

# Social insects - Types, Examples with Social life, Importance, Advantages



# Social Insects

**Owain Westmacott Richards**



## **Social Insects:**

**The Social Insects** William Morton Wheeler,1928      **The Insect Societies** Edward O. Wilson,1971-01-01 A study of insect sociology presenting individual investigations of wasps ants bees and termites and discussing caste behavior communication symbioses and other topics      **The Social Insects** Owain Westmacott Richards,1961      *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      **Caste and Ecology in the Social Insects** George F. Oster,Edward O. Wilson,2020-03-31 In this pathbreaking and far reaching work George Oster and Edward Wilson provide the first fully developed theory of caste evolution among the social insects Furthermore in studying the effects of natural selection in generally increasing the insects ergonomic efficiency they go beyond the concentration of previous

researchers on the physiological mechanisms of the insects and turn our attention instead to the scale and efficiency of the insects division of labor Recognizing that the efficiency of the insect colony is based on a complex fitting of the division of labor to many simultaneous needs including those imposed by the distribution of resources and enemies around the nest Professors Oster and Wilson are able to construct a series of mathematical models to characterize the agents of natural selection that promote particular caste systems The social insects play a key role in the subject of sociobiology because their social organization is so rigid and can be related to genetic evolution Because of this important consideration the authors work has consequences not only for entomology but also for general evolutionary theory 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 **American Social Insects** Charles Duncan Michener, Mary H. Michener, 1951 Preface This book concerns the lives of those insects that live in colonies and whose activities center about the queen tended by her six footed subjects Included also are the various insects that are parasites and associates of our principal subjects the bees ants wasps and termites as well as those that shed light on the origin and evolution of the colonial habits of these insects We do not intend that this book should be considered a contribution to science we hope rather that it will be an introduction to the behavior of social insects that will prove interesting to many and perhaps stimulate a few to learn more about these fascinating creatures Any of the groups of social insects would provide a worthwhile lifetime project for anyone wishing to enjoy an interesting study and at the same time make a valuable contribution to knowledge It is scarcely necessary to point out that such a study might also serve a practical purpose for many social insects are of great importance to man we need mention only the pollination and nectar gathering of bees the dissemination of pestiferous insects by ants and the destruction of property by termites We wish to thank the many

persons who have provided us with photographic illustrations Their names are mentioned elsewhere but the time and trouble required for each photograph can scarcely be acknowledged We wish also to mention those who stimulated us to write this book the late Clyde Fisher and Dr Mon A Cazier Mary H Michener Charles D Minchener Lawrence Kansas Parasites in Social Insects Paul Schmid-Hempel,2019-12-31 This book analyzes for the first time how parasites shape the biology of social insects the ants wasps bees and termites Paul Schmid Hempel provides an overview of the existing knowledge of parasites in social insects Current ideas are evaluated using a broad database and the role of parasites for the evolution and maintenance of the social organization and biology of insects is carefully scrutinized In addition the author develops new insights especially in his examination of the intricate relationships between parasites and their social hosts through the rigorous use of evolutionary and ecological concepts Schmid Hempel identifies gaps in our knowledge about parasites in social insects and uses models to develop new questions for future research In addition issues that are usually considered separately such as division of labor genetics immunology and epidemiology are placed in a common framework to analyze two of the most successful adaptations of life parasitism and sociality This work will appeal not only to practitioners in the fields of behavioral ecology and sociobiology but also to others interested in host parasite relationships or in social organisms such as apiculturists struggling to overcome the problems arising from mite infestations of honeybee colonies Social Insects V1 Henry Hermani,2012-12-02 Social Insects Volume I is a part of a four volume discourse and collection of research on insect sociobiology This volume covers the modern theory with certain concepts of insect sociality particularly through genetic behavioral and evolutionary pathways This book consists of eight chapters which mostly deal with the sociality of insects and other aspects The first chapter provides an introduction to the subject of insect sociality Topics in this chapter include definition of sociality types of social insects and insect sociobiology The next chapter focuses on the origin and evolution of insect sociality and discusses the theories of origin of sociality The following chapters discuss the aspects of social insects in terms of antiquity and territoriality Caste differentiation and division of labor is also emphasized as well as the genetics of sociality The last two chapters deal with the larvae of the social hymenoptera and the social and evolutionary significance of social insect symbionts This volume is a good reference for students and teachers in the study of entomology zoology and biology *Biology and Evolution of Social Insects* Johan Billen,1992 **Social Insects** Wolf Engels,2012-12-06 Evolution of Castes in Insects I BERNHARD RENSCH The evolution of organisms in the succession of generations has been primarily achieved through the appearance of new hereditary variants with minor deviations along with the development of stable structures and functions Harmful mutants were eradicated either immediately or in the subsequent generations through the process of natural selection while unharmed or advantageous ones usually survived As this process continued many new races and species developed which possessed structures and functions of a rational nature and which became increasingly independent from their environment These evolutionary tendencies were also promoted through either geographical

