

Population Genetics

Population Genetics



- The science of genetic change in population.
- **Population** : A localized group of individuals belonging to the same species
- **Species**: A group of populations whose individuals have the potential to interbreed and produce viable offspring
- **Gene Pool**: The total collection of genes (and alleles of those genes) in a population at any one time



Hardy-Weinberg Principle

- The concept that the shuffling of genes that occur during sexual reproduction, by itself, cannot change the overall genetic makeup of a population.
 - Without outside influences, pressures, or preferences, gene frequencies remain relatively stable



Hardy-Weinberg Principle

- This principle will be maintained in nature only if all five of the following conditions are met:
 1. Very large population
 2. Isolation from other populations
 3. No net mutations
 4. Random mating
 5. No natural selection

Hardy-Weinberg Principle

- Remember:
- If these conditions are met, the population is at equilibrium.
- This means "No Change" or "No Evolution".
- Reality: Change and evolution are ALWAYS occurring! This is one of the main reasons evolution is the unifying principle of biology!

Hardy Weinberg Equation

- Given a known allele frequency, you can calculate other allele frequencies

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

Where:

p = the frequency of allele A




q = the frequency of allele a

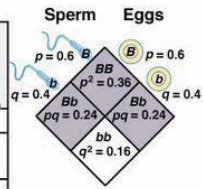
p^2 = the frequency of individual AA

q^2 = the frequency of individual aa

2pq = the frequency of individual Aa

Hardy-Weinberg Equilibrium

Phenotypes			
Genotypes	<i>BB</i>	<i>Bb</i>	<i>bb</i>
Frequency of genotype in population	0.36	0.48	0.16
Frequency of gametes	$0.36 + 0.24 = 0.6B$		$0.24 + 0.16 = 0.4b$



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