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Globalization And Agrarian Civilazation

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ABSTRACT
The paper presents a review of the events preceding the formation of an interdisciplinary research area, globalistics, and discusses some historical factors in its establishment. The globalistics is reviewed as a scientific discipline studying the history of agrarian civilization and the results of its interaction with the natural ecosystems. Impacts of some doctrines in the formation of a new sphere of scientific knowledge, globalistics, are reviewed. These include the doctrines of: V.I. Vernadski on biosphere, N.I. Vavilov on centers of domestication, N.D. Kondrat'yev on cycles of the global economics.

Keywords: globalistics, globalization, agrarian civilization, domestication, natural ecosystems, biosphere, noosphere.

GLOBALISTICS

Globalistics is a relatively new area of the scientific knowledge bringing together the research data of a variety of fundamental and applied aspects of global phenomena [Ilyin, 2010]. By its nature, globalistics is a unifier promoting production of some whole new interdisciplinary information. Conceptions of special features of this new branch of science, formulated to the present moment, declare it as a methodology for researches in the systems of globalism and globalization processes, and their matter, development trends and after-effects, global and regional strategies, and methods of global strategic planning and forecasting. Globalistics studies light-system relations and their global regulation, global transformation in various living environments of the world community, global problems of the Earth civilization existence, the main directions and motivations of the humanity safety development [Vlasov, 2009]. Tens monographs research processes of globalization and globalistics to the present moment, and hundreds articles on this issue are published yearly.

The first attempt of 455 scientists and experts from 28 countries to piece together available international material on the global processes was successful, and their monograph, encyclopedia "Globalistika" [Globalistics, 2003], has been issued already. It contains extended analysis of historical roots of both onset of human activity associated global processes and history of a new science direction, globalistics.

As a rule, the first stages in the formation of a new research sphere connecting different academic fields are taken by the theoretical approaches: in case of the globalistsics, these were concepts of globalization phenomena, first of all, of the economic, social, politic and cultural ones. Usually, the leading material bases of this sphere, that is, history of the Earth and of the agrarian civilization, to which all humanity belongs, and perspectives of their interactions, stay beyond these discussions. At that, while the onset and formation of the globalistics as an interdisciplinary sphere of scientific knowledge occurred in the last third of the XXth century [Ilyin, 2010], the globalization process by itself has, according to A.N. Chumakov, deep historical roots descending to the Neolithic Evolution Era [Chumakov, 2005], that is, to the period of the agrarian civilization onset and expansion.

FUNDAMENTALS OF GLOBALIZATION AND GLOBAL RISKS: DEVELOPMENT OF THE AGRARIAN CIVILIZATION

Formation of the social community of the agrarian civilization founders, the initial community of the modern humanity ancestors, began about 13 thousand years ago from the early experiments in domestication of plants and animals and today it is understood rather well [Zeder, 2008]. Development of this scientific direction was highly influenced by the researches of Nicolay Ivanovich Vavilov [Vavilov, 1992]. A domestication process became a key for growth and advancement of our civilization and predetermined its global demography. It was estimated to be founded by approximately 10 ths. persons, whose descendants distributed all over the world [Barendse et al., 2009]. For example, now about 88% of all people speak several languages belonging to one of the seven linguistic groups originating from two Eurasia regions that became the first centers of domestication (Mesopotamia and a part of China) [Binford, 1968]. We get more and more information telling that the agrarian civilization was spread mainly due to special combinations of climate and soil features. For example, J. Beck and A. Sieber [2010] proposed a simplistic «null model» assuming that suitability of four main landuse types – complex (plant-growing and animal farming) agriculture, sedentary animal husbandry, nomadic pastoralism, and hunting-and gathering – can be governed by climate and soil conditions alone. The authors used a method of ecological niches modeling (ENM) to get spatial predictions of lands suitability for these landuse types and superimposed a scheme of these predictions on the maps of the Old World and Australia. It showed that the model of a land suitability for various landuse types can explain an essential part of variability in the population density and correlates with the indices of local wealth generation [Gross Domestic Product (GDP) and Purchasing Power Parity]. The authors [Beck & Sieber, 2010] conclude that such a simple model based on the assumptions of the links between climate, soil and four types of landuse provides for good predictions of complex features of human distribution geography. Moreover, they reported on convincing data telling that the analysed landuse types and that two factors, soil and climate, are enough to control 40% of impact to GDP. Therefore, it is reasonable to expect that successful distribution of the agrarian civilization is conditioned by the balance between global gradients of soil and climate quality and, thus, by adaptive potential of humans and domesticated plant and animal species forming local agro-ecosystems. Within an interspecies community forming such a system, human genetic pools and genetic pools of domesticated species are connected with complex interrelations, whose features depend not only on the artificial selection but on an agro-eco-landscape background as well. We get more and more information on ever increasing dependence of economic development rate in various countries from degree of ecological degradation and decrease in biodiversity of natural and agricultural landscapes [Guo, Zhang & Li, 2010].

