Meetings

Czechoslovak Science

Since its inception in 1960, the Czechoslovak Society of Arts and Sciences in America, Inc., has organized biannual scientific and cultural congresses, first in Washington, D.C. in April 1962 [*Nature* **198**, 944 (8 June 1963)], the second in New York City in 1964 [*Isis* **56**, 455 (December 1965)], and, most recently, 2–4 September 1966 at Columbia University, New York. Scientists and scholars from 65 universities in the United States, from 8 Canadian and 8 European universities, as well as from one university each in Australia and Central America, participated in lectures and symposia.

A special feature of the program was a panel discussion on scientific research and the organization of science in present-day Czechoslovakia.

Research in Czechoslovakia at present is organizationally separated into basic and applied. Research installations are grouped into three distinct categories—first, under the academies of sciences; second, under the universities; and third, under the respective ministries. The Czechoslovak Academy of Sciences, with its branches and numerous institutes and laboratories, is responsible for theoretical research; it seeks solutions to long-range problems which require extensive basic research, and which are of key importance to the national economy. The universities conduct both basic and applied research of a narrower character, usually concentrating on specific research topics. The research activities of various installations which are subordinated to individual ministries are primarily of applied nature.

By far the greatest part of internationally recognized research in Czechoslovakia stems from the institutes of the Academy. Insight into research and the prevailing working conditions was provided by panelists who were formerly associated with the Academy, including P. Albrecht (National Institutes of Health), P. Bartl (Johns Hopkins University), F. Chytil (Brandeis University), V. Fried (Brooklyn College), J. Hron (New York City), F. Šipoš (Norwich Pharmacal Co.), and J. Vilček (New York University School of Medicine). This government-supported institution, founded in the early 1950's, has acquired the best qualified investigators from the universities. Those scientists who remained in the universities were left without sufficient support for their scientific work. The Academy has also attracted most of the gifted young university graduates to whom a career with an opulent Academy institute was more appealing than work at a generally ill-equipped and intellectually less stimulating university department. The situation is now such that a junior scientist working at an institute of the Academy would probably reject the offer of the chairmanship of a university department.

Despite the original meaning of its name, the Academy does very little teaching. Only a few privileged university graduates, with at least three years' research experience, are admitted to the institutes of the Academy as aspirants, in a Soviet-inspired form of postgraduate research training. Such work leads to the postdoctoral degree of Candidate of Sciences, equivalent to the Ph.D. degree in the United States.

The doctorate was abolished in the 1950's because it was considered a bourgeois affectation; it was replaced by such titles as graduated physician, graduated philosopher, and so forth. Recently, however, the doctoral degrees were reinstated. A Candidate's degree is now mandatory if one is to pursue a scientific career with the Academy.

The organization of the Academy includes a network of institutes devoted to basic research in practically all scientific fields; scientists devote themselves entirely to research and carry no teaching responsibilities. This form of organization brought with it many advantages as well as disadvantages, which became obvious during its first decade. The Academy has been very well supported by government funds, thanks, perhaps, to the strong political background of the two presidents of the Academy, Z. Nejedlý and F. Šorm. Many new buildings have been constructed for several institutes in Prague, Brno, and Bratislava (the Institute of Macromolecular Chemistry, the Biological Institutes, the Institute of Instrument Research, the Biophysical Institute, the Geophysical Institute, the Institute of Virology, and others); many have been completely rebuilt and equipped with new instruments from all over the world (the Soviet Union, East and West Germany, Sweden, England, and even the United States). Thus, at present, some of the most important institutes are comparable to many Western research institutes, at least in equipment. After a period of complete isolation from the West and total orientation towards Soviet Russia during the Stalin era and for several years afterward, contact between the institutes of the Academy and Western countries became easier. More money was available even for traveling abroad.

