stallation, "What the hell is it doing?"

Questions of this kind may never be answered to everyone's satisfaction. Indeed, Crocker says that while he expects many scientists will feel that they have now heard a consistent story, he is beginning to think this case will go onto "history's junkheap" as one of the great unresolved controversies of chemical and biological weaponry. After many years, he says, he begins to feel "somewhat feckless" to continue arguing a point when no new evidence is available.

The important lesson to be learned, he says, is that signatories of future treaties must let investigators in to see the evidence immediately upon reports that there has been a catastrophe with international consequences. ■ ELIOT MARSHALL

Science Focuses on the Next Presidency

Revitalization of OSTP, science advisory mechanisms contemplated as the sun sets on the Reagan Administration and a changeover approaches

THE budget tensions of the past several years are causing leaders of the nation's science research establishment to reexamine their strategies for securing federal support for R&D. This issue set the scene in Washington last week at the 13th Annual AAAS Colloquium on R&D Policy for exchanges on research on priorities, science education, and political activism. A prime concern is the direction that federal science policy will take under a new president and how programs will fare in the 1990s.

A key question for scientists, educators, and industry is how research priorities will be set across the federal government in the future. And the role of the director of the White House Office of Science and Technology Policy (OSTP) and presidential science advisory committees in the next Administration are matters of strong interest. John P. McTague, vice president of research for Ford Motor Co. and former acting director of OSTP, told colloquium participants that the White House agency could be more effective than it has been in recent times.

What is needed, he says, is "a high quality, full-time, broadly experienced staff to formulate policy options." Besides having adequate resources, McTague added, the director of OSTP must have "easy access" to the President and executive-level councils.

With respect to need for an outside presidential advisory council, David Z. Robinson, executive vice president of Carnegie Corporation, said the current White House body is insufficient. "I agree with Frank Press* that a 2-day a month science advisory committee is not worth very much," commented Robinson, who previously worked at OSTP. "It requires a commitment on the part of the individuals. . . .I would say, somewhere between a third and half time. . . ."

John Holmfeld, a senior staff member of the House Science, Space, and Technology Committee, says the President needs the advice of OSTP and that of an advisory committee. But he stressed that "resource allocation should not be the job of the science adviser." Otherwise, Holmfeld said, "[the advisory committee] will inevitably be seen as an interest group with an agenda of their own and priorities of their own."

Priority setting in the federal research sector continues to be controversial, especially as it affects the allocation of dollars between big and small science. Representative Doug Walgren (D–PA), chairman of the House subcommittee on science, research, and technology, noted that it may be necessary in the future to give priority to research on the basis of its potential to yield near-term benefits to society.

In particular, Walgren cited university-based research and education as being critical. He rated the doubling of the National Science Foundation's budget as a "highest priority." At the same time, Walgren attacked the Superconducting Super Collider (SSC) as a project that would "threaten not only research projects in high energy physics, but also sustained support for programs in other fields of science."

Also striking out at the SSC was Senator Tom Harkin (D–IA), a member of the appropriations subcommittee on labor, health and human Services, and education. He said the nation must reevaluate its commitment to "glamorous, big-ticket projects" like the SSC, space station, and Strategic Defense Initiative ". . .when the greatest progress is likely to come from thousands of smaller efforts."

But Alvin W. Trivelpiece, executive officer of AAAS, challenged assertions that the United States is too poor to undertake large projects while maintaining other essential research programs. He called on the scientific community to broaden its perspective on the needs of the nation. In particular, he said the country must pay more attention to science education at the primary school level. "You need to think about the entire system and we don't," commented Trivelpiece. "Most of us tend to work in the upper end of the system and we worry about it from a university or college point of view."

In any case, the research community is certain to have a limited amount of federal resources available to it, said Robert M. Rosenzweig, president of the Association of American Universities. Trade-offs will have to be made between research and capital spending, he said. What is critical, Rosenzweig said, is that such decisions be informed ones. "Choices that are made without regard for the opportunities that will be foregone are not serious choices."

The most critical factor, however, that may affect the outlook for the research community in the 1990s will be its level of political involvement. Indeed, Harkin challenged colloquium participants "to use your expertise and knowledge to become a political force. . . ." That view was echoed by McTague. "The pervasive importance of science and technology in the major societal issues," he said, "argues for and indeed requires greater involvement of the technical community in the political process as a whole. . . ."

Trivelpiece was more direct. "We need to try to fight harder to insure that in this present day of extremely difficult competition for resources that science and technology gets the resources [it needed]," he said.

Trivelpiece suggested that the scientific community needs to alter its approach to the federal budget process. He noted that the farm community would not passively accept price supports for just one commodity—wheat, corn, or tobacco, for example. "They don't do it. They don't circle the wagons and shoot inwards and kill each other. They fight back very hard," he observed.

*Frank Press was science adviser to President Carter and currently is the president of the National Academy of Sciences.

In particular, Trivelpiece said it is necessary to do more than just react to the federal research budget when the President sends it to Congress. R&D programs might fare better, he said, if the research community put more effort into influencing budget decisions each spring, 9 months before Congress sees it, when the President's budget is in its early planning stage. Said Trivelpiece, "a lot of money gets moved around in the Administration . . . and I think it can be influenced."

