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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 Dune crest in Kelso dunefield, Mojave Desert, California. Foreground ripples illustrate self-organization of fine sand bed into 10-centimeter wavelength ridges oriented perpendicular to wind during saltation. Upper lee face shows grain fall deposition of saltating grains, and subsequent failure as grain flow during later wind event, with wind blowing toward observer. See page 820. [Robert S. Anderson, California Institute of Technology, Pasadena, CA 91125]

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Regularizing "Pork"

Despite the outcries of academic leaders, "pork barrel" science and engineering—the congressional practice of attaching pet projects to general agency appropriation bills—is becoming more common. Depending on definitions, estimates of the level of earmarked funding range from a quarter to over a third of a billion dollars a year, with between 40 and 50% attached to budgets of the Department of Energy.

Opponents argue against this behavior on the grounds that it circumvents the peer review process, may result in the funding of projects that do not deserve support on technical merit, and leads to serious inefficiencies in the allocation of scarce federal resources. They also complain that the practice has adverse consequences for federal agency research programs. Funds sufficient to cover the special projects are often not provided in appropriations. Thus, "pork barrel" projects must be supported by curtailing planned programs in the agencies.

Proponents argue that, like other federal capital programs, "pork barrel" science and engineering projects are a way to spread the wealth. Although there have been exceptions, most of these projects have involved the construction of buildings and other facilities. Never easy to obtain, in recent years capital for such facilities has become especially scarce. Proponents argue that without the facilities constructed with earmarked funds, many universities cannot write competitive proposals to secure research support through normal peer review channels. Hence, federal research monies continue to go to a few leading research centers, and the rest of the country languishes. Given the economic importance now attached to science and technology, members of Congress are not prepared to sit back while the few regions of the country with the most accomplished research groups skim, what these legislators argue are, vital regional development resources.

Both arguments have merit. The practice shows no sign of abating. This suggests that it is time to move the discussion to a different level. If "pork barrel" science and engineering cannot be stopped politically, and arguably serves positive social ends, we should be trying to regularize the practice in a formal program, not terminate it. In recent months there have been several unsuccessful efforts to begin to do this. The University Research Facilities Revitalization Act (H.R. 1905), introduced by Representative Robert A. Roe (D–NJ), is stuck in committee. Similar language was inserted and passed in the trade bill that was vetoed. Both the House and Senate versions of the National Science Foundation (NSF) authorization act contain modest programs of competitive matching facilities grants, but so far funds have not been appropriated.

These efforts represent important first steps. But none of the current proposals will provide enough resources of the right kinds to stem the pork barrel tide. Ultimately we may need two programs, both requiring matching funds and supporting only capital costs. The first should fund facilities strictly on the basis of technical merit and could be appropriately administered by NSF. The second should fund facilities on the basis of a mixed consideration of technical merit and regional need. While NSF could coordinate the technical reviews, the actual funding decisions for this second program should probably be made by an interagency group housed administratively in some other agency, perhaps the Department of Commerce. Decisions in this second program will necessarily contain a significant political dimension. Giving this reponsibility to NSF runs too great a risk that political influences will spill over and contaminate other NSF decision processes.

Such a program would have the advantage of requiring Congress to make two explicit choices. First, it would have to choose the overall fraction of our nation's R&D expenditure that should be devoted to the construction of university research facilities. Second, it would have to choose what portion of these resources the nation should invest in the most cost-effective pursuit of research output, and what portion should serve the important additional goal of developing regional R&D infrastructure. Clearly these choices are too important to be made in the piecemeal way that we now make them. Having established such a program, Congress will have to enforce discipline on its members to prevent continued attachment of individual projects. There is reason to believe that if the program is successful, and large enough, such self-discipline would be possible.—M. GRANGER MORGAN, *Head, Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA 15213*