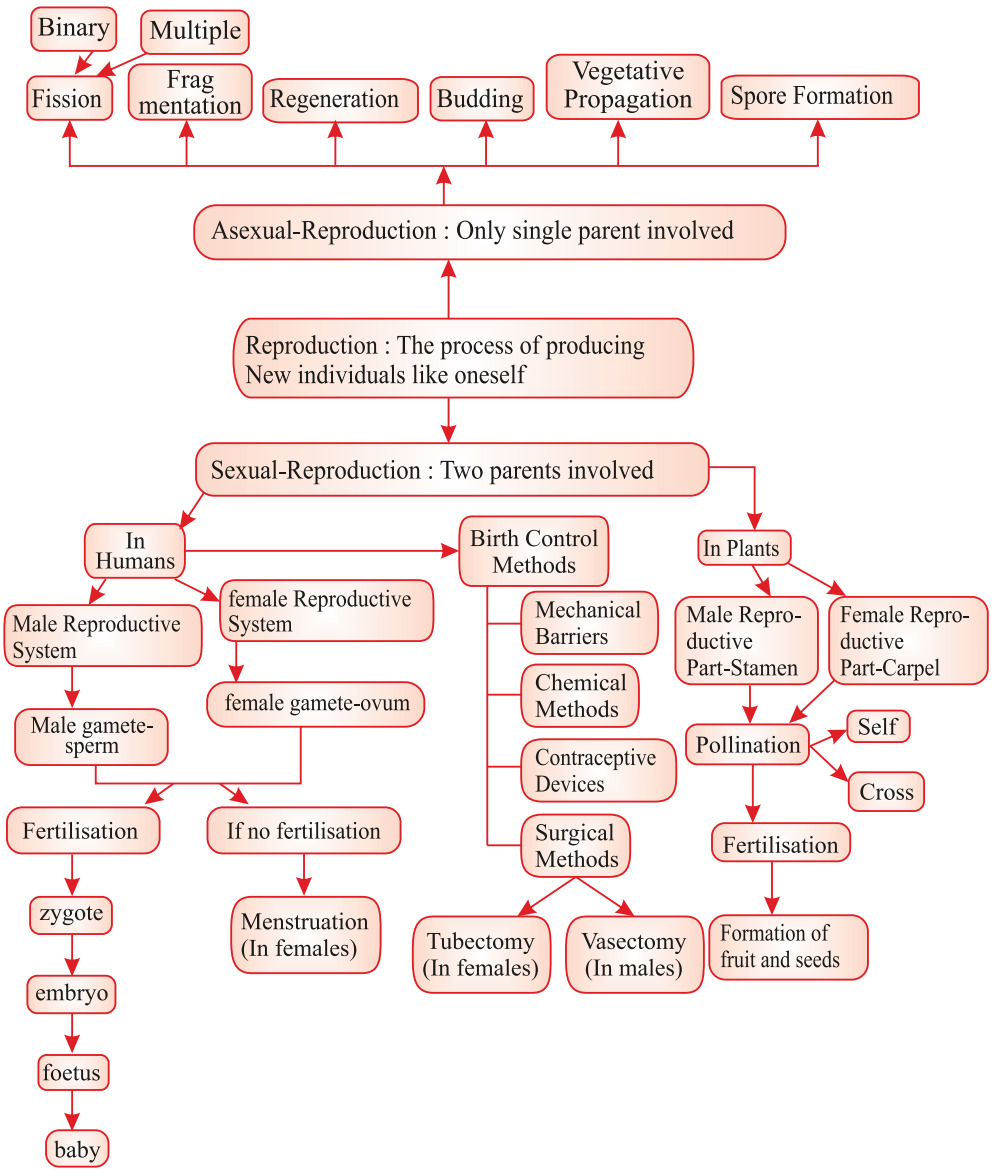
Chapter - 7

How do Organisms Reproduce



- Reproduction is the process by which living organisms produce new individuals similar to themselves. It ensures continuity of life on earth.
- Nucleus of the cell contains DNA (Deoxyribonucleic Acid) which is the hereditary material.
- DNA replicates and forms new cells causing variation. So, these new cells will be similar but may not be identical to original cell.
- Variations are useful for the survival of the individual and species over time as well as basis for evolution.

Types of Reproduction

(a) Asexual Reproduction

- A single individual gives rise to new individual.
- Gametes are not formed.
- New individual is identical to parent.
- It is extremely useful as a means of rapid multiplication.
- Adopted by lower organisms.

