

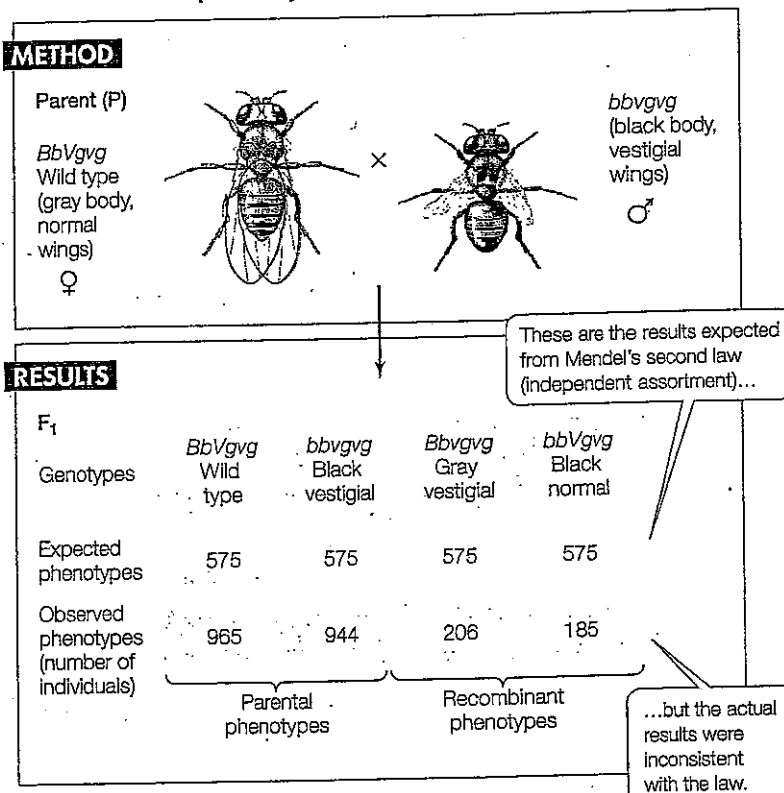
KEY

INVESTIGATING LIFE

12.18 Some Alleles Do Not Assort Independently

Morgan's studies showed that the genes for body color and wing size in *Drosophila* are linked, so that their alleles do not assort independently.

HYPOTHESIS Alleles for different characteristics always assort independently.



CONCLUSION The hypothesis is rejected. These two genes do not assort independently, but are linked (on the same chromosome).

$$\chi^2 = \frac{(o-e)^2}{e}$$

Wild $\frac{(965-575)^2}{575} = 265$

Black V. $\frac{(944-575)^2}{575} = 237$

Gray V. $\frac{(206-575)^2}{575} = 363$

Bl. normal $\frac{(185-575)^2}{575} = 265$

$$\sum \frac{(o-e)^2}{e} =$$

$$265 + 237 + 363 + 265 =$$

$$\chi^2 = 1,130$$

$$DF = 4 - 1 = 3$$

this number is much larger than the .05 P value of 7.82

Key

P = purple
 p = white
 T = tall
 t = short

Extension Questions $P_{\neq}T+ \times P_{\neq}T+$

24. You have performed a dihybrid cross of plants and got the following data: 206 purple tall, 65 white tall, 83 purple short, 30 white short. = 384 in total

a. Using your knowledge of genetics, determine the expected outcome for this experiment.

$$PT \quad 9/16 \times 384 = 216$$

$$P+ \quad 3/16 \times 384 = 72$$

$$pT \quad 3/16 \times 384 = 72$$

$$pt \quad 1/16 \times 384 = 24$$

b. What are the degrees of freedom in this experiment?

$$4 - 1 = \underline{3}$$

c. Calculate chi-square for your experimental data below.

	Observed data (o)	Expected (e)	(o - e)	(o - e) ²	$\frac{(o - e)^2}{e}$
Purple and tall	206	216	-10	100	.46
Purple and short	83	72	11	121	1.68
White and tall	65	72	-7	49	.68
White and short	30	24	6	36	1.5

$$\chi^2 = 4.32$$

d. Does your collected data differ significantly from the expected values? Explain.

$$.05 \text{ p value for } 3 \text{ DF} = 7.82$$

the χ^2 for the lab is less than this.

There is a 20-30% chance this variation is due to random events.

These results are not significantly different from the expected outcome.