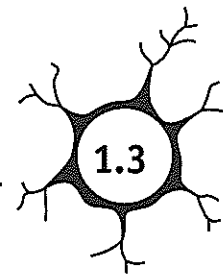
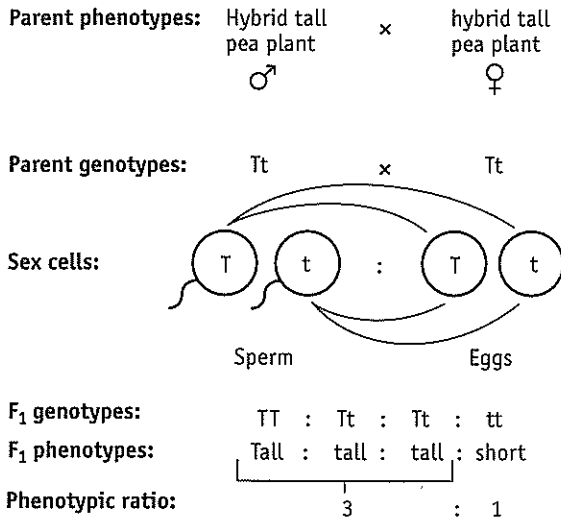


1 GENETICS

Monohybrid cross genetics: single-gene inheritance



Worked example



Genetics terms

Allele various forms of the one gene (e.g. 'T' and 't' are the alleles for plant height)

F₁ represents the 'first filial generation'

Phenotype the physical appearance of a genetic character (e.g. tall)

Genotype the gene make-up of an individual with respect to a characteristic (e.g. Tt)

Homozygous the genes in a genotype are identical (e.g. TT, tt)

Heterozygous the genes in a genotype are different (e.g. Tt)

Hybrid see *heterozygous*

- In pea plants, tall (T) is dominant over the dwarf condition (t). Work out the genotypes and phenotypes of the offspring of the following crosses:
 - heterozygous tall pea plant × homozygous tall pea plant
 - a cross between a hybrid tall and a dwarf pea plant
 - a cross between two heterozygous tall pea plants
- The lack of body pigmentation (albinism) in humans is due to a recessive allele (a) and normal pigmentation is the result of its dominant allele (A). Work out the chances (as a percentage) of the following couples producing an albino child:
 - normal heterozygous ♀ × normal homozygous ♂
 - albino ♂ × normal (carrier) ♀
 - normal heterozygous ♀ × normal heterozygous ♂
 - albino ♂ × albino ♀
- Assume that in the families below the allele for brown eye colour is dominant over the allele for blue eye colour.
 - A brown-eyed man marries a blue-eyed woman. All their children are brown-eyed. What are the genotypes of all the individuals in this family?
 - A blue-eyed man, both of whose parents were brown-eyed, marries a brown-eyed woman. They have one child, who is blue-eyed. What are the genotypes of all the individuals mentioned?
 - A blue-eyed man marries a brown-eyed woman whose father was blue-eyed. What proportion of their children would you predict to have blue eyes?
- In fruit flies, long wing (L) is dominant to short wing (l). Two long-wing flies produced 49 short-wing and 148 long-wing offspring.
 - What were the probable genotypes of the parents?
 - What proportion of the long-wing offspring should be heterozygous?
- Heterozygous black (Bb) guinea pigs are mated to homozygous recessive (bb) whites. Predict the phenotypic ratios expected from backcrossing the black F₁ progeny to:
 - the black parent;
 - the white parent.