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CHAPTER 8

How do Organisms Reproduce?

8.1.1 The Importance of Variation

- DNA copying should be done with consistency so as to preserve the body structure of an organism.
- Their body structure further helps them to fit in a suitable environment.
- The area in which an organism lives can change and therefore they have to adapt to the changing environment.
- Any change in an organism is directly linked to change in DNA.
- Therefore only those organisms will ultimately survive in which variations occur.
- Hence variation in an organism is an important process that occurs through DNA which further helps an organism to further get adapted to the changing environment.
- Hence organisms with variations can better adapt to a changing condition whereas those without any variation cannot.

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8.2 Modes of Reproduction Used By Single Organisms.

- Reproduction: A process by which a parent organism gives rise to its offsprings.
- Reproduction is of ~~two~~ types.

Sexual	Asexual
• A mode of reproduction which involves ~~a single~~ two parent of opposite sexes.	• A mode of reproduction which involves only a single parent.
• It is more advantageous to the organism as variation occurs.	• It is not that advantageous as Variation does not occur.
• Fusion of gametes occur	• No Fusion of gametes occur.
• Fertilisation occurs	• No fertilisation occur
• Examples: Humans, apes etc	• Examples: Bacteria, Yeast and Some plants.

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8.2.1 Fission

- A method of reproduction in which an organism splits itself.

- It is of two types

Binary fission

- When a parent organism splits into two equal halves.

- Examples:
  Amoeba - Here, the splitting can take place from any random location

  Leishmania - Here, the splitting takes place from a specified location. This organism also causes **kala-Azar**.

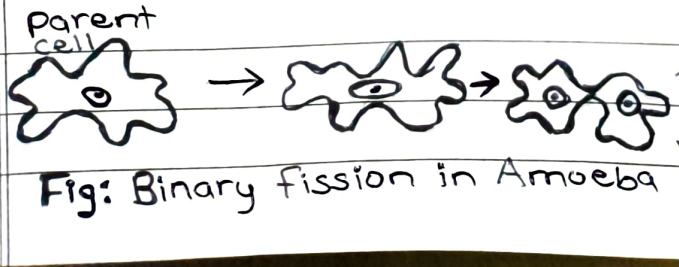

Fig: Binary fission in Amoeba

Multiple fission.

- When a parent organism splits to give rise to more than one organism.

- Example:
  Plasmodium - It divides into more than one cell.

- Plasmodium causes Malaria.

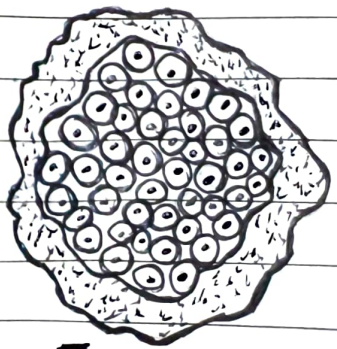

Fig: Multiple fission in Plasmodium

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8.2.2 Fragmentation.

- A method of reproduction in which an organism simply breaks into smaller pieces. Each piece then grows into a new organism.
- It can occur in multicellular organism with simple body organisation.
- Not all multicellular organisms can use fragmentation as the cells in them are organized into tissues and further into organs.
- Example: Spirogyra (an algae).

