FIRST NORTH AMERICAN RECORDS OF THE OLD WORLD ANT CRICKET *MYRMECOPHILUS AMERICANUS* (ORTHOPTERA, MYRMECOPHILIDAE)

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ABSTRACT

The Old World ant cricket *Myrmecophilus americanus* Saussure (Orthoptera, Myrmecophilidae) inhabits nests of the Old World tramp ant *Paratrechina longicornis* (Latreille) (Hymenoptera: Formicidae). *Paratrechina longicornis* has spread worldwide through human commerce, whereas *M. americanus* has been reported from sites in Asia, Oceania, South America, the West Indies, and the Mediterranean region. Here, we report the first North American records of *M. americanus*, all from peninsular Florida and the Florida Keys. In addition to older unpublished records of *M. americanus* from Archbold Biological Station (N 27.2°) and Gainesville (N 29.7°), we collected *M. americanus* from 5 of 13 *P. longicornis* nests surveyed in southernmost Florida (N 24.5-26.0°), but only from 1 of 20 *P. longicornis* nests surveyed further north (N 26.5-27.3°) in Florida. Although *P. longicornis* is common throughout most of Florida south of N 30°, its symbiont *M. americanus* appears to be common only in southernmost Florida. If climate limits populations of *M. americanus* in northern Florida, then it is likely that the higher latitude records reported as *M. americanus* from subtropical semi-arid Mediterranean sites (Egypt, Libya, and Israel; N 30-32°) are actually misidentifications of one or more distinct species, possibly *Myrmecophilus cottami* Chopard and/or *Myrmecophilus surcoufi* Chopard.

Key Words: ant cricket; ant symbiont; Florida; kleptoparasite; *Myrmecophilus*; *Paratrechina longicornis*; symbiosis.

RESUMEN

El grillo hormiga del Mundo Antiguo, *Myrmecophilus americanus* Saussure (Orthoptera, Myrmecophilidae) habita los nidos de la hormiga vaga del Mundo Antiguo, *Paratrechina longicornis* (Latreille) (Hymenoptera: Formicidae). *Paratrechina longicornis* se ha extendido por todo el mundo a través del comercio humano, mientras que *M. americanus* se ha reportado en los sitios de Asia, Oceanía, América del Sur, las Indias Occidentales y la región Mediterránea. Aquí, se presenta los primeros registros norteamericanos de *M. americanus*, todos de la península y los Cayos de la Florida. Además de los registros de *M. americanus* publicados anteriormente de la Estación Biológica Archbold (N 27.2°) y Gainesville (N 29.7°), se recolectó *M. americanus* de 5 de los 13 nidos de *P. longicornis* estudiados en el extremo sur de la Florida (N 24.5-26.0°), y en un sólo nido de los 20 nidos de *P. longicornis* revisados más al norte (N 26.5-27.3°) en la Florida. Aunque *P. longicornis* es común en la mayor parte de la Florida al sur de 30° N, su simbionte *M. americanus* parece ser común sólo en el extremo sur de la Florida. Si el clima límite la población de *M. americanus* en el norte de Florida, es probable que los registros de *M. americanus* reportados en latitudes más altas de sitios mediterráneos semiáridos subtropicales (Egipto, Libia, y de Israel, N 30-32°) son en realidad errores de identificación de una o más especies distintas, posiblemente *Myrmecophilus cottami* Chopard, 1922 y/o *Myrmecophilus surcoufi* Chopard, 1919.

Palabras Clave: grillo hormiga; simbionte hormiga; Florida; cleptoparasito; *Myrmecophilus*; *Paratrechina longicornis*; simbiosis

Ant crickets (Orthoptera, Myrmecophilidae, *Myrmecophilus* spp.) (Fig. 1) are small wingless symbionts that live in and around ant nests. *Myrmecophilus* crickets are kleptoparasitic, feeding on the ants' food within the ant nests and inducing adult ant workers to regurgitate liquid food (Henderson & Akre 1986). When detected, *Myrmecophilus* crickets are treated as unwelcome guests by their host ant colonies, and the ants kill and eat captured crickets. *Myrmecophilus*

