Letters

Effort Reporting and Cost Sharing of Federal Research

The recently issued Bureau of the Budget publication "The Administration of Government Supported Research at Universities" has been praised as a liberal document in Greenberg's review (News and Comment, 29 April, p. 624). Unfortunately, it includes the highly controversial "effort reporting" among its recommendations. A scientist whose university charges some of his salary to the federal government must submit quarterly effort reports indicating what fraction of his "total professional effort" has gone into government sponsored research. Such reports must also be made, even when the university pays the entire salary, if it seeks credit for a part of this salary in satisfying the new cost-sharing requirements. Moreover, these reports are not to be filed away. They are used in auditing the university's claims on federal funds, and large amounts of money will change hands, depending on what fractions are reported. The relevant Bureau of the Budget circular A-21 takes pains to point out that fractions estimated in advance are not acceptable. In applying for funds, one must decide in advance upon a fraction, and if one reports something less as having actually occurred, serious financial penalties will ensue.

Such attempts at detailed cost accounting may be appropriate when the university is in effect "doing a job" for the federal government. However (as is quite explicitly recognized by the document in question), in much of its support of basic research, the government is simply aiding the universities in continuing work which they have always done and presumably wish to continue to do. In these circumstances there would seem to be little if any point in taking elaborate measures to ascertain the exact cost of the research and exactly how much of it is paid for by each partner. Moreover, there are kinds of research in which cost accounting in any realistic and meaningful sense is just impossible. The case of a professor working on his research with graduate students is described in some detail on page 89 of the March 1964 report of the NAS Committee on Science and Public Policy entitled "Federal Support of Basic Research in Institutions of Higher Learning." (Unfortunately, the conclusions of this report are formulated in such a way as to give the false impression that effort reporting is condoned in all cases).

Actually the word "research" covers a multitude of activities varying from the meditations of an Einstein on the nature of the cosmos to the counting of the number of automobiles which pass a given street corner in an hour. Another research activity in which effort reporting is especially inappropriate is that done by the pure mathematician and theoretical physicist. Such men work alone or in pairs (rather rarely in groups of three or more), needing only pencil and paper and occasional access to a good reference library. Moreover, their work has in some ways a rather different character from that of a professional contributing his expertise to an organized project. In certain respects it is more like that of a philosopher forming his system of the world. Many mathematicians and theoretical physicists make no clear distinction between research, teaching, and learning. Teaching an advanced course may coincide with organizing one's thoughts for subsequent investigations. Reworking old material fades imperceptibly into discovery of new, and what starts with an attempt to understand something old from a personal point of view often results in new progress and new discoveries. The investigator's conscious goals may not be the solution of any particular recognized problem but only the achieving of a deeper personal understanding. His intellectual life is a many faceted whole, and it is meaningless to single out a part of it and describe it as his "research effort"—worse still as "services rendered"—to any particular project.

What is such a man to do when asked to certify several times a year that x percent of his "total effort" went into government sponsored research? The query is absurd and demonstrates how little is comprehended about the nature of such effort. Quite apart from the impossibility of giving a realistic answer to an unrealistically posed question, he is disturbed by the implication that it has become his duty to keep his mind to the grindstone for some specified number of hours or some specified fraction of his time. He had always understood that his duty was to make the best use he could of his mind in the time at his disposal, but this seemed to require a work schedule determined more by his mood fluctuations and by day to day developments than by any plan laid out in advance. In a sensitive man what could be more fatal to imagination than a formal obligation to spend so many hours a day trying to have an idea in order not to miss filling his effort quota? Finally, he is dismayed that his status has changed from that of an independent thinker, partially subsidized so as to have the leisure to think, to that of a professional, employed to do a job.

One can sympathize with the desires of men charged with the supervision of vast sums of money to see that the money is well spent. However, I believe that vigorous protests are in order when their well meant efforts are insensitive to important differences between an academic appointment and most kinds of employment and when this insensitivity puts men into impossible positions and threatens delicate but valuable institutions.

GEORGE W. MACKEY
Department of Mathematics,
Harvard University,
Cambridge, Massachusetts 02138

In a paragraph on cost sharing by universities, the Bureau of the Budget report says: "University cost participation is undoubtedly appropriate inasmuch as research is an integral part of a university's educational function." The word "undoubtedly" gives the impression that the statement is axiomatic —but an axiom should be examined carefully. The fact is that university cost participation is related very much

to the kind of research that is going on in the university. The type of research the university now undertakes to do cannot even have been imagined before federal support came into existence.

It is generally accepted in the major universities that time devoted to research is academically expended and is vital to world and national, as well as to university, welfare, and may have no immediate or even visibly remote technological application. It is the national welfare which demands the present scale of research operations. The university may reasonably be expected to contribute to a salary of a faculty member in proportion to the time he spends on actual teaching, but beyond that point the amount of investment by the university cannot be expected to be commensurate with the size of the enterprise. The larger the enterprise the lower fractional investment there should be on the part of the university and, in truth and in deference to tradition, it should approach nil.

Congress and the granting agencies should understand that the function of the university is not to support research but to provide the atmosphere in which good research can be conducted. Provision of that atmosphere is the important thing.

MILTON BURTON
Radiation Laboratory,
University of Notre Dame,
Notre Dame, Indiana 46556

Don't Dam The Grand Canyon!

Luther Carter has presented an admirably dispassionate summary of water politics surrounding the proposed construction of Bridge Canyon and Marble Gorge dams in the Grand Canyon of the Colorado River. (News and Comment, 17 June, p. 1600). We do not feel dispassionate about the imminent loss of the intact Grand Canyon, one of the most wondrous works of nature, utterly unique, priceless, and irreplaceable. This loss is intolerable because it is senseless and unnecessary. Bridge Canyon and Marble Gorge dams will serve only one significant purpose, and that is to generate and sell hydroelectric power in order to help finance the Central Arizona Project. In the face of available coal and nuclear sources of power, only a committed politician could take seriously such a frightful proposal. The Grand Canyon is an awesomely high price the American people are being asked to pay for the bureaucratic rigidites of their government and their politics. If these dams are built, not only do we pay this terrible price, but our children, and their children, and all future generations also pay it. They won't sing praises to our lack of wisdom and imagination or to our indifference.

MURRAY A. LAMPERT
GEORGE WARFIELD
BRUCE ROSENBLUM
ROBERT PARMENTER
EDWARD G. RAMBERG
ALBERT ROSE
Princeton, New Jersey 08540

On Scientific Illiterature

Within 4 weeks of each other, a leader in *Science* (Editorial, 18 Feb. p. 783) dealt with the gift of the gab as related to the procurement of grants for scientific research, and one in *Nature* (19 March) with the results of the latter, namely publication. A great deal of printing ink is being poured on the question of what to do about the cataract of information: "explosion" is hardly the word for what is occurring since this term refers to something that is sudden and finite. There is a case to be made for making publication of scientific results harder.

A man may pursue what, on the face of it, is useless research (UR). Again, he may work in a discipline that has high national prestige rating (NPR) or serves to alleviate the physical struggle for life. The example of nuclear studies, that involved a change from UR to NPR in the first half of this century, shows that, in the former case, competition is less severe than in the latter. It is only a surmise, but I hope a permissible one, that such competition contributes to the paper waste that many workers see in their own fields. If, as the article in *Nature* urges, the consumption of literature has to be rendered more effective, what about its production? Why should we be provided with umbrellas when it may be possible to control the cloud burst? Editors should not allow themselves to be blinded by science. Writing can be terse even though decorative, economical without being austere. Articles can be reduced by as much as 33 percent in length without the loss of one iota of information: this is always done easily with writing other