CHAPTER 9



Heredity and Evolution

Multiple Choice Questions

1. Exchange of genetic material takes place in

(a) vegetative reproduction
(b) asexual reproduction
(c) sexual reproduction
(d) budding

2. Two pink coloured flowers on crossing resulted in 1 red, 2 pink and 1 white flower progeny. The nature of the cross will be

(a) double fertilisation
(b) self pollination
(c) cross fertilisation
(d) no fertilisation

3. A cross between a tall plant (TT) and short pea plant (tt) resulted in progeny that were all tall plants because

(a) tallness is the dominant trait
(b) shortness is the dominant trait
(c) tallness is the recessive trait
(d) height of pea plant is not governed by gene 'T' or 't'

4. Which of the following statement is incorrect?

(a) For every hormone there is a gene.
(b) For every protein there is a gene.
(c) For production of every enzyme there is a gene.
(d) For every molecule of fat there is a gene

5. If a round, green seeded pea plant (RR yy) is crossed with wrinkled, yellow seeded pea plant, (rr YY) the seeds produced in F_1 generation are

(a) round and yellow
(b) round and green
(c) wrinkled and green
(d) wrinkled and yellow

6. In human males all the chromosomes are paired perfectly except one. This/these unpaired chromosome is/are

(i) large chromosome
(ii) small chromosome
(iii) Y-chromosome
(iv) X-chromosome

(a) (i) and (ii) (b) (iii) only
(c) (iii) and (iv) (d) (ii) and (iv)

7. The maleness of a child is determined by

(a) the X chromosome in the zygote
(b) the Y chromosome in zygote
(c) the cytoplasm of germ cell which determines the sex
(d) sex is determined by chance

8. A zygote which has an X-chromosome inherited from the father will develop into a

(a) boy
(b) girl
(c) X- chromosome does not determine the sex of a child
(d) either boy or girl

9. Select the incorrect statement

(a) Frequency of certain genes in a population change over several generations resulting in evolution
(b) Reduction in weight of the organism due to starvation is genetically controlled
(c) Low weight parents can have heavy weight progeny
(d) Traits which are not inherited over generations do not cause evolution

10. New species may be formed if

(i) DNA undergoes significant changes in germ cells
(ii) chromosome number changes in the gamete
(iii) there is no change in the genetic material
(iv) mating does not take place

(a) (i) and (ii) (b) (i) and (iii)
(c) (ii), (iii) and (iv) (d) (i), (ii) and (iii)

11. Two pea plants one with round green seeds (RRyy) and another with wrinkled yellow (rrYY) seeds produce F_1 progeny that have round, yellow (RrYy) seeds. When F_1 plants are selfed, the F_2 progeny will have new combination of characters. Choose the new combination from the following

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(i) Round, yellow
(ii) Round, green
(iii) Wrinkled, yellow
(iv) Wrinkled, green

(a) (i) and (ii) (b) (i) and (iv)
(c) (ii) and (iii) (d) (i) and (iii)

12. A basket of vegetables contains carrot, potato, radish and tomato. Which of them represent the correct homologous structures?

(a) Carrot and potato
(b) Carrot and tomato
(c) Radish and carrot
(d) Radish and potato

13. Select the correct statement

(a) Tendril of a pea plant and phylloclade of *Opuntia* are homologous
(b) Tendril of a pea plant and phylloclade of *Opuntia* are analogous
(c) Wings of birds and limbs of lizards are analogous
(d) Wings of birds and wings of bat are homologous

14. If the fossil of an organism is found in the deeper layers of earth, then we can predict that

(a) the extinction of organism has occurred recently
(b) the extinction of organism has occurred thousands of years ago
(c) the fossil position in the layers of earth is not related to its time of extinction
(d) time of extinction cannot be determined

15. Which of the following statements is not true with respect to variation?

(a) All variations in a species have equal chance of survival
(b) Change in genetic composition results in variation
(c) Selection of variants by environmental factors forms the basis of evolutionary processes.
(d) Variation is minimum in asexual reproduction

16. A trait in an organism is influenced by

(a) paternal DNA only
(b) maternal DNA only
(c) both maternal and paternal DNA
(d) neither by paternal nor by maternal DNA

