

Symposia at IUSSI2010

Below are details of the symposia that will form the backbone of IUSSI2010

1 From colonies to communities: the consequences of behaviour for communities

A colony's behavior determines its resource use and interactions with other species. A wide range of studies, on varied topics, have in common that they examine the ecological outcomes of behavior. These include studies of the behavior involved in ant-plant mutualisms, the role of behavior in producing and altering dominance hierarchies, trait-mediated indirect interactions, and effects of pollinator behavior on plant ecology. Rarely, however, have investigators working on these somewhat disparate topics come together to pursue common themes. In addition, this symposium will provide an important venue for exploring the linkages among levels of organization, from the outcomes of individual behaviors to the structure and dynamics of communities.

Organizers

Nathan Sanders, University of Tennessee, Knoxville, U.S.A.
Xim Cerda, Doñana CSIC, Sevilla, Spain
Deborah M Gordon, Stanford University, Stanford, U.S.A.

Invited speakers

Don Feener, University of Utah
Phil Lester, Victoria University of Wellington

2 Invasion biology of social insects

Social insects are among the most successful and important invasive species; among the 100 worst invasive species identified by the Invasive Species Study Group, social insects account for one-half of the 14 insect species listed. Study of invasive social insects is a large and growing area of research that touches on many areas of social insect biology, including ecology, reproductive biology, behavior, population genetics, chemical ecology, physiology, theory etc. In this symposium we plan to bring together researchers investigating invasive social insect species who collectively cover a broad range of taxa from a variety of geographical regions, and who employ a number of different approaches. This symposium will serve to summarize the current progress in this area as well as provide direction to future studies. In particular, concepts and theories attempting to shed light on the essential factors that make some species more likely to become invasive than others will be emphasized.

Organizers

Anne-Geneviève Bagnères, Université de Tours, Tours, France
Edward Vargo, North Carolina State University, Raleigh U.S.A.

Invited speakers

Marc Kenis, CAB International
DeWayne Shoemaker, USDA Agricultural Research Services

3 Going big: large scale spatial and temporal patterns in social insect communities

Large-scale gradients in biodiversity dominated the interests of the first biologists who traveled among distant lands or looked to fossils. Patterns in biodiversity track major trends and events in evolution, climate, continental drift, physiological constraints and interspecific interactions, but assessing the relative importance of these factors has been difficult until recently. Social insect biologists have begun to benefit from databases of genetics, species or genus distribution, diversity and other aspects of social insect species and assemblages to begin to parse the relative importance of different factors to the diversity and distribution of social insects. Recent work has allowed the evaluation of mechanistic theories to account for global patterns in social insect density and diversity. Classic theories of biodiversity are being reevaluated more robustly than ever before, with an attention to the untangling of abiotic correlates of diversity patterns. This symposium will feature the research of biologists working to explain large-scale spatial and temporal phenomena in social insect communities through observational, manipulative and modeling approaches.

Organizers

Robert R. Dunn, North Carolina State University, Raleigh U.S.A.

Terry P. McGlynn, California State University Dominguez Hills, Carson, U.S.A.

Invited speakers

Alan Andersen, CSIRO

Nathan Sanders, University of Tennessee

4 Ecological and evolutionary implications of inter-specific, multipartite interactions

Social insects play a key role in ecological communities because of their ubiquity, abundance and ecological dominance in most ecosystems. Their unique social habits make them the favoured partner in interactions with a large panel of organisms as diverse as plants, microorganisms, fungi and solitary and other social insects. This symposium will focus on the long-term interactions, whether diffuse or obligate, but involving at least three partners. We would like to highlight the recent findings that in most multipartite interactions, mutualism and antagonism are along a continuum, with numerous intermediates like cheaters that parasitize established mutualisms without providing benefits in return. This symposium will give the opportunity to examine how conceptual frameworks like the geographic mosaic of coevolution or context-dependency help understanding the evolution of multipartite interactions.

