

JPRS-UST-90-002  
15 JANUARY 1990



# ***JPRS Report***

# **Science & Technology**

## ***USSR: Science & Technology Policy***

**DISTRIBUTION STATEMENT A**

**Approved for public release;  
Distribution Unlimited**

REPRODUCED BY  
U.S. DEPARTMENT OF COMMERCE  
NATIONAL TECHNICAL INFORMATION SERVICE  
SPRINGFIELD, VA. 22161

**DTIC QUALITY INSPECTED 3**

**19980518 188**

# Science & Technology

## USSR: Science & Technology Policy

JPRS-UST-90-002

### CONTENTS

15 FEBRUARY 1990

#### Organization, Planning, Coordination

- Frolov on Formation of RSFSR Academy of Sciences [K. V. Frolov Interview; PRAVDA, 29 Dec 89] .... 1

#### Facilities, Manpower

- Independent Association Studies Construction, Equipment Reliability  
[I. Krokhlina; SOTSIALISTICHESKAYA INDUSTRIYA, 29 Dec 89] ..... 4

#### Automation, Information Policy

- History of Soviet Computer Development Summarized  
[A. Kondalev, L. Khomenko; POD ZNAMENEM LENINIZMA, No 20, Oct 89] ..... 6

#### Industrial, Military Applications

- New Intersectorial Center Develops Pulsed Wave Equipment [I. Levin; PRAVDA, 21 Nov 89] ..... 13

#### Technology Transfer

- Future S&T Cooperation Between Socialist Nations Discussed  
[I. Makarov Interview; POISK, 30 Nov-6 Dec 89] ..... 15

#### Regional Issues

- Academy Meeting Discusses Reorganization of LiSSR Science [SOVETSKAYA LITVA, 9 Dec 89] ..... 17  
BSSR Academy of Sciences President Discusses Career, Goals  
[V. P. Platonov Interview; SOVETSKAYA BELORUSSIYA, 1 Dec 89] ..... 17  
Reports at General Session of Ukrainian Academy of Sciences ..... 24  
Academy's Tasks Delineated  
[B. Ye. Paton; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 24  
Situation in Social Sciences  
[I. I. Lukinov; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 31  
Financing of Scientific Work, Housing for Young Scientists Discussed  
[V. V. Panasyuk; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 35  
Implementation of Scientific Developments: Specific Problems in Microbiology  
[V. V. Smirnov; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 36  
Problems of Physics Science  
[M. S. Brodin; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 38  
Importance of Informatization Stressed  
[V. I. Skurikhin; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 39  
Tasks of Earth Science Institutes Discussed  
[V. I. Starostenko; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 41  
Molecular Biology: Achievements, Problems  
[G. V. Yelskaya; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 43  
Ecological Situation in Southern Ukraine  
[S. A. Andronati; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 44  
Lagging in Machine Building, Instrument Making  
[A. N. Podgornyy; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 46  
Achievements, Shortcomings in Organization of Scientific Work  
[A. V. Gorodiskiy; VISNYK AKADEMIYI NAUK UKRAYINSKOYI, No 3, Mar 89] ..... 47  
Lack of Instrumentation, Information Shortcomings  
[N. V. Novikov; VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR, No 3, Mar 89] ..... 49

|                                                                                                                                  |    |
|----------------------------------------------------------------------------------------------------------------------------------|----|
| Personnel Problems, State Orders Discussed<br>[S. O. Firstov; <i>VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR</i> , No 3, 89] .....    | 51 |
| Achievements in Low Temperature Physics Cited<br>[A. I. Zvyagin; <i>VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR</i> , No 3, 89] ..... | 52 |
| <b>Miscellaneous</b>                                                                                                             |    |
| Research on 'Nontraditional Phenomena' Detailed .....                                                                            | 54 |
| Long-Wave Theory Outlined [V. Potapov; <i>NTR TRIBUNA</i> , 15 Dec 89] .....                                                     | 54 |
| Parapsychology Research Program Discussed [I. M. Kogan; <i>NTR TRIBUNA</i> , 15 Dec 89] .....                                    | 55 |
| <b>Awards, Prizes</b>                                                                                                            |    |
| Nominees for RSFSR State Prizes in S&T Announced [ <i>SOVETSKAYA ROSSIYA</i> , 3 Jan 90] .....                                   | 57 |

### Frolov on Formation of RSFSR Academy of Sciences

907A0079A Moscow PRAVDA in Russian 29 Dec 89 p 4

[Interview with Vice President of the USSR Academy of Sciences Konstantin Vasilyevich Frolov by A. Pokrovskiy: "The Russian Academy. A Conversation With Vice President of the USSR Academy of Sciences K. V. Frolov"; date and place not given]

[Text] PRAVDA: Konstantin Vasilyevich, in recent times both in the press and, so to speak, in the lobby of scientific institutions there has been much discussion about the necessity of establishing the RSFSR Academy of Sciences. Now, it seems, the question has gone from the "discussion" to the organizational stage. What prospects are appearing here?

K. V. Frolov: Indeed, the question of the necessity of the Academy of Sciences of the Russian Federation has arisen repeatedly. The most widespread argument here is that the largest republic, which has the greatest scientific potential, should also have its own academy.

PRAVDA: But counter arguments, apparently, have also been found, have they not?

K. V. Frolov: For the most part they were based, so to speak, on the "geographic" principle—since the majority of institutions of the USSR Academy of Sciences are on the territory of Russia, why is another republic academy needed? Here it was somehow overlooked that the task of such institutes is to perform work not only and not so much in the interests of the Russian Federation as in statewide interests.

Let us examine the situation on the basis of the example of one of the largest institutes—the Physics Institute imeni Lebedev. It conducts basic research and is supporting and developing scientific schools of physicists in Uzbekistan, the Ukraine, Georgia, Armenia, Azerbaijan, and the Baltic republics. In the Russian Federation itself neither time nor desire remains for these problems. And what about the selection of young talented people at schools? Or the preparation and conducting of research in the applied aspect directly for the needs of the Russian Federation? There is, it turns out, no such organization which is responsible not for everything in general, but for a specific matter.

At the same time in the republic there are many good scientists, whose further advance is limited by the quota of places at the USSR Academy of Sciences. Election to the republic academy not only would be prestigious for them, but would also help them to participate more actively in the development of scientific and technical progress and the culture of Russia. This is the instance, when it is possible to achieve appreciable results owing to the moral factor, without large capital investments.

PRAVDA: By the way, about the expenditures. Will the establishment of the Russian Academy not cost, as they say, a pretty penny?

K. V. Frolov: That is another peculiarity of the present situation, that it will not. The capital construction of some super academy campus or something of the sort is not needed, while the proper organization of the people, who are already working, is needed, but they have not been gotten together, have not been organized. Let us examine, so to speak, by items the already available scientific potential of the Russian Federation. First, a large number of departmental scientific research institutes with rather good equipment are there. This applies to biotechnology, to the chemical industry, to machine building, and to applied physics. But they have a common misfortune—often there are only two or three candidates of sciences per collective of several thousand people.

Now let us imagine that such an institute has been transferred from departmental subordination to the academy. By this alone we will finally overcome intersectorial isolation and will switch to the collective democratic management of science at the level of the Presidium of the RSFSR Academy of Sciences.

Let us add to what has been said that in our country many ministries are now united and some institutes in general have fallen from the immediate field of view of departments. They have been left without a rudder and sails, without a plan and budget financing. Therefore, it is the right time to use the possibilities of such institutes for the solution of the most important problems of the Federation in the area of ecology, transportation, communications, health care, construction, and technologies for processing in the light and food industries. Of course, the structure and composition of such institutes should be carefully considered from the standpoint of conformity to the new tasks. They should not copy institutes of the USSR Academy of Sciences.

Another reserve is connected with the conversion of institutes of the military-industrial complex. A great opportunity to work in accordance with public plans and to cooperate actively with civilian organizations is appearing for them.

Concerning the higher school. Much has been and is being said about its conservatism, about its shortcomings. But, after all, it is also necessary to understand the reasons for this. This is the trouble, that leading scientists of the USSR Academy of Sciences do not have their own chairs at the higher school. Many professors, who are adherents of the past and who are training for replacement people like themselves, work there. But the country needs scientific leaders, thinking people, scientific works in promising directions, along the broad front of breakthroughs in science.

But from where is all this to appear, if higher educational institutions do not have the opportunity to undertake the solution of vital problems? More than 30 scientific research institutes have been established at universities just on the territory of the Russian Federation. And all of them, as a rule, operate locally and are attempting to find

some economic contractual and, hence, minor jobs. Their inclusion in the academy, where the common voice of the higher school, industry, and the academy proper can be heard, will help to get rid of everything obsolete and unnecessary and to support what is new. At the same time the enlistment in work at the higher school of academicians of the Russian Federation from industry would be made significantly easier. This is very important for the development of the scientific potential of higher educational institutions, for the instruction of students, as well as for the real integration of the scientific forces of the republic.

In concluding the substantiation of the necessity of the Russian Academy of Sciences I would like to recall: now throughout the world there is a most respectful attitude toward science. We have begun to slowly forget about science and scientific and technical progress. Perhaps, the enthusiasm for political and economic reforms had an effect. This, undoubtedly, is important. But here, too, we are again faced with the fact that in these areas we do not have enough in-depth scientific research. From whom is one to expect it? Of course, from the new scientific formations, which have been rid of the consequences of the pressure of the old dogmatic system.

**PRAVDA:** It seems that we are again approaching the interrelations of the future Russian and the existing "large" academy....

**K. V. Frolov:** But it is necessary to evaluate the forming situation in greater depth. Yes, the very fact of the existence of the "large" academy for a long time checked the establishment of a Russian academy. But this does not at all mean that the appearance of the "newborn child" should entail the deterioration of the "health" of one of its parents. The conducted surveys showed that 70 percent of the scientists are in favor of the established of the RSFSR Academy of Sciences without detriment for the formed system of academic institutes. It is a different matter that it is not ruled out: the old institutes will not stand up to the competition with new ones and, so to speak, will die a natural death. Moreover, weighty reasons will appear to figure out which scientific institutions for decades have not been yielding results. And on this basis to form new institutes and to elect new members of the USSR Academy of Sciences.

The interrelations between the republic academies and the union academy should, apparently, also be formed differently. For how was it previously? Everyone had become accustomed to the fact that the "older sister" helped everyone and decided for everyone. With the appearance of the Russian Academy the conditions will arise for contacts of the republic academies on equal, democratic principles, on a contractual basis. Apparently, in connection with this the functions of the union academy should also be changed.

We are placing very great hopes on the Russian Academy in the solution of the problems of scientific and technical progress. It is a matter here of the following. Back during

the times of N.S. Khrushchev about 100 institutes of the technical type, which governed the development of such most important sectors as power engineering, material science, chemistry, computer technology, machine science, automation, and automatic processes, were removed from the USSR Academy of Sciences. Having come under departmental dictation, which was already spoken about, they simply lost their character, having been switched to the solution of minor, immediate problems. At the same time enormous harm was done to the Academy of Sciences. But then in the Ukraine Academician B. Paton succeeded in retaining such institutes within the Ukrainian SSR Academy of Sciences. And now we see what a potential in the area of scientific and technical progress this republic academy has accumulated in a quarter century.

I believe that on a statewide scale it is possible to fill this gap in case of the establishment of the Academy of Sciences of the Russian Federation and to return there from industry the mentioned 100 institutes. I say "return," because all those institutes were located on the territory of the Russian Federation and worked in the sphere of scientific and technical progress of Russia. People living on the territory of this republic worked at them. Therefore, the RSFSR Academy of Sciences has the complete moral right to these institutes being returned.

**PRAVDA:** You depict a very broad prospect, and, therefore, a question suggests itself more and more: What all the same are the interrelations of these new formations with already existing scientific organizations, particularly with such "whales" as the Siberian, Ural, and Far Eastern Departments of the USSR Academy of Sciences?

**K. V. Frolov:** If you are speaking in general, it is on a business and, when necessary, a competitive basis. But I understand about what you are asking. Thus, if some group of institutes or some departments and even individual scientists do not want to work within the "large" academy, they can transfer to the system of the RSFSR Academy of Sciences. It is clear that this is a difficult question not only organizationally, but also, if you wish, morally. For the transfer from the union to the republic level seems to imply some decrease in scientific rank. Therefore, we specially discussed this possibility at a meeting of the Presidium of the USSR Academy of Sciences. And in principle we came to the following conclusion: everything depends on the general moral state of the scientist. For we know that, for example, many specialists of Georgia consider it most prestigious for themselves to work at republic institutes. And why should this be otherwise in Russia? But, I repeat, such processes should occur on a democratic basis, without the pressure of force, and, what is the primary thing, without haste.

**PRAVDA:** But, besides the "large" academy, other prominent scientific institutions exist in Russia. How are the interrelations with them conceived?

**K. V. Frolov:** Let us recall how urgent there are in the republic the questions of its economic development, urban development, and the fulfillment of the Food Program. It is clear that one will not solve these problems without cooperation with the subdivisions of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin. But what about regional processes? The republic, which is enormous in territory, is guided by approximately identical approaches for the Nonchernozem Zone and the Far East, for the North and the South. We do not have such organizations which would deal with this in earnest. Scientific forecasts, which would help the Supreme Soviet and the government to make correct decisions, are needed here.

I want to say that in the new academy there should be a powerful wing which is connected with economic research that relies on all-union achievements.

The question of the study of national problems of the RSFSR is also approximately the same. New, young forces, which are capable of dealing with this, have appeared here. It is necessary to create the necessary opportunities for them. Finally, there are such questions which lie at the boundary, at the meeting point of sciences. For example, medicine and biology, the biological protection of plants and the level of the yield. They are poorly represented at the "large" academy, but require development. While in Russia scientific schools, which for the present do not have opportunities for development, formed traditionally. The RSFSR Academy should also represent them, acting jointly with the All-Union Academy of Agricultural Sciences imeni V.I. Lenin, the USSR Academy of Medical Sciences, and, of course, the wing that is concerned with the social sciences at the USSR Academy of Sciences.

And since our conversation has turned to the interaction of scientific organizations, I would like to say a few words about the Academy of Technical Sciences, the question of whose establishment is being raised more and more insistently. Such an academy, of course, is needed. Precisely it should determine scientific and technical policy in the country and the solution of such major problems as communications and transportation, make an expert evaluation of projects of the largest scale, and so on. But, in my opinion, it makes sense to undertake the establishment of another academy only after the RSFSR Academy of Sciences has been established and has operated for some time. This will make it possible to consider more accurately its organization and structure and to determine what its share will be after the inclusion in the RSFSR Academy of Sciences of institutes, chairs, and individual problem laboratories of the higher school.

**PRAVDA:** A last question remains: Who is authorized to make the final decision on the RSFSR Academy of Sciences and when?

**K. V. Frolov:** I believe that the RSFSR Council of Ministers must decide this at once. But one should all the same begin with the establishment of an organizing group and with the specification of the candidate organizing president and the list of institutes, which will be included in the new academy. Moreover, institutes attached to universities, laboratories of the higher school, as well as individuals, who have achieved outstanding scientific results, can take part in the competitions for election to the academy. Here one must not pursue quantity. The main thing is to lay a reliable foundation for a new, effective scientific institution, which under the conditions of perestroika could work to full effect in the name of scientific and technical progress of the country.

**Independent Association Studies Construction,  
Equipment Reliability***907A0080A Moscow SOTSIALISTICHESKAYA  
INDUSTRIYA in Russian 29 Dec 89 p 3*

[Article by I. Krokhnina: "An Independent Association of Scientists"; first paragraph is SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] Reports about accidents, catastrophes, breakdowns, and casualties do not leave anyone indifferent. Their number and frequency and the obvious repetition of the causes make it incumbent to talk about the necessity of taking today urgent and fundamental steps on combating them. Soviet scientists and specialists in the field of strength are among those who have responded especially actively to this.

But, excuse me, the reader will ask, did the science of strength until now really not know about catastrophes; did such a science really not exist before? It, of course, did exist. Moreover, the Soviet science of strength holds a leading place in the world and has a great intellectual potential. But the notorious departmental parochialism also left its mark on this field of science. It isolated the efforts of many specialists and often opposed to the results of their research narrow departmental interests or the demands to fulfill the plan indicators "no matter what." There was no opportunity to implement fully the results of highly professional scientific research and especially to appear on the world market of science-intensive products.

That is why the scientists, who work in this field, are placing so many hopes on the establishment of their own independent public organization. This idea was put into practice at the constituent conference of the KODAS (comprehensive prompt diagnosis of emergency situations, the strength, survivability, and safety of machines and components) Association, which was recently held in Moscow. The close to 160 founding members of KODAS, and these a highly professional scientists and experienced workers, who represent practically all the major regions of our country, elected as their president Corresponding Member of the USSR Academy of Sciences N. Makhutov.

The independent nature of the new organization is enabling it to establish a comprehensive system of the assurance of the safety of the operation of machines, components, and structures, which does not yet exist in our country. This comprehensiveness consists in the ability of the specialists, who have been united in the association, to solve practically any problems which concern strength, durability, and safety.

Whom might such a comprehensive diagnostic system interest today? First, apparently, state institutions and organizations, which are interested in the objectivity of the results of research. For example, a bank has to decide the question of a large loan for the construction of some facility or for the establishment of a works for the

production of new machines and mechanisms. Here only the certainty of the profitability and reliability of the new enterprise, which is supported by the opinion of authoritative specialists, can be the guarantee of the repayment of the loan. In this case the bank will be able to order from specialists of the association an examination, the independent nature of which will also ensure the maximum objectivity of the estimates. Industrial enterprises and design organizations, which have changed over to cost accounting and the economic impact of the activity and the competitive ability of which depend on the quality of the output produced by them, can also turn to the KODAS Association, which, moreover, will be able to provide them both with special methods literature and with scientific and technical documentation.

The making of free examinations on the order of public organizations, for example, ecological organizations, is one of the priority tasks of the association. The goal is the extensive awareness of the citizens of our country with respect to the state and level of the safety of existing facilities or the possible consequences of programs that are being prepared. It is proposed to allocate a significant portion of the assets of the fund of KODAS for overcoming the consequences of accidents, catastrophes, and other breakdowns, for implementing social and ecological programs, for rendering assistance to the victims of catastrophes and natural disasters, and for other philanthropic purposes.

In the present interdependent world the unity of people from different countries is appearing more and more often in their carrying out of joint activity for the purposes of the solution of common problems. For the present we do not know of direct analogies of the new Soviet association abroad. But the community of the tasks, which are being worked on by it and such western associations as the American Society of Mechanical Engineers, the American Society for Testing Materials, the Group for Nuclear Plant Safety in the FRG, as well as by a number of international arbitration organizations for the analysis of accidents and catastrophes, is absolutely obvious. It is clear that the cooperation of the KODAS Association with foreign specialists and firms is necessary in this area, which is important for everyone. The international posing of the problem of increasing the safety and survivability of machines and components is necessary. This interaction can be carried out in the most different forms. The international diagnosis of emergencies and the international examination of accidents and catastrophes can contribute to the exchange of experience of research and to the improvement of its methods as applied to extreme situations in the most different areas. The preparation and conducting of tests of materials and components and strength analyses of all kinds of engineering structures can be carried out both by joint ventures and by temporary collectives of Soviet and foreign specialists. Joint work in the area of research and development, where the latest methods, which have been developed by Soviet scientists, could undergo testing

with subsequent introduction at the technical and production base, which foreign enterprises and firms have, also seems promising.

Already today the Lvov Production and Consultation Association is conducting the examination of accidents,

catastrophes, and other breakdowns of components, consultations on the performance of analyses and tests, and scientific research work and is carrying out the sale of software and equipment in various fields of science, technology, and production.

### History of Soviet Computer Development Summarized

907A0074A Kiev POD ZNAMENEM LENINIZMA  
in Russian No 20, Oct 89 pp 68-75

[Article by Doctor of Technical Sciences A. Kondalev, lead scientific associate of the Institute of Cybernetics imeni V. M. Glushkov of the Ukrainian SSR Academy of Sciences, and Candidate of Technical Sciences L. Khomenko, scientific associate of the Institute of Cybernetics imeni V. M. Glushkov of the Ukrainian SSR Academy of Sciences, under the rubric "In the World of Science": "Informatization: Retrospection and the Prospects"]

[Text] The informatization of society has become the most important problem of the present. Stimulating scientific and technical progress and influencing more and more profoundly the structure of the economy, science, and the system of education, in the final analysis it determines the pace of social development. Unfortunately, our lag in this extremely important matter is appreciable.

The foundation of the technical base of informatization is computer hardware and data processing aids. Their development, industrial production, and updating in the industrially developed countries of the West, as well as Japan in a short time brought about the formation of information technology and the emergence of the economics of "the generation of knowledge." In the United States information and information technology have become a main commodity product of the market. Today every other family there has a personal computer. In our country only a handful do. In the West an overwhelming portion of the management information is processed by computers. We are taking just the first steps in this direction. In the United States integrated communication networks and "electronic mail" for the transfer of any types of audio-visual information have been developed. The countries of Western Europe will complete the development of such networks by 1990. We have not even begun this work.

The accessibility of computerized databases and knowledge bases is one of the decisive indicators of the level of the informatization of society. In the United States every interested person can for a fee (or even free of charge) connect to such a base and obtain the needed scientific, political, and everyday information. In our country there are simply no knowledge bases (with the exception of several departmental and narrowly specialized ones with, of course, limited access). Meanwhile the openness of databases and knowledge bases is not only a most important condition of the informatization of society, but also a guarantee of its further democratization and the development of gласnost.

It is impossible to say that in our country proper attention is not being devoted to the development of computer technology and information science (VTI). During the preceding three five-year plans the increase of the

production of computer hardware and means of instrument building in the USSR was planned from what had been achieved at the rate of 1.6-to 1.8-fold. This, if we compare it with the other sectors of production, is the highest growth rate. But if we compare these indicators with the indicators of the increase of the production of computer hardware and data processing aids in a number of foreign countries, it will turn out that there these figures were 1.5- to 2-fold and more higher.

In order to understand the causes of our lag, which began already in the 1960's, it is necessary to examine if only briefly the stages of the development of generations of computers in our country.

For the sake of brevity we will not detail the division of the development of domestic computer technology and information science into periods and will take the liberty of some arbitrariness in marking the boundaries of its stages. For each new generation of computers originated within the framework of the preceding one, while the periods themselves in our country and in other countries were different in length.

The first generation of computers (1948-1959) is electronic vacuum tube computers.

But the 1940's the calculating equipment in our country with its centralized planning under the conditions of the sharp increase of economic construction and scientific research, which required the performance of immense computations, ceased to meet the social demand. The need arose to have a qualitatively different type of calculating machine, which would operate automatically in accordance with a rule that was entered in advance—a program—and incomparably more rapidly than existing calculators.

And such a machine was developed for the first time in our country (and on the European continent) in Kiev at the Institute of Electrical Engineering of the Ukrainian SSR Academy of Sciences in accordance with the design and under the supervision of Academician S.A. Lebedev during 1948-1950. It was called the MESM (small electronic calculator). The MESM was capable of carrying out the mathematical and logical processing of information. It contained about 7,500 electronic vacuum tubes, occupied an area of 64 square meters, and consumed 25 kilowatts of power. Its speed was 50 arithmetic operations a second, which exceeded by hundreds of fold the speed of the adding machines that existed at that time.

For more than three years the MESM was the only operating computer in the country. Scientific and technical problems, which were important for the national economy, were solved on it. In particular, the superhigh-voltage electric power transmission line of the Kuybyshevskaya GES, which was been built at that time, the strength of the cables for high-speed hoists of deep mines, the technical characteristics of the engines for jet aircraft, which were being designed, the parameters of pinpoint underground explosions, and so on were computed.

The MESM was the basic prototype for all subsequent generations of Soviet computers.

During those years the theoretical research and concrete development in the area of computers were conducted in our country independently (and even in isolation) of other countries. And everywhere such work was secret—only information of a advertising and commercial nature was published.

The first open publications on the computers developed in the USSR appeared after the all-union conference "The Means of Developing Soviet Mathematical Machine Building," which was held in Moscow in 1956. At that time the public learned that a number of computers had been developed in the country, of them there were two powerful ones—the BESM (high-speed electronic calculator, 1952), the development of which at the USSR Academy of Sciences was supervised by S. A. Lebedev, and the Strela, which was developed by specialists of the instrument making industry under the supervision of Yu. Ya. Bazilevskiy (1953). The BESM at that time was the fastest machine in Europe.

With the appearance of series-produced semiconductor devices the development of semiconductor computers picked up noticeably. But the basic attention for the time being was devoted to the assimilation of the series production of vacuum tube computers, in which in a number of cases semiconductor devices were also used.

In 1958 the first samples of computers of two high-class models—the BESM-2 and the Kiyev, each with a performance of 10,000 operations a second—were produced. The M-20 computer with a performance of 20,000 operations a second was also developed almost at the same time as these computers. In 1959 the first tubeless computer based on magnetic elements, the Setun, appeared. A number of similar machines were also developed, of them the MPT-5 and MPT-9 were at the level of world models.

Soviet scientists went their own way in the development of the architecture and software of computers. Our machines were distinguished by the originality of the structural, circuit engineering, and design solutions. In the estimation of Academician M. A. Lavrentyev, Soviet computers during 1954-1956 were at the level of the best American computers. Meanwhile, the Americans put their first computer into operation 4 years before we did. This was a substantial lead!

During that period the formation of the system of computer centers (VTs's), mainly of a scientific orientation, took place. The intensive use at them of computers was responsible for the solution of many prestigious scientific and technical problems and the accomplishment of major engineering projects. Suffice it to recall that at that time the first jet passenger planes were built, an artificial earth satellite was launched, the first nuclear power plant yielded a current, and the series production of a new, transistorized element base for the building of

computers was begun (admittedly, later and in a smaller assortment than in the United States).

But in a different manner "headway was made in the question" of cybernetic thinking—the methodological and theory of computerization. The book "Cybernetics" (1948), which was written by American mathematician N. Wiener, evoked an intense reaction of our ideological corps, for which the philosophical arguments of the scientist about the community of what is alive and what is not alive, about the possibility of developing an electronic brain which is capable of replacing the human brain, and so forth served as the reason. They banned the book, while they declared cybernetics a bourgeois pseudoscience.

Nevertheless the work on computers in our country was continued, since it was clear that without them scientific and technical progress is impossible.

The assimilation and complete changeover to the series production of transistor computers are characteristic of the second generation of computers (1959-1967). New opportunities appeared for the improvement of the architecture of computers, the development of programming languages, the increase of the performance and reliability of machines, and the decrease of their dimensions and the consumed power. During this period about 30 models of transistor computers, the majority of which were series produced, were developed in the USSR.

The horizons of computerization broadened. Computer centers for various purposes, for which both powerful (up to 100,000 operations a second) and medium and small computers were required, emerged. Process control computers (UVM's) for the automation of scientific and technical experiments and the control of technological processes—the Dnepr, UM-1, VNIEM-3, and others—appeared. The BESM-6, which was developed in 1966, became a domestic general-purpose computer that is unique in performance (1 million operations a second). At several computer centers it is also being used today.

In the 1960's the ban on cybernetics was lifted, but we rushed to the other extreme: we began extol it without restraint as the science of sciences. And a sober understanding of the place and role of cybernetics in the ranks of other sciences came only in the 1980's.

The afforded opportunities for the making with the aid of the new computers of complex scientific and technical calculations ensured the successful designing of large hydroelectric power plants, the flight of man into space, the building of the nuclear icebreaker Lenin, new discoveries in nuclear physics, the synthesis of new materials, and so on.

The structures of computers, their element base, and the languages and the methods of the automation of programming underwent further development. Multiprogram computers, application packages, and operating systems were developed, the conditions of the collective

use of computers were assimilated at computer centers. A very convenient means for the interaction of the user with the computer appeared—the display.

However, all this was not enough for the solution of all the complicated problems in such areas as planning and economic calculations, scientific and technical calculations, and simulation, which were connected with the designing and launches of automatic space stations and spacecraft, with the development and tests of new equipment, and with research in elementary particle physics, material science, geology, metrology, the automation of production processes, and reference and dispatcher operations.

The increase of the production of computers and the introduction of automatic control systems began to be envisaged in the five-year plans. And nevertheless abroad the pace of development of these means was significantly higher. As was their quality. Third-generation computers had already appeared there.

It was discovered that we had fallen seriously behind. One of the causes of this is the overall lag of our machine building, instrument making, electronics, and the production of new materials and technological equipment.

The next, third, stage of the development of computer technology and information science fell to 1967-1975. At this time the development, production, and use of computers based on integrated circuits of a small-scale and medium-scale integration level were begun.

Having appraised the degree of our lag behind foreign computer producers, the sectors of industry, which are responsible for the production of computer hardware, made the decision to copy American computers and the software for them. This began with the development of the unified system of general-purpose computers (YeS EVM), which is similar to a family of computers of IBM—the IBM-360. Subsequently computers of the system of small computers (SM EVM)—minicomputers, microcomputers, and personal computers, which were analogs of the corresponding machines of other firms—were developed in the same manner.

Inasmuch as this was done not through direct ties with the firms, but in a roundabout way and without their consent, no less time was required for the reconstruction of the technical specifications and the organization of the series production of the computer analogs than for the development and organization of our own computers of the same class. A lag was built in thereby in advance.

