

CHAPTER - 8
HOW DO ORGANISMS REPRODUCE

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1. What is the importance of DNA copying in re-production?

Ans: DNA copying (replication) mechanism is necessary for reproduction as copying of DNA helps in transfer of information or characters from parents to offspring. It also helps to generate variations during sexual reproduction. This variation leads to evolution.

2. Why is variation beneficial to the species, but not necessary for the individual?

Ans: Variation is beneficial to the species as it allows a species to adapt to a changing environment. Only those who adopt the changes can survive in harsher conditions by adapting to the changes. But for an individual, the variation doesn't matter in most of the conditions.

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1. How does binary fission differ from multiple fission?

Ans: Binary fission differs from multiple fission in the following ways:

Binary Fission:

- (i) The parent organism splits to form two new organisms.
- (ii) It takes place during favourable environmental conditions.
- (iii) It takes place in organisms like amoeba, paramoecium etc.

Multiple Fission:

- (i) The parent organism splits to form many new organisms at the same time.
- (ii) It takes place during unfavourable environmental conditions.
- (iii) It takes place in organisms like plasmodium etc.

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

Ans: Spores are tiny spherical, asexual, reproductive bodies. They are covered with a hard protective wall. This enables them to survive in unfavourable conditions. They can only germinate and produce new plants under favourable conditions thereby benefitting the organism from dying out.

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

Ans: Complex organisms cannot give rise to new individuals through regeneration because they have complex body structure or design. They have complex tissues which further form organs followed by organ systems. Moreover, complex organisms lack specialised cells which have the potential to grow into a new organism unlike the simple organisms.

4. Why is vegetative propagation practiced for growing some type of plants?

Ans: (i) Plants that have lost their capability to produce seeds can be propagated by this method.
(ii) It helps to grow plants bearing superior traits, as they are genetically identical to the parent plant.
(iii) It is used for growing plants which require a longer time to grow and become mature.

5. Why is DNA copying an essential part of the process of reproduction?

Ans: DNA copying is an essential part of the process of reproduction because it is responsible for the transfer of parental characteristics to the offspring. DNA is the component of a cell which contains all the genetic materials or genetic information of the individual. In the process of DNA copying, a copy of genetic material from the parent is transferred to the child so that the child has the characteristics of his or her parents and resembles them.

1. How is the process of pollination different from fertilisation?

Ans: The process of pollination differs from fertilisation in the following ways;

- (i) Pollination is the transfer of pollen grains from the anther to the stigma of a flower whereas; Fertilisation is the fusion of male gamete with female gamete.
- (ii) Pollination is an external process while fertilisation is an internal process.

2. What is the role of the seminal vesicles and the prostate gland?

Ans: Secretions from seminal vesicles and prostate gland provide nutrition to the sperms. This makes transportation of sperms easier by providing them a fluid medium.

3. What are the changes seen in girls at the time of puberty?

Ans: Puberty is the period of sexual maturation and achievement of fertility. Changes seen in girls at the time of puberty are as follows:-

- (i) Growth of hairs in armpits and pubic region.
- (ii) Mammary glands (breast) develop and hips broaden.
- (iii) Uterus, Vagina, Fallopian tube enlarge and pelvis widens.
- (iv) Menstruation and ovulation in girls start at the time of puberty.

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

Ans: The embryo gets nourishment from the mother's blood with the help of a special tissue called placenta. This is a disc-like tissue which develops between uterine wall and embryo. As the mother gets nourishment, the nutrients travels through the mother's blood stream and get exchanged with the blood stream of foetus through placenta.

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

Ans: No, copper-T does not prevent the transmission of sexually transmitted diseases as fluid to fluid contact occurs through vagina. Copper-T only prevents implantation.

EXERCISES

1. Asexual reproduction takes place through budding in

Ans: Yeast

2. Which of the following is not a part of the female reproductive system in human beings?

Ans: Vas **deferans**

3. The anther contains

Ans: Pollen grains.

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

Ans: Sexual reproduction is considered superior over asexual reproduction as it brings about variations in the progeny. These variations allow organisms to live in diverse habitats with the help of adaptations. On the other hand, asexual reproduction does not bring about variations among the progeny.

5. What are the functions performed by the testes in human beings?

Ans: The testes are the primary male reproductive organs. The functions performed by the testes are as follows:- (i) They produce sperms. (ii) They secrete hormones, primarily testosterone.

6. Why does menstruation occur?

Ans: Menstruation occurs when the egg is not fertilised. Every month, uterus prepares itself to receive a fertilised egg. The menstruation cycle results in the thickening of the lining of the uterus, and the growth of an egg, which is required for pregnancy. If pregnancy does not occur, the lining is released in what is known as menstruation.

