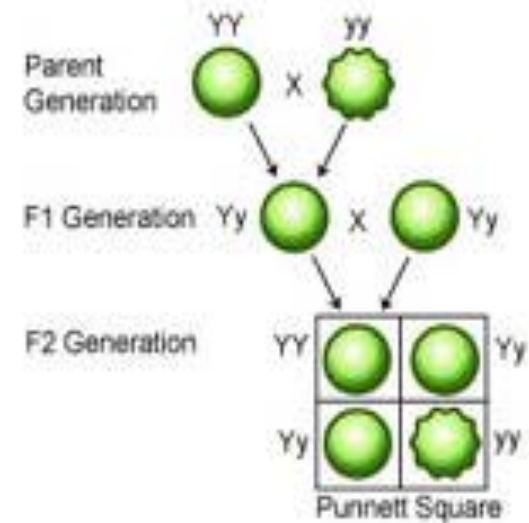
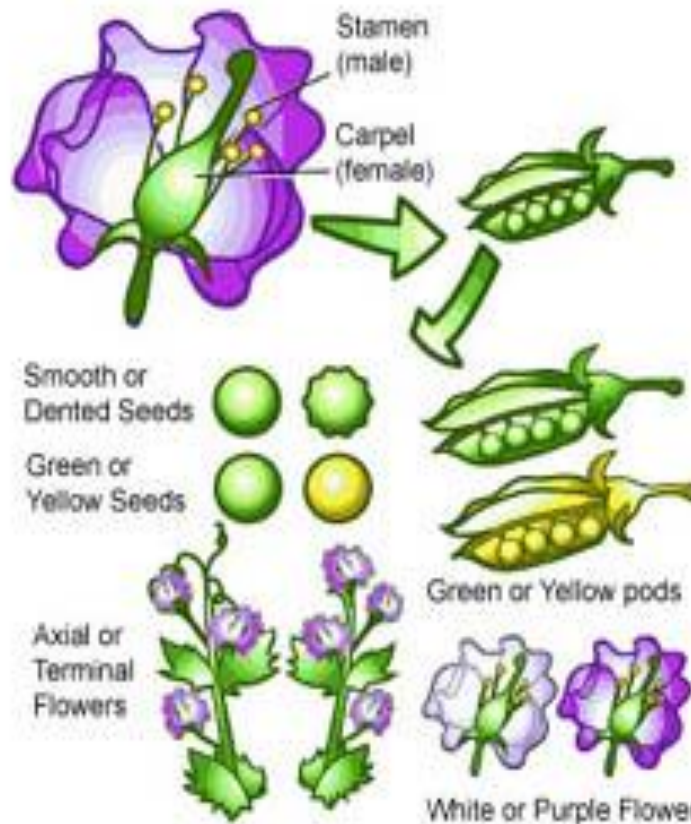


Law of Independent Assortment (The "Second Law")



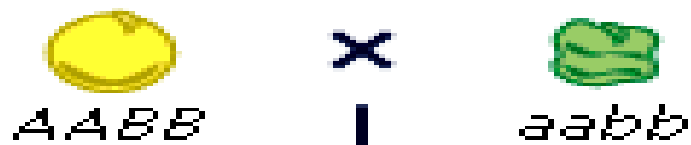
LAB 6





Mendel's Dihybrid Cross

The law of independent assortment states that each pair of alleles segregates independently of each other pair of alleles (alleles of different genes) during gamete formation.



parental generation (P)



