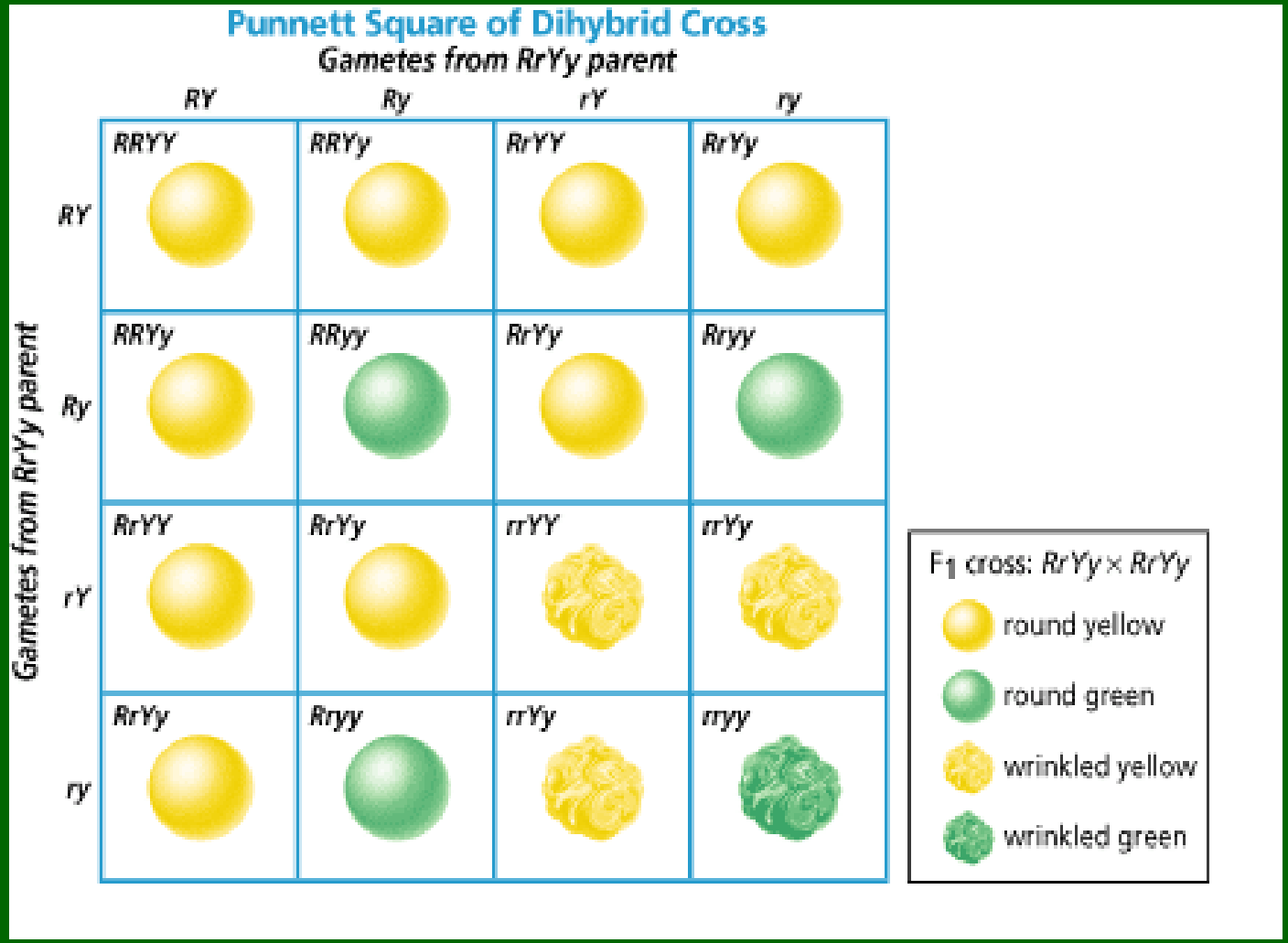
Dihybrid Crosses

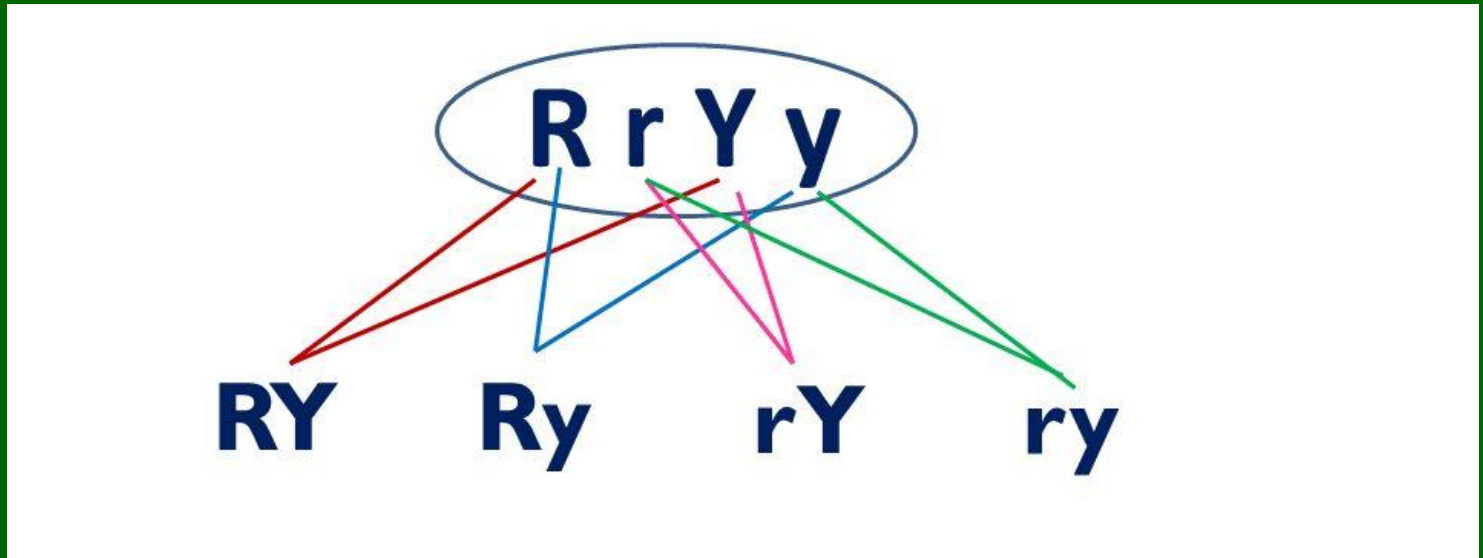


Dihybrid Crosses

- the natural progression for Mendel was to study 2 characteristics at the same time.
- The study of 2 pairs of contrasting traits at the same time = a dihybrid cross
  - ex. round yellow seeds X wrinkled green seeds

Mendel's Law

- **<u>The Law of Independent Assortment</u>**
  - *During gamete formation, segregating pairs of unit factors assort independently of each other.*
    - *the two traits are inherited totally independently of each other*



Solving Dihybrid Crosses

- Follow the steps

- If you were to cross a ***homozygous yellow wrinkled*** plant with a ***homozygous green round*** plant, what would your phenotypic and genotypic ratios be?

Step 1: Make a Key

If yellow is dominant over green and round is dominant over wrinkled:

- Y= yellow
- y = green
- R = round
- r = wrinkled

Step 2: Assign genotypes of the parents

- Homozygous yellow wrinkled = YYrr
- Homozygous green round = yyRR

- P = YYrr x yyRR

Step 3: Determine the Gametes

- If Parents = YYrr X yyRR

YYrr can produce the combinations

Yr, Yr, Yr, Yr

yyRR can produce the combinations

yR, yR, yR, yR

Step 4: Fill in the Punnett square

Note: Keep the alleles for each gene together and write the dominant allele first. Ex. YyRr NOT YRyr

	Yr	Yr	Yr	Yr
yR				
yR				
yR				
yR				

Step 5: Answer any questions

- Genotype probabilities:
  - = 100% YyRr (all 16 possible combinations)
- Phenotype probabilities:
  - = 100% yellow round (all 16 possible combinations)

Key
Y= yellow
y = green
