

- Calculates allele frequencies in a population.

Allele frequencies remain constant from generation to generation if -

- (1) Population is very large (reduces sampling error)
- (2) Random mating
- (3) No selection advantage for any genotype
- (4) No mutation, migration or genetic drift

Equations:

$$p^2 + 2pq + q^2 = 1$$

$$p + q = 1$$

p = dominant allele

q = recessive allele
frequency

p^2 = homozygous, dominant

q^2 = homozygous, recessive

$2pq$ = heterozygous frequency

e.g. In ladybirds, wing-case colour determined by alleles R (red) and r (black).

In a population, 168 had red-wing cases, 32 had black wing-cases. Calculate the frequency of heterz. popln.

$$32 = \text{black} = rr = q^2$$

$$\therefore \text{Frequency of } q^2 = \frac{32}{168+32} = \frac{32}{200}$$

$$q^2 = 0.16$$

$$q = \sqrt{0.16} = 0.4$$

$$\therefore p + q = 1$$

$$p = 1 - 0.4$$

$$p = 0.6$$

$$\text{Heterozygous} = 2pq$$

$$= 2 \times 0.4 \times 0.6$$

$$= 0.48$$