

# Phenotype

**Phenotype** is a set of all definable characteristics (signs) of an individual. In a broader sense, these are not only characteristics that can be observed and defined at the level of the organism (e.g. morphological characteristics such as an individual's height, weight, number of fingers, etc., IQ, individual behavior and others), but also characteristics of a certain physiological function (e.g. blood pressure, blood sugar level etc.) or biochemical functions (e.g. isoenzymes). At the cellular level, we can consider e.g. the shape of different types of cells (skeletal muscle cells are different from red blood cells, squamous epithelium cells, etc.) or their different function as a different phenotype. At the biochemical level, the difference in phenotypes can be demonstrated, for example, on hemoglobin molecules. In adulthood, adult-type hemoglobin HbA (97%) and HbA2 (2.5%) and fetal hemoglobin HbF (0.5%) are present in a healthy person. Other phenotypic variants of hemoglobin arose as a result of mutation and are often accompanied by various types of hemoglobinopathies.

**Phenotype is determined by genotype, epigenetic changes in gene function and environmental influences.**

**Genotype** represents the inherited genetic makeup that is recorded in the DNA sequence. Individuals with the same genotype may not have the same phenotypic manifestations. And similarly, individuals with the same phenotype may not have the same genotype. E.g. deafness is conditioned by various factors: • genetic causes - various types of heredity; • disease processes - phenocopy; • physical trauma - phenocopy.

**Epigenetic factors** affect the phenotype without changing the genotype. They affect gene expression without affecting cell totipotency. Epigenetic information is transmitted at the cellular level from one generation of cells to the next. During the development of an individual, epigenetic events are involved in cell differentiation, morphogenesis, variability and adaptability of the organism.

**Environmental influences** can significantly contribute to the phenotypic polymorphism of a trait (see e.g. multifactorial inheritance). We can approximate the meaning of the influence of the environment on human speech. Almost all people (exception - e.g. muteness) inherited the ability to speak and understand speech. What language and whether they will speak (eg children raised by a wolf pack) depends on environmental conditions.

Phenotypic variability, underpinned by genotypic variability, is a basic condition for evolutionary processes based on natural selection.

## Links

- ws: Fenotyp

## Related articles

- Genotype
- Genotype and environment
- The genetic code
- Epigenetics
- Phenocopy
- Interaction of genes and environment
- Multifactorial inheritance
- Characters