# GENETICS

# GREGOR MENDEL

# FATHER OF GENETICS

- In the mid-nineteenth century, Gregor Mendel, an Austrian monk, carried out important studies of heredity
  - Heredity is _____

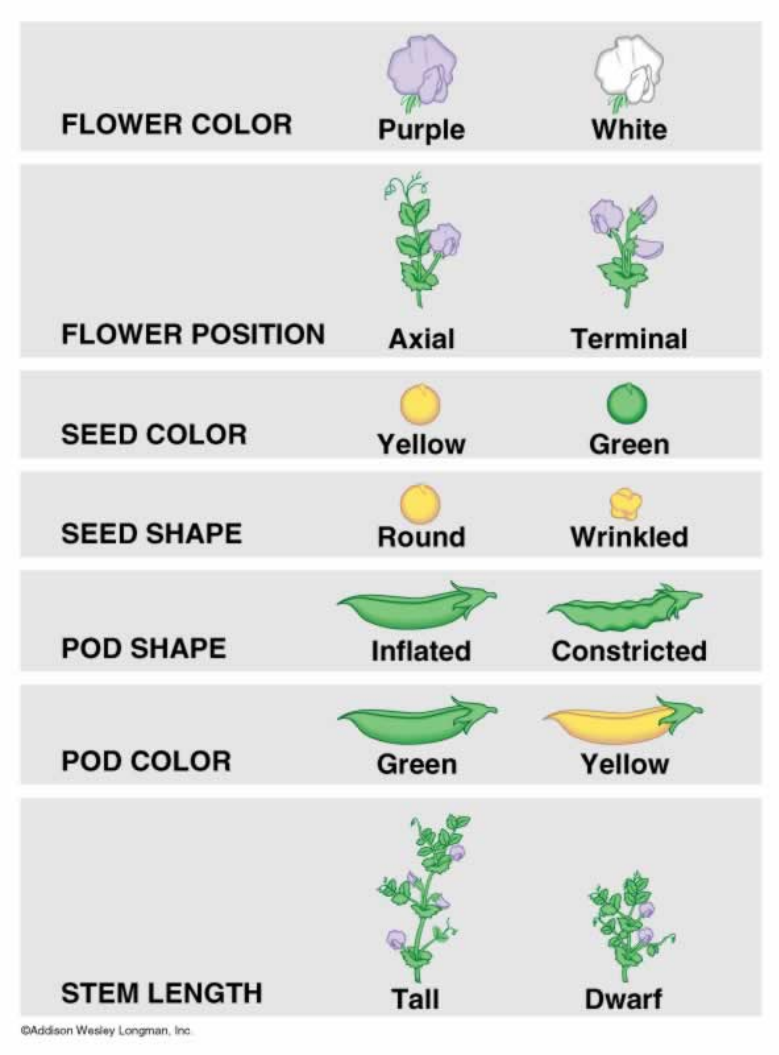
  Mendel was the first person to succeed in predicting how traits are transferred from one generation to the next

