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LETTERS

The Granting System

In his editorial, "Modest proposals for the granting system" (19 July, p. 231), Daniel E. Koshland, Jr., notes that better priority scores are being awarded, on the average, to the National Institutes of Health grants in 1985 as compared to those in 1975. This is ascribed to attempts by members of panels to outguess the system and help their fellow scientists. From personal experience on one such panel I can say that part of the "score inflation" is due to the fact that many of the weaker applicants have given up, so that the average quality of applications has improved substantially. Not only are we getting stronger applications, but a much smaller fraction of those received is being funded.

Serious consequences are the disruption of good laboratories and the discouragement of the most competent prospective young scientists. The situation can be remedied only with more funds or, in part, by shifting available funds to the support of investigator-initiated applications.

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I applaud Koshland's editorials (21 June, p. 1387; 5 July, p. 9; 19 July, p. 231) on the "gentle changes" that might make the granting–peer-review system more economical and equitable. I am afraid, however, that what we smugly call "peer review" has much in common with the spoils system we claim to want to avoid. Proposals are written with an anxious eye toward those who will be deciding their value. Since those who decide value have their own ideological allegiances, objectivity is a hard commodity to come by. The structure of scientific change has always involved a struggle of the new against the entrenched, and the peer-review system can hardly be expected to be exempt from these dynamics. But we should try to minimize their damages. Some suggestions follow.

First, the principal investigator of a project *owes* it to the academic community to exercise a responsible degree of restraint concerning salary requests. Among the few proposals I have personally been asked to referee, I have seen salary expectations extravagant enough to qualify for Senator Proxmire's "Golden Fleece" awards. When one adds to this largess the overhead percentage that must then flow to the university coffers, the fact that there is not enough money to go around follows as ineluctably as the night the day.

Second, simplifications are needed. Where academics are concerned, the government that governs least is most certainly the one that governs best. The government-academic complex is such a labyrinth of special-interest groups that it is a wonder science is ever accomplished at all. It may be, as Koshland says, that scientists do not feel they write too many proposals. It is most definitely certain that they wish they did not *have* to write so many. Track records should count for far more than specificities in methodology—which, if taken literally, can only prove to be Procrustean beds for the creative process. Besides, detailing what one might know about a subject in 2 years is not only silly and pretentious, it subtracts from time available for real research.

Another small and quite workable way to debrutalize the grant industry is simply to lessen the pressure for *having* a grant. One such pressure is the universal presumption, perhaps an ivory-tower hangover from the Great Society optimisms of the 1960's, that everyone who publishes regularly *does* have a grant. This presumption is reflected in those well-intended but infernal postcard requests for "this and related work"—at the expense of the sender. I am all for the dissemination of research results. But the costs in photoduplications, postage, and sheer address-writing, envelope-licking *time* involved in accommodating hundreds of such requests year after year is burdensome for someone not in the grant-money lane. Peer-review assessments of worth notwithstanding, unfunded researchers continue to do their work and turn out results. Why should those researchers, or their schools, have to underwrite the edification or simple curiosity of the rest of the community? Why not apply the same standards of consumer responsibility that every other aspect of life demands to the information business and require that one pay for what one gets?

There are two ready possibilities for implementation. One would be reasonable postage-and-handling charges made out to the researcher's place of affiliation. Another would be for journals to direct reprint requests to themselves for a profit-yielding charge. The second alternative would have the double benefit of easing the considerable financial stress under which most journals seem perpetually to operate, while relieving

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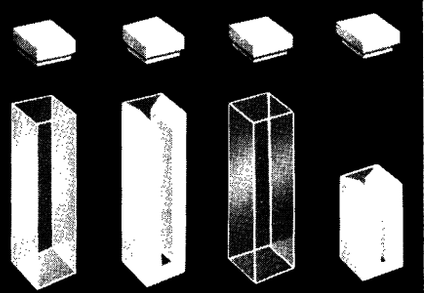

