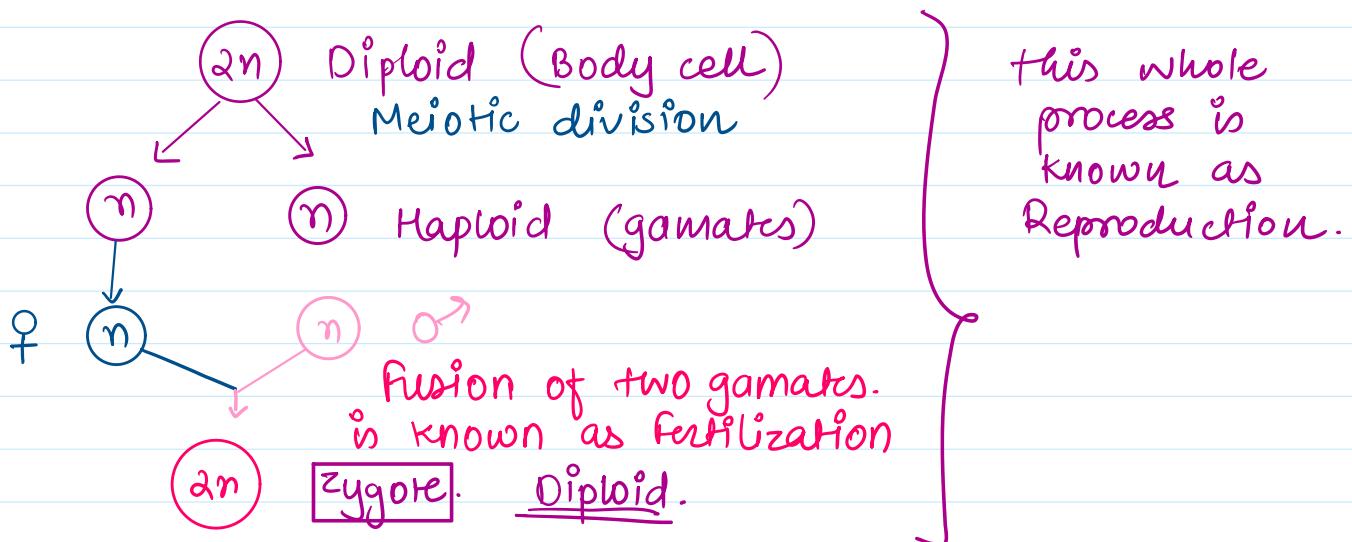


* Reproduction :- In this process a living organism produce new individuals similar to themselves.



Types of Reproduction:-

Asexual Reproduction

- single individual give rise to new individual.
- Gamete are not found.
- New individual is identical to parent.
- Extremely useful as a mean of rapid multiplication.
- Adopted by lower organism.

Sexual Reproduction

- Two individual (♀ & ♂) give rise to new individual.
- Gamete are found.
- New individual is genetically similar but not identical to parents.
- Useful to generate more variation in species.
- Adopted by higher organism.

⇒ Body cells of the organism undergo repeated mitotic division & form two or more similar individuals.
 Ex:- unicellular organism, some plants, Multicellular animals.
 (Sponges & Hydra).
 - Absent in higher invertebrates & all vertebrates.

Fission Fragmentation Regeneration Budding Spore formation vegetative propagation (plants).

(1) Fission :- Parent body divides into two daughter cells.
 Ex:- Amoeba, Paramecium, Vorticella, Euglena & other protozoa.

Binary fission

- Body of individual divides into two equal halves.
- Occurs during favourable conditions.

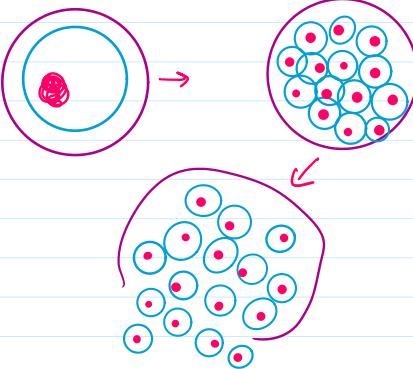
- Nucleus of the parent cell divides only once to form two daughter cells.
- Cytoplasm divides after nuclear division.
- No part of parent body is left unused.

Ex:- Amoeba, paramecium, euglena

Multiple fission

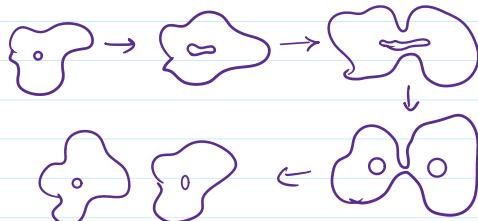
- It forms many daughter individuals simultaneously.
- Occurs during favourable & unfavourable conditions.
 (Ex:- Plasmodium & Amoeba).
- Nucleus of the parent undergoes repeated divisions to form a number of daughter nuclei.
- Cytoplasm does not divide after every nuclear division.
- Covering & residual cytoplasm is left behind.
- Ex:- Plasmodium, Amoeba. (Cocystid), Monocystis.

Simple Binary. Longitudinal B.F. Transverse B.F.



