PREFACE

The knowledge of physiology and metabolism of prokaryotes underpins our understanding of the roles and activities of these organisms in the environment, including pathogenic and symbiotic relationships, as well as their exploitation in biotechnology. Prokaryotic organisms especially bacteria, although remaining relatively small and simple in structure throughout their evolutionary history, exhibit incredible diversity regarding their metabolism and physiology. Such metabolic diversity is reflective of the wide range of habitats where they can thrive and in many cases dominate the biota, and is a distinguishing contrast with eukaryotes that exhibit a more restricted metabolic versatility. Thus, prokaryotes can be found almost everywhere under a wide range of physical and chemical conditions, including aerobic to anaerobic, light and dark, low to high pressure, low to high salt concentrations, extremes of acidity and alkalinity, and extremes of nutrient availability like oligotrophic (nutrient-poor) conditions. The field of microbial physiology has expanded at an incredibly rapid pace. However, knowledge about the physiology of bacteria thriving under oligotrophic conditions is scanty in terms of quality as well as quantity. The objective of the work that has been presented in this thesis was to explore partially the lifestyle of a facultatively oligotrophic bacterium, *Klebsiella pneumoniae* PB12. Since production of exo-polysaccharide was an event triggered in nutrient-deficient condition, the title of the thesis took the form as- "*Exploring physiology of an exopolysaccharide (EPS) producing facultatively oligotrophic bacterium Klebsiella pneumoniae PB12 with special emphasis on structure-function analysis of EPS*". The thesis is divided into four chapters. The first chapter dealt with the screening and identification of EPS-producing bacteria from river water samples. The second chapter revealed the basic growth physiology of *K. pneumoniae* strain PB12. Determination of structure and immunological function of the exopolysaccharide synthesized by *K. pneumoniae* PB12 was elaborately described in the third chapter. The fourth chapter dealt with the biotechnological prospect of exopolysaccharide produced by *K. pneumoniae* PB12 by studying in details the flocculation properties of the EPS. The

overall findings shall definitely enrich the science of oligotrophy and extend the premise of biotechnology application using EPS in bio-remediation.