

+2 ZOOLOGY

Chapter 1 Reproduction in Organisms

1. Asexual reproduction

- i) Reproduction by a single parent without the involvement of gamete formation is **asexual reproduction** and the offspring produced are genetically identical.
- ii) Asexual reproduction is usually by amitotic or mitotic division of the somatic (body) cells, hence is also known as somatogenic or blastogenic reproduction.

2. Sexual reproduction When two parents participate in the reproductive process involving two types of gametes (ova and sperm), it is called **sexual reproduction**.

3. What are the different mode of asexual reproduction. The different modes of asexual reproduction seen in animals are fission, sporulation, budding, gemmule formation, fragmentation and regeneration.

4. Fission type?

- i) **Fission** is the division of the parent body into two or more identical daughter individuals. Four types of fission are seen in animals.
- ii) They are **binary fission, multiple fission, sporulation and strobilation**.

5. binary fission type?

- i) In **binary fission**, the parent organism divides into two halves and each half forms a daughter individual.
- ii) The nucleus divides first amitotically or mitotically (karyokinesis), followed by the division of the cytoplasm (cytokinesis). The resultant offsprings are genetically identical to the parent.

6. Depending on the plane of fission, binary fission is of the following types

- i) Simple irregular binary fission
- ii) Transverse binary fission
- iii) Longitudinal binary fission
- iv) Oblique binary fission

7. Simple binary fission

- i) **Simple binary fission** is seen in *Amoeba* like irregular shaped organisms.
- ii) where the plane of division is hard to observe. The contractile vacuoles cease to function and disappear. The nucleoli disintegrate and the nucleus divides mitotically.
- iii) The cell then constricts in the middle, so the cytoplasm divides and forms two daughter cells.

8. transverse binary fission

- i) In **transverse binary fission**, the plane of the division runs along the transverse axis of the individual. e.g. *Paramecium* and *Planaria*.
- ii) In *Paramecium* the macronucleus divides by amitosis and the micronucleus divides by mitosis.

9. longitudinal binary fission

i) In **longitudinal binary fission**, the nucleus and the cytoplasm divides in the longitudinal axis of the organism.

ii) In flagellates, the basal granule is divided into two and the new basal granule forms a flagellum in the other daughter individual. e.g. *Vorticella* and *Euglena*.

10. oblique binary fission

i) In **oblique binary fission** the plane of division is oblique. It is seen in dinoflagellates. e.g. Ceratium.

11. In multiple fission?

i) In **multiple fission** the parent body divides into many similar daughter cells simultaneously.

ii) If multiple fission produces four or many daughter individuals by equal cell division and the young ones do not separate until the process is complete, then this division is called **repeated fission** e.g. *Vorticella*

12. sporozoites.

i) In Plasmodium, multiple fission occurs in the schizont and in the oocyte stages.

ii) When multiple fission occurs in the schizont, the process is called schizogony and the daughter individuals are called merozoites. When multiple fission occurs in the oocyte, it is called sporogony and the daughter individuals are called sporozoites

13. pseudopodiospore

When conditions become favourable, the encysted *Amoeba* divides by multiple fission and produces many minute amoebae called pseudopodiospore or amoebulae.

14. strobilation

i) In some metazoan animals, a special type of transverse fission called **strobilation** occurs

ii) In the process of strobilation, several transverse fissions occur simultaneously giving rise to a number of individuals which often do not separate immediately from each other e.g. *Aurelia*. **Plasmotomy** is the division of multinucleated parent into many multinucleated daughter individuals with the division of nuclei.

iii) Nuclear division occurs later to maintain normal number of nuclei. Plasmotomy occurs in *Opalina* and *Pelomyxa* (Giant *Amoeba*)

15. budding

i) In **budding**, the parent body produces one or more buds and each bud grows into a young one.

ii) The buds separate from the parent to lead a normal life. In sponges, the buds constrict and detach from the parent body and the bud develops into a new sponge.

16. endogenous budding

In *Noctiluca*, hundreds of buds are formed inside the cytoplasm and many remain within the body of the parent. This is called **endogenous budding**.

17. Morphallaxis

- i) In morphallaxis the whole body grows from a small fragment e.g. *Hydra* and *Planaria*.
- ii) When *Hydra* is accidentally cut into several pieces, each piece can regenerate the lost parts and develop into a whole new individual
- iii) The parts usually retain their original polarity, with oral ends, by developing tentacles and aboral ends, by producing basal discs.

18. Epimorphosis.

- i) **Epimorphosis** is the replacement of lost body parts. It is of two types, namely **reparative** and **restorative** regeneration.
- ii) In reparative regeneration, only certain damaged tissue can be regenerated, whereas in restorative regeneration severed body parts can develop. e.g. star fish, tail of wall lizard.

