

The Myrmecophilic Cricket *Myrmecophilus* in Spain (Orthoptera, Myrmecophilidae)

by

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ABSTRACT

Two species of myrmecophilous crickets, *Myrmecophilus acervorum* and *Myrmecophilus ochraceus*, are here established as present in the Iberian Peninsula. The generic host range for *M. acervorum* is limited to one genus, *Lasius*. The host range of *M. ochraceus* is wider, *Camponotus*, *Messor*, *Monomorium*, and *Tetramorium*. The identity of specimens from the Balearic Islands remains controversial.

Key words: ants, crickets, Formicidae, Iberian Peninsula, *Myrmecophilus acervorum*, *Myrmecophilus ochraceus*, Myrmecophilidae, Spain.

INTRODUCTION

Myrmecophilous insects, which live within the nests of ants, are astonishingly diverse and establish relationships with their hosts which are still poorly understood (Donisthorpe 1927; Kistner 1982; Hölldobler & Wilson 1990; Passera & Aron 2005). Myrmecophilous Orthoptera are a small complement of that immense cohort. Three genera (*Myrmecophilus* Berthold, 1927; *Myrmophilellus* Uvarov, 1940 and *Camponophilus* Ingrisch, 1995) are known, although the majority of species belong in the genus *Myrmecophilus*, distributed worldwide (Stalling 2010). For a summary of its interesting biology see Henderson & Akre 1986 and Schlick-Steiner *et al.* 2004. For a view of its living habitus see <http://www.creaf.uab.es/xeg/Lasius/Archivos/Myrmecophilus.wmv>.

We have collected specimens of *Myrmecophilus* from the Iberian Peninsula during routine myrmecological surveys. The enthusiasm of some members of the forum www.lamarabunta.org has added much to the list. We provide here

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a summary of what we know has been published on Iberian *Myrmecophilus* and add our own unpublished data. Published distribution data have been critically weighted according to our present concept of the species limits in *Myrmecophilus*. We reach the conclusion that two *Myrmecophilus* species exist in the Iberian Peninsula. All material is deposited with the Museu de Ciències Naturals of Barcelona and the author's collection.

RESULTS

Myrmecophilus (Myrmecophilus) acervorum (Panzer, 1799) (Fig. 1)

We have used the name *M. acervorum* by comparison with adult and subadult female specimens from Schwerin (Germany; S. Möller leg.) and comparison with figures in Baccetti (1966). Previously known localities for this species in Spain were Sant Cugat and El Papiol (Olmo-Vidal 2006; p. 406) and Pedralbes, Sarrià, Barcelona, under the name of *M. ochraceus* (Lucià-Pomares 2002; specimen studied). Noted below are the new localities for this species, grouped within provinces:

Province Barcelona

1) Bellaterra, 6 November 1982; nest of *Lasius grandis* Forel; 2 April 2003, 1 female; 16 June 2004, 1 male; nest of *Lasius neglectus* VanLoon, Boomsma & Andrásfalvy; X. Espadaler leg.



Fig. 1. Dorsal view of a female *Myrmecophilus acervorum* and ventral view of the ovipositor.

2) El Muntanyà, Seva, 30 April 2003, 1 male, 1 female; nest of *Lasius neglectus* (X. Espadaler leg.); 20 May 2005, 1 nymph; nest of *Lasius cinereus* Seifert; X. Espadaler leg.

3) La Roca del Vallès; 12 May 2003, 4 males; nest of *Lasius cinereus*; X. Espadaler leg.

4) Begues, 20 October 2005, 1 nymph; nest of *Lasius neglectus* at the base of *Platanus x hybrida*; X. Espadaler leg.

5) Can Miravitges, Badalona; 2005; nest of *Lasius neglectus*; F. Carceller leg.

6) Matadepera, 22 October 2009, 1 male, 3 females, 3 nymphs, nest *Lasius neglectus*, pine wood; X. Espadaler leg.

