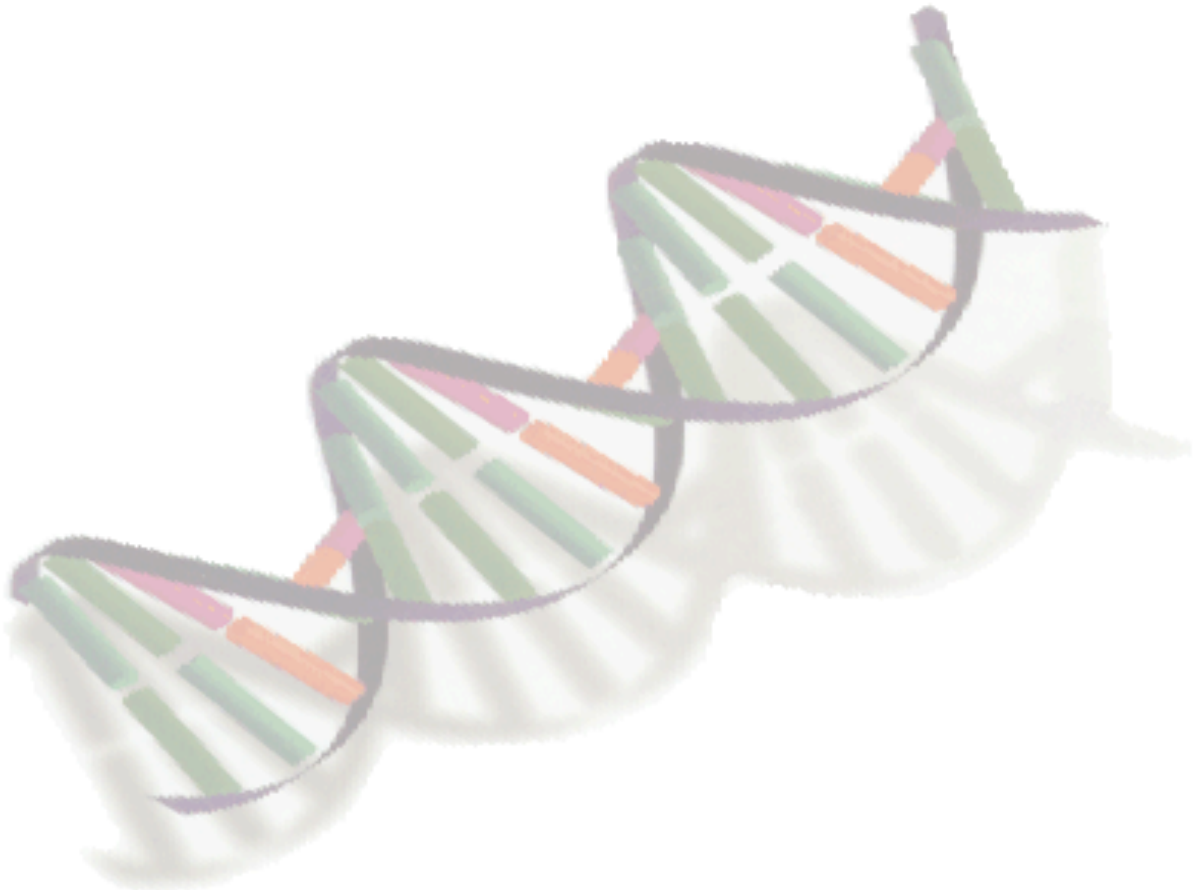
Genetics

Dihybrid Crosses

Pea Plants



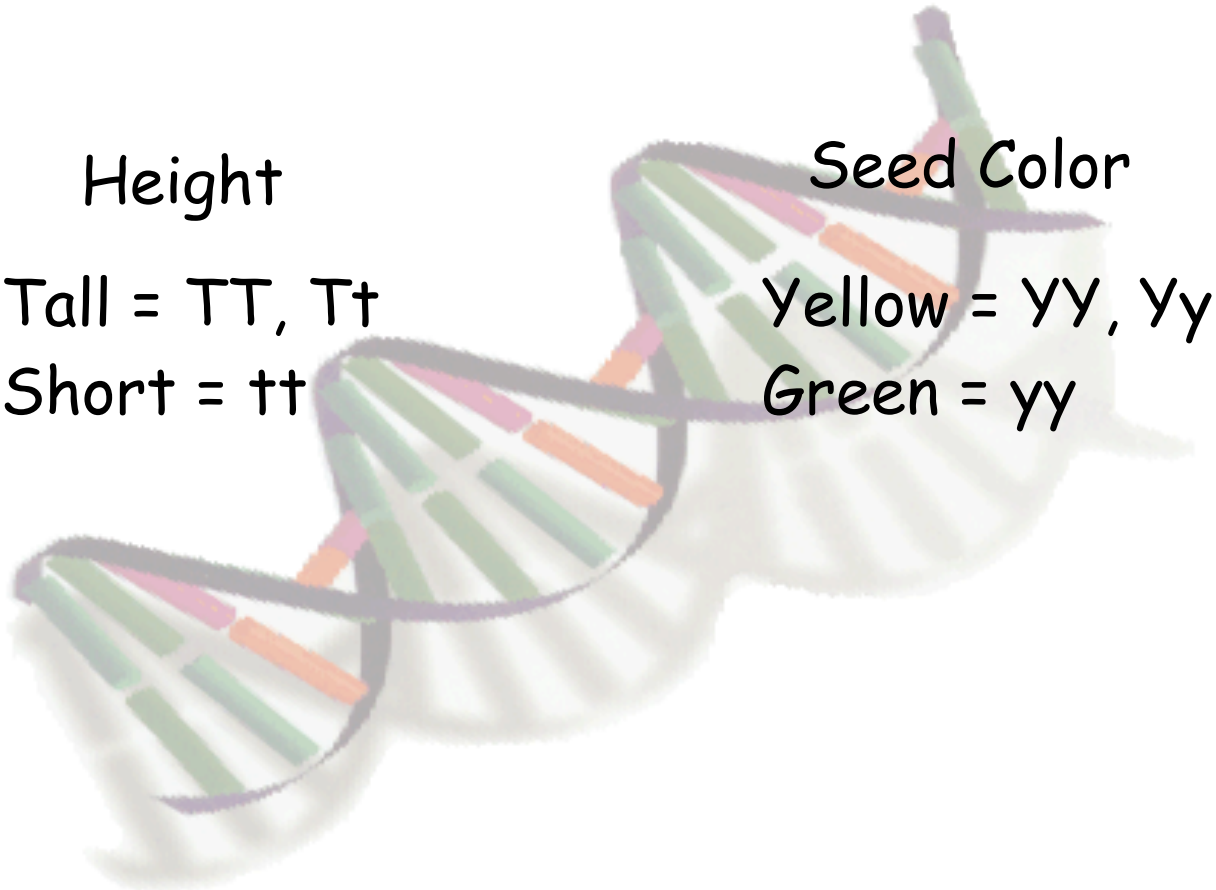
Pea Plants

Height

Tall = TT, Tt

Short = tt

Pea Plants



Height

Tall = TT, Tt

Short = tt

Seed Color

Yellow = YY, Yy

Green = yy

Pea Plants

Height	Seed Color
Tall = TT, Tt	Yellow = YY, Yy
Short = tt	Green = yy

Let's cross a homozygous tall (TT), homozygous yellow seed (YY) plant with a short (tt), green seed (yy) plant.

TTYY x ttyy

These are the **genotypes** of the two plants.

Homozygous?

Homozygous means that both genes for a trait are either DOMINANT or recessive.

(YY)