We were nearly 10 years late with the reconstruction of the first American microprocessor. Thus far we have not been able to build a supercomputer similar to the Cyber-205 or Cray-3 machine. While in the area of the production of personal computers, which are similar to those which the American Apple and IBM corporations produce, we were more than 15 years late.

We are not setting ourselves the goal to analyze in detail the causes of the formed situation. As a whole they have been revealed quite thoroughly in the official documents of the party, which are devoted to the restructuring of the economy of the country. The main cause is the administrative command system of the management of the national economy, which gave rise to a set of other causes.

Adequate stimuli did not exist in the country for the increase of interest in the improvement of the characteristics of computers and the expansion of the spheres of their use. Producers were certain of the 100-percent sale of their product, but consumers did not strive to put them into operation in good time and to achieve high indicators of the use of this equipment.

This happened because among the executives of the management hierarchy of all levels (directive organs, sectors of industry, production associations, enterprises) there were quite a number of incompetent personnel, especially at the top levels. Given the right to specify the prospect of the development of computer hardware, but cut off from its immediate production and use, they were not able to settle in a qualified manner either the scientific and technical or the economic organizational questions of the systematic, scientifically substantiated informatization of our society. Conditions formed, under which the specialists of scientific research, planning and design, and industrial organizations, who were well informed about the gap in the levels of the development and the technology of the production of computers in the USSR and developed countries not being in our favor, nevertheless passed off their very modest successes as outstanding achievements.

The foreign business trips of our specialists (and laymen) yielded a small return, since, as a rule, they were sent to scientific and educational institutions of little prestige.

We ourselves placed our capable scientists and engineers in almost complete isolation with respect to foreign scientists and specialists, by prohibiting contact with them and not permitting them to participate in important international scientific and technical conferences, even when there were invitations. Our enterprises, which produced computers, could not directly establish business contacts with foreign firms, even with those whose machines we were copying and producing.

Analog and analog-digital computer hardware experienced even greater difficulties in its development. Before the appearance of digital computers mainly analog means of automatic regulation and control were used in industry. The rapid development of digital computers and their successful use for the solution of complicated mathematical problems in science and technology gave rise to illusions even among prominent scientists. They believed that digital computers would completely replace analog hardware.

S.A. Lebedev, the founder of domestic computers, cautioned against this erroneous view. He at one time

engaged in the development of analog computers and understood that the extensive use of digital computers for the automation of management and control is possible only in case of the simultaneous development of digital, analog, and hybrid (analog-digital) hardware.

However, proper significance was not attached to this important argument. In the development of analog and digital hardware appreciable disproportions in the pace of development and the production volumes appeared already in the early 1960's. This happened due to the incommensurability of the allocations for research and the assimilation in the national economy of both types of hardware.

The output of items of analog and hybrid computer hardware with respect to digital computer hardware came to only fractions of a percent. Moreover, in production technology the analog microelectronic element base in the country lagged by an entire generation behind the digital element base and by two generations behind the element base of the United States.

However strange, in practice a certain independent coexistence of the two directions of computer technology without the mutual coordination of operations occurred. This had the result that when in the 1970's an attempt was made to introduce extensively automated process control systems (ASU TP), the incompatibility of modern process control computers with the old analog hardware, with which industrial machinery was equipped, proved to be one of the causes of failure.

They did not hurry to replace the obsolete analog instruments and devices, because to date the pace of the automation of technological processes and equipment does not meet the present requirements. As before obsolete and worn out means of monitoring, regulation, and the recording and display of information in the form of enormous control panels with bulky panel instruments and electromechanical recorders are being used at many industrial and power-generating facilities. At the same time advanced small electronic regulators, convenient visual display units, alphanumeric and graphic monochrome and color displays, and other means of automatic monitoring and control, which are based on the use of new types of sensors, primarily semiconductor ones, and new digital and analog integrated microcircuits, exist.

It is astonishing, but far from all the decrees of the CPSU Central Committee and the USSR Council of Ministers on the development, production, and use of computer hardware in the national economy were implemented. When we attempt to find an explanation for this, we should also bear in mind, apart from all else, the following rather important circumstance: given the proper emphasis on the extensive introduction of computers, in directive documents extremely too little attention was devoted to the development of much equipment that accompanies computers, without which it is impossible to use digital computers which are diverse in nature.

Among this hardware are a large number of internal and external devices of computers, including analog and hybrid ones.

The appearance in the early 1970's in the United States of the microprocessor, which is produced as a large-scale integrated circuit (LSIC), on a silicon chip less than 10 square millimeters in area, and had the same computing power as the average second-generation computer, had a revolutionizing effect on all computer hardware.

The new surge of theoretical research in the area of computer architecture also dates to this time. New concepts, of which the parallelization of the computing process and new principles of memory organization are the main idea, were advanced. Interesting ideas of new computers and computer hardware with the parallel processing of flows of data and instructions were proposed by Soviet scientists S.A. Lebedev, V.M. Glushkov, V.A. Melnikov, G.Ye. Pukhov, A.V. Kalyayev, I.V. Prangishvili, and others. In the BESM-6 computer S.A. Lebedev embodied what is called the "pipeline principle" (pipeline data processing), which found use in a number of other domestic and foreign high-performance computers and supercomputers. The Elbrus-1 and Elbrus-2 super-performance multiprocessor computer complexes were developed after the ideas of S.A. Lebedev.

The fourth generation of computers (1977-1985) is the period of the development of the third section of the unified system of computers and the system of small computers, multiprogram and multiprocessor computer systems, large-scale integrated circuit minicomputers and microcomputers, and the expansion of the sphere of use of computer technology and information science in the national economy.

Due to the limitedness of the size of the article we are not citing the comparative data on the technical level of our and American computers, the level and diversity of programming languages, and the level of automation of software production. Very regrettably, we are for the present far from the front line, which computer technology and information science have achieved in the developed capitalist countries. Apparently, the level of our demands on the informatization of society, which was much more modest than in other countries, also played a definite role here. It is possible to judge this if only from the level of the electronization of the work of the first Congress of USSR People's Deputies.

The only consolation is the fact that in the country against the background of other sectors of industry computer technology was developed more rapidly, while its unusual nature and high science-intensiveness gave rise to a special attitude toward it. Some people hyperbolized the potential of computers and assumed that without particular efforts it is possible by means of them to automate everything around and to change our life abruptly for the better. The very mention of artificial intelligence put others on their guard and evoked distrust

of computers. Both did not contribute to the proper appreciation of the real possibilities of computers and to their use for the automation of the processes of information processing and management.

Fortunately, the majority of specialists in the field of computer technology properly understood the real possibilities of computers and considered it necessary to develop more intensively research and the introduction in the national economy of computer hardware and data processing aids.

The production of more than 20 different software-compatible models of the unified system of computers and their modified versions with a range of performance of 200,000 to 5 million operations a second was assimilated in the country. Multiple-machine computer complexes with a performance of several tens or even hundreds of millions of operations are being produced on their basis. In the system of small computers the output of more than 10 models of compatible computers and their modified versions, on the basis of which a number of types of measuring and computing complexes and process control computer complexes (IVK's and UVK's) for the gathering and processing of measuring information and the control of technological processes and scientific experiments are being produced, were also assimilated.

The development of supercomputers, including a macropipeline computer, the idea of which belongs to Academician V.M. Glushkov, was begun. In the system of the Elektronika microcomputer a number of models for scientific and engineering calculations were developed. Local area networks appeared. The production of personal computers and the development of new models of them with broad professional possibilities were begun. The first flexible computerized manufacturing systems (GAP's) with robotized sections—a qualitatively new form of the automated process control system—began to be introduced. Computer-aided design systems (SAPR's), first of all for the automation of the designing of new computers, underwent development.

The present stage of the development of computers is the stage of the extensive introduction of very large-scale integrated circuits (VLSIC's) and the assimilation of the fourth section of the unified system of computers and the system of small computers, the series production of supercomputers, the development of high-level parallel programming languages and the technology of the computer-aided manufacturing of systems and applications software, the mass production and use of personal professional computers, the development of flexible computerized manufacturing systems and artificial intelligence systems, and the preparation of the scientific and technical base for the development of fifth-generation computers of the 1990's (EVM5P's) with computer vision, hearing, and voice communication for the extensive informatization of social labor and knowledge, the

computerization of individual labor, and the electronization of technological processes and tools of production.

In order to get an idea of what a fifth-generation computer is, we will cite the Japanese project of computers of the 1990's. It has been under way since 1981 and has been perceived as a Japanese challenge to the West.

Without focusing attention on the intellectual superiority of fifth-generation computers over fourth-generation computers, let us note that their performance should increase by a thousandfold. One of the importance problems, which the Japanese hope to solve by means of fifth-generation computers, is the supply of the country with its own foodstuffs through the sharp intensification of the technology of production and management in agriculture, fish breeding, and forestry. In industry they consider these problems to be solved, since the production, for example, of motor vehicles, television, and other machines and instruments is already being carried out by robots which computers control.

It is also believed that the data processing industry will make it possible to increase the employment of the Japanese population and to reduce unemployment and will lead to its complete elimination, while it will put the country in first place in the sale of data processing hardware on the world market.

The western countries reacted immediately to the Japanese project and formulated their own state programs of the development of computers of the 1990's.

We are obliged to acknowledge that our computer technology and data processing industry far from conforms to the world standards. It was beyond the power of administrative command management to organize a high pace of the production and to ensure the high quality of computer hardware and data processing aids. The cult of the chief and numerous directive and departmental instructions are the Procrustean bed for the truly creative worker. Only a few succeeded in more or less successfully opposing such a style of management.

Here it is appropriate on the basis of the example of Academician V.M. Glushkov to tell about the role of the scientific supervisor of a prominent academic institute and about the titanic efforts that had to be made during the period of stagnation for the introduction of scientific developments in the national economy.

V.M. Glushkov was an outstanding scientist, a talented supervisor, and an active public figure. But, like any person, he was not always able to do what he wanted to do and did not always want to do what he could do.

It is impossible not to note the obviously ambiguous attitude of the academician toward the development of high-performance computers at his institute. The entire country knew him as the first Soviet cyberneticist and an ardent promoter of computer technology. He was awarded lofty academic and honorary titles, prizes, and

awards precisely for computer technology. At the same time at the institute, which he supervised for 25 years, not one high-performance computer was introduced into series production.

Let us recall that at the laboratory of computer technology, which was established by Academician S.A. Lebedev, the first domestic computer—the MESM—and the SEVM [medium computer] were developed, built, and placed into operation, the development of the Kiyev computer was completed, and the development of transistor computers was begun. All this work was performed under the supervision of S.A. Lebedev (although as of 1952 he was already working in Moscow) by a collective of 20 people in cooperation with scientists of the Institute of Mathematics of the Ukrainian SSR Academy of Sciences over a period of 8 years.

At the stage of the production and debugging of the Kiyev computer Doctor of Physical Mathematical Sciences V.M. Glushkov was approved as head of the laboratory (August 1956). The laboratory grew quickly and in late 1957 there was organized on its basis the Computer Center of the Ukrainian SSR Academy of Sciences, which 5 years later was renamed the Institute of Cybernetics.

In spite of the fact that the range of personal scientific interests of V.M. Glushkov was connected with his basic specialty as an algebraist, as well as with the problems of cybernetics and the theory of digital automata, he kept in view all the research on computers at the institute and was the supervisor of this work. The collective of the institute, which had increased by more than fiftyfold and had within it a special design bureau and a pilot plant, under the immediate supervision of V.M. Glushkov was able to introduce in series production four computers: the Promin, the MIR and MIR-2 for engineering calculations, and the Dnepr control computer. All of them belonged to the class of small computers. Besides these there were developed and, at best, built in a single specimen: the Dnepr-2 process control computer complex, which for several years was operated at the institute, the specialized Kiyev-67 computer for the control of the process of the electron-beam machining of the substrates of microcircuits, and the MIR-3 computer. The design of the large Ukraine general-purpose computer, in which new architectural solutions were embodied, was interesting. But not even a breadboard model of this machine was made.

The question arises: Why did one of the most prominent institutes of the country, which had a powerful scientific potential in the area of computer technology, the theory of digital automata, the automation of programming, the methods of algorithmization, and computer mathematics, not engage in the purposeful development of high-performance computers? It is difficult to answer it.

The personal attitude of Academician V.M. Glushkov toward the problems of the informatization of the national economy of the country, which worried him,

also had an effect here. Apparently, he regarded as a vital task to focus the attention of the collective of the institute on the elaboration of the idea, which occupied him, of developing automated management systems (ASU's) and the unified statewide automatic system (OGAS) in the hope that other institutes and industry would be able to develop and to supply the country with the necessary computer hardware and data processing aids. But the ministries, which were responsible for the development and production of various computer systems, made the decision to orient the scientific research institutes and design bureaus, which were subordinate to them, toward the copying of foreign models.

Academicians V.M. Glushkov and S.A. Lebedev came out categorically against the strategy of scorning domestic know-how and the priority achievements of our design schools. But they found themselves in the minority. As a result insurmountable departmental barriers emerged in the way of the introduction of new domestic computers in series production. The plant of computing and control machines (now the Elektronmash Production Association), which by the efforts of the Institute of Cybernetics was established in Kiev for the production of the Dnepr process control computer, soon, at the will of the ministry, began to reject new developments of the institute.

Assignments on the placement into operation of automated enterprise management systems and the development of the statewide automatic system were included on the initiative of V.M. Glushkov and in the wordings proposed by him in the plans of the 8th, 9th, and 10th Five-Year Plans. An important place was assigned to the development of cybernetics as an integrated science, which is of great theoretical and practical importance. However, automated management systems at that time did not justify themselves economically due to the lack for their development of the necessary computer hardware and automation equipment, their low quality, and the incompetence of those, on whom the introduction of automated management systems depended. For the same reason the statewide automatic system did not undergo development.

Inasmuch as the fundamental problems of cybernetics, the theory of digital automata, automated management systems, the methods of the simulation and the optimization of the solution of problems, the automation of programming, and other theoretical operations were the priority directions of research at the institute, practical development in the area of high-performance computers was not of such a wide scale. This affected the formulation of the themes and the results of the work on computer technology, the development of the planning, design, and production base, and the creative growth of personnel.

The lack of its own modern production and technological base was a serious obstacle for the development and introduction in series production of the computers, systems, and devices, which were devised at the institute.

As a result, the designing of the devices, computers, and systems, which were developed at the institute, lasted from 6 months to 3 years, while their production dragged on that much longer.

Now scarcely anyone can explain why V.M. Glushkov, who held high posts in science, had great authority, and played a conspicuous role in party and state organs, did not achieve the development of the pilot plant as a large modern enterprise for the production of the latest models of computers, computer systems, computer hardware, and data processing aids. The expectation of the direct introduction in series production of developments of the institute at state enterprises of the Ministry of the Radio Industry, the Ministry of Instrument Making, Automation Equipment, and Control Systems, the Ministry of the Communications Equipment Industry, and other departments did not prove to be correct. Even the creation of V.M. Glushkov himself, models of computers of the Mir family, were not all accepted for duplications.

The fine idea of V.M. Glushkov to establish the Cybernetics Center of the Ukrainian SSR Academy of Sciences from several problem-oriented institutes for the development of theoretical and applied research in the field of cybernetic science was an unrealized dream. It did not receive support among the leaders.

It is easier from the vantage point of today to talk both about the achievements and about the miscalculations of the past. And it is necessary to do this in order to avoid new oversights.

The plan of the 12th Five-Year Plan was drafted under the new conditions. For the first time a 2- to 2.3-fold increase of the production of computer hardware was envisaged—this is a higher growth rate than during the preceding five-year plans. The quantitative increase was accompanied by the expansion of the range of computer hardware and data processing aids, the substantial improvement of their technical and economic characteristics, and the increase of their use. New steps are being taken in the development of computer technology and

information science. State concepts of the informatization of Soviet society are being formulated on a competitive basis. A group of well-known academicians wrote about one of them in the article "The Strategy of a Breakthrough," which was published in the newspaper PRAVDA in June of last year.

The scientists advanced a program of three-stage informatization, here the initial stage is dated 1989-1990, while the transition to the concluding stage—the stage of the global application of informatization to the entire territory of the country—takes shape, approximately, in 10-15 years. A number of steps, including extensive international cooperation, which is called upon to increase the prestige of our scientists and engineers as a part of the world scientific and technical community, are proposed so that such deadlines would be realistic. But for this it is necessary to revive this prestige within the country, for we will not be able to catch up with the West, without having caught up with ourselves in the implementation of the already existing best domestic designs and inventions.

The collective of the Institute of Cybernetics imeni V.M. Glushkov of the Ukrainian SSR Academy of Sciences under the conditions of perestroyka has expanded basic and applied research in the priority directions of computer technology and information science. The important development of a high-performance multiple-machine computer system (MVS), of which the YeS-1766 macropipeline computer, which was developed at the institute and was introduced in series production, is an original part, was carried out. The multiple-machine computer system is intended for the solution of complex scientific and technical problems with a performance of up to 100 million operations a second.

In recent times at the institute the concept of the informatization of Soviet society in the 1990's was formulated and was submitted to a government commission on a competitive basis.

COPYRIGHT: Izdatelstvo "Radyanska Ukrayina", "Pod znamenem leninizma", 1989

### New Intersectorial Center Develops Pulsed Wave Equipment

907A0075A Moscow PRAVDA in Russian  
21 Nov 89 p 2

[Article by Candidate of Technical Sciences I. Levin, general director of the Impuls-Apparat International Association, under the rubric "Science on Cost Accounting": "An Impulse for Impuls"; first paragraph is PRAVDA introduction]

[Text] PRAVDA on three occasions in a decade has turned to the fate of fundamentally new equipment, which was invented in the Soviet Union and received the name of pulsed wave equipment. It is difficult to say how the fate of this invention would have developed, had it not been for the attention of the newspaper. When departmental barriers had been raised to an incredible height, when the group of developers could in no way determine their status and was flung from department to department—now to the Ministry of Power and Electrification, now to the State Committee for Hydrometeorology and Environmental Control, and even to the Ministry of the Medical and Microbiological Industry—in the quest to find out whose equipment this is and whether it is not necessary to return it to the aviation industry, where it originated, the support of PRAVDA helped the laboratory to carry out all the tests and to set out on the broad intersectorial road.

Now in place of the former laboratory the Impuls Intersectorial Introducing Center has been established within the walls of a truly intersectorial department—the State Committee for Inventions and Discoveries attached to the USSR State Committee for Science and Technology. The decision is correct, although also belated—PRAVDA wrote about this back in 1978! For the intersectorial equipment, with which pulsed wave devices are grouped, can be successfully developed, find users, be introduced in the shortest time, and appear on the world market only in such organizational structures, which in their essence are extradepartmental and to which narrow departmental interests are alien.

Let us briefly recall of what group of inventions it is a question. About 20 years ago in aviation there arose the idea to control the inevitable icing of aircraft during flight not by means of heating, be it electric or air, which was generally accepted at that time, but by using wave pulses which are propagated over the surface.

Incidentally, such systems—they received the name EIPOS (electropulse anti-icing and deicing systems)—are being used extensively on airbuses. But the main thing is that the area of use proved to be far broader than imagined at first by the researchers themselves, when they were working on exclusively their own "aviation" problem. And it is here, with the emergence from aviation onto a new, broader path, that the ordeals of the developers also began.

PRAVDA journalist Viktor Fedorovich Reut, who, incidentally, brought from oblivion or out of a deadlock many promising inventions of a large scale, gave a quite detailed account of this in his statements. It was he who proposed to transfer the laboratory of EIPOS of that time to the jurisdiction of the State Committee for Inventions and Discoveries, moreover, he proposed the same kind of arrangement for other intersectorial inventions, something like a "kindergarten," as he wrote, for the testing and experimental development of new inventions, which are needed simultaneously by several sectors of the national economy and do not fit into the established framework of departments.

The EIPOS served as a model for the formation of such a structure. In the course of research and design development it turned out that by means of wave pulses it is possible not only to remove ice from the edge of an aircraft, but also to control all kinds of contaminants, which adhere to and freeze over various metallic surfaces—for example, the walls of railroad cars and the roofs of buildings. The system affords new possibilities in many technologies, where manual labor is traditionally used. It is a matter of the removal of hanging and stuck loose substances from the industrial equipment of transportation arteries, all kinds of hoppers, tanks, dispensers, and so on. This applies to the chemical industry, to fodder production, to bakeries, to construction material plants—in short, to hundreds of enterprises, at which daily tens of thousands of people, armed with hammers, sledge hammers, and crowbars, clean all kinds of surfaces with the risk of damaging them and disabling the equipment, and at times, let us face it, with a risk to their own health. Which of you has not followed with your heart in your mouth as at a great height, on the edge of a wing, a person with a crowbar in his hands balances, throwing down chunks of ice and icicles? Incidentally, the EIPOS is suited in the best possible way for the automatic removal of the ice coating and icicles from edges, especially such ones onto which it is difficult even for a mountain climber to climb.

The possibilities and prospects of pulsed wave equipment today no longer raise doubts. At both domestic and international exhibitions the stands of the Impuls Introducing Center always attract attention. The "sideshow" with the bucket, which specialists of the center put on for the demonstration of the possibilities of their equipment, is memorable to many television viewers: an ordinary bucket without any apparent efforts and without any drives flew from the pavement to the height of a 10-story building....

Of course, the EIPOS devices were developed not for the sake of such advertising demonstrations. A total of 105 patents in all the industrially developed countries, a recent contract with one British firm, and, finally, the establishment of the Impuls-apparat International Scientific Production Commercial Association, which quite recently began to make the product, testify to this.

The most advanced models of the organization of scientific and technical developments and their introduction and the methods of the new economic management in science are being tested out on the model of the former cost accounting, but already now leasing center. During 1988 the association developed for various clients 50 pulsed wave systems. During 1989 it has already developed hundreds.

But it would be premature to say that all the problems have been solved. Introduction as before remains a bottleneck in the present real system of management, although in this case there is no opposition of consumers. On the contrary, there are a large number of organizations which are directly interested in devices like the EIPOS, moreover, immediately, tomorrow, if you like. There are reliable partners in the West and in the CEMA countries, who are prepared to use the product of the center and to aid its further advance on the foreign market in various forms—from direct deliveries to the establishment of joint ventures. What does the Impuls Center lack?

When you move a little in front, along an unknown road, developing on the way not only new designs, but also new economic relations, you inevitably encounter obstacles which it is necessary to overcome or skirt. The old instructions and the old approach are paralyzing the initiative and are binding the hands of the developers. As before, it is impossible to spend earned money on what is vitally necessary. No, it is a matter not even of payments to researchers, engineers, and workers (and the entire staff of the center is 20 people plus contracting brigades), but, for example, of the acquisition of the necessary tools for cash and of equipment, transportation, and components.

The wholesale market remains for the present a dream. Cooperative works with foreign organizations have made it possible to relieve the urgency of some problems, but one must not in all questions, which do not lend

themselves to immediate settlement, put trust only in foreign suppliers! The Impuls Center, and not only it, but also other organizations, including the USSR State Planning Committee, have repeatedly addressed to the Ministry of the Electronics Industry the request to make available to it the components, which are extremely necessary for production, moreover, not in any exorbitant quantities, but in the thousands of units. Heaven knows what a problem it is for a mighty ministry, but it has simply not been solved to this day. Perhaps, at the transitional stage, when market relations are just being formed, several priorities should be envisaged for those directions, which have achieved a competitive level and are arousing the interest of foreign partners. Quite frankly, we will be forced to turn down very profitable proposals, which are received from the West, if the state of affairs does not change in the immediate future.

It is truly a strange situation: the center is earning money and does not have the opportunity to spend it on what it needs!

This, incidentally, also applies to the stimulation of labor. Just as any state enterprise, the center even under the conditions of leasing is under obviously unfavorable conditions as compared with the cooperative.

It is probably possible to quickly establish, reorganize, and transform in conformity with the requirements of the moment centers of this sort, which are engaged in "breakthrough" research and development with subsequent large-scale introduction—after all, they are not an interbranch scientific technical complex, not even an institute; the entire staff is only several tens of people! But if we want to obtain from them a quick and high return, to involve the most skilled performers, and to make this movement a mass one, it is necessary to clear away the obstructions of instructions, standards, and, perhaps, first of all the obsolete notions about the management of the movement. And then we will see who is stronger—the enterprise like Impuls or the cooperative.

### Future S&T Cooperation Between Socialist Nations Discussed

907A0076A Moscow POISK in Russian  
No 31, 30 Nov-6 Dec 89 pp 1, 7

[Interview with Academician Igor Makarov, chief scientific secretary of the Presidium of the USSR Academy of Sciences, by Yelizaveta Ponarina, under the rubric "What Is Science To Be Like?" (Hanoi-Moscow): "A Look at the Next Century"; date not given; passages in boldface as published; first five paragraphs are POISK introduction]

[Text] "Did you know that a scientist, who works abroad, labors twofold to threefold more efficiently than at home. And it is unimportant where this happens: in the USSR or in Czechoslovakia," is how Corresponding Member of the USSR Academy of Sciences V. Talroze began his statement at the 16th conference of representatives of the academies of sciences of the socialist countries in Hanoi. "Not the circumstances of the place, but the circumstances of the frame of mind come into play. More simply, interest is the main thing for the researcher following the meeting of the elementary requirements of life. But how do we use him? Walk through our academic institutes: per 1,000 associates you will encounter two to three from abroad. While in the United States at university laboratory, where basic science is performed, one in five is a foreigner!

"So that there is no need to discuss how to restructure our cooperation," the scientist summarized. "So that the benefit from it would be greater, it is necessary simply to expand it, to create good working and living conditions for foreign colleagues, and to spare no money for this! It will be recovered...."

"Eh, no," Academician K. Martinek from the CSSR disagreed with the speaker. "The lack of assets and hotels and poor everyday organization are no longer a reason not to discuss the results and not to revise the principles which were made the basis for our multilateral cooperation. Whatever the case, a fourth of the financial resources, which are allocated to the academies for contacts with colleagues from the socialist countries, are spent on multilateral contacts. But are we spending them that way? It is time to find how to switch from the extensive method of spending assets to the intensive method. That is, to invest money in what can yield a result and to check at the appointed time whether it has. Of course, it is no use expecting immediate successes from basic research, but it is also unwise to cooperate without having developed a mechanism for monitoring the activity first of all of our problem commissions. If we want to work effectively and purposefully, it is necessary to choose the priorities more accurately."

It was in such debates, and not at all in complete accord that this conference took place in Hanoi. And all the same it concluded with the initialing of a new agreement on the multilateral cooperation of the academies of sciences of 11 socialist countries.

We asked Academician Igor Makarov, chief scientific secretary of the Presidium of the USSR Academy of Sciences and head of the Soviet delegation, to comment on this event:

**I. Makarov:** The extraordinary thing about this meeting lay in the very period which the socialist countries are going through today. They, as is known, are on the threshold of profound radical changes, which are connected with the need for the modernization of socialism and the solution on this basis of the accumulated serious socioeconomic and political problems. The slow introduction of advanced technologies in production, the inability of a greater portion of our goods to compete, inflation—it is impossible to cope with all these troubles without the immediate active participation of scientists and the leading development of basic science.

On the other hand, science requires considerable resources and diverse single-design equipment. You will agree that in the situation of inflation and the destabilization of the economy it is not that easy to provide these conditions of the development of science. One of the most practicable solutions is the uniting of efforts. So that versatility is an objective trend of modern science. The global nature of the most urgent problems—such as ecological disasters, geological catastrophes, the development of space or the world ocean, the combating of AIDS, the study of the human genome, and others—have forced people to realize that no state will quickly overcome them single-handed.

Precisely for this reason the wind of the coming changes on the European continent was felt even in distant Vietnam. Judging from the development of events, in two to three years relations, which allow within the community the free movement of the population and the unimpeded exchange of capital, services, and goods, will form among the West European countries. This will probably speed up the pace of the socioeconomic development of the countries of the community, will shorten the time of the introduction of new technologies, and will increase the science-intensiveness of their industry. Scientific ideas will begin to flow from state to state not so much in the form of formulas and texts as in the form of finished items, equipment, and technologies—that is, they will immediately turn into the property of broad strata of the population.

All this signifies that the socialist countries also need to find such forms of interaction, which would emancipate scientists, would expand and strengthen their contacts to the optimum, and would guarantee the achievement of high results. The decision of the conference not to limit any longer the composition of the participants in our multilateral work just to specialists from the socialist countries, but, taking into account the increasing integration trends in society, to develop interaction with the scientific world on the principles of complete openness was a serious step in this direction. But already today several traditional approaches to the organization of cooperation do not work. Therefore, when preparing the

new Treaty on Cooperation first of all the principles of **mutual assistance and mutual advantage** were made its basis.

**POISK:** You would hardly call them new. Apparently, 20 years ago, when multilateral cooperation was just forming, these goals were also implied....

**I. Makarov:** But they were not clearly formulated. Now conditions have changed. In contrast to a plant, you will not buy modern science "turnkey" and import it from across the ocean. It is necessary to cultivate it and to teach personnel to think. To cultivate not only skills, but also the need for serious research and the ability to get to the bottom of something. Schools of high-class scientists are needed for this. They form over decades and without fail in active intercourse. Therefore, at the conference it was decided to promote in every way the establishment of joint international laboratories, various collectives of scientists, and scientific production associations. To attempt to organize the regular exchange of leading professors. To conduct a number of joint expeditions.... Something is already being done.

