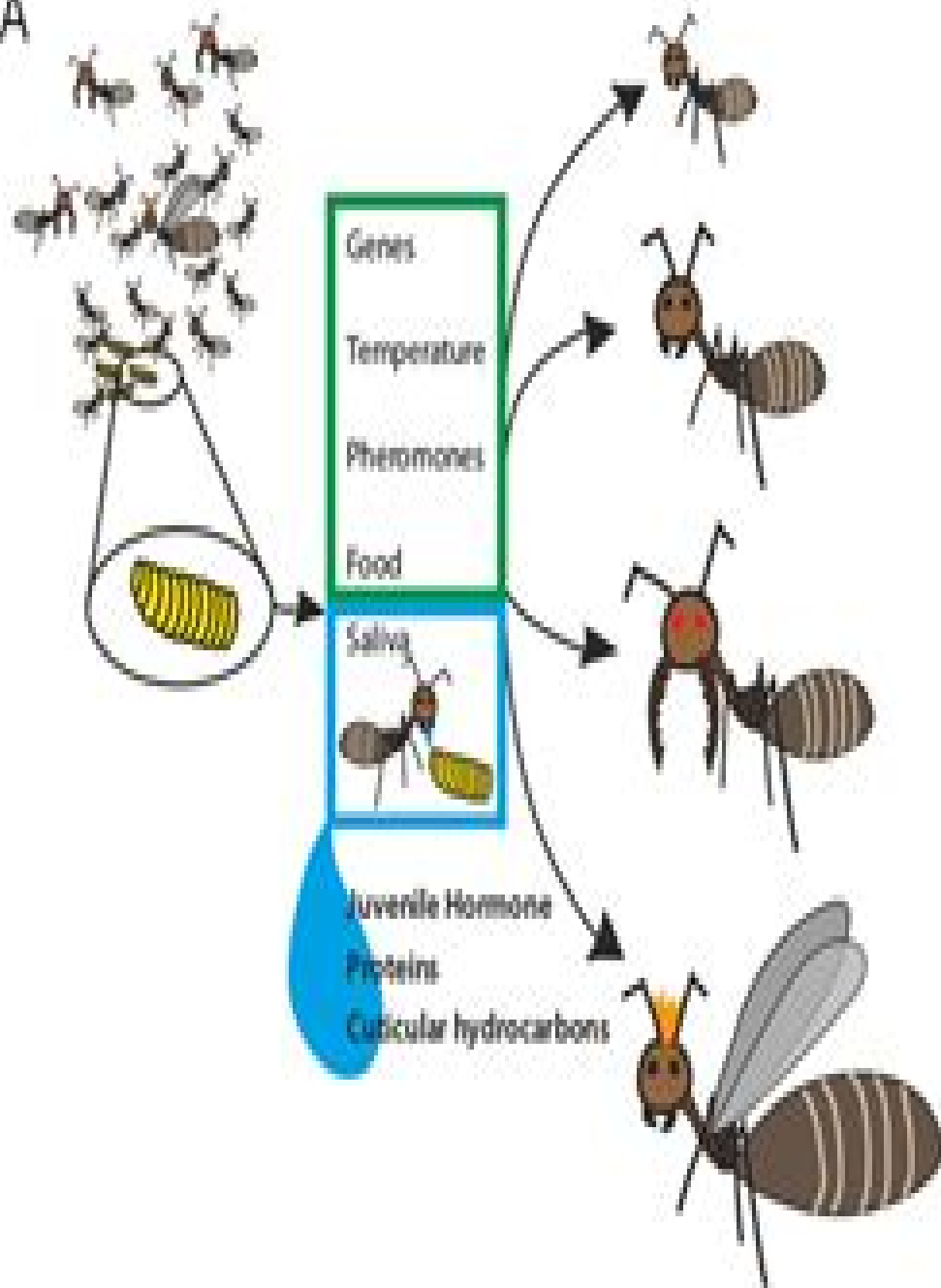


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Social Evolution In Ants

LL Leslie



Social Evolution In Ants:

Social Evolution in Ants Andrew F.G. Bourke, Nigel R. Franks, 2019-12-31 Biologists since Darwin have been intrigued and confounded by the complex issues involved in the evolution and ecology of the social behavior of insects The self sacrifice of sterile workers in ant colonies has been particularly difficult for evolutionary biologists to explain In this important new book Andrew Bourke and Nigel Franks not only present a detailed overview of the current state of scientific knowledge about social evolution in ants but also show how studies on ants have contributed to an understanding of many fundamental topics in behavioral ecology and evolutionary biology One of the substantial contributions of *Social Evolution in Ants* is its clear explanation of kin selection theory and sex ratio theory and their applications to social evolution in insects Working to dispel lingering skepticism about the validity of kin selection and more broadly of selfish gene theory Bourke and Franks show how these ideas underpin the evolution of both cooperation and conflict within ant societies In addition using simple algebra they provide detailed explanations of key mathematical models Finally the authors discuss two relatively little known topics in ant social biology life history strategy and mating systems This comprehensive up to date and well referenced work will appeal to all researchers in social insect biology and to scholars and students in the fields of entomology behavioral ecology and evolution

The Evolution of Social Behavior in Insects and Arachnids Jae C. Choe, Bernard J. Crespi, 1997 Social insects and arachnids exhibit complex forms of behavior that involve cooperation in building a nest defending against attackers or rearing offspring This book is a comprehensive up to date guide to sociality and its evolution in a wide range of taxa

Principles of Social Evolution Andrew F.G. Bourke, 2011-01-06 Investigates and sets out the common principles of social evolution operating across all taxa and levels of biological organisation

The Genetics Of Social Evolution Michael D Breed, Robert E Page, 2019-09-06 The contributor s primary goal in organizing this book was to initiate a synthesis of thought on how genetics structures the behavior of individual animals that live within complex social systems To do this they have brought together leading theorists and empiricists who apply genetics to the study of eusocial insect evolution

Organization of Insect Societies Jürgen Gadau, Jennifer Fewell, 2009-02-28 In this landmark volume an international group of scientists has synthesized their collective expertise and insight into a newly unified vision of insect societies and what they can reveal about how sociality has arisen as an evolutionary strategy J rgen Gadau and Jennifer Fewell have assembled leading researchers from the fields of molecular biology evolutionary genetics neurophysiology behavioral ecology and evolutionary theory to reexamine the question of sociality in insects Recent advances in social complexity theory and the sequencing of the honeybee genome ensure that this book will be valued by anyone working on sociality in insects At the same time the theoretical ideas presented will be of broad ranging significance to those interested in social evolution and complex systems

Neuroethology of the Colonial Mind: Ecological and Evolutionary Context of Social Brains J. Frances Kamhi, Sara Arganda Carreras, Mathieu Lihoreau, 2023-10-02 Animal groups often display striking collective

organization which relies on social interactions These interactions require neural substrates supporting the exchange of information among individuals and the processing of this information The social brain hypothesis suggested from neuroanatomical findings in primates posits that increasing levels of sociality involve a higher investment in neural tissue to cope with social information However distributed cognition and swarm intelligence might alleviate the cognitive load on the individuals and potentially reduce their neural requirements Research on social insects which are an exemplar of collective action has so far produced mixed results Individual cognition and collective action have received a lot of attention and much progress has been done in each of those fields however much less is understood about how the two interact Our goal is to aggregate theoretical and experimental research exploring the links between the complexity of individual and collective behaviors Experimental research testing the social brain hypothesis showed little support for a general explanation across the animal kingdom The relationship between the cognitive abilities of animals and their social interactions are much more complex than previously thought and tackling this problem requires a better knowledge of the fundamental mechanisms underpinning socio cognitive tasks What is the information used by the animals during social interactions How much information is necessary How many neurons and which neural circuits are required for processing this information What neural connections are important Do these social interactions involve memory formation How do the cognitive requirements and neural circuits vary between group members Answering these questions will bring considerable insights into the cognitive complexity involved for social and collective behaviors It will also advance our understanding of inter individual cognitive variability and division of labor in most socially advanced species This Research Topic will be a unique forum for researchers from different fields neurogenetics neuro ethology evolutionary ecology cognitive ecology collective animal behavior computational modeling working on different species to present up to date advances on the physiological correlates of social behavior and delineate future directions for the field of social neuroethology We welcome contributions on any aspect of the cognitive requirements of social and collective behaviors from molecular cellular and circuit level approaches to how individuals contribute to group action at the behavioral level Specific areas of interest include but are not limited to studies on the neural underpinnings of division of labor neuromodulation or neurogenetics of social behaviors the neural circuits and neuroanatomical basis of group action and how social signals affect learning and behavior We encourage submissions that present original research and review evidence or compare data from multiple species We hope to include work from different disciplines and on a wide range of species including model non model and wild animals with the aim of gaining insight into the patterns of neural investment in individual cognition

The Behavioural Ecology of Parasites E.