(tt),

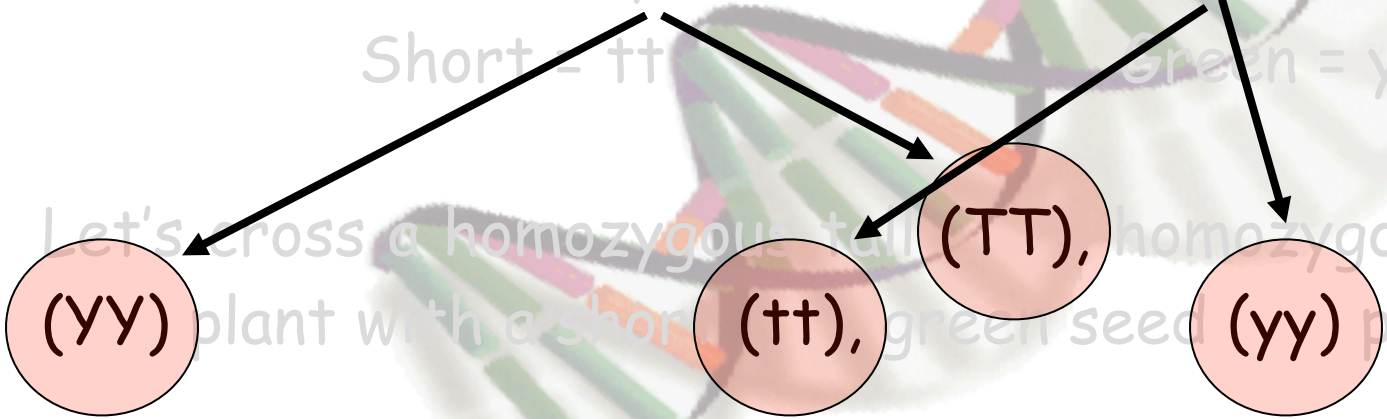
(TT),

(yy)

TTYY x ttyy

Homozygous?

Homozygous means that both genes for a trait are either DOMINANT or recessive.



TTYY x ttyy

Independent Assortment

Mendels' principle of Independent Assortment states that genes for different traits can segregate independently during the formation of gametes (eggs & sperm in animals, eggs and pollen in plants).

TTYY

Independent Assortment

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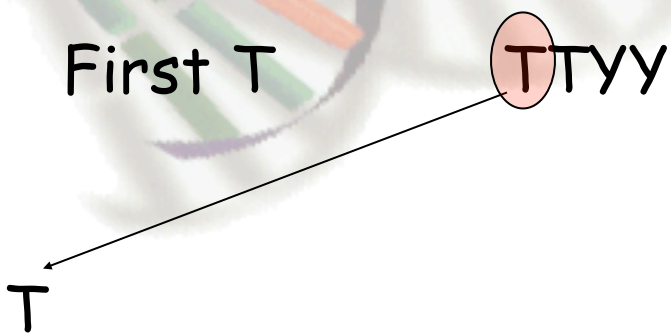

Independent Assortment

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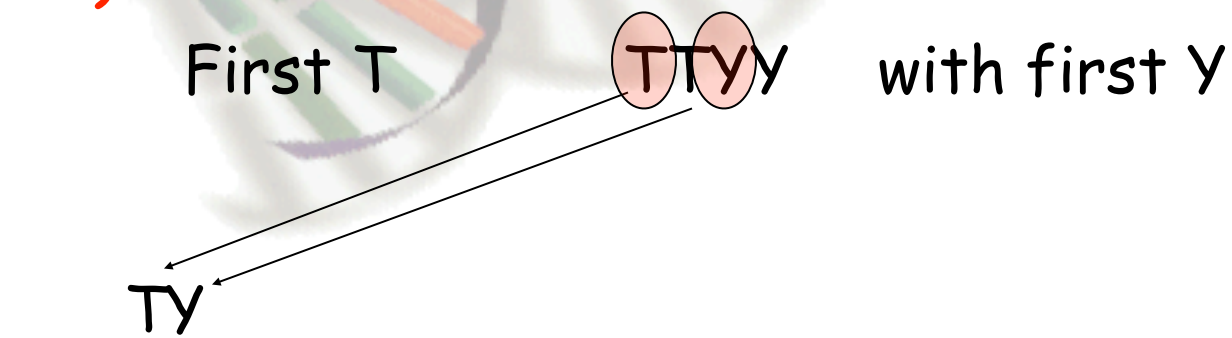

Gamete 1 = sperm, egg, pollen . . .

Independent Assortment

Mendels' principle of Independent Assortment states that genes for different traits can segregate independently during the formation of gametes (eggs & sperm in animals, eggs and pollen in plants).