The separation of the Academy from the universities has isolated many of Czechoslovakia's top scientists from graduate teaching, thus reducing the quality of university pedagogy. Nevertheless, government support has led to remarkably rapid development of several scientific disciplines under the auspices of the Academy. Several Academy institutes, and individual scientists working there, have made important contributions in their respective fields. However, because of the separation of the institutes of the Academy from the university environment, some scientists may feel a lack of the stimulation that is provided by a truly academic atmosphere.

The institutes of the Academy have other problems. Being centrally administered, with institutes scattered throughout the country, the Academy has become as bureaucratic as any government agency may be. Directors, department chairmen, and group leaders complain bitterly about the amount of paperwork required. The planning for all necessary equipment, chemicals, and other materials, and for personnel, must be usually done at least two years in advance. Even though the orders may have been approved (which is not always the case), instruments and chemicals may arrive after long delays, often resulting in the curious

situation that a scientist receives the items ordered long after he has completed the project for which he ordered them. The actual waste of money, and even "hard" currency, that this represents is anybody's guess. While government support is quite generous, the value of the research done in individual institutes is being questioned more and more frequently. After all, the Academy is using funds badly needed by this small country for other purposes. Clearly, the institutes of the Academy cannot be permitted to grow indefinitely. As things stand now, there just may not be enough openings for young people to bring fresh ideas and enthusiasm into the Academy. The main problem is that virtually no scientist is willing to leave an Academy institute, with the exception, perhaps, of a few who seek a career abroad. An Academy position offers tenure reinforced by a feeling of safety and relative stability.

As I have implied, the research facilities at the universities are still poorly equipped, despite recent efforts to improve them. Some of these establishments could conduct hardly any research at all, were there no collaboration between them and the various institutes of the Academy. Many people feel that the best way to maintain the rising level of scientific research in Czechoslovakia and, at the same time, raise the level of graduate education would be to give more support to university research. Bringing the universities and the Academy closer to each other should prove most profitable to both.

The applied research installations which are subordinated to individual ministries are relatively well equipped. However, despite the fact that they have sufficient operating funds, scientific work performed in these establishments has often been criticized as inferior—chiefly, it seems, because of the lack of qualified personnel. One often finds in such places modern laboratories equipped with the most expensive instruments, which are unused and deserted. Nevertheless, little effort has been made, so far, to remedy this situation by collaborating with the university scientists who desperately need such equipment.

Until very recently, there was little communication among the scientists in Czechoslovakia. In fact, several scientists might well be working on the same problem without any knowledge of each other's efforts. This situation was somewhat improved when the Academy was made responsible for planning and coordinating all basic research.

Contacts of Czechoslovak scientists with scientists abroad have also improved in recent years. At first, this became apparent at various symposia, which are being organized in Czechoslovakia in increased numbers. More recently, an increasing number of Czechoslovak scientists have been also allowed to participate in meetings in Western countries. Very few people in the West realize that these scientists often must pay their own expenses; this may explain, at least partially, their reluctance to join their Western colleagues at the various social functions common to such international gatherings.

The second part of the panel concerned the 10-year-old system of national planning of scientific and technological development in Czechoslovakia. Participants were V. Slámečka, author of *Science in Czechoslovakia* [Columbia University Press, New York (1963)], and R. Urban, author of a comparable text in German, *Die Organisation der Wissenschaft in der Tschechoslowakei* [Johann Gottfried Herder-Institut, Marburg/Lahn (1957)].

There are currently three types of plan (20-year, 5-year, and 1-year) which commit virtually all of Czechoslovakia's scientific resources—manpower, facilities, and money. The project-based science plan is hierarchical, and consists (in 1966) of 16 broad, interdisciplinary goals broken down into over one thousand basic and applied research projects allotted to the installations of the Czechoslovak Academy of Sciences, the universities, and the ministerial installations. The planning organization is headed by a top governmental agency, the State Committee for the Development and Coordination of Science and Technology; the Academy carries full responsibility for basic research in its own installations and at those of the universities. This all corresponds to the hierarchical divisions of the plan, from top-level interdisciplinary "collegia," which draft the broad goals, to project research teams and individual workers.

