

## HUMAN DEVELOPMENTAL STUDIES OF ORGANISM-ENVIRONMENT CORRELATIONS IN THE HISTORY OF BIOLOGY

**O. Mykhalechko**

**e-mail:** [mev@mail.ru](mailto:mev@mail.ru); [mijalisco@gmail.com](mailto:mijalisco@gmail.com)

Odessa Branch

A.O. Kovalevsky Institute of Biology of Southern Seas,  
National Academy of Sciences of Ukraine

37 Pushkinskaya St  
Odessa 65125, Ukraine

**Abstract:** Since ancient times the organism - environment correlation has been one of the main issues for the existence of man and humanity. This study in the light of a contemporary approach considers the transformation of knowledge on the organism- environment correlation in the history of biology. Changes have been noted in the study from “stagnated forms” of live organisms to forms capable of changing under the influence of the environment. Views (Goethe, Lamarck, Saint-Hilaire, Darwin, Severtsov, Shmalgausen) on the organism-environment relationship from Ancient Greece to nowadays have been given.

**Keywords:** organism, environment, correlation, history of biology, Goethe, Lamarck, Saint-Hilaire, Darwin, Severtsov, Shmalgausen

Since ancient times the organism-environment relation has been one of the main issues for the existence of man and humankind. Historically this relation was developed in biology from “stagnated forms” of live organism to forms capable of changing under the influence of the environment, that is, from the category of “substance” to the category “relation” and “correlation”

In Ancient Greece Empedocles (490-432 BC) was the first to explain that separate organs which he observed as separate forms dealt with the origin and development of life. Plato’s theory of forms was expounded by his pupil, Aristotle (384-322 BC) who explained the wide diversity of living creatures as forms and functions of an organism in their unity.

Beginning from the Age of Renaissance the anatomy of an organism was considered as a complex dynamic organization, the features and changes of which are tied with life conditions. This organism-environment relation was characteristic of the classical natural history period.

In the XVII<sup>th</sup> - early XIX<sup>th</sup> centuries, further organism-environment development led philosophers and natural historians to the idea of homologous body parts existing in different organisms in different conditions.

Later this was confirmed by the German naturalist T.W. von Goethe (1749-1832) who replaced French anatomist F.Vicq d’Azur’s (1746-1794) functional anatomy with a

focus on morphological anatomy. Goethe's claim is that "each animal is a small world, existing for its own sake, by its own means" – the changing forms in nature.

The French naturalist Etienne Geoffroy Saint Hilaire (1772-1844) established the principle of "unity of composition" based on comparative anatomy and embryology. He was a colleague of Jean-Baptiste Lamarck (1744-1829) and defended Lamarck's revolutionary theories. Saint Hilaire explained the changing of life forms historically under the influence of the environment on them, that the environment causes a direct induction of organic change. Georges Cuvier (1769 – 1832), a strong opponent of his colleague Lamarck's theory of evolution recognized the organism-environment relation interpreted in a theological sense.

The French philosopher, Jean-Baptiste Lamarck created the first successively developed evolutionary theory where the idea of the progress of life forms was connected with their historical development. However, E.G. Saint Hilaire and J.-B. Lamarck in spite of their discord with G. Cuvier in some issues shared their views on the organism-environment relationship.

Charles Darwin (1809-1882) regarded changes occurring in live organizations due to indirect influence of the environment on the evolution of organisms. Darwin's theory of evolution became a new epoch in the development of life sciences. In this period the classical natural history was being replaced by the science of biology where the organism should be regarded in close contact with occurring environmental factors of life. Gradually the "relation" category was declined.

Quite significant was the development of the Russian morpho-physiological school of the evolution of live organizations by two Russian scientists, Alexei Severtstov and Ivan Schmalhausen. In his "Morphological laws governing evolution" published in German in 1931 and - Russian in 1939, A. Severtstov analyzed diverse cases of the relations of form and function in phylogenesis linked with survival conditions. Ivan Schmalhausen emphasizes the relation of physiological or functional criteria of living organizations to ecological factors. His concept of the unity of the organism in individual and historical development and the origin of new biological disciplines (molecular biology, etc) illustrated a new approach in the organism-environment relation. Further development illustrates the interaction of human society as a factor causing changes in the natural environment.

Today the organism-environment issue is considered as one complete entity. In this exclusive role of the organism-environment relation, changes occur in the organism as well as the environment.

