

WORLDVIEWS OF ANCIENT SCIENTISTS IN THE FIELD OF PHYSICS

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Abstract. This article presents the views of ancient scientists in the field of physics, as well as their hypotheses about the structure of the atom, as well as their role in the development of physics.

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Leucippus is considered the founder of the doctrine of atoms, but practically nothing is known about him, therefore the creation of ancient atomism is associated mainly with the name of Democritus, a younger contemporary of Socrates and an older contemporary of Plato. Democritus wrote, according to some reports, many works and enjoyed great prestige among ancient writers, there were legends about his life and wisdom, but none of his works have survived - only fragments of them have been cited in the works of other philosophers and compilers. The best source for acquaintance with this historically first form of the doctrine of atoms as true being is Lucretius's poem "On the Nature of Things", which has been completely preserved to our time [1].

The famous American physicist Richard Feynman spoke well about the significance of atomism for world culture: "If, as a result of some kind of global catastrophe, all the accumulated scientific knowledge would be destroyed and only one phrase would pass to the coming generations of living beings, then what statement, composed of the smallest number of words, would bring the most information? I believe that this is the atomic hypothesis...: all bodies are made up of atoms – small bodies that are in constant motion... This one phrase... contains an incredible amount of information about the world, you just need to apply a little imagination and a little consideration to it... Everything consists from atoms. This is the most basic statement." It can be said without much exaggeration that all modern science is the result of applying this main idea alone to the explanation of a huge number of facts of experience.

Among the ancient atomists, the idea of the atom, however, is not only a physical principle, but a general philosophical, metaphysical principle underlying the general theory of being.

Atomistics is based on two more general principles of ancient natural philosophy and scientific thinking in general that are already well known to us.

Democritus proceeds from the fact that nothing comes from nothing; nothing that is can be destroyed; all change is only the union and division of the unchanging. Democritus fully shares the idea of Parmenides that being, or being, can neither arise, nor change, nor disappear. Epicurus, a follower of Democritus, also put this principle in first place, adding: "the universe has always been the way it is now, and always will be, because there is nothing into which it will change; because apart from the universe there is nothing that could enter into it and make changes."

Nothing happens by chance, but everything happens for a reason and necessity. The view of Democritus on causality was received in the 19th century. called Laplacian determinism. There is no randomness in the world itself. "Accidental" people call something for which they do not know the reasons. "People have created an image of chance to justify their foolishness" (fragment 798). But these reasons exist. Everything that happens has a well-defined cause, from which it necessarily follows. In other words, the concept of randomness characterizes not the world, but our knowledge about it, its limitations, insufficiency [2].

Thus, the principle of the conservation of matter or substance and the principle of causality - the two most general and important principles of unity and coherence, the regularity of nature - also lie at the basis of the atomistic principle, are assumed by it.

Atomistics further specifies what exactly is preserved during all changes in nature (what is “being”, or “being”), what, in fact, the changes are, and how the causal relationship is carried out.

Many facts of everyday and handicraft experience testify that the bodies and substances around us consist of invisible parts or particles. Say, one of the most important "materials" of the ancients was clay (by the way, Indian philosophers also have one of the images of the absolute Brahman), in which there were grains of quartz, "uncut" with a knife. The smell testifies to the existence of invisible particles that are emitted by the odorous body and, getting into the nose, cause the sensation of smell. The same is evidenced by the phenomena of gradual drying and evaporation (water leaves completely in a certain time, therefore, it leaves gradually, that is, in parts) or gradual abrasion (steps in a temple, for example). This is also evidenced by the ability of bodies to shrink and expand, to have different densities. The baby feeds only on mother's milk, but his bones, muscles, hair, etc. grow. - it means that milk contains a variety of particles, which gradually form the human body, which again “decomposes” after death, and its constituent particles are again dispersed in nature, are part of other bodies.

Lucretius stated in his famous poem that he could enumerate the facts testifying to the existence of atoms until his death. Since the time of Lucretius, the number of such facts of experience, observation and experiment has increased so much that they have become simply boundless.

Noticing that bodies differ in the degree of their hardness and softness, one can assume the existence of limits in both directions - both absolutely soft (completely shapeless, plastic) matter, and absolutely solid bodies, i.e. those bodies whose shape cannot be changed. Democritus, by the way, calls the atom an "indivisible form", as well as an "eidos" or "idea", referring precisely to the immutability, eternity of their imaginary external "appearance". Note that the immutability of the form of the atom contradicts the very concept of “matter”, which originally, among the Milesians, appears as the idea of plasticity, a formless beginning in itself, a substratum that can take any form.

Democritus does not agree with Anaxagoras, with his idea that if “existing” cannot be destroyed and at the same time divisible, then there is no limit to division, therefore, any body is divisible to infinity. We do not know the argumentation of Democritus, but it is possible that the course of his thought was approximately the following. The fact is that the whole exists only because of its parts. The whole is not simply "the sum of the parts", so to speak, simply "all parts", but in any case it is clear that if there are no parts, then there is no whole. The tree exists only due to the fact that there are cellulose molecules. A molecule exists only due to the fact that there are carbon, hydrogen and oxygen atoms of which it is composed. If there were no atoms in the world, then there would be no molecules, like compounds of atoms.

Atoms, in turn, exist only due to the presence of so-called elementary particles - electrons, protons, neutrons. Etc. Suppose now that the bodies are divisible to infinity. From what has been said it is clear that if bodies are divisible to infinity, then they are also divided to infinity, for the reality of the whole presupposes the reality of the parts. In other words, every finite thing consists of an infinite number of parts, among which there is no smallest. From this it follows that if you mentally eliminate addition itself, the method of connecting particles, then nothing will remain: addition exists (the process of connecting parts itself), but what is added does not exist! Everything complex logically presupposes something simple. There is no simple, there is no complex. Thus, the division must have a limit, otherwise the bodies will simply "disappear". Therefore, indivisible atoms exist. Thus, the recognition of the indivisibility of atoms is no longer an obvious experimental fact, but the result of a logical conclusion, speculative reasoning.

These definitions must be deduced from the fact that they are accepted as the ultimate foundation of everything that exists and happens in the world. If they serve to explain all generation, change, and destruction, then they must themselves be eternal and unchanging. If by means of atoms we are to explain all the qualitative differences of things, then all atoms must be the same in their quality, that is, they must consist of a homogeneous or one-quality substance. But in order to be able to explain the change with the help of unchanging principles, the movement of atoms is necessary. If this movement is inherent in bodies, the form (appearance) and quality of which are unchanged, then this movement is reduced only to their connection and separation, i.e. - mutual movement, change of only one relative position. Movement is the same primordial property of atoms, inherent in them "by nature", as well as absolute hardness or invariance of form. In addition,

colliding with each other, they transmit their movement, affect the movement of other atoms through impact, push.

References.

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