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THE ANNUAL ASSEMBLY OF THE ACADEMY

OF SCIENCES OF THE USSR

(February 2, 1955)

Vestnik Akademii Nauk USSR March 1955

Introductory address by the President of the Academy of Sciences of the USSR: A.M. Nesmeyanov

Since the last Annual Assembly the Academy of Sciences of the USSR has lost ten of its members.

Shortly after the Annual Assembly, on February 7, 1954, Vladimir Mikhailovich Rodionov died. A great organic chemist, he made a large contribution to the science of the fatherland with his research into the chemistry of natural alkaloid and dye synthesis. On February 19 member-correspondent Vladimir Iul'evich Vize died. A distinguished investigator of the Arctic Seas, he was known for his work in meteorology, hydrology, oceanology and climatology. On September 1st member-correspondent Dimitri Konstantinovich Zelenin died. One of the oldest Russian ethnographers, he was a specialist in Slavic ethnography. On October 27th the well-known member Ivan Ivanovich Tolstoi, author of many scientific works on classical biology, died. On November 16th Pyotr Ivanovich Lukirski died. One of the chief physicists of our country, he conducted conspicuous research in nuclear physics. On November 22nd our country and the Soviet Union lost a remarkable state and public worker, the talented member who gave his whole life in unlimited service to the fatherland, Andrei Yanuar'govich Vishinski. On December 4th member-correspondent Vladimir Visil'evich Golubev died. A well-known Soviet mathematician and mechanics specialist, he conducted conspicuous research in aero and hydrodynamics and did a great deal for Soviet aviation. On December 22nd the well-known Turkish language linguist, member-correspondent Nikolya Konstantinovich Dimitriev died. On December 30th our oldest historian died in his ninety-sixth year, author of many fundamental works in various areas of history, Robert Iur'evich Vipper. On January 6, 1955 we lost Eugene Vitorovich Tarle, a talented member whose brilliant research gained wide recognition both here and abroad. On January 10th Mikhail Victorovich Kirpichev died, a distinguished scientist in the field of heat engineering.

I ask you to honour the memory of our deceased comrades by rising to your feet.

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The past year has been one of further development for the Academy of Sciences of the USSR, and extension in the operations of many of its divisions.

It has found its expression in the organization of new independent scientific institutes of the Academy such as the Electrophysics Laboratory ( a large Institute with entirely new equipment), the Semi-conductance Institute, the Super-high Pressures Laboratory, and the Complex Transportation Problems Institute. It has also found expression in the development of the operations of previously founded Scientific Institutes -- the Electronics and Radio Frequency, Organic Compounds, Biological Physics and Scientific Information Institutes, and the V.A. Strelkov Mathematics Institute of the Applied Mathematics Branch. Of these Institutes only the Biological Physics Institute has not yet entered the full-fledged stage of scientific life.

The growth of the peripheral Institutes of the Academy is indicated in the reorganization of the Kirgiz Branch of the Academy, in the amplification of the scientific production of other Branches, particularly the Ural and Kazan Branches, and in the completion of the foundations of the Crimean Astrophysical Observatory at Simeiz.

Of course, the amplification and deepening of the scientific operations of the Academy has found its expression in the great productivity of the long established and successfully operating Institutes. In particular, this has resulted in a considerable increase in the production of the Academy Publishing House. In 1953 it published 15,000 pages of articles, in 1954 - 18,600 and in 1955 upwards of 25,000 are planned, though even such volumes cannot cover all questions. A still further increase in the Academy publishing quota is necessary in non-Academy publications to carry reprints of the jubilee collections, etc. I also think that it will be necessary to change many of the non-periodic "Proceedings" of the Institutes into periodic publications, choosing their material more strictly. It will also be necessary to extend the physical basis of the Printing House.

In my introduction I shall touch on the results of the scientific activity of the Academy and its Branches.

Vast efforts have been proposed, considerable investments have been made, and talented scientists have been attracted for the development of nuclear physics research in the Soviet Union. The achievements can be listed in a few words. The Institutes and scientists of the Academy have made a substantial contribution in this important task. In the past year work has continued with accelerators and other devices on cosmic ray particles in

study of the interaction of particles of different energies with atomic nuclei in nuclear reactions, by producing mesons and by investigating the characteristics of elemental particles. The near future necessitates new efforts and investments in this rapidly evolving field of science.