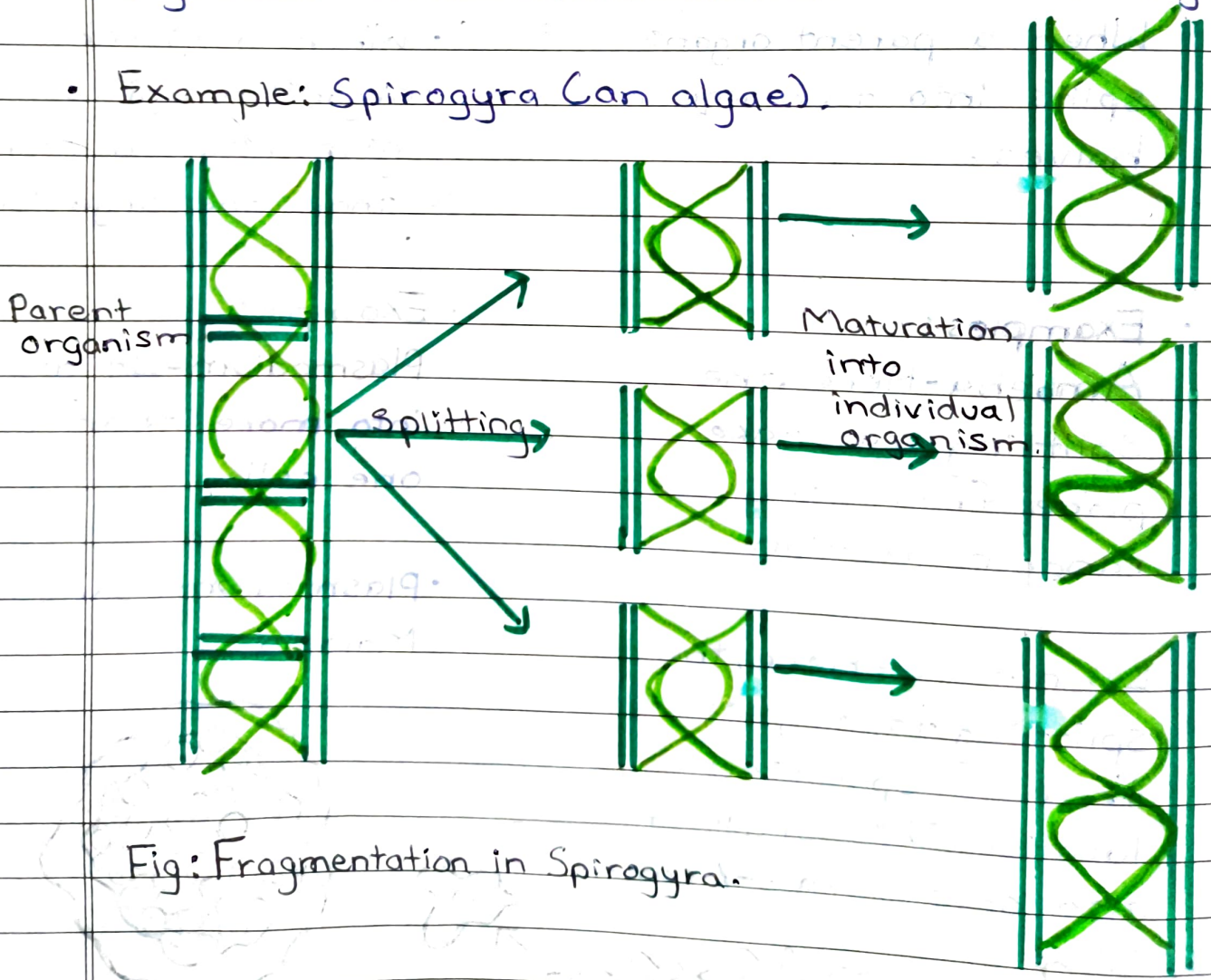
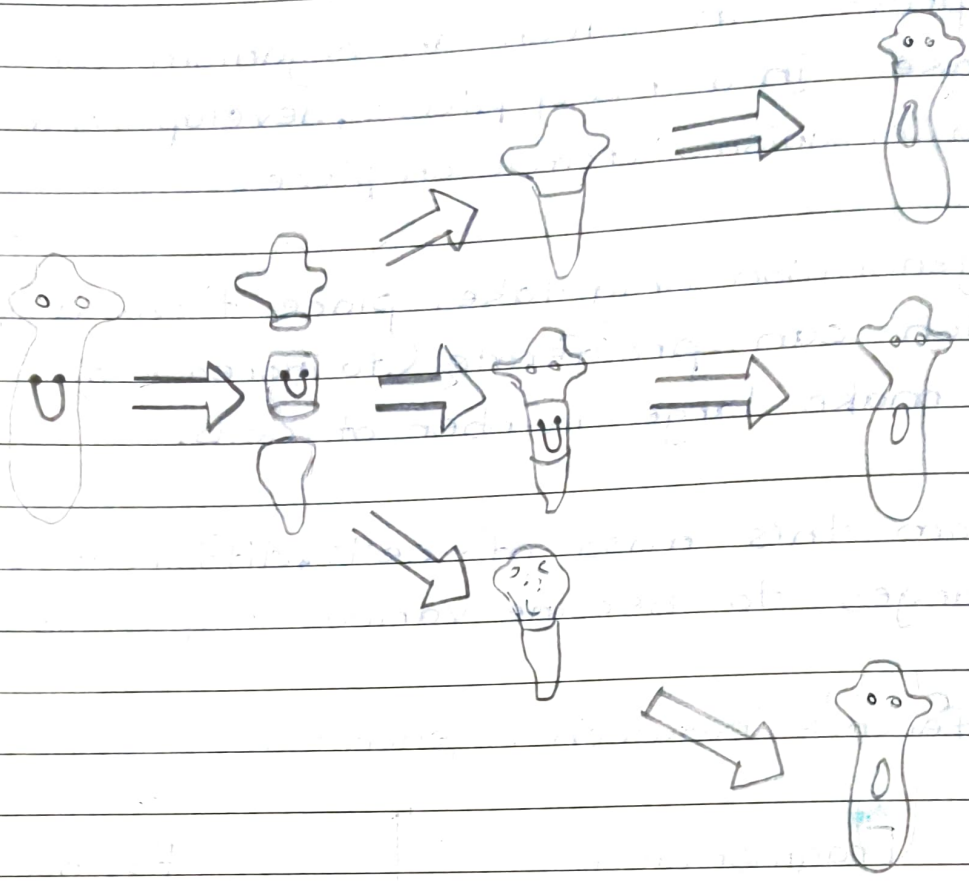