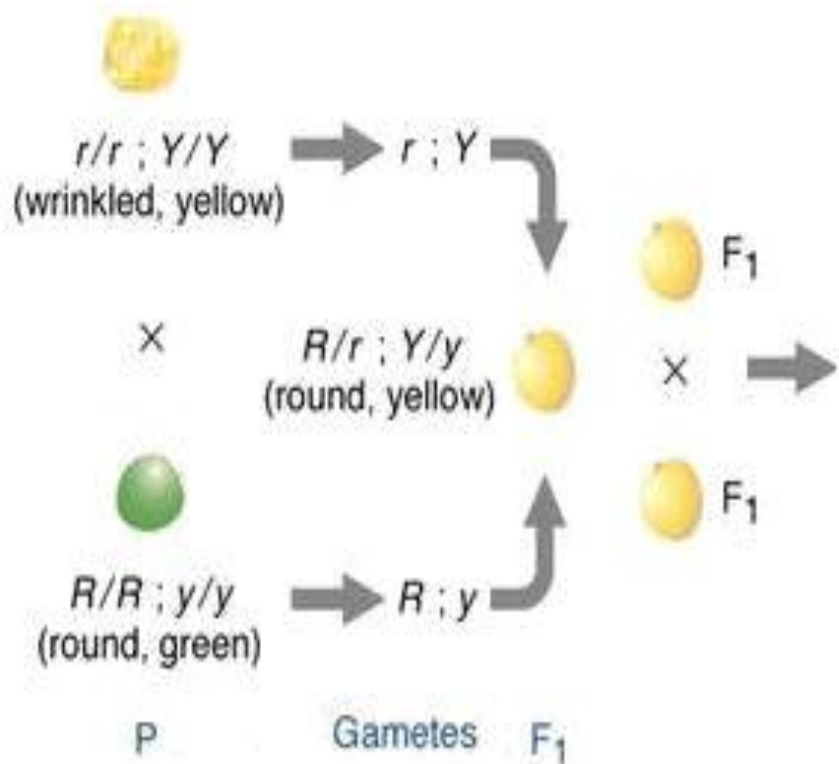
F₁ generation

















♀ \ ♂		pollen			
		AB	Ab	aB	ab
ovules	AB	 $AABB$	 $AABb$	 $AaBB$	 $AaBb$
	Ab	 $AABb$	 $AAbb$	 $AaBb$	 $Aabb$
	aB	 $AaBB$	 $AaBb$	 $aaBB$	 $aaBb$
	ab	 $AaBb$	 $Aabb$	 $aaBb$	 $aabb$

F₂ generation

Phenotype ratio : 9:3:3:1
 Genotype : 12:4

-  Round, yellow
-  Round, green
-  Wrinkled, yellow
-  Wrinkled, green



		♂ Gametes			
		$R ; Y$ $\frac{1}{4}$	$R ; y$ $\frac{1}{4}$	$r ; y$ $\frac{1}{4}$	$r ; Y$ $\frac{1}{4}$
♀ Gametes	$R ; Y$ $\frac{1}{4}$	$R/R ; Y/Y$ $\frac{1}{16}$ 	$R/R ; Y/y$ $\frac{1}{16}$ 	$R/r ; Y/y$ $\frac{1}{16}$ 	$R/r ; Y/Y$ $\frac{1}{16}$ 
	$R ; y$ $\frac{1}{4}$	$R/R ; Y/y$ $\frac{1}{16}$ 	$R/R ; y/y$ $\frac{1}{16}$ 	$R/r ; y/y$ $\frac{1}{16}$ 	$R/r ; Y/y$ $\frac{1}{16}$ 
	$r ; y$ $\frac{1}{4}$	$R/r ; Y/y$ $\frac{1}{16}$ 	$R/r ; y/y$ $\frac{1}{16}$ 	$r/r ; y/y$ $\frac{1}{16}$ 	$r/r ; Y/y$ $\frac{1}{16}$ 
	$r ; Y$ $\frac{1}{4}$	$R/r ; Y/Y$ $\frac{1}{16}$ 	$R/r ; Y/y$ $\frac{1}{16}$ 	$r/r ; Y/y$ $\frac{1}{16}$ 	$r/r ; Y/Y$ $\frac{1}{16}$ 

9  : 3  : 3  : 1 

Dihybrid cross

P true-breeding yellow, round peas



x



true-breeding green, wrinkled peas

yyrr

Y = yellow
R = round

y = green
r = wrinkled

F₁ generation (hybrids)

yellow, round peas

All HYBRIDS!

