Mendel's mechanism

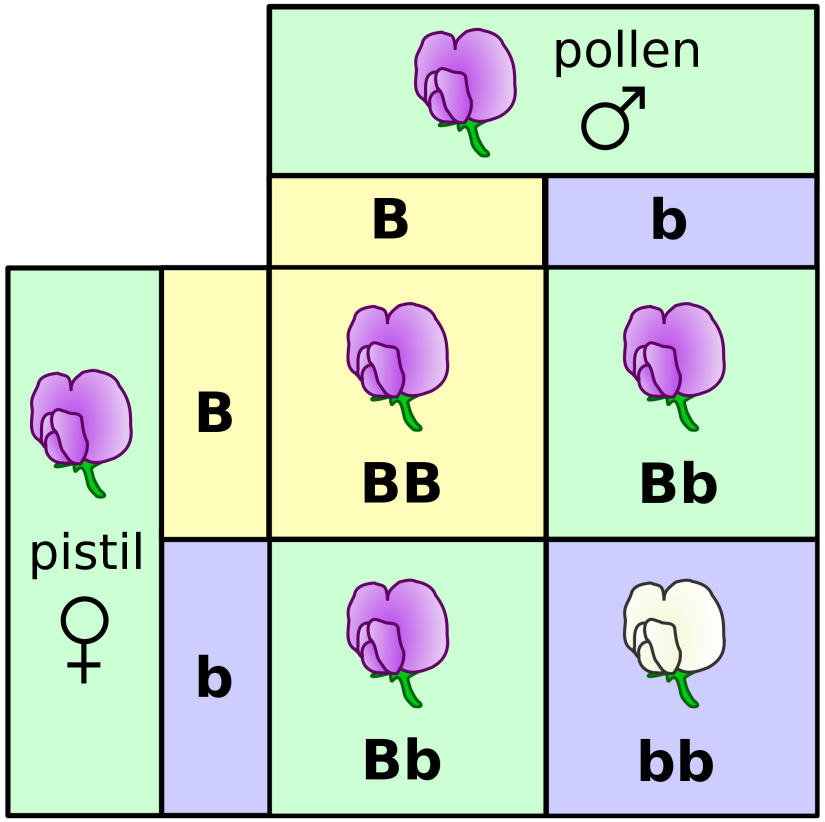
02 October 2023

Taking attendance

XE-MX-RT

Predicting genotype and phenotype frequencies

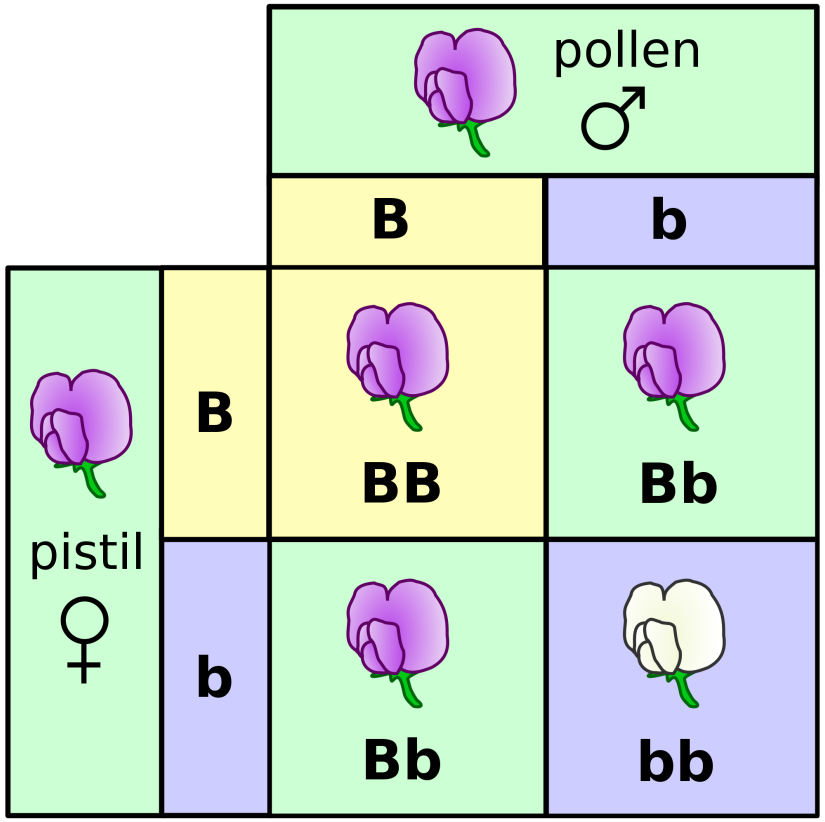
- 2 alleles for flower colour
  - B (dominant)
  - b (recessive)
- 3 possible genotypes
  - BB
  - Bb
  - bb
- 2 possible phenotypes
  - Pink (BB, Bb)
  - White (bb)