(1) Simple binary fission :- Occurs through any plane.

Ex:- Amoeba



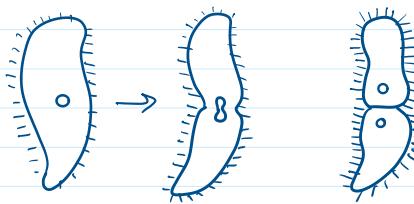
(2) Longitudinal B.F. :- Plane passes through longitudinal axis.
 Ex:- Euglena, vorticella & leishmania (kala azar).



(3) Transverse B.F. :- Plane Passes through transverse axis.



(5) Transverse B.F. :- Plane passes through transverse axis.
Ex:- Paramecium.



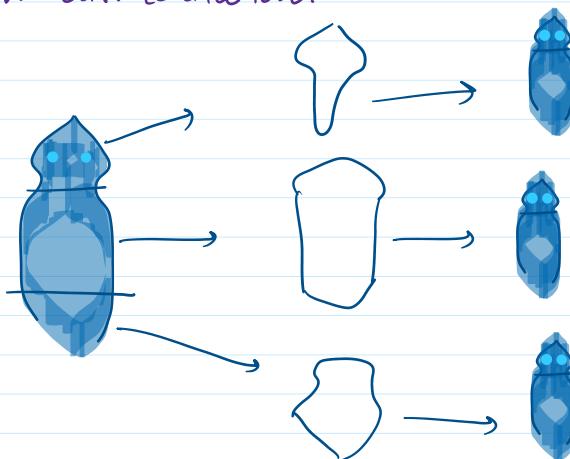
[2] **Fragmentation** :- Organism is somehow cut or broken into many pieces, each piece grows into a complete organism.
Eg. Planaria, Hydra, green filamentous algae, Spirogyra, fungi & bryophytes.



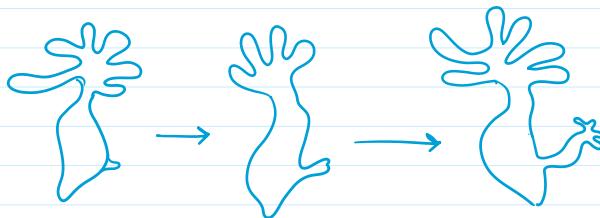
[3] **Regeneration** :- Process of restoration of lost body part or formation of whole organism from a small fragment.

Ex:- Hydra and planaria

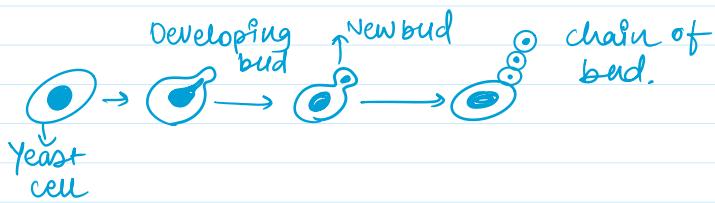
- Regeneration is carried out by some specialized cells **totipotent cells** and condition is known as **totipotency**. which can proliferate & make large number of cells.
- From this mass of cells (**callus**) different cells start to show differentiation.



[4] **Budding** :- Multicellular animals (Hydra) produce small buds, which gradually grows, ultimately acquiring the characteristic of parent organism.



- In unicellular organism (Yeast) - a fungus. A small protuberance (outgrowth) appears on the upper part of an adult cell, which gradually grows in size.
- From newly budded cell, another bud appears at the tip.
- Process continues 3-4 times, resulting in a chain of buds which grow into yeast cells.

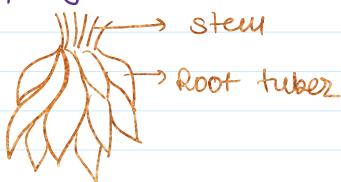


[E] **Vegetative propagation (In plants)** :- Number of perennial plants propagate vegetatively in Nature. In this method somatic parts of the plant develop into new plants under suitable condition.

Natural

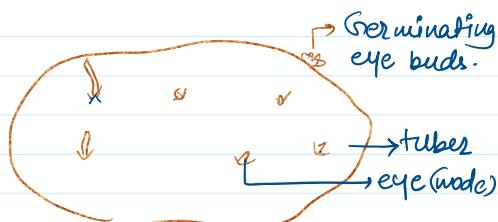
By roots :- roots of some plants grow adventitious bud which grow to form a new plant.

Ex:- Dalbergia, Guava, sweet potato, Dahlia, Asparagus.

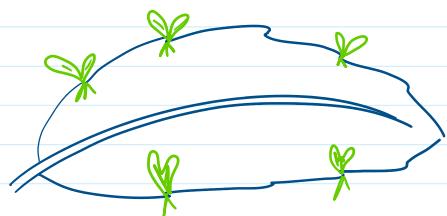


By stem:-

- (1) **Underground** :- Elephant Foot Yam.
- (2) **Tubers** :- Potatoes which have buds or eyes over their nodes. The buds produce new plantlets when a stem tuber or a part of it placed in the soil.



