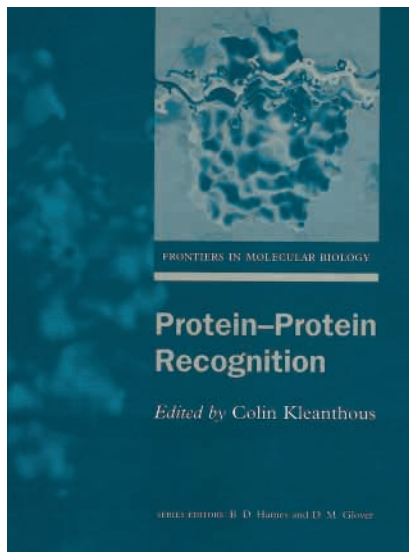


Get an update on protein-protein communication



Protein-Protein Recognition

edited by Colin Kleanthous

Oxford University Press (2000) 314 pages. ISBN 0-19-963760-1

£65

Protein-protein recognition is at the heart of almost all intracellular and extracellular communication. Signalling pathways, respiration, enzyme regulation and the immune response all involve processes that are based on interactions between proteins, indicating that such interactions are involved in cellular responses at various levels.

Although most of our knowledge of the microcosmos of the cellular world is based on protein-protein interactions, our knowledge of the molecular/structural basis of these interactions is very limited. In the so-called postgenomic era, bioinformatics is developing tools (algorithms) to predict protein-protein interactions on the basis of the information deposited in the ever-expanding sequence databases. This means that we know many proteins interact, but we do not know how. However, molecular biologists, physicists and chemists have developed a large repertoire of methods to explore protein-protein recognition.

Colin Kleanthous has now taken the time to edit a book that summarizes our current understanding of how protein-protein recognition works on a molecular level. The book comprises nine chapters, covering a number of topics, which range from basic aspects of protein-protein interaction (Chapters 1 and 2) to highly specialized biological systems in which protein communication is of major importance (Chapters 3-9).

Two excellent introductory chapters open the book, outlining the problems of kinetics and thermodynamics as well as of structural classification. The first chapter (by Janin) provides the reader with background knowledge on how to investigate protein-protein recognition in general, considering thermodynamics, structural analysis, energetics and kinetics and specificity. The second chapter (by Jones and Thornton) illuminates the problem on the basis of structural information available. Aspects of classification, structural properties, analysis, and prediction of protein-protein interaction sites are discussed. The scientist is provided with a nice web-tool to analyse protein-protein complexes by using atomic coordinates derived from structure analyses.

The following chapters deal with more specific topics in which protein-protein recognition is of particular importance and/or well studied. Protein complexes involved in electron transfer are the focus of Chapter 3 (by Mathews, Mauk and Moore), where theoretical aspects and methodology are discussed as applied to electron transfer reactions - for example, the cytochrome C peroxidase, methylamine-dehydrogenase or putidaredoxin-p450 systems. A considerable background knowledge seems to be required for one to work through the material. Chapter 4 (by Humphries and Liddington) deals with proteins important in tissue formation and dynamics, including cell migration and wound healing. Aspects presented include structure, interaction with ligands and a model of integrin activation. In the following two chapters we learn about structural immunology. In Chapter 5 (by Braden and Poljak), lysozyme-antibody interaction is presented as a paradigm of antigen-

antibody recognition. Energetics, folding and structural aspects are discussed, highlighting the complexity of the processes involved in protein-antigen recognition. Chapter 6 (by Dafforn and Lesk) deals with the structural basis of distinguishing self and non-self in eukaryotes. This simple and nicely illustrated chapter explains the most important features of the major histocompatibility complex (MHC) molecules (bound to peptide antigen) and the T-cell receptor, and how they interact.

Signal transduction in eukaryotes is the focus of Chapter 7 (by Hyvonen, Begun and Blundell), which gives an overview that covers signalling domains, G proteins and cyclin-dependent kinases. A table listing structural models, database accession codes, resolution and some biochemical information provides a very instructive tool, enabling one to become familiar with the field in a reasonable amount of time. The last two chapters are about protein-mediated enzyme inhibition. In Chapter 8 (by Laskowski, Jr, Qasim and Lu) serine proteases are used as a well-studied model system to introduce the problem and discuss various, primarily thermodynamic, aspects. I found the structuring of the chapter, which has about 20 subsections, a little difficult to follow. As another model system of protein-protein interaction in general, nuclease inhibitors are the topic of Chapter 9 (by Kleanthous and Pommer). Inhibitors of ribonuclease, barnase and colicin endonucleases are provided as examples.