19. syngamy?

- i) The types of sexual reproduction seen in animals are syngamy (fertilization) and conjugation.
- ii) In **syngamy**, the fusion of two haploid gametes takes place to produce a diploid zygote.
- iii) Depending upon the place where the fertilization takes place, it is of two types. In **external fertilization**, **Internal fertilization**.

20. external fertilization

In **external fertilization**, the fusion of male and female gametes takes place outside the body of female organisms in the water medium. e.g. sponges, fishes and amphibians.

21. internal fertilization

In **internal fertilization**, the fusion of male and female gametes takes place within the body of female organisms. e.g. reptiles, aves and mammals.

22. **autogamy**, fertilization) are prevalent among living organisms. In **autogamy**, the male and female gametes are produced by the same cell or same organism and both the gametes fuse together to form a zygote e.g. *Actinosphaerium* and *Paramecium*.

23. exogamy

In **exogamy**, the male and female gametes are produced by different parents and they fuse to form a zygote. So it is biparental. e.g. Human – dioecious or unisexual animal.

24. hologamy

In lower organisms, sometimes the entire mature organisms do not form gametes but they themselves behave as gametes and the fusion of such mature individuals is known as **hologamy** e.g. *Trichonympha*

25. Paedogamy.

Paedogamy is the sexual union of young individuals produced immediately after the division of the adult parent cell by mitosis.

26. merogamy

division of the adult parent cell by mitosis. In **merogamy**, the fusion of small sized and morphologically different gametes (merogametes) takes place.

27. **isogamy**

The fusion of morphological and physiological identical gametes (isogametes) is called **isogamy**. e.g. *Monocystis*,

28. **anisogamy**

whereas the fusion of dissimilar gametes is called **anisogamy** (*Gr. An*-without; *iso*-equal; *gam*-marriage).

29. **Conjugation?**

i) **Conjugation** is the temporary union of the two individuals of the same species.

ii) During their union both individuals, called the conjugants exchange certain amount of nuclear material (DNA) and then get separated.

iii) Conjugation is common among ciliates, e.g. *Paramecium*, *Vorticella* and bacteria (Prokaryotes).

30. **Phases of life cycle**

Phases of life cycle: Organisms have three phases – Juvenile phase, reproductive phase and senescent phase.

Juvenile phase/ vegetative phase is the period of growth between the birth of the individual upto reproductive maturity.

During **reproductive phase/ maturity phase** the organisms reproduce and their offsprings reach maturity period.

On the basis of time, breeding animals are of two types: **seasonal breeders** and **continuous breeders**.

Seasonal breeders reproduce at particular period of the year such as frogs, lizards, most birds, deers etc., Continuous breeders continue to breed throughout their sexual maturity e.g. honey bees, poultry, rabbit etc.,

Senescent phase begins at the end of reproductive phase when degeneration sets in the structure and functioning of the body.

31. **PARTHENOGENESIS**

i) Development of an egg into a complete individual without fertilization is known as parthenogenesis. It was first discovered by Charles Bonnet in 1745.

ii) Parthenogenesis is of two main types namely, Natural Parthenogenesis and Artificial Parthenogenesis.

32. **Natural parthenogenesis**

i) In certain animals, parthenogenesis occurs regularly, constantly and naturally in their life cycle and is known as **natural parthenogenesis**.

ii) **artificial parthenogenesis**, the unfertilized egg (ovum) is induced to develop into a complete individual by physical or chemical stimuli. e.g., Annelid and seaurchin eggs

iii) Natural parthenogenesis may be of two types, viz., complete and incomplete.

iv) **Complete parthenogenesis** is the only form of reproduction in certain animals and there is no biparental sexual reproduction. These are no male organisms and so, such individuals are represented by females only.

v) **Incomplete parthenogenesis** is found in some animals in which both sexual reproduction and parthenogenesis occurs. e.g. In honeybees; fertilized eggs (zygotes) develop into queen and workers, whereas unfertilized eggs develop into drones (male).

33. **Oviparous**

Ovum-egg-, *Parere*- to produce) animals (egg laying animals), the young hatch from eggs laid outside the mother's body. e.g. reptiles and birds (their eggs are covered by hard calcareous shells), invertebrates, fishes etc.

34. **Viviparous** (*L.*, *Vivus* - alive, *Parere* - to produce) animals give rise to young ones.

Viviparity is a type of development in which the young ones are born alive after being nourished in the uterus through the placenta. Majority of mammals including human beings are viviparous.

35. In **Ovoviviparous** animals, the embryo develops inside the egg and remains in the mother's body until they are ready to hatch. This method of reproduction is similar to viviparity but the embryos have no placental connection with the mother and receive their nourishment from the egg yolk. Ovoviviparity is seen in fishes like shark.