**POISK:** Could you be more specific? Do examples of such international scientific centers already exist?

**I. Makarov:** Undoubtedly. In Poland there are the S. Banach Center for Mathematics and the Center for Biocybernetics in Warsaw, in the GDR there is the Center for Electron Microscopy in Halle. It is possible to establish in the USSR a center for questions of computer mechanics and design automation for the coordination of cooperation, consultations, and the instruction and on-the-job training of scientists. The Institute of Design Automation of the USSR Academy of Sciences and the Institute of Machine Science of the USSR Academy of Sciences could assume the functions of the head organizations from the Academy of Sciences.

**POISK:** But how will such collectives be financed? There is no common currency....

**I. Makarov:** It was decided to discuss this question in May of next year at an applied science seminar in Moscow. Perhaps, it makes sense to establish special funds for specific programs and to carry out the sending on missions on the principles of noncurrency equivalent

exchange or, in individual cases, at the expense of the academies, in whose interests the work is being performed.

**POISK:** But still at the conference a note of dissatisfaction with cooperation was heard time and again....

**I. Makarov:** Yes, we all talked about the need to improve the organization of the matter. We even proposed a so-called minimax system of the selection of goal programs for research. That is, having reduced their number to a minimum, to enlist the most talented scientists. We came to the agreement that by August 1990 the problem commissions and other organs of multilateral cooperation would submit brief reports for the past five years and a concept of their subsequent activity. The goal is not so much to make the work of the commissions expert as to coordinate the efforts of scientists of different countries and to choose the priority directions in order to formulate and approve them by the end of 1990.

**POISK:** And what are the prospects of cooperation with Vietnam? Many of the leading scientists of this country received an education at scientific centers of the countries of the socialist community. At any rate, during the days of the conference I repeatedly had occasion to be a witness to touching meetings of teachers and students.... Will contacts be expanded?

**I. Makarov:** Absolutely. But whereas previously there were students, now there are colleagues and pupils of these students. Not only Vietnam and we need the research which is now being conducted by Vietnamese territory. For example, Bulgaria is performing there interesting work on the development of new drugs, Soviet scientists are conducting research for the development of materials, equipment, and structures for work under tropical conditions, are studying the adaptation of man to this climate, and are performing joint work on the formation of new strains of cultivated plants. In this respect Vietnam is a unique region—there are not that many places on the planet, where it is possible to harvest three or four crops a year, that is, to speed up drastically an experiment under field conditions.

In short, the multilateral cooperation of the countries of the socialist community, in spite of all the difficulties, remains a promising form of the development of basic science. Real science is international. Its strength and particular value lie in this.

### Academy Meeting Discusses Reorganization of LiSSR Science

907A0093A Vilnius SOVETSKAYA LITVA in Russian  
9 Dec 89 p 3

[Article (ELTA): "Lithuanian Science and Perestroyka"]

[Text] Vilnius, 8 December. (ELTA.) A session of the general assembly, at which perhaps the most important question of the times—perestroyka in Lithuanian science—was discussed, was held today at the Lithuanian SSR Academy of Sciences.

President of the Lithuanian SSR Academy of Sciences Academician Yuras Pozhela presented the formulated draft of the concept of perestroyka of science of the republic. The management of science should be improved without delay, the ingrained departmental division should be eliminated, the speaker noted. Too little capital is being allocated for its financing, and that is being distributed unevenly. Thus, higher educational institutions of the republic receive a negligible portion of the money, although an overwhelming portion of all the doctors and candidates of sciences of the republic work here. The poor financing of work as compared with developed countries of the world had the result that it is possible to compare the equipment, on which our scientists work, perhaps with a mallet. This deprives people of the opportunity to display their talents and ability, which gives rise to developments of a very mediocre level. Departmental parochialism and the constant "drumming up" of money formed a type of organizer of science—the energetic egoist, who looks after only the narrow interests of his field.

Science of the republic is scattered among academic and sectorial institutes and higher schools. There is no proper interest in the conducting of basic research and the introduction of developments in practice. Academic science served wealthy clients, but there was little benefit from this for the republic. The regulation of scientific work, which formed over the decades, which is especially typical of the social sciences, gave rise to the need for custom jobs, which did great harm. Unfortunately, there are scientists who do not know how to work otherwise.

The speaker emphasized that in the new concept of the management of science it is stipulated that the management of all scientific activity should be concentrated in Lithuania. For this it is proposed to establish at the Academy of Sciences a national scientific council, on which academicians, corresponding members, and prominent specialists of different fields will be included. This expert commission will plan, organize, and deal with financing, as well as will be an adviser of the republic government on various issues.

The scientists, who spoke during the discussion, voiced critical remarks and made suggestions. Dissatisfaction with the proposed monopoly of the Academy of Sciences, when the majority of scientists of the republic work at higher educational institutions of the republic,

was expressed. The Union of Scientists of Lithuania should also be involved in the process of perestroyka and the management of science. It was a question of the need for a law on science and the responsibility when granting priorities, the problems of financing were discussed. The majority of speakers endorsed the opinion that after the first discussion of the draft the work on the elaboration of the concept of perestroyka of science should be continued.

At the session of the general assembly it was decided to take the submitted draft as a basis. A commission, which will complete the work on the concept of perestroyka of Lithuanian science, was established.

The session of the general assembly decided that the republic Academy of Sciences is independent and is not subordinate to the USSR Academy of Sciences. Henceforth it will be called the Lithuanian Academy of Sciences. A commission for the preparation of the statute of the Lithuanian Academy of Sciences was established.

### BSSR Academy of Sciences President Discusses Career, Goals

907A0094A Minsk SOVETSKAYA BELORUSSIYA  
in Russian 1 Dec 89 p 2

[Interview with President of the BSSR Academy of Sciences Vladimir Petrovich Platonov, by SOVETSKAYA BELORUSSIYA editor Z. Prigodich, under the rubric "About the Times and About Oneself": "The Personal Life of the President. A Conversation of Z. Prigodich, Editor of the Newspaper SOVETSKAYA BELORUSSIYA, With President of the BSSR Academy of Sciences V. P. Platonov"; date and place not given; first paragraph is SOVETSKAYA BELORUSSIYA introduction; last paragraph is SOVETSKAYA BELORUSSIYA conclusion]

[Text] Our meeting with V.P. Platonov took place soon after his return from a trip to the United States. And it is natural that my first question was precisely about this.

**SOVETSKAYA BELORUSSIYA:** Vladimir Petrovich, I know that previously you also visited many foreign countries on the invitation of leading scientific centers. What was the goal of your latest trip and with what impressions and frame of mind did you return from across the ocean?

**V. P. Platonov:** The frame of mind, as you see, is good.... (Here the president laughed so sincerely and infectiously that it was difficult to restrain a smile in response.) Well, if we speak seriously, this was a very important, extremely interesting, and useful trip for me. It was purely scientific. They invited me to America first of all as a scientist. There I delivered scientific reports on the latest results which had been obtained by me and my students. Of course, this was crucial, because I had to address leading mathematicians of America, at the most famous scientific centers, such as the Institute for

Advanced Studies at Princeton, Harvard, Yale, and Columbia universities, the University of Massachusetts, and a number of others.

The report took, as a rule, a little more than a hour. And then a discussion, which lasted significantly longer, began. And everything is in English.

**SOVETSKAYA BELORUSSIYA:** Are you fluent in English?

**V. P. Platonov:** I would not say that I am that fluent. But to a sufficient extent to deliver reports and associate with colleagues.

**SOVETSKAYA BELORUSSIYA:** Was this contact mutually useful?

**V. P. Platonov:** Of course! For I did not simply deliver reports, but also discussed the latest results which had been obtained at leading mathematical centers of the world. During such a discussion much is made more precise and corrected, so that the work was not only interesting, but also useful. In general I am not a great fan of traveling, but such trips are to my liking. The month flew by unnoticed. I could have stayed to work a little more, but my present employment does not allow me to do this.

**SOVETSKAYA BELORUSSIYA:** Do you often manage to go abroad?

**V. P. Platonov:** There are quite a number of invitations. Tempting, flattering one. But...there are things to do, things to do. It is a pity, of course, for I consider such exhaustive contact with leading scientists of the world very important.

**SOVETSKAYA BELORUSSIYA:** Do you make up for this gap by contact with well-known Soviet mathematicians?

**V. P. Platonov:** To a certain extent, yes, but the trouble is the same—the lack of time. One has occasion to associate primarily during scientific symposiums or conferences, but they, as is known, do not happen often.

**SOVETSKAYA BELORUSSIYA:** What eats up your basic time?

**V. P. Platonov:** First of all, various business trips. I have up to 20 trips a year to Moscow alone, and each one is for a minimum of two to three days. How many days are spent—I would not say that it is entirely in vain, but with a very low efficiency. And what about various kinds of conferences, meetings, and seminars? Are they always necessary? I ask sometimes: invite a vice president or a director of an institute—no, they require only the president. But what for? Probably for the level, for prestige. Now one has to speak today, for example, on economic problems, tomorrow on themes of history, and the day after tomorrow on the problems of the Chernobyl accident. But an entire stream of documents and a large

number of organizational matters, into which it is necessary to look and on which it is necessary to make some decisions, also pile up on me daily. I am not complaining, but I will state honestly: such loads are at times at the limit of what is possible.

**SOVETSKAYA BELORUSSIYA:** Is the hat of the president heavy?

**V. P. Platonov:** It is heavy not in itself, but for the role and the duties, which are assigned to it today. It is impossible for one person to deal with everything. This is not only difficult, but also unwise. In my opinion, the main task of the president is the formulation of the strategy of the academy, that is, the determination of the basic directions of scientific research, the main themes, the central questions of science itself. In other words, a clear knowledge of what is now most important in science and at what to aim the efforts of scientists of one institute or another and the academy as a whole, is necessary. This is the first thing. Second, fundamental questions of the interaction of the Academy of Sciences and the national economy of the republic and the country should constitute an important part of the concerns of the president. And, of course, personnel questions. The selection of capable, energetic managers in all the scientific subdivisions, concern for talented scientists, the search for capable, gifted young people—all this is not simply an obligation, but the sacred duty of whoever has been placed by the will of fate at the head of the academy.

**SOVETSKAYA BELORUSSIYA:** Is it possible to consider that what you said constitutes a certain ideal of the manager in large-scale science, which you have defined for yourself and for which you are striving?

**V. P. Platonov:** The qualities outlined by me most likely only trace the basic outlines of this ideal, but by no means exhaust it. For, in addition to good organizing abilities, a manager of such a rank should have the established authority of a scientist. I would say even more: the president of the Academy of Sciences is first of all a scientist, and not an official. It is also necessary to treat him in precisely that way. But the whole paradox is that, when electing a good scientist (I am talking here not about myself personally, but about the principle) to this position, we soon load him up so much that he nearly ceases to be a scientist and gradually loses authority in the scientific work. But then time passes, something did not work out, did not turn out for the person, suddenly attacks and harsh criticism begin, and he, who devoted to the job not just 1 year of his life, is forced to resign from the position. And here is the result: for him nothing also worked out with management, and he left science. This is a serious human drama. I would not want very much to experience anything similar.

But let us return to the ideal, to which the conversation turned. I believe that one of the integral qualities of a modern manager in general, and in science in particular, is his intellectual level. The times, when a person with a

position needed the minimum culture, the minimum intellectual level, but the maximum authoritarianism and inflexibility, have passed. Today the manager should be an example on both the spiritual and the moral level. The atmosphere, in which people work, in many respects depends on this.

The Academy of Sciences is a special institution. Here a healthy moral and psychological atmosphere is especially important. Often the results of scientific research are directly connected with it. Unfortunately, during the years of stagnation this atmosphere here worsened drastically, the academy ceased to be a temple of science. It, of course, also should not be only a temple, its essential duty is to influence what goes on outside this temple. But still the temple is in first place. I am certain of this. If you wish, this is my credo, and I will not change it, even if at times it is also difficult for me. At times I simply worry about the fact that I do not find mutual understanding. The daily bustle, meetings, and the hectic activity of an administrator do not yield anything. Days and weeks pass, but if you look around, nothing is left. All your time was spent on trifles. Creative labor, as a result of which some real changes would occur and a specific product of scientific creativity would appear—there is not very much such labor. But this is the main thing.

**SOVETSKAYA BELORUSSIYA:** I agree with you. Tell me, in such a case, from what is a healthy scientific atmosphere formed and what is being done at the academy to establish it?

**V. P. Platonov:** I have already said how important it is that truly intelligent, responsive people, who are devoted to science, would head scientific subdivisions of any rank. Then this will also be a good example for subordinates and will have a beneficial effect on the interrelations of everyone working in the collective. But the main thing all the same is that scientific impartiality would triumph. That the labor of one scientist or another would be evaluated objectively and in an up-to-date manner. It would be regarded not as something quasiscientific or pseudoscientific, but precisely as his scientific results. This already in itself creates an intellectual atmosphere, because real, specific achievements, regardless of who obtained them, will enjoy respect.

But it is difficult to do this. Both objectively and subjectively. Objectively, because the academy unites different fields of science, which at times are so remote from each other that it is very difficult to compare, to contrast, and especially to evaluate scientific results. The subjective factor consists in the fact—and this, in my opinion, is no secret for anyone—the fact that in scientific collectives there exist, unfortunately, certain groups, which, having usurped one field of science or another, use in evaluations and opinions not so much scientific criteria as their own narrow egoistic, group interests.

I as president am exerting the maximum efforts so that such distortions would be categorically eliminated. On the one hand, we are relying on talented, promising

people. If you noticed, this year we had an unusual election of members of the academy. Perhaps, the most in its entire history. In several specialties the competition reached 10-15 people. In turn, we now have every reason to say that the academy was reinforced by an impressive detachment of serious scientists.

On the other hand, we are attempting to get rid of people who got into science by chance. People, who creatively are absolutely impotent, but became skilled in various plots and petty intrigues. The presence of even one such "worker" in a collective can substantially complicate the scientific atmosphere. But there is far from a handful of them. This ballast accumulated over the years, and now it is very difficult to free oneself from it. But it is necessary to. Otherwise there can be no question of any scientific impartiality and a truly creative atmosphere in collectives.

**SOVETSKAYA BELORUSSIYA:** Vladimir Petrovich, several times you have used the term "intellectual level." A large number of interpretations of this concept exist. But what meaning do you put into it?

**V. P. Platonov:** I would not want to define intellectual level in general, because here there can actually be different ideas. I will attempt to say what the intellectual level in science is. In my opinion, an intellectual in science is, first, a scientist, who has a sufficiently high scientific intellect, who himself works creatively and respects the creative labor of another person. Second, the scientist-intellectual is always honest and truthful in the general human sense, that is, in all his actions and deeds he is guided by high moral principles. And I would also add: he has an independence of opinions. In other words, the truth for an intellectual should be above all else. The truth both in each specific case and in the broadest sense.

And as to the other qualities.... Well, here they say: an intellectual should be kind. Very likely. A true intellectual should not be kind in the vulgar, narrow-minded understanding of this word, otherwise he will not defend the truth. There remains in my memory one interesting idea, which was expressed by Marietta Shaginyan in one or another of her autobiographical novels. She asserts that history does not know any great person who was kind in the everyday, widespread interpretation. And a profound meaning is contained in this, because the aspiration for the truth and the recognition of the truth always involve the fact that this causes someone grief and trouble. That is, on this path you cannot be kind for everyone. And should not!

I will cite a small example. A mediocre scientist comes to you, brings a mediocre work, and says that here the defense is ahead, support it with a favorable review, his fate depends on this. But you see that the work is worthless. What is to be done? If you take the position of a genuine intellectual level, you will be obliged to say to him—mildly, tactfully, but to say: it is impossible to submit the work in such a form for defense, it is still necessary to do some work. Will you in this case be a

kind man for him? Hardly. Most likely he will leave offended, having mentally accused you of God knows what sins. Not by chance does Omar Khayyam have lines, in which he says that the most difficult thing is to be an honest person.

**SOVETSKAYA BELORUSSIYA:** Do you think that the intellectual level in today's Belorussian science is high?

**V. P. Platonov:** I am afraid to seem excessively categorical, but I have the sense that our intelligentsia, including the scientific intelligentsia, to some extent has lost that state of mind, when it is possible to lay down one's life for the truth and for the interests of the people.

There is an explanation for this. For long years science was plundered. The number of people, whom we began to call scientists, increased by several fold. Many mediocre people rushed into this sphere, which at one time was considered very prestigious. Excessive rationalism began to have an effect. Therefore, the level of science decreased appreciably. The scientific atmosphere, as I have already noted, grew worse.

**SOVETSKAYA BELORUSSIYA:** Does what has been said mean that Belorussian academic science is now experiencing a certain crisis?

**V. P. Platonov:** No, I would not draw such a conclusion. There is no crisis. There is, perhaps, a certain decline—in activity, in the pace of development. And if I say such impartial things, it is not at all because here everything is so hopelessly bad, no. I am basing myself first of all on the lofty goals and demands, which face our science today. The Belorussian academy, I believe, has an enormous potential, at any rate, one that is quite sufficient to accomplish the most serious tasks.

**SOVETSKAYA BELORUSSIYA:** What, in your opinion, are the most important of them?

**V. P. Platonov:** It is my firm conviction that the academy should first of all be responsible for the level of basic science in the republic. And not only be responsible, but also, of course, promote this in every possible way. It is necessary that in those basic directions, which either formed historically or are important for the development of the national economy of the republic, that in these directions our basic science would strive to achieve the highest, world level. The task, undoubtedly, is not one of the easy ones. And not only because we are experiencing a personnel famine. The main difficulty, perhaps, is that the personnel who are available in many cases are not prepared for such work. I will explain what the matter is here. At one time we made a noticeable list toward introduction in economic contractual jobs. People willingly agreed to this. Why? Because it is materially advantageous. A person, roughly speaking, can earn good money, expending in so doing considerably fewer efforts. And it is already difficult for him to return to serious work. Today it is necessary to eliminate this list without delay, for in a number of directions the level of scientific research has declined noticeably. This, so to speak, is our

minimum program, while the maximum program is to attain the leading positions of world science.

**SOVETSKAYA BELORUSSIYA:** Where, in what direction is it possible to achieve this—if not today, then, say, tomorrow?

**V. P. Platonov:** I believe that today we already look worthy in a number of sections of mathematics. This is not only my personal opinion, but also the opinion of prominent foreign scientists, with whom I have had occasion to associate. Further. We have good results in optics, and, undoubtedly, we can and should develop the achieved success. At any rate, the scientific forces, which the Institute of Physics has today, make it possible to hope for this.

We have significant results in thermal physics, they fully conform to the world level. Interesting developments have been accomplished in bioorganic chemistry. The level of the work in the field of photosynthesis and on biological membranes is quite high. We also have rather good positions in material science, in which a number of our institutes—the Physical Technical Institute, the Institute of Mechanics of Metal Polymer Systems, and others—today are conducting scientific research. If we intensify the work on genetics, here, I believe, we will also be able to be quite high up. As you see, a large number of scientific directions are being developed here quite actively and fruitfully.

But this, so to speak, is large-scale, basic science. While another, no less important task also faces us—to intensify our influence on the development of the national economy of the republic. I have in mind first of all machine building, microelectronics, the radio industry, and computer technology.

The urgency of this task is increasing sharply in connection with the changeover of Belorussia to self-financing and self-management. We have to balance sensibly the conducting of basic and so-called applied research. A large number of problems, the solution of which depends not only on science, exist here. However strange this is, thus far we do not have an economic mechanism which would force enterprises to use the achievements of basic science and to spend assets on them. And I, in general, understand today's managers, because the introduction of any innovation inevitably involves restructuring, readjustment, and they often lose more from this than they get. Now if a market operated here, it would be a different matter: if you lagged behind a competitor and did not introduce some technical innovation in good time, the demand for your product dropped immediately. The threat of ruin would force the producer to follow literally on the heels of science and to snatch its achievements while they are still hot. Thus, if the scientist makes, if the scientist introduces.... We are dispersing our forces and are spending time on what we should not spend it. The Academy of Sciences is still the center of scientific thought, and this thought should be modern, advanced.

**SOVETSKAYA BELORUSSIYA:** Vladimir Petrovich, but there are a number of enterprises, which under present conditions are as if rather good friends with science....

**V. P. Platonov:** Yes, of course. We have established good contacts, for example, with the Integral Association. We have been cooperating for a long time and, it must be said, very fruitfully with another large association, BelavtoMAZ. It is also possible to mention the tractor plant. But, you understand what the trick is here.... All these are firms of union subordination. While an overwhelming number of enterprises of the republic are not displaying a particular interest in science. If they maintain a certain average level, they are content. Today, and especially tomorrow, when the new economic mechanism will gain strength, it is no longer possible to work that way. And if the managers of enterprises do not think, then the corresponding ministries and departments and the government of the republic must think about formulating clearly the prospect of the development of such enterprises and about determining what basic developments they need. But I will stress: precisely basic, fundamentally new developments, and not some minor improvements which yield an immediate gain.

Why do I pose the question that way? Because the academy is not a team of fire chiefs, which at the first call dashes to one section or another to put out a fire that has broken out. We, if I resort to a figurative comparison, are rather architects, who are drawing up, are developing the general outlines of the future building of social life.

It is impossible to require the academy to do everything. We have neither enough forces nor enough assets for this. For the material and technical supply of our science is very poor. Many sectorial institutes have entirely comparable financing. But through longstanding inertia everyone addresses to us assignments, wherever such arises. They drew up, for example, a program of the elimination of the consequences of the accident at the Chernobyl Nuclear Power Plant. They put down the lion's share of assignments for the Academy of Sciences and the Institute of Radiobiology. But this institute was established just two years ago, it can still do hardly anything. Institutes of the medical type turned out to be almost not put into action. Meanwhile, the key question of the program is the problem of the safe living of people. It would seem that medical personnel are also experts in the matter. No, they were evasive. We had to show in the appropriate instances the senselessness of such a state of things and to correct the matter.

Or here, for example, is the solution of the problems that are connected with the agroindustrial complex. Well, of course, we are trying to help the personnel of agriculture in every way, but our possibilities here are limited. Why? Because whereas the Western Department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin and the republic Agroindustrial Committee have no more than 10 special institutes, we do not have any. The Institute of Genetics and Cytology, the Institute of

Microbiology, and others, they, of course, are connected with the problems of agriculture, but at a high, basic level. One must not hold them exclusively to these problems and lower them to the applied level, obliging scientists in the literal sense to engage in the introduction of their own scientific developments. Otherwise our institutes will be forced to turn into sectorial ones, which in the final analysis will adversely affect the development of, let us suppose, biological science. And when the question of the development of fundamentally new types of cereal or vegetable crops and of a substantial breakthrough in agriculture arises, we will not be prepared for this. Why? Because for the achievement of the indicated goals it will be necessary to work, using the latest achievements of genetics, molecular biology, and a number of other fields. But we have switched people over to introduction, that with which any associate of any sectorial scientific research institute can deal. Is such a use of the personnel of academic science expedient? I think that it is inexpedient. That is why I speak about a sensible balance of basic and applied research. And if we achieve a high world level in the basic directions, which I named, we will raise the overall level of knowledge and scientific thought in the republic, and thereby we will also be able to influence production more thoroughly and efficiently. Thus, academic science, as I see it, should be aimed not at the scoring of some local successes, but at the solution of fundamental problems which would make it possible to develop what nobody yet has.

**SOVETSKAYA BELORUSSIYA:** Vladimir Petrovich, in speaking about the problems of the academy, you used the expression "personnel famine." Is this a metaphor or can your institutes in reality not fill vacancies?

**V. P. Platonov:** Well, there are, perhaps, not that many vacancies. But we actually are experiencing hunger—a hunger for capable, gifted young people, for talented, daring scientists. Science, after all, is no longer as prestigious as before. The level of the wage is low. Substantially lower than at higher educational institutions and even lower than in various offices. See what kind of paradox results. The chief of a department in a ministry receives today 530 rubles, while the chief of the administration of scientific personnel of the academy, a candidate of sciences, receives 250. I am not talking about other positions. How, given such pay, is one to raise personnel? Even those, who worked here for years, are scattering.

Or take the following fact. Last year the wage at sectorial institutes increased by 2.7-fold, while at the academy it increased by 30 percent. How is one to understand this? The head of a laboratory of a sectorial scientific research institute in accordance with the new system of remuneration can receive bonuses of up to 12 and more salaries a year, while they do not always give us an extra month's wage.

**SOVETSKAYA BELORUSSIYA:** Pardon the immodest question, but what wage does the president have?

**V. P. Platonov:** It is 900 rubles. But I am concerned not about myself, in general I have enough. But how is one to live on 150-170 rubles? Meanwhile, today people no longer want to accept even the position of director. Because, in conformity with prevailing instructions, a supervisor does not have the right either to large bonuses or to increments for introduction. And it often turns out that his wage is less than that of the head of a laboratory. But are their workloads and responsibility really comparable? Moreover, a director, if he wants to enjoy respect and authority, should in addition produce something.

**SOVETSKAYA BELORUSSIYA:** Yes, there are many problems.... So, have you become disappointed during these three years? Is there any moral satisfaction?

**V. P. Platonov:** Well, of course, there are far fewer minutes when I am satisfied. Because here—I have in mind not only the republic, but also the country as a whole—the role and place of the Academy of Sciences for the present are inadequately defined. It seems to me, and I have been leaning toward this all the time during our conversation, that it is necessary to give use more independence. Since so many scientists, quite intelligent people, let us say frankly, have assembled here, trust them. They are attempting all the time to regulate us. And then.... Too much effort is being spent on fusses, meetings, the writing of documents, that is, on work that is not of substantial importance for science.

**SOVETSKAYA BELORUSSIYA:** But is there no bitter regret?

**V. P. Platonov:** No. And there is why. I experience definite satisfaction with the fact that I have succeeded in improving somewhat the atmosphere at the climate—both the scientific and the human atmosphere. If we can reinforce and intensify this process, this is a reliable basis for the new, progressive development of the academy.

**SOVETSKAYA BELORUSSIYA:** How, given all these endless troubles, problems, trips, and meetings, do you succeed in finding time for scientific work?

**V. P. Platonov:** I succeed, but with difficulty. There are literally numbered hours. For the most part I now have to do work in the evening and on days off.

**SOVETSKAYA BELORUSSIYA:** Vladimir Petrovich, do you have any interests besides science?

**V. P. Platonov:** At one time I had quite a number of them. I liked and do like literature very much. I actively engaged in sports. I played basketball and volleyball. Moreover, I played quite decently—at the level of the first category. I was enthusiastic about court tennis. But now that I have become president, it is simply impossible to find time for these interests.

**SOVETSKAYA BELORUSSIYA:** How do you succeed in maintaining the necessary physical shape? For given such enormous loads....

**V. P. Platonov:** You know, I try to walk. In the morning and in the evening. At times I run, true, not a lot and irregularly. While in general, if we talk in broad terms, this is our serious shortcoming, which characterizes our overall culture. In all civilized countries they treat the pursuit of sports and physical culture very seriously, I would even say reverently. While in our country.... Now you, the editor of a newspaper, want, let us suppose, to play tennis. Is this possible?

**SOVETSKAYA BELORUSSIYA:** It is a little difficult....

**V. P. Platonov:** If you even come to an agreement concerning the court, they will set aside for you without fail an inconvenient time.... No, we must definitely learn culture and respect for the personality of the individual. Having proclaimed the idea of equality, we actually arrived at leveling. But is this really correct? Equality should be before the law, in the obtaining of an education and in some other basic things. But no more. Because genuine respect for the individual also implies indispensable differentiation, division. The people, who give more for society, should also receive more from it. If only in the form of an additional opportunity to engage in a favorite type of sport and in physical culture. It is true, is it not?

**SOVETSKAYA BELORUSSIYA:** Yes, it would be good.... Vladimir Petrovich, all the same, how do you spend your days off? Well, on Saturday, I know, you, as a rule, work here, at the academy. But what about on Sunday?

**V. P. Platonov:** I like to drive outside the city. For me it is very important to spend if only some time in the country. To go for a walk in the woods, to isolate myself from everything, to listen to the quiet. This has a very good effect on me. Nature soothes, pacifies, suggests deep thoughts. I relax best of all in this way. This is probably because I myself am from the country, I grew up among the fields and forests, nature, it can be said, became an organic, integral part of my soul. In general, three things, perhaps, formed me as an individual—nature, mathematics, and literature.

**SOVETSKAYA BELORUSSIYA:** It is good that you mentioned this.... I would like very much to know what you read, what of your reading in recent times has disturbed and shaken you most of all. And is your passion for mathematics leaving a mark on your choice of literature?

**V. P. Platonov:** You know, I was raised on the classics. Of the much talked of modern novels none, I dare say, has left a particular impression. They do not have the depth that the classics do. Therefore, most often I read and reread Dostoyevskiy, Chekhov. I like Yesenin very much. All these are different authors, but, perhaps, I also like them for this difference.

