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■ The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

COVER Footprint with skin impressions of a small (1 meter) Late Triassic lizard-like form (probably spenodontid) that walked along the shores of a rising lake. The lake level rose and fell during the early Mesozoic in response to orbital forcing of climate. See page 842. [Paul E. Olsen, Lamont-Doherty Geological Observatory of Columbia University, Palisades, NY 10964]

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The Fifth Decade

The 40th anniversary of the Office of Naval Research is an occasion for congratulations and presents an opportunity for estimating prospects for government-supported research and development in coming years. The ONR, to borrow from the language of summitry, served as the base camp from whence government set out to become the nation's patron of fundamental research. The flexibility, outreach, and breadth of vision the ONR contributed to postwar science serves as a striking model in the new context of today's challenges.

Few would have thought, in the interval between the end of the war and the onset of superpower tensions, that government's stakes in research and development would reach the present scale. In the mid-1960's a spokesman for the Bureau of the Budget would venture to tell a meeting of research administrators that because in the previous 5 years federal funds had doubled to the level of $15 billion, the era of fast growth was over. It took another 14 years, but the total doubled again. Now, in just the past 6 years, we have had the third doubling. Even after adjusting for inflation, the acceleration of support is striking.

Do the cards foretell a fourth doubling—perhaps before the new century sets in? Given the composition of the research and development agenda, loaded as it is in favor of defense and space, no one can say that the potential is not there. Aside from pressures for defense-related development, the basic sciences are pregnant with opportunities awaiting funding, as the flow of reports from the National Research Council demonstrates. But funds are not distributed evenly over the spectrum of federally financed research and development, a problem reflected in the current appropriation for the National Science Foundation with its clutter of floors and ceilings attesting to the politics of science.

Even in a moderate growth scenario, there always are winners and losers, but when we are in a cycle in which discretionary spending is to be minimized while preemptive priorities are maximized, queuing difficulties are likely to be very severe. Whether, indeed, another doubling from a high base of roughly $60 billion is even desirable turns on whether the productive capacity of existing research assets can be stretched that much, given the prolonged reinvestment drought in science education and research infrastructure. It would be very rash public policy to chase the elusive imp of "competitiveness" with a funding frenzy that takes for granted the sufficiency and resiliency of the research and development system's reserve capacities.

If in the fifth postwar decade science is confronted with a version of limits to growth, save for privileged areas of research and development as defined on government's terms, there is a lot to think about. With less support than will be needed to advance all fields of research, the unity of science can give way to contention between and among disciplines, each looking out for itself regardless of the cost to science as a whole. It would not be a pretty scene. A more mature behavior, reflecting the stages of growth through which science has come, would involve the convergence of disciplines and their organizations in a process of rationalization of ends and means in the presence of limits.

It would stretch credibility to claim that science has the institutional arrangements for such an undertaking, although they could be assembled with enough leadership and hard work. The issues to be addressed thereafter are both difficult and interrelated. They bear on the balance between big and small science, native pride and internationalization, targeting strategies and the free play of opportunities, distributive equity and concentration, and the workability of new funding mechanisms, to give only a partial listing. If it all sounds troublesome, and it is, the case would be worse if the complexities of rationalization were left entirely to government and its responses to the dictates of budgetary pragmatism.

The core features of the long partnership of science with government are still substantially in place, thanks in large measure to the enduring work done long ago by farsighted leaders at ONR. Now, as the growth capacity of science sights oncoming constraints on public investment, the fifth decade will put to test the partnership's abilities to address, through a workable institutional process, the emerging dilemmas of choice.

—WILLIAM D. CAREY