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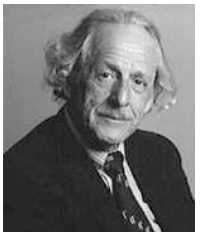

Of Super Tuesday and Superconductivity

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Campaign '88 has now passed through the Straits of Super Tuesday. Not all candidates passed in safety. Republican George Bush swamped his opponents, while among the Democrats the field was narrowed considerably, with Michael Dukakis, Albert Gore, and Jesse Jackson the apparent survivors.

Whoever the eventual nominees for the two parties, the pair should focus their debates, at least in some part, on ways to ensure the effective use of our scientific assets. In our last issue we ran a profile of the candidates' positions on science issues (*The Scientist*, March 7, 1988, p. 8-9). Edwin Diamond and Norman Sandler conducted a similar survey recently in *Issues in Science and Technology* ("Planning for Issues in Campaign '88," volume IV, no. 2, Winter 1988, p. 60-69). Reading the statements of the candidates and listening to their speeches makes one hunger for more substance, more precision. For example, how do they propose we exploit our strength in basic science for better economic advantage?

All last year competitiveness was the watchword in Washington. We don't hear that term as frequently now as then (much of it was admittedly media and political hype). But the ability of the U.S. industries to compete with their counterparts abroad will be a key election issue. The candidates owe it to the nation to speak in clear and exact language about this problem.

S&T: Fuel for Long-Term Growth

The issue of competitiveness reminds me of Robert M. Solow, last year's Nobel laureate in economics. Solow won the Prize for work published more than 30 years ago, yet his findings are just as relevant today.

In 1957 Solow demonstrated that seven-eighths of the growth of the American economy from 1909 to 1949 could be attributed to technical change (broadly defined as improved technology and improved education in the work force) and only one-eighth to new capital investment ("Technical Change and the Aggregate Production Function," *Review of Economics and Statistics*, vol. 39, no. 3, 1957, p. 312-20).

"The economy here as elsewhere in the industrial world has been built primarily on technological progress," Solow said last October 22nd at a news conference at MIT. "there are, of course, other important factors, but it's clear that tech-

nological progress, per se, has been most important among them." He continued: "It seems to me there ought to be a goal of national policy in the United States to try to restore some more liveliness and drive to research in general ... and to technologically relevant research in particular" (*MIT Report*, December/January 1988, p. 11). Anyone whose ideas can stand up for more than 30 years ought to be listened to carefully, especially by potential presidents.

Of course, technology does not appear out of the blue; it mainly grows out of discoveries in basic science. But the key in making effective use of new knowledge, as Solow indicates, is its application in the form of new technology.

Getting High-T_c Off the Ground

Superconductivity is a good, current example of this nation's disability in the area of applications, despite its strong basic science base. One year ago the scientific world was electrified by the attainment of higher temperature superconductivity. The excitement rubbed off on Washington, too. President Reagan gave speeches about flying trains and promised funds for special superconductivity research programs at the national laboratories. Yet new funds have not appeared. Scientists at the federal labs and in the nation's universities are complaining not only about lack of support but also lack of leadership, which will inevitably lead to a duplication of research efforts. While the U.S. government has been slow to support and coordinate superconductor research, Japan has been moving ahead, funding work at both the basic and applied levels.

Nearly 90 Japanese companies have now banded together in a consortium for superconductor research, an undertaking coordinated by the Ministry of International Trade and Industry. The government itself is already funding efforts to explore applications, even though these are seen as many years off.

While there is heightened interest in this country for encouraging university-industry-government cooperation, there is also a long-standing aversion to management of the economy in the style of the Japanese. That laissez-faire mentality also gives support to the decentralized organization of our science apparatus. I would not lend my voice to those calling for a monolithic Department of Science and Technology, but I would support coordination of our science efforts in areas such as superconductor research. Unfortunately, the NSF's Centers program, designed to foster this sort of transformation of basic science into marketable applications, is in a state of confusion (see p. 1). Perhaps we need to re-establish the short-lived Research Applied to National Needs (RANN) program of the late 1970s, which aimed at such coordination (see Harvey Brooks, "What is the National Agenda for Science and How Did it Come About?," *American Scientist*, vol. 75, no. 5, September- October 1987, p. 515).

Although there is an impending shortage of scientifically and technologically trained personnel in this country, few would dispute the present health and dynamism of our basic research enterprise. But to remain economically competitive, to effectively exploit our scientific resources, this nation urgently needs to become more skilled at, as Solow says, "technologically relevant research"—that is, applying basic research.

The long-term growth of basic science in this country, just as the long-term expansion of the economy, depends ultimately on turning new knowledge into new technology. If the candidates intend to address seriously the problems of competitiveness, they will need to focus on ways to better exploit our scientific strengths. ■