Organizers

Raphaël Boulay, Estación Biológica de Doñana, Seville, Spain

Jérôme Orivel, Université Paul Sabatier, Toulouse, France

Invited speakers

Nico Blüthgen, University of Würzburg

Paulo S. Oliveira, University of Sao Paulo

5 Major transitions in termite feeding biology and their consequences

Termites have a very wide range of feeding preferences, with species feeding on dead wood, leaf litter, microepiphytes, grass, humus and soil. Each food presents a different set of physiological, anatomical and ecological challenges. The evolutionary shifts have had wide ranging consequences for the biology of termites and are particularly important as termites are major ecosystem engineers and important components of food webs in most tropical and sub-tropical ecosystems. This symposium will use the phylogeny of termites as a framework for exploring how major feeding shifts have arisen and the ways in which they have influenced the subsequent biology of termites. The emphasis will be on the termites, but this does not exclude talks on the termite-symbiont system if they contribute to our general understanding of termite biology. Speakers are welcomed with contributions on any aspect of termite feeding biology but particularly those who can enhance our understanding of the major transitions between feeding types and their ecological consequences.

Organizer

Paul Eggleton, the Natural History Museum, London

Invited speakers

Christine Nalepa, North Carolina State University

Andreas Brune, University of Marburg

6 The role of relatedness in social evolution: a critical assessment of when it matters, and when not

Relatedness has been used to explain various patterns of behavior in social insects, but are there situations where variation in relatedness does not explain the patterns of social interactions that we see? When we look at eusocial species, relatedness is clearly a requirement to understand the evolution of obligate sterility among members of a society. Nevertheless, relatedness patterns often do not differ between solitary and highly social species, highlighting the importance of other factors beyond relatedness for the evolution of sociality. The gain of direct fitness benefits can explain some social patterns in species that are not obligatorily eusocial. The ratio of costs and benefits outlined in Hamilton's rule represent another important set of factors that can explain differences in social evolution. Although we have seen a recent shift in emphasis towards the cost and benefit ratio of social interactions, relatedness patterns are still a strong focus of research on social evolution. In this symposium, we are looking for examples where social evolution or patterns of sociality are not explainable by average relatedness or by variations in relatedness. The examples, including both cooperative and eusocial breeding, that this symposium hopes to attract will help us to evaluate when differences in relatedness are important for the differential expression of social behaviours and when they are insignificant relative to other factors.

Organizer

Juergen Liebig, Arizona State University, Tempe, U.S.A.

Invited Speakers

Juergen Heinze, University of Regensburg

Michael Taborsky, University of Bern

7 Sex and the insect society: focus on unorthodox breeding systems

Colony breeding structure is a fundamental feature of social insects, and the occurrence of modes of reproduction other than strict monogamy has important consequences for social evolution. Eusociality, with its attendant caste structure and unique life histories, can generate novel reproductive and genetic systems with important implications for the maintenance of sex and the proximate mechanisms underlying caste determination, as well as unprecedented opportunities to study these mechanisms. This symposium will synthesize exciting recent work on the evolution of mating strategies in insects and their kin along the subsocial to highly-derived eusocial continuum, considering the roles of inbreeding/outbreeding, parthenogenesis, and number and timing of mates, and the impact of these strategies in different clades. The use of various modes of reproduction, within a species or within a colony, is undoubtedly more widespread among social insects than has so far been appreciated; examining the interplay between mating strategies and sociality can aid in understanding the proximate and ultimate factors influencing colony structure and function.

Organizers

Tamara Hartke, Northeastern University Biology Department, Boston, U.S.A.
Kenji Matsuura, Okayama University, Okayama, Japan

Invited speakers

Trine Bilde, Aarhus University
Shigeto Dobata, University of Tokyo

8 Brood parasitism and inquilineism in social insects

The evolution of insect societies requires mechanisms to control selfish worker reproduction. These systems are not perfect and occasionally fail. These failures provide keyholes through which we can study the systems of control that normally keep the majority of workers functionally sterile. Many of the failures have only been recently recognized, unlocking a whole new way of appreciating conflict resolution. Molecular analyses have now revealed that individuals can be parasites of their own society, or those of their neighbours. In this symposium we will examine recently-revealed instances of inter and intra-specific reproductive parasitism and inquilineism. Each example will be instructive to our goal of showing that the potential for worker reproduction is taxonomically widespread in insect colonies. We will also discuss the mechanisms that insect societies have evolved to protect themselves from being exploited by social parasites, and the devices that the parasites have evolved to circumvent these mechanisms.

