merian subsistence base. Sumerian texts make poignant reference to famine and the insecurity of life in Mesopotamia [see T. Jacobsen, *Proc. Amer. Phil. Soc.* **107**, 476 (1963)].
33. K. Polanyi, in *Trade and Market in the Early Empires*, K. Polanyi, C. M. Arensberg, H. W. Pearson, Eds. (Free Press, Glencoe, Ill., 1957), pp. 250–256; for a discussion of chiefdoms, see E. R. Service, *Primitive Social Organization* (Random House, New York, 1962), pp. 144–152. The practical consequence of redistribtuion in the Mesopotamian case was the development of a tributory peasant society as a distinct social stratum [see E. R. Wolf, *Peasants* (Prentice-Hall, Englewood Cliffs, N.J., 1966), pp. 10–11; T. Jacobsen, *Proc. Amer. Phil. Soc.* **107**, 476 (1963)].
34. M. D. Sahlins, *Social Stratification in Polynesia* (Univ. of Washington Press, Seattle, 1958).
35. On the role of lords, see C. J. Gadd (*28*, p. 13); T. Jacobsen, *Z. Assyriol.* **52**, 91 (1957). On the development of political authority, see R. M. Adams (*9*, p. 278); K. A. Wittfogel (*8*); M. Fried, in *Culture in History*, S. Diamond, Ed. (Columbia Univ. Press, New York, 1960), pp. 713–731.
36. Part of Jacobsen's reconstruction of kingship emerging from a base of primitive democracy is based on the need for a rapidly mobilized defense and the holding of power by war leaders; see T. Jacobsen, *Z. Assyriol.* **52**, 91 (1957); R. M. Adams, *Sci. Amer.* **203**, 153 (1960); E. R. Service, *Primitive Social Organization* (Random House, New York, 1962), p. 114.
37. Abandonment of any city with irrigated fields would be unlikely unless the water failed or the fields became too salty for use. Both of these circumstances have been important in Mesopotamia since settlement began, and we may not be able to infer much about the role of religion in society from the lack of settlements around temples that were probably maintained for a time out of a sense of tradition by people living elsewhere.
38. S. N. Kramer, *The Sumerians* (Univ. of Chicago Press, Chicago, 1964), p. 89.
39. Table 1 is based in part on E. Porada, in *Chronologies in Old World Archaeology*, R. W. Erich, Ed. (Univ. of Chicago Press, Chicago, 1965). Since there is archeological continuity from Eridu times into the Sumerian period, there is probably biological continuity in the population, too. Strictly speaking, however, *Sumerian* is a term that refers to the language and not to the people.
40. The research in Iran was supported by NSF grants GS-67 and 724 and by the University of Chicago and Rice University. The Archeological Service, Musée Bastan, Tehran, granted permission to excavate and provided assistance in the field. I thank Edward Norbeck and Barbara Stark for advice in preparing the manuscript and Steve Wood for the drawings.

NEWS AND COMMENT

National Research Policy: Ambuscade for the "Establishment"

In the course of a series of hearings in recent weeks, Senator Fred R. Harris (D–Okla.) has emerged as a new and potent factor in the affairs of science and government, roaring forth as a champion of the country's science-poor regions and itching for combat with the so-called "scientific establishment." "I'm interested in shaking folks up," said the Senator in an interview, and that is precisely what he did last week when he snapped at the mild-mannered Donald F. Hornig, science adviser to the White House: "quit talking down to members of Congress." A moment before, he had accused Hornig and NSF Director Leland J. Haworth of being "a little bit patronizing and condescending" in defending the distribution of federal research and defense funds. The Senator, who is chairman of the Government Operations Committee's subcommittee on research, was venturing into what, over the past few years, has become rather well-plowed territory—the administration of federal research programs. But in effect, if not by design, Harris has brought something new to congressional interest in science, and that is a keen scent for the fundamentals of power and conflict inside the tangled complex of science, education, and regional economics and politics.