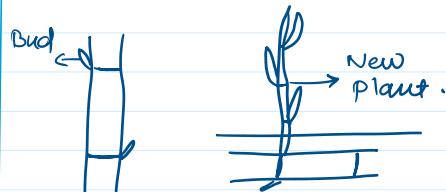
By leaves :- Begonia, Bryophyllum, saint paulia. The leaf buds fall on the soil and develop into new plants.



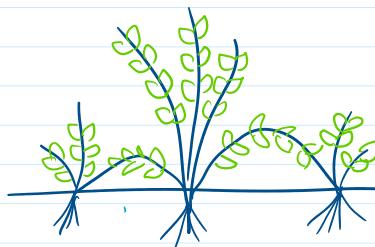
Artificial

Cutting :- Cutting of root, stem & leaf can be propagate when it placed partly under moist soil, and then develops in a new plant.

Ex:- Grape, phalsa, sugarcane & rose

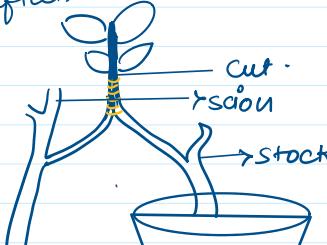


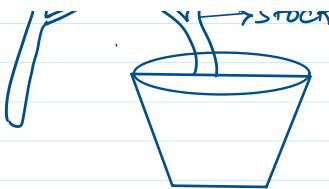
- (1) **Layering** :- Part of the stem of a plant buried in the soil while it is still attached & supported by the parent plant. the it can be separated from the parent plant
Ex:- Raspberry, strawberry



Grafting :- A very young scion (part of desired plant variety with superior characters) can be made to flower when it is grafted on a mature stock (plant with strong root system).

Ex:- citrus stock, varieties like sweet orange, lemon, lime can be grafted.





→ Advantages:-

- 1) It is used to propagate such plants which do not produce viable seeds, or very few seeds or very long dormant periods.
Ex:- Banana, Pineapple, orange, grape, rose, jasmine.
- 2) Producing disease free plants.
- 3) Genetically similar
- 4) It can bear flowers & fruits earlier than those which are produced from seeds.

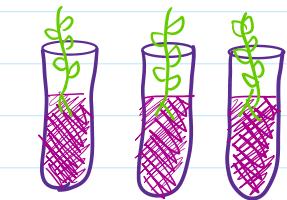
→ Significance of Asexual reproduction (Plant/ Animals) :-

- (1) Organisms can reproduce without mate.
- (2) Doesn't require the time & energy to find mate.
- (3) Produce large number of offspring rapidly.
- (4) It can spread & colonize an area in a short period of time.
- (5) Animals that are confined to one particular place & unable to look for a mate reproduce asexually.

Micropagation

01 June 2023 14:01

→ It is also known as clonal propagation. Cultivated plants is genetically identical to the original plant from which they were grown.



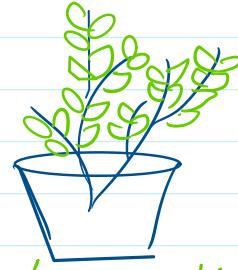
→ Explant (Living tissue or cell of plant)

↓
Placed on artificial nutrient media.



- It starts to divide rapidly.
- It forms a mass of undifferentiated cells (meristematic) called **callus**.

- Transfer to another nutrient media containing hormones for shooting & rooting
- New roots & shoots occur →



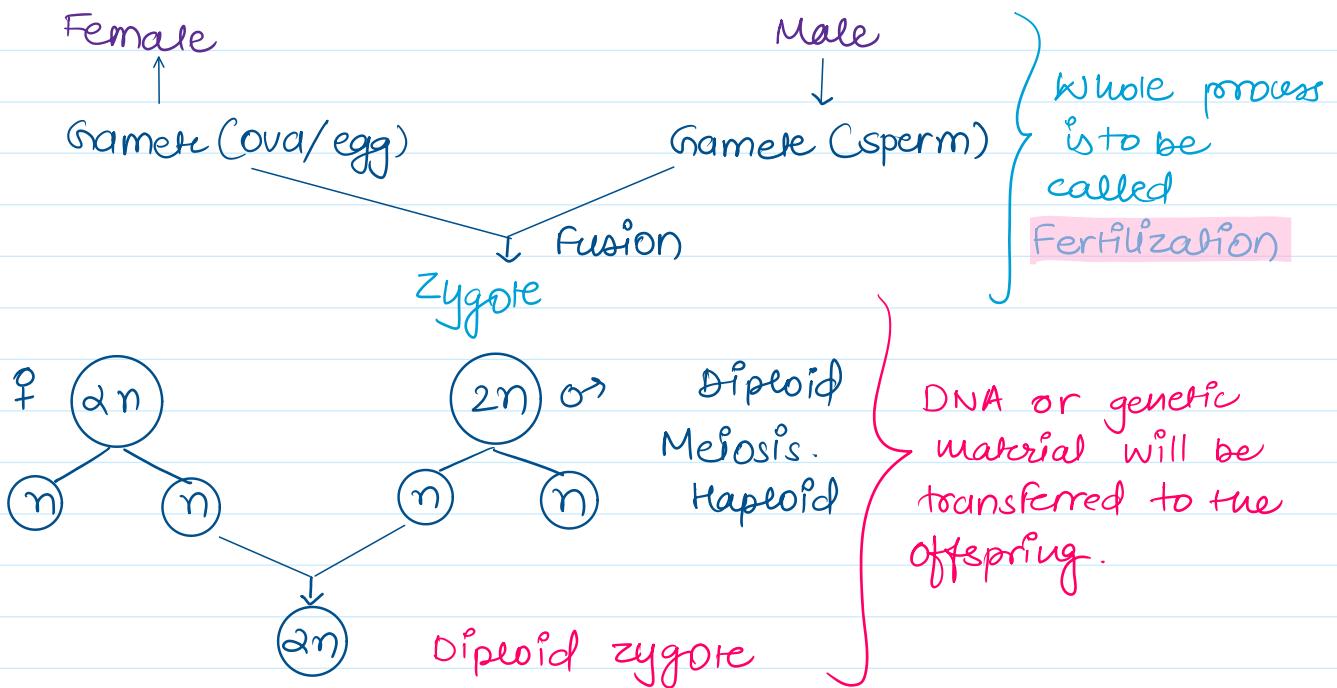
Transfer to the soil.

