

Leaving the House, Fuqua speaks on 24 years of boosting science

As the 99th Congress was dillydallying to a belated adjournment, the House of Representatives bid a fond, sentimental and bipartisan farewell to Don Fuqua, the Florida Democrat who led the important Science and Technology Committee. Upon entering the House in 1963 at the age of 29, a farmer from the Florida panhandle with a degree in agricultural economics from the University of Florida, Fuqua was appointed to the relatively new Committee on Science and Astronautics, which later was renamed the Committee on Science and Technology. As chairman of the committee the last eight years, he shaped its character. If the committee seemed to lack flash and an inquisitorial temperament, it was largely because Fuqua appeared calm, soothing and unthreatening, often partly obscured by cigar smoke.

How highly regarded Fuqua is among his colleagues was evident at a glitzy black-tie dinner on 22 September at Washington's Mayflower Hotel. It was attended by 540 guests, who listened to anecdotes, songs and praise directed at Fuqua by House Speaker Thomas P. (Tip) O'Neill Jr of Massachusetts, Minority Leader Robert H. Michel of Illinois, Jack Brooks of Texas, chairman of the Government Operations Committee, and Robert A. Roe of New Jersey, second to Fuqua in seniority on the committee and almost certain to become its chairman in the 100th Congress.

Panegyrics. Also retiring from the House at the end of the session, O'Neill is from the Class of 1963. The old order is changing in the House, he told dinner guests as he observed that Fuqua ranked 26th in House seniority. After ribbing Fuqua about leaving Congress voluntarily at the relatively young age of 53, O'Neill, who will be 74 at the end of the session, hailed him for his "hard work, devotion, advocacy, warmth and knowledge."

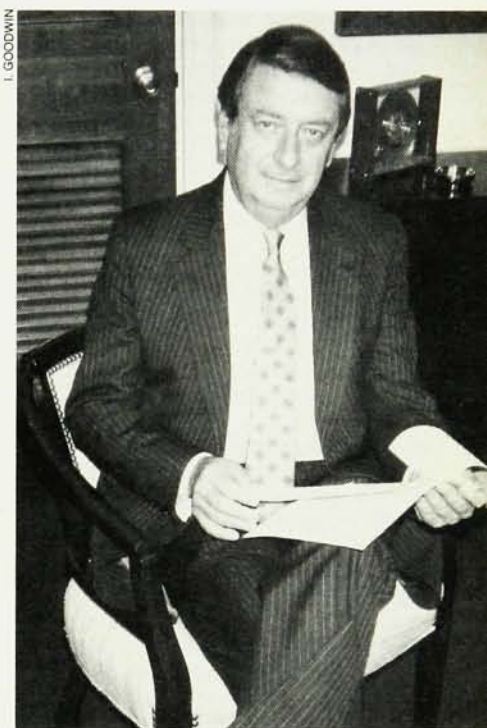
Eugene Cernan, the last astronaut to walk on the Moon, gave Fuqua a special arm patch similar to those NASA uses to designate each space voyage—this one portraying the Capitol, 24 stars

representing the number of years Fuqua spent in Congress, and the words "Tribute to Don Fuqua." The NASA emblem seemed particularly fitting because upon Fuqua's retirement from the House he will become president and general manager of Aerospace Industries Association, a Washington trade group representing the nation's space and defense contractors (PHYSICS TODAY, June, page 67).

Fuqua has endured some jeers for appearing to "cash in" on his chairmanship by taking the top spot with a lobbying group. Senator Donald W. Riegle, Democrat of Michigan, was quoted in a Washington newsletter, *Science and Government Report*, as deploring Fuqua's choice of jobs and characterizing it as an example of the "revolving-door problem" that "we are seeing a lot of in the agencies of government, certainly the Defense Department." For his part, Fuqua shrugged off criticisms of conflict of interest. When the full committee conducted hearings on the space shuttle Challenger catastrophe, Fuqua turned the chairman's chair over to Roe, who had rarely taken any interest in committee activities until then.