100%

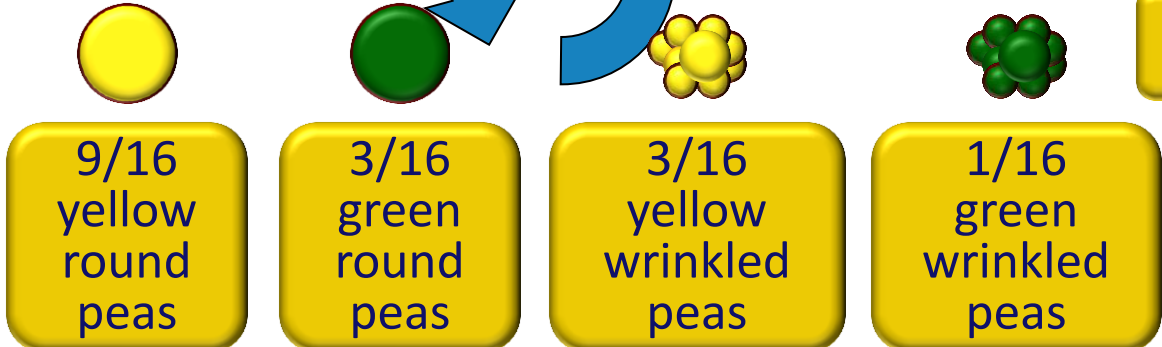


YyRr

self-pollinate

F₂ generation

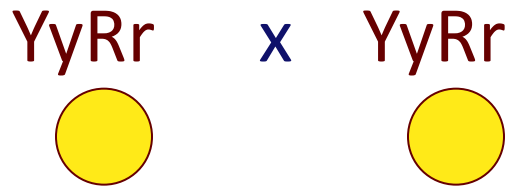
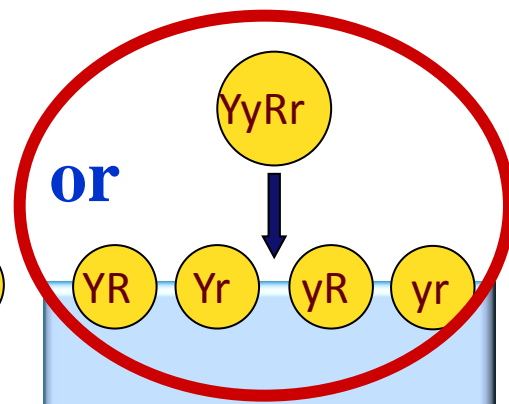
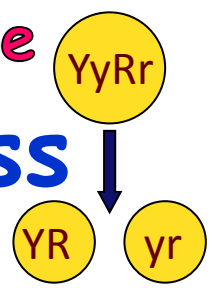
9:3:3:1



Dihybrid cross of color and seed shape



Dihybrid cross



	YR	Yr	yR	yr
YR	YYRR 	YYRr 	YyRR 	YyRr
Yr	YYRr 	YYrr 	YyRr 	Yyrr
yR	YyRR 	YyRr 	yyRR 	yyRr
yr	YyRr 	Yyrr 	yyRr 	yyrr

- 9/16 yellow round
- 3/16 green round
- 3/16 yellow wrinkled
- 1/16 green wrinkled

