

SEGMENT TWO, LECTURE FOUR: BEYOND DARWIN/MECHANISMS OF EVOLUTION

Populations (not individuals) evolve. So the smallest living unit that can be studied by evolutionary biologists is the population.

Populations are the individuals found in one area that belong to the same species (i.e., can interbreed and produce fertile offspring; Fig. 23.2).

Microevolution, refers to the generation to generation changes in a population's frequencies of alleles or genotypes. All of the genes in a population at a given time is called the gene pool.

Population genetics is the study of how populations change genetically over time. The combination of Darwinian evolution with population genetics led to a comprehensive theory of evolution called the modern synthesis.

Mutation - any change, even "silent" changes, in DNA. Mutation is the source of new alleles and genes.

Types of mutations (each has a known mechanism):

- Substitution mutation - replacement of one base by another.
- Recombination mutation - exchange of DNA segments between chromosomes.
- Insertion/Deletion mutations – very common in areas of repeated sequence.
Example: short insertions in one gene cause Huntington's disease.
- Gene Duplication mutations:
Example: a duplication mutation of one color receptor cone pigment gene in primates is now a third kind of color receptor.
- Inversion mutation – in which a segment of double stranded DNA is rotated 180°
- Change in chromosome number (whole sets or subsets).

The Hardy-Weinberg equation tests whether a population is evolving.