Fundraising. Fuqua's new position has already had tangible payoffs. The \$500-a-plate tribute dinner fetched about \$500 000, which, when added to his own \$100 000 contribution and a \$400 000 state grant, will provide the \$1 million necessary to endow the Don Fuqua Eminent Scholar's Chair in Engineering Science at Florida State University and Florida A&M, both in Tallahassee. Much of the private funding came from the manufacturers represented in the Aerospace Industries Association—among them Boeing, General Electric, General Dynamics, Grumman, IBM, Morton Thiokol, Northrop, Rockwell and TRW.

During the Fuqua era, the committee has bestowed many benefits on academic institutions, including some in Florida, of course. Two years ago, for instance, Fuqua persuaded his committee to amend the Department of Energy's basic-research budget to include



FUQUA

a new supercomputer center at Florida State. DOE put up little struggle against Fuqua's "pork barrel" tactic and, in the end, both the House and Senate went along with it, to the consternation of many scientists who argued that the center would be funded at the expense of basic research. Months later, during a hearing before the science committee, George A. Keyworth II, then President Reagan's science adviser, confessed that he had approved of the shift after Fuqua had discussed the supercomputer center. "I checked around in a kind of peer-review process of my own and decided it was a splendid idea," said Keyworth.

Fuqua and his predecessor as chairman, the late Representative Olin E. (Tiger) Teague of Texas, were longtime students of scientific and political sensitivities. H. Guyford Stever, who had been President Ford's science adviser and director of the National Science

Foundation, finds Fuqua "a great defender of science and technology. He put an immense amount of time into knowing the issues. He always seemed the best-briefed committee member. And he knew how to use his political savvy and power to get things done." When Fuqua announced last March that he wouldn't seek reelection, NSF's current director, Erich Bloch, described him as "a true friend of research." Two months later, Fuqua received NSF's Distinguished Public Service Award.

Representative Manuel Lujan Jr of New Mexico, the ranking minority member on the committee, calls Fuqua "a no-nonsense leader" endowed with an ability to mind political, scientific and academic interests with avuncular aplomb. "He's a class act," says Lujan. "He's patient and fair—and that's unusual on Capitol Hill, where the chairman's side prevails in any contest of wills. He is meticulous about giving equal time to the other side of the aisle."

Fingerprints. The ranking Democrat on the committee after Roe, Representative George E. Brown Jr of California, says: "I don't seem to ever recall Don demonstrating anger or animosity to a witness or another member. It's not in his character. But he's not been as aggressive in the committee as I would like to have seen him. That's not a flaw. He sought to avoid fights. He went along with the Reagan budget when it cut NASA to avoid confrontation. In that, maybe his political judgment was better than mine. But, to his credit, he fought hard to restore the NSF education program when the Reagan Administration took an ax to it." According to Brown, Fuqua was tougher on his own Democrats when the Carter Administration sought to trim science budgets. Brown says Fuqua's fingerprints are on virtually every piece of legislation that passed through the committee. "He is a workhorse," Brown observes, "not a show horse."

Alvin W. Trivelpiece, who appears frequently before the committee in his job of director of the Energy Department's Office of Energy Research, insists that the nation's scientists and engineers "owe Don Fuqua a great debt of gratitude. His unselfish, nonpartisan hard work as chairman set an example of what I believe a congressman should be."

In the following interview, conducted by Irwin Goodwin of *PHYSICS TODAY* in Fuqua's office, the chairman recalls his life and times on the committee. He considers his primary accomplishment his final one—the two-year science-policy study that he says "will serve as a basis for redirecting America's thinking regarding the government's role in

science and education." Fuqua believes the final report, to be made public early in the next session of Congress, is likely to have as much effect as Vannevar Bush's seminal report *Science—The Endless Frontier*, issued just before the end of World War II. It resulted in the formation of NSF five years later. Since then, the House has conducted two wide-ranging reviews of US science policy—the first under Carl Y. Elliott of Alabama in 1963–64, the other headed by Emilio Q. Daddario of Connecticut in 1965. While both surveys advocated increased government support for research, the opposite happened during the escalation of the Vietnam War. Fuqua speaks to this and other matters below in excerpts from a lengthy interview:

Q. In 1963, when you entered the House and joined the Committee on Science and Technology, there was an aura of good feeling about science and space. Both were well endowed by Congress, reflecting public enthusiasm about the space program and the nation's economy. But after the US reached the Moon in 1969, space was in eclipse and the country was preoccupied with the Vietnam quagmire and Great Society issues. Do you now perceive a difference in public and Congressional attitudes about science and space from when you arrived?

