

delegates voted to reserve decision on whether to accept a report proposing establishment of an interim working group on preparation of the agenda. The chairman protested that the committee had been meeting monthly since 1963 without an agenda, and that matters might be expedited if the delegates were given an opportunity to consider beforehand the items that might arise for discussion. A motion was offered to create a study group to consider the advisability of appointing the proposed interim working group, but, upon failure to achieve unanimity, the motion was dropped. Expression of "sympathetic and understanding regrets" was unanimously voted for the difficulties encountered by a representative group from underdeveloped nations that had been unable to attend the committee meeting because of poor weather at the airport that serves Saint-Tropez.

The committee next took up a proposal to establish an organization "for the study of the future." Dr. Swinger, drawing upon his American experience, assured the delegates, "No field is riper for development and exploitation than is the study of the future." Noting that funds for research were generally in poor supply at this time in the United States, Dr. Swinger pointed out that "future studies are nonetheless in a growth situation, and merit careful attention." The speaker was asked about the disciplinary and scholarly requirements necessary for effective study of the future. He replied that the field was characterized by great flexibility. Asked to cite significant recent contributions, Dr. Swinger replied that the great merit of the field was that each completed output tended to be forgotten amidst efforts to embark on even more ambitious studies.

The afternoon session was taken up with a series of reports. The ad hoc working party on technological and industrial development, recently returned from an extensive tour of Japan, reported that "Japan's greatest fear today is cheap German imitations." A protest from the German representative was cordially withdrawn after a member of the touring group explained that he felt certain the comment was directed toward East Germany.

Sir Hugh Hinderence reported that the spirit of international cooperation was increasingly strong within his government, but that various criteria necessarily entered into the relevant pol-

icy deliberations. Basically, he said, it was his government's feeling that those fields in which it enjoyed prosperity might best be handled on a national basis. In areas where the economic picture was less certain, he continued, various forms of cooperation might be desirable. Thus, while his own government had no desire to become a space power, it hoped that its neighbors would not feel restrained in this regard. To be of assistance, his government would be pleased to furnish the necessary components, particularly launch vehicles, on a cost-plus basis, provided due allowance was made for the uncertainties of delivery dates.

A report was received from the working group on international conferences. Efforts had been made, the group re-

ported, to prepare conferences on pollution, oceanography, youth and drugs, student unrest, and highway safety. Unfortunately, virtually everyone who was invited to attend responded that he was booked up for at least the next 3 or 4 years.

At the completion of the meeting it was unanimously agreed that the proceedings had been highly successful, and a subcommittee was appointed to consider whether the committee might fruitfully expand its schedule to meet twice monthly. Dr. Swinger, in thanking the delegates for their hospitality, said that the proceedings had revealed to him many interesting possibilities, and that he confidently looked forward to expanding the European activities of his organization.—D. S. GREENBERG

Romania: Academy Links Basic Science to Current Needs

Bucharest, Romania. In the exposition area on the northern edge of this city, the Romanian government this summer opened a mammoth exhibition, displaying the achievements of Romanian socialism in the 25 years since the country's liberation from Nazi occupation. The exhibition deals with all aspects of Romanian life, but the primary emphasis, not too surprisingly, is on economic achievements, and particularly on the development of industry.

Industrialization has been the central focus of economic growth in Romania since World War II. Before that time, the country was almost completely agrarian, so, by emphasizing the development of industry, Romania has been able to modernize all areas of the economy and, perhaps most important, achieve some level of economic independence.

This same desire for independence seems to be the guiding spirit behind the development of science in Romania. And this is not due merely to the advent of socialism. Throughout the 19th century, Romania was fighting for its independence, and intellectuals played a leading role in that fight. It was therefore almost mandatory for scientists taking part in that fight to do their research on subjects that were of

immediate importance to Romania. And today, in trying to develop a base in fundamental science and at the same time use science for economic development, this tradition has remained important.

Perhaps nowhere is this tradition more evident than in the Academy of the Socialist Republic of Romania, whose institutes carry out most of the country's basic science.

The Academy's roots go deep into Romanian history. From the outset, it was linked with the Romanian struggle for independence. After several false starts—the last squelched by the suppression of the 1848 revolution, in which many intellectuals played a leading role—the Academy was founded as the Romanian Literary Society in 1866, with 21 members. The next year, it was renamed the Academic Society and given the task, according to its charter, of "working for the advance of science and literature among Romanians." But intellectuals in Romania were more interested in fighting for national unity than in doing science, and so they mainly studied and publicized the common roots of the three Romanian peoples, particularly the language, literature, and history.

In 1878 the Berlin Congress recog-

nized Romania as a sovereign state, and, the following year, the Academy was given an annual endowment from the new state—then composed of Wallachia and Moldavia, recently freed from Ottoman rule (the third Romanian state, Transylvania, joined the country after its liberation from the Austro-Hungarian Empire at the end of World War I). At that time, also, the Academy was divided into sections of science, literature, and history. The first annual meetings were held, and a library, which has grown into the largest in Romania, built up. Through the years many eminent scientists—among them C. I. Parhon, who in 1909 wrote the world's first textbook on endocrinology—reported their activities at meetings of the Academy.

