Insect. Soc. (2015) 62:253–254
DOI 10.1007/s00040-015-0418-2

Insectes Sociaux

HIGHLIGHTED ARTICLE

A newly recognized eusocial bee

M. Breed[1]

Published online: 5 June 2015

The bee family, Halictidae, gives us a fascinating diversity of social behavior, presenting species across the spectrum of sociality. Halictids can strictly be solitary, communal or eusocial, but some species have the ability to adjust their level of sociality in an adaptive manner. The halictids show at least three independent origins of eusociality, as well as many reversions from eusocial to solitary behavior.

With over 4000 species worldwide, these small bees, which range in color from green to black and in tone from dull to metallic, may be our best window into the evolution of behavior at the beginning stages of eusociality. Excavations of soil nesting species followed by lab rearing have given great insight into social evolution. However, the social biology of less than 1 % of halictid species is known, and studies of additional species are of great value for our understanding of social evolution.

In this issue, Dalmazzo and Roig-Alsina (2015) report eusocial behavior in *Augochlora phoemonoe*. The halictid tribe Augochlorini is rich in flashy metallic green species and most species is rich in the new world tropics. The social behavior of augochlorines is understudied relative to the more temperately distributed Halictini. Brady et al. (2006) show that eusociality evolved independently in the Augochlorini, distinct from two separate derivations in the Halictini.

✉ M. Breed
michael.breed@colorado.edu

[1] Department of Ecology and Evolutionary Biology, University of Colorado, Boulder, CO 80309-0334, USA

Dalmazzo and Roig-Alsina collected female *A. phoemonoe* in the region of Buenos Aires, Argentina. This species nests in decaying wood and they were able to establish queens in artificial nests using long-established laboratory techniques for fostering halictids.

First, and perhaps most important in supporting an argument for eusociality, the investigators found that *A. phoemonoe* raised in the laboratory display a seasonal life cycle, with nest establishment by solitary queens, a first brood cycle of female workers, and then, a second brood cycle that produces the next reproductive generation of gynes and males.

Division of tasks among workers within colonies often co-occurs with the reproductive division of labor characteristic of eusociality. Dalmazzo and Roig-Alsina documented locomotion, feeding, construction, pollen collection, guarding and egg-laying activity of colony members. Not surprisingly, oviposition was a rare event and only queens were observed laying eggs. Daughters of the foundress engaged in much more construction, pollen collection and guarding than did their mothers. The mothers, however, initiated most social interactions with their daughters. These observations follow the same general pattern of structure of social behavior found in other eusocial halictids.

Among the key questions that remain for this species include the range of social behavior that might be observed in field populations. In particular, colonies of some other species of halictid lose their queen in the early or mid-stages of the colony cycle. One of her daughters then takes on the role of reproduction in the colony, and the resulting social structure is termed semisocial. Semisociality is potentially important because its presence or absence may reflect the impacts of

selection on queen longevity. Queen survivorship in field conditions is a critical issue for future investigation.

This study provides intriguing information that builds our comparative base for comprehending social evolution in bees, and by extension in all animals. It illustrates the value of continuing to expand, species by species, the evidence for sociality.

References

Brady SG, Sipes S, Pearson A, Bryan N, Danforth BN (2006) Recent and simultaneous origins of eusociality in halictid bees. Proc Biol Sci. Jul 7; 273: 1643–1649

Dalmazzo M, Roig-Alsina A (2015) Social biology of *Augochlora* (*Augochlora*) *phoemonoe* (Hymenoptera, Halictidae) reared in laboratory nests. Insect Soc 62:315–323. doi:10.1007/s00040-015-0412-8