7. Draw the labelled diagram of the longitudinal section of a flower.

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8. What are different methods of contraception?

Ans: The different methods of contraception are as follows:-

(i) Hormonal Methods: These methods of contraception contain hormonal preparations in the form of 'pills' which prevent the release of ovum.

(ii) Surgical Methods: This is a permanent birth control option. In males a small portion of sperm duct is cut by surgical method. It is called 'Vasectomy'. The cut end is tied properly to prevent the sperms from coming out. In females, a small part of the fallopian tube/oviduct is cut and tied to prevent the egg from entering the oviduct.

(iii) Barrier Methods: In barrier methods of contraception, physical devices such as condoms are used. These barriers prevent sperm from meeting the egg.

(iv) Chemical Methods: These are vaginal pills (spermicides) which work by killing sperm as it enters the vagina.

9. How are the methods of reproduction different in unicellular and multi-cellular organisms?

Ans: **UNICELLULAR ORGANISMS:**

(i) Unicellular organisms reproduce by asexual method.

(ii) No special cells and organs are present for reproduction.

MUTICELLULAR ORGANISMS:

(i) Multicellular organisms reproduce by sexual method.

(ii) Special cells and organs are present for reproduction.

10. Leaves of bryophyllum fallen on the ground produces new plants. Why?

Ans: The leave of bryophyllum has the capacity of generating roots and shoots when detached from the parent plant. When these leaves fall on the ground and come in contact with soil, then these plants grow from the leave buds.

11. Why are the testes located outside the abdominal cavity? Mention the endocrine and exocrine function of testes?

Ans: Sperm production requires slightly less temperature than the normal body temperature. So, testes are located outside the body.

Endocrine function of testes: It helps in the production of testosterone.

Exocrine function of testes: The exocrine function of testes is the production of sperm.

12. (a) What are sexually transmitted diseases? Name any one which is caused by bacteria and one caused by viral infection?

Ans: Sexually transmitted diseases are infections/diseases that pass from one person to another through sexual contact.

(a) Syphilis is caused by bacteria and HIV/AIDS is caused by virus.

(b) Mention any two methods to avoid such diseases.

(i) Practice safe sex.

(ii) Avoid sex with anyone who has genital sores, a rash, discharge or other symptoms.

13. How does vegetative propagation occur in nature? Explain with four different examples.

Ans: Vegetative propagation occurs in nature when plants grow and develop naturally without any human interference. New plants may emerge from the roots, stem and leaves of the parent plant. The vegetative plant structures arising from the stem are known as rhizomes, bulbs, runners, tubers etc. The plants propagated vegetatively are given below: **Stem:** Runners grow horizontally above the ground. The buds are formed at the nodes of the runners. **Roots:** New plants emerge out of swollen, modified roots known as tubers. Buds are formed at the base of the stem. **Leaves:** Leaves of few plants get detached from the parent plant and develop into a new plant. **Bulbs:** Bulbs have an underground stem to which the leaves are attached. These leaves are capable of storing food. The centre of the bulb contains an apical bud that produces leaves and flowers. Shoots are developed from the lateral buds.

14. Can we find variations in an asexually reproducing organism like bacteria? Write yes or no and give a reason in support of your answer.

Ans: No, we cannot find variations in asexually reproducing organisms like bacteria because only a single

parent is involved and there is no formation of gametes and its fusion.

15. How does reproduction help in providing stability into populations of species?

Ans: Reproduction is the process of producing new individuals of the same species by existing organisms of a species. Thus, it helps in providing stability to population of species by giving birth to new individuals as the birth must be at par with the rate of death to provide stability to population of a species.

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

Ans: Contraceptive methods are mainly adopted because of the following reasons:-

- (i) To prevent unwanted pregnancies.
- (ii) To prevent population explosion.
- (iii) To prevent the transfer of sexually transmitted diseases (STDs).

CHAPTER - 9 HEREDITY AND EVOLUTION

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1. If a trait a exists in 10% of a population of an asexually reproducing species and a trait B exists in 60% of the same population, which trait is likely to have arisen earlier?

Ans: In a population of asexually reproducing species, the chances of appearance of new traits due to variations are very low. And the trait which is already present in the population is likely to be in higher percentage and would have been arisen earlier. Therefore, the trait B, present in 60% of the population is the trait which has arisen earlier.

2. How does the creation of variations in a species promote survival?

Ans: Variations increase the adaptability of an organism to its changing environmental conditions. Hence, variations promote the survival of the species.

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1. How do Mendel's experiments show that traits may be dominant or recessive?

Ans: Mendel demonstrated that traits can be either dominant or recessive through his monohybrid cross. He crossed true-breeding tall (TT) and dwarf (tt) pea plants. They appeared tall only because the tall trait was dominant over the dwarf trait. This shows that traits may be dominant or recessive.

