

Chi Square and Dihybrid practice

Good Fit Between Ear & Data							Poor Fit	
df	.90	.70	.60	.50	.20	.10	.05	.01
1	.02	.15	.31	.46	1.64	2.71	3.85	6.64
2	.21	.71	1.05	1.39	3.22	4.60	5.99	9.21
3	.58	1.42	1.85	2.37	4.64	6.25	7.82	11.34
4	1.06	2.20	2.78	3.36	5.99	7.78	9.49	13.28

1. Mrs. McCarter's Biology class typed their own blood and there were 8 students with type A, 1 with type AB, 5 with type B, and 13 with type O. Conduct a Chi-square analysis of the class' data to see if the data is similar to the general population. In the US the averages are O 44%; A 42%; B 10%; AB 4%

Show all of your work

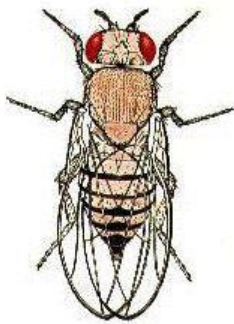
2. In peas, yellow seeds (Y) are dominant over green seeds (y). In a cross between 2 plants heterozygous for seed color, the following was observed:

Yellow = 4400

Green = 1624

Does the data fit the predicted phenotypic ratio? Complete a chi-square analysis to show this.

3. In the fruit fly *Drosophila melanogaster*, vestigial wings and hairy body are produced by two recessive alleles carried on different chromosomes. The normal alleles, long wings and hairless body, are dominant. If a vestigial-winged, hairy male is crossed with a female heterozygous for both of the normal traits, what would be the phenotypes and genotypes of their offspring?



vestigial wings

long wings (wild type)

hairless body

hairy body

Answers:

1. Mrs. McCarter's Biology class typed their own blood and there were 8 students with type A, 1 with type AB, 5 with type B, and 13 with type O. Conduct a Chi-square analysis of the class' data to see if the data is similar to the general population. In the US the averages are O 44%; A 42%; B 10%; AB 4%

Show all of your work.

Bloodtype	O	e
A	8	$27 \times .42 = 11.34$
B	5	$27 \times .1 = 2.7$
AB	1	$27 \times .04 = 1.08$
O	13	$27 \times .44 = 11.88$
total	27	

$$\frac{(O - e)^2}{e}$$

$$(8 - 11.34)^2 \div 11.34 = 6.98$$

$$(5 - 2.7)^2 \div 2.7 = 2.59$$

$$(1 - 1.08)^2 \div 1.08 = 0.0059$$

$$(13 - 11.88)^2 \div 11.88 = 0.106$$

$$\Sigma = 3.68$$

$$df = 3$$

$$p \approx 0.30 \text{ good fit}$$

2. In peas, yellow seeds (Y) are dominant over green seeds (y). In a cross between 2 plants heterozygous for seed color, the following was observed:

3:1

Yellow = 4400

Green = 1624

Does the data fit the predicted phenotypic ratio? Complete a chi-square analysis to show this.

	O	e
yellow	4400	$6024 \times .75 = 4518$
green	1624	$6024 \times .25 = 1506$
total	6024	

$$\frac{(O - e)^2}{e}$$

$$(4400 - 4518)^2 \div 4518 = 3.08$$

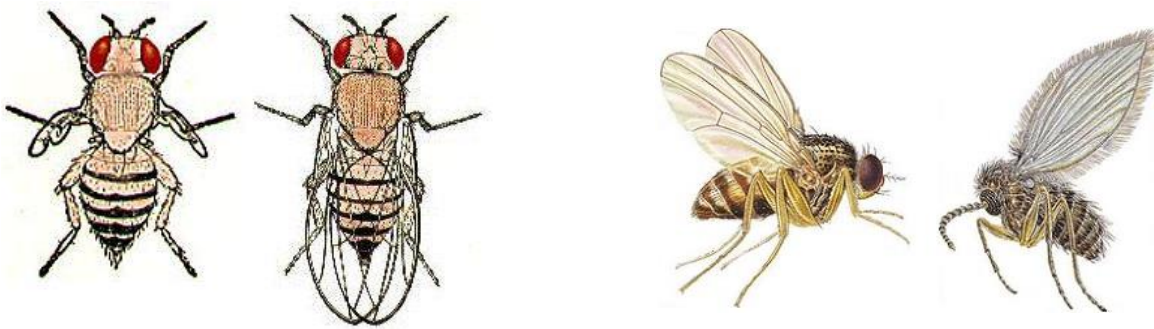
$$(1624 - 1506)^2 \div 1506 = 9.25$$

$$12.33$$

$$df = 1$$

$$p < 0.01 \text{ poor fit}$$

3. In the fruit fly Drosophila melanogaster, vestigial wings and hairy body are produced by two recessive alleles carried on different chromosomes. The normal alleles, long wings and hairless body, are dominant. If a vestigial-winged, hairy male is crossed with a female heterozygous for both of the normal traits, what would be the phenotypes and genotypes of their offspring?



vestigial wings long wings (wild type) hairless body hairy body

l L N n

male $llnn$ × $LlNn$ female

	LN	Ln	lN	ln
ln	$LlNn$	$Llnn$	$llNn$	$llnn$
ln	$LlNn$	$Llnn$	$llNn$	$llnn$
ln	↓	↓	↓	
ln	↓	↓	↓	

- 4 Long wings + hairless (25%)
- 4 Long wings + hairy (25%)
- 4 vestigial wings + hairless (25%)
- 4 vestigial wings + hairy (25%)