

BIOL 121 – Evaluating Hypotheses for Inheritance

- 1) You have identified a new phenotype in a population of fruit flies (*Drosophila melanogaster*). The flies have small wings and can't fly. You have named the phenotype "vestigial wings". You perform a cross between a male with vestigial wings and a female with normal wings. All of the offspring (both male and female) have normal wings. Based on this result, you hypothesize that inheritance of vestigial wings is autosomal and recessive. In order to evaluate this hypothesis you plan to cross males and females of your F_1 flies to generate an F_2 generation. Prior to making your cross, your supervisor asks you to diagram predictions for alternative hypotheses of inheritance for this trait.
 - a) Under the hypothesis that the vestigial allele is autosomal recessive, define your alleles for the wing gene. (0.5 marks)
 - b) Under the hypothesis that the vestigial allele is autosomal recessive, define **all** genotypes and their associated phenotypes (0.5 marks).
 - c) Under the hypothesis that the vestigial allele is autosomal recessive, draw a Punnet Square for the F_1 cross and resulting F_2 progeny. Indicate the phenotype frequency for all offspring (recall that sex is also a phenotype).

- d) An alternative hypothesis is that the vestigial allele is X-linked recessive. Under the hypothesis that the vestigial allele is X-linked recessive define your alleles for the wing gene. (0.5 marks)
- e) Under the hypothesis that the vestigial allele is X-linked recessive, define **all** genotypes and their associated phenotypes (0.5 marks).
- f) Under the hypothesis that the vestigial allele is X-linked recessive, draw a Punnet Square for the F_1 cross and resulting F_2 progeny. Indicate the phenotype frequency for all offspring (recall that sex is also a phenotype).
- g) Imagine that you performed the cross you diagrammed in “f” and generated 372 offspring. Indicate the ~ number of offspring that would be associated with each phenotype.