○ Advantage of micropagation:-

- 1) Large number of plants can be produced in short span of time and space.
- 2) Helps in crop improvement by producing disease free plants.

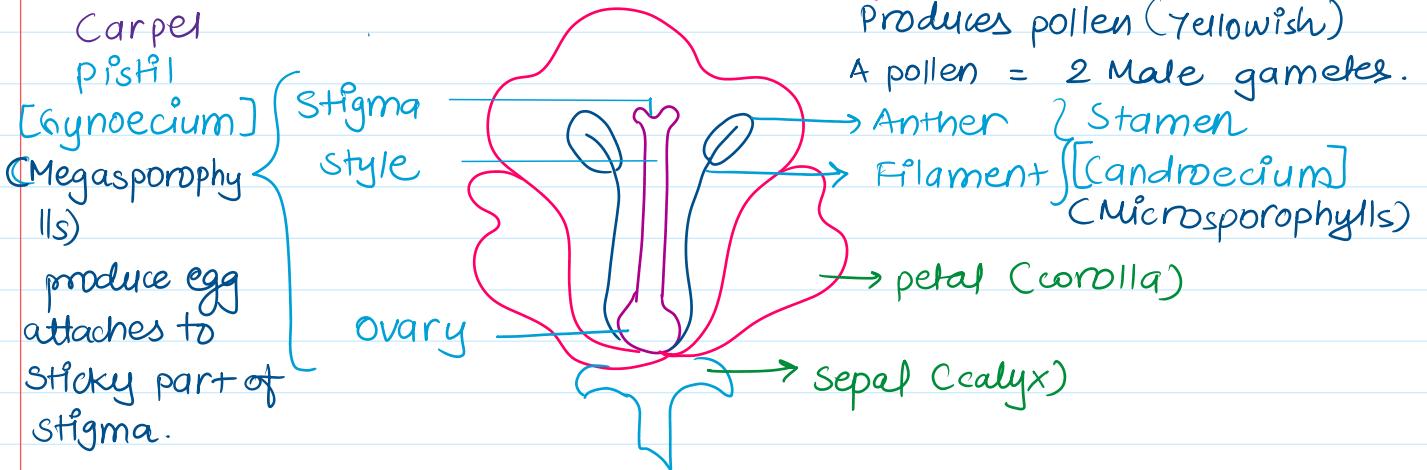
Sexual reproduction in flowering plants'

05 July 2023 14:51



- In lower organism → all cell are same in structure. or are not very different from one another.
- In higher organism → One germ cell (Ova) is large & not motile whereas (sperm) is small, have tail & motile.

⇒ Sexual Reproduction in Flowering plants



⇒ Flower may be **unisexual** +

- They have either stamens (Male) or carpel (Female)
- Eg. Papaya, Watermelon.

⇒ Flower may be **bisexual** +

- They possess both stamen and carpel.
- Eg. Hibiscus, Mustard.

Pollination

- process of transfer & deposition of pollen grains from the anther to the stigma of the flower is called pollination.

Self pollination

- process of transfer of pollen grains from the anther to the stigma
- same flower or
- another flower of same plant

Cross pollination

- transfer of pollen grain from the anther of one flower to the stigma of another flower borne on a different plant of the same species.
- Cross pollination requires the aid of an external agency.

