Selection is the process by which organisms that are better adapted to their environment tend to survive and breed, while those that are less well adapted tend not to. Every organism is subjected to a process of selection, based on its suitability for surviving the conditions that exist at the time. Different environmental conditions favour different characteristics in the population. Depending on which characteristics are favoured, selection will produce a number of different results.

- Selection may favour individuals that vary in the one direction form the mean of the population. This is directional telection and charges the characteristics or the population.
- Selection may favour average individuals. This is stabilising selection and preserves the characteristics of a population.

Most characteristics are influenced by more than one gene (polygenes). These types of characteristics are more influenced by the environment than ones determined by a single gene. The effect of the environment on polygenes produces individuals in a population that vary about the mean.

Directional Selection:

If the environmental conditions change, the phenotypes (the observable physical and biochemical characteristics of an organism) that are best suited to the new conditions are most likely to survive. Some individuals, which fall either to the left or right of the mean, will possess a phenotype more suited to the new conditions

These individuals will be more likely to survive and breed. They will therefore contribute more offspring (and their alleles) to the next generation than other individuals. Over time, the mean will then move in the direction of these individuals.

An example is the effectiveness of some antibiotics on destroying bacteria. Some populations of hartnia had developed resistance to antibiotics, if was because of a chance mutation in the bacteria Units allowed members of the small reminion resistant bacteria to survive and multiply in the presence of centrillin. The population increased at the expense of the non-resistant population so the frequency of the allele that enabled the production of penicillinase increased in the population = populations normal distribution curve shifted to the population having a greater resistance to penicillin. Types of selection



Stabilising Selection:

If environmental conditions remain stable, it is the individuals with phenotypes closest to the mean that are favoured. These individuals are more likely to pass their alleles on to the next generation. Those individuals with phenotypes at the extremes are less likely to pass on their alleles. Stabilising selection therefore tends to eliminate the phenotypes at the extremes. An example is human birth weights.

Stabilising selection therefore results in phenotypes around the mean of the population being selected for and those at both extremes being selected against.

Natural selection results in species that are better adapted to the environment that they live in. these can be:

<u>Anatomical</u>, such as shorter ears and thicker fur in arctic foxes compared to those in warmer climates.

<u>Physiological</u>, oxidising of fat rather than carbs in kangaroo rats to produce additional water in a dry desert environment.

<u>Behavioural</u>, such as autumn migration of swallows from the UK to Africa to avoid food shortages in the UK winter.

