

# Preface

Paul Wintrebert, a French embryologist, was the first to introduce the concept and the term of cytoskeleton (cytosquelette in French) in 1931. Since then, much has been learned about the organization and structure of the cytoskeleton in many types of cells. In no cell is the cytoskeleton more complex and well developed than in the nervous system, where the remarkable polarity of neurons and the extensive process formation in several types of glial cells are especially reliant on this superstructure. *The Cytoskeleton of the Nervous System* is intended to help bring together key advances from the enormous body of information relevant specifically to the cytoskeleton in the nervous system. The cytoskeleton of neurons is comprised of three main components - microtubules, neurofilaments, and actin filaments - which are important for axonal transport along long distances, establishing the uniquely polar cellular shapes, and providing a scaffold for regulating the topography and function of axonal and synaptic proteins and organelles. Alterations of cytoskeleton function in neurons are linked to the development of major neurodegenerative disorders such as Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis, and a host of others. Glial fibrillary acidic protein replaces neurofilaments and is the main intermediate filament component of the cytoskeleton in astrocytes, and mutations in this gene product cause Alexander disease. New technologies such as live-cell imaging and genetic engineering to create an array of in vivo models have powered the exponential development of our knowledge of the cytoskeleton in the nervous system. The topics included in the areas covered were selected to capture this technical progress and conceptual development.

This monograph begins with a general description of the cytoskeleton in axonal development and pathology and then moves to more detailed descriptions of particular components, including microtubules and associated proteins, neurofilaments and interacting proteins, actin and its binding proteins, and glial fibrillary acidic protein. The later chapters focus on the functional significance of the neuronal cytoskeleton in axonal transport and its regulation in health and disease states. Because each chapter is intended to read as a self-contained review of a specific topic, some unavoidable overlaps between them may exist. We hope that, by bringing relevant data together, "The Cytoskeleton of the Nervous System" will encourage further

development of unifying principles and stimulate new conceptual and technical approaches toward a better understanding of cytoskeleton functions in health and disease.

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