parts of spinal nerves in the body of man optic and olfactory nerves consist of sensory fibers.

 **AUTONOMIC NERVOUS SYSTEM:**

This is concerned with the control of the body’s involuntary activities, e.g heartbeat, breathing, digestion, secretion of sweat, yawning, blinking of the eye.

 The autonomic nervous s ystem (ANS) consists of two parts:

1. The sympathetic nervous system.

2. The parasympathetic nervous system.

 **THE SYMPATHETIC NERVOUS SYSTEM:**

 This consists of nerves which connect internal organs to the thoracic and lumbat areas of the spinal cord. It stimulates many parts of the body for necessary action in times of danger. It responds to emergency situations in the body during which hormone adrenalin may be released.

The parasymaptimulates many parts of the body for necessary action in times of danger. It responds to emergency situations in the body during which hormone adrenalin may be released.

 **THE PARASYMPATHETIC NERVOUS SYSTEM:**

This consists of nerves which connect internal organ to the 10th cranial here and the sacral region of the spinal cord. It stimulates the same organs as the sympathetic nervous (antagonistic) to the sympathetic system

**FUNCTION OF SYMPATHETIC AND PARASYMPATHETIC NERVOUS SYSTEM**

|  |  |  |
| --- | --- | --- |
|  | **SYMPATHETIC NERVOUS** **SYSTEM** | **PARASYMPATHETIC NERVOUS SYSTEM** |
| 1. | it accelerates heart beat  | Slows down heart beat |
| 2. | Constricts arteries | Dilates arteries |
| 3. | Dilates the bronchioles | Constricts the bronchioles |
| 4. | Dilates the iris (pupil) | Constricts the iris (pupil) |
| 5. | Slows gut movement | Speed up gut movement  |
| 6. | Contracts bladder and anal sphincter | Relaxes the bladder and anal sphincter  |
| 7. | Raises the blood pressure | Lowers the blood pressure |
| 8. | Inhibits the secretion of salivary glands | Stimulates the secretion of salivary glands |

 **INVOLUNTARY OR REFLEX ACTION:**

 An involuntary (reflex) action is an action carried out in response to certain stimuli without prior thought, e.g blinking of the eye, knee jerk, heartbeat, yawning, sneezing, coughing, e.t.c. it is fast, inborn (instinctive) and stereo-typed.

 The pathway through which the impulses pass is known as a reflex are made up of the following parts (heurones) sensory cells that receive the stimulus; sensory or afferent neurone transmits nerve impulses from the sensory cell to the spinal cord or brain; intermediate neurone conducts impulses from the afferent to the efferent neurone; motor or efferent neurone transmits impulses from the intermediate neurone to the effector; effector (muscle or gland) takes action.

 The receptors of the skin are stimulated and send impulses to the spinal cord through the dorsal toute to the grey matter of the spinal cord. From here, the impulses are relayed through the synapses into the intermediate neurone through another synapse to the motor or efferent neurone, this passes through the ventral route to the motor (effctor) organ which brings about a response. The impulse contracts the muscle of the hand, thereby removing the hand from the painful stimulus.

 **VOLUNTARY ACTION:**

 A voluntary action is an action consciously controlled by the brain. In other words they are those action we think about before we do them, e.g. singing, running, dancing, writing, drawing, typing, eating etc

 In a voluntary action, a nerve impulse is transmitted from the sensory neurone to the spinal cord and the brain for interpretation. The brain then sends the massages back through the motor nevone to the effectors organ.

**DIFFERENCE BLOW PETLEX AND VOLINTARY ACTIONS:**

|  |  |  |
| --- | --- | --- |
|  | **REFLEX ACTION**  | **VOLUNTARY ACTION**  |
| 1. | Action is intitated by muscle receptar | Action is intiated in the brain |
| 2 | Occurs unconsciously  | Occurs consciously |
| 3 | It is automatic and fast  | It is neither automatic nor fast |
| 4 | It is in born  | It can be leart |
| 5 | Nerve impulse do not reach the brain  | Nerve impulse always reach the brain |
|  |  |  |

 **DRAW AND LABEL A SIMPLE REFLEX ARC (10 LINES)**

 **CONDITIONED REFLEX:**

A conditioned reflex is a behavior acquired through learning after birth. As a result, it can be repeated without thinking about it.

