

Arthropods form the largest and most varied assemblage of organisms on earth. They are important economically as agricultural pests, as vectors of disease and as a source of food. The study of their endocrine systems reflects their economic significance, most work having been carried out on insects, crustaceans and ticks. Knowledge in these areas has increased greatly in the last decade, with the advent of improved techniques for the isolation and study of the hormones themselves, revealing fascinating relationships between the endocrine systems of the various arthropod groups. This volume brings together contributions from many of the leading workers in the field, providing in-depth accounts of the current state of knowledge of a wide range of hormone systems. The book presents a unique summary of some of the most significant and exciting advances of the last decade, brought together in a single volume for the first time.

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Edited by Geoffrey M. Coast, Simon G. Webster

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RECENT ADVANCES IN ARTHROPOD  
ENDOCRINOLOGY

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# RECENT ADVANCES IN ARTHROPOD ENDOCRINOLOGY

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## Contents

<i>List of contributors</i>	page x
<i>Preface</i>	xv
<i>Table of three- and single-letter abbreviations for amino acids</i>	xvii
<b>Part I: Moulting, metamorphosis and reproduction</b>	<b>1</b>
<b>Structures, functions and occurrences of insect allatostatic peptides</b> ROBERT J. WEAVER, JOHN P. EDWARDS, WILLIAM G. BENDENA and STEPHEN S. TOBE	<b>3</b>
<b>Neuropeptides inhibiting growth and reproduction in crustaceans</b> SIMON G. WEBSTER	<b>33</b>
<b>Molecular, cytological and physiological aspects of the crustacean hyperglycemic hormone family</b> FRANÇOIS VAN HERP	<b>53</b>
<b>Endocrine effectors in insect vitellogenesis</b> XAVIER BELLÉS	<b>71</b>
<b>Endocrine regulation of development and reproduction in acarines</b> LEE O. LOMAS and HUW H. REES	<b>91</b>

viii *Contents*

- Ecdysteroid synthesis in the crustacean Y-organ: role of cyclic nucleotides and Ca<sup>2+</sup>** 125  
DIETRICH SEDLMEIER  
and ALEXANDRA SEINSCHÉ
- Regulation of steroidogenesis: role of transaldolase in crab moulting glands** 138  
FABIENNE LACHAISE and GHISLAINE SOMMÉ
- Part II: Control of intermediary metabolism, and ion and water balance** 147
- New perspectives on the structures, assays and actions of locust adipokinetic hormones** 149  
MICHAEL J. LEE  
and GRAHAM J. GOLDSWORTHY
- Signal transduction of adipokinetic hormone** 172  
WIL J. A. VAN MARREWIJK  
and DICK J. VAN DER HORST
- The regulation of primary urine production in insects** 189  
GEOFFREY M. COAST
- Locust ion transport peptide (ITP): function, structure, cDNA and expression** 210  
JOHN E. PHILLIPS, JOAN MEREDITH,  
NIEL AUDSLEY, MARK RING,  
ANDRIS MACINS, HUGH BROCK,  
DAVID THEILMANN and DWIGHT LITTLEFORD
- Part III: ‘Myotropic and myoinhibitory’ arthropod neuropeptides: structures and functions?** 227