First T TTYY

TY
Gamete 1

Independent Assortment

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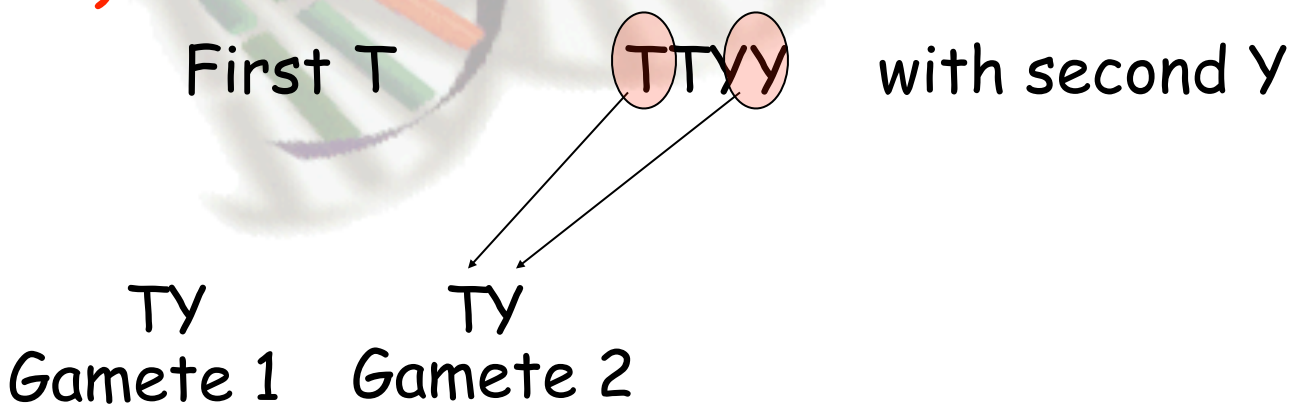


Independent Assortment

Mendels' principle of Independent Assortment states that genes for different traits can segregate independently during the formation of gametes (eggs & sperm in animals, eggs and pollen in plants).

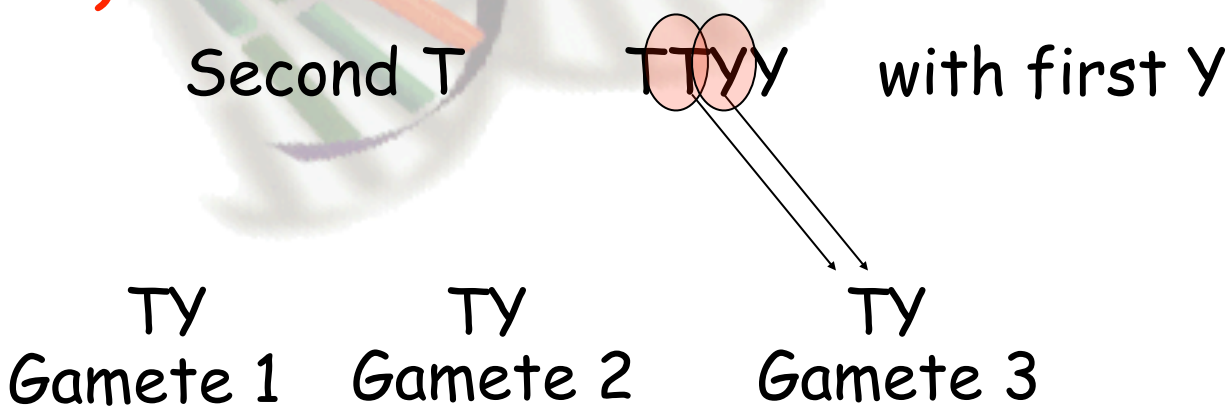
TTYY

TY
Gamete 1

TY
Gamete 2

Independent Assortment

Mendels' principle of Independent Assortment states that genes for different traits can segregate independently during the formation of gametes (eggs & sperm in animals, eggs and pollen in plants).