Examples are walking, driving, reading, writing, typing, swimming, e.t.c. it takes a long time to learn each of those skills, but once we have mastered them, we perform them very fast and efficiently without thinking about them. In fact, they become habits.

A Russian scientist lvan Pavlov was the first to decried this behavior conditioning in 1902 from his experiments on dogs. A dog’s mouth become wet naturally when it is give food due to reflex action

 In one experiment, pavlou rang a bell before giving the dog its food after several repeated attempts the dog leant to associate the bell with food. So it salivatedas soon as it heard the bell that is, before the food appeared. so pavlou called this response a conditioned reflex

 **Draw And Label:- (1) A Motor Neurene (2) A Sensory Neurone (8 Lines**)

**ROLE OF CONDITIONED REFLEX ON BEHAVIOR:**

1. It help individual to acquire new skills through the learning of such habits.

2. Development of certain behavior which were not originally shown in the individual.

3. Unhealthy behavior like smoking, drinking, and drug, taking may become bad habits when acquitted through conditioned reflex and may be difficult to stop

4. It is used in the training of dogs for their special roles in crime detection and for security.

**DIFFERENCE B/W REFLEX ACTION AND CONDITIONED REFLEX.**

|  |  |  |
| --- | --- | --- |
|  | **REFLEX ACTION** | **CONDITIONED REFLEX**  |
| 1. | It is an in born behavior  | It is a learned behavior |
| 2. | It takes a shorter time  | It takes a longer time  |
| 3. | It involves spinal cord and relayed to the brain after action is completed.  | It is controlled by the brain  |
| 4. | Action starts by muscle receptor  | Action starts in the brain cells |

**DIFFERENCE B/W NERVOUS SYSTEM AND ENDOCRINE SYSTEM**

|  |  |  |
| --- | --- | --- |
|  | Nervous system | Endocrine system |
| 1. | Message are passed mainly as electrical impulses along nerves  | Message are passed mainly as chemical substances (hormones) in the blood stream  |
| 2. | Response is fast  | Response is slow  |
| 3. | Effect is for a very short time  | Effect is for a long time |
| 4. | Response does not depend on the quality of stimuli | Too much or too little can cause metabolic disorder |
| 5. | It is mainly controlled by the brain or spinal cord  | It is controlled by pituitary glands  |
| 6. | Effecters (muscles and gland) receive the message | Target organs receive the message |

**WEEK ELEVEN, TWELVE and THIRTEEN**

**SENSE ORGANS:**

A sense organ is a group of specialized cells issued or recetors which is able to receive perceive or detect

**CRITICAL THINKING:**

Why is the yellowspot so called it is the most sensitive part of the retina. The fullest uisual information is sout to the brain from here.

Stimulus and transuit the information or massage to the central nervous

System

 There are five sense organs with their function as shown:-

|  |  |  |
| --- | --- | --- |
|  |  **SENSE ORGAN** |  **FUNCTION** |
| 1. | Eye  | Sense of sight or vision  |
| 2. | Nose | Sense of smell |
| 3. | Tongue | Sense of taste |
| 4. | Ear | Sense of hearing and balance |
| 5. | Skin |  Sense of tough, pain, heat, or cold and pressure (feelings) |

**ORGAN OF SIGHT:**

 The eye is the organ of sight found in all vertebrates and in mammals; it is almost spherical in shape

 The protective structures of the eye are eye socket, eyelid eye lashes

Tears glands and conjunctiva. The eye is housed in the eye socket located in the skill

 the eye is protected from foreign particle or mechanical injury by the upper and the lower eyelids the eyelashes protect the eyeball from dust, excessive light, and also shield the eye against swear and water there are also tear glands (lacrimal glands) at the meeting points ofeyelids.

