appalled that we didn't anticipate these other potential hazards. I wonder how they could have passed us by."

Schleicher's memorandum was never forwarded to the Bureau of Reclamation. But a report signed by Schleicher and three other geologists was forwarded to the Bureau in June 1973; it discussed the seismic hazards but left out Schleicher's "melodramatic" paragraph. "At no time did the Geological Survey issue a prediction that the dam would fail," states Vincent E. McKelvey, the Survey's director.

As a result of the Survey's concerns, an array of seismographs was installed in and around the dam to study possible activity along faults in the area. The instruments recorded the seismic noise generated by the dam's failure and the ensuing flood but showed no evidence whatever of any earthquake that might have caused the failure. "We are quite confident it was not caused by an earthquake," McKelvey says.

Another supposed source of prior warning about the dam's safety was a lawsuit filed by several environmental groups in an effort to block the dam because of its adverse environmental impacts. One witness at the trial—a former employee at the dam site—testified that she was on a survey team which found that several test holes drilled in the reservoir floor soaked up water at a high rate, indicating that there might be serious leakage. But the thrust of her testimony (which was disputed by Bureau of Reclamation experts) was that the leakage might harm water quality downstream or make it impossible to fill the reservoir. The lawyer who prosecuted the case—Anthony Ruckel, of the Sierra Club's Legal Defense Fund—told *Science*: "I did not raise the possibility of leakage causing a dam failure. The safety issue had never occurred to me." He also noted that "environmentalists don't have the experts or the ability to prove a dam is unsafe in advance."

The most vociferous critic of the Bureau's performance has been Robert R. Curry, professor of geology at the University of Montana at Missoula, who first made public Schleicher's memorandum. Curry has been quoted in some press reports as virtually predicting in advance that the failure would happen. But he told *Science* that neither he nor anyone else to his knowledge explicitly warned that the geological conditions in the area would cause the dam to burst. He says such predictions lie outside the expertise of geologists, who can point to hazards in the rock structure but are not qualified to say what effect such hazards will have on an engineering project such as a dam. Still, Curry believes that the Bureau of Reclamation, which employs both engineers and geologists, "could have predicted" the failure and was "irresponsible to ignore the geological hazards."

In speculating on possible mechanisms for the failure, Curry says that the young volcanic rocks in the area tend to contain lots of voids that are not interconnected, making it difficult to pump in grout and be sure it forms a continuous curtain. He also suggests that the pressure of the water in the reservoir might have compacted the porous rocks, possibly fracturing the grout or otherwise opening a pathway for water.

A quickie investigation into the causes of the catastrophe has been launched by an interagency task force; and a longer-term, independent investigation will be conducted by a blue-ribbon panel of eight outside experts, headed by Wallace L. Chadwick, of Los Angeles, a member of California's Earth Dams Board. Some Bureau of Reclamation engineers believe it will be necessary to dig an exploratory tunnel or tunnels into the abutment before it will be possible to determine just what caused the disaster that theoretically couldn't happen.

—PHILIP M. BOFFEY

Kennedy Hearings: Year-Long Probe of Biomedical Research Begins

Senator Edward M. Kennedy (D–Mass.), as chairman of the Senate health subcommittee, has just begun what he describes as a "year-long process of review and examination of public policy in the areas of biomedical and behavioral research." Out of this may come legislation that substantially reshapes the National Institutes of Health (NIH), by mandating a new emphasis on clinical research and the assessment of new biomedical technology.

". . . Our comittee does not come to these hearings with any deep distrust or disillusionment with biomedical and behavioral research," Kennedy declared at the outset of the first day's session. But as the morning wore on, it became apparent that though "disillusionment" may be too strong a term to express his feelings, "dissatisfaction" certainly is not. For more than a year now, Kennedy has been challenging the research community to throw itself into activities that would show it is responsive to its social obligations (*Science*, 20 June 1975) and he leaned on that theme as heavily as ever. His subcommittee colleague Richard S. Schweiker (R–Pa.) was even more persistent, indeed, strident, in asking scientists to tell him why they have not done more for him (the public) lately. It is going to be a rough, and extremely important, year.