R = round
r = wrinkled

Now try: F_1 X F_1 = YyRr X YyRr

- Remember to determine the gametes for your Punnett square.

Gamete combinations:
YR, Yr, yR, yr and YR, Yr, yR, yr

Fill in the Punnett Square

	YR	Yr	yR	yr
YR				
Yr				
yR				
yr				

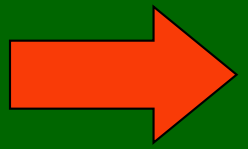
Do you see a pattern?

Results:

Y= yellow
y = green

R = round
r = wrinkled

- Genotyes:
  - ? YYRR
  - ? YYRr
  - ? YYrr
  - ? YyRR
  - ? YyRr
  - ? Yyrr
  - ? yyRR
  - ? yyRr
  - ? yyrr



- Phenotypes:
  - 9 Yellow Round
    - Dominant Dominant
  - 3 Yellow Wrinkled
    - Dominant Recessive
  - 3 Green Round
    - Recessive Dominant
  - 1 Green Wrinkled
    - Recessive Recessive

Ratio = 9:3:3:1

Try this:

I = Inflated Pod i = constricted pod

T = Tall t = dwarf

- ***The cross:*** a plant heterozygous for inflated pod and heterozygous tall is crossed with a another heterozygous inflated pod and heterozygous tall plant. What are the genotypic and phenotypic ratios?
  - The parents are:
    - IiTt x IiTt

Gamete Combinations

- If Parents are IiTt x IiTt

Gamete Combinations are

IT, It, iT, it and IT, It, iT, it

Fill in the Punnett Square

	IT	It	iT	it
IT				
It				
iT				
it				

Results:

Key
I= inflated pod
i = constricted pod

T = tall
t = dwarf

- Genotypes:
  - 1 IITT
  - 2 IITt
  - 1 IItt
  - 2 IiTT
  - 4 IiTt
  - 2 Iitt
  - 1 iiTT
  - 2 iiTt
  - 1 iitt

- Phenotypes:
  - 9 Inflated pod Tall
    - Dominant Dominant
  - 3 Inflated pod Dwarf
    - Dominant Recessive
  - 3 Constricted pod Tall
    - Recessive Dominant
  - 1 Constricted pod Dwarf
    - Recessive Recessive

Ratio = 9:3:3:1