this are indispensable for working out the details before attempting more sophisticated experiments with precision control of temperature and other variables.

With regard to the large crystal lysozyme that was recovered, the quote to the effect that no one has grown a crystal that size in 5 days was unclear. What was meant was that we had never seen a crystal grow this large using microcrystalline techniques in our control experiments.

We find it difficult to understand the reservations that were expressed about doing such experiments on the shuttle. The shuttle gives us access to a different environment in which growth conditions can be systematically varied in a controlled manner. Given the broad agreement that little progress has been made in the growth of protein crystals in the last 20 years, shouldn't this prospect be explored? The least that can happen is that we will obtain a better insight to improve growth techniques used here on Earth.

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The Granting System and Healthy Research

I am responding to Daniel E. Koshland, Jr.'s, editorial "Modest proposals for the granting system" (19 July, p. 231) from the perspective gained as member, and now chair, of a committee that has debated these topics with federal agency staff since 1982. The Forum on Research Management was founded by the Federation of Behavioral, Psychological, and Cognitive Sciences to improve communication between scientists and federal managers (*1*). Peer review, priority score inflation, indirect costs, simplified applications, and the role of funding agencies in salary support have been discussed, sometimes with final agreement.

Many complaints about peer review would vanish if agency research budgets doubled (a futile hope), but some complaints are common to funded and unfunded alike. For example, the process takes too long. Simple paperwork consumes most of the time and would be reduced if the Division of Research Grants at the National Institutes of Health, for example, could accept and distribute applications directly from laboratory computers. In addition, many agencies must fund basic science through their procurement system. Financial managers, naive about research, are imposed between scientist and project manager and often delay funding, discourage scientists from modifying their protocols as the project develops, and prevent them from treating several projects as one related task. Much would be saved if these agencies could reorient their procedures towards providing the support for basic research rather than its purchase.

Peer review appears to discourage innovative research because controversial projects that generate strong but differing opinions seem to be rarely funded: one dissent dooms an idea that excites most reviewers. Science may benefit from schemes using medians rather than means, lopping off extreme votes, or requiring public votes, for example, proposed to counter the blackball. Priority scores at NIH are now problematical, although simple inflation is not the real problem. If they improve uniformly across sections, then, with coordinate advances in the payline, normal funding patterns are maintained. Study sections bias funding decisions only when they assign idiosyncratic meanings to the scales: percentages and normalized scores strike at bias, not inflation. Furthermore, the increased competition for funds has likely improved the quality of the proposals, and better priority scores may well be deserved. This is not entirely to the good: "grant writing" consumes ever more time and effort, leading, unfortunately, to an increase in overhead costs and a decrease in research productivity. Because preparing applications competes too successfully with real research, Koshland and others reasonably argue that previously successful grantees and the well published be given special consideration. However, this aids the senior worker and perhaps routine research. A seemingly radical proposal is to award an entitlement grant with the Ph.D., with federal money sufficient for an initial project. This scheme would provide young scientists with a painless first grant and help to balance their chances for the next. This proposal is not so radical in fact, because research departments do set up the new Ph.D. with salary, facilities, and often a graduate assistant—in effect, a research grant.

In many universities this "seed money" derives from indirect cost revenues, one of their many general and valuable contributions. Discussions about indirect costs typically focus on their recent expansion and how they must be reduced, rather than on their value to the university as unrestricted income. But the industrial benchmark for overhead is at 150 percent of direct costs, compared to the 50 percent academic rate, which reveals that universities underrecover their costs. The remainder is subsidized by state taxpayers, by endowment income, and by student tuition. Indirect costs vary over time and place because of differences in labor and utility costs and the age and quality of the facilities; because state legislatures and university administrators variously push for more complete recovery; and because of the changing mix of disciplines. (The space needs for theoretical physics are different from those of the biomedical sciences, for example). The political turmoil within our universities set off by a common national rate is not difficult to imagine, as administrators would be pressured to give up valuable programs, including certain of the sciences, as too expensive. Indirect cost recovery, like the other issues, including the impact of academic salaries on research funds, merits continued discussion in an overall context of national science policy and the purpose of the federal government in supporting a healthy research establishment.

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Erratum: The last sentence of the fourth paragraph of Philip H. Abelson's editorial "Use of and research on pheromones" (27 Sept., p. 1343) contained an error. It should have read, "As a result, the amount of pesticides used has been decreased by about 70 percent, and costs of control have dropped."

Erratum: In the article "String as a theory of everything" by M. Mitchell Waldrop (Research News, 20 Sept., p. 1251), the last line of the first column was inadvertantly omitted. The affected sentence should have read, "Not only were the strong interactions far more complex than predicted by field theory, but the particles that participated in the strong interactions—the *hadrons*, a group that includes protons, neutrons, pi mesons, and many others—seemed to be relatively large, extended objects as much as 1 Fermi across (10^{-13} centimeter)." In the next-to-the-last line of the second full paragraph in column 2 on page 1252, 10^{-19} should have been 10^{+19}. Finally, the words "quandary" (page 1251, column 1, paragraph 6, line 2) and "quark" (page 1252, column 3, last paragraph, line 18) were misspelled.