Independent Assortment

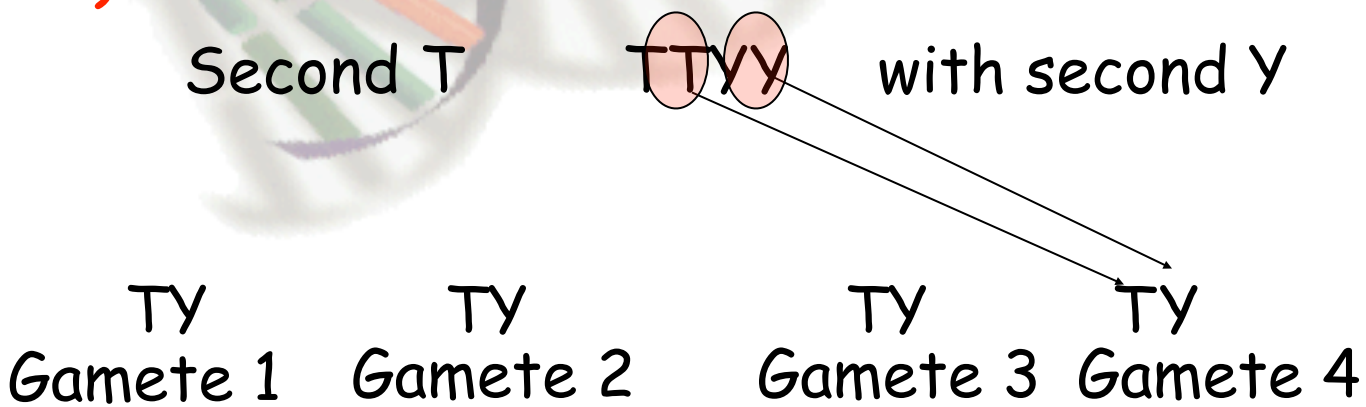
Mendels' principle of Independent Assortment states that genes for different traits can segregate independently during the formation of gametes (eggs & sperm in animals, eggs and pollen in plants).

Second T TTYY

TY TY TY
Gamete 1 Gamete 2 Gamete 3

Independent Assortment

Mendels' principle of Independent Assortment states that genes for different traits can segregate independently during the formation of gametes (eggs & sperm in animals, eggs and pollen in plants).



