**Multiple Alleles**

For each trait that Mendel examined, there were only \_\_\_\_\_\_\_ different alleles. All of the monohybrid crosses we have done also have only had two alleles. The genes that control other traits, however, can have several different alleles.

A gene that has more than two possible alleles is said to have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. An \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ can have only \_\_\_\_\_\_\_\_\_ of these alleles, one from each parent. A \_\_\_\_\_\_\_\_\_\_\_\_\_ of people can have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ alleles of the same gene.

Human blood types are an excellent example of multiple alleles. The possible blood types for humans are:

Blood type alleles determine which \_\_\_\_\_\_\_\_\_\_\_\_ (a part of the blood that the immune system will attack) is produced in your blood.

Your body will produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (a part of the immune system that attacks foreign substances) to attack all antigens that you do not have.

The different blood phenotypes are controlled by a gene that geneticists usually call \_\_\_\_. There are three different alleles for the \_\_\_ gene:

The \_\_\_ allele is recessive to both \_\_\_ and \_\_\_.

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| **Genotype** | **A antigen** | **B antigen** | **Phenotype** |
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IA and IB are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Codominance is different from incomplete dominance as a codominant set of alleles will show \_\_\_\_\_\_\_\_ phenotypes completely, where incomplete dominance shows a phenotype that is in the middle between the two alleles.

When a blood \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is performed, it is important that careful attention is paid to the blood types of both the donor and the recipient. If the recipient has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that will attack the antigens that are present in the donor’s blood, the red blood cells will clump together and interfere with circulation in a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |  |
| --- | --- | --- | --- |
| **Phenotype** | **Antigens Present** | **Antibodies Attack** | **Can Receive Donations From** |
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Blood typing is one of the simplest cases of determining genotypes and phenotypes of multiple allele genes, since there are only three different alleles. For example, coat colour in rabbits is controlled by a gene called \_\_\_\_ and has \_\_\_\_ different alleles. More than 80 different alleles have been discovered for the gene that controls the production of a single type of enzyme in humans. Often these different alleles have their own set of dominance relationships that can complicate the determination of genotypes of parents and offspring!