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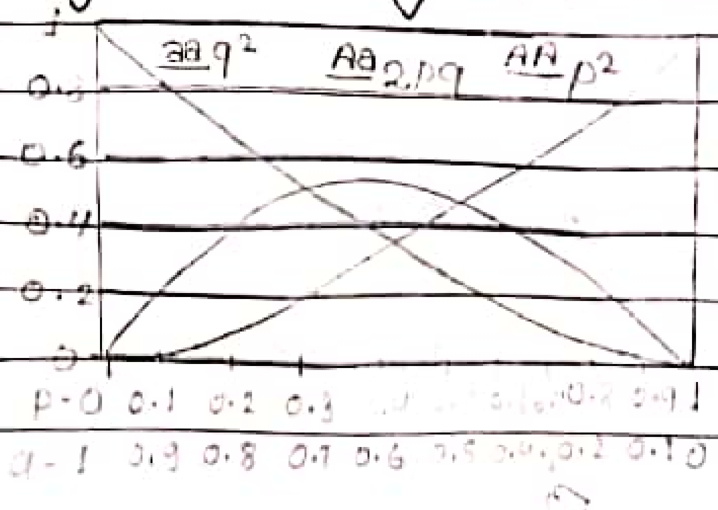
Q:- Write notes on HARDY WEINBERG LAW?

Ans:- Suppose in a population of plant species, a gene has two allele 'A' n 'a' having frequency 'p' n 'q' respectively. According to this law, the frequency of p and q in a population remains constant generation after generation unless there's any factors influence.

Hardy-Weinberg principle:-



Hardy - weinberg proportions for two allele. the horizontal axis shows the two allele frequencies p and q and the vertical axis shows the expectet genotype frequencies. each line shows one of the three possible genotypes

In population genetics, the Hardy Weinberg principle, also know as the Hardy - Weinberg equilibrium, model theorem, or law, states tha allele and genotype frequencies in a population will remain constant from generation to generation in the absence of other evolutionary, influences These influences include genetic drift, mate choice, assortative mating, natural selection, sexual sele--ction, mutation, gene flow, meiotic drive, genetic hitchhiking, population bottleneck, founder effect and inbreeding

In the simplest case of a single locus with two alleles denoted A and a with fre--quencies f(A) = p and f(a) = q. respectively, the expected genotype frequencies under random mating :-

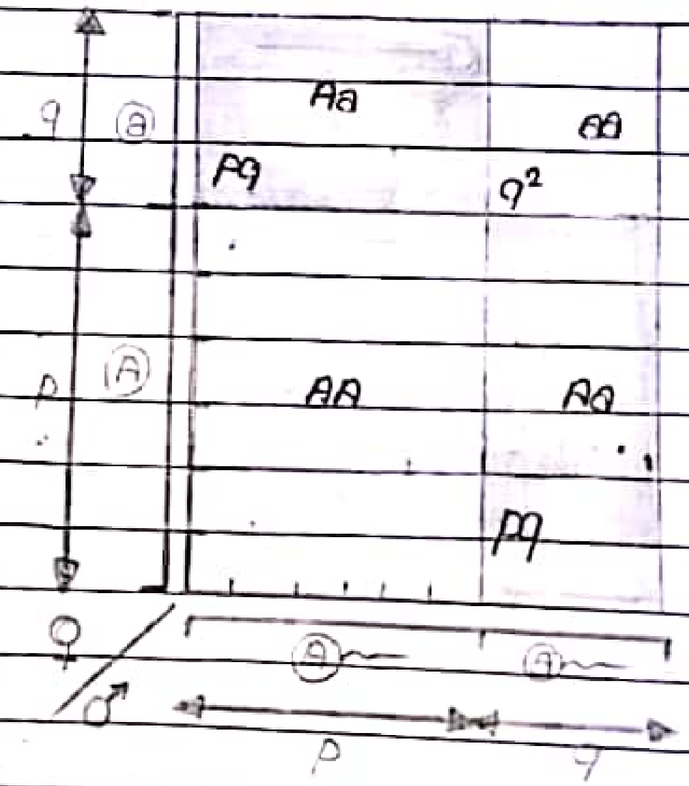
are $f(AA) = p^2$ for the AA homozygotes, $f(aa) = q^2$ for the aa homozygotes, and $f(Aa) = 2pq$ for the heterozygotes. In the absence of selection, mutation, genetic drift or other forces, allele frequencies p and q are constant between generations so equilibrium is reached.

Derivation :-

Consider a population of monoecious diploids, where each organism produces male and female gametes at equal frequency and has two alleles at each gene locus. Organisms reproduce by random union of gametes (the "gene pool" population model). A locus in this population has two alleles A and a that occur with initial frequencies $f_0(A) = p$ and $f_0(a) = q$, respectively. The allele frequencies of alleles from each genotype of the same generation according to the expected contribution from the homozygote and heterozygote genotypes, which are 1 and 1/2 respectively:

$$f_t(A) = f_t(AA) + \frac{1}{2} f_t(Aa)$$

$$f_t(a) = f_t(aa) + \frac{1}{2} f_t(Aa)$$



length of p.q corresponds to allele frequencies (here p = 0.6, q = 0.4). Then area of rectangle respresent genotype frequencies (thus AA : Aa : aa = 0.36 : 0.48 : 0.16).

The different ways to form genotypes for the next generation can be shown in a Punnett square, where the proportion of each genotype is equal to the product of the row and column allele frequencies from the current generation.

Table 1: Punnett square for Hardy - Weinberg

		Females	
		A (p)	a (q)
Males	A (p)	AA (p^2)	Aa (qq)
	a (q)	Aa (qp)	aa (q^2)

The sum of entries is $p^2 + 2pq + q^2 = 1$, as the genotype frequencies must sum to one.

Note again that as $p+q = 1$, the binomial expansion of $(p+q)^2 = p^2 + 2pq + q^2 = 1$ gives the same relationship.