

ECOLOGICAL PERCEPTION OF THE WORLD

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Vladimir Vernadsky is a great figure in world science. Priority in discovering the main laws governing the operation of the Earth's lithosphere, hydrosphere and low atmosphere belongs to him. The scientist advanced to this goal during all his scientific activity, combining the work on specific problems of sciences about the Earth with tackling inter-discipline tasks of a global scale. Vernadsky has created new scientific disciplines and branches of science—genetic mineralogy, geochemistry, the theory of natural waters, meteoritics, radiogeology, space chemistry, biochemistry and science on resources. He is a prominent historian of science and its organizer. He is also the author of the doctrine on living matter, the biosphere and the noösphere, which crowns his tremendous work and heuristic insight.

The current rapid spread of his ideas in various countries among scientists, writers, statesmen and, in general, all who are interested in the problems of interaction of society and nature can be viewed as a genuine triumph of Vernadsky's ideas. His concept of living matter, the biosphere and the noösphere is a kind of ecological triptych on which the strategy of control over the environment by man must be built.

Vernadsky's encyclopedic interest in nature, his numerous expeditions in Russia and abroad, the work at Moscow University and the Academy of Sciences, the communication with the world's most prominent scientists, and his tremendous purposefulness in work have produced truly fantastic results consisting of over 600 scientific papers permeated with the spirit of innovation and high creative revelation.

Vernadsky changed and deepened the ideas of the biosphere evolved by Jean-Baptist Lamarck and later by Eduard Suess. He proved that living matter does not simply permeate the upper part of the lithosphere, the entire hydrosphere and the lower atmosphere of the Earth, but also acts as a force regulating the substance and energy flows which link the three aforesaid spheres into an integral system. The oxygen atmosphere, the constancy of chemism of the waters of land and oceans, and the presence of continental elevations with their granite layer within the lithosphere - all this is an expression of integration of the operation of the planetary biota and the processes in the non-organic nature of the Earth. According to Vernadsky, the biosphere is not alone a field of manifestation of present-day life but also nature's materialized memory which preserves the old traces of the interaction of living and inanimate things. The biosphere is a giant, reliable and comfortable receptacle of life which was more fitted out by it than primordial.

Having proved that the biosphere is a global ecosystem, in the work "Biosphere in Space" (1944) Vernadsky formulated the principal law of geological development which can be regarded also as the main law of ecology. It ensues from it that the planetary biota plays the

central, key role in the global ecosystem and that living matter is not an ordinary component of the natural environment but acts in it as a supracomponent. Its state can serve as an indicator of the health of the biosphere as a whole.

And in what state is this health now? Man has already destroyed over 40 per cent of the planetary biomass and, probably, at least 20 per cent of the soil humus. Deforestation of land proceeds at a rate of 6-20 million hectares and desertification at 5-7 million hectares a year. The forests of Western and Central Europe and of the east of North America are sick as a result of the precipitation of acid fall-out on them and of the effect of various photo oxidants. Facts testify to a very alarming condition of the natural environment. It also ensues from the law that the Earth's biota should not be viewed only as a "working horse" which regenerates ecological resources. The capability of living matter to transform the environment, to organize it in a certain way proves that it possesses control functions. Spontaneous violation of them by man and deliberate violation which man tries to justify by the aim of building a "second nature" are equally ruinous for the biosphere.

Vernadsky regarded man's incursion into nature as a logical result of the accelerating geological development. "By a law-governed movement (evolution of nature is meant here) which has lasted for a billion or two years at a rate which manifests itself ever more, mankind embraces the whole planet, singles out and moves away from other living organisms as a new unprecedented geological force", he writes. The mastering of fire "underlies the whole subsequent growth of mankind and our present strength." Under its effect "the Biosphere is changed by man intentionally and mainly unintentionally." The anthropogenic destruction of the stratospheric ozone layer which is now under way and which, naturally, was not planned by anybody is an indisputable proof of the spontaneity of its change.

For all that, Vernadsky called the anthropogenic transformation of the biosphere, which is far from being idyllic, an entry into the noösphere, i.e. the sphere of reason, because it is linked, above all, "with the growth of scientific thought"... and "mankind's social labor based on it...".

Vernadsky noted that the natural environment has lost its relative stability, "...The creation of the noösphere by human thought and work, which has begun, changes the whole atmosphere of its (humanity's) history and does not make it possible to simply compare the past with the present as it was admissible in the past", he wrote. There are no reasons to object to this conclusion, knowing that the rapid change of the composition of the atmosphere by man can result in Mesozoic heat already in a few decades, though there are diametrically opposite forecasts, too. If the temperature changes do not go beyond the limits of ordinary ones people will witness an astonishing increase in the productivity of landscapes and water supply in them as a result of the growth of the fertilizing and anti-transpiration effect of carbon dioxide. To take into account the long-term tendencies of the development of the natural environment in the development plans of various countries is a difficult scientific task of our time.

Vernadsky viewed elimination of wars from the life of society as the greatest task of the 20th century. He did not doubt that "an immense future opens up before man if he realizes this

and does not use his reason and labor for the aims of self-destruction". Intuition prompted him that the nearing mastering of atomic energy by man would become a major turning-point in the development of human society and evolution of the biosphere. "Will man utilize this force, use it for the good but not for self-destruction? Is he mature enough to be able to use the strength which science must inevitably give him?" - Vernadsky asked the now living inhabitants of the Earth back in 1922.

His assessment of the scale of military uses of the forces of the atom was correct. The scientists have now indisputably proved the disastrous character of a nuclear conflict for civilization and for the global ecosystem. This imparts an altogether new ecological character to the struggle for peace and disarmament. In essence, it is the "pressure of life" comprehended by mankind—the force without operation of which preservation of the organization of the biosphere and the further coevolution of animate and inanimate nature are impossible. Complete elimination of military force from the attributes of the world community would be not simply a phenomenon of civilization but also the most appreciable manifestation of the greatest importance of the function of living matter from the moment when man became singled out from it as an independent planetary force.

Will the Earth's biospheric mechanism created over more than 4 billion year of geological history continue to exist or not? Such is the price of success or defeat of the anti-war movement in the nuclear age. For this reason, the positive effort of the governments of two great powers and the signing by General Secretary of the CPSU Central Committee Mikhail Gorbachev and President Ronald Reagan of the USA of the Treaty between the USSR and the USA on the elimination of their intermediate and shorter-range missiles was a kind of "moment of truth" for mankind and the biosphere. This act was the first embodiment of people's intuitive and realized striving to operate on the noöspheric level. No doubt, such a turn in the organization of the world community will yield its fruit also during the resolution of the major global problems in the future, sprouts the noösphere too, and one cannot but view this as the noösphere which is shaping up. "Creation of the biosphere requires manifestation of mankind as an integral whole. This is its inevitable prerequisite", Vernadsky stressed.

Vernadsky viewed the organized character of the biosphere as evidence of the fact that life is a logical attribute of a well-adjusted space mechanism. The flight of Soviet and American spacemen to Mars will be to a certain extent a check of this point of view.

Vernadsky, a man of genius, left his ecological perception of the world, which is unique in its simplicity, figurativeness, convincingness, integrity and prescience, as a priceless gift of science to people. He believed that man would replace the domination over nature by control of it, and has done more than anybody else for this purpose. His scientific heritage will always be a source of ideas and inspiration for researchers. It is necessary to mankind for progress.