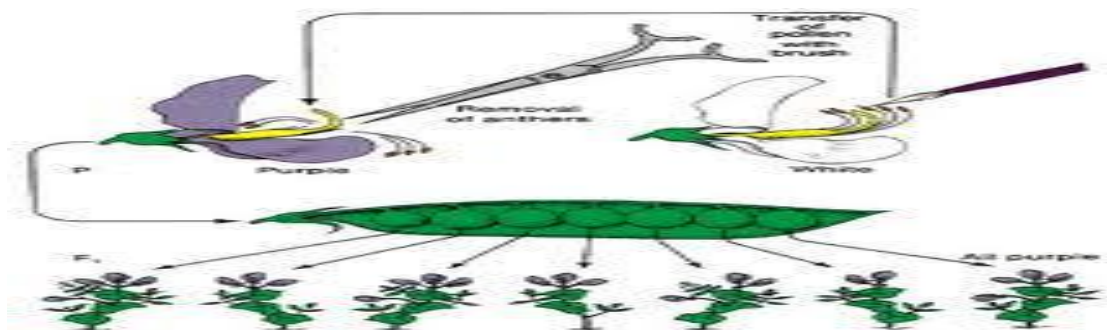


The law of segregation



وراثة

LAB 5

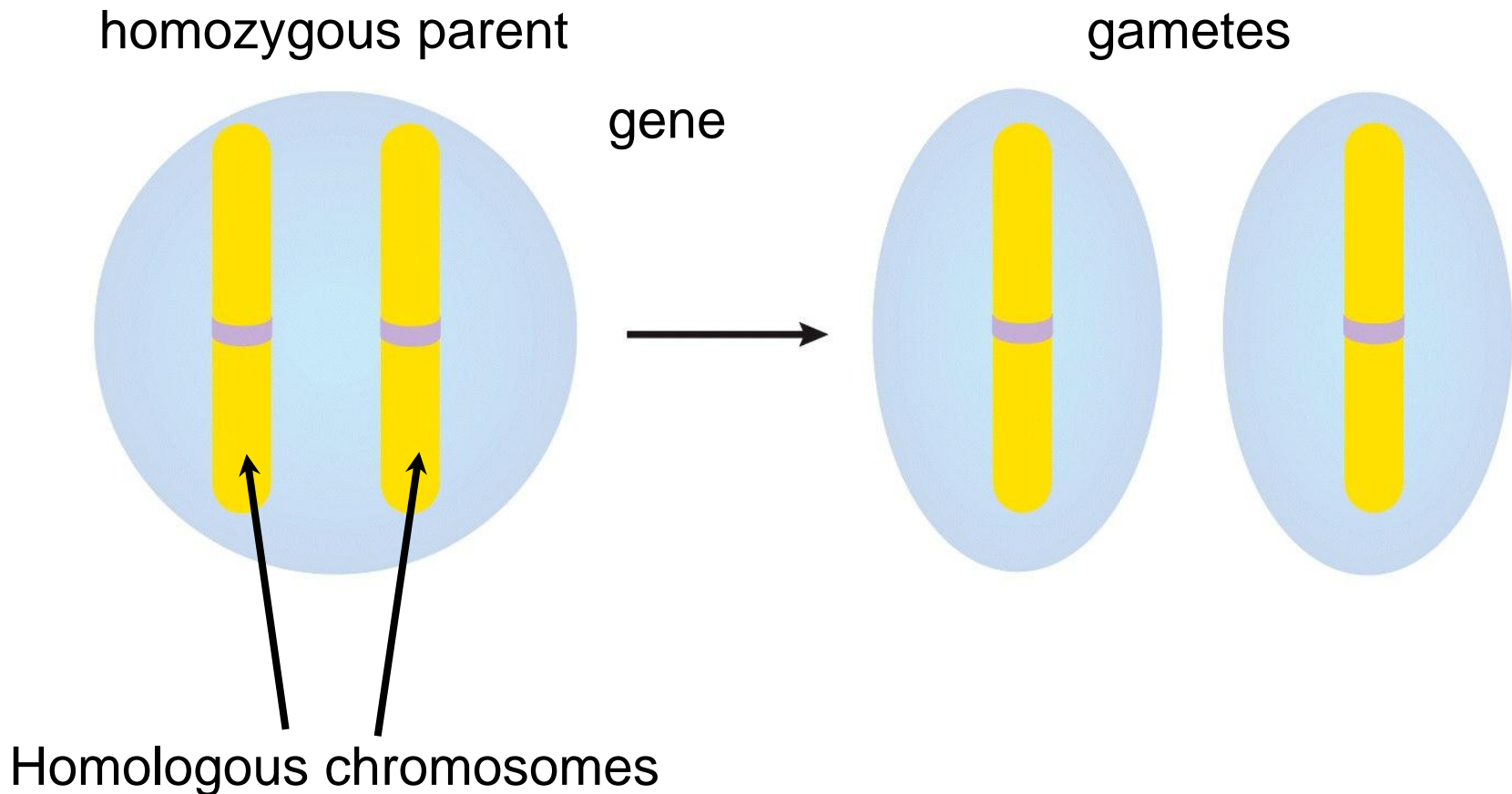




Law of Segregation (The "First Law")

- * Each individual has a pair of factors controlling each trait, one inherited from each biological parent.
- * During the formation of gametes (**sex cells**) these two factors separate. Only one ends up in each sex cell.

