to have the full set of genes to be able to contain a dominant allele that can dominate the recessive allele. Thus, the recessive allele will always be expressed. As males would only inherit the X chromosome from the mother and as only X chromosomes can hold recessive traits in males, any sex-linked genes with recessive traits in males would be inherited from the mother. Females might inherit it if the X chromosome in the father is recessive and the mother is a homozygous recessive or heterozygous.

When genes are passed from one generation to another and replication takes place, an error might occur and mutation would take place. Mutations cause a diversity of a species to occur. Mutations can be inherited by the offspring of the mutated organism. Mutations can be dominant or recessive. Dominant mutations are easy to detect but not recessive ones. Mutations can be beneficial or detrimental to an organism. E.g. sickle-cell anaemia mutation results in the gene controlling haemoglobin being involved in sickle-cell anaemia, causing a change in the three-dimensional shape of the haemoglobin molecule. When oxygen concentration in their blood decreases, the red blood cells become sickle-shaped and this interferes with the ability of the haemoglobin being able to bind with oxygen. This is a recessive mutated gene and is only expressed in the homozygous recessive condition. Mutations can also affect Down's syndrome which causes a change in the chromosome number. Some people might have an extra chromosome. These would normally fail to develop and only one type of zygote would develop in which there is an extra copy of chromosome 21, producing Down's syndrome. Spontaneous mutation rarely takes place unless mutagens are present in the environment, e.g. UV light, alpha, beta and gamma radiations. Some chemicals, e.g. tar, formaldehyde and LSD, are also mutagenic.

Some mutations are beneficial or detrimental to a cell's function. Organisms with beneficial mutation will leave more offspring than organisms without the beneficial mutation as these organisms will have a higher chance of surviving as they are more competitive and resistant, especially when there is a competition for food and space. The organism with the beneficial mutation will start to form a higher percentage of the population. This is known as natural selection. Overtime, more beneficial alleles will accumulate in a species and will form the majority of a species and is better adapted to the environment and adaptive radiation has taken place. They may even change to the extent that they become a new species. This is known as evolution, where present complex forms of organisms rise from simpler ancestral forms.

Artificial selection can also take place through selective breeding. Breeders would select a form of an organism that has strong gene combinations. These are allowed to produce offspring and as this continues those with the strongest gene combination is continually selected to produce more offspring. After many generations, pure-breeding that produces seeds with the desired qualities are obtained. Breeders can also cross different organisms to produce hybridisation so that offspring would inherit both of the parents' beneficial qualities.