Environmental Biotechnology

To the editor:

I would like to add a couple of points to Stephen Edgington's excellent exposé of environmental biotechnology (*Bio/Technology* **12:**1338-1342, December). First, though gene technology is making exciting contributions to environmental biotechnology, such as the tailor-made creation of novel enzymes and metabolic routes, its main contribution will be in the more mundane area of increasing efficiency and reducing costs of processes based on natural microbial isolates that already work, because the choice of whether or not to remediate, and between biological and physicochemical approaches, will often be detemined by cost.

Second, it is generally perceived that regulatory barriers constitute the main hindrance to the use of genetically modified organisms in bioremediation. But this is not the case. The design of "generic" microbial degraders is problematic. Unlike microorganisms designed for agricultural purposes, where the partner (the plant) is predetermined and the environment is controlled, microbial catalysts developed for bioremediation will face environmental conditions (e.g., pH, salinity, presence of nontarget toxic substances) that vary widely from site to site, thereby restricting their successful utilization. Furthermore, little is known about the microbial ecology of polluted sites or factors favoring performance of added catalysts. These aspects have contributed largely to the delay in using designed organisms for remediation.

However, genetic modules for critical enzymes and gene expression systems appropriate to environmental applications are becoming more widely available, and microbial ecology is advancing. Hence, there should soon be a surge in bioremediation by designed microorganisms. Indeed, there is political encouragement in Europe to get such microorganisms rapidly into the field, so that their utility and concerns about risk can be properly assessed.

Finally, combining bioremediation with highly effective chemical and physical processes will often provide the best solutions. Innovative combinations (e.g., electrolytic dehalogenation of highly halogenated hydrocarbons, prior to aerobic mineralization by microbes) are being assessed.

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Phage Misplay

To the editor:

We felt rather annoyed when reading "Phage Display: All Dressed Up and Ready to Role" by Dan Medynski (*Bio/Technology* **12**:1134-36, November).

The author most evidently does not know what a filamentous phage is like (it does *not* incorporate its DNA into the host genome and its replication and assembly is not coupled to the cell cycle of *E. coli*!), what the *real* problems and advantages of phage display are, and he even does not understand one of the papers he read and cites on page 1135 (*Bio/Technology* **12**:999-1002, October).

In our opinion, it is not enough to link together a few euphoric sentences which praise the advancement of science and technology; a certain basic knowledge of the system would do no harm if one undertakes to write on such a subject. Taking into consideration how difficult it oftentimes is for an active researcher to get some sound results of his work published we feel that no space in a serious journal should be given to a superficial and erroneous paper like this.

"We stopped dumping chemicals in the swamp years ago, right?"

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Dan Medynski replies:

Having used both M13 phage and the f1 origin replication incorporated into plasmids for both DNA sequencing and oligonucleotide-directed mutagenesis experiments on countless occasions, and appreciating the careful work of Jo Messing and others in adapting the filamentous phage for routine laboratory procedures, I, too, was a bit distressed that I overlooked the subtle but significant detail you mentioned about the phage life cycle when the final proof of my article "Phage Display: All Dressed Up and Ready to Role" was rushed into press. You are absolutely correct. I discovered the mistake myself upon receiving the November 1994 edition of *Bio/Technology* magazine and have blocked it out when fulfilling reprint requests. My years working at the lab bench have given me a keen appreciation of the time and effort it takes to build the basic science foundation upon which the breakthroughs of biotechnology are built.

Regarding your second comment, space limitations did not allow me to fully discuss the importance of all research contributions mentioned in the Biotools column.