

# Techniques in Pheromone Research

Edited by  
**H.E. Hummel and T.A. Miller**

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# Techniques In Pheromone Research

**Hans E. Hummel, Thomas A. Miller**



## Techniques In Pheromone Research:

**Techniques in Pheromone Research** Hans E. Hummel, Thomas A. Miller, 2012-12-06 Insects as a group occupy a middle ground in the biosphere between bacteria and viruses at one extreme amphibians and mammals at the other The size and general nature of insects present special problems to the student of entomology For example many commercially available instruments are geared to measure in grams while the forces commonly encountered in studying insects are in the milligram range Therefore techniques developed in the study of insects or in those fields concerned with the control of insect pests are often unique Methods for measuring things are common to all sciences Advances sometimes depend more on how something was done than on what was measured indeed a given field often progresses from one technique to another as new methods are discovered developed and modified Just as often some of these techniques find their way into the classroom when the problems involved have been sufficiently ironed out to permit students to master the manipulations in a few laboratory periods Many specialized techniques are confined to one specific research laboratory Although methods may be considered commonplace where they are used in another context even the simplest procedures may save considerable time It is the purpose of this series 1 to report new developments in methodology 2 to reveal sources of groups who have dealt with and solved particular entomological problems and 3 to describe experiments which may be applicable for use in biology laboratory courses

Insect Pheromone Research R.T. Carde, A.K. Minks, 2012-12-06 This book contains the proceedings of the First International Symposium on Insect Pheromones which was held at Wageningen The Netherlands from March 6 to March 11 1994 Eighty participants from 17 countries attended the symposium which turned out to be a unique forum for the exchange of the latest worldwide findings on insect pheromones an opportunity to discuss and debate unsettled issues and a mechanism to define new directions in pheromone research and foster interdisciplinary collaborations The meeting comprised five sessions representing the breadth of disciplinary interest in pheromones a typical characteristic of this research area In the sessions the following topics were presented 1 control of pheromone production organized by W L Roelofs 2 sensory processing of pheromone signals T L Payne 3 neuroethology of pheromone mediated responses T C Baker 4 use of pheromones in direct control A K Minks and R T Card6 and 5 evolution of pheromone communication c LOfstedt All sessions started with a series of 30 minute lectures after which ample time was reserved for discussion In each session some participants were asked to serve as discussants and to initiate and stimulate discussion and a rapporteur was recruited to make notes of these discussions and to summarize the general trends emerging from the session The general programming of the symposium was in the hands of R T Carde A K Minks and T L Payne

Experimental Techniques in Host-Plant Resistance Akshay Kumar Chakravarthy, Venkatesan Selvanarayanan, 2019-04-24 The earliest land plants evolved around 450 million years ago from aquatic plants devoid of vascular systems The diversification of flowering plants angiosperms during the Cretaceous period is associated with speciation in insects Early insect herbivores were mandibulate but the evolution of

vascular plants led to the co evolution of other forms of herbivory such as leaf feeding sap sucking leaf mining tissue borer gall forming and nectar feeding Plant defense against biotic stress is an adaptive evolution by plants to increase their fitness Plants use a variety of strategies to defend against damage caused by herbivores Plant defense mechanisms are either inbuilt or induced Inbuilt mechanisms are always present within the plant while induced defenses are produced or mobilized to the site where a plant is injured Induced defense mechanisms include morphological physiological changes and production of secondary metabolites Host plant resistance HPR is one of the eco friendly methods of pest management It protects the crop by making it less suitable or tolerant to the pest While books on theoretical aspects of HPR are available an exclusive book on the practical aspects is lacking There is a wide gap between the theory and the experimental procedures required for conducting studies on plant resistance for the post graduate students and young researchers A dire need for a book on practical aspects was strongly felt Initially a practical manual was prepared which eventually evolved into the present book We hope this book provides information on major aspects of screening crop germplasm sampling techniques genetic and biochemical basis of HPR behavioural studies on pheromone and plant volatiles and some of the recent approaches in HPR Further the references provide the scientific articles and books as additional information to readers and workers alike

**Gas Chromatography** Colin Poole, 2012-07-26 This title provides comprehensive coverage of modern gas chromatography including theory instrumentation columns and applications addressing the needs of advanced students and professional scientists in industry and government laboratories Chapters are written by recognized experts on each topic Each chapter offers a complete picture with respect to its topic so researchers can move straight to the information they need without reading through a lot of background information Individual chapters written by recognized experts The big picture of gas chromatography from theory to methods to selected applications Provides references to other sources in associated areas of study to facilitate research Gives access to core data for practical work comparison of results and decision making

