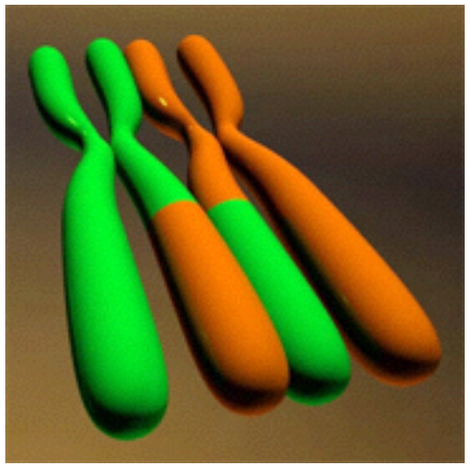
Bio393: Genetic Analysis

Recombination and mapping



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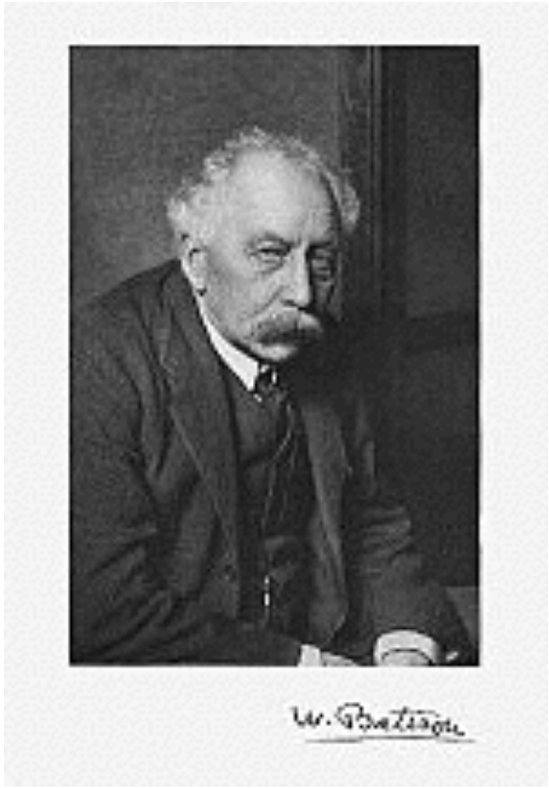

William Bateson

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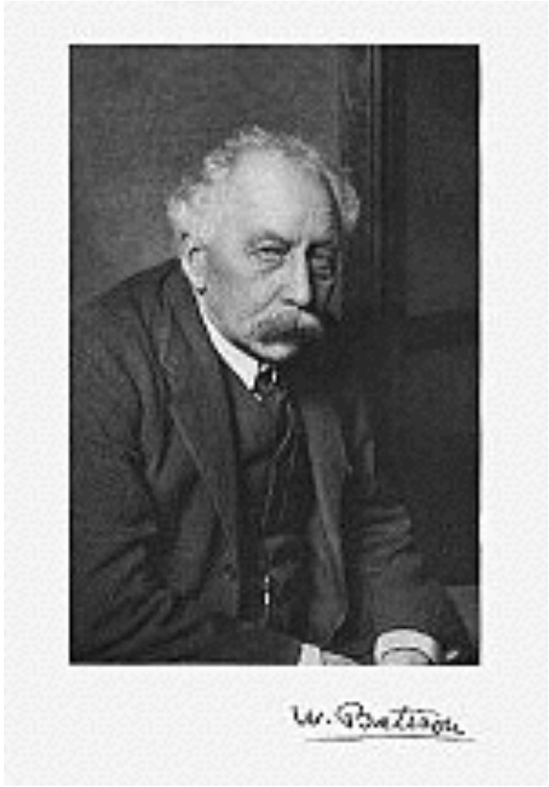

William Bateson

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Reginald Punnett **William Bateson**

Reginald Punnett **William Bateson**

Bateson and Punnett's pea crosses

PPLL X **ppll**

↓

PpLl

↓ ♀

Phenotype	Expected number	Expected ratio
Purple long	215	9
Purple round	71	3
Red long	71	3
red round	24	1

P= purple flower
p= red flower
L= long pollen
l= short pollen

Bateson and Punnett's pea crosses

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Which are recombinant and parental offspring?