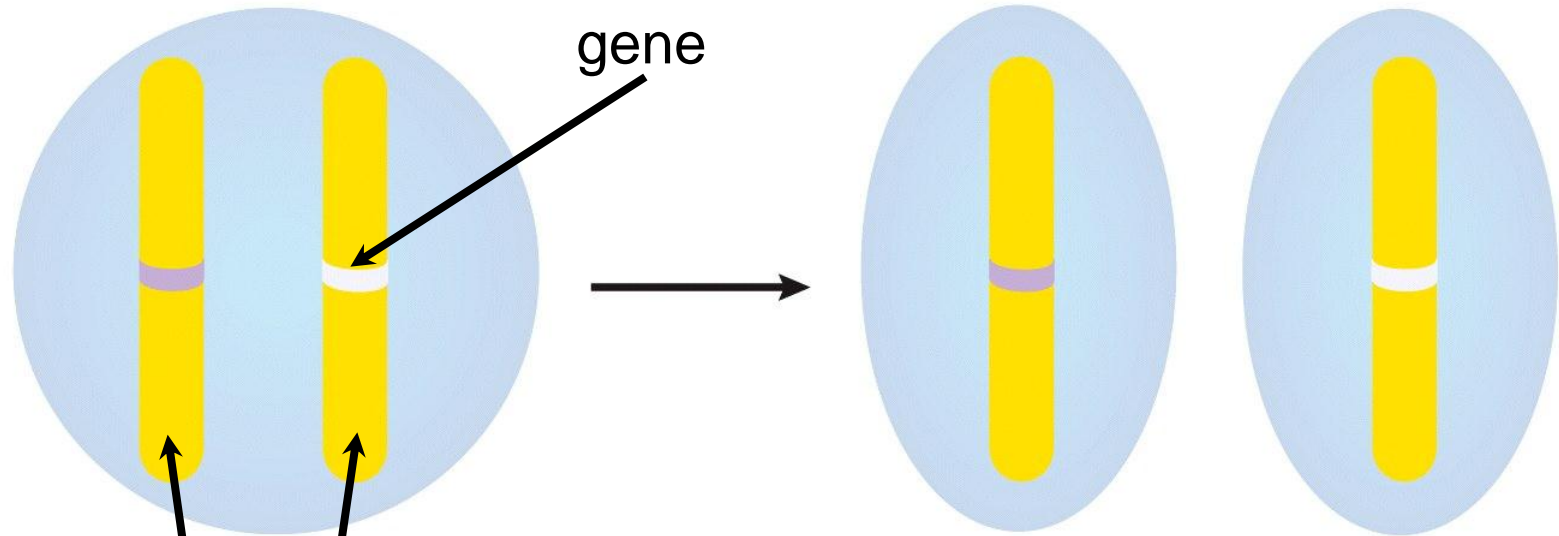
In modern terms, **the homozygous parents** in the P generation can pass one one kind of allele to their offspring.



The **heterozygous parents** of the F1 generation have two alleles for the gene in question, and can pass one or the other, but not both, to their offspring.

