Biology

CLASS NOTES FOR CBSE

Chapter 04. Heredity and Evolution

01. Introduction

Arecognisable feature of a human being (or any other organism) like height, complexion, shape of hair, colour of eyes, of and shape of nose and chin, etc, are called 'character' or 'traits' The transmission of characters (or traits) from the parents to their offspring is called heredity The hereditary information is present in the sex cells (or gametes) of the parents. Thus, gametes constitue the link between one generation and the next, and pass on the paternal (father's) and maternal(mother's) characters or traits to the offspring.

02. Variations

Althogh the offsprings inherit the characters (or traits) of the parents and resemble them very closely, but the resemblance is not complete in all respects. The difference in the characters (or traits) among the individuals of a species is called variation. for example, human height is a trait which shows variation. This is because some people are very tall, some are less tall, some have medium height, some have short height whereas others are very short. In most of the people, the earloble is 'hanging' and it is called free earloble in the some people, however, the earlobe is closely attached to the side of the head and it is called attached earlobe

03. Accumulation of Variations

The reproduction of organisms produces variations. The variations produced in organisms during successive generation get accumulated in the organisms. The significance of a variation shows up only if it continues to be inherited by the offspring for several generations. The great advantage of variation to a species is that it increases the chances of its survival in a changing environment. For example, the accumulation of 'heat resistant' variation (or trait) in some bacteria will ensure its survival even when the temperature in its environment rises too much due to a heat wave or some other reasons. Chromosome is a thread-like structure in the nucleus of a cell formed of which carries the genes A gene is a unit of DND on a chromosome which governs the synthesis of one protein that controls a specific characteristics (or traits) from parent to their offsprings during reproduction. Genes work in paris for example, the gene for tallness is represented by the letter T whereas the gene for dwarfness is represented by the letter t. The letters. T and t actually represent two forms of the same gene The term 'factors' which were used by Mendel as carriers of heredity information are now known as 'genes' Genes for controlling the same characteristic of fan organism can be of two types : dominant or recessive. The gene which decides the appearance of an oranism even in the presence of an alternative gene is know as a dominant gene. It dominates the

recessive gene for the same characteristic on the other chromosome of the pair. It dominates the recessive gene for the same characteristic on the other chromosome of the pair. The gene which can decide the appearance of an organism only in the presence of another identical gene is called a recessive gene. A single recessive gene cannot decide the appearance of an organism. is T and the recessive gene for dwarfness is t. Genotype shows the genetic constitution of an organism. In simple words. genotype is the description of genes present in an organism. Genotype is always a pair of letters such as TT,Tt or tt The characteristic (or trait which is visible in an organism is called its phenotype. When two parents cross (or breed) to produce progeny (or offsprings), then their progeny is called first filial generation or F_1 generation. Gregor Mendel was the first scientist to make a systematic study of patterns of inheritance which involved the transfer of characteristic from parents to progeny Mendel chose pea plants for studying inheritance because pea plants had a number of clear cut differences which were easy to tell apart. For example, some pea plants were 'tall' (having long stem) whereas other were 'dwarf' (having short stem). Some pea plants produced round-yellow seeds whereas others produced wrinkled-green seeds, etc. Another reason for choosing pea plant was that they were self pollinating (which enabled them to produce next generation of plants easily). And finally, Mendel chose pea
plants to study inheritance (and not animals including human beings) because many generations of pea plants can be produced in a comparatively short time span and their study is much simpler than that of animals A new form of plant resulting from a cross (or breeding) of different varieties of plant is known as a hybrid. In monohybrid cross we will study the inheritance of one pair of contrasting characteristics 'tallness' and 'dwarfness' of the pea plants by their generation and second generation progeny. In the dihybrid cross we will study the inheritance of two paris of contrasting characteristics of pea plants such as round-yellow seeds and wrinkled-green seeds.

04. RULES FOR THE INHERITANCE OF TRAITS : MENDEL'S CONTRIBUTION

Monohybrid Inheritance and the law of Segregation

(i) Mendel first crossed pure-bred tall pea plants with pure-bred dwarf pea plants and found that only tall pea plants were produced in the first generation of F_1 generation No dwarf pea plants (or short pea plants) were obtained in the first generation of progeny. Form this Mendel concluded that the first generation (or F_1 cross) showed the traits of only one of the parent plants : tallness. The trait of other parent plant, dwarfness did not show up in the progeny of first generation