NATURAL SCIENCES AND THE SCIENTIFIC PICTURE OF THE WORLD

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ABSTRACT
In the science article, physics, chemistry, biology, geography, ecology are considered together and a single scientific view of the universe is interpreted. The significance of Newton's classical mechanics in describing the scientific picture of the universe and the issues of ensuring a unified scientific worldview of students in a general education school are highlighted.

Keywords: Universe, Newton, atom, classical mechanics, circle, mechanics, thermodynamics, electrodynamics, optics, atomic and nuclear physics, quantum mechanics.

It is important to give an idea of the scientific picture of the world and to show the connections of natural science with classes in the classroom and extracurricular activities in general education schools. Classical Newtonian mechanics plays a special role in describing the scientific picture of the Universe. Once upon a time, all phenomena in nature were produced on the basis of the laws of Newtonian mechanics, but the manufactured microparticles showed that the connections are not based on Newtonian laws. Determination of the structure of the atom, X-rays, radioactive phenomena, Frank-Hertz experiments showed that the conditions for the connection of elementary particles depend on the laws of quantum mechanics. It should be noted that biological living beings also consist of chemical elements, and the laws of physics are equally applicable to biology and chemistry. In order to form a scientific picture of the world among students, it is important to scientifically substantiate the connections between such subjects as physics, chemistry, biology, biophysics, and biochemistry. Extracurricular group activities can be used to form a scientific picture of the world in the minds of students, holding such groups in the form of a seminar based on questions and answers will further increase students' interest.

Why are there so many natural sciences such as physics, chemistry, biology, etc.? Each of these branches further into several areas. For example, physics includes mechanics, thermodynamics, electrodynamics, optics, atomic and nuclear physics, quantum mechanics, etc. Of course, a large number of such disciplines and areas testifies to the objective complexity and versatility of the universe around us. In such cases, the following approach to problems is adopted in science: first, analysis, and then synthesis (generalization). In practice, the problem under study is divided into several small parts, that is, elements, and the connections, relationships and effects between them are studied. The components are analyzed, then the elements are combined again and the results of the analysis are studied. Synthesis is based on the results of analysis, and things and events are studied as a whole. If analysis is a preparatory stage of cognition in the research process, then synthesis completes it.

What is the main goal of science? The whole universe is a single whole, all its parts do not exist separately, but in unity, therefore our main goal is to study the universe only in unity. The study of the Universe as a unit, as a whole, makes it possible to observe and predict its changes, science can only be a science if it can predict in advance. From this point of view, there are certain shortcomings in the centuries-old process of development of natural science, for example, due to the great influence of man on the activity of the biosphere, it is necessary to take into account not only natural science, but also sociological or social sciences, economic laws and processes that affect development.

We turn to very ancient times in order to lay the physical foundations of natural science, a natural-scientific view of the universe. In 585 BC The Greek naturalist Thales became famous for predicting a solar eclipse, which was actually observed at that time in Greece. Pythagoras, a Greek scientist who lived in the 6th century BC, studied the sequence of numbers in arithmetic, the properties of plane figures in geometry, and discovered the theorem that bears his name. At this time, the physician, physiologist and philosopher Empedocles explained that the phenomenon of a solar eclipse is due to the passage of the Moon between the Sun and the Earth. He realized that since light travels at such a high speed, we do not perceive the time of its travel. Scientists of antiquity achieved certain success in mathematics (Euclid, lived in the 3rd century BC), astronomy (Ptolemy, lived in the 2nd century BC). Central Asian thinkers made a great contribution to the formation of elements of scientific knowledge in the Middle Ages. Al-Khwarizmi created the decimal number system. Al-Biruni proposed a method for determining geographical coordinates. Al-Ghazen contributed to the development of optics. Avicenna created one of the first classifications of sciences, gained fame as a talented doctor.

G. Galileo and I. Newton made revolutionary changes in mechanics in the 16th-17th centuries. Galileo, using the law of inertia, showed that the rectilinear motion of a body is equal to its state of rest, explained that no body can change the direction and magnitude of its speed without the action of a force, and for the first time bring mechanics to the level of theoretical science.