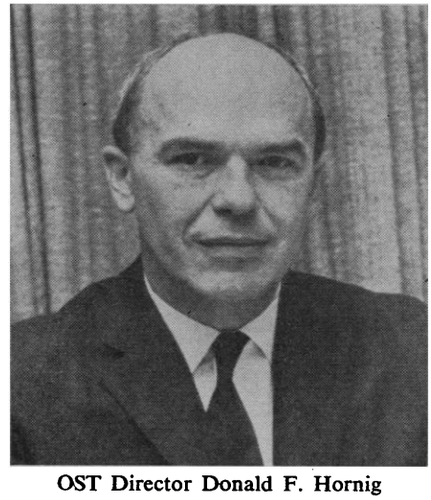
The ability to discern who is mad at whom and to orchestrate discontent is one of the most essential traits of the politician who would go far. And, on the basis of Harris' inquiry into federal science programs, it appears that he has the ability in ample quantity. In any case, at age 36, with a Phi Beta Kappa key from the University of Oklahoma and top place in his law class at the university, he has logged a great deal of political mileage, having served for 8 years in the Oklahoma State Senate, before winning a special election 2 years ago to serve out the unexpired term of the late Senator Robert S. Kerr. Added to which, it might be noted, Harris faces a reelection campaign this year in a state that stands 37th in the national rankings of federal R&D receipts and 40th in R&D funds per capita.

Representative Henry Reuss (D–Wis.) chairman of Harris' counterpart subcommittee in the House, has emerged as the Don Quixote of congressional science affairs; and Representative Emilio Q. Daddario (D–Conn.), chairman of the House Science and Astronautics committee's subcommittee on Science, research, and development, has chosen the stance of statesman, seeking a balance between his own independence and harmony with the National Academy of Sciences and other venerable institutions of science. Harris, on the other hand, has detected that the political tides of science are shifting, that the long-enduring influence of Cambridge is on the wane, and that the long-slumbering have-nots have evolved from a mass into an interest. And Harris, accordingly, is abiding by one of the first laws of politics, which is: associate yourself with the inevitable. As far as the scientific and academic communities are concerned, this association may well have far-reaching effects for them and Harris. For the issues involved can only become more important and more contested, and Harris has early staked out a claim to filling an unoccupied role in the U.S. Senate, namely, that of "Mr. Science." Though low in seniority, Harris stands high in the regard of the Senate elders—as evidenced by his early arrival at a subcommittee chairmanship. And, though it can be argued as to just where the Senate "club" begins and ends, it is generally agreed that Harris is on the verge of admission.

Harris' main problem may lie in Government Operations being a "watchdog" committee which handles neither regular authorization legislation nor appropriations. On the other hand, however, forceful members of the committee in the past have demonstrated that Government Operations can be a powerful instrument for focusing congressional attention and for imposing change on the Executive.

The young Senator's latest foray into the affairs of science and government arrived at the stage of formal proceedings on 18 July, when in the Hiltonesque splendor of the New Senate Office Building, he called 14 in-

vited guests to order for an off-the-record seminar on "Coordination of Federal Research Activities." It was a very unusual and shrewdly assembled collection of discussants for a newcomer interested in sniffing out factionalism beneath the generally harmonious exterior of the science-government alliance. For example, there was Ralph E. Lapp, physicist, prolific free-lance critic of the established leadership of the alliance and now revealed as the volunteer *eminence grise* of the Harris subcommittee. Also present was Jerome B. Wiesner, the newly appointed provost of M.I.T, whose conception and leadership of the White House Office of Science and Technology is a favorite target of Lapp's, as well as of Lapp's confrere, Philip H. Abelson, editor of *Science*. (Abelson who was invited to participate in the seminar, declined at the last moment.) Lapp, in his latest book, *The New Priesthood* (Harper & Row, New York, 1965), published last year, wrote that the structure of the executive science advisory apparatus so concentrated power in the hands of the President's science adviser (then Wiesner) "that some Washingtonians muttered that he had become a science czar." Wiesner returned the compliment in a *Book Week* review which accused Lapp of "glib but false generalization" in expressing "contempt for scientific administrators." Wiesner added in the review, "I understand that while preparing his book, Dr. Lapp was offered an opportunity to discuss some of the issues he covers with appropriate people in government, but that the offer was declined for fear he would be inhibited in presenting his views."



