

Still in jeopardy: our leadership in basic research

There can be no doubt that over the long haul our basic scientific research and educational programs are vital investments in our country's future. They are crucial to the kind of society we are, and beyond that they are the foundations for an advanced technological enterprise that has been a great strength and source of prestige for the United States. Yet looking back we find that support of basic research in this country has dropped by 21% as a portion of the gross national product from 0.38% in the peak years of FY 1967 and FY 1968 to the FY 1981 level of 0.30% (Science Indicators 1980, National Science Board, 1981). In the brief two years from FY 1980 to FY 1982, total nondefense Federal R&D declined in real dollars by 16.1%, and basic research 5%, and nondefense basic research by 6.6% (Congressional Action on Research & Development in FY 1982, AAAS, January 1982). The decline has been even more dramatic for high-energy physics—a very basic research frontier far removed from immediate practical applications and supported solely by annual Federal funding. If these downward trends continue, the basic research effort of this country, already in difficulty, will be further jeopardized.

History records that Europe led the world in science and learning—and also technology—for almost 500 years from the time of the Renaissance and the birth of modern science with Copernicus. Europe's baton of leadership passed to the US as a result of two devastating world wars and the flight to our shores of many leading scholars escaping from Nazi persecution. It saddens me greatly to see this nation giving that baton back without cause or reason after possessing it a mere fifty years. Yet this is the inevitable consequence of a continued decrease in our investment in basic research and learning. To allow such a decline to continue will be a tragically short-sighted vision of the nation's future. I fervently urge our leaders—in the Congress and in the Administration—to prevent this from happening."

The two paragraphs above are the conclusion to testimony I gave last March as chairman of the High-Energy Physics Advisory Panel before the Subcommittee on Energy Development and Applications of the House Committee on Science and Technology. There is today another, and a more human, dimension to the concern that I had expressed in my congressional testimony above, in terms of past and inevitably incomplete budget figures and percentages. The future quality of the US basic-research enterprise depends on its ability to attract, to train and to retain outstanding young scientists. However, it is becoming increasingly difficult to do this after more than a decade of declining budgets

in constant-value dollars, decreasing research and teaching opportunities, and growing discouragement on the part of students and young scientists.

The decline of our basic-research enterprise should be of national concern for purely practical reasons in addition to its cultural significance. There is persuasive evidence from other nations that the strong and vigorous national enterprise in applied industrial and military R&D goes hand in hand with a comparably preeminent program in basic research and education. Moreover, history has shown (for instance, I refer again to Europe after World War II) that once interrupted, a great basic-research enterprise based on extraordinary human skills and the most advanced technology can be restored only at great expense and over a long period of time.

These are not new observations. They have been made frequently by scientists and by senior government officials including Presidential Science Advisors, past and present. Furthermore the present administration has in fact proved very supportive of basic research compared to many other areas of nondefense funding. Yet the problem persists. Given the importance of this issue and the seriousness of the need for support, we, as scientists, should redouble our efforts to speak out and express our concerns with candor and conviction. Who can better present the well-documented case for the importance of fundamental knowledge gained from long-term basic research as distinct from the quest for immediate results and payoffs? To strengthen our case—and our research programs—we must also make the necessary hard choices as to the most promising and productive research areas and institutions. It is imperative that we create effective mechanisms for making these choices—within as well as across the different scientific disciplines.

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