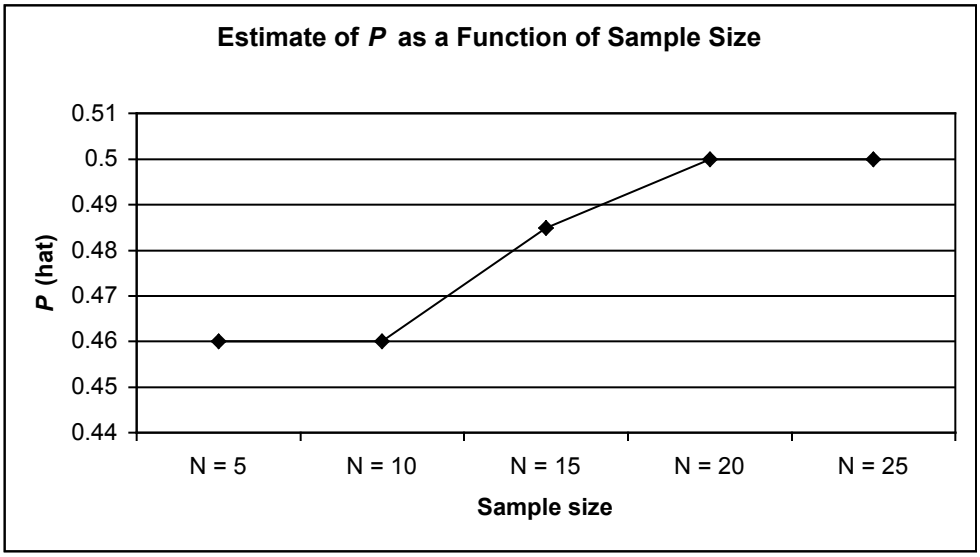
Answers to Exercise 31

Measures of Genetic Diversity

1. When one locus has a very rare allele, the rare allele is more likely to be detected as sample size increases. If enough rare alleles are sampled (A_1), the gene is less likely to be considered monomorphic, and *P* increases.



2. If either *p* or *q* are greater than the criterion, the *A* locus is considered to be monomorphic. When the criterion is lowered, the polymorphism estimate, *P*, decreases. Thus, *P* has two defects: it is arbitrary (depends on what criterion you use) and it is imprecise (very sensitive to sample size, especially when there are some rare alleles in the population).

3. Polymorphism, *P*, "scores" a gene as being "diverse" (polymorphic) or "not diverse" (monomorphic). It does little to inform you whether a certain gene is heavily polymorphic, or only slightly polymorphic—both count as simply polymorphic. Thus heterozygosity, *H*, is the measure of genetic variation preferred by many population geneticists (see F. Ayala, *Population and Evolutionary Genetics*, 1982).