By design, legislative authority for several NIH programs expires next year. The cancer and heart programs, training grant authority, and special initiatives in genetics and diabetes are among programs that will be up for renewal, making 1977 an ideal year during which to wipe the slate clean and begin again, should Congress decide it wants to. The questions foremost in the Senate's mind are whether research is being directed at the problems that most concern the taxpaying public and whether the fruits of research are being rapidly and broadly disseminated. The opening premise seems to be that the answer to each question is "probably not."

Lead-off witnesses on day 1 (16 June) of the hearings were the seven members of the Kennedy-initiated President's Biomedical Research Panel* who have just completed a 15-month study of the nation's research effort as sponsored by NIH and the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA). The panel report, com-

*Franklin D. Murphy, Times Mirror Corporation, Los Angeles; Ewald W. Busse, Duke University Medical Center; Robert H. Ebert, Harvard Medical School; Albert L. Lehninger, The Johns Hopkins University School of Medicine; Paul A. Marks, Columbia University; Benno C. Schmidt, J. H. Whitney and Company, New York; David B. Skinner, University of Chicago Hospitals and Clinics.

pleted at the end of April (*Science*, 21 May), was greeted cooly on Capitol Hill. And, if the present hearings are any indication, several weeks' time to digest the panel's findings—which were, in essence, that the basic research enterprise is sound if underfunded—have not warmed the Senate any. Kennedy certainly gives the impression that he thinks the panel missed the boat in relating basic research to social needs.

It is apparent that the report did little to allay the impression in the minds of the senators on the subcommittee that the public is not getting its money's worth out of research. Thus, throughout the opening days of the hearings one heard variations on this theme: Why don't you people in the NIH and the medical schools spend less time "understanding" disease and more time preventing or curing it? For instance, in what amounted to a monologue aimed at panel chairman Franklin Murphy, Kennedy criticized the panel for defining the mission of NIH as the "understanding" of disease, whereas the Public Health Service Act, he said, declares the NIH's mission to be the "prevention, diagnosis and treatment" of disease. One would like to dismiss this as a semantic difference, but in the present climate it seems a representative example of the inability of two sides to talk to each other. They come close but don't quite make it.

Kennedy either believes, or at least sounds as if he believes, that the biomedical research community is interested in little else than its own intellectual indulgence. "At root," he said, in an announcement of the hearings, "medical research is dedicated to uncovering new knowledge—for science's sake—not for the conquest of specific diseases or development of new technologies."

On day 2, NIH director Donald S. Fredrickson earnestly tried to persuade the Senator that this is not the case, saying that the "only" purpose of biological research is the benefit of mankind and that the NIH, newly aware of its social responsibilities, is eager to accept them. But panel members speaking the day before him did anything but set the stage for his carefully chosen words. The panel, particularly Murphy, leaned on the idea that the mission of NIH is research above all, and was reluctant to concede that science can be planned to attack problems the public wants attacked.

There is no doubt that Kennedy is genuinely concerned about what he perceives as an improper split between funds for basic and applied medical research. He asked Murphy more than once to tell him what percentage of resources should be spent for basic and what percentage for applied research in each of the NIH institutes and in ADAMHA.

But Murphy would not play. His response on each occasion was roughly the same. He called research a "moving target" and said that hard figures were difficult to come by "at this point in time." Furthermore, he pointed out, percentages would vary, not only from time to time but from institute to institute.

Kennedy was clearly annoyed. Pointing out that within a year the Congress is going to have to consider some major pieces of health legislation on which it needs advice, he said to Murphy, in effect, you on the President's biomedical panel are the experts. During the past year and a half you have talked to everyone in the field. If you can't tell us how federal dollars should be allocated, who can?

It is not an unreasonable question.

