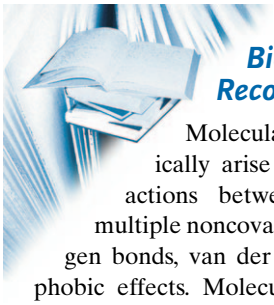


Cellular and Biomolecular Recognition

Molecular recognition events typically arise from the specific interactions between molecules through multiple noncovalent bonds such as hydrogen bonds, van der Waals forces, or hydrophobic effects. Molecular recognition interactions are ubiquitous in biology, where they play a central role in the context of biological information transduction. They are the chemical basis of diverse phenomena such as cell signaling, the immune response, and gene regulatory interactions.

As it is often difficult to study these interactions in their original biological context, mimicking cellular and molecular recognition processes by using synthetic molecules or nanostructures can provide new insights into the nature of these interactions. In applications, they can form the basis of new drugs, targeted delivery systems, or biosensors.

In 13 chapters, *Cellular and Biomolecular Recognition*, edited by Raz Jelinek, covers a broad range of topics related to novel multidisciplinary approaches to understanding and utilizing such molecular recognition events in biology.

A major part of the book is devoted to innovative chemical methods for the synthesis of nonbiological molecules or structures participating in cellular and biomolecular interactions. Chapter 4 introduces the molecular imprinting technique, which allows the development of polymer-based "cavities" that specifically recognize target molecules. Several applications as chiral drug sensors are presented. In Chapter 2, the same technique is discussed as a method to define binding sites on nanoparticles, and molecularly imprinted polymers are compared with other functional nanoparticle shells. Interesting synthetic approaches to the development of catalytic antibodies for targeted chemotherapy are discussed in Chapter 5. Chapter 6 is devoted to natural and synthetic stimulators of the immune response based on bacterial membrane components, while Chapter 8 discusses synthetic polymeric and supramolecular recognition elements for proteins. Chapter 10 deals with synthetic peptides and peptidomimetics that interact with biological membranes and may find applications as antimicrobial agents, for example. Chapter 1 discusses applications of chemically modified virus particles, a subject that seems to be somewhat marginal in the context of the other contributions.

The remaining chapters are devoted to the physical detection and characterization of biomolecular and cellular interactions. Chapter 3 describes the use of atomic force spectroscopy combined with fluorescence microscopy to investigate the interactions between silica particles and cells, and Chapter 9 discusses the surface plasmon resonance technique as a tool to study biomolecular interactions. Chapter 12 is concerned with the utilization of a variety of metabolite binding proteins as biosensors. Finally, Chapters 7, 11, and 13 deal with various optical sensing technologies such as the use of fluorescent conjugated polymers, fluorescence resonance energy transfer between fluorescent colloidal quantum dots, and biosensors based on fluorescent proteins. The chapters are generally well written, and most of the authors do a very good job of introducing their particular approach to the topic of the book.

It is hard to embrace all aspects of a broad and general subject such as *Cellular and Biomolecular Recognition* within a rather limited space. The editor Raz Jelinek copes with this challenge by restricting the contributions to *Synthetic and Non-Biological Molecules* (the subtitle of the book) and emphasizing multidisciplinary approaches at the boundaries between biology, chemistry, pharmaceutical sciences, and biophysics.

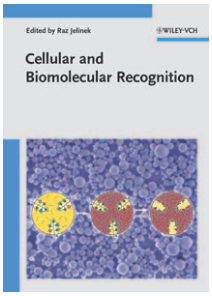
Even with this restriction, each contribution deals with a unique system and uses different experimental techniques, and superficially the overlap between the different chapters seems to be rather small. However, when reading through the chapter contributions, one realizes that the concept of synthetically generated molecular recognition interactions indeed pervades this book, and that the various topics and ideas are not so different after all.

The book does not serve as a general introduction to the topic of "biomolecular recognition"—which a reader might have expected from the very general title—but it gives an extremely interesting and up-to-date overview of various developments in this active research area of chemical biology, which aims at the study and manipulation of biological systems by synthetic methods. The subtitle of the book is, therefore, essential to understand its scope.

Consequently, this compilation is highly recommended to a readership that seeks a condensed and advanced survey of the diverse aspects and applications of biomolecular recognition in the context of synthetic and biomimetic assemblies. Particular emphasis is put on biomedical applications and biosensing. The chapters of this book also provide good starting points and reference lists for further study.

Friedrich Simmel
Physics Department, Technical University of Munich (Germany)

DOI: 10.1002/anie.200907317



Cellular and Biomolecular Recognition
Synthetic and Non-Biological Molecules. Edited by Raz Jelinek. Wiley-VCH, Weinheim 2009. 349 pp., hardcover € 139.00.—ISBN 978-3527322657