

Practice Thought Questions/ Problems for Week 4

- 1) Alleles at the *CspB* gene may confer drought tolerance in some plants. If you start a population with plants that are all homozygous for the not-tolerant allele in two environments (one with severe droughts, one in a very moist setting), do we expect a higher mutation rate to the drought-tolerant allele in one of these populations? Which one, if so?
- 2) Imagine 3 genes have alleles that contribute to blood pH. Imagine every gene has exactly 2 alleles: one that doesn't change pH and one that increases pH by 0.1. All the genes have no dominance, so for example, aa doesn't change pH, Aa increases pH by 0.1, and AA increases pH by 0.2. If blood pH was only controlled by these 3 genes, how many different pH's would be observed?
- 3) Which mutation "rate" should be higher: mutations at site 153 from A to G or mutations at site 153 from A to "anything but A"?
- 4) Why might the gene with alleles contributing to variation in a trait (like height) not be directly under the center of the peak of the LOD plot?
- 5) If a pedigree mapping study in an extended family finds a strong association between markers on chromosome 18 and susceptibility to breast cancer, but a genome-wide association study fails to detect any associations on chromosome 18 and susceptibility to breast cancer, doesn't that mean the pedigree mapping study was wrong? Don't genome-wide association studies have better precision?