SCIENCE ASEXUAL REPRODUCTION

INTRODUCTION

Reproduction is a process by which living organisms produce new individuals of their own kind and maintain their existence generation after generation.

Reproduction is not essential to maintain the life of an organism but it is essential to maintain life on earth and perpetuation of species from one generation to another.

Reproduction at its basic level (cellular reproduction) is involved in making similar or dissimilar body designs through the genetic material (DNA) present in the chromosomes of its nucleus.

DNA is the source of information for making proteins. Any change in the information leads to production of different proteins, which ultimately lead to altered body designs.

Basic event in reproduction is production of DNA copies in a reproducing cell. The process is called DNA replication. When the cell divides into two, each new cell gets a copy of each DNA or chromosome along with the whole cellular apparatus.

Complete accuracy in DNA copying leads to two exactly identical cells but any error in duplication can lead to dissimilar cells or variations.

The inbuilt tendency for variations during reproduction forms the basis for evolution.

Variations during reproduction enable the population of a species to get adapted easily to a particular inhabiting place/niche. Hence, reproduction is linked to the stability of populations of species.

Stronger variations are useful for the survival of species over time and enable the organisms to tide over any drastic alterations in their habitats.

IMPORTANCE OF REPRODUCTION

(i) Maintenance of the existence :- Organisms are maintaining the existence on the earth since their origin, million years ago only because of reproduction.

(ii) **Preservation of species :-** Species are preserved because of reproduction. It is possible because reproducing organisms produce new individuals which are very similar to themselves.

(iii) Role in evolution :- Some variations are produced in the new organisms during reproduction which play an important role in evolution.

TYPE OF REPRODUCTION

There are two main methods of reproduction in living organisms.

- (1) Asexual reproduction.
- (2) Sexual reproduction.

(1) Asexual Reproduction :

Production of offsprings by a single parent without the formation and fusion of gametes is called **asexual reproduction**.

It is a primitive type of reproduction in which **offspring** is produced by a cell or any vegetative organ of an organism.

In this type of reproduction offsprings are genetically identical to their parents.



Modes of asexual reproduction are fission, budding, spore formation, fragmentation, regeneration and vegetative propagation.

Fission : It is the simplest form of reproduction in which unicellular organism either divides into two or more individuals. It is further divided into two types :

(i) Binary fission : It is a type of reproduction in which nuclear division is followed by the appearance of a constriction in the cell membrane, which gradually deepens inward and divides the cytoplasm into two parts, each with one nucleus. Finally two daughter cells are formed.

e.g. Amoeba, Euglena.



Fig.: Amoeba reproduction by binary fission.

(ii) Multiple fission : Sometimes the nucleus divides several times, into many daughter nuclei.

• The daughter nuclei arrange at the periphery of the parent cell, and a bit of cytoplasm around each daughter nuclei is present.

• Nucleus develops an outer membrane. Finally the multinucleated body divides into many daughter cells. e.g. Plasmodium.



Budding : Process in which an outgrowth (bud) is formed on the body of parent organism which then detaches and become a new organism. **e.g. Yeast** *and Hydra*.

Budding is also of two types :

- (i) Exogenous budding : [External budding] In this, bud arises from the surface of parent body. e.g., Hydra, Yeast.
- (ii) Endogenous budding : [Internal budding] In this, bud arises inside or within the parent body. e.g., Sponges.



Spore formation : Spores are the microscopic asexual reproductive bodies with a thick wall.Spores are formed in **'sporangium'**.Each spore on germination give rise to a new organism e.g. *Rhizopus*, *Penicillium*.



(iv) Fragmentation : In this process an organism breaks up into two or more fragments and each fragment develops into an adult organism. e.g. *Spirogyra*.



Fig. : Fragmentation in spirogyra (an algae)

Regeneration : The process of getting back a full organism from the body parts of the parent individual is called **regeneration**. Regeneration is carried out by specialised cells. **e.g.** *Hydra, Planaria.*



Vegetative propagation : This is a type of reproduction found in higher plants in which a new plant is formed from a vegetative part of the plant such as roots, stems or leaves for eg. In potato, bryophyllum, sweet potato etc.

• Vegetative propagation occurs through leaf in Bryophyllum.

It is of following types :

- (A) Natural vegetative propagation
- (B) Artificial vegetative propagation.



(A) Natural vegetative propagation :

Plant reproduce without the help of human being.

By leaves : Leaves of some plants produce adventitious buds on their margin. Thus buds develop into new plants e.g. *Bryophyllum*, *Kalanchoe*.

By stem : In many plant, underground stems produce aerial shoots annually under favourable conditions **e.g.** Potato, Zinger, Onion, Grass.

• By roots : Roots produce adventitious buds which develops into new plants. e.g sweet potato.

B) Artificial vegetative propagation :

To prepare plants with desirable characters.

These are of four types.

(i) Cutting : This is the very common method of vegetative propagation practised by the gardeners. It is the process in which a vegetative portion from plant is taken and is rooted in the soil to form a new plant. e.g. Grapes, Sugarcane etc.



(ii) Layering : □n this process the development of adventitious roots is induced on a stem before it gets detached from parent plant, e.g., Mango, roses etc.

It is of two types :

(I) Mound layering : In this process of layering the lower stem branch of plant is used. • Leaves are removed from this stem.

• Then it is bent close to the ground, pegged and covered with the moist soil in such a way that it's growing tip remains above the soil surface.

• This pegged down branch is called as layer.

• After a few days the covered portion of stem develops roots.

• This stem is then detached from the parent plant and is grown separately into a new individual. e.g. Jasmine.



Fig.: The propagation of jasmine plants (chameli) by the layering method.

(II) Air layering : \Box t is adopted in those plants where stem cannot be bent to the ground.

• In this process the stem is girdled (i.e. ring of the bark is removed).

• Then it is covered with moist moss or cotton and wrapped with a polythene sheet to preserve the moisture.

• After few weeks adventitious roots develop from the injured part. The branch along with roots is then separated from the parent plant and planted to grow into a new plant. e.g. Orange, Pomegranate etc.



Fig.: Showing Air layering.

- (iii) Grafting : The process of joining together of two different plants in such a manner that they live as one plants is called as grafting. Out of the two plants one is rooted in the soil and is known as the stock.
- The other part consists of a small shoot bearing one or more buds, it is known as scion.
- Their union is carried out in such a way that their cambium must overlap each other. e.g. Mango, roses etc.