Abiotic

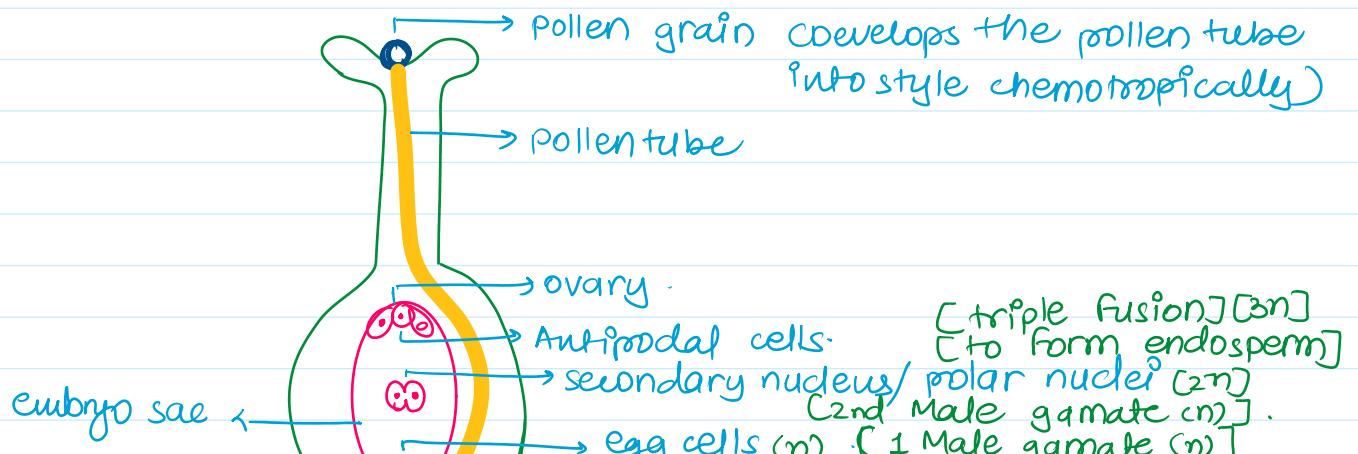
- Wind
- Water

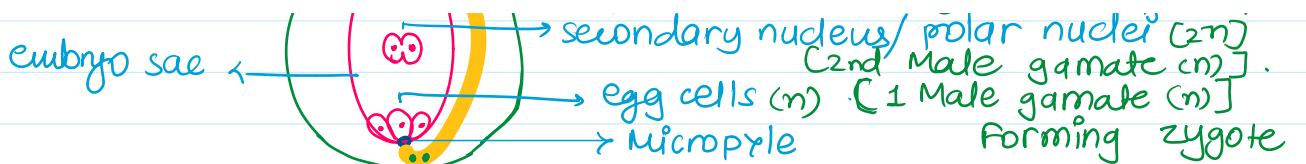
Biotic

- Insects
- Birds
- Bats
- Snails
- Other animals

- cross pollination brings about
 - Genetic Recombination.
 - Produces Variations.
 in offsprings.
- It also increases the adaptability & makes the offsprings better adjusted towards the changes in the environment.

Fertilization in Plants:-





Double Fertilization

1st :- egg cells + 1st Male gamate } embryo.
 $(n) + (n) = (2n)$

2nd :- Polar nuclei + 2nd Male gamate : } endosperm
 $(2n) + (n) = (3n)$ Triploid

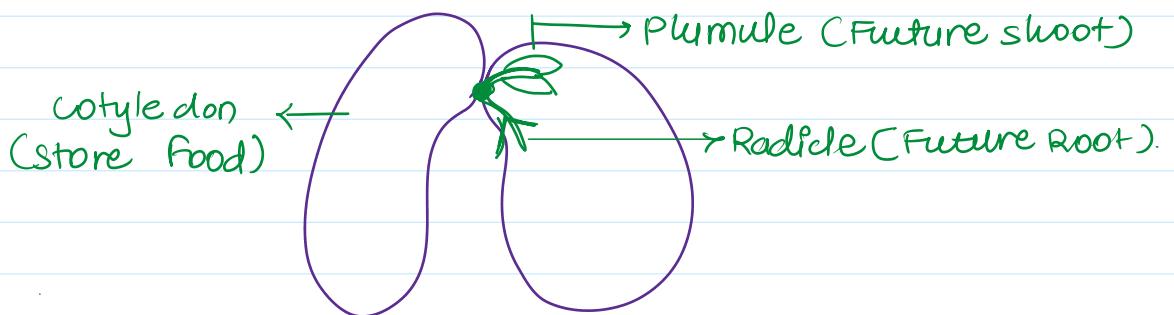
→ Ovule develops a tough coat and is gradually converted into a seed.

→ Ovary grows rapidly and ripens to form a fruit.

→ Petals, sepals, stamens, style and stigma may shrivel and fall off.

★ **SEED :-** seed contain future plant or embryo which will develop under appropriate conditions.

- This process is known as **germination**.
- Plumule - Develops into the shoot
- Radicle - Develops into the root.



→ Phase of sexual Reproduction :-

1) Prezygotic/Gametic phase :- Phase for production of their gametes. - Male :- sperm formation (spermatogenesis)
- Female :- ovum formation (oogenesis).

2) Zygotic Phase :- It involves fusion of gametes (sperm & ova) & formation of zygote.

- This process is called **fertilization/syngamy**.

3) Post zygotic Phase :- Events of growth & development of the embryo & foetus from a single cell - zygote.

Sexual Reproduction Important points :-

1. External Fertilization :- Fertilization takes place outside of the body. Ex:- fishes, amphibian
 2. Internal Fertilization :- Inside the body.
Ex:- Birds, Reptiles
 - Male gamete transported to female reproductive tract.
 - This transfer of gamete occurs at the time of mating or copulation. structures associated with mating are called as sex organ (accessory) → Male - penis.
Female - vagina.
- True fruits :- fruits develops only from the ovary as other floral parts degenerate & fall off.
- False fruits :- Thalamus contribute in fruits formation.
Ex :- Cashew, strawberry, apple.
- Ovary develops into fruits that develops a thick wall called pericarp. protective in functions.

