

# **Michael A. D. Goodisman**

## **Social Systems Biology**

**[www.goodismanlab.biology.gatech.edu](http://www.goodismanlab.biology.gatech.edu)**

**School of Biology and Institute  
for Bioengineering and Bioscience  
Georgia Institute of Technology**



# Sociality

**The evolution of sociality represented a major transition in biological history**

**What are the causes and consequences of sociality?**



# **Sociality in insects**

## **Ants, Bees, Wasps, and Termites**

- **Cooperate to complete tasks**
- **Show remarkable caste system**
- **Among the most successful animals**





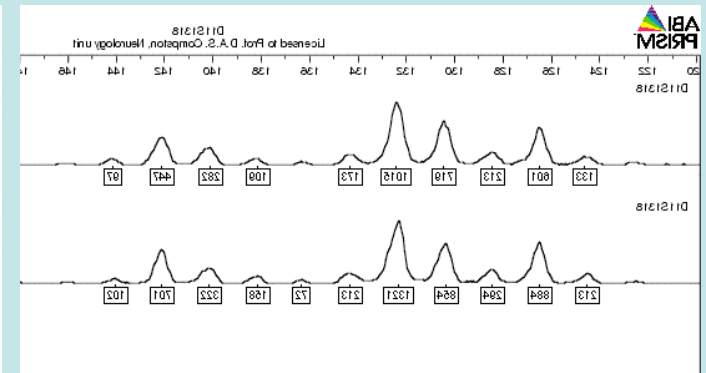
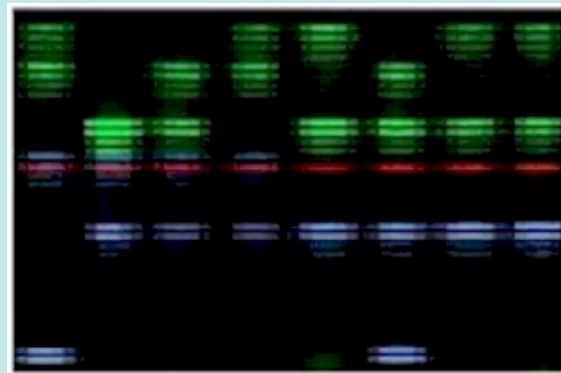


# *Causes and consequences* of social insect **invasions**

**Comparative approach**  
**Study multiple species**

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**Molecular population**  
**genetic techniques**

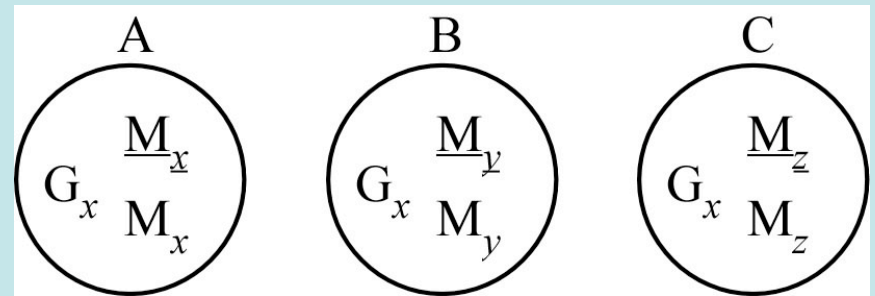


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**Social insect colonies are larger, longer-lived, and  
contain more reproductives in invasive habitats.**

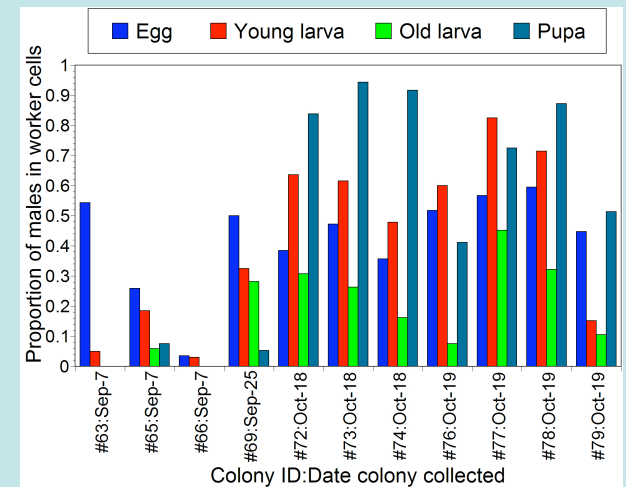
# *Causes and consequences* of social insect **mating behavior**

**Controlled laboratory  
mating experiments**



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**Analysis of  
natural colonies**