Organizers

Ben Oldroyd, University of Sydney, Sydney, Australia
Nadine Chapman, University College, London, U.K.

Invited speakers

Rebecca Kilner, University of Cambridge
Tom Wenseleers, University of Leuven

9 Insect-microbe symbioses as evolutionary innovation

It is becoming increasingly clear that social insects engage in numerous types of associations with microbes, including bacteria, yeasts, and fungi. These interactions influence the ecology and evolution of social insect societies in a number of ways, either by imposing constraints or by expanding the observed ecological niche of the insect and/or the microbe. This symposium will cover completely novel discoveries of social-insect symbiont functions and mechanisms and discuss these in relation to a conceptual framework of symbiosis as evolutionary innovation. This will include examining underlying proximate and ultimate mechanisms shaping social insect-microbe symbioses, focusing on key evolutionary innovations in social insect-microbe mutualisms. Contributions from recently discovered or less studied social insect symbioses are particularly encouraged. The symposium aims for a broad taxonomic range and an interdisciplinary approach to highlight and recognize common evolutionary patterns and to formulate new areas for future research.

Organizers

Michael Poulsen, University of Wisconsin, Madison, U.S.A.

Henrik H. De Fine Licht, University of Copenhagen, Copenhagen, Denmark

Invited speakers

Meredith Blackwell, Louisiana State University

Heike Feldhaar, University of Osnabrück

10 The social evolution of fusion and exclusion

The potential for fusion or mixing between different biological units is widespread, ranging from single cells forming multicellular structures, via modular multicellular organisms such as fungi forming larger individuals, to colonies of social insects forming super colonies. However, successful integration is usually restricted to close relatives regulated by precise kin recognition systems. Such conditional integration is consistent with kin-selection theory, because the potential inclusive fitness cost and the potential for cheating decrease with increasing relatedness. However, if recognition is based on genetic cues, in the short term, allorecognition alleles are under positive-frequency dependent selection, which removes the required polymorphism (Crozier, 1986). Several possible solutions have recently been proposed for this paradox, but these largely remain to be tested. In this symposium, the social biology of fusion and mixing in general, and the maintenance of genetic kin recognition regulating integration in particular, will be covered. The symposium will bring together researchers working on different hierarchical levels of biological organization, at which mixing occurs, ranging from single cells to social parasitism in social insects.

Organizers

Duur K. Aanen, Wageningen University and Research Center, Wageningen, The Netherlands

David Queller, Rice University, Houston, U.S.A.

Invited speakers

Rick Grosberg, University of California, Davis

Joan Strassmann, Rice University

11 Kin structure variation, gene flow and social adaptation

Molecular research carried out during the last 20 years has revealed substantial variation and evolutionary flexibility in kin structure both within and between social insect populations. Kin structure determines the nature and strength of kin conflicts, such as those between queens and workers over sex allocation or male parentage. The optimal resource allocation strategy of workers depends on the average kin structure in the population, as well as the colony-specific kin structure. Thus, to achieve the optimal strategy, the workers need to have evolved a response to both the population mean and the ability to facultatively respond to the kin structure in their own colony. However, gene flow between populations may mitigate optimal responses when kin structure varies among populations. This symposium will address the extent to which gene flow and social variation limit the ability of workers to optimize their behaviour, and whether such constraints confer power to the queen instead of the workers. First, if there is between-population variation in social structure, will gene flow between populations prevent locally optimal behaviour? Second, if there is variation in social structure within populations, are the different social types genetically differentiated and do they differ in their conflict behaviour? Third, if social structure varies within populations, can individuals assess the type of colony they are in, and respond optimally? To answer these questions and increase our understanding of the interplay of population genetics and social adaptation, we need to incorporate data from population genetics within and between populations and behavioural ecology, both in terms of conflict behaviour, and the mechanisms underlying behavioural decisions.