heterozygous parent

gametes

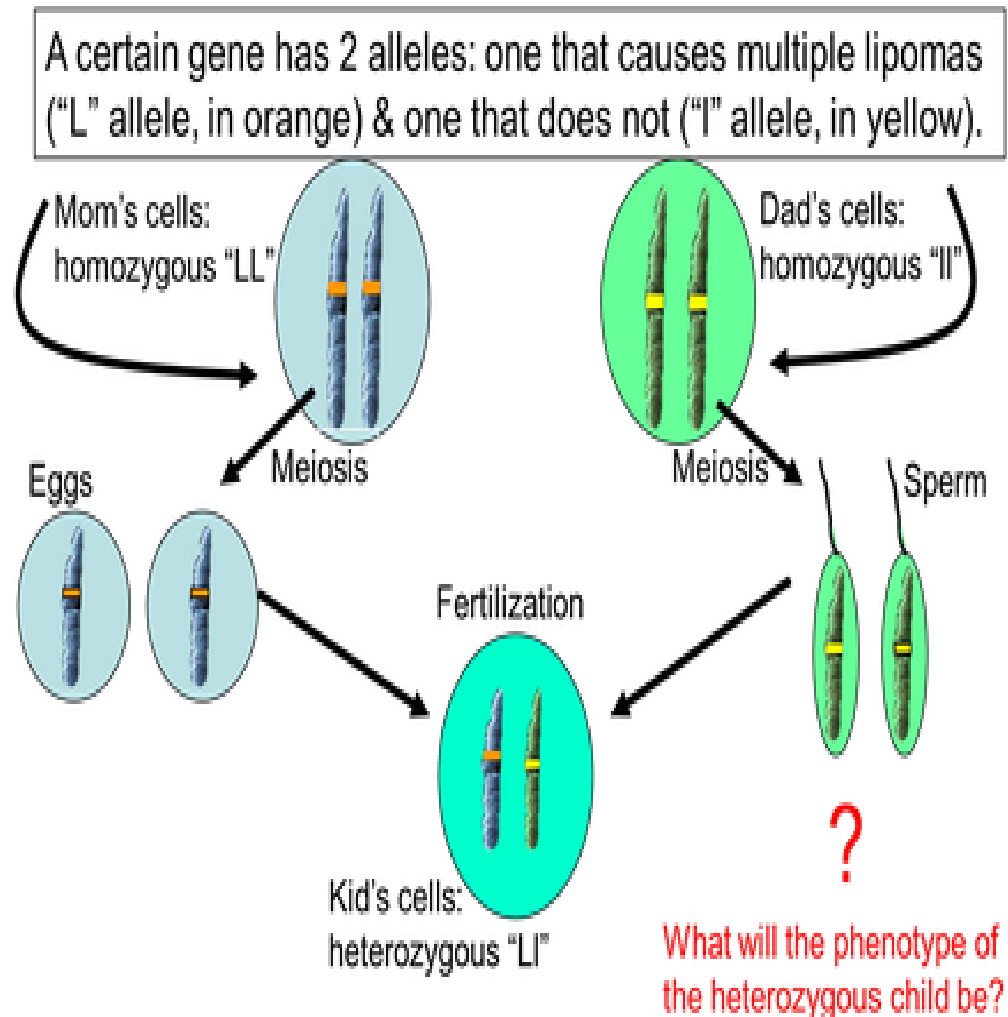


Homologous chromosomes

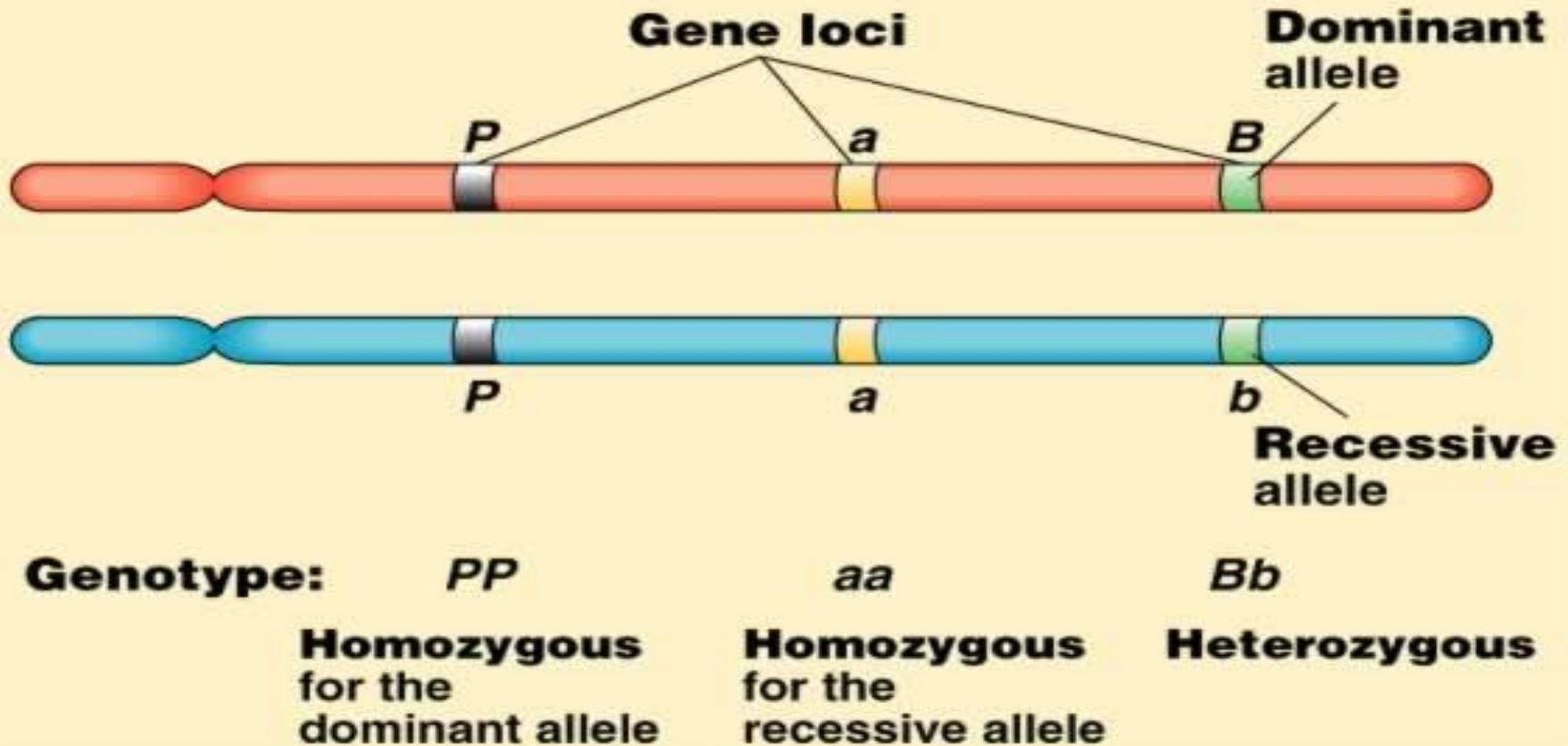
Dominant and Recessive Alleles



A dominant allele is one that is expressed to a greater degree than the other allele that is present. For example, one possible scenario for the differing lipoma alleles is shown on the right. Mom is **homozygous** for the multiple lipoma trait (designated as "LL"), while Dad is homozygous for the absence of lipomas (designated "ll"). Mom can