Fig: Fragmentation in Spirogyra.

8.2.3 Regeneration

- A process in which an organism when cut or broken into many pieces, develop into a completely new organism from each piece.
- Regeneration only takes place from specialised cells which can proliferate (to increase quickly in number) to make large number of cells.
- From this mass of cells, different cells undergo changes to become various types of cells.
- Difference between regeneration and fragmentation.

Fragmentation	Regeneration
• Organisms that are fragmented result in each fragmented growing into an individual organism.	• occurs when an organism only regrows a lost limb or any other part of the body.
• New individual is formed from each fragment.	• No new organisms are formed.
• Only a few organisms can fragment and form new individuals.	• All organisms have the ability to regenerate (only to some degree).
• Eg: Flatworms, Sponges, Spirogyra.	• Lizards can regenerate their tails, planaria.



8.2.4 Budding

- A reproductive process in which a new organism develops from a small outgrowth known as 'bud' on the parent organism.
- Organisms such as hydra use 'regenerative cells' for reproduction.
- The buds develop into fully mature organism and become a new independent organism.
- Example: Yeast and Hydra.

8.2.5 Vegetative Propagation.

- A process of asexual reproduction in which new plants can be developed using parts such as roots, stem, leaves etc.

- Methods:

  Layering: A plant propagation technique that involves bending a plant's stem or branch to the ground and burying it to form new roots.

  Grafting: A process that joins two plants together by attaching a portion of one plant to another.

  Example: Sugarcane, roses, grapes etc can be grown.

- Advantages:

- Plants bear flowers and fruits earlier than those raised by seeds.

- Plants that have lost the capacity to grow seeds can also be grown - eg:- banana, orange, rose and jasmine.

- All the plants produced are genetically similar to each other.

- Plants can be grown faster and cheaper.

- The survival rates of new plants is 100%.

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Fig: Leaf of bryophyllum with buds.

8.2.6 Spore formation.

- A method of reproduction in which new organism develops from reproductive parts such as spores.
- Many simple multicellular organisms use this method. eg: Rhizopus (a fungus).
- Structure of Rhizopus.
- Hyphae:- Long, thread like structure.
- Mycelium: Network of Hyphae.
- Sporangium: Blob-like structure attached to the end of hyphae.
- Spores: Reproductive cells present in sporangium. It has thick wall to protect it from extreme conditions.
- Spores when come in contact with moisture and nutrients gives rise to a new individual.

Fig: Spore formation in Rhizopus.

8.3 Sexual Reproduction.

- A method of Reproduction in which two parents are involved (of opposite sexes).

8.3.1 Why the Sexual mode of Reproduction.

- Creation of two new cells from one involves DNA copying.
- As DNA copying cannot be absolutely accurate, it generates errors and hence variation in organisms.
- Sexually reproducing cells have special cells with half the number of chromosomes as compared to non reproductive cells. ~~Cgerm cells~~
- When these reproductive cells (germ cells) from both the parents combine it forms zygote.
- The zygote ultimately develops into a new individual.

Male gamete - Smaller and motile (able to move).
Female gamete - Larger, immotile (unable to move), stores nutrients.

8.3.2 Sexual Reproduction in Flowering Plants.

- Angiosperms: Plants that have the ability to produce flowers.
- Parts of flowers.
  - Non-reproductive parts - Sepals, Petals.
  - Reproductive Parts
    - Male → Stamen - consists of Anther and filament.
    - Female → Pistil - consist of stigma, style and ovary.
- Types of flower
  - Unisexual - flowers which contain either male or female part.
    eg: Papaya, watermelon.
  - Bisexual - flowers which contain both male and female parts.
    eg - Hibiscus, mustard.

