
Preface

Proteins are the cell's workers, their messengers and overseers. In these roles proteins specifically bind small molecules, nucleic acid and other protein partners. Cellular systems are closely regulated, and changes in the populations of particular protein complexes or products of protein-mediated reactions by as little as a factor of 2 can switch cells from one state to another, from growth to stasis, from replication to apoptosis. Such changes in populations correspond to very small effects on thermodynamics or kinetics of reactions. Consequently, detailed characterization of protein interactions is of paramount importance in a quantitative and integrative biology, which aims to understand biological systems in terms of their molecular components.

Further, interfering with the interactions of proteins is the dominant strategy in the development of new pharmaceuticals. The discovery of novel small-molecule ligands, the characterization of their interactions with protein targets and the use of that information in guiding development of an inhibitor into a drug is a key component of the early stages of creating new medicines.

This volume aims to provide a complete introduction to common and emerging procedures for characterizing the interactions of individual proteins. All stages of the research process are covered—from the initial discovery of natural substrates or potential drug leads to the detailed quantitative understanding of the mechanism of interaction. We focus on those techniques that are, or are anticipated to become, widely accessible; that are performable with mainstream commercial instrumentation.

Much of this volume is aimed particularly at researchers new to the field of biophysical characterization of protein interactions—whether beginning graduate students or experts in allied areas of molecular cell biology, microbiology, pharmacology, medicinal chemistry or structural biology—who need to characterise their protein's interactions in greater detail. There is a particular emphasis on obtaining good quality data and helping the researcher understand whether or not they have succeeded in doing so.

We hope that the breadth of coverage and detailed consideration of technical issues will also serve as a reference for the professional molecular biophysicist “straying” outside their area of specific expertise.

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