
Preface

Nitrogenase is a complex metalloenzyme that catalyzes one of the most remarkable chemical transformations in biological systems: the nucleotide-dependent reduction of atmospheric dinitrogen to bioavailable ammonia (designated biological nitrogen fixation). The fundamental significance of this process has prompted vigorous research on nitrogenase. However, few problems in protein biochemistry have proven to be as challenging and recalcitrant as the molecular description of nitrogenase. Although progress has been made toward deciphering the enzymatic and biosynthetic mechanisms of this enzyme system, further development is hampered by the complexity of nitrogenase that makes it impossible to study this enzyme by any singular method. To overcome this problem, the research area of nitrogen fixation has evolved into a highly interdisciplinary field that tackles the remaining questions of nitrogenase mechanism and biogenesis with a combination of methods. This volume attempts to provide an up-to-date, in-depth overview of the methods that have been applied to studying the nitrogenase at a molecular level. A large ensemble of approaches is covered in this volume, ranging from genetic, biochemical, spectroscopic, and chemical methods to theoretical calculations. In addition, techniques used to study an enzyme system that is homologous to nitrogenase are described in this book. A project of this scope requires the timely cooperation of many participants, and I greatly appreciate the willingness of all authors to face and meet such a demanding schedule. I hope that this volume, written by recognized experts in their particular areas, will be useful for anyone who is interested in nitrogenase research and who is willing to take charge of addressing the remaining mechanistic and biosynthetic questions of this fascinating enzyme system.

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<http://www.springer.com/978-1-61779-193-2>

Nitrogen Fixation

Methods and Protocols

Ribbe, M.W. (Ed.)

2011, X, 326 p. 72 illus., Hardcover

ISBN: 978-1-61779-193-2

A product of Humana Press