 Tears, a saline or salty fluid washes away dust that have settled on the eye it also moistens the conjctiva and can destroy most bacteria

Because it has a chemical substance called lysosome. So tears have antiseptic effect.

**STRUCTURE OF THE EYE:**

**DRAW THE VERTICAL SECTION OF THE HUMAN EYE (15 LINES):**

 The vertical section of the mammalian eye shows the eyeball which is a fluidfilled hollow structure. The wall of the eyeball consists of three layers: the outermost sclera, the middle choroid and the inner retina.

**(i) THE SCLERA OR SCLEROTIC LAYER:**

This is also known as the white eye and it is the outermost layer of the eye. It is a thick fibrous connective tissue.

Functions:

1. It gives shape and firmness to the eye

2. Protects and supports the inner parts of the eye

**(ii) GORNEA:**

 The sclerotic layer bulges out in front of the eye to form the transparent cornea. So, it is a continuation of the sclera.

Functions:

1. It admits light into the eyes

2. Bends the light rays to bring them to a focus on the retina

3. Protect the eyes externally

**(iii) THE CONJUNCTIVA:**

 This is a thin, tough transparent membrane lining the inside of the eyelid, protects the cornea.

**FUNCTIONS:**

1. It protects the innermost delicate structures

2. It is inflamed during infection instead of the entire eye

3. It allows the passage of light into the eye

**(iv) OPTIC NERVE:**

 Is found at the back of the sclerotic layer. It also penetrates the choroid and the retina at a point known as the blind spot which has no light sensitive cells.

**FUNCTION:**

1. It transmits sensory impulses to the brain

2. It also transmits sensory impulses from the brain

**(v) CHOROID OR MIDDLE LAYER:**

This layer is highly vascularised, pigmented and rich in blood capillaries, because of the blood capillaries; this layer may be brownish of reddish. It contains black pigment.

**FUNCTIONS:**

1. It provides food and oxygen to the cells of the eye

2. The pigment found in this layer helps to absorb light rays and prevents light reflection into the eye

**(vi) IRIS:**

The choroid forms the iris in front of the eye. The iris has radial and circular muscle fibres.

**FUNCTION**

1. It controls the amount of light passing through the eye.

**PUPIL:**

 This is the aperture or opening through the first and it si also found within the choroid layer in front of the eye

**FUNCTION:**

1. The pupil is where light enters the eye

2. It controls the amount of light entering the eye. (When bright light shines on the eye circubr muscles of the pupil small thereby reducing the amount of light entering the eye)

**CILIARY MUSCLE:**

The choroid layer forms the ciliary muscle to which is attached the suspensoty ligaments that hold the lens in place

**FUNCTION:**

1. It alters the focal length

2. It brings about proper accommodation of the eye

**(Viii) LENS:**

 The lens is a transparent biconvex elastic structure held in position by the sensory ligaments

**FUNCTIONS**

1. It helps to refract light rays that enter the eye

2. it make fine adjustment to focus the image of an object on the retina

ix. **RETINA:**

 The retina is the innermost layer of the eyeball and it is the part of the eye that is sensitive to light this layer is vascularised pigmented and elastic images formed on it are always inversted and smaller than the real object

THE RETINA HAS TWO TYPE OF SENSORY CELLS:- CONES AND RODS

**CONES:**

These are sensitive to colour vision and high light intensities but do not respond in dim light

**RODS:**

Are more than the cones on number they distinguish only black and white colour they are sensitive to all light intensities

**FUNCTIONS OF THE PATINA:**

1. Images are formed on the retina

2. Retina helps to detect colous of objects

3. Light rays come to a focus on the retina

**(x) YELLOW SPOT (FOVEA CENTRALIS):**

 Is the most sensitive part of the retina the fullest visual information is sent to the brain from the yellow spot.

**FUNCTIONS:**

1. Images are focused here

2. It is the most sensitive part of the retina

3. Fullest visual information is sent to the brain through the yellow spot

**(xi) BLIND SPOT:**

 Is also found on the retina here the cells are not sensitive to light. From this blind spot, the optic nerve goes out of the eye to the brain.

