

## **Neuropeptide Systems as Targets for Parasite and Pest Control**

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Edited by Timothy G. Geary and Aaron G. Maule

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# Neuropeptide Systems as Targets for Parasite and Pest Control

Edited by

**Timothy G. Geary, PhD**

*Institute of Parasitology, McGill University, Montréal, Québec, Canada*

**Aaron G. Maule, PhD**

*Parasitology, School of Biological Sciences, Medical Biology Centre,  
Queen's University Belfast, Belfast, UK*

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## PREFACE

The need to continually discover new agents for the control or treatment of invertebrate pests and pathogens is undeniable. Agriculture, both animal and plant, succeeds only to the extent that arthropod and helminth consumers, vectors and pathogens can be kept at bay. Humans and their companion animals are also plagued by invertebrate parasites. The deployment of chemical agents for these purposes inevitably elicits the selection of resistant populations of the targets of control, necessitating a regular introduction of new kinds of molecules.

Experience in other areas of chemotherapy has shown that a thorough understanding of the biology of disease is an essential platform upon which to build a discovery program. Unfortunately, investment of research resources into understanding the basic physiology of invertebrates as a strategy to illuminate new molecular targets for pesticide and parasiticide discovery has been scarce, and the pace of introduction of new molecules for these indications has been slowed as a result. An exciting and so far unexploited area to explore in this regard is invertebrate neuropeptide physiology. This book was assembled to focus attention on this promising field by compiling a comprehensive review of recent research on neuropeptides in arthropods and helminths, with contributions from many of the leading laboratories working on these systems.

The Editors have been involved in neuropeptide studies in helminths for more than 20 years, including a productive period of intense collaboration on the identification and physiological characterization of nematode neuropeptides at The Upjohn Company (now part of Pfizer, Inc.) in Kalamazoo, Michigan. Aaron Maule continued in the basic research realm at Queen's University Belfast, while Timothy Geary remained focused on the discovery of non-peptide ligands for neuropeptide receptors as candidate antiparasitic drugs in Kalamazoo. The Editors would like to thank the many people involved in those efforts in both our laboratories; the number is too large to permit an exhaustive list, but the literature citations in the chapters provide the evidence. However, credit must be given in particular to Prof. David Halton, now an Emeritus Professor at Queen's, who first brought us together. His wisdom and foresight in encouraging us to pursue this field of research (in which he was a pioneer) has been rewarded (or at least so we hope).

The contributing authors have made notable and far-ranging contributions to the understanding of neuropeptide physiology and pharmacology in invertebrates. The organization of the chapters is intended to provide an overview of the organism-level biology of neuropeptidergic function in insects and helminths, progressing to an understanding of the molecular biology of the genes that encode their precursors and receptors in these organisms. We include for perspective consideration of the state of the art in discovery of insecticides and anthelmintics, a review of drugs that affect similar systems in nematodes, and a summary of drug discovery efforts that target mammalian neuropeptide receptors for therapy of non-infectious diseases in humans.

The authors have done a remarkable job of producing a coherent and highly valuable book. We hope it will stimulate new work in this exciting area. The burgeoning accumulation of genomic data will offer an unprecedented view into the genes that underlie neuropeptide physiology in invertebrates; this book should remind us that sequence data are of limited value unless interpreted through functional studies in organisms. We thank them for their insight and thoughtful reflections as documented in this volume. We also thank the many people at Landes Bioscience who facilitated its publication.

*Timothy G. Geary, PhD*  
*Aaron G. Maule, PhD*

## ABOUT THE EDITORS...



TIMOTHY G. GEARY is a Tier I Canada Research Chair and is Professor and Director of the Institute of Parasitology at McGill University in Montréal, Québec, Canada. Geary received a BSc degree from the University of Notre Dame in South Bend, IN (USA) and a PhD in Pharmacology from the University of Michigan in Ann Arbor, MI (USA, 1980). He worked on malaria chemotherapy at Michigan State University in East Lansing, MI (USA) until 1985, when he joined The Upjohn Company in Kalamazoo, MI (USA) as a staff scientist working on discovery of antiparasitic drugs. Geary joined the Faculty at McGill in 2005. His research interests include proteomics and genomics analyses of the host-parasite interface, discovery of anthelmintics and the pharmacology of antiparasitic drugs.

## **ABOUT THE EDITORS...**



AARON G. MAULE is a Director of Research for Molecular Biosciences and Professor of Molecular Parasitology at Queen's University Belfast, Northern Ireland. Maule was awarded a BSc(Hons) in Biology (1986) and a PhD in Experimental Parasitology (1989) at Queen's where he began working on parasite neuromuscular systems. He focused on molecular aspects of parasite neurobiology during postdoctoral positions at Queen's and at The Upjohn Company in Kalamazoo, MI (USA). Maule returned to Queen's as a member of academic staff in 1995 to pursue the basic biology of helminth signaling systems. His research interests include parasite neurobiology and the development and exploitation of gene silencing platforms for target validation and parasite control.