Bateson and Punnett's pea crosses

PPLL X **ppll**

↓

PpLl

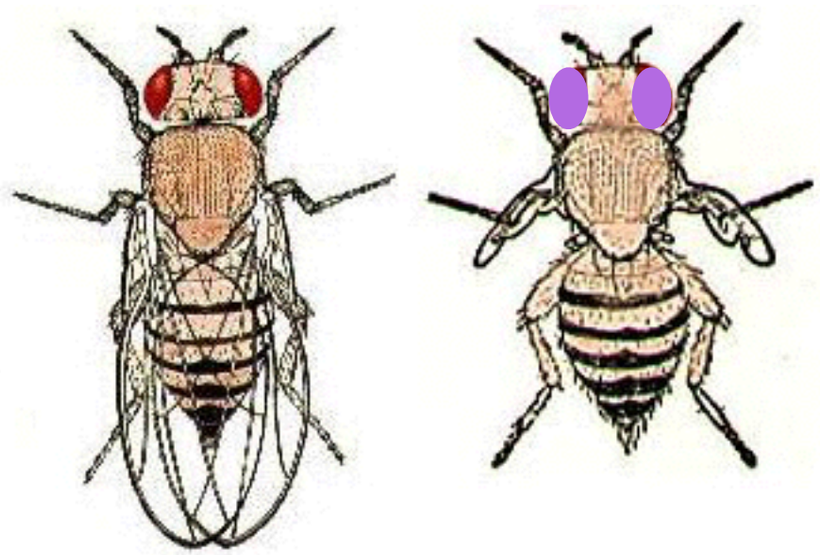
↓ ⊗

Phenotype	Expected number	Expected ratio	Observed number
Purple long	215	9	284
Purple round	71	3	21
Red long	71	3	21
red round	24	1	55

