CHAPTER 18

Congress and Technology

It is the proper duty of a representative body to look diligently into every affair of government and to talk much about what it sees. It is meant to be the eyes and voice, and to embody the wisdom and will of its constituents. . . . The informing function of Congress should be preferred even to its legislative function.[1]

—Woodrow Wilson

The executive branch by itself cannot be entrusted with ascertaining the general public interest. For one thing, it has its own interests to look after; for another, the access of outside interests to it is too unequal. The framers of the U.S. Constitution were well aware of the potential abuse of executive power—indeed, the Declaration of Independence, written eleven years earlier, had focused on the oppressive acts of King George III. The Constitution, therefore, specifies that establishment of the federal government's basic priorities is the responsibility of a more open and accessible branch of government, a representative Congress. Hence the standard answer to citizen complaints: "Write your Congressman."

But the citizen who does write his Congressman knows that, except for easily remedied personal problems such as an overdue Social Security check or an administrative mistake regarding veterans' or Medicare benefits, he can usually expect little more than soothing reassurances to the effect that the Congressman shares his concern and is keeping a watchful eye on the situation.

Congressional Committees

The problem is that individual Congressmen have very unequal shares of responsibility for overseeing government activities, and those to whom the responsibility has been delegated are usually strongly committed to the status quo. Except on issues currently in the spotlight of national attention, Congress almost always goes along with the recommendations of its committees and subcommittees, whose organization largely parallels that of the executive agencies. And like the federal agencies, the Congressional committees have to a large extent become captives of special-interest groups. Thus Harold Seidman in his book *Politics, Position, and Power* notes that in the Ninetieth Congress (1967-1968) at least half the members of the House and Senate Agriculture committees

were actively engaged in agriculture or related occupations . . . [and] 28 of the 33 members of the House Merchant Marine and Fisheries Committee came from port districts which have a major interest in ship construction and maritime subsidies. Membership on the House and Senate Interior Committees was predominantly from the Western states where reclamation projects, grazing, timber, and mineral rights are issues of primary voter interest.[2]

Seidman then concluded, almost unnecessarily, that parochialism in the executive agencies reflects and is supported by parochialism in their oversight committees."[3]

This parochialism, the existence of which is of course quite natural and unsurprising, goes a long way toward explaining why Congressional committees so often do not take the initiative and may even resist the development of independent information and analyses in their areas of responsibility. Instead, they seem ordinarily to be content to obtain their information from executive agency spokesmen and from the lobbyists for special interests. This is particularly true in complicated technical areas. In evaluating weapons systems, for example, Congress has traditionally obtained most of its information from the military—dismissing most other sources as unqualified. Similarly, in assessing controversies over the side effects of agricultural chemicals, Congress until recently relied almost exclusively upon the chemical industry and the Agriculture Department. In view of this situation, it is perhaps a fortunate by-product of the complexity of modern society and the power of modern technology that an increasing number of problems have ramifications which overlap the jurisdiction of several Congressional committees. (Witness the numerous Congressional hearings in recent years on different aspects of the "energy crisis.") This increases the probability that there will be at least one Congressional committee which will be both competent and sufficiently free of vested interests to provide a fair hearing on any particular technological issue—as did the Senate Foreign Relations committee in the ABM debate after the Senate Armed Services Committee had failed to listen to the ABM's opponents.

CONGRESSIONAL HEARINGS

Congressional hearings can be superb vehicles for bringing a problem to life and dramatizing it. Representative Fountain's grilling of the FDA Administrators on their handling of the cyclamates issue (Chapter 7), for example, had some elements of high drama. The record reveals how the integrity of the FDA bureaucracy was eroded by years of accommodation to the politically potent drug industry. Similarly, the dramatic confrontations between Senator Fulbright and a series of high Defense Department officials (Chapter 5) showed how little importance was actually assigned to technical considerations in the department's "technical" reviews of the ABM system. Thus Congressional hearings provide a unique opportunity to find out how government bureaucracies really operate behind their carefully cultivated public images.