The 20<sup>th</sup> century scientific - technical revolution (John Bernal 1901 – 1971) has aggravated many issues especially the human – environment relationship. Man in his life takes all he can from nature since in itself it is a victory of man over the forces of nature. There is no escape from nature. "Let us not flatter ourselves for our human victories over nature" Friedrich Engels warned. "For every victory, it takes its revenge. We with flesh, blood and brain belong to nature and exist in its midst".

Traditionally in ancient economy the relationship with nature was based on harmony limited to strict rules of nature use and on subsistence farming. In his lifetime man adapted his activity to the environment without altering it. Clearly today, modern humanity cannot return to the Stone Age, but to continue in its present state is impossible.

If we concert our efforts to decrease environmental pollution only by regulation of harmful emissions and by removing the consequences of ecological disasters, it will not lead to global improvement of the environment. An environmental crisis begins from an erroneous understanding by humans of their relationship with the environment, often blamed on human materialism. Our opinion is that humanity cannot survive in an artificially created environment. That is why for overcoming the environmental crisis it is, first of all, necessary to realize our spiritual nature, to value moral and not material growth and to tame the mad aspiration to produce and consume. There is enough on earth for everybody's need, but not for everybody's greed (Gandhi).

Development of environmental mentality for social consciousness and a search for real forms of interaction and possibilities for cultivating human and natural transformations from a human consumer to a human conserver will lead to improvement in the situation.

## References

- Alekseev S.A., Filatova F.N. 1981. Category of truth and environmental orientation of society (evolution from the Middle Ages to modern times). – Tsennostnie aspekti nauki y problemi ekologii. – M.: Nauka; P. 133-170
- Berg R.L. 1966. Problems of holism of live systems in works of I.I. Shmalgauzen. – Problemi kibernetiki. – M.: Misl, issue 16; P.18
- Blyakher A. Ya. 1962. Essay on the history of animal morphology. – M.: Akad. Nauk SSSR; 263 p.
- Vernadsky V.I. 1981. Selected works on history of science. - M.: Nauka; P. 236-253
- Vernadsky V.I. 1989. Ideas and comments on Goethe as a naturalist // Izbrannie trudi po istorii nauki. - M.: Nauka; P. 242-289
- Goethe V. 1957. Selected works in natural science. – M.: Klassiky nauki; 430 p.
- Darwin Ch. 1939. Origin of species. – M.-L.: AN SSSR, Volume III; 307 p.
- Lamarck Jean Baptiste 1937. Phylosophy of Zoology: 2 is. – Gos. Iz-vo boil. Y med. Lit-ri. – M.-L., – vol. 2; 483 p.
- Losev A.F. 1957. Ancient mythology and its historical development. - M.: Nauka; P. 12

- Lunkevich V.V. 1960. From Heraclitus to Darwin. – M.: Prosvetschenie; 480 p.
- Malinovsky A.A. 1969. Path of the theoretical biology. – M.: Znanie; 62 p.
- Polyakov I.M. 1937. Lamarck and lamarkism. Introduction paper on Lamarck's Philosophy of Zoology. - Gos. Iz-vo boil. Y med. Lit-ri. – M.-L.; 88 p.
- Polyakov I.M. 1959. Philosophical views of Lamarck. Voprosy filosofii, - № 11; 57 p.
- Pusanov I.I. Jean-Baptiste Lamarck. 1947. Founder of transformism. – M.: Iz-vo Moskovskogo obschestva ispitateley prirodi; 39 p.
- Rozhansky I.D. 1979. Development of natural sciences in the Ancient Age. – M.: Nauka; 483 p.
- Sakharov V.V. 1968. Organism and environment. – M.: Znanie; 46 p.
- St. Hilaire E.G. 1862. On the influence of the environment to changes in animal forms. Phylosophy of Anatomy. – M.: Litogo. Bespechago; 395 p.
- Severtsov A.N. 1939. Morphological laws governing evolution. – M.-L.: AN SSSR;– 610 p.
- Timiryazev K.A. 1939. Historical method in biology. In 7 vol. AN SSSR. – M., – V.5; P. 416-417.
- Zeller E. 1996. Essay on the history of Greek philosophy. Translated from German. – St. Petersburg: Aleteya; 294 p.
- Schmalhausen I.I. 1982. Selected works. The organism as an entity in individual and historical development. – M.: Nauka; 380 p.
- Schmalhausen I.I. 1983. Selected works. Paths and laws governing the evolutionary process. - M.: Nauka; 357 p.

<http://darwinmonkey.com/gallery.html>