

How Do Organisms Reproduce?

1. What is the importance of the process of reproduction?

Though reproduction is not an essential life process for an individual, it is very necessary for the perpetuation of the species.

Increase in the population of a species is possible only by reproduction. Favourable variations from parents to offspring are passed on by reproduction.

2. What is species?

A group of similar organisms which can naturally interbreed is called Species.

3. Do organisms produce exact copies of themselves during reproduction?

In asexual reproduction there are subtle differences between parent and offspring. In sexual reproduction these variations are more pronounced because two different individuals in a population would have quite different patterns of accumulated variations. Combining variations from two individuals would thus create more new combinations or variants. There is also gene recombination during the division leading to gamete formation.

4. What is the importance of variations?

Variations increase the survival chance, variation is the raw material for evolution. Successful variations are selected in evolution.

5. Why is variation beneficial to the species but not necessarily for the individuals?

Variations can be beneficial or harmful according to the ecological niche of the organism. A variation suitable for the particular niche is selected by nature in evolution. Thus variations are necessary for the survival of the species. Variation is important for evolution of the species.

E.g.: A population of heat resistant bacteria in temperature of the water survives, if the temperature of water increases by global warming but most other bacteria would die.

6. What is the importance of DNA copying in reproduction?

DNA is a macromolecule present in the chromosome. Genes are segments of the DNA.. DNA has the information to create proteins which lead to body design of the organism. If a similar individual has to be reproduced, the DNA should replicate to make an exact copy of itself.

7. What are the different methods of asexual reproduction?

- Fission
- Budding
- Fragmentation
- Spore formation
- Vegetative Propagation

8. Name the following:

An organism which reproduces by

- Binary fission - Amoeba
- Multiple fission - Plasmodium
- Budding - Hydra
- Fragmentation - Spirogyra
- Spore Formation - Rhizopus

9. How does binary fission differ from multiple fission?

Binary fission consists of divisions of the nucleus followed by the division of cytoplasm producing two cells each having a daughter nucleus. E.g.: Amoeba

In multiple fission, the nucleus of the parent cell undergoes repeated divisions to produce many daughter nuclei. The cytoplasm also divides and cleaves around each nucleus forming several daughter cells in the parent cell. In favorable conditions when the parent cell membrane ruptures all the daughter individuals are released. E.g.: Plasmodium.

10. How does binary fission in amoeba differ from binary fission in Leishmania?

Splitting of the cell into two can take place in any place in amoeba. In Leishmania which has a whip like structure at one end of the cell binary fission occurs in a definite orientation in relation to these structures.

11. How will an organism be benefitted if it reproduces through spores?

Spores have thick walls that protect them from unfavorable conditions. Such spores are produced in large numbers. They germinate when favorable conditions return.

12. Can you think of reasons why more complex organisms cannot give rise to new individuals through regeneration?

Complex organisms have highly differentiated tissues and organs. In this case regeneration of complex individual organism is difficult from a small piece.

13. Why is vegetative propagation practised for growing some types of plants?

a. In plants which do not produce viable seeds it is the only method of reproduction.

b. Vegetative propagation is quicker and mature plants can be raised very quickly by this method.

c. Genetically similar plants can be produced. This is of great importance in agriculture and gardening.

14. What are the advantages of sexual reproduction over asexual reproduction?

The progeny of asexual reproduction show very little variations. This reduces the chance of survival and evolution of species.

Sexual reproduction promotes diversity among the offspring because variations from two parents are coming together.

Progeny of sexual reproduction have more chance of survival because of the variations. New combinations of characters thus plays important role in the evolution of species.

15. What is asexual reproduction? Explain briefly various methods of asexual reproduction?

Formation of a new organism from a single parent without fusion of reproductive cells is called asexual reproduction.

a. Fission: For unicellular organisms, cell division or fission leads to the creation of new individuals.

i. Binary fission: The parent cell divides into two equal halves and two new individuals are produced. E.g.: Amoeba, bacteria, Leishmania

ii. Multiple fission: The parent cell divides into many daughter cells simultaneously. E.g.: Plasmodium

b. Fragmentation: Organisms break up into many pieces upon maturation. These fragments grow into new individuals. E.g.: Spirogyra

c. Regeneration: Simple animals like hydra and planaria can be cut into a number of pieces and each piece grows into a complete organism. Regeneration is carried out by specialized cells.

d. Budding: In hydra, a bud develops as an out-growth due to repeated cell divisions at one specific site. These buds develop into tiny individuals, when full mature they detach from the parent body and start independent existence.

e. Spore formation: Organisms like rhizopus produces spores in sporangia. Each spore has a thick wall to protect it. The spore germinates to produce a new organism.

f. **Vegetative propagation:** when a vegetative part like stem, root, and leaf can produce a new organism, it is called vegetative propagation.

Natural:

- i. Stem: Potato, onion
- ii. Root: Guava
- iii. Leaf: Bryophyllum

Artificial:

- i. Stem-cutting
- ii. Grafting
- iii. Layering
- iv. Tissue culture

16. How is specific chromosome number maintained in a sexually reproducing organism?

A special division takes place in the cells of reproductive organ such that the chromosome number is halved. Diploid mother cell produces haploid gametes. Gametes contain only half the amount of DNA. When gametes fuse during fertilization in the full number of chromosomes is re-established. Two haploid gametes fuse to form a diploid zygote.