P= purple flower
p= red flower
L= long pollen
l= short pollen

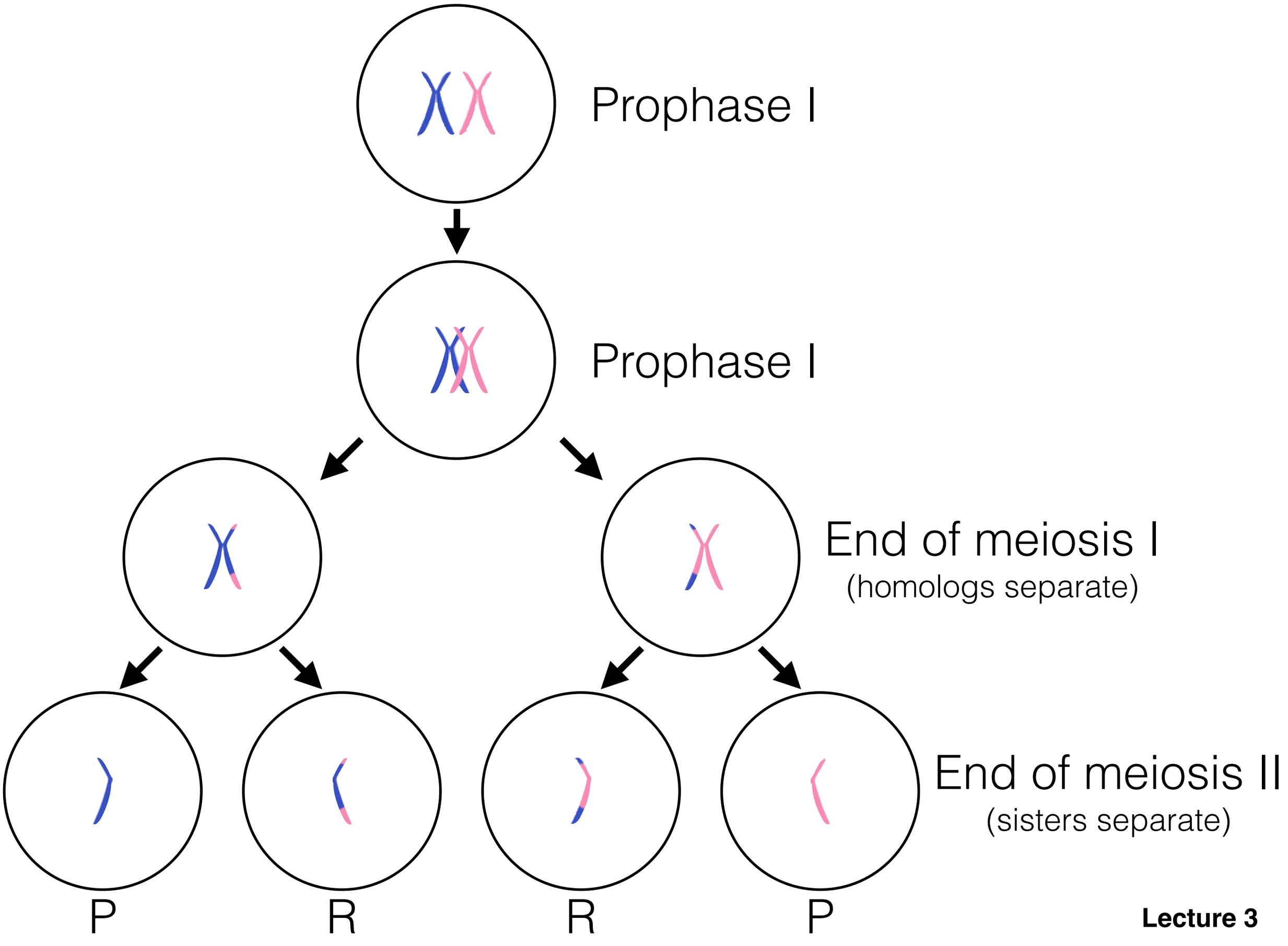
Which are recombinant and parental offspring?

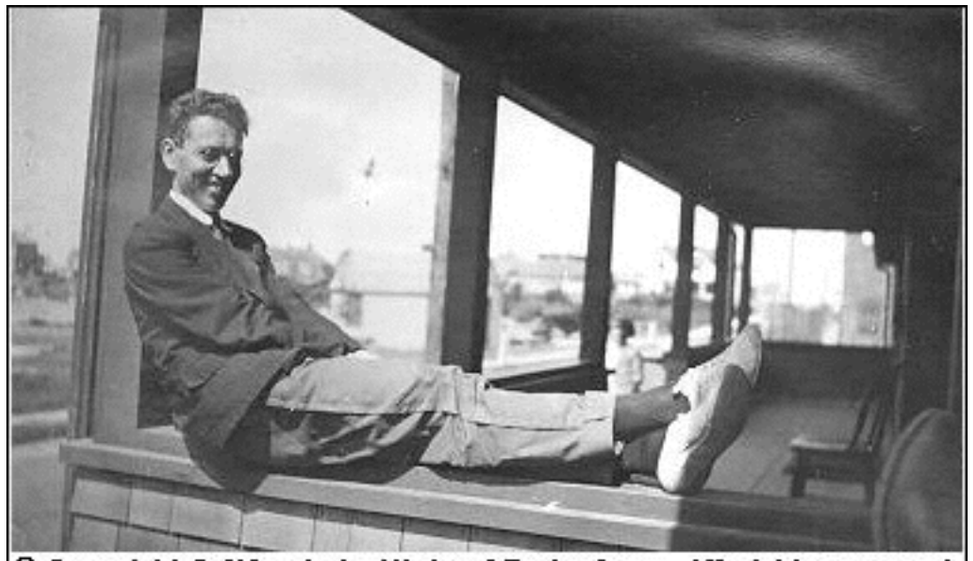
The fly room at Columbia



+ + ***pr vg***

Purple vestigial cross


Prophase I
Prophase I
End of meiosis I
(homologs separate)
End of meiosis II
(sisters separate)
P
R
R
P



