spection issue, and it seems to have substantial support in the Senate, although at present the openly stated support is far short of the necessary two-thirds vote required to ratify a treaty. Late in May, Senator Thomas J. Dodd (D.–Conn.), who has generally been skeptical of a comprehensive test-ban agreement, joined Senator Hubert H. Humphrey (D.–Minn.) in sponsoring a resolution for a ban against testing in the atmosphere, in space, and under water. Thirty-two other Senators placed their names on the resolution; this was a pretty good turnout on an issue that was actually remote from active Senate consideration. Administration officials say an informal survey shows that support for the resolution is even greater, and they are confident that if the issue should come to a boil, the Senate will go along with the Administration.

—D. S. GREENBERG

## Manpower: Senate Study Describes How Scientists Fit into Scheme of Things in Red China, Soviet Union

Ever since Marx, the status of a science has been claimed for Marxism by its exponents, and the Communist countries have cast scientists and technicians in leading roles in "Socialist construction." But the Communist passion for secrecy and the unavailability of statistics prevented Westerners from learning much about the supply, quality, and utilization of professional manpower behind the iron and bamboo curtains. In the past few years, however, because of exertions by scholars and government agencies here and because of some relaxation there, more has been learned on the subject, particularly in respect to the Soviet Union. And recently a Senate subcommittee published companion studies on staffing policies and practices in Communist China and the Soviet Union which touch on the organization of science and should interest both the specialist and, especially, the average curious reader.

The studies are *Staffing Procedures and Problems in the Soviet Union* and *Staffing Procedures and Problems in Communist China*, issued by the Senate Government Operations Committee's subcommittee on national security staffing and operations, which is chaired by Senator Henry M. Jackson of Washington.

The Jackson subcommittee is neither a legislative subcommittee nor an investigative subcommittee in the ordinary sense of having the responsibility of overseeing the operations of a specific agency. Rather, it devotes itself to the study of the policy-making apparatus. Because its reports have been generally of high quality, the subcommittee has a good reputation on Capitol Hill. One of its studies, for example, on Science Organization and the President's Office, is regarded, on the Hill, as having contributed to the reorganization plan under which the new Office of Science and Technology was established.

When the subcommittee last year got a new title emphasizing national security and a charter to review the administration of national security and to make recommendations to improve it, the panel appeared to have changed direction somewhat and to be concerned primarily with staffing and operations problems involving the State and Defense departments and other security agencies.

The reports on Red China and the Soviet Union differ from typical subcommittee products in that they were prepared in direct cooperation with the Executive Branch. In fact, it appears that the subcommittee originated the idea and acted as editor and publisher and that the agencies—probably State, Defense, and CIA—contributed material. The staff is not at liberty to say. Presumably, it was deemed advantageous to make unclassified information available to the public and to scholars for discussion and possible correction.

Both studies devote sections to staffing of the party, the government, and the military and discuss the education systems as feeders of professional and managerial manpower. The report on the Soviet Union is the more extensive and detailed, reflecting the greater accessibility of reliable information, and this report is likely to be especially useful to Sovietologists because of its charts, which lay out the particulars of party and government organization and identify present and, in some cases, past office holders.

The reports make clear that the organization of science, like every other feature of life in the two countries, is fundamentally influenced by the principle of party control through centralization in government and the educational and economic systems. There are no checks and balances in government, no private sectors in education or the economy, such as tend to create compartments in Western society.

The principle of party supremacy, the report on China suggests, raises special difficulties at present in Red China because of the party's mistrust of intellectuals, which extends to scientists and engineers.

"Many well-trained scientists in China were educated in the Western non-Communist world," says the report. "The regime regards their political reliability as doubtful. The leaders cannot risk placing such men in policy-making roles. They are even hesitant about placing such men in positions of lower level authority without the constant and overriding presence of a politically proven party stalwart."

In his book *Professional Manpower and Education in Communist China*, published by the National Science Foundation, Leo A. Orleans tells how the brief period of ideological relaxation during the "let the 100 flowers bloom" period in 1957 led many a university intellectual to go out on a limb in criticizing existing conditions. The limb was soon sawed off, and the unreliability of the intellectuals had been confirmed in the eyes of the regime.

The report says that poor planning and bad management have marred China's scientific effort. Start-and-stop projects wasted time and manpower. The available technicians, inadequate in number, were in some cases misused. And party administrators sometimes "attempted to manage researchers as though they were machines with off and on buttons."

### Scientific Manpower in China

The report summarizes the scientific manpower situation in China as follows.

"The major staffing problem in China's scientific organization is, of course, to find enough competent scientists and teachers. At the present time, they have in general a few qualified men backed by a large body of poorly trained and inexperienced personnel. They lack the large group of medium quality, experienced researchers of the kind that make up the main body of the scientific community in a technologically advanced society.

"China has a few well-trained and competent scientists in nearly every area of technology. Therefore, useful progress can be made in almost any scientific or engineering project of sufficiently high priority. However, there are not enough first-rate people around to make progress in more than a limited number of advanced projects at any one time. The rate of progress on

a priority project can be stepped up only by a process of bleeding other projects.

