

SCIENCE

Publisher: Richard S. Nicholson
Editor: Daniel E. Koshland, Jr.
Deputy Editor: Ellis Rubinstein
Managing Editor: Monica M. Bradford
Deputy Editors: Philip H. Abelson (*Engineering and Applied Sciences*); John I. Brauman (*Physical Sciences*); Thomas R. Cech (*Biological Sciences*)

Editorial Staff

Assistant Managing Editor: Dawn Bennett
Senior Editors: Eleanore Butz, R. Brooks Hanson, Barbara Jasny, Katrina L. Kerner, Linda J. Miller, Phillip D. Szuroni, David F. Voss
Associate Editors: Gilbert J. Chin, Pamela J. Hines, Paula A. Kiberstis, Suki Parks, L. Bryan Ray
Letters: Christine Gilbert, *Editor*; Steven S. Lapham
Book Reviews: Katherine Livingston, *Editor*
Contributing Editor: Lawrence I. Grossman
Chief Production Editor: Ellen E. Murphy
Editing Department: Lois Schmitt, *Senior Copy Editor*; Douglas B. Casey, Valerie Jablow, Harry Jach, Erik G. Morris
Copy Desk: Joi S. Granger, Beverly Shields, Kirsten L. Wall
Editorial Support: Sherry Farmer, *Supervisor*; Carolyn Kyle, Michele Listisard, Diane Long, Patricia M. Moore, Melissa Quackenbos, Kameaka Williams
Administrative Support: Sylvia Kihara, Jeanette Prastein

News Staff

Managing News Editor: Colin Norman
Deputy News Editors: Tim Appenzeller, John M. Benditt, Jean Marx
News and Comment/Research News: Ivan Amato, Christopher Anderson, Faye Flam, Troy Gately (copy), Ann Gibbons, Constance Holden, Richard A. Kerr, Eliot Marshall, Leslie Roberts, Richard Stone, Dawn Levy (intern)
Bureaus: Peter Aldhous (London), Marcia Barinaga (West Coast), John Travis (Northeast), Anne Simon Moffat (Midwest)
Contributing Correspondents: Joseph Alper, Barry A. Cipra, Jon Cohen, Robert Crease, Elizabeth Culotta, Robert Pool, M. Mitchell Waldrop
Administrative Support: Fannie Groom

Art & Production Staff

Production: James Landry, *Director*; Wendy K. Shank, *Manager*; Catherine S. Siskos, *Assistant Manager*; Scherraine Mack, *Associate*; Linda C. Owens, *Macintosh Operator*
Art: Amy Decker Henry, *Director*; C. Faber Smith, *Associate Director*; Diana DeFrancesco, *Technical Illustrator*; Holly Bishop, *Graphics Assistant*
Administrative Support: Leslie Blizard

Associate Publisher: Beth Rosner

Circulation Director: Michael Spinella

See Letters page for additional Advertising and Circulation Staff

Science Editorial Board

Charles J. Arntzen	John J. Hopfield
Elizabeth E. Bailey	F. Clark Howell
David Baltimore	Paul A. Marks
William F. Brinkman	Yasutomi Nishizuka
E. Margaret Burbidge	Helen M. Ranney
Pierre-Gilles de Gennes	Robert M. Solow
Joseph L. Goldstein	Edward C. Stone
Mary L. Good	James D. Watson
Harry B. Gray	

EDITORIAL

The Molecule of the Year

The Molecule of the Year is nitric oxide, NO, a molecule of versatility and importance that has burst onto the scene in many guises. In the atmosphere it is a noxious chemical, but in the body in small controlled doses it is extraordinarily beneficial. It helps maintain blood pressure by dilating blood vessels, helps kill foreign invaders in the immune response, is a major biochemical mediator of penile erections, and is probably a major biochemical component of long-term memory. These are just a few of its many roles, which are just beginning to be discovered, and they are discussed in the accompanying Molecule of the Year story (p. 1862). That NO plays so many roles is not surprising because the same biological second messengers usually are used in many diverse systems, but a gas was indeed a surprise for an endogenous role, and a labile and toxic gas even more so. As the first surprise of such an unlikely agent was overcome, the gas as a messenger seemed logical because it could pass through biological membranes readily and oxidize foreign substances.

NO's role in sexual dysfunction, that of impotence, supports further a new liberation from old mental straitjackets. The future is sure to bring more insights into the effect on complex processes such as IQ, bad behavior, and alcoholism by single genes or chemical reactions. Many people will be happy to learn that some forms of sexual dysfunction may not be caused by psychiatric disorders or the failure of a marriage but may instead reflect a deficiency in a chemical reaction that can be compensated for by medical treatment. New research on the role of NO may also lead to new insights into the loss of memory, which is so debilitating to so many.

This year's Molecule of the Year once again shows that scientific rewards can come from pursuing unconventional thinking. The recent presidential election focused on the persistent question of providing jobs and correcting ailing economies. Hopefully, the political and social scientists advising our leaders will pursue these problems with the same creativity that characterized the research on NO. The new, the unexpected, and the incongruous will be needed to address these social problems. In addition, our elected officials as well as the general public must face unpleasant realities, including the need for the United States to work hard to maintain its standard of living in a competitive world and the need to be open-minded enough to welcome unexpected solutions such as gaseous messengers.

Every year *Science* picks a Molecule of the Year along the lines described in our editorial of 22 December 1989. Molecule is a term we use to emphasize that we are honoring the discovery rather than the people who made the discovery, not because people are unimportant but because many other awards honor the discoverers, and most discoveries involve the contributions of many people. As in the case of "people prizes," there are many "runner-up" discoveries that are extremely important to humanity but, in our opinion, are not yet quite as developed as our winner. For example, one of our runners-up, the discovery of the structure of nitrogenase, has no immediate industrial application, but the way enzymes fix nitrogen is bound to be of great importance to agriculture. As more intense farming and cheaper fuel become the necessities of the future, better mechanisms for nitrogen fixation become more important. Enzymes certainly appear to have solved the problem better than man-made solutions so far. The hope is that the enzyme mechanism and the chemical knowledge can be combined to make a new solution that will benefit millions. The widespread use of supercomputers is not a sudden event, but the increased utility of this powerful tool in industry and science for applications such as aircraft design and oil exploration will solve many problems that were previously beyond approach.

All of the runners-up are discussed in the accompanying story. This year they are an impressive group ranging from discoveries that are already being applied, such as fetal diagnosis and treatment (in utero treatment of a fetus to correct its deficiencies and transplanting fetal tissue to adults with Parkinson's disease), to those that are now far enough along so that application seems inevitable, for example, antisense RNA. In addition, there are landmarks such as the mapping of chromosomes Y and 21, which will certainly lead to medical discoveries, and the use of magnetic resonance imaging to diagnose medical problems and to locate areas of the brain identified with specific thought processes. Those who sometimes question the advances of science should think for a moment about the incredible developments that have slipped into everyday life without headlines. The Molecule of the Year and the runners-up are a good place to start for the discoveries that will inevitably make the future better than the past.

Daniel E. Koshland, Jr.