Congressional hearings can also give Congress and the public access to the "experts." There are few scientists who would refuse the invitation of a Congressional committee to testify. Consequently, if the committee is able to determine who the experts are, it can lay before Congress and the public information and analyses which would otherwise just not be available. Panofsky's testimony on the Safeguard ABM system and Garwin's testimony on the SST made unique contributions toward the crystallization and focusing of the issues involved in these debates.

If these are the strengths of the hearing process, it has its weaknesses, too. The quality of a hearing is extremely dependent on the preparation, abilities, and intentions of the Congressmen and staff who choose the witnesses and formulate the questions which are addressed to them. The Congressmen and the staffs do not ordinarily have a technical background: only two Congressmen in the Ninety-third Congress (1973-1974) had an advanced scientific or engineering degree,[4] and there are only a few doctorate-holding scientists on the permanent staffs of individual Congressmen or of Congressional committees. Consequently, the preparation for a hearing tends to be a rather hit-or-miss affair.

Even when the "experts" on each side have presented their arguments, the technical complexities of the issues may so overwhelm the committee that the hearing ends up having only the appearance of a confrontation. Many Congressmen would like to reduce the issue in such debates to one of "my expert is bigger than your expert." But in fact, experts on different sides of an issue usually do not directly contradict each other's statements. Instead, each focuses on that information and those considerations which support his case. And since the witnesses address themselves to the Congressional committee rather than to other experts, it is quite easy for them to talk past one another. In the antiballistic missile debates, for example, the scientist proponents tended to emphasize the hostile intent of the Soviets and Chinese and the consequent requirement for some sort of missile defense, while the opponents argued that the proposed ABM system would be virtually useless against a serious attack. Did this mean that the ABM proponents were unable to rebut the technical criticisms of the opponents? Or that the opponents conceded the need for much greater efforts toward reducing the damage which an enemy could inflict on the United States with nuclear weapons? Partial answers to these questions were eventually offered during the two-year-long ABM debate.

Most Congressional debates are not so lengthy, however, and such questions would ordinarily be left to the Congressmen and their staffs to struggle with alone. It seems quite likely that, lacking the additional information and analyses which they need to answer these questions, most Congressmen would leave them unresolved and make their decisions on other grounds.

IMPROVING CONGRESSIONAL HEARINGS

Actually, it is not logic but tradition which dictates that witnesses at a Congressional hearing not question each other—as opposed to what happens, in effect, during the adversary proceedings in a courtroom. Perhaps Congressmen enjoy their roles as interrogators. If they could be persuaded to relinquish this prerogative occasionally, however, the payoff might be substantial. Consider the following brief exchange between two experts which occurred in 1957 at a hearing of the Joint Committee on Atomic Energy. Ralph Lapp, having been permitted to present a question from the audience, took issue with a statement by Merril Eisenbud, an AEC official, to the effect that fallout from thermonuclear bomb tests could be increased a millionfold and still be safe. Lapp asked for the radiation dosage in the Troy-Albany area in New York State after the April 1953 nuclear blast in Nevada.

MR. EISENBUD: I would personally estimate it at about ten milliroentgen.
DR. LAPP: Is it proper for me to respond? I have done a little arithmetic. Let us take ten milliroentgens, as Mr. Eisenbud estimates, and we multiply [by a million] . . . that would be . . . ten thousand roentgens.
SENATOR [CLINTON] ANDERSON [D.-N.M.]: Ten thousand roentgens would kill everybody in sight!
MR. EISENBUD: Yes.
SENATOR ANDERSON: So that would mean there would not be any immediate danger if you kill everyone in sight?[5]

Even if Congress managed to organize more real debates on technical issues and fewer soliloquies, there are certain deficiencies inherent in the hearing process itself which limit its usefulness as a means of gathering information and advice on technical subjects. Besides the difficulties already mentioned of preparing for the hearing and finding witnesses who are at the same time well informed and reasonably unbiased, there is the more fundamental problem that it is often impossible for any expert, or even a group of experts, to discuss complex issues adequately even among themselves without considerable previous opportunity for study of the relevant information—an opportunity not usually available when an invitation to testify is received. A mechanism is required which will allow extensive investigation and analysis of activities and policies in technical areas so that the issues can be clarified before hearings are scheduled.

