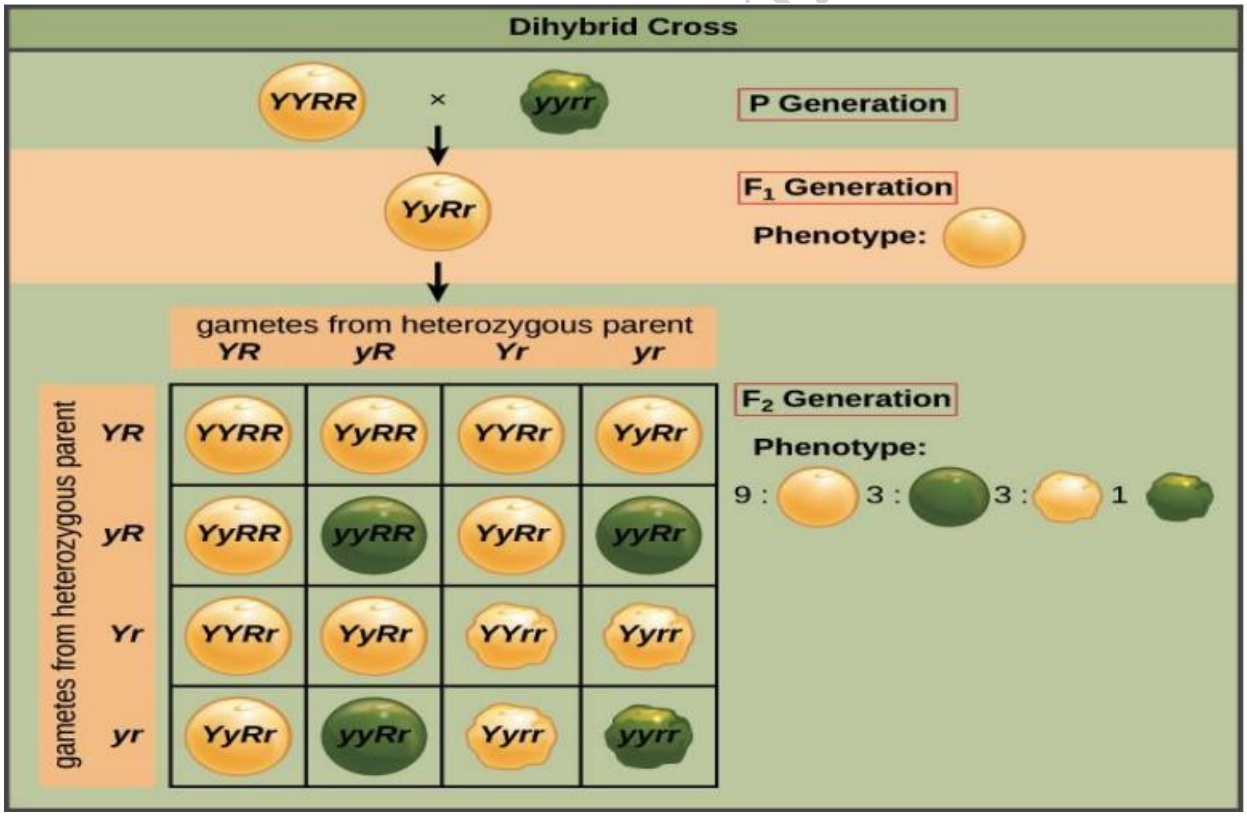
Lab -5-

Mendelian Second Law- the Law of Independent Assortment

During gametes formation, the segregation of alleles for one allelic pair is independent of the segregation of the alleles for another allelic pair.

1-Genes for different traits are inherited independently from each other.
2- This is why Mendel found all the different combinations of traits

the law of independent assortment leads to [9:3:3:1] ratio,and we can use a **Punnett square** to expect the results of self-fertilization in this case, as shown below :



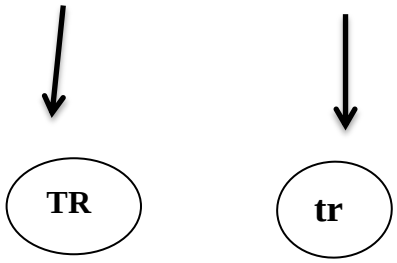
YY(yellow seeds) -- RR (rounded seeds) / **yy** (green seeds)—**rr**(wrinkled seeds)

Example : A tall stem pea plant with round seeds crossed with short stem (dwarf) with wrinkle seeded pea plant , if you know that all the first generation plants are tall and rounded , what is the ratio of genotype and phenotype of the second generation ?

Solution : As the first generation plant are tall and rounded, so each parent is homozygous for each triat as following :

Tall plant TT, Rounded seed RR Short plant tt , Wrinkled seed rr

P1 TTRR X ttrr



The second generation result from (self-fertilization) for first generation :

P2 TtRr X TtRr

F1 **(Punnett squre) for crossing**

♂ \ ♀	**TR**	**Tr**	**tR**	**tr**
TR	**TTRR**	**TTRr**	**TtRR**	**TtRr**
Tr	**TTRr**	**TTrr**	**TtRr**	**Ttrr**
tR	**TtRR**	**TtRr**	**ttRR**	**ttRr**
tr	**TtRr**	**Ttrr**	**ttRR**	**ttrr**

The ratios of genetypes and phenotypes as following :

- Long stem and rounded seeds = 9/16

(TTRR- TTRr- TtRR- TtRr- TTRr- TtRr- TtRR- TtRr- TtRr)

- Short stem and rounded seeds =3 /16 (ttRR- ttRr- ttRR)
- Long stem and wrinkled seeds = 3/ 16 (TTrr- Ttrr- Ttrr)
- Short stem and wrinkled seeds = 1/16 (ttrr)

Exercise:

1- In guinea pigs, black hair (B) is dominant to brown hair(b) and short hair (H) is dominant to long hair (h).
A black, long –haired guinea pigs (Bbhh) is matting with a brown, short haired guinea pigs (bbHh), what percentage of the offspring will be black with long hair ?
2- If you Know that the Dimples and Freckles are dominance triats on absence of two triats, what is the ratios of genotype and phenotype for the following marriage :

DDFf X Ddff