**SOVETSKAYA BELORUSSIYA:** And is Tolstoy included in the group of your favorite writers?

**V. P. Platonov:** Why, I also gladly read Tolstoy. But I place Dostoyevskiy higher. He forces one to think deeply and seriously. While Chekhov has much grief and subtle sorrow, a certain ablation of the soul occurs while reading. Of Soviet writers I would single out two most prominent figures. This is first of all Mikhail Bulgakov. His "Master i Margarita" [The Master and Margarita] is a masterpiece, inexplicable verbal magic. And how much is reproduced from the future! All this demagoguery, dogmatism, bureaucracy.... And what about "Sobachye serdtse" [The Heart of a Dog]? This, after all, is about what you and I were just talking—about your intellectual level, our lack of culture. And what a depth of penetration into human characters, what a degree of typification!

Well, my namesake—Andrey Platonov—was also a real revelation for me. It is, of course, difficult to read him. But what is remarkable? "Kotlovan" [The Foundation Pit], "Yuvenilnoye more" [The Juvenile Sea], and "Chevengur," which were written half a century ago, have not lost their topicality in the least. The sensation is that all this was written today, about you and me. That is what it means to be a great writer.

**SOVETSKAYA BELORUSSIYA:** And who of the Belorussian writers is closest of all to you in this sense?

**V. P. Platonov:** Well, of course, Vasil Bykov. This is our most brilliant prose writer. I have read nearly everything of his. I also like him as a person. He and I have been friends for many years. I value him first of all for the fact that he dared to state his opinion. This is very important in art. Far from everyone succeeds in such a thing. Bykov succeeded. Take his "Sotnikova" [The Cossack Lieutenant's Wife]. What power! For it is a small thing, but how much is said there—both about the terrible contradictory nature of our life and about the human essence. No, to be sure, this is a most talented writer.

At one time I read very much by Vladimir Korotkevich. Perhaps because all his things are profoundly romantic, and this to some extent corresponds to my spiritual world. In mathematics, after all, it is also impossible to do without romanticism. And, perhaps, Korotkevich is close to me in his pure, most sincere love for his native region and its people.

All the same we have—both in prose and in poetry—talented, interesting people. This gives pleasure, and I believe that it would be good in general if some more people of this sort were to appear. We are in this sense somewhat impoverished.

**SOVETSKAYA BELORUSSIYA:** Why, in your opinion, did it turn out this way?

**V. P. Platonov:** This has its own reasons—historical, social, and political. If we trace the events of our centuries-old history, simply everyone trampled the long-suffering Belorussian land! And each one wanted to convert the inhabitants here to his faith and to deprive them of national self-consciousness. That is why the

Belorussians right up to the revolution did not succeed in forming the nucleus of the nation—their own creative and scientific intelligentsia. And when the first shoots began to rise, the most serious blow was struck against them in the 1930's. During the recent, stagnation, times the Belorussian language and Belorussian culture in general were considered some kind of provincialism. Precisely during those years a wave of energetic, vigorous, but uncultured and unintelligent people swamped us. What you want after all this....

**SOVETSKAYA BELORUSSIYA:** But there were also true intellectuals. It is hardly possible to justify their passivity under these conditions. It is possible to understand it, but not to justify it.

**V. P. Platonov:** Of course. I believe that the basic reproaches for the position, in which our national culture found itself, should be addressed first of all to the intelligentsia. It should have rung all the bells and stood to the last.

**SOVETSKAYA BELORUSSIYA:** And a final question. If we trace the external milestones of your biography, it is possible to think that you are a child of fortune.

**V. P. Platonov:** What a child! Not a bit.... This is drudgery.

**SOVETSKAYA BELORUSSIYA:** Fine. Let us pose the question in a different way. Fame came to you very early. What do you think of it? Is it hindering or helping you?

**V. P. Platonov:** Fame actually did come to me early. And when I was quite young, I, undoubtedly, felt it. Then I began to treat this more calmly. Although I will say that for a scientist, for any creative person fame, only not as fanfares and honors, but as the recognition of society, is very important. It confirms you in the necessity and utility of what you are doing and lends strength. So that fame is not hindering me. The inefficient organization of our labor is hindering me far more. We spend an enormous amount of time on unimportant questions and thereby we are checking, are impeding the development of society, because if we—each person at his own place—could do if only a little bit of something important and useful, it would add up and would yield as a whole something significant, which would enrich us and advance us. Unnecessary fuss—that is what irks me.

**SOVETSKAYA BELORUSSIYA:** Vladimir Petrovich, in this everyday fuss does time remain for personal life?

**V. P. Platonov:** Everything, about which we have spoken here today, is my personal life.

The president leans against the back of the chair and again laughs resoundingly and like a mischievous youth. So what, a sense of humor is an important sign of spiritual health. While this is a guarantee that V.P. Platonov will still accomplish much in his life—both as an executive and as a scientist. Today, on his 50th birthday, we sincerely wish him this.

## Reports at General Session of Ukrainian Academy of Sciences

### Academy's Tasks Delineated

18140216A Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 4-14

[Report by President of UkSSR Academy of Sciences Academician B. Ye. Paton: "On Main Tasks in Implementing Resolutions of 19th All-Union CPSU Conference at UkSSR Academy of Sciences"]

[Text] Dear Comrades! The 19th All-Union Party Conference has developed a concrete program of actions at the new stage of perestroika, and it especially emphasized the enormous role of science. Cardinal changes both in economics and in the sociocultural area are only possible based on surpassing the development of science. Never before has the task of serious improvement of scientific research, drastic improvement of the level and quality of research and its practical payoff been formulated so keenly.

Of course, there are certain achievements in the activity of the USSR Academy of Sciences. The Academy is the country's leading center in the field of material science. In some material science directions we are world leaders. There are also successes in other science fields. Thus, research in various areas of mathematics, cybernetics, physics, astronomy and physiology is conducted at the world level.

There are a lot of positive examples that confirm the correctness of the chosen directions in restructuring Academy's activity.

The policy of priorities and ensuring Institutes' participation in developing promising scientific directions is bearing fruit. Specifically, a lot of work has been done in creating here the center for the development of material science problems of high-temperature superconductivity. I shall note that all studies in this area that had been presented by AN UkSSR [UkSSR Academy of Sciences] for the All-Union contest were recognized as the most important ones and included into a corresponding program.

A more demanding review of Institutes activity by the Presidium and decisive revision, if necessary, of scientific directions assigned to the Institutes are bringing positive results. For instance, Gas Institute, which has become the country's head institution in implementing the program of using natural and liquefied petroleum gas as motor fuel, has reached a qualitatively new status. One can see certain changes in the work of the Geology and Geochemistry of Combustible Materials, Plant Physiology, and Genetics Institutes, whose work has been recently subjected to fair criticism.

Restructuring of foreign economic activities and granting more independence to Academy's institutions positively affected activity and increased activity in

establishing direct ties with foreign companies on a commercial basis. Joint ventures in manufacturing of science-intensive products are being created. Here, we should mention the Cybernetics Institute imeni V.M. Glushkov, Electric Welding Institute imeni Ye.O. Paton, Problems of Material Science Institute imeni I.N. Frantsevich, Superhard Materials Institute, and Department of Disperse Systems of the Colloidal Chemistry and Hydrochemistry Institute imeni A.V. Dumanskiy.

Academy's efforts aimed at solving acute ecological problems have become more effective. During the last year and a half alone, 15 commissions of experts have been created, including commissions for projects for updating the Stebnik Potassium Plant and Metallurgical Mill imeni G.I. Petrovskiy in the city of Dnepropetrovsk and for construction projects of a number of chemical enterprises and their production departments. Conclusions of some of the commissions contributed to making right decisions at the government level. We should also mention as a good initiative the creation of a new Department of Problems of Utilization of Nature and Regional Economics at the AN UkSSR Near-Dnieper Science Center.

However, nowadays one should of course speak not as much of achievements as of unsolved problems, unused reserves and omissions in our work. This applies first of all to basic research, whose actual condition is far from satisfactory. Unfortunately, our Academy has lost its leading positions in such directions as mathematical statistics, algebra of algorithms and programs, the theory of friction and wear, experimental nuclear physics, physical methods in analytical chemistry, biochemistry and physical chemistry of proteins, and economical problems of S&T progress. The list can go on and on. Among the consequences of this situation is a substantial decrease in the number of works awarded Lenin and State Prizes and the number of foreign publications of works by our scientists.

We are still behind the world level in a number of directions which we have been developing for many years, such as mechanics of composites, physical and quantum electronics, geochemistry of petroleum and geotectonics, development of diagnostic methods in power machine building, scientific foundations of thermal processes in modern manufacturing, molecular-cellular immunology, genetic engineering etc.

Not that these problems have been unexpectedly discovered just now. They were discussed many times at AN UkSSR General Sessions and Presidium meetings. Resolutions were adopted, but unfortunately no anticipated changes, such as huge scientific breakthroughs and world level results, have happened yet.

A recently conducted analysis has demonstrated that the Academy's leading scientists think this is only due to insufficient support of scientific work with equipment for scientific experiments, computing technology and financing. Of course, this is important and does take

place. But something else is also true - one cannot achieve ponderable results without deep and fruitful scientific ideas and without creative and, I would say, really zealous, in the true sense of the word, attitude to science. And we now feel a lack of such ideas and such attitude. In this situation, one hardly can achieve breakthroughs in certain directions and bring the Academy to a qualitatively new state, even if all Institutes' demands are satisfied.

The situation that has formed is causing great concern. One should look for a way out by first of all establishing in scientific collectives real competitiveness on a healthy and, I am stressing, competitive basis, an atmosphere of a free exchange of ideas, creative discussion, unbiased attitude toward new theories and hypotheses, and of course by attracting to science gifted youth and new talents and improving the training of highly-skilled specialists.

Relying on intensive development of certain scientific directions, we often take the route of creating new Institutes and Departments and award Academic titles. As a result, we often end up having numerous collectives, Academicians and Corresponding Members, but no achievements that would define Academy's face. Of course, one cannot consider this a normal situation, and decisions of the 19th All-Union Party Conference are orienting us towards resolving it.

The UkSSR Academy of Sciences has everything necessary to make a sound contribution to the development of a number of priority directions, such as the theory of and methods for construction of high-speed multiprocessor computers, diagnostics of hot plasma, development of ceramic high-temperature superconductors, molecular electronics, radiation physical chemistry, molecular and cellular mechanisms of activity of organism's physiologic systems, and biotechnology. Here, we should count on a more active position of respective Science Departments and especially their Institutes, where science is actually made. It has been stated repeatedly that an academic Institute justifies its existence only if it effectively provides the world level of research in the directions assigned to it.

Academician I.I. Lukinov will speak in greater detail on the situation in social sciences. I shall only emphasize that overcoming the stagnation and achieving real restructuring in this area is a much more complicated and prolonged process than in the field of nature and technical sciences. Our social scientists must turn their faces decisively towards studying the reality, free themselves from dogmatism and relinquish commentatorship and temporization. Nowadays, we need serious scientific substantiation of paths of economic development and historic perspectives of the socialist civilization, rather than theoretical confirmation of changes that have already occurred in economics and social life.

In other words, our social sciences must not trail events, as has often been the case - they must lead the events and

perform the forecasting function. Then critical complaints on the part of some social scientists regarding frequent distractions for preparing materials on assignments from Republic's central bodies will vanish by themselves. I am sure that when research subjects become really topical and the scientific process becomes fruitful, social scientists will be able to outpace such assignments "from the top" with their initiative proposals.

The Social Sciences Section and our social scientists must make a stronger effort to implement two great social orders - ensure the fulfillment of the Republic's Integrated Program of Scientific Research on Problems of Communist Upbringing, and prepare a cycle of works on urgent problems of socioeconomic acceleration. The Section scientists are facing important tasks in preparing CPSU Central Committee Plenum "On Improving Inter-National Relations in the USSR."

Comrades! At the recent General Session of the USSR Academy of Sciences, which discussed scientists' tasks in light of decisions of the 19th All-Union Party Conference, special importance was given to practical implementation of the policy of priorities. This is extremely urgent for our Academy too.

We should state with self-criticism that our work along these directions has been conducted using actually obsolete administrative methods. Formally, everything necessary was seemingly done - priority research directions were determined at the Academy as well as at the Department level, priority subjects of scientific research works were chosen, and necessary resources for performing the work were given to the Institutes. Suffice it to say that in the last year and a half alone additional appropriations equalled almost R30 million. Unfortunately, one has not been able to appreciably approach the word level in the majority of priority directions.

Undoubtedly, the main mistake here is a large number of priorities. This is not the case when quantity transforms into quality. The above pertains to a certain degree to all Science Departments, but specifically to the Mechanics, Earth Sciences, Chemistry and Chemical Technology, Biochemistry, and Physiology and Theoretical Medicine Department. This approach only leads to dispersion of effort and resources. We have not been able to completely overcome subjectivism and selfish and ambitious aspirations of some managers. I am speaking of their desire to see their research among an Institute's or, better yet, the Academy's priorities. And often they do not stop to think whether this is in line with nationwide and world priorities and whether it matches actual resources of the Academy of Sciences. Here, we need a responsible attitude, first of all on the part of our respected Academicians and Institutes' Scientific Councils.

The first experience in determining the order of priorities depending on the degree of the research importance demonstrates that a more clear-cut system is needed. Competitive selection of works, based on comprehensive

forecasts and objective expert examination, is undoubtedly an integral characteristic of this system. Competitive principles are important for asserting the principle of scientists' competitiveness and increasing their responsibility for the level of their results and for spending resources allocated by the State.

Frankly speaking, for a very long time we have not been taking advantage of the opportunities inherent in the competitive principle. And even now there are still more words than deeds in this area. Even when contests were conducted, they were often becoming formal procedures with foregone conclusions, and this was negatively affecting scientists, especially the young ones, begetting inertia, conservative thinking and the desire to live comfortably, so to speak. It is therefore necessary to immediately give the contests back their original meaning, normalize the moral and psychological atmosphere in our Institutes, and set in motion reserves of creative initiative, which is especially valuable in the research process and which a lot of scientists prefer, unfortunately, to keep back.

For the selection of priorities to be rigorously substantiated, one should considerably improve the level of forecasting activity. Ignoring forecasts and treating them as something secondary results in tangible losses of effort and resources and lagging behind the world, and sometimes even the Union level in the most important directions. Also wrong is the practice of forming various level programs without first developing comprehensive forecasts.

This has been talked about many times, but unfortunately little has changed. And although commanding and administrative methods are not in high esteem nowadays, I think in this particular case one should use one's authority. This pertains first of all to Science Sections and Departments. One should only approve main directions of scientific activities of Institutes for the coming time period after developing forecasts of the development of proposed directions, conducting comprehensive outside expert examination of these forecasts and defending them at General Sessions of Science Departments. I shall note that such work, which had been performed within the framework of the fourth priority direction of the Integrated Program of S&T Progress of CEMA Member Countries, turned out to be extremely fruitful.

It is also important to pay attention to the fact that there was practically no real expert examination in the Academy, and without it the implementation of the competitive system is inconceivable. Mildly put, this type of scientific activity is not exactly enjoying popularity yet. A lot of scientists are not eager to act as experts, and often they do not have necessary skills either.

Meanwhile, science and the practice of implementation of large-scale projects are in dire need of objective expert examination. This is an important, and often the only

way of setting off the voice of reason against voluntaristic pressure and monopolistic behavior of head branch Institutes and agency selfishness, as well as personal sympathies and antipathies of managers inside their collectives. Its skillful implementation substantially reduces chances for wasting the effort and resources.

Ecologic expert examination needs special attention of our Institutes. Its importance was stressed at the 19th All-Union Party Conference. Frankly speaking, not always have we been ready to give competent recommendations as to the location and construction of large national economy projects. Moreover, our scientists have not been imbued yet with the so-called ecologic thinking, which is also reflected in the lack of correspondence between scientific developments and needs of nature utilization.

Comrades! The outpacing development of priority directions in basic research and the task of achieving world level results, which follow from the decisions of the 19th All-Union Party Conference, call for reorganizing the planning of research and increasing the role of the program-oriented approach. The UkSSR Academy of Sciences has accumulated certain experience in the implementation of scientific programs. I am speaking of programs on high-temperature superconductivity, membranes and membrane technology, primary converters of physical and chemical parameters, and radiation chemistry technologies.

It is well known that the UkSSR Academy of Sciences is completing the formation of State programs of basic research. I would like to concentrate your attention on the extreme importance of participation of our Institutes in these programs. And we need really joint works with AN SSSR [the USSR Academy of Sciences] institutions. Of course, the process of joining Union programs is not simple in many respects - one sometimes encounters evidence of subjectivism, monopolism and even open unwillingness of cooperation on the part of some Institutes. However, those our institutions whose proposals include topical subjects, are sufficiently substantiated and supported by energetic work at Departments and Institutes of the USSR Academy of Sciences, have already been included in appropriate programs. I think that after this work is completed we shall see clearly who and how good has worked, and the main thing, we shall see who and how much is appreciated at the Union level. We should also much more actively cooperate with foreign scientists and use better the opportunity of the international division of scientific labor. Self-isolation destructively affects the level and results of research, which has been proven by quite a few facts. Institutes must persistently work in this direction, even more so that because certain improvement of the foreign-policy situation facilitates the development of international scientific contacts.

As you well know, we place great hopes in the implementation of the Integrated Program of S&T Progress of CEMA Member Countries up to the Year 2000, in which

our institutions are fairly broadly represented. However, we have had only modest successes here so far. And the reason is that Institutes often only limit themselves to being represented in the program tasks. Whether important results are achieved will depend on the degree to which goal-oriented projects formed within the framework of the Integrated Program of S&T Progress of CEMA Member Countries are filled with new basic backlog, which must be created at the outstripping pace. The Information Science, Computer Technology and Automation Department, Physical and Technical Problems of Material Science Department and especially (speaking of priority direction "Biotechnology") all Departments of the Chemical-Technological and Biological Sciences Section should take a more active position with respect to this problem.

Republican programs of basic research will reflect new approaches to the planning and organization of science. The UkSSR Council of Ministers has approved the list of seven scientific problems for which programs will be formulated; the list was presented by the Academy. The programs will replace Republican Five- and One-Year Plans of scientific research in the field of nature and social sciences; it is well known, that in many respects these plans are just formal lists of subjects under development.

Academy's Sections responsible for preparation of scientific programs must work more energetically. They must concretely define the objectives and structure of each program and prepare proposals as to the cast of Scientific Councils on specific problems. The main goal is to ensure program formation based on competitive selection and objective expert examination of projects, enlisting extraagency reviewers. Drafts of appropriate methodological recommendations have been already prepared and will be presented for broad discussion. They deal with procedures for the formation, financing and implementation of these programs. Institutes should approach the discussion seriously and present their comments and proposals, in order to convert the recommendations into good working documents.

Comrades! Under the new conditions, the scope of budget financing of each scientific institution will depend to a large degree on its participation in Union and Republican programs. This system of fund allocation is due to switching of scientific organizations of the USSR Academy of Sciences, Academies of Sciences of Union Republics and the USSR State Committee for Public Education to new methods of financing and economic management. Taking into account the extreme importance decisions made in this area have for the organization of research, I shall dwell on some of their principal aspects.

First of all, they have ended discussions about switching the academic science to complete cost accounting and self-financing. Funds from the State budget will be appropriated for research and development specified in State S&T programs, the Integrated Program of S&T

Progress of CEMA Member Countries and plans of interbranch S&T complexes (MNTK) on the most important scientific and S&T problems, and in programs of basic research of the USSR Academy of Sciences and Academies of Sciences of Union Republics.

Appropriation of budget funds for conducting scientific research on subjects formed independently by scientific institutions is a new in principle aspect. Such research must be conducted in order to create advance scientific backlog and search for "growth points" and new directions in which scientists' efforts should be concentrated.

It also has been decided to create a reserve from funds appropriated from the budget, for financing the most important research the need for which arises during the year. It is a very important principle. These funds can be used for conducting works performed according to programs of basic research.

One of the determining aspects of the new order of financing is that funds will be appropriated not for the upkeep of scientific organizations, but for specific programs, subjects and initiative basic research, and this will be done on a competitive basis.

Another new aspect in financing of Institutes is the creation of a profit, comprised of both savings of budget funds and cost-accounting activities per contracts with customers. For the USSR Academy of Sciences and Academies of Sciences of Union Republics, central planning and financing bodies will establish standards for creating the payroll fund and a standard, common for all scientific organizations, for deductions from profit to the State (including local) budget; they also establish the rules for profit distribution.

I am calling your attention to the fact that the new provisions regarding distribution of financing among programs and subjects and forming research subjects at Institutes, as well as the competitive basis for fund distribution, are being introduced as early as January 1, 1989. Two weeks ago this problem was discussed at a meeting of the Academy Presidium. A corresponding resolution was adopted. As you can see, there is not much time left and there is a lot of work to do. There are still certain aspects that call for conducting as broad discussion as possible and making further decisions. We are therefore counting on active exchange of opinions in the debates at this General Session.

I would like to note that situations can arise when even good works that are past the stage of basic research will not make it to Union level programs, for one reason or another. Because of this, AN UkSSR Presidium provides for the possibility to form our own programs (or a separate set of subjects) that will be included into an agency order and left completely to the discretion of Science Departments. However, we are warning you not to consider such possibility as a "life-saver" for hopeless or low-urgency subjects. Competitive selection based on

objective expert assessments will become a reliable barrier in the way of attempts to ram such subjects into an agency order.

Setting differentiated standards for allocating funds for basic research to scientific institutions is also a serious problem. Institutes must begin developing basic research subjects as early as 1989. These subjects must be financed by freeing up funds as other scientific research work is completed, and also by revising subjects approved earlier.

Comrades! Under the new economic conditions we should also use a new approach to cooperation with VUZs [higher educational institutions]. Development of basic research is the most important task for both the Academy and higher school. Therefore, the very nature of the subject dictates the need to closely integrate research collectives of both sides. Unfortunately, the real picture is quite different. On the part of VUZs, we see the desire to stay aloof from Academy's Institutes when conducting basic research and forming respective Republican programs discussed earlier. Such separation will result in an unwarranted increase in the number of scientific programs, dispersion of effort and funds and duplication of subjects. Training of science personnel suffers too. Although contracts for creating departments for goal-oriented training have been signed with Kiev State University and Kiev Polytechnic Institute, their practical implementation is being dragged out. To solve all these problems, additional effort on both sides is needed. We count here on a more active position of members of our Academy, and first of all those working at VUZs.

Comrades! The shift of the center of application of all our effort to Institutes forces us to use a new approach to working with personnel. Frankly speaking, we have serious difficulties in this area. According to amendments to the Academy By-Laws adopted earlier, Institute Directors and subdivision heads are now elected democratically from among several nominees. But we are not used to it. As a result, we have encountered an unusual phenomenon - a lot of scientists are refusing to take a Director's position. It turned out that there is shortage of people capable of bringing up a constructive program of developing a scientific collective and take the responsibility for its fate.

I think in this case, the way out is to pay much more attention to training - and not on paper, but in fact - of a capable reserve of managerial personnel and to give firm and consistent support to independent and talented people who take initiative and strive for justified changes.

Another serious aspect of the personnel policy is rejuvenation of Academy's personnel. Unless we solve this problem, we will not reach the goal posed to science by the perestroika. In order for the young reinforcement to become the future of science, we must today make them

part of the research process and give them wide opportunities for creativity and taking responsibility. The main thing is to look for talents, support their formation and create opportunities for independent creative work. I think all these aspects must be taken into account when forming agency orders and especially initiative basic research subjects.

Training of the most highly skilled scientific personnel remains an acute problem. While on the whole the 1987 plan for training Doctors of Sciences was overfulfilled, the plan of defending Doctor of Sciences dissertations in priority scientific directions was only fulfilled 67 percent. I already noted earlier that we do not have enough Doctors, and sometimes even Candidates of Sciences for directions such as CAD systems, mathematical physics, biotechnology, semiconductor technology and technology of materials for electronic devices, certain areas of solid state physics, material science, power engineering, biochemistry, economics and sociology. I think everybody understands which Departments I am talking about and who personally must pay serious day-to-day attention to this problem. And this is due not just to shortcomings in planning and the absence of control on the part of Academician Secretaries and Institutes' managers, but also to sluggishness and inability or unwillingness to change old work habits. In particular, the need to expand the practice of defending Doctor of Sciences dissertations in the form of scientific papers has been stressed repeatedly, however, in most cases this does not go beyond appeals. You understand of course that we do not have ready-to-go prescriptions. One should look for solutions, and first of all at Institutes. I think, scientists who fearlessly take up the development of innovative directions where we feel an acute shortage of personnel, and especially those who are preparing their Doctor of Sciences dissertations on appropriate subjects, must get absolute support at their Institutes. In other words, they must be given the most-favored person treatment.

Organizing fieldwork at leading AN SSSR institutions and foreign science centers is another effective method for improving the professional level of scientific personnel. Here, the initiative completely belongs to Institutes. Nobody will solve this problem for them.

In discussing the most urgent tasks in the area of the personnel policy, it is impossible not to mention new trends that affect the personnel situation at the Academy. I am talking about substantial changes in social, moral and scientific reference points of the large part of scientific associates. Among the immediate reasons are more attractive, compared to the Academy, prospects for pay raises and pensions at VUZs, expansion of the cooperative movement and formation of cost-accounting creative collectives. It is no secret that these opportunities attract first of all energetic and full of initiative people, and first of all the youth, who are not satisfied with their material situation, living conditions and prospects for further growth, but even more with their inequitable (in some collectives) role. In the end,

this leads to the withdrawal of not exactly the worst group of workers from our Institutes, which causes serious concern.

Institutes must be more active in implementing measures aimed at effectively counteracting this phenomenon. Of course, bans or other voluntaristic acts are out of the question. One should use as much as possible the possibilities for material and other incentives available to Institutes. Institutes' directors practically do not use these possibilities, especially for young employees.

Lastly, creating a healthy moral climate at scientific Institutes plays not exactly the least important role in improving the personnel situation - it is a powerful factor in uniting a collective, retaining the personnel and unleashing their creative abilities.

I would like to speak briefly about our attitude to cooperatives in science, which have already become a reality. It is not simple. There are positive examples of accelerated implementation of scientific developments with the help of cooperatives and of their utilization in the area of scientific services. However, we must not overlook negative for our Academy consequences of their activities, and particularly withdrawal of personnel to cooperatives, which has already been mentioned.

I think this has to be investigated properly at the Academy as a whole and at each our institution, so that to have the most effective use of the cooperative form of organization of labor, and first of all for the most important subjects, rather than for subjects that somebody deems profitable and attractive.

Comrades! It was noted at the 19th Party Conference that elimination of bureaucratism and management by orders and decrees and redistribution of power, which ensures the maximum possible payoff of initiative and independence of creative collectives, is one of the main factors of further accelerated development of science. In the course of perestroika at the AN UkSSR, certain decentralization of functions has been accomplished. In particular, Institutes were given the right to solve problems related to developing their structure, personnel, limiting appropriations for the upkeep of the administrative apparatus, paying bonuses for the development and implementation of new technology, paying author's rewards, granting leaves for creative work etc.

When switching to the new working conditions, independence increases substantially, and rights of Departments and Institutes in planning and financing research are broadened. I have already said that Departments are given the right to independently form agency orders and that planning of search subjects is given now to Institutes' jurisdiction. Beginning in 1989, we intend to transfer to them all problems related to the implementation plan. Of course, all this requires that they demonstrate initiative and responsibility.

At the same time, one cannot help to notice that a lot of Institutes, as well as some Science Departments, have

not yet completely overcome the inertia of the old work style and methods and have not rejected habitual stereotypes, excessive organization and the desire to shift all responsibility for decision making to the Presidium. We quite often encounter facts when not only Institutes cannot use the rights that they have been given and that were stated in corresponding documents, but simply do not know these rights. Here are some examples. I will not mention the institution Director's name - he is a strong and energetic manager, and the Institute as a whole is working at a good level. This is exactly why it is amazing that a proposal has been sent to the Presidium to give Institutes the right to enter into contracts with coexecutors using funds allocated for performing individual assignments of programs. And this happened after Regulations on Contracts for the Development and Transfer of S&T Products and Rules for Financing of Scientific Research Work have been sent to all our institutions. It begs the question of whether anybody at Institutes at all studies these and similar important documents, or they are just being recorded and filed?

Another manager is proposing to give Institutes' Directors the right to cancel labor agreements with employees not adhering to labor laws. No comment, as they say.

These examples make us to ponder: What is it exactly that our permanent seminar for improving administrative skills of managerial workers is doing? Its work must be restructured radically. The contents of the learning process must be brought closer to real-life problems related to working under the new conditions and use active forms of studies, such as business games, analysis of real-life situations etc. Besides, in addition to improving the skills we should think of goal-oriented training of the new type of organizers, who would master the entire arsenal of knowledge and experience of the today's manager.

Science Departments are very slow in restructuring their work. Unfortunately, they are still preoccupied with routine and mostly minor problems. At the same time, their position on a number of principle and strategic issues, such as Institutes' participation in State programs of basic research, including our representatives to Scientific Councils on these programs, organizing competitive selection and expert examination of scientific projects and forming integrated interdisciplinary research, remains, with few exceptions, await-and-see and passive one.

As before, Academician-Secretaries seldom visit their Department's Institutes and do not sufficiently participate in the work of their Scientific Councils. Unfortunately, even some newly elected ones have not found time for it for almost a year now.