  _____," the branch of biology that studies heredity

# MENDEL'S CONTRIBUTIONS

Worked with pea plants

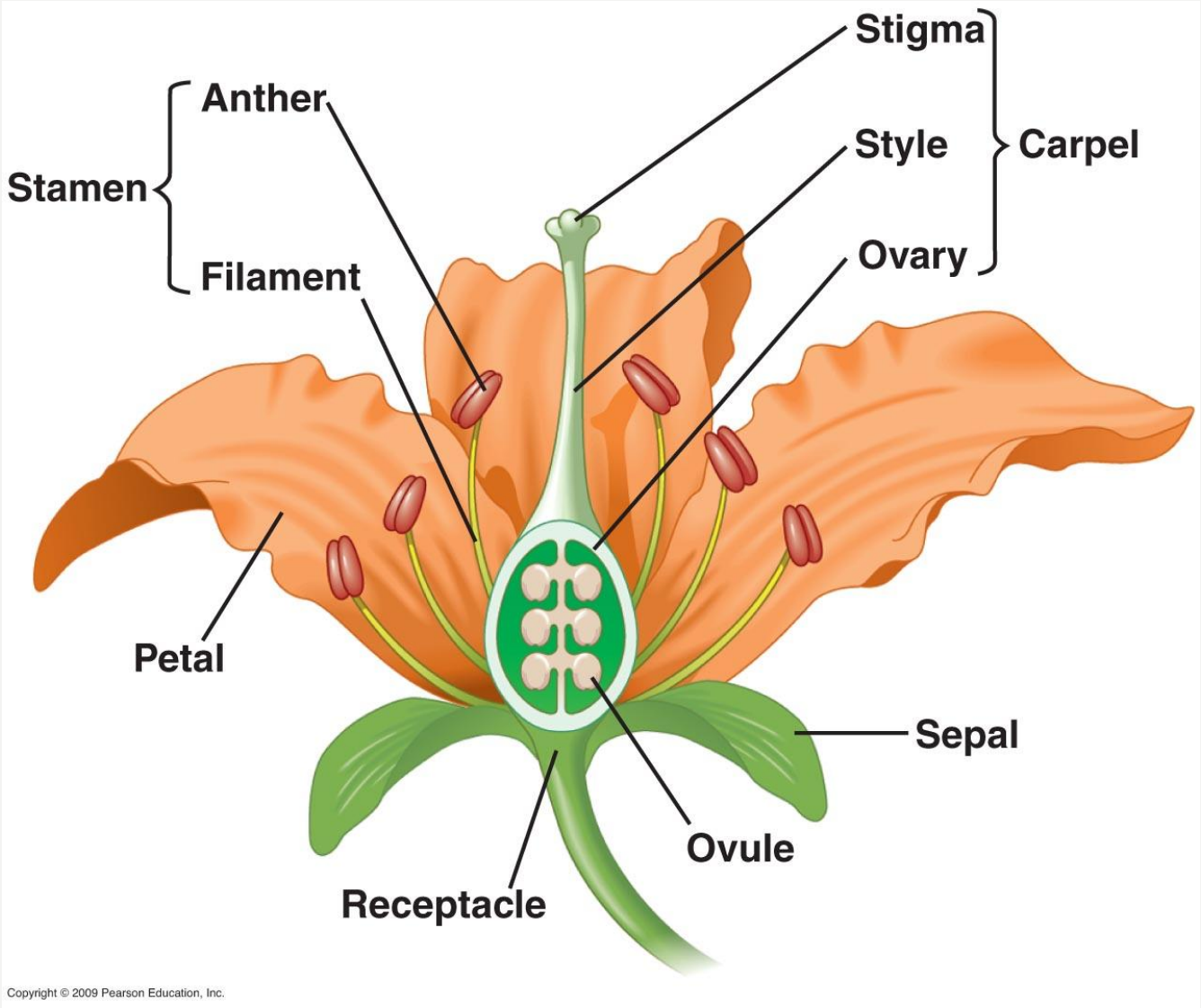
- Contain _____
- Reproduce _____
- Traits are easily observed
- _____ – 2 different parents
- Self-pollinate – 1 parent



# REPRODUCTION IN PLANTS

- The male gamete forms in a pollen grain, _____ _____, the stamen
  - The stamen consists of _____
- The female gamete forms in the female reproductive organ, _____
  - The pistil consists of the;
    - _____; sticky and receives pollen
    - _____; elevates stigma
    - _____; houses ovules

# FLORAL STRUCTURE



# PLANT REPRODUCTION

- Pollination; _____

  _____

- _____; when the male and female gametes unite to form a zygote
  - The fertilized zygote will develop into a seed
  - The ovary will develop into a fruit

# MENDEL'S EXPERIMENT

- Mendel removed the male organs from the plants he studied, so he could control which plants were crossed; _____

  _____

  - Now he could be sure of the parents in the cross
  - ❑ He studied _____

    _____
  - ❑ He used plants that he had been studying for several generations, and he knew their traits

# MENDEL'S EXPERIMENTS

- A hybrid is _____, such as tall and short height
- Mendel's first experiments are called _____ _____ because the 2 parent plants differed from each other by a single trait