**FUNCTION:**

1. It marks the point where optic nerves leave the eye to the brain.

**(xii) AQUEOUS HUMOUR:**

 This is a transparent watery liquid which fills the space between the cornea and the lens. The liquid contains solutions of proteins, sugars and salts in water.

**FUNCTIONS:**

1. Refracts light rays into the retina.

2. It helps to maintain the spherical shape of the eye.

**(xiii) VITREOUS HUMOUR:**

 Is a transparent, jelly-like liquid in the space between the lens and the retina. It contains solutions of proteins, sugars and salts in water.

**FUNCTIONS:**

1. It refracts light rays onto the retina

2. helps to maintain the spherical shape of the eye

**FUNCTIONS OF THE EYE:**

THE EYE HAS TWO MAJOR FUNCTIONS:

1. Image formation

2. Accommodation

**IMAGE FORMATION:**

 For the image of an object to be formed on the retina, light rays from the object must pass through the conjunctiva, cornea, aqueous humour, lens and vitreous humour to the retina. The image of the object formed on the retina is inverted and smaller than the object, however, the brain interpret the size and orientation of the image correctly.

**ACCOMMODATION:**

This is the ability of the eye to focus both distant and near objects on the retina **OR** it is the ability to see clearly far and near objects.

Adaptations for near vision:

**IN ORDER TO SEE A NEAR OBJECT CLEARLY:**

1. The ciliary muscles contract

2. The suspensory ligaments relax their tension on the lens

3. The lens assume a more convex shape

4. The focal length of the lens is reduced

**ADAPTATION FOR DISTANCE VISION:**

**IN ORDER TO SEE A DISTANT OBJECT CLEARLY:**

1. The ciliary muscles relax

2. The suspensory ligaments pull tightly on the lens

3. The focal length of the lens is increased

4. The convex lens assume a near fat shape

**EYE DEFECTS AND THEIR CORRECTIONS:**

 Eye defect occurs when ever an image cannot be formed or cannot be formed properly on the retina.

**THE MAJOR EYE DEFECTS INCLUDE:**

**1. SHORT-SIGHTEDNESS (MYOPIA):**

 This is a condition in which parallel light rays from a distance object are focused in front of the retina, o.e, the image of a distant object is formed before the retina. Myopia is caused by the eyeball being too long or the lens being too convex (i.e, too thick) hence, the persons tends to move the object, e.g. book near the eyes.

**DRAW AND LABEL SHORT-SIGHTEDNESS AND IT’S CORRECTION (10 LINES)**

**CORRECTION:**

 Short-sightedness can be corrected by wearing spectacles fitted with concave or diverging lenses. The concave or diverging lenses Diverge the light rays from a distant object before they enter the eye so that the eye now brings the rays to a focus right on the retina.

**2. LONG-SIGHTEDNESS (HYPERMETROPIA):**

 This occurs when parallel light rays from near objects are brought to a focus behind the retina. The eye can see distance but not nearby objects. This may be caused by the eyeball being too short or the lens being too flat

**DRAW AND LABEL LONG-SIGHTEDNESS AND ITS CORRECTION (10 LINES):**

**CORRECTION:**

 Long-sightedness is corrected by using spectacles fitted with suitable convex or converging lenses will converge the rays of light so that they come to a focus directly on the retina.

**3. PRESBYOPIA:**

 Is the loss of the elasticity of the lens and ciliary muscle with age. The lens can no longer easily adjust its shape to focus the images of near and distant objects clearly on the retina. This leads to loss of accomodation.

**CORRECTION:**

 Presbyopia is corrected by wearing bi-focal lenses (a combination of convex and concave lenses).

**4. ASTIGMATISM:**

 Astigmatism is caused by an unequal curvature of the cornea or lens. This makes the rays of light to be brought to a focus at different points on the retina causing the image to be blurred.

**CORRECTION:**

 It can be corrected by using cylindrical lenses.

