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MAIN FEATURES OF MODERN NATURAL SCIENCE

Abstract: *The article examines the main features of modern natural science.*

Key words: *scientific and technological revolution, global evolutionism, civilization, natural science, science*

ГЛАВНЫЕ ОСОБЕННОСТИ СОВРЕМЕННОЙ ЕСТЕСТВЕННОЙ НАУКИ

Аннотация: *В статье исследуются основные черты современного естествознания.*

Ключевые слова: *научно-техническая революция, глобальный эволюционизм, цивилизация, естественной науки, наука*

Scientific and technological revolution is a concept used to denote the qualitative transformations that took place in science and technology in the second half of the 20th century. The beginning of scientific and technological revolution dates back to the mid-40s. XX century In the course of it, the process of the transformation of science into a direct productive force is completed. The scientific and technological revolution changes the conditions, the nature and content of labor, the structure of the productive forces, the social division of labor, the sectoral and professional structure of society, leads to a rapid increase in labor productivity, affects all aspects of society, including culture, everyday life, human psychology, relationships society with nature.

The scientific and technological revolution is a long process that has two main prerequisites - scientific and technical and social. The most important role in the preparation of scientific and technological revolution was played by the successes of natural science at the end of the 19th - at the beginning of the 20th centuries, as a result of which a radical change in views on matter took place and

a new picture of the world was formed. The electron, the phenomenon of radioactivity, X-rays were discovered, the theory of relativity and the quantum theory were created. A breakthrough of science in the field of the microworld and high speeds has taken place.

The last three decades of the 20th century were marked by new radical scientific advances. These achievements can be characterized as the fourth global scientific revolution, during which post-non-classical science was formed. Having replaced the previous non-classical science of the first half of the 20th century, this newest period in the development of natural science, which forms the natural science component of the second stage of the scientific and technological revolution, is characterized by a number of features.

Firstly, this is the orientation of post-nonclassical science towards the study of very complex, historically developing systems (among them, a special place is occupied by natural complexes, in which the person himself is included as a component). The concepts of the evolution of such systems are introduced into the picture of physical reality through the latest ideas of modern cosmology (the concept of the "Big Bang", etc.), through the study of "human-sized complexes" (objects of ecology, including the biosphere as a whole, the "man-machine" system in the form of complex information complexes, etc.), and, finally, through the development of ideas for thermodynamic nonequilibrium processes that led to the emergence of synergetics.

Secondly, an important area of research in post-nonclassical science is represented by objects of biotechnology, and, first of all, genetic engineering. The successes of the latter at the turn of the XX - XXI centuries. are determined by the latest achievements in biology - in terms of decoding the human genome, posing and solving the problems of cloning higher mammals (these problems, we note, include not only natural science, but also socio-ethical aspects).

Thirdly, post-non-classical science is characterized by a new level of integration of scientific research, which has found expression in complex

research programs, the implementation of which requires the participation of specialists in various fields of knowledge.

For a long time, the idea of the absence of the phenomenon of self-organization in inanimate nature dominated in science. It was believed that objects of the inorganic world are capable of changing only in the direction of disorganization. The latter means that in accordance with the second law of thermodynamics, systems of inanimate nature can "evolve" only in the direction of increasing their entropy, and hence chaos. It was believed that self-organizing processes are inherent only in living systems.

The first serious efforts to scientifically study questions of self-organization were undertaken in cybernetics. This science dealt with both living and technical (built from non-living matter) controlled and self-regulating systems, i.e. with systems in which self-organization is embedded from the very beginning. Cybernetics was interested in homeostatic systems that maintain their functioning in a given mode. The very concept of homeostasis indicates that in a homeostatic system we can only talk about self-organization aimed at achieving the optimal structure of its elements. This idea makes it possible to understand the fact of stability and preservation of systems (including living ones). But from the standpoint of homeostasis, it is impossible to understand how new systems arise, and not only in living, but also in inorganic nature. In addition, the problem of homeostasis in cybernetics is considered from a purely functional point of view, and therefore it does not analyze specific mechanisms of self-organization.

Gradually, an increasing number of facts were accumulated in science, indicating the emergence of ordered structures and the phenomenon of self-organization in inanimate nature under certain conditions. Even everyday observations (the formation, for example, of sand dunes, vortices on water, various kinds of crystals, etc.) indicate that in inanimate nature, along with disorganization, self-organization also occurs, which manifests itself in the

emergence of new material structures. It is currently considered established that the processes of self-organization (as well as, of course, disorganization) can occur in relatively simple physical and chemical environments of inorganic nature. And this means that the simplest, elementary form of self-organization takes place already within the framework of the physical and chemical forms of motion of matter. Moreover, the more complex the form of motion of matter, the higher the level of its self-organization.

These observations and generalizations led to the emergence of synergetics - an interdisciplinary scientific direction that studies general and universal mechanisms of self-organization, i.e. mechanisms of spontaneous emergence and relatively stable existence of macroscopic ordered structures of the most varied nature. Synergetics erases the seemingly insurmountable boundaries between physical and chemical processes, on the one hand, and biological and social processes, on the other, because it explores the general mechanisms of self-organization of both.

Synergetics originated in your country. Back in the 60s of the XX century, the Russian scientist E. Belousov began interesting experiments with the so-called autocatalytic chemical reactions, which were then continued by A.M. Zhabotinsky. These experiments showed that the presence of autocatalytic reactions significantly accelerates the processes of self-organization in the chemical form of motion. Strong assumptions were made that it was the autocatalytic self-organizing chemical processes that served as the basis for the transition from the prebiological to the biological form of the motion of matter.

German professor G. Haken (Institute of Synergetics and Theoretical Physics in Stuttgart) managed to unite a large international group of scientists, who created a series of books on synergetics. These works presented the results of studies of self-organization processes in various systems, including social ones.

The formation of synergetics in the last quarter of the 20th century turned out to be somewhat similar to the formation of cybernetics in the middle of this century. This similarity is based on the found commonality in the phenomena that take place in the systems of inanimate and living nature, as well as in social systems. Self-organization processes take place in all these material systems.

However, there is also a significant difference between cybernetics and synergetics. Cybernetics, which arose at the turn of the 40-50s of the XX century, claimed general scientific importance in the study of control processes that take place in some inorganic (man-made), biological and social systems. And, I must say, it has successfully defended its general scientific status. Synergetics claims more today: it is already acting as a new outlook on the world, as the basis for the concepts of global and cosmic evolutionism.

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