Alfred Sturtevant

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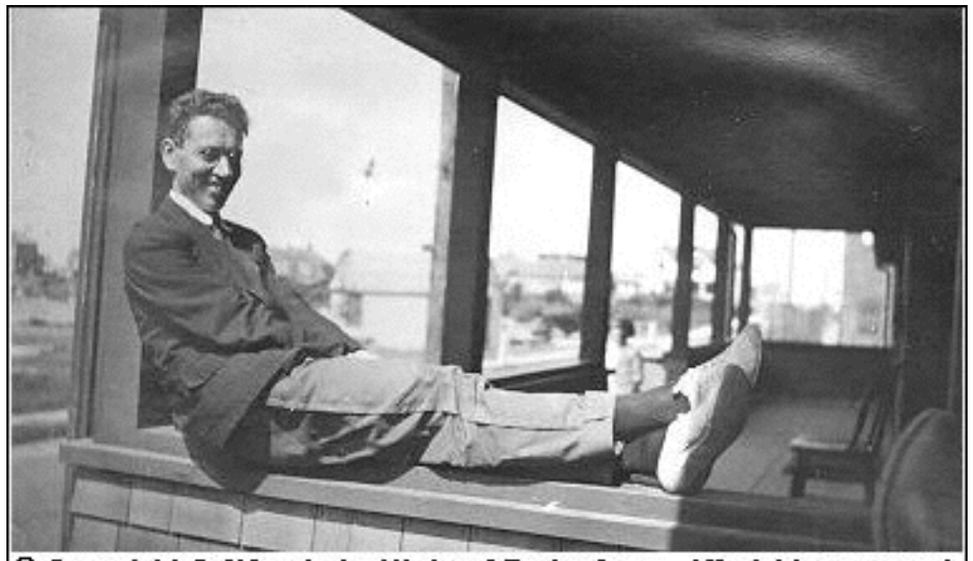
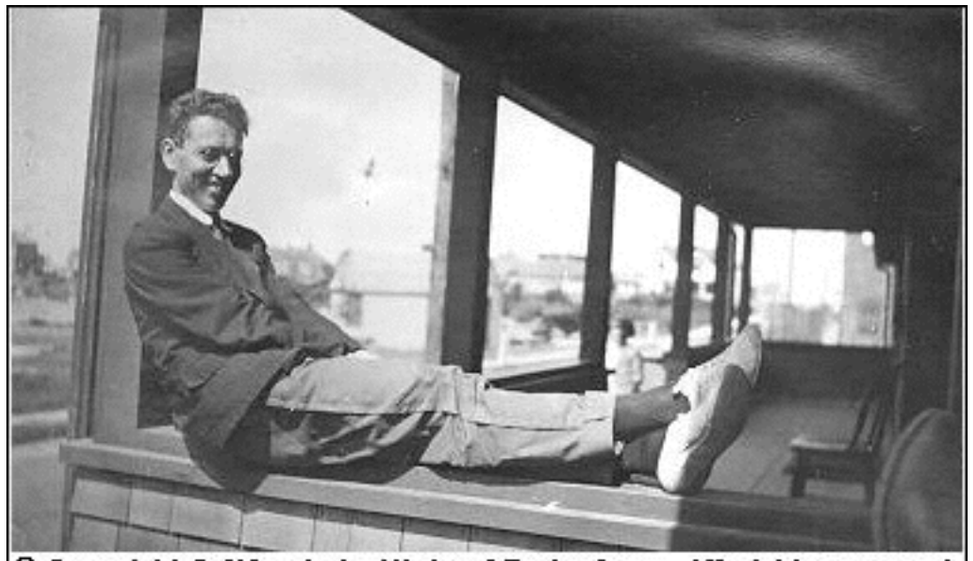