[1]Image: Public Domain

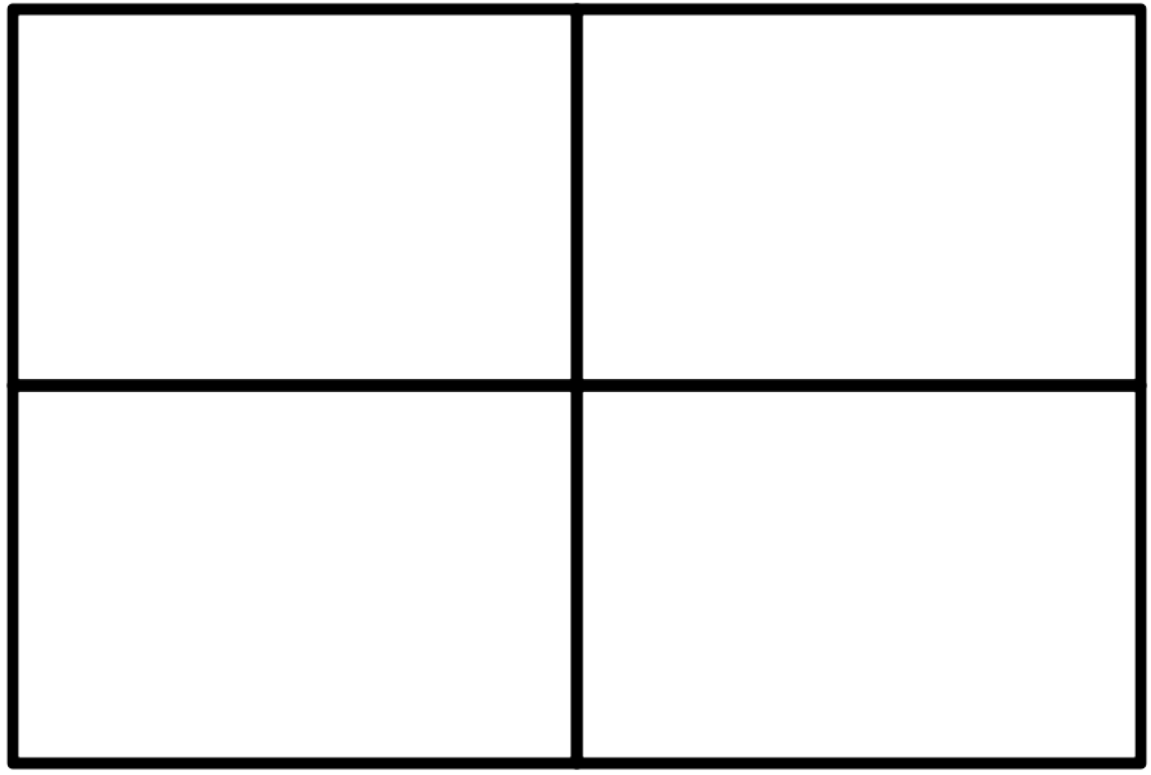
Predicting genotype and phenotype frequencies

- Punnett squares can predict genotype and phenotype frequencies
- Summary of all possible combinations of maternal and paternal alleles
- Predict probabilities of different genotypes given a cross



