Genetics: questions on drosophila practical

Science, Biology

1. No 2. The genotype of the male parental flies e/e ; vg+/vg+ 3. The genotype of the female parental flies e+/e+ ; vg/vg 4. e ; vg+ 5. e+ ; vg 6. Yellow- brown colour with normal size wings

7. e+/e ; vg+/vg

8. e+ ; vg+ e+ ; vg e ; vg+ e ; vg

9. True

Punnett table

Male

Female

e+ ; vg+

e+ ; vg

e ; vg+

e ; vg

e+ ; vg+

e+/e+ ; vg+/vg+

wild-type

e+/e+ ; vg+/vg

wild-type

e+/e ; vg+/vg+

wild-type

e+/e ; vg+/vg

wild-type

e+ ; vg

e+/e+ ; vg+/vg

wild-type

e+/e+ ; vg/vg

vestigial

e+/e ; vg+/vg

wild-type

e+/e ; vg/vg

vestigial

e ; vg+

e+/e; vg+/vg+

wild-type

e+/e; vg+/vg

wild-type

e/e; vg+/vg+

ebony

e/e; vg+/vg

ebony

e ; vg

e+/e ; vg+/vg

wild-type

e+/e; vg/vg

vestigial

e/e; vg+/vg

ebony

e/e; vg/vg

ebony vestigial

Phenotype ratio: 9 wild-type: 3 vestigial: 3 ebony: 1 ebony vestigial

10. Punnett table abov

11. 9: 3: 3: 1

12. My fly count for female 57 wild-type: 13 vestigial: 17 ebony: 5 ebony vestigial My female fly ratio 12: 3: 3: 1 My male fly count 49 wild-type: 12 vestigial: 20 ebony: 7 ebony vestigial My male fly ratio 7: 2: 3: 1

13. Female ratio 15: 4: 4: 1 Male ratio 15: 4: 4: 1

14. The differences in both of the answers may be because of two reasons. The first is the number of flies taken was too small to give us a significant output. Next the crossing or the experiment was executed poorly.

In order to see if the difference between the two ratios is statistically significant or not I would perform the chi square test analysis. For each phenotypic class in the F2, we compute the difference between the observed and the expected offspring and square the difference. This is again divided by the expected number.

There exists a critical value which is calculated on the basis of the degrees of freedom. Say we have 4 phenotypic expressions then the degree of freedom would be 4-1= 3. A standard chart gives the critical value corresponding to 3 is 7. 8. If the chi square result is below this critical value then the difference is not significant. However if the value exceeds the critical value then there is significant difference and the observed data do not fit the hypothesis being tested (Snustad & Simmons, 2010, p53).

15. The genes that cause ebony and vestigial are recessive in nature. This is so because only when both the copies are recessive only then the phenotypes are expressed. They are not expressed in homozygous condition thereby proving that they are recessive.

Both of the genes are linked to autosomal chromosomes. This is so because the ratios that I obtained are not very much different between the males and the females. The female ration I obtained is 12: 3: 3: 1 while the male ratio is 7: 2: 3: 1.

Yes, both the genes i. e. genes for ebony and vestigial are linked on the same chromosome which is evident by comparison of the ratios obtained. Most of the offsprings show parental phenotypes. The results I obtained are vastly different from the data given in the whole year group However; to be sure I would need to perform a testcross to see what the percentage of recombination between the alleles is. Genes that are linked together tightly do not recombine whereas gene which are not tightly linked give more recombination (Campbell & Reece, 2009, p293).

References

Campbell & Reece.(2009). Biology, New York: Pearson Benjamin Cummings. Print

Snustad. P. D. & Simmons, M. J.(2010). Principles of Genetics, London: JohnWiley. Print