## PARTICIPANTS

Miriam Altstein  
Department of Entomology  
The Volcani Center  
Bet Dagan  
Israel

Liesbeth Badisco  
Research Unit Functional Genomics  
and Proteomics  
Zoological Institute  
Katholieke Universitet Leuven  
Leuven  
Belgium

Geert Baggerman  
Research Unit Functional Genomics  
and Proteomics  
Katholieke Universitet Leuven  
Leuven  
Belgium

William G. Bendena  
Department of Biology  
Queen's University  
Kingston, Ontario  
Canada

Cheryl Butler  
Pfizer Global Research & Development,  
Pfizer Ltd.  
Sandwich, Kent  
UK

Elke Clynen  
Research Unit Functional Genomics  
and Proteomics  
Katholieke Universitet Leuven  
Leuven  
Belgium

Tim A. Day  
Neuroscience Program and Department  
of Biomedical Sciences  
Iowa State University  
Ames, Iowa  
USA

Timothy G. Geary  
Institute of Parasitology  
McGill University  
Montréal, Québec  
Canada

Karen Greenwood  
Pfizer Animal Health  
Kalamazoo, Michigan  
USA

Kyuhyung Kim  
Department of Biology  
Brandeis University  
Waltham, Massachusetts  
USA

Michael J. Kimber  
Neuroscience Program and Department  
of Biomedical Sciences  
Iowa State University  
Ames, Iowa  
USA

Chris Li  
Department of Biology  
City College of the City University  
of New York  
New York, New York  
USA

Nikki J. Marks  
Parasitology, School of Biological  
Sciences  
Medical Biology Centre  
Queen's University Belfast  
Belfast  
UK

Richard J. Martin  
Department of Biomedical Sciences  
Iowa State University  
Ames, Iowa  
USA

Aaron G. Maule  
Parasitology, School of Biological  
Sciences  
Medical Biology Centre  
Queen's University Belfast  
Belfast  
UK

Inge Mertens  
Research Unit Functional Genomics  
and Proteomics  
Katholieke Universitet Leuven  
Leuven  
Belgium

Angela Mousley  
Neuroscience Program and Department  
of Biomedical Sciences  
Iowa State University  
Ames, Iowa  
USA

Ronald J. Nachman  
Pest Management Research Unit  
Southern Plains Agricultural Research  
Center  
US Department of Agriculture  
College Station, Texas  
USA

Dick R. Nässel  
Department of Zoology  
Stockholm University  
Stockholm  
Sweden

Ekaterina Novozhilova  
Neuroscience Program and Department  
of Biomedical Sciences  
Iowa State University  
Ames, Iowa  
USA

Patricia V. Pietrantonio  
Department of Entomology  
Texas A&M University  
College Station, Texas  
USA

Jeroen Poels  
Research Unit Functional Genomics  
and Proteomics  
Zoological Institute  
Katholieke Universitet Leuven  
Leuven  
Belgium

Ank Reumer  
Research Unit Functional Genomics  
and Proteomics  
Katholieke Universitet Leuven  
Leuven  
Belgium

Alan P. Robertson  
Department of Biomedical Sciences  
Iowa State University  
Ames, Iowa  
USA

*Participants*

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Liliane Schoofs  
Research Unit Functional Genomics  
and Proteomics  
Katholieke Universitet Leuven  
Leuven  
Belgium

Jozef Vanden Broeck  
Research Unit Functional Genomics  
and Proteomics  
Zoological Institute  
Katholieke Universitet Leuven  
Leuven  
Belgium

Hans Peter Vandersmissen  
Research Unit Functional Genomics  
and Proteomics  
Zoological Institute  
Katholieke Universitet Leuven  
Leuven  
Belgium

Matthias B. Van Hiel  
Research Unit Functional Genomics  
and Proteomics  
Zoological Institute  
Katholieke Universitet Leuven  
Leuven  
Belgium

Tom Van Loy  
Research Unit Functional Genomics  
and Proteomics  
Zoological Institute  
Katholieke Universitet Leuven  
Leuven  
Belgium

Heleen Verlinden  
Research Unit Functional Genomics  
and Proteomics  
Zoological Institute  
Katholieke Universitet Leuven  
Leuven  
Belgium

Tracey Williams  
Pfizer Animal Health  
Kalamazoo, Michigan  
USA

Debra Woods  
Pfizer Animal Health  
Kalamazoo, Michigan  
USA

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