Before making up his mind whether to go forward with the development of the Boeing supersonic transport plane, President Nixon commissioned detailed

studies from several panels of experts. Such a procedure is routine for major decisions in the executive branch. Yet almost never have Congress and the public been given an authoritative assessment of the costs and benefits of a proposed new technology. Instead, the executive agencies present Congress with a sales pitch, and only rarely does a Richard Garwin or a Matthew Meselson step forward to organize the arguments on the other side.

A recent collaboration between the California legislature and the Rand Corporation (a well-known private "think-tank"[6]) provides a model for a more rational organization of legislative effort in Congress. Like many other states, California has been troubled in recent years by controversies over the siting of new nuclear-energy electric power plants. New state legislation seemed desirable. Before proceeding to draft such legislation, however, the Planning and Land Use Committee of the California State Assembly arranged with Rand for a detailed study of the issues involved. The resulting report, *California's Electricity Quandary*, occupies three summary volumes with more than a dozen supplementary reports.[7] It agrees with the Union of Concerned Scientists that nuclear reactors might not be as safe as the AEC has claimed and suggests that suitable sites might not be available for the sixty additional new nuclear power plants projected by the California utility companies before the year 2000. Finally, as a partial solution to the resulting quandary, the report suggests that significant steps to slow the growth rate of electric power demand in California are feasible.

The report was presented in a private briefing to the chairman of the State Assembly committee, and then it was released to the public in a full-scale press conference at Rand headquarters in Santa Monica. (It was Rand's first press conference.) Next, the report was presented to the entire Planning and Land Use Committee in a major public hearing. A subcommittee then organized several weeks of hearings based on the Rand report, including testimony from California power companies and state agencies. The hearing on nuclear reactor safety featured Henry Kendall, Dan Ford, and officials of the AEC. Finally, the subcommittee chairman, Charles Warren, prepared a bill based on all of this information and discussion. This bill, the Omnibus Energy Conservation and Development Act of 1973, passed the Assembly without modification and was sent to the State Senate. There confusion reigned: twenty-five different energy bills were being considered in the usual piecemeal fashion. The bill that eventually passed the state Senate was a power-plant siting proposal introduced by Senator Alfred Alquist, the chairman of the Senate Committee on Public Utilities and Corporations–but this bill stood no chance of passing the Assembly. The impasse was broken when Senator Alquist agreed to drastically amend his bill to resemble the Warren bill; and the revised Warren-Alquist bill handily passed both houses of the California legislature on September 14, 1973, over strong opposition from the electric utilities–only to be vetoed by Governor Reagan. As of this writing, however, legislative pressure remains strong for repassage and enactment of the Warren-Alquist bill without substantial amendment. Meanwhile, similar bills have been introduced into the legislatures of some half-dozen states.[8]

It would probably be neither practical nor desirable for the U.S. Congress to follow such an elaborate procedure for each of the hundreds of bills it passes each year. But in legislating on complex technical issues, Congress could certainly afford occasionally to adopt a little more rationality in this direction.

The Office of Technology Assessment

> Lets face it, Mr. Chairman, we in the Congress are constantly outmanned and outgunned by the expertise of the Executive agencies. We desperately need a stronger source of professional advice and information more immediately and entirely responsible to us and responsive to the demands of our own committees.[9]
>
> –Representative Charles Mosher (R.-Ohio)

Congress has answered the need expressed in the above passage by creating for itself a new institution, the Office of Technology Assessment (OTA), which began operations in late 1973.[10] While it is easy to overrate the impact that the OTA will have on an institution whose nature is still basically feudal, the mere existence of the OTA creates possibilities which would have been dismissed as visionary in the recent past.

