

LECH BOROWIEC¹ , ALBENA LAPEVA-GJONOVA² , SEBASTIAN SALATA³ 

Second record of *Monomorium exiguum* FOREL, 1894 (Hymenoptera: Formicidae) from Europe

<https://doi.org/10.5281/zenodo.10056857>

^{1,3} Myrmecological Laboratory, Department of Biodiversity and Evolutionary Taxonomy, University of Wrocław, Przybyszewskiego 65, 51–148 Wrocław, Poland, e-mail: ¹lech.borowiec@uwr.edu.pl, ORCID: 0000-0001-5668-6855; e-mail: ³sebastian.salata@uwr.edu.pl, ORCID 0000-0003-0811-2309

² Department of Zoology and Anthropology, Faculty of Biology, Sofia University, 1164 Sofia, Bulgaria, e-mail: gjonova@gmail.com, ORCID 0000-0003-0811-0768

Abstract: *Monomorium exiguum* FOREL, 1894, a species widely distributed in Sub-Saharan Africa and the Arabian Peninsula, was collected on Crete and is reported as a new exotic ant species for the Greek fauna. Presented discovery is also the second record for this species in Europe.

Key words: ants, Greece-Crete, new country record, faunistics.

INTRODUCTION

The ant genus *Monomorium* MAYR, 1855 consists of 297 valid species and 22 valid subspecies (BOLTON 2023). The genus has almost worldwide distribution, but the majority of its species are known from the Old World, especially from the Afrotropical and Australian regions. *Monomorium* species inhabit various habitats, from harsh deserts to rainforests. In Europe, especially in its Mediterranean part, and in the Mediterranean basin (including the Middle East), it is a speciose group with almost 90 species, most of them known from arid habitats: Mediterranean bushes, phryganas, seacoasts, semideserts, and deserts. One of them, *Monomorium pharaonis* (LINNAEUS, 1758), is a cosmopolitan invasive indoor species; few other were noted as invasive outdoor species (DEMETRIOU *et al.* 2023a, b).

Based on most recent data, published and unpublished, there are five species of *Monomorium* recorded from Greece, including two invasive taxa: an indoor *M. pharaonis* (L.) and outdoor *M. bicolor* EMERY, 1877 (DEMETRIOU *et al.* 2023a), and the other three native taxa: *M. creticum* EMERY, 1895, *M. monomorium* BOLTON, 1987 and *M. subopacum* (F. SMITH, 1858) are known mostly from Greek islands, only *M. monomorium* was also recorded from mainland provinces Epirus, Macedonia and Peloponnese. Additionally, one more species of this genus, recently collected in Crete, awaits its determination. In this work, we present the very first record of *M. exiguum* FOREL, 1894 from Greece. The material is deposited in the collection of the Department of Biodiversity and Evolutionary Taxonomy, University of Wrocław, Poland (DBET) and the Faculty of Biology, Sofia University, Bulgaria (BFUS).

RESULTS

Monomorium exiguum FOREL, 1894 (Figs. 1–6)

Monomorium exiguum FOREL, 1894: 85.

Material: 1 gyne, 5 workers (DBET), 17 workers (BFUS), Crete, Heraklion, Agiofarango gorge, 50 m, 34.9312 / 24.7789, leg. A. Lapeva-Gjonova. The nest was located under a stone in front of a cave.

Monomorium exiguum is a species common in the Sub-Saharan Africa, recorded from 24 countries (BOLTON 1987). Recently, it was recorded from the Arabian Peninsula and noted as one of the commonest members of the genus *Monomorium* in this region (SHARAF *et al.* 2018). Unexpectedly, GÓMEZ & ESPADALER (2006) first recorded this species from Europe based on a single worker collected at Sant Antoni de Portmany (Ibiza, Balearic Islands) in an irrigated garden. This specimen belongs to the pale form described as var. *flavescens* FOREL, 1916. Another record from the Mediterranean Basin was from Egypt (BAKR *et al.* 2007). Thus, our record from Crete is the second in Europe and only third in the Mediterranean Basin. Specimens from Crete also belong to the pale form described as var. *flavescens* FOREL, 1916.

