

GENETICS

LESSON 5: AUTOSOMAL OR MENDELIAN GENETICS

Learning Outcomes

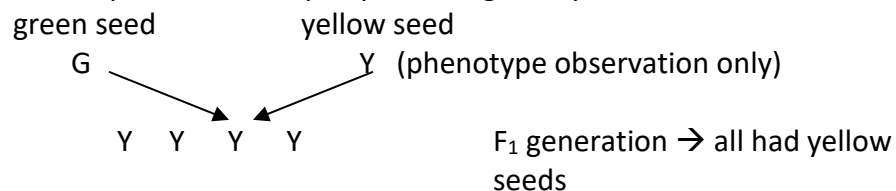
- I can describe how Gregor Mendel discovered genetics and patterns of inheritance.
- I can define the terms homozygous dominant, homozygous recessive and heterozygous, and correctly write out an allele pairing for each.
- I can differentiate between genotype and phenotype.

Genetics

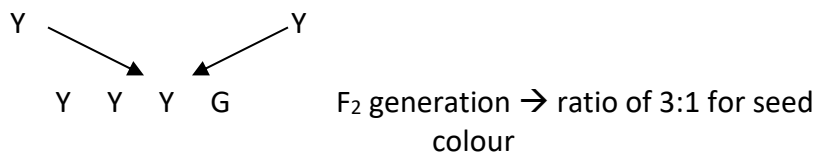
- the study of the heredity of traits (traits are what we see)
- the study of the passing on of characteristics from parents to offspring
- known about long before it was understood how genetics actually worked → seen in the selective breeding of livestock

Gregor Mendel (1822-1884)

- Known as the “father of genetics”
- First person to carefully conduct planned experiments on heredity and accurately record the results
- Before starting his experiments, he had already hypothesized that:
 1. there are elements that pass from parent to offspring
 2. different elements control different traits
 3. elements remain unchanged in an organism
 4. the elements are passed on in the same form
- Mendel tested these hypotheses using garden peas
 - Tested seven different traits, each of which had only two forms
- Experiment → tested seed colour (yellow and green forms)
 1. self-fertilized pea plants to get pure strains of each seed type
 2. cross-bred pure strains of pea plants to get a hybrid



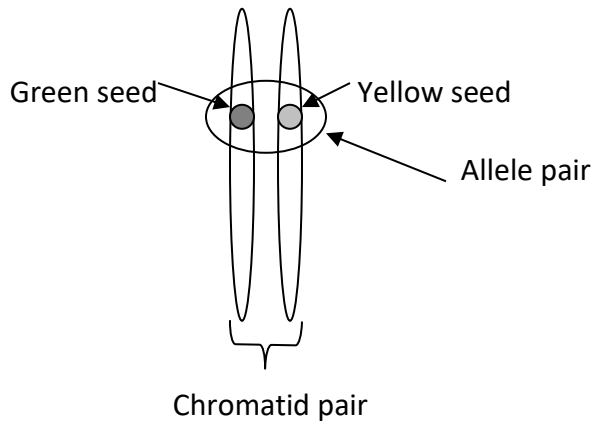
3. cross-bred two plants from the F₁ generation



4. Conclusion
 - a. Elements did exist
 - b. Male and female gametes contain the same traits as their parents
 - c. One form of each element is dominant → dominant trait masks the recessive trait when present

Alleles

- Alleles are different forms of a gene that result in different traits
- Each chromosome in a chromatid pair have the same types of genes (seed colour, wrinkled or smooth seeds, etc), but not always the same alleles



- When comparing alleles, a single letter is always used to represent the gene being studied
 - Y → yellow seed (capital used for dominant allele)
 - y → green seed (lower case used for recessive allele)
- Since there are two genes for each allele pair, there are three possible combinations
 - YY → homozygous dominant
 - Yy → heterozygous
 - yy → homozygous recessive

Genotype vs. Phenotype

- Genotype is the genetic combination of the alleles
- Phenotype is the visual characteristic of the gene

Genotype	Phenotype
YY	yellow seed
Yy	yellow seed
yy	green seed