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Scientific Note

First records of the exotic ant *Tetramorium bicarinatum* (Nylander, 1846) (Hymenoptera: Formicidae) in the Balearic Islands

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Abstract. The ant *Tetramorium bicarinatum* (Nylander, 1846) (Hymenoptera: Formicidae) is a successful tramp species that is found in several tropical and subtropical regions throughout the world, including hundreds of islands in the Pacific, Atlantic, and Indian oceans, as well as in many Mediterranean countries. Interestingly, reports of *T. bicarinatum* in Mediterranean islands are yet scarce. Here we present the first two records of *T. bicarinatum* in the Balearic Islands.

Keywords: Biological invasion, exotic species, Myrmicinae, citizen science.

Exotic ants have become a significant ecological and economic concern in many regions of the world. A total of 520 species are known to occur outside their native range, of which approximately 60% are considered of high invasion capacity (Wong et al. 2023). In this context, the Mediterranean basin stands as one of the world's most important hotspots of exotic ants, with the numbers increasing at a high rate (Schifiani 2019). As expected, the Balearic Islands are no exception to this trend. The last published checklist of the region recorded a total of 14 exotic species, out of the 56 recognized to inhabit the archipelago (Gómez & Espadaler 2006), which corresponds to 25% of the local fauna being alien ants. In this short note, we add another exotic ant to the list, *Tetramorium bicarinatum* (Nylander, 1846) (Hymenoptera: Formicidae).

This species is easily recognized by the presence of two well-developed frontal carinae, developed propodeal spines, and a massive rectangular petiole (Figs. 1-2). Workers are medium-sized (3-5 mm) and distinctly bicolored, with the head, mesosoma, and waist segments yellow to orange-brown, while the gaster is dark brown to blackish. It is native to Southeast Asia (Garcia & Fisher 2011), but it can now be considered a widespread tramp species found in many tropical and subtropical regions of the world. It often lives in anthropogenic habitats, from urban environments to agricultural fields, but in colder regions, such as Central and North Europe, it only survives indoors (greenhouses, heated buildings, etc.) (Wetterer 2009). It is known that *T. bicarinatum* has an invasive profile (Fournier et al. 2019), exhibiting common traits shared by many invasive ant species, including polygynous societies, within-nest mating, budding dispersal, omnivory and low intraspecific aggression (Holway 2002). The species can also occasionally constitute a serious pest in agriculture and disrupt ecological interactions (Wetterer 2015).

In recent decades, citizen science has become an invaluable asset in documenting species occurrence, proving to be useful in gathering data on invasive, rare or poorly documented species (Di Cecco et al. 2021; Mesaglio & Callaghan 2021), and even detecting potentially undescribed taxa (Rosa et al. 2022). Ants are no exception to this trend, as recent papers regarding alien or uncommon species detection demonstrate (Sheard et al. 2020; Báthori et al. 2022). Here, we present the first reports of the exotic ant species *T. bicarinatum* in the Balearic Islands based on two records, one being from a citizen science platform, highlighting the potential of these projects in advancing in the study of ant's distribution.

Figure 1. Closeup view of the propodeum and petioles of *T. bicarinatum*. Observe the coarse striation of the tegument.

T. bicarinatum was collected for the first time in the city center of Palma (Mallorca) on November 11, 2023 by J. Arcos. Two colonies were detected in an irrigated garden on the seafront (39°34'01.2"N, 2°38'40.5"E). A sample of 10 worker specimens is deposited in the first author's personal collection (collection code SMP-521). Workers were active and foraging at midday, both individually and in trials, in a small patch of grass delimited by a cemented path and a road. The entrance to the nests was located at the base of the stones that delimited the grass perimeter (Fig. 2D). Other ants detected in a 10 m radius were *Lasius grandis* Forel, 1909 and *Pheidole indica* Mayr, 1879. The first author sampled other points of Palma and walked approximately 3.5 km along the coast of the city but did not find other colonies of the species.

The second location comes from an observation uploaded to the citizen science website of iNaturalist (https://www.inaturalist.org/observations/149027580). Some individuals were spotted at a hotel complex in Colònia de Sant Jordi (Ses Salines, Mallorca) (39°19'18.6"N, 2°59'47.1"E, accuracy of 9 m, observation date February 18, 2023, author Peter Gabler). The first author came across the observation when routinely checking the daily uploaded photographs on the platform, unmistakably identifying it as *T. bicarinatum* by the distinctive morphologic characters mentioned above. The ant was initially classified on iNaturalist as *Tetramorium immigrans* Santschi,

Figure 2. A, B, C. Worker of *T. bicarinatum* from Palma (Mallorca) in lateral, frontal, and dorsal view, respectively. D: nest entrance in a public garden of Palma (Mallorca).

1927 by the user "peter_gabler". It was later changed to *Tetramorium meridionale* Emery, 1870 by the same user, and finally to *T. bicarinatum* by both "andrea_montechiarini" and "peter_gabler". Although we have not visited the locality nor have directly verified its presence, we are confident enough in its identity and precision of the point.

Despite the presence of *T. bicarinatum* in two distant locations in the same year (40.69 km between the two localities), the species seems to be have arrived to the Balearics in recent years. The same area prospected by the first author of this note was already sampled by K. Gómez in 2004-2005 (Gómez & Espadaler 2006), who located many exotic species that we were able to find again in 2023, but not *T. bicarinatum*. It is reasonable to think that an ant so remarkable in its morphology would not have been missed by two experienced myrmecologists if it was already present at the time. With this data, the arrival of *T. bicarinatum* in Mallorca could be tentatively dated between 2005 and 2023. More effort is now needed to survey the island's urban gardens to delimit the real extension of this new exotic ant. In this regard, our study emphasizes the significance of integrating scientific collections and participatory science data to provide valuable insights for detecting newly arrived exotic species such as *T. bicarinatum*. It is reasonable to think that an ant so remarkable in its morphology would not have been missed by two experienced myrmecologists if it was already present at the time. With this data, the arrival of *T. bicarinatum* in Mallorca could be tentatively dated between 2005 and 2023. More effort is now needed to survey the island's urban gardens to delimit the real extension of this new exotic ant. In this regard, our study emphasizes the significance of integrating scientific collections and participatory science data to provide valuable insights for detecting newly arrived exotic species such as *T. bicarinatum*.