Pheromone Biochemistry Glenn D. Prestwich, Gary J. Blomquist, 2014-06-28 Pheromone Biochemistry covers chapters on Lepidoptera ticks flies beetles and even vertebrate olfactory biochemistry The book discusses pheromone production and its regulation in female insects as well as reception perception and degradation of pheromones by male insects The text then describes the pheromone biosynthesis and its regulation and the reception and catabolism of pheromones Researchers in the areas of chemistry biochemistry entomology neurobiology molecular biology enzymology morphology behavior and ecology will find the book useful

*Insect Pheromones and their Use in Pest Management* P. Howse, J.M. Stevens, Owen T Jones, 2013-12-01 There is now a considerable literature on chemical ecology which had its beginnings in the study of insect pheromones This beginning was possible only by combining the disciplines and techniques of biology and chemistry For a biologist it is difficult to understand the time frames of analytical and synthetic chemistry A compound may take days to characterize and be available in minutes from a bottle on the shelf or it may take years to

characterize and synthesize Chemists have a similar frustration after an intense programme of work the insect in question may not emerge for many months study are however The rewards of integrated interdisciplinary considerable because they allow us to understand many facets of insect behaviour and consequently to control that behaviour for our own ends In this book we have set out to explain the results of research from chemical and biological perspectives and see how the knowledge gained has led to novel techniques that can be used in insect pest management and insect control An important part of understanding insect chemical ecology involves the understanding not only of new concepts but of the vocabularies used by scientists specializing in different fields It will be clear that the three sections of this book have been written by three different people an insect behaviourist an organic chemist and a biologist in industry

**Proceedings of the Fifth International Symposium on Trichoptera** M. Bournaud, H. Tachet, 2012-12-06 When we offered to host the 5th International Symposium on Trichoptera in Lyon in July 1986 we knew that for us the great Adventure was about to begin On that July morning in 1983 in Clemson South Carolina we could only dimly imagine what the future held in store One of the worst moment came in fact when we were told by the official scientific authorities that no subsidies would be forthcoming This refusal meant that we would be unable to give any financial help to those colleagues with only modest means at their disposal Let us hope that the publication of the Proceedings will convince certain French scientists and the powers that be that the study of Trichoptera represents a valid and exciting field of research The American raid on Tripoli which did not at the time seem to have any link with Trichoptera threatened to act as a deterrent as far as the North American participants were concerned However the fears expressed by some of our colleagues and not without reason when we consider the series of terrorist attacks later carried out in France were soon allayed although the organisers of the Congress must confess to having kept a discreet eye open for any suspicious brown paper parcels or unattended luggage

Methods for the Study of Pest *Diabrotica* J.L. Krysan, Thomas A. Miller, 2012-12-06 Insects as a group occupy a middle ground in the biosphere between bac at one extreme amphibians and mammals at the other teria and viruses of insects present special problems to the The size and general nature study of entomology For example many commercially available instruments are geared to measure in grams while the forces commonly encountered in studying insects are in the milligram range Therefore techniques developed in the study of insects or in those fields concerned with the control of insect pests are often unique Methods for measuring things are common to all sciences Advances sometimes depend more on how something was done than on what was measured indeed a given field often progresses from one technique to another as new methods are discovered developed and modified Just of these techniques find their way into the classroom when as often some the problems involved have been sufficiently ironed out to permit students to master the manipulations in a few laboratory periods Many specialized techniques are confined to one specific research laboratory Although methods may be considered commonplace where they are used in another context even the simplest procedures may save considerable time It is the purpose of this series 1 to

report new developments in methodology 2 to reveal sources of groups who have dealt with and solved particular entomological problems and 3 to describe experiments which may be applicable for use in biology laboratory courses

**Behavior-Modifying Chemicals for Insect Management** Ridgway, 1990-03-12 Presenting an authoritative overview of current findings on pheromone applications this reference reviews the principles involved in employing these compounds their chemistry and delivery systems for efficient use In addition it provides case studies of current and potential practical applications  
**Chromatography and Isolation of Insect Hormones and Pheromones** A.R. McCaffery, I.D.

