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Introduction to Session 5

Environmental Biotechnology

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Environmental biotechnology received the same degree of positive press in the late 1980s as did molecular biology and genetic engineering in the late 1970s and the early 1980s. Much was made of the *potential* of deploying microbial metabolic processes in the legally mandated effort to clean up hazardous chemical wastes in the environment. That potential was realized rather quickly in situations where contamination was limited to fairly simple hydrocarbons, such as gasoline and diesel fuel; many organisms have proved useful as agents of transformation for these chemicals, and commerical-scale remediations of hydrocarbon contamination, such as from leaking underground storage tanks, are now commonplace.

The successful deployment of microbial physiology against more complex and intractable hazardous organics, such as halogenated or polyaromatic compounds, as well as certain inorganic compounds like cyanide and toxic metals, has proved more difficult. Many lines of evidence now exist, however, to suggest that perhaps no chemical contaminant is totally recalcitrant in terms of its ability to be metabolized, though for many compounds, the rates of transformation are still disappointingly low. But great strides have been, and continue to be, made in the area of optimization; and genetic manipulations for improvement of transformation efficiency are certain to become more common in this field as public acceptance of the use of genetically altered organisms become more widespread. It is a virtual certainty that, within the next several years, credible commercial processes will exist for chemicals such as PCBs and other halogenated organic compounds, whose potential as candidates for environmental bioremediation just a few years ago was considered to be relatively small.

The papers presented in this session present a fairly good representation, considering the small sample size, of the spectrum of fronts on which environmental biotechnology research is proceeding in the early 1990s. The seven papers presented include research on bioremediation of such chemicals as herbicides, chlorinated aliphatics, chlorinated aromatics, cyanide compounds (acetonitrile), aromatic polymers (lignin), and greenhouse gases.