[1] Image: Public Domain

Dominant-recessive: BB vs Bb



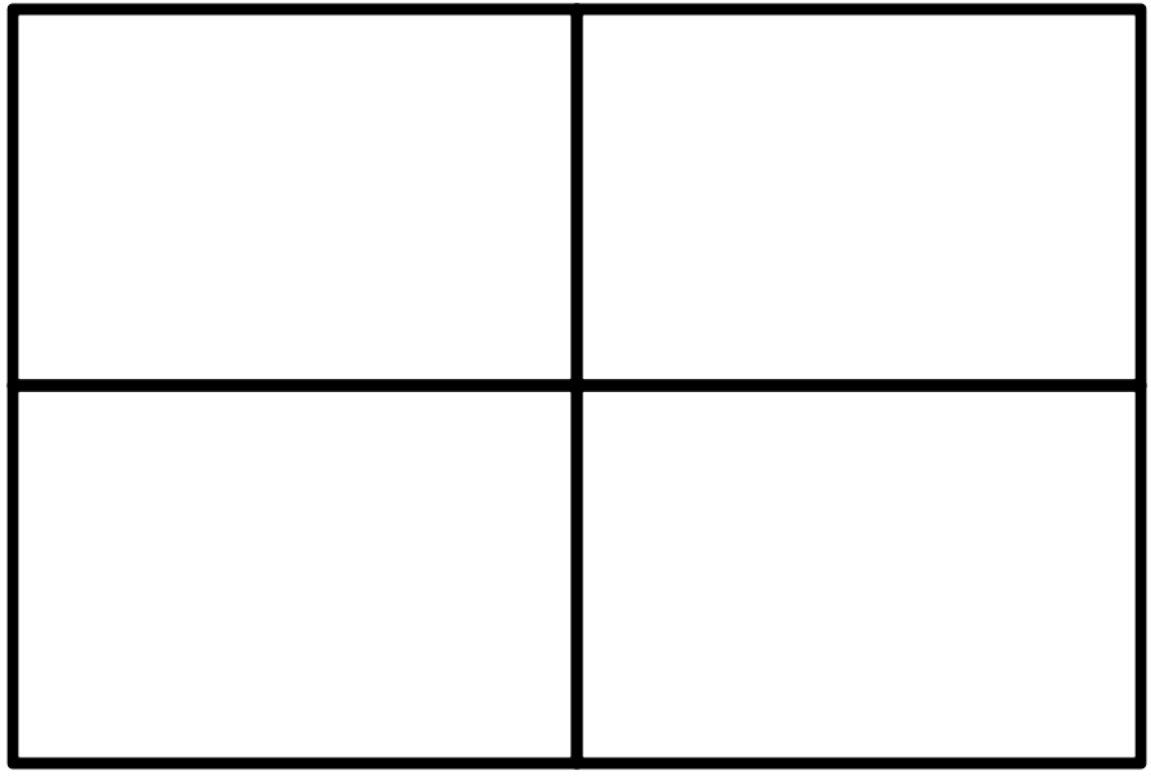
Incomplete dominance: Snapdragon

Antirrhinum majus

- Flower colour shows incomplete dominance
  - Homozygous red ($C^R C^R$) makes red flowers
  - Homozygous white ($C^W C^W$) makes white flowers
  - Heterozygous ($C^R C^W$) makes pink flowers
- Letter C with superscript indicates neither allele is dominant

[1] Image: Public Domain

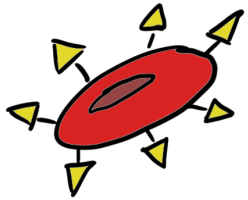
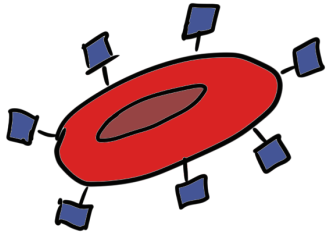
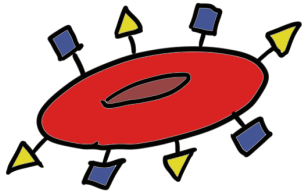
Incomplete dominance $C^R C^W$ vs $C^R C^W$



Phenotypes

- Red:
- Pink:
- White:

Codominance

Genotype	Phenotype	
$I^A\_$ (I^AI^A or I^Ai)		Type A
$I^B\_$ (I^BI^B or I^Bi)		Type B
ii		Type o
I^AI^B		Type AB

Three total alleles

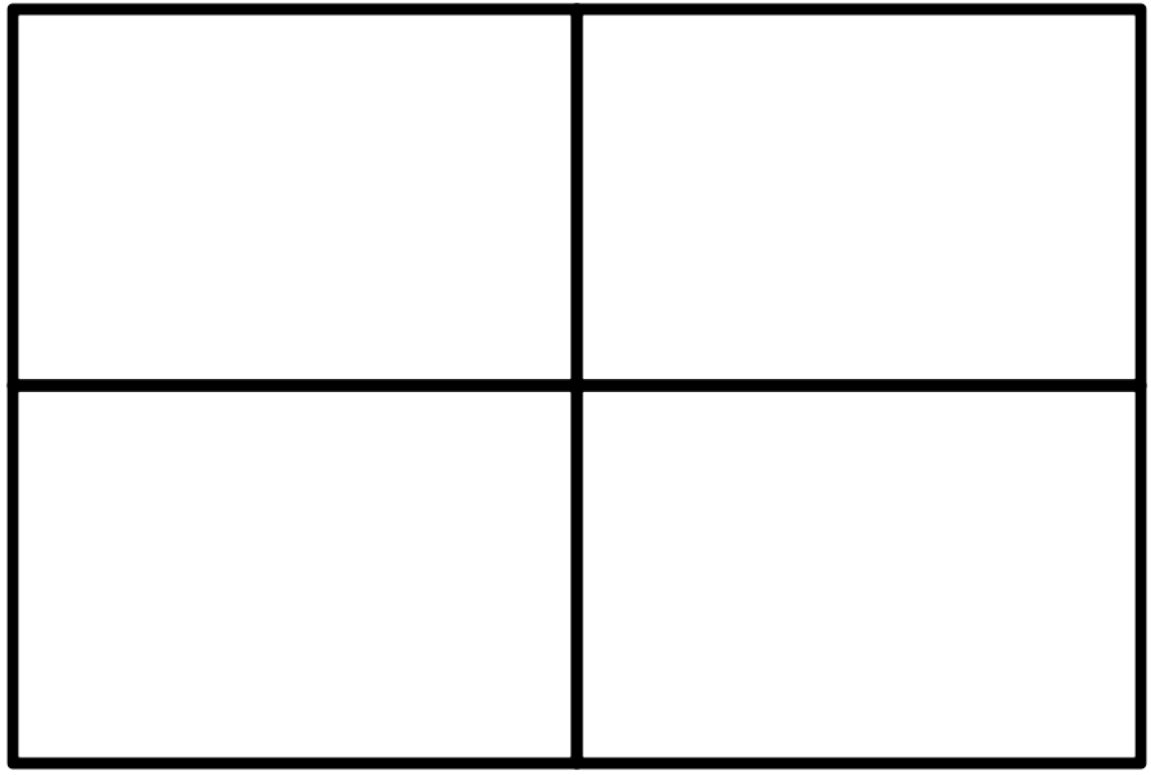
- 2 dominant (A, B)
- 1 recessive (i)