Dihybrid Punnett Square

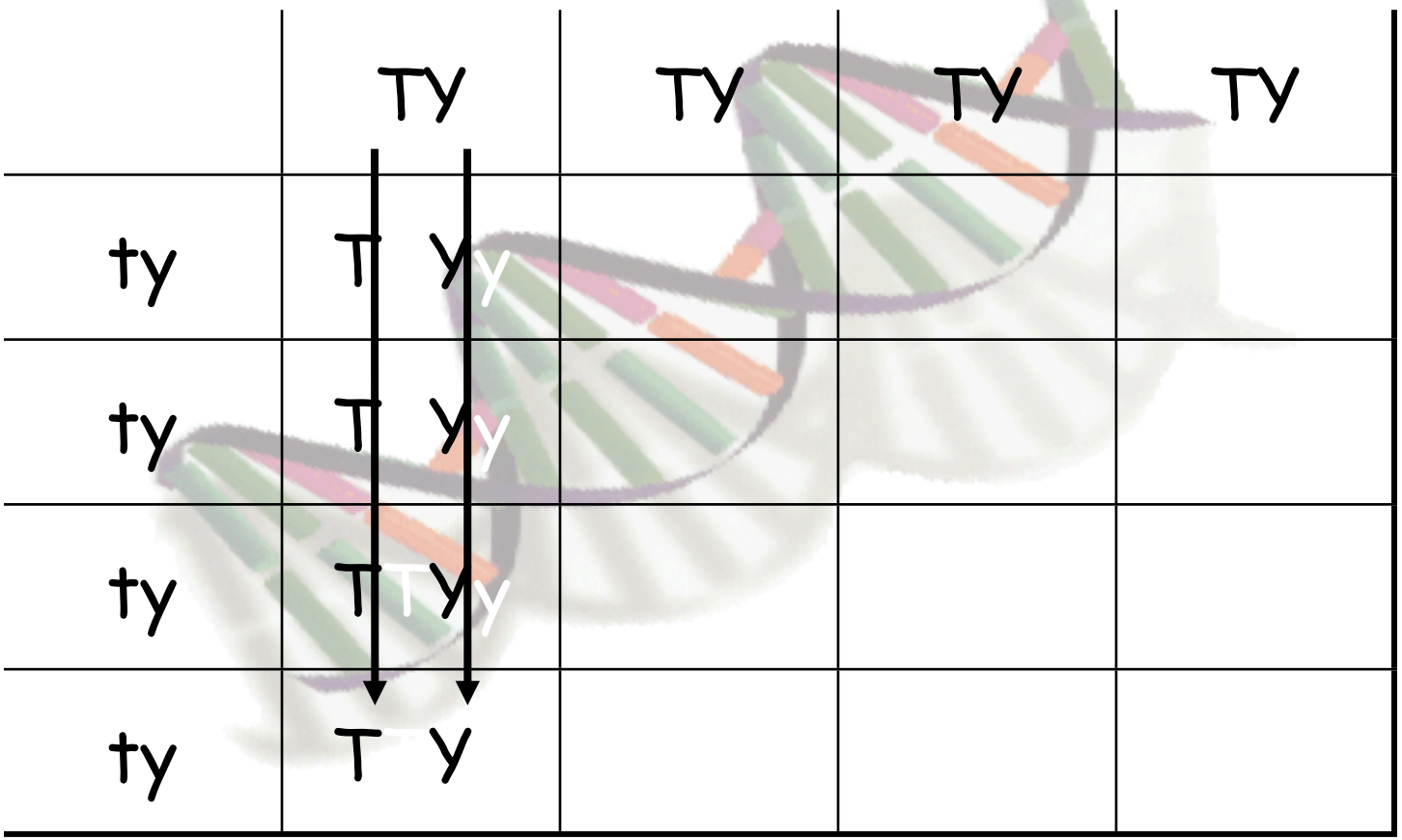
P1 = TTYY

	TY	TY	TY	TY
ty				
ty				
ty				
ty				

P2 = ttyy

Will be F1 Generation

Dihybrid Punnett Square



Dihybrid Punnett Square

	TY	TY	TY	TY
ty	TtYy	TtYy	TtYy	TtYy
ty	TtYy	TtYy	TtYy	
ty	TtYy	TtYy		
ty	TtYy			

Dihybrid Punnett Square

	TY	TY	TY	TY
ty	TtYy	TtYy	TtYy	TtYy
ty	TtYy	TtYy	TtYy	TtYy
ty	TtYy	TtYy	TtYy	TtYy
ty	TtYy	TtYy	TtYy	TtYy

Dihybrid Punnett Square

	TY	TY	TY	TY
ty	TtYy	TtYy	TtYy	TtYy
ty	TtYy	TtYy	TtYy	TtYy
ty	TtYy	TtYy	TtYy	TtYy
ty	TtYy	TtYy	TtYy	TtYy

