

## 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.

### Editorial Board

1977: WARD GOODENOUGH, CLIFFORD GROBSTEIN, H. S. GUTOWSKY, N. BRUCE HANNAY, DONALD KENNEDY, NEAL E. MILLER, RAYMOND H. THOMPSON  
1978: RICHARD E. BALZHISER, JAMES F. CROW, HANS LANDSBERG, EDWARD NEY, FRANK W. PUTNAM, MAXINE SINGER, PAUL E. WAGGONER, F. KARL WILLENBROCK

### Publisher

WILLIAM D. CAREY

### Editor

PHILIP H. ABELSON

### Editorial Staff

<i>Managing Editor</i> ROBERT V. ORMES	<i>Business Manager</i> HANS NUSSBAUM
<i>Assistant Managing Editor</i> JOHN E. RINGLE	<i>Production Editor</i> ELLEN E. MURPHY

*News and Comment:* BARBARA J. CULLITON, *Editor*; LUTHER J. CARTER, CONSTANCE HOLDEN, DEBORAH SHAPLEY, NICHOLAS WADE, JOHN WALSH. *Editorial Assistant*, SCHERRAINE MACK

*Research News:* ALLEN L. HAMMOND, *Editor*; GINA BARI KOLATA, JEAN L. MARX, THOMAS H. MAUGH II, WILLIAM D. METZ, ARTHUR L. ROBINSON. *Editorial Assistant*, FANNIE GROOM

*Associate Editors:* ELEANORE BUTZ, MARY DORFMAN, SYLVIA EBERHART, JUDITH GOTTLIEB

*Assistant Editors:* CAITILIN GORDON, RUTH KULSTAD, LOIS SCHMITT

*Book Reviews:* KATHERINE LIVINGSTON, *Editor*; LINDA HEISERMAN, JANET KEGG

*Letters:* CHRISTINE KARLIK

*Copy Editors:* ISABELLA BOULDIN, OLIVER HEATWOLE

*Production:* NANCY HARTNAGEL, JOHN BAKER; YA LI SWIGART, ELEANOR WARNER; JEAN ROCKWOOD, LEAH RYAN, SHARON RYAN

*Covers, Reprints, and Permissions:* GRAYCE FINGER, *Editor*; CORRINE HARRIS, MARGARET LLOYD

*Guide to Scientific Instruments:* RICHARD SOMMER

*Assistant to the Editors:* RICHARD SEMIKLOSE

*Membership Recruitment:* GWENDOLYN HUDDLE

*Member and Subscription Records:* ANN RAGLAND

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Area code 202. General Editorial Office, 467-4350; Book Reviews, 467-4367; Guide to Scientific Instruments, 467-4480; News and Comment, 467-4430; Reprints and Permissions, 467-4483; Research News, 467-4321; Cable: *Advancesci*, Washington. For "Instructions for Contributors," write the editorial office or see page xi, *Science*, 26 March 1976.

BUSINESS CORRESPONDENCE: Area Code 202. Business Office, 467-4411; Circulation, 467-4417.

### Advertising Representatives

*Director:* EARL J. SCHERAGO

*Production Manager:* MARGARET STERLING

*Advertising Sales Manager:* RICHARD L. CHARLES

Sales: NEW YORK, N.Y. 10036: Herbert L. Burklund, 11 W. 42 St. (212-PE-6-1858); SCOTCH PLAINS, N.J. 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); CHICAGO, ILL. 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-DE-7-4973); BEVERLY HILLS, CALIF. 90211: Winn Nance, 111 N. La Cienega Blvd. (213-657-2772); DORSET, VT. 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581)

ADVERTISING CORRESPONDENCE: Room 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE-6-1858.

## How Fares Basic Science?

When the elders gather to assess the spirit and substance of science, apprehension is invariably expressed about the state of basic research. Thus, it was only normal for the recent summer meeting of the Committee of Scientific Society Presidents to vote that "basic science is in trouble."

This is a useful, and suitably gloomy, battle cry to raise on the eve of the annual jousting exercise of budget-making. Unfortunately, the quality of the supporting evidence leaves much to be desired. Is basic science in grave trouble, in significant trouble, or in *some* trouble? Is it equally in trouble in government and in industry—or is there a great difference: a tale of two cities? What are the properties of the trouble—financial, political, institutional, attitudinal, or managerial? How much of the trouble is self-inflicted? It would be helpful to have answers. Lamentation is not enough, and basic science is not homogeneous.

As has been said before on this page, basic science long ago drifted amiably into the arms of government at the price of those checks and balances which go with pluralistic support. It should not come as a surprise to learn that the marginal industrial and foundation dollar has been driven out of the picture. It has also been noted that although government has been a very good friend of basic science, everything considered, it provides an erratic and uncertain environment for long-term research because it has not yet come round to treating basic science as *investment*, in contrast to year-to-year expense. This library of familiar music is likely to play for some time.

What becomes important now is the question of productivity in basic science. Instead of measuring "trouble" strictly in terms of rising, falling, or steady-state budgets, we need to ask different questions and apply different tests. It may very well be that built-in inefficiencies and distractions are sapping the vitality of the research process and that the dollars allocated to basic science no longer tell us much about the true levels of research effort.

Which factors operate to devalue the basic science dollar? The indirect cost surcharge on research grants is a familiar kind of burden, but not the only one. Countless man-months are subtracted from research effort in order to satisfy the routines of renewal application, accounting, reporting, and compliance with the rising tide of governmental and institutional regulations. Obsolescence of instruments and equipment, together with queuing delays, works to drop the blood count of research. The torrent of what passes for scientific and technical information presents obstacles through which investigators must blast or tunnel their way. This is the enervating dimension of basic science as it must be practiced now, and little of it meets the unwary eye. Would it overreach by too much to say that, compared with the environment of a decade ago, the research dollar has been devalued, in terms of productivity, by one-third?

With zero-based budgeting coming on strong, and a balanced federal budget being scripted for 1981, prospects for growth of support for basic science are problematic. The normal revenue growth under present tax laws will be claimed by defense, welfare reform, energy development, and perhaps a national health insurance program. Three-quarters of the government's budget is already relatively uncontrollable, leaving a very narrow area for discretionary expenditure, and it is in this cramped and bitterly competitive corner that basic science is to be found. Given all this, there are strong incentives for isolating those influences which undercut the productivity of basic research at existing support levels.

Basic science has known lean times. But a combination of austerity, industrial disinclination, continuing inflation, and falling productivity could prove to be too much. If the science adviser, the National Science Foundation, and the scientific community would take a close look at the issue of productivity, a brighter light might be shed on the sources of "trouble" in basic science.—WILLIAM D. CAREY