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BIOTECHNOLOGICAL APPROACH TO ABATEMENT OF RECALCITRANT XENOBIOTICS FROM ENVIRONMENT - THE PROBLEMS AND PROSPECTS.

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ABSTRACT

The industrial production of man-made chemicals has been on the increase during the last few decades. Most of these compounds, especially the halogenated ones, are highly recalcitrant and persist in the environment for several years disturbing the ecological balance. The more alarming fact is that these compounds reach human body through almost every item of food that one consumes, in a concentrated form through the process of biomagnification at different trophic levels.

Efforts are on throughout the world to find ways to eliminate/abate these pollutants from environment. Among the different methods tried/proposed microbial degradation is thought to be most effective. Several microbial strains have been developed in the laboratory which can degrade individual compounds. But, their efficiency in the actual field conditions have not been proved satisfactory due to various factors, the notable one being the presence of various other chemicals which affect the survival of the introduced organisms. Hence, there is a necessity for improving the strains by recombinant DNA techniques incorporating different degradative pathways. Mixed cultures of such genetically engineered micro-organisms (GEMs) may prove effective in, atleast, partially solving the problem.

We have isolated Pseudomonas strains capable of degrading fairly high levels of 3-chloro and 4-chloro benzoates (3-and 4-CBA) and phenol. Physiological studies on these organisms have indicated possibilities of cloning phenol hydroxylase gene from the phenol$^+$ strains in 3-CBA$^+$ 4-CBA$^+$ strain which will enable it to degrade both chlorobenzoates and phenol. Cloning of other catabolic pathways also is a clear possibility.

The future programmes envisaged includes bioformation of different industrially and pharmaceutically important chemicals by our bacterial isolates and making immobilised cell systems for treatment of industrial effluents containing xenobiotic pollutants.