# MENDEL'S RESULTS

- Mendel looked at the $P_1$ generation (_____) the $F_1$ generation (_____) and the $F_2$ generation (_____) and studied the results of many crosses
- He concluded that each organism has _____ that control each of its traits
  - We now know that these are _____
  - _____

# HOMOLOGOUS CHROMOSOMES

- An organism's 2 alleles are located on different copies of a chromosome; _____ (homologous chromosomes)

# GENETIC EXPRESSION

- Genes
  - _____ (nucleotide sequences)
  - Determine _____
  - _____ that can pass from one generation to the next
- Alleles
  - _____
  - Each parent passes on one allele for each trait to the offspring (homologous chromosomes)

# EXPRESSION OF PHYSICAL CHARACTERISTICS

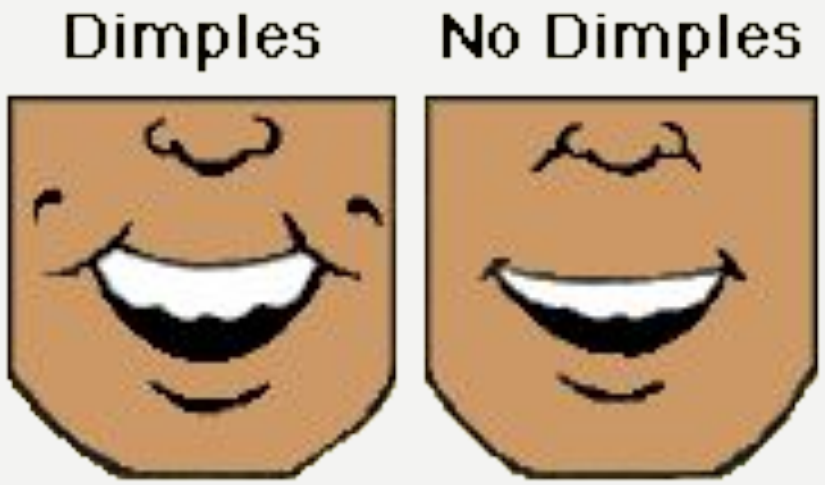
- Genotype
  - _____
- Genes are either dominant or recessive
  - Dominant Gene – trait that will _____
    - If both alleles are dominant, the _____
    - If one allele is dominant and one recessive, the _____ _____
    - Written first;  use a capital letter

# EXPRESSION OF PHYSICAL CHARACTERISTICS CONT.

- _____
  - Both alleles must be recessive in order for the trait to be recessive
  - _____ (same letter as dominant)

# DIMPLES

- Dimples – dominant (D)
- No Dimples – recessive (d)
- Mom passes on gene for dimples
- Dad passes on gene for no dimples
- In order for offspring to not have dimples, both parents must pass on allele for no dimples (dd)



# PHYSICAL CHARACTERISTICS

- Phenotype – physical expression of traits; _____
  - You cannot necessarily tell the _____ by looking at the _____
  - Two organisms can look alike, _____
    - Ex. Dd, DD; both have dimples

# HOMOZYGOUS & HETEROZYGOUS

- Homozygous
  - _____
  - Ex. DD or dd
- Heterozygous
  - _____
  - Ex. Dd

# PUNNETT SQUARE

- Used to express the possible combinations for a certain trait an offspring may inherit from the parents
- _____
- Is a predicted or expected ratio

# PROBABILITY

- In reality you don't get the exact ratio of results shown in the square, as _____
- The probability that an event will occur can be determined _____