ecological physiological or genetical isolation of populations In some phylogenetic lines there occurred an increase in the number of cells due to additional cellular divisions in the morphogenesis of structures This opened up the possibility for the development of the division of labour within cellular groups leading to more complicated and consequently more successful functions of tissues and organs A further advancement in the adaptation of a species to its environment was made possible through specialization for certain functions of whole individuals or groups of individuals

### **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

### **Social Insects V4**

Henry Hermani, 2012-12-02 Social Insects Volume IV is the last installment of a four volume treatise and is dedicated to the discussion on wasps and ants Comprised of four chapters this volume focuses on the sociality of various types of ants as their group has very diverse habits The first chapter describes the general biology and behavior of social wasps and discusses the cyclical populations nest associates and communal defense of wasps Chapter 2 introduces the broad and general overview of the biology of ants including their behavior food collection and nest construction Chapters 3 and 4 present the biology of army and fungus ants respectively This volume also explains how ants are defined and identified including their colony composition and behavior As with the previous volumes this volume seeks to be of service to students researchers and scientists in various fields of research particularly entomology social biology zoology and biological science

**Comprehensive Molecular Insect Science**, 2025-11-01 Comprehensive Molecular Insect Science Second Edition is a unique resource that provides extensive review articles on contemporary topics in insect science and entomology It covers crucial new subjects such as genetic control pollinators and the effects of climate change and environmental shifts on insect physiology and molecular biology Every section includes thorough discussions on the influence of genomics proteomics metabolomics and bioinformatics in the field which has seen significant advancements since the previous edition The book bridges gaps between disciplines helping readers grasp the fundamentals of insect science and appreciate its applications such as in environmental control Structured chapters guide readers offering references and practical resources like methods This authoritative reference is vital for understanding and managing the future of our civilization intertwined with the fate of

insects and flora on our planet Covers all contemporary topics stressing the importance of insect science in the context of climate change ecological sustainability and the challenges confronting humanity in the future Offers a comprehensive and authoritative review of the field helping readers navigate fragmented information they can't find elsewhere Bridges the gap between core entomology and related disciplines ranging from molecular biology to ecology Includes topics such as genetic control pollinators the impact of environmental change and the huge progress of genomics proteomics metabolomics and bioinformatics in the field

