

Chapter 1 Reproduction in Organisms

• REPRODUCTION IN ORGANISMS

• Life Span

- Period from birth till natural death. Every organism lives only for certain period of time Eg Elephant 60 -90 years, Fruit fly 4-5 weeks.

Every organism live only for a certain period of time.

Reproduction

Producing young-ones of their kind, generation after generation.

Types of reproduction:

- Asexual reproduction :single parent capable of producing offsprings .Somatogenic reproduction
- Sexual reproduction : two parents are invovled in producing offspring

Modes of asexual reproduction

- **Binary fission** : parent body divides into two halves, genetically identical to parent. Amoeba: It is simple or irregular.
- **Paramoecium** : Transverse binary fission. Organisms considered immortal
- **Multiple fission** : parent body divides into many daughter organisms Plasmodium.
- **Budding** : daughter organisms grow from small buds arising in parent body. Exogenous budding: outside the body eg. Hydra, Yeast.
- **Budding in Yeast Endogenous budding** : inside the body eg. Gemmule in sponge. Oidia of rhizopus
- **Conidia** : non-motile, exogenous spores in chains eg. Fungi.
- **Zoospores** : microscopic motile structures eg. Algae.
- **In plants** : term vegetative reproduction frequently used instead of asexual reproduction, units of vegetative propagation called vegetative propagules. Eg runner, rhizome, sucker, tuber offset, bulb give rise to new plant
- All organisms show remarkable similarity. Vast difference in their reproductive structure. Similar pattern or phases in their life cycles

• **PHASES OF LIFE SPAN.**

- **Juvenile phase** : The phase of growth before reproductive maturity.
- **Reproductive phase** : Reproductive maturity.
- **Senescent phase** : Phase between reproductive maturity and

The main events of sexual cycle are:

i. Pre-fertilisation events

a. Gametogenesis

- The process of formation of male and female gametes by meiosis (cell-division).
- ♦ **Homogamete (Isogamete)** : - gametes similar eg. Algae
- ♦ **Heterogamete(an-isogamete)** : - morphologically dissimilar gamete ,male gamete (antherozoid or sperm) ,female gamete (egg or ovum) eg. Human.
- ♦ **Sexuality in organisms** : In plants Bisexual term is used for Homothallic and Monoecious plants Both male and female reproductive structures in same plant eg. Higher plants, cucurbits and coconut.

♦ **Unisexual term used for Heterothallic and Dioecious plants** Male and female reproductive-structure on different plants.

Flowering plants – male flower–staminate flower and female flower–**pistillate flower** eg. papaya and date-palm.

• **Animals – Bisexual term is used for Hermaphrodite animals** -eg. Earth-worm, Tape-worm, Leech, Sponge.

• **Unisexual animals have male & female sexes in separate individuals** -e.g. insects, frogs, humanbeings

• **Cell division during gamete formation :**

• **Haploid-parent (n)** produces haploid gametes (n) by mitotic division, eg. Monera, fungi, algae and bryophytes
Diploid parent (2n) produces haploid gametes(n) by meiosis division (possess only one set of chromosomes)and such **specialized parent cell** is called **meiocyte or gamete mother cell..**

Name of organism	Meiocyte (2n)	gamete (n)
Human	46	23
Housefly	12	6
Ophioglossum (fern)	1260	630
Potato	48	24

b) Gamete transfer :- to facilitate fusion.

♦ Male gametes mostly motile and female non-motile, exception few fungi and in algae both gametes are motile in some cases

♦ Water medium for gamete transfer- in lower plants. Large number of male gametes produced to compensate loss

♦ Higher plants, pollen-grains are transferred by pollination.

♦ **Fertilization :-** Fusion of male and female gametes diploid zygote.

♦ **Parthenogenesis :-** development into new organism without fertilisation eg. Rotifers, honey-bees, some lizard, bird(turkey).

ii. Fertilization

Two types- external and internal .

• **External fertilisation :-** outside the body of organism in external- medium (water) eg. majority of algae, fishes, amphibians.

• **Advantage :-** show great synchrony between the sexes –

1. Release of large number of gametes into surrounding medium

2. Large number of offsprings produced.

- **Disadvantage** :- offspring vulnerable to predators, natural disasters.

- **Internal fertilisation** :- fusion occurs inside female body eg. majority of plants and animals. Egg non-motile and formed inside female body. Male gamete motile, produced in large numbers to reach egg and fuse with it. In seed plants, non- motile male gamete carried to female gamete by pollen-tube.

iii. Post -fertilisation events- formation of zygote.

a. Zygote. One celled , diploid, vital link between two generations.

- **External fertilization** :- zygote formed in external medium water eg. Frog,

- **Internal fertilization** :- zygote formed inside the body eg. Human beings. Development of zygote depends on type of **life cycle and environment**. Some develop thick wall (prevent damage and desiccation) & undergo period of rest eg. Algae, fungi.

- **Haplontic life cycle** :- zygote (2n) divides by meiosis to form haploid (n) spores.

- **Diplontic life-cycle** :- zygote (2n) divides mitotically, develops into embryo (2n).

- **Oviparous animals lay eggs out** :- side the female body.Eggs can be fertilized/ unfertilized. Fertilized eggs covered which hard calcareous shell, laid in safe place in the environment. Unfertilised eggs laid in water. Example- fishes, frogs, reptiles, birds

- Viviparous animals bear and rear the embryo inside female body, give birth to young-ones. Advantage- proper embryonic care, protection, survival chances of young-ones greater. Example cows, whales, human beings .

- **Embryogenesis** :- development of embryo from zygote by cell division (mitosis) and cell differentiation.

- **Cell** :- division increases the number of cells in the developing embryo Cell differentiation - groups of cells undergo certain modifications for the formation of different kinds of tissues and organs.

- **In flowering plants** :- zygote formed inside ovule

Sepal	Fall off
Petal	Fall off
Stamen	Fall off
Zygote	Embryo
Primary endosperm nucleus	Endosperm (3 N)

Synergid	Disintegrate
Antipodals	Disintegrate
Ovary	Fruit
Ovule	Seed
Ovary wall	Pericarp (epicarp + mesocarp + endocarp)
Integument	Seed coat (testa + tegmen)

- **Parthenogenesis** :Female gamete develops into new organism.
- **Seedless fruits** formed by **parthenogenesis**
- **Clone** : A group of individuals of the same species that are morphologically and genetically similar to each other & their parents
- **Turion** : Fleshy overwintering buds in aquatic plants help in perrenation Eg potomegaton, utricularia
- **Bulbil** : Fleshy buds that produce new plant Eg Agave and Oxalis