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**Preface:**  
**Membrane Active Peptides: Methods and Results on Structure and Function.** By MIGUEL A. R. B. CASTANHO

The world of membrane active peptides is fascinating. Lipid membranes are a challenge: at the molecular level they are neither bidimensional nor literally three-dimensional (3D) at the molecular scale; instead they are severely confined 3D systems. In contrast with the majority of "living chemistry," the (bio)chemistry of lipid membrane core processes is hydrophobic; yet the lipid bilayers interfaces are polar, allowing a multitude of physical interfacial interactions. Moreover, multicomponent lipid systems may lead to lateral heterogeneity, turning membranes into patched surfaces, with different areas having different functionalities. At the same time, peptides are curious short-chain heteropolymers: while they may be plastic, the adopted conformations tend to be restricted to the typified tertiary structures; they may be amphiphilic and/or amphipathic, and their physical and chemical diversity is immense. When peptides and lipids meet, they often associate and affect each other. In the most severe cases, peptides disrupt the lipid bilayers. In the most intriguing ones, peptides translocate across bilayers but leave them intact.

In any case, the scientist is confronted with the foundations of phenomena of the utmost importance to natural sciences: antimicrobial drugs innate to man, viral fusion and assembly, gene transfection and receptor-ligand interactions, to name a few.

This book reflects the richness the field it is devoted to: membrane active peptides, from structural to functional studies: Here one can find the work of prominent groups using a vast array of different samples and different tools, from theoretical work in silico to spectroscopic work in cells.

My challenge to the reader is to go through the book not thinking of membrane-active peptides as divided in strict families. To not think of viral, cell penetrating, and antimicrobial peptides as different entities. They are all membrane-active peptides and share more properties than one wonders at first sight. Their separation in different families is quite artificial. This book goes through generalist methodologies, such as in silico analysis and predictions, fluorescence and NMR spectroscopies, ellipsometry, surface plasmon resonance, electrophysiology, and FTIR, among others, and different samples, from artificial membranes (Langmuir monolayers, vesicles, planar lipid bilayers, supported bilayers...) to both animal and plant cells, to address pertinent topics as the detection of membrane-active segments in proteins, extent of uptake of peptides by lipid bilayers, in-depth location of peptides in lipid membranes, orientation relative to the lipids, aggregation, membrane permeabilization and membrane fusion, and the interplay between lipid heterogeneity and peptide uptake. In the end, the reader will learn about membrane-active peptides as a whole, their basic mechanisms and their impact on biotechnology, health and disease.

I am grateful to all authors for their active collaboration and commitment on this endeavour. Their expertise and educated insight on each subject turned this book into a timely tool and source of information for researchers and educators on peptide science and/or cell membrane structure and function. I thank them all and am certain that the reader will enjoy and benefit from their work. Thank you also to Manuel Melo for drawing the cover figure.

In the end I cannot help thinking of my own family and the families and friends of the authors for the attention they did not receive in the extra-hours of work dedicated to this book.

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