OST Director Donald F. Hornig

So, there sat Wiesner and Lapp, around the same table, with the sensitively tuned Senator from Oklahoma. There was also Augustus B. Kinzel, former director of research for Union Carbide, now executive officer of the Salk Foundation, and founding president of the National Academy of Engineering, the very existence of which reflects the engineers' dismay over their treatment within that bastion of academic basic science, the National Academy of Sciences. Then there was Harvey Brooks, dean of applied physics and engineering at Harvard, a major voice in Academy affairs, and chairman of the Academy's Committee on Science and Public Policy (COSPUP). Brooks might be considered the Pangloss of the "establishment," having once written in an essay, "The Scientific Adviser," "If it can be said that any [science] policy viewpoints have become dominant in government, this has been imposed more by the logic of events than by any particular group of advisers. The advisers merely foreshadowed what would probably have been brought about by events anyway. . . ." In addition, the invited participants included: George B. Kistiakowsky, of Harvard, senior statesman of science and government affairs and founding chairman of COSPUP; Edward Wenk, an OST alumnus, who now operates from his own base as chief of Science Policy Research for the Library of Congress; Don K. Price, of Harvard, president-elect of the AAAS; F. Joachim Weyl, former chief scientist of the Office of Naval Research, and now a consultant to the president of the Academy; Richard W. Poole, a Harris constituent who is dean of business administration at Oklahoma State University; Philip Handler, of Duke University, chairman of the National Science Board; Emanuel Piore, vice president and chief scientist of IBM, one of the few nonacademics in the White House science constellation; and Harold Orlans, a senior staff member of the Brookings Institution and author of "Effects of Federal Programs on Higher Education." (Orlans, it was announced last week, is to take leave from Brookings to serve as a consultant to Representative Reuss in an investigation of the use of social science research in various

Chairman Fred R. Harris (D–Okla.) (right) with Staff Director Steven Ebbin (center) and Senator Joseph M. Montoya (D–New Mexico).

domestic government programs.) Also there was Robert Green, chief of staff for COSPUP; Harris' own staff, and two subcommittee members, who have lately been voicing the plaints of the lesser recipients of federal R&D money; Senator Karl Mundt (R–South Dakota); and Senator Milward L. Simpson (R–Wyo.).

The focus of attention in the seminar was supposed to be a preposterous draft bill, calling for the creation of a Federal Council for Science and Technology in the Office of the President—with the President himself as chairman. The bill was probably intended as no more than a provocative irritant for the "Cambridge crowd," and unquestionably it served that purpose, for it drew them out in some state of alarm, but once the proceedings got underway, it was clear that there was little actual interest in putting the President of the United States in charge of science.

The seminar opened with one of the Cambridge-based participants jesting, "There has been no presidential directive as to the number of speakers you can have from Cambridge, has there?" But from thereon in, it was grim business, largely focused on a paradoxical complex of issues: the "outsiders" insisting that more structure, power, and responsibility be given to the White House science advisory system, principally so that Congress would know where to look when it sought to exercise its function of "oversight" of executive activities; and the "insiders," mainly the Cambridge-based architects of the present system, arguing that, by and large, *laissez faire*, based on quality, is the best way to run science. To which the outsiders replied that the present system guarantees affluence for a charmed few by making existing quality the criterion for support. To which the defenders replied, We have always favored building new centers of excellence, but that should be accomplished with funds separately budgeted for development—not with money that is needed to support ongoing high quality research.

As one of the Cambridge people put it, "diversity, competition, and quality should be the keynote to the Government's approach to science. . . ." He added that other countries seeking to emulate American scientific success, have tried "to do it by drawing an organization chart, instead of giving the people freedom to do what they please. And you can't do it, because we don't

NEWS IN BRIEF

● **NSF LEGISLATION:** Following a brief and placid debate, the House on 18 July passed a bill providing for a series of modifications in the basic legislative charter of the National Science Foundation. The bill introduced by Representative Emilio Q. Daddario (D–Conn.) strengthens the NSF directorship, adds four presidentially appointed assistant directors, and enhances the policy-making role of the National Science Board, both in and out of NSF affairs. It also encourages, though does not require, NSF to increase its support of applied research and social science. In addition, the bill directs NSF to keep track of the destination of all federal research funds, and requires the Board to prepare an annual report on the status of American science (see Daddario's "A revised charter for the Science Foundation," *Science*, 1 April). An identical bill, S. 3465, introduced by Senator Lister Hill (D–Ala.), has been referred to the Committee on Labor and Public Welfare. Hearings have not been scheduled, but they are expected to take place this session. In the House debate, Representative James Fulton (R–Pa.) urged that NSF be subjected to an annual legislative review. "We hear so much about money being spent on programs of research that really make no sense to us who are interested in science research and progress," he said. Fulton and Representative H. R. Gross (R–Iowa) also expressed concern about whether the social research provision means that "they [NSF]" will go into "such things as the national policy on segregation, or on civil rights, or on transportation, or on urban renewal." Daddario assured his colleagues they had no reason to worry, and the bill went through.

