The alien ant *Cardiocondyla mauritanica* on a small Corsican island: first record for European France

La fourmi exotique Cardiocondyla mauritanica *signalée pour la première fois en France européenne sur une petite île de Corse*

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Abstract

Cardiocondyla mauritanica *Forel, 1890 is first recorded for European France, on a small satellite island of southern Corsica (Porraggia Piccola island, Lavezzi archipelago). The origins of this ant species are poorly understood, but supposed from North Africa and the Middle East. It is currently spreading in many southern European countries with no recorded impacts on native biodiversity. This species could expand its range to higher latitudes with the ongoing global warming. Its presence was recorded from a remote natural area with restricted access, suggesting that the species is able to spread naturally over several kilometers. Further investigations are needed to precise its current geographical range in Corsica.*

Résumé

Cardiocondyla mauritanica *Forel, 1890 est signalée pour la première fois en France européenne, sur un îlot satellite du sud de la Corse (île Porraggia Piccola, archipel des Lavezzi). Les origines de cette espèce de fourmi sont méconnues, mais présumées d'Afrique du Nord et du Moyen-Orient. Elle se répand actuellement dans de nombreux pays du sud de l'Europe sans qu'aucun impact sur la biodiversité indigène n'ait été souligné. Cette espèce pourrait étendre son aire de répartition à des latitudes plus élevées avec le réchauffement climatique en cours. Sa présence a été enregistrée dans une zone naturelle isolée, avec un accès restreint, ce qui suggère que l'espèce est capable de se répandre sur plusieurs kilomètres sans l'aide des activités humaines. Des investigations supplémentaires sont nécessaires pour préciser son aire de répartition géographique actuelle en Corse.*

Keywords: Moorish sneaking ant, cosmopolitan, tramp species, Porraggia Piccola, Corsica.

Mots-clés : espèce cosmopolitaine, fourmi exotique, Porraggia Piccola, Corse.

Introduction

More than 300 ant species established successfully outside their native range (Wong *et al*. 2023). However, only a minority of these alien species are considered invasive with considerable ecological, economic and sanitary impacts (EASIN 2022; Wong *et al*. 2023). Most invasive ants still have a large proportion of suitable habitats to colonize, and, for some species, global warming could further increase this proportion (Bertelsmeier *et al*. 2016).

The spread of alien species is known to be facilitated by human activities (Bertelsmeier 2021) as most alien ants establish in areas already disturbed, such as urban green spaces, agricultural lands and buildings (Lopez-Vaamonde *et al*. 2010). Similarly, in the Mediterranean basin, most alien species do not occur in natural habitats, even if a fair proportion manage to spread in protected areas (Demetriou *et al*. 2023a).

Among the 183 ant alien species known in Europe in 2021 (Rabitsch & Blight 2021), 40 were present in the Mediterranean region (Schifani 2019). Nevertheless this list is constantly changing, as new species arrive (Menchetti *et al*. 2022, 2023) and established ones expand (Blight *et al*. 2023, Pavon *et al*. in prep). Moreover, some species have an ambiguous alien status due to the lack of knowledge on their native range and their ancient history of introduction in the Mediterranean basin (Schifani 2019).

Among alien species with ambiguous status, *Cardiocondyla mauritanica* Forel 1890 is a worldwide distributed ant (Wetterer 2012). Probably from North Africa and the Middle East Countries (Wetterer 2012), its origins are unclear and its alien status in the northern part of the Mediterranean basin is considered uncertain (Schifani *et al*. 2021). It shares some biological characteristic with invasive species, such as polygyny and unicoloniality (Heinze *et al*. 2006). It was also reported to coexist with some of them, such as the Argentine ant, *Linepithema humile* (Mayr 1868) (Reyes-López & Espadaler 2005; Wetterer 2012). However, *C. mauritanica* is not considered invasive in Europe (Reyes-López *et al*. 2008; Seifert 2003) as no negative effect has yet been observed on native biodiversity (Reyes-López & Espadaler 2005).

The species appear to colonize both natural and anthropogenic areas (Demetriou *et al*. 2023a; Schifani 2019) with preferences for xerothermic and open habitats (Seifert 2003). In the past decades it was found established in most southern European countries, including Portugal (Obregón Romero & Reyes López 2012), Spain including Balearic islands (Gómez & Espadaler 2006; Reyes-López & Espadaler 2005), Italy with Sicily and Sardinia (Schifani *et al*. 2021; Schifani & Alicata 2018), Greece and associated islands (Demetriou *et al*. 2023a; Salata & Borowiec 2018), Malta (Seifert *et al*. 2017) and Cyprus (Demetriou *et al*. 2023b). *Cardiocondyla mauritanica* is already known from Guadeloupe in the West Indies since 2000s (Galkowski 2016). However, no records were found for European France.