"The training of scientists and technologists appears lately to have been put on a more promising track, but the principal resource for advancement, the well-trained and experienced tutor, remains in short supply. There is no crash program that can solve the problem."

The Chinese have freely acknowledged that assistance from the Soviet Union has been instrumental in advancing Chinese science and technology in the 15 years since the Communists completed their quest for power in China. The report does not predict what the current storminess in Sino-Soviet relations will do to the Chinese scientific effort.

Interestingly, however, the report notes that, after 1956, practically all Chinese students sent to the Soviet Union were graduate students, and that after 1960 scarcely any students at any level were sent, although most of those in residence are apparently permitted to complete their studies. The report estimates that the total number of students sent to Russia was about 7500, of which about 2500 were probably graduate students. Less than 1000 are thought to be in the Soviet Union now.

In the report on the Soviet Union, the section on Staffing for Scientific and Technological Research and Development concentrates on the organization and the workings of the State Committee for the Coordination of Scientific Research, which was established 2 years ago for the purpose of unifying control and improving the efficiency of research and development, particularly nonmilitary R&D (the Soviet space program is linked to the military program and conducted in the same deep secrecy).

### Research and Development

One reason for the creation of a new coordinating agency for R&D is a familiar one in the West—a discontinuity in the application of research discoveries to industrial technology.

The report quotes Khrushchev as complaining to the 20th Party Congress in 1956 that "the separation of the research activities of the Academy of Sciences, the departmental research institutes and higher educational establishments can no longer be tolerated. This separation and lack of coordination prevent the concentration of research activity on the solution of major scientific and technological problems, lead to a duplication of effort and waste of resources, and slow up the introduction of research and technological achievements into production."

Five years later, no decisive improvement in the organization of science had been achieved, and it appears that national security programs centering on nuclear energy, missile development, and space research were placing an increasingly heavy burden on R&D resources. Changing the status quo and upsetting established bureaucratic and academic habits is apparently as difficult in the totalitarian East as in the West, and the need for change in the machinery was sharpening.

As the report puts it, "scientific research and development was playing an increasingly crucial role in policy-making, not only in the immediate area of international strategic interests, but also in other fields of national life. Yet there nowhere existed a source of information and advice on scientific-technological matters which could focus perspective on the whole of Soviet scientific capabilities and achievements. Each of the existing institutions with possibly one exception had parochial interests of a nature which made the dispassionate objectivity of advice emanating from them open to question. The burden of achieving an overall view of the scientific research picture was thrust upon either the government Presidium or the party Presidium, bodies which in view of the range of their responsibilities, were ill-suited to perform that function."

The report then describes in some detail the process of negotiation and pressure politics which led to the establishment of the state coordinating agency. The account parallels in general the more extensive one in Nicholas DeWitt's landmark work, *Education and Professional Work in the USSR*, and adds some details which seem to have been recently gleaned.

Before the reorganization, about a third of the R&D work concerned was coordinated by the U.S.S.R. Academy of Sciences directly and through the academies of the republics. Research at institutions of higher education was coordinated by the Scientific Technical Council of the Ministry of Higher and Specialized Secondary Education. The remaining R&D work, amounting to about half the total, was distributed widely among the ministries, state committees, and other administrative agencies.

The Soviet Academy was bypassed in the search for a coordinating agency, despite its achievements and its great prestige. The Academy, says the report, is too independent and too resistant to the normal political and administrative pressures. The report calls the Academy a "real anachronism in Soviet society," observing that Academy officers and members are chosen through elections which, "though by no means free from external political pressures, have been nevertheless about the only elections in the country with any real substance." The Academy also, over the years, has enjoyed the privilege of planning its own research projects, and the projects sometimes looked capricious to the commissars. These two factors make the Academy a poor prospect, in the eyes of the regime, for organizing and directing research.

Finally, in 1961 the State Committee for the Coordination of Scientific Research was established. The committee was not to conduct any R&D work but was given broad administrative and advisory functions. The chairman of the new state committee was appointed a Deputy Premier, apparently to make sure that "the committee's views were brought to bear in decision making at the highest level of government."

Among other responsibilities, the committee was to define the most important problems for immediate and long-range research; draft an overall plan for R&D; supervise research on key problems, no matter where it was being done; and authorize establishment of new research institutions, regardless of affiliation. The committee was also to coordinate all international activities in Soviet science, to supervise the dissemination of scientific and technical information, and to undertake the task of introducing new technology throughout the country.

The committee is composed of ex officio members from other government agencies and of the chairman, his deputies, and the heads of the more important sections of the committee staff. The precise size of the committee is not known, but it is believed to have a permanent staff of 400 to 500.

Much of the work, however, is done by scientists, engineers, and technicians from outside the committee, who are called on to act as consultants or serve for a time on special projects. There are also part-time "scientific councils" organized to work on fundamental problems—such as solid-state physics or oceanography—over a long period, with membership drawn from various

agencies. The report estimates that by 1962 some 2000 scientists, including 400 Academicians, were in these councils, and that perhaps 7000 scientists and specialists, in all, were involved in the work of the councils and their subsections and commissions.