In the first place it is necessary to pay some attention to the latest growth of the Academy in the field of theoretical research in physics. Here I can record definite success in the theory of meson-nucleus interaction and in the theory of interaction of elemental particles with vast energies ( $10^{15}$  -  $10^{17}$  electron volts). It is necessary to develop theoretical physics in the USSR further in every direction. Nuclear experiments must be conducted at contemporary levels in a number of other cities in our country.

In developing nuclear physics strongly as one of the most essential points of the growth of natural science in this period, we should not lose sight of the other very important fields in physics - radio physics, where a new and highly significant statement has recently been made by Academician P.L. Kapitsa, and semi-conductor physics. In the latter field, due to the related study of semi-conductor thermal and electrical characteristics, the Semi-conductance Institute under the direction of A.F. Noffe has created ideal thermoelements having vast technological prospects.

In the field of physics and its technical applications the Academy has as its objective a system of Scientific Institutes which to a determined measure will secure the chief points of growth of this science. The necessary conditions must be created for each of them since physics is particularly demanding in this connection.

In 1955 the creation of a Computations Centre with its powerful mechanized calculations has raised sharply the operating conditions of mathematics.

The completion of construction of the Pulkov Observatory and the building of an astronomical observatory at Partizansk (Crimea) have placed the work of astronomers in new and more favourable conditions with the aid of powerful instruments. We shall expect from this new Bureau of Physics - mathematics branch a most energetic use of the rich possibilities for a Scientific Institute of this branch in surmounting their difficulties and in adjusting the interaction of the sciences with the harmonious work of the scientists.

In the field of chemistry, in spite of the great achievements in the study of the transuramic elements, and in the chemistry of the rare earths, the chemistry of many rare elements is still underdeveloped. A more harmonious and intensive development of problems in catalysis which promise great applications is a necessity.

The work of the Academy in the field of high molecular weight compounds has been ameliorated very recently. However, there must be a much greater intensive development in this crucial point of growth of chemistry. The work of the Academy on the Chemistry of natural compounds - antibiotics, vitamins, hormones, alkaloids, etc - is entirely unsatisfactory. The creation of a Natural Compounds Institute became necessary long ago. A certain anxiety has been created by the departure of both of our Physico-Chemical Institutes from the cardinal problems of physical chemistry, and by the concentration of their work to a considerable extent on inorganic chemistry, physics and applications of physical chemistry such as corrosion questions. A thorough development of theoretical and experimental physical chemistry is necessary, particularly in kinetics, catalysis, electrochemistry and quantum chemistry.

The operations of the numerous Biological Branch Institutes have met with success. Some very interesting work has been done by the K.A. Timiryazev Plant Physiology Institute in conjunction with the A.N. Bach Biological Physics and Biochemistry Institute on the utilization of tracer atoms in the study of metabolism in organisms. A series of Institutes are continuing in their useful work on the inspection and classification of the flora and fauna of our country. Many Institutes and commissions are rendering ceaseless service to the efforts of our government toward the cultivation of virgin lands, the raising of the productivity of agriculture and the fisheries and toward the solution of vital questions in sanitation.

It is the duty of the Academy to make a most energetic contribution in the very important task of furthering agriculture. The resolution of the January plenum of the Central Committee of the KPSS will give a new stimulus to the creative genius of scientists in the science of agriculture.

Further, it is my conviction that we should move experimental biology rapidly forward, particularly in the areas bordering on chemistry and physics. It must be stated with concern that conditions have not yet been created for an adequate scale of operations in the area of biochemistry and biophysics, and that work on microbiology and cytology is proceeding on a very narrow front. Research must be extended in the various areas of animal, human, plant and microbe physiology.

The Academy is under obligation to develop mathematics, physics, chemistry and biology in all directions as the fundamentals of natural science and technology.

In the sphere of the technical sciences we should note the successfully growing activity of the Automatics and Telemechanics Institute. I think that the Technical Sciences Branch should concentrate its attention basically on problems in energetics, and on the development of new equipment with an eye to extensive automatization and the utilization of radio engineering and electronics.

In the field of the social sciences we can state with satisfaction that there has been an increase in the productivity of the Institutes and that a series of fundamental collective operations have taken place. The historians have produced the greatest amount of work; splendid achievements have been made by the archaeologists. However, recent and contemporary history is still lagging.

In economics there are large questions to be answered. Though it is possible to note an undoubted success here - the appearance of a text on political economics which is the fruit of much labour - it also should be stated that concrete economic research is removed from the consideration of actual requirements. Economics should light the path of engineering and the overall development of the people's agriculture in our country and in the countries of the peoples' democracies. The economic development of the leading capitalist countries must be well studied and we should give some thought as to how this may be done. We expect a great deal from our economists.

