

CONGRESS

through a Fish-Eye Lens

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In the seven or so years between leaving college as the proud possessor of a Ph. D. in the physical sciences and April of last year, I had followed fairly closely the traditional career patterns that are expected of those of us who invest so much of our lives in obtaining the right to be constantly mistaken for physicians. I had worked impatiently through the almost inevitable postdoctoral fellowship and spent the following four years teaching graduate courses and researching on the faculty at the University of Miami and the next several years heading up somewhat larger research programs for a federal agency.

During this period I had been lucky enough to publish more than 30 papers in scientific journals, to give innumerable presentations at meetings, including two plenary lectures, and to be responsible for close to one million dollars in research-fund expenditures. I was also in the process of writing a couple of books and some book chapters on various scientific subjects. What was in the future for me, then: head of department in a university or government research lab; more years of research and a growing list of publications?

It was at this point, thanks to a recent move to Washington, D.C., that I was infected with a progressive and deadly disease known as Potomac fever. The symptoms of this strange malady are insane cravings to join the many thousands of your co-sufferers who work on the banks of the Potomac river in Washington in that alien world called politics.

Flippancy apart, I had made a determination that my future lay in the world of policy formulation and administration, not in the research laboratory. This determination had been made over a period of some years during which I had often and loud complained that "those politicians and administrators don't know what they are doing," although usually in somewhat more exotic language.

I had come to believe that one of the most significant problems in sci-

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ence-policy development in government is the small number of good and successful scientists who are prepared to devote their energies to this area, except as part-time consultants. Realizing that the level of scientific competence and technical advice in much of the policy-making part of the federal government was inadequate, I found myself issuing a personal challenge: "Put up or shut up." I would either have to accept quietly what I perceived as poor policy formulation or see if I could do the job better.

The initial question was where and how to start. My move to Washington had been part of the process, but I was still in a technical position. For some time, my options seemed limited; the only routes into policy jobs with my strong research background seemed to be the slow climb through the executive agency bureaucracy or the traditional route of waiting until academic excellence placed me on an advisory committee. It was at this point that I became aware of the Congressional Science and Engineering Fellowship Program, coordinated by the American Association for the Advancement of Science (AAAS).

I eagerly applied to the Congressional Science Fellowship Program of several societies of which I was a member, each of whose program is administered through the AAAS. Several months later, after the application and selection process was completed, I found myself surprised to be selected as the Optical Society Fellow for the 1977-78 year. My surprise was partly because, despite my work in atomic spectroscopy, I did not really consider myself to be an optical scientist. Mixed with my surprise was a degree of apprehension, for I realized that it would be difficult to leave active scientific research for a year and subsequently to return if I decided to do so.

That was how it all started. In September of last year, I found myself

among a diverse group of 18 Fellows, most from outside Washington and most with less research experience than I, who entered an orientation session organized by the AAAS. The orientation consisted of two weeks of meetings with various senators, representatives, and committee and personal staff members from "the Hill," as we all rapidly came to refer to the Congress, and with representatives of congressional support organizations, including the Office of Technology Assessment, the General Accounting Office, and the Congressional Research Service. Thrown in for good measure were meetings with the director of the National Science Foundation, the President's science advisor, and representatives of the Office of Management and Budget and the National Academy of Sciences.

The purposes of the orientation were to give the Fellows a basic knowledge of the machinery of the federal government and a feeling of what it was like to work in various congressional offices, thus to enable each of us to choose an office in which to spend the fellowship year. With respect to both of these purposes, the orientation was a resounding success. So much so, in fact, that a number of my exhausted fellow Fellows observed at the end of orientation that they had probably learned more in those few short days than in their entire college experience. I can only agree. The fellowship year would have been worthwhile for most of us if all we had done was attend that orientation.

So much for orientation. Now came the most difficult part of the fellowship year, at least for me: choosing an office in which to spend my year. My primary scientific background is in oceanography, which meant that if I were to stay close to my background, I should seek out offices oriented to ocean issues. I quickly found that ocean issues pervade the entire Congress, and my choice of locations in-

cluded three committees in the Senate and four in the House, together with each of their various subcommittees, and the personal offices of the members of these committees. After interviews with a large number of offices, and weighing many factors, I finally elected to spend my year in the personal office of Rep. Robert L. Leggett, an eighth-term Democrat from California. Leggett is chairperson of the powerful Subcommittee on Fisheries and Wildlife Conservation and the Environment of the House Merchant Marine and Fisheries Committee and chairperson of the National Security Task Force of the Budget Committee. He also serves on the Armed Services Committee, including its research and development subcommittee.