Material and methods

This species was hand collected during ant community surveys on Corsican satellite islands in spring 2023 (Blaya et al. in prep). Among the 37 small islands surveyed, this species was only found on Porraggia Piccola (also called Porraggia North in Paradis *et al*. 2020; 41°23'35.3"N, 9°15'52.6"E), which was visited on June, 8th 2023. This islet is part of the Lavezzi archipelago in the district of Corse-du-Sud (département 2A), France, and included in the natural reserve of Bouches de Bonifacio (Figure 1). Porraggia Piccola is a granitic islet of 0.69ha, located 1.7km from mainland of Corsica (Paradis *et al*. 2020), but very close to Porraggia Grande (0,85ha), 35m away. Diversified habitats were observed on the islet, including bare granitic rocks, altered rocks area and bare organic soil, dense vegetation area, gull nesting sites and sandy shore (see pictures in Paradis *et al*. 2020).

Other specimen records from European France were searched for. First, we contacted local ant specialists for unpublished records: Christophe Galkowski from AntArea and Cyril Berquier from from The Office de l'Environnement de la Corse and the Observatoire Conservatoire des Insectes de Corse. Then, we checked museum specimens labelled "*Cardiocondyla mauritanica*" and "*Cardiocondyla nuda* var. *mauritanica*" in the Museum national d'Histoire naturelle (MNHN, Paris), for unpublished record. We also checked museum specimens of "*Cardiocondyla elegans*" for possible misidentification. Finally, we looked for "*Cardiocondyla mauritanica*",

"*Cardiocondyla nuda* var. *mauritanica*" and "Complex *Cardiocondyla nuda*" records on on-line databases (GBIF.org, AntCat.org, and AntMaps.org) and on a participative science website (iNaturalist.org).

Workers were identified using morphological criteria described in Seifert 2023.

Results and discussion

A dozen of workers and one queen of *Cardiocondyla mauritanica* were found on the islet of Porraggia Piccola (Figure 2). This species was particularly easy to spot as numerous workers were foraging on the ground. A nest was found on the ground on a sandy area on the south-east shore. The entrance of the nest was prospected, allowing to find a queen. Four other species were found on the islet on the same survey, i.e. *Messor minor* (André, 1883), *Messor capitatus* (Latreille, 1798), *Pheidole pallidula* (Nylander, 1849), and *Tetramorium* complex *caespitum-impurum*.

This islet had already been surveyed in 1985 but *C. mauritanica* was not recorded at the time (Delaugerre & Brunstein 1987). More recently, historical data have been gathered and large inventories were carried out until 2016 to build the atlas of the ants of Corsica (Blatrix *et al*. 2018). This work did not give any evidence of specimens belonging to *Cardiocondyla* genus, either on the main island or smaller satellite islands.

Probably native to North Africa and the Middle East, this species has already successfully colonized a wide range of countries and habitats, achieving its cosmopolitan status (Heinze 2017; Wetterer 2012). Thus, the spread of *C. mauritanica* in South Corsica is not surprising as the dry and warm climate suits its ecological preferences (Seifert 2003). Moreover, Mediterranean islands, including Corsica and Sardinia, are experiencing rising temperatures and declining precipitation (Vogiatzakis *et al*. 2016) that could increase the suitability of habitats for alien species from lower latitudes. As *C. mauritanica* is already known from south, west and central Sardinia (Scupola 2009) its arrival in Corsica which is a very close island to the north, was a matter of time. Small islands located in between Corsica and Sardinia, are an ideal path for natural spreading of aliens, acting as stepping stones.

