adviser in the White House have been unacceptable to the Office of Management and Budget because, under these drafts, this official would have been given a direct hand in putting R & D budgets together.

Although confirming the foregoing understandings, an aide to Representative Teague cautions that what the legislation finally contains will be up to the full Science and Technology Committee, which is expected to begin marking up the science adviser bill on 8 October. The bill seems assured of a generally friendly reception in the Senate once it is passed by the House.—LUTHER J. CARTER

International Geophysics: Science Dominates Politics

The following discussion of the meeting of the International Union of Geodesy and Geophysics was written by Philip H. Abelson, who attended as chairman of the U.S. National Committee for Geophysics. Abelson, editor of Science *and president of the Carnegie Institution of Washington, was president of the American Geophysical Union from 1972 to 1974.*

When delegates from a large number of countries assemble these days, the usual result is division and confrontation. At the recent quadrennial meeting of the World Meteorological Organization, 28 April to 25 May, for example, South Africa was expelled and the Palestine Liberation Organization was invited to sit as observers. The international scientific unions are not guaranteed immunity from actions of this kind. Thus, when 3000 scientists attended the recent meeting of the International Union of Geodesy and Geophysics (IUGG) at Grenoble (25 August to 6 September), the occasion might well have provided manifestations of some types of politization.

If such a development were to occur, one might expect it to appear early in the meeting of the IUGG, which has a spectrum of 76 member countries. The Union deals with topics relevant to such problems as resources, development, natural hazards, and pollution, which are politically sensitive. But although there was much politicking at the meeting in Grenoble, it was largely confined to Union organizational matters and the meeting will be remembered for its scientific content, not for the politics.

One aspect of the meeting with implicit political significance, though, was the behavior of the Soviets. The standard practice of the Russians is to participate in the planning of international scientific meetings and to submit titles and abstracts for them. Almost invariably, however, a substantial fraction of their participation is canceled at the last moment and after the program has been set. On this occasion the customary practice was followed, but the absences were more extensive than usual. More than half of those scheduled to make presentations did not appear, including some conveners of sessions. In symposia in which many Russians were expected to participate their absence made a shambles out of schedules, leading to much adverse comment. It was also noted that the Russian delegation seemed to be weighted toward politically reliable types, a situation reminiscent of earlier Cold War times. Insofar as reasons were given for the absences, they were the old threadbare excuses of illness or the comparatively new one of lack of money. We were told that the Russian Academy of Sciences was temporarily broke and that half of the Russians who actually arrived came using their personal funds. However, talks with eastern Europeans and with Westerners who have recently been in the Soviet Union made it seem likely that the real problem was tighter criteria of political reliability. One such source quoted a very competent young Russian geophysicist as saying, "I will never be allowed to attend a meeting outside of this country. I am too long in the tongue."

There was a sharp contrast in the numbers and character of the U.S. and U.S.S.R. delegations. Among the fewer than 100 Russians who were registered, there were virtually none younger than 40. Of the 600 Americans, about half were below that age. Among the Americans could be seen the future leaders of geophysics, but the coming generation of Russian geophysicists was missing.

For Americans the cost of attending the 13-day meeting was $1000 to $1500 each—a substantial sum in days of tight budgets. A small but significant number met part or all of this cost personally. About a third of the delegates were employees of federal agencies that paid the costs. About half were there on research grant funds. In addition, the National Science Foundation provided $30,000, which was administered by the American Geophysical Union. This was split so that 75 scientists received about $400 each. The 75 were chosen largely on the basis of youth and promising potential. Senior scientists were expected to fend for themselves.

Because many aspects of geophysics treat the whole earth, including its oceans and atmosphere, and outer space, incentives exist for various kinds of international cooperation. Obvious mutual benefits are derived from cooperation among meteorologists, and further improvements will come from such international undertakings as the Global Atmospheric Research Program. Research in oceanography has increasing international implications, which are tied into the law of the sea. Seismologists monitoring earthquakes and gathering evidence concerning the deep structure of the earth are dependent on good global interchange of information. The IUGG was organized to facilitate such cooperation. It has major meetings every 4 years at which officers for the Union are elected. At the same time, the seven component associations of the Union also elect the officers who will guide their affairs for the next 4 years. In the long 4-year interval between general assemblies of the Union, the officers (there are some 70 in all) provide continuity.

Many scientists, immersed in their research, regard election to such offices as a trifling honor. However, others find the positions worth seeking. They can help shape the development of their branch of science, and their status assists them in operating internationally. Each of the associations has limited but useful funds to subsidize travel of officers. This factor is especially important to scientists from eastern Europe and from the less developed countries. For some, the holding of office represents a valued mechanism for obtaining permission to travel internationally. Thus, before the elections of officers there is considerable maneuvering. In the selection of the slate, the scientific competence of candidates and their effectiveness in administrative matters have considerable weight. However, such matters as ideological and geographical balance also have a large influence. For example, in most slates there is usually one Russian and one American. Ordinarily, U.S. delegates do not work as diligently or as skillfully at their politicking as do the other delegates. Nevertheless, about 25 percent of the offices of IUGG and its associations usually go to the United States. This was also true in the recent elections at Grenoble.