● **LIBRARIES STUDY:** President Johnson plans to appoint a National Commission on Libraries to study Federal efforts to improve libraries. The President made the announcement when he signed a bill to extend the 10-year-old Library Services Act last month. The proposed commission would study new developments in library techniques, library planning, and whether Federal library programs are too "fragmented." The new law continues the Act for five years and authorizes $575 million for public library services and construction. An additional $125 million is authorized for new programs of cooperative library services among public, college, school and research libraries and for library services at State institutions and for the handicapped. Earlier an 8-member Advisory Council on College Library Resources was appointed to set up criteria for making supplemental and special purpose grants to college libraries for purchase of books and other materials under the Higher Education Act of 1965. Harold Howe II, Commissioner of Education, is chairman. Other members are Curtis G. Benjamin, McGraw-Hill Book Co.; Herman H. Henkle, John Crerar Library, Chicago; Sister Jane Marie Barbour, Our Lady of the Lake College, San Antonio, Texas; Albert P. Marshall, Lincoln University; Archie L. McNeal, University of Miami, Florida; Rutherford Rogers, Stanford; Mildred Johnson Heyer, Carson City, Nevada; and Herbert S. White, NASA.

● **APPOINTMENTS:** Wilfrid E. Johnson, retired general manager of General Electric's atomics products operation at AEC's Hanford (Washington) facility, to the five-member Atomic Energy Commission. He fills the vacancy created by the resignation of John G. Palfrey. Palfrey, whose AEC term expires 30 June 1967, has a year's grant to work at Harvard's Graduate School of Public Administration. Then he will return to Columbia Law School where he will serve on the University's Committee on Science in Human Affairs. . . . Frank Di Luzio to the new post of Assistant Secretary of Interior for Water Pollution Control from his present position as director of Interior's Office of Saline Water. . . . Paul A. Miller, president of West Virginia University, to Assistant Secretary of Health, Education, and Welfare for Education. . . . Robert Fleischer, director for the NSF Solar-Terrestrial Research program since 1962, to Deputy Head of the NSF Office of International Science Activities. . . . Eugene L. Hess, Program Director for Metabolic Biology at NSF, to head of the Molecular Biology Section, Division of Biological and Medical Sciences. . . . David W. Krogman, professor of biological chemistry at Wayne State University, to Program Director of NSF Molecular Biology Section. . . .

know what we've got. It's just too subtle and complicated." All the participants agreed that it would be harmful to try to run science from the White House, but the ins and outs could find no meeting ground between anarchy and dictatorship. Was OST, as now conceived, an effective mechanism? Those affiliated with OST thought that, by and large, the answer was yes. "Who knows whether OST is doing a good job?" asked one critic. Replied a long-time associate of OST, "This is a question which the Science Advisory Committee to the President occasionally addresses itself." "But that is the same bunch," replied another critic.

How can Congress get better scientific advice? The OST supporters said that Congress might call upon OST. A member of the seminar offered the view that "nobody can talk to people in various congressional committees without coming away with an impression that they have a most profound suspicion or hostility toward OST." To which a key insider sagely replied that congressional opposition to OST was usually a direct response to OST efforts to do precisely what the critics were seeking: more centralized direction of the federal research effort. "I think OST is unpopular . . . because it does interfere with the jurisdiction of Congressional Committees over agencies," a Cambridgeite pointed out. "There is no getting around it. You can't have a central coordinating mechanism without interfering with the jurisdiction of the Congress." Thus, the seminar went round and round, spelling out for the Senators, in brief order, many of the issues that have been debated in rather limited circles over the past few years. It cannot be said that any conversions took place, or that any important new concepts evolved. But it can be said that Senator Fred Harris, no doubt with the tutoring of Lapp, learned a good deal about issues and factions, as evidenced 1 week after the closed, off-the-record seminar when the Senator convened 3 days of public hearings on a subject that is rich with political paydirt: Distribution Among the States of Research and Development Funds Made Available by Government Agencies. Again, other congressional probers have been there before. But Harris was not on a statistics reconnaissance. Rather this was a seek-and-destroy operation, with the incumbent managers of the present system as the principal target.

