CLASS X: SCIENCE
Chapter 8: Heredity

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Q1. 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. The trait B has arisen earlier since it in 60% population while trait A is merely in 10% which is newly arisen and not spread to large number.

Q2. How does the creation of variations in a species promote survival?

Ans. Creation of variation may be suitable for a population to fight against some new change in environment while those which do not have this variation will not be able to fight with such changing conditions and will die.

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Q1. How do Mendel's experiments show that traits may be dominant orrecessive?

Ans. Mendel found that in his monohybrid and dihybrid cross out of a pair of contrasting trait in F1 generation only one trait is expressed and other remain hidden, the expressed trait is called dominant and the hidden trait is called recessive.

Q2. How do Mendel's experiments show that traits are inherited independently?

Ans. In dihybrid cross when a plant with round and yellow seeds were crossed with a plant with wrinkled and green seeded plant in F2 generation he obtained four combinations instead of two parental varieties, this is possible only when the factors of each character is free to move with any other factor of other character. This is called law of independent assortment.

Q3. 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 – blood group A or O – is dominant? Why or why not?

Ans. No, because there is no information about the blood group of all the progenies.Blood group A can be genotypically AA or AO.

Q4. How is the sex of the child determined in human beings?

Ans. In female there are two X means (XX) chromosomes but in case of males these are one X and other Y means (XY).

EXERCISES

Q1. A Mendelian experiment consisted of breeding tall pea plants bearing violet flowers with short pea plants bearing white flowers. The progeny all bear violet flowers, but almost half of them were short. This suggests that the genetic make-up of the tall parent can be depicted as:

(A) TTWW (B) TTww
(C) TtWW (D) TtWw.

Ans. (C) TtWW

Q2. A study found that children with light-coloured eyes are likely to have parents with light-coloured eyes. On this basis, can we say anything about whether the light eye colour trait is dominant or recessive ? Why or why not ?

Ans. Let us assume that children with light-coloured eyes can either have LL or L l or ll genotype. If the children have LL genotype, then their parents will also be of LL genotype.

$$LL \times LL$$
$$\downarrow$$
$$LL$$

If the children with light-coloured eyes have ll genotype, then their parents will also have ll genotype.

$$ll \times ll$$
$$\downarrow$$
$$ll$$

Therefore, it cannot be concluded whether light eye colour is dominant or recessive.

Q3. Outline a project which aims to find the dominant coat colour in dogs.

Observation table			
The area visited	Number of grey colour	Number of black / brown	Number of white dogs
A			
B			
C			
D			
Total			

Ans. Project: To find out the dominant coat colour in dogs.
Material required: Notebook, pencil.
Procedure: Observe different colour of pet dogs kept by your friends and note their different coat colour.
You may be able to find different coat colours such as, grey, white, black, brown, etc. Note your reading in the observation table.
Make a survey of different populations to determine the frequency of different coat colours in dogs. Find the percentage distribution of each coat type, out of the total number of dogs studied for the coat colour.

Total number of dogs studied =...........
% of Grey dogs =.................
% of Black/brown dogs =..............
% of White dogs =................
Conclusion : Draw conclusion on the basis of your data collected.
Let us assume in dogs, the coat/skin colour grey is found in more numbers, while black/brown are in less number. In dogs/cats, the gene for the coat colour is present on 'X' chromosomes, In dogs, for the recessive colour to express, both the 'X' chromosomes must carry the genes for the recessive coat colour which is possible in less number. Thus black/brown colour is a recessive character for coat colour in dogs, the dominant colour (with high % of individuals) can express both in homozyous and heterozygous form in dogs. Therefore dominant coat colour in dogs is grey.

Q4. How is the equal genetic contribution of male and female parents ensured in the progeny ?

Ans. Genetically organisms are of two types :

(i) Haploid : They have single set of chromosomes, where each chromosome is represented singly. As the chromosomes are the bearer of genes so haploids have single set of genes. A single gene determine the expression of character.

(ii) Diploid : They have two set of homologous chromosomes, where the chromosome occur in pair, one maternal contributed by the mother through her ovum and the second chromosome of the pair is contributed by the male parent through his sperm. The resultant cell zygote produce by the fusion of male and female gametes have two sets of chromosomes, each set contributed by each parent. In diploids a character is controlled by two genes factors. Both the father and mother contribute practically equal amount of genetic material to the child. It means that each trait can be influenced by both paternal and maternal DNA.