In linguistics, I should draw attention to the fact that here the Academy has gone beyond the walls of its own Institutes more than in the other portions of its work which effects the development of linguistics in the whole country.

It has been necessary to mention several times the unsatisfactory method that is used in the planning of scientific operations. Unfortunately, the plans of the Academy have until the present time been formed to a considerable degree by an "integration" of suggestions which each scientific viewpoint gives for itself. The serious deficiency in this planning is this, that it closes up the Academy into a circle of scientific interests of the particular Institutes.

In addition to this, the Academy of Sciences of the USSR will fulfill its role in the "scientific orchestra" of the country only when it acts not only as a simple administrator, but also as a director. This means that not only should it work in the closest contact with all the scientific Institutes in the country, but this very contact should be of a determined character. The Academy and its Institutes should have

a definite role which secures by theory and scientific method the whole system of the scientific institutes of the country. For this, the wealth of experimental practice of these Institutes must be used. We must use all our strength to surmount the inter-isolation of the science of Academy and Branch in those places where this condition exists. Here we are counting heavily upon a new contingent of academicians and member-correspondents who in the majority of cases are closely connected with scientific industrial institutes. Our Branches have not yet made complete use of this opportunity.

In 1954 we undertook a new experiment in the planning of scientific operations - the first such and therefore not completely comprehensive. On the suggestion of the Branch Bureau, the Presidium of the Academy commissioned a group of competent scientists and some of the best scientific industrial workers to plan the development of the most important scientific problems in each field.

Work has been completed on about a dozen problems for the time being in the sphere of natural and technical science. In each of these the state of the science was analyzed, the objectives and paths to their attainment singled out, the institute-members specified, and the times of coordination and demarcation determined.

The problems chosen varied in character. Some of them are very large and fixed on the solution of concrete large-scale scientific or technological problems. Others have in view the development of a whole important field of science and supply the plan for this development. One of these problems has a scientific-technological accent, a distant objective as it were, and others which are directed at concrete problems in the people's agriculture require a scientific solution in the shortest possible time. The results of this work on the determination and planning of the most important problems have been met with approval. These problems which to some degree, it is true, are still inadequate, are a part of the basis of the scientific investigations plan of the Academy for 1955, and form its core. Here the most important factor is that these problems comprise a plan made not only by the Academy, but also a series of industrial Branch Institutes and we must consider this, a plan of the Academy of Sciences of the United Republics. The Presidium of the Academy of Sciences of the USSR has chosen eleven of these problems for continual observation and inspection, and has control over the remaining Branches.

These eleven problems are (each with an indication of its leading Academy Institute): high power electronics (the S.I. Vavilov Physics Problems Institute); rapid calculation machines and their



This has led to the Branches and their Bureaus occupying themselves to a considerable degree with second-rate work. Their role of guiding, consolidating and organizing science does not correspond to actual requirements, and the Branches are becoming the counterpart of the scientific societies, and to some extent are replacing the latter.

Such a situation should be changed at its very roots, but to this end there are no boards of the most vigorous scientist-specialists in our country to act as directors in their areas of science. For this purpose the Branches and their Bureaus should be semi-autonomous and responsible, and they should have the necessary resources and apparatus.

The Presidium of the Academy in the last few months has prepared and is now putting into effect determined measures in this direction. These measures which define the role, independence and authority of the Branches also make possible innovations and simplifications in the apparatus of the Presidium, and the obtaining of considerable economic resources. It is necessary, however, to stress the fact that the new system will require an increase in the operations and responsibilities of the Branch Bureaus and the member-secretaries, a strengthening in the initiative and activity of all the members of the Branch, and a reorganization of its operations to this end.

An undoubted deficiency in the work of the Academy of Sciences of the USSR at the present time is the disproportionately large preponderance of the Moscow section of its Institutes and the small specific gravity of its peripheral Institutes. With the exception of Leningrad, the remaining scientific Academy Institutes outside Moscow are almost all affiliates.

Both the impossibility and unsuitability of having Affiliates of the Academy in each large town in the country, for example in each oblast' centre, is apparent. Affiliates, like the complex Institutes, are directed towards the scientific utilization and study of local characteristics, and should exist only in those areas which possess this characteristic naturally. Such basic areas are encompassed by fifteen of our affiliates. I assume therefore that the creation of new Affiliates does not create the need for them.

