

## REPRODUCTION IN ORGANISMS

Reproduction is the means of perpetuation of race. as older individuals undergo Senescence and die.

\* When the offspring is produced by single parents with or without the involvement of gamete formation, the reproduction is called asexual reproduction.

4. When two parents (opposite sex) participate in reproduction process and also involve the fusion of male and female gametes, it is called sexual reproduction.

### Asexual Reproduction

Single individual is capable of producing offspring which are identical and exact copy of their parent. The morphological and genetically identical individuals of same parents are called clones.

- Asexual reproduction is common among single celled organisms, plants and animals with simple organization.
- In Prokaryotes and Monera, the parent cell divides into two to give rise to new individuals. Thus, in these organisms cell division is the mode of reproduction itself.
- Binary fission - in this method of asexual reproduction, a cell divides into two halves and rapidly grows into an adult. Ex. Amoeba, Paramecium.
- Budding - small buds are produced that remain attached initially with parents and get separated on maturation, Ex. Yeast.
- Fungi and simple plants like algae reproduce through special reproductive structures like zoospores (motile structure), conidia (Penicillium), buds (Hydra) and gemmules (Sponges).
- In plants, vegetative reproduction occurs by vegetative propagules like runner, rhizome, sucker, tuber, offset and bulb.
- Water hyacinth is called "terror of Bengal" because it is one of the most invasive weeds found growing wherever there is standing water. It drains oxygen from the water which leads to death of fishes.
- The ability of plants like potato, ginger, sugarcane, banana etc. has ability to produce roots from their nodes when come in contact of soil. This ability is used by gardeners and agriculturists for commercial propagation.
- Bryophyllum develops adventitious buds from notches present at margin of leaves.
- Asexual reproduction is the most common method of reproduction in organisms having simpler body like in algae and fungi but during unfavorable condition they shift to sexual reproduction.

Sexual Reproduction involves formation of male and female gametes, either by the same individual or different individuals of opposite sex. These gametes fuse to form zygote which develops to form the new organisms.

In sexual reproduction, fusion of male and female gametes results in offspring that are not identical to parents.

- Some plants show flowering in particular season and some other flowers in all seasons. Some other plants like bamboo species flowers once in life time (after 50-100 years), Strobilanthus flowers once in 12 years.
- The female placental animals exhibit cyclic change in activities ovaries and accessory glands as well as hormone during the reproductive phase.
- In non-primate animals (cow, sheep, rat, deer, dog, tiger etc.) cyclic change in females is called oestrus cycles and where as in primates (monkey, apes, human beings) it is called menstrual cycle.

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Pre-fertilisation - all the events prior to fusion of gametes are included in it. It includes gametogenesis and gamete transfer.

a. **Gametogenesis** is the process of formation of male and female gametes.

4) Gametes are haploid cells which may be similar or dissimilar in structure. In algae, both gametes are similar in structure called isogametes. In higher organism that reproduces sexually, two morphologically distinct gametes are formed called heterogametes, male gametes are called antheridium or sperm and female gametes are called ovum or egg.

- In animals, species which possess both male and female reproductive organs in same individual are called bisexual or hermaphrodites (earthworm, sponges, tapeworm etc.) and both having either male or female reproductive organs are called unisexual (cockroach, human).

4) Gametes are always haploid, although organisms may be haploid and Diploid organisms form gametes by meiotic division. The organisms belonging to algae, fungi, and bryophytes have haploid plant body and pteridophytes, gymnosperms, angiosperms and most of animals are diploid.

o In diploid organisms, gamete mother cell (meiocyte) undergoes meiosis in which one set of chromosome is present in gametes.

b. **Gamete Transfer** — in majority of organisms, male gametes are motile and female gametes are non-motile, except in fungi and algae in which both gametes are motile.

- In simple plants like algae, fungi, bryophytes and pteridophytes water is the medium through which male and female gametes move.
- In higher plants pollen grains are carrier of male gametes and ovule has eggs, Pollen grains must be transferred from anther to stigma to facilitate fertilization. The transfer of pollen grains from anther to stigma is called pollination. Pollination may be self (anther to stigma of flower) or cross (anther to stigma of different flower).
- Fallen grains germinate on stigma to produce pollen tube that delivers the male gametes near the ovule.

**Fertilization** — the fusion of male and female gametes is called syngamy that results in the formation of zygote, the process is called fertilization.

- o The process of development of new organisms without fertilization of female gametes is called parthenogenesis,
- o In aquatic organism, fertilization occurs in water; outside the body of organism is called external fertilization.
- o In terrestrial organisms, syngamy occurs inside the body of organisms, so called internal fertilization.

**Post Fertilization Events**- events in the sexual reproduction after formation of zygote.

In the organisms having external fertilization, zygote is formed in external medium (water) and those having internal fertilization zygote is formed inside the body of female.

- In algae and fungi, zygote develops a thick wall resistant to desiccation and damage. This germinates after a period of rest.
- In the organisms having haplontic life cycle, zygote divides to form haploid spores that germinate to form haploid individual.

**Embryogenesis** — is the process of development of embryo from the zygote. During this, zygote undergoes mitotic division and cell differentiation. Cell division increases the number and cell differentiation helps in formation of new group of cells and organs.

- o In flowering plants, zygote is formed inside the ovule. After fertilization, sepals, petals and stamens of flower fall off. The zygote develops into embryo and ovules into seeds. The ovary develops into fruits which develop a thick wall called pericarp, protective in function.
- o After dispersal, seeds germinate under favorable condition to produce new plants.