A Simplistic Impression

The very phrases "basic research" and "new or fundamental knowledge" have lately become like red flags to a bull when it comes to scientists talking to members of Congress. Somehow, during the idyll of the past two decades when science was generously supported and left alone, researchers have managed to convey the impression that everything important in their work is unplanned, that progress depends upon the unpredictable, that serendipity is all. They, more than any outside party, have given the Congress the impression that they wander into their laboratories in the morning just waiting to be struck by the muse. Not only is this a simplistic, indeed, basically inaccurate impression; it is also proving to be near-fatal as far as public relations are concerned.

Those witnesses who scored a point with the Senator were the ones who seemed to speak to specifics. For example, panelist Ewald Busse, a Duke University psychiatrist, told Kennedy that in the area of alcoholism, where only 8 percent of funds are spent on research and the rest on treatment, percentages should be reversed because there clearly is no workable antialcoholism program. Kennedy was responsive. He had asked for informed advice and he seemed to accept it—even though it was a recommendation for more research. He did not then ask "what research on alcoholism?" But he persisted, and will continue to persist, in asking that question about all areas of medicine—what percentage for basic research, what percentage for people?

Another issue that came up again and again was clinical trials. Kennedy and Schweiker gave the impression that they equate clinical trials with "getting the fruits of research to the people," and they repeatedly asked how much money is being spent on such trials. When panel member David B. Skinner told Kennedy, in response to a question, that more could be done in the way of organized, controlled trials of new drugs, surgical techniques, and other therapies, Kennedy perked up and replied enthusiastically, "Excellent." Skinner happens to be an advocate of more clinical work, having urged the subcommittee to recommend more money to train practicing physicians to conduct controlled clinical trials and his answer to Kennedy was not contrived. But, in part it seemed as if he won his compliment for one of those "tell the teacher what he wants to hear" types of answers to a quiz.

The most heavy-handed of the "why don't you worry less about basic and more about applied research" questions came from Schweiker who is a charter member of the "diabetes club," having sponsored the successful legislation creating a national diabetes commission that has called for more funding in that area. Many researchers see this as just one more example of distortion of research by tackling problems disease by disease. And in its report the panel took issue with some of the commission's recommendations, thereby managing to antagonize the senator from Pennsylvania. Schweiker has the notion that we are on the verge of producing an artificial pancreas that will virtually cure the nation's millions of diabetics. He called the artificial pancreas a "breakthrough," and says he sees a "cure at hand" if only scientists would stop fooling around with basic research and concentrate on that man-made pancreas.

Obviously, as one panel member noted, "somebody got to" Schweiker with news of this "breakthrough." He did not make it up himself. But whoever he heard from apparently neglected to point out just how complicated and cumbersome and expensive the so-called artificial pancreas is. (Skinner noted that it involves an implantable, insulin-filled capsule, plus arterial and venous shunts to connect the patient to a minicomputer that reads his blood insulin levels and stimulates the release of insulin when appropriate.) To favor its mass application to the public at the expense of research on the nature of insulin metabolism would be like settling for kidney dialysis as the solution to kidney failure. To continue to work on it is one thing, to rush

into mass clinical trials with a piece of expensive, half-way technology is quite another.

Some of Schweiker's questions to the members of the biomedical panel were, he announced, really those of philanthropist and National Cancer Advisory Board member Mary Lasker. Whether it was she who was concerned about application of the artificial pancreas he did not say, but she did get in a barb about clinical trials in the National Cancer Institute (NCI). When Benno C. Schmidt, biomedical panel member and chairman of the President's Cancer Panel, told the senators that in the cancer institute money is split 50 : 50 between basic and applied research, Schweiker interrupted to ask why Lasker's letter of questions stated that the NCI is spending only 4 percent of its funds on clinical trials. Schmidt said simply that he and Lasker must have been referring to different things, she taking a narrower view of what constitutes clinical research than he in their assessments of the cancer budget.

The next day, Schweiker asked the same question of Fredrickson, who reported that 8 percent of the budget of the NCI goes for clinical trials. In the end, everyone agreed that there is a pressing need for definitions—distinctions between clinical research and clinical trials involving randomly assigned subjects and controls, for instance—if the hearings can continue without everyone's needing to bring a dictionary.

