

Population Genetics – the study of the transfer of genetic information from generation to generation for an entire population, not just within a single family

Sample questions addressed by population genetics:

- Why is sickle cell anemia more common in Africa than in North America?
- Why are there so many blood type alleles? (A, B, and O)

Frequencies vs. probabilities:

Starting assumptions:

- Survival is independent of genotype (**no selection hypothesis**)
- Mating is independent of genotype (**random mating hypothesis**)

Initial genotype frequencies:

Initial allele frequencies:

Genotype frequencies after reproduction:

Allele frequencies after reproduction:

Hardy-Weinberg equilibrium proportions

What if an individual's survival depends on its genotype? (natural selection on viability)

Calculating proportions of newborns surviving to reproduce as adults (by genotype):

Allele frequencies of survivors:

Difference equation for the frequency of the “disease” allele:

Finding the equilibrium frequency of the disease allele: