Population Genetics Encyclopedia Article

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BOOKRAGS

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Population Genetics

Population genetics is the study of the variations found within a population. Rather than examining the genes present within an individual, a study on population genetics looks at the gene frequencies within populations and also the selective factors that control their occurrence within natural populations. A powerful tool within this area of research is that of mathematical modeling. Mathematical models are used to predict what effects such things as selection, population size, mutation, and migration have upon the occurrence and frequency of both linked and unlinked genes.

Population genetics is an important study. Long term evolutionary changes are produced through the action of natural selection on populations, not individuals. A genetically isolated unit of population is a deme. A deme is self perpetuating by interbreeding within itself. All of the genes present in a deme make up the gene pool, and the future of the deme is dependent upon the gene pool. The Hardy Weinberg equilibrium tells us that, in the absence of mutation, selection, and migration, the frequency of alleles in a population remains constant. This is a state of genetic equilibrium, and in such a state, there is no evolutionary change. Once there is some sort of change to the factors effecting the deme, evolution and natural selection are observable. It is these changes and the factors that cause them that are studied within population genetics.

Studies in population genetics are directed towards problems which can shed light on evolution. Some of the most important aspects of these are the relative importance of natural selection as compared to chance, the rate of evolutionary change, and the long-term effects of natural selection. All populations from nature to laboratory and even fossil record are used to answer these questions. Because population genetics studies real world populations, predictions are not always validated. The heterogeneity of the studied environment provides many factors that are too complex or not understood well enough to be represented with total accuracy. This does not detract from the worth of population genetics, but merely adds a margin of error to the study.