A. There is a considerable difference. Just think back to 1957, when the Soviets launched the first Sputniks. There was an immediate response—one being the creation of the House Committee on Science and Astronautics, as it was called at the time. There also was enormous concern among the American people and Congress that education was inadequate in science and mathematics. In 1958 we passed the National Defense Education Act and by putting the word "defense" on the legislation the issue of education became very powerful. Before long we entered a self-agonizing period, with the assassinations of President Kennedy, Martin Luther King and then Bobby Kennedy, and later the civil-rights protests and the Vietnam War. It was a time for looking inward at ourselves, at where we were going, at our goals for the future. Now we know we didn't look far enough ahead. In space, for instance, we had not looked beyond Jack Kennedy's Apollo program to land men on the Moon. There was no follow on. There were some strictly scientific missions such as Viking and Ranger and, of course, communications satellites. NASA looked around for something to do with the spare parts from Apollo and came up with Skylab, to be launched by the old Saturn 1B. The only goal was the reusable space shuttle, which was in-

tended to be the way astronauts would explore space in the 1980s and '90s. So there was a lot of downtime for NASA until the first shuttle flight in April 1981.

Q. What was the attitude of the committee about science and space during the years after the Moon landing?

A. It was one of disappointment. We were not seeing any achievements, despite the money we were giving NASA. There were questions being asked about the space program. At the same time we were wracked by other questions about the President and Vice-President. They each resigned in disgrace. It was not a happy time. And with the first shuttle orbiter, Columbia, being fabricated, it was a lean time for our space activities. People like to see things happen.

Q. During this period, in 1973 to be precise, President Nixon lost one science adviser, Lee DuBridge, and fired another, Ed David. He dismantled the Office of Science and Technology and the National Aeronautics and Space Council—mainly because he distrusted the scientific community for opposing his pursuit of the Vietnam War, antiballistic missile systems and commercial supersonic aircraft. Was there a reaction to his disengaging the science-policy apparatus?

A. In Congress we felt there was not much we could do about it, though I remember Congressman Teague and some others wanting to do something. When Nixon left, they worked closely with Vice-President Rockefeller to reestablish by statute what is now the Office of Science and Technology Policy. That was 1976, our bicentennial year as a nation.

Q. That year, President Ford named the director of the National Science Foundation, then H. Guyford Stever, to take on the job of White House science adviser in addition to NSF. Did that strengthen or weaken the office?

A. We asked the same question at the time. With all credit to Guy Stever, who was certainly able to handle the dual capacities, it became clear that the person in charge of a line agency, in this case NSF, ought not to be giving advice and counsel on science programs and budget priorities to a President and White House staff while he was competing with other agencies. Stever did a great job while wearing two hats, but I'm sure the position should not be structured that way.

Q. You've seen science advisers come and go in the past 24 years. I have two questions about the position: First, has it been particularly effective for presidents and for the science community? And second, has it increased or decreased in importance and stature over the years?

A. I think the science adviser to the President is whatever the President wants him to be. The importance of the role of adviser varies with each occupant of the White House. President Reagan had trouble with his Council of Economic Advisers. He didn't like the advice they were giving him, so he dismissed them. It's like advice from your physician. If it's available and you dismiss it, the advice might just as well not be given. But if a President chooses to consider the advice in deciding scientific or technological policies, as I think a President should, it can be very useful. A President must first be willing to accept scientific advice. I think President Kennedy made good use of [Jerome] Wiesner on a whole range of issues, including arms control and nuclear testing. President Johnson often called on Donald Hornig. President Nixon didn't care much for any type of intellectual advice, while President Ford sought it, largely through Vice-President Rockefeller. At the beginning of his term, President Reagan was reluctant to appoint a science adviser. I made a personal appeal to the President. I had no candidates in mind. I said I thought it should be somebody he would listen to. After a number of other people suggested Jay Keyworth, the President appointed him. I think Keyworth had some impact on program levels, particularly in basic research. Physics fared very well, undoubtedly because of Keyworth.