**Orientation and Communication in Arthropods**

Miriam Lehrer, 1997-11-18

The present volume deals with the most fascinating aspects of sensory performance studied in insects crustaceans and spiders Arthropods inhabit practically every conceivable ecological niche and are perfectly adapted to cope with the constraints of their natural habitats They move on the ground in water and in the air They use visual olfactory acoustical vibratory and tactile cues for orientation to recognize and pinpoint their target their home place a feeding site a prey or a potential mate Many arthropods use celestial skylight and terrestrial magnetic compass cues for orientation and some of them were shown to develop through experience oriented behaviours based on a variety of innate hard wired orientation mechanisms In many cases aspects of behaviour that are involved in orientation cannot be separated from inter and intraspecific communication The book brings to the fore the role of communication not only in social and sexual behaviours but also in the context of oriented locomotion Top internationally renowned scientists have contributed to this volume and have succeeded in presenting a book full of highlights which will be of great interest to workers in this field of research With contributions by F G Barth D von Helverson K E Kaissling W Kirchner M Walker M Weissburg R Campan T Collett J Zeil K Kirschfeld R Wehner M Srinivasan M Lehrer R Gadagkar

**Chemistry and Biology of Social Insects**

International Union for the Study of

Social Insects. Congress, 1987

**Interindividual Behavioral Variability In Social Insects**

Robert L. Jeanne, 2019-04-09

This book represents empirical studies of some aspect of the phenomenon of variability in social insect behavior It illustrates the range of ways colony members can differ from one another and interprets the variability in terms of the external environment social context or individual experience

*Pheromone Communication In Social Insects* Robert K Vander

Meer, Michael D Breed, Mark Winston, Karl E Espelie, 2019-06-18 Bringing together for the first time prominent researchers in social insect pheromone communication including nestmate recognition this book looks at ants wasps bees and termites highlighting areas of convergence and divergence among these groups and identifying areas that need further investigation Presenting broad synthetic overviews as well as species specific studies the volume will be useful to natural scientists ecologists and those interested in pest management as well as to anyone interested in the fascinating chemically mediated behavioral interactions of social insects

Evolutionary Parasitology Paul Schmid-Hempel, 2021-07-15 Parasites and infectious diseases are everywhere and represent some of the most potent forces shaping the natural world They affect almost every aspect imaginable in the life of their hosts even as far as the structure of entire ecosystems Hosts in turn have

evolved complex defences with immune systems being among the most sophisticated processes known in nature In response parasites have again found ways to manipulate and exploit their hosts Ever since life began hosts and parasites have taken part in this relentless co evolutionary struggle with far reaching consequences for us all Today concepts borrowed from evolution ecology parasitology and immunology have formed a new synthesis for the study of host parasite interactions Evolutionary parasitology builds on these established fields of scientific enquiry but also includes some of the most successful inter disciplinary areas of modern biology such as evolutionary epidemiology and ecological immunology The first edition of this innovative text quickly became the standard reference text for this new discipline Since then the field has progressed rapidly and an update is now required This new edition has been thoroughly revised to provide a state of the art overview from the molecular bases to adaptive strategies and their ecological and evolutionary consequences It includes completely new material on topics such as microbiota evolutionary genomics phylodynamics within host evolution epidemiology disease spaces and emergent diseases Evolutionary Parasitology is suitable for advanced undergraduates graduate level students and interdisciplinary researchers from a variety of fields including immunology genetics sexual selection population ecology behavioural ecology epidemiology and evolutionary biology Those studying and working in adjacent fields such as conservation biology virology medicine and public health will also find it an invaluable resource for connecting to the bases of their science

**Success and Dominance in Ecosystems** Edward O. Wilson,1990

This book delves into Social Insects. Social Insects is an essential topic that needs to be grasped by everyone, ranging from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Social Insects, encompassing both the fundamentals and more intricate discussions.

1. The book is structured into several chapters, namely:

- Chapter 1: Introduction to Social Insects
- Chapter 2: Essential Elements of Social Insects
- Chapter 3: Social Insects in Everyday Life
- Chapter 4: Social Insects in Specific Contexts
- Chapter 5: Conclusion

2. In chapter 1, this book will provide an overview of Social Insects. The first chapter will explore what Social Insects is, why Social Insects is vital, and how to effectively learn about Social Insects.

3. In chapter 2, this book will delve into the foundational concepts of Social Insects. The second chapter will elucidate the essential principles that need to be understood to grasp Social Insects in its entirety.