Each chapter provides the reader with a broad reference list for further reading, which is important for those wishing to become more familiar with the underlying scientific topic and/or use the book for teaching purposes. The individual chapters reflect the challenge of providing reasonable figures for the non-specialist reader. While in some cases graphic representation seems to be very instructive (e.g. Chapters 4, 6 and 9), a few chapters leave the reader unable, without working through the reference list (e.g. Chapters 3 and 5), to develop a three-dimensional view. Clearly book production can be kept at a financially acceptable level only if

figures are black and white. In my arts course at high school I learned that some South American rain forest tribes can distinguish 70 different green tones. I am not sure that cell- or structural biologists can distinguish a comparable number of grey scales in black and white structure representations. Given the advances in technology, it would be highly desirable in the future to allow some flexibility in the design of display items. Being used to using the Internet to retrieve most updated scientific information in reprint quality, I feel that having all colour figures collected in 'plates' somewhere in the middle of the book is something from the last century and will hopefully be improved in the near future.

The book would have even more impact if chapters on large protein assemblies or motility were included, maybe at the expense of the contributions on immunity or enzyme inhibitors. Finally, I detected a few minor 'bugs' in the text. This, I suppose, partly reflects the speed at which biological research produces new results, along with the challenge of producing a book that covers a broad range of research but is not too outdated by the time of release. The price (£65) is not that high, although in the future one would expect a higher technical quality of display items for this amount of money.

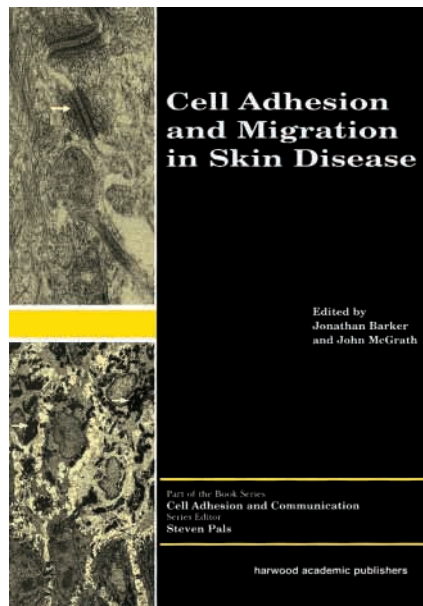
In summary, in my view, the book gives a very good introduction to the problem of protein-protein recognition and exemplifies the knowledge available on a fairly reasonable selection of topics. A few chapters (e.g. Chapters 3 and 8) seem to be more useful for experts in the respective fields rather than for newcomers or students. In these cases I would recommend a back-up with recent review articles.

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Sticky science is skin deep



Cell Adhesion and Migration in Skin Disease

edited by Jonathan Barker and John McGrath

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\$102

Cell-cell and cell-matrix adhesion are fundamental to the development and correct maintenance of all tissues, including the epidermis. There are several families of adhesion molecule, and changes in the levels of expression of adhesion molecules are key events in adult physiology and pathology - for example, in the extravasation of white blood cells, in inflammatory processes and wound healing, and in tumour invasion and metastasis. One question that remains unanswered is whether the changes in cell adhesion during these processes are causative or symptomatic of the disease. Thus, it is not surprising that much attention is now being given to the molecular mechanisms that underlie the control of cell adhesion and that some adhesion molecules are now targets for drug development. This expanding field requires scientists and clinicians to join forces and understand further the precise roles of adhesion molecules in skin development and pathology.

Cell Adhesion and Migration in Skin Disease is a basic overview of the role of cell adhesion and migration in all aspects of epithelial biology. It is aimed at newcomers to the field who may have an interest in bridging adhesion cell and molecular biology with physiology and disease. The book is divided clearly into three main aspects of epithelial cell adhesion: cell-cell attachment, cell-matrix attachment and leukocyte trafficking in skin disease. The first section beautifully describes the epidermal cornified envelope, keratins and desmosomes, and disease related to abnormalities in these structures and molecules. The second section, cell-matrix attachment, concentrates on the rivets that adhere the epidermis to the underlying basement membrane, hemidesmosomes. This section contains some wonderfully clear illustrations and immunofluorescence and electron micrographs of hemidesmosomes and the basement membrane. The contributors are international experts in their fields, and the book is the only one of its kind to date. Although an introduction to the family of epithelial cell-matrix adhesion molecules (integrins) is probably best found in other publications, the first two sections comprehensively cover desmosomal and hemidesmosomal cell-adhesion and mutations in such molecules in skin disease.

The third section, on leukocyte trafficking in skin disease, is very informative and includes an important and topical chapter on animal models of skin disease, an aspect of experimental skin biology that is expanding exponentially. The figures are self-explanatory and give a good flavour of the types of pathology and experimental techniques that are routinely considered by cell-adhesion scientists. Linking genetic disease with protein biology is a common theme throughout this book and it is well addressed. I believe this publication would be a good introduction for all those considering a PhD in adhesion cell biology of the skin.

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