Evolution and speciation at the molecular level

Evolution at the molecular level began to develop with the discovery of new DNA technologies. The reason scientists are interested is the ability of DNA to witness the evolution of species. Scientists compare DNA sequences between individual organisms, thereby finding family relationships. A particular problem in this research is the changes that occur randomly in the DNA, which can lead to bias.

Two basic methods are used in the investigation:

- DNA research (population structure, variation and systems)
- examination of various organisms

The genome is variable. Therefore, changes occur in it that lead to distortion of DNA sources. This is precisely what the study of molecular evolution deals with. The initial frequency with which the mutation occurs in the genome is 1/2 n (in humans n = 23). This value is also a measure of the probability of fixation of a given mutation. Each part of the gene tends to mutate in different ways. Selectionalso plays an influence.

The biggest influences on molecular evolution are: **genetic mutations**, **recombination** and **drift**. Evolution leads to gradual adaptation of the individual to the influence of the environment. All life on earth is believed to have originated from a primordial cell that was the common basis and existed approximately 4 billion years ago. Through gradual development and differentiation next to create many organisms that have spread throughout the world.

Why does evolution occur

1. *Selection Hypothesis:*
   - the cause of evolution is the striving for balancing and positive selection.
2. *The neutralist hypothesis:*
   - emphasizing the influence of mutations, random genetic drift and negative selection.
3. *Mutational hypothesis:*
   - emphasizes the influence of mutational pressure and random drift.

Mutations

Cell division is based on the transfer of genetic information from mother cells to daughter cells. Half of the genetic information is always transferred - that's why children are similar to their parents. However, these transmissions may not always be accurate and mutations may occur.

The result can be offspring that are stronger and more able to survive, or, conversely, offspring that are weaker and less resilient. However, changes can also lead to neutral manifestations with equal viability.

Recombination

Recombination is a fundamental element in sexual reproduction. In general, each parent passes one copy of a chromozomes. to their offspring . If maternal and paternal chromosomes come into contact during division, gene shuffling can occur. This guarantees a wide variety of possible genetic equipment of the offspring. (That's why not all children of the same parents are the same.)

Drift

Drift is a kind of random selection. The number of individuals who carry a particular trait in a population is called the gene frequency. Drift has a significant effect especially **in small populations**. This is a process where, as part of the inheritance of information, suppression of one of the two types of alleles and preference for the other allele can occur . Drift may not always lead to an individual's benefit, since the frequency of individual alleles is random.

The relationship between recombination and drift is quite close. Because originally beneficial alleles can be transferred to unsuitable positions with the help of rekombination. In some cases, natural selektion, intervenes to eliminate the carriers of bad genes. Template:Detailed information

Links

Related articles

- Evolution
- Mutation

- Rekombination
- Genome
- Selektion
- Evolution and speciation at the chromosomal level

External links

- Genetic Drift (https://en.wikipedia.org/wiki/Genetic_drift)

Sources

- Molecular Evolution (http://biomed.brown.edu/Courses/BIO48/12.Molecular.Evolution.HTML)
- Science News (https://www.sciencenews.org/article/molecular-evolution)
- Wikipedia (https://en.wikipedia.org/wiki/Molecular_evolution)

References

- ALBERTS, B – BRAY, D – JOHNSON, A. *Základy buněčné biologie.* 2. edition. Espero Publishing, 2005. 740 pp. ISBN 80-902906-2-0.