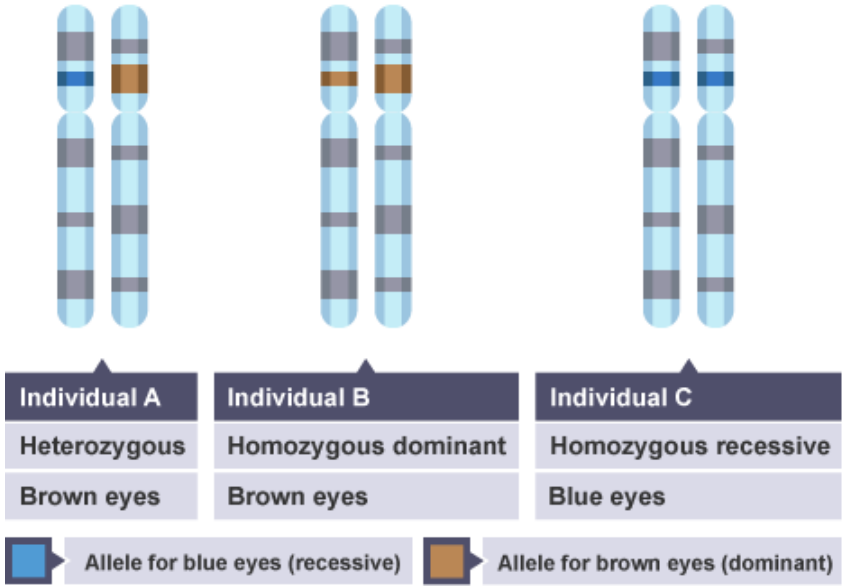
GENETICS AND EVOLUTION

REVIEW

- Haploid: Half set of chromosomes (1 of each)
- Diploid: Full set of chromosomes (2 of each)
- Genotype: Part of the DNA sequence (represented by case sensitive letters)
  - BB, Bb, bb
- Phenotype: The actual appearance of the gene
  - Brown hair, blond hair
- Allele: alternative forms of the gene
  - B -dominant, b-recessive

GENES: UNITS OF VARIATION

- Genes (Alleles) are the carriers of inheritable characteristics
- Alleles segregate during the formatting of gametes (sex cells)
- An inheritable characteristic = trait
  - I.e. eye colour, seed colour, hair colour



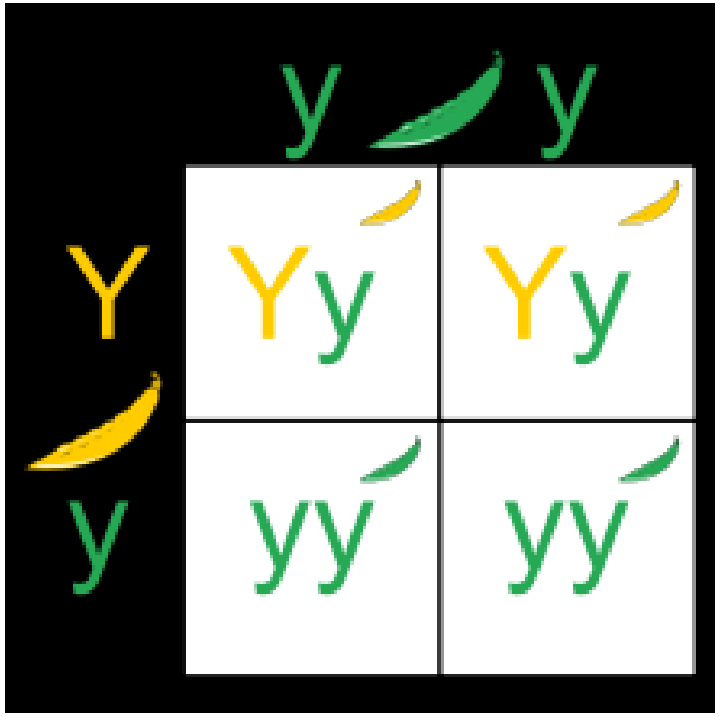
- A portion of DNA codes for a specific protein
- Genes are the source of random variation
- Therefore variation in DNA is the biological basis for evolution

GREGOR MENDEL

- "Father of Genetics"
- Austrian Monk
- In charge of Monastery garden
- His work with genetics enabled us to explain the mechanism of evolution
- Studies involving pea plants
  - Would cross plants with different traits to produce hybrids
  - Discovered there are dominant traits and recessive traits
    - Those with the dominant trait will express that trait
    - Those with the recessive trait will express that trait only if the dominant allele is not present
    - Recessive traits do not disappear as later generations could display the trait

