SEGMENT TWO, LECTURE FIVE: POPULATION BIOLOGY

The Hardy-Weinberg equation is a population biology test to determine whether a population is evolving by one of the three mechanisms of evolution. The Hardy-Weinberg Equation describes how allele frequencies change when only Mendelian genetics and transmission of genes are operating.

The primary equation is: $p^2 + 2pq + q^2 = 1$

where p and q are allele frequencies of the dominant and recessive allleles in a population, respectively.

p^2, 2pq, and q^2 are the frequencies of three genotypes: the homozygous dominant, heterozygous, and homozygous recessive genotypes, respectively.

Note that observed phenotypes may not translate directly into genotypes because dominant traits mask recessive ones.

Assumptions of the Hardy-Weinberg equation for a population that is at equilibrium are (see list, p. 458):

1. There is a very large population size, so there is no genetic drift
2. There is gene flow from other populations;
3. There are no mutations, that would change one allele into another;
4. There is random mating;
5. There is no selection—in other words, no evolution.

Hardy-Weinberg Equation

$$p^2 + 2pq + q^2 = 1$$

Frequency of AA Genotype	Frequency of Aa (and aA) Genotypes	Frequency of aa Genotype

p is the frequency of allele A.
q is the frequency of allele a.

Note that p + q = 1 when there are only two alleles.