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Fossil ants of the genus *Gesomyrmex* Mayr (Hymenoptera, Formicidae) from the Eocene of Europe and remarks on the evolution of arboreal ant communities

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Abstract

The formicid genus *Gesomyrmex* is reviewed and several new species are described from the middle Eocene (about 47 Ma) of Grube Messel, Germany, and from the middle Eocene (about 43 Ma) of Eckfeld maar, Germany. The new taxa are *Gesomyrmex curiosus* **n. sp.**, *Gesomyrmex breviceps* **n. sp.**, and *Gesomyrmex pulcher* **n. sp.** from Messel, and *Gesomyrmex flavescens* **n. sp.**, and *Gesomyrmex germanicus* **n. sp.** from Eckfeld maar. Two previosly described Oligocene species must be excluded from *Gesomyrmex*. Former *G. expectans* Théobald, 1937 is transferred to *Eoformica expectans* (Théobald, 1937) (**comb. nov.**), and former *G. miegi* Théobald, 1937 has to be considered as Formicidae incertae sedis (**comb. nov.**). A key to the living and fossil reproductive female caste (gyne) of the genus *Gesomyrmex* is provided. Given the fossil records of *Gesomyrmex hoernesi* Mayr, 1868 from different European amber deposits the presence of this genus in Europe during the Eocene is well established. Both extant and fossil *Gesomyrmex* species have an arboreal mode of life. The comparison of arboreal ant faunas from Eocene to Recent times shows that their community structure apparently changed considerably during this period. We infer that *Gesomyrmex*, along with other genera, was most prosperous during the middle Eocene of Europe, and today has a relict distribution in southern Asia.

Key words: Formicidae, *Gesomyrmex*, Tertiary, Eocene, arboreal ants, community structure

Introduction

Ants (Formicidae, Hymenoptera) are highly eusocial vespoid insects. At present there are recorded 11477 extant and 594 extinct valid species, which have been described in 408 genera (121 extinct) and 28 subfamilies (5 extinct) (Bolton *et al.* 2006). Ants are ecologically important because they play a major role at many levels in an ecosystem, such as predators, scavengers and seed dispersers (Beattie & Hughes 2002; Hölldobler & Wilson 1990).

Gesomyrmex ants are often overlooked arboreal elements of the tropical Asian myrmecofauna. These small, polymorphic formicine ants are native to a variety of forests and montane habitats in the Oriental tropics. *Gesomyrmex* contains six valid extant species, about which little is known. The native range of extant *Gesomyrmex* extends from the highlands of southern Borneo north into western India (Fig. 1). The genus is in the tribe Gesomyrmecini as defined by Bolton (2003) and its closest and only living related genus is *Santschiella* Forel, 1916 from Africa (Congo) with a single known species, *S. kohli* Forel, 1916. The relationships of the Gesomyrmecini with other formicine tribes are far from clear. The oldest literature contains intuitive suggestions about their possible relationship to the subfamily Camponotini, tribe Oecophyllii (Emery 1895, p. 772) or the genus *Santschiella* (Emery 1925, p. 48). The genus *Gesomyrmex* was established by Mayr (1868, p. 50) for a single species obtained from Baltic amber. Extant species were

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