17 November 1978, Volume 202, Number 4369

SCIENCE

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

1978: RICHARD E. BALZHISER, JAMES F. CROW, HANS LANDSBERG, EDWARD NEY, FRANK W. PUTNAM, MAXINE SINGER, PAUL E. WAGGONER, F. KARL WILLENBROCK

1979: E. PETER GEIDUSCHEK, WARD GOODENOUGH, N. BRUCE HANNAY, MARTIN J. KLEIN, FRANKLIN A. LONG, NEAL E. MILLER, JEFFREY J. WINE

Publisher

WILLIAM D. CAREY

Editor

PHILIP H. ABELSON

Editorial Staff

Managing Editor
ROBERT V. ORMES

Business Manager
HANS NUSSBAUM

Assistant Managing Editor
JOHN E. RINGLE

Production Editor
ELLEN E. MURPHY

News and Comment: BARBARA J. CULLITON, *Editor;* WILLIAM J. BROAD (intern), LUTHER J. CARTER, CONSTANCE HOLDEN, ELIOT MARSHALL, DEBORAH SHAPLEY, R. JEFFREY SMITH, NICHOLAS WADE, JOHN WALSH. *Editorial Assistant,* SCHERRAINE MACK

Research News: ALLEN L. HAMMOND, *Editor;* RICHARD A. KERR, 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, DIANE TURKIN

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

Letters: CHRISTINE KARLIK

Copy Editor: ISABELLA BOULDIN

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*, 29 September 1978.

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
Marketing Manager: HERBERT L. BURKLUND

Sales: NEW YORK, N.Y. 10036: Steve Hamburger, 1515 Broadway (212-730-1050); 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: Tenth floor, 1515 Broadway, New York, N.Y. 10036. Phone: 212-730-1050.

Science in the Political Economy

Although scientific research in the United States is not planned and managed after the fashion of controlled economies, it is still highly sensitive to ups and downs in the political economy. For one thing, government provides half of all the financial outlays that go into research and development. This makes for both stability and instability, for good times and lean times, and we will be reminded of the facts of life as the government plods toward its war on inflation in an environment of rising taxpayer resistance to public spending. Science, politics, and economics all shade into one another in a score of ways.

One problem is that science is still perceived in government as a discretionary activity buried in a vast and relatively uncontrollable budget. The concept of research as investment gained respectability only this year in President Carter's 1979 Budget Message, and an idea like this has a burdensome prehistory to overcome. Although there are good reasons to believe that the President's Science Adviser and the Office of Management and Budget will continue to view scientific research in this light, the going will get rough when research must compete with powerful client-oriented categories of the budget under the stresses of rationing.

Another problem is the battered state of the political economy itself. Considering the worsening of inflation coupled with low economic growth and lagging productivity, economic logic strongly argues for budgetary restraint and a reduced deficit. If double-digit inflation materializes by the time the 1980 budget is locked up, it will take very heavy doses of appropriations to make up for inflation and allow real budget increases for R&D. Science might be fortunate to escape with a cost of living increase. In short, hard days lie ahead and the scientific community may be in for a refresher on the linkage between resources for science and the capacity limits of the larger political economy.

Given all this, it needs to be said again that more money is not the only strategy by which government can advance science and innovation. There has been an unwise and unthinking tendency to look solely at the curve of federal R&D funding as a kind of Dow-Jones clue to the health of science. Other factors are just as important to the vitality and productivity of R&D. If budget dollars are to be scarce, government can help to the utilization of the R&D it has funded by overhauling its static patent policies. It can make existing research dollars stretch farther by simplifying rather than adding to the dog's breakfast of methods, procedures, and controls that are now imposed on university research at such formidable costs to productivity. Government can apply the brakes to the profusion of regulations that retard risk-taking and innovation in industrial R&D. In doing these things, government would reduce inflationary pressure and free budget dollars that are being drawn off from research into defensive administration. The view from this quarter is that genuine progress in these directions would go a long way toward making austere R&D budgets more acceptable.

For the longer run, the function of science and innovation in the performance of the political economy calls for closer examination. As far as the indicative evidence takes us, it appears that industrial growth and competitiveness owe a great deal to scientific and technological vitality. That lesson has not been lost on the developing countries, and the People's Republic of China is the latest and largest of the world's political economies to stake its future on the promises of science and technology. Closer to home, the celebrations of General Electric's centennial and AT&T's three-quarters of a century tell us a great deal about the convergence of scientific creativity, managerial skill, and entrepreneurship in generating growth with productivity. What matters in the end is not so much the quantity of R&D as the conditions and the environment that stimulate or constrain discovery and use. There is a message here for the architects of the political economy.—WILLIAM D. CAREY