

Dihybridism, interaction of non-allelic genes, polyhybridism

Dihybridism

 For more information see *Dihybridism*.

- **Dihybridism** = during the hybridization experiment, we simultaneously monitor the phenotype manifestations of 2 genes.
- the term was introduced by de Vries (1900)
- the rule of independent combination of traits applies = the probability that 2 random phenomena occur simultaneously is the *product* of the probability of occurrence of each of them for the crossing of organisms differing in 2 pairs of alternative signs
 - applies to genes located on **different** chromosomes.
 - if they are genes located on 1 chromosome, **they must be far enough apart**, to not apply gene binding
- **genotype's cleavage ratios:**
 - 1:2:1:2:4:2:1:2:1 (F2 generation)
 - 1 : 1 : 1 : 1 (Bc)
- **phenotype's cleavage ratios:**
 - 9 : 3 : 3 : 1 (F2 generation)
- P generation:
 - AABB x aabb nebo AAbb x aaBB
 - uniform offspring (F1 generation)
 - genotype AaBb
- v F2 generaci
 - 9 /16 individuals with dominant phenotype in both traits (AaBB, AaBb, AABB, AABb)
 - 3 /16 individuals with dominant phenotype in one trait (Aabb, AAbb)
 - 3 /16 individuals with recessive phenotype in one trait and dominant in the 2nd trait
 - 1 /16 individuals with both recessive traits (aabb)
- with incomplete dominance, 3 phenotypic manifestations appear in the F2 generation – dominant, intermediate and recessive

Interaction of non-allelic genes

 For more information see *Non-allelic gene interactions*.

- if 1 phenotypic trait is conditioned by multiple genes, deviations in cleavage ratios will appear
- for describing non-allelic gene interactions:

Epistasis

- = *superiority of a certain genotype of one gene over the genotype of another gene*
 - one-sided interaction
 - 12 : 3 : 1 (F2 generation)
 - 2 : 1 : 1 (Bc)
1. **dominant** = **suppression of expression** of the hypostatic gene by dominant alleles of the epistatic gene
 2. **recessive** = recessive allele of an epistatic gene **suppresses in the homozygous state** the phenotypic expression of the second gene regardless of its genotype (aa > B i b)

Hypostasis

- = *recessiveness*
- 9 : 3 : 4 (F2 generation)
- 1 : 1 : 2 (Bc)

Complementation

- = *the emergence of a certain trait must be complemented by the effects of the dominant alleles of both genes*
- 9 : 7 (F2 generation)
- 1 : 3 (Bc)

Duplicate genes

- = *we cannot distinguish the phenotypic expression of one gene from another*
- 1. **non-cumulative** = for duplicate genes to interact, one allele of either locus is sufficient for full expression of the dominant trait
- 2. **cumulative** = cumulative effect of incompletely dominant alleles of both locus (loci)

Polyhybridism

- tracking many signs
- F1 consists of 2^n gametic combinations (n = number of non-allelic genes) - types of gametes
- the number of possible genotypic combinations is 3^n (the offspring of a monohybrid form 3 different phenotypic classes)

Links

related articles

- Monohybridism
- Parental, F1, F2 generation
- Allelic interactions
- Genotype
- Phenotype
- Backcrossing

Source

- ŠTEFÁNEK, Jiří. *Medicine, diseases, studies at the 1st Faculty of Medicine, UK* [online]. [cit. 2009]. <<http://www.stefajir.cz>>.