4. In chapter 3, the author will examine the practical applications of Social Insects in daily life. This chapter will showcase real-world examples of how Social Insects can be effectively utilized in everyday scenarios.

5. In chapter 4, the author will scrutinize the relevance of Social Insects in specific contexts. The fourth chapter will explore how Social Insects is applied in specialized fields, such as education, business, and technology.

6. In chapter 5, this book will draw a conclusion about Social Insects. This chapter will summarize the key points that have been discussed throughout the book.

This book is crafted in an easy-to-understand language and is complemented by engaging illustrations. It is highly recommended for anyone seeking to gain a comprehensive understanding of Social Insects.

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**Table of Contents Social Insects**

1. Understanding the eBook Social Insects
  - The Rise of Digital Reading Social Insects
  - Advantages of eBooks Over Traditional Books
2. Identifying Social Insects
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Social Insects
  - User-Friendly Interface
4. Exploring eBook Recommendations from Social Insects
  - Personalized Recommendations
  - Social Insects User Reviews and Ratings
  - Social Insects and Bestseller Lists
5. Accessing Social Insects Free and Paid eBooks
  - Social Insects Public Domain eBooks
  - Social Insects eBook Subscription Services
  - Social Insects Budget-Friendly Options
6. Navigating Social Insects eBook Formats
  - ePub, PDF, MOBI, and More
  - Social Insects Compatibility with Devices
  - Social Insects Enhanced eBook Features
7. Enhancing Your Reading Experience
  - Adjustable Fonts and Text Sizes of Social Insects
  - Highlighting and Note-Taking Social Insects
  - Interactive Elements Social Insects
8. Staying Engaged with Social Insects

- Joining Online Reading Communities
  - Participating in Virtual Book Clubs
  - Following Authors and Publishers Social Insects
9. Balancing eBooks and Physical Books Social Insects
- Benefits of a Digital Library
  - Creating a Diverse Reading Collection Social Insects
10. Overcoming Reading Challenges
- Dealing with Digital Eye Strain
  - Minimizing Distractions
  - Managing Screen Time
11. Cultivating a Reading Routine Social Insects
- Setting Reading Goals Social Insects
  - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Social Insects
- Fact-Checking eBook Content of Social Insects
  - Distinguishing Credible Sources
13. Promoting Lifelong Learning
- Utilizing eBooks for Skill Development
  - Exploring Educational eBooks
14. Embracing eBook Trends
- Integration of Multimedia Elements
  - Interactive and Gamified eBooks

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 l when the half reactions listed above are combined into a balanced chemical equation the ratio of the coefficients  $\text{Cu} + \text{S} + \text{MnO}_4 + 4\text{A} + \text{Q}$  is

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web 1 practice problem balance the redox reaction in basic solution no 2  $\text{aq} + \text{Al} + \text{S} + \text{NH}_3 + \text{g} + \text{AlO}_2 + \text{aq} + 2$  practice problem balance the following reduction oxidation reaction in basic solution what is the coefficient in front of  $\text{OH}^-$  br 2 l bro 3  $\text{aq} + \text{Br}^- + \text{aq}$  previous topic next topic

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web google classroom for the following redox equation  $\text{MnO}_4 + 4\text{A} + \text{aq} + \text{SO}_2 + 2\text{g} + \text{Mn} + 2\text{aq} + \text{HSO}_4 + 4\text{A} + \text{aq}$  what will be the stoichiometric coefficient of  $\text{HSO}_4^-$  if the above equation is balanced in an acidic medium stuck use a hint report a problem

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web solution 1 the two half reactions balanced as if in acidic solution  $2\text{CN}^- + \text{Au} \rightarrow 2\text{e}^- + 2\text{H}^+ + \text{O}_2 + \text{H}_2\text{O}_2$  make electrons equal convert to basic solution  $4\text{CN}^- + 2\text{Au} \rightarrow 2\text{e}^- + 2\text{H}_2\text{O} + \text{O}_2 + \text{H}_2\text{O}_2 + 2\text{OH}^-$  the final answer