What the OTA does is provide for Congress what the President had until recently in the Office of Science and Technology and its Presidential Science Advisory Committee. In the words of the 1972 Technology Assessment Act (Pub. L. 92-484) creating the OTA: "the basic function of the Office shall be to provide early indications of the probable beneficial and adverse impacts of the applications of technology."[11] This is what is called a "technology assessment." A technology assessment can range anywhere from a brief report on a specific technological question to a large-scale study like Rand's report on *California's Electricity Quandary*. (Most routine queries that require only library research will continue to be handled by the Congressional Research Service.[12])

In 1973 ex-Representative Emilio Dadderio was appointed the first director of the OTA. Dadderio had, as a Congressman, nursed the OTA proposal to maturity, before he resigned to run unsuccessfully for governor of Connecticut. The office will eventually have a full-time staff of about twenty professionals. For studies requiring outside resources, however, the OTA is limited only by its appropriations. It is empowered to

> enter into contracts or other arrangements as may be necessary . . . with any agency . . . of the United States, with any State, . . . with any person, firm, association, corporation, or educational institution . . . [and] to accept and utilize the services of voluntary and uncompensated personnel . . . and provide [for their] transportation and subsistence.[13]

Besides contracting with major universities and private "think-tanks" for

technology assessments, the OTA can develop a mechanism for citizen feedback by requesting studies from organizations like the Center for Science in the Public Interest. The explicit provision for the expenses of volunteers should also encourage all sorts of informal relationships by which individual scientists could contribute important information and analyses. For example, the OTA might appoint several well-qualified monitors, representing a range of viewpoints, who would closely follow the course of an assessment after it had been contracted out and make suggestions to the assessment team and the OTA staff.[14]

STRUCTURE OF THE OTA

Unlike the other two Congressional information services, the General Accounting Office and the Congressional Research Service, the OTA is supervised by what amounts to its own joint Congressional committee, the Technology Assessment Board (TAB). The board consists of six Senators and six Representatives, equally divided between the Democratic and Republican parties.[15] Senator Edward Kennedy (D.-Mass.) was elected the board's first chairman, to serve until January 1975. The Technology Assessment Board can give the conclusions of the OTA reports public visibility and political impact–for example, by holding hearings. It will hopefully also help to protect the OTA from attacks on its appropriations by irate Congressional potentates to whom some of its findings may be unwelcome. And, in cases where the OTA is not receiving cooperation, the TAB is empowered to issue subpoenas.

The OTA will have little impact in the long run, however, unless its work is taken seriously by the technical community. The quality control of the OTA's reports will be partly the responsibility of a part-time Technology Assessment Advisory Council made up of the Comptroller General (who heads the General Accounting Office), the director of the Congressional Research Service, and ten "public" members "to be appointed by the Board, who shall be persons eminent in . . . the physical, biological, or social sciences or engineering or experienced in the administration of technological activities."[16] Additional ad hoc panels may also be appointed to review specific technology assessments or to prepare reports on technical issues relevant to particular pieces of legislation.

By accident, the Office of Technology Assessment was born just as the last remnants of the Office of Science and Technology were being casually swept out the back door of the Executive Office Building. Which raises the question: Will the fate of the OTA be any happier than that of the late OST? In many respects the prospects of the OTA are brighter. In the first place, in contrast to the posture of the Office of Science and Technology, which had only one client–the President–the demands for the services of the OTA will originate from many sources. The chairman, the ranking minority member, or the majority of the membership of any Congressional committee may ask for a study, as may of course the Technology Assessment Board itself or the Director of the OTA "in consultation with the Board." Furthermore, the OTA will constitute the main technical resource of Congress, while the President has always had available the full resources of the entire executive branch–if he trusts them. The priorities in

Congress are sufficiently pluralistic that it can be expected there will always be some Congressional committees to which the OTA will be important at any particular time.

