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Awards, Prizes

USSR Scientific Potential: Reorganizing Its Structure

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[Article by B. G. Saltykov (Moscow): "The USSR Scientific Potential: The Reorganization of the Structure"; first paragraph is EKONOMIKA I MATEMATICHESKIYE METODY introduction]

[Text] The actual structure of the USSR scientific potential, which formed under the influence of departmentalism as the main factor of the administrative command economy, is analyzed in the article. The problems of the functioning of new types of organizations of science (scientific and technical cooperatives and others), which are appearing in connection with the transition to economic methods of management, are examined.

Scientific and technical progress today to a significant extent depends on the efficiency of the functioning of science, more precisely, the entire sphere of research and development (NIOKR)—the basic source of technological and organizational innovations. This is correct for all industrially developed country, but the extent of this dependence is determined by the peculiarities of their historical development, the level of the economic, scientific, and technical potential, the degree of participation in the international division of labor, and other factors.

New objective demands on science have emerged in recent decades in connection with the pronounced aggravation of a number of economic and social problems. Thus, the depletion or the manifold increase of the cost of traditional types of resources was the cause of the rapid growth of research in the area of resource-saving equipment and technology and nontraditional and renewable sources of energy. In turn, the gigantic scale of industrial and agricultural production faced mankind with the threat of an ecological catastrophe. This placed among priority developments the developments in the area of ecology and waste-free technologies, including biotechnology.

But not only the demand, which was introduced from outside, prompted science to broaden intensively the front of research in order to find adequate solutions of the new technological and social problems. Science itself, including basic science, demonstrated to society such promising results that it became the source of the formation of new social needs, works, and then branches of industry. The successes of electronics and information science, which changed the characters of industrial production, the sphere of services, and leisure, had a particularly profound effect on the economy and society.

Finally, it is impossible not to note another factor which contributed to the rapid development of science in recent decades. The worsening in the 1960's and 1970's of international relations caused in a number of countries, first of all the United States, the unprecedented increase of spending on military research and development.[1] Industry, which produces the latest weapons systems, being the client and consumer of fundamentally new materials, products, and technologies, supports the stable (in a certain sense "extra-economic") demand for research and development in the corresponding directions. The space complex plays the same kind of role of a state stimulant of exploratory research. However, the fact that in recent years its commercialization has been occurring, so that with time a certain portion of research and development will be conducted here on the basis of cost recovery, is new.

The listed reasons in the aggregate had the result that today in all industrially developed countries science both in the scale of the used resources and in its importance has been placed among the most important branches of the national economy. Thus, in the USSR, the United States, Japan, and the FRG the share of the expenditures on scientific research comes to five to six percent of their national income. In these countries complexes of science-intensive branches, which are kinds of locomotives that ensure the movement of the economy along the track of scientific and technical progress, have been formed on the basis of basic science as an innovation culture medium. As A.I. Anchishkin correctly noted, "the capacity for economic progress is becoming identical to the development of science" [2].

In the past 10-15 years not only the scale, but also the qualitative character of the sciences—its cognitive means, technology, the concept of the workplace of the researcher, the methods of the organization and performance of work (see, for example, [3])—have changed radically. A large number of automated complexes of scientific equipment and instruments and hundreds of automated data banks and simulating systems are operating in the majority of fields of science. This made it possible to increase by tens of fold the labor productivity of researchers when performing routine operations and—what is the most important thing—made possible previously inaccessible formulations and solutions of fundamentally new creative problems.

The increased intensity of international exchanges and the increase of the number of international collectives also became an important prerequisite of success in basic research. The problems, which lie at the edge of what is known, are so complicated that they require the resources of the entire world community.

The changes occurring in world science have also affected the domestic sphere of research and development, but it has to be stated that although in the scale of scientific activity (more than 1.5 million scientists and science teachers in 1988) the USSR has drawn close to the leader in the area of science and technology—the United States (where according to various estimates there are 1.7-2.0 million similar specialists), the structure of the scientific potential and the quality and

consumer properties of instruments and equipment are considerably inferior to the corresponding characteristics of developed capitalist states.[2]

In our opinion, not so much the shortage of material resources and skilled personnel (this is already a consequence) as the complete exhaustion of the capabilities of the administrative command system to manage efficiently this specific sphere of human activity is the main cause of the crisis in domestic science.

For science as an object of management such traits as the great uncertainty between the expenditures, the results, and the time of their obtaining, the enormous role of the subjective factor, the world character, and the "noncommodity nature" (in essence, but not in form) of the result are being brought to the forefront. They erect natural limits to customary administrative procedures and require the search for adequate methods of influencing the intensity and orientation of research.

However paradoxical, this large-scale, most "intelligence-intensive" branch of the national economy also remains the least controllable factor of the growth of the economy. The basic reason for this lies, of course, in the fact that the laws of the functioning of science as a separate branch of the national economy are not completely known. Whereas back at the beginning of our century science in all countries of the world lived essentially "separately" from the economy and its scale and rate of growth were determined by historical, prestige, and other, often subjective factors, at present the situation has changed radically.

The significant scale of the resources being consumed (moreover, resources of the highest quality), as well as the powerful influence of the results of research and development on the development of the national economy require responsible and public decisions on the choice of the priority directions of research and the amounts and structure of the expenditures on science. Here it is necessary to realize that present-day science is multidimensional, its ties with other spheres of society are diverse and cannot be formalized. Moreover, science is developing as a full-blooded social institution, and now it is harmful and impossible to isolate its most urgent problems from society, for the means of development of all society often depend on the settlements of questions which at first glance are purely "intrascientific" questions.

The structure and dynamics of the scientific potential of a specific country in many respects are predetermined by several base characteristics of social development, among which the general political and economic orientations, historical and regional peculiarities, and national traditions are the main ones.

Thus, the type of centralized state with long-term traditions of authoritarian rule, which formed historically in the USSR, could not but influence the development of analogous structures in science. Moreover, together with such factors as the enormous territory and the long period of socioeconomic backwardness of the outlying areas of Russia this gave rise to the pronounced differentiation of the scientific potential in the "center-provinces" direction.

At the same time the constant priority of political goals (often to the detriment of economic goals) had the result that the pace of the formation of "regional" science to a significant extent was dictated by factors of national prestige, and not by objective needs of the economy and society.

The fact that the country was almost constantly under the conditions of hostile encirclement and, in this connection, the highest priority of national security interests had as a consequence the significant transfer of resources to military-oriented research and development. This stereotype of the structure of the scientific potential was reinforced to an even greater degree after the Great Patriotic War and the long period of international tension. Together with the historically established autarky of our country and the weak involvement in world economic relations this stimulated the development of a "continuous front" of research. The very low mobility and conservatism of organizational structures to date are contributing to the financial support of unproductive research collectives in a large number of directions instead of offsetting their "closing" with active international exchanges in the corresponding fields of research.

And still the administrative command (AK) system is, undoubtedly, the main factor, which had a decisive influence on the formation of the basic structures of domestic science and created the procedures and mechanism of functioning, which are characteristic only of it.

Departmentalism became the main method of organizing productive forces in the administrative command system. As a socioeconomic phenomenon it is characterized by the breakup of the economy into sectors, which function under monopoly conditions and are managed by special integrated structures of power (state-party-economic structures). By the end of the 1930's, when the basic features of the administrative command system had been formed, all strategic, that is, reproduction, decisions, including the development of research and development and capital construction, had been withdrawn from the jurisdiction of the most important units of the economy (enterprises) and transferred to the top echelons of management (ministries and departments). Thus, the system of branch, but in reality departmental science was created.

The scientific potential of departmental scientific technical complexes is markedly differentiated in conformity with the rank (priority) of one department or another in the economic hierarchy, which is a consequence of the "departmental ownership" of science as a resource of reproduction, which in practice has been secured legislatively in our country. In connection with this the widespread division of domestic science into three sectors—branch, academic, and VUZ [higher educational

institution] (at time they also correctly distinguish a fourth sector—plant)—is very empty, especially when they try to compare their scientific potentials with each other, distinguishing the VUZ sector as the weakest one. In reality the subsectors of the sphere of research and development of the USSR, which are characterized by systems generality, are formed according to completely different principles.

The first of them is represented by scientific and technical organizations of the group of high-priority science-intensive branches of machine building with a developed material and technical base of research and development and steady rates of growth and updating. This is the so-called defense sector. The resource supply of science in this area is substantially greater than the average for the country and exceeds by several fold the analogous indicators of the remainder of the branch sector. The quality of all the resources consumed by this complex of branches is significantly better.

An entire set of factors, which ensure the reproduction of its scientific potential at the necessary level, operates here. It has its own systems (which are separate from the common systems for the national economy) of the management and coordination of operations, material and technical supply, and capital construction. This also fully applies to the system of the training of scientific personnel, therefore, there should undoubtedly be included in this group the small number of higher educational institutions with a great potential, the graduates of which are used mainly within this complex (the Moscow Engineering Physics Institute, the Moscow Aviation Institute, the Moscow Higher Technical School, the Moscow Power Engineering Institute, and a number of other leading higher educational institutions of the country). In its level the material and technical base of these higher educational institutions, including their research and pilot experimental subdivisions, exceeds significantly (by several fold) the "average VUZ" characteristics.

Various economic and extra-economic steps: Increased wage rates, an intradepartmental system of the direct distribution of social benefits, and so on, are used for the stable reproduction of high-quality manpower resources in this group of branches.

Exploratory and basic research is substantially more developed in this part of branch science than in the remainder. At the same time this sector has extensive creative and purely commercial contacts with scientific research institutions (NIU's) of the USSR Academy of Sciences, which also contributes to the maintenance of the high level of the scientific potential. International competition in the corresponding directions of science and technology is also an effective stimulus of the constant search for new solutions in scientific collectives of this sector. Unfortunately, a significant share of the scientific and technical product of this sector has an "extra-economic" orientation.[3]

The scientific complex of the USSR Academy of Sciences, as well as a number of scientific institutions of the republic academies (first of all the Ukrainian SSR, the Belorussian SSR, and the Baltic republics), the level of research and development of which and the quality of the material base and personnel of which as a whole correspond to the union ones, belong to the second sector, which it is possible to call arbitrarily "the large Academy." The scientific research collectives of the group of higher educational institutions and universities, which carry out the training of specialists for this sector and cooperate closely with them on the scientific level (Moscow State University, Leningrad State University, Novosibirsk State University, the Moscow Physical Technical Institute, and others), belong here. A large proportion of basic research and a quite high rank (priority) of the corresponding departments in the economic hierarchy are characteristic traits of this sector.

The proper level of the scientific potential of the sector is ensured by an in-depth basic education of personnel, the existence of a significant number of historically established scientific schools, an interdisciplinary and an interbranch approach to the solution of scientific and technical problems, and relatively close ties with world science. Great openness and democracy, which are traditionally characteristic of scientific collectives of the academic sector, play not the last role.

The scientific and technical organizations of the majority of union ministries and departments, that is, the bulk of "civilian" branch science, form the next sector. Strictly speaking, within this sector it is also necessary to distinguish the group of branches with quite high indicators of the scientific potential (instrument making, electrical engineering, and others) and, on the contrary, the branches with a level that is substantially lower than the average level. Typological studies of the scientific and technical potential of this entire group of branches have already been conducted [5].

In spite of the quite complex internal structure of the sector, there are also very essential features, which are common for the bulk of its organizations. First, as a whole low indicators of resource supply, including an unintegrated and old instrument, material, and pilot experimental base, are characteristic of them. Second, the personnel potential of this science is replenished by means of graduates with a narrow engineering and technical education of a weaker group of higher educational institutions (mainly "noncapital" higher educational institutions). The wage of scientific and technical personnel here on the average is less than in the first sphere of science, which is close in type. Material and technical supply is also worse, while the range of materials, instruments, and equipment is far poorer.

This part of the sphere of research and development is specialized and closed in its own stratum of scientific and technical ties and is nearly cut off from basic science (including "the large Academy") and world science.

The organizations of "provincial" science constitute the fourth, bottom level of the sphere of research and development. It is possible to include here the most backward part of branch science of nonpriority ministries, scientific and technical organizations of "local subordination," and academic and VUZ complexes of the regions that are weakest in the level of socioeconomic development. A very low quality of scientific personnel and the material base and an orientation toward applied scientific and technical tasks often of a narrow regional purpose are characteristic of this sector. A significant number of small scientific research institutions and higher educational institutions of regional subordination, whose work has a social science and humanities orientation (economics, history, culture, medicine, and so on) and is distinguished by a lack of comprehensiveness and insignificance, are also found here.

The structure of the scientific potential of the USSR in recent decades has formed under the strong influence of the priorities of some departments or others in the general hierarchy of subjects of management.[4] The latter in turn reflected in many respects the ranks of state goals—first defense and space, then several fields of basic science and heavy industry, and only after that the social sphere.

In the consolidation of the thorough differentiation of science the system of its material and technical supply, the principles of which were carried over from the production sphere, plays an important role. As a result the specific nature of creative activity: The enormous range and uniqueness of the used products; the great variability of demand and the speed of delivery, which is equal to it; small quantities and volumes of required ingredients, and others, was also almost completely ignored here. Inasmuch as the rigid system of departmental priorities is the main criterion in the process of distributing instruments, materials, and services under the conditions of the shortage, the definitive division of science into two major spheres: "Big" science and "small"science, which live under fundamentally different conditions of the provision with resources, occurred. These are, on the one hand, the group of high-priority branches, as well as a number of scientific research institutions of the USSR Academy of Sciences and, on the other, the science of low-priority departments, which in practice do not have access to advanced instruments, materials, and equipment.

The structure of science, which was formed in this manner, is being supported and reproduced by an entire set of steps, among which the formal division of scientific research institutions into different categories (previously from the first through the third, at present into two), which made the existence of science of the "lowest quality" entirely legitimate, is the most characteristic one for the administrative command mechanism. In conformity with this basic premise in the "high-quality" part of science higher wage rates, priority financing from assets of the state budget, its own system of material and technical supply, and so forth are used.

At present the differentiation of the scientific potential, especially scientific personnel, as well as the used knowledge, instruments, and technologies of scientific research work, has reached such a degree that it is possible to speak about the emergence of a nearly impenetrable barrier between the highest and lowest strata of science. Here, if we use the terminology of Yu.V. Yaremenko [6], in science as a branch of the national economy there are extremely limited possibilities of compensating for high-quality resources with mass resources—it is well known that even a tenfold increase of the number of "mass" scientists is incapable of making up for the lack of one genuine scientist.

Departmentalism in science cultivates a monopoly, which is the main source of the low standards of scientific and technical progress in the national economy. Inasmuch as departmental patriotism does not encourage horizontal ties outside one's scientific complex, low-capacity research groups, which conduct their own research and development of a general type, are emerging of necessity. Thus, the development of a subsistence scientific economy both within the department and inside individual organizations is being stimulated. This finds expression not only in the appearance of excessive capital and stocks of resources, but also in the fact that in our country the general-purpose scientific research institute, in which all the diverse functions of creative activity and scientific service are combined, has become the most widespread form of the organization of scientific and technical activity. All this hinders the development of functional specialization in science and, in the end, decreases the efficiency of the use of the scientific and technical potential.

In such an organizational structure the cognitive potential can be increased only by the constant emergence of new laboratories and institutes, which would develop new fields of knowledge. The development of science in the 1960's took place in precisely such a manner. Over a period of a little more than 10 years (from 1960 to 1972) the number of scientific institutions increased by more than 1,000—from 4,196 to 5,307. When the real danger of the loss of state control over the development of the network of scientific research institutions arose, rigid restrictions on the process of establishing new scientific and technical organizations were introduced. However, the appreciable increase of the number of scientific personnel, which continued even after this, inevitably had the result that given the stabilization of the structure of the network of scientific research institutions their average size, which, according to our estimates, during 1975-1985 increased by more than 25 percent, continued to grow.[5]

As a result the administrative command mechanism formed such a structure of the scientific potential, in which only large and the largest (several thousand and at times tens of thousands of people) scientific and technical organizations are viable. On the other hand, the concepts of a "weak" and "poor" scientific and technical organization are synonyms of the "small" scientific and

technical organization. It is possible to explain precisely by deep-seated systems causes the fruitlessness of the attempts, which occurred in the 1960's and 1970's, at the establishment of small scientific and technical organizations that are independent of departments (like the well-known Fakel firm in Novosibirsk). The departmental monopolies always found effective means for their elimination.

The departmental organization of science under the conditions of the administrative command mechanism replaced the lacking market of scientific and technical products with the state system of the forced introduction of the results of science in practice. This, in turn, made optional (and at times also futile) the development of auxiliary scientific and technical activity, particularly those types of it, which support contact between science and the economy: the analysis of demand, the study of the market of scientific and technical products, the comparison and testing of competitive analogs, and others. For the same reasons the sphere of service of science itself—services of information gathering, storage, and analysis, forecasting, and many others—is in an extremely backward state.

In the early 1980's the reserves of the extensive development of the sphere of research and development due to sufficient increases of new resources were exhausted. As a result our science began to lose the positions in those fields, in which in the 1960's it had indisputable priority, and was unable to create reserves in a number of completely new directions of research. By the middle of the 1980's the situation had become so critical that it became impossible to change it radically by conventional steps, which reduce to organizational rearrangements.

In science, just as in the entire national economy, the need for the change of the entire management paradigm came to a head.

The achievement of a fundamentally greater mobility of our scientific potential and its capability to react quickly to the change of the needs of society and science itself should become the main goal of the reform of the organizational structures and the methods of the planning and financing of science.

In connection with the proclamation in 1986 of the new concept of the management of the national economy, which is based on economic methods, a number of steps on the change of the management mechanism and the structure of our scientific potential were implemented. Unfortunately, the most significant ones of them—the transformation of a large number of branch scientific research institutes into scientific production associations (in machine building up to 80 percent) and the establishment of 23 interbranch scientific technical complexes—were carried out in the spirit of the old, command concept. The former aspiration for standardization, the uniformity of decisions, and "complete coverage" is easily seen in these actions. Scientific and technical organizations' own interests were ignored, decisions were made and implemented by departmental structures of power. As a result, for example, a greater part of the new established scientific production associations are operating formally, several of them even had to be dissolved. A similar situation also exists in a number of interbranch scientific technical complexes (especially within the first two sectors of our science), which did not have a large, historically accumulated potential of knowledge and personnel and were not distinguished by the stability of partnership relations. Interbranch scientific technical complexes as, in essence, interbranch organizations are suffering, as before, from departmental isolation. It is clear that the formal establishment of such structures does not give any guarantees in the combating of departmentalism, rather, it is the opposite—only their complete liberation from the present "masters" and their transformation into free associations of scientific and technical organizations with strong budget support can be a guarantee of productive work.

The rejection of relations of authority as a tool of the regulation of economic activity should become the key principle of the new management paradigm. In place of it the transition to contractual (exchange) relations, which are based on the principle of the autonomy of all subjects of management (be it a scientific research institute, design bureau, enterprise, or organ of state management) and the equality of their rights, is necessary. The organization and legal regulation of such relations can be based only on the juridical independence and voluntary agreement of the parties concerned.[6]

In the sphere of research and development the research contract is an adequate means of the legal registration of equal relations. The terms and scale of financing, the supply of equipment and production premises, the breakdown of the rights of ownership of the obtained results, as well as the sanctions for the violation of the terms of the agreement are usually stipulated in this voluntary agreement between the consumer of the scientific product and the research collective. In world practice such a contract includes more than 100 different items, the composition and structure of which vary subject to the type and terms of the jobs. In the United States, for example, more than 50 basic types of research contracts are used.

The legislatively confirmed principle of self-organization, which will inevitably lead to the radical change of the role of the primary research collective (IK), should become one of the most important bases of the new concept of the management of science. In other words, not the institute, but the research collective, which elaborates a specific problem, should become the main unit in the organizational structure of science (particularly basic science). The collective is formed, as a rule, around a leader, consists of like-minded scientists, has a complex role structure, and is the most productive form of organization—institutes, centers, and so forth create merely the infrastructure for the activity of the research collective. Precisely research collectives should become the basic objects of financing in the sphere of

basic and, in part, applied research. The recognition of the scientist or the primary research group as an autonomous subject of law will make it possible to enlist in research, while providing acceptable forms of joint work, any scientists, as well as will give them the opportunity to participate in several programs simultaneously.

At the first stage the reform now being implemented did not go that far and was limited to the inclusion at the same time as the departmental mechanism of the relative financial independence of scientific research institutions—it is possible to interpret in precisely this way the changeover of science to cost accounting and cost recovery in the present form. These steps, of course, yielded specific results: In several ministries during 1988 along the amounts of research and development increased by 20-30 percent and more. However, the increase of the prices for scientific research products and services (in the planning and surveying sphere a number of operations became 1.5- to 2-fold more expensive) without the identical improvement of their quality played a definite role here. In part this was due to the increase of the production cost of operations due to the appearance of components that are new for research and development—the fee for resources and deductions for centralized funds. However, the main cause is the introduction of the practice of contract prices under the conditions of the monopoly of the performers of research and development, which is artificially maintained by the departmental structures of management. The fact that the share of "alien" clients (that is, from other departments) at branch scientific research institutions is, as before, small (up to 30 percent) testifies to this.

It should be kept in mind that the changeover to contract prices occurred under the conditions, when one of the strongest reasons for the intensification of the activity of specialists, who are employed in the sphere of research and development, was their aspiration to ensure the proper level of income. To a certain extent this is a consequence of the distortions in the remuneration of scientific labor, which have accumulated over the past decade. Due to the lack of development of a tax mechanism monopoly contract prices made it possible to ensure in science a very high level of income (in 1988 the growth rate of the wage here for the first time in many years considerably exceeded the average growth rate for the national economy).

Another reason for the flow of financial resources into the wage consists in the shortage of advanced instruments and research technologies. Under these conditions the stimuli for expanded reproduction and for the development of the material base of science do not work.

Here in the economy itself the demand for research and development, which are oriented only toward the improvement of operating technological systems in the direction of the decrease of the production cost, was actively justified. The interest in (and the orders for) major jobs, as a result of which fundamentally new technologies and products appear, practically did not increase (thus, according to reports of the State Committee for Statistics, the number of developed models of new types of machines and equipment continued to decrease (2,724 in 1987 as against 3,474 on the average in a year during 1981-1985, see [7])). By using extensively the afforded opportunities to earn money by the duplication of already created developments, science actually "is eating away the reserves."

The institution of the state order has not begun to work to the extent that is envisaged by the concept of economic management. The main reason is its low economic appeal for scientific research institutes and design bureaus. The profitability of a state order is substantially less (at times several fold) than orders of enterprises. At the same time the state order of ministries remains in essence a departmental order and is often used by them as a means of "keeping afloat" their own scientific research institutions.

In our opinion, the majority of shortcomings of the present stage of the reform have as their deep-seated cause its half-heartedness, when the transformations in the mechanism of the functioning and the structure of science are limited a priori by the aim to preserve departmental "serfdom." Here the basic reason for the opposition of the departmental apparatus to the new mechanism consists in the reluctance to abandon the fixed stereotypes of management, to switch to a fundamentally different view of the nature and methods of centralized regulation, and to master the methods of indirect influence on scientific activity, which seem complicated and "intangible."

In connection with this for our science the real appearance in it of an extradepartmental—public and cooperative—sector was an especially valuable and unique phenomenon. The intensive dynamics of the formation of scientific and technical cooperatives (NTK's) is evidence of the fact that in science an urgent need for "small" forms of scientific and technical activity existed—after the promulgation of the Law on Cooperation in the first 9 months of 1988 in Moscow alone about 500 of them, 90 of which were already operating at the end of September, were registered.[7] Here the principles of independence and self-organization received real embodiment.

Inasmuch as scientific and technical cooperatives emerge mainly on initiative "from below," the choice of the areas of their activity is governed by two factors: their possibilities and the urgency of the demand on the part of potential consumers. The instability of the economic situation, the lack of firm property guarantees, increased risk, and the enormous difficulties of investment activity are important conditions which determine the economic behavior of scientific and technical cooperatives.

Under the conditions of the continuing central allocation of materials, instruments, and equipment, the lack of wholesale trade, and the limited possibilities of retail

trade, scientific and technical cooperatives are mastering first of all labor-intensive and "intelligence-intensive" spheres of activity, among which are information science, software, and computing services; the rendering of intermediary services, advertising, and scientific and technical information; technical and technological design, the preparation of design documentation; the installation and repair of equipment, the start-up and adjustment of complex (imported) equipment; economic education, instruction in new methods of management.

According to our estimates, today the typical scientific and technical cooperative is a collective of five to 15 people, which enlists for work another 10-20 people on the basis of labor agreements. The technical level of the products of scientific and technical cooperatives and their quality, as a rule, are not inferior to those of the state and often surpass them. This is ensured by the greater intensity of labor and the increased responsibility for work, which is connected both with strong material stimuli and with the desire to firmly establish one's reputation on the market. The latter phenomenon is a new one for our economic subjects, its spread may become an important factor of the increase of the quality of scientific and technical products.

A rather important role in the maintenance of a high level of the results belongs to internal control and the collective responsibility of all the participants. The products of the scientific and technical cooperative undergo two examinations: those of the cooperative and the client. Negative stimuli (that is, the threat of the nonrenewal of the labor contract) are incomparably stronger in the scientific and technical cooperative, moreover, they will increase as the competition grows.

The prices for the products of scientific and technical cooperatives for the most part are no higher than those for the products of state scientific and technical organizations, and at times are lower. The latter applies to those areas of activity, in which competition already exists. The cooperatives, which do work at contract prices that are higher than state prices, justify this by the higher quality of the work or by the substantially shorter time of completion. According to scientific and technical cooperatives' own estimates, they do work several fold (two-to-tenfold) more rapidly than state scientific and technical organizations.

In our opinion, there is another explanation of the low prices and short times of the completion of jobs at scientific and technical cooperatives of several types. The point is that a significant portion of them, for example, those specializing in software development, use extensively and "privately" the scientific and methods reserves which were developed at state scientific research institutions. In essence in these cases the sale of a previously produced product is occurring. Moreover, the same product is sold over and over (only the cost of its adaptation to the conditions of a specific client is "honestly" added). For the sake of fairness let us note that this phenomenon is characteristic not only of scientific and technical cooperatives. Many branch scientific research institutes and design bureaus are pursuing exactly the same policy, by duplicating developments at contract prices, in which their entire cost (and not only the added cost!) is included. This is a natural consequence of the monopoly position of such organizations and the lack of a market of scientific and technical products.

In connection with the appearance of scientific and technical cooperatives the problem of what is called the "pumping" of money in noncash form into cash is being keenly debated in the press. In reality it is not so obvious and has a large number of aspects. First, it was brought about not by the cooperatives themselves, but by the abrupt expansion of the possibility of attracting additional intellectual resources with the payment for jobs at contract prices. Therefore, it should also be discussed as a more general problem of the remuneration of labor in science.

Second, the "pumping" of money in noncash form into cash always existed and exists in the state sector of science. Indeed, any scientific and technical job, for which its cost (profitability) is artificially overstated, actually leads to the payment of "money not backed by goods." The situation with the wage in state science during 1988-1989 eloquently testifies to this. This fully applies to jobs that are useless, have not been introduced, or were halted at the stage of research. Here the enormous sums, which were spent at state scientific research institutes, were often distributed to a large number of participants, so that each one received on the average his own small wage. The problem of apparent "pumping" at scientific and technical cooperatives is being brought about by the fact that the structure of their expenditures, as well as the small number of employees per theme are responsible for the relatively high individual wages. However, this is already a different problem—the problem of the fair monetary valuation of one job or another, the establishment of a sound market of scientific and technical products, and the elimination of the monopoly of producers.

Thus, "pumping" is a problem not of some forms or others of scientific and technical activity, and even not so much a financial problem as a problem of the effectiveness of research and development. The money, which has been paid for jobs that are useful for society, in the end is always recovered.

Considerable possibilities for combating "pumping" exist in the sphere of tax policy. By means of taxes it is possible to stimulate the use of the revenues of scientific and technical cooperatives in the area of investment and reproduction activity and to encourage the purchase of equipment and the construction of facilities. The use of differentiated tax rates subject to the directions of the use of the net income is possible. At present about 60 scientific research institutions of various ministries and departments have converted as an experiment to the tax

system of regulation. The progressive taxation of personal income will also contribute to the redistribution of assets between scientific and technical cooperatives and the budget.

Unfortunately, the version of the tax system, which went into effect on 1 July 1989, had the result that the functioning of scientific and technical cooperatives in a number of union republics became practically impossible. In the RSFSR and the Ukrainian SSR, for example, where the tax rates come to 35-40 percent of the gross revenue of scientific and technical cooperatives, not only the funds of the remuneration of labor of cooperatives, but also the development funds and the scale of reproduction activity should decrease drastically (by several fold). The consequences of such an exclusively fiscal policy appeared immediately: Strong scientific and technical cooperatives are "moving" (that is, are registering) to the territory of other republics, weaker ones are being eliminated or are beginning to operate "under the roof" of centers of the scientific and technical creativity of youth.

The opinion that the majority of people working at scientific and technical cooperatives are "self-seekers," who are striving at any cost to earn big money, is widespread in everyday consciousness. The results of surveys of operating cooperatives testify that the range of motivations of the members of scientific and technical cooperatives is very broad, therefore, when solving the problems of the cooperative movement in science oversimplified approaches are intolerable. Thus, among the main factors, which stimulate the development of scientific and technical cooperatives, the cooperative members questioned in the survey [10] put in first place the low wage at the basic place of work (37.8 percent), in second place—the conservatism and lack of flexibility of the system of management of scientific and technical progress (35 percent), and in third place—the underutilization of the creative potential of specialists (22 percent). Accordingly among the personal problems, which the people going to scientific and technical cooperatives strive to solve, the opportunity to improve their material status is put in first place (40 percent of the respondents), in second place (about 39 percent)—the possibility of self-realization and freedom of creativity and to have a job to their liking, and in third place—to be of real benefit to society and science and to make a contribution to perestroyka.