I chose to work in Leggett's personal office rather than with his fisheries subcommittee staff because I believed it was important for me to obtain a clear perception of the general flow of legislation through the House. This would, I reasoned, enable me to understand better how the issues that were important to me were ranked among the many national priorities for legislative action and federal-fund allocation. This reasoning turned out to be sound.

My fellowship year is, at the time of writing this article, drawing toward its end. Looking back, I see a year of diverse experiences and impressions that defy a concise summary or description. The typical congressional staff member, which is what a Fellow usually quickly becomes, generally works on numerous different issues and projects, some for only a few days or even hours. This was, at the outset, perhaps the most difficult thing for a scientist to accept. Our entire professional lives are spent studying a small number of research areas and trying to pursue each until we have a satisfactory and conclusive answer to our original questions. In contrast, most issues on the Hill must be addressed rapidly without the luxury of long-term study. The staff member must learn to assemble all the available information quickly and develop options for action based solely on this information. Seldom is there the chance to

postpone the issue until further research can be carried out.

This brings me to perhaps the most important observation that I have made during my year in Congress. It is widely acknowledged that, particularly in recent years, the dialogue between the scientific community and the political community has been deteriorating. Politicians and managers are becoming ever more skeptical of the role that science and technology can play in helping to solve their problems. At the same time, the scientific community is frustrated at the declining funding base for research and the continuing pressure to accelerate applied research programs and to set aside or defer basic science research.

In my year in Congress dealing with issues where the scientific aspects are outside my major discipline, I have come to understand the politicians' skepticism. Even though I knew that often a large research investment had been made in areas relevant to the subject matter of interest, it was virtually impossible to obtain directly from the scientific community the results of these investigations presented in such a manner that they could be used readily in identifying and selecting policy or management options.

The perception that arises when congressmen and their staffs are faced with this situation is that the scientific community is not responding adequately to national needs and the reaction, not unnaturally, is to demand tighter control by the government system over the research itself.

From my own experience I know that most, if not all, research, basic and applied, is highly relevant to national needs and simply needs to be assembled and interpreted within the framework of questions broader than the specific research idea that motivated the investigation. The average scientific paper pays little attention to these broader questions in its body and rarely if ever pays any such attention in the part of the paper likely to be the only part read by policy formulators or managers, that is, the title and abstract.

Of course, much of the scientific information in the literature is di-

gested and reprocessed to answer specific policy or management questions. This digestion process is typically carried out by agency program managers, or for the Congress by organizations such as the Office of Technology Assessment, the General Accounting Office, the Congressional Research Service, or the National Academy of Sciences. However, the structure of the scientific literature does not facilitate this assessment process, particularly when, as is most often the case, the assessment must be done in a limited time by people who may be occupied by many different issues simultaneously.

The typical research paper is read in its entirety only by those individuals who are themselves working in closely connected research areas. For the non-specialist, the title and abstract, and any key-word index, are the only things that he will normally read when surveying the literature in a given field

scholars made in Europe several centuries ago when they restricted written languages to their own use? Are we perhaps the potential subjects of a smaller-scale modern-day equivalent of the European revolutions? Perhaps we should learn something from the popularity of Senator Proxmire, since his Golden Fleece Awards, given for gross wastage of public funds, are more often than not awarded to federally funded scientific research programs.

Returning to my narrative concerning my year as a Congressional Science Fellow, I find it impossible to describe adequately the totality of activities in which I have been involved while in Congressman Leggett's office. These activities range from answering letters from constituents concerning issues such as the neutron bomb and social security taxes to representing the Congress in Australia and Argentina on a delegation negotiating an international treaty of global impor-

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for its relevance or application to his problem. This nonspecialist or policy maker will have two questions that he wants answered by his reading of a particular abstract: Why was this research performed or what question is the research meant to address, and how do the results of the research apply to my problems? Consider, then, that authors and editors invariably relegate the "why" questions to the introduction and the discussion of the potential application to the middle or concluding sections of the paper, if indeed those questions are addressed at all.

