

Phenotype Encyclopedia Article

Phenotype

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Phenotype

The word phenotype refers to the observable attributes of individual organisms, including their morphology, physiology, behaviour, and other traits. The phenotype of an organism is influenced by its specific genetic complement (that is, its genotype), plus any environmental influences on the expression of its genetic potential.

All organisms have unique genetic information, which is embodied in the particular nucleotide sequences of their DNA (deoxyribonucleic acid; this is the genetic biochemical of almost organisms, except for viruses and some bacteria). This individual genotype is fixed and constant (except for very low rates of mutation). However, there is a certain degree of developmental flexibility in the phenotype, which is the actual expression of the genetic information in terms of anatomy, behavior, and biochemistry. This flexibility can occur because the expression of genetic potential is partly affected by environmental conditions and other circumstances.

Consider, for example, an individual geranium plant, with a fixed complement of genetic information. If that geranium is grown under well-watered, fertile, non-crowded conditions, it will develop into a relatively tall, robust, and vigorously flowering specimen. However, if that same individual had been grown under drier, less-fertile, more competitive conditions, its productivity and growth form would have been quite stunted. Such varying growth patterns of the same genotype are referred to as phenotypic plasticity. Some traits of organisms, however, are fixed genetically, and their expression is not affected by environmental conditions. For instance, the flower colour of individual geraniums (which can be white, red, or pink) is genetically fixed, and does not vary with the conditions of cultivation. Moreover, the ability of species to exhibit phenotypically plastic responses to environmental variations is itself, to a substantial degree, genetically determined. Therefore, phenotypic plasticity reflects both genetic capability and varying expression of that capability, depending on circumstances.