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Nota di contenuto	Contents ; Contributors; Preface; Foreword; 1: Functional Assignment of Metagenomic Data: Insights for the Microbial Nitrogen Cycle; Introduction; Microbial nitrogen cycle; Exploring the nitrogen cycle using genomic and metagenomic techniques; Terrestrial nitrogen cycle; Aquatic nitrogen cycle; Future scope; 2: Microbial Metagenomics of Oxygen Minimum Zones; Introduction; Metagenomic insights into OMZ metabolism; Drivers of community structure; Challenges; 3: Interactions between Methane and Nitrogen Cycling: Current Metagenomic Studies and Future Trends; Introduction Interactions between methane and nitrogen cyclingCurrent metagenomic studies; Future perspective; 4: Quantification of Functional Microbial Nitrogen Cycle Genes in Environmental Samples; Introduction; N cycle; Analysis of N cycle-related functional communities; cPCR and qPCR; Quantification of functional genes using qPCR; 5: Stable Isotope Probing the Nitrogen Cycle: Current Applications and Future Directions; Introduction; Nitrogen uptake is limited in many environments; The utility of molecular approaches; DNA stable isotope probing; <sup>15</sup> N-DNA stable isotope probing; Nitrogen fixation

Biodegradation and bioremediation; Inorganic N cycling; Organic nitrogen; The way forward; Metagenomics; Combining <sup>15</sup>N-SIP, metagenomic sequencing and flow cytometry; Protein stable isotope probing; Chip stable isotope probing; Conclusions; 6: Application of Metaproteomics to the Exploration of Microbial N-cycling Communities; Introduction; Metaproteomics and the nitrogen cycle; Protein-SIP and the nitrogen cycle; Proteomics of microbial isolates relevant to the nitrogen cycle; Conclusions; Future trends

7: Functional Molecular Analysis of Microbial Nitrogen Cycle by Microarray-based GeoChip: Insights for Climate Change, Agriculture and Other Ecological Studies; Introduction; Microarray technology and functional gene array; GeoChip technology; GeoChip application in investigating N functional genes; Challenges for GeoChip technology and future directions; 8: Functional and Taxonomic Diversity of the Nitrogen Cycling Guild in the Sargasso Sea Metagenomes; Introduction; Taxonomic diversity of the Sargasso Sea microbial communities; Functional diversity of the N-cycling guild in the Sargasso Sea Discussion; Exclusion by filtering; A cautionary tale on ignoring the masses; Future trends; 9: Microbial Nitrogen Cycle: Determination of Microbial Functional Activities and Related N-compounds in Environmental Samples; Introduction; Microbial functional activities of the N-cycle; Determination of some N-compounds relative to the N-cycle; 10: Functional Metagenomics of the Nitrogen Cycle in Freshwater Lakes with Focus on Methylophilic Bacteria; Introduction; Functional metagenomics uncover the dominant methylophilic bacteria, Methylobacter and Methylophilum, and identify nitrogen metabolism strategies Nitrate supplement causes specific responses by the Methylophilaceae ecotypes

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Sommario/riassunto

The nitrogen (N) cycle is one of the most important nutrient cycles on the planet, and many of its steps are performed by microbial organisms. During the cycling process, greenhouse gases are formed, including nitrous oxide and methane. In addition, the use of nitrogen fertilizers increases freshwater nitrate levels, causing pollution and human health problems. A greater knowledge of the microbial communities involved in nitrogen transformations is necessary to understand and counteract nitrogen pollution. This book - written by renowned researchers who are specialized in the most relevant and

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