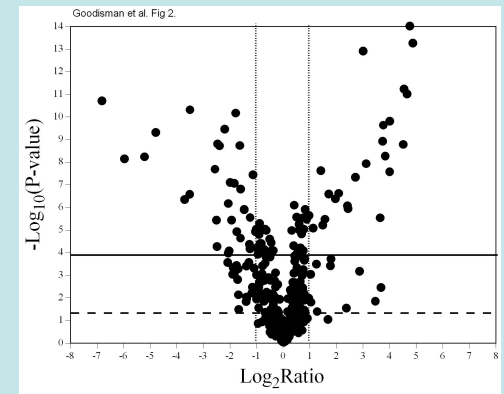
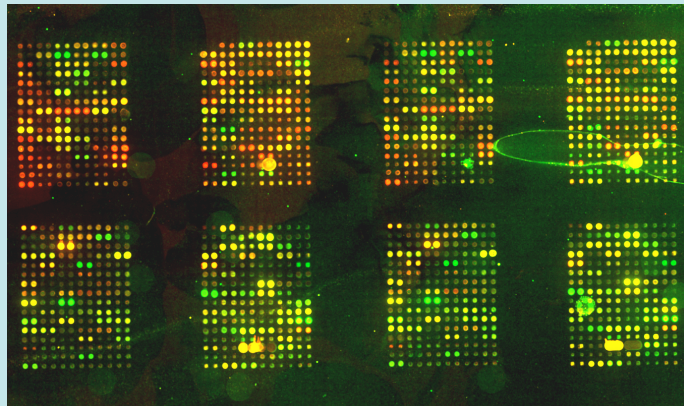
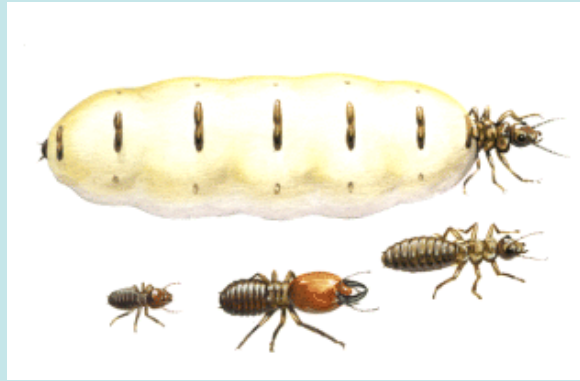
**Multiple mating by social insect  
queens increases colony fitness.**

# *Causes and consequences* of social insect **caste formation**

Advanced social insects  
with complex castes

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Genomic analyses  
of gene expression



**Social insects produce adaptive  
forms by varying patterns of gene expression.**

# *Causes and consequences* of social insect **genome evolution**

Genetic data from  
model social insects

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Genomic analyses  
of gene evolution

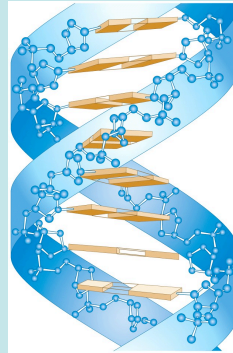
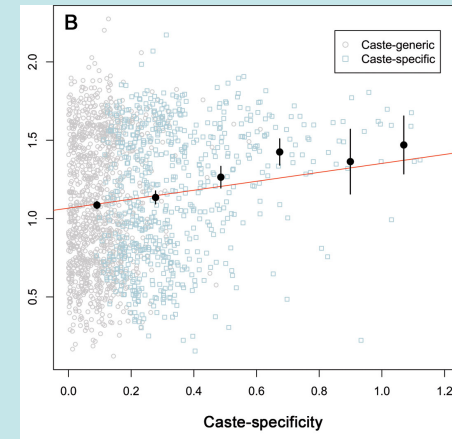
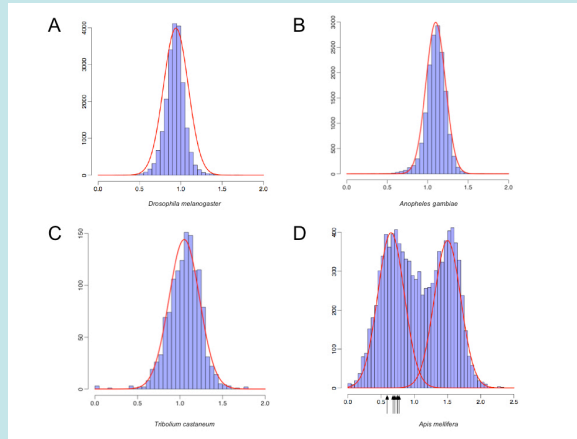


Figure 1-3  
Introduction to Genetic Analysis, Ninth Edition  
© 2008 W. H. Freeman and Company



**Social behaviors and DNA methylation  
impact genome evolution.**



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## Social Systems Biology

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### Lab members and collaborators

- Grad students/Postdocs: Erin Cook, Brendan Hunt, Eric Hoffman, Jennifer Kovacs, Laura Levy, Nicole Mazouchova
- Undergrads: Dimpal Bhakta, James Cellini, Erin Cook, Tyler Cunningham, Steven Heitner, Elizabeth Johnson, Sarah Marriner, Emily Matthews, Jennifer Rekau, Nami Ueda, Diana Williams
- Collaborators: Dan Goldman, Soojin Yi, Dick Zimmer

