Science in Russia: Alive, But Malnourished

by Jonathan Tennenbaum

On May 16-18, the Vernadsky State Geological Museum, located across from the Kremlin in the center of Moscow, hosted a remarkable conference entitled "Science and Our Future: Ideas to Change the World." The conference, the second yearly event of this kind, brought together 65 Russian scientists and research workers from a wide spectrum of fields of research, ranging from geology and geophysics, biology and medicine, theoretical physics and engineering, to areas related to improving the living conditions and infrastructure of human populations. And, indeed, several of the ideas, discussed during the three days of sessions, do have the potential to change the world in a significant manner.

The Vernadsky Museum itself, in addition to being a unique exhibition of V.I. Vernadsky's discoveries in biogeochemistry and his conception of the Noösphere, houses a research institute with unique competence in problems concerning the origin, exploitation, and management of the Earth's mineral resources. Lyndon LaRouche, who with his wife Helga Zepp-LaRouche visited the Museum in April 2004, has repeatedly emphasized the importance of these capabilities, embodying the scientific heritage of Vernadsky, for organizing a world economic recovery in the period immediately ahead.

A Charged Political Atmosphere

The conference sounded a hopeful note amid an atmosphere of uncertainty about the future of Russia, and of Russian science in particular. Mad President George Bush's provocative visit to the Baltic, the destabilizations in Kyrgyzstan and Uzbekistan, the implications of the "Orange Revolution" in Ukraine, and arm-twisting efforts of Condoleezza Rice during her visit in Moscow, added up to a sense of hostile "strategic encirclement" of Russia—just as the nation moved to celebrate the 60th anniversary of the victorious end of World War II. On the streets one could hear people say that the losses suffered by Russian society as a result of the economic disintegration and looting of the country by so-called "liberal reformers" and "oligarchs," after the collapse of the Soviet Union, have been in some respects even worse than those suffered in World War II.

In any case, since the mid-1990s, the Russian population has been shrinking at a net rate of between 500,000 and 1 million persons every year. Many of the most promising young scientists and other professionals have emigrated to the West, in search of a better life. Unfortunately, the economic

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Lyndon and Helga LaRouche tour the Vernadsky State Geological Museum of the Russian Academy of Sciences in Moscow in December 2001. At the center is a bust of Vernadsky. Left to right: Dr. G.V. Naumov, Lyndon LaRouche, Helga Zepp-LaRouche, Dr. Sergei Cherkasov.

policies of the present Russian cabinet, still dominated by the likes of German Gref, as well as the policies of the hated former cabinet official Anatoli Chubais, threaten to drive the country even further in the direction of a social explosion somewhere down the line. The tension could be felt, not least of all, in the scientific milieu itself.

Just days after the conference, a stormy Plenary Session of the Russian Academy of Sciences took place, at which, for perhaps the first time ever, a Minister of the Russian government—Science and Education Minister Fursenko—was booed from the audience and abruptly departed from the scene. Fursenko has been promoting a misguided policy of "reform" of the Academy of Sciences, which many of its senior members denounce as a virtual dismantling of the Academy. The Academy of Sciences constitutes probably the single most important national institution in modern Russian history, an institution whose origins go back three centuries, to Wilhelm Gottfried Leibniz's personal meetings with Peter the Great.

According to scientists we spoke with, the present government intends to "compensate" for the catastrophic reduction of state support for the once-powerful, but now vastly underfinanced Academy, through measures that will only make the situation even worse. These include closing a number of institutes, increasing salaries at the cost of drastically reducing the overall number of researchers, and promoting a far-reaching "privatization" of research.

In this atmosphere, charged with the danger of a strong anti-Western turn in the mood of the population and institutions, it was important to be able to brief Russian friends, including individuals of some considerable influence there, on recent developments in the United States, centered on Lyndon LaRouche's leading role, together with his Youth Movement, in organizing an effective political force in opposition to the insanity of the Bush-Cheney Administration. The prospect for a potential positive change in U.S. policies, expressed especially in an emerging, bipartisan alliance for an alternative economic and foreign policy, in and around the U.S. Senate, is profoundly remoralizing for people in Russia.

At the same time, the conference itself bore witness to the fact, that, despite the difficult situation, important forces in Russia are working optimistically for a brighter future—forces that see Lyndon LaRouche and his movement as friends and allies. LaRouche himself is virtually a household word in Russia; his writings are in great demand, including impatient requests I received, as LaRouche's representative to the conference, for Russian translations of his books *Economics of the Noösphere* and *The Earth's Next Fifty Years.*

Remarkable Research

From some 140 papers submitted from all over Russia, 25 were selected by expert review for plenary presentation and discussion over the three days of the conference, and prizes awarded to the three best, as determined by a vote of the scientists themselves. The topics of the three prize-winning papers, already indicate the range of subjects touched upon at the conference: "The Speed of Migration of Carbon and the Regeneration of Oil Deposits," "Laser Systems for Optical Communication between Relay Satellites," and "Adaptive Systems for Fire Safety of Human Activities." Other papers of interest included novel methods for the large-scale production of hydrogen; new approaches to controlled thermonuclear fusion via "ultra-high-compression"; increases of agricultural productivity through artificial enrichment of rare earth elements to the soil; electromagnetic structures involved in the origin of tornadoes and other severe storms; and anomalies in the motion of the Moon, calling for a revision of present textbook doctrines of gravitation; and many others. Here I shall only briefly describe the three prize-winning papers. Remarkable was the synthesis between fundamental research, and the development of technologies with the potential to revolutionize broad domains of human activity on this planet.

