

meeting were predictably mixed. Much of the defense of science had the ring of familiar rhetoric to it and there was a sense at times of believers preaching to the converted. Nevertheless, the sense of crisis and vulnerability that pervades

the scientific community is so strong that participants appear determined that the meeting result in more than the 27 October communique. Press called for a "major review of the whole institution of science and technology," observing that

"We should not resist institutional change because we like the old way of doing things." The challenge now is to figure out how to go about it and, in practical terms, just what it means.

—BARBARA J. CULLITON

A Response to Creationism Evolves

The growing threat of state laws mandating the teaching of creationism is prompting a coordinated reaction by evolutionists

With bills already enacted in the states of Arkansas and Louisiana effectively mandating the teaching of the biblical account of creation, and similar initiatives pending in more than 20 other states, time is more than ripe for coordinated reaction by evolutionists and their supporters. Two separate meetings held in Washington, D.C., on 19 and 20 October signal the beginnings of such a reaction. The first meeting was organized by the National Academy of Sciences (NAS) and the second by the National Association of Biology Teachers (NABT).

"This is an extremely important issue, but so far it has been ignored by much of the scientific community," comments Maxine Singer, a National Institutes of Health biologist who chaired one session of the NAS meeting. "In practical terms the problem often arises at the level of the local school board, but scientists have a crucial part to play in supplying relevant information to people directly involved."

Similar sentiments were expressed at the NABT meeting, and the point was dramatically illustrated by Eugenie Scott, an anthropologist at the University of Kentucky. She described how well-informed, broadly based local action in the town of Lexington, Kentucky, successfully blocked the efforts of a creationist group, which had been aimed directly at the school board. "These are social and political battles," she says, "and they are won by preachers and teachers, not just by scientists declaring what they believe to be the truth."

The threat of creationism extends beyond the classroom. "The whole structure of science is under attack," declares William Mayer, director of the Biological Sciences Curriculum Study, Louisville, Colorado. "And it's not just biology that's in danger, it's all of science: geology, physics, astronomy. The creationists are attempting to mandate what is appropriate for study and what is not."

If this is not enough to provoke flutterings in academic dovecots then perhaps the warnings of Niles Eldredge will be. "The creationists have already made moves to secure funding for so-called creation science on an equal footing with evolution science," says Eldredge, a curator at the American Museum of Natural History, New York. "This should be sufficient to convince my colleagues that the house really is on fire."

With the effects of creationism pervading so many levels of science and science education, the need for concerted action is now all too clear. "These meetings have been very important," says Eldredge. "At the very least, they have lifted our spirits for the fight."

The fight will be on many fronts. The most immediate skirmish will occur when the recent debate between University of California, San Diego, biologist Russell Doolittle and the creationists' chief intellectual Duane Gish, of the Institute for Creation Research, is broadcast on national television. Organized by Jerry Falwell at the Liberty Baptist College, Lynchburg, Virginia, and backed by the Moral Majority, the debate was recorded on 13 October. According to observers it was a rout. "Gish had his presentation timed to the last second," said Wayne Moyer, executive director of the NABT. "His delivery was slick and shaped carefully for the medium." Doolittle, by contrast, was heavy, labored, and poorly organized. "He was cut off in mid-sentence just as he was beginning to present the evidence for evolution," says Moyer. Colleagues report Doolittle is anguished because he feels he has failed the scientific community.

The debate was the subject of discussion at both the NAS and NABT gatherings. "People were appalled by it," says Porter Kier of the National Museum of Natural History, Washington, D.C. "Not because Doolittle had done a bad job, but that he had been trapped. The

creationists are well practiced in this kind of presentation. Scientists are not." Moyer insists that it was not Doolittle who let the scientific community down, but rather the reverse. "We let him go there with virtually no help in preparation for the debate and no support once he was there," he says. Doolittle has recently written to many of his colleagues apologizing for his poor performance. But it is clear from the sentiments expressed at the two Washington meetings that the *mea culpa* is felt to be more appropriate in the reverse direction.

All but one voice at the NAS gathering agreed that debating with the creationists should be avoided. "Scientists expect to have an exchange on rational grounds," says Eldredge, "but that's not how the creationists debate." Mayer charges the creationists with misrepresentation of the facts. "They bring up the same old things again and again and again," he says, "such as the second law of thermodynamics and the bombardier beetle, which they must know by now do not support their case. How do you counter this kind of thing?"

One way to counter it, the NAS group agreed, was to promulgate the basic facts about evolution in a short, simple, visually attractive presentation. "We have recommended to the council of the Academy that they consider producing a booklet of this sort," says Singer. The booklet will be distributed to schoolteachers and others "on the front line" so that they shall be better equipped to argue the case for evolution. "I'm frequently asked to recommend a simple straightforward source of this sort, but there isn't anything available," says Mayer. "A booklet of this sort would be extremely valuable."

Meanwhile the NABT meeting took on the more urgent task of responding to the anticipated reaction to the Doolittle-Gish debate. What is needed, the meeting agreed, is a handy creationism refuter

which specifically addresses the points that Gish raised in his presentation. "Make no mistake," says Mayer, "there will be a big response to the debate and we have to be ready to counter it. We have to ensure that teachers and college professors have the appropriate information in pithy form so they can answer reporters' questions when the time comes."