Dominant alleles caused by production of A or B antigens

Other antigens (Rh) determine positive or negative status

[1] Image: Public Domain

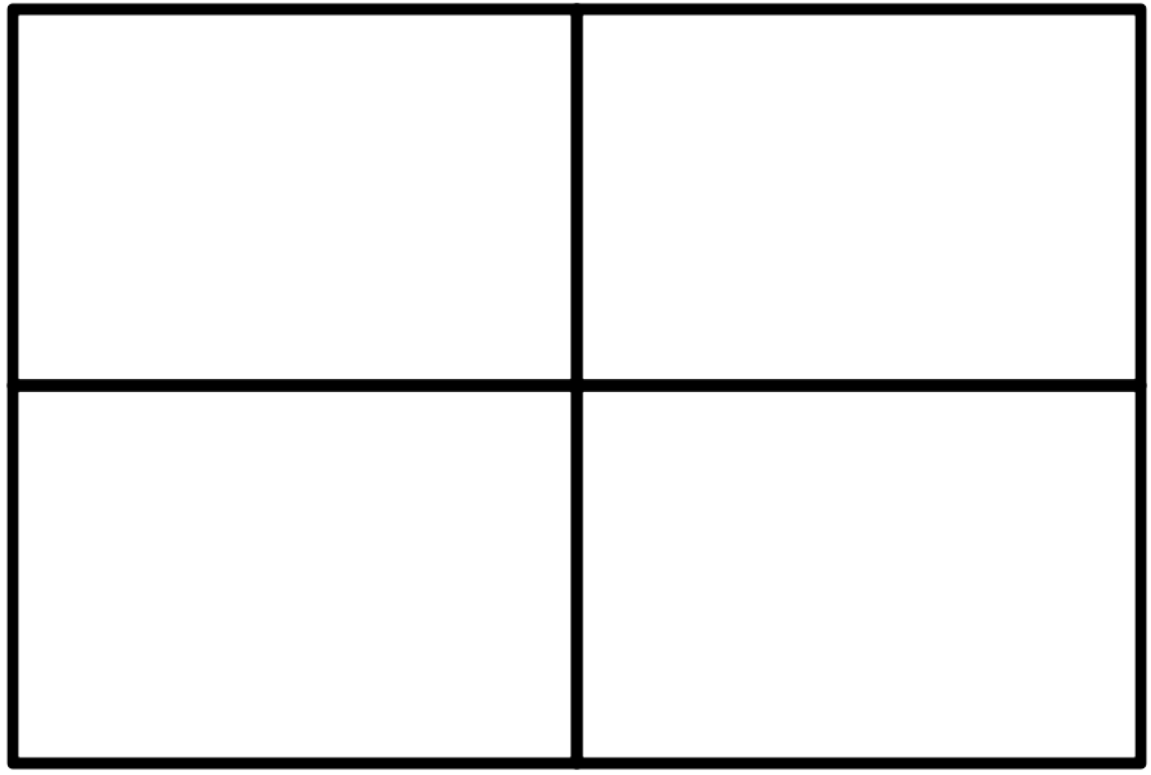
Codominant $I^A I^B$ vs $I^A I^B$



Phenotypes

- A:
- B:
- AB:
- O:

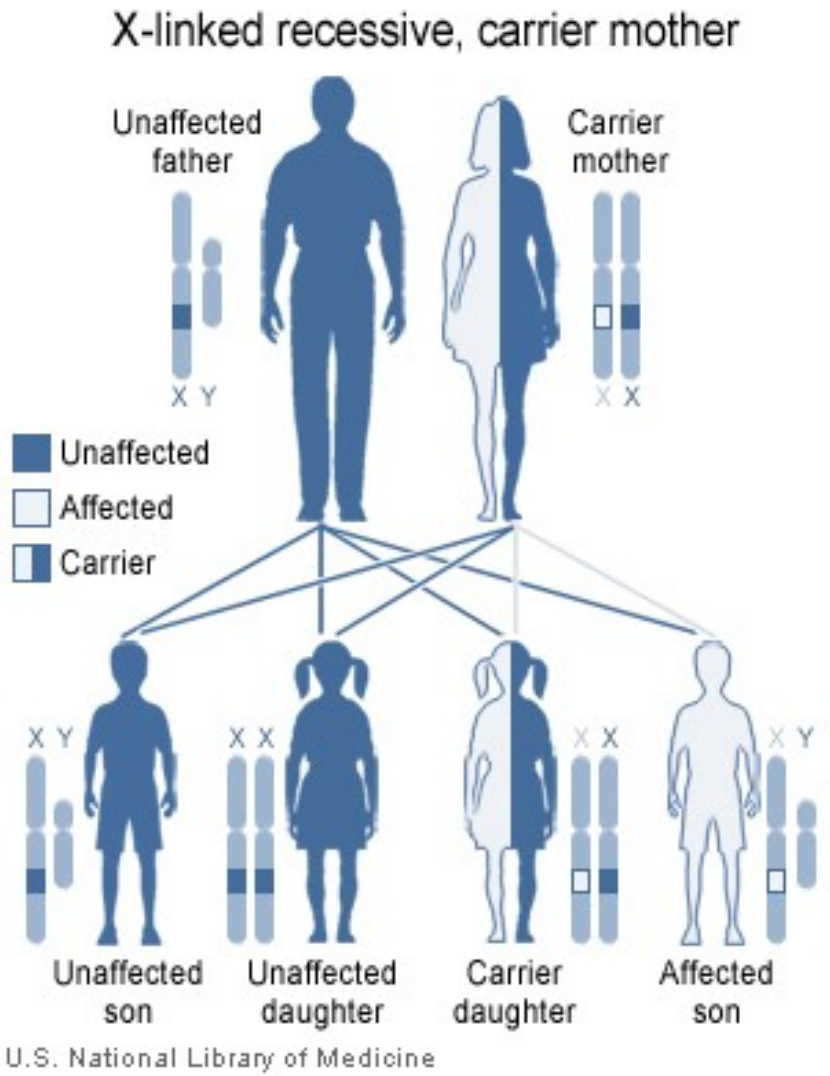
Codominant $I^A i$ vs $I^B i$



Phenotypes

- A:
- B:
- AB:
- O:

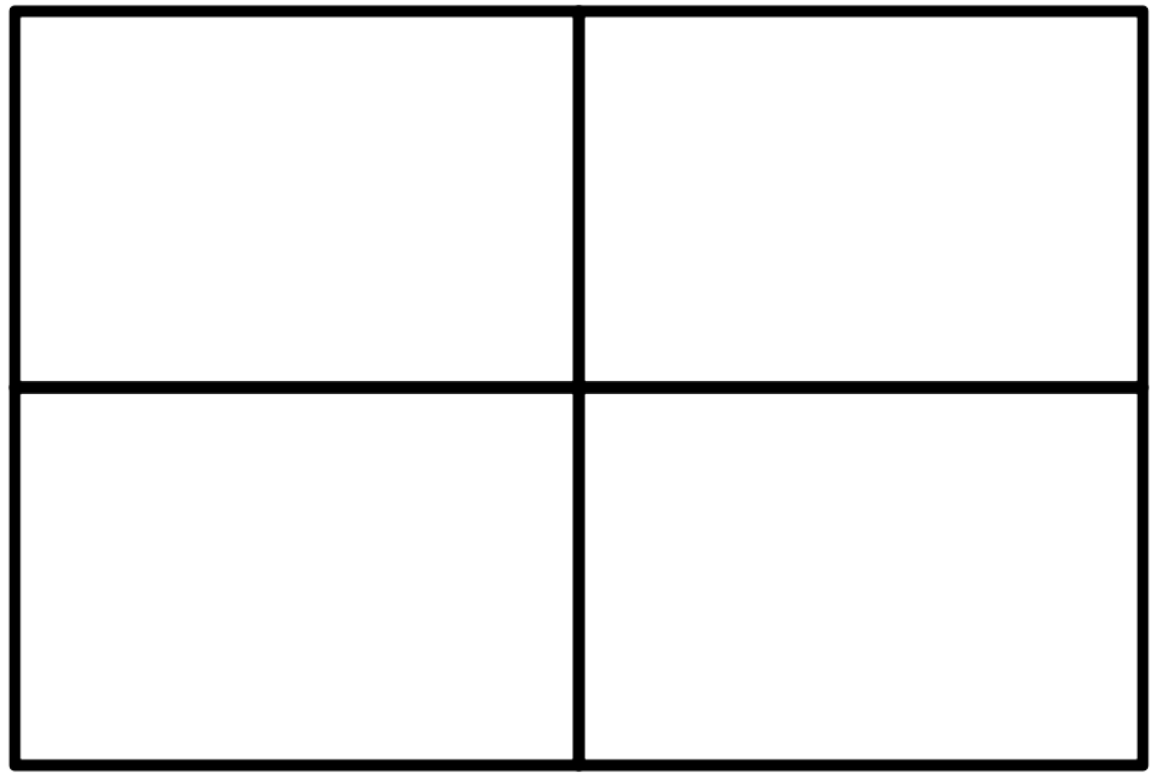
Haemophilia X-linked recessive



- Absence of blood clotting proteins
- Dominant allele X^H, recessive X^h
- No allele on the Y chromosome

[1] Image: Public Domain

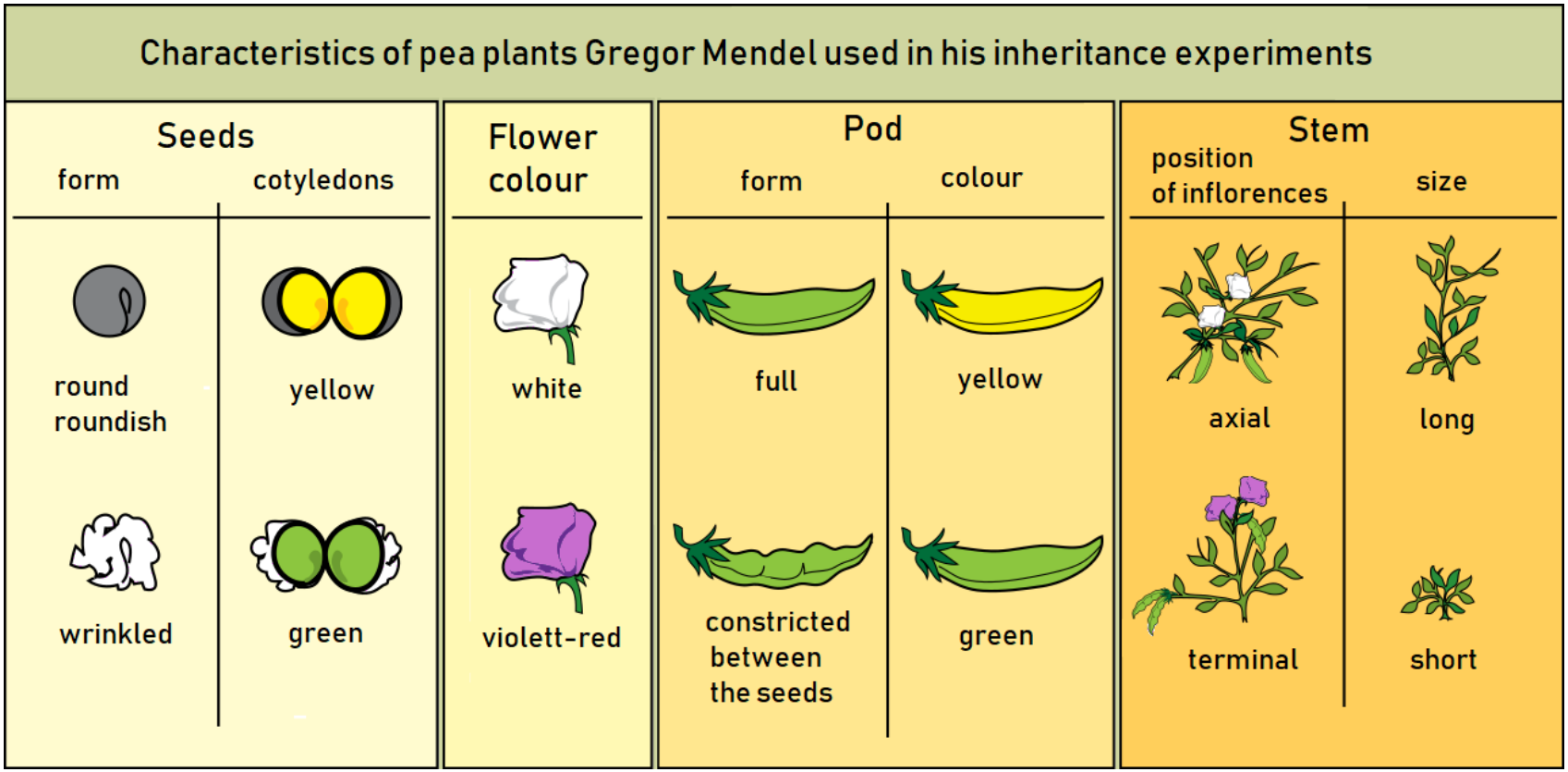
Sex-linked $X^H X^h$ vs $X^H Y$



Phenotypes

- Unaffected:
- Affected:
- Carrier:

Dominant-recessive dihybrid cross



Consider multiple phenotypes at once

[1] Image: Public Domain

Dominant-recessive dihybrid cross

Flower colour

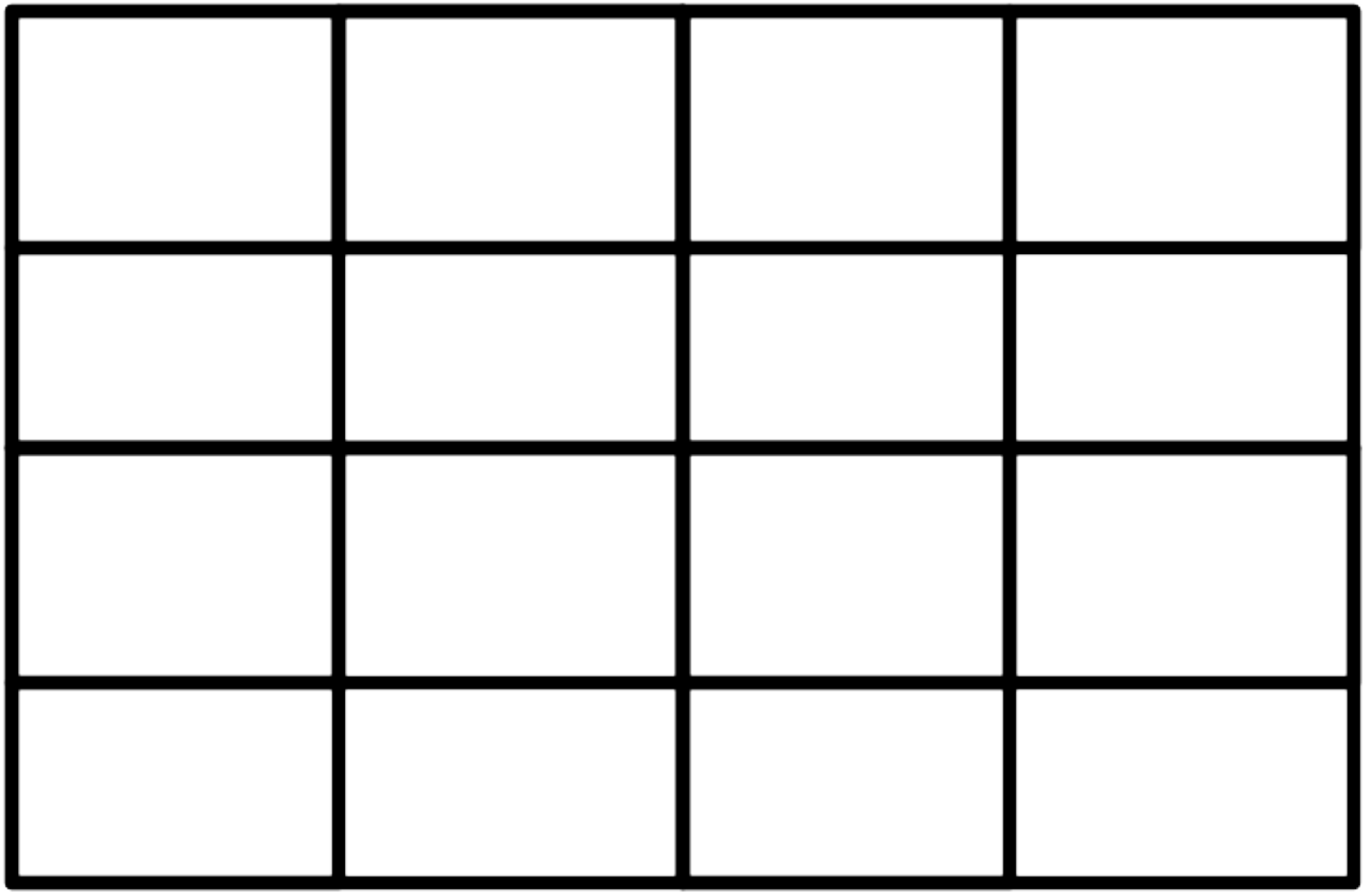
- Purple (P)
- White (p)

Seed form

- Round (R)
- Wrinkled (r)

What are the different possible combinations of flower colour and seed form?

