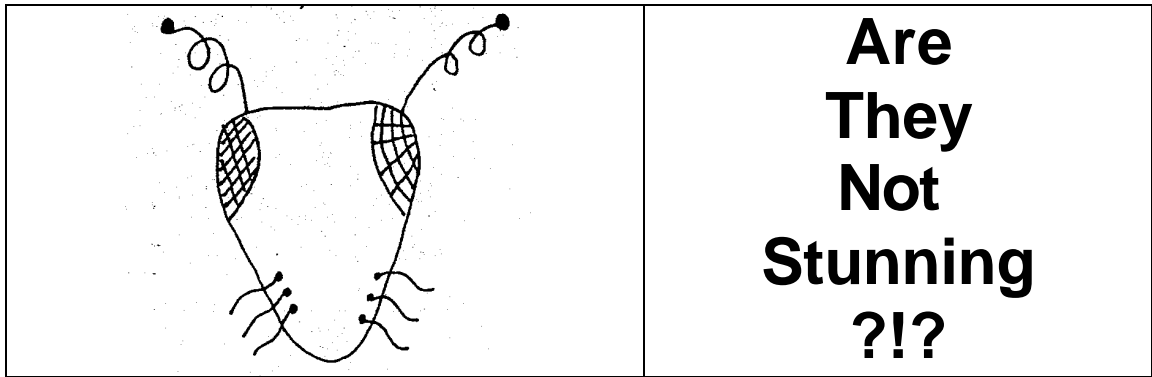


Answer the following questions in clear, legible format.

While gliding aimlessly in a puddle, a "male" and a "female" water strider encounter each other in the moonlight. Becoming intoxicated in each other's pheromones (sexual attractant molecules), and being consenting adults, they decide to procreate. The fertilized eggs are laid and the ensuing spring brings forth their offspring- a veritable plague of 1000 little striders.

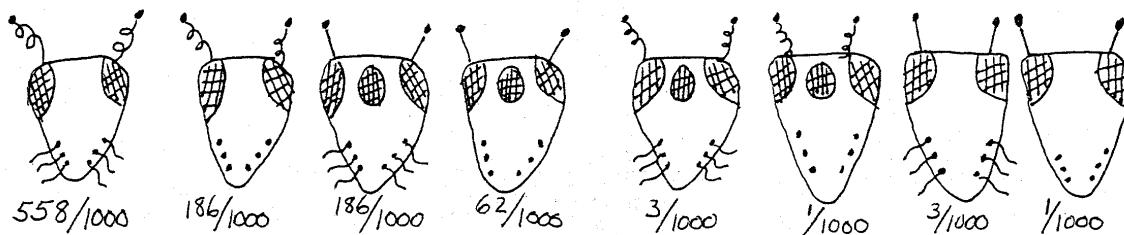
Each of the diploid parents has a total of four chromosomes, and they are **heterozygous** for three genes (**A**ntenna, **E**yes, and face **B**ristles). Each attractive parent looked like this:



1) Using the capital/lower case letter designations we employed in lecture, what is the genotype of each of these (2n) individuals? (2 pts)

2) What would be the genotype of water striders that were: a) homozygous dominant and b) homozygous recessive for these genes? (2 pts)

The 1000 offspring had the following distribution of phenotypes:



3) Which physical traits (each conferred by one gene locus on a chromosome) appear to be inherited together (i.e. linked), and which traits appear to be inherited from genes on independently sorting chromosomes? (2pts)

4) Create a Punnett square with one parents' gamete types along one axis and the other parents' gamete types along the other axis. In each of the "cells" of this grid indicate the **genotype** and **sketch the phenotype** for each potential offspring. Assume that the genes are unlinked for this exercise. (8 pts)

5) Draw a plausible diagram of the chromosomes from either of the heterozygous parents, showing the location of the three genes on the various chromosome "arms". You have some freedom here, but remember to show which genes appear linked on the chromosome of one homologous pair, and which sort independently on the other homologous pair (2 pts)

6) A) How can one explain the "rare" offsprings' phenotypic traits? B) Which of the "linked" genes appear to have been "unlinked" during Meiosis. Draw a diagram (using the depictions you set out in question 5) showing how this might occur. C) If the numbers of rare organisms had been twice as high (16), what would this tell us about the spacing of the "linked" genes? (4pts)