

Preface

The synapse is a fascinating structure for many reasons. Biologically, it is an exquisitely organized subcellular compartment that has a remarkable capacity for fidelity and endurance. Computationally, synapses play a central role in signal transmission and processing that represent evolution's solution to learning and memory. Nervous systems, including our own brains, possess an extraordinary capacity for adaptation and memory because the synapse, not the neuron, constitutes the basic unit for information storage.

Because the molecular complexities underlying signal processing and information storage must occur within the tiny space of the synapse, the precise molecular organization of proteins, lipids, and membranes at the synapse is paramount. Given the central role of the synapse in neuronal communication, it comes as no surprise that dysregulation of the synapse accounts for many, if not most, neurological and psychiatric disorders. Clinically, the synapse thus constitutes a prime target for treatments of these diseases.

It is for these reasons that we have chosen to focus our work on deciphering the structural and functional organization of the synapse. We have assembled leaders in the field of synapse biology to describe and distill the wonders and mysteries of the synapse. This book provides a fundamental description of the synapse developed over many decades by numerous investigators, paired with recent insight into new aspects of synapse structure and function that is still in flux and at the cutting edge of research.

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We are grateful for the exceptional efforts of our contributing authors, without whom this book would not have been possible. Their willingness to take time from their busy research schedules to share their insight and ideas with the breadth and depth that allow us to compile a collective work that is illuminating and useful, for both the general biologist and specialized neuroscientist, is very much appreciated. We express our gratitude to our assistants Ms. Susan Harward and Ms. Sue Birely for their professionalism and help with the book layout and proof reading. Lastly, we would like to thank our families (Laura and Henrik, Mary, Solon, Anselm, and Hans), who provided the support, encouragement, inspiration and comic relief, that in many ways helped to make this book possible.

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Editors

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