

1. (2 points)	<u>Class of male progeny</u>	<u>number carrying the <i>moz</i> allele</u>
	cinnabar eyes, normal wings	28 <i>moz</i> chromosomes of 100 tested
	wild-type eyes, curved wings	70 <i>moz</i> chromosomes of 100 tested

These are 58 recombinants between *cn* and *moz* and 142 recombinants between *moz* and *c*. 57.5 is the location of *cn*, there are 18 cM between *cn* and *c*. The proportion of recombinants is (58/200), therefore the location of *moz* is: $57.5 + (58/200)18 = 62.7$

2. (2 point) Use the information from question 1 to infer an approximate position of your gene (*einstein*) on the **cytological** map.

Under the header "Files" on FlyBase, there is a conversion chart; 62.7 corresponds to **46E-47A**.

3. (2 points) Name at least one candidate gene that maps in this region.

Explain why *mozart* might be an allele of your candidate gene.

Answers got credit based on correct cytological **location** (46E-47A) and the **quality of your explanation**.

4. (2 points) What caused these patches to develop?

The patches are homozygous *bw*⁻ clones resulting from X-ray induced mitotic recombination.

Do you think it more likely that the product of the *brown* gene acts in pigment deposition or in the metabolic pathway for pigment synthesis? **Pigment deposition is inherently cell-autonomous.**

5. (2 points) When *cn bw* / + + adults emerged from the pupal cases, a few had brown patches in their otherwise red eyes, but no white or cinnabar patches were observed.

***cn* is not cell-autonomous, and likely is involved in pigment synthesis.**

6. (6 points) For each of the following types of animal, indicate

First, whether the individual animals are all genetically identical and

Second, whether or not the cells present in each animal are homozygous at all or nearly all loci:

a) chimeric mice derived from wild-type 129/SvJ ES cells and B6 blastocysts.

No/Yes, but we accept Yes/Yes (chimeric mice are all chimeric and so might be thought of as genetically identical, but will have differing amounts of contributions from the two strains).

b) mice from a standard laboratory strain such as C57BL/6J **Yes/Yes**

c) F1 mice from a cross between two inbred lines such as C57BL/6J and 129/SvJ. **Yes/No**

d) *Arabidopsis thaliana* from a standard laboratory strain such as Col-0 **Yes/Yes**

e) *Arabidopsis thaliana* from a single recombinant inbred line **Yes/Yes**

f) *C. elegans* worms from a standard wild-type laboratory strain such as N2. **Yes/Yes**

7. (2 points) The observations indicate that *ray-1* acts negatively and *ray-2* positively.

b) *ray-1* ----| *ray-2* ---> ray formation.

h) *ray-2* ----| *ray-1* ---| ray formation.

8. (2 points) In further studies you find that a *ray-1*; *ray-2* double mutant looks identical to a *ray-2* single mutant (i.e. no rays are produced). Which of the pathways is most consistent with this result? (Refer to answers a through h in problem 7)

b) *ray-1* ----| *ray-2* ---> ray formation.