Fig. 1. Female *Myrmecophilus americanus* from Archbold Biological Station (leg. M. Deyrup). Bar = 1 mm.

crickets can chemically camouflage themselves, matching their cuticular hydrocarbon profile to that of their host ant species, apparently using cuticular hydrocarbons they scrape from both live and dead ants (Akino et al. 1996). Some *Myrmecophilus* crickets are generalists with respect to host ant, whereas others are very host specific (Komatsu et al. 2009). For example, Hebard (1920) listed 8-13 known host ant species for each native North American *Myrmecophilus* species. In contrast, most if not all host records for *Myrmecophilus americanus* Saussure are a single ant species: the longhorn crazy ant, *Paratrechina longicornis* (Latrielle) (Wetterer & Hugel 2008).

Saussure (1877) described *M. americanus* from Colombia, South America. *Myrmecophilus americanus* can be distinguished from most *Myrmecophilus* species by the combination of the following characters: Size small: males: 1.6-2.0 mm, females 1.8-2.5 mm (range mostly due to dry *versus* liquid preservation). General coloration: dark brown with a lighter stripe on the posterior half of mesonotum, and pronotum without a pair of lighter spots. Hind tibia has three inner and three outer apical spurs and one outer and three inner subapical spurs. Hind basitarsus usually has (in addition to two apical spurs) two dorsal spurs variable in size (one proximal and one distal); sometimes the distal or both dorsal spurs are lacking. The sclerified part of ovipositor dorsal valves is ladle-shaped. A few *Myrmecophilus* species share some of the above mentioned characters:

Myrmecophilus surcoufi Chopard, *M. cottami* Chopard, and *M. brevipalpis* Chopard are very similar to *M. americanus*. *Myrmecophilus surcoufi* and *M. americanus* differ in coloration (uniform in *M. surcoufi*, mesonotum with a light stripe in *M. americanus*); *M. cottami* and *M. americanus* differ by the hind basitarsus armature (a single dorsal spur in the middle in *M. cottami*); *M. brevipalpis* and *M. americanus* differ by the shape of maxillary palpi (fifth joint short and thick in *M. brevipalpis*, long in *M. americanus*) and by length of hind tarsus (longer than hind tibia in *M. brevipalpis*, shorter than hind tibia in *M. americanus*).

Using a variety of evidence, Wetterer (2008) concluded that *P. longicornis* and *M. americanus* are both Old World species, apparently native to tropical Asia and Melanesia (and not native to the Americas as the name *americanus* might imply). Both species have spread broadly through human commerce (Wetterer 2008; Wetterer & Hugel 2008).

Almost all published records of *M. americanus* are from tropical locales below N 23° latitude, including sites in India, the western Indian Ocean (Madagascar, Seychelles, and Réunion), Oceania (Hawaii), and the Neotropics (Brazil, Colombia, and many West Indian islands) (Wetterer & Hugel 2008). The only published non-tropical records of *M. americanus* come from considerably higher latitudes in the Mediterranean region (Egypt, Libya, and Israel; N 30-32°; Wetterer & Hugel 2008).

Although there are no previously published North American records of *M. americanus*, Trager (1984; pers. comm.) apparently found this cricket in Gainesville, Florida (N 29.7°) "scurrying among a large swarm of *Paratrechina longicornis* that had just been flooded out of its nest by lawn sprinklers." The cricket specimen was destroyed, but Trager (pers. comm.) is confident of its identification as *M. americanus* due to its distinctive light stripe, not found in any North American *Myrmecophilus* species. Trager (1984), however, mistakenly reported that the cricket was very likely *Myrmecophila acervorum flavocincta* Wasmann, based on Wheeler's (1910) misstatement that *"M. flavocincta* occurs with *Plagiolepis longipes* [= *Anoplolepis gracilipes*] and *Prenolepis longicornis* [= *Paratrechina longicornis*] and has been introduced into Brazil with the latter ant." In fact, *M. flavocincta* has never been reported associated with *P. longicornis*; Wasmann (1894) described *M. flavocincta* from a nest of *P. longipes* (= *A. gracilipes*) in India. Instead, Wheeler (1910) incorrectly conflated under the name *M. flavocincta*, Wasmann's (1905) record of *M. prenolepidis* (= *M. americanus*) associated with *P. longicornis* in Pará, Brazil.