A final advantage of OTA over the late Office of Science and Technology is that it is located in a much more open and public branch of the government. Hopefully the procedures of the OTA, the openness of the work of its experts, the protections suggested above against bias in their reports, and the open publication of these reports for public use and criticism will set an example which the executive branch will be obliged to follow. Given a choice, it is probable that many scientists would prefer to work under such conditions. And their reports are much more likely to obtain full consideration in Congress–and the executive branch as well–if they are openly available. Recall that the public release of the Rand report *California's Electricity Quandary* generated a great deal of press attention, which in turn helped to lubricate the California legislative machinery. Indeed, the OTA should establish mechanisms for the information and involvement of the larger public in its activities–at least a newsletter to publish announcements of proposed new technology assessments, progress reports, and brief accounts of completed assessments. Of course, some confidentiality will be necessary on occasion to protect military security and industrial trade secrets. In these cases the damage done to open public debate can be minimized by publishing "sanitized" reports containing the OTA's unclassified analyses, conclusions, and recommendations, omitting only the technical details being protected.

Getting Congressional Attention

The location of the OTA in Congress gives it many advantages, but there are also obvious disadvantages. Former Senator Joseph Clark did not express an uncommon view when he described Congress as "the sapless branch."[17] Congress has traditionally deferred to the executive branch on technological matters. The resources made available by the OTA will enable Congress to challenge the executive branch more easily in these areas–but there is little basis in recent history to believe that Congress will rise to the occasion without a great deal of prodding. Any resemblance between most Congressional committees and a group of Nader's Raiders is purely coincidental.

Despite its front-row seat on the operations of the federal government, Congress raises few issues of a nonparochial nature on its own initiative. It seems that Congressmen are usually just too busy servicing the needs of their own political constituencies to have much time or energy left over to worry about the general public interest. It requires political skill to get a Congressman's attention and support.

In all the cases that we have discussed the basic ingredient which attracted

Congressional attention was an aroused public. This is particularly true in the big debates: those over the SST and ABM. It was public concern over the sonic boom that originally triggered the major Congressional debates over the SST, and it was the suburban opposition to "bombs in the backyard" that revitalized the ABM debate. It is true that, after these beginnings, the Congressional debate branched out into other problems relating to these two technologies–but it was the public outcry that originally drew Congressional attention. Such national debates provide Congressmen with an audience. And with national news coverage focused on them, Congressmen are more likely to take the issues seriously.

Besides their natural sensitivity to publicity, there is a deeper reason why Congressmen respond much more attentively to an issue which has already received a great deal of public debate than they do to an issue of similar merit which comes to Congress unheralded. On controversial issues, Congress does not actually *decide*; rather, it *ratifies* what it takes to be the popular will. Thus, for example, in the development of the labor movement in the United States, years of labor organizing, strikes, and sometimes violent controversy preceded the eventual passage of the Wagner Act in 1938.[18] Similarly, Congressional action finally cutting off funds for the bombing of Cambodia in 1973 came as a much-delayed anticlimax to general public disaffection with the war in Indochina.

Of course, few technological issues generate political struggles as fierce as those which surrounded the ABM and the SST. Fortunately, most issues–like the cyclamates issue or the dangers of cross-country transportation of nerve gas–can be handled at a lower level of confrontation. In cases such as the latter, however, it is still useful to represent a political constituency which the Congressman being approached takes seriously, or to be introduced by an individual whom he respects, or to have already attracted news media attention to the issue. It is also almost essential to develop the issues for him and his staff with clear and persuasive written arguments so that they may choose which ones they wish to use for their own purposes.

Keeping Congressional Attention

Perhaps the most important problem that the concerned citizens' group faces, once it has first engaged Congress's attention, is keeping it. Elizabeth Drew has described the problem as follows:

> The people in Congress, like people who are not in Congress, are endowed with a rather limited attention span. A member of Congress' relationship with any particular national issue is likely to be of rather brief duration. Anyone who stays with an issue for very long may be considered by his colleagues and by the press to be a little bit odd, somewhat obsessive, a joke. (They laughed at the way Wayne Morse went on about the [Vietnam] war.)[19]

This is why the most effective weapon in the arsenal of the defenders of the status quo is delay.