Mature seeds.

↓ Albuminous

- Part of endosperm as it is not completely used up during embryo development.
- Eg. Wheat, Maize, barley, castor, sunflower.

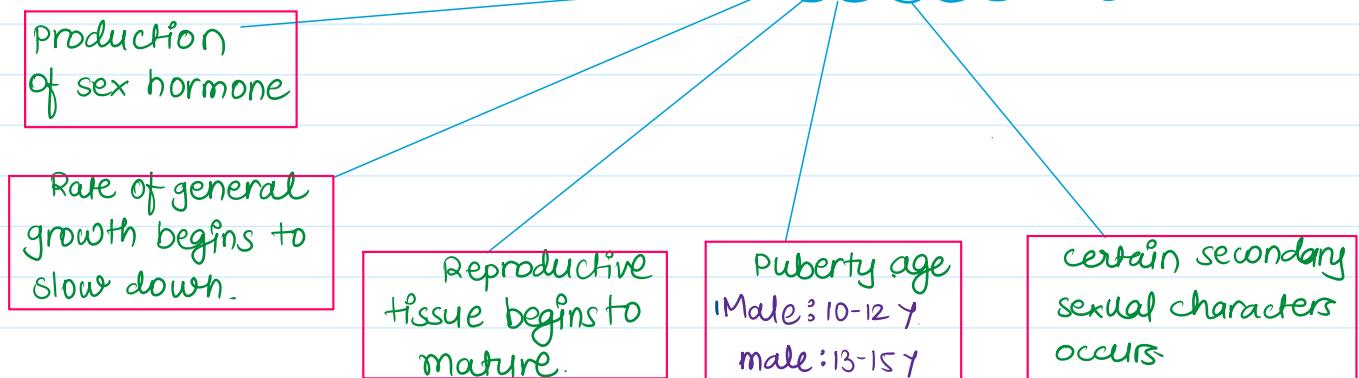
↓ Non-albuminous.

- Have no residual endosperm as it is completely consumed during embryo development.
- Eg. Pea, ground nut.

- ⇒ Human Beings are Dimorphism as they are unisexual
 Two gametes are involved in the fertilization process.
 (1) Male gamete - sperm.
 (2) Female gamete - egg or ovum.
 - These gametes are fused inside the female Reproductive tract to do fertilization process.

→ Puberty & secondary sexual characteristic.

- Puberty means development of sexual maturity.



Secondary Sexual characteristics

- Thick hair growth in the pubic region & armpit
- Thin hair appears on legs & arms,
- skin becomes oily & occurrence of acne.

