

American Association for the Advancement of Science

Science serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

Publisher: Richard S. Nicholson

Editor: Daniel E. Koshland, Jr.

News Editor: Ellis Rubinstein

Managing Editor: Patricia A. Morgan

Deputy Editors: Philip H. Abelson (*Engineering and Applied Sciences*); John I. Brauman (*Physical Sciences*)

EDITORIAL STAFF

Assistant Managing Editor: Monica M. Bradford

Senior Editors: Eleanore Butz, Martha Coleman, Barbara

Jasny, Katrina L. Kelner, Phillip D. Szuroimi, David F. Voss
Associate Editors: Keith W. Brocklehurst, R. Brooks Hanson, Pamela J. Hines, Linda J. Miller

Letters Editor: Christine Gilbert

Book Reviews: Katherine Livingston, *editor*

Contributing Editor: Lawrence I. Grossman

Chief Production Editor: Ellen E. Murphy

Editing Department: Lois Schmitt, *head*; Mary McDaniel, Patricia L. Moe, Barbara P. Orday

Copy Desk: Joi S. Granger, Margaret E. Gray, MaryBeth Shartle, Beverly Shields

Production Manager: James Landry

Assistant Production Manager: Kathleen C. Fishback

Art Director: Yolanda M. Rook

Graphics and Production: Holly Bishop, Julie Cherry, Catherine S. Siskos

Systems Analyst: William Carter

NEWS STAFF

Correspondent-at-Large: Barbara J. Culliton

Deputy News Editors: John M. Benditt, Jean Marx, Colin Norman

News and Comment/Research News: Mark H. Crawford, Constance Holden, Richard A. Kerr, Eliot Marshall, Joseph Palca, Robert Pool, Leslie Roberts, Marjorie Sun, M. Mitchell Waldrop

European Correspondent: Jeremy Cherfas

West Coast Correspondent: Marcia Barinaga

BUSINESS STAFF

Circulation Director: John G. Colson

Fulfillment Manager: Marlene Zendell

Business Staff Manager: Deborah Rivera-Wienhold

Single Copies Manager: Ann Ragland

Classified Advertising Supervisor: Amie Charlene King

ADVERTISING REPRESENTATIVES

Director: Earl J. Scherago

Traffic Manager: Donna Rivera

Traffic Manager (Recruitment): Gwen Canter

Advertising Sales Manager: Richard L. Charles

Marketing Manager: Herbert L. Burkland

Employment Sales Manager: Edward C. Keller

Sales: New York, NY 10036; J. Kevin Henebry, 1515 Broadway (212-730-1050); Scotch Plains, NJ 07076; C. Richard Callis, 12 Unami Lane (201-889-4873); Chicago, IL 60914; Jack Ryan, 525 W. Higgins Rd. (312-885-8675); San Jose, CA 95112; Bob Brindley, 310 S. 16th St. (408-998-4690); Dorset, VT 05251; Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581); Damascus, MD 20872; Rick Sommer, 11318 Kings Valley Dr. (301-972-9270); U.K., Europe: Nick Jones, +44(0647)52918; Telex 42513; FAX (0647) 52053.

Information for contributors appears on page XI of the 22 December 1989 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005. Telephone: 202-326-6500. **Advertising correspondence** should be sent to Tenth Floor, 1515 Broadway, New York, NY 10036. Telephone 212-730-1050 or WU Telex 968082 SCHERAGO, or FAX 212-382-3725.

To See Ourselves As Others See Us

The words of Robert Burns, "O wad some Pow'r the giftie gie us to see oursels as others see us!" are as applicable to scientists as they are to all other individuals. As we make our New Year's resolutions, this may be an important admonition to remember while we strive to preserve the health and vitality of scientific institutions. As science has become more visible and more powerful, it has also attracted more armchair critics and more adversaries. The visibility delights, but the criticism bewilders. We see ourselves as out to do good and to increase the standard of living, yet we are accused of torturing animals, polluting the environment, embarking on megaprojects of little interest to the populace, and tampering with the genetics of natural species. While most of these types of charges can be answered, and some of them are demonstrably false, most scientists would agree that others may have some substance. When the public has been asked to vote, it has supported science on most issues. But there appears to be growing skepticism toward science and a willingness by the public to believe illogical alternatives.

It is vital that scientists sensitize themselves to public concerns and address them in a compassionate and candid way. It is probably hopeless to convert the extremists—the no-animals-in-research, no-pesticides, no-genetic-engineering, and no-progress crowds—although careful answers to each of their positions should be developed. It is more important to understand why a portion of the general public is sympathetic to the argument that science can produce more harm than good.

The most unsettling feature of science is probably the rapidity at which it changes cultural values. When science was curing a few diseases and producing a few labor-saving gadgets it was viewed with unmitigated awe and respect. Now, the speed of scientific advances threatens to alter values faster than the social system can accommodate to such change. Sydney Brenner's statement that a modern computer hovers between the obsolescent and the nonexistent illustrates the speed of advances in modern science. If practitioners of science then talk in a language that is not easily understood or retreat into their laboratories, the problem is exacerbated. Birth control pills, automobiles, and increased longevity are all admirable, yet they have brought major changes in the sexual mores, family mobility, and lifestyle of all of us.

The practice of science is opportunistic. We solve the problem that is before our eyes and are not required to predict the widespread ramifications that result if the solution is more popular than we expect. No one can assess at the inception of an invention all of its social implications. We could not predict that an understanding of radio waves would change the way we communicate, that understanding control of bacterial growth would lead to a population explosion, or that a simple equation, $E = mc^2$, would change the nature of warfare. But as architects of change, we have occasionally oversold the product, implying that it will bring unmixed good, not acknowledging that a scientific advance is a Pandora's box with detriments or abuses as well as benefits. By confessing that we are not omniscient we may lose some awe and admiration, but we will gain in understanding and rapport.

Ultimately society controls the rules of scientific application mainly by its control of funding. We of course have the option to work for organizations of which we approve and the citizen's right of political advocacy. Scientists are the servants of society, not its masters, and we should remain so. But because we are close to the events of change, it is our special responsibility to spell out the disadvantages as well as the advantages of a new discovery as far as we can. What is good for science is not necessarily good for the country, and we should be particularly cautious in endorsing megaprojects (or microprojects) that compete for dollars in a significant way with other needs of society.

It is the nature of scientists to advocate change more than most people do. The increasing complexity of science, furthermore, requires language that is unfamiliar outside the scientific community. This tempts some to accuse us of being a secret cabal that embarks on projects society would reject if it had a chance to do so. The antidote is to explain the serendipitous nature of science, to display our own limitations with candor, to express our intentions and reservations in clear, nonspecialized terms, and to empathize and communicate with those whose lives will be changed by discoveries now being made in mysterious laboratories and published in esoteric journals.—DANIEL E. KOSHLAND, JR.

Science

To See Ourselves As Others See Us

Daniel E. Koshland Jr.

Science **247** (4938), 9.
DOI: 10.1126/science.247.4938.9

ARTICLE TOOLS

<http://science.sciencemag.org/content/247/4938/9.citation>

PERMISSIONS

<http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science* is a registered trademark of AAAS.