PROBABILITY AND GENETICS

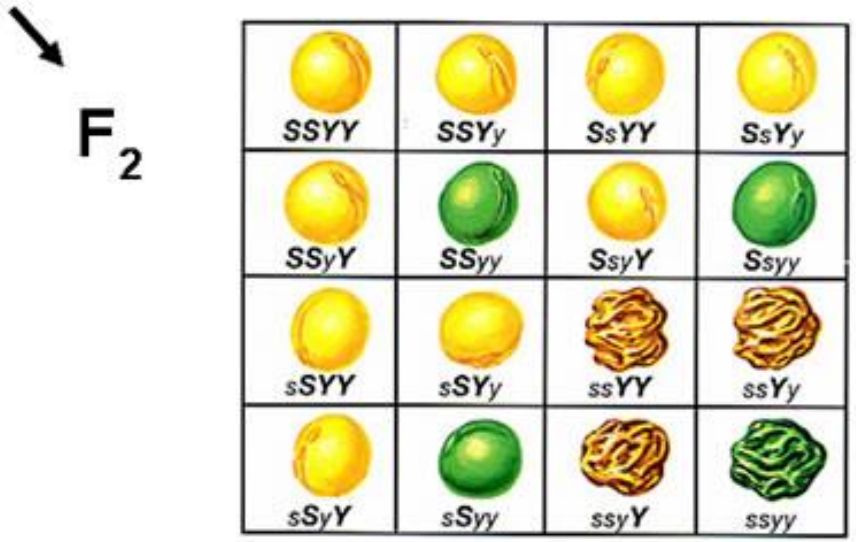
- Probability is the likelihood that an event will occur
  - Coin toss
- Punnett Squares
  - Can be used to determine gene combinations that may result from a genetic cross
  - Letters represent alleles
    - Capital=dominant, lowercase=recessive
- Organisms that have identical alleles for a trait are said to be Homozygous
- Organisms that have two different alleles for a trait are said to be Heterozygous



INDEPENDENT ASSORTMENT

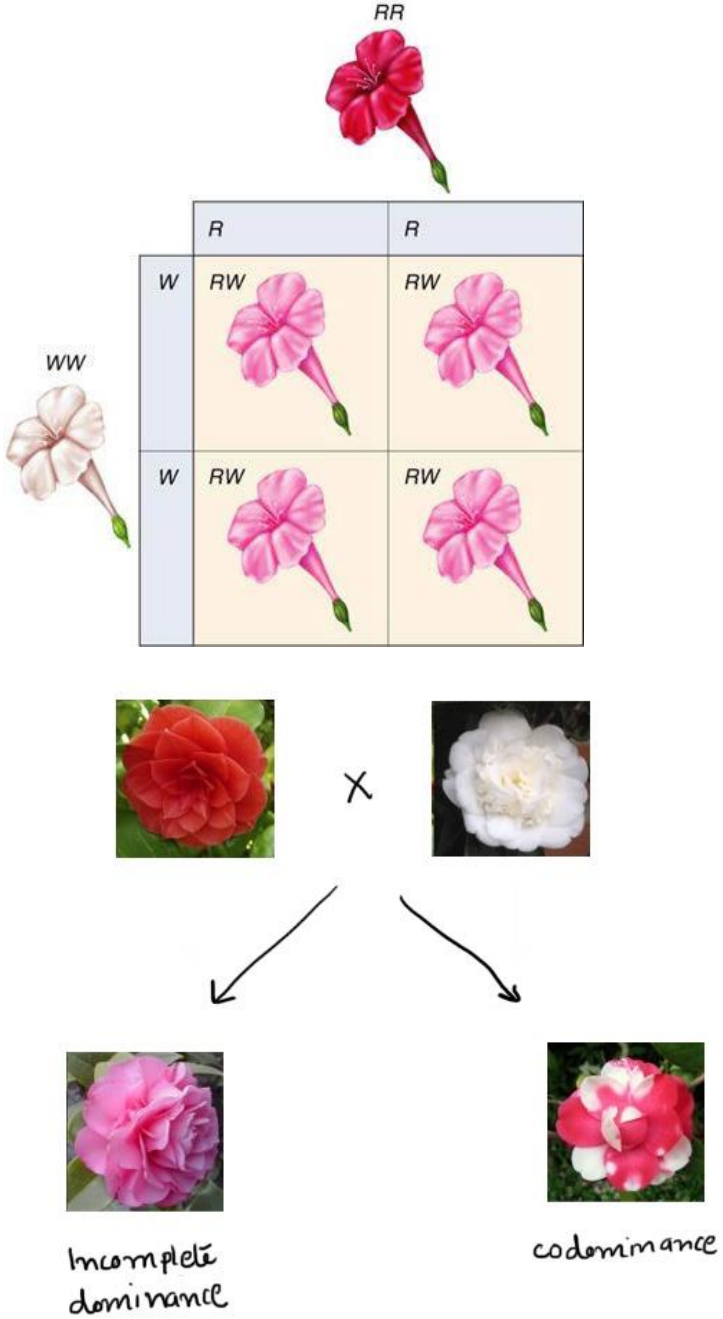
- Genes for different traits can segregate independently during the formation of gametes
  - This accounts for the genetic variation observed in plants, animals and other organisms

Y = yellow seed
y = green seed
S = round shape
s = wrinkly shape



GENE CONTROL

- Some alleles are neither dominant or recessive, and many traits are controlled by multiple alleles or multiple genes.
- Incomplete dominance
  - One allele is not completely dominant over another
- Codominance
  - Both alleles contribute to the phenotype



GENETICS AND THE ENVIRONMENT

- Characteristics are determined by the interaction of genes and the environment.
  - Ex: Sunflowers height
    - Genes will influence
    - Also influenced by climate, soil conditions, availability of water
- Genes provide a plan for development, but how that plan unfolds depends on the environment.

MAKE A BABY LAB