In giving some general appraisals of the activity of scientific and technical cooperatives at present, it is necessary to use not so much quantitative as qualitative criteria. Indeed, the scale of their work for the present is not such so as to speak of a significant contribution to the scientific and technical output of the country. Their value lies in another thing: Owing to scientific and technical cooperatives real alternative structures of scientific and technical activity have been created in the USSR for the first time. A choice has appeared for clients, competition has appeared among producers. There are already examples of the decrease of prices for the products of monopolistic scientific research institutes and design organizations just due to the fact that scientific and technical cooperatives offer to do the corresponding work more rapidly and at a lower cost.

The appearance of scientific and technical cooperatives and other extradepartmental organizations (centers of the scientific and technical creativity of youth—centers of NTTM, various cost accounting institutions) filled the vacuum, which existed in the domestic sphere of research and development, and marked the beginning of the formation of a new scientific and technical infrastructure. Diverse intermediary activity, consulting and information services, marketing, and so on are being shaped organizationally. Their development is a mandatory condition of the formation of a market of scientific and technical products.

The principle of self-organization is also creating the conditions for the revival of such effective research structures as independent scientific societies and unions. In the administrative command economy scientific societies for the most part are "made state ones," operate under departments, and hardly conduct independent research. Meanwhile, before the revolution these organizations played a large role in Russian science. On the eve of World War I in Russia there were several thousand scientific societies, many of which in competence and independence competed with the Academy of Sciences. The majority of them emerged owing to the vigor of scientists themselves and existed on assets which were collected by the progressive community. After the resolution many societies ceased their existence, while during 1929-1932 the restructuring of the remaining ones, their adaptation to the tasks of departments, and their incorporation into a unified system of management began.

The now emerging creative unions (the USSR Union of Scientists or unions by regions and individual fields of knowledge)—organizations, which have the rights of a legal person and are self-managed and self-financing—are also blending naturally with the new structure of science. Both state and public, including philanthropic, funds might become one of the sources of their financing. Here all legal persons should be given the right to create funds for the financing of scientific research activity.

Abroad the role of funds, including philanthropic funds, in the financing of research is very great. It is a matter not so much of additional sources of expenditures on research. The main thing is that they make it possible to conduct precisely the work, which neither the state nor industry wants to finance.[8]

Thus, the management mechanism of the economic type has begun to form a new structure of the scientific and technical potential of the country. In addition to the traditional network of large, sluggish scientific research organizations of a general-purpose nature, which are united by the community of departmental interests, the

shoots of alternative, extradepartmental science are appearing. The new system of state, public, and cooperative organizations of research and development is being augmented by the necessary scientific and technical infrastructure, which in addition to the already listed components should also include a system of innovation banks.

In conclusion it is impossible not to mention one of the most urgent problems today of the structural reorganization of the scientific potential of the country—the conversion of the defense complex. Conversion should be aimed at the use of the defense research and development potential: for the development of new products and technologies of civilian application and for the increase of the scientific potential itself (including basic research). For the present conversion is finding expression only in the "hanging" of additional themes on defense science with the simultaneous decrease of budget financing. Both these steps, which take poorly into account the interests of the very collectives of defense science, the formed specialization, and the new economic situation, can lead only to the destruction of the potential that exists here.

In our opinion, conversion can be effective only in case of such a choice of the range of products, which are new for the sector, and directions of research and development, which will make it possible to utilize the available capacities (including intellectual capacities) to the maximum degree and to use efficiently the scientific and technological reserves that exist here. In this case it is possible to exchange the "extra" scientific and technical (or other) products, which are developed in this manner, for products that are scarce from the national economic standpoint through foreign trade channels or by the "exchange" of the corresponding capital investments.

Within the framework of such a concept the reorientation of a certain part of defense science (especially the part that gravitates toward exploratory research) toward "academic" themes with the possible transfer of such collectives to the system of the USSR Academy of Sciences (work in the area of science-intensive technologies, electronics, applied mathematics, and others) is possible.

For the effective transfer of a part of the defense potential to the civilian sector it is necessary to provide legal and economic opportunities for the transfer of above-standard stocks of instruments, equipment, and pure and ultrapure materials (perhaps, on a commercial basis with the use of wholesale trade fairs, auctions, and so forth).

In the formulation and implementation of the strategy of the conversion of science one should rely to the maximum degree on the initiative of the collectives themselves, which have been forced to engage in a search for new themes. In our opinion, it is irrational to change the specialization of the work of research and design groups, which were established long ago, by administrative methods. In the organization of the work on new themes one should rely on young people, who are not burdened by the stereotypes of "submergence" in defense problems.

New organizational forms and methods of the conducting of research and development are necessary here. It is possible, for example, to agree to the establishment of small research and introducing centers (including youth and cooperative centers), which are legally independent of the main firm, but use its equipment, materials, and credits. Such a type of "subsidiary venture," which works on civilian themes, while retaining all the advantages of affiliation with the prestigeous part of the scientific and technical potential, simultaneously acquires complete freedom on the domestic and foreign markets of civilian products.

Thus, in the last years of the 12th Five-Year Plan important steps were taken in the direction of the radical reorganization of the structure of the scientific potential of the country. However, the changeover to the new mechanism will take quite a long time interval, during which the components of both systems of management—the administrative command and economic systems—will coexist of necessity and not entirely peacefully. The formation of effective innovation structures of our economy will depend in many respects on our ability to distinguish and effectively counteract the negative features in the development of the economic system of science.

Footnotes

1. As a result, the relative spending on civilian research and development as a percent of the gross national product (GNP) in the scientifically and technically most powerful country, the United States, at present is less than in Japan and the FRG. Thus, in 1987 this share in the United States came to 1.97 percent, while in Japan it came to 2.66 percent [1].

2. Suffice it to say that in 1989 in the United States the total expenditures on science will come to $130 billion, while in the USSR they will come to about 34 billion rubles. Of them the United States will spend approximately $17.7 billion on basic research, while the USSR will spend about 3 billion rubles [4].

3. As N.I. Ryzhkov reported at the Congress of People's Deputies, in our country about half of the total outlays on science—15.3 billion rubles of the 32-33 billion rubles in 1988—are spent on defense research and development (EKONOMICHESKAYA GAZETA, No 24, 1989).

4. It should be emphasized that the historically established regional differentiation of science in the direction from the "Center-West" pole to the "South-East" pole is superimposed on the structure of departmental priorities.

5. Their total number in the past 20 years has practically not changed and came in 1987 to 5,089 [7]. According to our estimates, the average number of scientific personnel at a scientific research institute at present comes to about 270.

6. The general concept of the new economic mechanism as applied to the sphere of research and development was presented in greater detail by us in [8]. I.V. Lomakin took part in the formation of its more developed version, which is presented below.

7. Some data of the first comprehensive survey of scientific and technical cooperatives, in which we took part, are cited below [10].

8. About 24,000 private funds, the majority of which also finance scientific research, exist in the United States. In 1985 they allocated in the form of grants (in all about 4,500) $346 million for scientific research.

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Official Advocates More State Regulation of Science

907A0189A Moscow SOVETSKAYA ROSSIYA in Russian 30 Mar 90 2nd edition p 1

[Interview with First Deputy Chairman of the RSFSR Council of Ministers Fikryat Akhmedzhanovich Tabeyev, by V. Abramov: "The Parallels of Progress"; date and place not indicated]

[Text] **SOVETSKAYA ROSSIYA:** Fikryat Akhmedzhanovich, in recent times the anxiety of society about the state of affairs in the development of science and technology has increased noticeably. At the recent All-Union Applied Science Conference new approaches, which make it possible to make scientific and technical progress a decisive factor of acceleration, were outlined. What role will the Russian Federation play in this?

F. A. Tabeyev: If you consider that an enormous share of the scientific and technical potential of the country is concentrated precisely in the RSFSR, then, without hesitating, it is possible to reply that it will be significant. The republic has always made a large contribution to the development of science and technology. Later it will only increased.

At the same time let us reflect a little. If we proceed from the principles of economic sovereignty, it apparently makes sense for Russian management organs to concentrate first of all on the acceleration of scientific and technical progress in those spheres of life, the responsibility for which now falls completely to the republic. I have in mind first of all the agroindustrial complex, consumer goods production, the social sphere in its full scope, capital construction, and nature conservation.

These directions were named at the most important ones in the economic program of the RSFSR Government, which was approved by the 2nd Congress of People's Deputies. The state of affairs here is extremely bad. Therefore, probably the entire country will gain from the concentration of the forces and assets of the republic on their solution.

At the All-Union Applied Science Conference we stated our view on the role and place of the union republics in the general strategy of the scientific and technical development of the country and, so it seems to us, received understanding and support.

SOVETSKAYA ROSSIYA: What are the principles which are being incorporated in the management of scientific and technical progress in the republic?

F. A. Tabeyev: One of the basic ones is the diversity of investment policy. The solution of the priority problems, about which we spoke, should rely on state support. It will take place through republic scientific and technical programs, which are needed both now and in the future.

However, Russia is too large for the centralized distribution of assets among scientific and technological projects to be always efficient. What, tell me, are those, who are busy with very useful, even though more specific, developments, to do? They are not always visible from Moscow. In no case must one deny scientists, inventors, and simply people with initiative subsidization or organizational support.

It is necessary to give the soviet organs of autonomous republics, krays, and oblasts the right to establish their own scientific and technical programs, to allocate assets for them from their own budgets, and to organize fulfillment. This means will be quicker than if it were to take place through the RSFSR Government and through the establishment of large research or introducing collectives of the republic level. It will be quick and, what is the main thing, advantageous.

The second condition, which is capable of accelerating scientific and technical progress, is state regulation. Now, it is true, such an approach can cause many people misunderstanding. In recent times we have become accustomed to the cliche: State regulation is always bad. Yes, so it is, when there are meant by it the giving of orders and the universal dictation of the administrator over the producer. But a different state regulation is also possible: by means of economic steps, particularly tax and credit levers.

I believe that the granting of easy credits to enterprises, which are engaged in retooling, the partial covering of their risky investments in science and technology, tax credits during the first years of the assimilation of innovations, the increase of the wholesale prices for competitive products, and, on the other hand, the increase of the tax on the profit of enterprises, which put out obsolete products—all this is precisely the very state regulation, which it is necessary to welcome and to use boldly in practice.

We must create in the national economy of the republic a qualitatively new economic environment. It should give equal rights and opportunities to the different forms of scientific and technical activity and economic interest to all the participants in the investment process. Without this real acceleration is impossible.

SOVETSKAYA ROSSIYA: Will the formation everywhere of regional scientific and technical programs not have the result that, for example, in two oblasts different collectives will begin to work on similar tasks, while a dissertation, which has already answered these questions, will lie in a third oblast—somewhere at a scientific research institute?

F. A. Tabeyev: So that such a thing would not happen, it is necessary to efficiently coordinate programs with each other. The appropriate mechanism for this has been set into motion. The RSFSR Council of Ministers proposes to establish in Russia a market of scientific and technical developments and ideas, which relies on data banks—on the orders of enterprises, on developments that are ready for introduction, and on potential performers of jobs. We have the basis for the establishment of such a market. It is the oblast scientific and technical information centers. Without destroying what is positive, which has already been gained in their activity, they can be transformed into commercial centers of information services, advertising, engineering mediation, and patent and licensing work. The republic computer network will unite such units which are filled with comprehensive data. Then there will be no problem of how to avoid parallel work and the unwise investment of assets.

We believe that under the conditions of the consolidation of the sovereignty of the union republics and the strengthening of their economic independence such a scientific and technical market is also extremely necessary for the country as a whole.

SOVETSKAYA ROSSIYA: How do you link the acceleration of scientific and technical progress in the RSFSR with the establishment of the Russian Academy of Sciences?

F. A. Tabeyev: The RSFSR Academy of Sciences can become the connecting link, which will make it possible to gather together the representatives of basic, sectorial, and VUZ [higher educational institution] science in sections, where a real scientific breakthrough to the future emerges. It is no secret that many successes of western countries are due to the concentration of intellectual forces at university centers. There theory stands next to the experiment and is supported by continuous information saturation. This yields high results.

In our country the training of personnel for science and science itself are separated. The departmental barriers are also strong. The academy could help to overcome this shortcoming. Especially as in Russia many universities and polytechnical higher educational institutions are located in cities, where powerful academic and sectorial research centers have already formed. It is necessary merely to set to work on uniting forces. In Voronezh and Kazan, Sverdlovsk and Ufa, Novosibirsk and Tomsk, Irkutsk and Vladivostok—everywhere there is a foundation for this, while the results will not be slow in showing.

We are connecting great hopes with the Russian Academy not only in the development of the natural and technical sciences, but also in the humanities sphere. This especially applies to research in the field of economics, sociology, ethnography, interethnic relations, literature, and language, which until recently was the

weakest link of scientific developments in the republic. The RSFSR Government will assist this work in every way.

Influence of Resource Management on S&T Progress

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[Article by A. A. Golub and D. S. Lvov (Moscow): "Toward a New Model of the Management of Scientific and Technical Progress"; first paragraph is EKONOMIKA I MATEMATICHESKIYE METODY introduction]

[Text] A nontraditional approach to the problem of the management of scientific and technical progress is presented in the article. Basic attention is devoted to the creation of favorable socioeconomic conditions which are conducive to the activation of innovation activity.

It was long considered that the basic advantage of socialism is the centralized plan. We believed for a long time that, balanced with respect to tens of thousands of items, it is capable of eliminating the deficit and disproportions. However, the time has come to acknowledge several obvious truths.

Given all the appearance of powerful centralized management the development of the national economy occurred essentially spontaneously. The most important function of the centralized regulation of the economy—the redistribution of resources for the purpose of seeking the most effective means of their investment—in practice was paralyzed. The departmental-sectorial structure of the management of the national economy of the country, which has been preserved until now, is objectively contributing to this. The bulk of the resource, scientific and technical, and production potentials, which is being channeled mainly into the expanded reproduction of the sectors of the technological structure, is constantly being drawn off through its channels. Here the economy is experiencing a chronic shortage of resources, which are necessary for the development and duplication of new technologies and the solution of ecological and social problems. Within the framework of the departmental structure the regrouping of forces in new directions, which are important for the realization of the strategic goals of socioeconomic development, does not seem possible. It does not make it possible to carry out the large-scale redistribution of resources for obsolete works to new ones. Given the superconcentration of production, which ensures the monopoly status of many enterprises, their changeover to full cost accounting will not yet signify the development of contention and competition, which stimulate the updating of production. The majority of enterprises under the new conditions of management will also be interested in the expanded reproduction of obsolete technologies. Their subordination to ministries, the mechanism of head scientific research institutes, and the management of science by methods, which were borrowed from the practice of managing current economic activity, ensure evolutionary scientific and technical progress and hinder the introduction of radical innovations.

To no small degree such a situation is explained by the lack of the theoretical analysis of the question of combining the market mechanism and the centralized regulation of the economy. This problem has remained in the shadow when conducting discussions on the improvement of the economic mechanism and was not solved in the documents which regulate the conducting of the current reform. Its promotion to one of the basic problems forces us to examine the principles of the centralized regulation of the market economy.

The market and the plan are not alternatives, but two sides of a coin. That is why it should be a question not of the separation of the spheres of influence of the plan and the market, but of the development of an interconnected model of the management of scientific and technical progress. How do we visualize this model? It is intended for the study of the laws of the long-term technical and economic development of the country. In [1] it is shown that the technological structure of the economy develops under the influence of long waves of economic conditions. Within the framework of the old reproduction technological structure the origination and formation of new technologies occur. As the economic conditions of production ripen, the vehicles of advanced technology are gradually attached to the resource field of the economy. A new circuit of reproduction relations, by means of which a new technological order (TU): A mutually complementary set of works, which forms a long reproduction chain from raw materials to end use, is formed, begins to be organized.

In the process of its development resources are "pumped" from the traditional technological order to the new one and at the same time the corresponding demands on their quality along the entire reproduction chain emerge. As a result large-scale structural changes occur. A new set of base works, the development of which transforms qualitatively all other sectors of the economy, appears. An example of the recent major transformations in the structure of the American economy is the development of advanced electronic technologies, computerization, and information communication facilities. At the same time in our country it is possible to point out only the first faded features of the origination and formation of new technologies and a technological nucleus. The basic reproduction structure remains essentially unchanged: The output of the technological circuits of the old technological order, which is connected with the development of traditional works in metallurgy, machine building, construction, agriculture, and transportation, is continuing. The characteristic curve of nonproduction consumption also remains as it was before. Many of us from our own experience sense

the ever deepening gap between the level of the electronization of daily life in the USSR and in western countries.

The system of centralized planning, which operated in our country, is, in our opinion, one of the causes of such a lag. For a long time we were ignorant of the fact that a different approach to the management of the economy is necessary for rapid technical development. A powerful mechanism of the redistribution of resources between traditional and new works, which creates the economic conditions for the formation and development of a new technological order, should be the main and decisive thing here. We simply do not have such a mechanism. Many people accepted as it or, what is more, passed off as it the system of intersectorial and physical balances.

But the use of traditional balance-sheet methods inevitably presumes the invariability of the reproduction structure of the national economy and the system of sectorial interrelations and its time lag and determinism. The high degree of uncertainty of the future directions of scientific and technical development from the very start imposes natural restrictions on the possibility of using balance-sheet approaches in the planning of scientific and technical progress. A new paradigm of management is needed here.

In the literature there is no clear-cut definition of the term "reproduction structure." For example, in [2-4] this concept is explained at the intuitive level. It is indicated that the community of interconnected works, the processes of the functioning and reproduction of which are interdependent, forms such a structure. The reproduction structure permeates the entire economy, and the logic of its transformations governs the development of the national economy. The mechanism of the replacement of these structures depends on the deep-seated processes that are occurring in the resource foundation of the economy. One structure succeeds another, when it becomes too crowded for the former one in the old resource field and its qualitative changes, which are due to the connection to it of new nontraditional resources, occur, and, finally, when the real possibility of assimilating these resources appears. The task of the strategic management of long-term development is to coordinate these three processes, having envisaged beforehand the impending depletion of the resource potential and have ensured the timely commitment of nontraditional resources to the sphere of economic activity. Here it is necessary to make efforts for the creation of the conditions of the origination of the basic elements of the new structure. One of them is the existence of a resource field. The old reproduction structure relied on the extensive use of natural raw materials and manpower in the sphere of economic activity. It monopolized them, having attached personnel to a specific type of occupations and having replaced national ownership of natural resources with state ownership with the delegation of all the power of the owner to individual departments. It is impossible to develop the new structure in the same resource field as the previous structure, inasmuch as the latter has become a permanent part of its own resource foundation. The new one should be resource-conserving and should develop under the conditions of the expansion of the resource field, while committing to the sphere of economic activity its elements which were not monopolized by the old structure. The products of intellectual activity are the only unused resource, which is not need by and is alien to the old structure. The new reproduction structure will also be built precisely on this base.

For a long time we have been discussing intensely the problems of the intensification of the economy, but in so doing have often forgotten that a solution of the problem of the simultaneous intensification of the use of all resources without exception is very doubtful. The intensive use of some resources will most likely adjoin the extensive exploitation of others. Thus, the intensification of farming, which involves the increase of the scale of investments of material and manpower resources per hectare of land and is expressed in the increase of its valuation, at the same time signifies the decrease of the output of agricultural products per unit of invested assets, that is, their extensive use is observed [4]. It is also possible to say the same thing about water resources: By economizing on irrigation, we are developing watering systems by the increase of financial allocations, and so forth. It seems that the previous reproduction structure was duplicated owing to the extensive commitment of primary resources. The increasing degree of their limitedness dictated the necessity of intensifying the processes of their use. At the same time the more extensive attraction of the products of intellectual activity can occur by the increase of the "weight" of this factor. Precisely such a process also ensures the development of the new reproduction structure. It is possible to call the nontraditional intellectual resources that are used for this, namely the products of intellectual activity, its nucleus.

From this it follows that the acceleration of scientific and technical progress, which can be visualized at the materialized vehicle of the results of intellectual activity, is hardly possible outside the transition from one reproduction structure to another, moreover, it is useless to attempt to use fundamental technical innovations in production complexes, which have gone out of fashion, hoping that this will serve retooling as a whole. Instead of the "spreading out" of such resources their concentration, which ensures the creation of a resource field for the formation of the new reproduction structure, is necessary. Here it is possible to distinguish two aspects. First, the qualitative transformation of the resource foundation of the economy in general by the active inclusion in it of the products of intellectual activity, as well as the material vehicles of scientific and technical progress. Second, the assurance of the access of the elements of the new structure to traditional resources: manpower, material and raw material, investment, and so forth.

Both problems require a specific approach and the focusing of attention on the improvement of socioeconomic relations and the economic mechanism. Precisely the questions of the creation of the resource foundation of the new structure in many respects also determine the priority directions of their transformations. Let us first dwell on the first of them. Let us examine the process of the expansion of the resource base of the economy by the inclusion in it of intellectual resources (which are understood in the broadest sense).

Intellectual products should hold the central place in the resource foundation of the economy. This is explained by many circumstances. First of all they are for the present not yet an employed resource, the limits of the commitment of which to the sphere of economic activity it is difficult to imagine. It is not monopolized by the existing reproduction structure and, as was already stated, is rejected by it. Provision with intellectual resources and the relative ease of their duplicate make it possible to achieve such a degree of their concentration, in case of which the new reproduction structure spreads in case of threshold values of the scale of the implementation of innovations, which are governed by economic expedience. Moreover, the limitedness of traditional resources is beginning to be felt to a greater and greater degree. The state of the natural resource potential is such that we do not have the right to maintain the load on the natural sector even at the former level. This will inevitably lead to an ecological catastrophe. The investment complex is chronically overloaded. Fundamental changes should also occur in the structure of manpower resources: Skilled and intellectual labor are succeeding hard physical and unskilled labor, which is typical of a system that is becoming obsolete.

In speaking about the management of development, it is necessary to pose among the priority questions the question of the creation of the sociopolitical and economic conditions for the formation of a field of intellectual resources on the broadest level—from basic ideas to the placement of fundamentally new technologies into production.

From the theory of evolution we know that mutations and the increase of diverse individuals in the population precede the emergence of a new biological species. Basic science should become such a "mutagenic factor." One must not expect from it any specific results that lend themselves to measurement and objective evaluation. Its strength is the guarantee of the diversity of ideas, the multiplicity of solutions, and so forth. The application to research of such a kind of cost accounting principles, which are very useful in applied science, but are absolutely useless for general theoretical research, is intolerable. It is necessary to develop a kind of elite science (as an elite art), which is shielded from cost accounting and goes beyond the framework of economized relations. Unfortunately, the outflow of scientific personnel to the field of the fulfillment of applied tasks, for which clients pay well, is now emerging. Pure science is paid, as before, very modestly. If we do not want to undermine the resource foundation of the new reproduction structure, we should not spare assets for the financing of exploratory themes, creating for the intellectual elite normal conditions of existence and without forcing its representatives to sink to the performance of the job of a craftsman. The relations of academic institutions and higher educational institutions should be reviewed. The abnormal situation, when universities are deluged with staff instructors, while leading scientists are cut off from the process of instructing students, has formed in our country.

Thus, first, it is impossible to manage basic science; second, it is necessary to secure for general theoretical research most favorable treatment conditions; third, to establish an elite science, without requiring of its representatives either the invention of a philosophers' stone or the solution of any problems whatsoever.[1] Only in this case will basic science become a substantial factor which stimulates the increase of activity in the sphere of applied research. Its practical orientation and real connection with the national economy also make legitimate the questions of cost accounting, management, and so forth. However, the proper diversity and the parallel solution of similar problems by independent collectives should also be ensured here. The next stage is scientific research and experimental design work. In this sphere more exacting mechanisms of selection operate, but all the same wherever possible it would be good to avoid cycling on one development. The degree of uncertainty is too great when it is a question of fundamentally new technologies and solutions. The greater it is, the greater the degree to which the problem of parallelism is vital.

The steps proposed above will lead to the formation of the nucleus of the resource foundation of the new structure. Moreover, it is also necessary to ensure its access to traditional resources.

The existing structure of management of the economic sector serves the invariable mode of expanded reproduction of traditional technologies. The development of new technologies does not receive under these conditions the required replenishment. Within the framework of the departmental structure the regrouping of forces in new important directions of development does not seem possible.

It is necessary to ensure at least the equal access of the two structures to traditional resources. The first thing that should be undertaken is to provide institutional mechanisms of the realization of the relations of national ownership of natural resources. At present it has actually been replaced by state ownership, while the rights of the owner have been given to ministries and departments, which for the most part also outline themselves the strategy of the exploitation of the natural potential. Such a strategy is entirely subordinate to their immanent goals, while the formed system of authority-management relations makes it possible to place reliable barriers in the way of any alternative versions.

The rights of owners should be transferred to organs of soviet power. Owing to their neutrality (theoretical neutrality, of course) with respect to the old and new structures they are capable of arriving at an objective distribution of natural raw materials. The fee for natural resources, which is established in conformity with the rent valuations which reflect their national economic significance [4], will become an effective economic lever under these conditions. It is not out of place to note that the lack of such payments stimulated the excessive expansion of the old structure and the "swelling" and "weighting" of its resource foundation. Without them the demand for natural raw materials will remain unlimited and will be regulated only by the limiting effect of the investment resources which are allocated for the assimilation of natural sources up to their complete depletion.

The introduction of payments for natural resources and for environmental pollution might become a "catalyst" of the process of the origination of the new structure. Something similar was observed during the energy crisis, when the jump of petroleum prices provoked the transition, which had become imminent by that time, to a resource-saving type of functioning of the economy. But let us stress once again: Without the transformation of the relations of ownership in the area of the use of nature the introduction of payments is a pointless measure.

It should be noted that manpower resources have actually also been monopolized by the old structure. People are bound to old technologies and are incapable of quickly reorienting themselves. The departmental system of the training of personnel also works for the benefit of the old structure, which is complicating the processes of their redistribution in favor of the new structure. It must be said that the human factor is called upon to play a dual role in the process of the formation of the resource foundation of the new structure. It is necessary to ensure the formation of an intellectual elite which is at the source of the process of producing the intellectual product. For this it is first of all necessary to lift all the restrictions on intellectual activity and to implement a set of sociopolitical and economic measures, which will be discussed below.

Now about investment resources. The existing practice of their distribution among departments from the achieved level reduces to naught the freedom of the shifting of investments, which is especially necessary under the conditions of structural reorganization. It is advisable to pose separately the question of the capacities of construction and installation organizations. It is necessary to remove them from departmental subordination, transferring them to regional soviets or forming independent construction and installation associations. This will also place the old and new structures under equal conditions of capital construction.

It is necessary to revise banking policy radically. Frequently the financial resources of a sector are spent within it precisely because there are no other, more attractive alternatives. The token level of the interest, which is paid by the bank on deposits of enterprises, or its absence prompts an organization, which has some accumulations, to spend them on its own needs, for example, on production, where they will yield at least some impact which is capable of affecting the level of the cost accounting revenue. It is necessary to provide the enterprise with a more profitable alternative, for example, to increase the interest rate on deposits and to permit reinvestment and the purchase of shares with the assets of the production development fund. Under such conditions the internal assets of enterprises could be diverted from ineffective projects of the expansion or improvement of the old structure and be put into the financing of the processes of the formation of the new structure.

Budget allocations are also divided among departments. It is necessary to change this mechanism radically. Let us dwell on two things. First, the decentralization of state spending is necessary. In essence similar changes, which are aimed at the strengthening of local budgets, are outlined in the current decrees and laws. It is very important to ensure their real sovereignty over their finances.

As to state allocations, they should be allotted in a special-purpose manner for specific large-scale programs or problems. It is necessary to subject the indicated measures to a careful socioeconomic and ecological examination, which should hold the corresponding place in the institutional structure of society, inasmuch as it is one of the most important elements of the regulation of the long-term dynamics of financial flows and their substantiated distribution among various measures.

Are there standardized procedures for the analysis of large-scale economic measures (KKhM's), which are suitable for all cases of life? It seems that there are not. Of course, it is possible to distinguish specific types of large-scale economic measures and to attempt to list for them the most common features of the analysis of socioeconomic effectiveness, but then, too, a significant number of situations, which do not fit the general scheme, will remain.

The experience of studying large-scale projects, such as the redistribution of the runoff of rivers, the development of power engineering, and many others, testifies that their creators do not have even the most elementary procedural skills, which enable them to analyze competently the measure being planned and to prepare its technical and economic substantiation (not to mention the socioeconomic and ecological examination of the project). Therefore, we will cite below the most general sequence of the analysis of large-scale economic measures, which is suitable for practically all measures, but also has, therefore, a form which has little similarity with the usual methods. This arrangement is useful not only for designers, but also for those who conduct the state and extradepartmental examination of large-scale economic measures.

First, the clear description of the goal of the project. In spite of the obviousness of this requirement, it is possible to encounter a large number of examples, when it is not met. For example, with respect to the question of the diversion of northern rivers it was first a question of preventing the drop of the level of the Caspian Sea. Then, when it turned out that the opposite situation was being observed and the increase of its level had emerged, the designers changed the wording of the goal.