Monomorium exiguum is a member of the *Monomorium monomorium* species group characterized by: very small body size; monomorphic worker caste; raised median clypeal portion projecting anteriorly and longitudinally bicarinate, anterior clypeal margin lacking a pair of teeth; unsculptured dorsal surface of mandibles and masticatory margin armed with four teeth (decreasing in size from apex to base); 10–12 segmented antennae with a well-defined three-segmented club; eyes present but variable in size (with four or more ommatidia) and situated in front of the midlength of the head; head longer than broad; cephalic dorsum smooth and shining; impressed metanotal groove with distinct cross-ribs; propodeal spiracle circular to subcircular; propodeal dorsum meeting declivity in a rounded angle; unsculptured promesonotum and propodeal dorsum; body pilosity variable in distribution but usually conspicuous, rarely absent from mesosomal dorsum; petiole, postpetiole and gastral tergites usually unsculptured (SHARAF *et al.* 2018). Species of this group from the Mediterranean and the Middle East can be easily identified using key to the genus *Monomorium* published by SHARAF *et al.* (2021). In the Mediterranean Basin, only *Monomorium clavicorne* ANDRÉ, 1881, known from northern Africa, Israel, and the Arabian Peninsula, is similar to *M. exiguum* due to its predominantly yellow body coloration, 11-segmented antennae, anterior median portion of clypeus straight without raised ridges and mesosoma with standing setae. *Monomorium clavicorne* well differs in the presence of only two pairs of standing mesosomal setae, one on pronotal corners and one on propodeum, while in *M. exiguum* whole dorsum of mesosoma is covered with 6-10 pairs of such setae.

It is difficult to estimate whether *M. exiguum* is a permanent element of the fauna of Crete. Finding a complete nest sample, with gyne and a group of workers, suggests the possibility of permanent colonization in this region. However, the ant fauna of Crete has been very intensively studied in recent years (SALATA *et al.* 2020), and it is the most comprehensively studied region in Greece, but this species has never been found. Thus, it could indicate that the colonization is recent and requires further studies. The species could be introduced accidentally by human activity or the nest was founded by a single queen carried by winds from North Africa (Egypt) or the Arabian Peninsula. Climate changes in Europe may favor the colonization of such exotic species that are otherwise known from warmer subtropic or tropic regions. In the Arabian Peninsula, *M. exiguum* occurs in various habitats. It was found

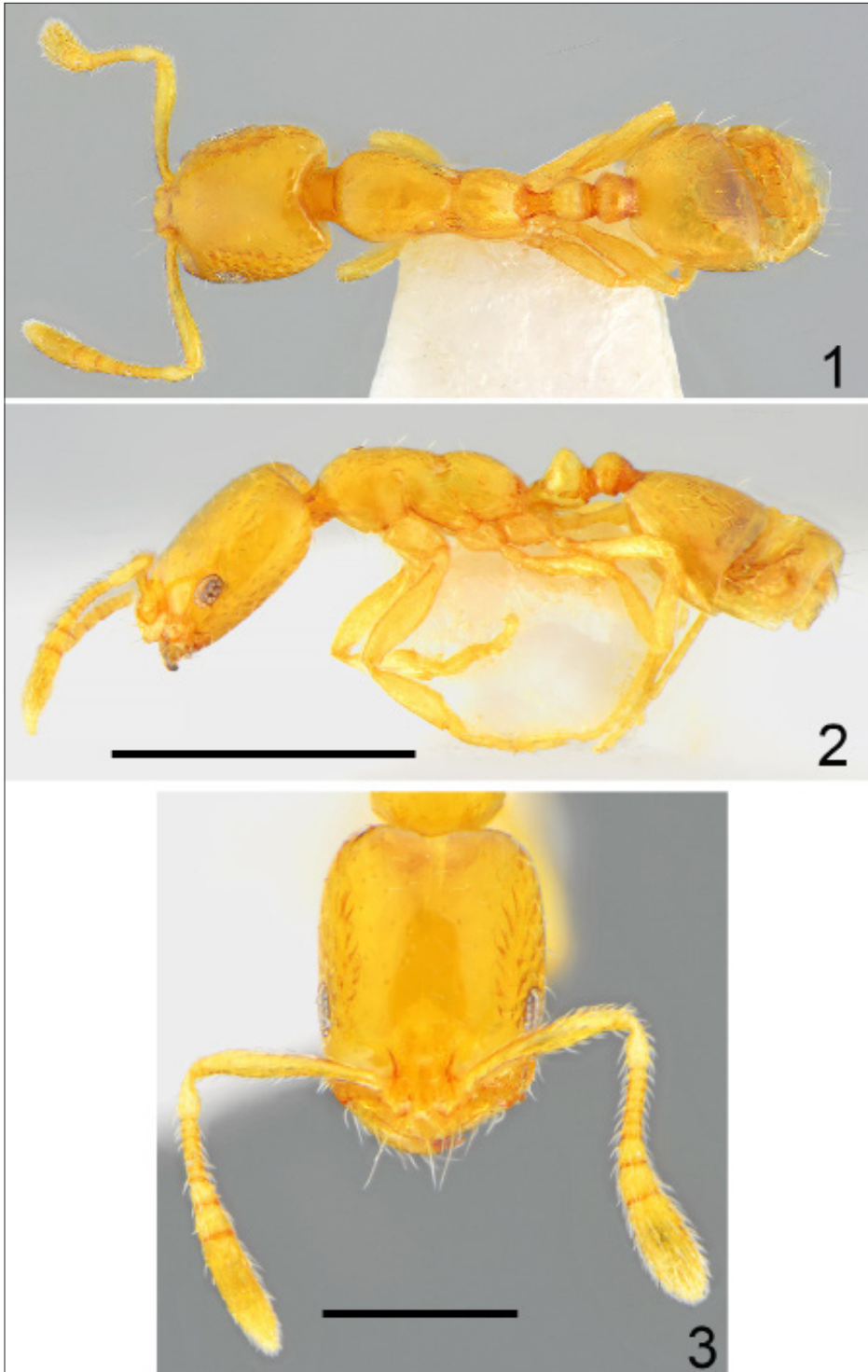
living in humid soil, leaf litter, under rocks, and under tree bark. Once, it was collected from inside galleries of a *Camponotus* sp. colony and found in various agricultural landscapes and human settlements, very often near trees or other vegetation (SHARAF *et al.* 2018). The area around Agiofarango Gorge on the southern coast of Crete, due to its similarity to habitats from some regions of the Arabian Peninsula, seems to be suitable for colonization by *Monomorium exiguum*.