Organizers

Heikki Helanterä, Perttu Seppä & Lotta Sundström, University of Helsinki, Helsinki, Finland

Invited speakers

Michel Chapuisat, University of Lausanne
Alan Grafen, Oxford University

12 Integrating molecular and morphological approaches to elucidate social insects phylogenies

Robust phylogenetic hypotheses at both high and low taxonomic levels are critically important for a better understanding of the evolution of, e.g. altruism, caste differentiation, species invasiveness, host-parasite interactions and mutualisms. Until fairly recently, comparatively few phylogenetic analyses had been conducted and integrated with evolutionary studies of social insects. Large gene sequence datasets are now becoming increasingly available due to technological advances. Together with new analytical techniques these data offer unprecedented opportunities for elucidating problematic issues in the phylogenetics of social insects. This has stimulated the re-evaluation of time honoured hypotheses based primarily on morphological data and inspired synthetic endeavours combining molecular and morphological datasets to put current understanding of the evolution of social insects on a much firmer footing. This symposium is meant to provide a platform for presenting the results of recent phylogenetic studies in all groups of social insects. We especially welcome contributions in which different data sources are combined and the respective merits and disadvantages of using these sources are evaluated.

Organizers

Caspar Schöning, Länderinstitut für Bienenkunde, Hohen Neuendorf, Germany
Lars Vilhelmsen, Natural History Museum of Denmark, University of Copenhagen, Copenhagen, Denmark

Invited speakers

Michael Sharkey, University of Kentucky
Sean Brady, Smithsonian National Museum of Natural History

13 Patterns and processes of aging and lifespan: how special are social insects?

Sociality leads to decreased extrinsic mortality and concomitant increases in life spans. In eusocial animals, the division of labour further favours evolution of pronounced phenotypic plasticity in life span. Both of these patterns have evolved repeatedly, providing ideal opportunities to study why and how dramatic, natural variation in ageing rates can occur. This symposium seeks to combine ultimate and proximate studies that address aging patterns and processes in social insects. The symposium will address two major questions: 1. What can be learned from studying social insects about the evolution of aging and life spans? 2. What can be learned from studying aging about the evolution of social insect societies? The overlap between these fields is significant but has not been explored to its full extent and contributions in this symposium will show examples of current research and try to define future opportunities for integrative aging research in social insects.

Organizers

Olav Rueppell, The University of North Carolina at Greensboro, Greensboro, U.S.A.
Joel Parker, University of Southampton, Southampton, U.K.

Invited Speakers

Gro V. Amdam, Arizona State University
Rochelle Buffenstein, University of Texas

14 Evolution of morphological novelty in social insects

This symposium will focus on the evolution of morphological innovation (e.g. winglessness in sexuals, soldier morphologies) in social insects and its relationship to colony architecture. It is our goal that the symposium will bring together researchers with different backgrounds to explore the underlying developmental and physiological mechanisms that contribute to the diversification of castes.

Organizers

Diana Wheeler, University of Arizona, Tucson, U.S.A.
Christian Peeters, Université Pierre et Marie Curie, Paris, France

Invited speakers

Armin Moczek, University of Indiana
Mathieu Molet, Université Pierre et Marie Curie, Paris

15 Genetics of Social Behaviour

Substantial advances have been made in recent years in the understanding of the genetic basis of behaviour in non-social organisms, especially the mouse and the fruit fly *Drosophila*. Genetic studies in these organisms have two traditions: quantitative genetic studies of natural variants and single-gene studies of induced mutants. These approaches have led to an understanding of how genes can influence behaviours that mostly involve a considerable degree of complex gene interaction. Social insects are striking organism with a complex individual behavioral repertoire. The interaction of tens of thousands of workers in a social insect colony results in seemingly perfect cooperation including brood care, communication, predator defense, and defense against infectious disease. This additional level of biological organization provides new solutions to the myriad challenges posed by the abiotic and biotic environment, but the genetic basis of innate behavior is largely unknown. The symposium aim to address the question whether we are able to find causal links between gene function and individual and social behaviors. A mechanistic understanding would provide fruitful insights into their molecular requirements and evolutionary origins. We will explore to which extend approaches from model organisms can be applied to social insects and what approaches are feasible given the development of new tools and resources such as microarrays and genome sequences. The symposium aims to cover single gene, gene network as well us QTL studies.

Organizers

Martin Beye, Heinrich-Heine Universitaet Duesseldorf, Duesseldorf, Germany
Charles W. Whitfield, University of Illinois, Urbana-Champaign, U.S.A.