Q. Keyworth resigned his office just as the Gramm-Rudman-Hollings deficit-cutting measure was passed by Congress. I'm not suggesting a connection between those two events, but G-R-H is adversely affecting government funding of basic research, isn't it?

A. Congress has been very protective of basic research in the last few years. But research is not exempt from budget reductions. It's going to have to take its lumps with the other government programs. Science is competing with support of the aged, the military and just about everything else. I'm not sure that science should or could receive special treatment. An excellent case can be made for science, because it is important for the future. We need scientific research if we want to maintain our high standard of living and unlock many of the mysteries of nature that lead to better health and better technology to benefit our lives and improve our country. For those reasons, research rates a very high priority, but you can't isolate science and say it's sacred. It has to be evaluated along with everything else in the budget. Science will have to fight. Right now the person who is a real fighter for funds, though he's not in the job of White House adviser, is Erich Bloch. I

think he has the stature to make a good case for more research at NSF. And I think DOE is making a strong case for basic research through Al Trivelpiece and [Energy Secretary] John Herrington.

Q. Do they have allies on Capitol Hill?

A. Yes, they do. One of those allies is leaving Congress. I would like to be remembered as a strong proponent of scientific research. I think it's good for the country.

Q. Congress can call upon the heads of agencies and other experts to testify at hearings, of course, but it doesn't have an independent investigating

who then headed our subcommittee on science, research and development. Daddario's subcommittee recommended that Congress enact a national science-policy act that would guide every department and agency using science and technology in its mission. Earlier that year Congress had passed the National Environmental Policy Act, but the idea of a similar law for science policy got as far as a task force set up by President Nixon. The task force recommended strengthening the President's science advisory offices and enlarging OTA, but nothing ever came of these ideas.

Q. What was your position on the

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body to deal with science policy, as the President has with the Office of Science and Technology Policy, though Congress has its Office of Technology Assessment.

A. That was the reason OTA was established. We were legislating on many difficult environmental issues that we knew little or nothing about. The issues were complicated by a lack of agreement among scientists about the risks and hazards of automobile emissions to human health. There were the automobile manufacturers on the one hand saying that there is absolutely no problem and that it would be extremely costly to reduce or eliminate exhaust emissions and the technologies were not available to do so. There were scientists and environmentalists who felt very strongly on the other side that there should be zero emissions regardless of the cost and that the technology could be achieved to do so. Congress was without a source of sound, impartial advice. Where could we go for advice? Congress had faced such issues years earlier, resulting in food and drug legislation and the creation of the FDA. But, starting with the publication of Rachel Carson's *Silent Spring* in 1962 and the debate over DDT and other chemical pesticides, Congress needed information and advice to legislate wisely about the environment—in issues such as radioactive fallout, air and water pollution, industrial effluents, agricultural chemicals and so forth. There were questions before us about the SST and weapons in Vietnam. Paradoxically, science and technology were often blamed for causing the problems and just as often boosted for promising the solutions.

We undertook a series of hearings in our committee in 1970 to review the government-science relationship. The chairman was Congressman Daddario,

Daddario proposals?

A. That we try to get the best minds available without going through the very technical type of study that the National Academy of Science is accustomed to doing. I advocated getting objective analyses from a group that would be responsible solely to Congress. On some issues we got into a bad situation by making the requirements too stringent. Then we had to come back later and change the limits. In doing that, we gave an impression to the American people that Congress was retrenching from a commitment to try to clean up the environment. I think we had exceeded our capabilities. In the case of exhaust emissions, it seems there was some truth in what the auto industry was saying about the retooling time and the costs involved. But we recognized that something needed to be done. OTA offered a plan for setting emission standards in stages. It doesn't tell Congress what to do. It gives us an assessment of the situation and arrays the options. What's unique about OTA is its small staff, which resists developing its own biases. Instead, it tries to round up some of the best minds on a situation and take an objective look at the issue, then give Congress the best information available at the time. I think that practice has worked very well.

Q. Has the Government Accounting Office also been helpful to Congress?

A. I think GAO does an excellent job on management studies and accounting matters. I think they're somewhat weak in trying to do scientific evaluations. It just goes beyond the scope of their capabilities. On the other hand, they recently completed a study for the science-policy task force on university research revenues and expenditures. It was a complicated study of a variety of large, mid-size and small academic

research centers. That type of examination is within GAO's field of expertise.