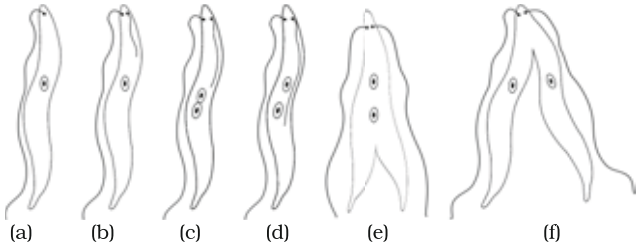
(b) Sexual Reproduction

- Two individuals i.e., one male and one female are needed to give rise to new individual.
- Gametes are formed.
- New individual is genetically similar but not identical to parents.
- It is useful to generate more variations in species.
- Adopted by higher organisms.

Modes of Asexual Reproduction

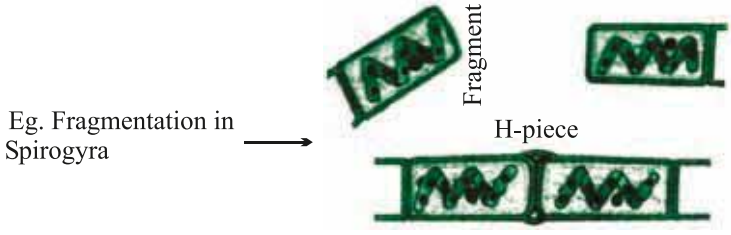
(i) Fission : The parent cell divides into daughter cells.

- **Binary fission :** 2 cells are formed. *E.g.*, Amoeba.
- **Multiple fission :** Many cells are formed. *E.g.,* Plasmodium.



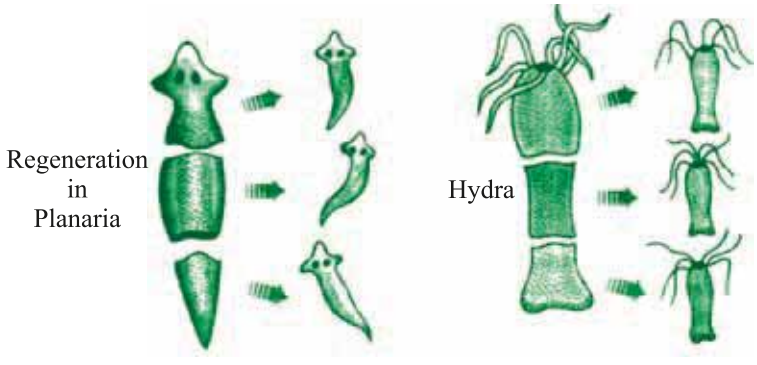
Binary fission in Leishmania

(ii) Fragmentation : The organism breaks-up into smaller pieces upon maturation, each piece develops into new individual. *E.g.,* Spirogyra.



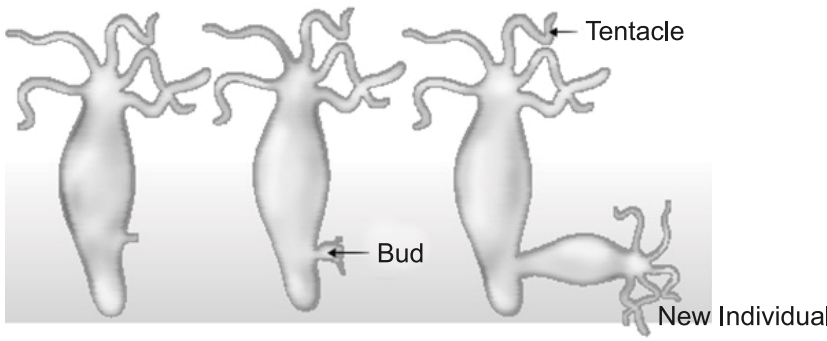
Fragmentation in Spirogyra

(iii) Regeneration : If organism is somehow cut or broken into many pieces, each piece grows into a complete organism. *E.g.,* Planaria, Hydra.



