PROBLEMS OF BIOPOLITICS IN TEACHING CHEMICAL TECHNOLOGY

Professor Pavel J. Sarkisov
Rector
Mendeleyev University
of Chemical Technology
Russia

Professor Michael N. Manakov
Director, Biotechnology Centre
Mendeleyev University
of Chemical Technology
Russia

Chemical technology, as well as its modern successor, biotechnology, is one of the most important pathways to the scientific and technological activities of humankind. It is only as a result of the application of the newest technological achievements in industry, that people are now able to supply themselves with the new kinds of fuel, food and materials, which are used domestically, in the construction industry, in transportation, medicine, etc. In every industrially developed country of the world, universities teach chemical technology to students, preparing them to apply the newest results in the fields of chemistry and biology to real life, in order to build new, and reconstruct existing, industrial technologies.

At the end of the 21st century, the various large-scale activities of humanity involving whole regions of the world, have started to produce conditions for environmental change which has endangered many countries, and the Earth, as a whole. Energetics transportation and mining, especially from open-pit mines, are usually among the most environmentally unfriendly ones. Chemical technology could also be put on this list, as soon as a breakdown in its realisation starts to constitute a serious danger to the environment.

Unfortunately, as a result of technical and economic factors in a number of countries, regions now exist where the concentration of chemical and biotechnological industries is so high that the total impact on the corresponding ecosystems has been very damaging. As a consequence of this, qualitative and quantitative change in the microbial population has taken place in soil and water, irreversible degradation of the plant and animal world, and finally, disease and high mortality among the human population, especially in children.

The current situation could be improved only by the total reconstruction of existing industries, and the reduction of the extent of extreme risks and the actual negative influence on their surroundings. New plants should be built in territories where they are acceptable, from an environmental point of view, provided that the applied technologies are environmentally clean or, at least, produce acceptable levels of pollution. Both these approaches need to be used by specialists who are trained, not only in chemical technology and biotechnology, but who also have the knowledge and skills necessary to treat environmental problems. This sets up important challenges for university-level education, as a whole, and the teaching of chemical technology, in particular.

During recent decades, the best professors in Russian universities have been attempting to achieve progress in teaching ecology to engineering students. It is more that 10 years since students began to major in "Industrial Ecology" and "Methods of Biosphere Protection," at the Russian Mendeleyev University of Chemical Technology. In addition, all students take a special course called "Principles of Ecology," and participate in lectures on applied disciplines where professors frequently focus on effective environmentally-friendly solutions.

This obviously raises the general level of knowledge, of an engineer in chemical technology, and makes that student more open to the creation of environmentally-clean industries. We believe, that it is not enough to achieve a breakthrough in the problem. We think that modern university-level environmental education, and especially the training of chemical technology students, should be based on a solid philosophical basis, providing people with a modern understanding of the interaction of humanity with nature. We think Biopolitics could provide this philosophical vision.

In 1991, one of the authors of this presentation was happy to take part in a Biopolitics Conference in Athens, Greece. The materials of this meeting caused interest among professors in the University and we decided to acquire a deeper knowledge of the system of general biological, philosophical and humanitarian ideas, constituting the entity of Biopolitics. This became possible, as a result of the active help by BIO and of its president and founder, Dr. Agni Vlavianos-Arvanitis. We were able to take part in the activities of the Biopolitics International Organisation, as well as, to give a series of lectures and seminars for our professors and students.

We were also delighted to observe an exceptional rise in interest in Biopolitics after Dr. Agni Vlavianos-Arvanitis and Professor Rusen Keles, from the University of Ankara, visited Moscow in 1992. Their lectures and seminars in our university, as well as the textbooks they gave us,

were of great value. Since 1992, one of the authors of this report has included lectures on Biopolitics in the course "Principles of Biotechnology," which is given to biotechnology engineering students. The governing body of the University actively supports measures to give professors and students a better understanding of the subject of Biopolitics and its application to the practical activities of mankind.

The study and spread of Biopolitics, as a humanitarian movement, is particularly important among students majoring in chemical technology. Traditionally, engineers studying chemical technology consider, as a model system, "plant-environment" and its risk, in terms of the maximum acceptable concentrations of polluting substances. The latter are determined in special offices, on the basis of experiments with the substance, its toxicity, its ability to cause mutations and carcinogenic change, etc., in laboratory animals. Thus, generally speaking, not only the danger of the substance to the ecosystem, but in a particular case, the risk for a human who has had a long contact with a substance, are taken into account.

