OUTLINE 15

E. Violation of independent assortment

1. Bateson and Punnet

2. Linkage

3. Crossing over

4. Chromosome mapping

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

William Bateson and R.C. Punnett

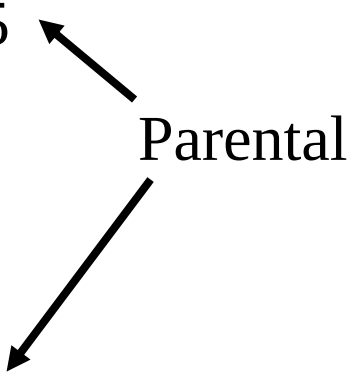
P = purple dominant to **p** = white

L = long dominant to **l** = round

P PPLL X ppll

F1 all purple / long

F2 **Phenotype**	**Number**	**Number expected**	
Purple / long	284	215	
Purple / round	21	71	Parental
White / long	21	71	
White / round	55	24	



Tendency toward non-independent segregation - Partial gametic coupling

Test cross F1 to double recessive:

Parents	PpLl	X	ppll
Gametes	PL		pl
	Pl		
	pL		
	pl		

Expect 1:1:1:1 ratio of phenotypes

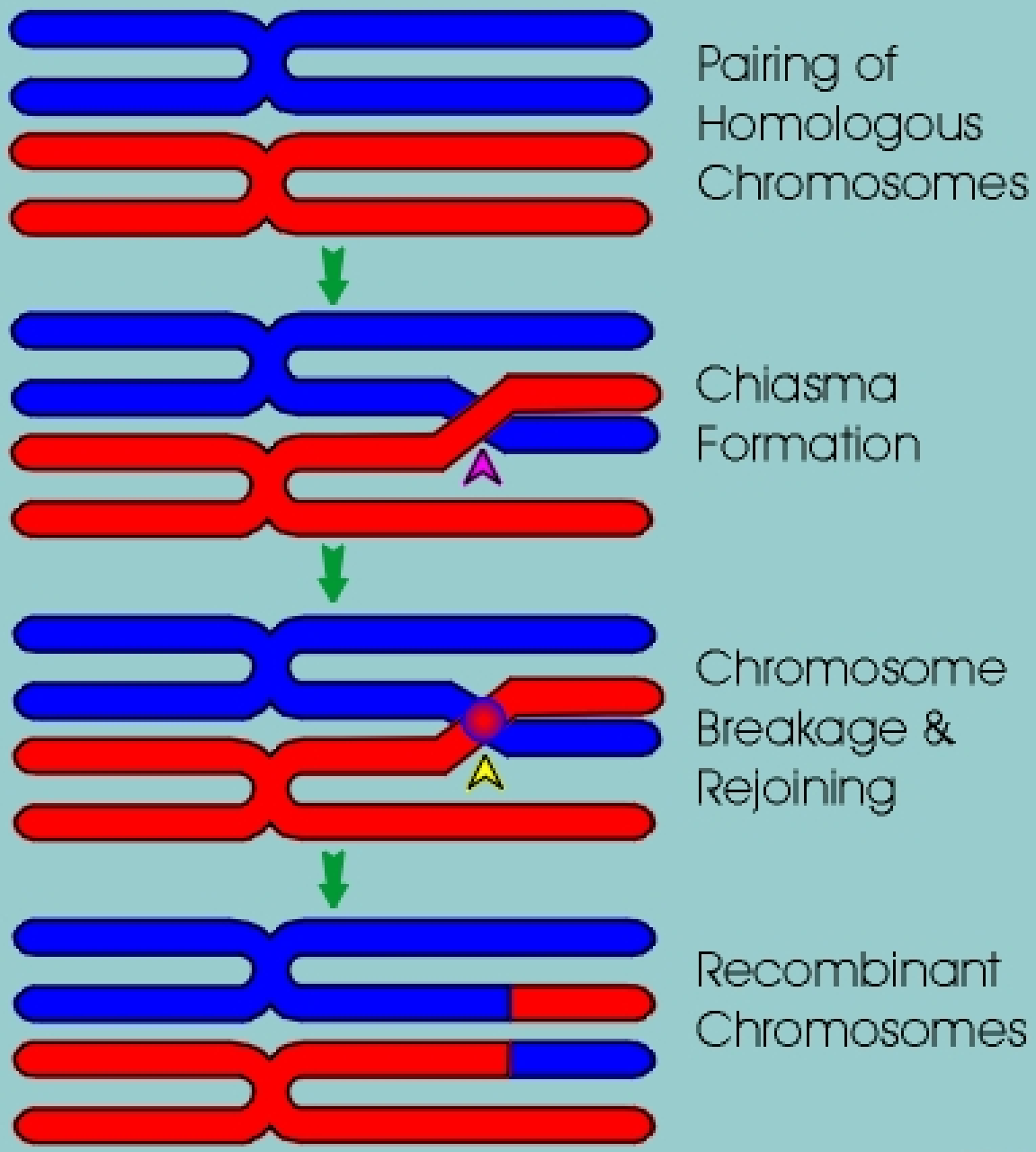
Bateson and Punnett observed 7:1:1:7

Test cross to determine if genes are linked in coupling or repulsion

	PL//pl x pl//pl	Pl//pL X pl//pl
Gametes	1/2 PL all pl	1/2 Pl all pl
	1/2 pl	1/2 pL
F1	1/2 PL//pl (purple, long)	1/2 (purple, round)
	1/2 pl//pl (white, round)	1/2 (white, long)