Q. Issues involving science are often so complex that no congressman and no scientist from another field are capable of judging the situation. Congress and the American public are mainly concerned with what's termed the "technological imperative" of science—that is, research with a commercial or military application. Basic research by its very nature has little direct use for defense or public purposes. How does Congress go about making decisions on basic research when the end result is nowhere to be seen or appreciated?

A. Well, it's a very difficult decision. I think most members of Congress have some appreciation of basic research because they know it can result in Nobel Prizes and new products. They have a gut feeling that our basic research is a national treasure that is envied by most if not all the world's industrialized nations. But it comes down finally that they have to take the word of the departments and agencies that certain types of research are worth funding. It's much simpler and more appealing to see the end products—the space shuttle, a particle accelerator, an engineering center, a supercomputer. We like to see what the money buys. People say, "What has my money gotten for me?" They see it in satellites because they have television sets that receive weather information and football games and royal weddings. Electron microscopes and particle accelerators are much harder to appreciate, let alone understand. They can see the results of medical research. I hear basic researchers testify before the committee that maybe their field isn't getting the funds and fellowships it deserves, but I think they have been treated rather well over the years. I think one of the things that we need to do is to try to do a better job of explaining to the American people the value of research. This needs to be

done constantly—and members of Congress need to be educated to appreciate research.

ferent field. It's exciting to find that missing piece of the jigsaw puzzle that thousands of people have been looking for or how that piece relates to other things we hadn't known about. It sometimes seems to me that scientists try to convince each other what a great job they're doing and what a great field they're in, forgetting that everybody else has no idea about nuclei or x-ray lasers or DNA. I can't think of any citizen, any taxpayer, who wouldn't be proud of spending money for such research. People didn't really understand why we went to the Moon. They thought of it as a glorious adventure.

Q. Now that money for science is getting scarcer, scientists have been urged to become lobbyists on Capitol Hill. Is this a good idea?

A. I take congressmen to labs all over the country to try to educate them about what our committee is doing, why we are funding some of these things. When I take them to a place like Brookhaven, they think, what in the world do physicists do with all that equipment? What are they finding out? Let them go talk to Nick Samios at Brookhaven or Leon Lederman at Fermilab to learn what they're trying to do. Behind each government grant there's a fascinating story. I've seen congressmen with their mouths open as they listen to scientists talk. It's a shame so many scientists do not bother to do that, not only to Washington legislators but to politicians in their hometowns and to students in local high schools.

Q. It's probably easy to do that at a national laboratory, but a lot harder to do at a laboratory at, let's say, Texas A&M University or Clarkson College.

A. Well, you've got a lot of little towns around Texas A&M, to use that as an example, or around Clarkson from which you can invite the science classes and science teachers to come in to see what you're doing. When I was president of the alumni association at the University of Florida several years

ago, we instituted a program called Florida Today. We brought people in, took them through the med center, the ag center, the veterinary school and some of the research places to show them what was going on. There were bankers, citrus growers, industrialists, life-insurance executives, opinion-makers, plus the members of the state legislature. It doesn't mean you're lobbying. If you write a good paper, you try to get it published. Is that

lobbying your colleagues or sharing information with somebody who hasn't known about the research? I don't consider it lobbying. When congressmen are invited to a football or basketball game at a college or university in their district, they should also be invited to guided tours of the research labs.

Q. Erich Bloch of NSF suggested doing that about two years ago. I haven't heard of a marked increase in Congressional tours of university science labs.

A. I've never known a scientist who was bashful about showing off what's going on in his research. They're very proud of it, as they should be. I think it's important for scientists to show off a little. It's important for the way our system of government works. Congressmen have a lot of things on their minds. They can't be expected to be experts in physics or chemistry or mathematics or whatever, but if you can expose them to a little periodically, then I think they have a better appreciation. If some issue comes up and professor so-and-so writes to a congressman and says, "This is a very worthy program," he may be more inclined to support that. He ultimately has to answer to people. Some 435 of us get peer-reviewed very critically every two years. We all have to answer for what we've done.

Q. Let's talk about the House task force. You created it, but you won't be around for its report. How would you characterize it?

