

Chapter: Reproduction in Organisms

Exercises

Question 1 Why is reproduction essential for organisms?

Answer: The process of reproduction is the fundamental feature of all living organisms. Reproduction is a biological process through which living organisms produce offspring which are similar to them. The process of reproduction ensures the continuance of various species present on the Earth. Also in the absence of reproduction, the species will not be able to exist for a long period and they may go extinct soon.

Question 2 Which is the better mode of reproduction sexual or asexual? Why?

Answer: The better mode for reproduction is sexual reproduction. This allows the formation of new variants by the combination of the DNA from different individuals, specifically one of each sex. It involves the fusion of both male and female gametes to their variants, which will neither be identical to their parents nor to themselves. This process of variation helps the individual to get themselves adapted to the constantly changing and challenging environments. In addition to this, it leads to the evolution of better-suited organisms which ensures greater survival of the living species. On the other hand, the process of asexual reproduction allows very small or no variations at all. As a result, the produced individuals are almost the exact copies of their parents and themselves.

Question 3: Why is the offspring formed by asexual reproduction referred to as clones?

Answer: A clone is usually a group of individuals which are identical morphologically and genetically. During this process of asexual reproduction, there is no fusion of male and female gamete that is only one parent is involved. This results in that the so produced offspring are identical morphologically and genetically to their parents and hence called the clone.

Question 4: Offspring formed due to sexual reproduction have better chances of survival. Why? Is this statement always true?

Answer: The process of sexual reproduction includes the fusion of both male and female gametes. Then this method of fusion allows the formation of newly formed variants by the combination of the DNA usually from two different members of species. For a better chance of survival, the variations allow the individual to adapt under various environmental conditions whereas it is not always necessary that the offspring produced by the process of sexual reproduction have a better chance of survival. Asexual reproduction is more advantageous for organisms under certain conditions. Take the example of those individuals who do not move from one place to another yet are well settled in their environment. In addition, the process of asexual reproduction is a fast and quick mode of reproduction that does not need as much time and energy as sexual reproduction requires.

Question 5: How does the progeny formed from asexual reproduction differ from those formed by sexual reproduction?

Answer: Progeny formed by asexual reproduction:

- 1) Asexual reproduction does not include the fusion of both male and female gametes. The organisms undergoing this type of reproduction produce offspring that are identical to them genetically and morphologically.
- 2) Hence the offspring produced by this method do not show variations and are known as clones.

Progeny formed from sexual reproduction:

- 1) sexual reproduction includes the fusion of both male and female gamete of two individuals, specifically one of each sex. The organisms undergoing this type of reproduction produce offspring not identical to them.
- 2) Hence the produced offspring show variations from their parents and each other.

Question 6: Distinguish between asexual and sexual reproduction. Why vegetative reproduction is also considered a type of reproduction?

Answer: Sexual reproduction:

- 1) This method includes the fusion of both male and female gametes.
- 2) Usually this requires two numbers of different individuals.
- 3) Here the individuals produced are not identical to their parents and they show variations from each other.
- 4) Most animals reproduce sexually. Whereas both sexual and asexual reproduction modes can be seen in plants.
- (5) This method is a slow process.

Asexual reproduction:

- 1) This method does not include the fusion of both males and female gametes.
- 2) This only requires one individual.
- 3) Here the individuals produced are identical to their parents and thus known as clones.
- 4) The asexual mode of reproduction is common in organisms that have a simple organization for example algae and fungi.
- 5) This method is a fast process.

The process of vegetative propagation is a process in which new plants are obtained without the production of seeds or spores. This includes the propagation of plants with the help of certain vegetative parts, for example, rhizome, sucker, tuber, bulb, etc. This does not include the fusion of both male and female gamete and needs only one parent. Thus, vegetative reproduction is considered a type of asexual reproduction.

Question 7: What is vegetative propagation? Give two examples.

Answer: The process of vegetative propagation is a mode of asexual reproduction in which the newly formed plants are obtained from the vegetative parts of it. For the propagation of newly formed plants, this does not include the seeds or spores. The vegetative parts of plants can be used as the propagules for raising the newly formed plants. For example, plants like rhizomes, runners, suckers, etc.

Examples of vegetative reproduction are:

- 1) Eyes of potato: The surface of the potato has several buds called the eyes. When buried in the soil each of these buds develops into new plants which are identical to their parent plant.
- 2) Leaf buds of Bryophyllum: The leaves of the Bryophyllum plant undergo several adventitious buds on their margins. These leaf buds can grow and develop into small plants when the leaf gets detached from the plant and comes in contact with the moist soil.

Question 8: Define

- a) Juvenile phase
- b) Reproductive phase
- c) Senescent phase.

Answer:

- a) Juvenile phase: It is defined as the period of growth in an individual organism after its birth takes place and before it reaches reproductive maturity.
- b) Reproductive phase: It is defined as the period when an individual organism starts to reproduce sexually.
- c) Senescent phase: It is defined as the period when an organism grows old and loses its ability to reproduce.