A portion of the projects can be rejected already at the first stage of analysis due to the lack of a specific national economic goal which conforms to the basic social, economic, and ecological priorities. The first stage is a kind of filter which is capable of recognizing narrow departmental interests and their "concealment" under national economic interests.

The most widespread method of such "concealment" is the replacement of the aim with one of the possible alternatives of the compliance with statewide interests. For example, the national economic goal, which is connected with the necessity of meeting the need of the country for electric power, is immediately, back at the predesign stage, replaced with an alternative—the increase of the generation of electric power, which automatically narrows the set of means of achieving the national economic goal which was presented in the version of the Ministry of Power and Electrification. Therefore, already at the stage of the formulation of the goal it is necessary to check whether there are alternatives, and if such are found, hence, a more general formulation should exist. In the preceding example the reduction of the consumption of power served as an alternative to the increase of its generation, but both make it possible to achieve a more general goal—the meeting of the need of the national economy for electric power. Given such a formulation in the subsequent analysis both versions (saving and the increase of generation) are regard as equal.

Second, a more complete description of the alternatives of the achievement of the goal is possible. This list should be representative and encompass as large a number of versions as possible. The set of alternatives, as a rule, has a complex hierarchical structure. The incompleteness of its description will inevitably lead to the incomplete analysis of the alternative being examined. The most widespread technique of juggling in the process of examination is the inclusion in their number in question of obviously less effective alternatives. For example, none of the supporters of the project of the diversion of Siberian rivers found time to study as an alternative version the possibility of changing over to irrigation technologies with low water use.

Third, the careful examination of each alternative from the standpoint of technical feasibility, economic effectiveness, ecological balance, and conformity to the social goals of the project. The methods of conducting the examination with respect to each of the points merit a separate discussion. The only thing that should be noted is their specificity for each specific project.

The similarity consists, perhaps, only in the fact that here the use of simulation models and the analysis of a process at "critical points," for example, the point of maximum risk for nuclear power plants, as well as the checking of the project for stability in case of a change of evaluation parameters (the change of social and ecological priorities, the change of economic estimates, technological shifts, and so forth) are rather useful.

Fourth, the comparison of alternatives. All the dominated ones (such ones, which among their permissible set are inferior to others that surpass them in economic, ecological, and social indicators) are first discarded. Then the most difficult stage of the examination, which requires the comparison of the economic, ecological, and social characteristics of these alternatives, begins. Along with the questions of weighting factors the problem of long-term dynamics arises. Here, just as at the preceding stage, the use of simulation models, which generate various scenarios of the change of the reciprocal priority of social, ecological, and economic goals and so forth, is required.

At times the examination should be concluded already at the third stage, since due to the complete lack of the possibility of an objective comparison of the alternatives, which have undergone examination (the preceding stage), the decision on the choice of one of them should be made at the qualitative level. In this case the task of the analysis of a large-scale economic measure is to describe most completely all its consequences and to propose versions of their comparison, having thereby provided the people, who make the decision, with the most informative data which have been drawn up in compact (visible) form. Figuratively speaking, the problem of the analysis of a large-scale economic measure reduces to the competent aggregation of the voluminous information available on it and its transformation into data what are written in terms comprehensible for the people who make the decision. Of course, at the same time as the aggregation and "adaptation" of information the cutting off of obviously unacceptable alternatives is carried out and the correctness of the formulation of the goal and the completeness of the set of means of its achievement is examined.

Inasmuch as it is very likely that for many large-scale economic measures experts, who represent the interests of society, should have the decisive say, as a whole the task of providing the institutional conditions of the formation of representative groups of experts, who express social interests most completely and accurately, is placed in the forefront.

The methodological research on the questions of the examination and evaluation of large-scale economic measures should not be replaced by the development of formalized schemes and procedures. It is no less important to conduct research on the problems of the creation

of such socioeconomic and institutional conditions, under which any significant project would undergo the most careful examination, which is unbiased and independent of departmental interests and is conducted with the use of all the possible means at this stage and with the enlistment of the most skilled specialists, under the conditions of complete glasnost. The main thing is to develop an effective socioeconomic mechanism which ensures the examination of large-scale economic measures. A permanent expert commission, which it is necessary to establish under the USSR Supreme Soviet and the Supreme Soviets of the union (autonomous) republics, could be its central element. The commission should have the rights to enlist for the analysis of each specific project a broad group of experts from among the most competent specialists. The temporary collectives formed in this manner will be able to select independently the strategy of the analysis of a large-scale measure, bearing in so doing responsibility for the completeness of the study of the problem and the soundness of the made decisions. It is necessary to cover the results of the work of such groups in the press in the greatest possible detail, with the indication of the separate opinion (if such exists) of individual experts. The most important projects should be submitted for national discussion. The activity of the permanent commission (which deals mainly with organizational issues) and the temporary work groups (which, strictly speaking, also carry out the examination of projects) should be financed from specialized special-purpose funds, which along with organizational isolation is an important condition of independence from the ministries and departments which are involved (directly or indirectly) in the project being analyzed.

Of course, several most general principles of the making of the analysis of large-scale economic measures and a set of mandatory actions of experts exist. The key features, which determine the sequence of the analysis of major measures, do not paralyze the initiative of experts, but merely streamline their activity, were formulated above.

The gaining of experience of the conducting of examinations will broaden the theoretical notions of the methodology of their performance. However, such recommendations should not hinder experts (and especially cannot serve as a guarantee of the completeness and quality of the conducted research), thereby freeing them of responsibility. Public opinion and glasnost are the only guarantees that experts will strive to make a sound decision. Their reputation will also serve as a measure of responsibility.

The experience of previous examinations and the theoretical research on the methodology of their conducting should be regarded by experts as reference material.

The examination will ensure the identification of the long-range social, ecological, and economic priorities of the development of society and the distribution of state allocations in conformity with them. During the transition period it will be a barrier in the way of major programs, which reflect the interests of the old structure, and a guarantee of the allocation of assets for the dissemination of the new structure.

The examination under the Supreme Soviet is not only a regulator of the channels of budget allocations. First of all the aims of the project are examined, it is checked for conformity to the social goals of society and to its ecological priorities. All basic measures, the set of which is capable of initiating the origination and formation of the new reproduction structure, will go without fail through such an examination. As a result the strategy of its development, which conforms to the greatest degree to the mentioned long-range goals, will be chosen. In such a manner the ecologization and humanization of development are ensured. The existence of an independent examination is one of the most important institutional conditions of the control of its orientation.

It is also impossible to evade the questions of the financing of mass measures. The criteria of their selection should correspond to the logic of the development of the reproduction structure. The evaluation of mass measures is an immeasurably simpler problem than the evaluation of large-scale economic measures. All of them fit well into simplified schemes of analysis, which are drawn up, as a rule, in the form of methods. But a problem arises: how to see to it that the methods would not turn into a documentary tool of administrative pressure or, on the contrary, into indulgence, which frees of responsibility the designers who used it for the substantiation of their own decision.

For this it is necessary to clarify for whom the methods should be mandatory and for whom they should be reference material. Enterprises, which have changed over to full cost accounting, will decide themselves whether the measures planned by them are effective. Under the conditions, when managers have not gained sufficient experience, procedural documents (if, of course, they adequately reflect the real principles of the functioning of the economy and the motivation of economic units) may prove to be very useful. However, it would be most advisable to have such a set of them, from which the management of the enterprise could select the most appropriate one in each specific case. Self-financing and cost recovery will automatically provide the conditions, under which the management and collective of the enterprise will bear full economic responsibility for the results of made decisions and, hence, the choice of the method of measurement, the accuracy of the used information, and so forth. The results of calculations in accordance with the method for them are just one of the elements of the decision-making process. The calculated amount of the impact should not be, as was previously the case, the basis for the obtaining of subsidies, benefits, and so forth, then the attitude toward this indicator will also be completely different.

For state institutions, which engage in the distribution of centralized investments, the granting of benefits, subsidies, and so forth and cannot due to the specific nature of the process of managing the economy bear full economic responsibility for their decisions, it is advisable to make the methods mandatory. The standardization of the procedure of making decisions (along with many drawbacks) has in this case at least two advantages. First, all economic units are placed under equal conditions, since the principles of the making of decisions by superior organizations are uniform and are known to them. Second, official procedural documents, in regulating the activity of noncost accounting organization, if only to some extent make up for the lack of economic responsibility for the decisions being made.

Thus, jointly implemented steps on the commitment to the sphere of economic activity of new resources, by the increased consumption of which the process of the formation and duplication of the new structure will take place, as well as on the assurance of its access to traditional resources, which for the present are still monopolized by the old structure, will lead to the resource field of the new structure. Let us now turn to the questions of the creation of the corresponding functional blocks of the economic mechanism, which are capable of initiating its origination and development. Its basic task is to create the germs of the new structure and to ensure their duplication, having protected them against the negative influence of the old structure until the new structure is capable of stable self-reproduction without active intervention. Without such a mechanism any attempts at the "cultivation" of new reproduction blocks are doomed to failure: They are too unprotected from the external environment. But the paradox is that the new economic mechanism cannot emerge in a void; it is a reflection of the socioeconomic relations that have formed in society. The old mechanism has a real foundation (which ensures its reproduction and resistance to all kinds of changes) and expresses the real interests of the formed institutional structure. Its backbone is sectorial ministries, which in themselves are the product of the technological order that is going out of fashion. Therefore, the first thing that should be done is to undermine, on the one hand, the resource foundation of the old technological order and, on the other, the monopoly of sectorial ministries on the market.

This first of all is the restriction of the power of the prevailing management system with respect to the disposal of resources, natural raw materials, and budget assets. For this one should, first, improve the relations of ownership, second, give the Supreme Soviet the role of the actual manager of budget allocations, and, third, take a number of urgent steps on the improvement of the prevailing economic mechanism. Without aspiring to complete coverage, let us name several of them.

The transition to indicative management is needed. The goal of national economic planning is the implementation of large-scale measures which are aimed at the change of the reproduction structure of the economy.

The model of planning, which was chosen in our country, did not eliminate the threat of a crisis, but merely made it possible to postpone it, for it was aimed at the utmost support of the old structure. This led to the enormous overaccumulation of fixed capital and to the mass formation of closed or nearly closed reproduction circuits [2, 3].

In reality planning has turned into the systematic hampering of development. Without letting the old system "die," in a planned manner we thereby did not leave room for the new one. The planning and long-term management of the economy should be oriented, first, toward the creation in advance of the resource field for the new structure by their gradually disconnection from the old structure, which will decrease the degree of overaccumulation of fixed capital; second, toward the purposeful formation of the new structure, which implies first of all the creation of "hothouse" conditions for it. It is necessary to protect the emerging reproduction structure organizationally and to provide it with the conditions of most favorable treatment on the economic level. For this changes in advance in the institutional structure, where the corresponding elements, which can be regarded as the vehicles of the interests of new economic spheres, should be represented, should be envisaged. New economic organizational formations with a flexible structure, which are created in accordance with the functional principle for the accomplishment of a specific large-scale task and coordinate the activity of enterprises in the area of scientific and technical development by the organization and financing of scientific research and experimental design work, indicative planning, and the formulation and implementation of programs, will succeed sectorial ministries. As the initial step enterprises should be completely freed from administration subordination to any departments, as well as from all other superstructural elements. However, a significant portion of the enterprises are not prepared for independent operation under the new conditions of management. They do not have competent personnel and advanced technologies and are cut off from the resource base. The disproportions in prices, the monopolistic structure of nearly all sectors of industry, and the lack of a market infrastructure and economic mechanisms of management make difficult the organization of a market and the granting of full economic independence. Apparently, up to one-third of the enterprises may be unprofitable. This means that at the same time as the organization of a market it is necessary to implement special steps on the maintenance of a balance, which are not a variance with the overall logic of the transformations.

Along with this one must not forget such a powerful tool as goal programs. They should not be regarded as a sequence of actions, which is scheduled down to the slightest details. The programs should be a detailed description of the concept of the solution of a problem, the control figures on the most important indicators, the criteria of the determination of the conformity of any of the measures, which are proposed for implementation,

to the tasks and goals of the program, a description of the mechanisms of the financing of the basic ones of them, which are directly included in the program or contribute to its accomplishment, and a description of the conditions of the preferential extension of credit, the benefits with respect to interrelations with the state budget, and other indirect symbols. Thus, a real basis for the choice of competitive forms of the fulfillment of programs and the constant search for the most effective measures will come to light. An integral element of the program is the set of preprogram measures, which creates the necessary conditions for the start of its implementation. Here both specificity and detail, which it is not necessary to require of the program as a whole, are needed.

Summarizing, we want to stress once again that at present the basic work on the assurance of scientific and technical progress requires first of all the revision of the established mechanism of the distribution of resources between the new and old structures, the expansion of the resource foundation by the attachment to it of the products of intellectual activity, and the provision of favorable conditions for the increase of creative activity.

The mechanism of the regulation of resource flows should be revised for the purpose of saturating those spheres of their use, where the priority tasks facing society will be accomplished to the greatest degree. Ecological economic and social examinations, which are independent of economic managers, are needed for this.

And, finally, a completely different approach to planning and the formulation of long-range programs, which are aimed at the origination and formation of new structures, is required. But inasmuch as these processes are impossible without the assurance of the diversity of the initial alternatives, the program should also have a very democratic form. The laws of its formation are like this: the decrease of the degree of spread of the possible variants with the implementation of the program, which signifies the formation of a new reproduction circuit, with the stage-by-stage cutting off of secondary variants which do not contribute to the accomplishment of the program tasks. In contrast to traditional programs, this cutting off takes place in the course of implementation, and is not predetermined in advance.

The necessity of replacing the old reproduction structure became urgent long ago. Inasmuch as it is was postponed in every way, the transition itself will be far from painless. We must prepare for economic and social upheavals, which are inevitable owing to the resolute steps of structural reorganization. The hopes of combining this process with the acceleration of socioeconomic development are illusory—the developing structure will actively adsorb all "surpluses." It is realistically possible to pose the question of acceleration only after the new structure has entered the period of its evolutionary development. These circumstances should be kept in mind when developing the new socioeconomic relations. It is necessary to find patience and not pose the question of the failure of the program of structural reorganization before it has been completed.

Footnote

1. It does not follow at all from this that we require the break of academic science and practice. We merely support the idea that it would work on practical tasks only insofar as this is necessary for the accomplishment of theoretical tasks, we support the shift of the emphases in the interaction of elite and applied science. In this alliance it is not basic science that exists for the accomplishment of practical tasks, but, on the contrary, practice serves the needs of science. It is time to remember in what years and by whose submission the idea arose that academic science should provide without fail appreciable fruits for the national economy and, moreover, very quickly. They smashed geneticists and in general the representatives of the scientific intelligentsia namely under this slogan.

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First 18 Months of New S&T Financing Rules Reviewed

907A0187A Moscow PRAVITELSTVENNYY VESTNIK in Russian No 12, Mar 90 p 7

[Article by I. Lavrov, chief of the Department of Science, Culture, and Health Care of the USSR Committee of People's Control, under the rubric "How the Decree Is Being Fulfilled": "Through the Thorns of Science"; first paragraph is PRAVITELSTVENNYY VESTNIK introduction]

[Text] More than a year ago—in conformity with the decree of the USSR Council of Ministers of 15 October 1988—the scientific research institutions and design and technological organizations of the USSR Academy of Sciences, the academies of sciences of the union republics, and the system of the USSR State Committee for Public Education changed over to the new methods of financing and management. This document supports the development of the priority directions of academic and VUZ [higher educational institution] science, consolidates the stimulating mechanism, and to a certain extent eliminates the barriers between science and production.

It can be said that in the time that has passed the first steps on the implementation of the decree of the government were taken. In particular, a number of standard documents, which specify the procedure of the planning and financing of research under the new conditions, were drafted. The statute on the creation and transfer of scientific and technical products at contract prices is in effect. The special-purpose financing of assignments, which are being performed by institutes in accordance with state scientific and technical programs, the plans of interbranch scientific technical complexes, and basic research programs of the USSR Academy of Sciences, as well as a number of other major jobs is being ensured. A unified unionwide fund for the financing of basic and exploratory research, which enables any scientific organization—regardless of its departmental affiliation—through the system of competitions to obtain the assets necessary for this, is being established. As a result of the concentration of resources the amounts of financing of state orders on the development of science and technology in one year increased by more than twofold.

The large collective of the Institute of Machine Science imeni A.A. Blagonravov of the USSR Academy of Sciences, for example, is actively mastering the new methods of management. Being the head organization of the Nadezhnost mashin Interbranch Scientific Technical Complex, the institute during the past year strengthened appreciably the contacts with VUZ science and enterprises and organizations of civilian machine building and defense sectors. All the work is now based on the principles of the special-purpose financing of themes, that is, monetary assets are allocated for each program, stage, and assignment with the specific indications of the performers and deadlines. As a result the associates of the institute in 1989 completed one-half of the 140 jobs, and in accordance with them received 68 author's certificates for inventions and five foreign patents.

At the same time, as was noted at the recent All-Union Scientific and Technical Conference, quite a number of factors are still preventing domestic science from fully accomplishing the tasks that have been posed by perestroyka. The check of the USSR Committee of People's Control of the progress of the implementation of the decree of the USSR Government, which was made at 66 academic institutes and 32 higher educational institutions, confirms this conclusion.

Unfortunately, the set of steps, which are aimed at the overcoming of monopolism in science and the development of the contention of scientific schools and collectives, is being implemented very slowly. The formation of the entire package of state scientific and technical programs was also dragged out. The USSR State Committee for Science and Technology required five months to determine the procedure of conducting competitions among organizations. While the above-named programs have thus far not been approved, although more than 200 million rubles have nevertheless been allocated to academic and VUZ institutions for these purposes. And the money is already being spent.

The procedure, when the USSR State Committee for Science and Technology sends the assets, which are intended for interbranch scientific technical complexes, to their head organizations, while they determine at their own discretion the allocations to the immediate performers, is hardly advisable. In practice such a subjective approach has the result that only 9.3 million rubles, or less than five percent of the total financing of complexes, were allocated to higher educational institutions for the fulfillment of assignments.

The presidium of the USSR Academy of Sciences, which thus far (contrary to its own decisions) has not specified the system of the conducting of competitions on unionwide basic research programs, was not at its best. The dates of financing have also not been established. And it turned out that many institutes of the regional departments of the USSR Academy of Sciences and the republic academies of sciences, in essence, found themselves left aside.

Moreover, a number of institutes on their own initiative sent to the USSR Academy of Sciences their own projects for participation in the competitions on the 18 all-union programs. And what of it? Many of them did not receive a response at all, while those, who were more lucky, did receive it, but often with the stipulations: "...without the granting of financing." That is what the "competition" is like, if one may call it that. In the end institutes with a Moscow residence permit remained the basic performers of the indicated programs.

The practice of the special-purpose financing of operations did not receive proper development. Thus, at the Siberian and Ural Departments of the USSR Academy of Sciences and the Tajik SSR Academy of Sciences the

earmarked budget allocations were distributed among scientific organizations mainly in accordance with their base indicators of past years. Here special scientific councils have thus far not been organized, as is envisaged by the decree of the government. But precisely they should by means of competitions determine the list of basic research and accordingly distribute assets. The lack of personal responsibility and wastefulness, unfortunately, continue to flourish at many institutes.

According to the logic of things during the past year the number of jobs performed by academic science under economic contracts with ministries, associations, and enterprises should have increased. In reality the picture is the opposite. The reason lies in the lack of interest of academic institutes, for they all received an increase of state allocations as a whole by nearly 30 percent. From where is the interest in economic contractual themes now to come?

There are also other negative aspects here. In pursuit of the rapid obtaining of much money at a number of institutes and higher educational institutions the number of minor jobs, which do not require in-depth research and original and fundamentally new solutions, was increased. As a result, for example, the number of themes capable of being protected decreased substantially. At the Leningrad Forestry Engineering Academy it decreased by 70 percent, at Kiev Polytechnical Institute and the Alma-Ata Power Engineering Institute it decreased by one-half. Contract prices in violation of the established procedure in many cases do not have a technical and economic substantiation and are not coordinated with the scientific level and the specific results of the practical use of developments. Finally, the lack of limitations in the remuneration of labor led at a number of higher educational institutions to such manifestations of group egoism as the keeping of students from participating in economic contractual jobs. At the Moscow Institute of the National Economy and the Ural Polytechnical Institute the number of such students decreased by one-half.

The practice of using standards of the formation of the wage fund with respect to state budget jobs subject to their amounts is not conducive to progress. Such, in essence, an expenditure method does not coordinate the remuneration of the labor of scientists with the end results of research and gives rise to the aspiration for the groundless overstatement of the cost of jobs. The prevailing situation: The right of an organization to retain for material stimulation the difference between the planned and the actual cost of development, also contributes to this. The "surplus value" of this sort at the expense of the client often reaches 70 percent.

Yes, cost accounting gave rise to the sharp increase of the remuneration of the labor of scientific personnel. According to incomplete data, the fund for the remuneration of labor in the system of the USSR Academy of Sciences increased last year by 22 percent, for institutions of the Belorussian SSR and Lithuanian SSR Academies of Sciences—by nearly a third, while at the Institute of Radio Engineering and Electronics—by 66 percent and the Institute of General Physics—by 90 percent.

Quite a number of distortion in the material stimulation of personnel were also found in the system of the higher school. At a number of higher educational institutions the increase of the payments for the performance of economic contractual jobs considerably leads the rate of increase of the amounts of the economic contracts themselves. At the Voronezh Construction Engineering Institute the remuneration of the labor of associates, who are engaged in scientific activity, increased by 27 percent, while the amounts of work increased by only four percent. At the Leningrad Technological Institute imeni Lensoveta these figures are respectively as follows: 150 and 15 percent.

In recent times all kinds of associations and trade and intermediary cooperatives, which are sources of far from always justified additional revenues, have been appearing practically without control at scientific institutions like mushrooms after rain. Of course, in themselves the high wages of scientists are entirely justified on the condition of the corresponding practical results. But it is here that a question arises: To what is their contribution greater—to scientific and technical progress or to inflation?

The trouble is that in the determination of the standards of the wage a scientifically substantiated approach, which takes into account the specific nature of research and the structure of expenditures, is still lacking. The serious differences (at times twice) on this issue in documents of the USSR State Planning Committee and the USSR Ministry of Finance are also aggravating the matter.

It is possible to increase the efficiency of the work of scientific institutions only by purposefully developing and strengthening their material and technical base. That is also how this was envisaged by the government decree. In practice, for example, at the Institute of Microbiology of the USSR Academy of Sciences the material incentive fund exceeded the fund of scientific, technical, and social development by fivefold, while at the Institute of Molecular Biology it was by tenfold. And there are many such examples.

As the check showed, the changeover of the sphere of science to the new conditions of management have thus far not led to the noticeable reorganization of the structure of institutes and to the elimination of subdivisions that are working fruitlessly. Moreover, the total number of personnel of the scientific organizations of the system of the USSR Academy of Sciences and the republic academies increased during the past year by 11,000. Few

temporary creative collectives—a little more than 50—were established, flexible organizational forms are emerging with difficulty.

The need exists for the USSR State Committee for Science and Technology, the USSR Academy of Sciences, the USSR State Committee for Public Education, the USSR State Planning Committee, and the USSR Ministry of Finance to speed up by joint efforts the progress of perestroyka at organizations and institutes of academic and VUZ science in the spirit of the requirements of the times.

Price Gouging at Design Bureaus, Research Institutes

907A0205A Moscow RABOCHAYA TRIBUNA in Russian 13 Apr 90 p 2

[Article by A. Kolomeyets, labor collective council member, Tyumen Motor Building Production Association, and G. Bazhutin, correspondent: "A Science-Style Racket"]

[Text] **Our discussion with these extortionists ought to be brief. They should be tossed out of the plant by their necks!**

Thus, one of the workers expressed his attitude at a meeting, not politely, but very clearly, regarding cooperation with certain scientific research institutes and design bureaus serving the Tyumen Motor Building Production Association. Yet, after all, until recently they had worked, so to speak, hand-in-hand. Why this displeasure? Let us try to find out.

More than two years ago, the CPSU Central Committee and USSR Council of Ministers passed the resolution "On Conversion of Scientific Organizations to Full Cost-Accounting and Self-Financing." It is an important document. After all, our numerous scientific research institutes, scientific production associations, and design bureaus, as everyone knows, had been doing mediocre work. Attempts to correct the problem by way of various directives instructing scientists to "throw all their efforts" and "sharply increase output" were not of particular use. There was no incentive. Finally, it happened: The ministries and departments obtained a possibility of providing scientists and designers with material interest in the final results of their labor. A prospect opened up for fruitfully cooperating with enterprises.

It would seem, a new era had begun in science. However... judging by everything, one day someone cleverly perceived a sort of feeding trough in the new resolution on his institute or design bureau's work. He began to sneak up on it.

Departmental "elaborations" and "explanations," prepared and "pushed through" by a narrow circle of interested parties, went through the system. As a result, the essence of the most important document was masterfully distorted. An opportunity was opened up to rapidly obtain great profits without great labor.

After a while, the plants began to receive letters, similar to that which the Turayev Machine Building Design Bureau "Soyuz" received. "In connection with conversion to cost-accounting, payment for the provision of design documentation for enterprises is being introduced. The cost of one sheet is 0.59 rubles."

Well, the Tyumen motor builders were amazed that they would have to specially order certain special documentation. However, it is a question of the most ordinary current technical information, the processing of which had already been paid for through the corresponding deductions into the sector's centralized fund. The price? Does one xerox copy really cost that much?

"We are acting according to instructions," they responded at the MKB. "If they do not want it, they do not have to take it."

Making this statement, the heads of the design bureau know full well that, whether it wants to or not, the association will "take it," since it has nowhere else to get it. After all, it is attached to certain scientific and design organizations by order of the ministry. It can only obtain the normative and technical documentation, standards, technical conditions, and recommendations on use of new materials from "its own" institute. It can only coordinate a technical novelty, created by the plant's inventors, with it alone. Only the organization indicated in the state order can be the developer of a new product.

Under these rigid conditions, the SRIs [scientific research institutes] and KBs [design bureaus] contrived to turn the most improbable things into an object of trade. They are trading in advertising brochures that foreign companies give away for free. They are selling catalogues, restrictive and recommendation lists, and much else.

The Minaviaprom's SRI for Economics, which regularly collects data from enterprises, reported: Henceforth, every blank report will cost... 159 rubles. One Arkhangelsk bureau refused to provide information on breakages of a signal system for airplanes, needed by an enterprise in order to improve the unit, without a guarantory letter of payment. So, is the reliability of flights a commodity too?

However, the most serious blow to the good intentions of the government resolution was made, in our opinion, by the GKNT resolution and the orders that it produced. It included the so-called author's certificate for scientific and design development work among the category of payable services.

The certificate is, essentially, a warranty service for a scientific design product. After all, developers often make mistakes. Who should be responsible for this, who should eliminate the omissions? Most likely, the one who

permitted them, as any sane person would say. He would be right. Relations have always been structured thus. The logic is simple: produce quality output, and there will be less fuss with the author's certificate.

The GKNT resolution and the documents accompanying it turned everything upside-down. Now, industrial enterprises must pay for design omissions and scientific errors. They are forced to conclude special contracts for supervision of the introduction of an innovation. To think about it, it is now far more profitable for institutes and design bureaus to produce poor quality, "raw" output. It is too bad for the metal workers, that the crane would not work after two turns, or a screw would not turn after two twists.

One can only guess how often scientists operate in this manner. We will give only one of the examples of which we know. The chief designer at the Tushinskiy Machine Building Design Bureau, R. Nesberg, wrote to the head of the Omsk branch of the NPO imeni Klimov: "We ask you to stipulate our participation when registering the contract with the Tyumen PO for the design certificate, technical guidance, and author's supervision. The overall cost, according to our preliminary estimates, will be 200,000 rubles."

What they mean by "costs" is unknown. However, they stand up for themselves firmly: Either 200,000, or we exclude you from service in general. Is this some sort of scientific racket?

Sometimes, one happens to hear: These are all signs of a market economy. Western scientists and designers, they say, worry first about material interest, and thus they build their relations with industrial companies. Where did people get this idea?

Let us look at the West. In the early 1970s, the Tyumen Motor Building Association bought a license from one of the English companies to produce clutches for light automobiles. No separate contracts whatsoever were concluded for the designer's certificate. However, in all these years the company has sent timely notification of the design and technological improvements made by it and has responded promptly to inquiries from Tyumen. Not once has it demanded so much as a half-penny for all this.

Unquestionably, its leaders were motivated by interest too. However, it is a strategic interest, calculated not for easy profits, but for long-term cooperation. For them, things like the company's honor and decent business conduct are extraordinarily important. Alas, this is of little concern for the employees of our institutes and design bureaus.

The curve of incomes in SRIs and KBs has leaped upwards. There are cases in which associates received up to 30 salaries a year. One can rejoice for the scientists. But for science? Hardly...

No breakthrough has occurred, and the technical and technological level of our industries has not only failed to approach the world standard but, conversely, has dropped even farther behind.

However, something else is still worse. In the workers' collectives, a persistent negative attitude in general toward all scientists and designers has blossomed. In some places, workers still just say that they should be driven out of the enterprises, but elsewhere they are switching from words to action. This antagonism threatens to upset many years of experience with truly good, mutually profitable cooperation, without which the development of our industry is simply inconceivable.

Who knows what consequences we should expect, if we do not manage to break these deformed tendencies in the briefest time period. It is time to suggest creating a commission of USSR Supreme Soviet deputies. Otherwise, the resistance of those who have become used to easy money will not be overcome.

