for; (ii) higher rates of productivity and greater efficiency are better than moderation; and (iii) if it can be done, it probably should be.

In order to meet Lane's expectations of our long-term leadership and having "a civic role to play for the nation," we must first examine ourselves, as practitioners of science and technology. I propose we do this by asking ourselves simple questions that fit into the theme of contributing to a dream (American or otherwise). What have been the real effects of manufacturing and industry on the general well-being of the living things of our world? Do we operate in a sustainable manner (taking only the excess and leaving the rest to regenerate and produce more)? Do we expect to be able to continue growing (in rates of production and consumption) in a world of finite resources? If our current scientific and technologic practices constituted a threat to the well-being of human (and other) societies, would we advocate not using them?

Lane speaks of a one-third cut in nondefense research and development spending as "a rather risky experiment." A far riskier experiment is the one we are now engaged in: rapidly increasing our technological abilities and production-consumption without a concurrent long-term plan addressing sustainability and degree of impact on life. Scientists are notoriously skeptical and analytical. We would serve our civic role best by questioning the very technologies we have helped create. This could lead to guiding principles for sustaining the life of humans and other species. For what is a dream in a future with little promise?

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Characterizing Math Education

With respect to the Random Samples item "Chinese math puzzle" (19 Jan., p. 297) concerning the poor math performance of U.S. children relative to their Chinese counterparts, we suggest there is one important reason, a different educational system. The Chinese system is "passive and intensive." Students do not have much freedom to choose what and how to learn. Most students in the same grade have to take the same courses at the same time. This is the passive part. The intensive part is related to an extensively systematic course content and homework. The two parts are designed, when combined, to enable a student to achieve a solid understanding and mastery of fundamental concepts and skills. This is possible because all students in the same classroom have a similar background. The American educational system, which could be described as "active and extensive," has its own advantages, but may be disadvantageous at the place where the Chinese system is the strongest.

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Research Productivity

In reviewing the National Academy of Sciences (NAS) report *Allocating Funds for Science and Technology* (*1*) to a Congress bent on cutting costs and taxes, I find no serious recommendation to improve the

productivity of research (F. Press, "Needed: Coherent budgeting for science and technology," Policy Forum, 1 Dec., p. 1448). Economist Fritz Machlup pointed out in 1962 (2) that the productivity of research depends on allocations of resources that must include knowledge. This is the unique resource that controls what research will be done and how. In particular, knowledge of research done and under way saves the expense of repetition. Studies (3, 4) have not only confirmed this idea, their observations have suggested that substantial portions (20 to more than 70%) of our research report work that is "trivial, duplicative, or wrong" (3) as a result of poor communications. Other studies, including reports published by the NAS in 1978 (5) and 1985 (6), have observed that the collection and evaluation of data is often duplicated at considerable cost for the same reason.

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Weed Management and Pear Russetting

A recent Random Samples item (26 Jan., p. 453) describing the involvement of indole-3-acetic-acid (IAA)–producing strains of epiphytic bacteria in pear russetting may have left some readers with misconceptions about *Erwinia herbicola* and pear russetting. Although *Erwinia* was described as "a genus of troublemakers," *E. herbicola* (now called *Pantoea agglomerans*) is a diverse species, including strains that live epiphytically on leaves or fruit and cause no adverse effects; indeed, some strains of *E. herbicola* are effective biological control agents that protect plants against important diseases. A small proportion of strains of *E. herbicola* living epiphytically on pear produce IAA and only IAA-producing strains cause russetting. Steven Lindow and his colleagues at the University of California, Berkeley, are evaluating various methods to decrease pear russetting, such as biological control with antagonists like *Pseudomonas fluorescens* that suppress populations of IAA-producing bacteria on developing pear fruit, and management of weeds that support large populations of IAA-producing bacteria. I described these methods to *Science* but they were trivialized in the unfortunate statement that "all farmers have to do is more weeding," attributed incorrectly to me. The methods developed by Lindow have promise for decreasing economic losses caused by pear russetting because they are based on an understanding of microbial and physiological factors that contribute to this complex problem.

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