About 1.5 – 3 mln years ago, ancestors of a Modern Human made the first attempts to use fire and increased by that the non-renewable losses of living matter. These were the first steps on the way enhancing their confrontation with natural ecosystems and leading to a catastrophe, because this was the moment, when a human began to stand against natural ecosystems, and this may result in the degradation of ecosystems fatal for human existence. Today, destruction of natural ecosystems and devastation of forest ecosystems enhanced by the economic globalization are the main factors of global ecological changes [Lambin & Meyfroidt, 2011]. By now, a man as a species predominates at the Earth and his anthropogenic activity causes successive transformation of natural ecosystems into agricultural, industrial or urban lands, followed by increased consumption of ecosystem resources, such as fresh water, wood, soil fertility along with the boost in the capability of natural ecosystems to compensate an environmental damage (atmosphere and water pollution with solid wastes). Quite recently, relatively intact natural ecosystems occupied approximately 12% of the Earth surface, while today their share is only 1.4% [Guo, Zhang & Li, 2010].

The forces driving global development of agriculture and landuse could be distributed in three groups: 1) global scale drivers including climate changes, trade expansion, transnational integration of commercial farming chains along with establishment of international bodies for its regulation, such as agricultural support in the Organization for Economic Cooperation (OECD) and the World Trade Organization (WTO) (these include rapid globalization of science and knowledge access, facilitation of global communication options causing accelerated flows of information, technologies and products relevant to agricultural development); 2) country-scale drivers involving all agriculture within a country, though such factors as poor infrastructure and market access may lead to spatially differentiated impacts; 3) local-scale drivers specific for any person and determined by his/her ecologo-geographic area and type of agricultural production system. All these drivers cause direct or indirect changes [Hazell & Wood , 2008]. P. Hazell and S. Wood use drivers of these three groups to organize some main agricultural "domains" of global agriculture characterized by specific features and most unstable chain-links and thus needing some specific projects of development.

INSTABILITY OF GLOBAL RURAL INDUSTRIES

According to the estimations of various international organizations, no attempt to approach some stable development of the global agrarian sector met with success up to now. It's been a long time since growing intensity of food production effectiveness followed by the increased use of fertilizers, irrigation water, agricultural equipment, pesticides and land areas made necessity in sustain development of agrosystems evident. However, no clearly formulated concept of sustainable development of an agrosystem is available up to now. Some studies (for example, [13]) specify the following key principles allowing for the possibility to elaborate approaches to reach agrarian sustainability: 1) integration of biological and ecological nutrient cycles, nitrogen fixation, soil regeneration, allopathy, predators and parasites competition in food production processes, 2) minimization of use of those non-renewable inputs that cause harm to the environment or to the health of farmers and consumers, 3) use of high impact knowledge and increase in farmers awareness thus improving their self-reliance and substituting human capital for costly resources, 4) increase in productive use of people's collective capacities to work together to solve common agricultural and natural resource problems, such as for pest, watershed, irrigation, forest and credit management. These principles obviously cannot rule out any technologies or practices. Any technology working to improve productivity for farmers without undue harm to environment promotes sustainability. These principles are multifunctional and their realization varies depending on ecological and economical systems. The main their idea is balance of agricultural and ecological goods and services.

