**GENETIC DRIFT**

**(Random fluctuation in allele frequencies over time),**

The **Hardy–Weinberg principle** (also known as the **Hardy–Weinberg equilibrium, model, theorem**, or **law**) states that [allele](http://en.wikipedia.org/wiki/Allele_frequency) and [genotype frequencies](http://en.wikipedia.org/wiki/Genotype_frequencies) in a population will remain constant from generation to generation in the absence of other evolutionary influences. These influences include [*mate choice*](http://en.wikipedia.org/wiki/Mate_choice), [*mutation*](http://en.wikipedia.org/wiki/Mutation), [*selection*](http://en.wikipedia.org/wiki/Selection), [*genetic drift*](http://en.wikipedia.org/wiki/Genetic_drift), and gene flow. Because one or more of these influences are typically present in real populations, the Hardy–Weinberg principle describes an ideal condition against which the effects of these influences can be analyzed.

In the simplest case of a single locus with two [alleles](http://en.wikipedia.org/wiki/Allele) denoted A and a with frequencies f(A) = *p* and f(a) = *q*, respectively, the expected genotype frequencies are f(AA) = *p*2 for the AA [homozygotes](http://en.wikipedia.org/wiki/Homozygote), f(aa) = *q*2 for the aa homozygotes, andf(Aa) = 2*pq* for the [heterozygotes](http://en.wikipedia.org/wiki/Heterozygote). The genotype proportions *p*2, 2*pq*, and *q*2 are called the Hardy-Weinberg proportions. [Note that the sum of all genotype frequencies of this case is the [binomial expansion](http://en.wikipedia.org/wiki/Binomial_expansion) of the square of the sum of *p* and *q*, and such a sum, as it represents the total of all possibilities, must be equal to 1. Therefore (p + q)2 = *p*2 + 2*pq* + *q*2 = 1. The solution of this equation is *q* = 1 - *p*.

P + q = 1