ACKNOWLEDGEMENTS

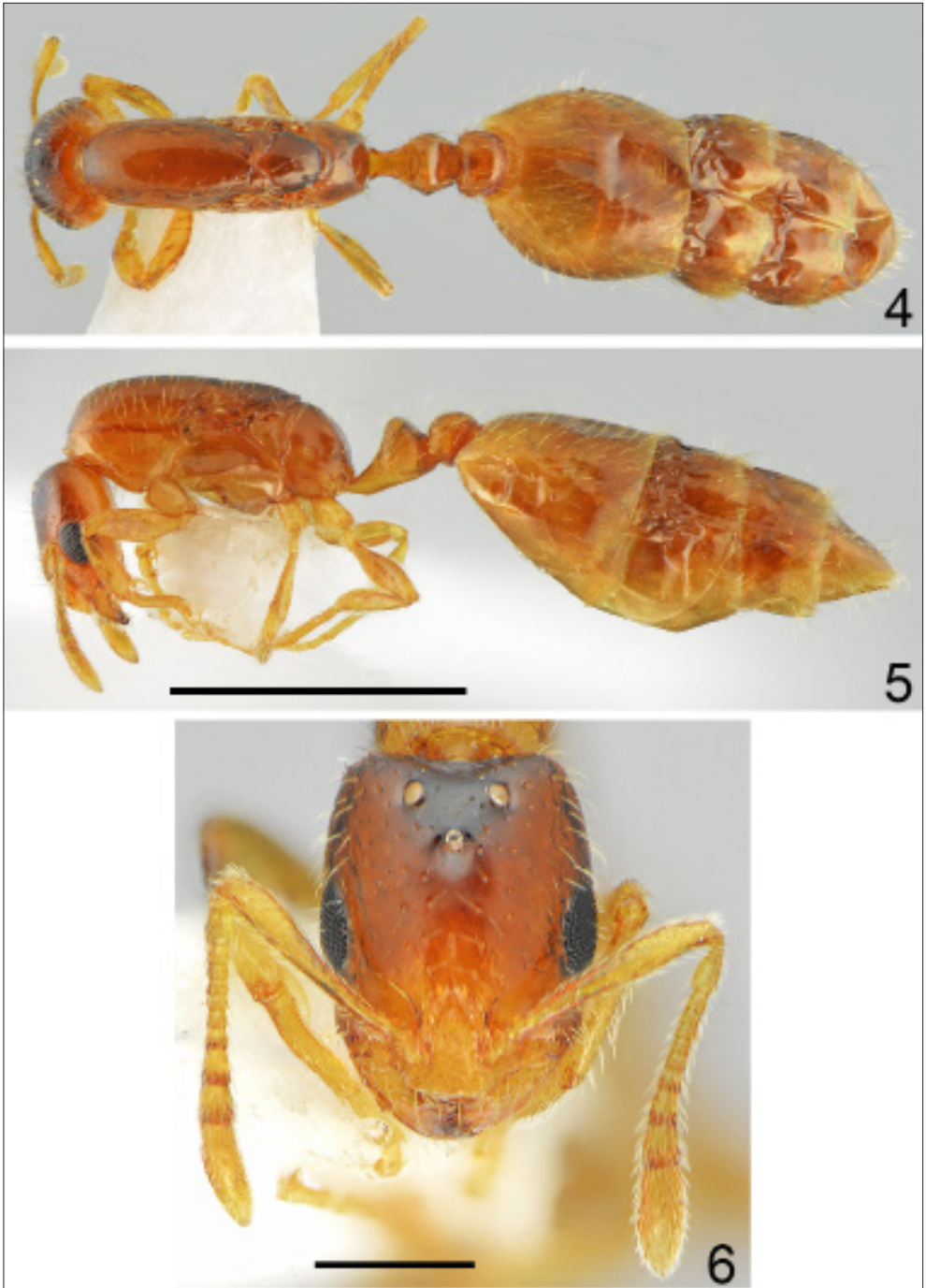
This study was supported by the grant BG-RRP-2.004-0008 SUMMIT-3.3 (A. Lapeva-Gjonova).