Invited Speakers

Stephen Goodwin, University of Glasgow
Olav Rueppell, University of North Carolina at Greensboro

16 The genetic basis and consequences of social evolution

Social evolution has produced a diversity of insect societies, ranging from subsocial to eusocial, all characterized by complex webs of social interactions among nestmates, and in some cases specialized castes. Recent advances in genomics, together with traditional quantitative genetic and novel evolutionary genetic approaches, have enabled researchers to begin to uncover the complex genetic and molecular basis of important social traits that have been shaped by social evolution. Researchers are also beginning to identify the broader genetic and genomic consequences of social evolution. This symposium will explore the following three closely related questions: To what degree are traits characterizing insect societies, in particular specialized castes and traits involved in nestmate-nestmate interactions, heritable and shaped by social evolution? What is the specific genetic and molecular basis of these important social traits? And, what are the long-term genetic and genomic signatures of social evolution? Further, this symposium will highlight novel evolutionary genetic and genomic approaches that consider the evolutionary causes and consequences of variation in the social environment.

Organizers

Timothy A. Linksvayer, University of Copenhagen, Copenhagen, Denmark
Anna M. Schmidt, University of Copenhagen, Copenhagen, Denmark

Invited speakers

Laurent Keller, University of Lausanne
Allen Moore, University of Exeter

17 The beneficial use of ants and termites in agriculture and nutrition

In contrast to bees, ants and termites are generally considered pests. However, ants have been used in biocontrol for centuries, particularly in tropical Asia, and as the demand for organic products and sustainable agriculture increase, ant biocontrol is facing a renaissance. Recent studies in Australia, Asia and Africa have shown that ants can replace chemical pesticides and at the same time increase yields, crop quality and livelihoods among poor people. Furthermore, several ant species are utilized directly as human and animal food and are used in traditional medicine. Like ants, termites are utilized as food and may in some areas form an important source of protein. Termites may also benefit agriculture both in terms of productivity and the restoration of degraded soil. Recent studies have shown termite activity can improve soil health and plant production through their effects on soil properties and processes, such as the percolation and storage of water after rain. Some ant and termite species are indeed pests but others are highly beneficial to the agricultural sector and to support food security. This symposium will (i) address the potential role and economic potential of ants and termites in agriculture, (ii) present the basic biology needed for the domestication of focal species, and (iii) identify knowledge gaps to be addressed in future research for a continued development of applied myrmecology and termitology.

Organizers

Mogens Gissel Nielsen, Aarhus University, Aarhus, Denmark
Joachim Offenberg, Aarhus University, Aarhus, Denmark

Invited speakers

Renkang Peng, Charles Darwin University, Darwin
Tracy Dawes, CSIRO

18 Optimization in natural systems: designing nature-inspired algorithms using social insects

Since the invention of ant colony optimisation algorithms, ‘nature-inspired’ algorithms have been developed for a large range of optimisation problems. Computing systems consist of many autonomous components that cannot be managed by one central control system. Similar to insect societies, these artificial systems need to be self-organised. It is thus not surprising that the behaviour of insect colonies remains a source of inspiration for computer scientists and engineers. Despite many optimisation algorithms claiming to be inspired by biological systems, this inspiration is often superficial. As biologists, we know little about the kind of problems social insects can solve and how. At the other extreme, computer scientists and engineers focus mainly on mechanisms applicable to artificial systems. We aim to bring together scientists from diverse fields to report on the range of problems social insects can solve, the way solutions are constructed and their application in engineering and computer science. The symposium will showcase research on solution construction in real and artificial decentralised systems.

Organizers

Madeleine Beekman, University of Sydney, Sydney, Australia
David Sumpter, Uppsala University, Uppsala, Sweden
Karl Crailsheim, Karl-Franzens-Universitaet, Graz, Austria
Jean Louis Deneubourg, Université libre de Bruxelles, Brussels, Belgium