Province Mallorca, Balearic Islands

The situation in the Balearics is dubious. William Morton Wheeler visited the islands on August 20, 1925 and in 1926 published a paper on the ants of the Balearic Islands in which he wrote “*In connection with the ants, two*

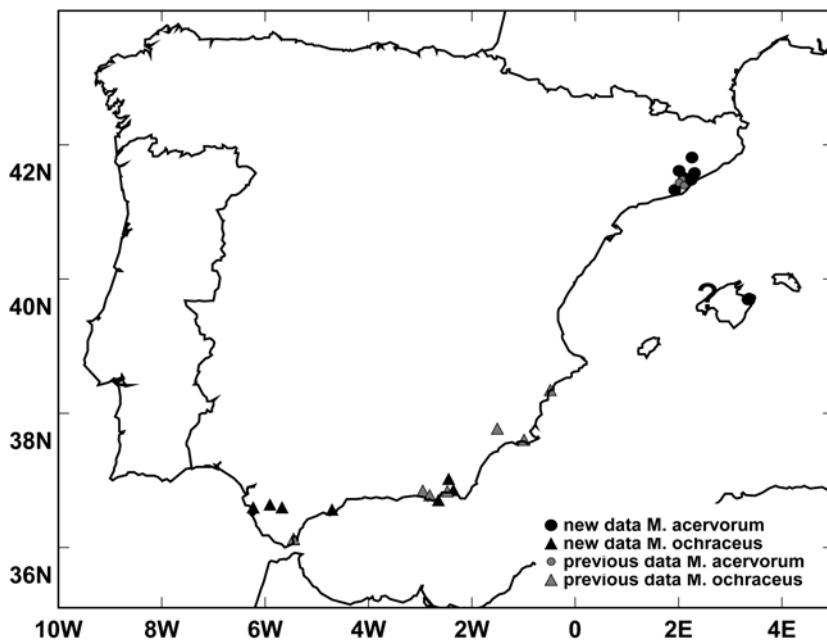


Fig. 2. Distribution of *Myrmecophilus* species in Spain. ? : dubious identification as *M. ochraceus*.

interesting insects, not hitherto recorded from the Balearics, are worthy of mention. One of these is the small myrmecophilous cricket Myrmecophila ochracea Fisher. It was common in the nests of Lasius niger in the forest of Quercus ilex and Pinus maritima near Esporlas, Majorca, but nearly all the individuals taken were very small and immature.”. The correct name of the ant is *Lasius grandis* Forel and of the locality is Esporles. Gorochov & Llorente (2001) studied a male from Esporlas (sic!) collected 19 October 1962 and identified it as *M. ochraceus*. Notwithstanding, we have studied one specimen that clearly belongs in *M. acervorum*:

1) Artà, Mallorca, 19 July 1921; 1 female; Ll. Garcías leg. This specimen, deposited at the Museu de Ciències Naturals of Barcelona, was already studied and determined as *M. acervorum* by E. Morales Agacino in 1940, and we concur. Artà and Esporles are 65 km apart as the crow flies. We have not studied Wheeler’s specimens and are, therefore, unable to judge the correctness of the identification by Wheeler. This needs to be verified and our guess is that it is *M. acervorum*. However, the possibility remains that two *Myrmecophilus* species are present in Mallorca and we have noted that problematic locality, Esporles, in fig. 2 with “?”.

***Myrmecophilus (Myrmophilina) ochraceus* Fischer**

Previously published localities for this species in Spain, were: Almeria: Dalías; El Ejido (Aguirre-Segura *et al.* (1995). Alicante: Alicante. Almeria: Almeria; Berja; El Ejido. Cádiz: Algeciras. Murcia: Cartagena; Totana. Valencia: no locality data. Balears: Mallorca: Esporlas. (Gorochov & Llorente 2001).

Noted below are the new localities for this species, grouped within provinces:

Province Almería

1) El Alquián, 29 December 1955; 1 nymph (female); Español leg. The specimen is deposited at the Museu de Ciències Naturals of Barcelona.

2) Roquetas de Mar, 24 February 1980, 8 nymphs; nest of *Monomorium subopacum* (F. Smith); X. Espadaler leg.

3) El Desierto, Tabernas, 12 January 2001, 1 male, 3 females; nest of *Camponotus amaurus* Espadaler; X. Espadaler leg.

Province Málaga

1) Entreríos, Mijas, 15 May 2003, 1 male; nest of *Messor barbarus* (Linné); 4 January 2004, 1 male; nest of *Monomorium subopacum*; 20 March 2005, 1 male; nest of *Messor barbarus*; J.J. López leg

Province Cádiz

1) Puerto de Sta. Maria; April 2005, 1 nymph; pinewood; nest of *Messor maroccanus* Santschi; R. Huertas leg.; 13 May 2005, 4 nymphs; nest of *Tetramorium semilaeve* André; R. Huertas leg.

2) Algeciras, 27 April 2005; 1 male; nest of *Messor bouvieri* Bondroit at a slagheap; R. Huertas leg.; 27 April 2005; 1 nymph; nest of *M. subopacum*; R. Huertas leg.