But to maintain support for research or to expand it, the scientific camp must win over the American public, advised Samuel C. Florman, vice president of Kriesler Borg Florman Construction Co. of Scarsdale, New York. The author of *Blaming Technology: The Existential Pleasures of Engineering* said researchers must "loosen" their approach to explaining science to the Congress and the public.

In the meantime, Florman predicted that the research community should "be prepared for a period of benign neglect." In the first year of a new Administration, he noted, "very few people are going to be thinking about R&D." ■ MARK CRAWFORD

Whistle-Blowers Air Cases at House Hearings

Congressmen focus on MIT researcher who alleged errors in the report of a study associated with biologist David Baltimore; Baltimore not asked to testify

THE troublesome issue of fraud and misconduct in science were in the congressional spotlight once again this month when two members of the House held back-to-back hearings. The first was conducted by Representative Ted Weiss (D–NY), chairman of the House Government Operations Committee's subcommittee on human resources and intergovernmental relations. The second hearing, called by John Dingell (D–MI), chairman of the oversight and investigations subcommittee of the House Energy and Commerce Committee, aired at great length a newly publicized dispute involving Margot O'Toole, a researcher in a study headed by biologist David Baltimore.

The Weiss hearing featured reruns of two highly publicized cases: one involving allegations by Jerome G. Jacobstein against Jeffrey L. Borer of Cornell Medical College over a study reporting the effects of stress on cardiac function; the other concerning Stephen Breuning, lately of the University of Pittsburgh, who was found to have fabricated a number of studies on the effects of psychoactive drugs with retarded children. A few days after the hearings, Breuning was indicted on charges of filing false claims with the government and of obstructing justice.

The hearings focused on whistle-blowing primarily from the whistle-blower's standpoint, and none of the scientists against whom allegations have been made were invited to testify. A Weiss staff member said the purpose was not to "find out who's right, but what happens to people who make allegations." The hearings also furnished the occasion for enthusiastic attacks on the National Institutes of Health (NIH) misconduct policy office.

The most extensive testimony was on the O'Toole case, which began 3 years ago as a technical dispute between two researchers at Massachusetts Institute of Technology. This has been escalated into a cause celebre as a result of the efforts of NIH's self-appointed fraud researchers, Walter Stewart and Ned Feder of the National Institute of Arthritis, Diabetes, and Digestive and Kidney Diseases.

The dispute centers on a study conducted under the auspices of Baltimore, the Nobel Prize–winning biologist who heads the Whitehead Institute at MIT. Margot O'Toole, a former postdoctoral researcher in a laboratory associated with Baltimore's, has contended there are serious errors in a paper based on the study, which was published in *Cell* in April 1986.* Although O'Toole never reported her concerns to the NIH and had finally resolved to drop the matter, Stewart and Feder brought it to the attention of the NIH misconduct policy office. No fraud has been alleged, but NIH has announced it will appoint a panel of three immunologists to examine the matter.

According to lengthy and detailed congressional testimony by O'Toole, her problems began soon after she came to work for Thereza Imanishi-Kari in MIT's Center for Cancer Research. O'Toole from the start experienced difficulties in obtaining expected results in experiments involving the effects of gene transfers on the immune systems of mice. She testified that she asked Imanishi-Kari for her own records on these experiments on various occasions, but the latter refused or was unable to locate them.

Imanishi-Kari eventually became "impatient" with her, attributing her failures to "incompetence," and told her to stop trying to do the experiments, said O'Toole.

In May 1986, after the *Cell* paper had appeared, O'Toole came across some records that formed part of the original data for the study. She said: "I became convinced that several of the major assertions of the paper were actually contradicted by the experimental results."

The issue is extremely complex, and arcane even for immunologists. In essence, the published paper reported that when a foreign gene (transgene) is introduced into cells of a mouse immune system, the transgene is not expressed in most cases, but it influences the type of antibodies manufactured by the mouse's own genes. O'Toole believed that the data indicated that, in fact, in most cases the products of both types of genes are still expressed.

O'Toole brought her findings to the attention of a variety of authorities at MIT and Tufts University, including her Tufts thesis adviser Henry Wortis and Herman Eisen, director of NIH trainees at MIT. The general upshot from a series of meetings seems to have been that the scientists involved all conceded that her criticisms were sound. However, they did not think them significant enough to warrant a retraction or correction of the paper. Wortis concluded that "alternative interpretations of the experimental data can be made. . . ." Eisen said there were some errors but not "flagrant" ones.

The message from MIT seemed to be that O'Toole should either make formal charges of fraud or drop the matter. At a meeting with the authors in June 1986, she said Baltimore advised her to drop it "for my own good." She did, and "left science saddened and disil-

*"Altered repertoire of endogenous immunoglobulin gene expression in transgenic mice containing a rearranged Mu heavy chain gene," by David Weaver, Moema H. Reis, Christopher Albanese, Frank Costantini, David Baltimore, and Thereza Imanishi-Kari, *Cell*, **45**, 247 (1986).