

120-year gap: new records of Myrmecophilidae (Orthoptera: Ensifera: Gryllotalpoidea) to Brazil

ALESSANDRE PEREIRA-COLAVITE^{1,2}, IGOR NASCIMENTO DE SOUZA^{1,3}, ALINE LOURENÇO^{1,4} & ANTONIO JOSÉ CREÃO-DUARTE^{1,4}

¹Laboratório de Entomologia, Departamento de Sistemática e Ecologia, CCEN, Universidade Federal da Paraíba, João Pessoa, PB, Brazil

 alepercol@gmail.com;  <https://orcid.org/0000-0002-7660-8384>

²Programa de Pós-Graduação em Ecologia e Monitoramento Ambiental, CCAE, Universidade Federal da Paraíba, Rio Tinto, PB, Brazil

³Programa de Pós-Graduação em Psicologia Experimental, Universidade de São Paulo, São Paulo, SP, Brazil

 igor.nascz@gmail.com;  <https://orcid.org/0009-0009-4512-406X>

⁴Programa de Pós-Graduação em Ciências Biológicas (Zoologia), CCEN, Universidade Federal da Paraíba, João Pessoa, PB, Brazil

 alinelourencovs@gmail.com;  <https://orcid.org/0000-0002-1769-8914>

 creaoduarte@yahoo.com.br;  <https://orcid.org/0000-0001-9134-1190>

Abstract

A new record of *Myrmecophilus* (*Myrmophilina*) *americanus* Saussure, 1877, in urban areas of Brazil is presented. This is the first record of ant-loving crickets in this region since 1905. Additional records from citizen science data suggest a wider presence of these crickets in Brazil. A distribution map of the records in Brazil and an updated Brazilian key are also included.

Key words: Ant-loving crickets, *Myrmecophilus* (*Myrmophilina*) *americanus*, Neotropical region, *Paratrechina longicornis*

Introduction

Myrmecophilus (*Myrmophilina*) *americanus* Saussure, 1877, is characterized by its unique ecological relationship. Instead of living independently, this cricket has evolved to be a guest within ant nests, benefiting from stable environmental conditions, easy access to food, and protection (Wetterer & Hugel 2014). The only known association of *M. americanus* is with the Longhorn Crazy Ant *Paratrechina longicornis* (Latreille, 1802). It primarily feeds on secretions obtained by strigilating their legs against their bodies. This enables trophallaxis with ants, supposedly imitating the ants' grooming behavior (Wetterer & Hugel 2008). *Myrmecophilus* crickets manage to avoid attack and remain within ant colonies through a combination of agile escape behavior and behavioral, tactile, and chemical mimicry of the host ants. However, when detected by the ants, myrmecophilids are treated as unwelcome guests ant colonies, and the ants readily eat captured crickets (Wetterer & Hugel 2008).

The first and only literature record of myrmecophilids for Brazil is that of Wasmann (1905), listing a specimen collected on May 22, 1904, and seven specimens collected on February 28, 1905, all of them from the northern region of the state of Pará—probably originating from Belém or its surroundings. Here, we report three new records of *M. americanus* (Fig. 1) in the city of João Pessoa, located in the state of Paraíba within the northeastern region of Brazil. All these occurrences involve urban environments situated in developed areas marked by significant human alterations.

