

5.5 Variation & Evolution

Types of Variation:

- Most characteristics are controlled by a number of different genes.
- The differences in the characteristics are not always clear.
- Continuous variation means that one characteristic within a population shows a gradient, for example, height. If an individual has inherited a number of alleles for height, they have the potential to grow tall. However, if they do not develop to their true potential it may be due to a poor diet. The differences have to be measured, and then the phenotypes can be told apart.
- Characteristics that are easy to tell apart are controlled by a single gene. This is called discontinuous variation. These genes may have two or more alleles, and will result in a time that can only be one or another, for example, black or white.

Origins of Variation:

- Non-heritable variation. Environmental factors can also determine phenotypic variation. For example, an organism will inherit genes for reaching a theoretical size. However, whether it reaches that size is determined by environmental factor such as nutrition. Therefore if organisms of identical genetic makeup are exposed to other conditions, they could show considerable differences. Non-heritable variation has little evolutionary significance as it is not inherited from each generation to the next.
- Heritable variation. These result from genetic changes. Changes may occur during sexual reproduction (during crossing-over, random distribution of chromosomes, and mixing of two parental genotypes). However, mutations are yet more long-lasting than the aforementioned, but are very rare.

Over-Production:

- All populations have the potential to reproduce and increase the size of their population.
- However, this rarely occurs as environmental factors usually intercept the rapid growth of a population. Therefore the number of offspring produced is far greater than the number of offspring that survive to reproduce themselves.
- Populations usually oscillate around a mean level.
- Competition can come from intra-specific sources or inter-specific.

Selection Pressure:

- Some animals are born with an advantage to others, for example, a white coat in arctic conditions.
- This makes them more likely to survive than others of a different coat colour.
- The ones who stand out will be eaten by foxes, for example, and the white ones are more likely to go unnoticed.
- The foxes in this case are called the selection pressure, and it is this that determines the spread of alleles in a gene pool. For example, the more dull coat colours of the arctic rabbit population will be rare, and the white coat colour will be common.