only contribute an "L" allele to her offspring, and Dad can only contribute the "l" allele, so all of their children will be **heterozygous** ("Ll"). In this particular case, heterozygous "Ll" individuals will all have multiple lipomas, because the multiple lipoma allele is **dominant**, while the alternate "l" allele is



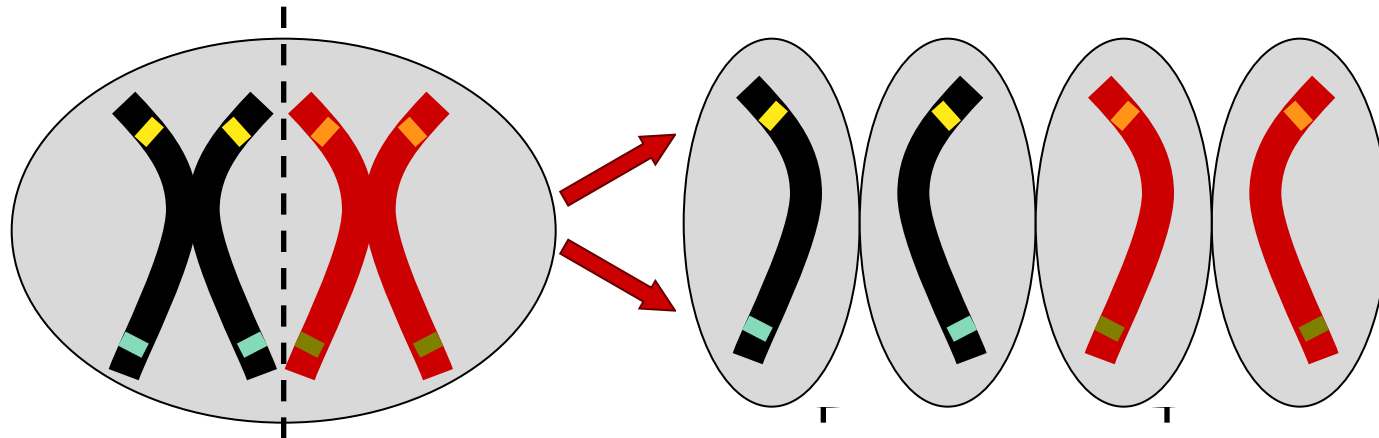
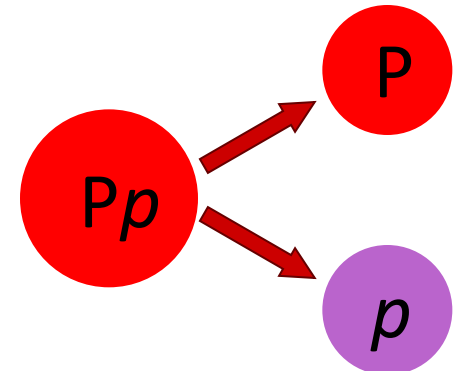
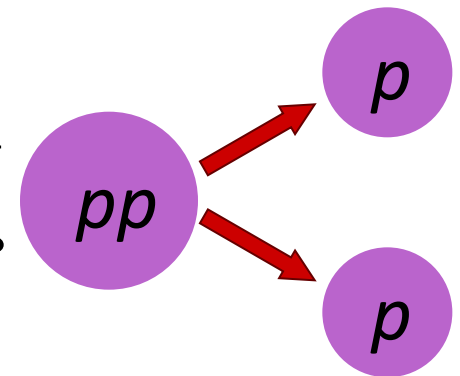
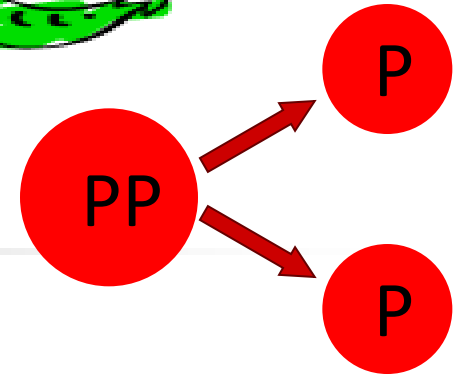
Place alleles on chromosomes