Alfred Sturtevant

$$\frac{\text{Number of recombinants}}{\text{Total progeny}} \times 100 = \text{Recombination frequency}$$

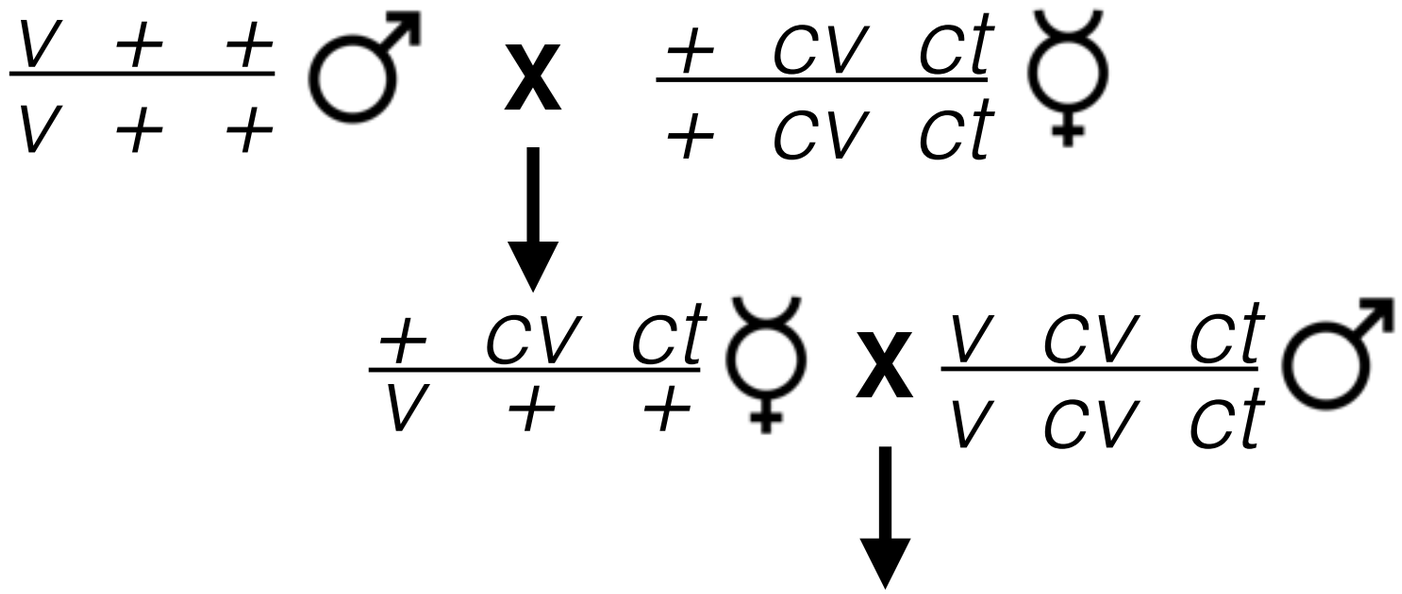


Alfred Sturtevant

$$\frac{\text{Number of recombinants}}{\text{Total progeny}} \times 100 = \text{Recombination frequency}$$

1% RF = 1 map unit = 1 centiMorgan

A three-factor cross



Eye Phenotype	Crossvein Phenotype	Cut Phenotype	Number of offspring
Red	No crossvein	Cut wing	580
Vermillion	Crossvein	Normal wing	592
Red	Crossvein	Cut wing	40
Vermillion	No crossvein	Normal wing	45
Red	Crossvein	Normal wing	94
Vermillion	No crossvein	Cut wing	89
Red	No crossvein	Normal wing	5
Vermillion	Crossvein	Cut wing	3

v = vermillion eyes
ct = cut wings
cv= crossveinless wings
+ = red eyes and normal wings

vermillion, crossveinless, cut recombination classes

What do regions of more or less recombination spots do to linkage map?