We need new approaches integrating biological and ecological processes in food production processes, minimizing use of those non-renewable inputs that cause harm to the environment or to the health of farmers, replacing expensive external resources with human capital, increasing effectiveness of people's collective capacities to work together and to solve common problems of optimization of agricultural and natural resource use, especially, for pest, watershed, irrigation, forest and credit management. These principles help us to establish new capitals of the agrarian system: natural, social, human, physical and financial. The main aim is increase in the natural capital, the maximal capitals can result use the better genotypes of cereals and animals, and environmental condition enabling their growing. Sustainability of agrarian systems implies concentration on improvement of genetic resources of agricultural species using all spectrum of modern biological approaches and search for novel management decisions, and modernization of control techniques for ecological and agrarian systems. Development of ecological approaches to agrarian systems management and energy flows control may result in agricultural modernization in microlandscape scales.

In the years since the "Green Revolution" of 1950th, dynamics of global food production is followed not only with a desirable increase in final yield, but with evergrowing environmental blacklashes, first of all, in form of gradual reduction of soil fertility and area of fertile soils due to various reasons. This process is followed by increased inputs of nonrenewable energy per a unit of crop output. For example, while global productivity of cereals in the period from 1960 to 2000 increased approximately 2.3-fold, impact of fresh water into yield of cereals increased 2-fold, nitrogenous fertilizers 10-fold, phosphorous fertilizers 7.5-fold, and pesticides 6-fold. Effectiveness of nitrogenous fertilizers impact into production of cereals yield unit dropped four-fold from 1960 to 2000 [Tilman et al. 2001, 2002].

Agrarian systems are an essential source of global environment pollution. Since 1960th, agrarian areas increased by 11%, from 4.5 to 5 bln ha, and area of croplands from 1.27 to 1.4 bln ha. While the industrial countries increased their agrarian areas by 3% only, the developing countries increased their areas by 21%. World amount of animal products increased four-fold also. At that irrigated areas increased twofold, use of various fertilizers four-fold, use of pesticides rose sharply and reached today 2.56 bln kg [Pretty, 2008], that is, unsustainability of the global rural industries became an obvious real fact. Association between growth of food production and degradation of ecosystems and decrease in non-renewable resources becomes now even sharper [Baulcombe, 2010]. A UK Royal Society working group chaired by David Baulcombe proposed a new conception of «sustainable intensification» of food resources implying increased impact of biological sciences into development of purposeful research programs of establishment of plant cultures resistant to stresses and diseases, conservation of biodiversity, use of renewable inputs and decreased loading of ecosystems.

Dynamics and direction of environment changes, physical and chemical transformations of the atmosphere, soils and ocean, and their coevolution with living objects are well recognized now. Over the past 150 years, human population increased five-fold, and consumption of non-renewable planet resources increased even more. Irreversible effects in form of land and sea ecosystems resulted these events. Human economic activities change the atmosphere essentially causing changes in the Earth thermal balance. The total of these factors leads to the decline in species diversity. It is expected that three following generation will increase the human population on the Earth up to 9-11 bln in several following decades. The generalized influence of our species on all other species and on the global Earth ecosystem will depend not only on the size of our population but on the way of our use of the world resources.

GLOBAL DECLINE IN BIODIVERSITY

The agrarian civilization is one of the main factors in the decline of the nature biodiversity by, at least, three reasons: transformation of the natural ecosystems into agrarian ones, and destruction of food chains and soils fertility along with the wide use of fertilizers and crop and animal protection chemicals. The humans have destroyed a lot of biogeographical barriers to distribute various species becoming aggressive colonizers of new ecosystems and changing them essentially. Use of fire for land clearing results in the destruction of existent structured communities and ecosystems. People now appropriate more than a third of all terrestrial primary production, and, in doing so, have simplified or destroyed large portions of some types of ecosystems, leaving behind fragments [Tilman & Lehman, 2001]. Many human environmental impacts became more than three times stronger within last 50 years, falling outside the ranges within which the majority of species evolved. Trends of the genetic erosion of agricultural species, in turn, become dangerous. In different countries they are caused by different reasons, however, the main of them is displacement of local plant kinds and animal breeds with improved or commercial versions. Moreover, this process is not controlled. Wide use of mineral fertilizers boosted the crop yields but at the same time it caused global nitrogen disbalance. Its further increase is a huge danger for millions consumers and corn growers [Hazell & Wood, 2008].