We should once again turn to the government document on conversion of science to cost-accounting and free it of the subsequent departmental additions. Henceforth, we must have strict control over the development of "explanations" and "proposals," which will inevitably start to appear again. We need a carefully considered tax system, capable of restraining the incommensurate appetites of dealers in science. Most likely, it would make sense to clearly define the legal rights of the consumers of scientific and design production. All this should support the main goal: Creating an honest competitive market for scientific ideas or design developments, without which real cost-accounting in science will never be achieved.

Economist Recommends Measures To Halt 'Brain Brain'

907A0193A Moscow EKONOMIKA I ZHIZN in Russian No 14, Apr 90 p 20

[Article by Candidate of Economic Sciences V. Katasonov: "The 'Brain Drain' Is Not an Unfamiliar Problem"; abridgment of article to be published in the journal of the CPSU Central Committee DIALOG, No 5, 1990; first paragraph is EKONOMIKA I ZHIZN introduction]

[Text] In consolidating their scientific and technical positions western countries have never missed opportunities to profit by the achievements of Soviet science and technology. But now, when the USSR has proclaimed the policy of greater openness to the world, the problem of preventing the "brain drain" abroad has also faced us.

Getting carried away in recent months by intensive self-condemnation, many of our information organs and individual public figures are prepared simply to "relish" the scientific and technical lag of the USSR behind the West. While in such cases western authorities often act as our most vigorous advocates.

Recently, for example, the U.S. National Academy of Engineering released a report, in which it is indicated that in such areas as the synthesis of fine-grained solids, composites, and rare earth elements the Soviet Union holds leading positions in the world. In the opinion of American specialists, the USSR has the latest technology in such fundamental directions as space power engineering, nuclear power engineering, explosion welding, high-frequency radio oscillators, pulsed energy sources, and the production of advanced ceramic materials.

Less than a year ago THE WASHINGTON POST wrote that the Soviet Union can offer much in accordance with the results of the study of one-celled protein, lasers, materials for the electronics industry, medical ultrasonic equipment, catalysts of chemical processes, advanced materials, technologies of compact nuclear reactors, advanced computer software....

While giving us flattering appraisals, in the West they are also taking into account, of course, the fact that the introduction of innovations in the USSR is carried out slowly. As a result, the personality of the scientist, inventor, and innovator in the USSR is completely revealed with difficulty, which in the West they regard as all but the main "favorable prerequisite" for enticing Soviet specialists there.

"What Kind of Foreigner Do They Need"

The need for specialists of the highest skill is not decreasing in the most developed western countries even given the increase there of the army of chronically unemployed. As the American WALL STREET JOURNAL writes, the shortage of superspecialists in the United States, for example, will grow throughout the 1990's, when "the large generation of American scientists and engineers, who received an education immediately after the Soviet Union launched its first artificial satellite in the late 1950's," begins to retire.

In the United States they consider the expansion of importation from other countries to be the simplest and quickest means of overcoming the growing shortage of "brains." Thus, Roland Schmitt, president of Rensselaer Polytechnic Institute, say frankly: "We need an even larger influx of foreigners." What kind? It is easy to guess this, having looked at the priorities of U.S. science and technology policy. Recently the American Government specified 22 technologies as critically important for the United States, particularly biotechnology, laser weapon technology, and the technology of the production of advanced composites.

For the present, unfortunately, there are not statistics which would reveal the structure of emigration from the USSR on the basis of occupation and education. In all last year alone, according to the data of the Ministry of Foreign Affairs, 228,000 people left the country. About 3 million more people would like to leave in the next few years. A significant portion of them are scientists and specialists. In addition to this direct channel of the "brain drain," indirect ones have also appeared: work of our technological elite at joint ventures and at the planned "technopolises" on the territory of the USSR, participation in various kinds of seminars and meetings abroad—of course, in cases of a simple-hearted and unvigilant attitude of our participants toward all measures of this sort.

In the Soviet press it has also already been reported that the most enterprising specialists at times sell to western firms not only their "brains," but also interesting ideas of their colleagues, designs, drawings, and prototypes of new products. When discussing "the internationalization of science" and "the freedom of intellectual exchange," for some reason we often fail to pay closer attention to this ticklish aspect of cooperation. Meanwhile, in the West a precise definition of enterprise of this sort was given long ago: "Industrial espionage," which is punished there in accordance with all rigors of the law.

The enticing of "brains" is one of the most important means of the competitive struggle. And here one should not have any illusions that the easing of international tension and the improvement of our relations with the West, however far they have advanced, in themselves can guarantee us the preservation of the domestic intellectual potential. It is necessary to look cautiously, but inquisitively at the various kinds of initiatives of the West and to strive to understand objectively in which of them good will and the sincere desire to help us are incorporated and in which of them there is the desire to get rich at our expense and to weaken us. In particular, in recent times invitations of western firms and universities to our undergraduates, graduate students, and young specialists to come to them for training, moreover, often

at the expense of the western party, have rained down as if from a horn of plenty. Is such philanthropy always disinterested?

But in general we do not yet fully realize the harm that the "brain drain" in all its forms is doing and can do to domestic science, technology, and the economy. First of all it threatens to preserve the scientific and technical lag of the USSR behind the West, which exists in a number of directions. It can undermine the positions of the domestic sectors and works, in which we are succeeding in holding leading positions, for example, in the aerospace and several sectors of the defense industry.

It is possible to put an end to the "brain drain" only in case of the radical restructuring of our entire economy. Without it the discovery of the talents and potential of the creative individual, the provision of scientists, engineers, and other specialists with worthy conditions of living and labor activity, and the increase of their social status are impossible. But it is also obvious that, as much as we would like to, we will not carry out such restructuring either in a year or in two years. And in case of the maintenance of the present pace of the "brain drain" the scientific and technical potential can be undermined in a few years. Consequently, emergency preventive steps are necessary.

Concern for the Intellectual

It would probably be necessary to start with the radical improvement of the living conditions of our scientists, the average wage of the majority of whom is less than that of drivers and a large number of other categories of personnel. It would be possible to obtain the assets for this, in particular, from the saving on different kinds of "projects of the century."

The increase of allocations for research and development should be combined more closely with steps on the increase of their effectiveness. Here the correct choice of the priority directions of the development of science and technology is very important. Now there are obviously too many of them: Along the lines of the presidium of the USSR Academy of Sciences alone a list of approximately 140 scientific and technical programs has been approved. The inexcusable "spreading out" of assets, which are limited as it is, is occurring, the very concept "research priority" is being devalued. The number of programs should be reduced decisively, while the work on them should lead to the development of advanced, competitive technologies and products.

We have a sufficient number of enterprises and design bureaus, first of all in "defense," which are "up to standard." True, these enterprises and design bureaus are, as before, in rigid administrative bonds, moreover, often even greater ones than other sectors of our economy. As a result workers, engineers, designers, and other specialists cannot get for their skilled, at times unique labor as much as their fellow countrymen get at cooperatives or joint ventures. Corresponding Member of the USSR Academy of Sciences S. Nepobedimyy said well about this abnormal situation: "It is clear to any sensible person that in the commenced restructuring of industry it was necessary to rely first of all on leading state industrial enterprises. It was necessary to place precisely the leaders of domestic industry in a privileged position, to provide them with most favored treatment conditions, and to orient them toward the output of products which provide currency receipts, in order to reduce the sale of raw materials and to bring backward enterprises without delay up to the level of the leaders."

Incidentally, there already exist examples (unfortunately, not many) of how, having overcome administrative bureaucratic barriers, labor collectives are attaining a qualitatively new level of activity: they are increasing labor productivity sharply, are achieving the most advanced levels of scientific and technical progress, are gaining a world market, and are stimulating personnel with a good wage. The same Mikrokhirurgiya glaza Interbranch Scientific Technical Complex, which is well known to everyone, earns every year both for itself and for the state millions of dollars in foreign currency. Although the labor of physicians and all the personnel has become more intensive, it is at the same time paid well and, what is the main thing, has become creative and interesting. Every worker is holding on tightly to his place in the collective, an atmosphere of "a corporate spirit" and "firm patriotism" formed in the shortest time. It is hardly easily to entice associates from the firm to S. Fedorov to a job at any other firm.

Quick and effective steps are needed to create such a situation, when not our "brains," but their fruits—products of intellectual activity—would be offered for sale abroad, moreover, at a good price. To a considerable degree this will probably depend on what the law on invention activity in the USSR will be like. If we proclaim the transition to a market economy, the invention cannot but acquire the form of a commodity, while the successful use of this form is possible only if the owners of this commodity and the terms, on which it is possible to dispose of it, are clearly specified.

Of course, it is necessary to seek new effective methods of bringing ideas and products onto the international intellectual market. Something is already being done in this direction. Thus, the traveling exhibitions "Soviet Science and Technology," which were organized by the USSR State Committee for Science and Technology, were recently held in the FRG and Italy. Scientific research and design jobs, which were completed and have been legally protected by us, in the area of machine building, new materials, medicine and pharmacology, biotechnology, instrument making, electronics, and electrical engineering were displayed at them. An understanding on the establishment of five joint ventures on the principle: The ideas are ours, the money is yours, was reached on their basis. In all 28 new technologies were sold with a profit for the Soviet side, including the developers themselves. Such an approach will undoubtedly help to keep intellectuals from the temptations of emigration.

Looking optimistically at the state of affairs, it can be said that, when all out present social, political, and economic troubles have for the most part been overcome, the problem of the "brain drain" will disappear. But today, too, we must not lose what is enabling us to be a leading scientific and technical power of the world.

Unemployed Scientists, Engineers Form Association

907A0209A Moscow NTR TRIBUNA in Russian No 5-6, 23 Mar 90 p 11

[Article by G. Sidorova under the rubric "Progress and Law": "Candidates of Sciences Are on Guard"; first two paragraphs are NTR TRIBUNA introduction]

[Text] "The Association of Unemployed was established in conformity with Article 51 of the USSR Constitution and is a voluntary association of Soviet citizens who are representatives of various enterprises, institutions, and organizations: Scientists, specialists, skilled workers, inventors, and efficiency experts—everyone, who for his active civic position in perestroyka is subjected to persecution and discrimination on the part of bureaucrats, has found himself outside the sphere of socially useful labor, and has been deprived of the reward for it, which is provided for by legislation."

(From the Temporary Charter of the Association of Unemployed Citizens of the USSR, Who Are Persecuted for an Active Vital Position in Perestroyka)

An unemployed man ran in the past election for the RSFSR Supreme Soviet for one of the districts. This was A.V. Gusev—a candidate of agricultural sciences, an honored agronomist of the RSFSR, and a winner of the Order of Lenin. Andrey Vasilyevich is a man who is well known in his field. Several years ago he was in charge of the suburban Moscow Marfino Sovkhoz, where in accordance with his ideas and under his supervision a unique technical and technological center for sheltered ground, which does not have analogs either in our country or abroad, was established. Owing to this center the sovkhoz gave Muscovites a bountiful supply of early vegetables.

But then in September 1986 by an order for the Moskva Agroindustrial Complex the director of the Marfino Sovkhoz was fired. As Andrey Vasilyevich himself says, the criticism of Moscow party organs and their officials served as the actual reason for dismissal. Since then Gusev on 50 occasions has addressed complaints to various instances, up to the USSR Supreme Society and the CPSU Central Committee, but has never been reinstated in the job. In 1988 he became a member of the Association of Unemployed Citizens of the USSR.

How did such an organization originate? Many people probably remember that about three years ago the organization "The Fate of Man" was organized under the Central House of Literary Men imeni A.A. Fadeyev. At that time an unexpectedly large number of scientists, whom a common misfortune connected—all of them were unemployed—came to the House of the Literary Man. Here it proved to be impossible to solve their problem, and the entire group appealed to the Union of Scientific and Engineering Societies. There the Committee of Social Aspects of Scientific and Engineering Personnel was established, while a little later the unemployed established their own separate Association, which became a collective member of the Committee.

The Moscow City Soviet refused to register the new organization, which had set as its goal to defend the rights of illegally fired personnel. So that the Union of Scientific and Engineering Societies is the only official roof of the Association of Unemployed.

When they nominated Gusev as a candidate for deputy, the hope appeared that it would at last be possible to raise the problems of unemployment at the highest level. Andrey Vasilyevich had five rivals. Unfortunately, he did not succeed in outdistancing them in the election. And this means that the hope, which had been about to appear, again became illusive.

Officially there is no unemployment in the country. But it actually exists. The unemployed population in the regions of Central Asia and Transcaucasia is especially large. The situation is such that there people simply have nowhere to put their hands to work, there are not enough workplaces. This type of unemployment, if one can express oneself this way, is traditional. Now a new variety of unemployed, which was "bred" in our country literally in recent years, had been added to it. It will be a question of specialists, who have been illegally fired, but have been deprived of the right to be reinstated through the court.

As it turned out, among such people there are many people of intellectual labor. In Moscow alone, according to the data of the Association of Unemployed, there are nearly 200 of them. In Kharkov about 100 people recently also united in the Association of Illegally Fired Personnel. The unemployed of Minsk and representatives of the Far East have already asked the advice of the Muscovites with regard to an association. In short, the process is growing.

"The intellectual potential is in an unsettled state"—that is how Yu.P. Popov, former junior scientific associate of the Chemical Faculty of Moscow State University, defined his status and the status of his fellow Association members. He, one of the leading inventors of the university (120 inventor's certificates in basic and the most important applied fields of science and technology), was fired nearly five years ago. The reason is that Yuriy Petrovich does not have a permanent residence permit in Moscow. Previously the stamp on the residence permit did not worry the leadership of the faculty. But it began to worry it when the restless Popov began to talk about the fact that the atmosphere at the faculty is "not always" creative.

Candidate of Chemical Sciences Yu.M. Yemelyanov, creator of the multicomponent high-frequency ozonizer (the central newspapers wrote about him more than once), was fired later from the same faculty as not having gotten through certification. It turns out that the author of 11 foreign patents does not conform to the position of senior scientific associate.

This is the selection and placement of personnel in the VUZ [higher educational institutions] style. But how does sectorial science settle an analogous issue? The certification commission of the State Institute of the Nitrogen Industry and Products of Organic Synthesis (GIAP) of the Ministry of Mineral Fertilizer Production, for example, passed on its senior scientific associate Yu.L. Rodimov the same "sentence" as was passed on Yemelyanov. But a number of designs of plasma generators like the PKhRD, which have considerable advantages as compared with plasma generators of traditional designs, were developed under his supervision.

But does academic science, perhaps, value creative people more? By no means. And here the ratings of the certification commission at the necessary moment are standard. Candidate of Chemical Sciences A.D. Aliyev "does not conform to the position of senior scientific associate," and for this reason he was fired from the Institute of Petrochemical Synthesis of the USSR Academy of Sciences. Even though he is a recognized specialist in the field of the chemistry of high-molecular compounds, who developed two new methods of synthesizing optically active polymers and discovered fundamentally new means of synthesizing sulfur-containing polymers with a set of practically valuable properties.

Not that long ago talent, the nontrivial nature of thinking, and the inquisitiveness of the mind were very costly. But whereas today VUZ, sectorial, and academic science have undertaken in concert to furnish the Association of Unemployed with people, who had proven their ability to be creators, hence, the criteria in the evaluation of scientists have become some different ones. Yes, today mainly the ability to come to an understanding with the authorities is required. Then, you see, they will not cut off a theme and they will not "overcertify."

Why is talent losing value? I will not reveal anything new, everything is well known. Science adopted the structure and ways of the administrative command system.

I spoke on this theme with Candidate of Economic Sciences Yu.V. Katasonov, former senior scientific associate of the Institute of the United States of America and Canada. Now he is a member of the council of the Association of Unemployed, but was also fired in accordance with the results of certification. "The situation in science reflects the state of society," Yuriy Vyacheslavovich said. "Everything has been adapted to the system."

The readers have probably taken note: The dramas of introduction have disappeared from the pages of newspapers. We realized that it is useless to consider individual reactionaries to blame. The system is not receptive to the achievements of scientific and technical progress. In turn a wave of new dramatic narratives—about scientists who were fired with a suspiciously uniform wording: as not having gotten through certification—began. It turns out that now the system is also already rejecting the very creator of what is new. The Association of Unemployed perceived this very keenly.

A council of five people supervises the work of the Association. They have "walked" so much about instances for their fellow sufferers and for themselves—it is natural that for these people no vague things remained in the matter of the forced unemployment of scientists. They came to an unambiguous conclusion—this is politics. Is it an extreme conclusion? It probably is extreme. But there are also grounds to think that way.

Indeed, the fact that they are firing not mediocre people in science, is clear if only from the example of the heroes of this publication.

I honestly attempted to ascertain whether, perhaps, simply people, for example, drinkers and troublemakers, got fired. There are no such people in the Association. A group of lawyers (its own, who, naturally, are unemployed) is carefully studying the cases of those who are joining it. Only those who were actually illegally fired are admitted to the Association.

Then has science, perhaps, undertaken in earnest its rejuvenation and are people of advanced age being fired? No, for the most part these are people of able-bodied age. For example, Rodimov and Aliyev were fired at the age of 49. If you consider that in our country people up to 40 are grouped with young scientists, it follows that they got rid of both at the peak of their creative forces.

What all the same is happening? From where is the system getting support? The council of the Association studied these questions thoroughly and arrived, however strange it is for the times of perestroyka, at government decisions. In particular, the decree of the CPSU Central Committee, the USSR Council of Ministers, and the All-Union Central Council of Trade Unions, which was adopted in 1985, "On the Improvement of the Remuneration of the Labor of Scientific Personnel, Designers, and Process Engineers of Industry." The notorious certification was also introduced in conformity with this decree. The scientific council was kept from its conducting. The director of the institution personally designates the composition of the certification commission, while the rest is already, so to speak, a matter of technique, if it is necessary to get rid of an associate.

They fired a scientist in accordance with the results of certification, but he cannot appeal to the court. Inasmuch as lists of personnel, who do not have the right to appeal to the court on labor disputes, exist. Scientific

associates, who were fired in accordance with the results of certification, also found themselves on these lists.

It is a closed circle. Where is the way out of it? The Association believes that the lists and the decree "On the Improvement of the Remuneration of the Labor..." should be abolished. In the rule-of-law state everyone should have the unconditional opportunity to defend his right to work.

I want to cite here one very pointed phrase. It is from a letter of scientists in defense of Popov, which was addressed to the Congress of USSR People's Deputies: "Such an attitude toward inventors and people of creativity, which has taken root in our life owing to the administrative command methods of management in the party and the state, is one of the basic, if not main factors, which brought the country to a dead end situation."

A disdainful attitude toward creative labor and, hence, to science itself in our country exists at all levels. An unemployed scientist comes to a job placement bureau, and they suggest to a candidate of sciences in "all seriousness" that he go to work at a scientific research institute as a guard or, at best, a laboratory assistant.

The director of an institute parts without regret with a talented associate. But what is one to regret, if the administration in so doing does not lose for itself anything on either the moral or the material level. Especially as such an associate all the same will have nowhere to go. As before, in our country the situation with intellectual property is strained. The institute is the owner of the development. And even if the same Rodimov, after finding himself another place somewhere, wants to continue his work in the area of plasma chemistry, he should get agreement on this with the "owner." Here scientists are striving to get reinstated at their former place, because they devoted to the theme (which has far from reached its end) many years of work, because the equipment and devices, which were developed by you, have been left with the "owner."

The Law on Property has now appeared. According to this law, "the right to dispose of one's own abilities for productive and creative labor belongs to the citizen." But through life it turns out that the scientist himself does not always dispose of his own abilities.

Hundreds of scientists for years go without work, although they clearly know where and how they could successfully use their creative potential. But it remains unclaimed.

Now, as is known, work on a law on departure is under way. There is no law yet, but we are already worried: Will not a brain drain begin? Incidentally, this is the first time I have pondered over this strange combination of words. Why do we not simply say the departure of scientists? Probably because this would be not simply the departure of those mentioned by surnames. This would be the process of the sharp reduction of the intellectual resources of the country. Are we very wealthy? Yes. We have accumulations of scientific and technical developments. We have an enormous number of scientists. We are so wealthy that we do not consider it necessary to value either.

True, it is also possible to look at all this with the eyes of the enterprising Japanese, who assert that a well-fed champion suffers defeat.

Scientists will go. Some to earn a living, some in order to be a scientist. But for those, who are now removed from science, departure is the solution simultaneously of all problems. Imagine that suddenly the heroes of this publication were to make up their mind to take this step. And then what here is waste material (their work), there will turn into intellectual property which is respected in the West. And how is one to know whether we will not have to repurchase this property for foreign currency?

How much indignation there would then be with regard to the lack of patriotism of the scientists who have left! But the nonpatriots are not at all they, but those who did not let them realize their potentials at home.

On what do the unemployed live? Everyone manages in a different way, some moonlight, some push a broom. The state does not pay them any benefits, inasmuch as it continues to pretend that we do not have unemployment. The Association for the present also does not pay them. For it is not officially registered and it does not have a bank account, in which it could accumulate a material assistance fund (in general our unemployed are the poorest unemployed in the world). Although such a fund is envisaged by the charter of the Association.

It can be formed from receipts, fines from enterprises for the illegal firing of personnel, and contributions of the government, trade unions, enterprises, international organizations, and individuals.

(Note: the fines of enterprises for the illegal firing of personnel. Such a sanction is not provided for by law. The Association proposes to introduce it. If the management of enterprises and organizations actually had to pay for its administrative urge, it would measure seven times before once firing anyone unjustly.)

The state should behave honestly with respect to its unemployed citizens: It should either pay them benefits or officially recognize voluntary associations of the unemployed, having granted them the appropriate status. Only in this case will organizations be able to have a legalized material assistance fund.

I was interested in finding out from the members of the council of the Association how they are perceived in high instances: as representatives of an organization of the unemployed or as private individuals. It turns out that they are perceived as private individuals. Why, of course, it is possible to continue to ignore the new social force that has appeared. But it, after all, all the same will make itself remembered, because the fates of people are

behind it. For example, the Association has already addressed an open letter to M.S. Gorbachev, in which it expressed its views on perestroyka, the rule-of-law state, and the status of the scientist in it. It is probably time for the USSR Academy of Sciences, the State Committee for Science and Technology, trade unions, and finally the government to enter into a specific dialog with the Association. And not only to settle as far as possible the fate of every scientist, who has been removed from science, but also to look at the root of the problem and to think about the future.

And, finally, one must not ignore any longer the fact that truly creative people are being selectively fired by means of certification. Yes, the count thus far runs into the hundreds of illegally fired scientists. So then, do we wait until the rebellious talented people all find themselves in the street, while obliging executors of orders remain in scientific laboratories? It is necessary to break the trend while the matter has not gone too far.

The scientist, who has been removed from science, loses as a scientist. And together with him our entire economy also loses. But there is also another aspect here—the social aspect. We ourselves are to blame for the fact that people of science perforce are turning into professional champions of justice. Meanwhile the Association of Unemployed has also not proposed at all to grow into a threatening sociopolitical force. In its charter it is clearly stated: "The Association ceases its activity upon the eradication in the country of cases of illegal firing."

Within the rule-of-law state the requirement is, undoubtedly, feasible.

President of USSR Society of Physicists Discusses Goals

907A0178A Moscow POISK in Russian No 9 (44), 1-7 Mar 90 p 3

[Article by Professor Sergey Kapitsa, president of the USSR Physics Society: "The Renaissance"; first paragraph is POISK introduction]

[Text] After nearly 60 years the USSR Physics Society has been restored in our country. We give the floor to its president, Professor Sergey Kapitsa.

At the end of last year the historical injustice with respect to physicists was finally corrected in our country: Our professional organization—the USSR Physics Society—was reestablished. Its predecessor—the Russian Physics Society—was founded on the initiative of D. Mendeleyev and other famous researchers back in 1872. In 1878 it was combined with the society of chemists and began to be called the Russian Physics and Chemistry Society. Alas, in 1930 its history was interrupted—of course, against the will of scientists. The chemists in two years in the end succeeded in defending their society, but physicists simply remained without their own professional association. Their attempt to reestablish the society in 1946 ended in failure—in the corresponding appeal the resolution of Stalin appeared: "Let physicists deal with their own business." At that time the development of an atomic bomb was, to his mind, the only important business of physicists. The next, also unsuccessful, attempt was mode in 1971....

The formation of the Physics Society is a natural step in the development and democratization of our science. Today throughout the country a search for alternative forms of its organization is under way.

What role could the new society play in the life of Soviet scientists? The question is a difficult one. The now prevailing structures encompass, it would seem, all and everything. The General Physics and Astronomy Department of the USSR Academy of Sciences and the Nuclear Physics Department unite about 150 members of the Academy, that is, a sixth of its membership. These influential departments determine the priorities in the development of science, the initiative of the establishment of new institutes, laboratories, and scientific buildings belongs to them. The National Committee of Soviet Physicists, which to a certain extent represents our science in the International Union of Pure and Applied Physics and other scientific organizations of the world, has been formed under the General Physics and Astronomy Department.

On the other hand, more than 50 scientific and problem councils, which coordinate research and hold conferences and seminars, are operating in the sphere of physics. The councils, which are work in science-intensive sectors of industry and the State Committee for Science and Technology, are also very influential.

It would seem that all the "ecological niches," where our society could develop, are already occupied. But first of all the society should do what others are not doing: develop the interdisciplinary contacts of physicists, scientists, and instructors, those who are connected with basic and applied research. Today, according to the data of statistics, 400,000 physicists with a higher education are employed in the national economy of the country. Of them about 100,000 are candidates of sciences and 10,000 are doctors of sciences. Physicists are isolated among departments and are divided among specialties. Our society has to overcome these barriers.

Today, when the pragmatic and commercial approach to science is spreading so, we should first of all distinguish and defend the priority of basic research. The society should oppose the manifestation of group interests in the evaluation of the contribution of scientific collectives and individual scientists. Active public opinion is particularly important in this matter. An independent public examination should also be conducted far more extensively in questions of the construction of expensive experimental facilities—accelerators, reactors, and so on.

The traditional hierarchical mechanism of decision making—this especially came to light under the conditions of the new system of grants—does not guarantee protection

against biased opinions and appraisals. In what amounts and from what sources science will be financed in the future, of course, also worries scientists. In physics an especially complicated situation has formed. For several decades many fields of it were developed, roughly speaking, on "interest from the bomb." Even if other research was not conducted under the cover of secrecy, the assets for it all the same were allocated from the total spending on defense. Today the process of the demilitarization of physics has begun, and it is necessary to seek new, open methods to substantiate the need for some outlays or others, at times very significant outlays.

It is important not to exchange for secondary goals the significant potential of the scientific sector of the military industry, which is to be converted. These scientific collectives can accomplish the most complicated tasks, for example, in medicine.

I believe that our society could also contribute to the elimination of the harmful gap between the higher school and science. This process began precisely in the fateful 1930's, when the majority of universities were cut off from academic science. The higher technical school also suffered, which made its contribution to the decline of engineering education. One must not tolerate this. One of the main paths of the introduction of basic scientific results in applied fields lies precisely through the system of higher education.

It is also necessary to improve immediately the teaching of physics in the school. So far we do not have good physics textbooks—either VUZ [higher educational institution] or school textbooks.

An exceptionally important task is the dissemination of physical and mathematical knowledge. It is gratifying that the journal KVANT is now being translated into English. Throughout the world much attention is now being devoted to the promotion of science, large centers, which are oriented first of all toward young people, are being established—particularly in France. For the wave of mysticism and occultism, which has swept over the country—and not only ours—is arousing serious apprehensions.

But the activity of scientists themselves in the country, unfortunately, is decreasing. It is possible to judge this from a number of indications. Take if only the following fact: The influx of articles to ZHURNAL EKSPERIMENTALNOY I TEORETICHESKOY FIZIKI has decreased in recent times by 20-30 percent. Many researchers are beginning to direct their attention to western journals and laboratories. How is one to avoid losses for domestic science? It is absolutely necessary to devote more attention to young scientists and to be concerned about their occupational and job advancement.

At the same time it is also necessary to seek more effective methods of drawing closer to the work scientific community.

Of course, it is also important to be concerned about the improvement of the material status of scientists and specialists in our country. For these purposes the Fund of the Physics Society is envisaged by our charter.

It is impossible to accomplish the listed tasks by the old—directive and centralized—method. Therefore, the Physics Society is being organized on a democratic, federative basis. We would like to see in it the union of independent and autonomous organizations with departments at large scientific centers and institutes.

This year the society proposes to organize two conferences—on conversion and on ecology. While in November we are to hold our first congress, which will take place in Leningrad.

New Facilities for USSR AS Presidium, Center for Humanities

907A0177A Moscow POISK in Russian No 9 (44), 1-7 Mar 90 p 1

[Article by Dmitriy Osinin: "While We Have in the Palace"; first paragraph is POISK introduction]

[Text] The Presidium of the USSR Academy of Sciences had adopted a decree on the organization of the Center of Humanities Knowledge. It will be housed in the old building of the presidium of the Academy on Leninskiy Prospekt of the capital.

This is truly a very old building. Prokopiy Demidov—one of the representatives of the famous "metallurgical" dynasty—built it in the middle of the 18th century. But in contrast to his relatives Prokopiy selected as his main life's work not industry, but the raising of...exotic birds and plants. His estate on the high bank of the Moscow River became, in essence, the first botanical garden in Russia. Here they grew even pineapples. While the Demidov palace itself was cluttered with thousands of cages with birds. All the Moscow nobility went to admire such wonders. What people were here! Painters, literary people, statesmen, learned men....

And then, after the death of the owner, an enviable fate awaited this palace. At one time it belonged to the Orlov family. Remember our history: Very much in it is connected with this great noble family. Later Tsar Nikolay I purchased the building together with the lands and lodged in it his spouse—Empress Aleksandra Fedorovna. Hence, too, the name of the palace, which has been retained to this day—the Aleksandrinskiy Palace.