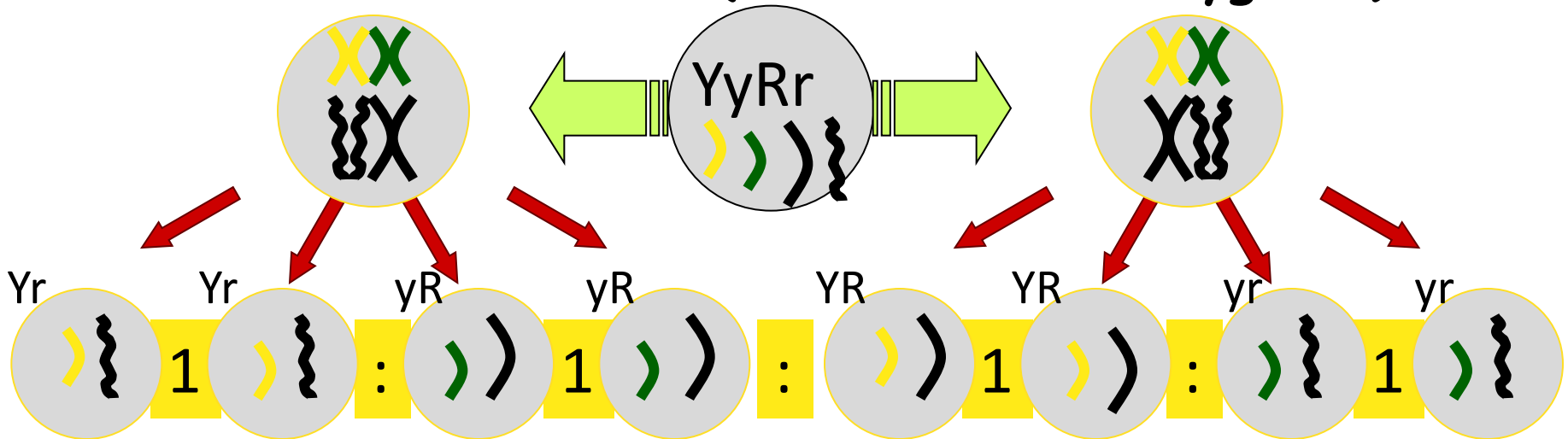
Dihybrid Cross

A breeding experiment that tracks the inheritance of two traits.

Mendel's "Law of Independent Assortment"

- a. Each pair of alleles segregates independently during gamete formation
- b. Formula: 2^n ($n = \#$ of heterozygotes)

} yellow
} green
} round
} wrinkled





Question:

How many gametes will be produced for the following allele arrangements?

- 1. $AaBbCCDd$
- 2. $MmNnOoPPQQRrssTtQq$

17-6900 Dihybrid Cross

Colored Aleurone: R/R, R/r
 Colorless Aleurone: r/r
 Starchy Endosperm: Su/Su, Su/su
 Sweet Endosperm: su/su