E. Lewis, J. F. Campbell, M. V. K. Sukhdeo, 2002-07-17 Parasites have evolved numerous complex and fascinating ways of interacting with their hosts The subject attracts the interest of numerous biologists from the perspective of ecology and behavioural biology as well as from those concerned with more applied aspects of parasitology However until now there has

been no recent book to synthesize this field This book written by leading authorities from the USA Europe Australia and New Zealand provides the most comprehensive coverage of this important topic on the market A Field Guide to the Ants of New England Aaron M. Ellison, Nicholas J. Gotelli, Elizabeth J. Farnsworth, Gary D. Alpert, 2012-11-13 This book is the first user friendly regional guide devoted to ants the little things that run the world Lavishly illustrated with more than 500 line drawings 300 plus photographs and regional distribution maps as composite illustrations for every species this guide will introduce amateur and professional naturalists and biologists teachers and students and environmental managers and pest control professionals to more than 140 ant species found in the northeastern United States and eastern Canada The detailed drawings and species descriptions together with the high magnification photographs will allow anyone to identify and learn about ants and their diversity ecology life histories and beauty In addition the book includes sections on collecting ants ant ecology and evolution natural history and patterns of geographic distribution and diversity to help readers gain a greater understanding and appreciation of ants

Encyclopedia of Animal Behavior, 2019-01-21 Encyclopedia of Animal Behavior Second Edition Four Volume Set the latest update since the 2010 release builds upon the solid foundation established in the first edition Updated sections include Host parasite interactions Vertebrate social behavior and the introduction of overview essays that boost the book s comprehensive detail The structure for the work is modified to accommodate a better grouping of subjects Some chapters have been reshuffled with section headings combined or modified Represents a one stop resource for scientifically reliable information on animal behavior Provides comparative approaches including the perspective of evolutionary biologists physiologists endocrinologists neuroscientists and psychologists Includes multimedia features in the online version that offer accessible tools to readers looking to deepen their understanding

Insect Evolutionary Ecology Royal Entomological Society of London. Symposium, 2005 Insects provide excellent model systems for understanding evolutionary ecology They are abundant small and relatively easy to rear and these traits facilitate both field and laboratory experiments This book has been developed from the Royal Entomological Society s 22nd international symposium held in Reading in 2003 Topics include speciation and adaptation life history phenotype plasticity and genetics sexual selection and reproductive biology insect plant interactions insect natural enemy interactions and social insects

Sociobiology and the Human Dimension Georg Breuer, 1983-01-13 This book is about animals and humans their common features and their gradual and principle differences It tells of democracy in baboons prostitution in hummingbirds bigamy in wrens baby sitting in jackals of chimpanzees at the computer console and of the super ego of dogs but it is also about the labour productivity of hunter and gatherer peoples incest avoidance in animals and humans and of the myths about matriarchy In a language accessible to any interested layman Georg Breuer gives a balanced account of the main ideas and achievements of sociobiology and the main criticisms levelled against it According to him sociobiology has given many a valuable impetus but sometimes presents a distorted or one sided view In particular it has not answered or

