

MECHANISM OF EVOLUTION

Evolution is driven by changes in the gene pool, which is the collection of genes within a population. There are four primary mechanisms responsible for altering the gene pool of a population:

- (a) Mutation
- (b) Gene Flow
- (c) Genetic Drift
- (d) Natural Selection

Mutations

Mutations are alterations in the DNA sequence of an organism. Mutations occurring in germ cells, such as egg or sperm cells, are passed on to future generations and contribute to evolution. These inherited mutations are present in every cell throughout an individual's life. Acquired mutations, on the other hand, arise during an individual's lifetime due to environmental factors like ultraviolet radiation and do not pass on to future generations. They are not considered part of the evolutionary process.

Gene Flow

Gene flow involves the transfer of genes from one population to another. For instance, pollen transported by wind or people migrating to different cities or countries can facilitate gene flow. When individuals from different populations interbreed, gene exchange occurs, leading to the flow of genetic material between populations. Gene transfer can occur horizontally, through asexual means, which is common in prokaryotes.

Genetic Drift

Genetic drift refers to the random change in allele frequency within a population due to chance events. Its impact is more pronounced in smaller populations and less significant in larger ones. Two examples of genetic drift are the bottleneck effect and the founder effect.

Bottleneck Effect

This occurs when a population experiences a sudden reduction in size due to environmental factors like earthquakes, epidemics, etc. As a result, certain genes are lost from the population, leading to a significant decrease in genetic diversity. The surviving population's genetic makeup differs from the original population.

Founder Effect

When a small group of individuals from a larger population establishes a new population, there is a loss of genetic diversity. The new population does not reflect the genetic diversity of the parent population, leading to certain genetic traits becoming more prevalent, potentially causing genetic diseases in future generations.

Natural Selection

Natural selection occurs when individuals with particular traits exhibit higher survival and reproductive rates than others. These advantageous traits are passed on to offspring, resulting in evolutionary changes in future generations. One classic example of natural selection is Darwin's Finches, which evolved into 15 different species based on their adaptations and feeding habits.