Wilson, 2012-12-06 The connection between the study of insects their development behaviour and biochemistry and chromatography is perhaps not immediately obvious However this connection exists and it is of fundamental importance to our understanding of many areas of insect physiology Insects range in size from small to minute and consequently the amounts of hormones or pheromones they produce are equally minute Ultimately any attempt at understanding the processes which control development social behaviour or the biochemistry of insects requires some means of isolating the tiny quantities of the hormones and pheromones responsible in sufficient quantity and purity for identification The ability to devise novel techniques to separate these materials from frequently complex biological mixtures including precursors and metabolites and to devise detection systems for them is vital Methods for the quantification of these substances at different stages in the life cycle or in response to environmental change or stress are then essential Chromatography both as a means for isolation and as a method for quantitative analysis has been an essential tool in these studies This volume represents the outcome of a joint international symposium organized by the Chromatographic and Royal Entomological Societies at the University of Reading between the 21st and 23rd March 1989 aimed specifically at discussing the chromatography and isolation of insect hormones pheromones and related substances The papers presented at that meeting and collected together here covered many aspects of the subject including the chromatography of juvenile hormones ecdysteroids peptides pheromones and semiochemicals  
**Methods in Chemical Ecology Volume 2** Kenneth F. Haynes, Jocelyn G.

Millar, 2012-12-06 Identification of chemicals that affect the naturally occurring interactions between organisms requires sophisticated chemical techniques such as those documented in volume 1 in combination with effective bioassays Without an effective bioassay the identification becomes akin to looking for a needle in a haystack but without any idea of what a needle looks like To a large extent semiochemical identifications must be driven by bioassays The design of bioassays for use in chemical ecology is governed by the sometimes conflicting objectives of ecological relevance and the need for simplicity Bioassay design should be based on observations of the interactions between organisms in their natural context a theme that appears throughout this volume As a result this volume is as much about ecology and behavior as it is about specific methods It is impossible to design a relevant bioassay whether it is simple or complex without understanding at least the fundamentals of how chemical cues or signals mediate the interaction in nature Thus the development of bioassay methods

must be driven by an understanding of ecology and a knowledge of the natural history of the organisms under study Given such an understanding it is often possible to design assays that are both ecologically relevant and easy to perform

*Chemical Ecology* Jorg D. Hardege,2009-06-10 Chemical Ecology is a component of Encyclopedia of Chemical Sciences Engineering and Technology Resources in the global Encyclopedia of Life Support Systems EOLSS which is an integrated compendium of twenty one Encyclopedias The Theme on Chemical Ecology provides the essential aspects of the chemicals involved in the interactions of living organisms It deals with studies involving defensive chemicals which are utilized to deter potential predators which may attack a wide variety of species animal interaction aquatic ecosystems chemical ecology and pest management relation to medicine and pharmaceuticals This volume is aimed at the following five major target audiences University and College students Educators Professional practitioners Research personnel and Policy analysts managers and decision makers

**Pheromones and Animal Behavior** Tristram D. Wyatt,2014-01-23 Pheromones and other kinds of chemical communication underlie the behavior of all animals Building on the strengths of the first edition widely recognized as the leading text in the subject this is a comprehensive overview of how pheromones work Extensively revised and expanded to cover advances made over the last ten years the book offers a thorough exploration of the evolutionary and behavioral contexts of chemical communication along with a detailed introduction to the molecular and neural basis of signal perception through olfaction At a time of ever increasing specialization Wyatt offers a unique synthesis integrating examples across the animal kingdom A final chapter critically considers human pheromones and the importance of olfaction to human biology Its breadth of coverage and readability make the book an unrivaled resource for students and researchers in a range of fields from chemistry genetics genomics molecular biology and neuroscience to ecology evolution and behavior

*Analysis of Taste and Aroma* John F. Jackson,H.F. Linskens,2013-03-09 Molecular Methods of Plant Analysis Concept of the Series The powerful recombinant DNA technology and related developments have had an enormous impact on molecular biology Any treatment of plant analysis must make use of these new methods Developments have been so fast and the methods so powerful that the editors of Modern Methods of Plant Analysis have now decided to rename the series Molecular Methods ofPlant Analysis This will not change the general aims of the series but best describes the thrust and content of the series as we go forward into the new millennium This does not mean that all chapters a priori deal only with the methods of molecular biology but rather that these methods are to be found in many chapters together with the more traditional methods of analysis which have seen recent advances The numbering of the volumes of the series therefore continues on from 20 which is the most recently published volume under the title Modern Methods ofPlant Analysis As indicated for previous volumes the methods to be found in Molecular Methods ofPlantAnalysis are described critically with hints as to their limitations references to original papers and authors being given and the chapters written so that there is little need to consult other texts to carry out the methods of analysis described All authors have been chosen because of their special