I would like to note that Departments' tasks on improving the organization of scientific research were recently the subject of a special and fairly critical examination at a meeting of the AN UkSSR Presidium. We came to an unambiguous conclusion - in some cases, the Departments have not been at their best during the

complicated perestroika period. And although this is a very sad assessment, especially for those who do have certain successes, one must accept it and draw right conclusions.

At present, development and practical implementation of the strategy of developing respective science branches aimed at achieving world level results, organization of expert assessments of scientific projects and work results, determining the qualitative level of scientific potential of our institutions, evaluating the methodology of scientific search and giving scientific collectives methodological and consulting help are main tasks of Science Departments.

One could voice certain complaints as to the work of Vice Presidents, Chief Scientific Secretary, Heads of Science Centers, President and the entire Presidium. It is desirable that during the debates specific critical remarks aimed at the Presidium and its members, as well as constructive proposals on improving its activity, are made.

The staff also has to radically restructure its work, and first of all abandon management by orders and decrees and unnecessary paperwork, and spend more time in the field. In the very near future the staff structure and functions will change considerably and become as close as possible to Academy's work under the new conditions. We intend to cut the staff by approximately 20 percent. All these problems have been discussed and decided on by the Presidium.

Comrades! One cannot but pay attention to another important aspect. It is exactly the deep sense of perestroika that it is first of all aimed at a human being and his or her moral values, which in the not too far past were often ignored or even stifled. And the Academy will not reach a new qualitative state until each worker perceives the perestroika tasks as his or her vital interest and until these tasks transform into a concrete program of actions of each collective. Personal qualities and moral and psychological climate play here an extremely important and I would say decisive role.

Where collectives are healthy and capable of functioning and where Party influence is felt, perestroika is accepted with real enthusiasm, which reflects immediately in concrete actions. A different situation is forming at Institutes that are torn apart by fights among various groups, where scores are set and squabbles are pushing scientific tasks to the background. Here, fertile ground is created for flourishing of monopolism, imitation of scientific activity and deformation of moral principles. In the end, this leads to a general decrease in work efficiency and sharply reduced contribution to solving urgent scientific and national economic problems.

Of great concern are facts of passivity, organizational impotence and lack of any desire on the part of a number of leading scientists to affect the course of events. In particular, such passivity is exemplified by the attitude to a recent poll on evaluating the status and prospects for

development of scientific directions at our Academy. Suffice it to say that less than 50 percent of all Academy members returned AN UkSSR Presidium questionnaires and that the majority of those returned were in essence formal replies without objective analysis and interesting concrete proposals. However disappointing it is, one has to talk about this, as it is first of all members of our Academy who are called upon to initiate and be in the forefront of processes of normalization and renewal. It is them that we expect to actively work and really care for developing research and training deserving scientific successors.

The UkSSR Academy of Sciences is now at a very important stage - the milestones and directions of perestroika planned by us are turning into concrete deeds. Without goal-oriented nurturing of initiative, independence and acute interest in and need for innovation, one cannot achieve new frontiers. These qualities can be developed if one relies on further democratization of the life of work collectives, development of glasnost and openness and assertion of a really creative atmosphere.

In this respect I would like to dwell on another important problem. It became known that a meeting of the initiative group on creating another informal association, the Republican Union of Scientific Associates, took place recently. Isn't somebody trying to create too many various informal unions, funds and even fronts? I do not think it is necessary to make a final assessment of this initiative. The problem begs for serious studies. But it would be good if the above mentioned initiative group at least remembered that in the UkSSR there is a branch of the Union of S&T Societies headed by Academician V.I. Trefilov.

In conclusion, I shall dwell shortly on problems of the social sphere. To a large extent they determine people's mood and tone. I am speaking of providing housing, the possibility to improve one's health and get medical care, placement of children to nurseries and kindergartens, leisure time and sports. Recently, certain steps have been taken in this area - the share of investment in housing construction has increased substantially, trust "Akademstroy" has been finally organized, and our own construction facilities are getting stronger. Youth housing cooperatives are expanding.

But despite the effort, the situation remains complicated. The social program is being poorly implemented; as was the case before, it is mainly aimed at Academy members and management of our institutions. Rank-and-file employees, and first of all the young people we are talking about so much, are feeling the effect of the program to a much lesser extent. This is especially intolerable under the conditions of democratization of our society and bringing the social program to the forefront.

It has been said repeatedly that in order to improve the situation, one should use all opportunities - those that

are available now and those that are opening up. Institutes, and especially large S&T complexes (NTK), should play the leading role in the social sphere. They must be more active in forming and using their own S&T and social development funds, attracting funds of interested Ministries and agencies and cooperating efforts in construction of housing and social, cultural and consumer services facilities.

Comrades! Serious changes are taking place in the life of our country, its national economy, politics and spiritual sphere. Of course, they pose complex and important tasks for us. But we should not be afraid of difficulties, nor should we be frustrated by the novelty of these problems. If we act with purpose, initiative and energy, we will no doubt be able to solve them successfully.

### Situation in Social Sciences

18140216B Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 15-20

[Speech by AN UkSSR Vice President Academician I.I. Lukinov, under the "Speeches of General Session Participants" rubric]

[Text] The implementation of the reform of our political and economic system poses new requirements to social sciences. Theoretical foundations of the reform are in the plane of new thinking and modern data of basic research and development of both the process of perestroika itself and forecasting its short- and long-term consequences.

It is impossible to create a socialist State of Law without a radical revision of the theory of State and law, which had been distorted during the periods of personality cult and stagnation, and development of really scientific concepts of legal regulation. Juridical science must translate the needs of perestroika in the entirety of its basic elements (ensuring economic independence of producers and priority of consumers' interests; sovereignty of Soviets; development of self-government, democracy and glasnost; efficient discipline and responsibility; activation of labor activity; protection of rights and freedoms of all members of our society; and social justice) into the language of law and reflect them in the system of State-legal norms. It should be noted that juridical science, including activities of scientists at our State and Law Institute, is lagging in theoretical reinterpretation of complex processes that are taking place; it is lagging behind practical requirements, and often shuts itself in its own shell when analyzing texts of standard acts, terminological discussions and historic digressions.

In the meantime, the reorientation towards developing basic theoretical concepts and burning problems of perestroika is still slow. Here, it is especially important to call jurists' attention to problems of developing democracy and self-government, legal regulation of managerial and business activities under the new conditions, disclosing the opportunities of utilization of relations of

ownership, and ensuring just legal regulation of problems of labor and labor remuneration, social protection, and law and order.

Creation of the Soviet State of law is an objective law of the development of our political system. It is this very State that must firmly establish the humane essence of socialism, ensure implementation and protection of person's rights, freedoms, honor and dignity as the highest value of the socialist society, and form new political and legal mechanisms that would preclude the very possibility of usurping power and deforming principles of government by and sovereignty of the people. In doing this, activities of the State apparatus and other political institutions must be confined to a rigorous legal framework.

One can see that there is huge work ahead, and not just for jurists (both practical workers and scientists), although they of course will be carrying the main load, but also for professionals in other areas of social sciences - philosophers, sociologists, economists and historians. The thing is that to create a legal socialist State, it is necessary to destroy ideological stereotypes, discard management by orders and decrees, discard voluntarism and subjectivism and uproot bureaucratism. One can understand the complexity of problems faced by politologists, jurists and representatives of other social sciences.

It is necessary to develop theoretically one of the founding principles of a State of law - the separation of legislative, executive and judicial power. Drafts of laws on changes and amendments to the USSR Constitution (Main Law) and of the Law on Electing People's Deputies, which were adopted after a nationwide discussion, revealed new problems, which call for comprehensive research and development. Legal scholars are working along these lines, preparing specific proposals related to the formation and efficient functioning of the State of law.

There are also a lot of legal problems in the area of economic reform implementation. It must be said that so far the recently adopted Law on State Enterprise (Association) has been working weakly, to put it mildly. To analyze causes for its inefficiency and search for ways and methods that would ensure the implementation of democratic principles it contains is an important sphere of application of creative effort of scholars of law.

In reforming the economic system, the first and foremost task is to develop a scientific concept of the socioeconomic development up to the end of this century and for the early 21st century, with the goal to reach qualitatively new frontiers of progress of the socialist civilization. Scientists - economists and sociologists - took an active part in developing this concept, which envisions profound transformations in productive forces and production relations.

Despite certain revival during the three years of perestroika in the sphere of economics, which has been

manifested in an increased pace of growth of labor productivity and resource-saving, increase in cost-accounting revenues and accumulation and consumption funds, the economic situation remains complicated. We have not been able to balance the interbranch structure and market demand and supply, overcome inflationary processes and the chain reaction of increasing expenses and prices.

S&T progress has not yet become a cost-saving factor. As in the past, resource-saving technologies are not used in mass production. For the first time the State budget deficit has been acknowledged at the official level, although economists discovered it long ago and were coming out against artificially defraying the deficit by printing banknotes.

Repeated attempts during the last two Five-Year Plans to change proportions between groups of branches of the first and second subdivisions in favor of accelerating the production and renewal of consumer goods and services failed. Hence an even more acute market deficit and inhibited increase of the living standard, while effective demand is increasing.

The situation with providing food products has become especially complicated, and this forced making the solution of the food problem the priority direction of our economic development. When one adds to this the existence of a large number of inefficient foreign trade operations and an irrational export-import structure, one would understand the reasons for the precrisis situation, which it has been extremely difficult to get out of.

Based on a comprehensive analysis of the current situation, economics Institutes in cooperation with the Republic's Gosplan have proposed to add to the concept of the next Five-Year Plan accomplishment of a more radical economic maneuver and structural reorientation of Ukraine's national economy along two decisive directions - first, the outpacing development of science-intensive production processes, which ensure general acceleration of the pace of S&T progress, and second, accelerated development of the high-priority social sphere.

Of course, this will call for profound qualitative and structural changes and a revision of the traditional investment and pricing policy. Unfortunately, so far it has been difficult for us to actively influence structural changes, due to the supremacy of centralism. As before, each Ministry applies pressure "from the top" and keeps trying to secure fund appropriations for investment according to the average Union pace of growth, thus preserving the "numbness" of the economic structure. In 1988, cost-accounting investment in the Republic was only equal to 24 percent of the total investment volume. Granted, the plan for 1989 provides for increasing this number to 47 percent. However, against the background of providing 100 percent of material resources for State orders, cost-accounting accumulations often remain

unrealized at the level of work collectives. At the same time, even when using differentiated standards in switching to cost accounting, the same levelling and extreme differentiation in the profitability level of industries and enterprises are often maintained. The system of wholesale prices is regulated by raising them, starting with prices for fuel and energy resources and raw materials, which threatens to pull the entire chain of rising prices, including retail prices, into a new spiral turn.

Scientists are working on the problem of overcoming inflationary processes with simultaneous simulation of alternative price forecasts. Recently, they completed the development of proposals for restructuring of the business mechanism of the agroindustrial complex in order to solve the complicated food problem. The proposals have been submitted to the CPSU Central Committee and country's Government, as well as to the Central Committee of the Communist Party of the Ukraine and the Republic's Government, as initiative proposals of the Academy for the upcoming CPSU Central Committee Plenum on the subject.

However, scientists working in the sphere of economics and sociology are still greatly indebted to the society, which is expecting them to develop new positive scientific concepts and effective levers for accelerated restructuring of the national economy. They must work more intensively on solving fundamental problems of intensification and improving the efficiency of the socialist economy. In developing an active social policy and concrete socioeconomic solutions, including the ecological aspects of human activity, we place great hopes in the development of sociologic research and study and accumulation of broad public opinion.

When expanding and deepening studies of processes of the cooperative movement, cost-accounting, commodity and money and lease relations, and individual labor activity, we cannot help but see along with positive also negative social phenomena, such as increasing profiteering trends under the conditions of ever sharper market deficits and creation of economically inequitable opportunities for competition between cooperatives and State enterprises.

AN UkSSR Economics Department should more actively influence the activity of its Economics of Industry Institute and out-of-town branches of the Economics Institute in developing problems of regional cost accounting; it must also more actively influence the Council for Studying UkSSR Productive Forces in solving the problem of structural changes as a decisive precondition of current and future progress.

New theoretical approaches are also important when studying cooperative and integrated type business systems, their economic stability and mobility of cost-accounting functioning with investment diversification, when forming various internal structures and conducting technological and organizational renovations. One must

not view specialization in an antiquated manner, one-sidedly. Despite the tremendous variety of forms, sizes and methods of economic management, mechanisms of the current world progress are linked to concentration and integration processes and to the formation of new economically stable economic systems with various structures, which flexibly adapt to changing market demand.

Nowadays, giant diversified concerns represent one of the leading forms of industrial capital in the world. As early as in the early 1970s, the majority of largest USA companies were diversified. Since then, this process has become much stronger and has reached an unprecedented scope. Under the influence of S&T revolution, a comprehensive structural reorganization of the economy at the macro- and microeconomic level is taking place fairly rapidly. The movement, merger and absorption of capital and capital concentration in the hands of ever more powerful corporations, which are directing it towards outpacing development of science-intensive production processes and promising industries and spheres, is the most typical feature of the current competitive struggle between monopolistic giants.

The diversification of corporations' capital takes place in ever new industries, based on an unprecedented horizontal and vertical integration. Between 1975 and 1985, the scale of operations on capital mergers and absorptions increased from \$12 billion to \$300 billion in the USA, from £0.5 to £7.1 in England and doubled in FRG [the Federal Republic of Germany]. Along with large companies, medium-size and small businesses, including small venture companies that are developing based on the newest scientific discoveries, are being pulled to a certain extent into these processes.

Here is an example showing the degree and pace of structural changes in diversified concerns. Just in the 1980s, General Electric Company sold 190 of its businesses for a total of \$6 billion and bought 70 new businesses for \$10 billion and thus considerably strengthened its positions in newest science-intensive industries, such as the development of aerospace systems, aircraft engines, medical equipment, semiconductors and technical plastics. In the process, product sales in 1981-1987 increased 50 percent and exceeded \$39 billion, while the workforce decreased from 404 thousand to 295 thousand. Similar trends are typical for a lot of today's corporations.

But in our country, by force of habit and under the administrative management of branch Ministries and agencies, we keep developing lopsided narrowly specialized business systems, which in some cases had been created as primitive "self-subsistent economies." And when it comes to, for instance, organizing large-scale manufacturing of consumer goods, enterprises brush this aside any which way they can, alluding that such products do not fit their specialization and using this as their cover. Under the new conditions of cost-accounting

activity, thoroughly developed cooperated and integrated business systems are the most economically powerful and stable entities; they are better in meeting ever changing consumer demand and market needs.

It is from this standpoint that one must radically revise concepts of forming (along with the rational structure of the national economic complex of the country, Union Republics and large regions) effective structures of integrated business systems with perfect enterprises with the major specialization, as well as complementary specializations. Really revolutionary results are only achieved at enterprises based on state-of-the-art resource-saving technological processes of mass production of high-quality products with minimal scrap (and ideally scrapless) and minimal labor expenditures per unit of use value. Without this, it is impossible to ensure stable economic conditions for accelerated economic development and commodity-money turnover, rapid technological renovation and manufacturing of a broad assortment of high-quality commodities, in order to eliminate market shortages. Our Republic's economy scholars, together with specialists in the field of nature and technical sciences, can and must make a sound contribution to solving this problem.

The Socioeconomic Problems of Foreign Countries Institute in cooperation with AN SSSR [USSR Academy of Science] international science centers should study activities of today's monopolistic associations more comprehensively, in order to use on a large scale the world experience in efficient organization of production.

History studies are seriously lagging the demands of the time. Presidium of the Academy of Sciences is concentrating the effort of history scholars on the development of major methodological problems of the history science and comprehension and new reading of the Leninist concept of our country's history and its turning-point periods and events. This pertains to both the remote past, particularly to law-governed character of the development of the Ukrainian people and nation, and to events and processes of the post-October era.

It is here that there are especially many "blank spots" and contradictory opinions. They pertain not only to the 1930s and 1940s, but also to virtually the entire post-war time. In solving these problems, we cannot lock ourselves within the framework of strictly Republic's subjects. The first and foremost role is given to studying inter-national relations between the peoples of our country and the historic experience in the implementation of Leninist nationalities policy. This direction becomes especially important on the eve of the CPSU Central Committee Plenum that will discuss these problems.

However, our historians are turning slowly to these problems and social practice needs. History works on problems of the friendship of peoples and national relations are light-weight in character and in some cases contradict the realities of today's life. Obviously, it is

necessary to comprehensively study and develop problems of our historic past and overcome the consequences of stagnation in the history science. The History, Philosophy and Law Department must substantially intensify its activities along this direction.

The exacerbation of social problems during the periods of Stalin's personality cult and stagnation and difficulties in solving these problems in the process of perestroika are the main reasons for the aggravation of inter-national relations. In our Republic, these problems have not been as acute as in some other regions of the country. However, one cannot help to notice the negative trends that can become potentially dangerous not only for the healthy practice of inter-national mutual influence and contacts, but also for the entire complex system of national relations. These are consequences of many years of indifferent attitude toward the specifics of socioeconomic and spiritual needs of working people and deformations in the social and spiritual spheres.

It has been noted that nowadays these consequences are exacerbated by inflationary processes, difficulties with the food problem, and low interest on the part of producers in high-quality and efficient operation of the public economy. The existing economic difficulties can increase national tension, which can take the form of a national protest and intensify disintegration processes and even autarky tendencies. In the national cultural life sphere, the problems are reduced to still insufficient satisfaction of specific spiritual needs of various nationalities and artificial narrowing of the areal of functioning of national languages, the absence of a scientifically justified and flexible policy in book publishing, weakening of the national cultural memory, and the growing gap between the quality of education and the needs of nationalities and ethnic groups.

In the meantime, the situation with the basic research of inter-national relations in the Republic leaves much to be desired. We sometimes have a better idea of the life and spiritual culture of peoples of other Republics, foreign countries and entire continents rather than those of the peoples inhabiting the Ukraine. However paradoxical it may be, our social scientists are not armed with comprehensive knowledge of the current sociocultural development and actual interests of their own people. In the past, works by historians, philologists and representatives of other social sciences were determining the modus of evaluation by the public of the status of inter-national relations; but nowadays, when national problems have come into the spotlight of sharp public attention, the leading role in covering these problems belongs to writers, publicists and journalists. Leaders of some informal associations are trying to play the role of experts on the subject, distorting the actual situation, often from extremist positions.

It should be noted that for a long time we have had a lopsided approach to the training of specialists in the area of inter-national relations. As a matter of fact, post-graduate studies had been preparing cadres only

oriented toward problems of international upbringing, out of touch with the profound essence of inter-national relations. Besides, we had not organizationally supported in a timely manner new directions, such as ethnic sociology, ethnic psychology and ethnic demography.

Our situation is gradually changing to the best. About a year ago an Ethnology Department was organized at the Art Studies, Folklore and Ethnography Institute, and a Sociolinguistics Group works at the Linguistics Institute. At the beginning of 1988, an integrated plan of scientific research and publications on problems of national relations was developed. An Interagency Scientific Council on Problems of National Relations, Soviet Patriotism and Socialist Internationalism has started its work.

To activate the research in the area of national problems, institutions of the Social Sciences Section must completely reorganize their work. One must first of all develop basic research. Nowadays, main attention is concentrated on the development and implementation of a number of large-scale research programs and on creating a system of acquisition and express processing of statistical and sociological information. All this work must be subordinated to the development of the forecasting function of sciences dealing with various aspects of inter-national relations.

Among the negative trends are also the weakening of national "cultural" memory of a certain part of Ukrainian intelligentsia in various areas, including politics, culture, science and art, which inevitably leads to weakening of positions of the national culture and narrowing of the sphere of functioning of the Ukrainian language.

It is the opinion of linguistics scholars that the development of harmonic Ukrainian-Russian bilinguality based on the multinational structure of Ukraine's population must be the stated language policy at the current stage. The bilinguality must become the norm of inter-national communication, provided that the Ukrainian language is the priority language at schools and other educational institutions. Language as means of communication and education and a condition for the development of the national culture must be studied in great detail not only by linguists, but also by sociologists, psychologists and historians.

Today, a contradictory but interrelated and integral world is forming. In this world, each people are inimitable, and the more of their own individuality they contribute to the mankind culture, the more successfully they interact with other peoples. On the other hand, the richer the mankind culture, the more favorable are the conditions for the development of each people. Such is the dialectics of the international and national in the modern world.

The same dialectics of the national and international is also applicable to the union of Soviet nations and nationalities rallied together by the unity of their goals

and interests. Whatever the storms in the area of international relations, whatever the imperfections, omissions and difficulties we encounter, one must first of all always think of the maximum possible strengthening of the unity of the common Soviet, and not letting extremist forces to undermine this foundation of the might of our socialist system and the Soviet State.

Of course, the above discussed problems do not cover the entire sphere of tasks facing social scientists. I have only accentuated the main tasks, which were the subject of discussion at the 19th All-Union Party Conference and to which our scientists must make their largest contribution.

### **Financing of Scientific Work, Housing for Young Scientists Discussed**

18140216C Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 21-22

[Speech by Director of the Physical Mechanical Institute imeni G.V. Karpenko, AN UkSSR, AN UkSSR Academician V.V. Panasyuk under the "Speeches of General Session Participants" rubric]

[Text] We are witnessing the implementation of resolutions of the 27th CPSU Congress and the 19th Party Conference and establishment of the new form of economic management in our country. It is based on cost accounting, and economic factors are being brought to the forefront.

Science is also switching to this form of economic management. I would like therefore to dwell on certain problems of functioning of our S&T complexes, i.e., AN UkSSR scientific organizations that include an Institute and cost-accounting subdivisions (TsKTB [special design and technological bureaus], experimental production facilities and an experimental plant).

Under the new business conditions, we will have two sources of financing - the budget and business contracts. Apparently, financing for cost-accounting subdivisions will only be provided via business contracts. As fund savings are becoming now the basis for material benefits for workers at all enterprises, increasing the number of business contracts at Institutes encounters certain difficulties. Besides, business contracts performed by Institute's cost-accounting subdivisions are not taken into account in forming the institution's payroll and social development funds. On the other hand, cost-accounting subdivisions will try to get as much profitable work as possible on the side, in order to ensure the maximum possible (legally) remuneration of labor for their employees.

Therefore, at the current stage of perestroika it is feasible to discuss problems of regulating relations between institutions of S&T complexes. We think that to do this, a number of steps should be taken, such as:

- exclude tasks for AN UkSSR experimental production facilities and experimental plants from section "Industry" of national economy plans and include them in section "Scientific Service";
- establish that all plan indices for cost-accounting subdivisions of a complex are approved by the Institute (Directorate of the complex), who is responsible to the AN UkSSR Presidium for the activity of its cost-accounting subdivisions;
- establish for the complexes a common form of material stimulation and a common fund of socioeconomic development;
- permit to shift scientific service subdivisions from the Institute to a business contract subdivision and vice versa within a complex, as dictated by production needs;
- beginning in January of 1989, each cost-accounting subdivision must additionally transfer to the general complex fund a portion of the profit (for instance, 2.5 percent) it will receive for work performed not to the order of the base Institute, but for an outside organization;
- establish that the AN UkSSR Presidium only controls activities of such subdivisions and approves their Directors and the size of their bonuses or payroll increments, on Institutes Directors' representation.

The implementation of such reorganization of S&T complexes and expansion of their rights would, in our opinion, facilitate the creation of organizationally flexible management forms, make it possible to rapidly respond to the demands of S&T progress and relatively easily integrate the effort of science and industry in order to accelerate the practical implementation of scientific achievements.

As a positive example of such vitally needed reorganization, I shall cite the results of joint activities of the Experimental Production Facility of the SKTB of the Physical Mechanical Institute imeni G.V. Karpenko, AN UkSSR, located in the city of Droboych, and Droboych Chisel Manufacturing Plant, aimed at developing and organizing production of drill bits and diamond tools for imported and domestic drilling machines used in the coal mine industry.

Within the framework of a cost-accounting subdivision, not only our specialists developed the design, product manufacturing technology and necessary materials, but they also created an experimental basis and organized production of small series of these products over 3.5 years. At present, R1 million worth of these products are manufactured to orders from Minugleprom SSSR [the USSR Ministry of Coal Industry]. The problem was solved for the entire cycle, from concept to actual product manufacturing. The products were awarded the Quality Mark and are already being exported with drilling machines.

The collective is working on further improvement of these products and increasing production volume to

meet the demand of other industries. The first phase of the plant for series production of drill bits and diamond tools is under construction in Drogobych.

I could also cite other examples of such activities. One can see that cost-accounting subdivisions form an important link in improving the efficiency of our scientific work and implementation. Forms such as the creation of regional engineering implementation centers, organization of joint enterprises with foreign companies etc. also open up new opportunities.

For instance, at the S&T Complex "Physical Mechanical Institute imeni G.V. Karpenko" (PMI), two engineering centers and a regional engineering center on problems of corrosion protection are in operation (the latter center has been created in cooperation with the Republic's Gosnab [State Committee for Material and Technical Supply], a branch of a joint enterprise of the PMI imeni G.V. Karpenko and a foreign organization is in the preparatory stage, a branch of the Lvov City Center of S&T Creative Work of the Youth, i.e., our creative collective, is in operation, etc.

To improve the efficiency of this work, it is necessary to broaden the rights of the complexes and restructure the above mentioned organizational forms, and then Institutes will become centers of real perestroika.

I shall bring up another problem. It has to do with planning and financing of scientific developments at the Academy of Sciences. In my opinion, the introduction of new forms by the AN UkSSR Presidium, and particularly competitive principles, in selecting subjects and priorities and allocating financial resources, meet the high demands the perestroika poses for science. With this approach, the role of Problem Councils as experts on promising studies is being raised to a new level. I think it would be expedient to also transfer to the Problem Councils certain funds for organizing promising or practically important works on specific subjects. Then, the Councils will become a real force in organizing topical research on specific problems in the Republic.

I also think that as long as the UkSSR Academy of Sciences has approved Problem Councils on certain problems, the problems are topical. Therefore, the Republican Government must appropriate certain funds for the fulfillment of respective programs.

In conclusion, I shall touch on the subject of providing housing for young specialists. We all understand that science continuously requires attracting new forces and rejuvenating the cadres with promising talented professionals. AN UkSSR President Boris Yevgenyevich Paton has convincingly spoken of this in his report. But how should one attract the young ones to the creative process when a lot of them do not have any housing? If this continues to be the case, we will not have the young generation in the required numbers and of the required quality, and we would not achieve the required intensification of basic research. I am therefore asking the AN

UkSSR Presidium and Republican Government to consider the matter of providing housing for young professionals and appropriating in 1989-1990 additional funds for each AN UkSSR Science Center for Institutes' shared participation in the construction of housing for young specialists and post-graduate students. A positive solution would make it possible to really and effectively reinforce science schools and promising scientific directions with new cadres.

#### Implementation of Scientific Developments: Specific Problems in Microbiology

18140216D Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 25-26

[Speech by Director of the Microbiology and Virology Institute imeni D.K. Zabolotnyy, AN UkSSR, AN UkSSR Academician V.V. Smirnov under the "Speeches of General Session Participants" rubric]

[Text] B.Ye. Paton's report has brought up the issue of the importance of the work we must accomplish and what is it that the Ukrainian science has to do to achieve the domestic and world level. I would like to share some thoughts that to a certain extent could help to solve this problem.

At present, quite a few resolutions and accordingly all kinds of directive instructions are issued by agencies and Ministries on restructuring of science at the Academy of Sciences. I think we should consider this in the general context of the united Soviet science. Apparently, it would be expedient to pass an act that would unify all the above directions, so that there is some kind of succession in science and so that academic institutions are linked to universities and scientific research institutes. One cannot close one's eyes to the fact that at present a number of scientific research and agency institutes have undoubtedly become brakes of S&T progress.

Tell me, for God's sake (although we are atheists), why on Earth should a scientific research institute put its stamp of approval - approve (or, more often, disapprove) the implementation of a scientific research development by an academic institute? I think this is wrong. We know about it, but the problem remains unsolved.

Here is another point. I am speaking about implementing the results of completed basic works. Recently I have read American experts' conclusions on the development of certain directions in the world science. Here is what they said about our country's science: "In the Soviet Union, basic research has largely improved in recent years. At the same time, the country is no competition, because it does not have small, energetic, and interested companies to implement these results." This is true. We run into these problems time and again. And now, when enterprises switched to self-financing, the situation has become more aggravated. See for yourself - we have recently sold to Spain for convertible currency a

license for our development, medical preventive preparation "Gerolact." Spain will be manufacturing it for its own needs and for several Islam countries. At the same time, here in the Ukraine, despite all our activities, an absolutely miniscule amount of this preparation will be manufactured, while people are getting on waiting lists to get this valuable medical preventive preparation sorely needed by the elderly. The problem remains acute and must be resolved. I think that until enterprise messengers are "chasing", figuratively speaking, new developments, we will make no headway, and the situation will remain complicated.