REFERENCES

- BAKR R.F.A., FADL H.H., BADAWY R.M., SHARAF M.R. 2007. Myrmecophile insects associated with some ant species (Hymenoptera: Formicidae) in Egypt. The second international conference of economic entomology (Entomological Society of Egypt), Cairo, Egypt 8-11 December 1: 205–233.
- BOLTON B. 1987. A review of the *Solenopsis* genus-group and revision of Afrotropical *Monomorium* MAYR (Hymenoptera: Formicidae). *Bulletin of the British Museum (Natural History). Entomology* 54: 263–452.
- BOLTON B. 2023. An online catalog of the ants of the world. Available from <http://antcat.org>. (accessed 2023-04-22).
- DEMETRIOU J., GEORGIADIS C., KOUTSOUKOS E.C., SALATA S., BOROWIEC L. 2023a. Alien ants (Hymenoptera, Formicidae) on a quest to conquer Greece: a review including an updated species checklist and guidance for future research. *NeoBiota* 86: 81–122.
- DEMETRIOU J., GEORGIADIS C., MARTINO A.F., ROY H.E., WETTERER J.K., BOROWIEC L., ECONOMO E.P., TRIANTIS K.A., SALATA S. 2023b. Running rampant: the alien ants (Hymenoptera, Formicidae) of Cyprus. *NeoBiota* 88: 17–73.
- FOREL A. 1894. Abessinische und andere afrikanische Ameisen, gesammelt von Herrn Ingenieur Alfred Ilg, von Herrn Dr. Liengme, von Herrn Pfarrer Missionar P. Berthoud, Herrn Dr. Arth. Müller, etc. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 9: 64–100.
- GÓMEZ K., ESPADALER X. 2006. Exotic ants (Hymenoptera: Formicidae) in the Balearic Islands. *Myrmecologische Nachrichten* 8: 225–233.
- SALATA S., BOROWIEC L., TRICHAS A. 2020. Review of ants (Hymenoptera: Formicidae) of Crete, with keys to species determination and zoogeographical remarks. *Monographs of the Upper Silesian Museum* 12: 5–296.
- SHARAF M., AL DHAFAER H.M., ADAWOOD A.S., GARCIA F.H. 2018. Ants of the *Monomorium monomorium* species-group (Hymenoptera: Formicidae) in the Arabian Peninsula with description of a new species from southwestern Saudi Arabia. *PeerJ* 6(e4277): 1–31.
- SHARAF M., MOHAMED A.A., BOUDINOT B.E., WETTERER J.K., GARCIA F.H., AL DHAFAER H.M., ADAWOOD A.S. 2021. *Monomorium* (Hymenoptera: Formicidae) of the Arabian Peninsula with description of two new species, *M. hegyvi* sp. n. and *M. khalidi* sp. n.. *PeerJ* 9(e10726): 1–60.



Figs. 1–3. *Monomorium exiguum*, worker: dorsal (1), lateral (2, scale bar 0.5 mm), head (3, scale bar 0.2 mm). Photo by L. Borowiec.



Figs. 4–6. *Monomorium exiguum*, gyne: dorsal (4), lateral (5, scale bar 1 mm), head (6, scale bar 0.5 mm). Photo by L. Borowiec.



Fig. 7. Habitat at the site where *Monomorium exiguum* was found in Crete. Photo by A. Lapeva-Gjonova.

Accepted: 19 October 2023; published: 30 October 2023

Licensed under a Creative Commons Attribution License <http://creativecommons.org/licenses/by/4.0/>