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web aug 29 2023 the first step to balance any redox reaction is to separate the reaction into half reactions the substance being reduced will have electrons as reactants and the oxidized substance will have electrons as products usually all reactions are written as reduction reactions in half reaction tables

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web bonus problem here is a balanced net ionic equation  $3\text{Br}_2 + 6\text{OH}^- \rightarrow 5\text{Br}^- + \text{BrO}_3^- + 3\text{H}_2\text{O}$  the above equation takes place in two

stages first bromine reacts with  $\text{OH}^-$  ions to form bromide ions and  $\text{BrO}^-$  ions second the  $\text{BrO}^-$  ions react to form bromide ions and bromate  $\text{VO}_3^-$  ions

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web we can balance it for charge by adding two electrons to the right side of the equation so that the net charge on each side is 0 oxidation  $\text{Ni} \rightarrow \text{Ni}^{2+} + 2\text{e}^-$  now that the oxidation half reaction is balanced it tells us that two electrons are produced for every atom of nickel oxidized but where do those electrons go

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web balancing redox reactions in acidic solution problems 1 10 problem 1  $\text{Cr}_2\text{O}_7^{2-} + \text{Fe}^{2+} + \text{Cr}^{3+} + \text{Fe}^{3+}$  solution 1 balanced half reactions  $6\text{e}^- + 14\text{H}^+ + \text{Cr}_2\text{O}_7^{2-} \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$   $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{e}^-$  equalize the electrons  $6\text{e}^- + 14\text{H}^+ + \text{Cr}_2\text{O}_7^{2-} \rightarrow 2\text{Cr}^{3+} + 7\text{H}_2\text{O}$   $6\text{Fe}^{2+} \rightarrow 6\text{Fe}^{3+} + 6\text{e}^-$  multiplied by a factor of 6

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web when balancing equations for redox reactions occurring in acidic solution it is often necessary to add  $\text{H}^+$  ions or the  $\text{H}_2\text{O}$  pair to fully balance the equation in this video we'll walk through this process for the reaction between dichromate  $\text{Cr}_2\text{O}_7^{2-}$  and chloride  $\text{Cl}^-$  ions in acidic solution created by jay

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web balance each half reaction in basic solution 4 5 6 7  $\text{Cr}_2\text{O}_7^{2-} + \text{NO}_2 + \text{SO}_4^{2-} + \text{MnO}_2 + \text{Cr}^{3+} + \text{NO}_3^- + \text{SO}_2 + \text{Mn}^{2+} + \text{O}_3$  balance each redox reaction in acid solution using the half reaction method 8  $\text{H}_2\text{O}_2 + \text{Cr}_2\text{O}_7^{2-} \rightarrow 2\text{H}_2\text{O} + 2\text{Cr}^{3+} + \text{O}_2$  9  $\text{TeO}_3 + \text{N}_2\text{O}_4 + \text{O}_2 \rightarrow \text{Cr}^{3+} + \text{TeO}_4$  10  $\text{PbO}_2 + \text{IO}_3^- + \text{H}^+ \rightarrow \text{Pb}^{2+} + \text{IO}_4^-$  11  $\text{PbO}_2 + \text{IO}_3^- + \text{H}^+ \rightarrow \text{Pb}^{2+} + \text{IO}_4^-$  12  $\text{AsO}_3 + \text{IO}_3^- + \text{H}_2\text{AsO}_4^-$

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web aug 29 2023 some points to remember when balancing redox reactions the equation is separated into two half equations one for oxidation and one for reduction the equation is balanced by adjusting coefficients and adding  $\text{H}_2\text{O}$   $\text{H}^+$  and  $\text{e}^-$  in this order balance the atoms in the equation apart from o and h

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