- Types of pollination.
  - self pollination- When pollen grains are transferred from anther to stigma of same flower.
  - cross pollination- When pollen grains are transferred from anther to stigma of a different flower.

- Reproductive process.
- The pollen grain lands on stigma.
- It produces pollen tube through the style to reach ovary.
- Ovary contains ovules which further contains the egg cell.
- The male germ cell (produced also by pollen grain) enters ovule and fuses with the egg cell.
- Leads to formation of **zygote** → **Embryo** → **seed**
- The **ovule** gets converted into **seeds** while the **ovary** ripens and forms **fruit**.
- The seed contains future embryo which develops into a seedling under appropriate condition by a process called **germination**.

Fig: Longitudnal section of flower.

Fig: Germination of pollen on stigma.

Fig: Germination.

8.3.3 Reproduction in Human Beings. [Female]

Fertilisation and development.

- Girls when born contain thousands of eggs in ovaries.
- From puberty, one egg every month is released to attain fertilisation.

- During sexual intercourse, sperms crosses the vaginal passage and fertilizes the egg (**fertilisation**) and forms **zygote**.

- The zygote gets converted to **embryo** and gets attached to the wall of uterus (**Implantation**).

- Placenta is formed as a connecting structure between **foetus** and **mother's body**.

Functions of placenta.

- Exchange of nutrients and gases between mother and foetus.

- Removal of waste products from the foetus.

- Providing immunity to the child.

- Development of foetus takes 9 months (**Gestation period**)

- Finally the child is delivered due to rhythmic contraction and relaxation of uterus (**parturition**).

8.3.4 What happens when the Egg is not fertilized?

- The uterus prepares itself every **month** to recieve a fertilised egg.

- It becomes thick and spongy to nourish the fertilised embryo.

- As the egg is not fertilised, the egg is not needed anymore, and removed through the vagina through blood and mucus.

- The process is known as **menstruation**, which lasts about **eight days.**

- Sexual maturity / Puberty.

- **Puberty:** The time period when childrens body gets matured to an adult one.

- Many hormonal changes occur during puberty which causes bodily changes in the children.

Common changes - boys and girls.

- Growth of hairs in armpits, genital areas and between thighs.

- Thin hair on legs, arms and face.

- Pimples develop and skin frequently becomes oily.

changes in girls.

- Breast size begins to increase with darkening of nipples.

- Girls begin to menstruate. | Waist broadens.

- High-pitched voice | Loudness of voice - Low.

Changes in boys

- chest broadens
- New hair grows on face.
- Voice becomes louder | Low-pitched voice.
- Sperm production starts.

8.3.5 (a) Male Reproductive System.

- Consist of portions that produce the germ-cell and deliver the germ cells to the site of fertilisation.
- Parts of male reproductive system.
  - **Testis**
    - Located outside the abdominal cavity in **scrotum**.
    - Its temperature is 2°C lower than body temp. for sperm production.
    - Produces **testosterone** hormone.
  - Vas deferens.
    - Tube-like structure connected to testis.
    - Helps in delivery of sperm.
  - Prostate gland
    - Produces fluid for semen and also produces hormones.
  - Seminal vesicle.
    - It also produces semen fluid.
    - Its fluid secretions protects sperm in female body.

- Bulbourethral gland.
  - Also known as cowper's gland.
  - Lubricates urethral and neutralizes urine for the passage of sperm.

- Sperm.
  - Germ cells present in semen.
  - Has parts like - head, tail and neck and helps fertilize the egg cell.

