Genetics and the History of Population Size

Alan R. Rogers

October 10, 2014

Principles

The expected length of a coalescent interval is long
▶ in large populations
▶ if there are only a few lineages

What if the population changes in size?

Genealogy of 2 genes

Genealogy of 3 genes

Genealogy of 4 genes

Effect of a population explosion

Middle: genealogy of 50 individuals; dots are mutations.
Bottom: ○ = simulated data, line = theory.
**Principles**

Coalescent intervals tend to be long in those parts of the tree where
- there are only a few lines of descent
- the population size is large

**Mismatch Distributions of Amerindian mtDNA Haplogroups**

![Mismatch Distributions](Fagundes et al 2008)

**Genealogies of Amerindian mtDNA Haplogroups**

![Genealogies](Fagundes et al 2008)

**Estimated Size of Amerindian Population**

![Population Estimates](Fagundes et al 2008)

**Estimated Size of Bison Population**

![Bison Population](Drummond et al 2005)