



E-Study material
For 3rd Semester Botany Honours (CBCS)
Course Code: BC307T
Core Course VII: Genetics
Unit 1: Mendelian genetics and its extension
Topic: Multiple alleles

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Multiple alleles:

The multiple alleles can be defined "*as a set of three, four or more allelomorphic genes or alleles, which have arisen as a result of mutation of the normal gene and which occupy the same locus in the homologous chromosomes*".

CHARACTERS OF MULTIPLE ALLELES

1. Multiple alleles occupy the same locus within the homologous chromosomes. It means only one member of the series is present in a given chromosome.
2. Since only two chromosomes of each type are present in each diploid cell, only two genes of the multiple series are found in a cell and also in a given individual.
3. The gametes contain only one chromosome of each type, therefore, only one allele of the multiple series in each gamete.
4. Crossing over does not occur in the multiple alleles.
5. Multiple alleles control the same character, but each of them is characterized by different manifestation.
6. The multiple alleles of a series are more often related as dominant and recessive.

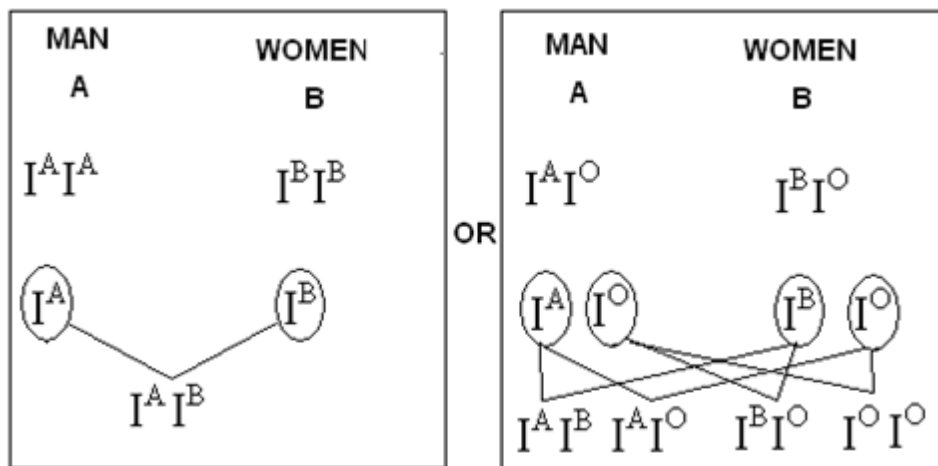
Examples:

ABO blood group in man:

Berntstein 1925 discovered that the inheritance of different blood groups in man is determined by a number of multiple allele series. I^A , I^B , I^O . I^A is dominant over I^O , I^B is dominant over I^O and I^A and I^B are co-dominant

BLOOD GROUP	MULTIPLE ALLES
A	$I^A I^A$ $I^A I^O$
B	$I^B I^B$ $I^B I^O$
AB	$I^A I^B$
O	$I^O I^O$

Thus a cross between a man having A blood group and a women with B blood group may produce following blood groups:



Q. What do you mean by RH factor?

Ans:

Rh Factor:

The Rh factor was discovered in 1940 by LANDSTEINER and AS. WIENER from rabbits immunized with the blood of a monkey (*Macaca rhesus*). When blood from a rhesus monkey was injected into guinea pig it was found that the guinea pig produced antibodies which would agglutinate the red cells of all rhesus monkeys. This indicates that the red cells of all monkeys of this species contain a particular antigen, which was designated Rh. When human blood was tested by this guinea pig serum, it was found that the cells of some persons were clumped whereas the blood of other persons was not affected. It was concluded that some persons have the same antigen (Rh) as found in the blood of rhesus monkeys, while others do not have it. Those with the antigen

were designated Rh- positive (Rh +) and those without it Rh-negative (Rh-). Rh + is presumed to be a dominant character and Rh- is a recessive trait.

Q. What do you mean by erythroblastosis foetalis ?

The Rh factor has great significance in child-birth. It has been found that an Rh-negative woman married with Rh-positive man, becomes sensitized simply by carrying a Rh-positive child within her body. Some of the cells from the embryo may mix into her own blood stream during development. The first child will be born normal. But in the second pregnancy the antibodies in the blood stream of the mother, pass through the placenta and cause damage to the red cells of the foetus. This causes the disease known as erythroblastosis foetalis, which is characterized by anemia due to hemolysis in the foetus and it soon dies. Now a day in this case an Anti D vaccine is given to such mother before pregnancy.

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