As in the case of the Balearics, the arrival of *T. bicarinatum* in some other Mediterranean islands appears to be a recent phenomenon, as it was first observed in Sicily, Crete, and Malta in 2006, 2014, and 2017, respectively (Gomez 2017; Schifani & Alicata 2018; Salata et al. 2019). No records exist for Corsica, Sardinia, Cyprus, or the Aegean Islands (except for Crete), but it is impossible to say if it is truly absent there or has just simply been overlooked due to a lack of samplings in anthropogenic environments. Despite its unstoppable spread, it could be said that *T. bicarinatum* seems to be, fortunately enough, a "slow invader" in the Mediterranean region.

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Authors' Contributions

JA: Conceptualization, Investigation, Methodology, Supervision,

Writing - original draft, Writing - review & editing PA: Conceptualization, Resources, Writing - original draft, Writing - review & editing.

Conflict of Interest Statement

The authors declare no conflict of interest.

References

Báthori, F.; Jégh, T.; Csősz, S. (2022) Formerly considered rare, the ant species *Cryptopone ochracea* (Mayr, 1855) can be commonly detected using citizen-science tools. *Biodiversity Data Journal*, 10, e83117. doi: 10.3897/bdj.10.e83117

Di Cecco, G. J.; Barve, V.; Belitz, M. W.; Stucky, B. J.; Guralnick, R. P.; Hurlbert, A. H. (2021) Observing the observers: how participants contribute data to iNaturalist and implications for biodiversity science. *BioScience*, 71(11): 1179-1188. doi: 10.1093/biosci/biab093

Fournier, A.; Penone, C.; Pennino, M. G.; Courchamp, F. (2019) Predicting future invaders and future invasions. *Proceedings of the National Academy of Sciences*, 116(16): 7907-7910. doi: 10.1073/pnas.1803456116

Garcia, F. H.; Fisher, B. L. (2011) The ant genus *Tetramorium* Mayr (Hymenoptera: Formicidae) in the Malagasy region-introduction, definition of species groups, and revision of the *T. bicarinatum*, *T. obesum*, *T. sericeiventre* and *T. tosii* species groups. *Zootaxa*, 3039: 1-72. doi: 10.11646/zootaxa.3592.1.1

Gomez, K. (2017) Two species of exotic ants (Hymenoptera: Formicidae) new to Malta. *Boletín de la Sociedad Entomológica Aragonesa*, 61: 233-235.

Gómez, K.; Espadaler, X. (2006) Exotic ants (Hymenoptera: Formicidae) in the Balearic Islands. *Myrmecologische Nachrichten*, 8: 225-233.

Holway, D. A.; Lach, L.; Suarez, A. V.; Tsutsui, N. D.; Case, T. J. (2002) The causes and consequences of ant invasions. *Annual Review of Ecology and Systematics*, 33(1): 181-233. doi: 10.1146/annurev.ecolsys.33.010802.150444

Mesaglio, T.; Callaghan, C. T. (2021) An overview of the history, current contributions and future outlook of iNaturalist in Australia. *Wildlife Research*, 48(4): 289-303. doi: 10.1071/wr20154

Reyes, J.; Espadaler, X. (2005) Tres nuevas especies foráneas de hormigas para la Península Ibérica (Hymenoptera: Formicidae). *Boletín de la Sociedad Entomológica Aragonesa*, 36: 263-265.

Rosa, R. M.; Cavallari, D. C.; Salvador, R. B. (2022) iNaturalist as a tool in the study of tropical molluscs. *PLoS One*, 17(5): e0268048. doi: 10.1371/journal.pone.0268048

Salata, S.; Georgiadis, C.; Borowiec, L. (2019) Invasive ant species (Hymenoptera: Formicidae) of Greece and Cyprus. *North-Western Journal of Zoology*, 15(1): 13-23.

Schifani, E. (2019) Exotic ants (Hymenoptera, Formicidae) invading mediterranean Europe: a brief summary over about 200 years of documented introductions. *Sociobiology*, 66(2): 198-208. doi: 10.13102/sociobiology.v66i2.4331

Schifani, E.; Alicata, A. (2018) Exploring the myrmecofauna of Sicily: thirty-two new ant species recorded, including six new to Italy and many new aliens (Hymenoptera, Formicidae). *Polish Journal of Entomology*, 87(4): 323-348. doi: 10.2478/pjen-2018-0023

Sheard, J. K.; Sanders, N. J.; Gundlach, C.; Schär, S.; Larsen, R. S. (2020) Monitoring the influx of new species through citizen science: the first introduced ant in Denmark. *PeerJ*, 8: e8850. doi: 10.7717/peerj.8850

Wetterer, J. K. (2015) Geographic origin and spread of cosmopolitan ants (Hymenoptera: Formicidae). *Halteres*, 6: 66-78.

Wetterer, J. K. (2009) Worldwide spread of the penny ant, *Tetramorium bicarinatum* (Hymenoptera: Formicidae). *Sociobiology*, 54: 811-830.

Wong, M. K. L.; Economo, E. P.; Guénard, B. (2023) The global spread and invasion capacities of alien ants. *Current Biology*, 33: 566-571. doi: 10.1016/j.cub.2022.12.020