Invited speakers

Stephen Pratt, Arizona State University
Barbara Webb, University of Edinburgh

19 Behavioral syndromes in social insects: the evolution of behavioral variation between individuals and colonies

In the last few years, animal behavior researchers have started to recognize that there is abundant behavioral variation among individuals within species, and that this variation may be adaptive. This has been described as ‘personalities’ or ‘behavioral syndromes’. Social insect researchers on the other hand have long been aware of such behavioral differences. What are the parallels or differences between ‘behavioral syndromes’ found in solitary animals and the behavioral roles in social insect workers? Behavioral variation among nestmates, often linked to division of labor, may be age-related, or depend on physiological state; however, similar-aged individuals of a single colony can also differ consistently in their behavior. Furthermore, recent research has shown that there are significant differences among colonies as well. What causes behavioral variation among colonies, and is this a result of adaptive evolution similar to ‘behavioral syndromes’? These questions have not been explored, but promise significant advances in our understanding of the evolution of within-species variation. In addition to within-species variation, we often find between-species variation in behavior in social insects. Social insect research has now progressed to the point where in addition to describing such differences, we can propose and test evolutionary explanations for these species differences. What are the social and ecological factors that promote the evolution of particular behavioral strategies, for example in division of labor, communication, foraging strategies, etc.? In this symposium, we will address the evolution of behavioral differences among individuals, colonies, and species.

Organizers:

Anna Dornhaus, University of Arizona, Tucson, U.S.A.

Susanne Foitzik, Universität München, Munich, Germany

Invited speakers:

Andy Sih, University of California at Davis

Lars Chittka, Queen Mary College, University of London

20 Insect societies as complex systems

Multiple interactions are fundamental to the organisation of insect societies. Indeed, social insect colonies are cited as the prime example of a complex system and over the last 20 years self-organisation has established itself as the theory underpinning our understanding of the proximate organisational principles of insect societies. The topical field of complexity science with its theoretical bedrock in statistical physics can further our understanding of social insect colonies through data-driven development of new theory. Insect societies provide an unrivalled system for experimental manipulation on at least two levels of organisation – individual and colony - that is crucial for the development of new theory. The goal of the symposium is to further our understanding of social insect colonies as systems by bringing together experimentation and modelling in areas such as task allocation, decision-making, aggregative behaviour, sorting, food distribution, spread of disease, dominance hierarchies and nest building. The hope is to help establish social insects as a prime model system for complexity science and bring about new developments that could have profound implications for our understanding of phenomena that influence our daily lives.

Organizer

Ana Sendova-Franks, University of the West of England, Bristol, U.K.

Invited speakers

Kim Christensen, Imperial College London

Claire Detrain, Université Libre de Bruxelles

21 Communication and the integration of multiple information sources in colony organisation

This symposium will focus on understanding how multiple information sources are integrated in the organization of insect societies. To function effectively an insect colony must be able to respond adaptively to changes inside and outside the nest, for example in nest construction, need for defence, and the location of feeding places. To do this the individual workers change and coordinate their activities in relation to colony needs as determined using a wide variety of information sources including their own memory, cues from the colony environment, and signals and cues from nestmates. Within this area, recent research has raised many questions: why are there multiple signals, for example in ant foraging, where one would seem sufficient; what are the relative roles of social versus private information; how do workers adaptively choose among different information sources; how does the foraging method affect the best information sources to use; which signals are fixed, and which are responsive to a complex and changeable environment? how does the use of information in the organization of insect colonies compare to organization e.g. of cells or individuals?

Organizers

Christoph Grüter, University of Sussex, Falmer, Brighton, U.K.

Elva J.H. Robinson, University of York, York, U.K.

Francis L. W. Ratnieks, University of Sussex, Falmer, Brighton, U.K.

Invited speakers

Thomas D. Seeley, Cornell University

James Nieh, University of California at San Diego

22 Semiochemicals in insect societies: the effects of genes and environment and their interaction

Chemical communication underpins the vast majority of insect behaviours. This is especially important in social insects where altruistic behaviours should be directed towards relatives. Within the last few decades much of the research focussed primarily on the identification of possible recognition cues produced by social insects, but in recent years this has shifted towards the source and maintenance of these cues, especially the effect of the environment on the production of these cues. An important class of recognition cues is the cuticular hydrocarbons and in solitary insects such as *Drosophila* the genetic component towards the production of these compounds are well documented. In contrast, in social insects the reverse appears to be the case with most evidence pointing to strong environmental effects (e.g. food, temperature) and a weaker genetic effect. In the last four years our understanding of social-insect chemical ecology has greatly increased and with it the interaction between genetic and environmental factors should become clearer. The aim of the symposium is therefore to bring to together the latest research on semiochemicals, especially recognition cues, of social insects with a strong emphasise on the role that either the environment or genetics has on the production and regulation of these chemical signals.