A. We started in August of 1984 with a preliminary manifest. We began the formal study in February 1985. We're in the process of putting together the task force's report. We've concluded that not a lot of big things are wrong. One conclusion deals with interdisciplinary work. Colleges or research institutions are not geared to provide for interdisciplinary advanced degrees. Yet we find that industry and society are becoming so complex that scientists and engineers need to be increasingly interdisciplinary.

Q. By "interdisciplinary" you mean subjects such as biophysics, say, or materials science?

A. Or if you're talking about environmental research in acid rain, you get into a lot of different disciplines. It also means universities working with industry and national laboratories. There are not many universities doing interdisciplinary research. NSF isn't organized to handle that. It prefers to deal with nuclear physics as a single program; the same goes for computer science.

Q. What could Congress do to facilitate interdisciplinary studies?

A. We're not looking to pass more laws. We're saying that there's a need for interdisciplinary training in univer-

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done constantly—and members of Congress need to be educated to appreciate research.

Q. Do you think scientists by and large are doing a good job of explaining their research work to the public?

A. I think they are doing less than an adequate job. We could do a better job of explaining to people the importance of a particular piece of research and how it might unlock the mysteries or misunderstandings in a totally dif-

ferent field. It's exciting to find that missing piece of the jigsaw puzzle that thousands of people have been looking for or how that piece relates to other things we hadn't known about. It sometimes seems to me that scientists try to convince each other what a great job they're doing and what a great field they're in, forgetting that everybody else has no idea about nuclei or x-ray lasers or DNA. I can't think of any citizen, any taxpayer, who wouldn't be proud of spending money for such research. People didn't really understand why we went to the Moon. They thought of it as a glorious adventure.

sities and for interdisciplinary research supported by the government.

Q. I see.

A. My committee has oversight of NSF. This is something we should talk to Erich Bloch about at NSF. That doesn't mean we would urge him to ignore all other styles of research. But we recognize a real need to try to bridge some of the directorates at NSF for research on some problems.

Q. What is the task force prepared to say on pre-college education?

A. We will express strong concern about science and mathematics from kindergarten through grade 12.

Q. Isn't that an issue the Department of Education should deal with?

A. Well, we want to talk about it because NSF is concerned with it. There's concern that it's not getting the attention that it should from Washington.

Q. The National Science Board's Coleman commission reached that conclusion in its report, *Educating Americans for the 21st Century*, back in 1983. The commission [under the chairmanship of William T. Coleman Jr, former Transportation Secretary in the Ford Administration] proposed spending as much as \$4.6 billion over five years to raise the pre-college learning curve.

A. We've been railing against the constant decline in dollars [proposed by the Administration] for science education from kindergarten through 12th grade at NSF and adding money to the budget each year. That's not to say we're unconcerned with undergraduate and graduate education, which NSF supports. We held hearings a few months ago on the Neal report [based on a Science Board study of undergraduate education led by Homer Neal of the State University of New York at Stony Brook], which spoke of the decline of science, mathematics and engineering as a danger to the country's scientific and industrial capacity. It contained an impressive entreaty for additional NSF support of undergraduate training in those subjects. Coupled with that are the need to involve more women and minorities in those fields and questions about whether universities should tighten their requirements for science and whether states should up their requirements for graduation. The country seems faced with a horse-and-cart situation. The states say, "We don't have the certified teachers to teach science and math, so we can't require more classwork." We passed H.R. 1310, the Emergency Mathematics and Science Education Act, in March of 1983, when the education crisis was on the front page of every paper and cover of every magazine. But we had been holding hearings on the problem since 1980.

Q. That was three years before the

Department of Education acknowledged the problem in *A Nation at Risk*, wasn't it?

A. The Administration hadn't acknowledged the problem at all. President Reagan had promised in his first election campaign to abolish the Education Department and his first budget showed massive reductions for the department and NSF. We dug in our heels. We had hearings. When we looked to the future, it was obvious that we had to begin with grades K-12. The National Defense Education Act trickled out in the 1960s and nothing took its place. NSF once had a strong program, including summer workshops for science teachers. That was dismantled.

