



Seewiesen Colloquia

Speaker invited by Research Group Baldwin:

TUESDAY, 19 April , 2016, 13:00 h, in House 4, Lecture Room

The interplay between individual idiosyncrasy and collective behavior in insect groups: lessons from cockroaches and bumblebees

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Animals, from fruit flies and cockroaches to birds and humans, display consistent individual variation in behavior (i.e. animal personality). However, the role of individual variation in group behavior is not well understood in animals, particularly in insects where tracking many individuals simultaneously has traditionally been difficult or impossible. Recent technological developments, particularly in computer vision, are making this problem increasingly tractable, however, and are opening the door for understanding the nuances of individual variation and its role in collective behavior. Here, I use a low-cost, image-based automated tracking system (BEEtag) to investigate the extent, origins, and function of individual behavioral variation in two insects with varying level of social behavior: cockroaches (*Blaberus discoidalis*) and bumblebees (*Bombus impatiens*). In cockroaches, we find that individuals display strong and stable differences during collective light avoidance. These differences are robust to changes in group composition, but fascinatingly disappear when individuals are tested in isolation, suggesting that group context plays a key role in modulating personality in this species. In bumblebees, we find that individual workers vary substantially in both foraging activity and nest behavior. Interestingly, the distribution of behaviors appears to be regulated at the colony level, and behavioral idiosyncrasy plays an important role in determining patterns of task switching when colony labor demands shift. Finally, we use this tracking-technology to examine the effects of individual pesticide exposure on social behavior in colonies. Overall, these studies underscore the importance of individual variation in social insects, but also highlight the complex interplay between behavior at the individual and the group level.

Who is James Crall?

2016 PhD (anticipated), Harvard University, Organismic and Evolutionary Biology

2016 Rockefeller Foundation Planetary Health Alliance Fellow, Harvard University

Selected publications:

Crall JD, Gravish N, Mountcastle AM, Combes SA. 2015. BEEtag: A Low-Cost, Image-Based Tracking System for the Study of Animal Behavior and Locomotion. **PLoS ONE** 10:e0136487

Crall JD, Souffrant AD, Akandwanaho D, Hescock SD, Callan SE, Coronado WM, et al. 2016. Social context modulates idiosyncrasy of behaviour in the gregarious cockroach *Blaberus discoidalis*. **Animal Behaviour** 111:297–305.

Crall JD, Switzer CM, Oppenheimer R, Combes SA (in review). A common neonicotinoid pesticide disrupts nest behavior and social network architecture in bee colonies.

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