Many scientists say that the most im-

portant function of an international meeting is the facilitation of personal contacts. After individuals from opposite parts of the world meet and discuss matters of common interest, they can establish a basis for trust and cooperation that no amount of letter writing can ever achieve. Friendships made at quadrennial meetings often last a lifetime. The 13-day length of the IUGG meeting provided opportunities for many contacts.

Many scientists who attend a General Assembly see it as a special kind of scientific meeting. During the 9 days of scientific sessions, 34 multidisciplinary symposia were conducted. Some of the advances made during the past 4 years were treated in symposia entitled "Recent crustal movements," "Deep sea drilling and the history of the ocean," "Marine pollution," and "Global effects of the interplanetary medium—magnetosphere–lower atmosphere interactions." There were many other formal and informal sessions, including those of commissions and working groups. The latter usually consist of six to ten scientists who address a specific topic in depth, canvassing existing information and outlining cooperative programs aimed at providing crucial information or analysis.

A great international meeting permits a rough assessment of the quality and quantity of scientific research being conducted in the participating countries. In the possibly prejudiced view of American attendants at the IUGG meeting, the United States was the leading contributor. Roughly half of the significant new knowledge in geophysics in the last 4 years has been the product of U.S. scientists. This was evident in presentations at the meeting. It was documented by a massive 1106-page U.S. report that had been prepared by members of the American Geophysical Union (*1*).

A key ingredient in the U.S. position is the superiority the United States has enjoyed in equipment, instrumentation, and computational facilities. Some of the other countries, notably the United Kingdom, though less well endowed with hardware, have scientists equipped to use their minds very effectively. The quality of work in western Europe, Japan, Canada, and Australia is very good. There are intelligent and competent geophysicists in the Third World, but they labor under dreadful handicaps of lack of equipment and other support. A special situation exists with respect to recently independent countries. A decade ago their leading geophysicists were usually colonial civil servants, most of whom have since been phased out. A new cadre of native geophysicists is beginning to appear and some were at Grenoble, but considerable time must elapse before a substantial number are trained.

For the most part, the quality of contributions of the Russians and eastern Europeans was disappointing. It is not certain that a fair sample was presented, since the Russians sometimes play their cards close to the chest. There were some exceptions. The Russians presented a considerable body of data and analysis of their observations of disturbances in the ocean's thermocline—work that was well regarded by some U.S. oceanographers and that has possible military significance. Another body of information involved Russian studies in connection with their space probes to Venus and Mars. In at least some aspects of their studies they have achieved leadership.

It is difficult to determine the level of effort of the Russians in geophysics, but from various conversations it appears that the number of scientists involved is comparable to that in the United States. Among the Russians, there are many highly intelligent, gifted individuals. However, it is clear that the young Russian scientists work under a number of handicaps. They have relatively poor equipment and inadequate computational facilities. The directors of laboratories wield too much power, often suppressing new ideas or new lines of research. Communication among various institutes is not as effective as it is, for example, in the United States. Finally, there is the limited ability to visit and interact with scientists from other countries.

From a strictly numerical standpoint, the less developed countries had enough votes at Grenoble to push through measures and to elect a slate of their own officers. A number of reasons can be advanced for the absence of such a confrontation. One is that the predominant spirit of the occasion was scientific rather than political. A second is that most of the delegates from the less developed countries are realists. They understand that to be effective an officer of the Union must have the backing of an appropriate infrastructure. They also recognize that geophysicists from less developed countries have much to gain from cooperation and much to lose from confrontation. Were geophysicists of the developed countries pushed too far they would respond by forming an exclusive club and all geophysics would be poorer.

—PHILIP H. ABELSON

References

1. The report, edited by Peter Bell of the Geophysical Laboratory of the Carnegie Institution, covers highlights of U.S. work in geophysics in the period 1971 to 1974. The report has been distributed to all members of the American Geophysical Union and is a special issue of *Reviews of Geophysics*. Copies may be obtained from the American Geophysical Union, 1909 K Street, NW, Washington, D.C. 20006, for $20.

Employment Testing: Debate Simmers In and Out of Court

The United States is the world's biggest user of psychological tests. In the area of employment selection, placement, training, and promotion, they have been used indiscriminately and discriminatorily. Some people believe they should be thrown out altogether because any pencil-and-paper test operates to the disadvantage of blacks and other minorities. The government, however, argues that good tests properly used can be an effective means of bringing socially and educationally deprived persons and groups into the golden land of "equal opportunity."

Testing is only one of a wide array of techniques for screening and selecting employees. But because it is purportedly the most objective and most nearly scientific means of ascertaining an individual's qualifications and potential, it has been the object of a great deal of attention.

The world of testing is in a state of ferment and flux, particularly because of its high political volatility. The federal government is in the process of developing a revised set of guidelines on test use that will apply uniformly to the public and private sectors. Employers, many of whom have been frustrated by seemingly contradictory and complex demands made by the government, are eagerly awaiting the new guidelines. Psychologists and psychometricians are laboring at smoothing out the discrepancies between the uses of tests to achieve employment based on merit and to increase minority representation. And, as these groups are struggling to establish equitable and consistent procedures, the courts are beginning to establish a body of case law—in a rapidly growing number of employment discrimination cases involving tests—that some people fear will result in wholesale abandonment of the use of tests.