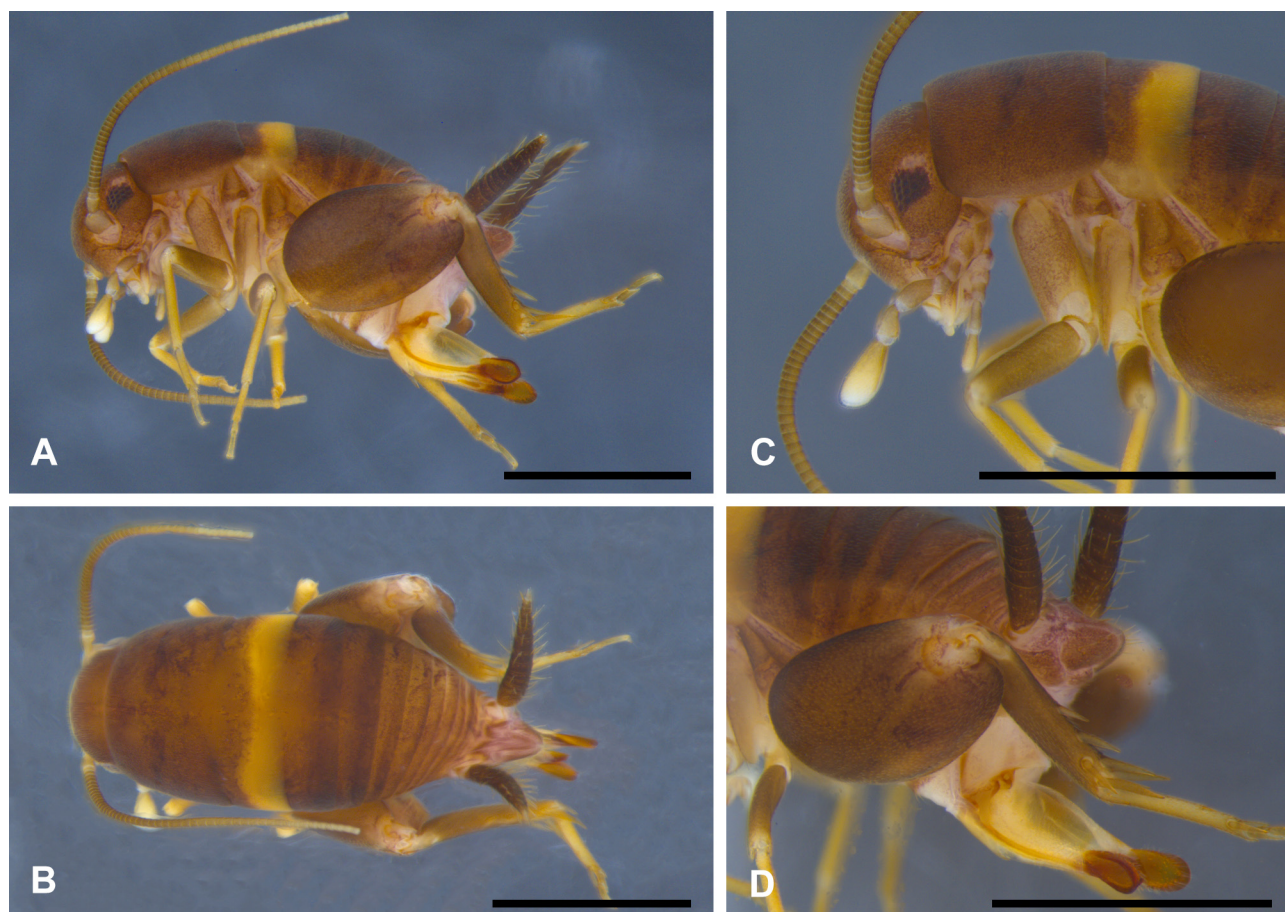


FIGURE 1. *Myrmecophilus (Myrmophilina) americanus* Saussure, 1877, female. A, habitus, lateral view; B, habitus, dorsal view; C, head, pronotum and mesonotum, lateral view; D, hind leg and ovipositor, lateral oblique view. Scales: 1 mm.

The myrmecophilids were found on two occasions accompanying the migration process of their host ant, *P. longicornis*. In the first two instances (both observed at the senior author's house), adults and nymphs followed the ants along the pheromone trail, moving individually at a rate of approximately one every 40–60 seconds. Notably, the first observation intrigued us as four crickets remained gathered and stationary on the pheromone trail for more than 5 minutes. The third record (observed at the second author's house) occurred during a raid by the army ant *Neivamyrmex* sp. on the *P. longicornis* nest, leading to the escape of the crickets (https://youtu.be/-b7aeob_ZQ).

Examined material. BRAZIL. Paraíba: João Pessoa, Bancários, 7°08'46.82"S, 34°49'59.1"W, 01.V.2023, Coleta manual. AP Colavite col. (DSEC0000001OR, 1 adult mounted together with *P. longicornis*). Same label (DSEC0000002OR, 3 adults, 9 nymphs, 9 ants), in alcohol 96%. All specimens are deposited at the Coleção Entomológica do Departamento de Sistemática e Ecologia of the Universidade Federal da Paraíba (DSEC).

Adding to the new records made here, seven recent observations of Myrmecophilidae were documented on the citizen science platform iNaturalist (www.inaturalist.org), originating from the southeast and northeast regions of Brazil. These new occurrences of ant-loving crickets are also located in the urban expansion areas of densely populated cities. Among them, only one of these records was undoubtedly identified as *M. americanus*, while it was not possible to confirm the others as this species, which may even belong to different ones since other species have been identified in South America (Yuan & Stalling 2022). These records indicate that the family appears to be well-distributed in the country (Fig. 2) and has great potential for new records with the support of citizen science. The importance of participatory science platforms, such as iNaturalist, is indisputable for current knowledge of the distribution of groups considered rare, threatened, or even extinct in nature (Mesaglio *et al.* 2021).