**OTHER EYE DEFECTS INCLUDE:**

1. Colour blindness

2. Night blindness

3. Cataract

**4. CONJUNCTIVITIS:**

 The human eye and the camera work in a similar way. The pupil, iris and the retina in the eye correspond to the aperture, diaphragm and film respectively in the camera.

**SIMILARITIES B/W THE HUMAN EYE AND THE CAMERA:**

1. Lens is converging in nature

2. Both retina and film are sensitive to light

3. Both iris and diaphragm are used to control the amount of light

4. The image formed is real, inverted and diminished

 **DIFFERENCE B/W HUMAN EYE AND CAMERA:**

|  |  |  |
| --- | --- | --- |
|  | **human eye** | **Camera**  |
| 1. | Its focal length varies. | Its focal length is foxed |
| 2. | Human eye adjusts focal length by contraction or relaxation of the ciliary muscle.  | Objects are focused by mere shifting of the lens forward or backward. |
| 3. | It records the image into a pattern of electrical impulses which are sent to the brain through the optic nerve.  | It records the image in light sensitive silver salt crystals on the film. |

**Care of the eye:**

1. Always wash the face with clean water.

2. Avoid staying in areas containing fumes of smoke that can irritate the eye

3. Use a clean handkerchief for cleaning the eyes

4. Avoid rubbing the eye with dirty fingers

5. Use antibiotic eye drops like chlorophenicol, spersellerg in case it is inflamed or reddish

6. Read books with fairly large prints and under correct lighting conditions

7. Consult a doctor in case of eye infections and if the eye sight is not good so that proper spectacles can be prescribed

**ORGAN OF HEARING- THE EAR:**

 The ear is the organ of hearing as well as the organ of balance in mammals. The greater part of the ear is embedded in the skull for protection.

**DRAW THE STRUCTURE OF THE EAR (12 LINES)**

 The mammalian ear is divided into three parts:

1. Outer ear

2. Middle ear

3. Inner ear (labyrinth)

**OUTER EAR:**

 This consists of the pinna, the auditory meatus (ear tube) and the tympanic membrane (ear drum).

**(i) PINNA:**

 Is made up of soft cartilage covered by skin. It is flexible and present only in mammals. The pinna collects sound waves and directs them to the auditory meatus. It also detects the direction of sound waves.

**(ii) AUDITORY MEATUS(EAR TUBE):**

 This is a harrow passage which contains wax-producing glands and fine hairs. The auditory meatus prevents the entry of tiny insects, germs and dust.

 **EARDRUM (TYMPANIC MEMBRANE):**

 It is found at the end of the auditory meatus. It is a thin, drum-skin membrane which vibrates when sound waves impinge on it. It is delicate but from, and separates the external ear from the middle ear.

 It transmits sound waves from the outer ear to the middle ear.

 **MIDDLE EAR:**

 This is a small air filled chamber in the skull made up of three tiny soft bones called oosicles held in place by muscle, and the eustachain tube.

a. **The eat ossicles are:-**

i The Malleus (hammer)

 These three ossicles together form a movable bridge linking the outer and the inner eats.

 The round window connects the middle eat with the inner eat.

 The ossicles transmit vibrations across the tympanic membrane to the oval window.

 They also magnify the pressure on the oval window several times.

b. **Eustachian tube:** Is a narrow tube in the middle ear, is connected to the back of the pharynx. It opens only dusting yawning. It equalizes out pressure on both sides of the eardrum by allowing air to enter or leave the middle ear.

 **Inner Ear:** In the inner ear ate body passage ways called body labyrinth filled with a fluid called perilymph. Within the body labyrinth are membranous labyrinth filled with another fluid called endolymph.

Both the body labyrinth and the membranous labyrinth forum two vital sensory structures:-

 1. The cochlea (organ of hearing).

 2. The semicircular canals, utoiculus and sacculus (organ of balance).

 Each semicirculat canal is attached to the uttculus, and each point of attachment is swollen to forum the ampulla which contains sensitive cells.

 The cochlea arises from the facculus and is coiled like a snail’s shell. It contains the organ of corti that actually responds to sound.