planation is not particularly useful to a representative or senator seeking ways to explain to the nonscientist constituent why the present levels of government support for basic and applied research are essential for the *future* economic growth in certain technical areas where the United States must remain among the leaders. Without such support, we could easily lose our ability to compete internationally in these areas.

The importance of having members of Congress informed on this issue cannot be underestimated. Those of us who testify help in the process of keeping them informed. But they are busy, and science and technology are not always their highest priority. For this reason, I believe that in the final analysis it may be more important for a substantial number of our citizens to have a better appreciation of the fact that virtually everything that they eat, drive, fly, view, take, wear, and so forth exists in its present form in part due to past government support of basic and applied research. Industrial support of applied research and development is also essential to this process and needs to be encouraged. However, at the moment, I am more concerned with the government role in the basic end of the activities.

I have a suggestion on how to improve this situation of public understanding of the role of science and technology in our lives. I believe that it is time for scientists and engineers to take more responsibility for explaining science and technology in ways the rest of our citizens can understand and appreciate. That is, we need to convince *them* that science and technology are important to our nation's future. How to accomplish this? Pamphlets, television, radio, and other media events help. Traveling lecturers who give excellent views of technical subjects in entertaining ways help. However, in my opinion there is no substitute for person-to-person contact between scientists and engineers and members of the rest of the community in which they live.

Therefore, I propose that October be designated "Science and Technology Awareness Month." What this means is that members of the AAAS, the American Institute of Aeronautics and Astronautics, the Society for Industrial and Applied Mathematics, the Institute of Electrical and Electronics Engineers, the American Physical Society, the American Nuclear Society, the American Chemical Society, and so forth volunteer to give a simple, jargon-free talk on what they do and why they believe it is important to our nation. They should give these talks to their local chapter of the Lions, Kiwanis, or Rotary clubs; Chamber of Commerce; or any other appropriate civic or service organization. Far from being put off, the public I come in contact with is fascinated by science and technology and is willing to learn about them and the benefits they produce. It helps if things are put in terms that they understand and the explanation comes from a friend or neighbor.

My objective is to cause the greatest possible mixing of those who earn a living as scientists or engineers with those who do not. If this kind of interaction is to occur, it needs to be stimulated but need not be too highly organized. In my attempt to try to stimulate this activity, I am sending this same letter to several civic service clubs and booster organizations in the hope that they will contact the various local or national technical professional societies to make arrangements to have volunteers talk to them. Those who believe that a better informed public is important for the health of U.S. science and technology should volunteer to help make conditions better by giving such talks to their local service club, high school PTA, or civic clubs. Mayors, councilmen, representatives, and senators should also be invited. They might enjoy the talk and add some thoughts of their own. Since this is being suggested in the spirit of volunteerism, I will give a talk on DOE's basic research programs to the first service or civic club that invites me.

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Animal Rights Movement

Sharon Lynn Campbell's recent letter (8 June, p. 1043) clearly demonstrates that few lessons have been learned from the challenges of the animal rights movement. Campbell rejects Jeffrey L. Fox's wise counsel that "scientists should not use dramatic testimony from patients who have benefited from animal research" and criticizes the animal rights movement with the comment that "they are not often open to reason." Campbell does not acknowledge that there are now large and growing professional associations of lawyers, veterinarians, psychologists, scientists, physicians, and others, all based on and supporting the animal rights philosophy. These are reasonable, articulate, intelligent individuals who share a common perception that (i) animals have rights independent of humans and that (ii) our traditional homocentric

bias is no longer a valid world view or justifiable foundation for biomedical research.

The biomedical research establishment is increasingly reacting to the challenge of the animal rights movement in ways that are often hyperemotional, nonobjective, and uncharacteristically unscientific. This is a disturbing trend, since the same individuals continue to castigate the animal rightists for using such tactics.

What is needed in this continuing debate is objective analysis and discussion of the strengths and weaknesses of both sides of the issue. We are doing this. The phenomenal growth, increasing intellectual vigor, and legislative victories of the animal rights movement clearly demonstrate that we have made an acceptable case to the general public.

Until the biomedical research community is ready to accept that their traditional approaches to research and health care are not infallible, that change is needed and desirable, and that the legitimate concerns of the public must be seriously addressed, they will continue to encounter a high level of opposition.

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EDB Alternatives

The issue of grain fumigation has been addressed in *Science* (News and Comment, 17 Feb., p. 671; Letters, 30 Mar., p. 1354) and elsewhere (*1*) in recent weeks. Commentators have described a retreat to more traditional chemical treatments of grain as the result of controversy and rulings over ethylene dibromide (EDB). We are concerned that this may stimulate a perception that the alternatives mentioned are safe or safer than EDB. The truth is that compounds such as aluminum phosphide, methyl bromide, and especially carbon tetrachloride mixtures (usually with carbon disulfide) are highly toxic. Grain terminal workers and grain inspectors are at special risk. We have documented serious multifocal nervous system damage among grain terminal workers, which we attribute to exposure to the carbon tetrachloride–carbon disulfide mixtures in particular (*2*). In practice, worker protection cannot be ensured. Uncontrolled fumigation of incoming grain cargoes and inadequate labeling of shipments according to prior fumigation are two important risk factors.

Our concerns and conclusions over the safety of grain fumigation are reinforced in the findings of a recent General Accounting Office investigation (*3*).

We hope that the EDB controversy spurs a broader examination of the safety and efficacy of the predominant chemical methodologies for insect control in the grain industry.

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1. S. King, *New York Times*, 25 March 1984, p. E9.
2. M. Peters *et al.*, *Am. J. Indust. Med.* **3**, 317 (1982); S. Sauter, paper presented at the American Industrial Hygiene Association Conference, Portland, Ore. (1981).
3. *Grain Fumigation: A Multi-faceted Issue Needing Coordinated Attention* (General Accounting Office, Washington, D.C., 1981).

Gene-Splicing Experiment

Colin Norman's article "Judge halts gene-splicing experiment" (News and Comment, 1 June, p. 962) contains an incorrect assessment of the proposal submitted by Advanced Genetic Sciences, Inc. (AGS), to the Recombinant DNA Advisory Committee (RAC) for their consideration. The proposed biological control experiment does parallel that previously approved by the RAC for Steven Lindow and Nickolas Panopolous, but differs substantially in target crops and bacterial strains. The statement on page 963, "the company has been funding Lindow's research and now wants to test his modified bacteria on several different crops," is inaccurate and establishes a negative and detrimental viewpoint toward our scientific objectives and company interests. The strains cited in the AGS proposal were isolated and characterized at AGS independently of Lindow's efforts. Our proposal was in no way an effort to avoid the current litigation and injunction delaying Lindow's field application.

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Erratum: In the article "Windows on a new cosmology" by George Lake (18 May, p. 675), the caption for figure 4(b) on page 680 was incorrect. The photograph shows the electric dipole moment apparatus at the Institute Laue-Langevin in Grenoble, France [courtesy of N. Ramsey].