

## THE OLDEST ANTS ARE CRETACEOUS, NOT EOCENE: REPLY<sup>1</sup>

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Our study of the Hat Creek amber (Poinar *et al.* 1999) was undertaken to determine the range of the biota in the resin, to identify the plant that produced the resin, and to assess the future implications of these significant deposits. The study was in no way “compromised” by providing an alternative interpretation of the systematic position of the genus *Sphecomyrma* Wilson and Brown.

Grimaldi and Agosti (2000) present new interpretations of previously known data for establishing the genus *Sphecomyrma* in the family Formicidae. It is curious that Grimaldi *et al.* (1997) does not contain the data upon which their proposed ant phylogeny was based. In fact, the data was a modification of the original data matrix of Baroni Urbani *et al.* (1992). One of these “modifications” was eliminating the sole formicid synapomorphy contained in the original matrix, the length of the scape, which was a character that placed the genus *Sphecomyrma* outside the Formicidae. There are no other published definitions of the family Formicidae that are based on one or more synapomorphies and that allow for the inclusion or exclusion of critical taxa. In their present statements, the reasons given by Grimaldi and Agosti (2000) for placing the genus *Sphecomyrma* within the Formicidae are as follows.

- (1) Presence of a metapleural gland. Unfortunately this is not a formicid synapomorphy because it is absent in a number of ant genera, including some of the basal formicid clades such as the genus *Camponotus* Mayr.
- (2) A differentiated petiole. This character, which is not included in the data matrix by Grimaldi *et al.* (1997), cannot be considered a formicid synapomorphy because it is present in other hymenopteran families closely related to the Formicidae such as the Vespidae and Bradynobaenidae.
- (3) Social behavior. This character, also omitted from the original data matrix by Grimaldi *et al.* (1997), cannot be supported on the present evidence of so few, separate fossils.

It should be noted that shortly after our paper (Poinar *et al.* 1999) was published, a paper by Rust and Andersen (1999) was published that described a new species of *Pachycondyla* F. Smith from the Fux and Olst formations (transitional between the Paleocene and Eocene) in Denmark. These authors also mentioned “the different

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opinions on the systematic position of the Cretaceous ants” and regarded their early Tertiary ants as “one of the earliest records of true ants,” thus making a distinction between true ants of the family Formicidae and the Cretaceous forms, including the genus *Sphecomyrma*.

We are not saying that Cretaceous ants do not exist, only that definite morphological types that can be placed in the present day genera have not yet been reported and that the fascinating genus *Sphecomyrma* share more characters with wasps than with ants of the family Formicidae.

- Baroni Urbani C, Bolton B, Ward PS. 1992. The internal phylogeny of ants (Hymenoptera: Formicidae). *Systematic Entomology* **17**: 137–68
- Grimaldi D, Agosti D. 2000. The oldest ants are Cretaceous, not Eocene: comment. *The Canadian Entomologist* **132**: 691–3
- Grimaldi D, Agosti D, Carpenter JM. 1997. New and rediscovered primitive ants (Hymenoptera: Formicidae) in Cretaceous amber from New Jersey, and their phylogenetic relationships. *American Museum Novitates* **3208**: 1–43
- Poinar G Jr., Archibald B, Brown A. 1999. New amber deposit provides evidence of early Paleogene extinctions, paleoclimates, and past distributions. *The Canadian Entomologist* **131**: 171–7
- Rust J, Andersen NM. 1999. Giant ants from the Paleogene of Denmark with a discussion of the fossil history and early evolution of ants (Hymenoptera: Formicidae). *Zoological Journal of the Linnean Society* **125**: 331–48

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