

AGE AND TRENDS OF ANT-HOMOPTERAN SYMBIOSES

The Dominican amber specimens of *Acropyga* captured with coccoids in their mandibles reported here represent the oldest *definitive* record of ant-homopteran symbiosis, although an earlier origination of such associations is likely (Grimaldi and Agosti, 2000). Little is known about Cretaceous formicines; however, the widespread use of homopterans by almost all formicine genera suggests that the relationship originated as early as the Cretaceous (Grimaldi and Agosti, 2000). Nonetheless, the primitive nature of the Cretaceous ants and the tendency of most primitive living subfamilies of ants to be largely predatory and/or scavenging suggest that the relationship between Cretaceous ants and coccoids was not yet mutualistic, if even obligatorily commensalistic, *despite* the probable widespread availability of honeydew in the Cretaceous.

The oldest report of ant-homopteran symbiosis was based on a piece of amber containing a group of *Germaraphis* aphids and 15 workers of *Iridomyrmex* (Wheeler, 1915). However, because *Germaraphis* aphids and *Iridomyrmex* ants are common in Baltic amber and are sometimes found grouped together, Heie (1987) considered the assemblage of *Germaraphis* with *Iridomyrmex* in that piece to be merely coincidental. Heie, furthermore, doubted that aphids with strong wax production, e.g., *Germaraphis* spp., had associations with ants (personal commun. in Boucot, 1990: 477). Nonetheless, Hölldobler and Wilson (1990) agreed with Wheeler's original conclusion that the two organisms were symbiotic. Although Wheeler's specimen is equivocal, an Eocene/Paleocene age of ant-homopteran symbioses is certainly expected, given the Miocene evidence of intimate relationships between extant ants and mealybugs.

Today, the genus *Acropyga* is distributed in Central and South America, Europe, Africa, Southeast Asia, and Australia. Inclusions of this genus in amber, however, are known only from Dominican amber, represented by two clearly distinguishable species. No *Acropyga* species have been found in Baltic amber. From this, one might conclude that *Acropyga* did not yet exist in the Oligocene and that the genus

probably originated in the New World where the earliest findings are preserved in Miocene amber. The restricted distribution of the *Tetraponera* mealybug-carriers to the paleotropics and the fact that this genus is monotypic suggest that *Tetraponera* is substantially younger than *Acropyga*. Likewise, the regional restriction of *Dolichoderus* herdsmen ants to Southeast Asia indicates that they, too, are younger than *Acropyga*, albeit very successful. At least a dozen species of *Dolichoderus* tend more than two dozen species of mealybugs (table 1).

ACKNOWLEDGMENTS

David Grimaldi (American Museum of Natural History [AMNH]) made significant contributions to the manuscript and provided the Harvard collection amber specimens, their photographs, and their identifications; Jan Koteja (University of Krakow) provided identifications of some of the living and amber coccoids and comments on other published records; Dan Janis (AMNH) produced the scanning electron micrographs (SEMs); W. Dorow and J.-P. Kopelke provided excellent photographs of the Frankfurt collection specimens; and Phil DeVries shared some insight on honeydew harvesting by ants. Roy Larimer generously donated the Dominican amber piece with the *Azteca* ants to AMNH. The original manuscript greatly benefited from comments by Phil DeVries, Jan Koteja, Stefan Cover, Phil Ward, and Jack Longino, to whom we are grateful. We also thank two anonymous reviewers for their helpful comments.

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