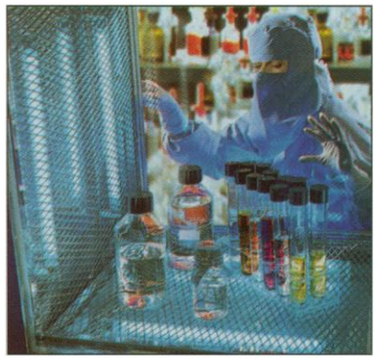
A letter writer warns that not enough safeguards are in place to protect the U.S. population from the release of harmful organisms from U.S. laboratories. A researcher emphasizes that NASA's funding of crystal-growing on the space shuttle contributed to the development of a promising flu drug. Human tissue engineers clarify their procedure in growing blood vessels. A method of testing wells in Bangladesh for arsenic poisoning is described. And a Hungarian scientist calls for the "appropriate balance between the discovery of new facts and finding their proper place and importance in the framework of science."

Uncontrolled Release of Harmful Microorganisms

At a recent colloquium held at the U.S. National Academy of Sciences in Washington, DC, there was intensive discussion of a wide range of applications of laboratory automation. These applications included methods for prevention and early detection of biological warfare agents, infectious diseases, and water and food supply contaminants. The main concern raised was the use of pathogens by terrorists or nations as a result of biological warfare. It is clear that U.S. Army authorities and the Federal Bureau of Investigation are able to predict the outcome of numerous scenarios regarding the hostile use of microorganisms. Also, it appears that we are well prepared to detect, respond to, and potentially prevent such threats.



Are there enough safeguards in place to protect the U.S. population from the release of harmful organisms from U.S. labs?

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However, a different type of threat, the release, either intentionally or unintentionally, of laboratory strains and genetically modified organisms, is underestimated. These organisms include natural, highly antibiotic-resistant commercial strains, as well as bacteria that were created either by genetic manipulations such as rapid DNA shuffling or by rationally designed point mutations. Such organisms can interact with human pathogens and can easily change the microbial diversity and ecology that we know today. We have already experienced an example of such release in the case of the antibiotic-resistant human opportunistic pathogen *Burkholderia cepacia*. This plant pathogen is used in agriculture as a biocontrol agent and in the bioremediation of toxic chemicals (*1*). *Burkholderia cepacia* is still released into the environment as a bioremediation agent, despite the fact that it is now recognized to be a cause of devastating infections in patients with cystic fibrosis (*1*, *2*) and in other vulnerable individuals (*1*, *3*), and its use in agriculture is controlled by the Environmental Protection Agency (*4*).

It is evident, therefore, that we need to create guidelines and safety measures that will prevent the uncontrolled release of microorganisms into the environment. In addition to the necessary guidelines, those involved in biotechnology should direct their attention to creating laboratory host strains that will survive only in controlled laboratory conditions. Bacterial and viral genetic manipulations that may influence our environment need to be restricted to such laboratory strains. Such measures should reduce the threat of the accidental release of harmful species into our ecosystem.

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Space-Grown Neuraminidase Crystals

David Malakoff's article concerning the science that will be conducted on the international space station (News Focus, 14 May, p. 1102), mentions a recent press release by the National Aeronautics and Space Administration (NASA) regarding influenza neuraminidase crystals that were grown in space. Malakoff interviewed me, and I clearly explained to him that crystals grown on the Mir space station produced the best x-ray diffraction data set in our laboratory at that time and were used to determine the 3-dimensional structure of N9 neuraminidase (*1*). This native structure was subsequently used for all of the University of Alabama, Birmingham, Center for Macromolecular Crystallography's (CMC's) drug complex structures, and still is today. In addition, we flew N2 and B-Lee-40 neuraminidase on the U.S. space shuttle. These crystals were used to determine several inhibitor-protein complex structures and to optimize the cryopreservation protocol used for all future neuraminidase crystals. In spite of my providing this information, Malakoff quotes Graeme Laver as saying that "the single space-produced crystal involved in the project was grown aboard Mir without NASA's help. 'And it had nothing to do with the drug's development. BioCryst's findings came from crystals I grew on Earth.'"

The CMC and BioCryst Pharmaceuticals worked as a team, sharing all information from this drug development project. It is incorrect to assert that the data and work performed by the CMC (using space-grown crystals) did not contribute to the scientific development of a useful clinical candidate drug. NASA's contribution to this project was substantial in terms of 10 years of funding support and crystallization of N2 and B-Lee-40 neuraminidase to support the drug design.

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Tissue Engineering

Dan Ferber ("Lab-grown organs begin to take shape," News Focus, 16 Apr., p. 422), describes our recent study (*1*) presenting the only human tissue engineered blood vessel (TEBV) that is both completely biological and strong enough to be implanted. The article, which compares our work with a study by Niklason and collaborators published in the same issue of *Science* (p. 489), states incorrectly that the human TEBVs we implanted in dogs had been lined with an endothelium. In fact, although TEBVs were routinely produced with a functional endothelium, we intentionally did not endothelialize the human TEBVs for xenografting because xenogeneic endothelial cells induce an acute rejection which leads to rapid thrombosis (24 hours). The