Q. How did Congress react?

A. The Education and Labor Committee, under Carl Perkins [of Kentucky], became very excited and wrote the first bill to pass the 98th Congress—in March 1983—the Education for Economic Security Act. The Administration had opposed the bill. There were two titles in it. One was initiated by Education and Labor, and Title II was our bill, which dealt with higher-education fellowships for graduate students. I had been working with Father [Theodore] Hesburgh [of Notre Dame University], who was chairman of a new group, the Business-Higher Education Forum. I had been talking with a lot of people about getting industry support, matching funds, for graduate fellowships. Many of them were looking for a mechanism to do that. They had upped their support for such programs. They wanted a coordinating program. I worked with Bob Anderson, who is chairman of Rockwell International, and Ed Conway, chairman of Air Products and chairman of the Business-Higher Education Forum this year. There was a groundswell. Then came the reports by the Science Board and the Carnegie Foundation [for the Advancement of Teaching], followed by newspaper editorials and

need of solutions.

Q. What are some other task-force findings?

A. Well, biotechnology has raised questions.

Q. Recombinant DNA? The issue of letting strange genes loose upon society?

A. Well, that or manipulating genetic material to breed super animals or human beings—efforts to make swine leaner and dairy cows give milk with less fat content. Many of those things will happen and should happen.

Q. This relates to scientific ethics. Do you think it's right for scientists to attempt to influence or restrict their colleagues in certain types of research?

A. I don't think there's good science and bad science. There's science. People who do not care to work on the Strategic Defense Initiative, possibly for moral reasons—should they try to block other people by voting in a faculty meeting to ban such work on campus?

Q. In the 1960s many universities voted to prohibit military work on campus.

A. That's a campus decision, but say you're in a chemistry department and eight professors of chemistry say, "We do not want anybody else to do it here. We vote 8 to 5 to keep you from doing the kind of research that you want to do here." That's a breach of academic freedom, in that some scientists may be trying to impose their morals or politics on other scientists. I oppose that. I think scientists have the right to do their own thing.

Q. That question of scientific ethics is different from the question of government regulation of types of research—say, on recombinant DNA.

A. In biotechnology especially we've got to be very careful about the proper procedures so that the public perceives that their rights are protected, that some mad scientist is prohibited from releasing genetic material that might affect people badly. I have introduced

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magazine covers. Our bill sat for a while over in the Senate, but finally Orrin Hatch [of Utah] put in an amendment about silent prayer in the schools, and we hitched it as a caboose to that bill. The bill got worked on so it was not very effective, but it seemed to be the only train leaving the station. The Senate passed it in March 1984. We didn't get all we wanted, but it is an attempt to attack the education emergency, which our task force still finds in

a bill, the Biotechnology Science Coordination Act, that would spell out precise procedures, a sequence of events, requiring peer review and government permits. I'm not saying it is a perfect piece of legislation and I don't think there should be government controls. I think the scientific community must police itself.

Q. The subject of a Department of Science comes up from time to time. Did the task force engage that topic?

A. We looked at that. My personal feeling is I think it would be bad to have a minister of higher education or a minister of science and technology. I think the system we have is best. If there is a science adviser who is very persuasive, it is likely that he can provide a particular thrust or two. However, he is isolated enough from the line agencies that his thrusts don't totally dominate the science that is

Many schools have the potential to do good scientific work. We have to recognize that things are changing—population shifts. Look at what Texas has done for higher education. Look at California and my own state.

Q. Is your bill designed to end the old spoils system as we know it?

A. No, it won't stop Congress from doing that. And it shouldn't. I think it will take a lot of pressure off the schools

I'm trying to get Erich Bloch to get some of the SDI basic-research money to administer in NSF, so that it doesn't carry the taint of being a military program.

being conducted. If there is an engineer at the head of NSF, as we now have, it may tilt the programs a little bit toward engineering, and probably wisely so, but other leaders, at the Office of Naval Research or the Department of Energy, could counterbalance the engineering tendency. I think competition among the various disciplines as well as science agencies is good. I think we'll come out with better science.

Q. And probably more funding?

A. And probably more funding. To place science research under one roof I think has many drawbacks.

Q. The issue of facilities or infrastructures of one sort or another on our campuses has occupied the scientific community for the past four or five years and the task group has heard a great deal of testimony on the problem. What's your view on the subject?