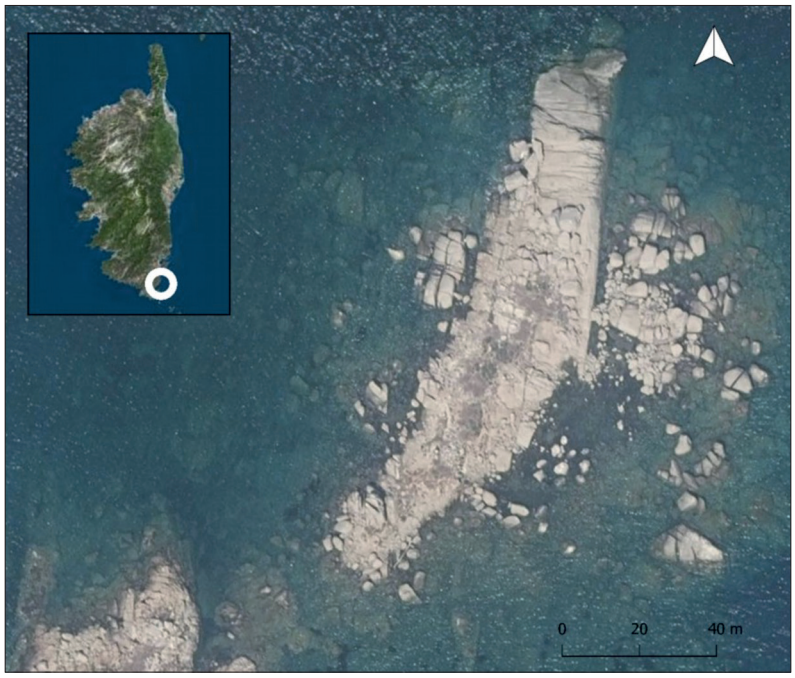

Figure 1 – Photography of the satellite islet Porraggia Piccola (Corse du Sud, France).
Its localization around main island of Corsica is indicated with the white circle. At the south west of the islet the northern part of Porraggia Grande is visible. Main island of Sardinia is located 15km to the south. Source: BD ORTHO (IGN).

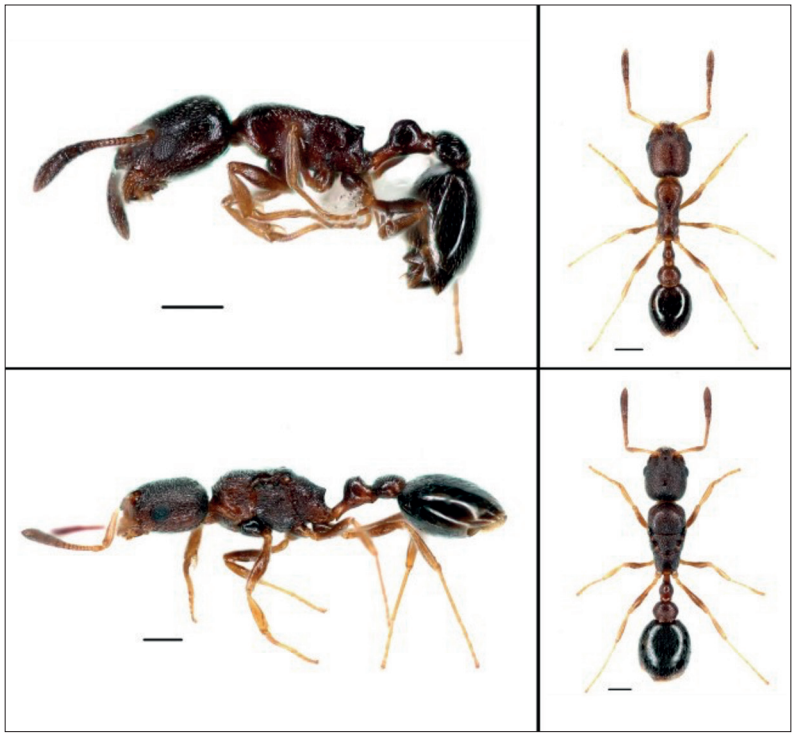

Figure 2 – Photography of collected individuals identified as* Cardiocondyla mauritanica *(© Philippe Ponel).
The scale bar represents 0.25mm. The top photos show a worker and bottoms photos show a queen.

Although human-mediated introduction could have helped *C. mauritanica* to colonize new localities, especially in such an attractive touristic destination as Corsica, its presence in the restricted-access and remote islet of Porraggia Piccola shows its ability to spread naturally over several kilometers. The dispersal of this species over long distances is made possible by winged queens during nuptial flights (Seifert 2003). Prevailing winds, such as libeccio and sirocco, respectively directed north-east and north-west in South Corsica (Burlando *et al*. 2008), could have helped the spread of *C. mauritanica* by carrying sexuals individuals from Sardinia to Corsica and satellite islets.

No other record of *C. mauritanica* were found in the databases. All the specimens labelled C. *mauritanica* and *C. nuda* var. *mauritanica*, found in the investigated collections from the MHNH of Paris, were collected from North African countries. One record of *C. mauritanica* was reported on iNaturalist.org on the 24th of October, 2023, from Stagnolu beach near Bonifacio in South Corsica. However, the relatively low resolution of the uploaded picture cannot lead to an identification and the record remain dubious.

Further investigation could be necessary to assess the *C. mauritanica* spread as last extensive surveys in Corsica date from 2016. This ant was found in the company of other native ant species, on an island where plants and arthropods were well diversified, suggesting it has no negative effects on native biodiversity as described by Reyes-López & Espadaler in 2005. However, it would still be interesting to follow the progression of this alien ant species and its potential effects, especially outside urbanized areas.

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