2. How do Mendel's experiments show that traits are inherited independently?

Ans: When Mendel crossed pure breed tall pea plants with pure breed short pea plants, he found that only tall plants were produced in F1 generation. Mendel further crossed the tall pea plants obtained in F1 generation with dwarf plants and obtained the ratio of Tall: Short plant 3:1 in F2 generation. This experiment proved that traits are inherited independently.

3. A man with blood group A marries a woman with blood group O and their daughter has blood group O. Is this information enough to tell you which of the traits is dominant? Why or Why not?

Ans: The given information is not enough to tell us which of the traits-blood group A or O is dominant. In blood heredity, blood type A is always dominant and blood type O is always recessive.

4. How is the sex of the child determined in human beings?

Ans: In human beings, female have a pair of XX sex chromosomes and male have a pair of XY sex chromosomes. In human beings, the male gamete determines the sex of a child. If a sperm carrying Y-chromosome fertilizes an ovum, then the child will be a boy. If a sperm carrying X-chromosome fertilizes an ovum, then the child will be a girl. The Y chromosome carries factors responsible for triggering male development and the X chromosome carries factors responsible for triggering female development.

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1. What are the different ways in which individuals with a particular trait may increase in a population?

Ans: The different ways in which individuals with a particular trait may increase in a population are: genetic drift and natural selection.

2. Why are traits acquired during the lifetime of an individual not inherited?

Ans: As the traits are acquired during lifetime of an individual does not interfere with genetic makeup of the DNA of the germ cells, they are not inherited. These traits do not have any effect on DNA of the germ cells and so, these are not inherited.

3. Why are the small numbers of surviving tigers a case of worry from the point of view of genetics?

Ans: Small numbers of surviving tigers are a cause of worry from the point of view of genetics because their decreasing number would cause a decrease in set of genes. In other words, many genes will be eliminated thus, limiting the chances of variation during sexual reproduction and the coming generations will not be able to see tigers at all.

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1. What factors could lead to the rise of a new species?

Ans: Genetic variation, natural selection and reproductive isolation could lead to rise of a new species.

2. Will geographic isolation be a major factor in the speciation of a self pollinating plant species? Why or Why not?

Ans: No, geographical isolation will not be a major factor in the formation of new species of self pollinated plants. This is because self pollinated plants receive pollen grains from the same flower or another flower on the same plant and its distance from other plants hardly affects its reproduction. Moreover, self pollinated plants rarely show variations in characters.

3. Will geographical isolation be a major factor in the speciation of an organism that reproduces asexually? Why or Why not?

Ans: No, because asexual reproduction involves only a single parent and does not require any other organism to carry out reproduction. So, the geographical isolation does not affect its reproduction cycle. Moreover asexually reproducing organisms rarely show any variations in characters.

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1. Give an example of characteristics being used to determine how close two species are in evolutionary terms.

Ans: Homologous characteristics can help to identify an evolutionary relationship between apparently different species. For example, mammals have forelimbs, as do birds, reptiles and amphibians. The basic structure of the limbs is smaller though it has been modified to perform different functions in various vertebrates.

2. Can the wing of a butterfly and the wing of a bat be considered homologous organs? Why or Why not?

Ans: No, the wing of a butterfly and the wing of a bat cannot be considered homologous organs because they both perform the same function of flying but their origin and structure is not similar.

3. What are fossils? What do they tell us about the process of evolution?

Ans: Fossils are the remains or impressions of organisms that lived in the ancient times, Fossils provide the evidence that the present animals have originated from previously existing ones through the process of continuous evolution.

EXERCISES

1. (d)

2. (d)

3. (a)

4. **A study found that children with light coloured eyes are likely to have parents with light coloured eyes. On the basis, can we say anything about whether the light eye colour trait is dominant or recessive? Why or Why not?**

Ans: On the basis of this study, we cannot make any inference whether light eye colour trait is recessive or dominant, because as both the parents have light colour eye, all the children will definitely have light colour eye, though certain variations may occur.

5. **How are the areas of study-evolution and classification interlinked?**

Ans: The study of classification of various organisms gives us an idea about the evolutionary history of the organisms. Organisms, which have certain similar characteristics, are placed in one group. It can thus be concluded, that the organisms placed in one group may have evolved from common ancestors and may have a common evolutionary history.

6. **Explain the terms analogous and homologous organs with examples.**

Ans: Analogous organs are those organs which have different basic structural design and origin but have similar functions. For example, the wings of birds and insects have different basic structure but have similar functions, i.e. flying.

On the other hand homologous organs are those organs which have the same basic structural design and origin but have different functions. For example, the forelimbs of humans and the wings of birds perform different functions but their skeletal structure is similar.