Organizers

Stephen J. Martin, University of Sheffield, Sheffield, U.K.

Falko P. Drijfhout, Keele University, Keele, U.K.

Invited speakers

Gary Blomquist, University of Nevada, Reno

Alain Lenoir, University of Tours

23 Nestmate and other kin-recognition systems: from ecology and behaviour to molecular and neurophysiological techniques

Nestmate recognition is crucial in the lives of social insects because it allows them to direct help towards close kin and is vital given that colonies are subject to predation, robbing and parasitism by both conspecific and allospecific intruders. Recent advances have elucidated that nestmate recognition, in contrast to conventional belief, may be based on simple decision rules and cognitive processes. Moreover, after decades of research we are finally closing in on the exact recognition cues used in nestmate recognition. On the other hand, recognition of closest relatives within insect societies seems notoriously absent, and kin recognition in the context of mate choice is still largely understudied amongst the social insects. In this symposium we will discuss cognitive processes and recognition cues used in nestmate and other kin recognition systems. The aim is to further our understanding of how the ecology, behaviour and physiology of a species determines how levels of kin recognition trade off, and assess how molecular and neurophysiological techniques can be used to learn more about the process of kin recognition. We would like to stimulate presentations of studies that bridge the gap between kin recognition in the classic social insects and that in other organisms.

Organizers

Margaret J. Couvillon, University of Sussex, U.K.

Jelle S. van Zweden, University of Copenhagen, Copenhagen, Denmark

Invited Speakers

Francis L.W. Ratnieks, University of Sussex

Mamiko Ozaki, Kobe University

24 New insights into social evolution: Molecular and genomics approaches to comparative neuroethology

Research into the neural mechanisms underlying social behaviour is hampered because the social insects lack most of the genetic and genomic tools available to the classic model systems, such as *Drosophila melanogaster*. Unfortunately these model systems are usually considered to lack relevance for most studies of social behaviour, but there is increasing evidence that basic processes in solitary systems have been co-opted to produce complex social behaviour in social insects. Comparing conserved behavioural modules in social and non-social species can reveal how neurobiological systems have been adapted for a highly social life style. With the development of new tools and resources in social insects, we propose a comparative molecular-genomic approach can accelerate research into the mechanisms and evolution of social behaviour. Furthermore, the application of new genomics approaches to social insects is enhancing the value of social insects as comparative models for basic neuroscience research in areas as diverse as learning and memory, olfaction, anaesthesia, and sleep. This symposium discusses the importance and value of comparative molecular approaches to neurobiology and sociobiology.

Organizers

Andrew Barron, Macquarie University, Sydney, Australia

Christina Grozinger, Pennsylvania State University, Pennsylvania, U.S.A.

Invited speakers

Yehuda Ben-Shahar, Washington University in St. Louis

Giovanni Galizia, Universität Konstanz

25 My brain made me do it: Neurological basis of behavioral repertoire changes in social insects

Behavioral repertoires vary greatly between social insect castes and can change dramatically over the lifetime of an individual. With the advent of increased genomic data in social insects, a variety of techniques, previously restricted to model systems such as *Drosophila*, are becoming increasingly available for the study of the neurological basis of social insect behavior. This symposium examines differences in brain structure, neurochemistry, and function during maturation and aging. Comparisons will be made across lineages and along the spectrum of sociality. Particular attention will be given to changes in the brains of reproductives during colony foundation and of workers as a function of task specialization.

Organizer

Marc Seid, Smithsonian Tropical Research Institute, República de Panamá

Invited speakers

Allison Mercer, University of Otago

Second speaker to be announced

26 Trajectories towards sociality across arthropod taxa

This symposium will aim at identifying various processes in the evolution of sociality across different groups of arthropods. The social trajectory approach views a species' social structure as arising from a series of behavioral decisions over an individual's lifetime. These decisions may involve dispersal, foraging behavior, mating systems and parental care. Comparisons of the trajectories taken by different taxa are likely to reveal unifying themes, due to common phylogeny, ontogeny or ecological constraints. To allow a wide systematic perspective, the symposium will include taxa outside the mainstream of sociality research, such as spiders, beetles, aphids and thrips, as well as mainstream organisms such as hymenopterans and termites.

