## Birzeit University

## Biology and Biochemistry Department

## BIOL311

## Assignment

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1. How is the inheritance of brown and white eyes trait different?

**White eye is sex linked recessive that is mean that the gene is on one of the sex (chromosome X ) (Where sex-linked traits are transmitted through the Y or X chromosomes, whereby with this recessive inheritance, the X chromosome must have two recessive genes in the female, while the male suffices to have one gene on the X chromosome)**

**Brown eye is autosomal Recessive (autosomal traits appear equally in both sexes)**

1. In a *D. melanogaster* experiment; initially, 3 wild-type **males** were crossed with 3 brown-eye **females**, a week later these parents were killed after checking the presence of offspring larvae in the culture, then 12 days later the **F1 generation** was examined in which all the offspring were **wild type**. From the F1 generation, six flies (**4 females and 2 males**) were taken for the second cross. After that, the P2 was killed, and then about a week later their numbers were counted and recorded in the table below.

**Table 1: Summary of data obtained from counting F2 generation.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Trait | Sex | First count | Second count | Third count | Total |
| Red | Male | 10 | 18 | 7 | 35 |
| Red | Female | 9 | 20 | 9 | 38 |
| Brown | Male | 4 | 5 | 3 | 12 |
| Brown | Female | 9 | 6 | 1 | 16 |

**According to the data above, answer the following questions:**

1. **What are the genotypes of the parental generations?**

**P1 = wild type = b+b+ with bb because all F1 is wild type**

**The trait ( brown is autosomal so the genotype of P2 is b+b with b+b\ F2 is 3:1**

1. **What is the expected phenotype and genotype ratio for the F2 generation?**

**Genotype F2: b+b+(wild ), b+b(wild ),b+b(wild ),bb(brown )**

1. **Calculate the Chi-Square Test? (In table with your calculations) Explain the results.**

**Ratio is 3:1**

**observed**

**Red =35+38=73**

**Brown=12+16=28**

**Expected=3/4\*101=75.75**

**1/4\*101=25.25**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Expected ratio** | Observed (o) | Expected (e) | Deviation(o-e) | Deviation (d2) | d2/e |
| **3\4** | **73** | **75.75** | **73-75.75=**  **-2.75** | **(-2.75)2=**  **7.56** | **7.56/75.75=0.099** |
| **1\4** | **28** | **25.25** | **28-25.25=**  **2.75** | **(-14.25)2=**  **7.65** | **7.56/25.25=0.299** |
| **Total from above table** | **101** |  |  |  | **X2=0.39**  **P= 0.5** |

**From this table we can find p**

**Df = 1 because 3:1 n =2**

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1. **Which principle of inheritance and cross can explain these results?**

**Monohybrid Cross (A genetic cross involving only one character) and because is one trait complete dominance because wild type is dominant the brown color.**

1. Three White female flies (**virgin**) crossed with three **wild male** flies, the same procedure was performed as in question 2, and the following data was recorded.

**Table 2: Summary of data obtained from counting F1 generation.**

|  |
| --- |
| White Female x Wild Male |
| F1 Generation |  |  |  |  |  |
| Traits | **Sex** | **First count** | **Second count** | **Third count** | **Totals** |
| Red | Male | 0 | 0 | 15 | 15 |
| Red | Female | 24 | 2 | 32 | 58 |
| White | Male | 24 | 1 | 10 | 35 |
| White | Female | 0 | 0 | 13 | 13 |

**Table 3: Summary of data obtained from counting F2 generation.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| F2 Generation |  |  |  |  |  |
| Traits | **Sex** | **Day 1** | **Day 2** | **Day 3** | **Totals** |
| Red | Male | 2 | 0 | 0 | 2 |
| Red | Female | 2 | 1 | 2 | 5 |
| White | Male | 4 | 0 | 2 | 6 |
| White | Female | 2 | 2 | 1 | 5 |

1. **What are the genotypes of the parental generations?**

**P1 = XWXW with XW+y**

**P2=XwXw+ with XWy**

1. **What is the expected phenotype and genotype ratio for the F1 generation? Discuss the obtain results.**

**But the ratio when crosses is 1:1**

**Because in the first count has no male red and female white**

**From the panett squre**

|  |  |  |
| --- | --- | --- |
|  | **XW** | **Xw** |
| **Xw+** | **XWXW+** | **XWXW+** |
| **y** | **XWy** | **Xwy** |

**So F1 genotypeXWXW+( phenotype:female wild) : genotypeXWy( phenotype male white)**

1. **What is the null hypothesis? When using the CHI -SQUARE and the result is less than 0.05 this leads to the difference between the two, and the expected results are low and here is the imposition of zero theoretical**

**It is a type of hypothesis that relies on the absence of a difference between certain characteristics**

1. **Calculate the Chi-Square Test? Did you reject or accept the null hypothesis? Why?**

**Expected null hypothesis because p it’s not 0.05 or less**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Expected Ratio | Observed (o) | Expected (e) | Deviation(o-e) | Deviation (d2) | d2/e |
| **1\4** | **2** | **4.5** | **2-4.5=-2.5** | **6.25** | **1.38** |
| **1\4** | **5** | **4.5** | **5-4.5=0.5** | **0.25** | **0.05** |
| **1\4** | **6** | **4.5** | **6-4.5=1.5** | **2.25** | **0.5** |
| **1\4** | **5** | **4.5** | **5-4.5=0.5** | **0.25** | **0.05** |
| **Total=18** |  |  |  |  | **X2=1.98**  **P=0.48** |

1. **Which principle of inheritance and cross can explain these results?**

**Dihybrid Cross (A genetic cross involving two characters in which the parents possess different forms of each character )because it is two trait (sex –linked and eye color)and independent assortment because sex chromosome independent color trait**

Good Luck