Question 9: Higher organisms have resorted to sexual reproduction despite its complexity. Why?

Answer: Even though sexual reproduction includes more time and energy, higher organisms have resorted to sexual reproduction despite having complexity. This is mainly because this mode of reproduction helps to introduce new variations in progenies through the combination of DNA usually from two different individuals. These variations allow the individual to cope up with the various environmental conditions and hence the organisms made are better adapted for the environment. These variations also lead to the evolution of better organisms and due to this, they provide better chances of survival. Also, asexual reproduction does not provide any genetic differences in the individuals produced.

Question 10: Explain why meiosis and gametogenesis are always interlinked?

Answer: Meiosis is a process of reduction of division in which the amount of genetic material is reduced whereas, in the process of gametogenesis, forming of gametes takes place. The gametes produced by the organisms are haploid, that is they contain only one set of chromosomes, while the body of these organisms is diploid. Therefore, for the production of haploid gametes, the germ cells of an organism undergo the process of meiosis. During this process, the meiocytes of an organism undergo two successive nuclear and cell divisions with a single cycle of DNA replication for the formation of the haploid gametes.

Question 11: Identify each part in a flowering plant and write whether it is haploid (n) or diploid (2n).

1. Ovary
2. Anther
3. Egg
4. Pollen
5. Male gamete
6. Zygote

Answer:

1. Ovary - Diploid (2n).
2. Anther - Diploid (2n).
3. Egg - Haploid (n).
4. Pollen - Haploid (n).
5. Male gamete - Haploid (n).
6. Zygote - Diploid (2n).

Question 12: Define external fertilization. Mention its disadvantages.

Answer: The process of external fertilization is the process in which the fusion of both male and female gamete takes place outside the female body in an external medium, generally in water. Some of the examples of organisms that exhibit external fertilization are fish, frogs, starfish, etc.

Disadvantages of external fertilization: In external fertilization, female eggs have fewer chances of fertilization. This can result in the wastage of a large number of eggs produced during this process of external fertilization. In addition to this, proper parental care is absent to the offspring, due to which there is a low rate of survival in the progenies.

Question 13: Differentiate between zoospore and zygote.

Answer:

Zoospore:

- 1) The motile asexual spore that utilizes the flagella for movement is known as the zoospore.
- 2) This is an asexual reproductive structure.
- 3) It usually takes place in the dispersal.
- 4) This can be seen in the lower kingdom.

Zygote:

- 1) The non-motile diploid cell which is formed as a result of fertilization is known as the zygote.
- 2) This is formed when sexual reproduction takes place.
- 3) Here very little part takes place in the They take dispersal.
- 4) This can be seen in the higher kingdom as in kingdom Plantae and kingdom Animalia.

Question 14: Differentiate between gametogenesis from embryogenesis.

Answer:

Gametogenesis:

This is the process of the formation of the haploid (n) male and the diploid (2n) female gametes from the diploid meocytes through the process of meiosis.

Embryogenesis:

This is the process of the development of the embryo from the repeated mitotic divisions of the diploid (2n) zygote.

Question 15: Describe the post-fertilization changes in a flower.

Answer: Fertilization is the process of the fusion of both male and female gamete for the formation of a zygote. After the process of fertilization, the zygote divides several times to form an embryo. A fully fertilized ovule forms the seed. The seed contains an embryo that is enclosed in a protective covering which is known as a seed coat. When the seed continues growing further. The other floral parts fall off. This results in the growth of the ovary, which enlarges and ripens to become a fruit with a thick wall called the pericarp.

Question 16: What is a bisexual flower? Collect five bisexual flowers from your neighborhood and with the help of your teacher find out their common and scientific names.

Answer: A flower that contains both male and female reproductive structures which is anther and pistil is called a bisexual flower.

Some examples of them are as follows:

Water lily (*Nymphaea odorata*)

Rose (*Rosa multiflora*)

Hibiscus (*Hibiscus Rosa-Sinensis*)

Mustard (*Brassica nigra*)

Petunia (*Petunia hybrida*)

Question 17: Examine a few flowers of any cucurbit plant and try to identify the staminate and pistillate flowers. Do you know any other plant that bears unisexual flowers?

Answer: The cucurbit plant has unisexual flowers as these flowers have either stamen or pistil. The staminate flowers are bright; petals are yellow along with the stamens that represent the reproductive structure of males. In addition to this, the pistillate has only the pistil that represents the reproductive structure of females. The other examples of unisexual plants are corn, papaya, cucumber, etc.

Question 18: Why are offspring of oviparous animals at a greater risk as compared to offspring of viviparous animals?

Answer: The oviparous animals lay eggs outside their body. Thus, the eggs of these animals are under continuous threat from other environmental factors. Whereas the development of egg takes place inside the female's body is the viviparous animals.

Therefore, the offspring of an oviparous animal is at higher risk as compared to the offspring of viviparous animals which give birth.