Gregor Mendel

What he did
Who is Gregor Mendel?

- Known as the “Father of Genetics”
- Worked with pea plants
- Looked at traits and how they are passed on
Law of Dominance

- Mendel started with two pure strain plants (he knew exact parent traits)

- Mendel crossed two plants with pure contrasting traits, one pure tall plant with one pure short plant

- Only one of the traits appeared in the next generation, all the offspring were tall

Mendel called this the F1 generation
Mendel concluded that

- Tall is the dominant allele
- Short is the recessive allele
- Dominant trait is the trait that is seen
- Recessive trait is the trait that is not seen (hidden)
- **Homozygous** = when an organism has two identical genes
  - Example TT or tt

- **Heterozygous** = having two different genes
  - Example Tt

- **Phenotype** = physical characteristics; what is seen
  - Example = tall or short

- **Genotype** = the genetic make up; what the genes are
  - Example = TT, tt and Tt
Tall \((TT)\) x Short \((tt)\)
Tall ($TT$) x Short ($tt$)
Tall (TT) x Short (tt)
Genetics and Probability

- Probability is the likelihood of a particular event happening.
- Flipping a coin – what is the chance of getting a head? Tale?
- Probability can be used to predict the outcomes of genetic crosses.
Segregation

- The separation of the alleles
- Segregation happens during the formation of sex cells – Gametes

- Male gamete = sperm
- Female gamete = egg (ova)
Humans have 46 chromosomes
23 from Mom
23 from Dad

46 Homologous Chromosomes

Homologous = each of the 23 chromosomes from one parent has a matching pair of 23 from the other parent
Every cell has homologous pair of chromosomes

- Diploid number = “Two sets”
- Represented by 2N
- In humans 2N = 46

Every cell in your body is diploid, except your gametes
- Gametes have only one set of chromosomes.

- They are Haploid = “one set”
  - Haploid is represented by N
  - In humans N = 23

- How do haploid gametes get made from diploid cells?
Mitosis

- How your body makes more cells

- Start with one cell and end up with two cells that are identical.
Starts with 1 cell

End up with 2 identical cells

$2n_{(46)}$
Meiosis

- Meiosis the process of making gametes (sex cells)

- In humans one cell with 46 chromosomes gets changed into 4 cells with 23 chromosomes
Meiosis is made up of 2 parts:

- Meiosis I
- Meiosis II
Meiosis I

- Basically the same as Mitosis – first thing that happens is the chromosomes replicate.
- The chromosomes separate and the cell splits forming two daughter cells.
- Each cell containing one complete set of chromosomes and are both diploid = 2N = 46 chromosomes.
Meiosis II

- Both cells divide again but this time the chromosomes do not replicate

- result = 4 daughter cells are all haploid = N = 23 chromosomes
Start with one cell

46

46

46

46

23

23

23

23

End up with 4 sex cells
Tall \((TT)\) x Short \((tt)\)
Tall \((TT)\) x Short \((tt)\)
Tall ($TT$) x Short ($tt$)