According to WHO estimations, 3 mln people are poisoned with pesticides yearly, and more than 200 ths. of them die; up to 25 mln agricultural workers are exposed to the direst dangers due to chemicals. Agricultural industry became one of the most hazardous activities. It occupies the second place for the number of mutagens after industrial wastes, beating in this index household chemicals, medicine and transport, and "provides" the humanity with 21% of all chemical mutagens. The pesticides were shown to cause numerous malfunctions in the nervous system, digestive system and reproductive functions. In the USA, pesticides are blamed in 10 – 18% deaths. The main today pesticide exporters — France, Germany, the USA, the Great Britain and Switzerland — make an essential part of their profits due to pesticide trade.

In 2002, the global leaders elaborated the Convention on Biological Diversity, CBD purposed to achieve a significant reduction in the rate of biodiversity loss by 2010. The investigation described in [Butchart et al.] includes analysis of 31 indicators evaluating the progress toward this target. Most indicators of the state of biodiversity (covering species' population trends, extinction risk, habitat extent and condition, and community composition) tell on their accelerated decrease associated with increase in indicators of pressure on biodiversity (including resource consumption, invasive alien species, nitrogen pollution, overexploitation, and climate change impacts). Despite some local successes, the target reduction in the rate of biodiversity loss was not achieved by 2010. The UN announced that year as the International Year of Biodiversity. It was estimated that yearly global economic costs of biodiversity loss is approximately 1.35 – 3.1 USD trillion [Marton-Lefevre, 2010]. Tropical deforestation (tropical forests reduce by 6 mln ha each year) leading to almost the fifth part of the greenhouse gas emission is the key component in the climate change. Loss of biodiversity reduces profits of our children by amount unknown today.

Life index of our planet tells that since 1970 abundance of wild species decreased by 30%, mangrove forests lost one fifth of their territories since 1980, and 29% algae species disappeared.

Recognizing the inability to halt damaging ecosystem change, the United Nations Environment Programme (UNEP) convened in December 2010 a special meeting «to determine modalities and institutional arrangements» in establishment of a new situation assessment body akin to the Intergovernmental Panel on Climate Change (IPCC), to track causes and consequences of anthropogenic ecosystem change [Perrings et al., 2011]. The «blueprint» for this body, Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) is included into recommendations of intergovernmental conference held in the Republic of Korea in June 2010 г. The recommendations were named as "Busan outcome" (www.unep.org/pdf/SMT_Agenda_Item_5-Busan_Outcome.pdf). However, these recommendations are rather guidelines, addressed to government bodies and concentrated on the assessment of the possibilities to make desirable decisions, which are necessary and recognized for rather long time now. The obvious inefficiency of global efforts to cope with global processes of ecosystem degradation could be caused, first of all, by the delay in development of a novel interdisciplinary science, globalistics, that did not reach its capabilities to provide practice recommendations. We can expect that such a delay exists just because this research area remains underarranged, lacking formulation of clear problems specific just for the area and history of its own development.

AWAKENING OF A GLOBAL CONFLICT BETWEEN DEVELOPMENT OF THE AGRARIAN CIVILIZATION AND NATURAL ECOSYSTEMS

The main impact into awakening of the problems of compatibility between human livelihood and his global expansion, and natural ecosystems was made by such scientists as V.I. Vernadsky, N.I. Vavilov and N.D. Kondratyev. Their findings established foundation of the globalistic as a doctrine of interaction between the developing agrarian civilization and the Earth.

V.I. Vernadsky developed a doctrine concerning the Earth and its biosphere as a living organism, and the agrarian civilization as the main driver of the geological transformation [Vernadsky, 1987, 1988, 2004]. N.I. Vavilov established a doctrine on the onset of the agrarian civilization and necessity to mobilize the global genetic resources to its support caused by the global depletion of biodiversity (gene banks) [Vavilov, 1992]. N.D. Kondratyev was the first to examine the dynamics of human social medium as an integral whole, formulated concepts of long conjuncture cycles uniting the global economic dynamics and social earthquakes, global wars for markets and for food and energy sources. He was a founder of the World-systems approach and the first investigator of the universal laws of the network relations between the System elements despite their nature [Kondratyev, 2002].