After the revolution it was decided to turn the unique monument of history and architecture into a museum. People came here in order to familiarize themselves with the most abundant collection of exquisite furniture. They say that Ilf and Petrov wrote their famous novel about the ill-fated chairs not without the "prompting," which was hear in these walls.

And, of course, not by chance did the Social Sciences Section of the Presidium of the USSR Academy of

Sciences consider it possible to petition for the location of the new Center of Humanities Knowledge precisely in the Aleksandrinskiy Palace.

Thus, there is to be a center. But what is it to be like? A specially established group, of which leading humanities scholars became members, is now working on its concept. Very little time has been allotted. After many years of grueling protracted construction the date of the move of the Presidium of the USSR Academy of Sciences to a new building has, at last, drawn near.

Widespread Debate Rages Over 'Biotechnology'

Commission Findings

907A0188A Moscow PRAVITELSTVENNYY VESTNIK in Russian No 11, Mar 90 p 6

[Article under the rubric "Problems of Ecology": "It Is Necessary to Continue Research"; first three paragraphs are PRAVITELSTVENNYY VESTNIK introduction]

[Text] There will hardly be found a person, who if only from time to time looks at the newspapers and is unfamiliar with the abbreviation BVK. Protein-vitamin concentrate, the trade name is paprin. Passions have been seething in the press for three years—the production of the harmless, it would seem, additive for fodders for animals has been placed very nearly in the same rank as such ecological catastrophes as the degradation of the Aral Sea. Two applied science conferences have discussed the problem. The debates are continuing in parliamentary halls. The discussion has not come to an end....

A representative commission, on which 13 well-known scientists were included: Academicians M. Ivanov, Ye. Mishustin, and R. Petrov, Corresponding Members of the USSR Academy of Sciences K. Dyumayev and A. Yablokov, Academicians of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin V. Fisinin and L. Ernst, Academician of the USSR Academy of Medical Sciences N. Izmerov, Corresponding Member of the USSR Academy of Medical Sciences V. Volgarev, Academician of the Latvian SSR Academy of Sciences R. Kukayn, Doctors of Biological Sciences V. Yeroshin and G. Provatorov, and Doctor of Medical Sciences R. Khaitov, in the fall of last year examined the problem of protein-vitamin concentrate.

Today we are publishing with some abridgments the findings of the commission.

"...The biotechnological obtaining of fodder protein for the USSR is a realistic and economically expedient direction of the production of protein additives, which are used in mixed fodders for the intensive production of pork, poultry meat, eggs, as well as in other sectors of animal husbandry.

"Paprin is an effective high-lysine protein and vitamin additive for fodders. Animal husbandry products, which have been obtained with the use of paprin, are safe for man.

"The introduction of the technology of the large-tonnage production of paprin in a number of places has been accompanied by cases of the adverse effect of discharges of this production on the health of the population, in particular, by the increase of the number of cases of bronchial asthma and other allergic diseases.... The technical solutions, which were implemented at the Kirishi and Angarsk plants, showed the possibility of the production of paprin without the contamination of the environment.

"To consider it expedient for the USSR Academy of Medical Sciences, the USSR Ministry of Health, and the USSR Academy of Sciences to continue research on the effect of products of microbiological synthesis on the immunological reactivity of the body.

"It is necessary to carry out reconstruction at other plants for the production of paprin and to continue the work on the improvement of the technology and the increase of product quality. To organize the production of paprin in granulated form or another form that does not raise dust and to ensure the automatic checking of the content of protein in discharges into the atmosphere.

"The change of specialization at present of the existing plants for the production of paprin is inadvisable...."

Opposing Views

907A0188B Moscow PRAVITELSTVENNYY VESTNIK in Russian No 11, Mar 90 p 6

[Article under the rubric "Problems of Ecology": "Arguments and Counter Arguments"; first paragraph is PRAVITELSTVENNYY VESTNIK introduction]

[Text] R. Kukayn and A. Yablokov did not agree with several conclusions drawn by the commission. Specialists of the USSR Ministry of the Medical and Microbiological Industry analyzed their remarks—a kind of discussion by correspondence took place. We call it to the attention of the readers.

R. Kukayn and A. Yablokov: The production of protein-vitamin concentrate at best could make only a small contribution to the solution of the entire problem of fodder proteins—about four percent of the need for protein additives.

USSR Ministry of the Medical and Microbiological Industry: In 1988 more than 1 million tons of paprin were produced—this is approximately one-tenth of the fodder additives. If you convert the volume into protein of just animal origin, the share of protein-vitamin concentrate would be about 40 percent. Import purchases make up the remainder in the balance of protein additives—their increase will lead to an increase of the foreign currency losses and to the growth of our dependence on the countries which are soybean producers.

R. Kukayn and A. Yablokov: The assertion that tests have shown the "complete safety of the use" of yeast, which has been grown on petroleum paraffin, is at least incorrect. Even in domestic literature there are many data on the negative effect of protein-vitamin concentrate on the indicators of metabolism, the peculiarities of reproduction, and the internal organs of animals. There are also data on the adverse effect of protein-vitamin concentrate on a specific portion of the volunteers.

USSR Ministry of the Medical and Microbiological Industry: In domestic and foreign scientific literature there are no data either on the negative effect of protein-vitamin concentrate on the body of animals or on the harmfulness of food products which have been obtained with the use of paprin. If, of course, the diet of animals is balanced. If all the protein in fodders were to be replaced with biochemical protein, it would be a different matter. Due to the imbalance of the diet in amino acid composition in case of the study of high doses of protein-vitamin concentrate individual deviations were noted, of course, in the body of animals. For example, G. Semashkevich in his research (1966) is case of a 100-percent dose of protein-vitamin concentrate notes a change of skeletal muscles. Precisely such results are cited in journal and newspaper reports as evidence of the harmfulness of the product. But let us ask: Will it do man good if he eats, say, only eggs and nothing more?

Research on the effect of paprin on the body of animals and man was conducted at more than 30 institutes of our country and the GDR, starting in 1966. On the basis of the extensive scientific discussion, analysis, and generalization of an entire block of obtained data conclusions on the safety and biological value of paprin were drawn.

The results of observations of volunteers, who consumed pork, broiler meat, eggs, and milk, which were obtained with the use of protein-vitamin concentrate, did not reveal any deviations in clinical indicators. At the Institute of Nutrition of the USSR Academy of Medical Sciences 88 people were observed, while 32 people were observed at the Rostov Medical Institute. The sanitary chemical norms of the products, their organoleptic properties, and their ability to be endured did not differ from the control products. The symptoms of discomfort in the gastrointestinal tract, which were identified in seven volunteers, were connected with the fact that before the start of the observations they had subclinical gastrointestinal diseases.

R. Kukayn and A. Yablokov: The data on the relative safety of production are based on the Kirishi Plant alone, which was reconstructed in recent years with the expenditure of vast assets.

USSR Ministry of the Medical and Microbiological Industry: Priority attention was devoted to the Kirishi Plant because a large number of reports in the press were devoted to it and because a completely closed technology of obtaining paprin was implemented and is being tested here for the first time. The results of the tests confirm the possibility of the conversion of all plants to an ecologically clean technology. In general during 1980-1985 the organizations of the USSR Ministry of Health and the USSR Ministry of the Medical and Microbiological Industry studied the concentration of the specific protein at the sites of plants. It turned out that in the air of the residential regions, which are adjacent to the enterprise, the maximum allowable concentration is not being exceeded. At a conference in the USSR Ministry of Health in 1987 it was noted: "Both an increase of the primary occurrence of bronchial asthma among the adult and child population of the regions of the location of these plants and a significant change of the specific immunological reactivity to the antigens of the products of microbiological synthesis are not recorded. The level of the sick rate with the disabling of workers at protein-vitamin concentrate plants is no higher than at enterprises of the petrochemical industry."

The monitoring of the content of protein in the air (according to the data of the Kirishi Sanitary and Epidemiological Station and the sanitary laboratory of the plant) showed that of the 6,500 specimens in 1.5 years protein was detected in only 38 (0.5 percent), moreover, its content is one-tenth to one-hundredth of the maximum allowable concentration.

R. Kukayn and A. Yablokov: The developed production capacities for the output of protein-vitamin concentrate are now being used inadequately due to the shortage of raw material—paraffins. This shortage is being covered by imports.

USSR Ministry of the Medical and Microbiological Industry: The production capacities for the production of protein-vitamin concentrate now come to 1.3 million tons a year. They should be completely supplied with paraffins, which are being obtained from the Pareks units of the USSR Minkhimnefteprom. The equipment was purchased, but was not installed on time. In 1988 the USSR Minkhimnefteprom delivered 1,157,000 tons of paraffins, 37,000 tons were purchased. The additional deliveries of raw material from Bulgaria during the entire 12th Five-Year Plan came to 200,000 tons—approximately 3.5 percent of the annually consumed amount of raw material. These purchases were made by way of compensation for deliveries of crude oil from the USSR.

R. Kukayn and A. Yablokov: When examining the problem of protein-vitamin concentrate it is impossible not to take into account the mass protests of the population.

USSR Ministry of the Medical and Microbiological Industry: They appeared after a number of purposely prepared reports, in which the scientific results are distorted and references to works, which do not have a bearing on the study of paprin, are given. The script of the campaign, which has been launched against protein-vitamin concentrate, is similar to the one which was also performed in foreign countries. Is this by chance?

Medical Industry Deputy Minister

907A0188C Moscow PRAVITELSTVENNYY VESTNIK in Russian No 11, Mar 90 pp 6-7

[Interview with USSR Deputy Minister of the Medical Industry Mikhail Mikhaylovich Sobolev, by PRAVITELSTVENNYY VESTNIK correspondent G. Lomanov under the rubric "Problems of Ecology": "A 'Crusade' Has Been Declared Against Biotechnology. To

Whom Is It Advantageous?"; date and place not given; passages in boldface as published; first paragraph is PRAVITELSTVENNYY VESTNIK introduction]

[Text] USSR Deputy Minister of the Medical Industry M. Sobolev answers the questions of our correspondent.

PRAVITELSTVENNYY VESTNIK: Mikhail Mikhaylovich, we will be frank—the production, for which you are responsible, was on the verge of disaster. Last fall the USSR Supreme Soviet adopted a decision—to change the specialization of protein-vitamin concentrate plants. True, in a month scientists and experienced specialists, who consider such a step incorrect, appealed to the parliament. While just recently agrarian deputies supported them. Where will the pendulum now swing? The situation is very unstable, and, it seems, precisely now there is a reason to weigh once again the arguments of the opponents and supporters of protein-vitamin concentrate.

M. M. Sobolev: I agree. Especially as during the discussion of this problem the pluralism was very one-sided. The attempts of scientists, who know the matter and for many years have been studying the theme in earnest, could not penetrate the "dense defense" of a number of local and central newspapers.

PRAVITELSTVENNYY VESTNIK: We will return to this again. Let us begin with the main thing. In the discordance of the statements against protein-vitamin concentrate it is possible to distinguish three key questions—Do we need paprin at all, is its production safe for the population of the residential regions, which are adjacent to enterprises, and, finally, are the products obtained by means of it harmless? Thus, the first thesis of the opponents is that throughout the world they are abandoning protein-vitamin concentrate, only we are intensively developing its production. Is everyone again "out of step"?

M. M. Sobolev: This argument seems strong only to those who are not familiar with the history of the issue. About 20 years ago in Great Britain, Italy, France, and other countries the designs of large-tonnage enterprises for the production of microbiological protein were developed. Experts of the United Nations for questions of nutrition came to the conclusion that it is safe for the health of man and animals. I will recall: Protein-vitamin concentrate is obtained by growing yeast microorganisms on purified petroleum paraffins. But in 1976 petroleum prices increased sharply. The competition of the "kings" of soybeans, two-thirds of the world production of which is concentrated in the United States and Brazil, also had an effect. This also hampered in the West the extensive industrial production of protein based on hydrocarbons.

We also do not regard protein-vitamin concentrate as an alternative to other additives with a high protein content—paprin is used first of all for the making of a completely balanced diet. Moreover, given our extremely meager resources of protein additives we simply cannot manage without protein-vitamin concentrate. For even now, when we annually produce more than 1 million tons of paprin, the Soviet Union is forced to buy protein additives abroad. In 1987 almost 500 million rubles in freely convertible currency had to be spent on them.

PRAVITELSTVENNYY VESTNIK: What will happen if they decide all the same to change the specialization of the plants?

M. M. Sobolev: If we do not find a substitute for paprin, the consumption of pork will decrease by 10 percent, broiler meat—by 13 percent, and eggs—by 7 percent. Our diet, which is limited as it is, will become even more meager. Do the people, who gather at meetings and slavishly demand that the plants be closed, know this? I am not sure....

PRAVITELSTVENNYY VESTNIK: But it is possible to reorient oneself toward the more intensive production of vegetable proteins. Ecologists are proposed precisely this.

M. M. Sobolev: We also do not regard paprin as a panacea for all the troubles of our animal husbandry. But there is an objective reality, which one has to take into account and which you will not change by waving a magic wand. Our agriculture is experiencing a chronic shortage of fodders. While the biological value of protein-vitamin concentrate is greater than that of the same soybean meal. Assume that the plants have been closed—with what will we replace paprin? Soybeans? They do not grow everywhere, mainly in temperate areas. But in order to compensate for the shortage of fodder protein, which will inevitably arise in case of the change of the specialization of protein-vitamin concentrate enterprises, it will be necessary to set aside for soybeans an additional 1.7 million hectares. For clarity this is all, I emphasized, **all the planted areas** of such a republic, for example, as Moldavia. Is a leap in the development of fodder production realistic? No, of course, this is also clear to the layman.

By the way, the authors of several reports also speculated that fertile lands are being allotted for protein-vitamin concentrate plants. What is this—ignorance or conscious counting on simpletons? For all our enterprises take up 665 hectares! Is this area comparable to the lands which one would have to plant with soybeans?

PRAVITELSTVENNYY VESTNIK: Let us summarize: You believe that the West abandoned microbiological protein, directing attention first of all toward market conditions, and not because it is harmful. But the passions over protein-vitamin concentrate flared up after its safety was called into question.

M. M. Sobolev: It would not harm to remember precisely who "doubted" it. Suffice it to recall the publication in KOMSOMOLSKAYA PRAVDA entitled "The Bomb of Postman Vasilyev." Well, whom do the results of the research of a large number of institutes, the conclusions

of competent specialists, and the opinion of experts of the United Nations interest? It is more evident to the postman, he, apparently, knows the matter better. The psychology of mass consciousness and the blind faith of people in any printed word astonish me.

PRAVITELSTVENNYY VESTNIK: We reap what we have sown. How many global but, when it came to the test, absurd and harmful projects were sanctified by the name of science, how much "pocket" research skillfully "substantiated" them. And the newspaper sensation over protein-vitamin concentrate did not begin suddenly. The putrid smell of the treatment facilities of Kirishi, the composition of the sewage, which was discharged into the Volkhov River, was below all criticism. Not by chance did the sanitation services demand that production be halted.

M. M. Sobolev: Not by chance. And, incidentally, they acted correctly. I will not talk about the large number of technical mistakes and miscalculations of the managers of the plant, as a result of which sewage treatment worsened considerably. I will stress the main thing—the ban concerned the hydrolysis works. But the "action group," which the postman heads, also demanded that another works—the paraffin works—be closed, although there were no serious complaints against it.

PRAVITELSTVENNYY VESTNIK: But you will not deny that both the contamination of the air with protein dust and the outbreak of allergic diseases occurred. That, in spite of the demands of consumers, the lion's share of paprin is produced not in granulated form, but as powder.

Sobolev: All of us, who work in biotechnology, by no means idealize the state of the sector. But we believe that it is necessary not to close enterprises, but to strive for the high ecological cleanness of production. I will not list what was done in Kirishi and Angarsk and at other plants. I will speak about the result—during the first half of last year in Kirishi more than 1,500 analyses of the air were made, but the presence of protein was noted in only two, moreover, its concentration is one-tenth to one-hundredth of the the maximum allowable concentration. While during the second half in the same number of specimens protein was not detected at all.

PRAVITELSTVENNYY VESTNIK: Are there really few examples, which the norms of the maximum allowable concentrations were specified to please a department and did not meet either sanitary or ecological requirements?

M. M. Sobolev: In this case the maximum allowable concentration of the specific protein was determined in terms of the allergically sensitive portion of the population, with which approximately one in 200 people is grouped. I invite the readers also to reflect on the following fact—all eight protein-vitamin concentrate plants use products of large petroleum refining enterprises, which also pollute the air. Last year the Kirishi Petroleum Refinery together with the local state regional electric power plant discharged into the air 180,000 tons of hydrocarbons, sulfurous anhydride and acid, carbon monoxide, and vanadium pentoxide, moreover, the strongest allergen. While the protein-vitamin concentrate plant discharged a kilogram of protein waste. However, they are demanding that precisely it be closed. Is it a coincidence? I do not think so.

PRAVITELSTVENNYY VESTNIK: In asserting that paprin is harmless for man and animals, the department cites the opinion of medical personnel. But then Corresponding Member of the USSR Academy of Sciences A. Yablokov wrote that for a long time he could not understand their evasive position, until he found out that in the late 1970's the Main Administration of the Microbiological Industry allotted the Institute of Nutrition of the USSR Academy of Medical Sciences 800,000 rubles for the construction of a laboratory complex.

M. M. Sobolev: And are its associates to this day paying with the "needed" conclusions? Are such declarations correct? First, we did not give any money for construction—the institute, incidentally, to this day is located in the old building. Second, A. Yablokov knows, if anyone does, that 30 scientific institutes participated in the integrated studies of microbiological protein. In addition to the Institute of Nutrition, among them there are another five medical and biological institutes, including academic institutes. In a polemic salvo you would say almost anything, but it is impossible to ignore the facts.

The people, who bear legal and moral responsibility for the safety of the use of paprin—scientists and experienced workers, and, finally, foreign buyers, who have also tested protein-vitamin concentrate, unanimously confirm the safety of its production and use. An international symposium, which was held at the end of last year, once again noted that the extent and methods of many years of biomedical tests of the product completely satisfy the requirements of international organizations. I will quote: "The absence of carcinogenic, embryotoxic, mutagenic, and other harmful effects of these products on the body of animals has been shown definitely..., the safety of the products of animal husbandry for man has been proven." So who is "not in step?"

I read with surprise in the press a eulogy to the leader of the next "action group," who went to Novosibirsk in order to organize "a new round of work on protein-vitamin concentrate." As if tens of institutes has not studied the problem for 15 years. As if hundreds of thousands of tons of the product have not undergone many years of state tests. And by all means—a new "round" is needed. What is this—militant incompetence or the conscious aspiration to go around in circles?

PRAVITELSTVENNYY VESTNIK: It seems that we have also made a complete circle and have returned to the discussion of how the polemics on the problem of protein-vitamin concentrate is being conducted in the press....

M. M. Sobolev: Polemics presumes a certain level of competence and the opportunity for both parties to express their opinion. Neither exists in the campaign, which has been launched in accordance with the "witch hunt" scenario, which is well known back from the times of the Middle Ages. Many conjectures and direct misinformation have come to be widely used. I am not talking about lapses. The journal SOVETSKIY SOYUZ, for example, surprised foreign readers with a "scientific" discovery: "In Kirishi they are making protein from glycerin." Even a school child, who is studying chemistry diligently, will not confuse glycerin with paraffins.

In Pavlodar the oblast soviet executive committee, which has been frightened by the activity of the local "action group," is revoking the previously given consent for the construction of a protein-vitamin concentrate plant. After a number of reports in the local press and the showing on television of, in my opinion, the openly provocative movie "Haze Over the City" mass hysteria is starting. Residents are calling the office of the correspondent of the republic newspaper and are asking: "Does the correspondent know that last night there was a salvo discharge of protein-vitamin concentrate?" Pardon me, what discharge? For they have not yet begun to build the plant! I am convinced that we are underestimating the capabilities of the mass media. A few articles, two or three television broadcasts, and then the establishment of an "informal" group are sufficient, and it is possible to stop and ban any cause. Especially if it is a question of something that is exotic and hard to understand, but tickles the nerves. For example, microbiology.

The next sensation: There appears in the central press an article of its own correspondent, who notes with satisfaction that the fight against the construction near Kazan of a fodder lysine plant is developing successfully. He quotes the docent of the Chair of Microbiology of Kazan University: "The dust of protein-vitamin concentrates is assigned to the first class of hazard, that is, it is equated in toxicity to the vapors of mercury, hydrocyanic acid, and other poisons."

PRAVITELSTVENNYY VESTNIK: It is stated strongly....

M. M. Sobolev: I do not think that the microbiologist confused the classes of hazard, apparently, the journalist understood it inexactly. But note that he did not even ask himself the question, why had 1 million tons of such a terrible "poison," which is annually fed to animals, thus far not killed all life in the country? Well, all right, there is not enough knowledge, but elementary logic should exist.

But...it was said, the readers are disturbed. Who will now listen to a specialist, if he attempts to explain—yes, protein-vitamin concentrate has a specific allergic activity. As do, incidentally, other products which contain protein, for example, ordinary wheat flour and soybean powder. However, it causes a reaction in far from all people, paprin does not have any, including an allergic, effect on the majority of people. To whom is this interesting? Now hydrocyanic acid—that is super!

PRAVITELSTVENNYY VESTNIK: So do you believe that some statements against protein-vitamin concentrate are due simply to the desire for a sensation?

Sobolev: I do not rule it out. But it is not this that is dangerous. Readers probably remember the sensation about the pike, which swallowed and then spit up a live dog, which was published by respected, serious newspapers. Then they refuted the "hoax." The sensation is not that terrible if only because it is not very plausible. I think that only a very ignorant person will believe that protein is as poisonous as hydrocyanic acid. It is far more disturbing that the press is readily making its pages available to the opponents of protein-vitamin concentrate, while the counter arguments of scientists are being ignored. At times the impression is created that someone far more experienced and interested than the Kirishi "action group" is skillfully directing the campaign.

PRAVITELSTVENNYY VESTNIK: The ancients in such cases advised—seek for whom it is advantageous....

M. M. Sobolev: The advice is good and has hardly become obsolete. But first let us see for whom the curtailment of the biotechnology program is disadvantageous. First of all each of us—the country loses food resources and gives up gained scientific and technical positions. Incidentally, the unique equipment and specific technology in practice preclude the possibility to change the specialization of the enterprises. It is disadvantageous for local organs, which are deprived of a valuable product that is necessary in literally every region.

The demand "stop biotechnology!" is reminiscent of the stories, which are well known to everyone, about how we "stopped" cybernetics, genetics, and much more. Incidentally, for your information the people, who are charging the passions over protein-vitamin concentrate, according to the most modest estimates, have already done damage of at least 150 million rubles.

Now, for whom it is advantageous? Undoubtedly, for those who are striving for popularity at any price, whom even the fame of Herostratos does not worry. Moreover, for some short-sighted managers, who for the sake of departmental or local interests are prepared to go against statewide interests. And, finally, for the American "soybean" lobby, which 4 years ago appeared on the Soviet market and now in connection with the decrease of prices for petroleum and gas is worried by the possibility of serious competition on the part of the producers of microbiological protein.

PRAVITELSTVENNYY VESTNIK: Do you believe that the campaign against protein-vitamin concentrate plants was incited?

M. M. Sobolev: I cannot assert this specifically. But it is also no secret that someone in the West is now rubbing with satisfaction his hands, which are squeezing the "soybean" rein. Not by chance did influential American Senator and former U.S. Vice President H. Humphrey say: "Soybeans are a new form of power, a new currency, a new dimension of the language of our diplomacy." When I see that a "crusade" has been declared against biotechnology, I am obliged to ask—Whose purpose does it serve? As deputy minister I should analyze the facts in all their interconnection, evaluate the situation rationally, and forecast the course of events. I do not have the right to the logic of a reporter, who places fodder protein and hydrocyanic acid in the same rank.

PRAVITELSTVENNYY VESTNIK: However, after the decision of the parliament on the change of the specialization of the plants you wrote a resignation. Judging from the fact that we are talking in your official office, it was not accepted. Why? And to what was it due—momentary weakness?

M. M. Sobolev: No, it was due to the firm conviction, which is based not on emotions, but on professional knowledge of the problem, of the incorrectness of the decision. Moreover, I wanted to ward off any reproaches of a departmental stand. While my resignation was not accepted, apparently, because the government and the USSR Supreme Soviet considered that it is necessary to weigh everything again before dotting the "i's."

Our distant ancestors, in order to appease the gods, sacrificed domestic livestock to them. Now our society, which has not been spoiled by an abundance of products, is being invited to sacrifice annually more than 1 million tons of meat to someone's vanities. Is it not a bit too much?

UN Advisory Group Position

907A0188D Moscow PRAVITELSTVENNYY VESTNIK in Russian No 11, Mar 90 pp 6-7

[Article by Professor P. Scrimshaw under the rubric "Problems of Ecology" (Brussels, 1976): "No Product Has Been Tested So Carefully"]

[Text] ....The UN Protein Advisory Group (PAG) drafted in 1974 "A Guide for the Evaluation of the Safety and Nutritional Qualities of New Food Protein Products" and in 1975 published the separate "Guide for the Evaluation of the Fodder Protein of One-Celled Animals." The International Union of Pure and Applied Chemistry prepared a number of additional recommendations which concern the protein of one-celled animals....

The recommendations of the leadership of the Protein Advisory Group have been abided by with exceptional care. No food or fodder product, which is on sale at present, has been tested so carefully.

The data available at present indicate that the level of the content and the nature of the residual paraffins in the protein of one-celled animals do not present a danger for the health of animals provided that raw material of the appropriate purity is used for the growing of the microorganisms. There are also no data on the danger for the health of the consumers of products, which have been obtained from these animals, although these products might also contain paraffins, which passed into them from the protein of one-celled animals.

A problem arises when, in addition to scientific considerations, national interests, and the interests of health care, other factors, which lead aside or arouse public opinion, come into force....

The selected yeast and bacteria, which have been grown on purified hydrocarbons, such are normal alkanes and methanol, can be a safe and nutritious fodder for animals, while the products obtained from them can be used by man for food.

Appeal to USSR Supreme Soviet

907A0188E Moscow PRAVITELSTVENNYY VESTNIK in Russian No 11, Mar 90 pp 6-7

[Appeal of the participants in the All-Union Symposium "The Protein Products of Microbiological Synthesis" to the USSR Supreme Soviet of 15 December 1989, under the rubric "Problems of Ecology"]

[Text] Dear People's Deputies!

The sixth point of the decree of the USSR Council of Ministers "On Urgent Steps of the Ecological Improvement of the Country," in which the halt of the production of protein-vitamin concentrate from petroleum paraffins is envisaged starting in 1991, deeply worries us.

The production of the protein of one-celled animals, and of paprin in particular, is one of the means of the decrease and, in the future, the elimination of the shortage of protein. This is the unequivocal conclusion of the Soviet specialists and the delegations of scientists of the GDR, Bulgaria, the CSSR, the PRC, and Hungary, who are participating in the work of the symposium, which was confirmed by the adopted resolution of more than 150 scientists and specialists, who are symposium participants.

The symposium participants believe that the adoption by the USSR Supreme Soviet of the indicated decree in the area of Point 6 is not substantiated, it was adopted without regard for the opinion of scientists and in case of its implementation will do significant harm to the economy of the country.... We request the revision of Point 6 with allowance made for the conclusion of the scientists, who worked on the commission of the USSR Supreme Soviet for this question, and the unanimously adopted resolution of the symposium.

[Signed] Personnel of more than 20 institutes and enterprises signed the appeal.

History of Protein-Vitamin Concentrate

907A0188F Moscow PRAVITELSTVENNYY VESTNIK in Russian No 11, Mar 90 p 7

[Article under the rubric "Problems of Ecology": "A Chronicle of the Development of the Production of Protein-Vitamin Concentrate in the USSR"; passages in boldface as published]

[Text] **1968.** In Ufa the first pilot industrial plant with a capacity of 10,000 tons of protein-vitamin concentrate a year is put into operation. Biomedical and zootechnical tests had been under way since 1963. The USSR Ministry of Health permits the production and use of the product in animal husbandry (with some restrictions).

1970. A decree of the CPSU Central Committee and the USSR Council of Ministers envisages the construction of large-tonnage protein-vitamin concentrate plants in eight cities.

1985. The previously adopted restrictions on the use of protein-vitamin concentrate are lifted.

May 1987. After critical statements of the press meetings are held in Kirishi. On the demand of the inspecting organs at the Kirishi Plant the hydrolysis works is completely shut down, while the protein-vitamin concentrate works is shut down for reconstruction.

October-December 1987. The first section of the protein-vitamin concentrate works in Kirishi is put into operation after reconstruction. The discharge of industrial sewage is halted, the absence of protein of protein-vitamin concentrate in the air of the city is ensured. In February 1988 the second section of the works is put into operation.

1988. An active campaign "against protein-vitamin concentrate" takes place in the local press and a number of central newspapers. In accordance with the opinion of the ministry, the statements in the press of scientists, specialists, medical personnel, and workers of agriculture "in favor of protein-vitamin concentrate" are completely blocked.

June 1988. The All-Union Applied Science Conference on the Problem of Protein-Vitamin Concentrate is held in Moscow with international participation. Hundreds of scientists and specialists discuss it. Opponents of protein-vitamin concentrate and the press are invited. The conference draws an unequivocal conclusion—"in favor of protein-vitamin concentrate." The resolution is sent to all the mass media. **It has not been published to this day.**

June 1989. At the first session of the USSR Supreme Soviet during the approval of the composition of the government N. Ryzhkov comes forth with a proposal on the change of the specialization of protein-vitamin concentrate plants. The situation at the sites of the protein-vitamin concentrate plants becomes tense.

