

Aim: What are the genetic requirements for species stability and variation?

Recall that Hardy-Weinberg Equilibrium is described by the equation representing allele frequencies for allele p and allele q: $p^2 + 2pq + q^2 = 1$.

Conditions required for Hardy Weinberg equilibrium:

- no net mutations or allele frequency changes
- no individual enter/immigrate or leave/emigrate from population
- population is infinitely large; small populations can bottleneck
- individuals mate at random
- selection does not occur (b/c selection perturbs the equilibrium)

Disruption of Hardy-Weinberg equilibrium occurs when:

- mutation
 - migration
 - genetic drift/adaptive radiation
 - natural selection (stabilizing, directional/1 extreme, disruptive/2 extremes, sexual prefs)
- Hardy-Weinberg equilibrium can only hold (sort of) in cases where there is heterozygote advantage, such as sickle cell

Species emerge due to:

- Morphological (Biological) differences and speciation
- geographical isolation (physical barriers)
- reproductive isolation (breeding barriers)
- punctuated equilibrium/non-gradual spurts (modern concept that disagrees w/gradual)

Molecular evolution and cladograms

Cladistics uses certain features of organisms to establish evolutionary relationships

AA p 351 and towle 346: cladograms are not on exam ✕

remember KPCOFGS (kingdom, phylum, class, order, family, genus, species)

molecular evidence/ basic structural similarities

- biochem and genetics are similar
- DNA and RNA are similar going way back
- all life uses same amino acids/universal code
- organisms have similarities at level of protein (ie humans and mice)
- proteins evolve to do similar functions with subunits