A. My personal view is that there should be some kind of set-aside of research money earmarked for facilities. I have a bill called the University Facilities Revitalization Act that proposes that some funds from the agencies go toward buildings and infrastructures, with matching money from the states, private sources and the universities. It didn't get very far in this Congress. I don't see vast amounts of new money coming from Washington for university structures for some time. But it will take these set-asides to stop the political pressures on members of Congress, the end runs around the scientific communities and government agencies, to obtain money for buildings. The pressure on Congress is building. There are pleas coming from universities, because they don't have any other method of getting money for their campuses.

Q. What seems to be happening now is something like the "spoils system" for universities and colleges, often with the rich and famous becoming more so because they have friends in Congress.

A. I think we have to look at the change in demographics of the country.

to use that device with Congress to get special building funds.

Q. The Defense Department's reduced support of basic science is hotly discussed whenever R&D funding comes up. I don't know whether your task force dealt with that because your committee doesn't have jurisdiction over DOD.

A. Well, we don't do the funding, but we do have overall jurisdiction for science in general. It is of interest because of things like the Mansfield Amendment [to the fiscal 1970 Omnibus Defense Appropriations Act], which was in effect only two years, but the Pentagon still refers to it when it wants to justify holding down on grants and contracts for basic research it says is not "mission oriented." DOD did a little better, I think, when [Richard] DeLauer was in the Pentagon [as undersecretary of research and engineering]. But now that times are leaner for DOD, people there are talking about the Mansfield Amendment again. SDI will send money for science at universities. In fact I'm trying to get Erich Bloch to get some of the SDI basic-research money to administer in NSF, so that it doesn't carry the taint of being a military program. I'm referring to SDI's basic research. It may have some military applications, but I look for SDI to have a tremendous amount of civilian applications.

Q. Are you encouraged by the Pentagon to proceed with that idea?

A. Yes, I think we're making some progress. I think that Bloch has talked to [Defense Secretary] Caspar Weinberger about it.

Q. Was it your plan to transfer basic research from SDI to NSF?

A. Some of it. I think that SDI is probably not equipped to administer that much money in basic research.

Q. Who would make the program choices?

A. That would have to be worked out, but I would think laser research and basic physics would fall to NSF. Much of the Innovative Science and

Technology program of SDI, covering unclassified research at universities, might be run through NSF. I haven't talked with Bloch about this lately. I'm sure other people are interested in this also. The ones I've talked to, even those opposed to SDI, would prefer NSF to administer the program's basic research. The big hang-up is that university scientists are afraid to do SDI work, lest a black cloth get wrapped around it. That's a legitimate concern—the fear of security classification with DOD. And NSF is willing to take it on.

Q. Does the task force deal with the issue of big science vs. little science?

A. We talked about international cooperation and big science—the space station, fusion energy, the Superconducting Super Collider. Mega-science projects. But we're not funding the major facilities we have so they can operate at optimum advantage. [Burton] Richter [of the Stanford Linear Accelerator Center] told us his center is running at around 35% of full capacity because it lacks funds. I can't see how we can expect to move to new and bigger things when we're not operating what we have. SSC should not be considered a priority until we can run our existing machines to the fullest.

Q. The situation with Fermilab's Tevatron and the Stanford Linear Collider may be likened to building expensive new weapons systems and storing these in mothballs.

A. If you do that you're in serious trouble.

Q. The implication is that we're not going to build anything new because we just don't have the funds to operate what we've already got.

A. Or to go ahead with the new and, once it's completed, shut down many of the other research centers. Or not build any big new facility unless there is international support. There is no easy solution to the fix we're in.

Q. Do you care to list your major disappointments as committee chairman?

A. The biggest disappointment was the Challenger accident. And after that, that we haven't had money to do the space science that we have envisioned. I'm disappointed that we weren't able to launch Space Telescope while I was committee chairman. I'm also disappointed in our inability to support graduate education and fellowships as fully as we would like. I'm getting depressed listing my disappointments.

Q. What is likely to be the legacy of the Fuqua era in Congress?

A. I remember a story that [Representative] Claude Pepper [of Florida] tells about the old gunfighter in the West who was asked what he'd like on his tombstone. He said he'd like the words "He did his damndest." □