OUTLINE 16

E. Violation of independent assortment

3. Crossing over

4. Chromosome mapping

5. Effects of linkage and crossing over on genotypic and phenotypic ratios

F. Pleiotropy

G. Violation of complete expression

1. Gene interaction - epistasis

2. Consequences

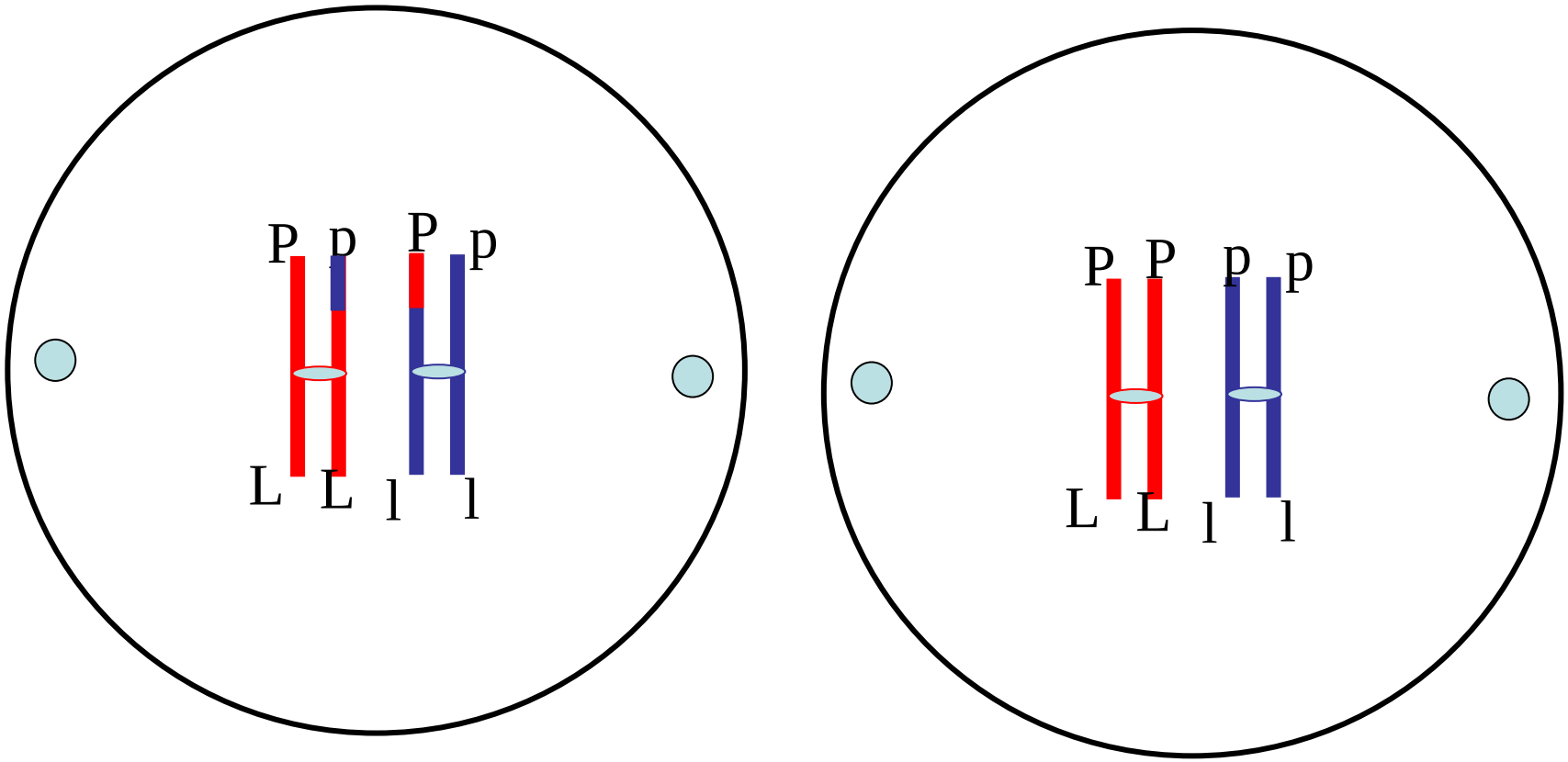
penetrance

expressivity

H. Phenotypic plasticity

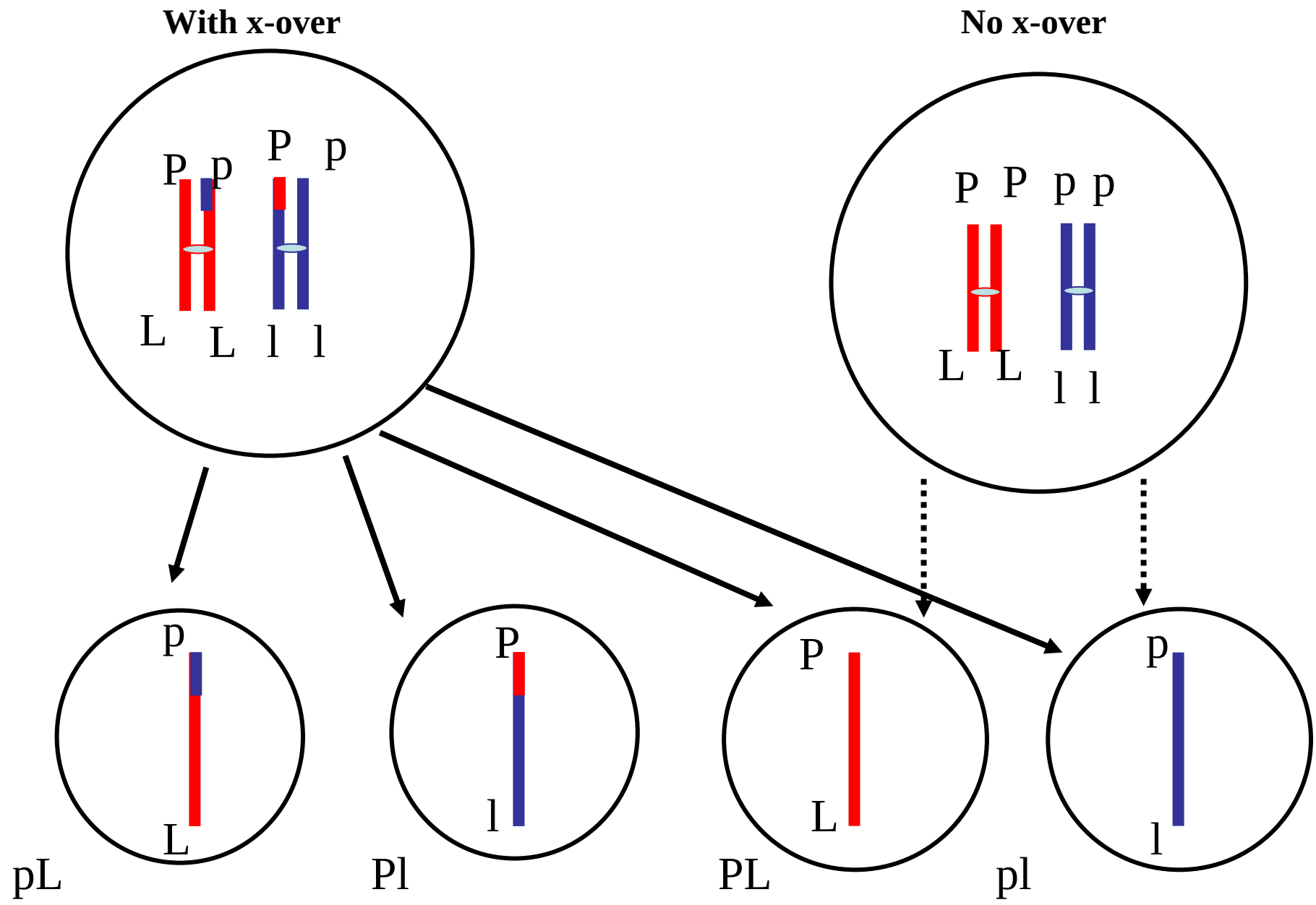
P: PL//PL X pl//pl

F1: (PL//pl)



= centrosome

Effects of crossing over on number of possible gamete types



Test cross F1 to double recessive:

Parents	PpLl X	ppll	PL//pl X	pl//pl	
Gametes	PL	pl	PL	parental	(7)
	Pl		pl	parental	(7)
	pL		pL	recombinant	(1)
	pl		Pl	recombinant	(1)

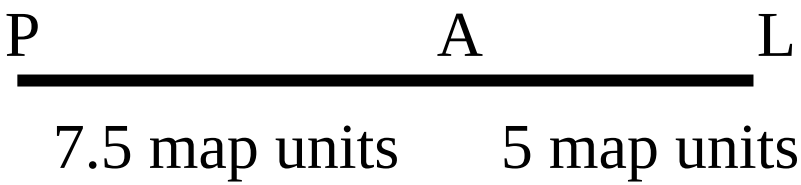
Expect 1:1:1:1 ratio of phenotypes

Bateson and Punnett observed 7:1:1:7 2/16 = 12.5% recomb.