The oldest extant *M. americanus* specimens from North America that we found were collected by Mark Deyrup outside buildings at Archbold Biological Station near Lake Placid, Florida (N 27.181° W 81.352°; 1 Nov 1989, 1 May 1990, 8 Apr 1994, 23 May 1994, 15 Jan 1998, and 1 Jun 2000), all accompanying swarms of *P. longicornis* relocating their colonies after being disturbed (M. Deyrup, pers. comm.; SH confirmed identification).

Between 2007 and 2012, JKW searched for *M. americanus* in Florida whenever encountering large, accessible *P. longicornis* nests under rocks, concrete blocks, wooden boards, or logs (n = 33 nests), preserving specimens in 99% ethanol (all identified by SH). JKW found *M. americanus* in 5 of 13 *P. longicornis* nests in southernmost Florida, from Key West to Hollywood (N 24.5-26.0°; Table 1), but only in 1 of 20 *P. longicornis* nests at more northerly sites in southeast Florida from Boynton Beach to Port Saint Lucie (N 26.5-27.3°).

Wetterer & Hugel (2008) reported that *M. americanus* was widespread and fairly common in *P. longicornis* nests on West Indian islands, found in 13 of 39 nests searched on 7 islands. Here, we found that *M. americanus* appears to be similarly common in *P. longicornis* nests of southernmost Florida (N 24.5-26.0°). *Myrmecophilus americanus* is apparently uncommon in *P. longicornis* nests at higher latitudes in Florida, though it may be locally abundant, e.g., at Archbold Biological Station (N 27.2°). If *M. americanus* is common only in the southernmost parts in Florida, this indicates that the populations of *M. americanus* in more northern parts of the state are limited by some factor other than host availability. It is possible that the crickets have simply not yet spread to many *P. longicornis* colonies in northern Florida. Alternatively, the crickets may have a narrower climatic tolerance than the ants.

If climate limits populations of *M. americanus* in northern Florida, then this suggests that the higher latitude records reported as '*M. americanus*' from subtropical semi-arid Mediterranean sites (Egypt, Libya, and Israel; N 30-32°) are actually misidentifications of one or more distinct species, possibly *Myrmecophilus cottami* and/or *Myrmecophilus surcoufi* (Chopard 1919, 1922). Significantly, the only report of '*M. americanus*' found associated with a host ant other than *P. longicornis* was from Egypt and originally identi-

TABLE 1. SITE RECORDS OF *MYRMECOPHILUS AMERICANUS* COLLECTED BY JKW FROM *PARATRECHINA LONGICORNIS* NESTS IN FLORIDA. GEO-COORDINATES IN DECIMAL DEGREES N AND W.

Locale	Geo-coordinates	Date
Lake Worth, Snook Islands Reserve	26.616, 80.046	21 Oct 2012
Miami, SW Rickenbacker Causeway beach	25.746, 80.194	29 Sep 2012
Virginia Key, West end beach	25.745, 80.176	29 Sep 2012
Bahia Honda State Park, beach picnic area	24.664, 81.289	14 Dec 2008
South Dredgers Key, by military lodge	24.581, 81.775	12 Dec 2008
Key West, Higg's Beach	24.547, 81.788	13 Dec 2008

fied as *M. cottami* (Ebner 1956). Although Capra (1929) and Chopard (1968) designated *M. cottami* as a junior synonym of *M. americanus*, Otte (1994) and Massa (1998) rejected this synonymy and Maruyama (2004) included *M. cottami* on a checklist of *Myrmecophilus* species. SH tentatively considers *M. cottami* to be a valid species. If the Mediterranean specimens reported as *M. americanus* prove to be a distinct species, then the present records of *M. americanus* from Florida are the only subtropical records known for this otherwise tropical species.

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