

Drosophila Mapping Homework **change problem 3**

In *Drosophila*, the genes stubble bristle (S), vestigial wings (V) and black body (B) are autosomally linked. The mutant alleles are all recessive to wild type. Determine the map in each of the problems and calculate the coefficient of coincidence and interference.

Problem 1		Problem 2		Problem 3	
Phenotype	Number	Phenotype	Number	Phenotype	Number
B s v	570	B s v	1	B s v	109
b S V	559	b S V	3	b S V	
B S v	1	B S v	51	B S v	4193
b s V	2	b s V	58	b s V	
B s V	37	B s V	2104	B s V	194
b S v	41	b S v	2089	b S v	
b s v	18	b s v	92	b s v	4
B S V	22	B S V	102	B S V	
	1250		4500		4500

Problem 4 In *Drosophila* the genes A B and D are autosomally linked according to the map below. In each case, the mutant allele is recessive to the dominant. You propose to cross **ab x d**. Determine the resulting F2 phenotypes and numbers assuming that you recover 1500 flies from the cross and assuming that the coefficient of coincidence is **0.85**.



Problem 5 In *Drosophila* the genes A B and D are autosomally linked according to the map below. In each case, the mutant allele is recessive to the dominant. You propose to cross **ab x d**. Determine the resulting F2 phenotypes and numbers assuming that you recover 1500 flies from the cross and assuming that the coefficient of coincidence is **0.76**.



Problem 6 In *Drosophila* the genes A B and D are autosomally linked according to the map below. In each case, the mutant allele is recessive to the dominant. You propose to cross **ab x d**. Determine the resulting F2 phenotypes and numbers assuming that you recover 1500 flies from the cross and assuming that the coefficient of coincidence is **0.92**



Questions

Use this information for Problems 1 – 3

Possible P1 parents for problems 1-3 cross:

- a. stubble black vestigial x wild type
- b. stubble black x vestigial
- c. stubble vestigial x black
- d. vestigial black x stubble

Possible non-recombinant and recombinant reciprocal phenotype pairs for problems 1-3:

	<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>
	BSV	BSv	BsV	bSV
	bsv	bsV	bSv	Bsv

Possible middle gene for problems 1-3: a. gene B b. gene S c. gene V

Problem 1

(use these values for problem 1)

	<u>cM</u>	<u>coef of coinc</u>	<u>interference</u>
a	6.48	1.09	0
b	6.40	0.92	0.09
c	3.20	1.000	0.08
d	9.92	1.20	-0.09
e	3.44	0.83	-0.08

1. What were the P1 parents of this cross?
2. Which phenotype set represents the non-recombinants?
3. Which phenotype set represents a double crossover?
4. Which gene is in the middle?
5. What is the distance between B and S?
6. What is the distance between S and V?
7. What is the distance between B and V?
8. What is the coefficient of coincidence?
9. What is the interference?
10. Is this positive interference (**a**) or negative interference (**b**)?

Problem 2

(use these values for problem 2)

	<u>cM</u>	<u>coef of coinc</u>	<u>interference</u>
a	2.51	0.82	0.25
b	4.31	1.14	-0.2
c	6.91	0.8	0.183
d	4.40	0.85	-0.25
e	2.42	1.25	0.2

- 11 What were the P1 parents of this cross?
- 12 Which phenotype set represents the non-recombinants?
- 13 Which phenotype set represents a double crossover?
- 14 Which gene is in the middle?
- 15 What is the distance between B and S?
- 16 What is the distance between S and V?
- 17 What is the distance between B and V?
- 18 What is the coefficient of coincidence?
- 19 What is the interference?
- 20 Is this positive interference (**a**) or negative interference (**b**)?

Problem 3

(use these values for problem 3)

	<u>cM</u>	<u>coef of coinc</u>	<u>interference</u>
a	8.0	1.0	-0.13
b	5.00	1.08	-0.07
c	4.87	1.15	0
d	3.00	0.93	0.07
e	2.87	0.87	0.13

- 21 What were the P1 parents of this cross?
- 22 Which phenotype set represents the non-recombinants?
- 23 Which phenotype set represents a double crossover?
- 24 Which gene is in the middle?
- 25 What is the distance between B and S?
- 26 What is the distance between S and V?
- 27 What is the distance between B and V?

- 28 What is the coefficient of coincidence?
- 29 What is the interference?
- 30 Is this positive interference (**a**) or negative interference (**b**)?

Use this information for Problems 4-6

Possible non-recombinant and recombinant reciprocal phenotype pairs for problems 4-6:	$\frac{a}{\mathbf{ABD}}$ abd	$\frac{b}{\mathbf{ABd}}$ abD	$\frac{c}{\mathbf{AbD}}$ aBd	$\frac{d}{\mathbf{aBD}}$ ABd
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Problem 4

- 31 Which phenotype set represents non-recombinants?
- 32 What is the expected number for this set?
- | | | | |
|---|------|---|------|
| a | 1380 | d | 1372 |
| b | 1376 | e | 1368 |
| c | 1374 | | |
- 33 Which phenotype set represents double recombinants?
- 34 What is the expected number for this set?
- | | | | |
|---|---|---|---|
| a | 1 | d | 4 |
| b | 2 | e | 5 |
| c | 3 | | |
- 35 Which phenotype set represents a single crossover between A and B?
- 36 What is the expected number for this set?
- | | | | |
|---|----|---|----|
| a | 83 | d | 89 |
| b | 87 | e | 85 |
| c | 81 | | |
- 37 Which phenotype set represents a single crossover between B and D?
- 38 What is the expected number for this set?
- | | | | |
|---|----|---|----|
| a | 41 | d | 35 |
| b | 39 | e | 33 |
| c | 37 | | |

Problem 5

- 39 Which phenotype set represents non-recombinants?
- 40 What is the expected number for this set?
- | | | | |
|---|------|---|------|
| a | 1380 | d | 1372 |
| b | 1376 | e | 1368 |
| c | 1374 | | |
- 41 Which phenotype set represents double recombinants?

- 42 What is the expected number for this set?
a 1 d 4
b 2 e 5
c 3
- 43 Which phenotype set represents a single crossover between D and A?
- 44 What is the expected number for this set?
a 63 d 69
b 65 e 67
c 61
- 45 Which phenotype set represents a single crossover between A and B ?
- 46 What is the expected number for this set?
a 61 d 55
b 59 e 53
c 57

Problem 6

- 47 Which phenotype set represents non-recombinants?
- 48 What is the expected number for this set?
a 1390 d 1396
b 1388 e 1394
c 1392
- 49 Which phenotype set represents double recombinants?
- 50 What is the expected number for this set?
a 1 d 4
b 2 e 5
c 3
- 51 Which phenotype set represents a single crossover between D and A?
- 52 What is the expected number for this set?
a 66 d 62
b 64 e 60
c 68
- 53 Which phenotype set represents a single crossover between D and B ?
- 54 What is the expected number for this set?
a 38 d 36
b 32 e 34
c 30