V.I. Vernadsky formulated three interrelated world trends underlying the globalization: «Firstly, the history of the mankind never had this now-observed universality... Secondly, never [earlier] in the history of mankind, the interests and well-being of everybody (and not of separate persons or groups) were the real state aim ... Thirdly, another problem … arose for the first time: the problem of the conscious regulation of reproduction, life prolongation, struggle with diseases for all the mankind. It is for the first time that this problem became formulated with respect to penetration of the scientific knowledge into all the mankind» [Vernadsky, 1997].

A concept of biosphere follows from the V.I. Vernadsky works of 1940th. It exists in the form of an integrated live and life-supporting system containing an Earth outer shell including the surrounding atmosphere, hydrosphere and lithosphere necessary for the existence of living organisms and being their environment extending downwards and upwards until any life forms exist. However, this concept became known and accepted only in the last decade. For the first time, the term «biosphere» was used by an Austrian geologist Eduard Suesse (1831-1914) in the last and overarching chapter of his small book on the genesis of the mountains, «Die Entsteinung der Alpen», published in 1875. In this book the same as in a multivolume work «Das Antliz der Erde», the last volume of which was issued in 1909, Suesse did not determine a meaning of the term (quoted after [Vernadsky, 2004]). Nevertheless, Pierre Teilhard de Chardin (1881-1955) and V.I. Vernadsky used the term developing their own biosphere concept (quoted after [Vernadsky, 2004]). According to V.I. Vernadsky, the biosphere should include all the substances and all the parts of the Earth space, exposed in any manner to a life action, i.e. the question is on a sphere of life influence.

The biosphere is a complex system with its own structure complexified in course of evolution. The leading part in this system is taken par a living matter. V.I. Vernadsky [1987, 1988, 2004] wrote: «Basically, the biosphere may be considered as an area of the Earth crust occupied with the transformers converting the cosmic radiations into the efficient Earth energy: electrical, mechanical, thermal, etc... No chemical force at the Earth surface is more permanent and hence more powerful in its final results that living beings as a whole. The living matter performs various complex functions: energetic, concentrating, destructive, environmental-forming and transport. However, existence of living matter by itself, independently of the outside world is impossible ... all living matter is an integral whole, consistently related not only between each other but with the surrounding bone environment of the biosphere ».

Transformation of the solar energy into living objects of the biosphere due to the photosynthesis can be built as a food chain, along which the energy accumulated by a chlorophyll molecule and concentrated in a green leaf or alga is transferred to the herbivores, then to carnivores, to omnivores, and, finally, to a human that crowns this food pyramid.

«It is not overstatement to say, — V.I. Vernadsky wrote — that the chemical condition of our planet, biosphere, is wholly under influence of life, is conditioned by the living organisms. The energy usually shaping the atmosphere is, undoubtedly, of cosmic origin. It comes from the Sun in form of radiant energy. However, it is just living beings, totality of life, that convert this cosmic, radiant, energy into the Earth, chemical, energy and create the infinite variety of our world».

The living matter has a variety of biogeochemical functions in the Earth biosphere. V.I. Vernadsky detailed five functions of this sort. The first one is gaseous. The most gases of the upper planet horizons are life-generated. The underground fuels are the products of decomposition of vegetable organic matter buried earlier in sedimentation masses. A marsh gas, methane (CH_4), is the most abundant of them. The main gases in the Earth atmosphere, nitrogen and oxygen, are of biogenic origin.

The concentrating is the second function. For example, diatomic alga, radiolarians and some sponges act as silicon concentrators, luminaria as iodine concentrators and some special bacteria concentrate manganese.

A reduction-oxidation function is the third one.

A biochemical function is the fourth one. This is associated with the growth, reproduction and spatial movement of living organisms. Reproduction of living organisms causes their upsurge and «proliferation» of living matter into various geographical areas.