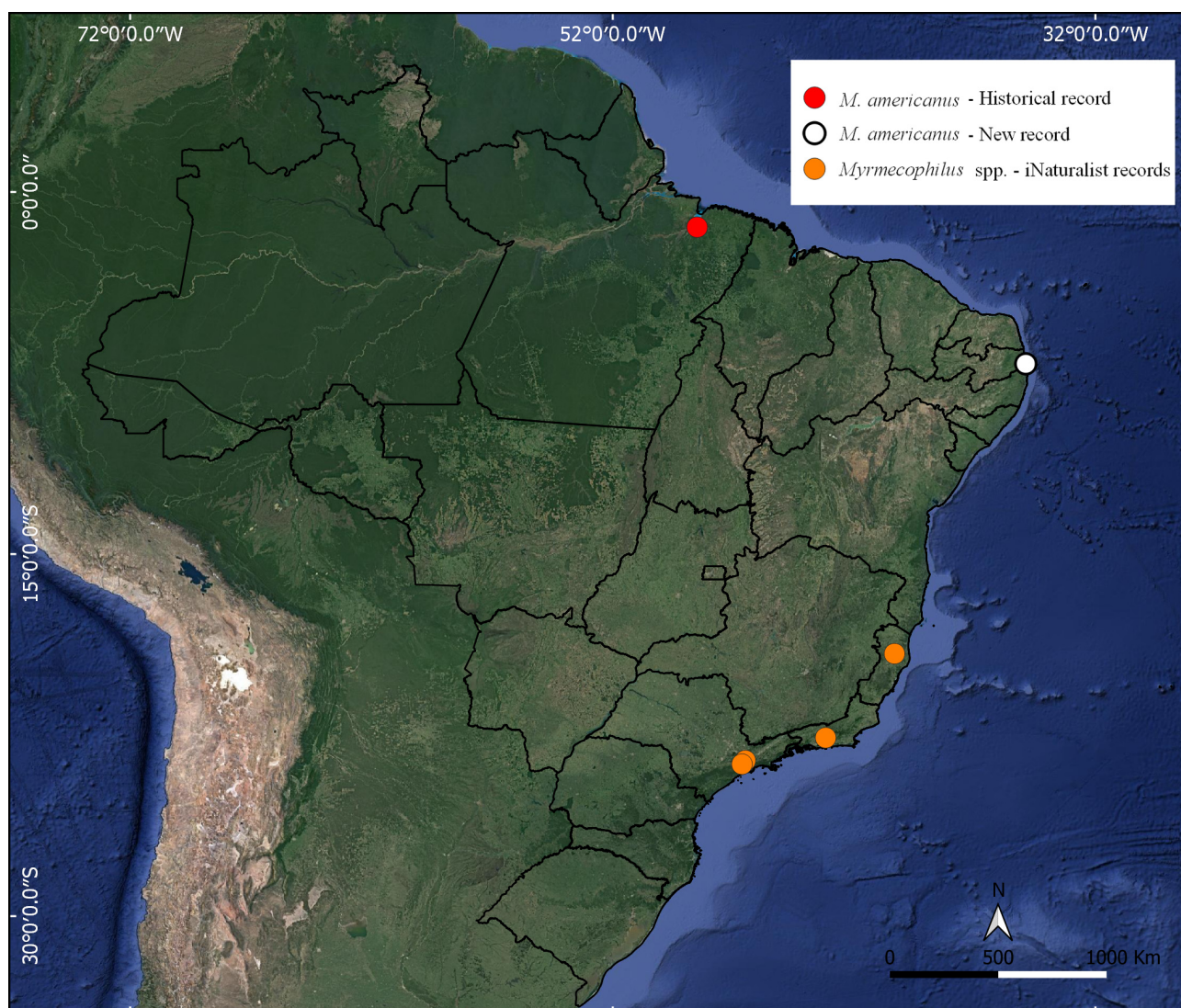


FIGURE 2. Distribution map of Myrmecophilidae for Brazil.

iNaturalist observations. *Myrmecophilus (Myrmophilina) americanus*: **BRAZIL. Espírito Santo:** Rio Bananal, Lat. -19.127903, Lon. -40.321597, XII.2023. Photo by Kel Silva ([inaturalist.org/observations/193975261](https://www.inaturalist.org/observations/193975261)).

