Preface

The main objective of this book is to introduce readers to contemporary integrated structural biology approaches. Selected examples of current developments in solution and solid-state nuclear magnetic resonance (NMR) spectroscopy, dynamic nuclear polarization (DNP), electron paramagnetic resonance (EPR), cryo-electron microscopy (cryo-EM) and cryo-electron tomography (cryo-ET), time-resolved X-ray crystallography, in-cell NMR, chemically induced dynamic nuclear polarization (CIDNP) and atomic force microscopy (AFM) are presented. In particular, the unique ability of magnetic resonance to provide atomic-level information in solution and in the solid state is highlighted through multiple case studies discussed in the book. Not only are applications to structural characterization described but also ways to uncover mechanisms in complex biological systems. Integrating the data obtained from more than one methodology is a common thread in all chapters, as well as a demonstration of the importance of using several techniques synergistically to address problems at the forefront of structural biology. These include elucidating the structural features of ribosomes, intact viruses and viral protein assemblies, cytoskeleton protein assemblies, membrane proteins, photoreceptors and photosynthetic reaction centres, nucleic acids and protein–nucleic acid complexes, large enzyme complexes, and whole cells.

The book is aimed at both practitioners in the different structural biology methodologies as well as scientists who are interested in entering the field.

We thank all the authors for sharing their ideas, discussing current results, and providing their perspectives in this rapidly evolving field.

Tatyana Polenova, Caitlin M. Quinn and Angela M. Gronenborn

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