Preface

Biodiversity is the outcome of successive periods of evolution for over three billion years. From simple unicellular microbes to the complex human body, all are equally important components of biodiversity, interacting to form functional ecosystems. Biological resources have sustained human society over thousands of years and the diversity of these resources has been exploited for three basic necessities: food, clothes, and shelter by pre-historic people as well as modern mankind. Recognizing the enormous value of biodiversity for present and future generations, the United Nations Conference on Environment and Development (the Rio "Earth Summit") proclaimed the Convention on Biological Diversity (CBD) in 1992. Through this global agreement, 193 nations aspire to the "conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources" [1]. Furthermore, the United Nations have declared the present decade (2011–2020) as the "United Nations Decade on Biodiversity." With the objective of stopping biodiversity loss and in the long run regaining the lost biodiversity, governments agreed to the "Strategic Plan for Biodiversity 2011–2020 and the Aichi Targets." Among the five targets, "enhancing the benefits to all from biodiversity and ecosystem services" is one important strategic goal. Against this backdrop, I consider the publication of this book very well-timed.

The Article 2 of the CBD defines biotechnology as "any technological application that uses biological systems, living organisms, or derivatives thereof, to make or modify products or processes for specific use" [2]. The major facets of our lifestyle that have been touched by biotechnology are agriculture, medicine, bulk products, environment, and energy. Biodiversity is intricately linked with the provision of services by biotechnology. The diversity of food and fiber crops is crucial to feed, clothe, and house the growing population, particularly in the developing world. According to the World Health Organization, better knowledge of the earth's biodiversity is vital for future medical and pharmacological discoveries that will keep us away from death and disease. The bioprocess industry is looking for new enzymes and metabolites that resist harsh industrial manufacturing conditions like extremes of temperature, pH, and pressure. Biodiversity holds the

key. The rate and extent of bioremediation can be significantly increased by the application of novel organisms, hence the importance of biodiversity in environmental protection. As predicted by the "International Energy Outlook 2013," the world's energy consumption would increase by a massive 56 % between 2010 and 2040 and the demand would be highest in China and India. Biodiversity has the potential to provide novel bioresources to meet this demand.

Accordingly, the chapters of this book have been selected to cover the spectrum of biotechnological applications of biodiversity. In "Current Issues in Cereal Crop Biodiversity" Danilo E. Moreta and colleagues write about the biodiversity of cereal crops such as rice, wheat, maize, millets and an emerging staple food, quinoa. In "Biodiversity in Production of Antibiotics and Other Bioactive Compounds" Girish Mahajan and Lakshmi Balachandran have highlighted the importance of the diversity of microbes in providing leads for the development of new drugs. In "Medicinal Plants, Human Health and Biodiversity: A Broad Review," Tuhinadri Sen and Samir Samanta emphasize the role of plant biodiversity in affording botanical drugs and herbal medicines on which the majority of the world's population (particularly in the developing countries) are dependant. İpek Kurtböke and co-authors, in "Eco-Taxonomic Insights into Actinomycete Symbionts of Termites for Discovery of Novel Bioactive Compounds" review the microbial diversity of a very small ecosystem, the termite gut and its potential to deliver a wide range of useful bioproducts. In "Bioresources for Control of Environmental Pollution" Barindra Sana describes the diversity of plants, microbes, and lower eukaryotes and their application in bioremediation of environmental pollutants. In "Organisms for Biofuel Production: Natural Bioresources and Methodologies for Improving Their Biosynthetic Potentials," Guangrong Hu and colleagues write about the diverse plants, algae, yeasts, and bacteria as producers of biodiesel, gasoline, jet fuel, alkanes, and hydrogen. Taxonomical listing of species currently used or being explored vis-à-vis the bases of their selection for biotechnological applications have been presented by the authors. Modern approaches to discover new biodiversity have also been discussed. Conservation strategies form an important part of the chapters. Commercial biotechnological processes exploiting biodiversity have also been focused.

Legal and policy issues in biodiversity are gaining importance alongside the scientific and technological innovations for its exploitation. Unfortunately, a north-south conflict exists on the utilization of biological diversity. The global south (comprising mostly of developing nations) is rich in biodiversity but has limited access to advanced technology, while the global north (consisting of developed countries) is bioresource poor but possesses the economic power and scientific technology required for commercialization of bioresources. Repeatedly, the south has accused the industrialized north of biopiracy [3]. To prevent the commercialization of biodiversity without paying rational compensation to the rightful owners, the "Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization" was adopted by the governing body of the CBD in 2010. This international agreement strives for "sharing the benefits arising from the utilization of genetic resources in a fair and equitable way,

including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding, thereby contributing to the conservation of biological diversity and the sustainable use of its components" [4]. It is hoped that successful implementation of the Nagoya Protocol will ease the north-south conflict and promote congruous biotechnological applications of biodiversity not only for us but also for the generations to come.

I thank the Managing Editor, Prof. Dr. Thomas Scheper and the Publishing Editor, Elizabeth Hawkins for giving me the opportunity to edit this book on a very important global issue. I thank the authors for spending their valuable time preparing their excellent contributions. My sincere thanks also go to all the reviewers for their meticulous corrections that vastly improved the manuscripts. I hope the readers will find every chapter interesting and informative.

Kolkata, India, April 2014 Joydeep Mukherjee

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http://www.springer.com/978-3-662-45096-3

Biotechnological Applications of Biodiversity
Mukherjee, J. (Ed.)
2015, IX, 229 p. 28 illus., 8 illus. in color., Hardcover
ISBN: 978-3-662-45096-3