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Volume 298

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Molecular Motors and the Cytoskeleton Part B

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Richard B. Vallee

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MOLECULAR MOTORS AND THE CYTOSKELETON

Part B

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Preface

This volume is the fourth in the *Methods in Enzymology* series on the same general topic. The first two volumes (85 and 134) were entitled "Structural and Contractile Proteins: The Contractile Apparatus and the Cytoskeleton." The title was changed to its current version with the third volume (196). The structural and functional complexity of cytoplasm was undreamed of a few decades ago and has been one of the great surprises of modern cell biology. These volumes represent a compilation of methodological information on the three major filament systems—F-actin, microtubules, and intermediate filaments—as well as on a number of cytoskeletal structures which lie outside these categories. The topics covered reflect the increasing diversity of isoforms, regulatory factors, and motility proteins that have been identified so far.

The rapid pace of discovery of new proteins and novel activities continues unabated and is reflected in the contents of this volume. Much of this information originated from genetic and molecular analysis, and a clear trend has been to produce and characterize polypeptides identified by these approaches and others by recombinant means. Common methods have emerged for the preparation of diverse proteins, making the art of protein purification and handling seem to be of decreasing value. However, many aspects of the behavior of individual proteins are distinctive, and the need for unique methods for the purification of recombinant proteins is becoming more appreciated, as revealed in this volume.

The need to understand protein–protein interactions has also become increasingly evident. Thus, although many interactions can be reproduced using recombinant proteins, the need to visualize, preserve, and isolate complexes with minimal perturbation has become of great interest. Methods to identify and isolate complexes with minimal manipulation are included in this volume. The case of the kinesin and myosin protein families is particularly revealing. Within the past few years there has been a remarkable proliferation of myosin-related and kinesin-related genes and their products, and analysis of recombinant motor domains has proceeded at a rapid pace. Gradually the newly identified proteins are becoming realities in the test tube, and each has its unique behavior and biochemical complexity. This trend is likely to follow for most, if not all, of the kinesin-, myosin-, and dynein-related genes. Methods to isolate novel myosin- and kinesin-related holoenzyme complexes are described in this volume, and future volumes promise to reflect a dramatic increase in the purification of these proteins from their cell and tissue sources.

Many of the energy-utilizing proteins of the cytoskeleton catalyze novel enzymatic reactions involving force-producing, filament-severing, and other nonconventional activities. New methods to monitor these activities both *in vivo* and *in vitro* have been essential to progress in the field and are included in this and in previous volumes.

A number of colleagues have provided valuable help in surveying the current state of the field and identifying topics of value for this volume. I am particularly grateful to Drs. Elizabeth Luna, Yu-li Wang, Kevin Vaughan, and Jorge Garces for their advice and assistance.

RICHARD B. VALLEE

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