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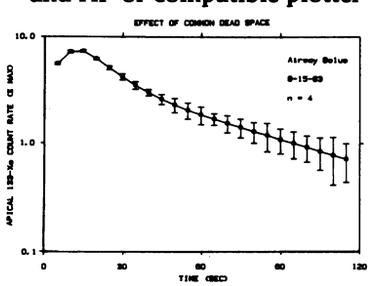

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researchers—and what secretarial help they can muster—from an expensive, time-absorbing, and largely thankless task that distracts from serious communications. In the spirit of personal statements coming before institutional ones, I have adopted a policy of accommodating postcard requests only from scholars working in countries where journal availability is low.

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Biotechnology and the Biosphere

There may be another dimension to the case of the ice-nucleating bacterium *Pseudomonas syringae* that was not mentioned in Gina Kolata's article "How safe are engineered organisms?" (Research News, 5 July, p. 34). According to Russell Schnell (*1*) of the National Oceanic and Atmospheric Administration Laboratory in Boulder, Colorado, *Pseudomonas syringae* enhances rainfall. It seems that the lipoprotein coats of this and other species of bacteria found on plants and in detritus when shed and wafted up into the clouds form ideal nuclei for ice formation that is absolutely necessary for rain to fall. Furthermore, contrary to what was previously thought, recent studies show that particles without organic materials derived from bacteria and plants (that is, "clean dust") are useless as nuclei for the formation of raindrops (raising the possibility that the Sahel drought could be prolonged by the absence of organic nuclei).

If *Pseudomonas syringae* does indeed have a beneficial role in enhancing rainfall, then the ecologist's concern about possible secondary or indirect effects of releases of genetically altered organisms is vindicated—incredibly, at the very first major controversy over release of engineered organisms. To the agriculturist the ice-nucleating bacteria are viewed only as pests, something to destroy or at least neutralize. But before such action is taken we should try to find out if the organisms in question have other functions that are of redeeming value. Reduction in rainfall due to lack of ice-nucleating capacity could be a lot worse than crop loss due to frost. At least we ought to consider such possibilities and assess indirect as well as direct impacts before we conclude that the alteration is "benign" (as inferred for current proposals in Kolata's article). Essentially, this is the position of the ecologist when it comes to proposals for genetic alteration in open systems; it is not an "alarmist" position but just commonsense caution when one is dealing with complex environmental systems that are poorly understood.

Since microorganisms play major roles in maintaining earth's life-support systems, we need to be especially careful about tinkering with decomposition and other recycling processes. Unlike the life-support system of a spacecraft, which is mechanical and man-made, the biosphere is bioregenerative and self-regulating. Since we did not build it we don't know much about how it really works, and we have shown little interest in studying it at the necessary large scale until recently, when malfunctions have begun to appear due to human impacts. The case of the ice-nucleating bacteria is an excellent example of the need for a more holistic assessment that allows for consideration of roles and functions other than the one that seems undesirable.

What is needed now is a reasonable procedure for assessment at the ecosystem level that leans to the side of caution when there are a lot of unknowns. Accordingly, there is urgent need for increased support for research in environmental microbiology (that is, microbial ecology) and ecosystem science.

One consequence of the industrialization of agriculture is that food tends to become a market commodity rather than something to nourish us (that is, a life-support necessity). While a strong market economy is necessary for efficient food production, enthusiasm for biotechnology should not lead us to treat all organisms merely as "commodities" to be manipulated for short-term economic gain when there are nonmarket values and long-term consequences to be considered.

It is high time we became concerned with the health of the biosphere. A new technology for benefit-cost assessment could balance in an objective manner the short-term economic (market) benefits and the long-term costs in terms of damage to nonmarket goods and services that might be affected by proposed alterations. Advances in biotechnology should be accompanied by advances in the technology of ecosystem impact assessment if we are to minimize mistakes and disappointments.

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