Population Genetics
Problem Set 9 (Note: for Final exam, not for Exam3)

1. What is the biological significance of a gamete being a “coupling” or “repulsion” gamete?

2. What is one way of estimating the rate of recombination, c, between two loci?

3. In humans, what is the approximate relationship between map units (centimorgans, cM) and the number of base pairs of DNA along a chromosome.

4. What are two proposed disadvantages and two proposed advantages for the evolution of sexual reproduction (and recombination).

5. Give the best definition for the following terms:

a. Epistasis:

b. Linkage (or gametic) disequilibrium:

c. Recombination:

d. Map unit or centimorgan, cM:

e. Genetic hitchhiking:

f. Selective sweep:

g. Background selection:

h. Muller’s ratchet:

6. Consider two loci (A and B) with two alleles each (A_1, A_2, B_1, and B_2). The population currently has the following gametic frequencies:

.3 A_1B_1, .15 A_1B_2, .1 A_2B_1, and .45 A_2B_2.

a) Estimate the current linkage (or gametic) disequilibrium.

b) If the A and B loci are linked with recombination equal to .1, how much gametic disequilibrium is expected following 3 more generations of random matings?

7. Consider the following genotypic numbers for an arbitrary population of two loci.

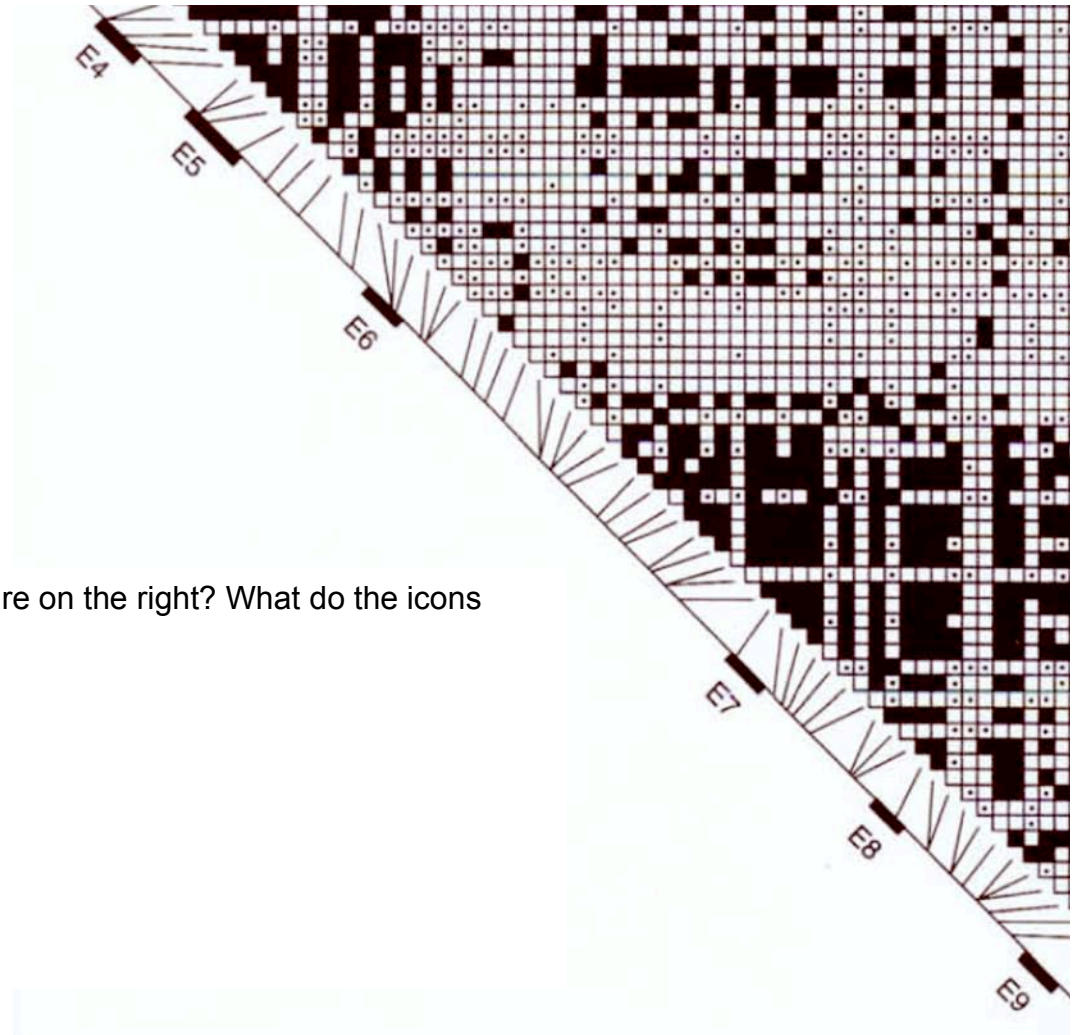
	Locus B			
Locus A	**BB**	**Bb**	**bb**	**Total**
AA	880	460	160	1500
Aa	76	300	24	400
aa	44	40	16	100
Total	1000	800	200	2000

a. What are the allele frequencies (please do not round) at each locus?

b. What are the expected genotypic frequencies at equilibrium for the A locus?

c. What is the equilibrium frequency of the bb genotype?

d. What is the equilibrium frequency for the Aabb genotype? What is the current frequency of the Aabb genotype? What may explain the difference?



8. What is the figure on the right? What do the icons represent?