the three military services. In HEW, such a reorganization might create undersecretaryships of Health, of Education, and of Welfare.

Whatever happens departmentally, Allen faces unsolved administrative problems in OE. The Office of Education is run by a phalanx of associate commissioners, each responsible for administering a particular program or for dealing with a particular sector of education. Rivalries flourish, coordination is difficult, and OE still sees itself much as its clients like it to be—a gatherer of statistics and a mailer of money.

Secretary Finch has had an "education review team" looking at several aspects of OE's operations. This group includes insiders and outsiders, oldtimers and new hands. Recommendations of the team made public this week deal with budget and program matters, but it is a good bet that Finch and Allen will be urged privately to push on with an OE reorganization.

The key to a reorganization of the 3000-member OE staff would be the filling of about 30 policy-level jobs at the top with people capable of carrying out Allen's intentions. In exerting control of the agency now, Allen would appear to have several things in his favor. There are vacancies in several top jobs, so bloodletting will be reduced. Allen has at his disposal several appointive jobs that go with the assistant secretaryship, and these raise his management impact. Increases in federal salaries, particularly at upper levels, will allow him to offer a number of jobs in the $20,000- and $30,000-a-year range which should be competitively attractive. And Allen's 13 years as New York State school chief should have acquainted him with able potential recruits outside the federal government.

A reorganized OE could profitably direct its attention to correcting a glaring weakness in the administration of education legislation. Neither Congress nor OE has done much about seriously evaluating the multitude of programs on the books and making improvements where necessary. Drafting and passing a law to create a new program is in many ways much easier and politically more profitable than finding out how the program actually works and correcting flaws or abuses. Now that the legislation mill seems to have slowed, this would seem an excellent time for Congress to exercise its "oversight" powers on education legislation and for OE to overcome its old habits of letting sleeping dogs lie.

It is risky to predict which problems will prove biggest for Allen. The effects of rising militancy among students and teachers and the demand for "local control" of schools will affect, if indirectly, the job of the chief federal education official. Campus unrest shows no signs of abating, and Allen and his colleagues are almost certain to be faced with the awkward job of administering "antiriot" provisions which call for the cutoff of federal assistance to persons seriously implicated in campus disorders. Allen has had big-league experience in today's confrontation politics, having mediated New York City's recent teachers' strike and emerged with what little praise was accorded anyone. And, as he comes to Washington, he probably is aware that educators today, wherever they serve, are best advised to expect the unexpected.—JOHN WALSH

NATO: Scientific Affairs Division a Miniature NSF for the Alliance

Brussels. NATO is a wobbly military organization, but it does contain a small and inconspicuous branch that functions well as a sort of miniature National Science Foundation for the 15-nation alliance. This is NATO's Scientific Affairs Division, which, since its creation in 1958, has evolved into one of the more unusual scientific offshoots of the cold war. Though the Warsaw Pact countries routinely wish damnation on NATO, Eastern European as well as Soviet scientists not infrequently take part in scientific conferences sponsored by the division. And though France has pulled out of the military side of NATO, forcing relocation of its headquarters from Paris to Brussels, she still participates in its scientific branch. If any further examples be needed of basic science's indifference to ideology and to the source of support for research, it is to be found in the NATO Scientific Affairs Division. Furthermore, the genesis and history of the division at least hint at some universality in the American pattern of military organizations' generally having a freer hand than their civilian counterparts in supporting academic science. Such was the experience with the Office of Naval Research at the end of World War II, and it is being repeated today in the Defense Department's Project Themis for building up research in lesser institutions. Asked why NATO should be a source of support for basic research mainly associated with academic institutions, Rudi Schall, a German physicist who has been acting head of the division for the past 2 years, frankly replied, "Because it's much easier for a military organization to get the money." Actually, it is not very much money as scientific budgets go, but the division has so arranged its activities that, per dollar spent, it probably can match any organization for the number of people it draws into its programs.

Not at all secret, but generally unnoticed among the mightier affairs of NATO, the Scientific Affairs Division has an annual budget of only $4.4 million. Nevertheless, by following a strategy aimed at getting the widest possible effect from its relatively limited resources, it ranks high in the world as a source of support for postgraduate scientific training and scientific conferences. In addition, it has a modest program of project support, and at present it is looking into new activities, with particular attention directed toward computer technology and oceanography. The postgraduate training program currently provides funds for more than 1000 scientists to train in universities and research institutes throughout the alliance. About half study chemistry and physics; the remainder are distributed among virtually all other fields of science, with a small number in the social sciences. Since 1959, when the fellowship program was established, it has provided support for more than 8000 scientists; this validates the division's claim to being the

underwriting agency for a "significant part of post-graduate scientific education in the West." In each country, a government organization selects the fellows (NSF handles it in the United States), and the number of fellows appointed by each country is related to its financial contribution to NATO and the amount the country chooses to attach to its fellowships. Schall said that for study in the United States, which is the most popular destination among the fellows, the stipend can run as high as $5000.