All agreed that point by point the creationists' arguments can be readily dealt with. The problem that individuals face in reacting to creationist arguments is being able to slip with facility from questions of biology, to geochemistry, to astronomy, to geology, and to all the other sciences over which such questions typically snake. The creationists have a booklet called "A handy dandy evolution refuter," so why should the evolutionists not be armed likewise?

Aside from the facts of the case, both the NAS and NABT meetings recognized the social and political arena in which the creation-evolution confrontation usually takes place. "In many ways we are facing a strictly political problem," comments Mayer. "While we were sitting around thinking about the issues, legislation was being railroaded through in Arkansas. In addition to getting information to people we have to be ready for action at the local level."

Sensing the need for grass roots action against legislative and other initiatives by the creationists, Stanley Weinberg, a retired biology teacher in Iowa, set up 1 year ago a network of committees of correspondence. "American politics are local politics," says Weinberg, "and committees of correspondence are a standard method of political action."

So far there are committees in 37 states, the smallest of which has a membership of nine, the largest 300. Weinberg acts as a coordinator, sending a newsletter and lists of relevant people and sources through the network. The aim is to enable local communities to react to initiatives by the creationists, by providing the names of people in the area who can respond authoritatively and by assembling resources. Participants at both Washington meetings were greatly impressed by the network and agreed that ways should be sought to develop it further. "We are very thinly spread," says Weinberg, "and our scope is limited at the moment. The expenses are met by dues from members, but very often the person who runs the committee, the liaison, has to meet costs from his own pocket."

A case that illustrates very clearly the

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Reagan Pledges Support for TMI Cleanup

The Reagan Administration has promised a substantial contribution to the cleanup of the damaged nuclear reactor at Three Mile Island. At a Republican fund-raiser near Harrisburg, Pennsylvania, on 9 October, budget director David Stockman said that "over \$100 million" would be funneled into the cleanup, chiefly for research on the fuel core. Stockman's promise was followed by a written pledge of help on 19 October, signed by presidential counsellor Edwin Meese.

Writing to Pennsylvania Governor Richard Thornburgh, Meese noted that the President had already agreed to have the Department of Energy (DOE) spend \$37 million in fiscal 1982 for work at Three Mile Island. "I wish to assure you," Meese continued, "that the President intends to request from Congress sufficient funds in future years to complete the identified DOE program. . . . This will include a total of approximately \$75 million (including FY 1982) to carry out the program approved by the President last spring, as well as a total of \$48 million (including previously appropriated funds) to complete the activities initiated under the agreement with EPRI [Electric Power Research Institute]."

However, Meese wrote, the government would have to limit its help to those areas which are of general benefit or are related to "its unique responsibilities under the Atomic Energy Act of 1954 to ensure safe disposal of nuclear waste." The commitment is not open-ended. Meese indicated that the DOE would "provide technical assistance to clean up the water in the building basement; remove and dispose of abnormal wastes not disposable at commercial sites; remove and evaluate the damaged reactor core; develop special tooling needed for early core access; and other appropriate activities consistent with these guidelines." In closing, he said that the financial burdens created by the accident would have to be borne by those "who produced and used the electric power from the facility, not the federal government."

Governor Thornburgh counts it a

victory to have extracted this pledge, limited though it is, from a White House which is cutting spending in nearly every other area. Thornburgh has been campaigning around the country since July to win backing for a cooperative financing plan to help the local utility pay for the \$1 to \$1.3 billion decontamination project. He managed to solicit one large pledge from the Edison Electric Institute, which represents investor-owned utilities. Its board voted last month to raise \$192 million over the next 6 years. Reagan's contribution falls \$70 million short of what Thornburgh sought, but Thornburgh calls it a "breakthrough of enormous significance."—*Elliot Marshall*

Gorsuch Defends EPA Meetings with Industry

The two top administrators of the Environmental Protection Agency recently defended the propriety of meetings held this summer between agency officials and chemical industry representatives. Despite sharp bipartisan criticism at two House subcommittee hearings, EPA administrator Anne M. Gorsuch and deputy administrator John Hernandez insisted that the meetings were not policy-setting sessions and were convened only to discuss scientific issues. Critics of the meetings, including the Natural Resources Defense Council, argue that these sessions, which were not publicly announced, appear to have persuaded EPA against regulation of formaldehyde and di(2-ethylhexyl) phthalate (DEHP) (*Science*, 30 October, p. 525).

Toby Moffett (D-Conn.) told Gorsuch and Hernandez at a hearing on 21 October that the sessions may have violated a federal law that requires agencies to give public notice of meetings with private individuals. Moffett is chairman of the environment, energy, and natural resources subcommittee of the Government Operations Committee.

The EPA officials denied any wrongdoing. "We deliberately stayed away from policy questions at the meetings," Hernandez said. But Moffett and other subcommittee members hammered Gorsuch and Hernandez

local nature of the creationists' tactics culminated on the evening that separated the two Washington gatherings. It was with great relief that Eugenie Scott announced to the NABT meeting on the morning of 20 October that the Fayette County, Kentucky, school board had rejected a move to mandate equal time for creationism. The vote was a narrow three to two against.