In order to focus continued Congressional attention on questions relating to the general public interest rather than to special interests, it helps if there is action in other arenas. As we have already remarked, Congressmen like an audience for their efforts–but most Congressional hearings are ignored unless they are coupled with public or legal controversies that have already drawn media attention. The battle over DDT provides a prime example of how an issue was kept alive over the years by the action shifting continuously from one arena to another: first Rachel Carson's *Silent Spring*; then the report of the President's Science Advisory Committee; then the local courts and the state legislatures; new findings by scientists on the pervasiveness and toxicity of DDT; administrative hearings in front of the Environmental Protection Agency; more advisory reports; more court actions; etc. The Office of Technology Assessment should deliberately try to compensate for the spasmodic nature of Congressional, public, and even executive-branch attention by undertaking periodic reviews of a variety of issues such as pesticide usage, nuclear reactor safety, or land-use planning–whether these areas are currently the focus of controversy or not–with reports to Congress on its findings. In this way Congress and the public could find out what impact previous legislation has actually had and be warned of new problems before they reach crisis proportions.

Another way in which to keep Congressional attention is of course to emulate the special interests and become involved in Congressional elections. Various groups involved in debates over technology have done just this. Meselson approached several Congressmen with the chemical and biological warfare issue through their big campaign contributors. In the SST debate many local anti-SST groups inserted the issue into Congressional campaigns. And at least two public interest groups have dedicated themselves with considerable success to using the electoral process to change Congress so that it will become more favorable to their views. One, the Council for a Livable World, contributes to the political campaigns of Senatorial candidates from small states who favor its arms control objectives; the other, the Friends of the Earth's League of Conservation Voters, before each national election issues a list of a "dirty dozen" Congressmen whom it would most like to see defeated.

Congressional Staff

Lack of time, lack of staff, lack of expertise, pitted against the Pentagon's legions of experts, frustrated our [i.e., the Senate Armed Services Subcommittee on Research and Development's] attempts to make a significant number of line item cuts. Ultimately we had to resort in the main to asking the Executive Department to make percentage cuts, instead.

Most every item should be carefully considered and closely challenged. But

until Congressional committees charged with this responsibility have adequate staffs, skilled in investigation and interrogation, we will not be able to meet this charge. We will have no alternative but to continue with percentage cuts, thereby relinquishing to the Executive branch the real decision-making power.[20]

—Senator Thomas J. McIntyre (D.-N.H.)

It cannot be overemphasized that it is a Congressman's staff which represents his memory and his ability to follow through on an issue. The staff member has more time than the Congressman to listen to arguments, and once he understands and is convinced by them, he is likely to know which ones will be persuasive to his boss. Persuading a key staff member of the importance of an issue and educating him on what must be done may therefore be as important as persuading the Congressman himself—or even tantamount to it. Furthermore, the Congressman is more likely to be willing to commit his staff man to the fray if that staffer is already well informed and chomping at the bit.

Each Representative has a staff of about eight people in his Capitol Hill office, and each Senator's Congressional staff numbers about twenty; in addition, each of the thirty major Congressional committees has a staff of about twenty-five. These numbers may at first sight seem rather large, but most of the Congessmen's personal staff is concerned with political or office chores—case work, answering constituent mail, and the like. A Congressman's Legislative Assistant and Administrative Assistant are in charge of Congressional business and running the office, respectively. Each member of Congress thus has at most a few staff members who can afford to specialize in areas of special interest to him—unless he happens to chair a subcommittee or, better yet, a major committee. But even committee staffs comprise mostly lawyers and political types. Consider the Senate Commerce Committee, for example. Its eight subcommittees are responsible for aviation, communications, consumer affairs, environment, foreign commerce and tourism, merchant marine, oceans and atmospheres, and surface transportation; and they oversee the functioning of the Department of Commerce (including the National Bureau of Standards, the National Oceanic and Atmospheric Administration, and the Patent Office), most of the Department of Transportation, and four federal regulatory agencies: the Federal Aviation Administration, the Federal Communications Commission, the Federal Power Commission, and the Interstate Commerce Commission. Yet with all this technology under its supervision, the Senate Commerce Committee has only *one* staff specialist with an advanced degree in engineering or science. Other committees with jurisdiction over science and technology are in a similar position, as Senator McIntyre's lament, quoted at the beginning of this section, attests.