The ostensible focus of the hearing was a when-did-you-stop-beating-your-wife inquiry, incorporated into a resolution (S. Res. 231) that would require the National Science Foundation to recommend changes in the distribution of federal R&D funds. As the resolution put it, NSF was to advise on ways "to provide for a more equitable distribution of such funds to all qualified institutions of higher learning to avoid the concentration of such activities in any geographical area. . . ." Once the hearing was under way, Harris added that it would also look into the implementation of last September's presidential directive, "Strengthening Academic Capability Throughout the Country." Thus, the stage was set for a Dien Bien Phu of the "establishment."

The first two witnesses, Haworth and Hornig, readily agreed that, when it comes to supporting basic research projects, the government does, to a large extent, concentrate funds in a limited number of institutions. "For . . . getting the best job at the least cost," said Haworth, "the U.S. government has no alternative but to support research at institutions of the best capability.

Most of those high-quality centers, like Harvard, M.I.T., Columbia, and the Universities of Chicago, Illinois, Wisconsin, and California, were in existence and noted for excellence long before large-scale federal spending began." To this Hornig added, "I do not believe there has been a *geographical* bias; there has, of course, been a decided bias in favor of excellence, wherever it existed." Both Haworth and Hornig repeatedly stressed their belief that separate institutional development funds, awarded when there is evidence of local initiatives, were the best device for spreading scientific capability. And they argued that such funds are now going out from NSF, NASA, and the Defense Department, which this year set up a special $20 million fund for bringing smaller institutions into its research program. Both witnesses expressed opposition to Resolution 231, explaining that they did not consider it necessary or desirable to single out one agency of the executive for making government-wide policy recommendations. In general, they both took the view that the present system is sound and sensitive to the requirements of change.

Harris then let them both have it, telling Hornig, who was in the witness chair: ". . . it seems to me that you and Dr. Haworth . . . have been a little bit patronizing and condescending in treatment of this committee by coming here and saying things which are rather obvious, that educational excellence is primarily a local matter. We all know that. . . . Now both of you have about the same kind of statement. You have spent half your time saying these things are not as bad as you think and are not really as important as you think, but you are doing a whole lot about it. Now, I think if we would recognize this is of great concern, and one which ties in very greatly with the economic development of this country, and with national policy, and quit talking down to members of Congress as you have done . . . then we would come a lot nearer to getting down to some case here."

Hornig, who can share honors with Dean Rusk for impassively rolling with the congressional punch, replied: "It did seem well to me to get the basic facts out as a basis for discussion."

In that spirit, the session droned on, recessed, and reconvened on the following 2 days, whence appeared a number of academic administrators with mournful sagas of grant-seeking in the hinterlands. Typical was Harvey R. Fraser, president of the South Dakota School of Mines and Technology, in Rapid City, who told the subcommittee, "I'd like to cite an example of the difficulty of obtaining government-sponsored research. For several years, from 1960 to 1965, we had a very energetic, capable, research-minded Ph.D. on our staff. He submitted numerous proposals but was only modestly successful in obtaining grants. Two years ago, this man resigned and transferred to a large university. In one year he had more grants and more research than he could handle. We had and do have outstanding facilities in his area [geology]. His capabilities for research did not suddenly generate the day he left a small school for a big one."

Other witnesses from the small institutions reported to the subcommittee that last year's presidential directive for broader distribution of research funds has been followed by little change or an actual decline in the relatively modest amounts they previously received. George L. Cross, president of the University of Oklahoma, said the available figures indicate a $200,000 decline from the levels of recent years. Herbert R. Albrecht, president of North Dakota State University, at Fargo, reported that

in 1964–65, 18 applications were funded, and 12 rejected, for awards totaling $360,206; in the current academic year, 21 were funded and 22 rejected, for a total of $409,843. Most of the witnesses from the small schools agreed, however, that the federal agencies now seem much more interested in them and that it still may be too early for the presidential directive to have taken full effect. Harris, however, concluded that while the statistics got better, "the only other hard result I have seen in the President's memorandum has been the idea that we would simply overlay the present program; there is not any real change in the present program. . . ."