# PRODUCT RULE

- _____

  _____

- Ex. Possibility of big nose is ½

  Possibility of big ears is ½

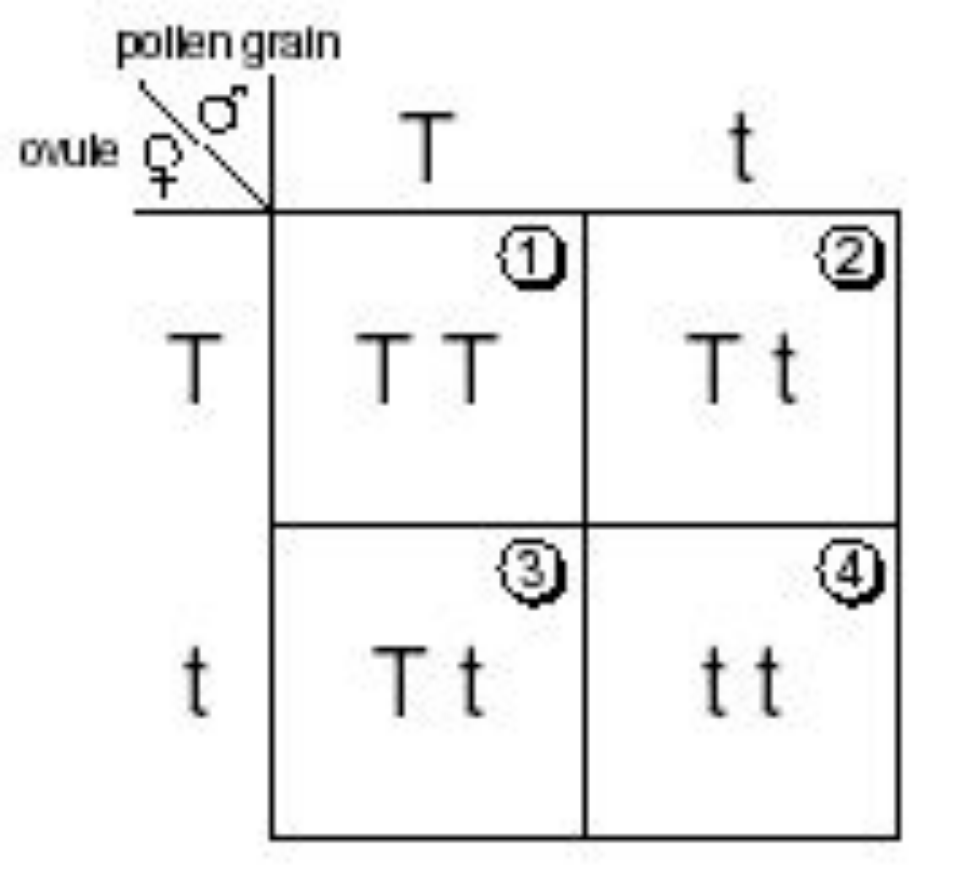
  ¼ of the time offspring are predicted to have

  big ears and a big nose (multiply)

# MONOHYBRID CROSS

- Studies one characteristic
- Organisms _____

_____



# PHENOTYPE AND THE ENVIRONMENT

- _____
- For example, _____ can affect the expression of genes
- Room temperature some flowers bloom red, at higher temperatures the flowers bloom white

