The Hardy-Weinberg Equilibrium/Law.

G. H. Hardy: English Mathematician.

Dr. Wilhelm Weinberg German Physician.

"Allele and genotype frequencies in a population tend to remain constant in the absence of disturbing influences."

Disturbing influences: – They are

⇒ Non-random mating
⇒ Mutations
⇒ Selection
⇒ Limited population size.
⇒ Random genetic drift.
⇒ Gene flow.
⇒ Migration.

In Reality – The conditions for Hardy-Weinberg equilibrium are never met in nature.

⇒ There are always some disturbing influences in nature.
⇒ Hardy-Weinberg Law/equilibrium can be approximated in the lab.
⇒ It has usefulness as a model for studing real populations.

The Equations: –

$$p+q=1$$
$$\text{or, } (p+q)^2=(1)^2$$
$$\text{or, } (p+q)(p+q)=1\times1$$
$$\text{or, } p^2+2pq+q^2=1$$

If –

⇒ A gene has two alleles, A and a

⇒ The frequency of allele A is represented by = P

⇒ The frequency of allele a is represented by q

⇒ ~~afterscape~~ ∴ The frequency of genotype AA = PP = P^2

= Homozygous dominant

⇒ The frequency of genotype aa = qq = q^2

= Heterozygous recessive.

⇒ The frequency of genotype Aa = 2PQ

= Heterozygous

An Example :–

Assume a population in which 36% of the population are homozygous for a certain recessive allele, a. Assume the population is at equilibrium.

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Q No-3 :- What percentage of the population are homozygous for dominant allele A ?

Ans:-

We know $P = 0.4$

$\therefore p^2 = (0.4)^2 = 0.16 = 16\%$

Q No-4 What percentage of the population are Heterozygous for this trait?

Sol:- Heterozygous for this trait $= 2pq$

$= 2 \times 0.4 \times 0.6$

$= 0.48$

$= 48\%$ Ans.