July 1989. A commission of the USSR Council of Ministers for the study of the situation is Kirishi is established. Leading scientists and USSR people's deputies are on the commission. The commission speaks "in favor of protein-vitamin concentrate."

August 1989. The confrontation between the labor collectives of the protein-vitamin concentrate plants and a number of informal organizations continues. On the instructions of M. Gorbachev a commission of the USSR Supreme Soviet made up of the most authoritative scientists of the USSR Academy of Sciences, the USSR Academy of Medical Sciences, and the All-Union Academy of Agricultural Sciences imeni V.I. lenin is established. **Representatives of the USSR Ministry of the Medical and Microbiological Industry and the wood chemistry complex are not included on the commission.**

October 1989. The commission submits a report to the government and the USSR Supreme Soviet. The conclusion is as follows: **"The change of the specialization of protein-vitamin concentrate plants is inadvisable."**

November 1989. The USSR Supreme Soviet adopts the decree "On Urgent Steps of the Ecological Improvement of the Country," Point 6 of which envisages the halt of the production of protein-vitamin concentrate from petroleum paraffins starting in 1991. Scientists and deputies, who do not agree with this decision, appeal to the USSR Supreme Soviet.

December 1989. The regular scientific symposium is held in Moscow. Representatives of six countries participate. The symposium makes an unequivocal decisions—"in favor of protein-vitamin concentrate." Its participants appeal to the USSR Supreme Soviet.

February 1990. On the instructions of A. Lukyanov the committees and commissions of the USSR Supreme Soviet consider the appeal of members of the government on the revision of Point 6 of the decree.

February 1990. The USSR Council of Ministers decides to establish another expert commission for the production of protein-vitamin concentrate.

Poor Engineering, Design Work Slows Progress in Machine Building

907A0174A Moscow NTR TRIBUNA in Russian No 3-4, 23 Feb 90 p 13

[Article by B. Polukhin under the rubric "We Continue the Theme": "A Dangerous Leap"; passages in boldface as published; first two paragraphs are NTR TRIBUNA introduction]

[Text] The low quality and the lag behind the world level of new series-produced equipment are one of the sore points of domestic machine building. Thus, only 20 percent (and then by stretching the point) of its products are competitive (NTR, No 7, 1989). Many critical opinions on this account have been heard in the press. But, as

a rule, these were the statements of economists and scientists. Therefore, of course, when Yu. Sidorenkov, chief designer of the Vitebsk Machine Tool Building Plant imeni Kominterna, dropped by the editorial office, I seized the opportunity and showed an interest in the opinion of the experienced worker. Why, for example, do clients have so many complaints about NC machine tools? And Yuriy Yakovlevich replied:

"The root of evil, I believe, lies in the faulty practice of the assimilation and trying out of new equipment under the conditions of series production. Such is also the opinion of the majority of Vitebsk machine tool builders. If you come to us, you will be convinced...."

In all in the city there are three machine tool building plants (and another one in the oblast) and the special design bureau of gear machining, grinding, and tool-grinding machines. So that there is a quite large "cluster" of the sector here.

However, from a conversation with specialists of the special design bureau it turned out that the problem of the quality and technical level of NC machine tools is not confined to the plant gates.

"Since up to 70-75 percent of the omissions and defects were incorporated already in the drawings of an item, which are sent down to the plant," V. Sitov, chief of the special design bureau and winner of the prize of the USSR Council of Ministers, said, "it is necessary to begin the analysis of the problem first of all with the state of the scientific reserve of the sector and the method of work of designers."

In the country there are on the average five scientists per designer (those who work at design bureaus). And it seems that there should be enough scientific ideas and advanced methods of calculations. But here is the paradox: Given our branched network of sectorial institutes and the abundance of products, which are produced by them, the designer today has practically nothing from which to choose. Why? The point is that the majority of scientific developments either are obviously obsolete or when checked turn out to be wrong, and at times simply have far-fetched results. The situation, in case of which scientists of sectorial scientific research institutes work not for the benefit of a specific order with an end result in "iron," but for the benefit of a report with a mystical economic impact from introduction, contributes to this.

But Vladimir Onisimovich cited from the practical experience of the special design bureau an example of how science works for the benefit of the end result.

"It was necessary to develop immediately for the sector a step motor. They sent a inquiry to the appropriate scientific research institutes. A reply arrives—they agreed to accept the order, the cost of development is 4 million rubles!... It is robbery in broad daylight. They turned to another institute. There they reduced the price to one-tenth, but the time of development is three years!... What is to be done? Then they found the author of the theory of this motor. They quickly make a trip to him at the Moscow Power Engineering Institute. After a brief conversation in several days they developed for us at the institute a method of design of the step motor. We paid the Moscow Power Engineering Institute only 1,000 rubles for it. Then four staff members of our special design bureau in two weeks...drew up completely the set of design documents which are necessary for the production of the motor."

Therefore, the designer often also "washes the blue prints" of existing models of equipment and turns them over to the client.

The fact that nearly all design bureaus are subordinate to plants, V. Sitov believes, also affects the quality of new machines. Such dependence, first, turns them, as a rule, into a personnel reserve for providing assistance to the village.

Second, such a status of designers often forces them to design new equipment for the level of technology and standards of production, which already exist at the plant.

But the problems of the machine tool do not end at this. They also continue after the drawings are turned over to the plant. Let us now examine the interaction of the **design bureau-plant** chain. Traditionally, and literally back a few years ago, they worked as follows.

After receiving the design documents, the plant produced and tested first prototypes of machines, then the trial run. After their acceptance by the state commission and the appropriate corrections of the design documents the item was put into series production.

In this case the problem of quality and the time of assimilation of the development of new equipment mainly came up against the fact that this process goes on without the halt of basic production and the availability of the necessary experimental capacities. Hence the imperfections of the design were properly revealed already in series production. While the change of models of a machine tool according to such an arrangement with allowance made for the stage of design took place in three to four years.

However, the machine builders of leading western countries, without reducing the high quality of items an iota, in practice cut in half this time of the assimilation of new models of machine tool, moreover, as a rule, these are NC machine tools. How?

As Academician P.L. Kapitsa wrote back in the 1970's after his visit to firms and companies of the United States, the amazing successes and reserves of the rapid assimilation of new equipment there are incorporated in the organization of this process. It is carried out by special large sectorial scientific research laboratories, design bureaus, and pilot plants. All the development and operations, which are connected with the bringing of

prototypes of equipment up to condition and the development of the technological process of their manufacture, are assigned to them. It remains for industrial plants of the sector merely to organize production itself.

But today our machine builders are also not using this advanced world know-how. Then how, for example, did the plants of the Ministry of the Machine Tool and Tool Building Industry, particularly the Vitebsk plants, achieve the shortening of the time of the changeover to a new model of NC machine tools, while almost approximating "world" standards?

After the production and testing of prototypes they simply began to change over immediately to series production. A leap—and you do not need any radical rearrangements and unnecessary trouble. The solution is a simple one, but....

Yu. Sidorenkov, chief designer of the Plant imeni Kominterna, with whom we are already acquainted, told me to what this led:

"Thus, the prototype of the 53B30PF2 gear hobbing machine was turned over by us to the state commission, when the automatic machine tools on this base had already been displayed. As a result designs of machine tools, which have not been brought up to conditions, are coming from shops."

But since not only machine tool builders have mastered this "innovative" method (it must be noted that it is also "profitable" for enterprises—the quick changeover to new expensive equipment makes it possible to increase the profit by leaps), it is not surprising that half of the K-524 NC systems, which come from the Kiev Tochelektropribor Plant, are rejected at the Plant imeni Kominterna at incoming control.

True, at the neighboring Machine Tool Plant imeni S.M. Kirov they found a solution: An entire additional brigade of electronic engineers was set up for correcting flaws in NC devices. But what kind of brigade will have to be organized tomorrow?... For low quality has become the Achilles' heel of practically all the components of the machine tool, which are accepted in accordance with the column "new equipment."

What kind of NC machine tool does the client get as a result?

S. Ryk, chief designer of the Vitebsk special design bureau and winner of the prize of the USSR Council of Ministers, cited for me devastating figures. Whereas the operational reliability of NC devices in the FRG is 10,000 hours (Japan is already threatening 20,000 hours), in our country it is actually eight to 16 hours....

"What is the solution?" I asked production workers.

The Vitebsk machine tool builders believe that the time has come to resolutely transform and rearrange the traditional organizational structure of the **scientific research institute-design bureau-plant** chain. To use, at last, the know-how of advanced world practice.

Thus, V. Sitov proposes to reorganize sectorial institutes so that the scientist would be forced to go to the designer. For this to establish on the basis of large design bureaus regional cost accounting centers with research laboratories for the development of prototypes of new equipment. Only within the walls of this center will the scientist at last work not for the benefit of the report and dissertation, but on the research which is necessary for the designing of specific machines and equipment.

And in addition to research laboratories to organize at the center a technically equipped experimental base and a pilot plant. And then the designer will turn over to plants of industry drawings of prototypes of equipment, which have been brought up to condition, with a developed technological process of their production.

At the Vitebsk special design bureau such a center is already being set up: A large research department and a network of testing laboratories have been organized. More than 1.5 million rubles were spent on this, but the results have recovered all the expenses. Today 60 percent of the equipment, which is produced in accordance with designs of the Vitebsk collective, is fitted out with microprocessor equipment.

While with the Krasnyy borets Plant the special design bureau organized a cooperative machine tool works jointly with one of the leading West German firms, and more than 20 percent of the output of the plant is already being exported. A similar works has also been organized with the plant of tool-grinding machines.

How rational is the idea of the Vitebsk machine tool builders today? It is for you, scientists and specialists, to judge.

Problems of Kazakh Academy of Medical Sciences Discussed

907A0195A Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 2, Feb 90 pp 3-7

[Joint conference of the presidiums of the USSR Academy of Medical Sciences, Kazakh SSR Academy of Sciences and the Collegium of the Kazakh SSR Ministry of Health Care: "Topical Problems of Medical Science and Practice in the Republic"]

[Text] A joint conference of the presidiums of the USSR Academy of Medical Sciences [AMS], the Kazakh SSR Academy of Sciences [AS] and the Kazakh SSR Ministry of Health Care Collegium was held at the KaSSR Academy of Sciences House of Scientists Conference Hall on 25 September 1989.

E.M. Asanbayev, Kazakh CP Central Committee secretary, K.S. Omarbekova, KaSSR Council of Ministers deputy chairman, and M.D. Dzholdasbekov, department chief for ideology, Kazakh CP Central Committee, participated in the joint conference.

U.M. Sultangazin, KaSSR AS academician and president, opened the conference.

The president stressed that we live in a special time, a time of significant changes in the social, public, and economic life of our country. The CPSU Central Committee Plenum, which discussed the draft party platform on the ethnic question, was held quite recently. The plenum determined a way to improve interethnic relations and build a Soviet Federation on the basis of the principle of self-determination of nations and full sovereignty of republics. In the Union republics, approaches to radical economic reform and to the concept of regional cost-accounting are being discussed. As of 1 January 1990, our republic is converting to regional self-management and self-financing. Therefore, we must define scientific policy: What are the place and role of the republic academy in all-Union and scientific programs, the connection to sectorial science, and the sources of financing? In particular, we must re-examine our ties to medical institutions from the viewpoint of coordination and finances. All this is the command of our time. The joint conference between the USSR Academy of Medical Sciences Presidium, the KaSSR Academy of Sciences Presidium and the republic's Ministry of Health Care Collegium is the natural response to the need for the healthy, harmonious development of our society.

All large scientific problems in medicine are interdisciplinary in nature. Therefore, in order to solve them we must consolidate not only the forces of various institutions, but also sectorial knowledge. In this regard, I would like to recall the words of Academician V.I. Vernadskiy, who said that scientists should unite not in professions, but in problems. In fact, physicians are working jointly with mathematicians, physicists, specialists in computer hardware, chemists, and biologists.

The implementation of measures to introduce the achievements of basic sciences in medical practice is of priority significance. For example, the application of the theory of graphs, combinatorial analysis, digital mathematics, and methods for organic and physical chemistry has made it possible to create new theoretical and practical directions which have sharply decreased the labor-intensity of creating new preparations. Utilization of a computer system (screening) has accelerated the search for anti-cancer preparations. The use of diagnostic mathematical modeling methods is of great practical and scientific significance. Today, computer imitation and modeling of various variants for the prognosis of treatment and the effectiveness of different therapy methods are extensively used in medical practice.

Even now, basic and applied research is being done in medical biology, chemistry and physics in the republic's Academy of Sciences. Thus, biologists are doing goal-oriented work in the fields of genetic and cellular engineering, the decoding of hereditary defects, immunology, and neurophysiology.

Over the course of many years, the Institute of Zoology has been studying the natural appearance and circulation of the agents of naturally appearing diseases, such as brucellosis, toxoplasmosis and others. In the area of the republic, the natural centers of a number of illnesses have been revealed and their circulation in nature, such as the role of wild animals in their spread among people, has been proven. This work was awarded the Gold Medal imeni K.I. Skryabin. Measures were developed and introduced in industry for the struggle against and prevention of a number of the most important diseases.

One of the fundamental bases of modern medicine and a promising direction are studies in molecular immunology, using the methods of cellular and genetic engineering. At the Institute for Molecular Biology and Biochemistry imeni M.A. Aytkhozhin, work is being done to create tests and diagnostics for viral hepatitis A and B and for flu viruses, based on molecular probes of the environment. Using genetic engineering techniques, preparations are being developed for immuno-prevention and immuno-therapy of staphylococcic diseases.

In connection with the troubled ecological situation of our planet, the question of studying the genetic consequences of pollution of the surrounding environment is urgent. The Aral Sea tragedy and the systematic conduct of underground nuclear explosions at testing sites in the area of Semipalatinsk are examples. Unfortunately, this question is not being given proper attention in the republic's scientific institutions. There are no clearly developed sanitation measures proceeding from the specific features of regions.

A serious problem now facing the country's health care system, as everyone knows, is the struggle against AIDS. Currently, the halting of possible paths for transmission of the human immunodeficiency virus is very important.

In this regard, studies have been started on the development of effective methods for the diagnosis of AIDS, the creation of a test system using natural purification of the virus and the design of testing systems based on individual proteins or chemically synthesized proteins. However, all this is obviously inadequate.

The study of biological membranes is of great significance for understanding cellular physiology and pathology. Thanks to the clarification of the molecular bases for the ion transport mechanism through artificial and biological membranes, a new class of membrane bioregulators, ionophores, has been created.

Unfortunately, President U.M. Sultangazin noted, research in molecular immunology and on the genetic consequences of pollution of the environment is done by few forces, helter-skelter, with insufficient coordination. The KaSSR AS Department of Biological Sciences should do serious organizational work in this direction.

In the fields of chemistry and biochemistry, the synthesis of many biologically important peptides and their analogues is being implemented; new biopolymers for medical purposes and fermentation and vitamin preparations have been obtained; a flu vaccine has been created.

A whole series of effective medicinal preparations was obtained as a result of studying basic classes of plant substances. However, biological tests of the new compounds which are being synthesized are not being performed at a proper level. Hundreds of preparations will not be approved for decades. The Ministry of Health should display greater interest in testing synthesized compounds.

Physics is having a tremendous influence on the development of medicine. The successes in optics and electronics have unusually expanded the possibilities for studying the functions of the human organism. Lasers, ultrasound, accelerators: These are all the contribution of physics to medicine.

Basic research has enabled us to develop many new instruments and devices for restoring the functional activity of an organism, for diagnosis, and for treatment of a number of diseases.

Unfortunately, many of these instruments have not found practical application in the treatment of patients, since they were not put into series production by the medical industry.

With bitterness, KaSSR Academy of Sciences Academician U.M. Sultangazin was forced to verify that the arsenal of technical equipment existing in the KaSSR Academy of Sciences system, concentrated in the institutes for nuclear physics, high energy physics, mathematics and mechanics, to this day are not fully used for scientific research in the field of medical science and practice.

For example, there is the situation with the Institute of Mathematics and Mechanics, which offered its services to the Kazakh Scientific Research Institute for Oncology and Radiology in the automation of data processing using a computer. However, this initiative did not find proper support on the part of the physicians.

A similar picture exists in the implementation of other scientific developments by scientists in medical practice. Thus, the radiopharmacological "thallium-201-chloride" preparation, developed for the early diagnosis of heart disease, is being used in medical practice, but in such small amounts that we are forced to sell this preparation to other ministries and departments.

The KaSSR AS and the republic Ministry of Health Care have old traditional ties. In 1980, the joint session of the General Meeting of the KaSSR Academy of Sciences and republic Ministry of Health Care was held on the topic of "Development of Basic Scientific Research for Medicine." A coordinating plan for joint scientific research work on the important directions of health care theory and practice and to implement the scientific results of basic and applied research, done by institutions of the KaSSR Academy of Sciences and the republic Minzdrav, were drafted and approved. However, this cannot be said regarding our ties to the USSR AMS.

The joint work of the inter-departmental scientific council of the KaSSR AS and the republic's Ministry of Health Care, which is systematically examining and directing the activity of scientific research institutes and higher educational institutions to fulfill the coordination plan and which implements the organization and conduct of scientific conferences and symposia, deserves attention. It is necessary to seriously think about forms of cooperation for temporary collectives and the joint use of equipment.

Further expansion of the work of academic institutes and health care institutions, aimed at solving the indicated scientific problems, at improving medical services for the population, and at the regular and purposeful conduct of preventative steps, is possible only with the presence of highly skilled specialists and a scientific and technical base.

The scientific potential of medical science in the republic consists at present of 10 members of the USSR AMS and KaSSR Academy of Sciences, more than 200 doctors of sciences and about 2,000 candidates of medical sciences. They work in 13 medical scientific research institutes, five higher educational institutions, the Institute for Improving the Skills of Doctors, and in academic institutes.

In order to eliminate the lag in certain directions of medicine, we must practice the internship work by young specialists in large scientific centers in our country and abroad in new scientific directions. We should also develop a joint program for training cadres in the near future. The republic's need for medical equipment is tremendous. Therefore, we deem it expedient to ask the government for the conversion of defense industry enterprises to the production of medical equipment.

In conclusion, the KaSSR AS president emphasized that the main task of today's joint conference between the USSR Academy of Medical Sciences Presidium, the KaSSR AS Presidium and the KaSSR Ministry of Health Care Collegium is to develop a strategy for the interaction of scientists on the most topical problems in medical science and practice for the republic, for coordinating matters of training scientific cadres, for problems of scientific research work and for promoting an improvement in the work of the intra-departmental scientific council. We must formulate recommendations for the 13th 5-year period: We must draft the priority basic scientific directions in medicine, proceeding from the interests of the region and the science's own internal logic of development; we must clearly define ways to cooperate with the USSR Academy of Medical Sciences.

The following gave reports at the conference: V.I. Pokrovskiy, president and academician of the USSR AMS—"Medical Science and Tasks of the USSR Academy of Medical Sciences in the Period of Restructuring;" T.A. Izmukhambetov, KaSSR Minister of Health Care—"The Status and Prospects for Development of Medical Science in the Republic;" Ye.V. Gvozdev, KaSSR AS vice-president and academician—"Comprehensive Scientific Research in KaSSR AS Institutes for Solving Topical Problems of Health Care;" T.Sh. Sharmanov, director of the USSR AMS Scientific Research Institute for Regional Problems of Nourishment, USSR AMS academician—"Regional Principle for Development of the USSR AS: The Most Important Condition for Raising the Effectiveness of Medical Science;" A.F. Tsyb, director, corresponding member, USSR AMS Institute for Medical Radiology—"Topical Problems of Modern Rheumatology;" V.I. Votyakov, director, BSSR Ministry of Health Care Scientific Research Institute for Epidemiology and Microbiology—"Tasks of Basic Research for the Progress of Theoretical and Practical Medicine;" S.V. Prozorovskiy, director of the Institute for Epidemiology and Microbiology imeni N.F. Gamalei—"Tasks of Biotechnology in the Field of Developing Modern Methods for Diagnosis of Infectious Diseases;" N.D. Beklemishev, KaSSR AS academician—"Theoretical and Practical Problems of Immunology and the Study of Allergies;" Zh.Kh. Khamzabayev, head of the scientific and technical administration of the KaSSR Ministry of Health Care, doctor of medical sciences—"Problems of Radiation Medicine in the Republic;" and B.Ye. Altynbekov, director, KaSSR AS Institute for Labor Physiology and Hygiene, KaSSR AS corresponding member.

After lively debates, a carefully considered resolution "On Coordinating Joint Studies by the USSR Academy of Medical Sciences, KaSSR Academy of Sciences, and KaSSR Ministry of Health Care for Future Development of Medical Science in Kazakhstan" was passed.

Coordinating Medical Research in Kazakhstan

907A0195B Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSR in Russian No 2, Feb 90 pp 7-10

[Resolution signed by V. Pokrovskiy, president and academician of USSR Academy of Medical Sciences, U.M. Sultangazin, president and academician of KaSSR Academy of Sciences, and T. Izmukhambetov, KaSSR Minister of Health Care: "On Coordination of Joint Research of the USSR Academy of Medical Sciences, KaSSR Academy of Sciences, and KaSSR Ministry of Health Care for the Future Development of Medical Science in Kazakhstan"]

[Text] Having heard and discussed the reports by V.I. Pokrovskiy, president and academician of the USSR Academy of Medical Sciences [AMS], T.A. Izmukhambetov, KaSSR Minister of Health Care, and other scientists, the USSR AMS Presidium, KaSSR Academy of Sciences [AS] Presidium, and KaSSR Minzdrav Collegium believe that directions of medical and physiological sciences, such as the regulation of lymph- and blood-circulation, study of allergies, oncology, radiobiology, reconstructive surgery, food hygiene, virology, and others, have received development in Kazakhstan.

Kazakhstan has 13 medical scientific research institutes, five medical VUZs [higher educational institution] and the Institute for Improving the Skills of Doctors. They have some 4,000 scientific and scientific-teaching employees, including one USSR AMS academician and one USSR AMS corresponding member, three academicians and four corresponding members of the KaSSR AS, 20 honored workers in science of the KaSSR, more than 200 doctors of sciences, and nearly 2,000 candidates of sciences.

Scientific work is being done on ten programs of the USSR State Committee on Science and Technology [GKNT]. In problems directed by the USSR AMS Presidium, work on 81 topics is being carried out. For purposes of expanding and coordinating scientific research on topical medical and biological problems in the republic, an Inter-Departmental Scientific Council was formed by a resolution of the KaSSR AS Presidium and the KaSSR Minzdrav Collegium. Within the framework of the council, comprehensive development work will be done by seven institutes of the KaSSR AS, by five KaSSR Minzdrav institutes, by the Alma-Ata State Medical Institute, and by a number of republic treatment and prevention institutions. This comprehensive work on the given scientific directions has made it possible to obtain a number of results, significant on the Union and international levels.

However, the condition of a number of health care problems in the republic, such as infant mortality, infectious disease, job-related pathology, ecological violations, etc., remain extremely troublesome and require scientifically substantiated and more constructive approaches to solving them.

First, the development of medical science must be given a strong preventative orientation in the near future. This relates to expanding and intensifying scientific research on the nature of diseases, on the specific features of development of diseases in the republic, on comprehensive scientific development of the theory for predicting the immediate or delayed states of problems, and on establishing a system for consistent medical and organizational measures.

Second, the further development of topical directions of medical science in the republic should be implemented, taking into account its complex specific features. The regionalization of health care problems as applied to the social, economic, climatogeographic, ecological, demographic, and ethnic conditions of Kazakhstan is necessary. This is important when specifying theoretical, organizational, and clinical tasks for solving regional problems and in the scientifically substantiated and rational allocation of existing resources.

Third, we must clearly define the priority scientific directions, whose development can create theoretical and methodological grounds for solving topical problems in the republic (infant and maternal mortality, infectious diseases, tuberculosis, oncological and cardiovascular diseases, and others).

Currently, these directions in our republic are: Medical genetics, questions of hereditary carriers through factors of the surrounding environment, viral and bacterial infection, teen-age neuro-endocrinology, adaptation in early ontogenesis, radiation biology, biotechnology, and others. The residual financing principle, the poor material and technical base of scientific institutions, and the shortage of highly skilled scientific cadres are holding back the development of basic work, research technologies and the achievement of qualitatively new results. The republic's ecological imbalance and adverse radiation situation have raised a number of acutely topical problems for radiation medicine.

The qualitative solution of these tasks calls for the integration of academic, sectorial and VUZ science, permitting us to achieve a more complete evaluation of the condition of the problem, to determine ways to accelerate the solution of various aspects in the direction of the standard goal: the reduction of morbidity, mortality and invalidism. The integration of academic, VUZ and sectorial medical sciences is a necessary condition for radical reorganization of the system of training scientific and scientific-teaching cadres and doctors in VUZs. This means raising the profitability of basic research, as well as the level of medical science on the whole and its significance for practical work.

For purposes of raising the effectiveness of joint development work and consolidating ties between academic and sectorial science and practical health care, the presidiums of the USSR AMS and KaSSR AS and the collegium of the KaSSR Ministry of Health Care HAVE RESOLVED:

1. To expand joint research by institutions of the KaSSR AS, KaSSR Ministry of Health Care, and the USSR AMS, with the involvement of institutions of the KaSSR Ministry of National Education and other republic departments in solving important medical and biological problems.

2. To define the following as the basic prospective directions in medical and biological research:

- Medical genetics and molecular biology
- Radiation biology
- Viral and bacterial infection
- Molecular mechanisms of human immunology
- Adaptation in early ontogenesis, teen-age neuro-endocrinology
- Perinatal pathology of mothers and children
- Problems of child mortality
- Scientific grounds for the nourishment of healthy or ill persons
- Ecological pathophysiology
- New technical systems in medicine (laser, ultrasound, plasma technology)
- Finding new methods and means for treatment of cardiovascular diseases, tuberculosis, and malignant neoplasms
- Creation of mathematical models for pathological processes and the use of computerized diagnostic and mathematical methods for studying the laws of the epidemiological process.

3. The KaSSR Minzdrav and Academy of Sciences, on the basis of competitive selection, are to start forming a coordination plan for joint research in the 13th 5-year period on the above-indicated directions, having ensured financing, and are to examine it at a joint conference of the KaSSR AS Presidium and KaSSR Ministry of Health Care Collegium in the first half of 1990.

4. The USSR Academy of Medical Sciences, KaSSR Academy of Sciences and KaSSR Minzdrav, when forming programs and plans for scientific research and development work, are to stipulate the use of modern forms of organization of scientific research: scientific intradepartmental centers, MNTK [Interbranch Scientific-Technical Complex], NPO [scientific production association], NUPO and temporary scientific collectives.

5. The republic Minzdrav and Academy of Sciences is to draft a proposal for the organization of a Kazakh Scientific Research Institute for Radiation Medicine and radiation medicine faculty and is to present this to the KaSSR Council of Ministers.

6. The USSR AMS and the republic Minzdrav and Academy of Sciences are to draft proposals to consolidate the material and technical base, which ensure the proper development of priority scientific problems of medicine for the republic, and is to submit these to the KaSSR Council of Ministers and USSR Minzdrav.

7. The USSR AMS and the KaSSR Minzdrav and Academy of Sciences has requested the republic Council of Ministers to examine the question of allocating enterprises, in connection with conversion, for the production of technology and equipment and the production of synthetic and natural medical compounds.

8. The KaSSR Academy of Sciences stipulates the possibility of joint use of unique, expensive hardware and computer equipment (accelerators, atomic reactor, spectrometers, etc.).

9. The USSR AMS Presidium, KaSSR AS Presidium, and KaSSR Minzdrav Collegium are to prepare a substantiated proposal on organizing the Kazakh Department (Scientific Center) of the USSR AMS with a specific list of scientific research institutions, which may be transferred to the department (center) being planned, on the amounts of its financing, and on the number of personnel.

10. The USSR AMS, KaSSR Academy of Sciences and KaSSR Minzdrav stipulate the possibility of expanding the training of cadres with higher skills in the field of basic research and the priority scientific directions of the republic, on the basis of academic institutions with the scientific guidance of scientists from the USSR AMS, KaSSR AS and KaSSR Minzdrav. The goal-oriented internship of scientific employees in the field of medicine and medical biology at large Union and foreign centers is to be used extensively.

11. The KaSSR Academy of Sciences is to examine the question of creating a data bank and supporting the step-by-step informatization of processes of scientific research in the field of medicine for the purpose of intensifying scientific development work and the immediate application of their results in practice.

12. The questions of practical implementation of scientific development work are to be examined at a joint conference of the KaSSR Academy of Sciences Presidium and KaSSR Minzdrav Collegium.

13. Supervision of the fulfillment of this resolution is entrusted to Ye.V. Gvozdev, vice-president and academician of the KaSSR Academy of Sciences, Professor Zh.Zh. Khamzabayev, chairman of the KaSSR Ministry of Health Care Scientific Medical Council, and D.S. Sarkisov, chief scientific secretary and academician of the USSR AMS Presidium.

Members Express Dissatisfaction With Marchuk Reelection

18140002A Moscow MOSCOW NEWS in English 13-20 May 90 p 5

[Article by Yevgeniya Albats, MOSCOW NEWS analyst: "Academy Makes Its Choice"; An afterword to the Presidential Election at the USSR Academy of Sciences]

[Text] As could have been predicted, there were no surprises: Academician Guri Marchuk was re-elected President of the USSR Academy of Sciences for another five years. I wish I could congratulate the Academy most sincerely, but I'm afraid that some of the spokesmen for research institutes who described Marchuk's past presidency as distinguished "by a readiness to ignore society's interests and experts' advice" would not appreciate my congratulations.