Links to Society

But the Academy was still financed primarily by private individuals. It had no research institutes of its own. The science that was done was isolated and individual, carried out in universities with limited facilities. Nevertheless, strong Romanian schools in mathematics, in chemistry, and in medicine, as well as in other fields, were developed in the period before and after World War I. Much of the science that was done was directly linked to the society. Costin Nenitzescu, the organic chemist, for example, worked on the isomerization of hydrocarbons, which is important for exploiting oil, in which Romania is very rich. In medicine, Parhon's fundamental research into the causes of endocrinal diseases, which are particularly common in Romania, had direct importance for the country's welfare. These links with the society remain significant today. Partly because of its history, the Academy sees itself and its basic science as inextricably tied up with Romania's problems, and, through its institutes, it seems to be trying to use the traditions of the past, primarily the work of single individuals, to contribute to the current needs and concerns of the country.

In 1948 the Academy became a state institution, and, since that time, the emphasis has turned more and more toward natural science. (Today there still are sections in philosophy, psychology, and law, in history, in philology, in literature and arts, and in economics and sociology, but it is the natural scientists who now dominate the Academy's activities.) Most of the basic science in Romania is carried out at the Academy's more than

40 scientific research institutes; some is still done at the universities, but the research professors are in very close contact with the Academy. All told, there are some 56 Academy institutes, all of which have been set up since World War II.

In science, as in all other aspects of Romanian life, planning is an elaborate and extensive process. There are "bourgeois" complainers, of course—the people who feel they should be free to do what they want to do. In a recent interview, one chemist told *Science*, "we run into all kinds of problems because we plan too much. You can't plan science. A scientist must be free to investigate whatever he wants to investigate and see what comes from there."

After a 2-week visit to Romania, however, this observer seemed to find that most scientists accept the idea of planning. Most realize that their country is too poor to be able to subsidize science that offers no hope of practical application. And most agree with Horia Holubei, the chairman of the ministry-level Nuclear Energy Committee, who told *Science*, "we are interested in good science, in good fundamental results. But the science cannot be done in a vacuum. It must be centrally planned and administered or it would all be a waste of time."

The main planning body for science is the National Council for Scientific Research, which was established in 1965 to bring science into closer contact with industry. The National Council has no research institutes of its own. Rather, it is a ministry-level coordinating committee which directs the work done in the research institutes of the 14 economic ministries. The National Council is directly under the central committee of the Communist Party, which draws up a 5-year plan for the country's development at each party congress (the most recent congress, the 10th, was held in August just after President Nixon's visit). The Romanian leaders are proud of the fact that the goals of these plans have been modest and therefore, in almost all cases, have been met or exceeded.

With the 5-year plan as a general framework, the National Council decides what kinds of research are needed and apportions the work among the ministry institutes. Nicolae Barbalescu, a professor of organic chemistry at the University of Bucharest and the Council's vice president, said in an interview that all Council members are

scientists. As such, they know the capabilities of the various institutes and do not assign work that has no chance of being carried out. In the framework here, the ministry institutes are primarily charged with responsibility for applied research and development, although, should the Council deem it necessary, they can also be called on to conduct fundamental research that may be applicable to the economy in the future. For even more specific applied research, there are so-called planned research laboratories, which are set up by individual industrial plants and work on very specific problems posed by their plants.

This leaves basic science pretty much in the hands of the Academy. And within its research institutes the real struggle for independence in science is carried out. Some of the Academy institutes, particularly those in the technical sciences (which are really engineering institutes) and in the chemical sciences, are given tasks by the National Council as part of the economic plan. But most of the Academy work is planned by the Academy itself, and in this plan, *Science* was told, the main point is flexibility.

An International Center

Many Academy institutes try to build on the tradition of the past to contribute directly to the society's development. In fields that have long-standing traditions, the Academy institutes have become centers of expertise for both fundamental and applied work. The C. I. Parhon Institute of Endocrinology, for example, combines a hospital, research laboratories, and lecture and conference rooms in what was once a large estate in the northern part of Bucharest. It treats patients, carries out research, and trains doctors. And, by using the tradition in endocrine research that had been developed in Romania by Parhon and continued by the institute's current director, Stefan Milcou, the Parhon Institute has become an international center in its field. Doctors from Bulgaria, the Soviet Union, Czechoslovakia, and many other countries regularly come to the institute for postgraduate training, and it carries out research in cooperation with the World Health Organization, the World Cancer Organization, and the Laboratory for Cancer Research in New Haven, Connecticut.

In chemistry, also, the traditions of the past have been exploited and applied to present-day problems. Nenitzescu, the chairman of the Academy's chemistry

section, is the director of the Center for Organic Chemistry in Bucharest. After achieving fame for developing the now widely employed process of using aluminum chloride as a catalyst in the isomerization of hydrocarbons, Nenitzescu has more recently turned his attention to carbonium ions and small-ring compounds. His institute is concerned with hydrocarbon chemistry, a scientist there explained in an interview, and it has close ties with the economy and with the society. Like the Parhon Institute, it serves as a training ground for young researchers, and also as a place where engineers from industrial institutes can come to learn about new methods and techniques. The institute also works on specific problems that the industrial institutes are unable to handle. And there is also close contact with foreign scientists—in this case, particularly with American ones, such as George A. Olah of Case Western Reserve.