A human biogeochemical activity is the fifth function. It consumes ever-increasing amount of the Earth crust for needs of industry, transport, agriculture and welfare assistance. This function takes a special place and deserves especially thorough examination.

An idea of a human role as a governing factor in biosphere reforms was widely recognized in the scientific world and philosophically underpinned since before the V.I. Vernadsky works. The Vernadsky's achievement is that he was the first to demonstrate the consistent nature of this process through its association with the preceding evolution of the biosphere. One of Vernadsky's papers issued in French, «Human autotrophy», proves inevitability of the switch to a stage in the history of biosphere, when not only nature-human interrelations but a society also will be reshaped according to the requirements of scientific knowledge. According to

Vernadsky, the human brain appears in the history of biosphere as a «fixed and organized will» [Vernadsky, 1987, 1988, 2004].

V.I. Vernadsky wrote that the living matter is a totality of organisms inhabiting the biosphere, where a human becomes a geological factor. He highlighted a continuous intensification of the biosphere anthropogenic burden. As a result, the human activity conditions all the processes taking place at the Earth. Development of methods for sustainable growth of the agrarian civilization is impossible without examination of properties of living matter shaping the biosphere, where humanity and nature make up a whole. This becomes especially actual now, when the conflict between the agrarian civilization and biosphere is especially pronounced though it is quite clear that humanity can exist only within constrained biospheric parameters. It shows that these systems must coevolve. The humanity is still an element of biosphere, and the destiny of the biosphere is its destiny.

Power of the humanity grows exponentially. V.I. Vernadsky highlighted that the mankind must convert from a social-heterotrophic being to a social autotrophic one, that is, it must switchover to the artificially synthesized food, however, he supposed this possible only after a human intellect and science become really leading Earth force. That was the stage, when he already formulated idea on the inevitable transformation of the biosphere into noosphere.

However, V.I. Vernadsky did not use the word “noosphere” at that time. This term was proposed in 1927 by Édouard Louis Emmanuel Julien Le Roy (quoted after [Vernadsky, 2004]. He reviewed the laws of life evolution and came to a conclusion that the human biological evolution had spent itself. The further evolution of «alive at our planet will performed only by spiritual means: induction, society, language, intellect, etc. And it will be the noosphere following the biosphere».

V.I. Vernadsky reviewed the role of the human intellect as a planetary phenomenon and came to the following conclusions:
«The creative work is the force, which is used by a human to change the biosphere, in which he/she lives. This manifestation of the biosphere changes is an inevitable phenomenon accompanying the growth of a scientific thought. This change of the biosphere do not interact with a human will, it occurs spontaneously, like a natural matter of course. Life environment is an organized planet crust, the biosphere, and inclusion of a new change factor, scientific work of the humanity, in course of its geologically prolonged existence is a natural process of the biosphere transition into a new phase, new state, that is, noosphere».

V.I. Vernadsky believed in the determinate character of the noosphere origin. «The burst of the scientific thoughts in the XX century was preformed by all the biosphere past and is deeply rooted in its construction. It cannot stop and reverse. It can only slow its speed... The biosphere will inevitably transform, in one way or another, sooner or later, into the noosphere ...» [Vernadsky, 1987, 1988, 2004]. Such a belief allowed V.I. Vernadsky to be enthusiastic in the future. At the height of the historically most holocaustic war he had no doubts that the future was in hands of the progressive mankind, which certainly would temperate the hostile social and natural forces.

V.I. Vernadsky wrote: «The face of the planet, biosphere, is changed by a human chemically sharp, voluntarily and, mainly, involuntarily» [Vernadsky, 1987, 1988, 2004]. The noosphere is a whole new mode of the biosphere existence. The evolution process acquires a «special geological sense because it had created a special geological force, scientific thought of the social mankind» V.I. Vernadsky wrote: «…we go through its bright inclusion into the geological history of the planet. For the last millennia, we can observe the intensive growth in the effects of one species of living matter, enlightened mankind, on the changes in the biosphere: affected by the human thought and human labor, the biosphere transforms into a new state, the noosphere…» [Vernadsky, 1987, 1988, 2004].