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17. Select the group which shares maximum number of common characters

(a) two individuals of a species
(b) two species of a genus
(c) two genera of a family
(d) two genera of two families

18. According to the evolutionary theory, formation of a new species is generally due to

(a) sudden creation by nature
(b) accumulation of variations over several generations
(c) clones formed during asexual reproduction
(d) movement of individuals from one habitat to another

19. From the list given below, select the character which can be acquired but not inherited

(a) colour of eye
(b) colour of skin
(c) size of body
(d) nature of hair

20. The two versions of a trait (character) which are brought in by the male and female gametes are situated on

(a) copies of the same chromosome
(b) two different chromosomes
(c) sex chromosomes
(d) any chromosome

21. Select the statements that describe characteristics of genes

(i) genes are specific sequence of bases in a DNA molecule
(ii) a gene does not code for proteins
(iii) in individuals of a given species, a specific gene is located on a particular chromosome
(iv) each chromosome has only one gene

(a) (i) and (ii) (b) (i) and (iii)
(c) (i) and (iv) (d) (ii) and (iv)

22. In peas, a pure tall plant (TT) is crossed with a short plant (tt). The ratio of pure tall plants to short plants in F_2 is

(a) 1 : 3
(b) 3 : 1
(c) 1 : 1
(d) 2 : 1

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23. The number of pair (s) of sex chromosomes in the zygote of humans is

(a) one (b) two
(c) three (d) four

24. The theory of evolution of species by natural selection was given by

(a) Mendel (b) Darwin
(c) Morgan (d) Lamarck

25. Some dinosaurs had feathers although they could not fly but birds have feathers that help them to fly. In the context of evolution this means that

(a) reptiles have evolved from birds
(b) there is no evolutionary connection between reptiles and birds
(c) feathers are homologous structures in both the organisms
(d) birds have evolved from reptiles

Short Answer Questions

26. How is the sex of a newborn determined in humans?

27. Do genetic combination of mothers play a significant role in determining the sex of a new born?

28. Mention three important features of fossils which help in the study of evolution.

29. Why do all the gametes formed in human females have an X chromosome?

30. In human beings, the statistical probability of getting either a male or female child is 50 : 50. Give a suitable explanation.

31. A very small population of a species faces a greater threat of extinction than a larger population. Provide a suitable genetic explanation.

32. What are homologous structures? Give an example. Is it necessary that homologous structures always have a common ancestor?

33. Does the occurrence of diversity of animals on earth suggest their diverse ancestry also? Discuss this point in the light of evolution.

34. Give the pair of contrasting traits of the following characters in pea plant and mention which is dominant and recessive

(i) yellow seed (ii) round seed

35. Why did Mendel choose pea plant for his experiments?

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36. A woman has only daughters. Analyse the situation genetically and provide a suitable explanation.

Long Answer Questions

37. Does geographical isolation of individuals of a species lead to formation of a new species? Provide a suitable explanation.

38. Bacteria have a simpler body plan when compared with human beings. Does it mean that human beings are more evolved than bacteria? Provide a suitable explanation.

39. All the human races like Africans, Asians, Europeans, Americans and others might have evolved from a common ancestor. Provide a few evidences in support of this view.

40. Differentiate between inherited and acquired characters. Give one example for each type.

41. Give reasons why acquired characters are not inherited.

42. Evolution has exhibited a greater stability of molecular structure when compared with morphological structures. Comment on the statement and justify your opinion.

43. In the following crosses write the characteristics of the progeny

Cross	Progeny
(a) RR YY x RR YY Round, yellow Round, yellow	....
(b) Rr Yy x Rr Yy Round, yellow Round, yellow	....
(c) rr yy x rr yy wrinkled, green wrinkled, green	....
(d) RR YY x rr yy Round, yellow wrinkled green	....

44. Study the following cross and showing self pollination in F_1, fill in the blank and answer the question that follows

Parents	RRYY	x	rryy
	Round, yellow		wrinkled, green
F_1 —	Rr Yy	x	?
	Round, yellow		

45. In question 44, what are the combinations of character in the F_2 progeny? What are their ratios?

46. Give the basic features of the mechanism of inheritance.

47. Give reasons for the appearance of new combinations of characters in the F_2 progeny.