The issue is, I feel, quite clearly defined. We, the scientific community, have developed an arcane system of communication among ourselves. The products of our labors, publications, are often such that only fellow scientists and sometimes only those working in our own specialty can begin to understand them. Are we not making the same mistake that the savants and

tance. Each Congressional Science Fellow's experience is different according to the office he worked in. My own is probably unique in that I was able to experience both the personal office and scientific staff activities. The congressman's personal office activities include close interaction with constituents and transitory although often intense attention to issues embodied by the 10 or 20 bills debated on the floor of the House of Representatives each week. By contrast, the committee experience generally involves more-detailed consideration of issues and development and refinement of individual pieces of legislation.

For my own personal interests, this mixture was ideal. However, the average scientist would have more interest in the committee process, for it is in interactions with the committees that the individual scientist may have his greatest impact on legislation. I will, therefore, briefly

describe some of the activities of the Fisheries and Wildlife Conservation and the Environment subcommittee to provide, I hope, some insight into the process of legislation, particularly with respect to the inputs of information that shape the legislation itself; for it is in providing these inputs that the scientific community can aid rational decision making.

The Fisheries and Wildlife Conservation and the Environment subcommittee, of which Rep. Leggett is chairperson, has four professional staff members, one research assistant, a subcommittee clerk, and a secretary. This staff of seven people is large compared with some subcommittees', but it appears very small when one considers the scope of its jurisdiction. This jurisdiction is defined as "fisheries and

Major series of oversight hearings have been held on two pieces of legislation, the Fisheries Conservation and Management Act and the Endangered Species Act. Both these pieces of legislation are highly controversial, and various legislative amendments have been proposed, ranging from minor changes that "fine tune" certain provisions of the acts all the way to outright repeal. The two acts are controversial, each in many different aspects, but the reader may be familiar with the Supreme Court ruling upholding a decision that the existing Endangered Species Act precluded completion of the almost-finished Tellico Dam in Tennessee because such action would destroy the entire population of a fish called the snail darter, only 100 or so of which exist. Simi-

general, congressional committee staff members are hard pressed to cover the wide variety of issues within their responsibility. The staff member responsible for any given bill is often the key to its success or failure. One of his functions is to act as an information broker, ensuring that the relevant interest groups are all heard and providing background information that will enable the committee to understand the issue and make rational, reasoned decisions that are based on sound knowledge and not simply on emotion. Individual congressmen are, by and large, extremely adept at rapidly assessing the realities of an issue. However, they have even less time than the staff member to spend in reviewing issues and must often rely on digested information provided by the staff to guide their thinking.

Certainly in these circumstances training in science and technology is a valuable tool for a committee staff member. Few congressional staff members have any scientific or technical training whatsoever. Most are lawyers or political scientists. We who have technical training are, like lawyers and political scientists, adept at assimilating seemingly disconnected pieces of information, assembling them in a meaningful pattern, and discerning the essential elements of the information. In technical issues we bring the added dimensions of familiarity with, and ease of use of, the arcane language of science and a nose for misrepresentation or misinterpretation of statistical and technical data. On many occasions during my fellowship year I have been able to bring unique perspectives to the committee's consideration of an issue by virtue of these abilities.

The committee staff member is, as described, pivotal to the legislative process. In dealing with a given issue the typical staff member obtains information from relevant federal departments or agencies, from lobbying organizations, or from friends of the committee—people who have at one time or another offered advice on some subject and so are known to the committee staff and its collective memory, the files.

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wildlife, including research, restoration, refuges, and conservation, international fisheries, the National Environmental Policy Act, and the environment in general." The subcommittee, therefore, has oversight responsibility for such major pieces of legislation as the Endangered Species Act, the National Environmental Policy Act, the Fisheries Conservation and Management Act, the Marine Mammal Act, and the National Wildlife Refuge Act and any other matters within its jurisdiction. Oversight responsibility simply means that the subcommittee will hold hearings concerning any issue within its jurisdiction that appears potentially to require legislation for its resolution or hearings concerning the implementation of the various pieces of existing legislation within its jurisdiction. During the past year, for example, the subcommittee has held oversight hearings on issues such as the killing of porpoises during tuna fishing, the allowable quota for killing of bowhead whales by Alaskan Eskimos, and the development of new regulations for preparation of environmental-impact statements.

larly, the reader may be aware that the Fisheries Conservation and Management Act extended United States jurisdiction over fisheries out to 200 miles off the United States coastline. This act, in force only about a year, has led to many controversies, for example, seizure of foreign fishing vessels violating the law, reciprocal closure of Canadian and United States fishing to each other's nationals over a disputed agreement, and complaints of fishermen about restrictive fishing rules designed to restore or protect overfished species, particularly in the West Coast salmon fisheries.