Alfred H. “Hot Dog” Sturtevant

How do we know if it's P- A - L , or P - L- A?

If x-over frequency between P and A is 7.5% then:



If x-over frequency between P and A is 17.5% then:

Fig 15.6

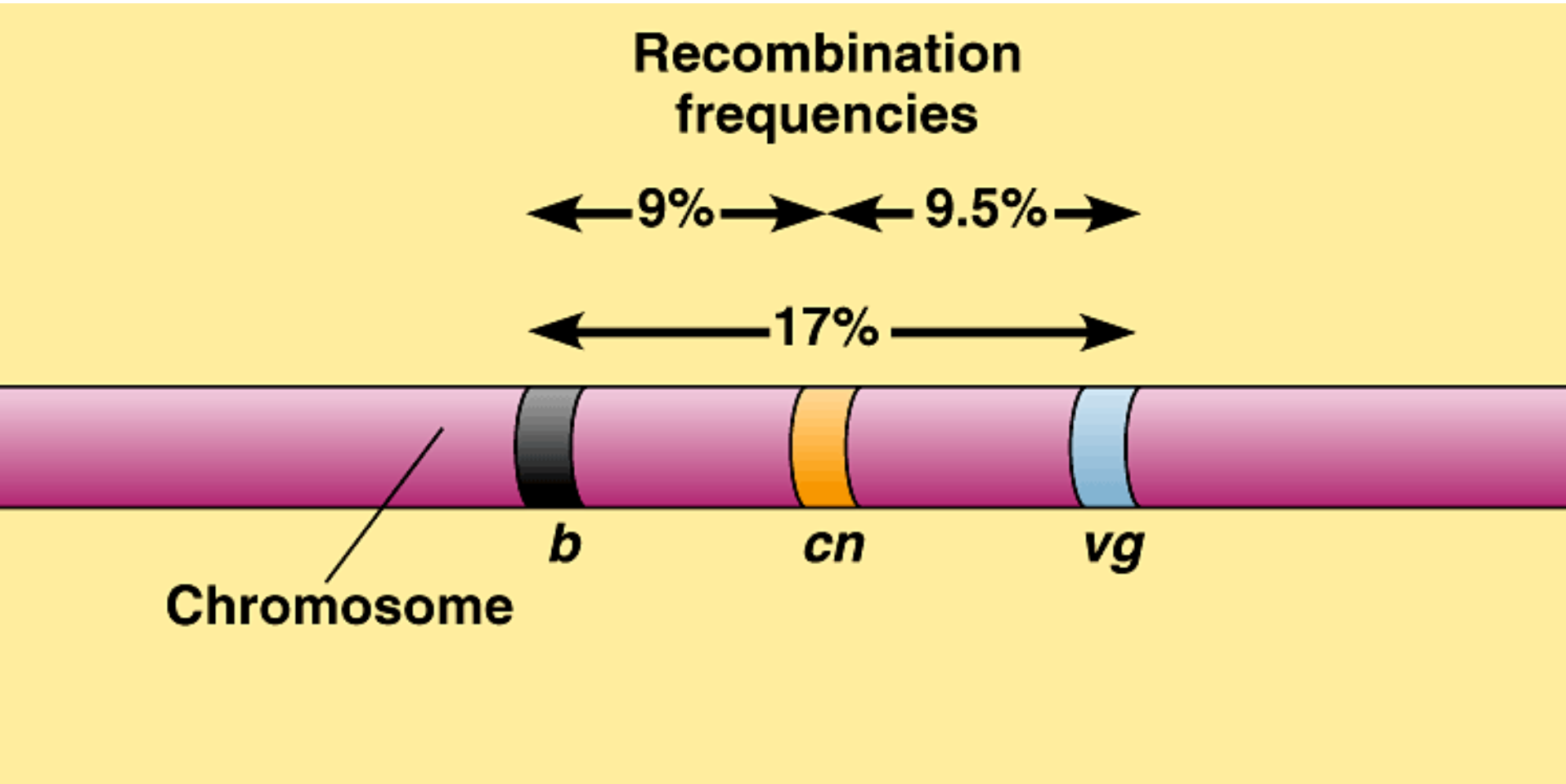
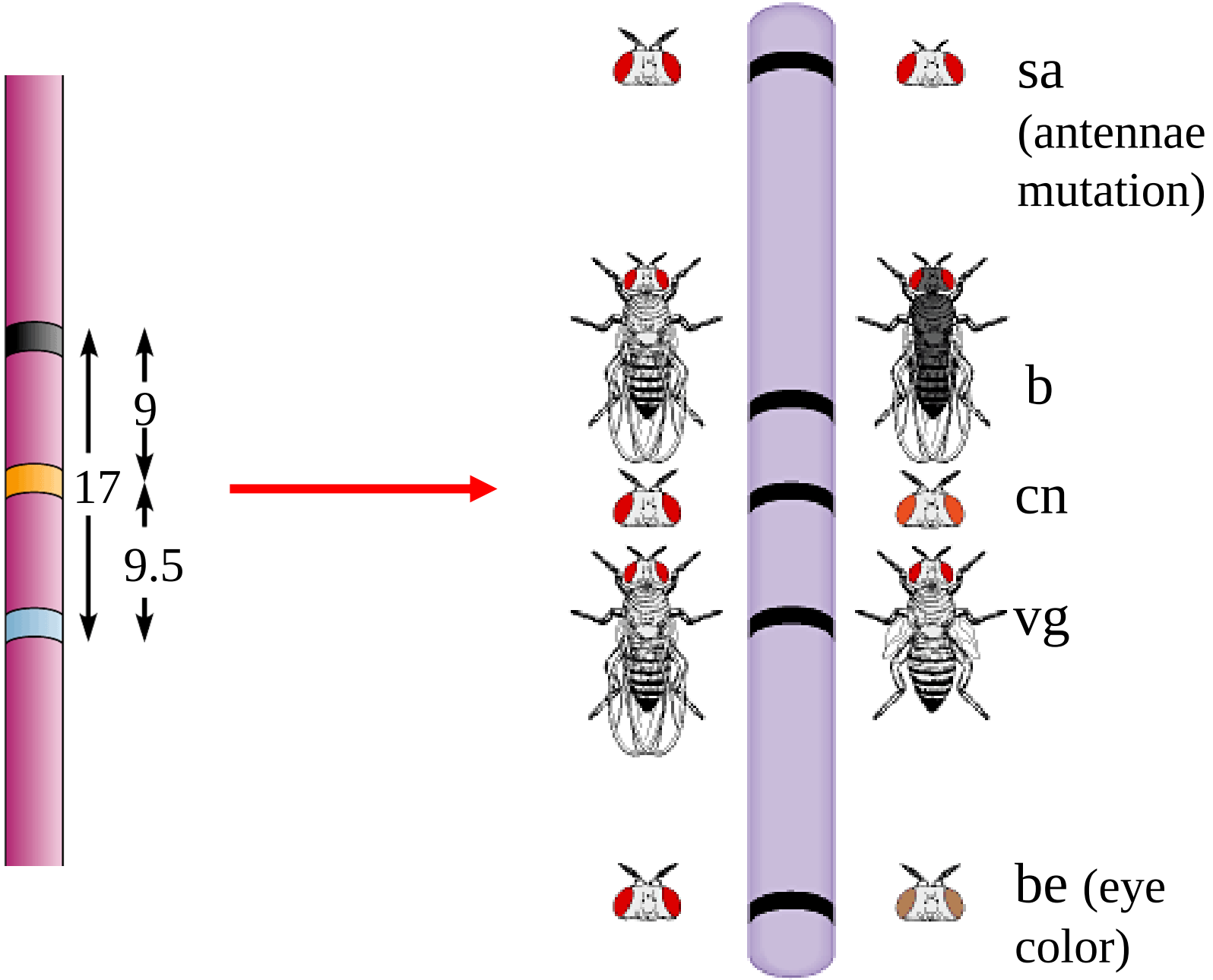


Fig 15.7



Application of Mendel's Rules assumes:

1. **One allele completely dominates the other**
2. **All genes have 2 allelic forms**
3. **All traits are monogenic (affected by only one locus)**
4. **All chromosomes occur in homologous pairs**
5. **All genes assort independently**
6. **An allele is completely expressed when either dominant or heterozygous**
7. **Each trait is controlled by a different set of factors**

Pleiotropy:

The same locus influences coat color and crossed eyes in felines

Fig 14.11 Effect of **epistasis** on phenotypic ratios of a dihybrid cross

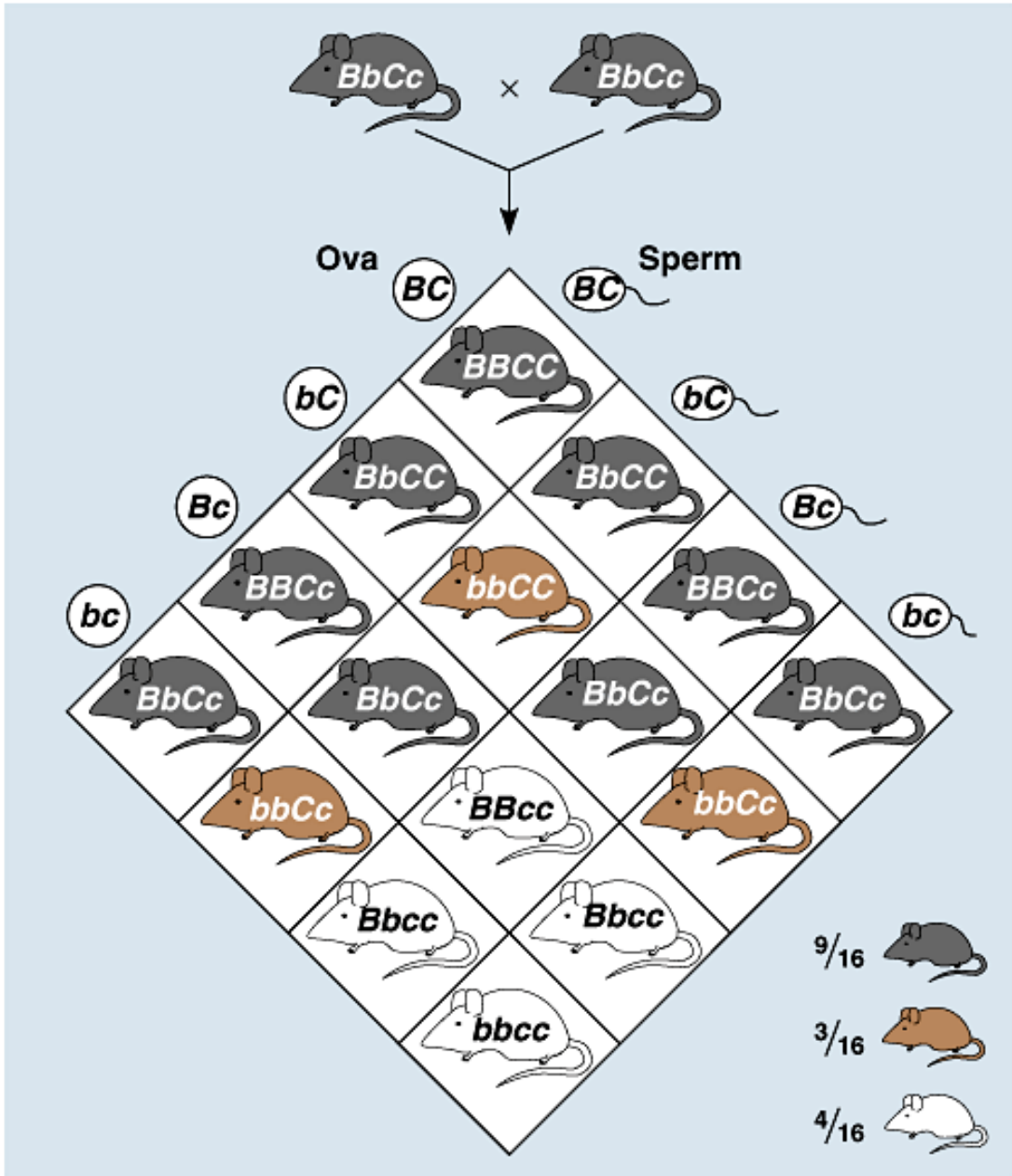
C= pigment

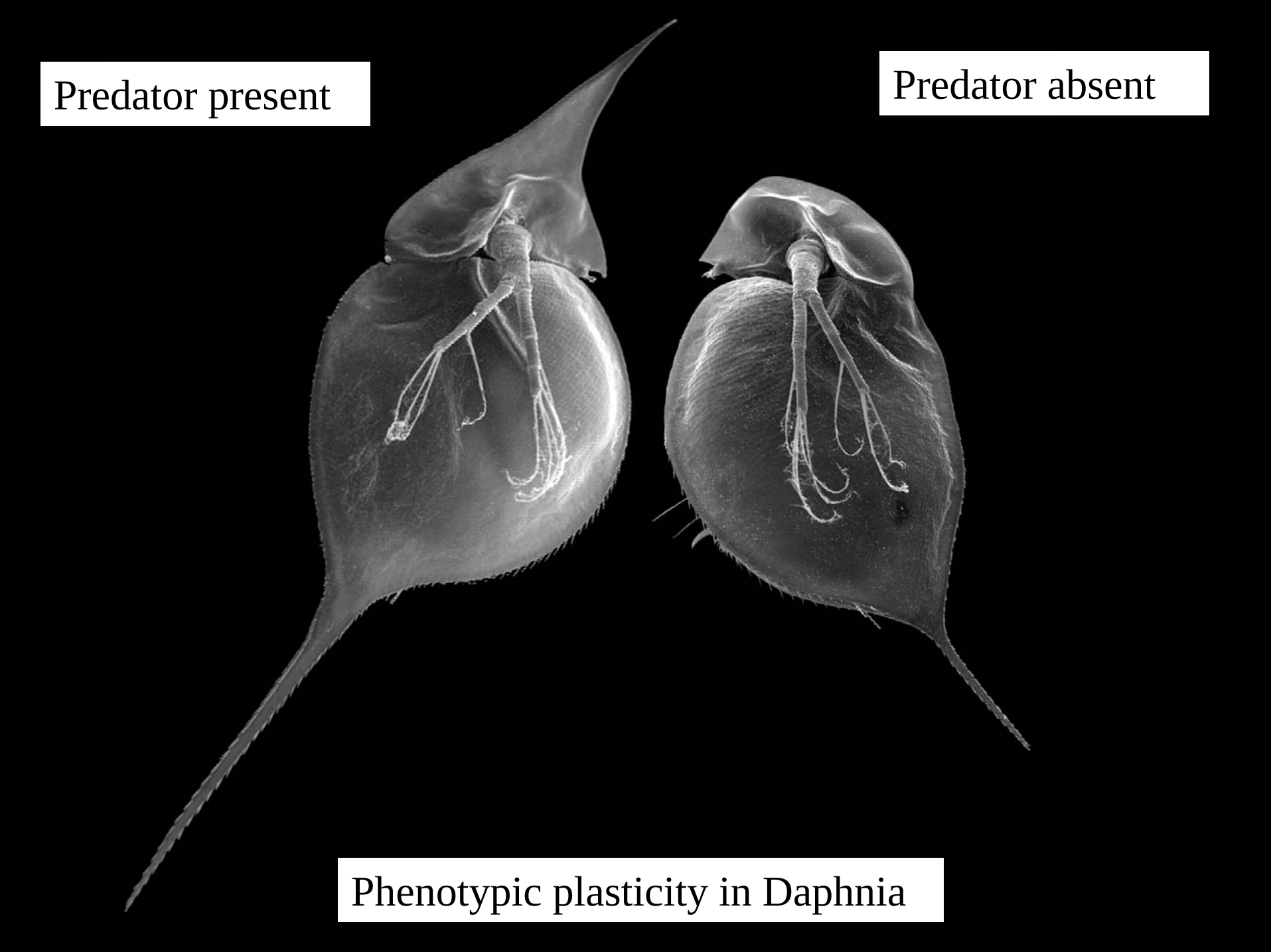
c = none

B = deposition of lots of pigment (black)

b = less deposition (brown)

If cc, fur is white regardless of genotype at B locus




Predator present
Predator absent
Phenotypic plasticity in Daphnia

Crayfish predator

Sunfish predator

Snail prey

A snail raised with fish

A full sib raised with crayfish