

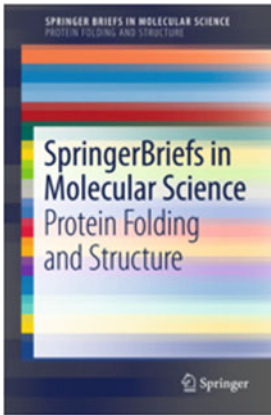
SpringerBriefs in Molecular Science

Protein Folding and Structure

Series editor

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Prepared by leading experts, the Springer Briefs subseries on *Protein Folding and Structure* contains diverse types of contributions, from snapshot volumes that allow fast entry to a general topic to those covering more specialized aspects in the field of protein folding and structure. In common, these *Briefs* aim at covering essential concepts, methodologies and ideas in the context of contemporary research in protein science. Through these compact volumes, this series serves as a venue for publication between typical research papers, review articles and full books, and aims at a broad audience, from students to researchers in academia and industry.

About the Editor



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Springer Briefs subseries on Protein Folding and Structure, which launched its first volume in 2014.

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Cláudio M. Gomes · Patrícia F. N. Faísca

Protein Folding

An Introduction

 Springer

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In memory of Professor Mark T. Fisher (1954–2018), a dear friend and expert on protein folding whose fascination by the GroEL folding chaperonin, one his favourite molecular machines, was only surpassed by his curiosity and keen spirit.

Mark Fisher in Lisbon,
February 2010

Preface

Understanding protein folding is essential to understand Biology, as this self-organising process is essential for life. Proteins are fascinating macromolecules that perform a myriad of biological functions, from catalysis to signaling and structure maintenance, just to mention a few examples. To be able to perform their functional role, most proteins must fold into a specific three-dimensional structure, the so-called native state, whose coordinates are exclusively dictated by the protein's amino acid sequence termed primary structure. Within this statement lies one of the mind-blowing facts in Protein Science—the realisation that a given linear chain of amino acids encodes all the required information to fold the polypeptide into the native structure, as well as one of the major open questions in the field—what are the rules that dictate such specific and unique protein structure. And it is all about Physics and how Biology harnesses it!

This sixth volume of the *Springer Briefs series on Protein Folding and Structure*, which is also my inaugural contribution to the series as a co-author of this volume, introduces the reader to the fundamentals of protein folding in its multiple perspectives. The first three chapters organise current knowledge departing from basic, yet complex, questions: How is protein structure maintained? Why is structure acquired? And, how is it acquired? These chapters encompass the fundamental concepts and provide the reader with a perspective on how knowledge evolved over the last decades. We then turn to protein folding in vivo, disclosing the biological perspective of the problem and influence of the cellular milieu on a process, which is otherwise strictly ruled by the laws of Physics. By examining protein misfolding in the context of human disease, we highlight the very important biomedical and societal dimension of protein folding research, which encompasses several amyloid-forming neurodegenerative diseases such as Alzheimer's, among numerous others. The volume closes with a timely chapter on selected methods for protein folding research.

As a Series Editor, my expectation is that this volume will become a valuable resource to students in the biological and physical sciences, a primer to those wishing to enter the field or a key source of references for established researchers. As an author, I also hope that this book successfully conveys the fascination for a

research topic at the forefront of modern molecular biology and that many of its younger readers will choose one of the many facets of protein folding as their future research topic.

Lisbon, Portugal
November 2018

Cláudio M. Gomes
Editor, Springer Briefs series on Protein
Folding and Structure

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The authors are long-lasting friends who share a passion for protein folding. Having had distinct academic backgrounds and tracks, they are now faculty members at the University of Lisbon, where they teach and research in a highly collaborative environment.

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