Myrmecophilus sp.: **BRAZIL. Espírito Santo:** Rio Bananal, Lat. -19.127903, Lon. -40.321597, XII.2023. Photo by Kel Silva ([inaturalist.org/observations/190679450](https://www.inaturalist.org/observations/190679450)). **Rio de Janeiro:** Magé, Piabetá, Lat. -22.610108, Lon. -43.175175, 09.XI.2023. Photo by Mauro Fulgoni ([inaturalist.org/photos/333942524](https://www.inaturalist.org/photos/333942524)); same as above, Lat. -22.610063, Lon. -43.174907, 17.XII.2023. Photo by Mauro Fulgoni ([inaturalist.org/observations/194168787](https://www.inaturalist.org/observations/194168787)); same as above, Lat. -22.610089, Lon. -43.175158, 29.XII.2023. Photo by Mauro Fulgoni ([inaturalist.org/observations/195137689](https://www.inaturalist.org/observations/195137689)). **São Paulo:** São Paulo, Parque Doroteia, Lat. -23.704539, Lon. -46.643688, 01.XII.2021. Photo by Gustavo Melo ([inaturalist.org/observations/203825237](https://www.inaturalist.org/observations/203825237)). São Paulo, Jardim Eliane, Lat. -23.554607, Lon. -46.503628, 11.XI.2023. Photo by Ingrid Azevedo ([inaturalist.org/observations/190679450](https://www.inaturalist.org/observations/190679450)).

The prolonged absence of records of myrmecophilids in Brazil appears peculiar. Wetterer & Hugel (2014) proposed two hypotheses to explain the limited occurrences of *M. americanus* in colonies located in the United States state of Florida. One possibility is that the myrmecophilids have not yet dispersed to many colonies of *P. longicornis* in the region. Alternatively, it could be that *M. americanus* exhibits a more restricted climatic tolerance than the ants do. In Brazil, the latter hypothesis can be dismissed due to the supposedly more consistent and favorable climatic conditions for ant-loving crickets. The first hypothesis suggests the myrmecophilids may not keep pace with the dispersal of *P. longicornis*, and, therefore, may not be present in all colonies. This seems more applicable to the Brazilian situation.

Considering the “favorable” climatic conditions in Brazil, the absence of new records of *M. americanus* for over 100 years may also be attributed to the fact that host ant colonies have not been the primary focus of entomologists. Studies concentrating on the organization of wild colonies in São Paulo State, Brazil, do not document the presence of ant-loving crickets (Solis *et al.* 2007). Consequently, it is plausible that not all colonies undergo this parasitism during their development. This may either due to the absence of myrmecophilids migrating with the ants to new nests (Wetterer & Kluge 2014) or the host’s removal of the crickets after detection (Wetterer & Kluge 2008). Research regarding the occurrence of *P. longicornis* in Brazil is more closely tied to the ant’s vectorial potential, particularly concerning the potential role in the mechanical transmission of vectors in hospital environments (e.g., Bragança & Lima 2010; Roxo *et al.* 2010; Nascimento *et al.* 2020), or urban fauna surveys (e.g., Santos *et al.* 2019; Melo *et al.* 2020).

Lastly, the recently published book ‘Insetos do Brasil’ delves into the taxonomic aspects of Brazilian Hexapoda (Rafael *et al.* 2024). Nevertheless, ant-loving crickets remain documented as “fossil taxa” within the country. To aid in identification, we provide an updated key for Orthoptera (Ensifera), including the Myrmecophilidae family. The numbering sequence follows Souza-Dias *et al.*’s (2024: 265) key.

Identification key for superfamilies, families, subfamilies and some groups of Ensifera species that occur in Brazil.

- 5 (2). Brachypterous or macropterous, cylindrical body. Front legs strongly dilated and modified for digging, fore femora and tibiae short and robust; tibiae and tarsi with pointed projections (dactyls). Well-developed eyes, ocelli present. Females without ovipositor. Length 20–35 mm. Gryllotalpidae
- 5'. Wingless, broadly oval body. Hind femora much enlarged, hind coxae closely approximated ventrally. Eyes greatly reduced, ocelli lacking. Females without ovipositor. Living in ant nests. Length 2–4 mm Myrmecophilidae
- 5". Fore legs normal, without modifications for digging. Females with elongated ovipositor, with dilated apex (except *Anurogryllus*) Grylloidea. 6

