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I'm going to explain monohybrid cross from the unit Mendelian Gentics and it's extension.

outlines of this module monohybrid cross examples law of dominance, law of segregation test cross, co-dominance, and incomplete dominance.

At the end of this module you can explain monohybrid cross, illustrate law of dominance, and law segregation. Understand the concept of testcross, co-dominance .and incomplete dominance.

Monohybrid Cross is a cross between two purebred individuals having homozygous genotype and differs in only one pair of contrasting characters belonging to one trait. One parent is homozygous for one allele and the other parent is homozygous for other allele.. For example tall and dwarf capital T, Capital T and small t small t , Monohybrid cross is a genetic mix between two homozygous individuals.

Capital T Capital T and small t small t of opposite phenotypes, tall and dwarf for a genetic trait that is height. Mendel performed. Hybridization experiments and he studied 7 pairs of contrasting characters. These are the results of his observation round and wrinkle parents when they crossed in F1 progeny he got all the round plants. And in F2 here he got 2.96 is to one, that is three is to one ratio. (2.96 : 1 i.e.3 ; 1) round and wrinkled.

When he crossed the yellow and green in F1 and all the progeny were yellow. And in F2 he got.
3.01 is to one that is 3 is to1 yellow and green plants.
Similarly. When he crossed tall and dwarf. He received 100% of tall progeny in F1 generation and 2.84 is to one that is approximately 3:1.Tall and dwarf in F2 ratio.

Coming to the illustrations of monohybrid cross, Mendel performed the cross between tall and dwarf plants. Plants are similar in all other aspects except the height, that is, they differ only in one pair of contrasting character, tall and dwarf. In F1 progeny he got all the tall plants, the character which appeared in F1 progeny. He termed it as a dominant and the character which did not appear as the recessive. For the factors of the tall plant. he has taken the first alphabet capital letter as the symbol for the tall factor and the corresponding small letter as a factor for the recessive character. So capital T Capital T is the Genotype for the tall plant. Small t small t is a Genotype for the dwarf plant. When plant produce the gamete, it being haploid capital T and dwarf plant. Gamete small t, These two gametes combine and produces capital T small t that is heterozygous tall in F1 progeny. Mendel wanted to know what happened to the recessive character. He allowed
the self- pollination among the F1 progeny and observed the characters in F2 progeny.In F2 progeny, the recessive character reappeared. The characters in F2 progeny were three tall is to one.dwarf.

The character which can be seen externally or what you say physical character is known as phenotype. Hence the phenotypic ratio is 3 tall is to 1 dwarf.(3 tall :1 dwarf)

Whereas the genotypic ratio is 1, homozygous tall is to 2 heterozygous tall is to one homozygous dwarf.(1:2:1)

Another example of monohybrid cross. Mendel performed the experiment with a round seeds and wrinkle seeds in F1 progeny He got all the plants with the round seeds and he observed for the F2 generation. He received the phenotypic ratio of three round and one wrinkled. And the genotypic ratio of 1 homozygous round is to two heterozygous round is to one homozygous wrinkled.

Law of dominance.
States in a hybrid when two factors of contrasting characters or traits are present together, one factor will mask or hide or cover the expression of another factor. Example, capital Y and small. Y is the heterozygotes condition the phenotype Is yellow the factor for yellow Capital Y is dominant and will express.And the factor for green small y is a recessive and will be suppressed.

So when yellow seeds plants are crossed with the green seed plants. In the F1 progeny all the plants with yellow seeds appeared. Here both the factors are present in the plant. That is capital Y and small y but because of dominance only capital Y will express its character that is yellow seeds small y Character that is Green seeds is suppressed. In the F2 generation the green reappears I n the ratio of three yellow is to 1 green and the genotypic ratio is 1. Homozygous yellow is to Heterozygous yellow and one homozygous green.
Eye colour in men. Brown eye colour is dominant over the blue eye colour in some population. In some people. Suffering with the heterochromia one, eye will be a blue colour another eye will be of the Brown colour. When homozygous Brown eyed parent and a homozygous blue eyed parent get marry they produce the children 100% heterozygous Brown eye heterozygotes .Brown eyed parents when they (cross). get marry. They produce the progeny of. 25% homozygous dominant Brown eyed and 50% heterozygous Brown eyed and 25% homozygous recessive, blue-eyed.

Mendels law of segregation. It is also known as purity of gametes. Several texts refer to this as the first law of mendel. In hybrid of different factors which remained together. They do not get contaminated or mixed or blended and get segregated from each other during gamete formation. For example, capital B small B. Capital B is effective for the black small b is the factor for the white, and though they are present together in heterozygous condition are in F1 hybrid. They get segregated when the gamete formation takes place.
Monohybrid cross in Guinea pigs. The black and white guinea pigs when they crossed F1 progeny all were black whereas the white Guinea pigs reappear in F2 progeny when F1 Blacks were inbred. The F2 phenotypic ratio is 3. Black is to 1 white and Genotypic ratio is 1. Homozygous black, two heterozygotes black and one homozygous white. Monohybrid cross helps to determine the relationship between two alleles. That is Genotype. Whether it is dominant or recessive. Monohybrid cross also helps to observe. How are the progeny expressed the heterozygous genotypes. Which they inherit from their homozygous parents.
Testcross is the cross of F1 individual back to the recessive parent. Test cross is performed to confirm

Whether F1 individual is in homozygous condition or heterozygous condition. If one had cross, hybrid is crossed with the recessive parent, the progeny will be both tall and dwarf in equal ratio and when F1. In homozygous condition is crossed with the dwarf plant. All the progeny will be only of tall character. This indicates. If an individual is in homozygous condition, all the progeny will have the dominant character. The F1 individual is in heterozygous condition. The progeny will have both tall and dwarf characters.

Incomplete dominance. Dominance is not universal in some cases when. Organism differ in the character are crossed that is in hybrid experiments. it combine the. Character, For example in Mirabilis Jalappa. When red Flower plant is crossed with a white plant, the progeny will have the plant with pink Flowers. When the pink flower plants are inbred or self-pollinated. in the F2 progeny. The red colour, pink colour and white colour appears in the ratio of 1 red is to 2 pink is to 1 white.

In incomplete dominance, both phenotypic and genotypic ratio are same. That is one red two pink and one white. Let's say capital R capital R. Two capital R small r and one small r, small r.

co -dominance. Co-dominance is the phenomena in which. Both factors act as the dominant and they express. For example, a cross between Red furred cow and White furred Bull. The F1 progeny produces. both white and red furred individual and when they are inbreed in F2 generation, 1 white furred two white, red furred and one red.furred progeny appear so here also phenotypic and genotypic ratio is same. Another example for the co-dominance is blood group inheritance. Blood group inheritance. In human beings there are four blood groups. Blood Group A is due to the dominant gene A, blood Group B is due to the dominant gene B, blood group O is due to recessive gene o . Therefore, blood Group A will be having two genotypes, either capital A capital A or capital A and o. Similarly, blood Group B will have capital B Capital B and capital Bo. When capital A Capital B genes combine both express resulting into the AB Blood Group. . A is co-dominant over B. Both express that results into the AB blood group. Thank you.