members are active, recently has set up a task force on international affairs and defense policy and named Lucien N. Nedzi of Detroit, a dissident member of the Armed Services Committee, as one of its leaders. The first task force study will be on the ABM. According to Donald M. Fraser of Minneapolis, DSG chairman, sentiment within the DSG is running strongly against ABM deployment.

The DSG study is one of several efforts aimed at giving House members new perspectives on defense issues and freeing their minds of the shibboleths of the past. Thirty-eight House members and 14 senators recently sponsored a 2-day conference in which a number of academicians participated, including Schultz of the University of Maryland, Herbert York (a former director of Defense Research and Engineering) of the University of California at San Diego, and John Kenneth Galbraith of Harvard. In Galbraith's view, members of Congress who try to hold down defense spending and restrain the arms race need not fear repudiation at the polls; for, he said, such is the current state of public opinion that the Pentagon's congressional "sycophants and second lieutenants" are the ones most likely to lose out with the voters.

Whether or not Galbraith is correct, various members of Congress are promoting activities at the grass roots that aim to prove him a prophet. For example, some of Senator Kennedy's political allies are engaged in a New York-based effort to encourage formation of anti-ABM groups, especially among the young who last year supported senators Eugene McCarthy of Minnesota and the late Robert F. Kennedy of New York in the presidential primaries.

• The Foreign Affairs Committee has recently activated a long-dormant subcommittee on national security policy, a group in some respects analogous to the new Symington subcommittee in the Senate. In its first hearings witnesses such as Wiesner, Herman Kahn of the Hudson Institute, and George B. Kistiakowsky of Harvard testified on defense technology, including possible trends of the future. The subcommittee chairman, Clement J. Zablocki of Milwaukee, has generally supported U.S. policies in Vietnam, and he favors current plans for ABM deployment. Nevertheless, in an interview with *Science*, Zablocki said the committees on military affairs have been doing an inadequate job of overseeing the military. He indicated that, for one thing, greater attention should be given problems of arms control.

In sum, many members of Congress, in both House and Senate, and including some hawks as well as doves, have finally come to believe that the defense budget and programs are matters too costly and serious to be left to the Pentagon to decide. Attempts to build neat jurisdictional fences have produced results sometimes bordering on the ludicrous. For example, the Senate Armed Services Committee has held hearings on the "military implications of the treaty on nonproliferation of nuclear weapons," while the Foreign Relations Committee has taken up the "foreign policy implications of the anti-ballistic missile system." Increasingly, senators and representatives are realizing that defense questions often are partly political in nature and fall as much within their competence as within that of the military.

Of course, a mere willingness on the part of members of Congress to undertake a more rigorous review of military budgets and proposals does not ensure success of the undertaking. For instance, to look at the situation in the Senate, there is no clear evidence yet that the doves of the Foreign Relations Committee are doing much more than exchanging propaganda blows with the hawks of the Pentagon and the Armed Services Committee.

In order for the various congressional committees to cope successfully with military questions, they may have to go to great lengths to improve their staff work and to anticipate key issues with special studies in which all policy questions are delineated and all relevant viewpoints are set forth. In fact Congress may have to establish a special new staff of defense consultants, in the Legislative Reference Service of the Library of Congress or elsewhere; or it may want to go still further—establishing a special commission of nongovernmental advisers (drawn from science and other fields) on defense policy, or perhaps a joint House-Senate committee on national security analogous to the Joint Economic Committee. Greater fact-finding and analytical resources should help the congressional committees to examine military-political issues more deeply and judiciously.

—LUTHER J. CARTER

Germany: Booming Research Effort Turning to Space and Computers

Bonn. Science and technology in West Germany are now going through the sort of growth-rate boom that characterized their American counterparts around the beginning of this decade. Funds provided through the Bonn government have been rising over the past few years at an annual average of 16 percent, for a current research total from all sources of about $3 billion. New activities are springing up throughout the country, and Germany never lacks for money when it comes to cooperative endeavors with her European partners, some of whom, particularly the British, would just as soon drop out of commitments that have burgeoned far beyond original estimates.

But the Germans, with an economy so buoyant that it rocks its neighbors' economies, are looking for new endeavors. And now that the country is well past the postwar reconstruction period and atomic power—heretofore the focal point of German advanced technology—appears to be en route to commercial success, the Germans are inevitably looking to fields that are becoming increasingly important for international trade, politics, and prestige. These, of course, are space, computers, and oceanography, fields into which the Germans are going on a scale that is impressive by European standards.