The international community and international relations of scientists are the next important aspect. I am not sure Mechnikov would have become Mechnikov had he not worked at the Pasteur Institute. I don't know whether Kapitsa would have achieved his results had he not worked for Rutherford, or whether Landau would have achieved his results had he not performed fieldwork for Niels Bohr. The list can go on and on. The situation today is such that we cannot send even a very talented young person for long-term fieldwork. Of course, we are doing something, but all this is only amateurish. For instance, at present our Institute has sent two young professionals for one-year fieldwork. And we had to find ourselves where to send them, and then seek that the institution we are sending them pays for the trip. I repeat, we are doing and will keep doing everything possible, but this is only palliative, rather than a global solution for problems we are facing.

Here is another painful subject—ill-fated expert examination acts. Recently, the editorial board of an international magazine returned to us an extremely interesting article. Why do you think they returned it? Not because it was bad, but because all data it contained had been already published in Soviet magazines. But if an article has not been published in our magazines, we will not get an expert examination act. And we must even specify where it was published. We are talking a lot about this, but "the cart is still at the square one." But one must solve the problem, because the issue of increasing the number of international publications remains acute.

Yes, there are quite a few complications. For instance, we recently conducted a beautiful show of products of Beckmann company, a multinational company that specializes in manufacturing of ultraprecise instruments. We had been "establishing contacts"; at least the company gave (or, to be precise, will give) us five instruments on a contractual basis. The problem is, how to bring these instruments, given to us for free, into the Soviet Union? We cannot overcome the customs. It turns out that the Institute cannot bring into the country instruments given to it as a gift by a Western country.

Now a few words about fundamental problems of microbiology. I cannot speak calmly about microbiology, the field of science that studies microorganisms - objects that open up to us the secret of life. Around us, in our environment, 90 percent of microorganisms have not

been gotten to know by science. Gas exchange in nature, fermentation and putrefaction, even the very existence of man - for all of this we are indebted to microorganisms. The important subject of ecology is also related to their activity, and they form the foundation of biotechnology.

So, we have recently analyzed at the Institute's Scientific Council the areas where we are ahead, at the world level or lagging. And what have we found? We are at the world level in problems of taxonomy, including methods for studying DNA and mechanisms of hybridization, particularly ultrafine methods. At the same time, we are lagging in recombinant technology and some other problems. We have tried to find out why such situation developed. Of course, in many cases we, scientists and researchers, are to blame. But if one takes a broader look, one would see that our position in the first case is not bad, because smart heads and skillful hands were needed. But the second problem also required unique instruments and fine reagents. Stretch the analogy further... Now everything becomes clear.

One must stop talking and start doing something. In my opinion, we should practice organization of international laboratories. There is already an understanding on organizing three such microbiology laboratories together with Czechs and professionals from other Western countries. But here too a number of problems are arising which we cannot solve. I am proposing to give Institutes independence in this respect, so they make such agreements directly with foreign institutions. The existence of such laboratories will undoubtedly produce useful results.

The next subject is compilation of programs. In particular, our Republican programs should be planned not from bottom to top, as is done now, but from top to bottom. And they must be planned not in a directive manner, but via a certain, shall we say, qualified expert council, which is also holding funds, i.e., is able, after assigning a subject to a strong collective and appropriating funds for the subject, to ask the collective to account for the work done.

And lastly, probably the most important problem, the personnel problem. At present, the inflow of young scientists to science has decreased noticeably. To a large extent we too are guilty, but I think the situation is developing in such way that science has lost its prestige to a certain extent. Indeed, I have never read in a newspaper about somebody lecturing a lathe operator how to turn parts. But almost every newspaper, including the "Pionerskaya Pravda", is writing articles on how to make science and whether dissertations are necessary. Agricultural workers, journalists etc. are writing on the subject. I am not for science to be above criticism; I am for the criticism to be competent, correct and clever. I am for criticism to help S&T progress and science.

### Problems of Physics Science

18140216E Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 27-29

[Speech by Director of the Physics Institute, AN UkSSR, AN UkSSR Academician M.S. Brodin under the "Speeches of General Session Participants" rubric]

[Text] In the process of restructuring of our society, and especially of its economy, an important role is assigned to science, and first of all to the basic science, which creates the ideological basis of technical progress and determines its long-term directions.

I would like to discuss problems of development of physics in our Academy.

First of all, it should be noted that the potential of the physics science at AN UkSSR is fairly ponderable, both in terms of the number of highly skilled personnel and in terms of ideas and achieved results. USSR State Prizes awarded to the Academy personnel and monographs contracted from our scientists by well-known foreign publishers attest to our scientific achievements.

However, given this potential, achievements of the physics science could be better, both in terms of their scope and level of innovation. I think we have the necessary preconditions for formulating and solving a number of important problems along the most promising directions that correspond to sociotechnical demands of the society and the trends in the development of the world science. Here are some of them.

**1. Molecular Electronics.** In modern electronics, which is based on the use of semiconductors, there is a clear trend toward reducing the size and weight of devices and reducing power consumption, while substantially increasing their functional capabilities and speed of response. Today, microminiaturization of transistor elements in integrated circuits is such that there are almost a million of them per square cm of semiconductor substrate. Specialists are striving for more, and now the size of a microtransistor is approaching that of large molecules. When forming approaches to the new generation electronics, ideas of using individual molecules or their polymer chains as the element base of microelectronics are being formed. In the process of implementing this idea, the degree of integration and speed of response will increase by several orders of magnitude, and power consumption will drop to the minimum.

To do this, goal-oriented integrated basic research is needed. Given proper organization and centralized financing, such research could be organized in our Academy. We have a good backlog for this - separate uncoordinated studies are conducted at several Physics Institutes, and there are already new ideas and first results. One should combine efforts of appropriate groups and get the involvement of chemists, material scientists and possibly biologists.

**2. Laser Solid State Technology.** As solid state and laser physics are fairly well developed at Institutes of the AN UkSSR Physics and Astronomy Section, I think it is feasible to organize large integrated research along this direction at a qualitatively new level, with orientation toward solving the following basic and applied problems:

- control of volumetric and surface properties of various materials (semiconductors, metals, ceramics, polymers and laser materials) under the combined action of laser irradiation, ion fluxes and nuclear particles;
- and further development of laser methods of metal-working, using laser sources with controlled spatial, time and spectral characteristics, as well as using electric and magnetic fields.

Here, subdivisions of Institutes specializing in physics, material science and chemistry can cooperate fruitfully. In integrating the effort of scientists from various institutions, one should avoid formalism. The work must be based on scientists' common creative interest and on appropriate material, technical and physical support and subject-oriented control. The number of such large integrated studies could be increased.

Now I would like to dwell on the following important problem.

To successfully develop a number of priority directions in physics (solid state physics, laser physics and technology, and electronics), and not just in physics, one needs engineering materials. Thus, further progress in the application of lasers depends to a large extent on the ability to control parameters of laser radiation, such as frequency, intensity and space and time characteristics. Such control is based on radiation interaction with certain materials.

The key problem in the implementation of programs of so-called optical computers (there are such programs both here and abroad) is the development of optical switches - light-controlled cells with fast time ( $10^{-12}$  s and less) and fairly low switching energy.

The problem of developing such elements is to a large extent a problem of materials with high noninertial nonlinearity. Semiconductor superlattices are fairly promising in this respect. They are epitaxial structures designed at the atomic level, which have no natural analogs and make it possible, on the one hand, to verify basic conclusions of the quantum solid state theory, and on the other hand, to create optoelectronic elements with unique characteristics. In Western countries, studies of superlattices have been actively conducted for over ten years.

In our Republic, everything in this field remains practically at the zero level, despite good traditions of semiconductor material science both at academic (the Semiconductors Institute, AN UkSSR) and sectoral (the All-Union Scientific Research Institute of Monocrystals) Institutes.

It has, therefore, become urgent to create an inter-Institute technological center at the AN UkSSR. The center's task would be the synthesis of superlattices and other promising materials, in order to conduct various basic research and solve certain application problems. Experience in creating similar centers has already been accumulated in Japan, the USA and FRG.

I would also like to bring up the question of the fate of basic science, particularly physics, because of the trend toward strengthening of cost-accounting principles. Of course, basic science must not be put on the cost accounting basis; it must receive priority financing without counting on at-the-moment benefit. By the way, Institutes of the AN UkSSR Physics and Astronomy Department are already suffering from the forced career toward cost-accounting works with a utilitarian bias, and Academy's specialists are performing this work without additional remuneration, i.e., their financial situation is getting worse, compared to their colleagues at VUZs [higher educational institutions]. This anomaly must be eliminated.

On the other hand, financing of basic research under the new conditions must be more reasonable. Switching to competitive allocation of funds within the framework of research programs, which is being implemented now within the AN USSR system, is all in all a progressive phenomenon, but certain subjectivism and tendentiousness have already shown up, and one should develop measures against this. In particular, one should provide sufficient financing at the Republican level and, of course, within the framework of the competitive system.

And lastly, the problem of developing medico-biological research at non-specialized Institutes.

It is generally known that during the 13th Five-Year Plan priority treatment in our country's development will be given to the social sphere, and first of all to public health service. The State is appropriating additional funds for this purpose. It is also well known that a lot of AN UkSSR institutions, the Physics Institute among them, are conducting fairly broad and successful research in the interest of medical science and public health. The possibility to use budget funds has played a large positive role in this.

But now, when cost accounting elements are being introduced into the activity of academic institutions, there is a danger that conditions for conducting such work at organizations, for which this work is outside their line, will deteriorate. At the level of individual institutions, the "residual principle" of financing and material and technical support might triumph, despite the fact that this ill-fated principle as a whole has been decisively rejected by our State.

We think that official inclusion of research and development on medical subjects to the category of priority work for the Ukrainian SSR Academy of Sciences would be the most effective measure against such practice. It is

important to create organizational and financial preconditions so that public health agencies could effectively act as customers of basic and applied research and new in principle medical technology for other agencies, and particularly for the AN UkSSR. In the meantime, at present neither the UkSSR Ministry of Health nor Health Administrations of Soviets of People's Deputies have funds for financing such work.

In conclusion, I would like to express my hope that steps towards restructuring the activity of the Union and Republican Academies will eventually improve the efficiency of scientific work and increase the contribution of science to the national economy.

### Importance of Informatization Stressed

18140216F Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 29-32

[Speech by Department Head, Cybernetics Institute imeni V.M. Glushkov, AN USSR, AN UkSSR Academician V.I. Skurikhin under the "Speeches of General Session Participants" rubric]

[Text] I would like to call attention of the AN UkSSR General Session to a new problem—the problem of informatization of the society. The thing is, informatization is not just a fashionable word, it is a fact that is taking place right before our eyes. We already live in an informatized society, and we cannot escape it. Information plays an ever greater role in the life of a modern society; it is becoming a material force that actively affects all spheres of public life—political, economic, and cultural. According to American scientists' calculations, approximately 54 percent of economically active population in the USA work in the information services sphere and directly use information in their activities. One can see a similar situation in Japan and countries of Western Europe. Studies conducted in the VNR [Hungarian People's Republic] yielded the 32 percent figure. According to expert assessments, it can be assumed that in the USSR it is between 26 and 28 percent.

It is an acute problem, and I am surprised that in his speech AN UkSSR Vice President Academician I.I. Lukinov, who was speaking on behalf of a group of socioeconomic Institutes, did not say a word about this important problem.

What do we mean by terms "informatization" and "informatized society"? What is the crux of the problem? Each social system and each level of development of productive forces has its specific level of communications, method for acquisition and utilization of knowledge, and specific information technologies.

At present, the level of informatization and information service has reached a critical point, after which profound qualitative changes in the entire public life begin. The time is coming when each member of the society will be able to receive necessary information and knowledge

contained in this information at the required moment, in the required place, and in the form that is most convenient for utilization and decision making. So what does informatization have to do with problems discussed at this Session? There is a direct relationship.

Democratization and glasnost are inconceivable without information. Informatization is very important for the perestroika and renewal of our society. Speaking of informatization, I mean not just acquisition of some kind of reference data, but acquisition and utilization of knowledge. We used to say, and from this podium too, that computing capabilities should be brought directly to the workplace. Under the new conditions, the conditions of automation, this has been rephrased: bring knowledge to the workplace and make the knowledge work actively, next to a cutter, electric arc and surgeon's scalpel. When stated in these terms, the problem of informatization becomes a keystone of our process of perestroika and renewal of the socialist society.

Abroad, not just engineers are interested in the problem of informatization, but also politicians, philosophers and economists. Overthere, they make long-term conclusions as to alternative ways of capitalism development and unfitness of Marx' labor theory for an informatized society, i.e., they challenge our ideology of social evolution.

Informatization produces more significant effects in the material production sphere. One has talked a lot about this in newspapers and on TV, so I do not want to repeat it. One should deal with these issues, seriously and over a long term. The Soviet people need informatization, and so does the cause of perestroika, and this is attested to by a number of facts we are learning from radio and TV. A sharp increase in labor productivity and social dynamism depends to a large extent on the degree of utilization of means of informatization.

Informatization includes two types of problems - problems of creating a structure of informatization and problems of structural changes in the life of the society caused by informatization. It is now clear what the infrastructure should look like - this has been discussed a lot. It should include a developed data transmission network, particularly using communications satellites, the nationwide and local computer networks, personal computers, informatized workplaces, databases, knowledge bases etc.

We have talked a lot, here and in the media, of the effect of computerization on industrial production, construction etc. In other words, one is talking about things we already understand more or less - what the technical basis of infrastructure should be like. But we are lagging far behind developed countries, and the situation must be corrected, i.e., effort must be made to reach the currently required level.

Working on the GKNT SSSR [USSR State Committee for Science and Technology] assignment on developing the concept of informatization of the society, we have

directly felt the acuteness of problems related to consequences of informatization. What are these problems and whence their acuteness?

First of all, there is a problem of relations between the peasantry, working class and so-called stratum. Granted, today nobody uses the term "stratum" anymore, because the number of people employed in the information sphere is becoming comparable to the number of workers and peasants. The number of those employed in the sphere of informatization is constantly increasing. In essence, information services are becoming a commodity, and information enterprises and information industry are cropping up.

Secondly, the problem of intellectual property is very important. How should one combine the thesis that knowledge belongs to the people and is public property and the thesis of their availability in any informatized society with the inalienability of knowledge from each person? As the standard of living and lifestyle are changing in an informatized society, the problem of social design is coming up. I would like to specifically dwell on it. In the past, we talked a lot about the Soviet way of life. Nowadays, one does not talk much about it. Let us ask ourselves: How do we see in the future our lifestyle in an informatized society? Who should be working on it? Who would tell us what our future way of life must be like so that it looks attractive not just to us, but also to the entire world?

Informatization will lead to the appearance of new types of arts, computer painting, sculpture and music. How this new kind of culture will affect the social life? All this will affect the social order and the development of means we are working at. It is therefore extremely important that problems of social design are solved comprehensively. We must think of our life in the future.

What will the face of science be like in an informatized society? How, for instance, will our Academy function? Do we have a concept of informatized Academy and who is thinking of this concept? It is high time to think it out and do something about it.

On the other hand, one cannot help to mention negative aspects of informatization. Among those are increased computer crime and hooliganism, revival of the shade economy, methods for usurping power by seizing access to certain information sources, abuses related to information shortages, and information "Chernobyls." Along the road to computerization we are in for some dangerous things, such as voluntarism, erosion of the feeling of collectivism, informomania and informophobia.

Informophobia is fear of information, and not just in the form expressed in an ill-fated saying "The less you know the better you will sleep." The thing is, active counteraction to information is taking place. A character in a modern satirical comedy said: "Literature is necessary but very dangerous." In our practice, we have already encountered similar sayings: "Yes, informatization is good but very dangerous."

Such attitude has certain effect on the work in the field of informatization. Historians, economists, sociologists and ideologists have something to think about. I shall add that absolutely new problems are being formed, such as problems related to law-enforcement activity etc. The list can be extended, but I will just say this: Informatization of the society is a multifaceted and complex problem, which requires comprehensive work. The future of each of us depends on its effective solution. We must think of how we would live in an informatized society.

A lot has been said here about the need for new technologies. One basically meant material and energy technologies. But nowadays new information technologies are also cropping up. Their integration with new material and energy technologies is a great force, and we must strive for it in the interest of perestroika and renewal of our society.

So what should one do? In principle, it is possible to do nothing and stay at the same level we are at now. But one should not forget that both in the West and in the East we have an information encirclement (in the same sense as we were used to speak about the capitalist encirclement). In a situation like this we will only have to stew in our own juice and not even dare raise our voice.

In our Academy a lot is being done in the field of informatization. There are a number of good works and a lot of fruitful ideas, but this is not the point. I have already said that what is lacking is general understanding of the tasks and their complexity and magnitude. The first thing we should strive for is to understand the importance of the problem and to be concerned with the fact that it is not being solved at an appropriate level. As the first step in solving this problem, I would suggest to organize an all-Academy conference (possibly, combining the effort of two Departments, the Information Science, Computer Technology and Automation Department and Economics Department, which has sociological subdivisions) and discuss in great detail all problems facing us in this respect. It would be desirable to discuss an integrated plan of our actions and coordinate them with problems formed at the AN SSSR [USSR Academy of Science] (B.Ye. Paton has mentioned them), so that we can actively join in the implementation of All-Union programs.

A corresponding reorientation of subjects, taking into account these important aspects so that to actually implement the principle of unity of short- and long-term goals can be a practical step in this direction. The Information Science, Computer Technology and Automation Department, Council on Problems of Automation of Scientific Research and Scientific Council on Problem "Cybernetics" should participate in this work. As a matter of criticism, I must say that the above mentioned Department and Councils are doing little on this problem, losing sight of it and paying excessive attention to detail, while not discussing general problems as a whole. Plans were compiled, but they have been

poorly implemented so far. One should intensify the work of the Academy of Sciences Institutes aimed at studying social problems and using databases and knowledge bases. This work is already being conducted at head Institutes, such as the Material Science Problems Institute imeni I.M. Frantsevich, Electric Welding Institute imeni Ye.O. Paton and Cybernetics Institute imeni V.M. Glushkov.

In conclusion, I would like to call your attention to the problem of personnel training. In order to master new technologies, one must train the personnel. We have launched a training center, which has already graduated several groups of specialists. But under the new conditions of financing and self-repayment, complex problems of staffing and creating S&T base for the training center are coming up, of course. Apparently, one cannot limit oneself to only having a center in Kiev - it is necessary to have such training institutions at all academic centers. Until we teach people to do high-quality work, we should not demand high quality work from them.

A poet once said that he felt himself a Soviet plant that produces happiness. Our Academy is also a plant, a knowledge-manufacturing plant. And knowledge that via informatization works for communism and the implementation of our ideals is a strong force. If we make good use of this force, if the Academy takes it upon itself to implement this long-term program, then we will make a worthy contribution to the implementation of resolutions of the 19th Party Conference.

#### Tasks of Earth Science Institutes Discussed

18140216G Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 32-34

[Speech by Academician Secretary of the AN UkSSR Earth Sciences Department, AN UkSSR Corresponding Member V. I. Starostenko under the "Speeches of General Session Participants" rubric]

[Text] Grim consequences of large industrial accidents in recent years indicate that during the planning stage of important national economic projects, new complexes, and residential developments one does not pay due attention to geological studies and does not use scientific results in the field of geology, hydrogeology, and geophysics. A complex hydrogeological situation in the Dnieper region caused by the accident at the Chernobyl AES, in the Dniester Basin caused by the accident at the Stebnik integrated works, a number of cave-ins in Donbass coal mines, Krivoy Rog ore mines and Kalush mine workings, activation of ancient shifts in the Odessa oblast after the earthquake near Vranich, the unfortunate selection of the site for construction of the Odessa ATETs [nuclear thermoelectric plant], and a tense engineering-geological situation at the Rovno AES site are examples. A passionate discussion that has developed recently around the Dnieper-Danube canal is a graphic illustration of planners' and contractors' negligence. One completely ignores the fact that this complex hydraulic

engineering facility will be located in an 8-9 magnitude zone and can be destroyed after the very first strong earthquake in the Vnarch zone.

A similar situation has formed in the region where the Crimean AES is being built. First, studies at the construction site were conducted by the Atomenergoproekt Institute and NPO [scientific production association] "Energiya", Minatomenergo SSSR [USSR Ministry of Atomic Energy], without the involvement of professional geologists and seismologists studying the region. Studies conducted in recent years by Mingeo SSSR [USSR Ministry of Geology] organizations, Geological Science Institute AN UkSSR, and Geophysics Institute (GPI) imeni S.I. Subbotin, AN UkSSR, have proven that the site of the AES under construction is located in unfavorable tectonic conditions and that to the north of it there is a seismically active South-Asov fracture. Paleoseismotectonic and paleoarchitectural studies covering the last 3,000 years indicate that earthquakes of magnitude 9 are possible in the region. And when one takes into account the fact that hydrogeological and engineering-geological conditions deteriorate under the influence of technogenic factors, the standard magnitude should even be increased to 10. This was the conclusion drawn in 1988 by specialists in the field of geology, tectonics, hydrogeology and geophysics, based on their analysis of available data. The All-Union Seminar conducted at Chernogolovka proved the conclusions made by AN UkSSR Institutes. Now, a State Commission headed by Academician Ye.P. Velikhov must decide the fate of this project.

Besides, in the Ukraine, whose territory (and this is common knowledge) is equal to 2.7 percent of the total USSR territory, the technogenic effect on the environment is almost ten times higher than the country's average.

The above facts explain the reason for the transformation of scientific directions at the institutions of the AN UkSSR Earth Sciences Department (ESD) that has been taking place lately. The thing is, along with traditional scientific directions related to basic multifaceted studies of planet Earth and based on this prospecting for mineral resources, works aimed at protection and urgent studies of Earth bowels are becoming ever more important, and vitally important at that. This basic research has its specifics and calls for developing an appropriate theory, methodology and technology.

Geological, hydrogeological, geophysical and seismic studies have become an integral part of ecological measures that are being taken in the Republic.

AN UkSSR institutions are rapidly increasing the pace of work under this new emphasis. This is what determines the restructuring of work at institutions of the Earth Sciences Department. I shall briefly mention some of these works, without touching traditional directions.

First of all, the Geochemistry and Mineral Physics Institute, Geological Sciences Institute (GSI) and Geophysics Institute imeni S.I. Subbotin perform a large scope of necessary hydrogeological, geological and geophysical work related to eliminating the consequences of the accident at the Chernobyl AES. Unfortunately, one will have to work on this problem for many years to come. The GSI heads and performs work aimed at fighting the flooding in Southern regions of the Republic and is solving the entire set of geological problems related to this phenomenon.

At present, the work on creating, on the GSI's initiative, a Coordination Council on Scientific Problems of Eco-geology is in its final stage. AN UkSSR ESD Institutes most actively participate in the work per interagency program "Geological Environment" developed for the 12th Five-Year Plan on the UkSSR Gosplan's initiative. I should mention by the way that the Republic's Gosplan constantly draws Academy's geologists and geophysicists to solving important and complex ecological problems.

The Geophysics Institute imeni S.I. Subbotin performs an extremely important task - seismic microdistricting of seismically dangerous regions in the UkSSR.

On the assignment from the UkSSR Council of Ministers, the Academy has prepared and submitted to the UkSSR Gosplan an integrated program of scientific research work on detailed seismic districting. The program provides for conducting studies up to the year 1995 and has been coordinated with the Republic's Gosstroy [State Construction Committee]. It is financed from the reserve fund of the UkSSR Council of Ministers.

Are there any difficulties in conducting work per this new set of tasks and the entire direction? Unfortunately, there are, and a lot of them. And the main difficulty is the absence of the newest experimental-analytical equipment, and obsolete computer equipment. Thus, the domestic industry does not manufacture the necessary state-of-the-art seismic devices at all. So, one has to look for a solution. Meanwhile, just one set of such equipment would completely satisfy the Republic's needs and make it possible to conduct seismological research at the state-of-the-art level. There are also organizational difficulties. Thus, through the fault of the Crimea oblast Ispolkom and trust "Simferopolpromstroy", the problem of construction of the Crimea Geophysics Observatory and organizing an integrated geophysical testing ground in the Crimea AES construction site region has not been solved yet.

I shall dwell briefly on other aspects of the activity of the AN UkSSR ESD institutions.

Lately, there have been a lot of cases of cancellation of financial contracts by production organizations, and particularly by Mingeo SSSR organizations. So, the importance of scientific products prepared by Institutes is being reassessed. This forces professionals to be especially active and only offer the market the best of their developments. It can be assumed that as a result of huge

work being performed now the size of business contract funds for those organizations that have something to offer to industry will increase, rather than decrease, compared to the last year.

Contacts and joint work of Department's institutions with foreign organizations have been revived, and the number of bilateral contacts is increasing. Obviously, these works should eventually result in exporting scientific geological and geophysical technology on a currency basis. At present, just elements of such contacts are being formed (for instance, GSI and GPI imeni S.I. Subbotin work with institutions of the Bulgarian Academy of Sciences, GPI imeni S.I. Subbotin works with Italian geophysicists etc.). So far, the largest export of scientific results in Department's institutions related to the activity of the Soviet-Guinean Scientific Research Center in Conakry is conducted at our expense. But such transitional stage is absolutely necessary.

The current political and economic situation in the country is such that one cannot live and work as before. Collectives of institutions of the AN UkSSR Earth Sciences Department are feeling this and acting accordingly. The work on improving their activity and eliminating shortcomings will continue.

#### **Molecular Biology: Achievements, Problems**

18140216H Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 37-38

[Speech by Department Head, Molecular Biology and Genetics Institute, AN UkSSR, AN UkSSR Corresponding Member G.V. Yelskaya under the "Speeches of General Session Participants" rubric]

[Text] Let me discuss B.Ye. Paton's report from a molecular biologist's standpoint. Each living organism is a highly organized self-regulated system with a large cascade of various levels of regulation and a well-developed feedback network. This is what makes it possible for a living system not just to self-preserve and self-repair, but also constantly improve and develop. Therefore, by analogy, when speaking of improving our science, the first thing we must do is develop an adequate cascade-type regulation system. Conventionally, one can delineate several basic levels the regulation must be conducted at.

The primary level is a scientific associate - laboratory - Institute. Levers that make it possible to manage at this level have been listed in the report. I should say that at present they do widely broaden the possibilities for regulating scientific work at this level.

An example of the use of these levers in our Institute is a combination of organizing a temporary creative collective, goal-oriented utilization of the system of the economic incentive fund, and close ties to the University. Incidentally, VUZ [higher educational institution] science is not always to be blamed for weak ties, and not

always it turns away from us. Sometimes our attitude to it is somewhat snobbish. And only strong ties, as in the case of a close merger (for instance, a University Chair branch at our institution) eliminates the separation of VUZ and academic science.

All these factors have made it possible for our Institute and the KSU [Kiev State University] Semiconductors Chair to attain the leading position in the field AN UkSSR Academician M.S. Brodin has been talking about here. We are the only ones who are actually making biochips - biosensor elements that can then be used in biocomputers. I should say that Western experts estimate that as far as its revolutionizing effect on the society is concerned, the biosensor technology is second only to microelectronics.

As you can see, there is lack of information - we are urged to work in this field even as we are going to conduct a seminar one of these days where we will report our initial results.

At this level of regulation, one can do a lot, but only following the "more-less" and "better-worse" principle. However, it is impossible to radically solve the majority of problems. So, when a speaker is saying: "You have been given great opportunities and you must use them", one should understand that serious demands, much more serious than before, are now posed for the next level, Presidium of the UkSSR Academy of Sciences and Republic's Government. It is they who must coordinate and adequately regulate the primary level. What type of levers can be used here? A correct and adequate social order.

Everything that has been said here about All-Union programs and the competitive system is correct. But everybody here knows how slowly and undemocratically they are being formed at present. At least in the field of biology. Therefore, unless an international expert assessment is introduced and Councils of Directors replace head organizations on programs, the situation is not going to change.

The next problem I would like to dwell on should also be solved at a higher level. I am speaking of isolation of our science. We constantly use terms "Soviet science" and "Soviet biology." Say, wouldn't "French chemistry" and "Australian physics" sound funny? It offends one's hearing, doesn't it? I think that in a sense the term "Soviet science" misleads us, the Government and the people. The thing is, science has been international in its essence at all stages of human activity. Nowadays, in the era of information and communication explosion, it has also become international both in its form and structure. It seems to me that our objective is not to overtake and surpass, but to integrate. We have fallen out of this cartridge and must now integrate into it. Then we will not have a problem of overtaking and surpassing. So how does one do it?

The Japanese miracle of the 1960s was ensured by the fact that over 200,000 young Japanese professionals

conducted fieldwork at the leading centers in the USA, Canada and Europe. At present, over 100,000 Chinese professionals are abroad, in leading capitalist countries. But as far as we are concerned, we have 10-15 thousand at best (and mostly in socialist countries at that).

This problem cannot be solved at the primary, Institute level. I think our Session should ask AN UkSSR Presidium to develop a concrete plan and ask the Government to implement large-scale actions on training world-class young science professionals.

Here are a few more examples. At the last World Congress of Biochemists in Prague, there were over 5,000 participants, including only five from the 50-million strong sovereign Ukraine. Another ten or so had made their way by hook or by crook, some through UNESCO, others on private invitations. By way of comparison: There were 62 delegates from Bulgaria, about 250 from FRG [the Federal Republic of Germany] and about 1,000 from the USA.

