
Preface

The laboratory of Molecular Microbiology was established in the year of 1998 at the Department of Botany (now at Department of Biotechnology), North Bengal University. With the aim to contribute knowledge in the field of environmental microbiology, the laboratory undertook a research program for generating the database on sanitary quality of the rivers located in and around Himalayan foothills. The other aspect of study was the exploration of the nature of microbial community that flourished in the waters of the river with special emphasis on the incidence and abundance of the antibiotic and metal resistant bacterial population. In the last three years the laboratory has made considerable progress in the fields of bacterial phylogeny, antibiotic resistance and metal resistance.

While generating database on the sanitary quality of major rivers of northern West Bengal, the author observed fluctuating populations of nickel, copper, cobalt and zinc resistant bacteria in different sampling months in one of the major river (Torsa) of this region. The incidence and abundance of metal resistant bacteria in the waters of the river demanded investigation of the heavy metal content of the river water; but the analysis did not indicate any alarming level of toxicity. The recovery of high percentage of nickel resistant bacteria from such ecosystem, which cannot be regarded as metal contaminated, motivated us to initiate the study on the exploration of the nature of genetic system associated with nickel resistance in some of the Gram-negative Torsa isolates. Among the several metal resistant genetic systems contributing mercury resistance, copper resistance, cadmium resistance, zinc resistance etc., the phenomenon of nickel resistance has attracted the attention of the present author due to its genetic diversity. Six different operons (*ncc*, *cnr*, *nre*, *ncr*, *nir* and *nrs*) contributing nickel resistance have already been discovered and worked out in some detail. These operons were mostly found to locate in large plasmids recovered from the strains isolated from the metal contaminated environments.

The present study has focused on the nature of genetic system(s) conferring nickel resistance in the strains isolated from the waters of Torsa River (exemplary metal uncontaminated ecosystem). The reason behind the fluctuating population of nickel resistant bacteria in a so-called metal 'uncontaminated' ecosystem was investigated. Some of the representatives of nickel resistant bacteria isolated from the river were taxonomically characterized. The nature of the nickel resistance genetic system(s) of these isolates was explored by PCR and Southern hybridization. The cloning and sequencing of unique amplicons followed by sequence analysis allowed to throw some light in describing the nature resistance. The phylogenetic analysis of three nickel-resistant isolates, BB1A, NiVa 51 and NiVas 114, enabled to ascertain the genus and the claim of novel species.
