

Three-point attempt

The **three-point experiment** is one of the simplest genetic **mapping** methods. Its principle is based on a hybridization experiment and gene linkage .

The three-point test is of practical use in a situation where we are trying to more closely **determine the position** of a certain gene (or locus) on a specific chromosome . If we know the position of two genes (markers) on the same chromosome, we can **determine the order of all three genes** on the respective chromosome from the results of the hybridization experiment (hence the three-point experiment).

Example

We have two known genes **A** and **B** and we are trying to find the relative position of gene **X** to these known genes.

1. We therefore cross a recessive homozygote (aabbxx) with an F1 hybrid (AaBbXx).
2. We will evaluate the frequency of individual genotypes in the offspring:
 - **ABX** /abx or **abx** /abx = **75%**
 - **aBX** /abx or **Abx** /abx = **15%**
 - **AbX** /abx or **aBx** /abx = **9%**
 - **ABx** /abx or **abX** /abx = **1%**
3. The least represented group (ABx or abX) represents the group of so-called **double recombinants** , i.e. individuals in which two recombinations occurred at the same time (which is the least likely phenomenon). It is clear that due to two recombinations (between the middle and both outer genes), the **middle gene will be separated** from the two outer genes. Thanks to this reasoning, we can find out which gene lies **in the middle** (or between the extreme genes).
4. In this case, the **X gene** lies in the middle, i.e. the final order of the genes on the chromosome is **A–X–B or B–X–A** (however, only one option is correct, since we know the position of both markers on the chromosome, it is not a problem to determine which variant is correct).

Links

Related articles

- Gene linkage

External links

- [1] (https://biol.lf1.cuni.cz/ucebnice/en/genetic_cartography.htm)

References

- OTOVÁ, Berta, et al. *Lékařská biologie a genetika I. díl.* 1. edition. Praha : Karolinum, 2008. pp. 123. ISBN 978-80-246-1594-3.