References

- Bragança, M.A.L. & Lima, J.D. (2010) Composição, abundância e índice de infestação de espécies de formigas em um hospital materno-infantil de Palmas, TO. *Neotropical Entomology*, 39 (1), 124–130.
<https://doi.org/10.1590/S1519-566X2010000100017>
- Mesaglio, T., Soh, A., Kurniawidjaja, S. & Sexton, C. (2021) ‘First Known Photographs of Living Specimens’: the power of iNaturalist for recording rare tropical butterflies. *Journal of Insect Conservation*, 25, 905–911.
<https://doi.org/10.1007/s10841-021-00350-7>
- Melo, T.S., Koch, E.B., Andrade, A.R.S., Travassos, M.L.O., Peres, M.C.L. & Delabie, J.H.C. (2020) Ants (Hymenoptera: Formicidae) in different green areas in the metropolitan region of Salvador, Bahia state, Brazil. *Brazilian Journal of Biology*, 82, e236269.
<https://doi.org/10.1590/1519-6984.236269>
- Nascimento, L.E., Amaral, R.R., Ferreira, R.M.A., Trindade, D.V.S., do Nascimento, R.E., da Costa, T.S. & Souto, R.N.P. (2020) Ants (Hymenoptera: Formicidae) as potential mechanical vectors of pathogenic bacteria in a public hospital in the Eastern Amazon, Brazil. *Journal of Medical Entomology*, 57 (5), 1619–1626.
<https://doi.org/10.1093/jme/tjaa062>
- Rafael, J.A., Melo, G.A.R., Carvalho, C.J.B. de, Casari, S. & Constantino, R. (Eds.) (2024) *Insetos do Brasil: Diversidade e Taxonomia. 2nd Edition*. Editora INPA, Manaus, 880 pp.
<https://doi.org/10.61818/56330464a01>
- Roxo, E., Campos, A.E.C., Alves, M.P., Couceiro, A.P.M.R., Harakava, R., Ikuno, A.A., Ferreira, V.C.A., Baldassi, L., Almeida, E.A., Spada, D.T.A., Augusto, M. & Melo, F.A.F. (2010) Ant’s role (Hymenoptera: Formicidae) as potential vectors of Mycobacteria dispersion. *Arquivos do Instituto Biológico*, 77 (2), 359–362.
<https://doi.org/10.1590/1808-1657v77p3592010>
- Santos, M.N., Delabie, J.H.C. & Queiroz, J.M. (2019) Biodiversity conservation in urban parks: a study of ground-dwelling ants (Hymenoptera: Formicidae) in Rio de Janeiro City. *Urban Ecosystems*, 22, 927–942.
<https://doi.org/10.1007/s11252-019-00872-8>
- Solis, D.R., Bueno, O.C., Moretti, T.C. & da Silva, T.F. (2007) Observações sobre a biologia da formiga invasora *Paratrechina longicornis* (Latreille, 1802) (Hymenoptera, Formicidae) em ambiente urbano brasileiro. *Revista Brasileira de Zoociências*, 9 (1), 75–80.

<https://doi.org/10.1590/1808-1657v75p2112008>

- Souza-Dias, P.G.B., Sperber, C.F., Costa, M.K.M., Mendes, D.M.M., Campos, L.D., Olivier, R.S., Silva, D.S.M., Fianco, M., Szinwelski, N., Bolfarini, M.P., Domenico, F.C., Chamorro-Rengifo, J. & Jesus, F.M. (2024) Cap. 19, Orthoptera Olivier, 1789. In: Rafael, J.A., Melo, G.A.R., Carvalho, C.J.B. de, Casari, S. & Constantino, R. (Eds.), *Insetos do Brasil: Diversidade e Taxonomia. 2nd Edition*. Editora INPA, Manaus, pp. 254–290
<https://doi.org/10.61818/56330464c19>
- Wasmann, E. (1905) Zur Lebensweise einiger in- und ausländischer Ameisengäste (148. Beitrag zur Kenntnis der Myrmecophilen und Termitophilen). *Zeitschrift für Wissenschaftliche Insektenbiologie*, 10, 329–336.
- Wetterer, J.K. (2008) Worldwide spread of the longhorn crazy ant, *Paratrechina longicornis* (Hymenoptera: Formicidae). *Myrmecological News*, 11, 137–149.
- Wetterer, J.K. & Hugel, S. (2008) Worldwide Spread of the Ant Cricket *Myrmecophilus americanus*, a symbiont of the Longhorn Crazy Ant, *Paratrechina longicornis*. *Sociobiology*, 52 (1), 157–165.
- Wetterer, J.K. & Hugel, S. (2014) First North American Records of the Old World Ant Cricket *Myrmecophilus americanus* (Orthoptera, Myrmecophilidae). *Florida Entomologist*, 97 (1), 126–129.
<https://doi.org/10.1653/024.097.0117>
- Yuan, N.N. & Stalling, T. (2022) First record of *Myrmecophilus* (*Myrmecophilus*) *quadrispinus* for Peru and South America (Orthoptera, Myrmecophilidae). *Journal of Orthoptera Research*, 31 (2), 197–200.
<https://doi.org/10.3897/jor.31.84157>