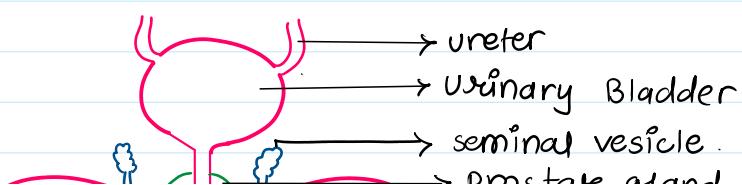
Female

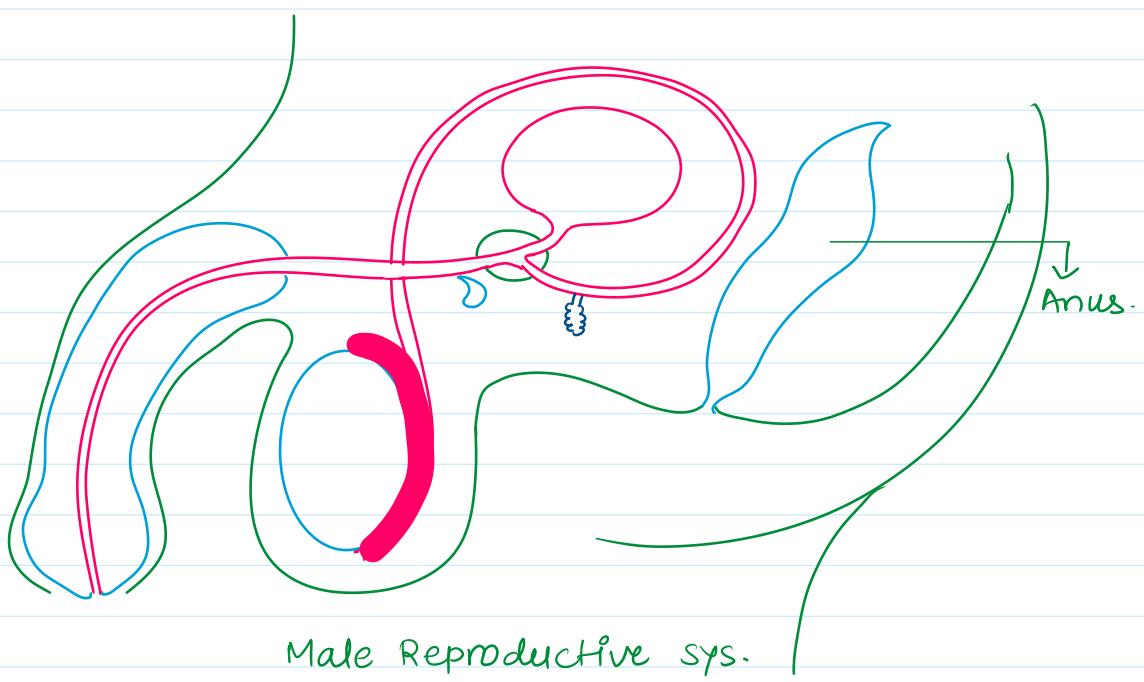
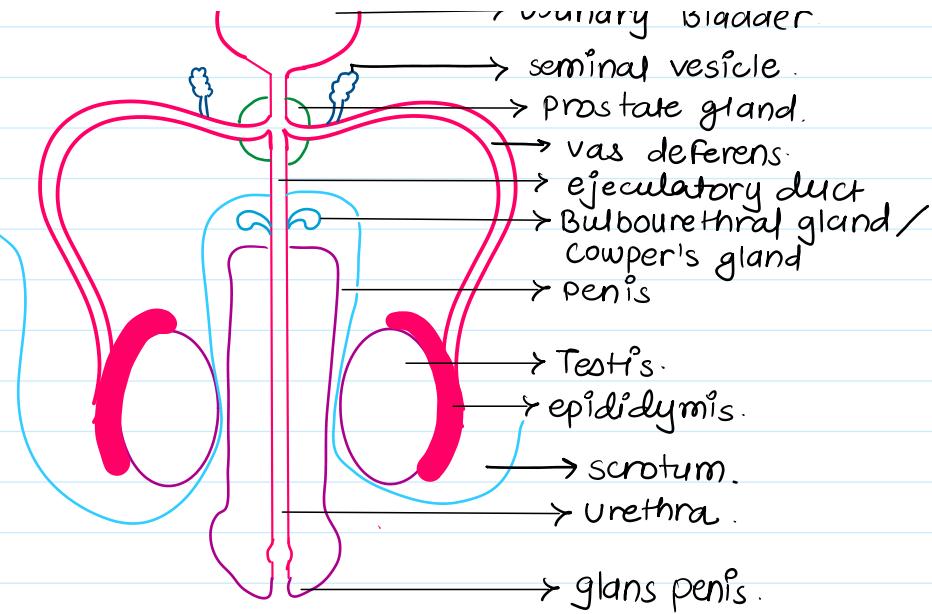
- Breast size begins to increase
- Darkening of skin of nipples at the tips of breasts.
- Menstruation begins.
- Deposition of fat in various body parts like thighs & hips.
- High pitched voice.

Male

- Thick hair growth on the face & voice begins to crack & becomes deep.
- Body becomes muscular.
- Enlargement of testes, scrotum & penis.

⇒ Male Reproductive tissue :-





Male Reproductive sys.

Testis

- primary sex organ
- Sperm formation & male sex hormone **Testosterone**.
- located :- outside the abdominal cavity .
- found hanging in pouch like structure **scrotum**.

→ provides optimal temperature for formation of sperms which is 2.5°C lower than Body temp.

→ weather is cold → scrotum shrinks closer to abdomen to get heat.
→ weather is warm → scrotum moves

Secondary sex organs.

- **Duct system** :- epididymis & vas deferens.
epididymis :- coiled tube on testis.
- stores sperms temporarily. connects with vas deferens.

Vas deferens :- Muscular tube passes upwards & transports the sperms.

- Vas deferens from each side joins from seminal vesicle to form an **ejaculatory duct**
- It opens into urethra, which is common path for sperm & urine.

→ **Accessory glands** :- pair of seminal vesicles, prostate gland & a pair of cowper's gland/ Bulbourethral gland.

Closer to abdomen to get heat.
→ Weather is warm; scrotum moves away to get rid of extra heat.

prostate gland & a pair of Cowper's gland/Bulbourethral gland.

- (i) **seminal vesicle** :- paired, tubular, coiled glands situated behind urinary bladder.
- secrete a viscous fluid constitutes the main part of the **seminal fluid** or semen.
- This fluid provides **nourishment** to sperms & medium for **transportation**.

(ii) **prostate gland** :- lies at the base of the bladder & surrounds the beginning of urethra.

- **Alkaline compound** to seminal fluid which increase the **motility** of sperms.

(iii) **Cowper's glands** :- two small bodies situated either side of the urethra, inferior to the prostate gland.