Iron Curtain Visitors

The division's Advanced Study Institutes Program is another example of the way in which a relatively small sum of money can be used to involve the participation of a large number of persons. The division currently sponsors about 50 conferences, most of them held during the summer in remote but comfortable European locations. (Schall noted wryly that "two weeks on a Greek island seems to be very good for scientific thought.") Last year the Institutes Program drew an attendance of over 3500 persons. Over the past 9 years, some 30,000 scientists have taken part. About 10 percent of the participants are from non-NATO countries, mainly Sweden and Switzerland. According to Schall, about 3 percent of the total number of conferees come from Eastern Europe or the Soviet Union. When the conferences are jointly sponsored with other organizations, as is sometimes the case, the costs for the non-NATO participants often will be assigned to the other organization, Schall explained. But he said there have been cases in which NATO has footed the bill for non-NATO participants, including those from Warsaw Pact countries, with nothing but a spirit of scientific brotherhood pervading the situation. Schall reports, "the NATO leaders said we can invite anyone we want, as long as it can be justified on scientific grounds." Among the conferences in recent years were those on molecular aspects of protein structure and function, in Venice; on structure of the lower atmosphere and electromagnetic wave propagation, in Wales; and on engineering applications of statistical extremes, in Portugal. About two-thirds of the conferences are reported in book-length volumes, which the division says are "usually acknowledged as authoritative surveys of their subjects."

The division also spends about $700,000 a year to help support some 300 research projects in universities and research institutes of the member nations. These cover a broad spectrum of the basic sciences, and, in substance, look very much like the sort of work NSF might support.

It may be assumed that, among the relatively small group of American scientific leaders who have worked during the postwar years to establish close links between academic science and military organizations, the scientific branch of NATO was singled out as having particular significance, for some of the most outstanding figures in this group have taken turns as full-time head of the division or of its direct predecessor, the NATO Science Committee. The first of these was Norman F. Ramsey, the Harvard physicist, who has served in a variety of high-level government advisory positions. He was succeeded by Frederick Seitz, who later became president of the National Academy of Sciences and chairman of the Pentagon's topmost science advisory body. Then came Professor W. A. Nierenberg, physicist and current director of the Scripps Institution of Oceanography. The next was W. P. Allis, physicist, of Massachusetts Institute of Technology; he was succeeded by J. L. McLucas, also a physicist and now president of The Mitre Corporation. Schall, who came from the joint German-French Defense Research Institute at St. Louis, France, became acting director of the division in 1966; now that he is returning to the institute, the directorship is to be taken by a Norwegian physicist, Gunnar Randers, who has held the post of managing director of the Norwegian Institute for Nuclear Energy. Isidor Rabi, the Nobel laureate physicist who has long been influential in science-government relations in the United States, never served full time with the division, but he has been an adviser, and he is considered to be an important figure in its affairs. When the division celebrated its tenth anniversary last year, the speakers included Rabi and another veteran of science policy-making, Sir Solly Zuckerman, who is the British government's chief scientific adviser. Zuckerman on that occasion addressed himself to the question of why NATO was supporting science. The answer he offered was twofold: (i) "the effectiveness of defense policy depends on the use it makes of science"; (ii) NATO is supporting science because scientists can make valuable contributions to defense policy-planning. On this latter point, Zuckerman reported, "Some years ago I was provided the opportunity at the annual NATO military exercise . . . to challenge the concept of tactical nuclear warfare. My argument, based on detailed analyses, was that the use of these weapons in field warfare in Europe would immediately lead to physical conditions of destruction which were totally incompatible with military operations." Zuckerman added that the NATO supreme commander encouraged him to publish his analysis. "Since then," Zuckerman stated, "my conclusions have been substantiated in other studies carried out in England, and also, I seem to remember, by at least one carried out" in the NATO Technical Center.

Nevertheless, it might be pointed out, NATO remains prepared to use nuclear weapons in the defense of Western Europe.

Narrowing the Gap

On a few occasions the Scientific Affairs Division has served as the spawning ground for proposals for new international activities in science and education. One of these proposals, which now seems to be on the brink of fruition after a good deal of uncertainty, is for a European Institute of Technology; it can be traced back to a study that the NATO Science Committee made in 1960, on "Increasing the Effectiveness of Western Science." Later the proposal was taken up by a committee headed by James R. Killian, Jr., of M.I.T., and in 1967, when concern about the technological gap was flourishing, a detailed proposal was worked out at a conference sponsored by the Scientific Committee of the North Atlantic Assembly and the Foreign Policy Research Institute of the University of Pennsylvania. Support was provided by various organizations, including the European Cultural Foundation and the Council of European Industrial Federations. When the project had evolved into a design for an advanced school of management, responsibility for further planning was assigned to the Organization for Economic Cooperation and Development. Britain, West Germany, Holland, and Italy have promised funds, though France has announced that she will not participate.