The report does not give much information to answer two major questions: (i) Is the reorganization of science paying dividends? (ii) Will the committee really coordinate all Soviet science or just the nonmilitary part?

On the latter point the report admits that "what role the new scientific research coordination committee will play in the military oriented programs is not yet clear. The signs at present do not point to more than a "participating" role in the coordination and direction of the work.

The report makes a major point when it notes that "the reorganization of the Soviet scientific research and development effort clearly owes much to the outstanding successes scored in the fields of atomic energy, guided missiles and space research—success attributed to the pooling of resources and the combined efforts of scientists, engineers and designers." The high-priority military and space programs have been getting the best of everything in terms of both materials and manpower, and, as the report points out, the rigidities of the Soviet staffing system and the shortage of capable people in the middle and lower echelons of science and administration have limited the efficacy of R&D in the nonpriority fields. And now in this reorganization, the Soviets hope to maximize results in what might loosely be called civilian technology by applying what they learned in paying Paul by robbing Peter.

—JOHN WALSH

## ACDA: Criticism of Arms Agency Increases, but Congress Grows Friendly and Outlook Brightens

The short and not-so-happy life of the Arms Control and Disarmament Agency (ACDA) has entered a new stage. No longer caught midway in a strenuous tug-of-war between passionate enemies and devoted friends, the agency has lately been beset by critics from all sides. The principal distinction now is that some of the critics are friendly—that is, well-disposed toward ACDA but disappointed by its performance—while the others are hostile—antagonistic to the idea of an agency dedicated to negotiating an arms control or disarmament agreement with the Russians.

The friendly criticism is by no means new. Soon after the agency was established, in September 1961, government officials, liberal politicians, scientists, and others who had pressed for the creation of an "agency for peace," in the vague expectation that it would bring an immediate revolutionary shift in U.S. foreign policy, began to voice their disappointment with ACDA. Their private lament has become increasingly popular: in recent weeks, the New York *Times* and the *Reporter* have carried articles enumerating the causes of the agency's malaise, and both within the agency and elsewhere in government it is increasingly easy to get people to put aside what they are doing to shed a tear or two over ACDA's sad plight.

Now, as earlier, much of the criticism centers on the agency's bureaucratic structure of four main bureaus plus seven other compartments for its staff of 187. The people filling the top slots, beginning with the agency's director, William C. Foster, are frequently accused of having greater talent for appropriate gestures than for constructive action, and of pursuing respectability with greater zeal than they pursue disarmament. The combination of convoluted bureaucracy and unenthusiastic leaders is held responsible for the disgruntlement of middle-level staff people, and for a slow-starting and unimaginative research program.

Most of these complaints are fair enough, and all illuminate some of the agency's more serious problems and defects. But as the criticism has increased, the agency has been changing—albeit slowly, and in uncertain directions—and not all the criticism has kept pace with the changes. Perhaps the most fundamental change is that the fierce political passions the agency once excited in Congress have begun to dwindle. This in itself has disappointed some of the agency's more fervent outside supporters, and is interpreted by them as an emblem of the agency's compromises and lack of zeal in hammering away at its controversial responsibilities. But just as there will be no test-ban treaty without the acquiescence of the Senate, there will be no Arms Control and Disarmament Agency without congressional appropriations. In all fundamental ways, the agency is shaped by Congress; an affable relationship is the prerequisite for any fruitful activity. Congress's increasingly neutral view of the agency is not to be regarded with scorn.

The agency has just cleared the first of four congressional hurdles—the passage of new authorization legislation by the Senate. The Senate bill now goes to the House (where the authorizing committee, Foreign Affairs, has not yet scheduled hearings), and there still remains the matter of actual appropriation by both Houses, but the scope of the agency for the next 2 years will probably not be very different from what the Senate has proposed.

ACDA's request for an expanded budget and for modified security regulations was carefully inspected by the Senate Foreign Relations Committee (*Science*, 19 April) and passed by the Senate in approximately the form the committee recommended. The result was a bit different from what the agency wanted. Instead of the $15 million the agency had requested for fiscal 1964, the Senate voted a $20 million authorization covering fiscal 1964 and 1965—still a sizable jump from the agency's fiscal 1963 budget of $6.5 million. By making the authorization cover 2 years, the Senate reaffirmed its right to stand watch over the agency's activities. The move was a compromise between the permanent authorization requested by the agency and the annual review that some senators felt was necessary, but in fact the matter is a relatively trivial one. The 2-year authorization means that the Foreign Relations Committee, as well as the Appropriations Committee, will continue to have a voice in the agency's affairs.

The security changes went through as requested and will bring regulations governing ACDA contractors into line with those governing Pentagon and Atomic Energy Commission contractors. The changes are expected to reduce the delays that have frequently beset the process of letting contracts.

The Senate also initiated a few changes in the agency, interesting in that they reveal what some of the irritants have been. The Foreign Relations Committee was annoyed by a particularly vigorous lobbying campaign in support of the agency's request, which began even before the bill was formally under consideration. The pressures seemed excessive and were attributed by the committee to secret encouragement from within the agency. The result was a cautionary amendment prohibiting the agency from using its funds to promote its own legislation through