Law of Segregation

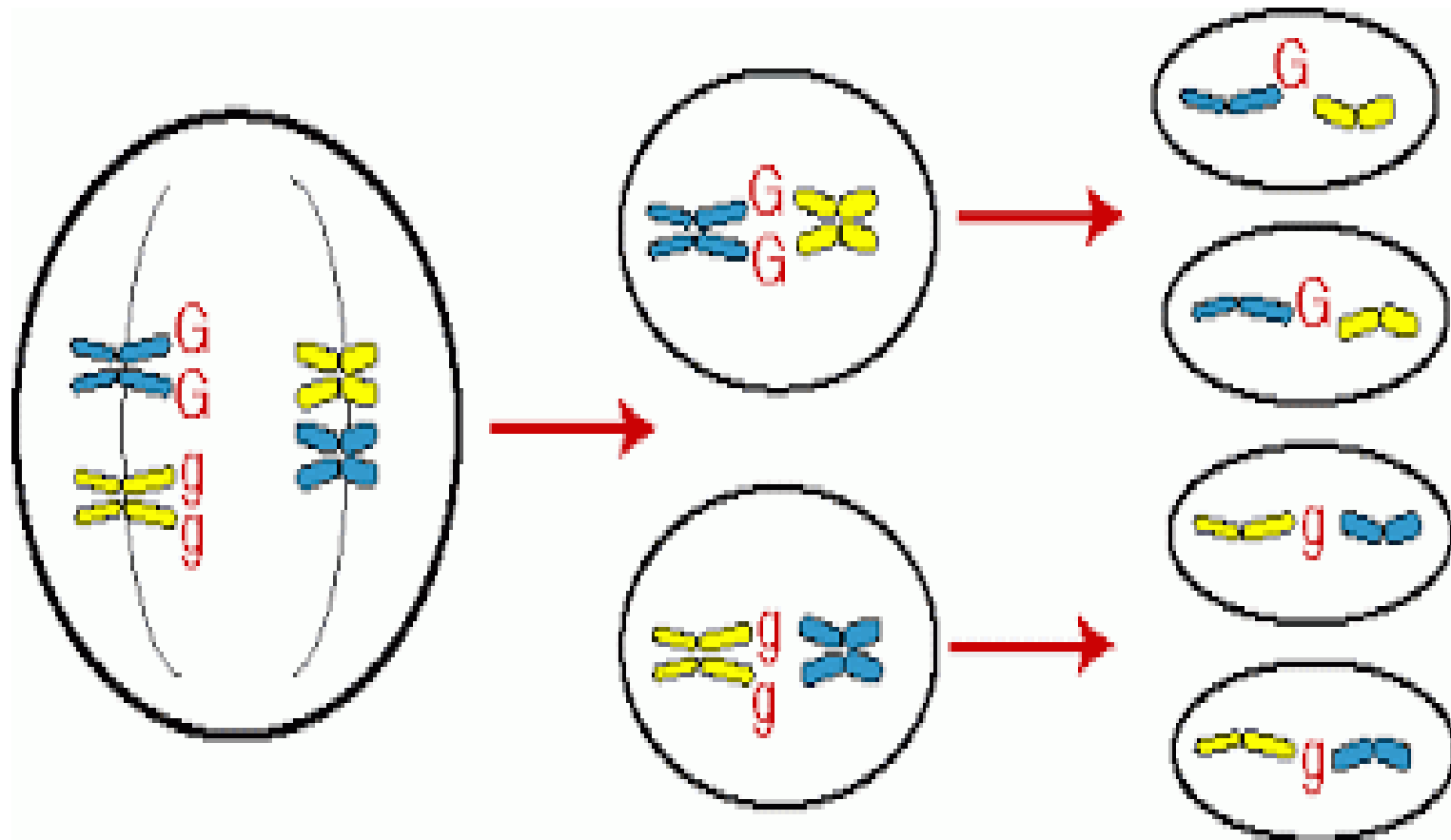


Mendel's Law of Segregation, states that allele pairs separate or segregate during gamete formation and randomly unite at fertilization.





Law of Segregation





Law of Dominance

- * Traits are controlled by two factors that can be called “dominant” or “recessive.”
- * A “dominant” trait shows if the offspring inherits at least one dominant factor from one parent.
- * A “recessive” trait shows only if the offspring inherits two recessive factors, one from each parent.

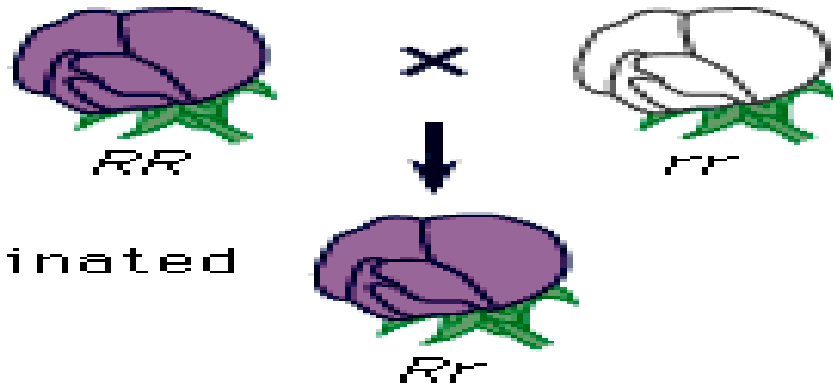


Genotypes

- **Homozygous** genotype - gene combination involving 2 dominant or 2 recessive genes (e.g. **RR** or **rr**); also called **pure**
- **Heterozygous** genotype - gene combination of one dominant & one recessive allele (e.g. **Rr**); also called **hybrid**