It is obvious that Congress is woefully understaffed with technical expertise. Recognizing this, a number of professional societies have recently initiated a Congressional Scientist-Fellow Program, whose purpose is to place outstanding younger scientists and engineers on Congressional staffs for approximately one year. The first scientist-fellow, Barry Hyman, a mechanical engineer, began

working with the Senate Commerce Committee in January 1973.[21] During his one-year fellowship he helped draft and organize hearings on three major bills. In September 1973 he was joined by six additional scientist-fellows: two electrical engineers, two physicists, a molecular biologist, and an assistant dean on leave from Yale Medical School. Congress appears to desire the services of many more such fellows: the American Association for the Advancement of Science, which is coordinating the program, has received some eighty requests for scientist-fellows from Congressmen, and the competition among Congressmen was very hot to see who could sign up the first fellows. Additional professional societies were expected to join in sponsoring the Congressional Scientist-Fellow Program in 1974, and foundation support was being sought which would allow a considerable further expansion.

Hopefully the presence of these scientists on Congressional staffs will increase the willingness of Congressmen to venture into the technology policy area. Congressmen may even begin to seek scientific staff with their own funds. Indeed, all of the first group of congressional Scientist-Fellows have been invited to stay on as staff members—and about half have decided to accept. There is a precedent for this: the two permanent Congressional staff members with doctoral degrees in physics originally came to Congress with outside support. One, Tom Ratchford, a physicist on the staff of the House Science and Astronautics Committee, first came to work for this committee under the Congressional Fellowship Program of the American Political Science Association. The other, John Andelin, a physicist who is now Administrative Assistant to Representative Mike McCormack (D.-Wash.), initially came as a volunteer.

Those Congressional Scientist-Fellows who return to universities and industry also can have a great impact on the relationship between Congress and the scientific community. They can be points of contact for Congressional staff searching for experts and information on particular issues. With their knowledge of how to get important issues and information to the Congressmen and Congressional committees where it will do the most good, they can be extremely useful to those scientists involved in public interest science activities in their home institutions.

Conclusion

In summary, citizens should think of Congressmen not as champions to be enlisted in the cause, but as a distracted, reluctant, and skeptical audience that sometimes can be persuaded to pass remedial legislation or to put pressure on a wayward government agency—once some group of citizens has developed the case and put it before the public or the courts. This prospect may appear rather forbidding, but sometimes Congress is the only resort. Even efforts which are only partially successful can make Congress and the public more sensitive to an

issue when it arises again. In the meantime the new Office of Technology Assessment and the Congressional Scientist-Fellow Program should significantly increase Congress's ability to recognize and deal with technological issues.

NOTES

1. Woodrow Wilson, *Congressional Government* (1885); quoted in U. P. Harris, *Congress and the Legislative Process* (New York: McGraw-Hill, 1967), p.4.

2. Harold Seidman, *Politics, Position, and Power: The Dynamics of Federal Organization* (New York: Oxford University Press, 1970), p. 40.

3. Ibid.

4. Representative Mike McCormack (D.-Wash.) has a master's degree in chemistry from Washington State University and Representative James G. Martin (D.-N.C.) has a Ph.D. in chemistry from Princeton. Two senators, James G. Abourezk (D.-S.D.) and Dewey F. Bartlett (D.-Okla.), and several Representatives have bachelor's degrees in engineering.

5. *The Nature of Radioactive Fallout and Its Effects on Man*, U.S. Congress, Joint Committee on Atomic Energy, 85th Cong., 1st sess., May-June 1957; quoted in H. Peter Metzger, *The Atomic Establishment* (New York: Simon and Schuster, 1972), p. 98.

6. "Think-tanks" are organizations which do studies of technical issues, usually for fee-paying clients. Rand, whose name stands for *r*esearch *and d*evelopment, is one of the oldest such organizations. It was founded shortly after the Second World War, mainly to do research for the Air Force. For a popular account, see Paul Dickson, *Think Tanks* (New York: Ballantine, 1972).