R/R Su/Su



rr su/su

P₁ X



R/r Su/su



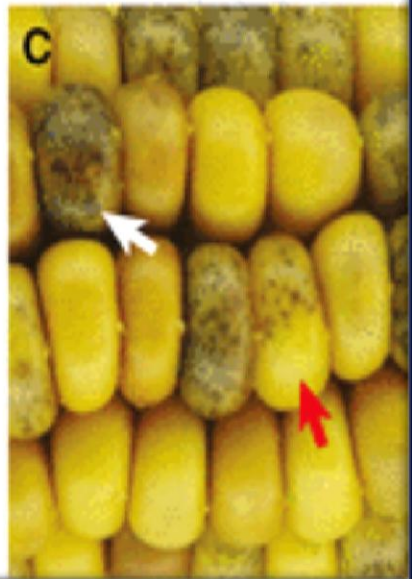
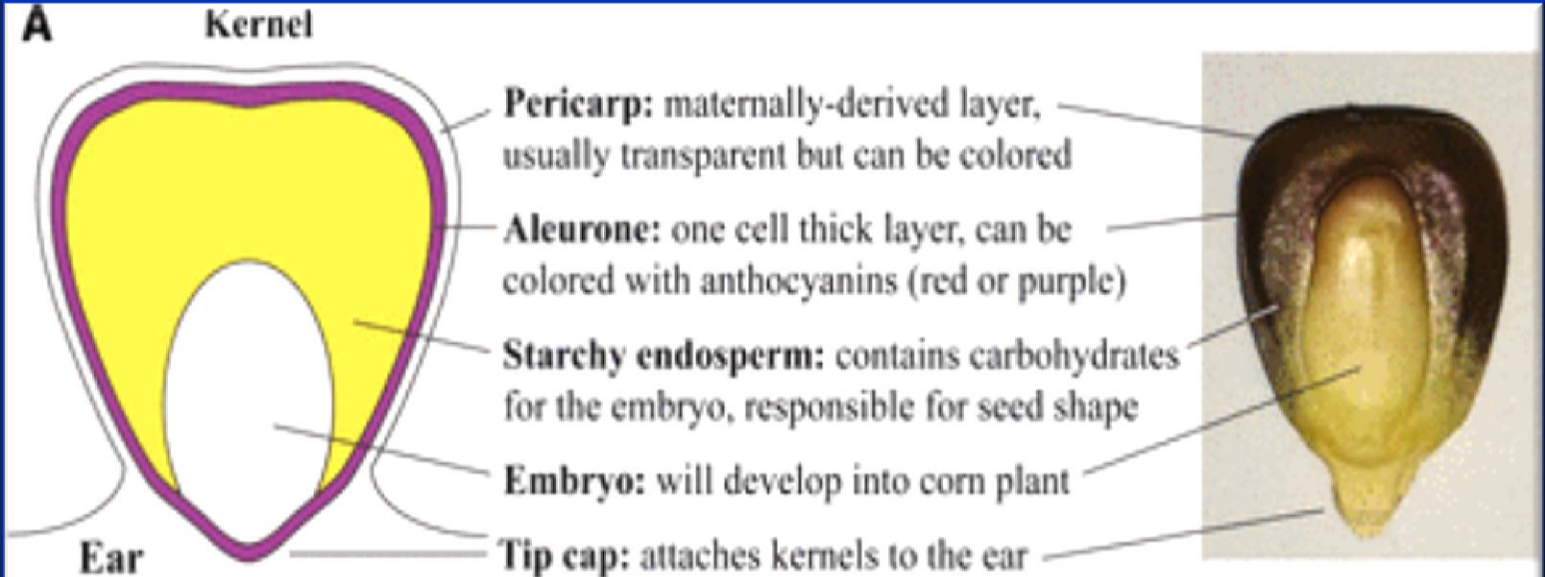
R/r Su/su

F₁ X



9R/_ Su/_ : 3R/_ su/su : 3r/r Su_ : 1r/r su/su







There are four grain phenotypes in the above ear of genetic corn: **Purple & Smooth (A)**, **Purple & Shrunken (B)**, **Yellow & Smooth (C)** and **Yellow & Shrunken (D)**. These four grain phenotypes are produced by the following two pairs of heterozygous genes (**P & p** and **S & s**) located on two pairs of homologous chromosomes (each gene on a separate chromosome):

Dominant Genes

P = Purple

S = Smooth

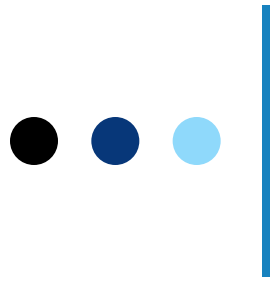
Recessive Genes

p = Yellow

s = Shrunken

••• | Dihybrid vs Monohybrid

- Dihybrid Cross - crossing parents who differ in two traits ($AAEE$ with $aaee$)
- Monohybrid Cross - crossing parents who differ in only one trait (AA with aa)



Test Cross

A mating between an individual of **unknown genotype** and a **homozygous recessive** individual.

AaBb X aabb

Phenotype ratio will be :1:1:1:1

Home work:

Write the composition of the Genotype and its ratio to the previous example in a table. And check the ratio phenotype?

••• | Home work ?

- * What is the **genotype** of the white flowers?
- * What is the **phenotype** of the genotype RR?
- * What is the **type** of gametes in the following genotype Aa BB?

منيره الدوسري

Thank
You!