Regeneration in Planaria and Hydra

(iv) Budding : A bud is formed which develops into tiny individual. It detaches from parent body upon maturation and develops into new individual. *E.g.,* Hydra



Budding in Hydra

(v) Vegetative Propagation : In many plants, new plants develop from vegetative parts such as :

- By roots : *E.g.,* dahlias, sweet potato.
- By stem : *E.g.,* potato, ginger.
- By leaves : *E.g.,* bryophyllum (leaf notches bear buds which develop into plants).
- Artificial methods :

(a) Grafting : *E.g.,* Mango

(b) Cutting : *E.g.,* Rose

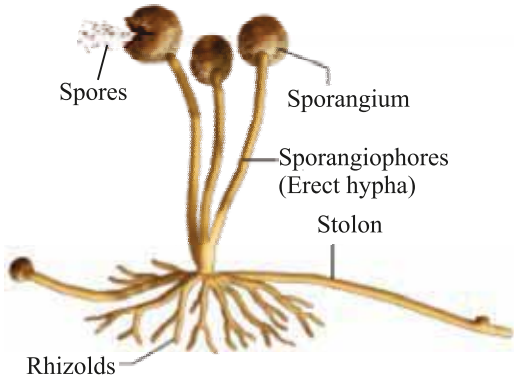
(c) Layering : *E.g.,* Jasmine

(d) **Tissue culture :** New plants are grown by using growing tip of a plant. These growing cells are kept in a culture medium leads to the formation of callus. Callus is then transferred to hormone medium which causes growth and differentiation. *E.g.,* ornamental plants, orchid.

Benefits of tissue culture :

- We can grow plants like banana, rose, jasmine etc. that have lost the capacity to produce seeds.
- New plants are genetically similar to parents.
- Helps in growing seedless fruits.

(vi) Spore Formation : Spores are small bulb like structures which are covered by thick walls. Under favourable conditions, they germinate and produce new organism.



Spore formation in Rhizopus

Sexual Reproduction

When reproduction takes place as a result of the fusion of male and female gametes is called sexual reproduction.

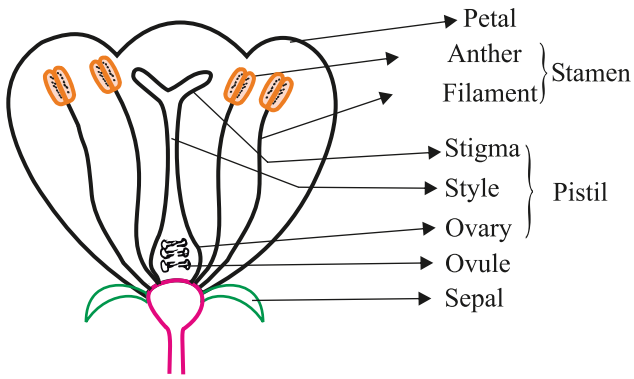
Fusion of gametes is called fertilization which results in variation.

Sexual Reproduction in Plants

- Flowers are the reproductive organs of plants.
- A typical flower consists of four main parts namely sepals, petals, stamen and pistil.

Types of Flowers

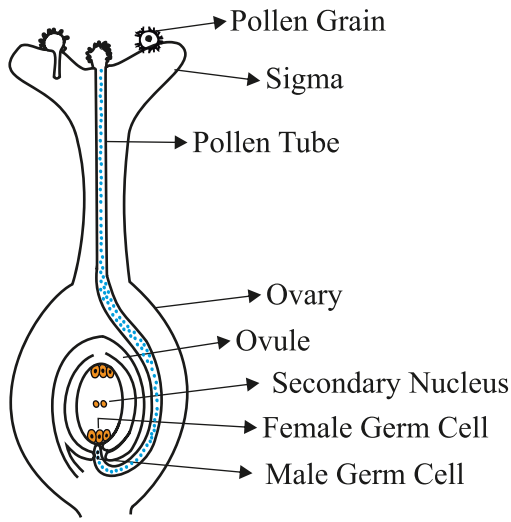
- **Bisexual flower :** Both male and female reproductive parts are present. *E.g.,* Hibiscus, mustard.
- **Unisexual flower :** Either male or female reproductive part is present. *E.g.,* Papaya, watermelon.



Longitudinal Section of Flower

Process of Seed Formation

- Pollen grains, produced in the anther, are transferred to the stigma of same flower (self pollination) or stigma of another flower (cross pollination) through agents like air, water or animals.
- Pollen grains germinate and form pollen tubes which pass through style to reach upto the ovules present in ovary.
- The fusion of male and female gametes is called fertilization. Zygote is produced inside the ovary.
- Zygote divides to form embryo. Ovule develops thick coat and changes into seed gradually.
- Ovary changes into fruit and other parts of flower fall off.



Germination of pollen on stigma

- The seed germinates to form a plant under suitable conditions such as air, moisture etc.

Double Fertilisation :

1) **First Fusion:**

Male Gamete + Female Gamete $\xrightarrow{\text{Syngamy}}$ Zygote $\xrightarrow[\text{Development}]{\text{Growth \&}}$ Embryo

(n) (n) (2n)

Syngamy term is used for fusion of male and female gamete in plants.