Thus, starting from near zero in 1961, West Germany is currently spending about $90 million a year on space activities, and this amount is scheduled to rise to approximately

$150 million within a few years. The Germans put about 40 percent of their resources into international programs, principally the European Launcher Development Organization (ELDO) and the European Space Research Organization (ESRO), but the Minister for Scientific Research, Gerhard Stoltenberg, has laid down the rule that a strong home base should be the prerequisite for taking part in scientific and technical ventures abroad, and, since the base is still relatively small, emphasis is being put on building up facilities. The program has so far concentrated on scientific research, mainly with sounding rockets, but German firms have done well in competition for European cooperative satellites, and an all-German satellite is now being constructed for launch by NASA. The Germans are also working with the French on a communications satellite to broadcast the 1972 Munich Olympic Games. With no manned space effort or aspirations to divert their resources, and with the military barred from space, whatever the Germans muster in space activity goes directly into scientific research or commercial applications.

In electronics, which has been one of the weak points of her otherwise flourishing industrial scene, Germany will spend about $7.5 million in government funds this year to lay the groundwork for a cooperative program with industry that is scheduled for nearly $200 million in government support between 1971 and 1975. Since this program is perhaps Germany's first major venture into direct government stimulation of an industry, it obviously has significance beyond electronics.

The third field selected for emphasis, oceanography, currently receives relatively moderate financial support, $8 million a year, but the figure is expected to more than double by 1972; Science Minister Stoltenberg holds a parliamentary seat near the port city of Kiel, and oceanography is said to be a pet project of his.

With Italy in political and administrative turmoil and Britain and France holding public expenditures more or less level to protect their currencies, Germany's research boom, large as it is, tends to be magnified in the eyes of her neighbors. Furthering this, of course, is the inclination of scientists everywhere to forget past good treatment and confront their government with what is going on elsewhere. This practice, well established in the United States, has naturally taken hold in Europe. But pushing it still further is the fact that the Germans, proud to tell the world of their achievements, have adopted the American practice of organizing group tours for foreign journalists to view the smart, new, instrument-packed laboratories that have lately been constructed. A few months ago, for example, a group of British journalists made such a swing as guests of the German government, and upon returning to their own pessimism-ridden land, loudly proclaimed Germany's return to scientific eminence.

Potential is Circumscribed

There is no doubt that Germany has performed a remarkable feat in resurrecting her science and technology from the destruction of war, but, perhaps more than is generally realized, her potential in these fields is circumscribed, first, by her vulnerable political situation and, second, by resource limitations that are quite real—no matter how rich and energetic the country may look to her economically troubled neighbors.

Since Germany and big technology form a combination that evokes grievous memories, the West Germans have carefully followed practices designed to curb fears that they are moving toward self-sufficiency in technologies that might easily be converted to military purposes. Upon achieving sovereignty in 1955, the Federal Republic renounced the construction of nuclear weapons for all time, and later backed this up by throwing open the German nuclear establishment to a variety of international inspection schemes that are probably the most extensive adopted by any country. And, in line with the desire to avoid even the appearance of nuclear self-sufficiency, the Germans readily agreed that neither of the two centrifuge enrichment plants that they will build with the British and Dutch is to be located on German soil. In space, Germany is cooperating with France and Britain in the development of an all-European launcher, but, though the project is so far a costly mess and Germany has the capability and resources to go it alone, she has renounced any intention of becoming independent in big rocketry.

Geography and costs enter into this decision to some extent. Germany does not have a suitable launch site at home and, unlike the French, does not have possessions abroad that will suit the purpose. And, by what may well be a legislative law of nature, the West German parliament is beginning to throw sharp questions at the Ministry for Scientific Research now that the research and development budget is hovering around 2.5 percent of the gross national product. But the most potent factor in her efforts to seek international ties for big science and technology is political. In the face of hostility from the Soviets and Eastern Europe, the Germans want to lash themselves to Western Europe, and since, by their very nature, science and technology are convenient meeting grounds for international cooperation, the Germans have shown themselves to be the best Europeans whenever such ventures are up for consideration. Thus, they have stood by the European Center for Nuclear Research (CERN) at a time when the British have dropped out of plans to build a 300-Gev accelerator; similarly, they have stood by the European space launcher project, and, though as eager as any country to profit commercially from nuclear technology, they have been good citizens of Euratom, while the French have consistently manipulated that organization for their own national purposes.

Outlook Not So Rosy

While the German scientific scene looks good to outsiders, enthusiasm is not altogether prevalent inside. Though reforms are supposed to have been made, or are in progress, the authoritarian "Herr Professor" system still prevails in academic science. Bright young men are held down by hoary chair-holders. This situation has been known to occur even in the freewheeling United States, but in Germany, the network of opportunity is far smaller, professional mobility is relatively limited, and the power of the chair-holders is neither small nor easily ignored. Also, while research funds from the Federal government, the 11 States of the Republic, and industry have been increasing steadily, fears have begun to arise that excessive wealth is going to spectaculars while a lot of less visible basics are being neglected. For all the talk about a research boom, it is worth noting that Germany still has a significant brain-drain problem. In 1962, a total of 303 German scientists and engineers registered as immigrants to the United States. In 1966 the figure was 363, and in 1967, the last year for which the Germans have complete figures, the total was 482. The causes

for this traffic, and the net figures, once returnees are taken into consideration, are not clear. But the numbers at least raise the possibility that, beneath the surface, things are not quite as rosy as they often are made out to be.