7. **Outline a project which aims to find the dominant coat colour in dogs.**

Ans: Select homozygous black (BB) male dog and a homozygous white (bb) female dog. Allow them to mate and produce offspring (F1 generation). If all of the F1 offspring are black, we can conclude that black coat colour is dominant than white coat in the dog.

8. **Explain the importance of fossils in deciding evolutionary relationships.**

Ans: Fossils are the remains or impressions of organisms that lived in the ancient times. The importance of fossils in deciding evolutionary relationships are as follows:-

(i) They help us to find the evolutionary links of different species.

(ii) They give us information about how the new organisms have evolved from earlier ones.

(iii) They also help us by giving information about extinct species and the time period in which they lived.

9. **What evidence do we have for the origin of life from inanimate matter?**

Ans: The evidence for the origin of life from inanimate matter was provided through an experiment, conducted in 1953, by Stanley L Miller and Harold C Urey. In the experiment, they assembled an atmosphere containing molecules like ammonia, methane and hydrogen sulphide, but no oxygen, over water. This was similar to atmosphere that thought to exist on early earth. This was maintained at a temperature just below 1000.

And sparks were passed through the mixture of gas to simulate lightning. At the end of a week, 15% of the carbon from methane had been converted to simple compounds of carbon including amino acids which make up protein molecules and support the life in basic form. This experiment suggests that life originated on earth from inanimate matter.

10. **A pea plant with blue colour flower denoted by BB is cross-bred with a plant with white flower denoted by WW.**

(a) **What is the expected colour of the flowers in their F1 progeny?**

Ans: Blue colour

(b) **What will be the percentage of plants bearing white flower in F2 generation, when the flowers of F1 generation plants were selfed?**

Ans: 25%.

(c) State the expected ratio of the genotypes BB and Bw in the F₂ progeny.

Ans: BB: Bw =1:2

11. List three main factors responsible for the speciation and briefly describe each one of them.

Ans: (i) Genetic Drift: Random change in the frequency of genes.

(ii) Natural Selection: Nature selects the fittest individual in a population.

(iii) Reproductive Isolation: When two individuals are geographically isolated and natural selection operates upon them differently leading to inability to the individuals to interbreed.

12. Homologous organs are different from analogous organs. Mention the two basic characteristics that decide about analogy and homology between the two organs.

Ans: **Homologous organs:** They have similar internal structure. They perform different functions.

Analogous organs: Their internal structure is quite different. Their internal structure is quite different. They have similar functions.

13. Variation is useful for the survival of species over long time. But the variants have unequal chances of survival. Explain this statement.

Ans: Variations which are favourable increase the chances of survival of the species. It forms the basis of evolution. For example, if an organism can withstand a little higher temperature, then the variation goes on accumulating in its future generations. Hence, those organisms can survive when there is sudden rise in the temperature. This ensures the survival of the species. But some other organisms (variants) without this variation of heat resistance may not survive due to sudden rise in temperature. So, variation is beneficial to the species, but not necessary for individual.

14. If a population of red beetles, living on green bushes is being eaten by crows. During sexual reproduction a green beetle is found in progeny:

(a) What is the future of a new trait?

Ans: Since it is green in colour, it can hide itself in green bushes.

(b) Will it survive in the new habitat?

Ans: Yes, it will survive because of variation.

15. Explain how sexual reproduction gives rise to more viable variations than asexual reproduction. How does this affect the revolution of those organisms that reproduce sexually?

Ans: Sexual reproduction involves fusion of gametes. The offspring's show variations from their parents due to crossing over the exchange of gene segments. They are not exact copies of their parents, due to recombination of parental genes. Also due to environmental factors certain favourable variations are also produced. Due to production of variations, sexually reproducing animals show very quick evolution.

Where as in asexual reproduction, organisms raised are the exact copies of parents. They rarely show any variation.

16. How is the equal genetic contribution of male and female parents ensured in the progeny?

Ans: In reproduction process, the gametes of both the parents participate. These gametes are produced by meiosis, thus contain half number of chromosomes. During sexual reproduction, a female gamete (having 23 chromosomes) fuses with a male gamete to form zygote. Zygote is diploid which contains 23 chromosomes from mother and 23 from father. In this way, an equal genetic contribution of male and female parents is ensured in the progeny.

17. Only variations that confer an advantage to an individual organism will survive in a population. Do you agree with this statement? Why or Why not?

Ans: Yes, I agree. All the variations in a species do not have equal chances of surviving in the environment. Depending on the nature of variations different individuals would have different kinds of advantages. Selection of variants by environmental factors forms the basis of evolutionary process. The variations, which prove disadvantageous to an individual organism, will not survive because the environmental

factors cannot support this.