2) Second Fusion

Male Gamete + Secondary Nucleus ⟶ Primary Endosperm Nucleus

(n) (2n) (3n) ↓ Growth & Development

Endosperm

(n) = HAPLOID [Single Set of Chromosomes]

(2n) = DIPLOID [Two Sets of Chromosomes]

(3n) = TRIPLOID [Three Sets of Chromosome]

Reproduction in Human Beings

- Humans use sexual mode of reproduction.
- **Sexual maturation :** The period of life when production of germ cells *i.e.,* ova (female) and sperm (male) start in the body. This period of sexual maturation is called puberty.

Changes at Puberty

(a) Common in male and female

- Thick hair growth in armpits and genital area.
- Skin becomes oily, may result in pimples.

(b) In girls

- Breast size begin to increase.
- Girls begin to menstruate.

(c) In boys

- Thick hair growth on face.
- Voice begins to crack.

These changes signal that sexual maturity is taking place.

Male Reproductive System

(a) Testes : A pair of testes are located inside scrotum which is present outside the abdominal cavity. Scrotum has a relatively lower temperature needed for the production of sperms.

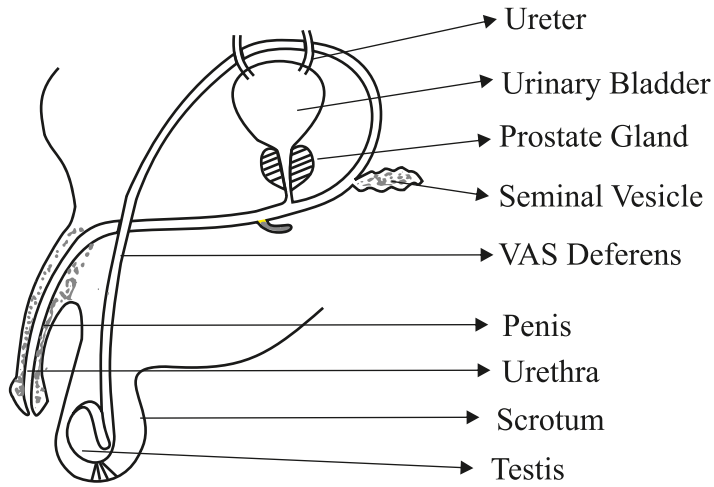
- Male germ cell *i.e.,* sperms are formed here.
- Testes release male sex hormone (testosterone). Its function is to:
  (i) Regulate production of sperms.
  (ii) Bring changes at puberty.

(b) Vas deferens : It passes sperms from testes upto urethera.

(c) Urethera : It is a common passage for both sperms and urine. Its outer covering is called penis.

(d) Associated glands : Seminal vesicles and prostate gland add their secretion to the sperms. This fluid provide nourishment to sperms and make their transport easy.

Sperm alongwith secretion of glands form semen.



Human – male reproductive system

Female Reproductive System

(a) Ovary : A pair of ovary is located in both sides of abdomen.

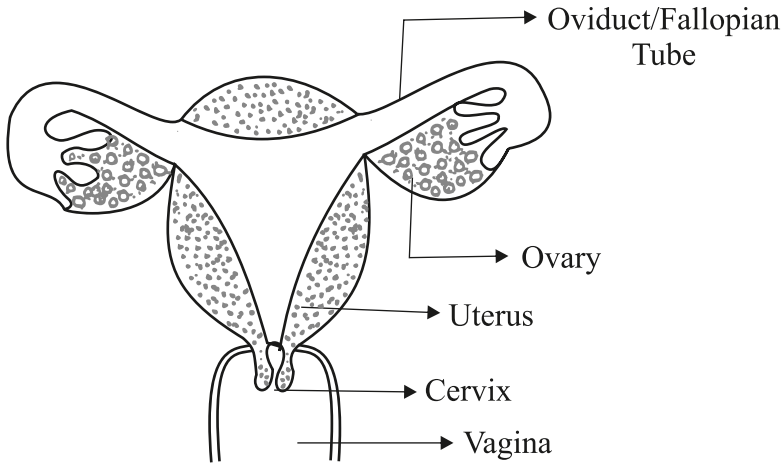
- Female germ cells *i.e.,* eggs are produced here.
- At the time of birth of a girl, thousands of immature eggs are present in the ovary.
- At the onset of puberty, some of these eggs start maturing.
- One egg is produced every month by one of the ovaries.

