Preface

From dawn till dusk I sit here before my door and I know the happy moment will arrive of a sudden.
When I will surely see… In the meanwhile the air is filling with the perfume of promise.

Rabindranath Tagore (Gitanjali: Song of offerings)

Proteases, for a long time have received the attention of biochemists as degrading enzymes. The first scientific documented research was published by P.A. Levine entitled "The Cleavage Products of Proteoses" in the first issue of the *Journal of Biological Chemistry* (October 1, 1905). Now, after about 110 years and with more than 468,000 entries in MEDLINE database, proteases remain one of the focused topics of current research. Approximately 2% of the genes in most organisms are transcribed for proteases, which is second in number only to transcription factors. Proteases are involved in virtually every physiological and pathological process. Thus, proteases are considered as one of the important targets in drug development.

Proteases have likely arisen at the earliest stage of protein evolution as simple destructive enzymes necessary for protein catabolism and generation of amino acids in primitive organisms. For many years, studies on proteases have been focused mainly on their roles associated with protein degradation. However, it has now become clear that their role is not limited to breaking down of proteins and have multiple functions: it modulates enzymes activity, regulates membrane function, alters receptor channel properties, affects transcription, cell cycle, and reproduction, forms active peptides and many more than we had assumed. The hydrolysis of peptide bonds often involves multiple steps, for example, ubiquitination often requires the activity of enzyme complexes. Their activation, modification, and inactivation, therefore, play important roles in biological functions. Inhibitors of many of the proteases have now been well characterized and they attract much importance because of their great therapeutic potential in a number of diseases and some of which are already in clinical use.

Proteolytic enzymes, which are known to play important roles in numerous cellular and extracellular processes in health and diseases, are characterized. In addition to new discoveries of proteolytic principles in a variety of biological systems, proteases have gained importance as laboratory tools in the experimental

investigation of peptides and proteins. An outstandingly large number of publications on recent developments led to the recognition of the serine, cysteine (especially calpains and caspases), metallo-, threonine, glutamic, and aspartic proteases in different diseases such as allergy, asthma, atherosclerosis, cancer, AIDS, Alzheimer's and Parkinson's diseases, and also parasite-mediated diseases such as malaria and leishmaniasis. Substantial data have been accumulated implicating the role of proteases in numerous types of cancers including cancer of the breast, the gastrointestinal and urological tract, the lungs, and the brain. A strong and substantial clinical relation exists between matrix metalloproteases (MMPs) and cancer, and they are widely studied to predict disease progression among cancer patients. There is substantial hope that substances designed to affect MMPs or turn off the MMPs activation may prove useful for treatment against a variety of cancers, which could open new avenues in cancer therapy.

In this book, we have presented 24 state-of-the-art articles. Several contributors in this book illuminate our understanding on the role of different proteases with their findings, interests, and problems. We are confident that researchers' especially young scholars will benefit out of that. Some of these articles emphasize existing concepts while some shed light on newer ideas. In fact, these are the flowers of the spring. So, "let a hundred flowers blossom and a hundred schools of thought contend."

We like to extend our sincere thanks to all the authors for their excellent writing skills covered with current information that make every article a pleasure to read. We are thankful to Dr. Naren Agarwal, Dr. Madhurima Kahali, Dr. Nidhi Chandhoke, and Dr. Praveen Kumar (Biomedical Division, Springer, New Delhi) for the time and energy they spent for achieving our goal. We are also thankful to Prof. Sankar Kumar Ghosh, Vice Chancellor, University of Kalyani for his encouragement.

Kalyani, India — Sajal Chakraborti
Kalyani, India — Tapati Chakraborti
Winnipeg, Canada — Naranjan S. Dhalla

http://www.springer.com/978-981-10-3161-8

Proteases in Human Diseases

Chakraborti, S.; Chakraborti, T.; Dhalla, N.S. (Eds.)
2017, XVII, 513 p. 63 illus., 52 illus. in color., Hardcover
ISBN: 978-981-10-3161-8