17. Draw and label the parts of a flower.

18. What are the functions of the following parts of a flower?

- a. **Sepals & petals:** Sepals in the calyx cup protect the flower in the bud stage. They persist in the fruit. Petals of insect pollinated flowers are brightly colored and scented to attract bees and butterflies for pollination. They are colorless and inconspicuous in wind pollinated flowers.
- b. **Stamen:** This is the male reproductive part of the flower. The anther produces pollen grains.
- c. **Carpel:** It has a swollen bottom part called ovary, a middle elongated part called style and a sticky terminal part called stigma. The ovary contains ovules which contain the female gametes - the eggs.

19. What is pollination?

The transfer of pollen grains from the anther to the stigma is called pollination. If this transfer occurs in the same flower, it is called self-pollination. If the transfer occurs from one flower to another flower, it is called cross-pollination.

20. How is the process of pollination differing from fertilization?

The transfer of pollen grains from the anther to the stigma is called Pollination. This occurs in angiosperm plants.

The fusion of male and female gametes of all sexually-reproducing organisms is called fertilization.

21. What are the steps involved in fertilization and formation of seeds?

- a. Transfer of pollen grains from the anther to the stigma.
- b. Pollen grains germinate to produce the pollen tube which grows through the style to the ovule in the ovary.
- c. The pollen tube releases male gametes which fuses with the egg nucleus to form a zygote.
- d. The zygote divides and develops to an embryo.
- e. The ovule develops into a seed.
- f. The ovary develops into the fruit.

22. What are the secondary sexual characteristics seen in males?

- a. Growth of thick hair on the face
- b. Cracking of the voice

23. Why are the testis located outside the abdominal cavity in the scrotum?

Sperm production requires a lower temperature than the normal body temperature.

24. Draw the female reproductive system and label the parts.

25. What is ovulation?

The release of mature ovum from the ovary is called ovulation. This process occurs every month.

26. Draw the longitudinal section of pistil to show pollen grains' germination.

27. List the events after fertilization in an angiosperm takes place.

- a. The zygote divides several times to form an embryo. This embryo develops plumule, radicle and one or two cotyledons.
- b. The ovule develops a tough coating and becomes a seed.
- c. The ovary develops into a fruit
- d. The petals, stamens, style and stigma shrivel and fall off.
- e. The calyx (of sepals) persists.

28. Draw the male reproductive system and label the parts.

29. What is the role of the seminal vesicles and the prostate glands?

The seminal vesicle and the prostate glands add their secretions so that the sperm are in a fluid which makes their transport easier and this fluid also provides nutrition.

30. What are the changes seen in females at the time of puberty?

- a. The breast size begins to increase with the darkening of the skin of the nipples.
- b. They begin to menstruate.

31. What happens when the egg is not fertilized?

If the egg is not fertilized, it lives only for a day. Every month the uterus prepares itself to receive the fertilized egg. The lining of the uterus becomes thick, spongy and richly supplied with blood. If the egg is not fertilized, the lining breaks and comes out through the vagina as blood and mucous. It usually lasts for 2 – 8 days. This process is called menstruation.

32. How does the embryo get nourishment inside the mother's body?

The embryo gets nutrition from the mother's blood with the help of a special tissue called placenta. This is a disc which is embedded in the uterine wall. It contains villi on the embryo's side of the tissue. On the mother's side are blood spaces. This provides a large surface area for diffusion of glucose, oxygen and other nutrients from the mother to the embryo.

33. What are the contraceptive methods taken to avoid pregnancy?

- a. Creating a mechanical barrier so that the sperms do not reach the egg. This is done with a condom which is worn around the penis or a similar device that is placed in the vagina.
- b. Changing the hormonal balance of the body so that fertilization cannot occur. This is done with the help of oral contraceptive pills.
- c. Contraceptive devices like loop or copper-T are placed in the uterus to prevent pregnancy.
- d. Surgical methods like vasectomy in males and tubectomy in females.

34. If a woman is using copper-T, will it help in protecting her from sexually-transmitted diseases?

No. Copper-T which is placed in the uterus prevents pregnancy. It cannot prevent sexually-transmitted diseases.

● 35. What are the functions performed by the testis in males?

a. Testis produces sperms.

b. Testis produces male hormones called testosterone. This hormone helps the male to develop secondary sexual characteristics. It gives maleness and male feelings.

36. How are the modes of reproduction different in unicellular and multi-cellular organisms?

For unicellular organisms, cell division or fission leads to the creation of new individuals. In multi-cellular organisms with relatively simple body organization like spirogyra, simple reproductive methods can work. True multi-cellular organisms cannot divide cell by cell. They have specialized tissues and organs placed at definite positions in the body. So multi-cellular organisms have tissues and organs specially differentiated for reproduction.

37. How does reproduction help in providing stability to population of species?

Populations of organisms with well defined places in the ecosystem use their ability to reproduce. The consistency of DNA copying during reproduction is important for the maintenance of the body design features that allow the organism to use the particular niche. Reproduction is therefore linked to the stability of population of species.

38. What could be the reasons for adopting contraceptive methods?

Pregnancy will make major demands on the body and mind of the woman and if she is not ready for it, her health will be adversely affected. By adopting contraceptive methods, frequent and unwanted pregnancies can be avoided. Moreover, population can be controlled to improve the standard of living.

More children bring financial constraints on the parents to feed, clothe and educate them. So to control the size of the family, contraceptive methods are adopted.

Some of the contraceptive devices like condoms prevent sexually-transmitted diseases as well.