As a natural result, for billions years the mankind quicker and quicker «…seizes all the planet, stands apart, extends away from the other living organisms as a new unprecedented geological force. At a speed comparable with the propagation expressed as progression in time-course, such a way creates in the biosphere ever-increasing variety of new bony natural bodies and new large natural phenomena» [Vernadsky, 1987, 1988, 2004]. In the XX century, a human, for the first time in course of the Earth history learnt and seized all the biosphere, reframed the map of the Earth and separated all over its surface. The mankind became a single whole. The biosphere was changing drastically before our eyes. «Its reshaping by a scientific thought through the organized human labor – V.I. Vernadsky accents – is not an stochastic phenomenon depending on a human will, but is a spontaneous natural process» [Vernadsky, 1987, 1988, 2004]. V.I. Vernadsky persists in saying that a human is not a stochastic, independent from the environment (biosphere or noosphere) freely acting natural phenomenon, but an inevitable manifestation of a regular, lasting for billions years natural process.

Ideas of V.I. Vernadsky on the inevitability of the noosphere establishing are underlain with a more profound historical grounds than our incapability to foresee global problems and, first of all, the environmental crisis in these later days. «The scientific knowledge showing itself in a form of a geological force creating the noosphere cannot lead to the results contradicting the very process that created it» [Vernadsky, 1987, 1988, 2004]. This new state of the biosphere, which we are approaching, being unaware of it, is the «noosphere». «The noosphere is the last of the evolution and geological history states, the state of the present days» [Vernadsky, 1987, 1988, 2004].

The noosphere concept resulted in a new understanding of the sense of the evolutionary processes occurring at the Earth, including the idea that a human is an event and element of the cosmic process.

A human, the same as any other living being and any other living matter, is some function of the space and its obligate part. And, being its obligate part, the mankind developed at least three models of the noosphere development: 1) the "nuclear winter", 2) resource and 3) ecological, or, more correctly, biospheric models and promoted their realization.

The Vernadsky art shows the combined trends towards knowledge synthesis, change in the natural history from the processes of differentiation and fragmentation to their integration. And here is the source of the names of the sciences, origination and development of which he promoted: geochemistry, biogeochemistry, cosmochemistry, radiogeology and, finally, globalistics.

V.I.Vernadsky laid the foundation of a new synthesizing way of thinking that was spread not only to natural science, but to human science, as well. The XX century was, according to V.I. Vernadsky, the period when the complex, often unrelated historical processes come to their end, and «we exist in the conditions of the integrated historical process including all the planet biosphere... material, objectively continuous connectedness of the mankind and its culture steadily and quickly deepens and strengthens». Consistency of the mankind and universality of its understanding are created, according to V.I. Vernadsky, only by a scientific thought: «it is basically united and uniform for all ages, social environments and forms of government». «A scientific thought and the identic scientific methodology, uniform for all, covered now all the mankind, spread all over the biosphere and transform it into the noosphere» [Vernadsky, 1987, 1988, 2004].

From this point of view, just the foundation of a new sphere of a human scientific activity, globalistics, corresponds to a predicted by V.I. Vernadsky formation of a new stage in the biosphere evolution, emerging of the noosphere.

We can observe the practical demonstration of this new stage in form of search for mitigation of the global conflict between the agrosphere and the biosphere realized, for example, in the development of the high-precision agrotechnologies (biotechnologies, nanobiotechnologies, etc.) [Cheshko et al., 2015]. The technologies already producing a profit and proving their effectiveness include: increase in «target oriented» soil treatment, production and use of microorganisms and modification of final production, application of data on «metagenome» (aggregate of the genomes of soil microbiota, or aggregate of a multicellular organism genome and genomes of its commensals, prokaryotes) for correction of soil metabolome and of multicellular organisms towards the desired direction. These include switch from the «punitive» principle of agricultural species pathogen protection to the principle of «mutual aid». These include the methods for production and use of genetically modified organisms demonstrating a paradigm change, due to which not environmental conditions should be made to fit an organism but an organism should fit the environment.

In such a way, we are at the start of development of modern agrotechnologies actually complying the necessity in search ways to reduce the speed of biosphere deterioration, increase the probability of more sustainable development of the agrarian civilization and viability of the mankind as a species.

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