Preface

Since the first edition of this book, the intersection of protein science and nanotechnology has become an exciting frontier in interdisciplinary sciences. Proteins exist naturally on the nanoscale, which, coupled with our increasing ability to control their form and function, makes them obvious candidates to play a lead role in nanotechnology. Increasingly this potential is being recognized and realized, and we hope that this book plays a role in inspiring more research in this burgeoning field.

After an introductory chapter, this volume has three parts. The first, “Old proteins, new tricks,” highlights examples of proteins that are generally well understood in the biological world, which are being harnessed for a wide range of applications, some more developed than others. We begin with the silk proteins, and other fibrous proteins, followed by chapters that highlight the increasingly recognized potential of amyloid fibrils, hydrophobins, and S-layer proteins for bionanotechnological applications. In the next part “New proteins,” we take a look at engineering proteins for specific ends, how we might characterize these, and the sorts of uses to which these new proteins might be put. In the last part “Tools of the trade,” we give an overview of the sorts of tools that are now readily available to manipulate the structure and function of proteins, both rationally and using methods inspired by evolution. We also take a look at some instrumental methods that are important for studying protein nanostructures as they assemble. Together, the aim is to provide an overview of this multifaceted field and a useful guide to those who wish to contribute to it.

Christchurch, New Zealand

Juliet A. Gerrard
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