

REPRODUCTION IN ORGANISMS-II

Life Span :-

Each and every organism can live only for a certain period of time.

- The period from birth to the natural death of an organism represents its **life span**.
- It may be as short as a few days or as long as a few thousand years.
- The life spans of organisms are not necessarily correlated with their sizes.

Reproduction :-

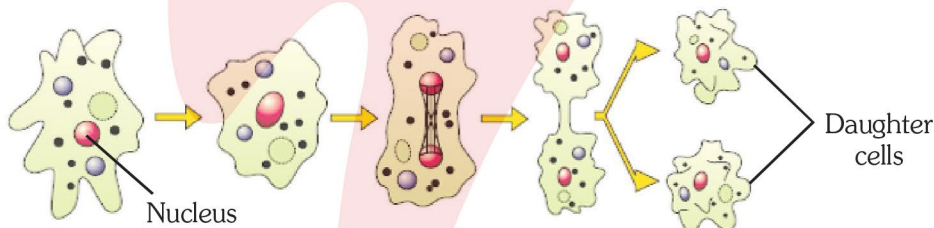
- It is a biological process in which an organism give rise to young ones (offspring) similar to itself.
- Reproduction enables the continuity of the species, generation after generation.
- The reproduction is of two types :
(A) Asexual (B) Sexual

(A) Asexual Reproduction :

- The production of offsprings by a single parent with or without the involvement of gamete formation.
- The offsprings produced by asexual reproduction are identical and are also exact copies of their parent.
- A group of genetically identical offspring produced from single parent is called **clone**.

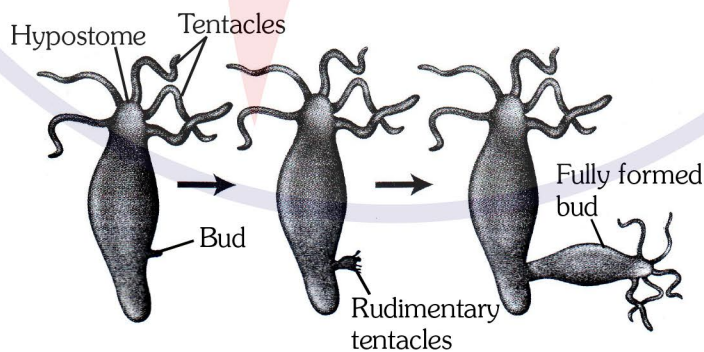
Types :-

- (i) Binary Fission : eg : Amoeba, Paramecium

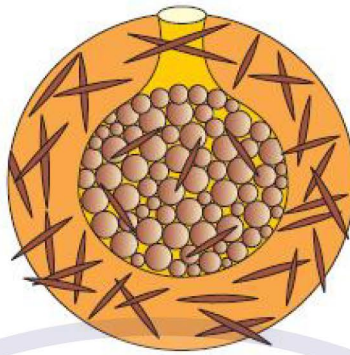


(Binary fission in Amoeba)

- (ii) Budding : eg : Hydra



(Budding in Hydra)



(Gemmule formation in Spong)

(B) Sexual Reproduction :-

- Sexual reproduction involves formation of the male and female gametes either by the same individual or by different individuals of the opposite sex.
- These gametes fuse to form the **zygote** which develops to form the new organism.
- Because of the fusion of male and female gametes, sexual reproduction results in offspring that are not identical to the parents or amongst themselves.
- *Different phases of life in sexual reproducing animals :*

(a) Juvenile Phase :

- All organisms have to reach a certain stage of growth maturity in their life, before they can reproduce sexually.
- In animals, this period of growth is called the **Juvenile phase**, while in plants it is known as **vegetative phase**.
- This phase is of variable durations in different organisms.

(b) Reproductive Phase :

- The end of juvenile phase is marked by the beginning of the next phase called reproductive phase.
- In animals, the juvenile phase is followed by morphological and physiological changes prior to active reproductive behaviour.
- In several animals, including human beings, the reproductive maturity is marked by a number of changes that occur in their bodies.
- The reproductive phase is also of variable duration in different organisms.