And here is an example of the "sluggishness" of our system of ties with our foreign colleagues. Our Institute's Director and I had spent three days in Prague compiling a draft of a joint scientific work with French scientists; it took the European Committee one month to solve the problem of appropriating funds; a letter with the positive decision was in the mail from Madrid to Kiev for one month; the question whether we may use the funds had been debated in Moscow for over a month; and it will take another two to three months to solve the problem of my trip abroad. In the meantime, Belgian and French scientists will already have published a paper on their results.

Lastly, the final level of regulation - conventionally, the "nationwide" level. I am speaking of reviving the human and civic conscience in each person and regenerating personalities from "small screws", because without this the creative process of building a "non-deformed" socialist society is impossible. The role of scientists, and intelligentsia at large, at this level is tremendous. Being to a certain extent an indicator of nation's intellectual potential, all of us in this room can hardly proudly say that we are standards of morality and civic motivation. To become such standards is but the most complicated task, but also the most effective one, as far as the revival of our society is concerned.

### Ecological Situation in Southern Ukraine

181402161 Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 38-41

[Speech by Head of AN UkSSR Southern Science Center, Director, Physical Chemistry Institute imeni O.V. Bogatskiy, AN UkSSR, AN UkSSR Academician S.A. Andronati under the "Speeches of General Session Participants" rubric]

[Text] The atmosphere of democratization and glasnost in all spheres of life of our society has revived the civic activity of various strata of our population, and particularly in bringing up and solving the most acute ecological problems.

The activity along this direction must be well thought over and competent, and proposals must have comprehensive scientific justification. Therefore, scientists and professionals, and especially the personnel of the Academy of Sciences as the most objective and unbiased organization free from narrow departmental interests, must play an important role in studying and solving ecological problems.

As early as several years ago, ecological problems of Republic's Southern region were mostly centered on talks and practically useless attempts on the part of the UkSSR Academy of Sciences and a number of scientists and well-known public figures to do something to solve them. However, at present positive trends are already shaping up. The main thing is the cancellation of the decision to build the Odessa ATETs in Teplodar, curtailing of the "Project of the Century" - the construction of water resources complex Danube-Dniester-Dnieper, and the decision to stop the development of ecologically hazardous enterprises in the Crimea.

Recently, due to the joint effort of the Ukrainian Academy of Sciences, the public and Party and Soviet bodies of the Kherson oblast it became possible to positively solve the Zburyev Kut problem.

At the same time, these successes in normalizing the environment are but initial steps in fighting chronic ecological "diseases" of the region.

I would like to stress that in the overwhelming majority of cases, bringing up ecological problems of the Southern region is dictated not by selfish local but by nationwide interests, because everybody is obviously interested in the preservation of our national treasure - the Black Sea, Danube, Dniester and Dnieper - and the huge recreational reserves of this abundant land.

Unfortunately, the ecological situation in the South is not improving significantly. New negative consequences of antropogenic activities are being manifested again and again. But at the same time, new projects of building ecologically hazardous facilities are cropping up. For instance, it is proposed to build a high-capacity oil refinery in the Odessa oblast.

Contamination of the Black Sea increases. The problem of Odessa and Crimean beaches that came up last summer is but one example. Unique underwater phylloflora plantations are perishing, and populations of a number of representatives of the Black Sea flora and fauna are shrinking. Uncontrolled and ecologically hazardous activities of a large number of industrial and especially agroindustrial enterprises has led to the destruction of a large number of rivers in the region,

which are becoming gutters. It has resulted in a sharp deterioration of the quality of large rivers and water reservoirs.

The tragedy of Yalpug and Kugurluy Lakes in the summer of 1988, when fish and crawfish were dying on a mass scale, was first of all caused by water contamination with the waste of cattle-breeding farms and fertilizers and pesticides from agroindustrial enterprises in the Southern Moldavia and Odessa oblast. The decision (which was a mistake, as we now know) to cut off these lakes from the Danube had also aggravated the situation.

At present, steps are being taken to save Yalpug and Kugurluy. But it is hard to say now, when and at what cost one would be able to restore these beautiful water reservoirs, which are a source of potable water.

Contamination of the Dniester is an ecological disaster at an even larger scale. At present, program "Dniester" is being prepared at the AN UkSSR Southern and Western Science Centers and at the Moldavian SSR Academy of Sciences. The program must provide necessary scientific justification and recommendations and delineate measures aimed at saving the Dniester. The situation is getting even more aggravated because proposals by the AN UkSSR, Odessa oblast Ispolkom and the public in both Republics to create an inter-Republican agency (a commission or committee) with necessary power are not being implemented so far. And without such agency it will be fairly difficult to solve the problem of revitalizing the Dniester, which flows through the Ukraine and Moldavia.

Shortly, a joint meeting of the Republican Council on Biosphere Problems and our regional Department will take place in Odessa. It will discuss a draft of program "Dniester" and the issue of the Beryozovka Chemical Plant (the USSR Ministry of Fertilizer Production).

Shortly after port Yuzhnyy for shipping chemical cargo was built, construction of the Odessa Near-Port Plant (ONPP) has begun on a barter basis. The creation of a port for shipping ammonia, superphosphoric acid and other chemical cargo is actually the beginning of active development of the fertilizer industry in the region. The ONPP is under construction, and its carbamide production capacity is growing. Despite the high level of technological processes used at the Plant, this has created an extremely tense ecological situation around the Plant and the Port. It has become necessary to relocate residents of nearby villages.

But this is probably just the beginning of a broad offensive of the fertilizer industry against the region. It had been proposed to build at the ONPP site a Superphosphate Plant that also includes high-capacity manufacturing of sulfuric acid. The Odessa oblast Ispolkom refused to issue a permit for placing the Plant at the site and asked the Ministry forget the oblast as a territory for locating such facilities. But the offensive continues. Now, the Ministry has selected a site near Beryozovka. Not far from there is the cleanest in the oblast Tiligul

estuary, and huge reserves of unique therapeutic mud have been discovered nearby.

A permanent expert Commission had been created at the AN UkSSR Southern Science Center to conduct expert examination of projects of new industrial and power generating facilities. We asked the oblast Ispolkom to involve the Commission in evaluating the projects from both economic and ecological standpoints. The Commission spoke decidedly against the construction of Beryozovka Chemical Plant and presented a detailed justification of its decision.

In the summer of 1988, the oblast leaders asked N.I. Ryzhkov to reconsider the decision to build the Plant. Chairman of the USSR Council of Ministers entrusted the AN SSSR [USSR Academy of Science] President and the USSR Minister of Mineral Fertilizer Production to study the problem. AN SSSR President G.I. Marchuk has spoken for an expert examination of the project by an interagency Commission that would include representatives from the AN SSSR, AN UkSSR, Odessa oblast Party Committee and the Ispolkom of the oblast Soviet of People's Deputies, USSR Ministry of Mineral Fertilizer Production, Gosagroprom, Goskompriroda [USSR State Committee for Environmental Protection], Gosgidromet [USSR State Committee for Hydrometeorology and Environmental Control] and other agencies. Unfortunately, the Commission has not begun working yet; moreover, it has not been yet practically created. There are AN UkSSR proposals as to its composition. In the meantime, the Ministry already formed a commission. On arriving in Odessa, Deputy Minister Comrade Yermakov said on behalf of the Commission that the question is not whether to build the Plant; one must decide how to build it...

Summing it up, I would like to express my Odessa colleagues' and my conviction and the opinion of AN UkSSR Presidium: Such Commission should be formed by the Academy of Sciences, not by the Ministry.

Up until now, the immense and I would say selfless work by scientists conducting expert examination of projects and forming program "Dniester" and regional programs and plans has not been paid for. However, this scientific activity must be paid for. Under the new conditions of economic management, there are ways to do it. For instance, a cooperative Science Center is being organized at the Physical Chemistry Institute imeni O.V. Bogatskiy. At customer's expense, the Center will analyze Dniester water, develop technology for purification of potable water, conduct expert and consulting work and form programs and plans. I think this will increase experts' responsibility and make it possible to solve the most important regional problems.

In conclusion, I cannot help to speak about another acute problem of our region.

There are harsh public objections to plans for the expansion of the Yuzhno-Ukrayinskaya AES (construction of reactors 5 and 6), and not as much to a possible increase

in the radiation background as to the real danger to the South Bug and unique historical, archeological and natural monuments that would be flooded when new water ponds are built in the vicinity of the AES to cool its reactors. A number of professionals have also spoken against the construction of reactors 5 and 6. The AN UkSSR Southern Science Center and the Center's Scientific Coordination Council for the Nikolayev oblast are planning to discuss this problem shortly.

How does one stop the unending escalation of construction of new ecologically hazardous facilities in the region? Apparently, by increasing the role of scientists and professionals in solving such problems. In our city, an opinion has been formed that it is high time to formulate a concept of a city and a region. Either Odessa is a center of the chemical, oil refining and mineral fertilizer industries, or it is an All-Union and possibly international health resort and cultural and science center. All Odessites, as well as Party and Soviet leaders, are in favor of the second alternative. I think a lot of other sober-minded people share this thought.

The development of Odessa as an international resort and cultural and science center will be justified not just socially, but also economically.

Concluding my speech, I am proposing to consider at the appropriate level the problem of changing the rules dealing with construction in the coastal zone. There are restrictions on building industrial facilities in this zone, but for some reason they do not pertain to ports. I think one should also provide scientifically justified restrictions on building industry-creating ports. The story of the Yuzhnyy port and subsequent events surrounding it are convincing.

### **Lagging in Machine Building, Instrument Making**

18140216J Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 45-47

[Speech by Director, Problems of Machine Building Institute, AN UkSSR, AN UkSSR Corresponding Member A. N. Podgorny under the "Speeches of General Session Participants" rubric]

[Text] Resolutions of the 27th CPSU Congress and 19th Party Conference stated that without improving the reliability of products of the machine building industry, which is the key branch of the national economy, one cannot solve strategic tasks of perestroika in our country. Working parameters of modern machines (RPM, temperature, pressure etc.) are constantly improving, and their complexity and fundamental character are increasing. Under these conditions, reliability of machines, parts, and structures becomes increasingly important. At each stage of technological development, it takes tremendous effort and resources to solve reliability problems.

This is true not only for the state-of-the-art technology, but also for machines developed many years ago, which are subjected to ever increasing loads as the pace of industrial life accelerates. Take, for instance, large power generating plants. They include highly stressed subassemblies and units, which, if they fail, could become a source of increased danger for people and the environment. A lot of them (built 25-30 years ago) are still in operation, although they have reached the end of their design life. There is a problem of continuing their operation without overhauling their main modules. To solve this problem, one needs reliable information on the technical condition of subassemblies and systems and on how it has changed during their operation.

So, the development of the machine building industry is impossible without the creation and wide implementation of technical diagnostics and testing systems. These systems are needed at all stages of machines' life cycle, from manufacturing through operation.

In the end, chasing the gross output to the detriment of quality, and manufacturing of products without conducting necessary life tests and using diagnostic means (particularly built-in control systems and "no-disassembly" diagnostics) had been resulting in increased expenses for the repair and manufacturing of spare parts. R120 billion annually are appropriated for the machine building industry, and R40 billion are appropriated for machine repair. Thus, the implementation of more durable equipment will make it possible to save natural and human resources. It is considered normal for the cost of diagnostic equipment to be equal to 10-15 percent of the cost of the diagnosed object.

Unfortunately, our country is badly lagging in the development of state-of-the-art diagnostic equipment, a scarce and science-intensive product. Principal metrological parameters of a large number of series-produced sensors, instruments, devices, testing machines and test stations are below the parameters of their foreign analogs. The degree of automation and "intellectualization" of the domestic diagnostic equipment does not match the leading level either. All this forces us to import necessary devices and equipment.

It is well known that the USSR Ministry of Health has prohibited giving diagnostic equipment to medical cooperatives, because there is not enough of it and it wears out rapidly.

MNTK [Interbranch S&T Complex] "Machine Reliability" organized two years ago must facilitate the development and implementation of new diagnostic and testing equipment, but it will only be able to meet the demand for a small share of diagnostic means required by the practice.

The North-East Science Center in cooperation with the Problems of Machine Building Institute, AN UkSSR, conducted work on identifying diagnostic means developed by various organizations in the Republic and studying industrial enterprises' demand for them. It

turned out that a lot of diagnostic means with good technical parameters had been developed. There is technical documentation for most of them, but there is only one or at best several samples of each instrument.

The urgent task for scientists and production personnel is to solve the problem of providing such equipment for industry and thus improve the reliability of mechanisms that are being developed.

In our opinion, the AN UkSSR Presidium Commission on Machine Building should continue the work it has begun in Kharkov on inventorying diagnostic means developed in the Republic, conduct expert examination thereof and take upon itself the role of the coordinator. For series production of the most modern instruments, State orders should be placed with specialized enterprises on Commission's recommendations. Naturally, these orders must be "supported" with necessary micro-processor equipment and modern element base.

There is an agreement in principle with the management of NPO "Spektr" (Minpribor SSSR [USSR Ministry of Instrument Making, Automation Equipment and Control Systems] head enterprise) to provide technical assistance to enterprises, conduct expert examination and place orders.

Also, one should not reject the possibility of participation of S&T cooperatives, which can help substantially reduce the development and manufacturing time.

Only creative cooperation with industry science will make it possible to ensure the most efficient implementation of diagnostic equipment and thus improve the reliability and quality of industrial products. Diagnostic means made at a high S&T level can become a source of currency receipts. We already have proposals from Hungarian and Czechoslovak S&T organizations to jointly develop and debug instruments and devices and subsequently sell them to third countries.

Unfortunately, the implementation of these proposals is proceeding slowly. The lack of experience in developing direct S&T ties and creating joint enterprises precludes our institutions from the maximum possible utilization of available opportunities. I think AN UkSSR Presidium must organize proper personnel training and summarize the existing experience.

The democratization of our life and implementation of the new economic policy have created preconditions for developing foreign economic relations. This helps qualitatively renovate scientific equipment and improve the efficiency of our work. However, in some cases we are running into certain difficulties - publication restrictions are imposed on entire scientific directions and research fields, and as a result we find ourselves in the position of detached onlookers in the field of S&T marketing. And this is at a time when our capability in developing instrument making and creating technology that can be paid for in hard currency are small as they are. Decisions

on restrictions are made promptly, but removing restrictions from developments that can be sold abroad is a prolonged process. In my opinion, this procedure must be simplified - decisions should be made at an Institute by its Expert Commission and Director and approved by an AN UkSSR Vice President and possibly his Expert Commission. One should not forget that promising developments often become hopelessly obsolete in three to four years.

One more problem that must be solved. I am speaking of the index of economic efficiency, which has been used for years to determine the successfulness in operation of scientific institutions. With industry and science switching to the new economic conditions, the economic efficiency has lost its original importance.

Apparently, it still should be retained as one of several indices necessary for making decisions on conducting scientific research, choosing the best alternative and determining the price of S&T products. But yet, this is not the only index. Along with it, there are other indices, such as S&T level, competitiveness and the period of effective utilization of a product.

Under the new business conditions, these factors determine in the end the profit made by an Institute. And the lack of economic efficiency does not preclude the possibility of making profit, which is the only parameter to judge the efficiency of institution's activities. It is due to these considerations that I am asking AN UkSSR Presidium to consider the problem of excluding annual economic efficiency from the list of main indicators of Institute's activity and therefore not to set annual or five-year economic efficiency targets.

#### **Achievements, Shortcomings in Organization of Scientific Work**

*18140216K Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 48-50*

[Speech by Director, General and Inorganic Chemistry Institute, AN UkSSR, AN UkSSR Academician A. V. Gorodiskiy under the "Speeches of General Session Participants" rubric]

[Text] In the organization of scientific research, certain changes are taking place. Their essence is the outpacing development of basic research, concentration of effort on and goal-oriented State financing of priority directions. Of course, all this is right. But there are certain questions as to concrete implementation of these goals.

If one reasonably evaluates the correlation of forces in domestic science, then our Academy's place is far from second-rate. In his speech at the 19th Party Conference, General Director of the Ivanovo Machine Tool Building Association V.P. Kabayidze, a man that can hardly be suspected of flattery, only named Ukrainian institutions as "really scientific Institutes." I think the assessment given to the Electric Welding Institute can to a certain

extent be expanded to the entire Academy. The important thing is that V.P. Kabayidze's opinion is an independent assessment by a practitioner.

And he is not alone in his assessments. Our Academy is indeed highly thought of. I do not want to exaggerate and say that the majority of Institutes have leading positions. A lot of them, and particularly our Institute, still have to win such positions. But the UkSSR Academy of Sciences as a whole is a leader in a number of fields, sometimes an informal, but in some cases a formal one. It has a significant theoretical backlog.

This is one side of the problem. The other side is that management of virtually all priority scientific directions is concentrated at the Union Academy of Sciences. Because of this, there are fears that competitive principles in science can be somewhat deformed.

Now. We all understand the need to change the remuneration system and the system of economic incentives. Unfortunately, centralization has been so far extremely strong in this area; we feel excessive petty tutelage on the part of the USSR State Committee for Science and Technology.

Two years ago all Institutes conducted certification of scientists and switched to the new remuneration system. In a number of respects the system is positive. As to the efficiency of certification, Academician P.G. Kostyuk aptly said about it last year at the General Session of our Academy. He noted that firing a poorly working individual takes so much effort that it becomes economically unjustified.

Next year we are in for another reorganization - instead of engineers and senior and leading engineers we will have 1st, 2nd and 3rd category engineers. And again a new system has been sent from the above, and again it is mandatory for everybody. Is it possible for our Academy to develop an efficient system for ourselves?

Why engineer's salary is much higher than that of, say, a librarian? The thing is, in science information support is very important. Why then librarian's labor at an academic institution and rayon library is paid for equally? Why cannot one give our Academy the right to solve payroll problems?

I have cited these examples not to complain, but to show that restructuring in science has been so far taking place under conditions of nonuniformity and certain excessive organization. We should not count on the GKNT [USSR State Committee for Science and Technology] to effectively manage us. On the other hand, while complaining about measures implemented from the above, one should honestly admit a rather weak activity of Institutes in discussing these measures.

Our Academy's institutions must themselves determine their own priorities. They should win decent positions in domestic and world science, albeit under difficult conditions. It should be noted that the situation is far from

hopeless. We remember the time when soccer champions were almost exclusively Moscow teams. But today "Dnieper" has gotten the gold medals. And there is nothing unusual in this. Our Institutes must set the goal to take the same leading positions in their respective fields as the ones taken by the Electric Welding Institute imeni Ye.O. Paton, Cybernetics Institute imeni V.M. Glushkov, Physiology Institute imeni A.A. Bogomolets and Problems of Material Science Institute imeni I.N. Frantsevich.

Excessive centralization in managing science is not only characteristic of directive bodies - we have not escaped it either.

There are forms that are only typical for our Academy and have not yet been subjected to general centralized regulation (I am speaking of cost-accounting subdivisions). Unfortunately, here we ourselves resort to excessive regulation.

At present, the efficiency of operation of experimental enterprises is determined by only one criterion - fulfilling the plan in monetary terms. Naturally, this indicator does not reflect tasks we set for experimental production. Moreover, only material output in the form of products is counted as monetary result. But as far as design, technological and applied developments are concerned, they all are considered "work-in-process." Of course, such approach does not help improve the efficiency of science.

But the problem is not even shortcomings of this criterion. The problem is, we ourselves are exacerbating it. The bonus system, which we ourselves are creating in a centralized manner, is again based on indicators of productivity in monetary terms, i.e., it does not provide incentives for fulfilling Institutes' assignments, but rather forces experimental enterprises to preserve product invariability.

Here, two approaches are possible: Either develop a reasonable common system, if we need monotony, or give Institutes the right to develop their own systems of incentives for their cost-accounting subdivisions.

Speaking of cost-accounting subdivisions, one should state the desire to create an all-Academy production facility in addition to Institutes' ones. This all-Academy cost-accounting enterprise should be oriented toward manufacturing of measuring instruments and equipment, i.e., toward problems that will hardly be solved on the nationwide scale in the nearest future. Such production facilities can be organized on a sharing basis.

When we are "down below", we are mostly for independence and against centralization. But when we are "up above", our views change. While demanding independence for themselves, Institutes are far from striving for independence of their subdivisions. I cannot say the General and Inorganic Chemistry Institute is sharply different from the rest of institutions in being more democratic. But I think that one of the democratic

measures adopted by us would be useful. We have sharply broadened the possibilities for our scientific associates to switch at will from one science department to another. And what are the results? First of all, the moral climate has improved and the number of conflicts has decreased. Secondly, managers of science departments have been put in a situation that demands scientific, rather than just administrative, leadership. Thirdly, there have been no significant personnel moves, while the work has improved. The thing is, for a person to switch to a new science collective, the latter must agree to the reinforcement, which is not always the case.

Despite all this democracy, we have not sinned too much against centralization. Priority directions are determined by the Institute and stimulated via a system of additions to wages and salaries. The form of temporary collectives is used to solve important and urgent tasks. Thus, priority directions are forced through not by means of directives, but through economic management. This method is fairly successful. With its help, the problem of modifying medical sorbents was timely solved in the summer of 1986, a lot has been done to solve the problem of developing the second generation of chemical power sources, and basic work in the field of electrochemistry and inorganic materials technology was performed. Under these conditions, therestill is an opportunity to freely choose a real science leader.

I am reporting this not for advertising purposes - I am just presenting my point of view. So far, we have been satisfied with this form of work; it is quite possible that for other collectives a different form of interrelations will be useful.

Lastly, I would like to call your attention to another Academy-wide problem. I am speaking about the joint work on developing a forecast of the development of Republic's national economy up to the year 2015. What bothers me here? The forecast concepts are specified by agencies, rather than by the Republic. These concepts are aimed not as much at changing the quality and grades of products as at quantitative expansion of production. Often, such expansion provides for using raw materials brought in from outside - the specific technogenic ecological load keeps increasing.

We should apparently strive for adopting a different concept. It is much more sensible to orient our enterprises toward manufacturing high-quality science-intensive products. This approach is justified not just by ecological considerations, but also by economic expediency. Our enterprises have sufficient design and technological experience and the Republic has numerous completed developments, as well as a base for conducting further basic and applied research.

The adoption of this forecast concept will provide a social order for S&T developments, and one would be able to use the results of completing this order not just in our Republic, but also in other regions of the country.

### Lack of Instrumentation, Information Shortcomings

18140216L Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 54-56

[Speech by Director, Superhard Materials Institute, AN UkSSR, AN UkSSR Academician N. V. Novikov under the "Speeches of General Session Participants" rubric]

[Text] I would like to dwell on some serious obstacles hindering the forward movement of our science and efficient implementation of research results into the national economy.

I shall first dwell on shortcomings in the organization of work on large-scale projects. The thing is, the Superhard Materials Institute is guided in its activities first of all by national economic demands, as are the majority of AN UkSSR institutions. Money, material supplies and investments are given to us by branch Ministries and individual enterprises. Thus, the residual principle of supporting basic research has formed. It resulted in the psychology of begging and real beggary of basic science. Every time one gets an assignment or a research subject necessary for industry, one almost automatically asks: "Please add personnel or increase the payroll fund, give us additional equipment, instruments and funds for quest research", because as a rule regular channels for providing academic institutions with materials, instruments and even foreign science literature are dry. So an Institute is trying to find a customer - the oil industry, electronics industry etc. - at any cost.

Such system cannot but affect the status of basic academic science. Attention is scattered among numerous subjects, which are important and necessary, but are not those great principle projects that would bring ponderable scientific results in the future. Nowadays, under the conditions of cost accounting and self-repayment, the situation is getting even more complicated - industry does not pay money upfront for search involving risk.

I shall tell you about the situation with an extremely important problem the Superhard Materials Institute is working on now - manufacturing of large diamond crystals and basic research of their electronic properties. It is absolutely necessary to study p-type conduction in large synthetic crystals, taking into consideration their possible defectiveness and the presence of impurities.

An important task is to improve necessary characteristics during the synthesis by using a clean controlled environment, high-quality source materials, and automation and optimization of the design of high-pressure multielement reaction cells. To conduct this work, we have been looking for a customer since the early 1980s, because one must spend at least R5-6 million to update the technology. There is a special decision on the subject by the USSR State Committee for Science and Technology, everybody supports it and criticizes the sluggishness in solving the problem, but necessary funds

are not available yet. Meanwhile, in Japan a 10 mm diamond was grown several years ago. This year, an even larger specimen, 17 x 10 mm, has been made at DeBiers' laboratory in Johannesburg.

In the 1980s, DeBiers has invested over \$100 million in the development of his industrial and manufacturing base. What is the value of such expensive large diamond, manufacturing of which is a world S&T achievement? The thing is, according to the Japanese plans these achievements, along with the technology for application of diamond and diamond-like films will make a revolution in electronics as early as 1990s.

My suggestion is to replace the in essence for-show reports by scientists at meetings of AN UkSSR Presidium (with a foregone positive assessment but without actual material support) with an annual contest of ponderable projects of the entire Academy. Here, a real prize for the Academy will be a large State order and State budget stimulation of a scientifically substantiated application. And the prize will be fought for in a principle discussion by physicists and biologists, chemists and material scientists, geologists, economists, historians and philosophers.

In the spirit of glasnost, I would like to make several more comments. One can hardly justify closed and scattered distribution of instruments and other technical means for scientific work. Maybe, this system suits some Presidium leaders, as it is easier and there are fewer offenses? Or maybe somebody cannot display his objectivity because of his concerns for his own Institute, association, department or laboratory? However, this approach does not help the common cause.

The work in the area of scientific instrument making also has to be improved. In my opinion, by transferring available forces of AN UkSSR cost-accounting organizations into skilled and energetic hands, it would be possible to really feed the hunger for at least some instruments, such as digital meters, analyzers, computers etc.

I think we have here the same situation as in agriculture, where there are a lot of chernozem and tractor drivers, but the harvest is meager. Here is an example. Thanks to early works of employees of the Metal Physics Institute, AN UkSSR, and later also of our organization, a high-temperature differential thermoanalyzer was designed and several samples were made. The analyzer was certified at trade shows and appreciated by customers in the USSR and abroad as a priority and effective design. The demand for the instrument is 200 pieces (there are orders for 188). According to expert assessments by economists, the effect of implementing this equipment will be equal to tens of millions of rubles. There is a possibility to export it abroad. One can see that the development is valuable and promising. However, for years we have been conducting negotiations at the Minpribor SSSR [USSR Ministry of Instrument Making, Automation Equipment, and Control Systems] and other agencies on

manufacturing these products, but industrial enterprises are not taking this upon themselves - the production volume is not there.

World experience indicates that scientific instrument making should be in the hands of small production associations and venture S&T groups, rather than large industry. The latter can supply small groups created here with necessary electrotechnical, mechanical and electronic components and materials. In my opinion, AN UkSSR Presidium should more decisively reorganize the cost-accounting base of the Academy, so that it can serve not only production but also science, and first of all science.

My last suggestion has to do with information, which now reminds one of a one-way road.

We take part in numerous shows, seminars and schools, write and mail out endless memos, and often repeat the same information. The information flow in the opposite direction breaks down into tiny brooks, and it is scanty compared to the upward flow. The issue of creating a powerful cybernetic information center has ripened, because routine low-efficiency work in this area is intolerable.

At present, the sign of active scientific activity are automated databanks that include libraries, systems of interconnected personal computers and powerful printing and copying bases.

Abroad, the problem of making a copy of an article or a book one needs, getting an S&T reference, making a translation, making slides and graphs, automatically mailing a list to many addresses has been solved long ago. But here this takes a lot of workers, who fill orders unskillfully and very slowly. Scientists waste a lot of time here.

Having critically evaluated its activity after the well-known resolution of the Central Committee of the Ukrainian Communist Party (1986), our Institute has defined a long-term scientific program of basic priority works and improved its dealing with personnel. In getting State appropriations for basic work, we place special hopes in competitive principles. The thing is, at present (incidentally, this has also been a subject at an international Congress devoted to the development of new materials) the importance and efficiency of diamond technology in electronics is competing with the importance of high-temperature superconductivity. Thus, Director of the General Electric research center in Schenectady, NY, William F. Banholzer has recently said in a New York Times interview that the new diamond technology "is potentially more important, especially in the nearest future, than all recent discoveries in the field of high-temperature superconductivity."

Broad opportunities are opening up for the Superhard Materials Institute to implement its developments based on the new financing and economic management

methods. I support the planned restructuring at the AN UkSSR, which provides for increasing Institutes' role and responsibilities. I think that an important role in modernizing our S&T potential and creating an advanced technological and measurement base will be played by foreign investments based on direct ties and leasing agreements for foreign equipment, to be paid for by export of science-intensive products.

But probably the most important thing is improving the work of our main capital - scientific associates. I think one should change the practice of building the new without touching the old, so as not to create unsolvable problems and conflict personnel situations. One should switch to the system of contracts with professionals, and especially managers, from Director to a Senior Scientific Associate, for a certain period between two and five years, for a concrete scientific assignment and with necessary support. Such system will make it possible to budge the problem of solving the task of creating better conditions for those who work actively. And one should transfer those who do not cope with scientific work.