Example



parental
generation
(P)

self-pollinated

F₁ generation

		pollen	
		R	r
ovules	R	 RR	 Rr
	r	 Rr	 rr

F₂ generation

From the previous example



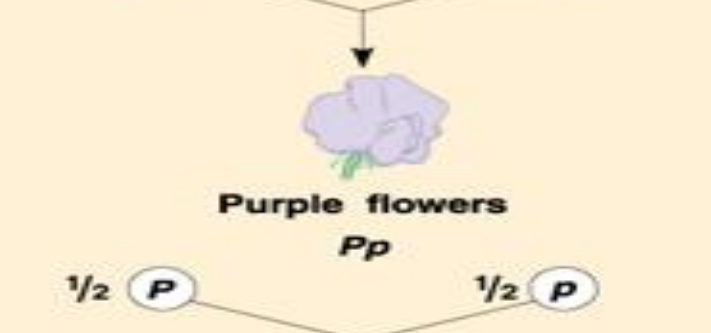
P GENERATION

Appearance:
Genetic makeup:
Gametes:

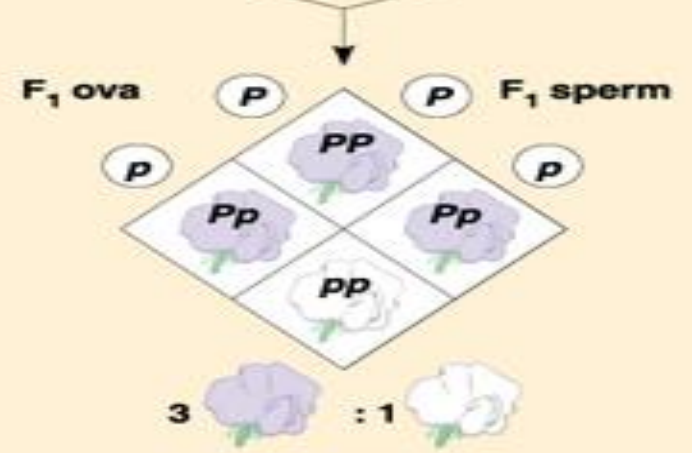


F₁ GENERATION

Appearance:
Genetic makeup:
Gametes:



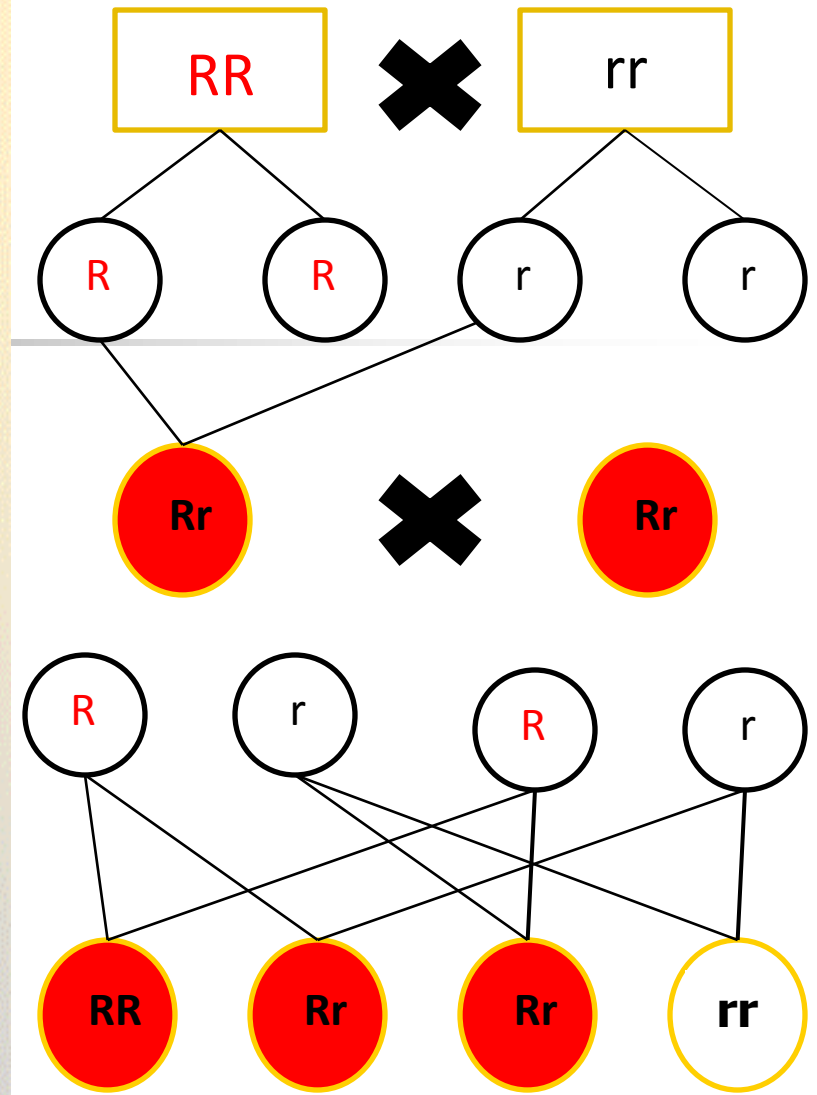
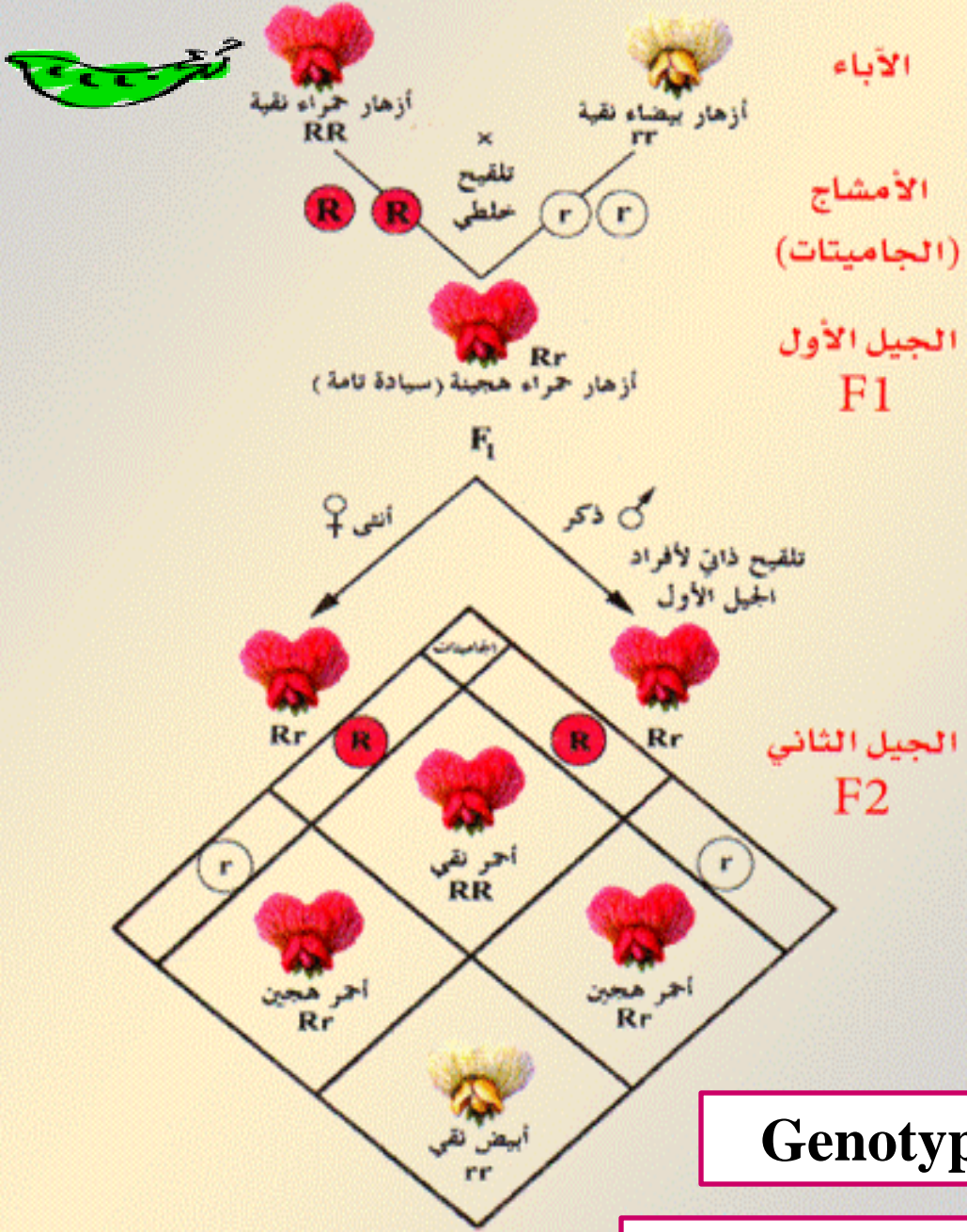
F₂ GENERATION



Phenotype
3:1

Genotype

1RR : 2Rr : 1rr



Genotype

1:2:1

Phenotype

3:1

Law of Segregations



Test cross

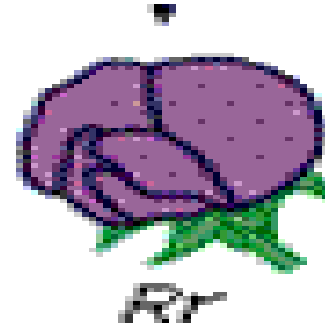
In a test cross, a parent with a dominant phenotype but unknown genotype is crossed with a recessive parent.



rr

Gametes

r



Rr

R

r



The resulting individuals

Rr

rr

Phenotype ratio **1 : 1**



Test cross

- Homozygous x heterozygous(hybrid)
- **Offspring:**
 - 50% Homozygous **RR or rr**
 - 50% Heterozygous **Rr**
- Phenotypic Ratio is **1:1**
- Called **Test Cross** because the offspring have **SAME** genotype as parents

TECHNIQUE

testcross or backcross



×

Dominant phenotype,
unknown genotype:
 PP or Pp ?