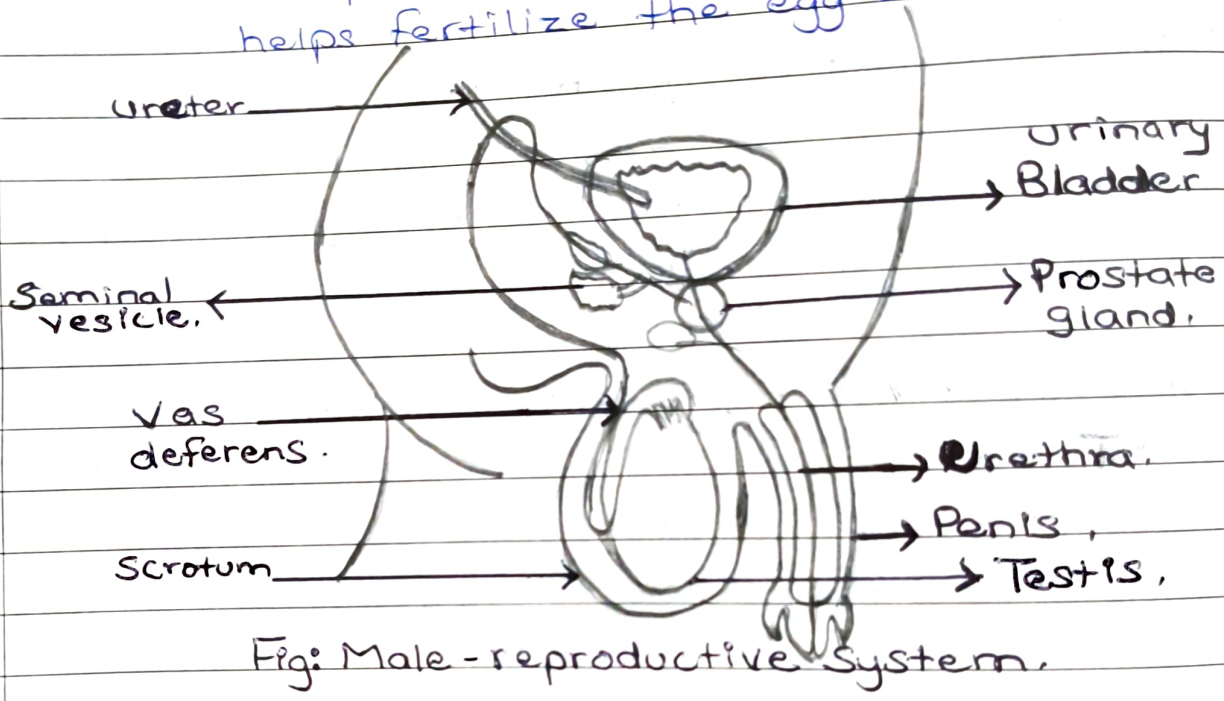

Fig: Male - reproductive System.

8.3.5 (b) Female Reproductive System.

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Fig: Female Reproductive System

8.3.6 Reproductive Health.

- Refers to all matters related to reproductive system - including physical, mental and social well-being.

- Sexually Transmitted diseases (STD's).
- Diseases that are transferred from an unhealthy to a healthy person due to sexual act.

- Bacterial STD's

① Gonorrhoea - A sexually transmitted bacterial infection that if untreated may cause infertility.

Symptoms:- Pain in lower abdomen, pelvis, Vaginal and Penis discharge (abnormal), irregular menstruation.

Causative agent:- Neisseria gonorrhoeae.

② Syphilis - A bacterial infection spread by sexual contact that starts as a painful sore.

Symptoms - Skin rashes, small bumps or ulcers on skin, genitals, vaginal discharge, itching.

causative agent - Treponema pallidum

③ chlamydia - A sexually transmitted disease that may cause painful urination.

Symptoms - Vaginal / Penis discharge, vaginal bleeding, pain in lower abdomen, testicle / vagina.

causative agent- chlamydia trachomatis

- Viral Diseases.

① Warts - A small fleshy growth on the skin or mucous membrane.

Symptoms - Fleshy, painless growth on body parts such as hands, feet and genitals.

causative agent - Human Papillomavirus Virus.

② AIDs (Acquired Immunodeficiency Syndrome).
A viral infection that lowers the body's abilit to fight against infections.

Symptoms - Lowered immunity, Weight loss, fatigue, reccurrent infections, loss of appetite night sweats etc.

causative agents - Human Immunodeficiency Virus.

- Contraceptive Methods.
- Methods used to avoid pregnancy.

① Barrier Methods.
Helps to restrict/stop the entry of sperm towards the egg.

condoms are used to cover penis or Vagina to

avoid the entry of sperm into the vagina.

② Contraceptive pills are used to change the hormonal balance of the body so that eggs are not released and fertilisation does not occur.

- It may cause side-effects since it changes hormonal balance of the body.

③ Contraceptive devices such as lippes loop and copper releasing IUD's (CUT, CU7) and Multiload 375 etc decrease the motility of sperms in the vaginal tract.

- May cause irritation, pain and light bleeding.

④ Surgical methods

- Vasectomy - The vas deferens of male is cut and tied to restrict the entry of sperm.

- Tubectomy - The fallopian tube of female is cut and tied to stop the release of egg.

- It is very difficult to reverse it.