Population genetics - I

Genetics 371B Lecture 33 1 Dec. 1999

a.k.a. Evolutionary Genetics

Why bother with this stuff?

The use of models

Some terminology

- **Genotype frequency**
  - P_{Aa}
  - P'_{Aa}
- **Allele frequency**
  - P_A
  - P'_A

The Random-Mating population

Assumptions

- ◇ Discrete generations
- ◇ Random mating
- ◇ Genotype frequencies in the two sexes are equal
- ◇ No mutation
- ◇ No immigration or emigration
- ◇ Genotypes are equally fertile
- ◇ No selection
- ◇ Infinite population size
- ◇ An autosomal locus

How do genotype frequencies change over time?

Starting genotype frequencies:

P_{AA}, P_{Aa}, P_{aa}

(Do we really want to do this?)

	AA	Aa	aa
AA			
Aa			
aa			

How do allele frequencies change over time?

Starting allele frequencies: p_A, p_a

- $p'_A =$
- $p'_a =$

What does this result tell us about the genotype frequencies?

- $P'_{AA} =$
- $P'_{Aa} =$
- $P'_{aa} =$

…These are the "Hardy-Weinberg frequencies"

How about the next generation?

Examining assumptions

- What if the two sexes **don't** have the same genotype frequencies?

  Start with: P_{fA}, P_{mA}, P_{fa}, P_{ma}

  P'_{fA} = P'_{mA} =

  P'_{fa} = P'_{ma} =

Multiple alleles...

If the alleles are **a**, **b**, and **c**…

The possible genotypes are:

And their frequencies are:

And what about multiple loci?

- Unlinked loci

- Linked loci

Linkage disequilibrium