

---

# **THE ROLE OF MOLECULAR GENETICS IN THE MICROBIAL MANAGEMENT OF ENVIRONMENTAL POLLUTION**

**A. A. M. KUNHI**

DEPARTMENT OF FOOD MICROBIOLOGY  
CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE  
MYSORE-570013

Ever-increasing production and indiscriminate use of myriad of synthetic chemicals have been causing irreparable damage to the environment, during the last few decades. The natural microbial communities, with their unparalleled biochemical versatility, have been able to combat this continuous and unabated onslaught, to a limited extent. But, in the recent years, with the advent of a wide range of substituted, particularly halogenated chemicals, the degradative ability of microorganisms has dwindled, due to their recalcitrance or poor degradation. A number of chlorinated pesticides, chloroaromatics, and a wide range of other haloorganics belong to this group of chemical compounds. It is imperative to isolate microbial strains with degradative potentials, and to improve their catabolic ability through various manipulations, including genetic modifications. It is also observed, often, that the laboratory-developed microorganisms do not perform well in the field. The major reasons for this are chemical heterogeneity and the presence of native microorganisms, the interactions of which lead to "biochemical incompatibility" of the inoculated strain. Hence, it is necessary to increase the substrate range of the inoculant organism, which can be done through various genetic manipulations such as mutation and selection, gene cloning etc. Genes coding for enzymes that are under rigorous regulation can be cloned, for the constitutive production of the enzymes, thus making the pathway more efficient. Or genes from different sources could be collected and recruited to construct novel pathways, which could be cloned into degradative organisms that would increase their substrate range. Molecular genetics thus offer unlimited possibilities to genetically improve degradative microorganisms, which may be effectively deployed in the development of technologies for the elimination of pollutant chemicals from industrial effluents, and for bioremediation of contaminated soils, waste dump sites etc.

---

**Kunhi, A.A.M.** 2000d. The role of molecular genetics in the microbial management of environmental pollution. **Short term course on Molecular Techniques in Microbiology** (9-20, October 2000). Central Food Technological Research Institute, Mysore, India.