<i>Contents</i>	ix
<b>The dipteran Leu-callatostatins: structural and functional diversity in an insect neuroendocrine peptide family</b>	229
HANNE DUVE, ALAN THORPE, ANDERS H. JOHNSEN, JOSÉ-LUIS MAESTRO, ALAN G. SCOTT and PETER D. EAST	
<b>An insect peptide family in search of functions: the tachykinin-related peptides</b>	248
DICK R. NÄSSEL, C. TOMAS LUNDQUIST, J. ERIC MUREN and ÅSA M.E. WINTHER	
<b>The distribution, biological activity, and pharmacology of SchistoFLRFamide and related peptides in insects</b>	278
IAN ORCHARD and ANGELA B. LANGE	
<b>Conserved crustacean cardioactive peptide (CCAP) neuronal networks and functions in arthropod evolution</b>	302
HEINRICH DIRCKSEN	
<b>Control of the insect oviduct: the role of the neuropeptide CCAP in the tobacco hornworm, <i>Manduca sexta</i></b>	334
ANNA K. MARSHALL and STUART E. REYNOLDS	
<b>Part IV: Peptidases, peptide and pseudopeptide mimetics: towards new strategies of insect pest control?</b>	355
<b>Insect angiotensin-converting enzyme: comparative biochemistry and evolution</b>	357
R. ELWYN ISAAC, DAVID COATES, TRACY A. WILLIAMS and LILIANE SCHOOFS	
<b>Mimetic analogues of the myotropic/diuretic insect kinin neuropeptide family</b>	379
RONALD J. NACHMAN, G. MARK HOLMAN and GEOFFREY M. COAST	
<i>Index</i>	392



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xi

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xiii

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## Preface

In the past few years, there has been a dramatic increase in our knowledge of the structure and function of arthropod neuropeptides. Just ten years ago, very few insect and crustacean neuropeptides had been identified. Rapid advances in techniques for peptide purification, sequence analysis and mass determination have greatly facilitated the characterisation of neuropeptides which are often present in small (picomole;  $10^{-12}$  mol) amounts. Today, more than 100 arthropod neuropeptides have been fully characterised and that number is continually being added to. The availability of these peptides, together with specific antisera and cDNA probes, has expedited progress towards understanding their functions as hormones, neurotransmitters or neuromodulators at molecular, cellular and organismal levels. Although the diversity of the phylum might presage a similar diversity in neuropeptide structure and function, some neuropeptides, such as crustacean cardioactive peptide (CCAP), appear to be extraordinarily well conserved with regard to structure, function and neural network architectures. Others appear to have very different functions in divergent (or even similar) arthropod groups, although they maintain sufficient structural similarity to permit comparisons to be made. Additionally, many neuropeptides have multiple actions on a wide variety of target tissues, and new functions are regularly being reported. Indeed, it seems likely that the physiologically relevant role(s) of many neuropeptides may be quite different from those originally described. In a volume of this size, it has not been possible to cover all aspects of this rapidly expanding field, but invited contributors describe current work in selected areas of arthropod endocrinology and highlight future directions such studies might take. Endocrine mechanisms implicated in the control of intermediary metabolism, water balance, visceral and cardiac muscle activity, moulting and metamorphosis are dealt with in the first sixteen chapters, while the final two chapters are concerned with peptide processing and the development of stable lipophilic peptidomimetics. In the long term it seems likely that agonists or antagonists of arthropod neuropeptides will

xvi     *Preface*

be of commercial value as insecticides and possibly in manipulation of growth and reproduction in crustacean aquaculture.

This volume arose from a two day symposium held as part of the 1996 annual meeting of the Society for Experimental Biology. We wish to acknowledge the financial support provided by the Company of Biologists, Cambridge University Press and the Society for Experimental Biology. We would also like to thank everyone who attended this symposium and who contributed to some very lively discussions.

Geoff Coast and Simon Webster

## Table of three- and single-letter abbreviations for amino acids

Alanine	Ala	A
Arginine	Arg	R
Asparagine	Asn	N
Aspartic acid	Asp	D
Aspartic acid or asparagine (undefined)	Asx	B
Cysteine	Cys	C
Cystine (half)	Cys or Cys 	—
Glutamine	Gln	Q
Glutamic acid	Glu	E
Glutamic acid or glutamine (undefined)	Glx	Z
Glycine	Gly	G
Histidine	His	H
Hydroxylysine	Hyl	—
Hydroxyproline	Hyp	—
Isoleucine	Ile	I
Leucine	Leu	L
Lysine	Lys	K
Methionine	Met	M
Ornithine	Orn	—
Phenylalanine	Phe	F
Proline	Pro	P
Serine	Ser	S
Threonine	Thr	T
Tryptophan	Trp	W
Tyrosine	Tyr	Y
Unknown or 'other'	Xaa	X
Valine	Val	V