The biopolitics approach to the problem is much more profound and ethical. Acknowledging the rights of "bios," according to its own inherent laws, biopolitics exchanges the anthropocentric point of view for a biocentric one. As extensive, and unfortunately negative, experience tells us, the preservation of nature, exclusively for the use of humanity, leads only to the degradation of ecosystems and, consequently, to absolutely negative results for humanity. On the contrary, in cases where an ecosystem has been preserved as a whole, when the interests of all life forms are in harmony, the results turn out to be positive.

The truth, which is of vital importance in this sense, is that life-systems can not cease developing, because to break in development is to die for them. It is also, at this point, that Biopolitics is much richer than the old utilitarian approach, because it teaches how to reconstruct the ecosystem, not as it was before human influence, but in order to establish harmony for the future. This means the removal of sources of directly negative influence, on any representation of bios, and the provision of conditions for the natural self-regulation, reconstruction and development of the system, which includes humanity and the results of its activities.

Mendeleyev University, as well as a number of other institutes in Russia where biotechnology students are trained, makes additional positive conditions for the development of the Biopolitical movement. Biotechnology-majoring students have good biological and environmental training and are, therefore, more open to understanding the idea of the unity of all life organisms on Earth. They can understand more profoundly the environmental problems of the chemical and biotechnological industry, and can easily take part in the eco-biotechnological industry and in eco-biotechnological experiments.

Since the 1993-94 academic year, the University has taught students "Eco-biotechnology," which has created serious interest. The main aim of the teaching and scientific activities of the Chair of Biotechnology, in the field of Eco-biotechnology, is the need to estimate the total influence of a given plant on the surrounding environment as a whole not giving preference to humanity or any other kind of life form. Eco-biotechnology attempts to study and describe changes in ecosystems, as a result of interruptions in tropical chains, caused by technological impact on nature. In the future, this will clearly allow removal of sources of the most dangerous ecotoxicants and create conditions for the reconstruction and harmonious development of the regional ecosystem.

We consider Eco-biotechnology one of the variants of the practical realisation of Biopolitical ideas in chemical technology and biotechnology. Clearly, for a number of students majoring in Eco-biotechnology, the ability to study Biopolitics and read the Bio-Syllabus, published by the Biopolitics International Organisation in 1993, is of enormous value. We want to express our special gratitude to the president and founder of the Biopolitics International Organisation, Dr. Vlavianos-Arvanitis, for this major contribution in the field of education, as well as for donating 100 copies of the book to our University. The Bio-Syllabus is currently being used as a textbook at Mendeleyev University.

The arrival of this book, edited and printed by Biopolitics International Organisation, will enable the University, in the academic year 1994-95 to make the following educational and informal steps toward the development of Biopolitical ideals. We assume that lectures on Biopolitics will be included, not only in the General Biotechnology course, but also by the Chair of Humanitarian Knowledge. In order to give professors in Moscow a better understanding of Biopolitics, the University plans to conduct a number of seminars on the subject of "Biopolitics in the System of Environmental Education."

We would be glad if Biopolitics International Organisation and its president and founder, Dr. Agni Vlavianos-Arvanitis, could take a personal part in both seminars and help in the search for speakers and both Russian and foreign sponsors, who would cover the main preparation of expenses for the work of the school seminar in Sochi. The University, through its biotechnological centre, is ready to find participants, organise their accommodation at the recreational base, their meals and cultural programme. We hope that these seminars will be one more important step in the development of Biopolitical ideas among the students of Russia and other countries.

Professor Pavel Sarkisov has been Rector of D.I. Mendeleyev University of Chemical Technology of Russia, since 1985. A Chemical

Engineer, specialising in silicon industry, he received his Ph.D. from Mendeleyev University and subsequently served as junior and senior scientific fellow and professor on the faculty. He has published over 300 scientific papers and patents in the field of chemical technology and his current scientific interests lie in the fields of physical chemistry, technology of crystal glass materials and industrial environmental problems. Winner of the State Prize of the Republic of Ukraine, Professor Sarkisov is also Corresponding Member of the Russian Academy of Sciences, Vice-President of the Mendeleyev Chemical Society, Member of the New York Academy of Sciences and Council Member of the American Institute of Chemistry.

Professor Mikhail N. Manakov is currently Director of the Institute of Food Substances of the Russian Academy of Science, and Head of the Chair of Industrial Biotechnology at the Mendeleyev University of Chemical Technology. Author of more than 200 scientific papers and patents in the field of chemical technology and biotechnology, his current interests are in the microbiological synthesis of biologically active substances, food chemistry and biotechnology and ecological problems in industry.