Like many other scientific organizations that have settled into a program of activity, the NATO Scientific Affairs Division is also looking for something else to do. In recent years its budget has experienced only slight

growth, rising by about $100,000 a year. Research of direct military significance is outside its province, since this is handled by a separate body, the Defense Research Group, which is simply a small secretariat for coordinating the military research activities of the member nations. And NATO's two research facilities, the Anti-Submarine Warfare Center at La Spezia, Italy, and the Technical Center at the Hague, are administered by the military branches of the alliance.

"What we need," Schall said, "is a new impetus." And, for this purpose, the division has been looking into oceanography and computer software. Just how it might involve itself in these fields is not clear, but one administrative form that NATO finds attractive is that of the Von Karman Institute for Fluid Dynamics, in Belgium. Referred to as a NATO-related institute, it is financed by all the NATO countries, and the Scientific Affairs Division also provides some support through grants and fellowships. In oceanography, Schall said, the NATO role would probably be confined to coordinating existing activities, but in the computer field—which the division has had under study for 2 years—there might be an actual research facility, closely linked to NATO, but, on the style of the Von Karman Institute, administratively independent of it.

At this point it cannot be said whether these plans will ever be carried out. For one thing, they involve subjects that are already being handled by existing organizations that, in many cases, are having a difficult time getting resources. The division's present activities—fellowships, conferences, and research grants—do not intrude on anyone's bailiwick, and are welcome no matter how many other organizations are in the same business.

But perhaps of greater importance is the fact that American scientific leaders no longer seem to consider the division as important as they once considered it. Its first five heads were Americans, and rather high-ranking ones. Its new chief is one of Norway's most distinguished physicists, but the United States is the centerpiece of NATO—an American has always been its top military commander, and those NATO matters in which the United States has shown little interest are not among the most thriving in NATO affairs. —D. S. GREENBERG

Soviet Science: OECD Reports a Pattern of Uneven Development

Immediately after Sputnik, waves of apprehension swept through the United States and other Western nations about the surprisingly high quality of Soviet science and technology. In subsequent years, great curiosity about the nature of Soviet science has not been matched by detailed information. This deficiency is partly remedied by the publication of a long-awaited report, "Science Policy in the USSR," which was completed recently under the sponsorship of the Directorate for Scientific Affairs of the Organisation for Economic Co-Operation and Development (OECD).* The report indicates that Soviet scientists and political leaders need to spend considerable time thinking about how to correct imbalances in their R&D system.

Those intrigued by Soviet science and technology will find this massive document (more than 700 typescript pages in the restricted version) an indispensable source of information and analysis despite its production under very difficult conditions. In preparing reports on the science policy of other nations, the OECD has been able to obtain full cooperation from the countries under study, which have provided facts, made provisions for travel, and arranged clarifying "confrontation" meetings with their scientists. Such was not the case with the Soviet Union. The authors of the report had to rely on extensive published data and on their personal visits.

The study is divided into five principal sections which were written by specialists on the Soviet Union from several Western countries. The introduction was written by Pierre Piganiol, science adviser to the Compagnie Saint-Gobain of France. The section on central planning of Soviet R&D is by Eugene Zaleski, Director of Research at the Centre National de la Recherche Scientifique, Paris. The second section, on scientific and engineering manpower resources of the U.S.S.R. from 1961 through 1966, contains a great deal of valuable information on the utilization of Soviet technical personnel; the author is Joseph P. Kozlowski of the National Science Foundation in Washington. Helgard Wienert, a consultant to the OECD Secretariat, wrote two of the major parts, one on the organization and planning of research in the academy system, the other on research in institutions of higher education.

The final section, on science and industry in the U.S.S.R., is, in this reader's view, the most interesting; it was written by R. Amman, M. J. Berry, and R. W. Davies of the University of Birmingham in England. Through use of central planning and the establishment of R&D priorities, the English specialists conclude, the Soviet Union has been able to achieve outstanding successes in aviation, rocketry, space exploration, atomic energy, machine tools, and iron and steel technology. But, despite the Soviet system's ability to organize to meet new and important research objectives, much of the Soviet R&D system seems characterized by sluggishness. Although Soviet military R&D seems relatively well-financed, the adequacy of civilian facilities receives much criticism. The standard for facilities for civilian scientists seems somewhat below the British standard and well below that of the United States. Soviet accounts emphasize that there is a "research development imbalance"—that development is given insufficient resources as compared to research. The main bottleneck in Soviet R&D, the Birmingham specialists conclude, is the relative unavailability of testing facilities, primarily for manufacturing and proving prototypes. Soviet scientists commonly argue either that such an imbalance does not exist in the United States or that the imbalance here is much less pronounced.

Another obstacle to technical inno-

* The report, though completed, has not yet been publicly distributed and was obtained by *Science* from a source outside the OECD. It is expected that the report will be published by April when it can be purchased from the OECD Publications Center, 1750 Pennsylvania Avenue, NW, Washington, D.C. 20006.