#### Personnel Problems, State Orders Discussed

18140216M Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 61-63

[Speech by Department Head, Problems of Material Science Institute imeni I.N. Frantsevich, AN UkSSR, AN UkSSR Corresponding Member S. O. Firstov under the "Speeches of General Session Participants" rubric]

[Text] Perestroika has posed complex tasks, but there are no ready prescriptions on how to solve them. We have been waiting for this Session, so we can discuss here our sore problems and to a certain extent clarify some aspects of our future activities. In Institutes' collectives and in our Party organizations (and I am Secretary of the Party Committee of a large Party organization), people are waiting for a concrete perestroika rather than talks about it. Of course, it must rely on democratization and glasnost, and their elements have already shown up in our work. But another thing is even more important - concrete actions.

B.Ye. Paton's report to the Session was unusual. It contained relatively little criticism of individual institutions and specific people, as well as little praise for those who have achieved certain successes. And in my opinion this is natural - one has not yet achieved results that one could speak of as great achievements. What the President said are to a certain extent theses, but they show the mechanism of the very perestroika we are caring for. And you and I have to implement them.

When we return after the General Session to our collectives, people will ask us about a lot of things. Particularly, our colleagues will want to hear an answer to the today's cardinal question: "How are we going to live under the new financing conditions?" Indeed, we have been given an unusual tool, and we have to tune it

ourselves. An Institute is the basic unit in the system that will be working on principles of cost accounting and self-repayment. At the same time, Institutes are sometimes trying to develop this scheme further. Departments are asking: "And what if we work well and save money? Where would the savings go to - to the common caddy or we would have a way to use it?"

There are very many questions. Competitive orders, contests - they are new in our practice. But in competing for them, it is very important to preserve the really scientific atmosphere and climate. We need not only the spirit of competitiveness, but also the spirit of openness, if you will, of real science, and this spirit cannot be purchased for money, no matter what.

I have been seriously troubled by one point in B.Ye. Paton's report. He said that we have encountered a situation when a lot of scientists do not want to be directors - they do not want to take a troublesome managerial position. This is also true at the Problems of Material Science Institute - we have encountered the cadre hunger when looking for candidates for a Deputy Director and some other positions. In this, I see miscalculations in personnel training.

I share the thought that one should be considerate towards the young, but scientists in the 35 to 50 years age category also need a lot of attention. It is from their ranks that managers of our science are to come in the near future. But it turns out that they do not want to manage. One should immediately make them more active, change the climate accordingly, and use as much as possible the potential of this army of scientists as experts and representatives of working groups in contests. I had a chance to see lists of such working groups. In practice, they are only comprised of Directors or General Directors. One would not find there mere Doctors of Sciences. It turns out that scientists who today determine the face of our science and organize and conduct All-Union, international and Republican meetings, conferences and schools are actually removed from the organization and management of science. One should pay special attention to this category of scientists by drawing them into management. Then one will have no problems looking for candidates for Directors' positions.

One can see that this is a serious problem. In this respect, I remember a very much respected person, my teacher, AN SSSR [USSR Academy of Science] Vice President Yu.A. Osipyan. He is a member of a working group dealing with the development of new metal materials. Of course, a person of such intellect and scientist of such caliber will be helpful in any group. But it begs a question whether he, a specialist in the field of semiconductors, is able to work there with maximum efficiency, especially being a very busy man.

Maybe one should approach the formation of working groups from a slightly different point - draw to their work those who actively works so to speak "in the trenches", at the forefront of science, and rely on those people.

I shall bring up one more personnel problem. It has to do with our planners. The time has come to retrain them, improve their skills and change their psychology. In the meantime, they see themselves as the last barrier between the State and "unwise" scientists who are trying to spend as much money as possible. A situation has formed, when Institute's departments are permanently and irredeemably indebted to their planning departments and Institutes are in the same position relative to the Presidium. This situation has to be eliminated.

I would like to state more clearly our attitude toward cooperatives. Very little was said about it in the report, although there have been some additional comments in the speeches. In my opinion, in six months to a year one should get back to discussing this problem and determine finally the attitude toward and maximum possible utilization of cooperatives and to the cooperative movement at large.

And another imminent problem. I think there is no need to prove the importance of developing new materials. Apparently, the time has come to create in the Republic a respective Problem Council, and not under the auspices of the Physical and Technical Problems of Material Science Department, but a Joint Council. It is possible to create similar organizations at the Union level as well.

Taking this opportunity, I shall share my thoughts as to increasing the role of Councils of Work Collectives in real management of Institutes. We must now start creating such Councils, which can be organs of democracy and implementation of the Party policy. It somehow happened that at this stage perestroika has got sort of stuck at the upper levels. But the revolution we all are taking part in should not be only executed from the top; the widest masses must join in.

And the last problem - State orders. Yes, we must form them using various expert mechanisms. But there is another aspect to this. Because nowadays one brings everywhere to the agenda acute problems related to ecology, public health etc., they too probably should be taken into consideration when forming State orders and solved expeditiously with our participation. In particular, I am speaking of the fact that we spend a lot of currency for solving ecological and public health problems. Why not use State orders so that we work along necessary directions? The idea is to form State orders not only down here based on our proposals, but also up there, based on a comprehensive analysis of the situation.

#### **Achievements in Low Temperature Physics Cited**

18140216N Kiev VISNYK AKADEMIYI NAUK  
UKRAYINSKOYI RSR in Ukrainian  
No 3, Mar 89 pp 63-65

[Speech by Director, Low Temperatures Physical Technical Institute, AN UkSSR, AN UkSSR Corresponding Member A. I. Zvyagin under the "Speeches of General Session Participants" rubric]

[Text] I too have some thoughts on the problem we are discussing today - improving the science management system. At present, we orient ourselves toward the fact that budget financing will depend mainly on institutions' participation in fulfilling programs. It is about the hierarchy of these programs that I would like to say something.

At present, various level programs are in essence formed based on the scale of the problem, i.e., a State program is a global problem that covers an extremely broad range of issues, a smaller scale program is an academic program etc. It seems to me that this hierarchy needs improvement. We have encountered a situation when scientific institutions located in outlying districts, and specifically institutions of the UkSSR Academy of Sciences, find themselves in an inequitable position, especially when funds are being appropriated. Moreover, it seems to me that such program hierarchy makes science in the Republic, including work on implementing Republican programs, somewhat secondary. And this, it seems to me, is wrong.

The thing is, as has been pointed out by B.Ye. Paton and other speakers, there are scientific directions where Ukrainian Institutes are in world's leading positions. And they are surely capable of forming a State importance program. Of course, such a program must be somewhat narrower and more specific, but it must be called a State program, not a Republican one. The UkSSR Academy of Sciences can also form such a program. Some examples have already been given here. Along with such direction as, for instance, electric welding, I can also name low temperatures physics and cryogenic technology. There is no such All-Union program, although it is an extremely serious S&T direction. In this field, we have examples of fairly effective organization of science, which made it possible for us to achieve the world level. For instance, within the framework of a Republican program developed by the AN UkSSR, we are developing the problem of mastering superlow temperatures along current trends in physics development, when one uses extreme inputs characterized by prefix "super-" - superhigh pressures, superstrong magnetic fields and superlow temperatures.

Not that long ago we (I mean the country as a whole) were lagging in this area behind the West. But now we have done away with the lag. We have developed equipment for several levels of superlow temperatures and a sophisticated dissolution refrigerator for the level of approximately 20 mK. These refrigerators are already manufactured in the Ukraine. They have also received high marks abroad. Recently, a refrigerator was shipped to GDR [German Democratic Republic], and there is a demand for it in CSSR [the Czechoslovak Socialist Republic], FRG and even England, which until recently was considered the monopolist in manufacturing such units. The construction of a unit for a 1 mK temperature level (the second in the country) has been launched in the Ukraine. Lastly, it is planned to launch at our Institute a unit for a microkelvin level in the nearest future. As far as I know, nowhere in the country is it planned to create such unit. You can see that

due to the effort of Ukrainian scientists we are achieving the world level in this, important for basic physics, direction.

Another example is participation in the high-temperature superconductivity program. It should be noted that this Union program was formed based on the program developed at the AN UkrSSR. Initial successes have already been achieved in the Ukraine. Specifically, three different samples of SQUID [superconducting quantum interference device] manometers operating at nitrogen temperature were demonstrated recently at the GKNT. They got very high marks. In particular, minutes of the meeting at the GKNT noted that AN UkrSSR LTPTI [Low Temperatures Physical Technical Institute], where these units had been developed, has the leading position in the country. This is in essence the first practical implementation of the hypothetical opportunity we have been talking about when discussing high-temperature superconductors. Of course, the development of these instruments was preceded by comprehensive basic research. In particular, quantum interference in high-temperature superconductors was discovered. You can see that we do participate in fulfilling the high-temperature superconductivity program, but this part of the program is still managed by the capital city institutions, rather than Ukrainian ones.

Here is another example. Within the framework of Republican programs, systems that use new advanced nitrogen technology were developed in the Ukraine. They help reduce losses of agricultural products in transit. We already talked, both here and at Departments' meetings, about a system of nitrogen refrigerators that have a number of serious advantages over traditional ones. Recently, another valuable feature of such systems has come to light - they make it possible to discontinue the use of freon, which, as is well known, destroys the protective layer of Earth atmosphere. Over 600 such refrigerators are in operation in eight oblast centers of the Ukraine. The

demand for them is much higher, but Republic's capacity for their mass production is limited.

The above examples demonstrate that we in our Republic can achieve world-class results.

We have accumulated considerable organizational experience in working according to programs, and we consider them a progressive form of organization of science. Unfortunately, previous programs were not financed and had somewhat recommendational character. I think Ukrainian science is absolutely capable of forming and managing State-importance programs. They should be State programs, although somewhat narrower and specific.

I second B.Ye. Paton's proposal to intensify the work of Department's management and its Bureau in improving ties with institutions and the management of the Union Academy and with the GKNT. It is important for solving the problem of financing; in addition, it will increase the prestige of works conducted at the AN UkrSSR.

In their activities, the Departments should rely on Scientific Councils. This form did exist in our Academy. But their activity had gradually come to naught exactly because of its recommendational character. If we give the Councils both power and finances, we will be able to reanimate this extremely useful and progressive form of drawing the scientific community to science management. The Councils should be able to manage problems and have necessary funds. This will make it possible to further improve the level of forecasting. In the past, the work on forecasting was often formal in character, because forecasters, i.e., those who at least had been thinking of the development of science, not always were able to implement their forecasts. But if the Councils are given this opportunity, forecasting will cease being a formality and become a serious and important endeavor.

Vydavnytstvo "Naukova dumka", "Visnyk Akademiynauk Ukrayinskoyi RSR", 1989©.

**Research on 'Nontraditional Phenomena' Detailed****Long-Wave Theory Outlined**

907A0097A Moscow NTR TRIBUNA in Russian  
No 23-24, 15 Dec 89 p 15

[Article by Candidate of Economic Sciences V. Potapov, the Institute of Scientific Information on the Social Sciences of the USSR Academy of Sciences: "Theories Do Not Burn"; first three paragraphs are NTR TRIBUNA introduction]

[Text] In the statements of people's deputies at the session of the Supreme Soviet the name of economist N. Kondratyev as the author of the theory of so-called long waves was recalled with much respect. I wanted to find out something additional about him in "Sovetskiy entsiklopedicheskiy slovar" [Soviet Encyclopedic Dictionary]. But I did not find his name there nor a word about this theory.

[Signed] A. Kvartsov, translator

Sverdlovsk

Our compatriot Nikolay Dmitriyevich Kondratyev was the founder of the world-famous long cycle theory. He was the first to discover in the capitalist economy the regularity of large-scale replacements of the fixed capital and technical base of industry and agriculture, which are not connected with crises. Its essence is that the capitalist economy develops over long cycles lasting 48-55 years with pronounced upswings and downswings. These cycles also received subsequently a second name—long waves in the economy.

Kondratyev counted three waves: the first began in the last decades of the 18th century and lasted until the middle of the 19th century; the next one covered the second half of the 19th century; the third began at the end of the last century and beginning in the second decade of this century entered the phase of decline. Kondratyev did not manage to advance farther.

The long cycle theory of Kondratyev promised to become a general-purpose tool of the long-range forecasting of economic development. And already in the 1920's Nikolay Dmitriyevich demonstrated this in his works.

Thus, in 1925 Kondratyev, based on the situation in the world economy and a long-range scientific forecast of its development, believed that the Soviet Union should by natural development, as a primarily agrarian country, win firm positions on the world market of agricultural products and quickly accumulate the capital necessary for industrialization, but not speed it up, entering a race with the United States (which had already gone through the first stage).

Therefore, Nikolay Dmitriyevich ruthlessly criticized the first five-year plan of industrialization, which had been submitted for discussion by S.G. Strumilin and

reflected the point of view of the State Planning Commission. Kondratyev noted the internal contradiction and groundlessness of this plan, the unrealistic nature of the indicators and the arbitrariness in the determination of the main proportions of the development of the national economy, and the erroneousness of the concept of planning, for which not scientific forecasting, but the directive assignment "the plan is law" was made the basis.

Today everyone knows well what choice the country made and what its result is.

Of course, the ideas of Kondratyev in no way fit Stalin's plan of the building of socialism, and by 1930 his scientific school had been smashed. The scientist and his allies were declared opponents of the building of a new order and were grouped with its enemies—the members of the mythical "labor peasant party."

The fate of Kondratyev's theory abroad was different. From the 1920's to the 1980's such well-known scientists as the Austrian J. Schumpeter, the American J. Forrester, and others developed it. Their research confirmed the objective and universal nature of Kondratyev's theory and made it possible to speak today about the existence of four long cycles. What are they?

I will cite as the most easily understood one the diagram of the succession of long cycles of Japanese scientist Hattori Tosio. His first cycle begins in 1788. Such inventions as the steam engine and the loom were the basis for its development. Metallurgy and rail transport were the basis for the second cycle (which began in 1851), chemistry, electricity, and motor transport were the basis for the third (which began in 1896). While the fourth cycle, which ends in 1990, begins immediately after the end of World War II. Electronics, high molecular petrochemistry, and the aircraft industry were its technological base.

And, finally, there is the fifth—forthcoming—cycle, which interests us most. Its start falls to 1990, the peak falls tentatively to 2020, for the present it is difficult to determine the duration of the phases of upswing and downswing. What sectors and innovations of engineering and technology will constitute, in the opinion of the Japanese scientist, the base of the development of human civilization in the next half century? These are ceramics, which replace metals, semiconductors, laser technology, information and communications, and space research.

What does a knowledge of Kondratyev's waves give the economist in practice? This is the opportunity to explain in a better reasoned manner many economic phenomena of the past. For example, why the crisis of 1929-1933, which received the name the Great Depression, was so deep. A descending wave of the third cycle started in the 1920's.

Or what assumptions does it make it possible to draw today?

In my opinion, in the last decade of our century the changes, which are occurring under the influence of the new stage of the scientific and technical revolution and the introduction of resource-saving technology, should encompass the capitalist economy in depth and in breadth. Capitalism will enter the phase of a protracted upswing, not of cataclysms....

In this connection what problem faces us today? If we want to hold a worthy position among the developed countries of the world, in our economic policy we should, in my opinion, adhere to the following strategy. Not to buy and not to produce any technology, which today is advanced for us, only because this is inexpensive or in any case will ensure some increase of labor productivity. It is necessary to concentrate the largest portion of the material and intellectual resources of the country on the development and introduction of technologies of the future—technologies of the fifth wave. Only in this way will we provide ourselves with the conditions for a breakthrough in the 21st century.

#### Parapsychology Research Program Discussed

907A0097B Moscow NTR TRIBUNA in Russian  
No 23-24, 15 Dec 89 p 15

[Article by Doctor of Technical Sciences Professor I. M. Kogan: "The Concept of Three Levels"; words in all capital letters as published; first four paragraphs are NTR TRIBUNA introduction]

[Text] In No 14 you wrote about the All-Union Committee for Energy-Information Exchange in Nature attached to the USSR Union of Scientific and Engineering Societies, which was specially established for the study of nontraditional phenomena. It would be interesting to find out how the specialists of this committee evaluate the objects of their research.

[Signed] N. Popov, undergraduate

Tomsk

Doctor of Technical Sciences Professor I.M. Kogan responds to the letter of our reader. He is chairman of the section of extrasensory studies of the All-Union Committee for Energy-Information Exchange in Nature attached to the USSR Union of Scientific and Engineering Societies and director of a public parapsychology laboratory. He conducts a scientific seminar on these themes at Moscow State University imeni M.V. Lomonosov.

Let us look at the diagram [diagram not reproduced]. On it the basic information phenomena are listed. These phenomena are so diverse that our laboratory is capable of studying only a small portion of them. I can judge the rest from domestic and foreign experience.

Parapsychological phenomena are divided into information and force phenomena. Belonging to the first group,

for example, is telepathy—the transmission of information from a human agent to the human percipient, who is isolated sensorially from him.

NEARSIGHT encompasses phenomena of the perception of information about objects of nonliving nature at small distances—up to a few meters. This is the recognition of a color or Zener cards in opaque packages, the reading of texts without "the aid of vision" or touch (for example, the phenomenon of R. Kuleshova), and so on. FARSIGHT is the obtaining of information about objects of nonliving nature at any distance. For example, several sensitives have succeeded in describing the situation at an unknown location far from them. Reading by photography and geographic map, which L.A. Korabelnikova succeeds in doing, about which your newspaper recently reported, is also grouped with farsight.

TELEKINESIS (or psychokinesis) is the moving of objects "by the effort of thought," remote affecting of the readings of physical instruments. STIMULATION is the effect of the mental state of a person on the activity of enzymes, the germination of seeds, the motor activity of animals. The BACKSTER EFFECT is the change by the same means of the electrical conduction of the leaves of plants.

Reports on more exotic phenomena are also being published. Among them are the exposure of photographic film or photographic paper by "mental action" (PSI-PHOTO), the deformation of objects by the same means, and extrasensory DIAGNOSIS and HEALING without direct contact with the patient. Such phenomena are possible only if some forces, some energy, that is, a field, operate in space. Since such fields are generated and perceived by living organisms, they have been called biofields.

There is also noted in the figure PROSCOPY—the prediction of the future, which is being successfully accomplished by the Bulgarian woman Vanga Dimitrova; the determination of the condition of a patient as a result of "the reading by hand" of his cardiogram (the CLAIRVOYANCE of L.A. Korabelnikova); the search for underground anomalies by DOWSING, or BIOLOCATION; finally, the exotic POLTERGEIST like the recently much talked of "Barabashki."

Of course, not all parapsychological phenomena are equally reliable. It is entirely possible that some of them will prove to be the fruit of a mistake, accident, and even falsification. Nearsight and dowsing, in our opinion, are the most reliable. Many well-known scientists, such as Academician Yu.B. Kobzarev, talk confidently about the cases of telekinesis with N. Kulagina, which have been observed by them. The Baxter effect, as well as stimulation, which are quite capable of being caused by the biofield of the extrasense or if only by its infrared component, and remote diagnosis and healing hardly leave doubt.

Telepathy is an unstable phenomenon that is hard to reproduce, although, I think, it is hardly worth doubting

the fact of its existence. Farsight and clairvoyance fit with difficulty in the notions that are customary for us. Nevertheless, numerous recorded cases make it incumbent to treat them with some trust.

Proscopy, at first glance, seems in general to be at variance with cause-effect relations. However, in principle this is not so. Our entire life is connected with predictions (forecasting). Suffice it to mention the weather forecast or the prospects for the future harvest—and we understand perfectly that such a “prediction of the future” (proscopy) is based on the obtaining and corresponding processing of information, which was accumulated in the past, and current information. The same thing also happens in parapsychological proscopy. Although here such stunning results are obtained (for example, from the already mentioned “Grandmother Vanga”) that I would refrain from giving them a confident evaluation.

Finally, such phenomena as healers, psi-photo, and poltergeist are most unusual and rare and give rise to diametrically opposed evaluations. One must not, however, hasten with anathema.

Such a description of unrecognized phenomena, which was built for the purpose of reducing confidence and reliability, testifies that it is pointless to give parapsychology a single evaluation. Therefore, the author of this article has proposed “The Concept of Three Levels.”

Phenomena, for which the corresponding physical correlates have been established by instruments, are assigned to the level of **REAL PHYSICAL MODELS**. For example, nearsight. At the level of **POTENTIAL PHYSICAL** models there are phenomena, with respect to which it is possible to conjecture that physical phenomena constitute their basis. But the physical mechanism itself has not yet been discovered experimentally, and, therefore, at present it is possible to talk about it only on the theoretical level, in mathematical language. Telepathy, for example, is at this level. Phenomena, which are similar to reading by photography, prospecting by geographic map, and diagnosis over the telephone, form the **PSYCHOLOGICAL LEVEL**.

“The Concept of Three Levels” shows that the entire set of these phenomena does not fit within just the notions of modern physics. Obviously, integration with studies of higher nervous activity and with humanities notions and other sections of the knowledge of man and philosophy is necessary.

**Nominees for RSFSR State Prizes in S&T  
Announced**

907A0086A Moscow SOVETSKAYA ROSSIYA in  
Russian 3 Jan 90 p 4

[Article: "From the Committee for RSFSR State Prizes in Science and Technology Attached to the RSFSR Council of Ministers"]

[Text] The Committee for RSFSR State Prizes in Science and Technology attached to the RSFSR Council of Ministers reports that the following works have been allowed to participate in the competition for the 1990 RSFSR State Prizes in science and technology:

1. V.A. Malyshev, R.A. Minlos. "Cluster Expansions and Spectral Models of Statistical Physics and Quantum Field Theory" (a series of works).

Nominated by the USSR State Committee for Public Education.

The public discussion is being held at the Leningrad Department of the Mathematics Institute imeni V.A. Steklov of the USSR Academy of Sciences at the address: 191011, Leningrad, Naberezhnaya Fontanki, 27. Telephone number for inquiries: 312-40-58.

2. I.Ya. Nekrasov. "The Physical Chemical Conditions of the Formation of Deposits of Tin and Associated Metals" (a series of works).

Nominated by the Far Eastern Department of the USSR Academy of Sciences.

The public discussion is being held at the Far Eastern Scientific Research Institute of Mineral Raw Materials of the USSR Ministry of Geology at the address: 680005, Khabarovsk, Ulitsa Gerasimova, 31. Telephone number for inquiries: 34-06-59.

3. Yu.N. Rabotnov, O.V. Snosnin, A.F. Nikitenko, S.A. Shesterikov, A.M. Lokoshchenko, N.N. Malinin, Yu.P. Samarin, A.A. Chizhik. "The Development and Experimental Substantiation of the Mathematical Theory of Creep and Its Applications" (a series of works).

Nominated by the Siberian Department of the USSR Academy of Sciences.

The public discussion is being held at the Institute of Machine Science imeni A.A. Blagonravov of the USSR Academy of Sciences at the address: 101830, Moscow, Center, Ulitsa Griboyedova, 4. Telephone number for inquiries: 135-32-01.

4. A.G. Zemskaya, N.P. Ryabukha, Yu.A. Garmashov, L.N. Nesterov, Yu.N. Savchenko, R.I. Genne, I.Ye. Poverennova. "The Development and Introduction in Clinical Practice of Methods of the Diagnosis and Surgical Treatment of Various Forms of Epilepsy" (a series of works).

Nominated by the USSR Ministry of Health.

The public discussion is being held at the Scientific Research Institute of Experimental Medicine of the USSR Academy of Medical Sciences at the address: 197022, Leningrad, Ulitsa Akademika Pavlova, 12. Telephone number for inquiries: 234-54-01.

5. V.I. Krasnopol'skiy, B.I. Kulakov, V.N. Serov, I.R. Zak, B.L. Gurtovoy, F.A. Smekuna, S.N. Buyanova. "The Development and Introduction in Clinical Practice of Methods of the Prevention and Treatment of Purulent-Septic Diseases in Obstetrics and Gynecology" (a series of works).

Nominated by the RSFSR Ministry of Health.

The public discussion is being held at Leningrad State Institute for the Advanced Training of Physicians imeni S.M. Kirov of the USSR Ministry of Health at the address: 193015, Leningrad, Ulitsa Saltykova-Shchedrina, 41. Telephone number for inquiries: 272-21-07.

6. V.G. Vtorova, Yu.A. Knyazev, L.F. Marchenko, T.V. Sebko, V.A. Besspalova, M.I. Martynova, L.L. Vakhrush-eva. "The Development and Introduction in Clinical Practice of Rational Methods of the Prevention and Treatment of Diabetes in Pregnant Women, Women in Labor, and Children" (a series of works).

Nominated by the RSFSR Ministry of Health.

The public discussion is being held at the Institute of Experimental Endocrinology and Hormone Chemistry of the USSR Academy of Medical Sciences at the address: 117036, Moscow, Ulitsa Dmitriya Ulyanova, 11. Telephone number for inquiries: 124-41-00.

7. V.A. Gologorskiy, B.R. Gelfand, V.Ye. Bagdatyev, V.A. Kubyshev, N.A. Sergeyeva, Yu.N. Belokurov, A.B. Gramenitskiy, A.D. Kostyuchenko. "Infectious Toxic Shock in Surgical Patients" (the development of diagnosis and pathogenic therapy).

Nominated by the RSFSR Ministry of Health.

The public discussion is being held at the 1st Moscow Medical Institute imeni I.M. Sechenov of the USSR Ministry of Health at the address: 119048, Moscow, Ulitsa Dovatora, 15, Hospital No 61. Telephone number for inquiries: 246-87-49.

8. A.B. Ostrovskiy, S.V. Savin, I.Ye. Slyusar, V.G. Timokhin, L.V. Parmokhin, Ye.M. Yeliseyev, B.V. Borevskiy, D.I. Yefremov. "The Discovery and Highly Efficient Prospecting of a Group of Pools of Underground Waters—an Important Contribution to the Solution of the Problem of the Water Supply of the Vast Arid Zone of the Stavropol Region and Kalmykia."

Nominated by the USSR Ministry of Geology.

The public discussion is being held in the Commission for the Study of Productive Forces and Natural Resources attached to the Presidium of the USSR

Academy of Sciences at the address: 117049, Moscow, Maronovskiy Prospekt, 26. Telephone number for inquiries: 238-21-12.

9. V.I. Strukov, G.F. Dal, L.L. Pashkova, Yu.A. Lovtsov, N.G. Goguzev, Ye.A. Dovshitskiy. "The Development and the Assimilation of the Series Production of Standardized Reciprocating Expanders for Low-Discharge Air-Fractionating Units."

Nominated by the USSR Ministry of Chemical and Petroleum Machine Building.

The public discussion is being held at Leningrad Polytechnical Institute imeni M.I. Kalinin of the RSFSR Ministry of Higher and Secondary Specialized Education at the address: 195251, Leningrad, Ulitsa Politekh-nicheskaya, 29. Telephone number for inquiries: 552-65-84.

10. A.P. Burdukov, B.M. Galitseyskiy, G.A. Dreytser, O.N. Kashinskiy, V.V. Kostyuk, V.Ye. Nakoryakov. "Transient Thermal and Hydrodynamic Processes in Single-Phase and Two-Phase Media" (a series of works).

Nominated by the Siberian Department of the USSR Academy of Sciences.

The public discussion is being held at the Institute of High Temperatures of the USSR Academy of Sciences at the address: 127412, Moscow, Izhorskaya Ulitsa, 13/19. Telephone number for inquiries: 485-90-09.

11. A.S. Balalykin, Yu.I. Gallinger, Yu.M. Kornilov, G.I. Perminova, B.K. Poddubnyy, G.A. Romanov, L.K. Sokolov, V.N. Sotnikov. "The Development and Introduction of Methods of Medical Endoscopy in Case of Diseases of the Digestive Organs" (a series of works).

Nominated by the Executive Committee of the Moscow City Soviet of People's Deputies.

The public discussion is being held at the Institute of Surgery imeni A.V. Vishnevskiy of the USSR Academy of Medical Sciences at the address: 119083, Moscow, B. Serpukhovskaya Ulitsa, 27. Telephone number for inquiries: 236-60-94.

12. N.K. Mazitov, N.G. Envald, B.S. Komissarov, Kh.S. Gaynanov, M.A. Akhmetov, G.A. Matorinskiy, S.A. Smetankin, A.I. Lyubimov. "The Development and Introduction in Production of Modular Power-Saving Machines of Year-Round Use for an Ecologically Clean Technology of Surface Soil Cultivation."

Nominated by the Tatar ASSR Council of Ministers.

The public discussion is being held at the Moscow Institute of Engineers of Agricultural Production imeni V.P. Goryachkin at the address: 127550, Moscow, Timiryazevskaya Ulitsa, 58. Telephone numbers for inquiries: 216-11-70, 216-26-66.

13. I.S. Turovskiy. "Obrabotka osadkov stochnykh vod" [The Processing of Sewage Sludge] (monograph).

Nominated by the USSR State Construction Committee.

The public discussion is being held at the Scientific Research Institute of Water Supply and Water Treatment of the Academy of Municipal Services of the RSFSR Ministry of Housing and Municipal Services at the address: 123371, Moscow, Volokolamskoye Shosse, 87. Telephone number for inquiries: 491-33-23.

The Committee addresses to scientific production associations, enterprises, scientific institutions, higher educational institutions, scientific and technical societies, scientists and specialists, and the community at large the request to send their opinion on the works and collectives of authors.

All opinions, materials of the discussions, and remarks on the works and collectives of authors should be sent to the Committee by 5 February 1990 at the address: 103012, Moscow, Kuybyshevskiy Proyezd, 5.