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Mathematical and Computational Biology Series

Quantitative methods are revolutionizing modern molecular and cellular biology. Groundbreaking technical advances are fueling the rapid expansion in our ability to observe, as seen in multidisciplinary studies that integrate theory, computation, experimental assays, and the control of microenvironments. Integrating new experimental and theoretical methods, **Quantitative Biology: From Molecular to Cellular Systems** gives both new and established researchers a solid foundation for starting work in this field.

The book is organized into three sections:

1. **Fundamental Concepts** covers bold ideas that inspire novel approaches in modern quantitative biology. It offers perspectives on evolutionary dynamics, system design principles, chance and memory, and information processing in biology.
2. **Methods** describes recently developed or improved techniques that are transforming biological research. It covers experimental methods for studying single-molecule biochemistry, small-angle scattering from biomolecules, subcellular localization of proteins, and single-cell behavior. It also describes theoretical methods for synthetic biology and modeling random variations among cells.
3. **Molecular and Cellular Systems** focuses on specific biological systems where modern quantitative biology methods are making an impact. It incorporates case studies of biological systems for which new concepts or methods are increasing our understanding. Examples include protein kinase at the molecular level, the genetic switch of phage lambda at the regulatory system level, and *Escherichia coli* chemotaxis at the cellular level.

In short, **Quantitative Biology** presents practical tools for the observation, modeling, design, and manipulation of biological systems from the molecular to the cellular levels.



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