In addition to its oversight activities, the subcommittee must consider and hold hearings on new legislation, which in the past year has included a bill to double the size of the National Park system by adding lands from Alaska to it and a bill to establish a research program to support conservation decision-making in the fisheries of the Antarctic Ocean.

This extremely full agenda of issues before the Fisheries and Wildlife Conservation and the Environment subcommittee is not atypical, and, in

As most of the competent scientific and technical research community are not aware of the legislative process, rarely communicate with the Congress, and generally react to legislation only after it is in effect and then through a funding agency, it is not surprising that they are not often consulted by congressional staff. The staff simply do not know to whom to go for scientific information on a given issue and do not have the time or the network of contacts to find the appropriate scientists. Certainly the consideration of a number of issues on which I have worked during the past year has been aided by my ability to pick the telephone up and call the relevant person for information or opinion.

To conclude this summary of my year's activities, I would like to describe briefly the impact that the Congressional Science and Engineering Fellowship Program has had and will continue to have on the legislative process. In its 5 years of existence, the program has placed nearly 70 scientists and engineers in the Congress for a year. Of these, 49 have completed their year, with 17 at present remaining in the Congress on the permanent staff. The remaining Fellows have either returned to their former employment or found jobs in policy formulation, principally with the executive departments. The legislative process has already benefited greatly from the 70 man-years of technically competent advice brought to it by the fellowships. However, the long-term benefits of the fellowships that are currently beginning to emerge will prove considerably more valuable.

These long-term benefits are diverse. The fellowship program has helped to create an awareness in Congress that individuals with scientific and technical training can become good Congressional staff and can even bring capabilities to the staff that are not normally present but that can be highly beneficial to the legislative process. Similarly, the Fellows, by their collective experience and through continuing interaction with the scientific and technological communities, are raising awareness in these communities that the Congress is a suitable place in which to seek employment,

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particularly in the early stages of one's career, even if the eventual goal is to continue in academic research. These two factors working together will certainly lead to an increase in the number of science and technology graduates who are hired by congressional offices outside the fellowship programs. The number of staff on Capitol Hill with such technical competence will, therefore, increase significantly from its current minuscule presence. I cannot ever envisage a time when the number of scientists on the Hill exceeds the number of lawyers; however, science and technology in particular and the public interest in general will benefit from the presence of a significant capability within the Congress to deal competently with complex technical issues, instead of the present almost total reliance on outside advice.

Even though the technical competence of congressional staffs is certain to improve in the future, the Congress will still depend to a major extent on information from the outside that is volunteered to the staff by persons interested in a particular issue. It is in volunteering such information that the scientific and technical community is distinguished by its silence. Rarely if ever does the individual Congressman or the staff receive unsolicited opinion and assessment of even such fundamental issues as the distribution of financial support in the budget among various scientific research priorities. It is not surprising, then, that budgetary and other decisions made by the Congress often go "against" the scientific community.

The primary reason that the voice of the scientific and technical community is not often raised to influence such decisions is that the individual members of the community have very little knowledge of the legislative process and, therefore, of when and where to contribute to it. Additionally, we have no active political arm, as

the labor unions, for example, do. It is likely that one of the major benefits of the Congressional Science and Engineering Fellowship Program will be that its graduates will educate scientists and technologists, particularly those of the new generations, in the ways of Congress.

Such knowledge of the process of legislation will enable the dialogue between our community and Congress to be dramatically enhanced. However, ultimately we are all in control of our own legislative destiny, and simply knowing the process will not be enough. I cannot emphasize too strongly that it is incumbent on the individual scientist or engineer to participate actively in the entire democratic process, not just in electoral politics or interaction with funding agencies. The representative or senator is constantly balancing the many conflicting interests that are voiced to him. Your voice is at present insignificant among the many that he now hears. However, even a limited effort can bring great rewards. As a community we have the advantage of a reputation for comparative rationality and impartiality, and, so long as we maintain this, any advice or opinion that we provide the Congress will always be held in high regard.

I would close this article by saying that the year I have spent as a Congressional Science Fellow has been immensely valuable and exciting to me personally. I believe that the year has also been valuable to you, the community that I represent, and I hope that it will in the future be even more valuable as I utilize my new-found knowledge of the Congress. However, I should point out that the Congress is a dynamic, multifaceted organism, too complex for any one individual to comprehend. Therefore, my comments in this article represent only the single-minded overview of an oceanographer representing the Optical Society, or "Congress through a fish-eye lens."