role of the science adviser. These statements are untenable in view of the fact that eight counties in the immediate area of the antenna system have already voted by more than a four to one margin that they are opposed to locating Project Seafarer in Michigan. The continued effort to call for public opinion polls or a second referendum involving counties outside the proposed area has resulted in a loss of confidence in both the science adviser and the governor.

There are lessons to be learned by other states considering uses of a science adviser. The science adviser needs to operate within a system of checks and balances and to be constrained by some form of public accountability. A one-man operation that is political as well as scientific is unlikely to result in good scientific advice or a gaining of public confidence. Certainly the office of science adviser must be structured so that the adviser does not appear to serve primarily to sell government programs. In Michigan, the congressman for the district involved, the new senator, both houses of the state legislature, and major newspapers have called upon the governor to "veto" Project Seafarer. President-elect Carter has stated that Project Seafarer would not be built in Michigan against the wishes of the people and has noted that referenda have been held. The office of science adviser, by locking its operations in inflexible procedures requiring at least 2 years before involving the public in any significant way, has failed to provide information in the continuing debate and has left the governor standing alone.

DONALD G. YERG
Michigan Technological University, Houghton 49931

Animals and Ethics

The letters from Aronson and Cooper and from Sachs (19 Nov. 1976, pp. 784 and 786) take exception to several statements in Wade's article (8 Oct. 1976, p. 162) on the cat experiments at the American Museum of Natural History. The letters are, unfortunately, in no way unusual in their failure to face squarely the broader ethical issues involved in animal experimentation. Speaking of Henry Spira, one of the leaders of the action against the museum, Aronson and Cooper remark: "In none of his articles does Spira acknowledge that any animal should ever be used for any experiment, no matter how crucial it may be judged for human welfare or survival." If it is true that Spira has deliberately evaded the problem, this is a valid criticism. By the same token, it is incumbent on scientists not to deserve the converse criticism: "In none of their writings do they acknowledge that any experiment should not be done, regardless of how much suffering it entails for the animals used."

Aronson and Cooper refer to the "simplistic, reductionist idea that 'alternatives to live animals' . . . can be substituted for animal experiments. . . ." and to the "quasi-moralistic claim that animals have 'rights' equal to the sociopolitical rights of women and minorities." They complain that Wade does not indicate that "many see such statements as being antiscience." I would like to point out that most of the "alternatives to live animals" (many of which are used very successfully in some areas) were developed for purely pragmatic, not humane, reasons; that evaluating the "rights" of living things, far from being an obvious and simple decision, is a difficult philosophical problem; and that raising moral questions is not "antiscience."

Sachs states that "The public's right to challenge the ethics and economics of animal research is unquestioned." He then goes on to say: "The present peer review system, as fallible as it may be, has been largely successful in curbing unethical excesses and in fitting research priorities to available funds." The peer review system, to my knowledge, is devoted almost exclusively to determining the scientific merit of a proposal and the capability of an investigator to carry it out. The "economics" (funding) of the proposal is considered also. But the review committees, regrettably, do not include members designated specifically as spokesmen for the experimental animals, to "challenge the ethics . . ." of the proposed research.

MARJORIE ANCHEL
New York Botanical Garden, Bronx 10458

Recombinant DNA Research

According to the National Environmental Policy Act (NEPA) of 1969, alternative policies for recombinant DNA technology were supposed to be under consideration last fall. Despite this requirement, it is widely believed that this technology will inevitably proliferate and that the real policy decisions have already been made. An article in *Science* (News and Comment, 15 Oct. 1976, p. 303) reflects the prevailing view: "The nuclear genie is now out of the bottle for good or ill, and the crucial time of grace for instituting control over the recombinant DNA technique is probably over."