addressed the question of why man and man only is able to identify and feel sympathy with any other human being The evolution of this most human of all traits confers on us the capability for charity and solidarity and for the happiness of true love which is unattainable by any animal *Social Evolution in Ants* Timothy A. Linksvayer, 2005 When social interactions occur the phenotype of an individual can be influenced both directly by its own genes and indirectly by genes expressed in social partners Eusocial insect colonies are notable for extensive behavioral interactions among larval worker and queen nestmates In particular developing larvae are reliant on care provided by workers and queens Social insect phenotypes are thus affected by zygotic genes expressed during development direct genetic effects genes expressed in care giving adult workers sibsocial genetic effects and genes expressed in queens maternal genetic effects The purpose of this dissertation was to incorporate this complexity into models of social insect evolution and to empirically study the evolutionary importance of direct and indirect genetic effects on ant phenotypes *Information Processing in Social Insects* Claire Detrain, Jean L. Deneubourg, Jacques M. Pasteels, 2012-12-06 Claire Detrain Jean Louis Deneubourg and Jacques Pasteels Studies on insects have been pioneering in major fields of modern biology In the 1970 s research on pheromonal communication in insects gave birth to the discipline of chemical ecology and provided a scientific frame to extend this approach to other animal groups In the 1980 s the theory of kin selection which was initially formulated by Hamilton to explain the rise of eusociality in insects exploded into a field of research on its own and found applications in the understanding of community structures including vertebrate ones In the same manner recent studies which decipher the collective behaviour of insect societies might be now setting the stage for the elucidation of information processing in animals Classically problem solving is assumed to rely on the knowledge of a central unit which must take decisions and collect all pertinent information However an alternative method is extensively used in nature problems can be collectively solved through the behaviour of individuals which interact with each other and with the environment The management of information which is a major issue of animal behaviour is interesting to study in a social life context as it raises additional questions about conflict cooperation trade offs Insect societies have proven particularly open to experimental analysis one can easily assemble or disassemble them and place them in controllable situations in the laboratory *Ecology of Social Evolution* Judith Korb, Juergen Heinze, 2008-02-23 Research on the evolution of social behaviour has been dominated by genetic relatedness for a long time however both recent empirical studies and theoretical concepts give growing evidence for ecological factors acting as very prominent additional or alternative driving forces in social evolution Now the time is ripe to investigate similarities and differences in the course of social evolution in different animals This book brings together renowned researchers working on sociality in different animals For the first time they compile the evidence for the importance of ecological factors in the evolution of social life ranging from invertebrate to vertebrate social systems and evaluate its importance versus that of relatedness **Army Ants** Daniel J. C. Kronauer, 2020-10-06 Daniel J C Kronauer brings to life the research surrounding army ants nature s preeminent

social hunters Without central coordination army ants march in columns by the thousands and build nests and bridges using their own bodies They also play a crucial role in promoting and sustaining the biodiversity of tropical ecosystems **Life Story of an Ant** Sharr Riya,101-01-01 The life of an ant is a powerful lesson in resilience teamwork and intelligent adaptation Despite their size ants form some of the most structured and cooperative societies on Earth Each ant whether a queen worker or soldier has a defined role that contributes to the colony s survival and success Their intricate communication system using pheromones and body language allows them to coordinate complex tasks like food gathering defense and nest building Ant nests are engineering marvels with tunnels and chambers designed for specific purposes Some ants even practice farming and animal herding showcasing remarkable ingenuity Their strength cooperation and ability to adapt to almost any environment have made ants one of the most successful species on the planet This fascinating journey into the world of ants offers not only biological insights but also inspiration for how we can better cooperate innovate and endure in our own lives Ant Behavior Abraham Hefetz,2025-10-07 Ant Behavior utilizes evolution as a framework for comprehending the social structure and conduct of ants This book delves into the intricate workings of ant colonies illustrating how they function not just as societies but as cohesive superorganisms The text covers vital aspects such as colony structure nest architecture and the division of labor emphasizing how ants collectively achieve their societal goals In addition to exploring the colony dynamics this comprehensive guide sheds light on reproductive competition communication and intra colonial conflict It explains the complex caste systems and details how ants engage in collective behavior to protect their colonies Drawing on the latest research it provides readers with a deep understanding of ant sociality and evolutionary biology The book is an essential resource for students and researchers in entomology and zoology particularly those with an interest in social insects and evolutionary studies Uses evolution as a lens for understanding ant social behavior Covers all aspects of ant societies from nest architecture to mating behaviors and beyond Includes definitions of key terms chapter summaries and case studies to aid in understanding The Biology of Social Insects Michael D. Breed,Charles D. Michener,Howard E. Evans,2019-06-25 In this book internationally known experts provide a comprehensive view of current knowledge of social insect biology including much previously unpublished information Particular emphasis is given to the relationships between social insects and humans sections are devoted to economically important social insects pollination foraging and the role of insects in ecosystems and agroecosystems The authors also discuss communication behavior and caste within insect colonies A special section focuses on the neurobiology of social insects A series of papers considers the presocial insects which live in family groups but without caste differences Also well represented are the fields of sociobiology and the origins and evolution of social behavior The book will be valuable to agricultural scientists as well as to entomologists sociobiologists ecologists ethologists and natural historians Endocrinologists and neurobiologists will also find important new material Sociobiology Edward O. Wilson,2000-03-24 When this work was first published it started a tumultuous round in

