Dihybridism- close up

Template:Zkontrolováno A hybridization attempt, where the phenotype manifestations of **two genes'** are observed simultaneously, is called **dihybridism**. The simultaneous observation of three characters is called trihybridism, etc.

The term was introduced by de Vries (1900) for the crossing of organisms differing by 2 pairs of alternative characters.

The evaluation of the hybridization experiment and subsequent comparison with the mathematical model requires a large and representative set so that the obtained data on phenotypic manifestations and their combinations have sufficient statistical value.

When observing two or more traits at the same time, it is necessary to define whether the genes for the observed traits are localized on autosomes or heterochromosomes and whether their localization is on different pairs of chromosomes or whether they are located on the same chromosome (see gene linkage).

When monitoring the phenotypic manifestations of two different monogenically inherited traits in parental generation (P) and subsequently in F1 and F2 generation showed that the F1 generation is **uniform** and in the F2 generation there is a **combination of aptitudes'**. The random combination of traits is related to the **independent segregation** of chromosomes into gametes (see Meiosis). If we focus on specific genes, free combinability applies exclusively to genes located on different pairs of autosomes. Regarding heterochromosomes, the differences between **homogametic *(XX) and*** *heterogametic* (XY) sex must be taken into account; respectively between the genetic make-up chromosome X and chromosome Y. For genes that are located on the same chromosome, their combinability affects the map distance between them (see gene linkage).

Dihybridism and Mendel's experiments

🔎 *For more information see Mendel's experiments.*

The simultaneous monitoring of two signs was already dealt with by **J. G. Mendel'** ***in his classical hybridization experiments. E.g. crossed a pea (*****Pissum sativum*****) with yellow and round seeds (the genes can be labeled* AABB*) with a pea with green and wrinkled seeds (*aabb*). The monitored genes were located on different pairs of autosomes and occurred only in two allelic forms, allelic relationship being complete dominance and recessive. Mathematical evaluation of the hybridization experiment showed that the F1 generation is genotypically (*AaBb*) and phenotypically (yellow/round seeds)*** *uniform*. The F1 dihybrid creates **4 types of gametes'** (2^2 combinations - see Meiosis) in both sexes with respect to the allele representation of the monitored genes: *AB*; *Ab*; *aB*; *ab*. The representation of individual types of gametes has the same frequency (25%).

There are **4 phenotypic combinations'** in the F2 generation, where the ratio of individual phenotypes is:

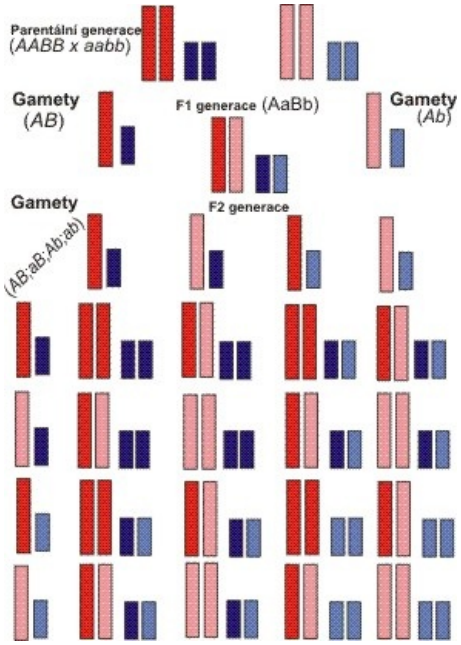
> **9** (yellow/round seeds) **: 3** (yellow/shriveled seeds) **: 3** (green/round seeds) **: 1** (green/shriveled seeds)

Punnett combination square

Combinations of genotypes and the resulting representation of phenotypes can be derived from the Punnett combination square.

	Genotypes F2 generation			
gamets	**AB**	**Ab**	**aB**	**ab**
AB	*AABB*	*AABb*	*AaBB*	*AaBb*
Ab	*AABb*	*AAbb*	*AaBb*	*Aabb*
aB	*AaBB*	*AaBb*	*aaBB*	*aaBb*
ab	*AaBb*	*Aabb*	*aaBb*	*aabb*

The following figure schematically shows the segregation of two pairs of chromosomes into gametes and the genotypes of the F1 and F2 generation.



Links

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- Dihybridism, interaction of non-allelic genes, polyhybridism
- Monohybridism
- Parental, F1, F2 generation
- Allelic interactions
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