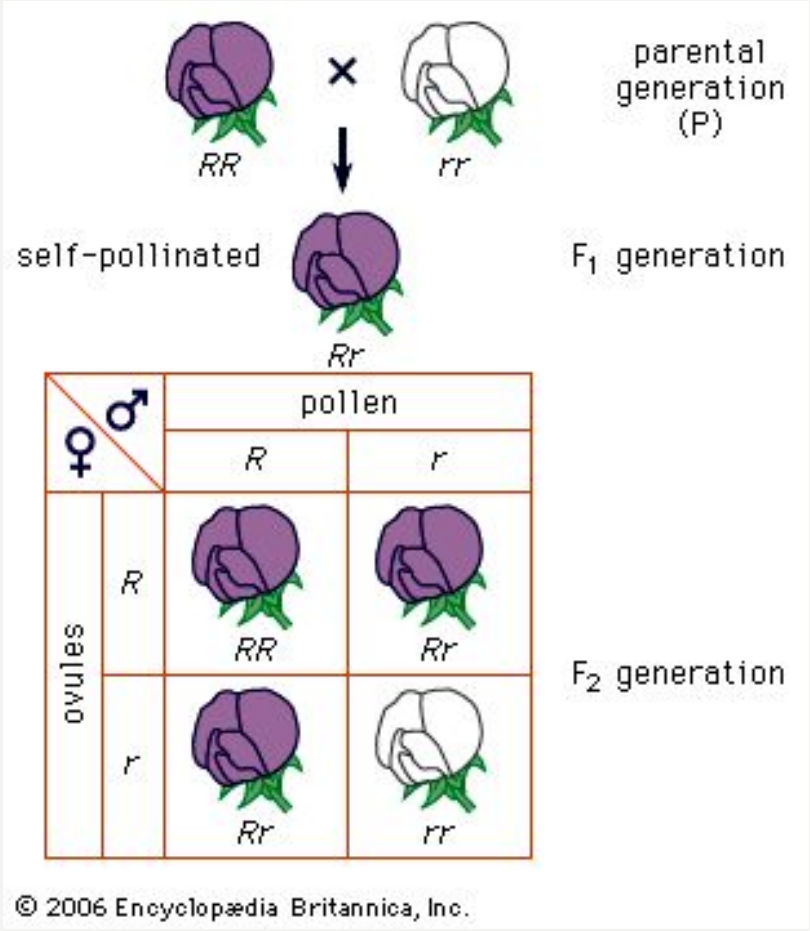
# PRINCIPLE OF DOMINANCE

- Some forms of a gene or trait are dominant over other traits
- _____

_____

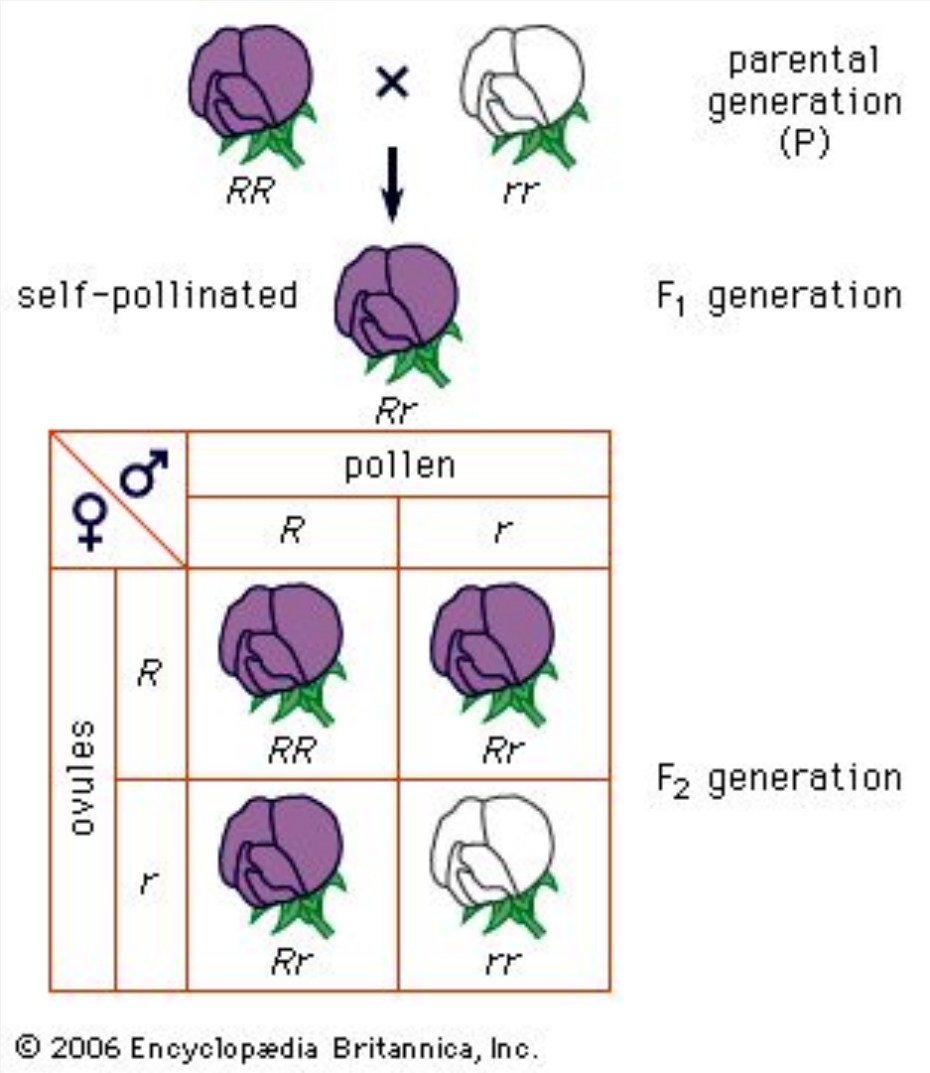
_____

_____



# PRINCIPLE OF SEGREGATION

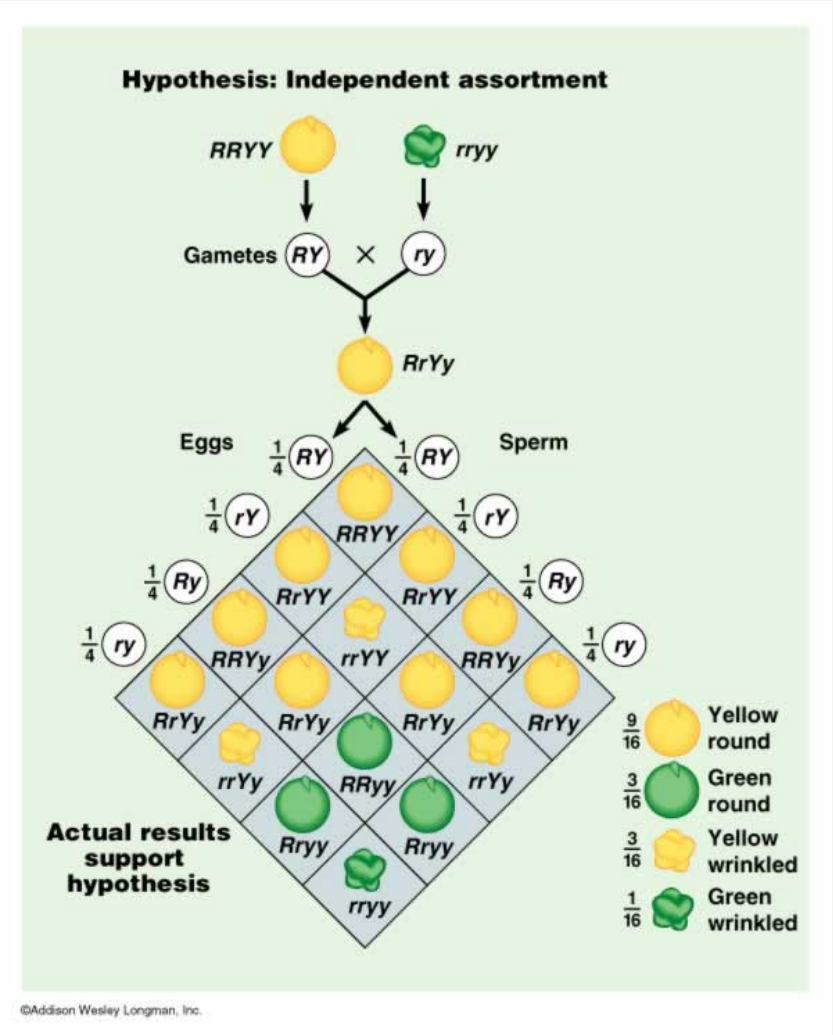
- When sex cells are forming, _____
- When crossing plants from F1 generation
- A predictable ratio of phenotypes appear
- For every 1 recessive plant there are 3 dominant plants
- Ratio can only occur if _____



# DIHYBRID CROSS

- Crosses that _____

_____



# PRINCIPLE OF INDEPENDENT ASSORTMENT

- Each pair of alleles segregates _____

_____