6 January 1967, Volume 155, Number 3758 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

ROBERT L. BOWMAN — EVERETT I. MENDELSOHN
JOSEPH W. CHAMBERLAIN — NEAL E. MILLER
JOHN T. EDSALL — JOHN R. PIERCE
EMIL HAURY — KENNETH S. PITZER
ALEXANDER HOLLAENDER — ALEXANDER RICH
WILLARD F. LIBBY — DEWITT STETTEN, JR.
GORDON J. F. MACDONALD — CLARENCE M. ZENER

Editorial Staff

Editor
PHILIP H. ABELSON

Publisher: DAEL WOLFLE
Business Manager: HANS NUSSBAUM

Managing Editor: ROBERT V. ORMES

Assistant Editors: ELLEN E. MURPHY, JOHN E. RINGLE

Assistant to the Editor: NANCY TEIMOURIAN

News Editor: DANIEL S. GREENBERG

News and Comment: JOHN WALSH,* ELINOR LANGER, LUTHER J. CARTER, NAOMI PANUSH, BRYCE NELSON, JANE AYRES, GILLIAN PARRILLO

Book Reviews: SYLVIA EBERHART

Editorial Assistants: ISABELLA BOULDIN, ELEANORE BUTZ, BEN CARLIN, GRAYCE FINGER, NANCY HAMILTON, OLIVER HEATWOLE, ANNE HOLDSWORTH, KONSLYNNIETTA HUTCHINSON, KATHERINE LIVINGSTON, BARBARA SHEFFER

**European Office:* Lime Tree Farm, East Hagbourne, Berkshire, England. Telephone Didcot 3317

Advertising Staff

Director: EARL J. SCHERAGO
Production Manager: ROSE MARIE ROMAGNOLO

Advertising Sales Manager: RICHARD L. CHARLES

Sales: New York, N.Y., 11 W. 42 St. (212-PE-6-1858): ROBERT S. BUGBEE

Scotch Plains, N.J., 12 Unami Lane (201-889-4873): C. RICHARD CALLIS

Medfield, Mass. 02052, 4 Rolling Lane (617-359-2370): RICHARD M. EZEQUELLE

Chicago, Ill. 60611, 919 N. Michigan Ave., Room 426 (312-DE-7-4973): HERBERT L. BURKLUND

Los Angeles 45, Calif., 8255 Beverly Blvd. (213-653-9817): WINN NANCE

EDITORIAL CORRESPONDENCE: 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Phone: 202-387-7171. Cable: Advancesci, Washington. Copies of "Instructions for Contributors" can be obtained from the editorial office. ADVERTISING CORRESPONDENCE: Rm. 1740, 11 W. 42 St., New York, N.Y. 10036. Phone: 212-PE 6-1858.

Cost-Benefit Competition

Vietnam, the possibility of a tax increase, and uncertainties over future economic conditions and the amount of federal revenue all color the budget the President will soon submit to Congress. Military requirements, fixed charges, and appropriations for education, poverty, and Great Society programs all have strong claims. Figures are not yet available on the science portion of the budget, but assuredly the amount will be smaller than many scientists would like.

Because cost-benefit analysis has proved so useful in the Department of Defense, other agencies are now expected to give the Bureau of the Budget information on the total costs, over several years, and the expected results of proposed programs. The applied-research agencies clearly have an advantage in this regard over agencies that support undirected research, and two of the former have recently released reports that will do them no harm in competing for funds. Project Hindsight of the Department of Defense (*Science*, 18 November and 2 December) analyzed the sources of the events and key ideas that have made our weapon systems as effective as they are. This excellent study found that research conducted to solve specific problems has been highly productive, while undirected research, conducted without specific applications in mind, has contributed little to modern weaponry. The original report made it very clear that the analysis dealt only with weapon developments of the past 2 decades, but some news accounts which had wider circulation than the report itself overgeneralized the results to imply that basic research generally has been largely a waste of money.

A recent Public Health Service study cited the expected costs and the prospective savings, in medical and hospital expenses and in increased earnings, of programs to reduce or eliminate venereal disease, automobile accidents, arthritis, and other health hazards.

If basic research (undirected and largely academic research) is to receive what advocates consider adequate support, a stronger case must be made on its behalf. (Last year the National Science Foundation got no increase over the previous year's appropriations.) It is impossible to make dollar-and-cents forecasts of the benefits of a basic research program which have the apparent precision and assurance of, for example, the conclusion that $119 million spent on detection and early treatment of uterine cervical cancer would save the lives of 34,000 women and a billion dollars in reduced medical expenses and increased earnings.

Because basic research is handicapped in this kind of competition, we should be more effectively presenting its benefits—all the real benefits and not just those that can easily be translated into dollars and cents. I have seen no government-agency report that does this as convincingly as the annual reports of the Carnegie Institution of Washington. The 1965–66 report starts with an eloquent analysis of the values of fundamental research and continues with a persuasive account of specific research conducted in Carnegie laboratories and departments.

The Office of Science and Technology and the National Science Foundation must take the lead in dealing with the Bureau of the Budget and the Congress, but there is also work to be done by scientists throughout the nation. There are congressmen to talk to and write to. When new findings are announced, it is good insurance for the future to make certain that the reporters know that "this work was supported by a grant from ——." Agencies and individuals alike must recognize that there will be only as much federal money for basic research as a majority of individual congressmen are willing to appropriate.

—DAEL WOLFLE