Kentucky already has an act that permits the teaching of creationism, but in April 1980 a group known as the Citizens for Balanced Teaching of Origins (CBTO) approached Fayette County's school superintendent with a proposal that equal time should be mandatory. Guy Potts, the superintendent, referred the group to the state superintendent of schools, Raymond Barber, who said that state law permitted the use of discretionary funds for purchasing creationist teaching material.

Not content with this, CBTO prepared a more detailed proposal which they then submitted to Potts the following February. Meanwhile, Scott had helped organize a group that was to combat the creationists' initiative: the Committee for Effective Action in Science Education. "The committee was very broadly based," says Scott, "with teachers, min-

"We did a great deal of quiet lobbying," says Scott, "and we deliberately sought no publicity." The vote was bound to be close because two of the five members of the board had recently been elected as stated creationist sympathizers. Two of the board always seemed likely to reject the proposal. And the swing vote was an officer in a local fundamentalist church. "You can imagine that we were very anxious about the outcome," says Scott.

The battle in Fayette County was won at least partly because of the presence of a cosmopolitan community in its main town, Lexington, which is where the University of Kentucky is located. "I'm sure there are many places in the state, and in other states, where this kind of move happens very quietly and no one responds," says Scott. Weinberg says that his contacts through the committees of correspondence confirm this suspicion.

The enthusiasm with which participants at the NAS meeting learned about Weinberg's committees of correspondence in general and the success of local action in Lexington, Kentucky, in particular, led them to suggest that the burden of coordinating such activities should be taken on by a national organization. While he is anxious lest such a move

copies of a creation-evolution supplement to *Science* '81's December issue are to be given to the National Science Teachers Association for distribution to its members. But whether or not the idea of a task force is also approved, the coordination of the committees of correspondence remains to be resolved.

Further recommendations from the two meetings include the establishment of a small working party to channel information flow and activity by scientific, educational, and religious organizations; the provision of resources for a small number of accomplished speakers who could lecture throughout the country; and the possibility that Frank Press, the president of the NAS, should devote substantial efforts to exposing the nature and degree of the problem through influential channels.

A crisis atmosphere is palpable, and this is not surprising. In addition to the pending legislation in almost half the states in the Union, the scientific community can witness Duane Gish presenting creationists in the mold of Galileo, facing the "dogma of the scientific establishment." It can contemplate the outcome of current initiatives to divert National Science Foundation funds to so-called creation science. And it can wonder at the implications of the call in the October issue of *Acts and Facts*, published by the Institute for Creation Research, for members to submit names of teachers that are teaching evolution or preventing the teaching of creationism in schools. "These are terrorist tactics," says Thomas Jukes, of the University of California, Berkeley. "The creationists are working at all levels. We can't afford to ignore them any longer."

As a timely and salutary postscript to the NAS and NABT meetings, William E. Dannemeyer (R-Calif.) introduced into the House on 21 October a bill that, if enacted, would limit congressional funding to the Smithsonian Institution if its museum of natural history continues to ignore alternatives to evolutionary theory. Evolution is a religion, says Dannemeyer. And his bill provides "one way to ensure that Federal dollars are not being used to promote one religious theory exclusively."

Dannemeyer concluded his presentation with this ominous statement: "If the theory of evolution is just that—a theory—and if that theory can be regarded as a religion . . . then it occurs to this Member that other Members might prefer it not to be given exclusive or top billing in our Nation's most famous museum but equal billing or perhaps no billing at all."—ROGER LEWIN

Duane Gish presents the creationists in the mold of Galileo, facing the "dogma of the scientific establishment."

isters, parents, and other citizens, as well as scientists. This was very deliberate policy."

Potts sought help from the University of Kentucky in evaluating the proposal, and he eventually decided that he could not recommend it to the school board. In any case the board was entangled in its budget and a local controversy over sex education, and it was clear that the proposal was not going to be aired. The leader of CBTO therefore utilized a standard provision of procedure, and arranged to have a slot on the agenda of the next meeting of the school board, in August. Scott and her colleagues learned of this move—a perfectly legitimate end run—and so were ready to counter the proposal at the meeting. Nevertheless, the school board was sufficiently impressed by CBTO's document and arguments that it agreed to consider them for the next school board meeting, on the evening of 19 October.

should strangle the system with bureaucracy, Weinberg recognizes the need for a more substantial national involvement.

Some participants suggested that perhaps the American Association for the Advancement of Science might take on this charge. "We are very concerned about creationism," states William Carey, executive officer of AAAS, "and it was the subject of long discussion at our recent board meeting." Carey is considering the establishment of a task force within the AAAS that would coordinate scientific and academic groups and individuals affected by the creationist controversy. The likelihood that the association will take over Weinberg's role with the committees of correspondence is, however, not great.

The AAAS is moving beyond the mere passing of condemnatory resolutions in other ways, too. Creationism will be addressed at the annual meeting of the association in January. And 100,000