Dominant-recessive dihybrid cross: PpRr vs PpRr

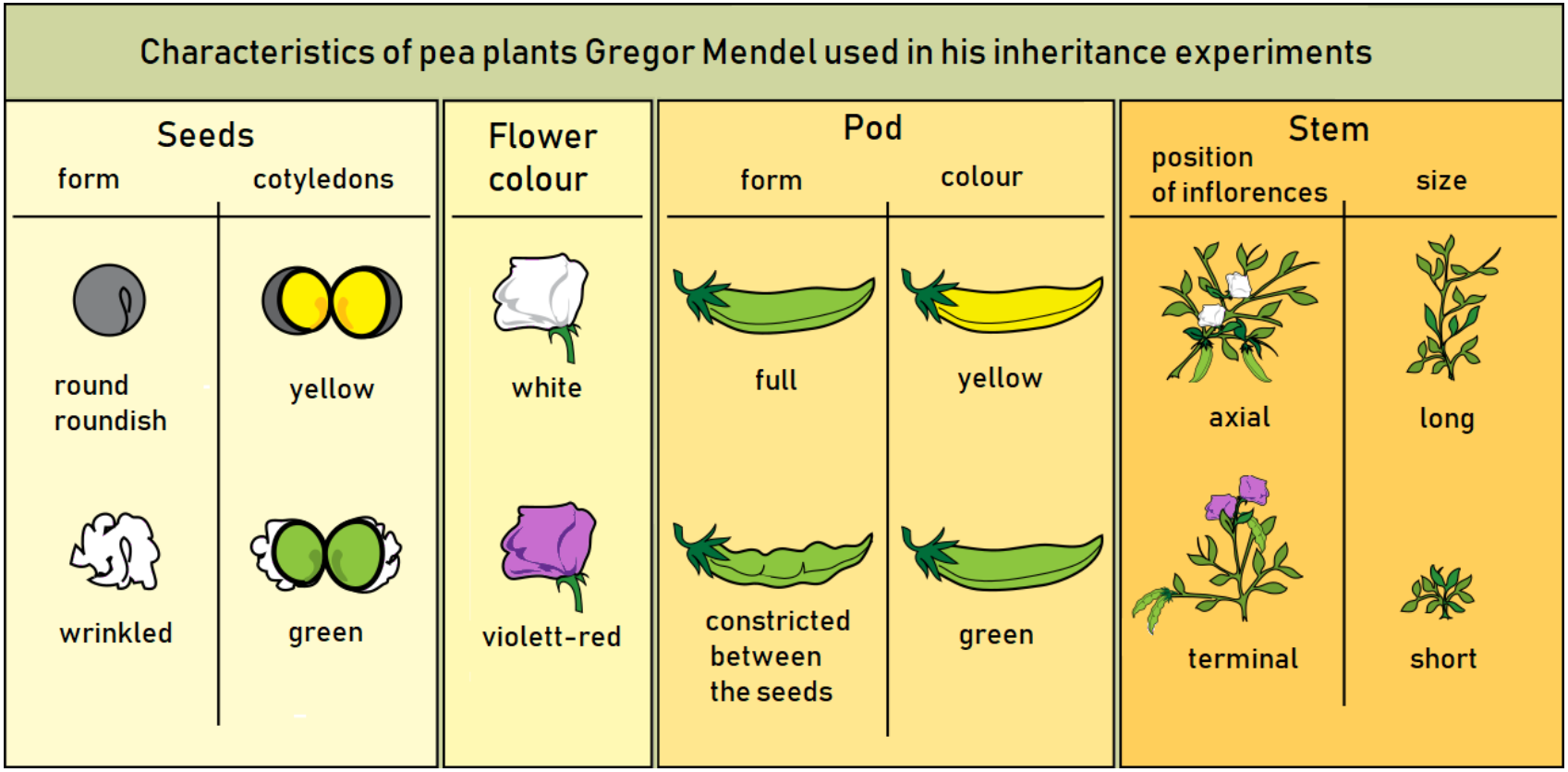


Dominant-recessive dihybrid cross: PpRr vs PpRr

Phenotype ratios

- Purple Flowers, Round Seeds:
- Purple Flowers, Wrinkled Seeds:
- White Flowers, Round Seeds:
- White Flowers, Wrinkled Seeds:

Dominant-recessive trihybrid cross



Colour (P, p), Seed (R, r), Size (L, l)

[1]Image: Public Domain

Dominant-recessive trihybrid cross: PpRrLl vs PpRrLl