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# To Lift the Lamp Beside the Research Door

*Give me your tired, your poor,*
*Your little scientist yearning for a grant,*
*The wretched refuse of the Budget Battle,*
*Send them, competition-tossed, to me:*
*I lift the lamp beside the Treasury door.*
(with apologies to Emma Lazarus)

Those would be appropriate words for a new statue entitled "Miss Enlightened Self-Interest." This high-wage nation is entering the era of the global economy with a science policy that would have any well-trained accountant dying of shame. We analyze, by merciless peer review, the grants of low-income science (in the $\$10^5$ range); condemn those who go outside the peer review process for middle-income science ($\$10^7$ range); and allow the top brackets of "big science" ($\$10^9$ range) to be evaluated by nonscientists. An analogy would be a meticulously itemized office budget: Pencils ($17.50), Typewriter ($327.96), and Miscellaneous ($10,000).

What is the outcome of such a process? At a time when foreign competition in the computer business is at a peak, low energy physics is being cut back in total funds and in dollars per grant. At a time when the infant biotechnology industry needs encouragement and personnel, training grants and postdoctoral fellowships are being reduced and eliminated. At a time when we must create methods to adjust to major demographic shifts both internally and in a changing global economy, social scientists are competing for dwindling funds. At a time when materials science research and new chemical products are needed more than ever, the National Science Foundation, their main source of funding, announces the possibility that summer salaries may be eliminated and that program directors must negotiate downward. At the same time, massive projects with only remote relevance to the national welfare are enjoying favor. "Little science" is being told that it is in a zero-sum game; big science is being told that it is in an infinite-sum game of "add-ons."

Does this mean that we should eliminate big science because of the budget squeeze? Certainly not. Does it mean that relevance must be a sine qua non of basic research? Certainly not. Does it mean that we should reexamine our procedures for scientific priorities? Certainly, yes.

The first step in reevaluation is remembering that little science can be intellectually adventurous and has produced the big breakthroughs—the lasers, the transistors, the recombinant DNA's—which spark totally new directions in research and industrial applications. Thus it is vital in this new era of balanced budgets to establish a priority that ensures healthy support of little science. But we need big projects too, even big irrelevant projects. They are like our national parks, our Statue of Liberty, our voyage to the moon. We must think big, and supercolliders, sequencing the human genome, the space shuttle, and space telescope are goals that challenge our imaginations and organizational abilities. Almost all big science projects are worthy. The problem is that they cost so very much money.

If even one big project were deferred, there would be all the incremental funding needed for little science. Therefore it seems time for truly big science to enter an era of competition with programs of similar size rather than with the much smaller projects of little science. One item that should be compared with the big science projects is the sum of all the incremental cuts in little science.

We scientists will find it difficult to list the diverse projects in a priority order. The least we can do is have peers outside the immediate discipline evaluate the scientific claims of the advocates of big projects so that Congress can place the programs in proper relation to others of similar size.

The time has come to evaluate big projects against each other and against the restoration of cuts in little science in the same way that we evaluate small projects. The republic, through its elected representatives, will and must have the final word. The scientific community, however, should help make that final word an informed decision. In this way, enlightened self-interest can lift the lamp beside the research door.

—DANIEL E. KOSHLAND, JR.