About the Editors

Clemente Capasso

Clemente Capasso obtained his MSc in biology *cum laude* at the University of Naples 'Federico II' (Italy). His research interest at the Italian National Research Council (CNR; Rome, Italy) from 1992 to date has been the study of the structure/function relationship of both native and recombinant proteins from terrestrial and marine organisms. In particular, he studied metallothioneins and aspartic proteinases in Echinoderms and Antarctic fish. This research activity has allowed him to acquire extensive knowledge of most protein purification procedures as well as kinetic, chemical–physical and structural characterization of enzymes. He also has experience with molecular biology techniques, such as nucleic acids isolation, cloning and expression of recombinant proteins and enzymes in *Escherichia coli*. Recently, his research activity has been focused on the investigation of enzymes involved in the hydration of CO₂ (carbonic anhydrases) in extremophilic microorganisms. The preliminary results of this study are helpful in developing new methodologies for the use of enzymatic systems in biotechnologies. All of these activities have led to more than 50 publications in peer-reviewed journals. He has a long and strong scientific background, developed over 15 years of experience acquired by intense training in Italian and international laboratories. He is the Associate Editor of *Journal of Enzyme Inhibition and Medicinal Chemistry*, and is on the Editorial Board of the journal *Expert Opinion on Therapeutic Patents*.

Claudiu T Supuran

Claudiu T Supuran received his BSc in chemistry from the Polytechnic University of Bucharest (Romania) in 1987, and PhD in chemistry from the same university in 1991. In 1990, he became Assistant and then Associate Professor of Chemistry at the University of Bucharest. In 1995, he moved to the University of Florence (Italy), where he is currently a Professor. His main research interests include medicinal chemistry, design of enzyme inhibitors and activators, heterocyclic chemistry, chemistry of sulfonamides, sulfamates and sulfamides, biologically active organoelement derivatives, QSAR studies, x-ray crystallography of metalloenzymes, metal complexes with biologically active ligands (metal-based drugs), carbonic anhydrases, cyclooxygenases, serine proteases, matrix metalloproteinases, bacterial proteases and amino acid derivatives, among others. He has published two books and more than 820 papers in these fields. He is the Editor-in-Chief of *Journal of Enzyme Inhibition and Medicinal Chemistry*, and of *Expert Opinion on Therapeutic Patents*.

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Foreword

Targeting carbonic anhydrases

Clemente Capasso
& Claudiu T Supuran

Carbonic anhydrases (CAs) are metalloenzymes that are intensely investigated due to the biomedical applications of their inhibitors and because they are involved in many crucial physiologic and pathologic processes. CAs equilibrate the reaction between three simple but essential chemical species: CO₂, bicarbonate and protons, which are all essential molecules/ions in important physiologic processes in all life kingdoms (Bacteria, Archaea and Eukarya), throughout the tree of life.

This book presents a collection of chapters dealing with the latest developments in CA research, which has experienced an important revival in the last 5 years, with the discovery of several classes of inhibitors and their mechanisms of action, as well as the validation of some human CA isoforms as antitumor/antimetastatic drug targets. Indeed, sulfonamide/sulfamate CA inhibitors are clinically used as diuretics, antiglaucoma, antiepileptic and antiobesity agents.

After a general overview of CAs belonging to the five genetically distinct families, the main class of inhibitors, the sulfonamides and their isosteres (sulfamates, sulfamides) are presented in several chapters. They deal both with the primary sulfonamides as well as the less investigated secondary/tertiary ones, a recently described new chemotype among these pharmacological agents.

The totally new classes of CA inhibitors discovered in the last few years, such as the polyamines, phenols, coumarins and dithiocarbamates/xanthates are dealt with in the subsequent chapters. Bacterial, fungal and protozoan CAs and their targeting are discussed in the next chapter, while the last two chapters deal with the less investigated (up to now) CA activators, as well as the biotechnological applications of these enzymes in the CO₂ capture processes and other applications.

As this research field is a highly dynamic one, we consider that the present book offers the latest and most up-to-date findings related to CAs and their inhibitors/activators. Our hope is that the next few years will be as prolific as the last ones in the investigation of these incredible enzymes and their modulators of activity.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.