The effectiveness of this planning system is limited by the avowed subordination of the national science plan to the overall objectives and plans of Czechoslovak economy and ideology. Its efficiency appears to be very low, primarily because of the complexity of a system which seriously taxes the productivity of Czechoslovak scientists (to such an extent that the Academy had to curtail, by decree, the hours its staff members might spend in planning and coordinating meetings), and because of its inflexibility, largely caused by the lack of modern information processing and communication techniques. Since the planning mechanism is said to involve nearly all of Czechoslovakia's 130,000 scientific workers, the reported aversion of most scientists to administrative and other similar activities is not surprising.

On the other hand, the Czechoslovak national system of science planning is both unique and highly interesting as an organizational model for the optimization of the deployment of national resources of science and technology. Because of the nature of science planning at such a high level, which requires that planning be both long-range and continuous, Czechoslovakia is likely to be in a favorable position once she is ready to introduce modern information processing techniques and devices to monitor efficiently the performance of planned activities and to accelerate the decision-making and subsequent planning response of the system. Even though a computerized information system for Czechoslovak science management is at least a decade away, there is ample evidence that the Soviet bloc is gradually designing, under the leadership of the Soviet Union and Czechoslovakia, a cooperatively guided international system of science planning and control.

The deliberations of the panel were concluded with the remarks of J. G. Polach (Resources for the Future) on the Soviet efforts to formulate an overall scientific and technological policy for the Communist bloc. Kosygin's speech at the Scientific Workers' Conference in Moscow in 1960 clearly indicated a lack of communication between the scientists, on one hand, and the technicians and economists, on the other, has resulted in serious misallocations of human, material, and financial resources and in a considerable time lag in the practical application of research and development results. Consequently, the program adopted by the XXII Congress of the Soviet Communist Party and the Party Central Committee outlined the new fundamental criteria for science policy and spelled

out priorities for scientific research and development.

The Soviet Communist Party Program and directives were, quite naturally, adopted in due course by Czechoslovakia and other Bloc countries. By now, they all have prepared their so-called "perspective" planning of scientific development to the year 1970. This is an interesting experiment which accords with the policies formulated at the Congress and with Party decisions. Teams of scientists, technicians, and economists are asked to evaluate the feasibility of directing research and development toward specific scientific and technological objectives in terms of available human, material, and financial resources.

As our own government concern with, and expenditures for, scientific activity grow, the responsible agencies may find it worthwhile to follow attentively the course of Czechoslovak science in the coming years.

M. RECHCIGL, JR.

Forthcoming Events

December

19–20. British **Biophysical** Soc., winter mtg., London, England. (W. Gratzer, Biophysics Dept., King's College, 26 Drury Lane, London W.C.2)

19–21. **Acceleration Biology,** Sunnyvale, Calif. (Univ. of California Extension, Berkeley 94720)

26–31. **American Assoc. for the Advancement of Science,** annual, Washington, D.C. (R. L. Taylor, AAAS, 1515 Massachusetts Ave., N.W., Washington, D.C. 20005)

In addition to the 20 sections of the Association and five AAAS committees, the following organizations have arranged sessions at the AAAS annual meeting 26–31 December in Washington, D.C.

Mathematics

American Mathematical Soc. (E. Pitcher, Lehigh Univ., Bethlehem, Pa.)

Association for Computing Machinery (D. Leiti, Heliodyne Corp., Rosslyn, Va.)

National Council of Teachers of Mathematics (J. Gates, 1201 16 St., NW, Washington, D.C.)

Society for Industrial and Applied Mathematics (J. H. Griesmer, I.B.M., T. J. Watson Research Center, Yorktown Heights, N.Y.)

Physics

American Astronautical Soc. (S. F. Singer, Univ. of Miami, Coral Gables, Fla.)

American Meteorological Soc. (J. E. Masterson, Natl. Center for Atmospheric Research, Greenbelt, Md.)

Harvard Project Physics (F. J. Rutherford, Harvard Univ., Cambridge, Mass.)