Genotype ratio:
TtYy - 16/16

Phenotype ratio:
Tall, Yellow - 16/16

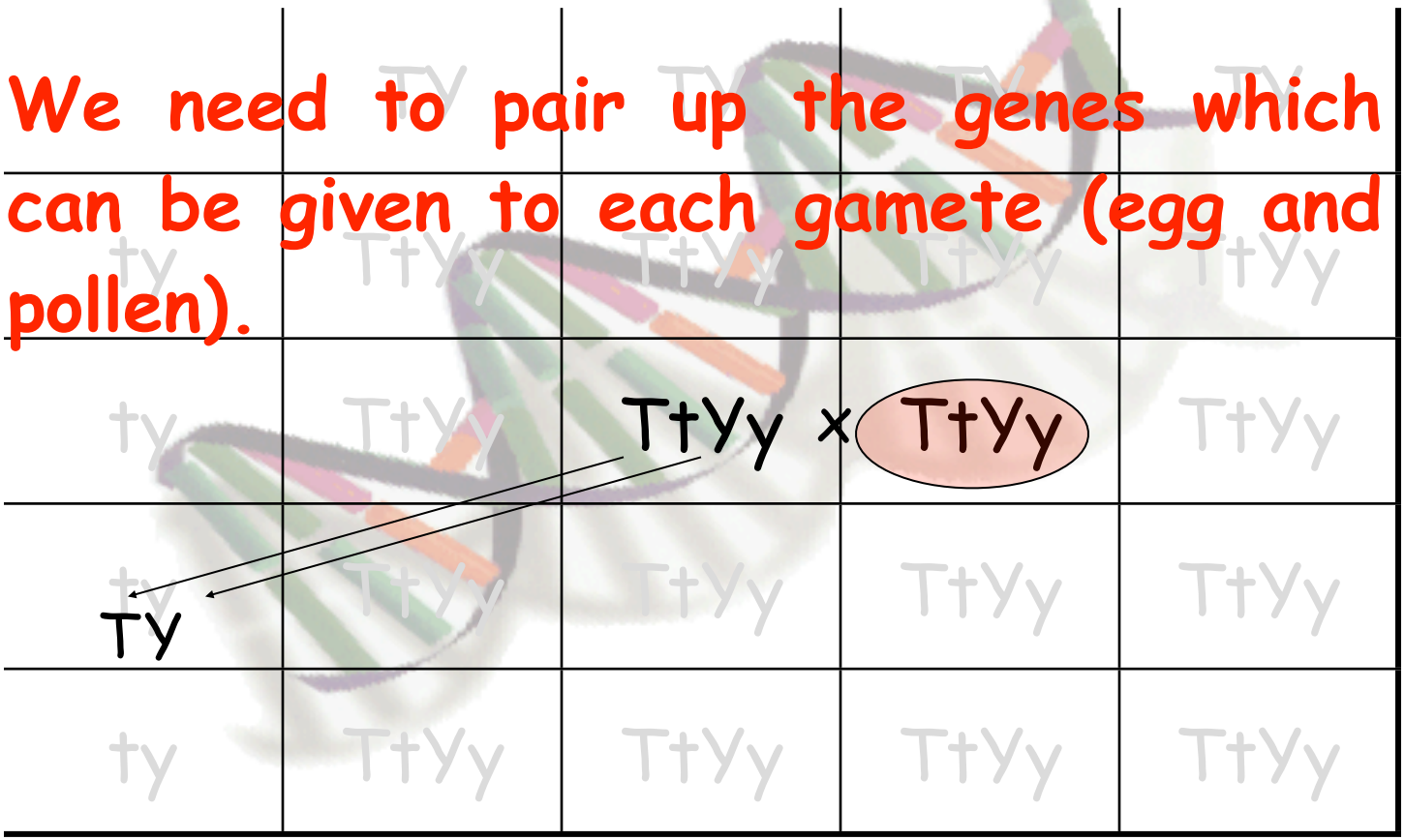
Dihybrid Punnett Square

Let's cross two of the plants from the F_1 generation.

		TtYy	TtYy	

Dihybrid Punnett Square

We need to pair up the genes which can be given to each gamete (egg and pollen).



Dihybrid Punnett Square

We need to pair up the genes which can be given to each gamete (egg and pollen).				
		TtYy x	TtYy	
TY	Ty	t Y	t y	
ty	TtYy	TtYy	TtYy	TtYy

Dihybrid Punnett Square

	TY	Ty	tY	ty
TY				
Ty				
tY				
ty				

Both the plants can give the same gene combinations to their gametes, so the pairs along the top and down the side are the same.

Dihybrid Punnett Square

	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty				
tY				
ty				

When you pair up the gametes from the two plants, always put like letters together and within the like letters, put the CAPITAL letter in front of the lowercase letter.

Dihybrid Punnett Square

	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty				
tY				
ty				

When you pair up the gametes from the two plants, always put like letters together and within the like letters, put the CAPITAL letter in front of the lowercase letter.

Dihybrid Punnett Square

	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty	????	????	????	????
tY	????	????	????	????
ty	????	????	????	????

Dihybrid Punnett Square

	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty	????	????	????	????
tY	????	????	????	????
ty	????	????	????	????