The first of the mentioned papers, on the regeneration of oil reserves, actually underlines a key point Lyndon LaRouche has been making recently, in his proposal for a "Vernadsky Strategy" for a new type of economic cooperation among the world's nations. LaRouche pointed out, that the magnitude of long-term requirements for mineral resources, posed by the ongoing economic development of the populations of China, India, and other Asian nations, necessitates a new cooperative approach to the management of the world's raw materials. The required approach must, among other things, go beyond mere prospecting and extraction, to focus on the processes by which mineral resources are created in the Earth in the course of geological history, and how such resources might in the future be *replenished* or *regenerated,* at an increasing rate, through Man's deliberate intervention into the geosphere and biosphere.

One key area for this, needless to say, is that of oil and

natural gas. For many years a controversy has raged among specialists, whether the petroleum reserves, now used by Man, originated in biological material (biomass) accumulated over millions of years, or whether petroleum is in some way being *continuously generated* within the Earth, by essentially abiotic processes. In their prize-winning paper, V.D. Skaryatin and M.G. Makarova of the Vernadsky States Geological Museum, cite extensive evidence to the effect, that oil fields in various areas of Russia and adjacent countries, some abandoned after long periods of exploitation, are gradually *filling up again,* through a constant process of "migration" of carbon and hydrocarbon compounds from deeper layers of the crust. Evidence of the same process of gradual replenishment—occurring on the scale of mere decades, rather than the millions of years often supposed necessary for biogenic production—is also found in systematic discrepancies between originally estimated size of deposits, and the significantly larger amounts actually recovered in the course of exploitation.

While quoting Dmitri Mendeleyev's famous admonition, that petroleum's true value is as a chemical feedstock, rather than a fuel, Skaryatin suggests, that, once the conditions of continuous generation of oil and gas within the Earth's crust are properly taken into account, in the process of planning and organizing extraction operations, these resources could be made essentially "renewable," and Man need not fear "running out" of them in the foreseeable future.

The potential impact of *human economic activity* on the "spontaneous" generation of oil and natural gas in the Earth's crust, was emphasized in another, most interesting paper, presented to the conference by the well-known Russian geophysicist A.A. Barenbaum, from the Institute for Problems of Oil and Gas of the Russian Academy of Sciences. Barenbaum proposed, in accordance with the principles of Vladimir Vernadsky, a synthesis of the two "competing" schools of thought on the biogenic versus abiotic generation of oil and gas. According to Barenbaum, the ongoing synthesis of petroleum, in certain regions of the crust, is, in and of itself, an essentially abiotic, thermochemical process. However, the *input* of carbon, hydrogen, and other substances into that process, is largely a function of the *biosphere circulation of carbon and water,* which in turn is driven by living matter—and increasingly, by Man's own activity!

In particular, Barenbaum said, carbon dioxide and other forms of carbon, circulating in the biosphere, are transported by water into inner layers of the crust, where they become "raw materials" for petroleum synthesis. This suggests the possibility that Man, through the increased production of carbon dioxide in the atmosphere as a result of industrial activity, may actually be accelerating the generation of oil and gas within the Earth's crust, within time scales of mere decades; that is, much shorter than normal geological cycles. Barenbaum points to some crucial evidence for his thesis, including the discovery of traces of man-made isotopes that do not occur in Nature, in deep oil deposits.

A completely different example of man's technological innovation was provided by A.V. Bagrov, of the Institute of Astronomy of the Russian Academy of Sciences, who described a revolutionary new type of satellite-based instrument, capable of measuring angles between astronomical objects with a precision of mere microseconds of arc. That angular error would correspond to the apparent diameter of a basketball on Mars, as observed from the Earth some 50 million kilometers away! With such a precision, it becomes possible to observe the motions and pathways of motion of neighboring stars in our galaxy, within time frames of mere *hours*—as opposed to years or even decades—to detect planetary systems, and to determine precise distances of various astronomical objects.

At the same time, the new methods could open the door to a revolution in global satellite communication systems, by permitting the use of optical lasers, instead of the microwave frequencies presently used. This would mean increasing the communication density by orders of magnitude beyond anything now existing. A key barrier to the use of lasers in satellite communications, until now, has been the problem of how to determine the precise positions of orbiting objects and to steer a narrow laser beam from one to the other over thousands of kilometers. A similar challenge arose, in the 1980s, in efforts to develop laser anti-ballistic missile defense systems. However, the demands for precision and stability, required for reliable laser-based communications between satellites, are in many ways even greater. Key to the new Russian work, reported at the conference, is the use of multiple interferometry.

The third prize-winning paper was of a very different character, less fundamental in terms of scientific principle, but oriented more directly to the immediate needs of the population. Y.E. Boguslavsky of Rostov University, together with a group of collaborators from several institutions, made an exhaustive analysis of fires in two regions of Russia, focussing particularly on the role of defective household appliances, which constitute a major cause of fires involving loss of life. On this basis, they proposed a system of "Adaptive Fire Safety" designed to reduce loss of life by as much as *two orders of magnitude.* Among the novel technical features of their proposal are:

1. The use of a new, "cryothermic, gravitational-acoustic-emission" measurement system, also developed at Rostov University, to provide quantitative data for the evaluation of fire safety of materials used in building construction and household objects. In this method, test samples are subjected to combinations of thermal and pressure stress, and response characteristics are measured by a variety of devices, including especially detectors of low-level acoustical signals generated by crystal dislocations and other processes leading to mechanical failure.

2. The "intellectualization" of household electrical appliances, converting them from potential sources of fire danger, to fire-alarm systems, able to detect and signal their own malfunction as well as the presence of dangerous gases.