the age old nature versus nurture debate It shows how research in human genetics and neuroscience has strengthened the case for biological understanding of human nature Debugging the Link between Social Theory and Social Insects Diane M. Rodgers, 2008-11-15 During the nineteenth and early twentieth centuries natural and social scientists began comparing certain insects to human social organization Entomologists theorized that social insects such as ants bees wasps and termites organize themselves into highly specialized hierarchical divisions of labor Using a distinctly human vocabulary that reflected the dominant social structure of the time they described insects as queens workers and soldiers and categorized their behaviors with words like marriage slavery farming and factories At the same time sociologists working to develop a model for human organization compared people to insects relying on the same premise that humans arrange themselves hierarchically In Debugging the Link between Social Theory and Social Insects Diane M Rodgers explains how these co constructed theories reinforced one another thereby naturalizing Western conceptions of race class and gender as they gained prominence in popular culture and the scientific world Using a critical science studies perspective not previously applied to research on social insect symbolism Rodgers attempts to debug this theoretical co construction She provides sufficient background information to accommodate readers unfamiliar with entomology including in depth explanations of the terms used in the research and discussion of social insects particularly the insect sociality scale The entire premise of sociality for insects depends on a dominant understanding of high low civilization standards particularly the tenets of a specialized division of labor and hierarchy comparisons that appear to be informed by nineteenth century colonial thought Placing these theories in a historical and cross cultural context Rodgers explains why hierarchical ideas gained prominence despite the existence of opposing theories in the literature and how they resulted in an inhibiting vocabulary that relies more heavily on metaphors than on description Such analysis is necessary Rodgers argues because it sheds light both on newly proposed scientific models and on future changes in human social structures Contemporary scientists have begun to challenge the traditional understanding of insect social organization and to propose new interdisciplinary models that combine ideas about social insect and human organizational structure with computer technologies Without a thorough understanding of how the old models came about residual language and embedded assumptions may remain and continue to reinforce hierarchical social constructions This intriguing interdisciplinary book makes an important contribution to the history and future of science and sociology

The Top Books of the Year Social Evolution In Ants The year 2023 has witnessed a noteworthy surge in literary brilliance, with numerous compelling novels captivating the hearts of readers worldwide. Lets delve into the realm of bestselling books, exploring the fascinating narratives that have charmed audiences this year. Social Evolution In Ants : Colleen Hoover's "It Ends with Us" This poignant tale of love, loss, and resilience has captivated readers with its raw and emotional exploration of domestic abuse. Hoover expertly weaves a story of hope and healing, reminding us that even in the darkest of times, the human spirit can triumph. Social Evolution In Ants : Taylor Jenkins Reid's "The Seven Husbands of Evelyn Hugo" This spellbinding historical fiction novel unravels the life of Evelyn Hugo, a Hollywood icon who defies expectations and societal norms to pursue her dreams. Reid's absorbing storytelling and compelling characters transport readers to a bygone era, immersing them in a world of glamour, ambition, and self-discovery. Discover the Magic : Delia Owens' "Where the Crawdads Sing" This mesmerizing coming-of-age story follows Kya Clark, a young woman who grows up alone in the marshes of North Carolina. Owens weaves a tale of resilience, survival, and the transformative power of nature, entrancing readers with its evocative prose and mesmerizing setting. These top-selling novels represent just a fraction of the literary treasures that have emerged in 2023. Whether you seek tales of romance, adventure, or personal growth, the world of literature offers an abundance of captivating stories waiting to be discovered. The novel begins with Richard Papen, a bright but troubled young man, arriving at Hampden College. Richard is immediately drawn to the group of students who call themselves the Classics Club. The club is led by Henry Winter, a brilliant and charismatic young man. Henry is obsessed with Greek mythology and philosophy, and he quickly draws Richard into his world. The other members of the Classics Club are equally as fascinating. Bunny Corcoran is a wealthy and spoiled young man who is always looking for a good time. Charles Tavis is a quiet and reserved young man who is deeply in love with Henry. Camilla Macaulay is a beautiful and intelligent young woman who is drawn to the power and danger of the Classics Club. The students are all deeply in love with Morrow, and they are willing to do anything to please him. Morrow is a complex and mysterious figure, and he seems to be manipulating the students for his own purposes. As the students become more involved with Morrow, they begin to commit increasingly dangerous acts. The Secret History is a brilliant and suspenseful novel that will keep you wondering until the very end. The novel is a cautionary tale about the dangers of obsession and the power of evil.

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ω represents the frequency of a sine wave when we write it this way $\sin \omega t$ if $\omega = 1$ the sin completes one cycle in 2π seconds if $\omega = 2\pi$ the sin completes one cycle sooner every 1 second for $f = 1$ if $\omega = 2\pi f$ the sin completes one cycle even faster every $1/f$ seconds or equivalently sin completes f cycles in 1 second

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