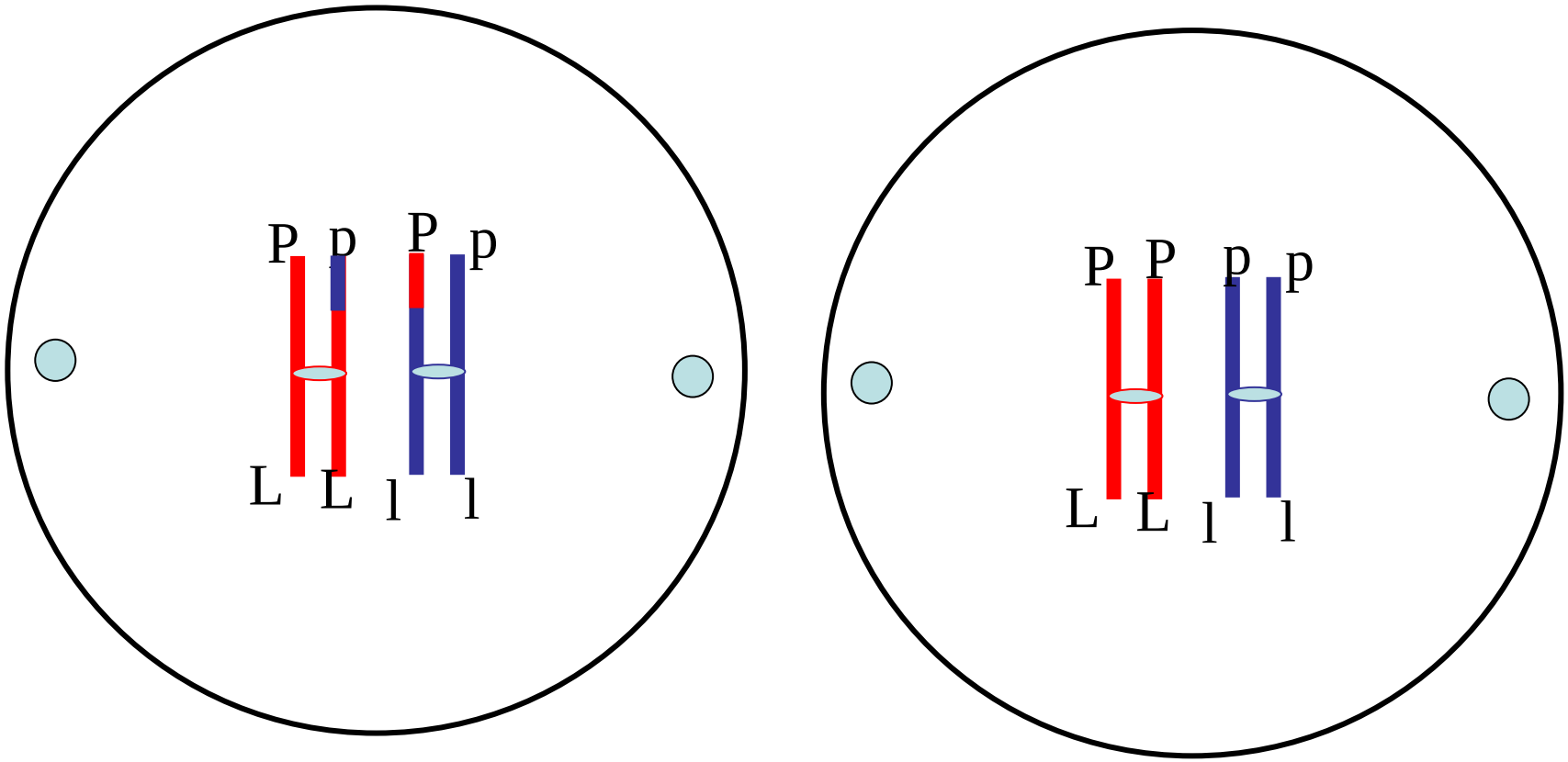
With independent assortment: PpLl x ppll expect 1:1:1:1

CROSSING OVER



P: PL//PL X pl//pl

F1: (PL//pl)



= centrosome

Effects of crossing over on number of possible gamete types