(b) Oviduct or Fallopian tube

- Receives the egg produced by the ovary and transfer it to the uterus.
- Fertilisation *i.e.,* fusion of gametes takes place here.

(c) Uterus : It is a bag-like structure where development of the baby takes place after implantation of embryo in its wall.

- Uterus opens into vagina through cervix.



Human – female reproductive system

When egg is fertilised :

- The fertilized egg called zygote is planted in uterus and develops into an embryo.
- The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta. It provides a large surface area for the exchange of glucose, oxygen and waste material.
- The time period from fertilization upto the birth of the baby is called gestation period. It is about 9 months.

When egg is not fertilised :

- The uterus prepares itself every month to receive fertilized egg.
- The lining of the uterus becomes thick and spongy, required to support the embryo.
- When fertilisation had not taken place, this lining is not needed any longer.
- This lining breaks and comes out through vagina as blood and mucus. This cycle takes around 28 days every month and called menstruation.

Reproductive Health

Reproductive health means a total well-being in all aspects of reproduction *i.e.,* physical, emotional, social and behavioural.

Sexually Transmitted Diseases (STDs)

- Many diseases can be sexually transmitted such as :

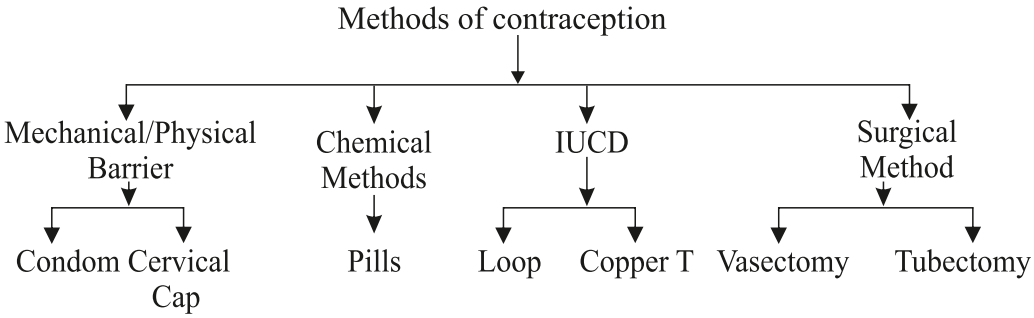
  Bacterial : Gonorrhoea and syphilis

  Viral : Warts and HIV-AIDS

- Use of condom prevents these infections to some extent.

Contraception

It is the avoidance of pregnancy, can be achieved by preventing the fertilisation of ova.



Methods of contraception

(a) Physical barrier

- To prevent union of egg and sperm.
- Use of condoms, cervical caps and diaphragm.

(b) Chemical methods

- Use of oral pills
- These change hormonal balance of body so that eggs are not released.
- May have side effects.

(c) Intrauterine contraceptive device (IUCD)

- Copper-T or loop is placed in uterus to prevent pregnancy.

(d) Surgical methods

- In males the vas deferens is blocked to prevent sperm transfer called vasectomy.
- In females, the fallopian tube is blocked to prevent egg transfer called tubectomy.

Female Foeticide

- The practice of killing a female child inside the womb is called female foeticide.
- For a healthy society, a balanced sex ratio is needed that can be achieved by educating people to avoid malpractices like female foeticide and prenatal sex determination.
- Prenatal sex determination is a legal offence in our country so as to maintain a balanced sex ratio.

MCQ **/Very Short Answer Type Questions (1 Mark)**

Q.1 Gametes are formed in-

a) Asexual Reproduction b) Sexual Reproduction

c) Vegetative Propagation d) Tissue Culture

Q.2 Plasmodium reproduces by-

a) Budding b) Binary Fission

c) Fragmentation d) Multiple fission

Q. 3 Which of the following is not a part of flower.

a) Stem b) Carpel

c) Stamen d) Sepals

Q. 4 Reproduction is essential for living organisms in order to

a) Keep the individual organism alive

b) Fulfill their energy requirement

c) Maintain growth

d) Continue the species generation after generation

Q. 5 Which among the following diseases is not sexully transmitted.

a) Syphilis b) HIV-AIDS

c) Cholera d) Gonorrhoea

Q. 6 The ability of a cell to divide into two cells during reproduction in Leishmania is called.

a) Budding b) Reduction division

c) Binary fission d) Multiple fission

Q. 7 Characters transmitted from parents to off springs are present in

a) Cyptoplasm (b) Ribosome

c) Genes d) Golgi bodies