In addition to this, the Soviet Union cannot count on a firm leading position in science if in high level scientific work the whole country will not participate in the scientific institutes of many large towns. Therefore it is perfectly right not to create new Affiliates in peripheral areas, but rather Academy

Branch Institutes having in mind the organization of strong, high-level scientific institutes.

Why, for example, are there no scientific Academy Institutes in such a large industrial and university city as Gorki? Proceeding from similar considerations we are proposing to organize in Gorki the Radio Physics Institute of the Academy of Sciences of the USSR. Another such new peripheral Academy Institute is the Reservoir Biology Institute which is being formed on the basis of the scientific investigation station "Borok" at the Rybinsk reservoir. The Electro-physical Laboratory to which I have referred is already under construction far from Moscow. The creation of new scientific Institutes is extremely necessary in the fields of physics, chemistry and biology. The Branches must carefully study the possibility of utilizing forces outside Moscow to ensure the rise of science in these areas. We should never be confused by the fact that in the especially important fields of science we shall have not one, but two or more Institutes. The more quickly we move ahead, the smaller will be the monopoly on science, the more varied the points of view in discussion, and the more rapid and complete the attainment and utilization of scientific truth.

For the full fledged development of science in the whole country centralized attention must be organized for the needs of the scientific Institutes of the country. In my first introduction to the Annual Assembly on February 2, 1952 I projected the formation of a Scientific Information Institute. The decision for the creation of an Academy Computations centre was previously accepted for the maintenance of scientific work on computers. At the present time I can report with satisfaction that the Institute and Publishing House will issue over a period a huge series of reference journals which offer a complete coverage of the world's scientific literature. These journals are :

Fizika  
Khimiya  
Biokhimiya  
Biologiya  
Matematika  
Mekhanika  
Geodeziya and Astronomiya  
Geologiya and Geografiya

Already 100,000 references have been compiled. Preparation is under way for the publication of two of the first engineering journals:

Elektroobstovo  
Radiotekhnika  
Automatika  
Mashinovedenie

Complete indexes will be published - objective, formative and systematic; the authors list has already been issued.

The Presidium has adopted a resolution on the new publication "Itogi Nauki" as a reference journal - systematic monographic surveys covering the last two or three years of the most rapidly developing fields of science. In addition to this, the Institute already prints non-periodic surveys and interpretations of the most pressing scientific and engineering problems, and is also increasing the supply of and making more accessible reference books and a series of periodicals. Finally, questions are being developed on machine information using both digital computers and another types. The activity of the Scientific Information Institute creates the necessary conditions for peripheral scientific operations from the point of view of the accessibility of scientific literature.

The start of operations at the Computations Centre will mean a sharp increase in the productivity of scientific work in many areas connected with awkward calculations such as those in meteorology, divisions of mechanics, energetics, and structural analysis, etc. The Institute must prepare itself well for the work of the Computations Centre which should begin operations this year.

The Branches must consider and take to the Presidium of the Academy suggestions on the creation of Institutes of the Central Scientific Research Service. I think, for example, that it is necessary to organize a laboratory for biological research into the synthesis of complex organic compounds with the use of tracer atoms. If biologists with a great deal of effort prepare a good assortment of such substances the productivity of many other scientists would be greatly increased.

In conclusion I shall cast a glance at what we should accomplish in our scientific rivalry with other governments. The productivity of scientific work plays a larger role here than in industry. A good organization of scientific work on a wide scale of operations is continually increasing our strength and success, and in this connection the initiative of the Branches is a necessity. Well organized, aiming for the solution of the most important scientific problems, with thought for the proper division of labour, equipped with the newest scientific devices, with the scientific strength of the whole country well arranged, we shall continue in absolute certainty to the attainment of first place in world science.

The geographical discoveries of "Vityaz" in the Pacific Ocean occurred during these last five years. A series of very important results for construction in the permafrost zone were obtained during this period.

During the sixth Five Year Plan it will be necessary to a much greater degree to concentrate the scientific strength of the Academy in cooperation with the Academies of the Union Republics and the Branch Institutes of the chief problems facing science to strive for final valuable results.

As has been shown in the directives of the scientific session of the KP SSR, it is necessary that the unlimited development of science, the expansion of theoretical research in all fields of knowledge and an increase in the role of the scientific Institutes in technological progress all be achieved. The Academy must play an especially great role in the deepening of theoretical research. But this theoretical research must be of a maximum practical value, and its results must revolutionize production.