SCIENCE

Publisher: Richard S. Nicholson
Editor-in-Chief: Floyd E. Bloom
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, Pamela J. Hines, Barbara Jasny, Katrina L. Kelner, Paula A. Kiberstis, Linda J. Miller, L. Bryan Ray, Phillip D. Szuromi, David F. Voss
Associate Editors: Gilbert J. Chin, Suki Parks
Letters: Christine Gilbert, *Editor;* Steven S. Lapham
Book Reviews: Katherine Livingston, *Editor;* Jeffrey Hearn, *Editorial Assistant*
Editing: Valerie Jablow, *Supervisor;* Cara Tate, *Senior Copy Editor;* Jeffrey E. Cook, Harry Jach, Erik G. Morris, Christine M. Pearce
Copy Desk: Ellen E. Murphy, *Supervisor;* Joi S. Granger, Daniel T. Helgerman, Melissa Q. Rosen, Beverly Shields, Kameaka Williams, *Assistant*
Editorial Support: Sherryf Farmer, *Supervisor;* Brent Gendleman, Carolyn Kyle, Michele Listisard, Diane Long, Patricia M. Moore, Ted Smith
Administrative Support: Sylvia Kihara, Charlene King, Jeanette Prastein
Telephone: 202-326-6501; **FAX:** 202-289-7562; **TDD:** 202-408-7770

News Staff
News Editor: Colin Norman
Features Editor: John M. Benditt
Deputy News Editors: Tim Appenzeller, Joshua Fischman, Jean Marx, Jeffrey Mervis
News & Comment/Research News Writers: Linda B. Felaco (copy), Constance Holden, Jocelyn Kaiser, Richard A. Kerr, Andrew Lawler, Eliot Marshall, Rachel Nowak, Robert F. Service, Richard Stone, Lori Wolfgang (intern)
Bureaus: Marcia Barinaga (Berkeley), Jon Cohen (San Diego), James Glanz (Chicago), Dennis Normile (Tokyo), Wade Roush (Boston)
Contributing Correspondents: Barry A. Cipra, Elizabeth Culotta, Ann Gibbons, Anne Simon Moffat, Virginia Morell, Robert Pool, Gary Taubes
Administrative Support: Fannie Groom
Telephone: 202-326-6500; **FAX:** 202-371-9227; **Internet Address:** science_news@aaas.org

Art & Production Staff
Production: James Landry, *Director;* Wendy K. Shank, *Manager;* Lizabeth A. Harman, *Assistant Manager;* Laura A. Creveling, Scherraine B. Mack, Stephen E. Taylor, *Associates;* Leslie Blizard, *Assistant*
Art: Amy Decker Henry, *Director;* C. Faber Smith, *Associate Director;* Katharine Sutliff, *Scientific Illustrator;* Holly Bishop, *Graphics Associate;* Elizabeth Carroll, Preston Morrighan, *Graphics Assistants*

Europe Office
Editorial: Richard B. Gallagher, *Office Head and Senior Editor;* Stella M. Hurtley, Julia Uppenbrink, *Associate Editors;* Belinda Holden, *Editorial Associate*
News: Daniel Clery, *Editor;* Nigel Williams, *Correspondent;* Michael Balter *(Paris),* Patricia Kahn *(Heidelberg), Contributing Correspondents*
Administrative Support: Janet Mumford; Anna Sewell
Address: 14 George IV Street, Cambridge, UK CB2 1HH
Telephone: (44) 1223-302067; **FAX:** (44) 1223-302068
Internet address: science@science-int.co.uk

EDITORIAL

Science and Everyday Life

Several recent editorials in *Science* have discussed how current moves to sort out national budgets in the United States and other countries are likely to have adverse effects on funding for science. Some critics have even suggested that scientific research may have received more than its fair share of governmental pies. On the contrary, I believe that the ultimate effects of advances in basic research in science and engineering, both on the wealth of nations and on the everyday lives of citizens, are such that all developed countries should be spending a larger fraction of the gross domestic product on their science base than they now do.

Life in developed countries today differs strikingly from life 100 years ago, and scientific advances are the cause. In the first few decades of this century, more than 25% of the U.S. work force was employed in agriculture. Today, the fraction is around 2%. Yet this smaller fraction produces more food than ever before because of higher yielding crops and animals, machinery, fertilizers, irrigation systems, and chemical and biological control of crop pests, diseases, and weeds. Further great transformations are no doubt coming as we learn to bioengineer food production systems, using technologies that are more sustainable than current ones, which are so dependent on fossil fuels. Underlying these extraordinary developments are fundamental scientific advances in areas such as genetics, population dynamics, soil chemistry, cell biology and physiology, and many more.

Other examples of advances in basic science that have changed everyday life are all around us. The bar code reader and credit card scanner at the supermarket would have seemed beyond science fiction a few decades ago. The modern office, with computers so interlinked that I can work with a colleague in San Diego as if we were in the same office, was also undreamed of. These familiar elements of daily life are applications of curiosity-driven basic research in solid-state physics, optics, and (for the computer software) topology and abstract algebra. Yet to many people, science seems an arcane activity, dealing only with questions about the origin and fate of the universe, the nature of elementary particles, or the evolution of human consciousness. The myriad applications encountered daily are demystified, and even apparently detached from the realm of science, by their familiarity.

In common with most readers of *Science*, I was drawn to a life in research because of a desire to understand the world and our place in it. However, though you and I may pursue our researches for the excitement of it, our collective activity will make tomorrow's world even more different from today's than today's is from yesterday's. And the profound economic implications of that fact are a more compelling reason for governments to support their countries' science base than is the pursuit of basic knowledge.

For example, in my own country, many sectors of industry do relatively poorly at translating the continuing strength of the U.K. science base into products that create wealth for the nation. The U.K. Foresight program aims at increasing the cross talk among industry, government, and the basic research community in order to capture a larger fraction of the wealth that undoubtedly flows from U.K. research. Such capitalization on a country's investment in its science base is not inconsistent with the recognition that some large research programs are best pursued by international collaboration. It is to be hoped that the current examination of U.S. scientific programs will not lead to withdrawal from major international activities that have genuine mutual benefits. That would damage both the U.S. national interest and the broader international science community.

Many years ago, Vannevar Bush gave us the resonant image of science as the "endless frontier." Using insights gleaned since Bush's time, I would say that the frontiers of science are not so much endless as fractal. The more we discover, the more we recognize the potential for future discoveries and applications that will transform the daily lives of individuals and the economic lives of nations. A key ingredient in any real plan for balancing the national budget of a developed country must therefore be sustained investment in fundamental and strategic research, to sow the seeds for tomorrow's industry and technology.

Robert M. May

On 1 September 1995, Robert M. May succeeded Sir William Stewart as Chief Scientific Adviser to the U.K. government and head of the U.K. Office of Science and Technology.