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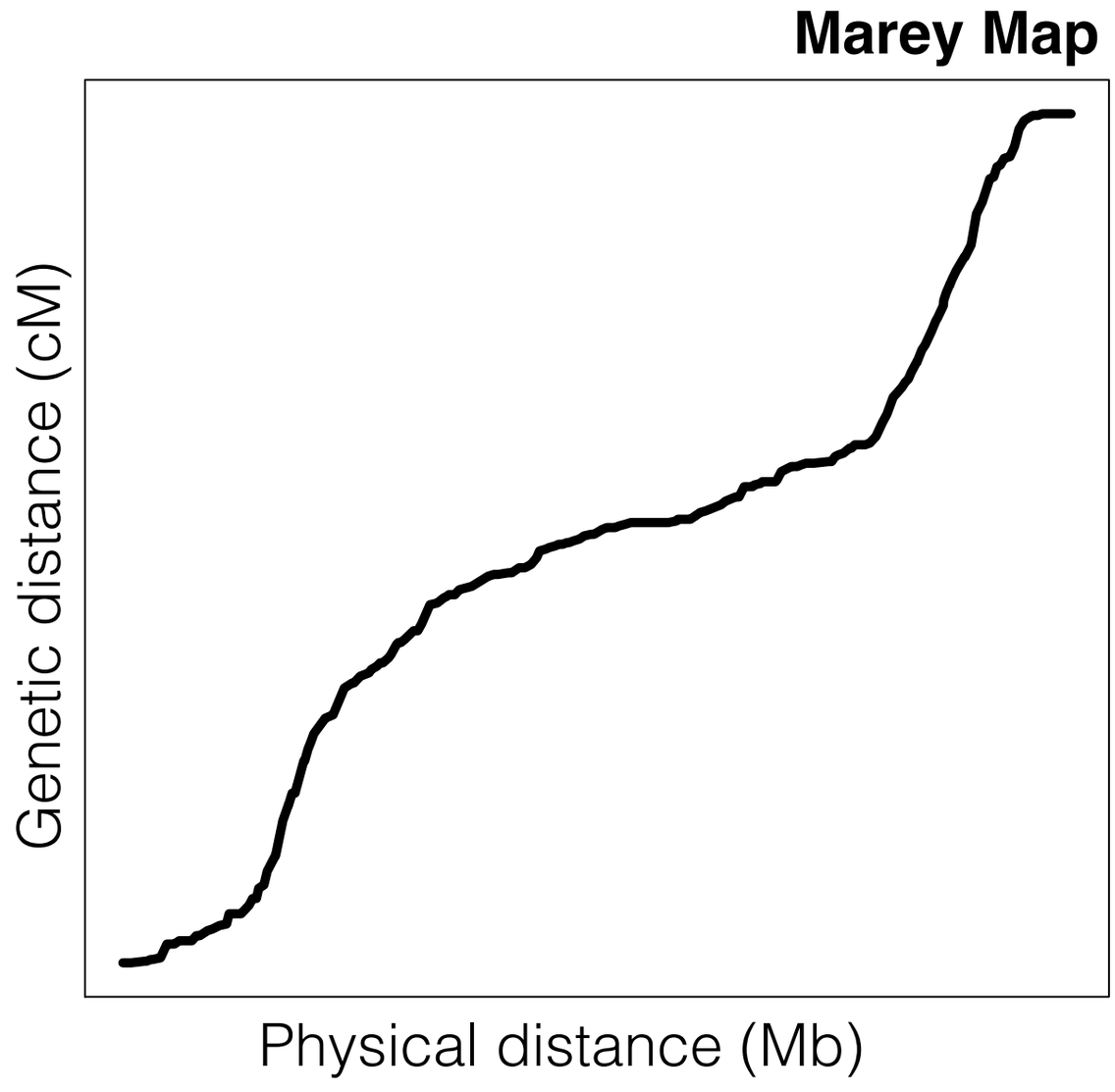
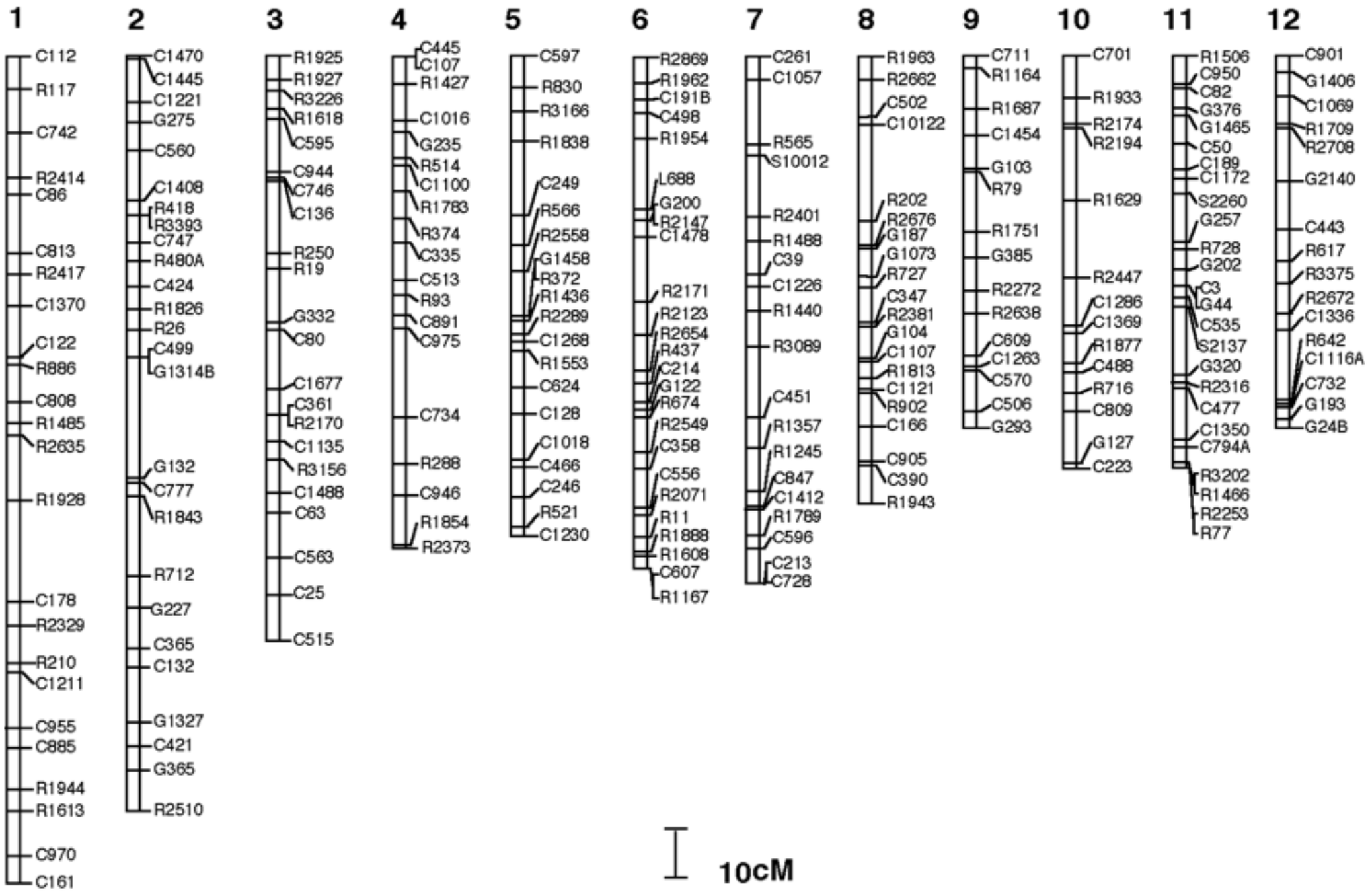
What do regions of more or less recombination spots do to linkage map?



Molecular markers are often used for genetic mapping

- Single nucleotide variants
- Microsatellite repeats
- Insertion/deletion variants

Molecular markers are often used for genetic mapping



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