Chemical research started out in 1949 in a small laboratory at the Polytechnic Institute at the University of Bucharest. Its 60 research workers dealt with all branches of chemistry—organic, inorganic, and physical. Now there are three institutes in Bucharest, one for each branch of chemistry. Each has its own building and well over 100 researchers. And there are also chemical institutes in Cluj, Timoasara, and Jassy. The increase in the number of chemists, brought about by the government's interest in developing a modern chemical industry in Romania, has made it possible for fundamental work to expand.

One group of researchers at the Organic Chemistry Center, for example, has used amyl sodium as a catalyst to make a new kind of polyethylene that is stronger, and has a higher melting point and molecular weight, than existing polyethylenes. Soon the product will be produced by industry here, and many other countries are also interested in it. "It started out as a theoretical problem about 10 years ago," Ciresica Huch, the leader of the research group, told *Science*, "but the Ministry of Chemistry became interested after we published our results."

In other fields, of course, where there was no strong tradition before World War II, the emphasis has been on building a tradition and on supporting basic science. In atomic physics, for example, until very recently there was little chance for the Academy institute to contribute to the economy. In the years since 1956, when the institute was established by the ministry-level Nuclear Energy Commit-

tee (which had been set up a year earlier), many Romanian scientists were sent to the Soviet atomic center in Dubna and to other foreign research centers for training. Several cooperative research ventures were also undertaken. "Until 1968," Holubei told *Science*, "our principal interest was scientific development. Last year, as the government became interested in utilizing nuclear power here, our committee was reorganized, so that we now direct all the nuclear work in Romania—research, development, and production of equipment and parts." Under the new economic plan, the government hopes to build several small nuclear power plants over 10 years.

But Holubei wants basic science to continue to flourish. He would like to see the Academy's Atomic Physics Institute develop into something like the institutes in other, more established fields that have been able to continue their fundamental science and, at the same time, use their research for strengthening the economy. "Last year Romanian scientists contributed 0.5 percent of all the papers published in the world in nuclear physics," Holubei said. "We want to increase that percentage." Ion Ursu, the director of the Atomic Physics Institute, agrees with Holubei. "To be independent," Ursu said in a recent interview, "we must have good fundamental science. Otherwise, we will always be in the position of borrowing from more advanced countries, and we do not want to do that."

In Romania, planning has not been an end in itself. Rather, it has been the means by which development—and, eventually, independence—could grow. Scientists here are the ones who plan the research, and one can be sure that fundamental science will not be slighted. The scientists who would like to be free to do whatever kind of work they like are still around, and it is unlikely that any amount of pressure, patriotism, or national pride will eliminate them. But they are definitely in the minority. Most Romanian scientists, because of the traditions of the past and because of their country's need for the contributions they can make, seem willing to accept the planning as necessary. They feel that their country could not have developed to the extent it has without planning, and the thing they seem most interested in is its further development and its independence.—ANDREW JAMISON

A former Science news intern, Harvard senior Andrew Jamison traveled in Eastern Europe this summer.

NEWS IN BRIEF

● **HANDLER DECLINES ADVISORY POST:** Philip Handler, president of the National Academy of Sciences and chairman of the National Science Foundation's policy-making board, has declined to serve on the Defense Science Board. This board advises the Secretary of Defense on scientific matters. An official at NAS said that Handler had not made public his reasons. Frederick Seitz, Handler's predecessor at NAS from 1963 to 1968, had been chairman of the board, as well as a science adviser to NATO. Detlev Bronk, NAS president from 1950 to 1962, had been an active member of the Defense Science Board and chairman of the Aviation Medicine Committee of the Academy.

● **PHYSICIST WINS FERMI AWARD:** The Atomic Energy Commission has named Dr. Walter H. Zinn the 13th winner of its \$25,000 Enrico Fermi Award. Zinn, a vice president of Combustion Engineering, Inc., previously directed the AEC's Argonne National Laboratory at Argonne, Ill. He was a member of the Fermi team which built the world's first atomic pile.

● **SST ADVICE REVEALED:** The Nixon Administration belatedly released reports on the supersonic transport which Representative Henry Reuss (D-Wis.) said amounted to a "resounding nonendorsement" of the program. Reuss had been refused access to the report by John Volpe, Secretary of the Department of Transportation, until he invoked the Freedom of Information Act. The report was prepared by a committee named by Nixon last winter which included officials from the departments of State, Defense, Treasury, Justice, Labor, Commerce, and Welfare. The panel took a negative view, Reuss said. The transportation subcommittee of the House Committee on Appropriations is now studying the report.

● **ONTARIO SCIENCE CENTRE:** A \$30 million Canadian science center, similar to the Museum of Science and Industry in Chicago, has been completed in Don Mills, near Toronto, Canada. The Ontario Science Centre features 450 scientific and technological displays that permit active participation by observers. The Centre was funded primarily by the provincial government of Ontario.