Breeding Seasons :-

- In most of animals do not breed throughout the year, instead they are **seasonal breeders**.
For instance; birds living in nature lays eggs only seasonally.
However, birds in captivity (as in poultry farms) can be made to lay eggs throughout the years by hormonal treatment. In this case, egg laying is not related to reproduction but is a commercial exploitation for human welfare.
- **During reproductive phase**, the females of placental mammals exhibit cyclical changes in the activities of ovaries and accessory ducts as well as secretion of hormones.
- In non-primate mammals like cows, sheeps, rats, deers, dogs, tigers, etc. such cyclical changes during reproduction are called **Oestrus cycle** where as in primates (monkeys, apes and humans) it is called **menstrual cycle**.
- Many mammals are reproductively active throughout their reproductive phase and hence are called **continuous breeders**.

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(c) Senescence (Aging) Phase :

- After reproductive maturity all organisms enter into a senescent phase.
- **Senescence** may be defined as the period between reproductive maturity and death of the organism.
- *In both plants and animals, hormones are responsible for the transitions between the three phases.*
- Interaction between hormones and certain environmental factors regulate the reproductive processes and the associated behavioural expressions of organisms.

Events in sexual reproduction :

- Sexual reproduction is characterised by the fusion (or fertilisation) of the male and female gametes, the formation of zygote and embryogenesis.
- For convenience these sequential events may be grouped into three distinct stages namely the pre-fertilisation; fertilisation and the post-fertilisation events.

(1) Pre-fertilisation Events :

- The two main pre-fertilisation events are gametogenesis and gamete transfer.

(a) Gametogenesis :

- The process of formation of the two types of gametes-male and female.
- Gametes are haploid cells.

Homogametes or isogametes :-

- In some algae, the two gametes are so similar in appearance that it is not possible to categorise them into male and female gametes, called homogametes or isogametes.

Heterogametes :-

- In a majority of sexually reproducing organisms the gametes produced are of two morphologically distinct types.
- In majority of animal species, the individuals are either male or female such animals are called **unisexual**.
eg : **Human**, **Monkey**, **Cockroach** etc.
- Some animal species possess both male and female reproductive organs such animals are termed **bisexual** or **hermaphrodites**.
eg : **Sponges**, **tapeworm**, **earthworm**, **leech**.
- In diploid organisms, specialised cells called **meiocytes** (gamete mother cells) undergo meiosis and form gamete.

(b) Gamete Transfer :

- After their formation, male and female gametes must be physically brought together to facilitate their fusion (fertilisation).

(2) Fertilisation (Syngamy) :-

The most vital event of sexual reproduction is perhaps the fusion of gametes. This process is called **syngamy** results in the formation of diploid **Zygote**.

External fertilisation :-

In most aquatic organisms, such as a majority of fishes as well as amphibians, syngamy occurs in the external medium (water), i.e., outside the body of organism. This type of gametic fusion is called **external fertilisation**.

Internal fertilisation :-

In many terrestrial organisms such as reptiles, birds, mammals, syngamy occurs inside the body of the organisms, hence the process is called **internal fertilisation**.

(3) Post-fertilisation Events :-

- Events in sexual reproduction after the formation of *zygote* are called post-fertilisation events.
- Zygote is the vital link that ensures continuity of species between organisms of one generation and the next.
- Every sexually reproducing organism, including human beings begin life as a single cell "*the zygote*".

Embryogenesis :-

- Embryogenesis refers to the process of development of embryo from the zygote.
- During embryogenesis, zygote undergoes cell division (mitosis) and cell differentiation.
- While cell divisions increase the number of cells in the developing embryo, cell differentiation help groups of cells to undergo certain modifications to form specialised tissue and organs to form an organism.
- Animals are categorised into oviparous and viviparous based on whether the development of the zygote takes place outside the body of the female parent or inside, i.e. whether they lay fertilised/unfertilised eggs or give birth to young ones.
- In *oviparous animals* like reptiles and birds the fertilised eggs covered by hard calcareous shell are laid in a safe places in the environment; after a period of incubation young ones hatch out.
- On other hand, in *viviparous animals* (Majority of mammals including human beings), the zygote develops into a young one in side the body of the female organism. Because of proper embryonic care and protection, the chances of survival of young ones is greater in viviparous organisms.