Letters

Biological Systems

In his editorial on "Biological systems," Daniel E. Koshland, Jr. (10 June, p. 1385), clearly states a chemist's viewpoint of organisms as complicated test tubes that happen to be alive. He notes that "originally biology emphasized taxonomy and the diversity of species." Some biologists are still concerned with such issues, but perhaps such an approach is considered to be hopelessly quaint. It is Koshland, though, who displays an 18th-century, pre-Darwinian view of biology in his ranking of archetypes like "the" bacterium, "the" nematode, "the" fly, and "the" rat on "the evolutionary ladder." It is curious to find the editor of *Science* writing in terms of the kinds of organisms and their place in the great chain of being.

Perhaps some people consider themselves to be more complex, and thus higher on the ladder, than "the" fly, but I will reserve judgment on my own position until after I master the simple arts of metamorphosis and flight.

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Support for Systematics

Robert J. O'Hara *et al.* (Letters, 15 July, p. 275) agree with my alarm (Policy Forum, 20 May, p. 967) regarding the current status (or lack thereof) of systematics, but fear that my emphasis on the practical need of identifying and cataloging species might backfire in the long run because it diverts attention away from the study of evolutionary history of organisms. I do not choose to become embroiled in debate between proponents of phenetics and cladistics. The choice of the word biosystematics in my title was an attempt to unite all students of biological classification. The purpose of the article was to alert the entire scientific community to the crisis in systematics in all its manifestations, including identification service and evolutionary history. In these times of tight budgets and painful choices, however, systematics is more likely to be supported when scientists of other disciplines and administrators understand the practical and immediate role that systematics plays in many areas of science and ultimately, as I noted, in the lives of all people.

The remarkable response to my article, from systematists, pharmacologists, microbiologists, physiologists, biomedical researchers, ecologists, physicians, and senatorial and congressional staff, indicates the importance and timeliness of the topic. Indeed, Congressman James H. Scheuer (D–NY) and 82 cosponsors recently introduced H.R. 4335 in the Congress. The bill, entitled the National Biological Diversity Conservation and Environmental Research Act, was referred to the subcommittee on natural resources of the House Science Committee, as well as to the Merchant Marine and Fisheries Committee. Hearings were held on 9 and 30 June, and the bill soon will be voted on by the subcommittee. The bill addresses the recommendations of the Office of Technology Assessment report (*1*) on biological diversity; it would create a national policy toward conservation of biological diversity, create a National Center for Biological Diversity and Environmental Research, make biological diversity an explicit part of environmental impact statements, and require a coordinated federal management strategy for maintaining biological diversity. One function of the center would be the collection of information regarding the biota of the United States by a national survey. Responsibilities would include, among other things, research and training in the basic principles of ecology and systematics. Passage of H.R. 4335 would be an excellent beginning in the amelioration of the interconnected crises in biodiversity and systematics.

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REFERENCES

1. Office of Technology Assessment, *Technologies to Maintain Biological Diversity* (Government Printing Office, Washington, DC, 1987).

Product Liability

Philip H. Abelson in his editorial "Product liability in a litigious society" (17 June, p. 1589) argues that "Juries do not realize that in the end the costs are usually borne by the public" and that "excessive product liability costs will continue to be a drain on society."

The problem is not that product liability causes costs that do not otherwise exist. The costs of injury exist independent of the legal treatment governing their distribution, and the public pays in either case. Under rules that limit manufacturer liability, the costs are borne by the injured consumers, who are part of the public. Under rules that place liability on the manufacturer, the costs are borne initially by the manufacturer and subsequently by all consumers through higher prices. The costs in both cases are borne by the public, although their distribution is different.

Discussions of product liability often takes on the trappings of a morality play, with the emphasis on negligence by one party or the other. The more accurate picture is that some percentage of products is willy nilly involved in injuries, and the problem is how to distribute the costs. Limiting liability adds financial problems to physical ones. Placing liability on the manufacturer is a form of risk socialization, although perhaps not the best form.

If the present system is unpalatable, then some other social arrangement, perhaps akin to worker compensation—"consumer compensation"—can be developed that would spread the financial costs over all products and all consumers and avoid the undesirable features of the present system.

If we are to make sensible and unbiased policy, we must avoid interpreting high(er) insurance premiums (which may or may not be justified, but that is another matter) as unjust impositions or as cost-raising. They do raise the registered costs of firms and do have allocative consequences, but they represent costs that exist and must be borne by someone, either concentrated among the injured or diffused as part of the total cost of the product as a whole.

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Howard Hughes Institute

Daniel E. Koshland, Jr., in his editorial of 1 July (p. 9), appropriately lauds the program of the Howard Hughes Medical Institute that is providing needed resources to undergraduate liberal arts colleges. Koshland notes that "these small schools are having increasing difficulty in attracting scientific faculty. . . ." As a postdoctoral associate at a large research university who is interested in teaching at a liberal arts college, I have found that interviewing for tenure-track positions at such colleges is often a disquieting experience. I have commonly encountered questions such as, "Are you really serious about teaching?" or "How can someone with your background [research university graduate school and post-doc] be interested in teaching at our school?" While I am certain that such questions are well intentioned and sincerely asked, I have detected a certain hesitancy on the part of search committees at liberal arts colleges to

hire scientists who have backgrounds predominantly in research. I would hope that the support of the Hughes Institute, along with the increasing recognition that undergraduates should be able to receive first-class scientific training without attending Ivy League schools, will encourage liberal arts colleges to recruit faculty interested both in teaching and active research.

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Koshland's editorial on the new Hughes Institute initiative to support undergraduate education in the sciences struck exactly the right note. The Institute is indeed to be commended for growing both wiser and bolder as it has grown older, and one hopes there is more good to come. High-quality science education of the sort that attracts the ablest students depends on whether faculty members can sustain a simultaneous and serious commitment to both research and teaching. That, in turn, depends on a supportive academic and scientific environment. In decades past, value was placed on the idea that research and teaching are complementary activities, each enhancing the other; considerable respect was accorded to those scientists who developed the kind of broad perspectives and ability to synthesize that permitted evaluation and communication of a wide range of scientific observations. In recent years, however, the lives of those who aspire to the scientist-teacher ideal have become increasingly difficult. Correspondingly, career choices along those lines have been discouraged.

The core of the problem is a combination of financial and sociological forces which have made it appear that teaching and research are in conflict. Over the short run, teaching returns to institutions both less money and less prestige than does research. The upshot is that at the larger institutions, with their heavier dependence on outside money, time spent on teaching and on other activities necessary over the long run for both good teaching and good research, is widely regarded as time lost from more productive effort. Scientists at the smaller institutions are made to feel that their sustained concern for teaching has compromised their right to claim support as research scientists. Without anyone's intending it, the award of large sums of money based on short-term research productivity has created a mind-set within the scientific and academic community that seriously compromises its own longer range values and the likelihood of success in achieving them.

The problem is not an easy one to solve, particularly for federal agencies that are under pressure from their constituents to show rapid gains from money expended. It is, however, the sort of problem that the Hughes Institute, having displayed a willingness to invest for longer term payoffs, could undertake to address. To meet the immediate need, the institute might consider a program of research grants targeted specifically to those who still aspire to the scientist-teacher ideal. Of equal importance would be a special postdoctoral program, one which gives young scientists at an early stage of their careers the freedom to explore the advantages of combining research and teaching activities. If we are not careful, we will find ourselves in a situation in which the availability of support for scientist-teachers becomes irrelevant because there are not any people with the kind of background necessary to take advantage of it.

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