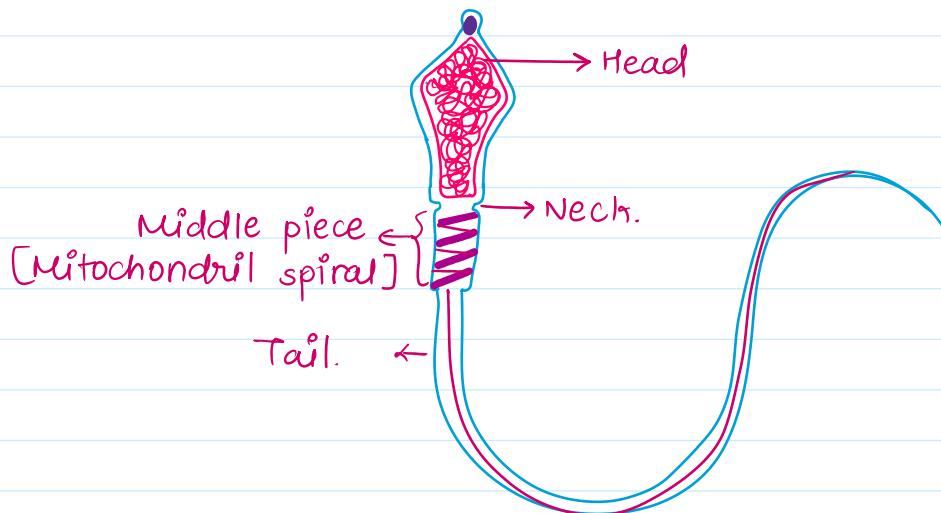
- It helps in **lubrication** as well as **neutralization** of the acidity of male urethra.

⇒ **Mating Organs** :- The penis.

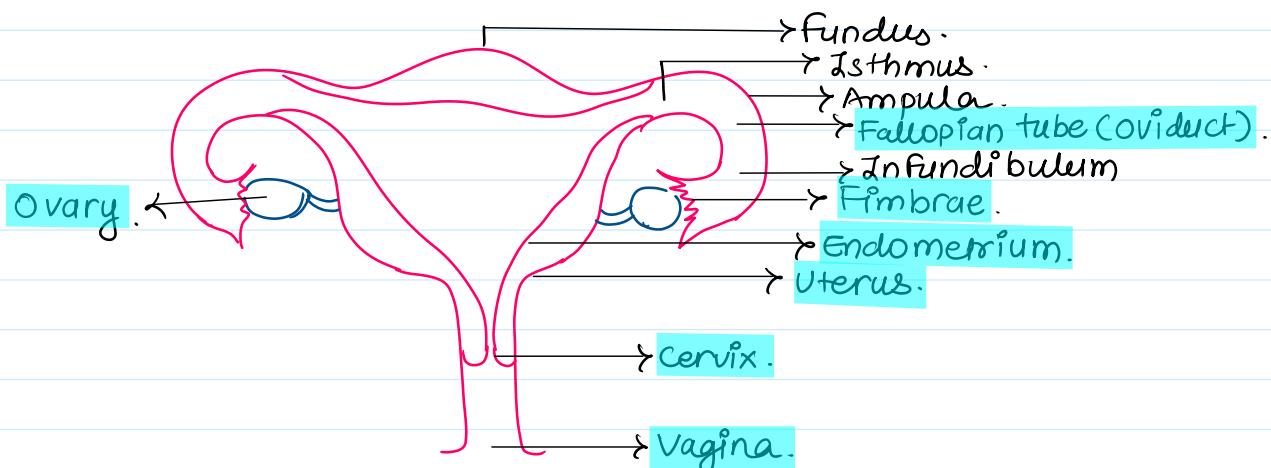
- Muscular, tubular organ which hangs in front of scrotum.
- copulatory organ.
- Two parts - shaft & the glans.
- Inside of the penis - spongy erectile tissue that can expand & contract

⇒ **Sperms** :-

- consist of mainly genetic material
- long tail helps to move
- Middle piece - Mitochondrial spiral, provide energy for Movement of sperm.



Female Reproductive System



⇒ Consists of organs that produce an ovum periodically, facilitates its fertilization & growth of foetus.

Ovaries.

- Pair of almond shape structure at lower part of abdominal cavity.
- When a girl child born - her ovaries contain thousands of immature eggs.
- After puberty, a few follicles (primary follicles) begin to mature every month.
- Mature follicles contain Graafian follicle, which contains single ovum.
- One egg is produced by one ovary.
- Graafian follicles now ruptures to release the ovum from the ovary by the process of ovulation.
- Ruptured follicle left in the ovary is converted to a structure called corpus luteum.
- It also produces female sex hormone like estrogen & progesterone.

Secondary sex organs

⇒ Oviduct/Fallopian tube, Uterus, cervix, vagina.

- i) **Fallopian tube** :- Pair of thin tubes that lead from the ovaries to the uterus.
- Each tube has funnel shaped part through which it receives the mature ovum released from ovary.
- Fertilization of ovum by sperm occurs inside the oviduct at Isthmus.
- ii) **Uterus** :- hollow, pear shaped, elastic, muscular organ, specialized to retain & nourish the foetus during pregnancy.
- Upper portion :- Broader, where F.T. enters.
- Lower portion :- Narrow, called cervix. opens into the vagina.
- Zygote gets implanted in the lining of uterus, & start dividing.
- (3) **Vagina** :- Muscular distensible tube leading to the outside of the body through an opening located in vulva (external genitalia)
- Situated b/w rectum & urethra.
- Receives seminal fluid from male during copulation.
- It's also the passage through which new

copulation.

- It's also the passage through which new born gets out.