Why could this have been predicted? Because all the Academicians, including the ones I talked to in the nervous pre-election atmosphere, named Marchuk as the only real candidate. The argument was simple: "There's no alternative..."

There were a few, though. This time the Academy was not "granted" its President as happened in October 1986, when Guri Marchuk, the only candidate, was brought in and introduced by Secretary of the CPSU Central Committee Yegor Ligachev. This time the Academy was trusted to nominate its own candidates. But all five nominees refused to run: Academicians Osipyan and Shatalin refused because they were busy enough as members of the Presidential Council; Academicians Alferov, Gaponov-Grekhov and Basov found other equally plausible excuses. Once again, there was only one name on the ballot. Never mind that Academician Khristianovich who proposed Basov for President spoke rather acidly about Marchuk's mediocrity as a scientist (glasnost is glasnost!), and insisted that the Soviet Academy should be led by a scholar of world renown. His opinion found no support, which is quite symptomatic, really.

Cautiously if not cooly received four years ago, Marchuk has gained in authority since. Today he is spoken of as a forgiving person, an experienced organizer, and a leader with useful connections at the top. But I feel that Marchuk's most valued asset is his aura of stability. For three years I've attended the Academy annual sessions and listened to President Marchuk's invariably optimistic reports, which I found difficult to correlate with the position of Soviet science in the world.

This year's report presented by Guri Marchuk at the annual session just before the election dismissed whatever fears might have remained of risky steps or sharp turns in his policies. He said: "The creative activities of our scientific community need stability, and we have managed to protect the USSR Academy of Sciences from many destructive forces." For aging Academicians this is all important, no doubt. According to Academician Ginzburg's estimate, the Academy's average member is 69 and a half years old; 139 members are over 70; 106 are over 75.

"There were neither intrigues, nor quarrels, nor power struggles," an Academician I hold in high esteem told me. "Nothing. Complete indifference, aside from the desire to preserve everything as it is."

The last three and a half years were not the easiest for the Academy financially (a disintegrating economy has meant fewer demands on advanced science) and morally, given the Soviet brain-drain and the Academy's dwindling reputation.

The Academy's reputation as the "stronghold of science" and as an island of relative democracy has fallen sharply. For many reasons including the Chernobyl disaster and the wave of scandals that swept through the Academy's institutes as they elected their directors.

For perfectly understandable reasons (few directors are not Academy members) the Academy leadership's attitude toward those elections conflicted with that of the rank-and-file majority (some 220,000 Doctors, Candidates of Science and staff researchers work within the framework of the Academy). The last straw was when the Academy was electing People's Deputies to the First Congress, and the General Assembly did not find Academician Sakharov worthy of its mandate. Only the intercession of the broad scientific "masses" corrected this obvious lapse. However, the event brought out into the open the schism between the Academy proper (306 Academicians and 567 Corresponding Members), and the researchers who do the actual science and depend strictly on the Academy.

The latest Presidential election has only "reinforced" this schism. The Appeal signed by representatives of the Academy's research institutes and delivered to the Presidium, was never read out loud. "One day we shall be ashamed of this election," another esteemed Academician told me. "I am ashamed already..."

The farther to the left the times have shifted, the more radical the research community has become, the more conservative the Academy appears. What about the Academy's reputation as the country's intellectual elite?

Academies, as elitist assemblies for scholars, exist in many countries. Unlike most academies where members must pay dues, the Soviet Academy (the very establishment meant to add respectability to the totalitarian regime) pays its members. This may be perfectly all right, considering that in civilized countries many of our leading scientists might have enjoyed greater bounty than their academics' salary plus 250 roubles a month for Corresponding Members and 500 roubles for full Members. But those bonuses are like honey to those seeking to join the Academy by hook or by crook. They are also the material lever used to keep independent, free-thinking and therefore potentially dangerous intellectuals under control. If you want to become a Member of the

Academy (which means greater prestige and career opportunities, such as an independent research unit, good scientific equipment or an administrative post), keep your mouth shut, and abstain from all social and political activities. If you cannot meet that requirement, forget about the opportunities.

I have witnessed several elections to the Academy. To an outsider they all looked like intrigues, disgraceful for intelligent people and often purely manipulated. An Academician I know said: "Newtons have no time to elbow their way up, therefore they are pushed aside by clever, energetic and indifferent scientists with indifferent morals, who now make up the Academy's majority." Add to that the right that some "competent" bodies have to reserve seats for "important" personages (the subject raised by Academician Ginzburg in IZVESTIA a short time ago), which right they use for bargaining of this kind: "You elect so-and-so, and we will give you a slot." As you see, there are many strings to be pulled. (To give the Academy its due, candidates nominated "from above" have often been black-balled.)

Anyway, many scientists who now make up the Academy's core spent years working to get admitted, even if they didn't play the various "games." And so they prefer to keep the code of silence and non-resistance out of time-honoured inertia. Also, with time they became the centres of bigger or smaller groups of colleagues and assistants, for whom they feel responsible, and this responsibility is often incompatible with personal freedom.

In this country, science always thrived on secrecy. Classified fields of research had priority when it came to equipment, funding and personnel. Many scientists chose to work on secret projects because they offered normal work conditions. But the atmosphere of fenced-off settlements, restricted institutes and research centres enjoying the patronage of "competent" authorities was not conducive to independent thinking. Thanks to these special privileges for "secret" projects, many new Members who joined the Academy without being directly involved in the fundamental sciences brought with them paramilitary principles and thinking.

What about Andrei Sakharov? This exception only proves the rule. He was not the only scientist to study the physics of the atom bomb and other bombs, but he was the only one to speak out against expanding nuclear tests. If there were more scientists who felt guilty and wanted to repent, they kept that desire to themselves.

In recent years the Academy has lost many of its leading lights who set the moral and ethical standards for the academic community—even if they were always followed. As I scanned the audience listening to their new President, I could hardly identify those who could and would replace the old guard now dead. Will the young, eager ones come to replace them? They will, if they don't leave for the West to seek freedom. What then?

This is sad, because this is the end of one of our dearest illusions: "The economy has degenerated, but our intellect is intact." Is it really?

Market Economy Increases Need for S&T Forecasting

907A0175A Moscow NTR TRIBUNA in Russian
No 3-4, 23 Feb 90 pp 12-13

[Article by Doctor of Economic Sciences S. Perminov, director of the Institute of Economic Problems of Science and Technology: "The Symmetry of Responsibility"; first two paragraphs are NTR TRIBUNA introduction]

[Text] The scenarios of technical development, which answer the question: "What would there be, if we were to adopt one version or another of scientific, technical, and investment policy?" are of the greatest practical interest in the forecasting of scientific and technical progress.

Doctor of Economic Sciences S. Perminov, director of the Institute of Economic Problems of Science and Technology, continues the discussion on forecasting in science, which was begun last year (NTR, Nos 4, 16, 21).

The restructuring of the economic mechanism and the democratization of the management of the economy presume substantial changes in the system of scientific and technical forecasting. This is connected first of all with the shift of the center of gravity in the making of economic decisions at the level of the enterprise (association). In 1989 three-fourths of the investments in retooling were made already by means of the internal assets of enterprises (associations). In connection with this it is possible to foresee that with the transformation of scientific and technical progress into a decisive factor of profitability the interest of enterprises in the tasks of scientific and technical forecasting will also increase. Indeed, the study of the technological situation is no less important than marketing. Consequently, in the future the status of technological forecasting at the level of the individual unit should increase substantially. In this respect the example of the United States, where, on the one hand, there is an enormous demand for forecasts on the part of corporations, while, on the other, a large number of flourishing consulting firms, which provide scientifically sound advice, exist, is indicative.

On an Information Diet

The receipt of primary information for analysis should be achieved as a result of a kind of "monitoring" of scientific and technical progress. Along with regular statistical information the gathering of data on specific situations of the application of new technologies, including the technical and economic, ecological, and social characteristics and the used organizational forms and economic levers, is of exceptionally great importance.

Let us explain this, having examined several traits of the existing system of the statistics of the sciences. It includes several tens of reporting forms. Established back in the 1960's, this system does not make it possible to answer reliably the following elementary questions: How many organizations, which conduct research and development and provide scientific and technical services, are there in the country; what is the number of specialists who are engaged in this work, and so forth. The procedure of calculating the expenditures on scientific research, experimental design, and technological operations leads to significant double counting (according to our estimates up to 30 percent). Finally, the methodology of the Soviet statistics of science differs so substantially from the international standards, which have been adopted in this area, that it is impossible to make in a high-quality manner international comparisons in this area.

If we speak about the principles of the restructuring of the statistics of science, not scientific institutions, but scientific and technical operations proper, which are being performed more and more extensively at nonspecialized organizations, first of all at enterprises, should be, in our opinion, the basic objects of statistical record keeping. It is necessary to broaden the group of operations, which are an object of observation of the statistics of science, having included miscellaneous scientific and technical services, the role of which is growing to the utmost.

On What the Forecast Depends

I believe that the most difficult questions, which it is necessary to clarify as a result of forecasting, are the following.

1. In what direction and at what speed are we moving in the "space" of the most important technical and economic parameters? Is a change of trends occurring?

2. To what extent can economic levers, as well as changes in innovation, technical, and investment policy influence the formed trends? What are the alternatives? What are the range of maneuvering, the real goals, and the possible scenarios of development?

3. How is one to overcome the lag behind leading countries in the situation, when the diffusion of key technologies is being carried out in the world with an ever increasing speed, that is, on an ascending section of growth?

Thus, attention is being focused on the situations of "change," "breakthrough," and so forth, while at the same time the extrapolation of the formed trends in the development of equipment and technology is the most traditional method of forecasting. Under the conditions of the acceleration of scientific and technical progress and the radical changes of the technological structure of the economy this method proves to be ineffective. The extrapolation approach is also inadequate because, strictly speaking, the formulation of scientific, technical, and investment policy for the future is the goal of forecasting.

The Adjustment of the Economic Mechanism Is Needed

The formulation of scientific and technical policy should include not only the identification of the priority directions of scientific and technical progress, but also the specification of the demands on the economic mechanism, which is called upon to ensure the needed technological changes. Indeed, technical innovations differ in their specific nature and, hence, the special adjustment of the economic mechanism is needed: the specification of economic standards and rates of taxation, the choice of the best organizational form for the conducting of research and development. For example, interbranch scientific technical complexes are needed in the "breakthrough" directions, while small forms are needed in programming for computers.

The central issue is the assurance of the leading development of the priority directions of scientific and technical progress by the creation of the conditions of most favorable economic treatment. The changeover of scientific organizations of self-financing has changed radically not only the alignment of economic interests, but also the financial proportions in this sphere. Particular difficulties arose precisely during the transition period, when the actually formed flows of scientific and technical products suddenly received a different financial reflection.

The present breakdown of the scientific potential by directions of scientific and technical progress and sectors of the national economy formed mainly as a result of development in breadth. The arrangement is very simple: If a new direction appears, resources are allocated for it (an institute or subdivision is established) in part by proportionate "paring" from others.

Let us note another fundamental property of innovations, which requires consideration in the economic mechanism: The end national economic impact from a major innovation is distributed over the economic system and in time. The results of the use of a development can have very far-reaching consequences, while already obtained scientific and technical knowledge (for example, new technologies) is easily duplicated, can be used for a very long time, and can be of benefit without substantial additional expenditures. This can lead to a contradiction that is hard to resolve, when major, "revolutionary" innovations, which are advantageous for society as a whole, prove to be disadvantageous for development by individual economic units.

In such situations along with administrative pressure the economic mechanisms of the orientation of the interests of developers toward the interests of the national economy, particularly the extension of bank and commercial credit, should be put into action.

The broadening of economic responsibility and independence can be accomplished, in our opinion, on the basis of the principle of "the symmetry of responsibility." This means that economic relations not only "horizontally," but also "vertically" should be formed on the basis of contracts, which establish the clear responsibility of all the participants in the innovation system, material stimulation, economic sanctions, and clearly specified intermediate and end results. The formation of the system of the management of scientific and technical progress on the basis of mutually advantageous contracts would change radically the functions of organs of the management of scientific and technical progress. The bureaucratic apparatus of administrative pressure will not be needed, since the center of gravity is transferred to analytical and economic work.

The improvement of the economic mechanism in the scientific and technical sphere essentially means "the designing of a market" of innovations. This task is unprecedented in its scale and is new on the theoretical level.

It seems necessary to create a special infrastructure of the system of investment and information cost accounting organizations for the goal-oriented financing and crediting of development. World experience shows that in science-intensive sectors for the sustaining of a fast pace of innovations a significant share of development can be performed by small scientific and technical organizations, which, adhering to specified ultimate goals, assume the risk and make the primary selection of innovations. The excessive monopolization of the scientific and technical sphere does not allow the market mechanism to function normally. The investment infrastructure in the scientific and technical sphere should, thus, achieve the reorientation of the scientific and technical potential, promoting the creation and rapid development of organizational forms, which are most identical to the content of one development or another.

President of 'Resurrected' Physicists Society Interviewed

907A0191A Moscow PRIRODA in Russian No 3, Mar 90 pp 71-76

[Interview with Doctor of Physical Mathematical Sciences Professor Sergey Petrovich Kapitsa, president of the USSR Physical Society, by Yu. N. Yeldyshev and N. D. Morozova, under the rubric "The Organization of Science": "The Restored Society"; date and place not given; first two paragraphs are PRIRODA introduction]

[Text] The constituent congress of the USSR Physical Society was held on 17-18 November 1989 in Moscow. In all 800 delegates from 93 cities, 200 institutes, and various scientific organizations of the country took part in its work. At the congress the charter of the Society was adopted, the structure was approved, and the board made up of 50 people was elected. Professor S.P. Kapitsa was elected president of the USSR Physical Society, Professor Yu.V. Novozhilov was elected vice president.

Believing that the readers of PRIRODA might be interested in finding out about the nature tasks of the Society, we asked S.P. Kapitsa to answer a number of questions.

[Boxed item: Sergey Petrovich Kapitsa, doctor of physical mathematical sciences, professor, head of a laboratory of the Institute of Physical Problems of the USSR Academy of Sciences and the Chair of Physics of the Moscow Physical Technical Institute. His basic scientific results pertain to hydrodynamics and electrodynamics, magnetism, nuclear physics, and the physics of accelerators. Deputy chairman of the Commission for Synchrotron Radiation attached to the Presidium of the USSR Academy of Sciences. Member of the Club of Rome, the Pugwash Movement of Scientists, and the Committee of Soviet Scientists for Global Security. Member of the editorial collective of PRIRODA, editor in chief of the journal V MIRE NAUKI. Director of the program "The Obvious—the Incredible" on Central Television. Winner of the Kalinga Prize for the popularization of science (instituted by UNESCO).]

PRIRODA: First of all, permit us to congratulate you, Sergey Petrovich, on behalf of the editorial collective, the editorial board, and, we believe, many readers of PRIRODA, with which you are connected by many years of close cooperation not only as a member of the editorial collective, but also as an active author of it. It is especially pleasant for us to do this, since the election was conducted on an alternative basis and you had worthy rivals. But now allow us to ask the first question: In connection with what did the idea of establishing the Physical Society arise?

S. P. Kapitsa: The formation of such a Society is a natural step in the development and democratization of our science. In the management of the country we are now switching from a linear, hierarchical, completely determinate structure to a far more complicated model. The same thing is also occurring in the management of science, particularly physics. The Physical Society is necessary especially as a search for new, alternative forms of the organization of science is under way. Our main task is to unite physicists, who work in science and industry, at universities, higher educational institutions, and schools. Now, according to the data of the Central Statistical Administration, there are 400,000 of them, of them about 80,000 are candidates of sciences and 10,000 are doctors of sciences. This is the aktiv which should be united around the Society.

In addition to departmental isolation there also exists demarcation by specialties, by the narrow sections of knowledge, in which each of us works professionally. It is necessary to seek more effective means of becoming a part of world science—for many decades our physics developed if not out of touch with it, then in a certain isolation. Finally, we are realizing to a greater and greater degree the necessity of the protection of the

professional rights of physicists and the interests of physics as a science. But today this is especially important due to the revival, even the advance of antiscientific and anti-intellectual trends and moods. To an even greater degree this is important due to the place and importance, which can and should belong to science itself, and first of all physics, in the revival of our country and in the restructuring of society.

PRIRODA: But in Russia a similar society already existed.

S. P. Kapitsa: You are correct, there was actually such a society, and we have every reason to speak not so much about the formation of the Physical Society as about the restoration or, if you wish, the continuation of the activity of the physics section of the Russian Physical and Chemical Society, which was forced to cease its activity in 1930, when the majority of public professional organizations were dissolved.

The Russian Physical and Chemical Society was formed in 1878 by the merging of the Russian Chemical Society, which was founded in 1868, and the Russian Physical Society, which was established in 1872. The decisive role in this belonged to D.I. Mendeleyev. The halt of the activity of the Society was partial, inasmuch as in 1937, however paradoxical, it was possible to organize the All-Union Chemical Society imeni D.I. Mendeleyev. In 1946 an attempt was also made to restore the Physical Society, but in the corresponding appeal the resolution of Stalin appeared: "Let physicists deal with their own business." The bomb was the "business" of physicists.

Later the question of restoring the society was raised by the General Physics and Astronomy Department of the USSR Academy of Sciences; I remember that L.A. Artsimovich and I spoke repeatedly about this. It would seem that everyone agreed that this would be very good, but...the question remained open. In January 1989 an organizing group, which set the goal to resume the activity of the Physical Society, gathered; in February constituent assemblies of the physical societies of Moscow State University and the Physics Institute of the USSR Academy of Sciences were held. At the meetings of the organizing group a draft of the Charter was drawn up, while in May the decision on the preparation and holding of the Constituent Congress was made. From May to October the formation of physical societies and departments of the Physical Society took place in Moscow, Kharkov, Leningrad, Irkutsk, and other cities. And now, finally, in the middle of November there is the Constituent Congress; it was held in the Assembly Hall of Moscow State University, and all its participants are grateful to the University and especially the Physics Faculty, which did so much for its successful holding.

PRIRODA: What tasks, in you opinion, should the Physical Society accomplish and what place is being assigned to it in the existing structure of the management of society?

S. P. Kapitsa: So that it would be more clear what place it could hold, I will recall how our physics is "arranged." The most influential organ is the General Physics and Astronomy Department of the USSR Academy of Sciences. About 150 members of the Academy, that is, one-sixth of its membership, are united in it and in the Nuclear Physics Department. Here the most important research is planned and directed, priorities are determined, and many personnel and organizational issues, for example, the establishment of new institutes and laboratories and scientific journals, are settled. An important place in the "physics world" belongs to the branched network of scientific councils—there are more than 50 of them. As a rule, they are organized on a broad basis, in order to overcome departmental isolation, and follow the development of individual fields of physics, coordinate and hold conferences, seminars, and schools; many of them have their own journals and maintain international contacts. I would say that this is a kind of public organization, which is operating well within the quite formalized system of the Academy. Precisely the work, which in many countries sections of the national physical societies perform, is conducted in the scientific and problem councils. Our Society needs to establish reasonable working contacts with the scientific councils, while in no case duplicating their activity, but rather augmenting it. Perhaps, this is now one of the basic difficulties, since if the Physical Society had not interrupted its activity, it would have occupied its own ecological niche in an evolutionary manner. Now this is all the more difficult as the past 40 years were years of the rapid growth of our science, while the Physical Society must start from scratch.

And all the same the group of tasks, with which the same Academy is not dealing and, apparently, should not deal and which an organization similar to our Society should accomplish, is now already visible.

First of all these are questions of education. The Committee for Public Education has come forth with important initiatives in this area. But physicists should look at the problem of education from their own professional point of view in a unified manner. This problem has several aspects.

I will begin with the fact that the most effective method of the "assimilation" by society of the results of basic scientific research is through the system of higher education. It is believed that the gap between basic and applied research comes to 25 years. This is precisely the time, during with it is possible to teach the new generation new ideas. Thus, quantum mechanics first entered the consciousness of physicists who deal with solid-state physics (during the development of the theory of semiconductors and the invention of transistors), and then these notions took root in the consciousness of engineers at enterprises, which assimilated the production of semiconductor instruments. Unfortunately, in our country the gap, which had formed between the higher school and science, led to large losses. Many physicists tried to resist this, but the matter went no farther than the

establishment of the Moscow Physical Technical Institute and the Moscow Engineering Physics Institute and a number of other institutes and faculties of universities in Novosibirsk and Kharkov. As a whole universities were cut off from scientific centers, while technical higher educational institutions fell decades behind modern scientific standards and the level of physics, which, undoubtedly, contributed to the decline of engineering education.

Further, it is necessary to reinforce the teaching of physics in the school; this is especially urgent in connection with the proposed transformation of instruction in the natural sciences through the entire school complex. The recently formed Association of Physics Teachers, which has become a part of our Society, should play a significant role in this.

The development of a set of textbooks is closely connected with the teaching of physics. Thus far neither the proper progress nor order exists here, so that the assistance of the Physical Society is extremely necessary. The development of physics textbooks and the aspiration to increase the overall level of teaching are being complicated in a number of republics by the problems of the national language. For all the self-value of linguistic culture it must be remembered that there is no Soviet, Russian, or Ukrainian physics—there is only world physics, and language for it is only an information medium, which should be as universal as possible. For example, in the Scandinavian countries they teach physics in English. The Physical Society should fight for a high level and universality of knowledge in all corners of our country.

The importance of the systematic promotion of physical and mathematical knowledge is increasing sharply. The search for new forms of promotion is possible and necessary, we should oppose the turbid wave of mysticism, occultism, and pseudoscience, which is now rising. Unfortunately, astrologers are availing themselves more of glasnost than astronomers are. This circumstance is arousing great alarm, inasmuch as in such a situation not only is it easy to give birth to a new Rasputin or Lysenko, but it is also easy for science itself to lose authority and positions in society, in which the previously dozing antiscientific and anti-intellectual moods and irrationalism have been stirred up markedly in connection with the general crisis which has enveloped the country. The authority of the Academy of Sciences here is very important, but more often, in my opinion, the statements of the Physical Society can be more opportune and more effective (is it not better to take aim from a lighter and more accurate gun of our caliber than to fire from the "academy" cannons?).

Thus we are facing a complex set of moral and ethical problems which are connected with modern science, and physics in particular. Unfortunately, we are poorly prepared for discussion in this area and do not have adequate traditions. But physicists should participate without fail in the formation of social consciousness. Here we are faced with the problem "physics and society" in one of its most poignant manifestations.

Further, I regard as one of the basic tasks of our Society the settlement of the questions of entrepreneurial activity in physics—the development, introduction, and cooperation of every kind of production. No one, after all, is also dealing with this: The State Committee for Science and Technology considers questions of this sort to be beneath its dignity, the Academy of Sciences gives an hostile reception to any idea of establishing scientific cooperatives. Perhaps it is a matter of a not entirely apt name, it is a question of temporary forms of unification in accordance with scientific interests and tasks. They require support and development as a method of introducing scientific developments. However, the means of solution here are not so obvious. How is one to use in the best manner the recognized, for the present truly great potential of our scientists and the energy and knowledge of an entire generation of physicists? Apparently, it is necessary to seek with far greater responsibility and boldness new, truly effective means of implementing the achievements of physics in practice, and the Physical Society should direct attention to this.

PRIRODA: One of the most sore subjects for modern science is the financing of basis research. What do you think about the appeal, which was heard at the congress, that the Physical Society would carry out the monitoring of the distribution of assets for basic physical research?

S. P. Kapitsa: I would not group this with the chief tasks of the Society. For it is necessary to have not so much the desire as the necessary moral authority. But money will not appear because we scream loudly. On the contrary, in this way it is possible, rather, to cause a split, which in the end will lead to losses for science.

But then to defend its image and to help to develop a proper attitude toward it—the Physical Society should, of course, deal with this. Today the level of basic research in many respects does not satisfy us. The state of physics to a certain extent predetermines the development of many sections of science and technology, therefore, a special place belongs to physics. Today, when the pragmatic, cost accounting approach to science is so prevalent, it is especially important to distinguish and defend the priority of basic research. On no account must one measure this activity with the ruble or even the dollar, but it is necessary to be sufficiently critical and to evaluate achievements in the area of basic research in accordance with the highest world standards. Precisely here, where there are no other criteria except the quite abstract criteria of the lofty truth, the support of the public opinion of both our colleagues and the international community of scientists is especially important.

Finally, much advanced research in the field of basic physics requires complex and expensive facilities. Did we always determine correctly the priorities in this area, were the large amounts of assets, which the state allocated for the construction of accelerators and reactors,

plasma chambers and space research facilities, justified? For such projects cost at times hundreds of millions of rubles. It is necessary to explain this, moreover, at an easily understood level, to both the Supreme Soviet and the people's deputies, among whom, incidentally, there are quite a number of physicists. The question of why it is necessary to spend money on accelerators and not, for example, on disposable syringes, is entirely reasonable. The independent examination of such projects is urgently needed in order to convince everyone of their necessity and to prepare public opinion.

Similar hearings also take place in the U.S. Congress. I spoke there myself as an expert, telling about "nuclear winter" together with our and American specialists, in order to explain to the senators the essence of the problem. And this is not an isolated case. Professor W. Panofsky, one of the most prominent American physicists, told me how he had occasion to address the Senate and to explain why it is necessary to build huge accelerators. It was a question of the financing of the E. Fermi Laboratory. This was the largest accelerator project in the world. Military men came out against it, asserting that such huge facilities are not needed and it is better to invest the money in aircraft carriers and missiles. On this Panofsky disagreed with them: If in the United States there is no real science, aircraft carriers and missiles are not needed—what is one to protect by means of them? I believe that we should also keep this consideration in mind.

PRIRODA: Sergey Petrovich, do you know how the money for major projects in science is now actually distributed?

S. P. Kapitsa: In my opinion, no one knows this clearly. I, for example, am on the Scientific Council for Problems of the Acceleration of Charged Particles of the USSR Academy of Sciences; we discuss projects as a whole and examine plans, which are adjusted and approved, but it must be said that the system of financing is extremely disordered and, what is the main thing, is concealed from the eyes of the scientific community, and practically all the deadlines of the construction of large accelerators were violated by many years.

PRIRODA: Will the Physical Society be able to clarify this question if only to some degree?

S. P. Kapitsa: I would say that it has such a chance, but I do not know whether or not this will happen, because, if it is divided into hostile groups and is turned into an arena for squabbles, the settling of scores, and the protection of the interests of individual groups, it is of no use. But if our Society proves to be sufficiently conscious and mature, there is hope for success. And only social experience, which we will acquire in the process of activity, as well as in the extensive public discussion of all issues, can be a guarantee of it.

PRIRODA: Are you not afraid that the Physical Society with time might become just another centralized bureaucratic organization, the staff of which as a result will work for its own benefit, while trying to convince the community in so doing of its necessity?

S. P. Kapitsa: It is impossible to accomplish the tasks, which the Society is setting for itself, by the old directive method. Therefore, the principle of the organization of the Society should be a federative one. In it we want to see a union of independent and autonomous regional societies and departments at large scientific centers and institutes, which unites physicists for the accomplishment of common tasks. Bureaucracy is a tool of centralism. Therefore, if we do not restrict by bureaucratic methods the activity of the organizations which are a part of the Society, all of this does not threaten us. The all-union society should do what is interesting to everyone, while local issues—in the area of education, personnel, and entrepreneurial activity—should be settled locally, where a switch to direct international ties is also necessary.

PRIRODA: At the congress, it seems, were attempts already made to avert the danger of "bureaucratization," when there was advanced to the proposal to elect a board of the Society, which consists of not more than 20 members, the counter proposal, which calls for voting for the maximum possible membership of the board with the mandatory rotation of its members?

S. P. Kapitsa: I do not agree that the board is a bureaucratic organ; in my opinion, this is a consultative organ which represents the congress for the making of some decisions or others. All the life in the Society, in my opinion, should take place in its commissions and sections. While the so-called leadership should make available to them the appropriate conditions—moral, financial, and others. The only thing that is, perhaps, material is the opportunity to influence the nomination of those people, to whom one direction or another in the activity of the Society will be entrusted. To think that the board is a tool of power and to view it from such a point of view seems to me to be an extreme oversimplification.

PRIRODA: Was the experience of analogous organizations abroad used when preparing the Charter and the structure of the Society?

S. P. Kapitsa: Of course, and first of all that of the European Physical Society. I know it well, inasmuch as for a number of years I was the representative from our country in it and at one time vice president. Its model is more or less identical to our Society. Unfortunately, so far we have not used very effectively the channels of contact and exchange with it. Thus, the European Physical Society organizes every three years the European Physical Assembly, at which up-to-date surveys on all the main directions are given, we send there at best a few people. How many times we proposed to conduct a similar measure in our country, but there was no one to undertake this. Moreover, congresses of physicists have not been held at all in our country, the Constituent Congress is the first one. Unfortunately, scientific problems were not discussed at it, while the debate was

mainly over the Charter. The Physical Society, undoubtedly, should come forth with the initiative of holding conferences, especially on major, interdisciplinary issues.

The experience of the American Physical Society—a powerful organization, which publishes several tens of journals and has its own publishing houses and expert councils and the finances of which are formed by membership dues and publishing activity—is very interesting; it comes forth with serious public initiatives which concern, for example, the popularization of science. Precisely the American Physical Society came out with in-depth criticism of the Strategic Defense Initiative program. Here is an example of what an independent, extradepartmental examination can do. But indisputable authority, which it is possible only to win, and not to declare, is needed for this.

