

Concept 14.4

Microevolution is a change in a population's gene pool.

The union of genetics with evolutionary biology focuses on change within populations.

Populations and Their Gene Pools

- ◇ **Population** is a local group of individuals belonging to the same species.
- ◇ A **population** is the smallest level at which evolution can occur.
- ◇ **Individual organisms DO NOT evolve**, natural selection acts on individuals and affects their reproductive success.

A key concept in understanding the evolution of populations is the gene pool.

Gene pool - all the alleles in all the individuals that make up a population.

Changes in the Gene Pools

The processes that lead to genetic variation -- mutations and sexual recombination -- are random.

Natural selection (and thus evolution) is not random. The environment favors genetic combinations that contribute to survival and reproductive success.

Thus some alleles may become more common than others in the gene pool.

- **Frequency of alleles** - how often certain alleles occur in the gene pool.

- **Microevolution** - is evolution generation-to-generation based on the change of frequencies of alleles within a population.

Hardy-Weinberg equilibrium - populations that do not undergo change to their gene pools are not presently evolving, the frequency of alleles in that gene pool are constant over time.

The two main factors that can change a gene pool are genetic drift and natural selection.

Genetic Drift - A change in the gene pool of a population due to chance.

All populations are subject to some genetic drift. However the smaller the population is the more impact genetic drift has on that population.

The Bottleneck Effect - disaster may drastically reduce the size of a population and thus the size of the size of the gene pool.

Founder Effect - a few individuals colonize an isolated new habitat, the smaller the colony the less the genetic makeup will represent the gene pool of the larger population from which the colonists came from.

Gene flow and Mutation

Gene Flow - the exchange of genes with another population .

Mutation - a change in an organism's DNA that is carried by a gamete and enters the population.

Natural Selection and Fitness

Of all the causes of microevolution only natural selection usually leads to adaptation.

Fitness - the contribution that an individual makes to the gene pool of the next generation.

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Evolutionary biology is important in health science.

Natural selection and Sickle Cell Disease

Evolution of Antibiotic Resistance in Bacteria