7. Ronald Doctor et al., *California's Electricity Quandary* (Santa Monica, Calif.: Rand Corporation, 1972), 3 vols.

8. The information in this paragraph is from Maureen Fitzgerald, "Who Does What in the Energy Crisis," *California Journal*, December 1973, pp. 407-9; Emilio Veranini, chief consultant to the California Assembly Committee on Planning and Land Use, "Political Interaction and Energy Policy" (unpublished talk at American Physical Society meeting, Berkeley, California, December 27, 1973); and from correspondence with Warren and Alquist.

9. Representative Mosher is the ranking Republican on the House Science and Astronautics Committee. Its Subcommittee on Science, Research, and Development, formerly chaired by Representative Emilio Q. Daddario (D.-Conn.), authored the bill creating the Office of Technology Assessment. The quoted remark was made in support of this bill during floor debate (*Congressional Record* 118 (1972): 3202).

10. For the background of the OTA and various recommendations for its mode of operation, see Anne Hessing Cahn and Joel Primack, "Technological Foresight for Congress," *Technology Review*, March-April 1973, pp. 39-48. The concept of technology assessment was developed in *Technology: Processes of Assessment and Choice*, prepared by the National Academy of Sciences for the House Committee on Science and Astronautics (Washington, D.C.: Government Printing Office, July 1969). See also *Technical Information for Congress*, prepared by the Congressional Research Service for the House Committee on Science and Astronautics, rev. ed. (Washington, D.C.: Government Printing Office, 1971). An amusing introduction to the business of technology assessment is given by Nina Laserson Dunn, "Technology Assessment at the Threshold," *Innovation* 27(1973): 14-27.

11. Technology Assessment Act (Pub. L. 92-484), Sec. 3(c).

12. For a review of the effectiveness of the Congressional Research Service, see Richard E. Cohen, "Information Gap," *National Journal*, March 17, 1973, p. 379.

13. Technology Assessment Act (Pub. L. 92-484), Sec. 6(a)(2) and 6(a)(4).

14. This suggestion is Jessica Tuchman's.

15. In the Ninety-third Congress, the membership of the Technology Assessment Board consisted of Senators Kennedy (D.-Mass.), Hollings (D.-S.C.), and Humphrey (D.-Minn.), Case (R.-N.J.), Dominick (R.-Colo.), and Schweiker (R.-Penn.), and Representatives Davis (D.-Ga.), Teague (D.-Tex.), Udall (D.-Ariz.), Mosher (R.-Ohio), Harvey (R.-Mich.), and Gubser (R.-Calif.).

16. Technology Assessment Act (Pub. L. 92-484), Sec. 7(a)(1). The first ten public members were appointed to the Technology Assessment Advisory Council in late 1973: Harold Brown, J. Frederick Buey, Hazel Henderson, J. M. Leathers, James McAllister, Eugene Odum, Frederick Robbins, Edward Wenk Jr., Gilbert White, and Jerome Wiesner.

17. Joseph S. Clark, *Congress: The Sapless Branch* (New York: Harper & Row, 1964).

18. This point was drawn to our attention by Richard Levin at the 1973 Alta Conference on Scientists in the Public Interest. (See note 8, Chapter 16.)

19. Elizabeth Drew, "Members of Congress are People," *New York Times*, January 29, 1973, p. 29.

20. Press release issued by Senator McIntyre's office, November 7, 1969.

21. The American Society of Mechanical Engineers is sponsoring Barry Hyman in cooperation with his home institution, George Washington University. The American Association for the Advancement of Science, partly out of its own funds and also utilizing a personal contribution from its treasurer, William Golden, is supporting three Congressional fellows; the American Physical Society is supporting two fellows; and the Institute of Electrical and Electronics Engineers is sponsoring one fellow who is supported by his home institution, Georgia Tech. The AAAS is coordinating the program. One of the authors of this book (Joel Primack) was involved in the creation of the Congressional Scientist-Fellow Programs of the AAAS and APS, and the other (Frank von Hippel) served on the 1973 selection committees for both organizations.