S. 32: Civilianizing Federal science

Next week, the Senate is expected to vote on one of the most far-reaching science policy bills to come before it in a long time. The National Science Policy and Priorities Act (S. 32), introduced by Sen. Edward Kennedy (D-Mass.), would greatly expand the role of the National Science Foundation and change the orientation of Government-funded research from defense to civilian needs.

As it now stands, the bill is a revised and enlarged version of one Kennedy introduced two years ago. Since then, it has picked up 33 co-sponsors and has been unanimously approved by the Committee on Labor and Public Welfare. The bill has fared somewhat less well in the House, where a companion to Kennedy's original bill has been moldering for more than a year. Rep. John Davis (D-Ga.) introduced a bill identical to S. 32 late in June, which has been referred to Davis' Subcommittee on Science, Research and Development.

S. 32 begins with two radical propositions: that Federal investment in science and technology should increase at a rate equal to, or greater than, the gross national product, and that Federal spending for civilian research should equal or exceed spending on defense-related research. Over the past eight years, spending on science in proportion to GNP has decreased, and the Department of Defense traditionally gets the lion's share of Federal science funding.

S. 32 would authorize NSF to designate problems in areas such as health care, poverty, public safety, pollution, unemployment, housing, education, transportation, nutrition, communications and energy resources that should receive priority. Over the next three years, NSF would receive a total of $1.8 billion to conduct or contract for research aimed at solving designated problems. The bulk of this money would go to a new agency to be established within NSF, the Civil Science Systems Administration. CSSA would receive $1.2 billion for research, design, testing, evaluation and demonstration of systems to solve national problems. Kennedy describes CSSA as a NASA-type agency that would become the focus for science in the Seventies "in much the same way as the space program did in the Sixties."

Another major provision of the bill is for "technical manpower transition." The vagaries of Federal science funding, notably reductions in expenditures on the space program, have thrown thousands of scientists and engineers out of work. In many cases, their specialized training is inapplicable to other fields. Some $560 million would be provided over the next three years to assist in transition of manpower from research programs that have been terminated or cut back to civilian-oriented R&D. Specific programs would include: grants to state and local government agencies to enable them to hire unemployed or underemployed scientists, engineers and technicians; establishment of "community conversion corporations" which would conduct or contract for R&D focused on the problems of a particular community and would give preference in hiring to unemployed scientists and technicians; grants to nonprofit organizations and private firms to enable them to hire scientists, engineers and technicians for work on civilian projects while receiving on-the-job training; fellowships to enable unemployed scientists, engineers and technicians to acquire new skills, and establishment of placement programs. Kennedy predicts that S. 32 would directly provide jobs for 40,000 scientists and engineers.

In spite of its impressive Senate support, parts of S. 32 are opposed by the Administration and by NSF itself. The Administration's opposition is mostly on grounds that the bill would involve NSF in activities traditionally belonging to the mission agencies. Former NSF head William D. McElroy questioned the need for CSSA, noting that the RANN (Research Applied to National Needs) program already carries out many of the proposed activities. At a deeper level, NSF officials seem concerned about the implied change in NSF orientation, from its traditional role as supporter of basic research to an emphasis on applied research.

tor of NATURE therefore, and with the cooperation of Drs. Ungar, Desiderio and Parr, I present here those of my reservations that remain unresolved."

The most impressive feature of the Baylor group's article, in Stewart's view, is the similar biological effects natural and synthetic scotophobin produced in untrained mice. Yet these comparable effects, he challenges, do not prove that natural scotophobin contains memory in the first place. Can the results with the natural and synthetic scotophobins be reproduced? Some researchers claim that they can, Stewart concedes; yet their effects, he notes, were small compared with those observed by the Baylor researchers.

It is not clear, Stewart continues, how the authors determined the peak of biological activity in the isolated brain material. The first set of experiments, he says, gives essentially no information about purity. "Quantitative analysis [of the second set] indicates that the isolated material was impure."

Stewart scores the authors for making errors in amino acid analysis, carrying out ambiguous chemical degradation experiments and for refusing to publish mass spectrometry data that does not reinforce their interpretations. He applied the authors' interpretation methods to a chemical unrelated to scotophobin "to illustrate the point that if one departs from sound practice in interpreting a mass spectrum, it is possible to prove virtually anything."

Stewart notes that the amino acid composition of the active material the authors report is somewhat different from what they have reported before. On the whole, he concludes, "the weaknesses in those parts of the article that deal with the isolated material are so grave . . . that the authors' conclusions are more likely false than true."

In their rebuttal, Ungar, Desiderio and Parr reply tartly, "It would be impossible, within the limits of five days and 1,500 words granted us to answer in detail the criticisms for which Mr. Stewart was given over a year and apparently unlimited space. We hope, however, to produce enough arguments to reverse his evaluation that 'our conclusions are more likely false than true.' "

The authors note that while Stewart refers to six successful replications of their experiments, he questions the validity of some of them. On the other hand, they argue, he takes at face value the three unsuccessful experiments, as if their negativity made them immune to criticism. He also asks for control experiments, all of which, they counter, have been done and published.

"We are ready to plead guilty to omission of some details in the description of our isolation procedures," they admit, "partly because of what we believed to be space limitations, partly because they were published elsewhere or were not considered critical." They say they fail to understand why Stewart does not understand how they determined the peak of biological activity in the isolated brain material. They are particularly disdainful of Stewart's skepticism about the purity of their final product. "Even by the most generous estimate," they assert, "the impurities cannot represent more than a few percent."

Their mass spectrometric data, they say, are closely linked with chemical