

Preface

DECIPHERING THE EVOLUTIONARY AND DEVELOPMENTAL MECHANISMS that shape the architecture of neuronal circuits promises to reveal the principles by which brains enable behavior and cognition. In recent years, rapid technical and conceptual advances in neuroanatomy, molecular genetics, physiology and theory have enabled deep insights into these mechanisms across model systems ranging from flies to humans.

This volume brings together perspectives from investigators who have driven these discoveries. A key theme across articles is the leveraging of evolutionary change, both divergent and convergent, across species to provide a larger framework for neuronal circuit design and function. This evolutionary theme is integrated with developmental perspectives, illustrating how conserved molecular building blocks and selection pressures have given rise to both shared and divergent circuit motifs across species, and leads to a series of articles covering the mechanisms and principles of circuit assembly. This major theme dissects how molecular, cellular, functional, and theoretical approaches have all been used to understand the development of diverse cell types and circuits in the brain, to offer a tantalizing view on a rapidly expanding field of neuroscience.

Together, the chapters collected here offer a view of how neural circuits develop, diversify, and function. While no single volume can capture the full breadth of this field, we hope that the contributions assembled here will serve both as a resource for specialists and as an entry point for students and investigators from neighboring disciplines.

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Laura C. Andreade
Justus M. Kebschull
Anthony M. Zador