Biotechnology Issues

I would like to clarify some points in relation to the U.S. Department of Agriculture's handling of biotechnology issues as related to Agracetus's efforts to field test tobacco plants made disease-resistant by genetic engineering (News and Comment, 16 Aug. p. 634).

The federal government is involved in a very positive manner in an almost singularly unique situation of combining all agency guidelines and regulations in biotechnology in one document. This was done by the Cabinet Council on Biotechnology through the President's Office of Science and Technology Policy (OSTP) and published as a comprehensive statement in the *Federal Register* of 31 December 1984. Comments have been received from the public on both regulation and research in biotechnology for the entire federal government. As a result, a totally coordinated effort in the review process of biotechnology is evolving that should be to the benefit of all research scientists, industry, and the users of the products of biotechnology.

The Department of Agriculture has a logical distribution of responsibilities. All regulatory aspects of biotechnology are under the purview of the Animal and Plant Health Inspection Service (APHIS). For research issues, I chair the Department of Agriculture's Agriculture Recombinant DNA Research Committee, which reviews recombinant DNA research proposals in agriculture. This committee is department-wide and located in Science and Education under assistant secretary Orville G. Bentley; it is not a part of the Agricultural Research Service. The committee has representatives from all appropriate agencies in the Department of Agriculture, including the Agricultural Research Service, the Cooperative State Research Service, the Office of Grants and Program Systems, and APHIS, as well as representatives from the National Institutes of Health and the National Science Foundation. The entire federal structure for regulation and assessment of biotechnology of which this committee is a part is evolving through the leadership of Bernadine Healy of OSTP and now David T. Kingsbury of NSF, and it promises to function well. During the early evolutionary phases of the expanded recombinant DNA responsibilities, there may be some delays; but in the end it is anticipated that there will be a well-coordinated total federal system in place to the benefit of all parties concerned. A considerable amount of time and consideration has been given to bringing this program to fruition.

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Crystals in Space

Having many years of experience growing crystals of biological macromolecules, I would like to express my skepticism about growing crystals in space (Research News, 26 July, p. 370).

The problems associated with growing crystals of biological macromolecules for diffraction studies are finding solvent conditions for the production of well-ordered single crystals of a suitable habit and a certain minimum size.

If we look at these problems in relation to the (rather meager) data (*1*) so far presented by the proponents of the space program, we might be able to decide whether it makes "scientific sense."

Each biological macromolecule is unique and, although we have certain general principles (*2*), the conditions for crystal-growing for each new system must be determined ab initio. Needle-shaped or thin-plate crystals present problems to the crystallographer who prefers "chunky" crystals. Given an undesirable habit, it is necessary to search for other conditions to produce other crystal forms, as Blundell indicates. This may require many experiments changing a number of solution variables. Since the β-galactosidase crystals shown by Littke and John (*1*) are long thin needles, one would think the first priority would be to try to obtain different crystal forms rather than larger ones of the same form.

Most of the emphasis of the space program seems to be on the size of crystals, and Bugg might be correct in that convective currents prevent the growth of large crystals; but how large should they be? More than 30 years ago Low and Richards (*3*) described the growth in gelatin gels of β-lactalbumin crystals weighing up to 50 milligrams (about 30 cubic millimeters), and Lewin (*4*) grew crystals of mercury mercaptalbumin derivatives 7 mm long. A requirement for high resolution neutron diffraction is large crystals, and for this purpose lysozyme crystals up to 20 mm^3 have been obtained (*5*). On the other hand, the advent of synchrotron x-ray sources has