Recessive phenotype,
known genotype:
 pp

Predictions






If PP

Sperm

p p

Eggs

P

	 Pp	 Pp
 Pp	 Pp	 Pp

or

If Pp






Sperm

p p

Eggs

P

p

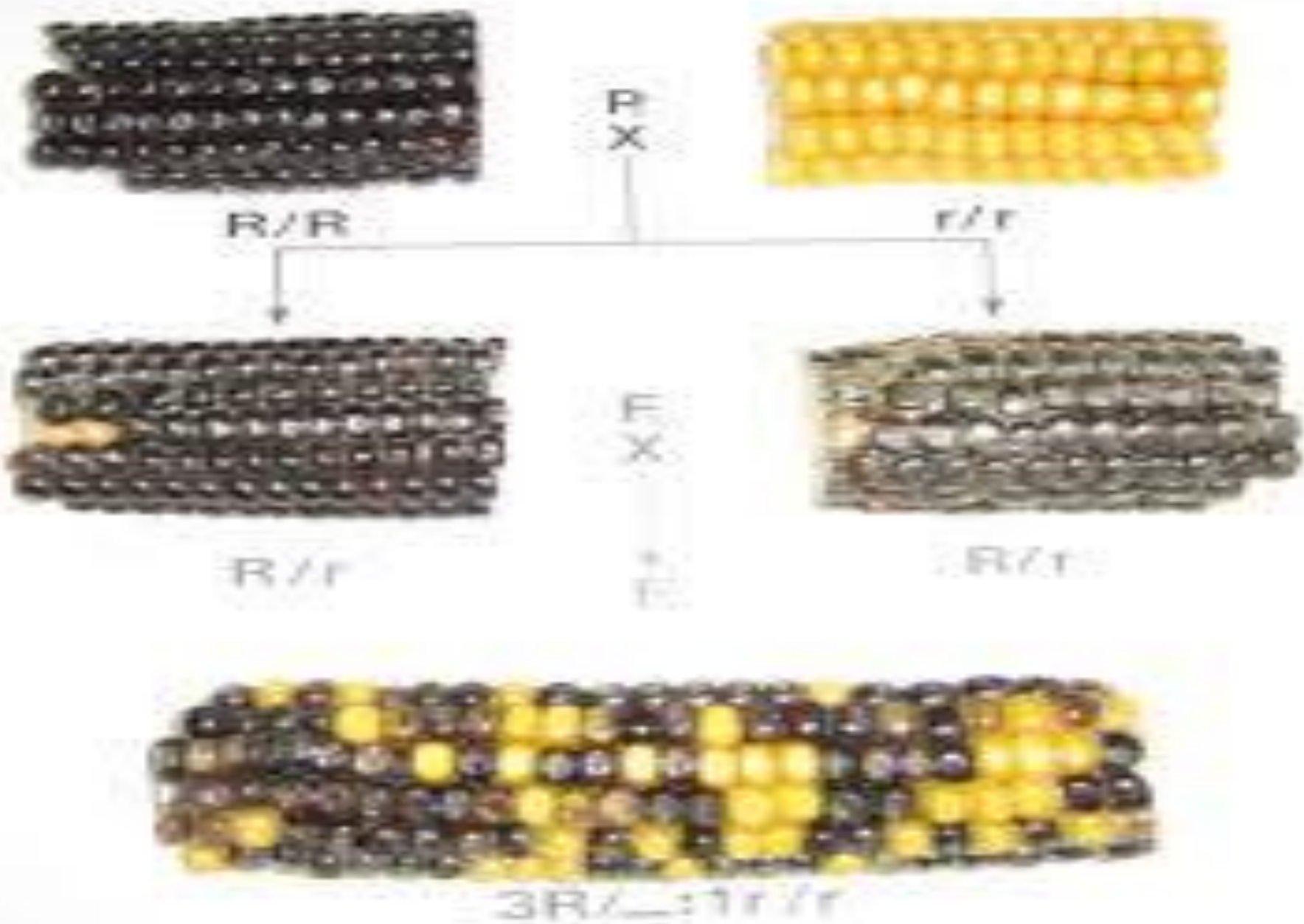
	 Pp	 Pp
 pp	 pp	 pp

Corn cones



17-6810 Monohybrid Cross

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Monohybrid Crosses

genotype: total set of alleles of an individual

PP = homozygous dominant

Pp = heterozygous

pp = homozygous recessive

phenotype: outward appearance of an individual



Designer "Genes"

- **Alleles** - two forms of a **gene** (dominant & recessive)
- **Dominant** - stronger of two genes expressed in the hybrid; represented by a **capital letter (R)**
- **Recessive** - gene that shows up less often in a cross; represented by a **lowercase letter (r)**



More Terminology

- **Genotype** - gene combination for a trait (e.g. **RR, Rr, rr**)
- **Phenotype** – outward appearance of an individual (e.g. **red, white**)



More Terminology

- Each organism has two **alleles** for each **trait**
 - **Alleles** - different forms of the same **gene**
 - **Genes** - located on chromosomes, they control how an organism develops



HOME WORK

1-What is heredity?



2-Why Mendel used peas,
Pisum sativum ?

منيره الدوسري

Thank
You
جزا

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