Issues for the Year

The Senator's interrogation of, or conversation with, the panel members lasted 3 hours but inevitably left out a lot of issues—issues which Kennedy summarized as these before dismissing the panel. During the year, he said, he hopes to address the following issues, among others:

- The need to give NIH new resources if Congress assigns it new responsibilities.
- The desirability of strengthening the role of the director of NIH.
- The need to get politics out of the process by which individuals are appointed to NIH advisory committees.
- The peer review system and the harm that may come to it from "sunshine" laws that threaten confidentiality.
- The low salaries of NIH brass.
- The need for stable funding of research.

So far, the health subcommittee has heard from the panel; Health, Education, and Welfare officials; Fredrickson; assistant secretary for health Theodore Cooper; ADAMHA head James D. Isbister; and a few representatives of the biomedical community at large, including Harvard Public Health School dean Howard H. Hiatt; former NIH director Robert Q. Marston; and Walter A. Rosenblith, provost of the Massachusetts Institute of Technology. Before the year is out, the subcommittee intends to hear from dozens more. The question is how well the scientific community—or even a single member of it—can explain to the Senate what it is all about.

—BARBARA J. CULLITON

Science Adviser: Four GOP Senators Seek to Block Nomination of Stever

A letter signed by four Republican senators urging President Ford not to appoint National Science Foundation director H. Guyford Stever to the recently revived post of head of a White House science office has caused a sharp congressional backlash. The four senators, Carl T. Curtis of Nebraska, Clifford P. Hansen of Wyoming, Jesse Helms of North Carolina, and James A. McClure of Idaho, charged in a letter dated 9 June that "NSF officials have seriously manipulated and abused the NSF grant award process" in its curriculum revision program and suggested the possibility of an "official cover-up within NSF."

In addition, the letter said that "both Rep. James Symington and Sen. Edward Kennedy, NSF Subcommittee chairmen respectively in the House and Senate, failed to get to the bottom of the NSF matter, despite repeated insistence by Republican members that they do so . . . ." The letter concluded, "Your appointment of Dr. Stever as the President's Science Adviser will make it most difficult for Republicans to call these Democrats politically to account for their error in judgment and lack of initiative in this important matter."

The letter elicited rebuttals and reproaches not only from Democrats but from Republicans, notably Representative Charles A. Mosher of Ohio, ranking Republican member of the House Science and Astronautics Committee and of the subcommittee which Symington chairs.

In a letter sent to each of the four senators, Mosher begins by saying he is "startled and disappointed" to learn of the letter to Ford and observes that "I cannot help but believe that you accepted very inadequate, selective and distorted information as the basis for the judgments you expressed."

Mosher goes on to regret that the letter "injects partisan politics into the issue" and says that the questioning of Symington's actions as chairman of the subcommittee overseeing NSF activities are not justified.

Mosher does "agree that it is extremely important for the White House to thoroughly investigate the charges which are made against Dr. Stever and the NSF," but notes, "Personally, I believe that Dr. Stever's record warrants his appointment to the new post. Therefore, I hate to see the President and Dr. Stever publicly harassed by allegations which I am convinced are blown far out of proportion to the realities of the situation."

The responses from both sides of the aisles on both sides of the Hill seem to have been inspired not so much by the desire to champion Stever as to challenge what appears to be a breach of congressional *politesse* and a violation of the bipartisan approach which has largely prevailed in science policy matters.

Stever, who served as the President's science adviser for the 3-year period during which the advisory machinery was lodged in NSF, is understood to have been offered the new White House post some weeks ago. Informed observers speculated that, in view of the uncertainties of future prospects for the Ford Administration, Stever might prefer to stay at NSF or pursue the proffers of what are said to be attractive jobs outside government.

Stever, however, is said to have indicated he would accept the science adviser's job but cautioned the President that his nomination might meet opposition in Congress from critics of his role in dealing with the problems of NSF's edu-