Thus, with the "establishment" in a state of dismay, Harris recessed the hearings. According to his previously announced schedule, they were to be followed this week by a closed seminar with representatives from federal research agencies, complementing the earlier seminar with nongovernment participants. But, without any publicly stated explanation except, "We're not ready for it now," the subcommittee called off the seminar. A subcommittee source, however, privately offered a very different explanation. "The people running the government agencies were handpicked by the bunch we had in for the last seminar. They're not going to tell us anything we didn't hear last time. There's no use getting the party line all over again, so we've called it off for the time being."

Just where Harris is bound with his subcommittee is not certain, but a few things are certain: whatever the merits, hostility to OST and regional discontent are live political issues with ready-made constituencies. Furthermore, the Senator is operating from a political base that cannot be ignored—a tactic that the scientific leadership has found tempting in the past. Harris' parent committee, chaired by Senator John L. McClellan (D–Ark.) contains a few members from states that are more or less in the mainstream of federal research support—such as Kennedy and Javits of New York, Ribicoff of Connecticut, Montoya of New Mexico, and Jackson of Washington. But purely on economic lines, they are outweighed by McClellan and Harris, Ervin of North Carolina, Gruening of Alaska, Muskie of Maine, Metcalf of Montana, Mundt of South Dakota, Curtis of Nebraska, and Simpson of Wyoming. There's not a Californian in the lot; furthermore, the subcommittee is loaded with have-nots: Harris, McClellan, Mundt, and Simpson, with Ribicoff and Montoya the only members from states that rank reasonably high in the R&D totals.

Now, how have the targets of Harris' interest reacted to the events of the past few weeks? Publicly, they are silent, but inquiry among those involved reveals a mixture of pain and puzzlement. One administration staff man pointed out that Hornig and Harris actually share the same goal—good science throughout the country. But, this same aide added, "We can't be expected to strip MIT in order to build up others. What we need is massive amounts of money for institutional development, but with Vietnam in the picture, we can't get it." This observation is quite possibly at the heart of the matter. Harris is not in favor of stripping MIT, but neither is he in favor of short rations for the University of Oklahoma and other institutions that feel deprived. If one may speculate on his feelings, they probably add up to the belief that if the pie can't grow to keep pace with the cries of the have-nots, then perhaps the rich will have to tighten their belts for a while. Which may be what he had in mind when he remarked that the funds designated for development were simply an "overlay" on the present program. Of course it is an overlay, because that is precisely how the scientific governors of the system intend to meet the pressures—with new and separate funds, not by redirecting money now going to support research in the major institutions. For the scientists running the system, it all seems quite logical—more money is the answer to the problem. But politics is often no more than a struggle over scarce resources, and Fred R. Harris is very political.

—D. S. GREENBERG

Space Science: Congressmen Want Larger Voice

Representative Joseph E. Karth of Minnesota and his colleagues on the Space Science and Applications Subcommittee of the House Science and Astronautics Committee are among the latest members of Congress to discover that, in some circumstances, success eludes those who try harder. Karth, who is chairman of the subcommittee, has worked diligently at understanding the programs entrusted to his review, only to find that his recent attempt to second-guess the program planners has cast him in the role of a meddler.

His experience illustrates the classic frustration of Congress in an era of deep government involvement in science and technology. How does it pass judgment on highly technical programs without being either a rubber stamp or an incompetent intruding upon the affairs of experts?

Karth, who by general agreement is an intelligent and unusually hard-working committee chairman, has just retreated from his position that the money the National Aeronautics and Space Administration plans to spend for a Mariner "flyby" of Venus in 1967 would be better spent for a probe of the Martian atmosphere in 1969. The probe would have supplemented the two Mariner flybys of Mars planned for that year. The Senate Aeronautics and Space Sciences Committee supported NASA's plans for the Venus flyby, and its position prevailed in the meeting that was held by House and Senate conferees last month to reconcile differences in the space-authorization bills passed by their respective bodies.

The Senate Committee's review of NASA's space science program is far less thorough than that conducted by the Karth subcommittee. Indeed, when Karth and other conferees from the