

GENE INTERACTION -I

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Interaction within alleles of a gene that controls a single character may be dominant, incomplete dominant and co-dominant and are called intra-allelic interaction. When there is an interaction between different pairs of alleles of the two different gene that influences a character of an individual is called interallelic interaction. The term epistasis was coined by Bateson in 1909. The gene that has masking the expression of other gene located at different locus is called epistatic gene, and the gene whose effect is masked is known as hypostatic gene. Epistasis leads to the modification of Mendelian dihybrid or trihybrid segregation ratio in F₂ generation.

Types of gene interaction

Following are the various types of epistatic gene interaction :

Dihybrid ratio (9:3:3:1)

Bateson and Punnett discovered four different phenotypes in F₂ generation in the ratio of 9:3:3:1 in poultry. Each breed of poultry possesses type of comb.

1. The Wyandotte breed has a rose comb
2. The Brahma has a pea comb
3. The leghorn has a single comb, and
4. The Malaya walnut comb

Each of these breeds true. Cross between rose comb and single combed types show that rose comb is dominant to single comb; pea combed is dominant over single comb.

When a rose combed fowl is crossed with a pea combed fowl, all the F₁ birds show a new comb called walnut comb. When the walnut combs are inbred, in F₂ walnut 3 rose pea single comb. The rose comb is due to the presence of R gene and Pea due to P gene. Walnut comb is due to the presence of the dominant

genes R and P and single comb are due to the presence of recessive of r and p.
The ratio expected in F2 is 9:3:3:1.

Parent Wyandote (rose) X Brahmas (pea)

Genotype RR PP
Gametes R P

F1 RRPP (Walnote)

				
	RRPP	RRPp	RrPP	RrPp
	RRPp	RRpp	RrPp	Rrpp
	RrPP	RrPp	rrPP	rrPp
	RrPp	Rrpp	rrPp	rrpp

9 walnut: 3 rose: 3 Pea: 1 Single

Duplicate recessive epistasis OR Complimentary gene action 9:7

When recessive alleles at either of the two loci can mask the expression of dominant alleles at the two loci, it is called duplicate recessive epistasis. This is also known as complementary epistasis. The best example of duplicate recessive epistasis found in flower colour of sweet pea. The purple colour of flower in sweet pea is governed by two dominant gene say A and B when these genes are in separate individuals (Aabb or aaBB) and white (aabb) they produce white flower. A cross between purple flower (AABB) and white flower (aabb) produced purple colour in F1 intermediate of F1 plants produced purple