The American Physical Society subsidizes and organizes major conferences and congresses, which each bring together several thousand people. Such measures are very important for young scientists, who, first, will be able to see their older colleagues and, second, have chances to speak and to be noticed. In general, I should emphasize that it is necessary to stimulate the mobility of our scientific personnel. Until recently the long-term assignment of scientists and teachers to prominent scientific centers and universities of the world was nearly absent in our country; exchange, both within the country and with foreign countries, is inadequate, mainly due to financial and bureaucratic obstacles. Now new opportunities are also being afforded for practical studies of young physicists abroad, it is necessary to think about the organization and coordination of this activity.

PRIRODA: Of course, this is an effective method of overcoming isolation and a certain provincialism. However, at the same time a number of problems, which we are only beginning to realize, are arising, and among them is the so-called brain drain. What do you think about this?

Kapitsa: This is a very serious issue, it requires a separate discussion. The fact that in our country they have agreed to such important steps—they have eliminated practically all obstacles for international exchange—is a great and good deed. Undoubtedly, it will lead to the significant improvement of our science. Here some costs are also inevitable, and I would not begin to fear this. But it is not necessary that excessive emotions, from which we have already suffered so much in the past, would arise. On the other hand, perhaps, this will force us to treat more seriously our scientific personnel, especially young personnel, who are now faced with a choice—either to work in their homeland on wretched terms or to work for world science in other countries, where, incidentally, the level of our education for the present is recognized as high (such educational institutions as Moscow and Leningrad Universities and the Moscow Physical Technical Institute provide personnel at the world level). However, the conditions, under which young scientists work, far from everywhere and far from always correspond to world standards. This is also giving rise to a "brain drain." Hence the conclusion that it is necessary to treat domestic scientific personnel much more considerately, to encourage international contacts in every every way and not to limit them, and to make the appropriate conditions available to the people who are valued according to the world scale of values.

PRIRODA: Now it is fashionable to speak about the conditions of existence, the conditions of financing. How has this question been settled in your Society?

S. P. Kapitsa: A fund of the Physical Society is envisaged by the Charter. It will be formed first of all from the dues of the organizations that are encouraging the activity of the Society, we call them cofounders (it seems to me that sponsor is not an entirely apt word), and from individual membership dues. I will recall that we have three main founders—the Committee for Public Education, the USSR Academy of Sciences, and the Union of Scientific and Engineering Societies (SNIO). When organizing the Physical Society we used the infrastructure of this Union. The Union of Scientific and Engineering Societies gave us much assistance and made certain financial and manpower resources available so that we could begin our activity. For the most part we count on the dues of the institutes and societies, which will cooperate with us. Such money is already appearing. Moreover, the Society itself has many opportunities to earn money: It is possible to conduct a scientific examination, to engage in publishing activity, to prepare textbooks, and to interact with cooperatives. But this, of course, is not the method of financing science, especially basic science.

PRIRODA: Has the amount of the individual membership dues already been determined?

S. P. Kapitsa: Yes, it will come to 10 rubles.

PRIRODA: And the dues of organizations?

S. P. Kapitsa: As they say, whatever one can pay.

PRIRODA: Thus, the USSR Physical Society is setting to work. With what will it begin? What, in you opinion, is it necessary to undertake first of all?

S. P. Kapitsa: The main thing is to arrange the priorities correctly. It seems to me that it is possible to begin with education; the problems of young people are very important; then there is the establishment of ties with scientific councils. The interdisciplinary research, which first of all is connected with ecology, is interesting. The present ecological imperative requires an integrated approach, in which physicists and chemists, mathematicians and systems researchers, economists and sociologists should together seek and propose solutions, prepare public opinion, conduct an examination of projects, and form skilled personnel in a area, where there are not established traditions, but the need and the pressure of external factors are great. I would also group here the questions connected with interdisciplinary introduction.

For example, modern physics and medicine: How is one to help domestic medicine get out of dire straits, what is the possible contribution here of experimental physicists? Our country so far has not been provided with X-ray, positron, and nuclear magnetic resonance tomographs, ultrasonic diagnostic equipment, and many other achievements of science and technology. As for the military field, such scientific and technical questions as arms control and the verification of international agreements are also on the agenda. This is the international function of science, in which a conspicuous place belongs to physics.

I believe that now many social questions will appear. In connection with the conversion of the defense industry and the decrease of expenditures on defense the problem of what to do with the scientific sector of the military industry is arising, for a large army of physicists, which is working in different "boxes," exists. In addition to the obvious question of their professional job placement or change of specialization, the broader problem of the preservation and efficient use of this very valuable potential is also arising.

As to our very first direct actions, they are the following. First, we need to get premises. Then, and this is very important, this is what we have already begun to deal with, there is the formation of commissions and committees. Much will depend on who will work in them and on whether we will be able to find worthy and active people. At the beginning of the year it is planned to hold a plenary meeting of the board of the Society, at which all the representatives of the commissions, who, incidentally, should not at all be members of the board without fail, will gather. In a year at the new congress we can expand the former board, those, who did not work, will leave it, while during this time we, I hope, will find interested and active people. The aspiration to strictly predetermine everything in advance (this also pertains to the number of members of the board)—this, it seems to me, is also bureaucracy in its worst manifestation. It is necessary that the system would be flexible, while the Society could organize itself.

Finally, it is very important to organize as quickly as possible the publication of BYULLETEN FIZICHESKOGO OBSHCHESTVA SSSR.

PRIRODA: Please tell me about this in a little more detail: What are the platform of this publication and its basic tasks?

S. P. Kapitsa: We would like very much that with time BYULLETEN would develop into a journal like PHYSICS TODAY or BULLETIN OF THE BRITISH PHYSICAL SOCIETY. In our country such a journal does not exist, and this is also one of the main tasks, which we are setting for ourselves in the immediate future.

The journal should give information about what is happening in physics in the directions, about which we spoke at the beginning of the interview—these are the questions of education and the social rights of physicists, the problem "physics and society" in all its manifestations, and entrepreneurial activity in physics. We do not aspire to cover specific scientific problems, for the splendid survey journal USPEKHI FIZICHESKIKH NAUK and the high-class set of journals in all fields of physics, which is published by the Academy of Sciences, exist for this (perhaps, a publication on physics in English is lacking). Moreover, there are popular science journals: PRIRODA, KVANT, FIZIKA V SHKOLE, and even YUNYY TEKHNIK write much about physics. So let them live and develop. We are trying to create what for the present does not exist in the country—a social science physics journal, in which pedagogical, organizational, and "human" questions of physics would be discussed professionally.

While I would open the first issue of the journal with the following appeal: "Today, at last, it has been acknowledged that it is possible to accomplish new tasks only on a broad democratic and intellectual basis with the participation of all the members of the family of physicists, who are engaged in basic and applied research and the training and education of our replacement in the school and science. But we should always remember that the main thing is what is happening in laboratories and auditoriums. Physics is made precisely there, and everything else that can be accomplished by our Society depends on what happens there."

USSR Academy of Sciences Rehabilitates Oppressed Scientists

907A0190A Moscow POISK in Russian No 12 (47), 22-28 Mar 90 p 6

[Article by Corresponding Member of the USSR Academy of Sciences Viktor Aleksandrovich Kumanev, director of the Commission for the Establishment and Immortalization of the Victims of the Stalinist Repressions, Who Were Members of the USSR Academy of Sciences, under the rubric "The Annual General Assembly of the USSR Academy of Sciences": "Restored Names"; first paragraph is POISK introduction]

[Text] The question of the posthumous restoration to membership in the USSR Academy of Sciences of groundlessly expelled scientists—academicians and corresponding members—was submitted to the General Assembly of the USSR Academy of Sciences. We asked Corresponding Member of the USSR Academy of Sciences Viktor Aleksandrovich Kumanev, a historian and director of the Commission for the Establishment and Immortalization of the Victims of the Stalinist Repressions, Who Were Members of the USSR Academy of Sciences, to comment on this fact.

What is happening today is a natural process, a result of the moral purging, through which our entire society is going. We are obliged to return to the history of science

the slandered names and the names which were subjected, using the words of L. Tolstoy, to "the figure of suppression." Scientists, who won world fame, truly the stars of science, were forgotten in their homeland. These names not only disappeared from the lists of the Academy, but were also at one time struck from textbooks, books, and articles. Thus, they as if did not live and did not create in the homeland, for its good....

During the times of Stalin our science incurred irreplaceable losses. Many prominent scientists and scientific associates (not only of the "large Academy," but also of the academies of sciences of the union republics) became victims of the mass repressions and lawless acts. Brutal outrages were committed upon their human dignity; they were placed under unbearable conditions for creative work and normal life. Incidentally, Foreign Member of the USSR Academy of Sciences Olaf Broch, a Norwegian Slavics scholar, was excluded from the registered staff of the Academy, in particular, for the fact that he ventured at that time to criticize the restrictions of the freedom of creativity in the USSR.

Several slandered scientists, who were declared enemies of the people and saboteurs, for example, Academicians N. Voznesenskiy, I. Grigoryev, and N. Maksimov and Corresponding Members D. Yegorov and V. Ignatovskiy, were subjected to repression, but were not expelled from the Academy. Why? Most likely, the staff members of the repressive apparatus, in obeying instructions from above, were in a hurry to carry out reprisals. Corresponding Member V. Ignatovskiy was accused of "espionage" and was shot during the war years, while being a member of the Academy. However, the following also happened—with well-known scientist and philologist N. Durnovo, a professor of Saratov, Minsk, and Moscow universities and author of the first Russian dictionary of linguistic terms: Groundlessly accused of sabotage, N. Durnovo was expelled from membership in the USSR Academy of Sciences (posthumously) for "...activity aimed at harming the USSR."

The list of scientists, whom our commission proposed to restore to membership in the USSR Academy of Sciences, is extensive—there are more than 20 names on it. Historical and moral justice requires these names to be given. The groundlessly expelled full members of the USSR Academy of Sciences (academicians) are V. Ipatyev, M. Rostovtsev, D. Ryazanov, M. Speranskiy, Ya. Uspenskiy, V. Frantsev, and A. Chichibabin; the corresponding members are A. Vasilyev, G. Gamov, N. Glubokovskiy, N. Durnovo, A. Kizevetter, S. Kulbakin, and Ye. Shmurlo.

Several scientists, who were expelled from the USSR Academy of Sciences, were restored to membership in it on the basis of orders and decrees of the presidium of the USSR Academy of Sciences, although the settlement of this question was and is within the competence only of the General Assembly. For today we are talking about the building of a "rule of law" state, while the charter of the Academy should be the law of its life. Therefore, this General Assembly is returning, while strictly adhering to the established principle, to the registered staff the names of those who have been rehabilitated and have already been restored.

The names of Academicians A. Balandin, N. Vavilov, N. Likhachev, N. Lukin, I. Luppol, M. Lyubavskiy, I. Mayskiy, V. Osinskiy (Obolenskiy), S. Platonov, N. Tulaykov, and L. Shtern, Corresponding Members V. Beneshevich, A. Vologdin, V. Gan, D. Yegorov, and G. Ilinskiy, and other well-known scientists were included in the second list.

We also submitted the proposal (it was approved by the presidium) on the necessity of restoring to the Academy of Sciences four foreign members—Olaf Broch (Norway), Henry Hallett Dale (Great Britain), Hermann Joseph Muller (the United States), and Mehmet Fuat Koprulu (Turkey). Their expulsion was symptomatic of those times. Henry Hallett Dale, a Nobel Prize winner, pharmacologist, and physicist, and geneticist Hermann Joseph Muller expressed disagreement with the policy of Lysenko. (Muller worked in our country for several years at the Institute of Genetics of the USSR Academy of Sciences.) This was enough for them to "invite" the foreign members from the Academy on high-handed instructions "from above." Mehmet Fuat Koprulu, founder of the Democratic Party in Turkey and founder of the European school of Turkish literary scholarship, was expelled for...an undesirable foreign policy for a "leading light of science," inasmuch as, while devoting himself in earnest to science, the scientist simultaneously held the post of minister of foreign affairs.

Many prominent figures of sciences found themselves in an extremely difficult situation and were forced in the 1920's to emigrate from the country. Not everyone left voluntarily. For example, A. Kizevetter was simply thrown out of the country, and then was expelled from membership in the Academy with the traditional false formulation for that period "as having lost contact with the USSR Academy of Sciences." Many left believing that the working conditions offered beyond the border would enable them to give science incomparably more than in the hungry, ravaged Republic of Soviets. There were also such people as prominent metal scientist Chernov (a destroyer was specially sent to the Crimea for him), who refused to leave the mother country. The "defector" in those times was automatically declared an anti-Soviet and, accordingly, was excluded from the registers "for actions incompatible with the dignity of a Soviet citizen and the title of full member of the Academy of Sciences." V. Ipatyev, who did not return from a foreign business trip, for example, was expelled with such a formulation. M. Rostovtsev, a historian of antiquity, a professor of Petersburg University, and an honorary doctor of a number of universities, G. Gamov, to whom the first calculation of the genetic code belongs, linguist S. Kulbakin, historiographer Ye. Shmurlo...were "defectors."

In recent times a "well-reasoned" sensation like the one, for example, that V.I. Lenin directly and persistently engaged in the deportation of the cream of the intelligentsia, including such well-known scientists as the above-mentioned A. Kizevetter, as well as N. Berdyayev, S. Bulgakov, P. Sorokin, and so on, from time to time will pop up in the press. The deportation took place from 30 August to 7 September 1922. At that time Lenin after his second stroke (March 1922) was gravely ill and in no way could have "supervised" the infamous "operation" that is ascribed to him. It is a matter of a completely different person—as has now been established. Iosif Stalin, who had been elevated to the rank of general secretary, personally dealt with the "forced emigration." The struggle against the intellectual elite was an integral element of his program. For the usurper the "ideal people" is an uneducated, uncultured people, who will not rebel if they were to expel some great Russian writer from honorary membership in the Academy of Sciences as an emigre. (It is a question of the great artist of the word I. Bunin.) But today we are returning the names of the former honorary members to the academy register....

Among the names of those expelled from the Academy of Sciences during the years of Stalinism we will find the names of many well-known historians, including S. Platonov. (With respect to his "case" such well-known scientists as N. Likhachev, M. Lyubavskiy, and others were arrested, and then expelled from the Academy of Sciences.) As is known, the arrests of the later 1920's and early 1930's were an ominous prelude to the "great terror" and should have prepared mass consciousness for the idea of an entire army of hidden "enemies of the people." Platonov, a prominent historian and archivist, was arrested in 1930 and was expelled from the Academy of Sciences in 1931. The reason for the arrest is the discovery in the archive of the Academy of Sciences of a document which testifies to the abdication of Nicholas II. For the preservation of such an important document they should have, on the contrary, expressed gratitude to the archive. However, the storing of the document was regarded as its...concealment. They also arrested Platonov for preparing a mythical antistate coup. Moreover, "Premier" Platonov supposedly intended to appoint as minister of foreign affairs another well-known scientist, Ye. Tarle. Tarle was saved only by the fact that Stalin had read his work "Napoleon" and replaced anger with mercy. With the "light" hand of Stalin they again began to call Tarle an academician....

Historians of the party and elaborators of the problems of general history suffered. Among them is N. Lukin, director of the Institute of History (the academician actually was already doomed, since his sister was the first wife of Bukharin).

Tragicomic curiosities also occurred. The persecution of the school of Pokrovskiy was launched in full force after his death. They ascribed to the scientist, in particular, the thesis of prerevolutionary noble historians, which he criticized, that history is nothing other than "politics which has been reverted into the past." The allies and followers of Academician A. Deborin were subjected to persecutions, he himself was not arrested (on the whim of the "leader"), they merely ceased to publish him.

For the most part the old historical school, the generation of scientists, who received an education and won scientific authority before the revolution, incurred losses. Under Stalin forgeries and overembellishment succeeded basic knowledge in historical science. Everything—the repressions, the forced or forcible emigration, conscious forgetting, and the "expurgation" of many names—contributed to this. At the same time as expulsion a different, opposite process also took place. Thus, for example, in 1939 Stalin himself became an honorary member of the Academy of Sciences. (They gave him such a gift on the occasion of his birthday.) Incidentally, they also assigned to one of his main services as a scientist the catechism of Stalinism—"Kratkiy kurs istorii VKP(b)" [A Short Course on the History of the All-Union Communist Party (Bolsheviks)]. Hardly anyone knows that "Kratkiy kurs..." was written by a group of authors (Ye. Yaroslavskiy, V. Knorin, and P. Pospelov). After the publication of millions of copies Stalin (as the first!) ascribed this large volume to himself. And when the director of the Museum of the Revolution once addressed to "the great thinker" the request to hand over the manuscript for an exposition, Stalin replied with a blunt refusal—he had burned the manuscript. Molotov, who was expelled in 1959, was also an honorary academician. It seems that the question of the registered membership of several other pseudoscientists should be settled with time. We need this, just as restoration on the registers of the Academy of Sciences, at least for self-purification, but not at all for the correction of history. Can the name of Stalin stand next to the names of the scientists destroyed by him?!

All the scientists being restored by us will be told about in detail in the biographical collection "Chleny Akademii nauk SSSR—zhertvy stalinskikh repressiy" [The Members of the USSR Academy of Sciences—Victims of the Stalinist Repressions], which should be published in 1991. The names of the restored scientists should appear in the supplemented and revised handbook "Personalnyy sostav Akademii nauk SSSR" [The Personnel of the USSR Academy of Sciences]. A memorial will be erected for the perpetuation of the memory of the figures of science, who died and were repressed during the years of the personality cult, on the grounds of the main building of the presidium of the USSR Academy of Sciences (Leninskiy Prospekt, 14). The publication of works, including of those subjected to "the figure of suppression," should also become an important matter.

Our commission worked about two years to prepare the necessary materials for the meeting of the presidium and this General Assembly. We probably would not have managed without the help of personnel of the archive of the USSR Academy of Sciences. At the archive we organized a public information center, to which materials from relatives and friends of the figures of science, who died and were repressed, are being sent. We immediately appealed

and are appealing again to institutes and scientific centers to help us establish new facts. This is also necessary for the living. Unfortunately, today we do not know much about the fate and last days of Speranskiy, Ignatovskiy, Durnovo, Maksimov, and even Vavilov.... But during the 1920's and 1930's there were many individuals who worked usefully in modest "posts of science"—they were neither academicians not corresponding members. Their death was also an irreplaceable loss not only for relatives, but also for science.

RSFSR State Prizes for Science, Technology Awarded

907A0203A Moscow SOVETSKAYA ROSSIYA in Russian 14 Apr 90 2nd edition p 2

[Decree of the RSFSR Council of Ministers "On the Awarding of the 1990 RSFSR State Prizes in Science and Technology"]

[Text] Having considered the suggestions of the State Committee for RSFSR [Russian Soviet Federated Socialist Republic] State Prizes in Science and Technology attached to the RSFSR Council of Ministers, the RSFSR Council of Ministers resolves:

To award the 1990 RSFSR State Prizes in Science and Technology to:

1. Doctor of Geological Mineralogical Sciences Ivan Yakovlevich Nekrasov, director of the Far Eastern Geology Institute of the USSR Academy of Sciences—for a series of works on the study of the physical chemical conditions of the formation of deposits of tin and associated metals.

2. Doctor of Technical Sciences Izrail Samuilovich Turovskiy, head of a division of the All-Union Complex Scientific Research, Design, and Technological Institute of Water Supply, Sewerage, Hydraulic Structures, and Engineering Hydrogeology of the USSR State Construction Committee—for the monograph "Obrabotka osadkov stochnykh vod" [Sludge Treatment].

3. Nikolay Grigoryevich Goguzev, deputy director of the Ural Compressor Plant of the Kriogenika Interbranch State Association; Georgiy Fedorovich Dal, chief designer, Yuriy Arsentyevich Lovtsov, fitter, Larisa Lukinichna Pashkova, chief of a design bureau, and Vsevolod Ivanovich Strukov, former chief designer, workers of the same plant; Candidate of Technical Sciences Yevgeniy Anatolyevich Dokshitskiy, chief of a sector of the Balashikha Scientific Production Association of Cryogenic Machine Building imeni 40-letiya Oktyabrya of the Kriogenika Interbranch State Association—for the development and the assimilation of the series production of standardized reciprocating expanders for low-flow air distributors.

4. Doctor of Medical Sciences Aleksey Stepanovich Balalykin, head of a laboratory of the Second Moscow State Medical Institute imeni N.I. Pirogov of the RSFSR Ministry of Health, supervisor of the work; Doctor of Medical Sciences Galina Ivanovna Perminova, senior scientific associate of the same institute; Doctor of Medical Sciences Yuriy Iosifovich Gallinger, head of a department of the All-Union Scientific Center of Surgery of the USSR Academy of Medical Sciences; Doctor of Medical Sciences Yuriy Matveyevich Kornilov, scientific supervisor for endoscopy of the Central Clinical Hospital of the RSFSR Ministry of Health; Doctor of Medical Sciences Boris Konstantinovich Poddubnyy, director of a department of the All-Union Oncological Scientific Center of the USSR Academy of Medical Sciences; Candidate of Medical Sciences Gennadiy Aleksandrovich Romanov, director of a department of the Moscow Oblast Scientific Research Clinical Institute imeni M.F. Vladimirskiy of the Main Administration of Health of the Moscow Oblast Soviet Executive Committee; Doctor of Medical Sciences Lev Konstantinovich Sokolov, head of a laboratory of the Central Scientific Research Laboratory of the Medical and Health Improvement Association attached to the USSR Council of Ministers; Doctor of Medical Sciences Veniamin Nikolayevich Sotnikov, head of a chair of the Central Institute of the Advanced Training of Physicians of the USSR Ministry of Health—for the development and introduction of methods of therapeutic endoscopy in case of diseases of the digestive organs.

5. Doctor of Technical Sciences Anatoliy Petrovich Burdukov, deputy director of the Institute of Thermal Physics of the Siberian Department of the USSR Academy of Sciences; Candidate of Technical Sciences Oleg Nikolayevich Kashinskiy, head of a laboratory, and Academician Vladimir Yeliferyevich Nakoryakov, director, workers of the same institute; Doctor of Technical Sciences Boris Mefodiyevich Galitseyskiy, professor of the Moscow Aviation Institute imeni Sergo Ordzhonikidze of the USSR State Committee for Public Education; Doctor of Technical Sciences Genrikh Aleksandrovich Dreytser, head of a chair of the same institute; Doctor of Technical Sciences Valeriy Viktorovich Kostyuk, chief of a department of the RSFSR State Planning Committee—for a series of experimental and theoretical studies of nonstationary transfer in single-phase and two-phase flows.

6. Doctor of Physical Mathematical Sciences Anatoliy Fedorovich Nikitenko, senior scientific associate of the Institute of Hydrodynamics imeni M.A. Lavrentyev of the Siberian Department of the USSR Academy of Sciences; Doctor of Physical Mathematical Sciences Oleg Vasilyevich Sosnin, deputy director of the same institute; Academician Yuriy Nikolayevich Rabotnov (posthumously); Doctor of Physical Mathematical Sciences Aleksandr Mikhaylovich Lokoshchenko, lead scientific associate of the Scientific Research Institute of Mechanics attached to Moscow State University imeni M.V. Lomonosov of the USSR State Committee for Public Education; Doctor of Physical Mathematical Sciences Sergey Aleksandrovich Shesterikov, head of a division of the same institute; Doctor of Technical Sciences Nikolay Nikolayevich Malinin, professor-consultant of Moscow State Technical University imeni N.E. Bauman of the USSR State Committee for Public Education; Doctor of Technical Sciences Yuriy Petrovich Samarin, rector of Kuybyshev Polytechnical Institute imeni V.V. Kuybyshev of the RSFSR Ministry of Higher and Secondary Specialized Education; Doctor of Technical Sciences Andrey Aleksandrovich Chizhin, head of a division of the Scientific Production Association for the Study and Design of Power Equipment imeni I.I. Polzunov of the USSR Ministry of Heavy Machine

Building—for the development and experimental substantiation of the mathematical theory of creep and its applications.

7. Candidate of Geological Mineralogical Sciences Aleksandr Borisovich Ostrovskiy, chief hydrologist and deputy general director of the Northern Caucasus Geological Production Association of the USSR Ministry of Geology, supervisor of the work; Yevgeniy Mikhaylovich Yeliseyev, drilling foreman of the Kavminvody Hydrogeological Expedition; Leonid Vladimirovich Parkhomin, chief hydrogeologist of a party of the Kavminvody Hydrogeological Expedition; Candidate of Technical Sciences Ivan Yegorovich Slyusar, chief engineer, Candidate of Geological Mineralogical Sciences Vladislav Gennadyevich Timokhin, chief of a division, workers of the same association; Doctor of Geological Mineralogical Sciences Boris Vladimirovich Borevskiy, senior scientific associate of the All-Union Scientific Research Institute of Hydrogeology and Engineering Geology of the USSR Ministry of Geology; Stanislav Vasilyevich Savin, deputy chief of the Main Administration of Geology for the RSFSR of the USSR Ministry of Geology; Candidate of Geological Mineralogical Sciences Dmitriy Ivanovich Yefremov, chief of a party of the Moscow Geological and Hydrogeological Expedition of the Tsentrgeologiya Geological Production Association of the Central Regions of the USSR Ministry of Geology—for the discovery and prospecting of large deposits of fresh ground waters for the water supply of arid rayons of Stavropol and Kalmykia.

8. Doctor of Physical Mathematical Sciences Vadim Aleksandrovich Malyshev, lead scientific associate of Moscow State University imeni M.V. Lomosonov of the USSR State Committee for Public Education; Doctor of Physical Mathematical Sciences Robert Adolfovich Minlos, lead scientific associate of the same university—for the series of works "Cluster Expansions and Spectral Models of Statistical Physics and Quantum Field Theory."

9. Candidate of Medical Sciences Yuriy Anatolyevich Garmashov, docent of the Leningrad State Institute of the Advanced Training of Physicians imeni S.M. Kirov of the USSR Ministry of Health; Doctor of Medical Sciences Aleksandra Georgiyevna Zemskaya, head of a chair, Doctor of Medical Sciences Nikolay Pavlovich Ryabukhe, professor, workers of the same institute; Doctor of Medical Sciences Lev Nikolayevich Nesterov, head of a chair of the Kuybyshev Medical Institute imeni D.I. Ulyanov of the RSFSR Ministry of Health; Candidate of Medical Sciences Irina Yevgenyevna Poverennova, assistant lecturer of the same institute; Candidate of Medical Sciences Rayngold Ivanovich Genne, assistant lecturer of the Omsk State Medical Institute imeni M.I. Kalinin of the RSFSR Ministry of Health; Doctor of Medical Sciences Yuriy Nikolayevich Savchenko, head of a chair of the same institute—for the development and the introduction in clinical practice of methods of the diagnosis and surgical treatment of various forms of epilepsy.

10. Candidate of Medical Sciences Viktor Yefimovich Bagdatyev, senior scientific associate of the 2nd Moscow State Medical Institute imeni N.I. Pirogov of the RSFSR Ministry of Health; Doctor of Medical Sciences Boris Ruvimovich Gelfand, professor, Doctor of Medical Sciences Viktor Adolfovich Gologorskiy, head of a laboratory, Doctor of Medical Sciences Valeriy Alekseyevich Kubyshkin, professor, Doctor of Medical Sciences Nadezhda Aleksandrovna Sergeyeva, senior scientific associate, workers of the same institute; Doctor of Medical Sciences Yuriy Nikolayevich Belokurov, head of a chair of the Yaroslavl State Medical Institute of the RSFSR Ministry of Health; Doctor of Medical Sciences Aleksey Borisovich Gramenitskiy, professor of the same institute; Doctor of Medical Sciences Alfred Lvovich Kostyuchenko, anesthesiologist and resuscitator of the Military Medical Red Banner Academy imeni S.M. Kirov—for the development of the diagnosis and pathogenetic therapy of infectious toxic shock in surgery patients.

11. Vladimir Sergeyevich Komissarov, chief of a subdivision of the Tatar ASSR Agroindustrial Committee; Nikolay Grigoryevich Envald, first deputy chairman of the same committee; Doctor of Agricultural Sciences Nazib Kayumovich Mazitov, head of a laboratory of the Semenovod Scientific Production Association of the All-Russian Department of the All-Union Academy of Agricultural Sciences imeni V.I. Lenin; Makhmud Akhmetovich Akhmetov, director of the Mikhaylovskiy Sovkhoz of the Tatar ASSR Agroindustrial Committee; Candidate of Technical Sciences Khazip Sabirovich Gaynanov, head of a chair of the Kazan Agricultural Institute imeni M. Gorkiy of the Main Administration of Higher Educational Institutions attached to the State Commission of the USSR Council of Ministers for Foodstuffs and Purchases; Garriy Aleksandrovich Motorinskiy, deputy chief of a design bureau of the Novosibirsk Sibselmash Production Association; Stanislav Aleksandrovich Smetankin, lead designer of the same association; Doctor of Technical Sciences Andrey Iosifovich Lyubimov, head of a chair of the Chelyabinsk Institute of the Mechanization and Electrification of Agriculture of the Main Administration of Higher Educational Institutions attached to the State Commission of the USSR Council of Ministers for Foodstuffs and Purchases—for the development and introduction of a set of agricultural implements of year-round use for surface soil cultivation.

[Signed] Chairman of the RSFSR Council of Ministers A. Vlasov

Administrator of Affairs of the RSFSR Council of Ministers I. Zarubin

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