3) Tarifa, 8 May 2005, 1 male, 4 females; close to the beach; nest of *M. barbarus*; J.J. López leg.

4) San José del Valle, Sierra de las Cabras, 9 April 2006, 1 female; nest of *M. barbarus*; I. Sánchez leg.

5) La Suara, 26 November 2006; nest of *M. barbarus*; X. Espadaler leg.

DISCUSSION

All ant species noted as hosts, especially *Lasius grandis* and *Messor barbarus*, have a nearly ubiquitous presence in the Iberian Peninsula. In contrast, the known distribution of *Myrmecophilus* crickets is markedly coastal. This probably reflects a restricted climatic envelope, with a minimum of humidity for this genus, and not a particular distribution or scarcity of hosts.

M. acervorum in the Iberian Peninsula is found in nests of a single genus –*Lasius*– with three species. Two (*L. cinereus*, *L. grandis*) are native, and the third (*L. neglectus*) is an exotic invader of recent arrival in Spain (ca. 1985; Espadaler *et al.* 2007). Thus, the cricket, in Spain, has probably established a new relationship with this ant species. Strigilation by crickets of ant body surface was already noted by Wheeler (1900) and carefully observed by Henderson & Akre (1986) in laboratory nests. It has been shown that the chemical camouflage, specially the hydrocarbon complement, may be acquired within the short period of a week (Akino 2008). It would be interesting to check the chemical profile (cuticular hydrocarbons) of the crickets living with the native ant species *L. cinereus* and *L. grandis* and compare the variation or degree of convergence with the chemical profile of crickets found in nests of the exotic

L. neglectus. The plasticity for chemical camouflage in *M. acervorum* is shown by the dual hosts detected in two localities (Bellatera, in *L. grandis* and *L. neglectus*; El Muntanyà, Seva, in *L. cinereus* and *L. neglectus*).

An alternative hypothesis for *M. acervorum*, the anthropogenic distribution of the cricket *jointly* with the ant, should not be dismissed. In fact, another myrmecophilous species, the small isopod *Platyarthrus schoblii* is known to occur in a wide area (Tartally *et al.* 2004) and it is assumed to have reached some non-native locations hidden within nests of *L. neglectus* in potted ornamental plants. Similar cases of a cricket-invasive ant association have been reported by Ashmole & Ashmole (2004; p. 37), in the island of Santa Helena, for *M. sanctaehelenae* Chopard –a probable synonym of *M. acervorum*– and the ant *Pheidole megacephala*, for *M. leei* Kistner, Chong & Lee with the ant *Anoplolepis gracilipes* (F. Smith) from Malaysia by Kistner *et al.* (2007) and for *M. americanus* with the ant *Paratrechina longicornis*, by Wetterer & Hugel (2008).

On the other hand, *M. ochraceus* shows a much wider host variation in Spain: four genera (*Camponotus*, *Messor*, *Monomorium*, *Tetramorium*), from two distinct ant subfamilies (Formicinae, Myrmicinae) are used as hosts. This suggests a much wider capacity to adapt to host chemical profiles.

It is interesting to note that *M. acervorum* has a much wider range of host species in Europe, with a minimum of eight genera (*Camponotus*, *Formica*, *Messor*, *Myrmica*, *Polyergus*, *Tetramorium*, *Tapinoma*, *Lasius*) that belong in three subfamilies of ants (Baccetti 1966; Chopard 1943; Stalling 2010). A possible explanation would be the fact of the exclusive presence of females of *M. acervorum* in Central Europe (Baccetti 1966), which behave as parthenogenetic species, as opposed to the presence of males and females in the samples from the Iberian Peninsula. One of the advantages of parthenogenetic species is the potential immediate founder effect of a single individual, which could better adapt to a broader ecological niche (Price *et al.* 1993). This could explain the presence of *M. acervorum* in Central Europe, with a greater number of ant species than in the south. The wide range of hosts is also known for other *Myrmecophilus* species as well (MacGown & Hill 2006), and the dichotomy “host-specialist” versus “host-generalist” is an interesting generalization to explore (Komatsu *et al.* 2009).

Of course, the presently known distribution (Fig. 2) is to be regarded, at best, as very preliminary and the identity of old samples from the Balearic Islands remains to be ascertained. The enormous void in the majority of Iberian Peninsula is likely due to the scarcity of focused, biased sampling towards this group of intriguing ant hosts. The highly biased distribution of both species calls for a dedicated survey of ant nests in search of those interesting insects.

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