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Funding for Academic Research

A separate booklet entitled "Science: The End of the Frontier?" accompanies this issue of *Science*. The report by Leon M. Lederman presents a picture of malaise in the academic research community. He attributes the principal causal factor to a lack of federal funds. Shortly after Lederman took office as President-Elect of AAAS in February 1990, he initiated a survey to determine what effects funding problems are having on academic science. Letters were sent to chairs of departments of physics, chemistry, and biology at 50 universities. They and a few of their departmental colleagues were asked to comment on their experiences in seeking research funding and how that experience was affecting their performance, attitudes, and plans. In total, about 250 letters were elicited. They were prepared by some of the most productive assistant and full professors. Many of the letters were long and emotional. They combined to create a strong impression of a serious condition of morale. Brief extracts of some of the comments are presented in the report. They tell of enormous efforts to obtain funds and great disappointments when proposals are rated "excellent" but are not funded. Travails experienced by professors are observed by graduate students who consequently decide to opt out of a career in academia. One of the poignant letters was from a professor having an endowed chair. His financial future is secure, but "every time you write a proposal for a renewal of your grant, you are playing Russian roulette with people's lives. You soon find that your chief responsibility is no longer to do science at all; it is to feed your graduate students' children."

The survey could be faulted on many grounds by statisticians and by others who frame questions for such undertakings. Lederman, himself, points to deficiencies, and to the anecdotal character of the survey. However, those 250 letters and their content are suggestive of a serious problem.

Part of the report is devoted to discussion of the factors that have led to the present tight funding situation. In terms of constant dollars, federal support for academic research is now about 20% greater than it was in 1968. However, indirect costs have climbed, costs attributable to federal regulations have increased, and the price of needed new powerful equipment has jumped. The easy research problems have been solved and research must tackle more complex phenomena. Perhaps the most important factor is that the number of doctoral scientists at universities has doubled. In part this can be attributed to the emergence of new fields such as materials science and molecular biology. In any event there are more scientists competing for limited funds.

The report reminds us of a glorious past in which American science was the unquestioned leader. But foreign contenders are now receiving a greater share of nondefense research support than their counterparts in the United States. There is a basis for pessimism about the future status of American science if present trends continue. There may be a connection between academic research and our faltering competition in high-technology products. "In 1990 the threat to the security of the nation lies in an endangered scientific infrastructure."

Having described a rather alarming set of problems the report seeks to provide solutions. The favored remedy would be a doubling of federal support for academic research followed by an increase of 9% per year in constant dollars for a decade or more. However, in the current climate of budget tightness such a goal is probably unrealistic. Accordingly, alternatives are explored. One of them is to recommend appointment of a high-level commission to address the matter. Membership would include "representatives from the executive and legislative branches of the federal government, industry, the financial community, and the academic community." In addition to examining funding mechanisms the commission might be charged with addressing a number of matters. One of them would be a means of improving the efficiency and strategic planning of research funding and ways of ensuring that academic research serves the nation most effectively. Another topic might be the issue of balance between big science projects and individual investigator research. Still another issue cited is the role of center versus project grants. Lederman states that "I am aware that there is much we must do in those crucial activities which connect research results to economic utility. These involve subtleties of technology transfer, tax laws, marketing, and other functions which the academic community has traditionally ignored, but with which it must learn to interface more gracefully."—PHILIP H. ABELSON

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