Stoltenberg, a historian by training but a career politician by vocation, became Science Minister in 1965, at the age of 37—a post he accepted in preference to several other high-level cabinet posts he might have had. Politically, this was a good move, since science budgets, though on the way up, were free of political contention, and, while his cabinet colleagues were frequently being battered on one issue or another, he was easily riding the indisputable line that Germany must do more research and cooperate with her neighbors on big science and technology projects. It is generally agreed that he did this extraordinarily well, and, among other things, Stoltenberg clearly deserves credit for having salvaged the European launch vehicle project when Britain's attempt to pull out last year nearly brought about a collapse.

Nevertheless, with Germany now about to go into fairly large-scale space and computer efforts, fears persist that perhaps the wrong lessons were derived from the success that, despite a seemingly late start, she achieved in atomic energy. When that program began, back in 1958, Britain and the United States were facing bills for a lot of expensive wrong turns and false starts. The Germans watched, copied what looked good, and finally emerged with a research program and, eventually, a salable line. In fact, the West Germans have clinched the first sale of a power reactor to a South American country, a 318-MWE (megawatt electric) heavy-water reactor to supply power for Buenos Aires. The Germans built the *Otto Hahn*, Europe's first nuclear-powered ship, and two 600-MWE reactors, of American design but German construction, have been sold to German utilities on a strictly commercial basis —with no government subsidy involved, or at least detectable. Furthermore, German work in fast breeder reactors is considered to be top-notch and likely to put Germany into a strong competitive position for the power reactor market that is shaping up for the late 1970's.

Against this background of a relatively late start and apparently swift success against international nuclear competition, the lure of the computer field is an understandable one. But the story there is quite different. IBM dominates the field, and a handful of others share the bit that is left over. For Germany, on a national basis, to try to take on that sort of competition, even if only to fill in the few cracks that remain, might well turn out to be the first big fiasco in what has otherwise been an all-success story.

—D. S. GREENBERG

Nixon and NSF: Politics Block Appointment of Long as Director

Political considerations appear to have blocked the appointment of Franklin A. Long, vice president for research and advanced studies at Cornell University, as the new director of the National Science Foundation. The vetoing of Long—who until last week seemed all but certain of the post—occurred at high levels in the Nixon administration. The stumbling block was apparently related to Long's liberal positions on arms control and disarmament, an issue which is currently of great concern to the administration but has no bearing on NSF. The incident is almost certain to cause an uproar in the scientific community, which regards the NSF job as "nonpolitical," and it is bound to exacerbate relations between Nixon and the academic world, which has never been very enthusiastic about the President anyway.

As recently as last Friday, 11 April, it appeared certain that the White House would name Long to succeed Leland J. Haworth, who will retire on 30 June after 6 years at the helm of NSF. Long was tentatively scheduled to meet with President Nixon that afternoon, and there were plans to announce his appointment to the press shortly afterward. Then, at the last minute, both the meeting and the announcement were canceled. Administration sources told *Science* that the cancellation was caused by a sudden change in the President's schedule. But this explanation is disputed by close friends of Long's.

One close associate of Long's, who was deeply distressed at the sudden turn of events, told *Science* unequivocally that "discussions between Long and the White House have terminated." The associate said the termination was caused by difficulties "of a political character" which are related to Long's involvement, officially and unofficially, in arms control and disarmament issues. The associate could not say precisely what issues were involved.

As far as can be determined, Long has not been among those scientists who have attacked the Nixon administration for its decision to deploy a "thin" ABM system—called "Safeguard"—to protect the nation's missile sites from surprise attack. Long told *Science* last week (before his appointment fell through) that he has taken no public stand on the Safeguard system and that he approved of the Nixon administration's seeming desire to hold arms limitation talks with the Russians. A colleague of Long's believes the White House may have been concerned about Long's liberal record on arms control in general, rather than about any specific stand he has taken.

However, another source close to the incident said the blocking of Long was triggered by administration anger over an article of his which appeared in the December 1968 issue of the *Bulletin of the Atomic Scientists*, entitled "Strategic balance and the ABM." This article is not a particularly biting attack on ABM deployment and does not specifically criticize Nixon's ideas on the subject, which were not made public until after the article had been published. Long's article did, however, state that ABM deployment would be "a strong pressure toward acceleration of the arms race;" that it "could spell the end to the growth of any significant detente between the United States and the USSR;" and that it might jeopardize the partial test-ban treaty. It is perhaps understandable that Nixon might have second thoughts about appointing someone who had expressed reservations about ABM deploy-