Dihybrid Punnett Square

	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty	TTYy	TTyy	TtYy	Ttyy
tY	TtYY	TtYy	ttYY	ttYy
ty	TtYy	Ttyy	ttYy	ttyy

Dihybrid Punnett Square

	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty	TTYy	TTyy	TtYy	Ttyy
tY	TtYY	TtYy	ttYY	ttYy
ty	TtYy	Ttyy	ttYy	ttyy

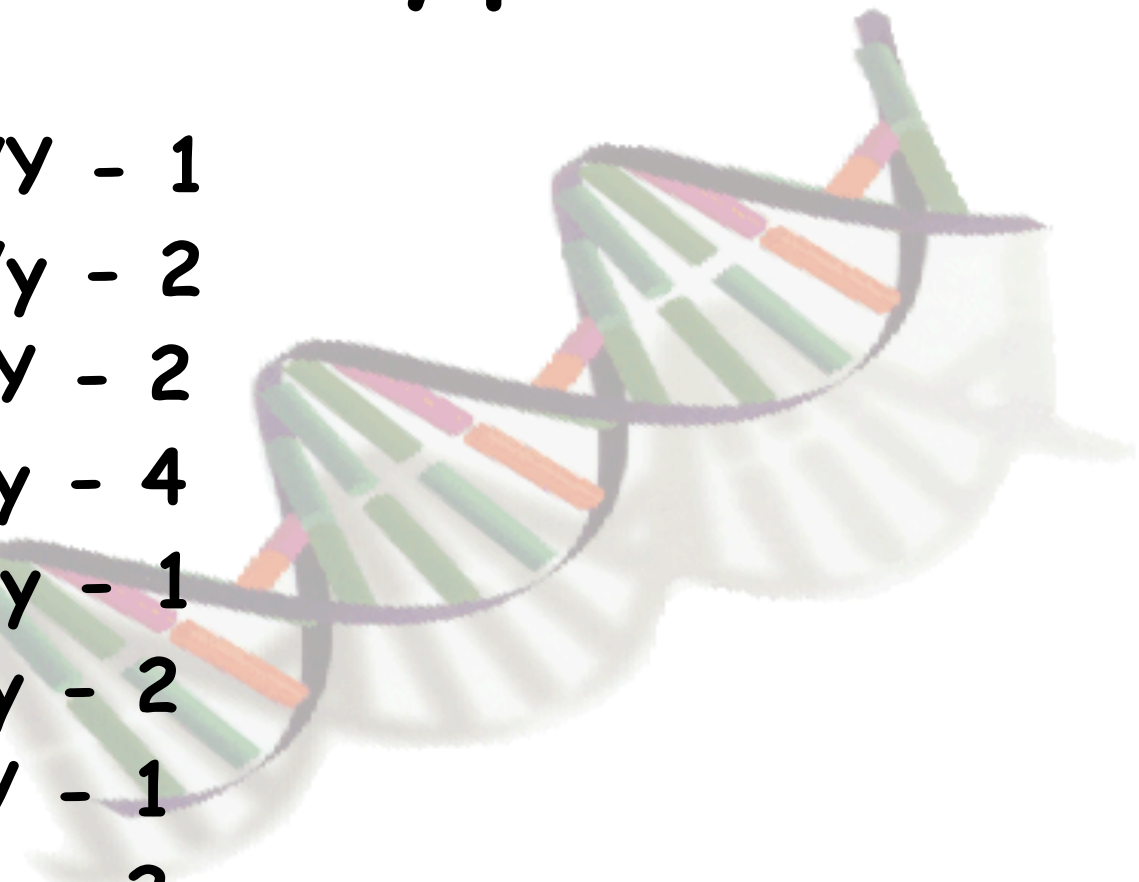
F_2 generation

Dihybrid Punnett Square

Genotype and phenotype ratios?

	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty	TTYy	TTyy	TtYy	Ttyy
tY	TtYY	TtYy	ttYY	ttYy
ty	TtYy	Ttyy	ttYy	ttyy

Genotype Ratio



TTYY - 1
TTYy - 2
TtYY - 2
TtYy - 4
TTyy - 1
Ttyy - 2
ttYY - 1
ttYy - 2
ttyy - 1

Phenotype Ratio

TTYY - 1
TTYy - 2
TtYY - 2
TtYy - 4
TTyy - 1
Ttyy - 2
ttYY - 1
ttYy - 2
ttyy - 1

Tall, Yellow - 9

Tall, Green - 3

Short, Yellow - 3

Short, Green - 1

Dihybrid Punnett Square Homework

Question 3 on Rats Practice Problems and questions 2 & 3 on Foxes and Watermelons Practice Problems.