

Population Genetics Problem Set
Conservation Biology
Spring 2009

1. Suppose that you study the genetics of a locus that controls flower color (C). Assume that individuals who are homozygous C^R always have red flowers, homozygous C^W have white flowers and the heterozygotes are pink. You go out and write down the phenotypes of a number of plants and get the following:

red = 70
pink = 120
white = 110

- (a) What are the allele frequencies in the study population?
(b) Is this population at Hardy-Weinberg Equilibrium?

(ANS (and see key after trying): $\text{freq}(C^R) = 0.453$, $\text{freq}(C^W) = 0.567$
 $\text{freq RED phenotype} = 0.233$, $\text{PINK} = 0.40$, $\text{WHITE} = 0.367$
Comparison of these actual frequencies with those predicted from H-W show the pop is NOT at equilibrium))

2. Suppose that the following frequencies are observed for three different alleles found in a population:

$I^A = 0.40$
 $I^B = 0.05$
 $I^C = 0.55$

(a) Write and expand an equation to predict the frequency of each genotype at Hardy-Weinberg equilibrium. (this is not as hard as it might seem – just apply the principles that we went over in class that explained how the Hardy-Weinberg model was constructed.

(b) If the population is at Hardy-Weinberg equilibrium, give the frequency of each of the following:

- (i) $I^C I^C$
- (ii) $I^A I^C$
- (iii) $I^A I^A$

(SEE KEY FOR THESE ANSWERS)