Genetics, L2 Biology Module provided by: Medjani S,

TD 03 (Transmission of characters)

Exercise 1:

A pure-bred long-stemmed green pea plant was crossed with a short-stemmed white pea plant. The result of the cross was 102 long-stemmed green pea plants (F1).

1) Determine the number of characters studied and the dominance or recessiveness of the phenotypes studied .
2) What are the genotypes and phenotypes obtained during a self-cross of two F1 plants?
3) What are the genotypes and phenotypes obtained when crossing an F1 plant with a short white stemmed pea plant? What is this test called and what can we deduce here when we know that the experimental results of this cross gave 26 plants with long green stems, 25 plants with long white stems, 26 plants with short green stems and 25 plants with short white stems?
4) What are the genotypes and phenotypes obtained when crossing a long-stemmed (homozygous) and green (heterozygous) pea plant with an F1 plant?
(**This question is a homework assignment**)

Exercise 2:

In Drosophila, we know of a b allele that causes black body coloration, and which is recessive with respect to the wild-type b+ allele that causes gray coloration, and at another locus, a vg (vestigial) allele that leads to atrophied wings, and which is recessive with respect to the wild-type vg + allele that gives normal wings. A test-cross is carried out with females heterozygous for these two loci and a double recessive male.
The offspring (1,050 flies in total) has the following composition:
450 gray body, normal wings
black body , vestigial wings
black body , normal wings
90 gray body, vestigial wings
1) What information do you get from this?
2) Calculate the recombination frequency?
3) Suppose you identified a third gene (eye color gene, cn) that had a recombination frequency of 4 cMwith the body color gene and a recombination frequency of 20 cMwith the wing shape gene. Illustrate the genetic map of these three genes?

Exercise 3:

The recombination frequency between genes A and B is 35%; between B and C is 10%; between C and D is 15%; between A and C is 25%; between A and D is 10% and between B and D is 25%. What is the position of each gene on the chromosome? Draw a diagram of a genetic map showing the map unit distances between genes.