experience in handling plant material and or their expertise with the methods described      **Pheromones** ,2010-10-22 First published in 1943 Vitamins and Hormones is the longest running serial published by Academic Press The Editorial Board now reflects expertise in the field of hormone action vitamin action X ray crystal structure physiology and enzyme mechanisms Under the capable and qualified editorial leadership of Dr Gerald Litwack Vitamins and Hormones continues to publish cutting edge reviews of interest to endocrinologists biochemists nutritionists pharmacologists cell biologists and molecular biologists Others interested in the structure and function of biologically active molecules like hormones and vitamins will as always turn to this series for comprehensive reviews by leading contributors to this and related disciplines This volume focuses on insulin and IGFs Longest running series published by Academic Press Contributions by leading international authorities      **Insect-Plant Interactions** James R. Miller,Thomas A. Miller,2013-12-01 The authoritative overviews in this volume provide a wealth of practical information on current approaches to the study of insect plant interactions Methods described include direct behavioral observation assays of host finding oviposition and feeding behavior of insect herbivores post ingestion physiological effects measurement of food quality and sensory responses of insects to plant stimuli chemical isolation and identification of active phytochemicals evaluation of plant resistance to insects and the biochemistry of allelochemic interactions      Integrated Pest Management Rajinder Peshin,Ashok K. Dhawan,2009-04-12 The book Silent Spring written by Rachel Carson in 1962 is considered the la mark in changing the attitude of the scientists and the general public regarding the complete reliance on the synthetic pesticides for controlling the ravages caused by the pests in agriculture crops For about ve decades the Integrated Pest Mana ment IPM is the accepted strategy for managing crop pests IPM was practiced in Canet e Valley Peru in 1950s even before the term IPM was coined Integrated Pest management Innovation Development Process Volume 1 focuses on the recog tion of the dysfunctional consequences of the pesticide use in agriculture through researchanddevelopmentoftheIntegratedPest Managementinnovations Thebook aims to update the information on the global scenario of IPM with respect to the use of pesticides its dysfunctional consequences and the concepts and advan ments made in IPM systems This book is intended as a text as well as reference material for use in teachingthe advancements made in IPM The book provides an interdisciplinary perspective of IPM by the forty three experts from the eld of entomology plant pathology plant breeding plant physiology biochemistry and extension education The introductory chapter Chapter 1 gives an overview of IPM initiatives in the developed and developing countries from Asia Africa Australia Europe Latin America and North America IPM concepts opportunities and challenges are d cussed in Chapter 2      Biopesticides Handbook Leo M.L. Nollet,Hamir Singh Rathore,2015-01-22 The need to feed an ever growing global population combined with increasing demand for sustainable agricultural practices has generated a significant rise in demand for biopesticides By responding concurrently to the interests of farming forestry and industrial sectors biopesticides offer a considerable potential for utilization in sustainable      The Chemistry and Biology of Volatiles Andreas



Herrmann,2011-06-15 Coming to a conclusion this wonderful informative and very interesting book presents an excellent overview of small volatile organic compounds and their role in our life and environment Really fascinating is the entirety of scientific disciplines which were addressed by this book Flavour and Fragrance Journal 2011 this book deserves to be a well used reference in the library of any laboratory specialising in VOC Chemistry World 2011 Volatile compounds are molecules with a relatively low molecular weight allowing for an efficient evaporation into the air They are found in many areas of our everyday life they are responsible for the communication between species such as plants insects or mammals they serve as flavours or fragrances in many food products or perfumed consumer articles and they play an important role in atmospheric chemistry This book takes an interdisciplinary approach to volatile molecules Review style introductions to the main topics in volatile chemistry and biology are provided by international experts building into a broad overview of this fascinating field Topics covered include The structural variety of volatile compounds Biogenesis of volatiles Synthesis of natural and non natural volatiles Analysis of volatiles Volatile compounds as semiochemicals in plant plant or plant insect interactions Volatiles in pest control Pheromones and the influence of volatiles on mammals Olfaction and human perception Volatiles as fragrances The generation of flavours and food aroma compounds Stabilisation and controlled release of volatiles The impact of volatiles on the environment and the atmosphere **Rice Insects: Management Strategies** E.A. Heinrichs,T.A.

Miller,2012-12-06 Due to the worldwide importance of rice as a crop plant the biology of rice pests is of great interest to agricultural research This timely book brings together contributions from the fields of entomology agronomy population ecology and biostatistics to provide a comprehensive survey of rice insect interaction Among the topics discussed are crop loss assessment economic thresholds and injury levels for insect pests mosquito leafhoppers and planthoppers population dynamics pheromone utilization techniques for predator evaluation chemical based for insect resistance applications of tissue culture systems analysis and rice pestmanagement With its emphasis on experimental techniques of pest analysis and control Rice Insects Management Strategies will be a valuable reference for researchers and practitioners alike

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