The most fundamental laws of nature are presented in the work “The Mathematical Principle of Natural Philosophy” written by I. Newton in 1687, in which he substantiated his three basic laws, therefore classical mechanics is also called Newtonian mechanics. The laws of classical mechanics are applicable to bodies of large mass moving at relatively low speeds. All Newton's laws arose as a result of generalization of the facts obtained in many experiments. As a result of the popularity of Newton's laws in physics, attempts were made to explain all phenomena in nature on the basis of these laws, but it turned out that interactions between microparticles and movements close to the speed of light do not obey the laws of Newtonian mechanics.

The Polish astronomer N. Copernicus in his work “On the rotation of the celestial sphere” (1543) sheds light on the heliocentric theory that the Sun is at the center of the Universe, and finds a geocentric theory that convinces that the Earth is at the center of the universe is wrong. During this period, the Italian scientist J. Bruno proved that the Universe has no center, it is unlimited and consists of an infinite system of stars. The theory of N. Copernicus and the ideas of J. Bruno were confirmed by G. Galileo through a telescope he made, he was able to see craters and mountain ranges on the Moon, the constellations of stars that make up the Milky Way, the moons of Jupiter and spots on the Sun. The German astronomer I. Kepler discovered the laws of motion of the planets in the solar system. These discoveries confirmed the Copernican theory. As a result, these ideas began to spread rapidly among people. The Roman Church banned the works of N. Copernicus, in 1633 the Inquisition of the Roman Church staged a trial of G. Galileo and forced him to renounce his ideas. Galileo admitted that he was "wrong" and was forced to abandon his ideas.

At the end of the 17th century, a revolutionary turning point took place in mathematics, the English scientist I. Newton and, without suspecting it, the German mathematician G. Leibniz introduced integral and differential calculus into science. These studies formed the basis of the science of mathematical analysis and became the mathematical basis of all natural sciences. During this period, R. Descartes and P. Fermi founded the science of analytical geometry with their scientific work.

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In the middle of the XVII century. natural science began to include ideas about the evolutionary development of natural phenomena, which reflected the scientific works of I. Kant, M. V. Lomonosov, P. S. Laplace, who developed hypotheses about the natural origin of the solar system, played a major role. M.V. Lomonosov (1711-1765) experimentally determined the law of conservation of matter, substantiated it theoretically and gave an idea of the law of conservation of motion.

The basic laws of thermodynamics were discovered by the scientific work of a large group of scientists - N. Carnot, J. Mayer, G. Helmholtz, R. Clausius, Thomson, W. Nerst and others, one of which was the law of conservation of energy, which was accepted as a general scientific law . M. Faraday and D. K. Maxwell founded the theory of the "Electromagnetic field". Of particular importance for the development of theoretical thinking in biology were "Cell Theory" by T. Schwann, M. Schleiden, Yu. E. Purkin and "Evolutionary Theory" by Ch. Darwin.

Until the end of the 19th century, all natural sciences developed, and after mechanics, chemistry, thermodynamics, and electricity belonged to the theoretical sciences. In 1861, A. M. Butlerov formulated the doctrine “On the chemical structure of molecules”, in 1869 D. M. Mendeleev discovered the “Periodic Table of Chemical Elements”. In physiology, I.M. Sechenov discovered "Higher Nervous Activity". The continuation of this idea was discovered by IP Pavlov (1855-1935) "conditioned reflexes". At the beginning of the 20th century, a second revolution took place in physics and natural science as a whole, i.e., a realistic and quantum-mechanical view of the world was recognized. These include "Electromagnetic waves" discovered by G. Hertz, "X-rays" by Roentgen, "Radioactivity" by M. Becquerel, "The element of radium" by M. Sklodowska and P. Curie, "Light" of pressure by P. K. Lebedev. ”, “The First Theory of Quantum Theory” by M. Planck and other discoveries that caused. As a result of these discoveries there was a historical change in the physical picture of the World. If before Maxwell physical existence was represented in the form of material points, then physical existence was considered to consist of continuous fields that could not be explained from the point of view of mechanics. In the twentieth century, a new era has come, the physical picture of the World has become a fundamentally new realistic and quantum mechanical picture.

The scientific picture of the world serves as a link between philosophical science and theories of specific sciences. As a result of the interaction of such sources, new theoretical principles and categories of natural science arise.

Some concepts of the scientific picture of the universe include the achievements of science that determine the place of man in it. In this case, the scientific picture of the world does not show the sum of general knowledge, but a complete system of ideas about the general properties, state and laws of nature. Thus, the scientific picture of the world is a synthesis of various scientific theories and their qualitative generalization, a special form of a unique system of knowledge.

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