Organizers

Ally Harari, Agricultural Research Organization, Bet Dagan, Israel

Tamar Keasar, University of Haifa - Oranim, Tivon, Israel

Invited speakers

Sara Helms Cahan, University of Vermont

Yael Lubin, Ben Gurion University

27 Immunity and sociogenomics of host-parasite interactions

Given their lifestyle, where many related individuals live together at high densities, social insects should be particularly susceptible to attack by parasites and pathogens. Furthermore, parasites have been implicated in global declines of both natural and managed pollinators in recent years, with potentially catastrophic economic and environmental consequences. Yet, social insects have also evolved a number of defences against parasite attack, both at the individual and colony level. Knowledge of these defences and their ecology and evolution is critical for understanding the interactions between social insects and their parasites. The rapidly developing techniques in the fields of genomics, transcriptomics and proteomics, mean that the studies of interactions between social insects and their parasites can now be carried out at both the phenotypic and the genotypic level. Integration of new molecular tools with existing individual and colony assays will enable a comprehensive understanding of the evolutionary ecology of social insect host-parasite interactions. Contributions from speakers are welcome that concern the defence of social insects against parasites, with studies carried out on levels from the genome to the colony.

Organizers

Sylvia Cremer, University of Regensburg, Regensburg, Germany

H. Michael G. Lattorff, Martin-Luther-Universität, Halle-Wittenberg, Germany

Ben M. Sadd, Institute of Integrative Biology, ETH Zurich, Switzerland

Invited speakers

Dan Hultmark, Umea University

Paul Schmid-Hempel, ETH Zurich

28 Parasites in social insects

There is growing appreciation of the fundamental role of parasites in host evolution, and it is commonly thought that parasites are particularly significant for social insects with their high density aggregations of closely related individuals within homeostatically controlled nests. The recent concern about losses of honeybee colonies at a global scale makes understanding the interactions between social insects and their parasites particularly topical. Yet our understanding is still extremely limited. Most studies are restricted to investigations of single, normally relatively virulent, parasites in one of a few popular model systems. These have been extremely valuable but we consequently have only scattered information on even the occurrence of parasites in the vast majority of social insects and know little about the more avirulent and cryptic majority of parasitic symbionts. For very few parasites do we have a good understanding of their transmission dynamics or host range. Moreover, natural parasite infections involve a complex interaction between multiple parasite strains or species, the host's resistance mechanisms, environmental conditions and possibly other non-parasitic symbionts as well. This symposium will aim to complement insightful studies of single host-parasite systems with those investigating the diversity of parasites or which focus on more complex host-parasite, parasite-parasite, parasite-symbiont or parasite-environment interactions.

Organizers

William Hughes, University of Leeds, Leeds, U.K.

Mark Brown, Royal Holloway University of London, Egham, U.K.

Peter Neumann, Swiss Bee Research Centre, Bern, Switzerland

Invited speakers

Jay Evans, USDA-ARS Bee Research Lab

Steven Valles, USDA Agricultural Research Services

29 The living past of Insect Sociobiology

N.B. This particular symposium will consist of invited speakers only

Insect sociobiologists take a keen interest in the history of our own discipline. This is readily seen at informal gatherings around meetings, when younger colleagues ask their elders how one or another textbook discovery really came about. The aim of this proposed session is to draw upon the recollections of selected participants to illuminate growing points in our own past. The emphasis will be on personal testimony and the speaker's place in that period, lab and/or scientific development.

Organizers

John Wenzel, Ohio State University, U.S.A.
Christopher Starr, University of the West Indies

Invited speakers

Michael Breed, Colorado State University
Nigel Franks, University of Bristol
Raghavendra Gadakar, Indian Institute of Science
Pierre Jaisson, Université Paris-Nord
Bob Jeanne, University of Wisconsin

30 Open symposium - Social insect behaviour

Based on the abstracts received, this open session will be used for the presentation of talks and posters that present research on social insect behaviour that does not fit into the organized symposia.

Organizers

The IUSSI2010 organizing committee

31 Open symposium - miscellaneous

Based on the abstracts received, this open session will be used for the presentation of talks and posters that present research that does not fit into any of the other symposia.

Organizers

The IUSSI2010 organizing committee
