

**A survey of the ants of Minorca (Hymenoptera:
Formicidae) with two new species for the island:
Hypoponera punctatissima (Roger, 1859) and
Temnothorax algiricus (Forel, 1894)**

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ABSTRACT

The island of Minorca was surveyed for ants in June 2008 and two new species to the island are recorded: *Hypoponera punctatissima* (Roger, 1859) and *Temnothorax algiricus* (Forel, 1894). Throughout the Balearics, both species have so far been found in Mallorca. A total of 27 species were found on Minorca within a wide range of habitats during a week's fieldwork in June 2008 and a list of species is given with their data. The Argentine Ant *Linepithema humile* (Mayr, 1868) continues to increase and spread across the island. This has serious implications for native species of ant. Species presence and abundance recorded during this survey is compared to that of previous surveys.

Key words: Minorca, Formicidae, *Hypoponera punctatissima*, *Temnothorax algiricus*, *Linepithema humile*.

RESUMEN

Estudio de las hormigas de Menorca (Hymenoptera: Formicidae) con dos especies nuevas para la isla: *Hypoponera punctatissima* (Roger, 1859) and *Temnothorax algiricus* (Forel, 1894)

Se muestrearon las hormigas de Menorca en junio 2008 y se citan dos especies nuevas para la isla: *Hypoponera punctatissima* (Roger, 1859) y *Temnothorax algiricus* (Forel, 1894). En las Baleares, estas dos especies solamente se conocen de Mallorca. Se encontraron 27 especies de formícidos durante una semana de muestreo en hábitats distintos, y se presenta una lista de citas con sus datos. La hormiga argentina *Linepithema humile* (Mayr, 1868) sigue dominando los hábitats de la isla, y esto tiene implicaciones graves para la fauna autóctona.

Se compara la presencia y abundancia de especies citadas durante este muestreo con la de muestreos previos.

Palabras Clave: Menorca, Formicidae, *Hypoponera punctatissima*, *Temnothorax algiricus*, *Linepithema humile*.

INTRODUCTION

The ants of the Balearic Islands in Spain are well studied (WHEELER, 1926; COLLINGWOOD AND YARROW, 1969; COMÍN DEL RÍO, 1977; COLLINGWOOD, 1978; COMÍN DEL RÍO & DE HARO VERA, 1980; GÓMEZ & ESPADALER, 2006). Nevertheless, additional surveys on the islands may reveal new species to their myrmecofaunas, due to new colonisations or species having been overlooked, as well as trends in distribution and abundance of previously recorded species. This is particularly the case when the islands are affected by factors, such as invasive species, which are capable of causing changes in dynamics or extinctions of populations of native species. The most recent published study specific to Minorca (COMÍN DEL RÍO & DE HARO VERA, 1980) had the total number of species at 33. Prior to the present study, 39 species of ant had been reported from the island (GÓMEZ & ESPADALER, 2007), although the presence of some is questionable.

A striking feature of the myrmecofauna of Minorca is the abundance of the Argentine Ant *Linepithema humile* (Mayr, 1868), which is extremely invasive in the Balearics (GÓMEZ & ESPADALER, 2005) and is one of the five species of ant listed by IUCN in the “100 of the World’s most Invasive Alien Species” (LOWE *et al.*, 2004). COMÍN DEL RÍO (1977) cited this ant for the first time on the island, and predicted its spread and devastation of native species (also reported in COMÍN DEL RÍO & DE HARO VERA, 1980). GÓMEZ & ESPADALER (2005) report on the situation extensively. This highly invasive ant has expanded its distribution since 1977 to occupy most areas of the island, as well as being a common pest within houses. In a survey for the species in 2004, GÓMEZ & ESPADALER (2005) found *L. humile* in all 19 sites sampled.

I carried out a survey of ants at a number of sites on the island of Minorca during early June 2008. This paper discusses the data collected during that survey, which includes two new species to the myrmecofauna of the island and new data on distributions and abundance of some species.

METHODS

Surveys were carried out on the island of Minorca from 2nd to 8th June 2008, during which specimens of all species encountered were collected and examined. Ants were collected by sweeping and beating vegetation, searching under stones and rocks, looking within dead twigs both on trees and on the ground, general ground searching, and sieving leaf litter and soil. Species were identified using Iberian ant keys (COLLINGWOOD, 1978; GÓMEZ & ESPADALER, 2007), as well as recent revisions of species and genera (SEIFERT, 1992; 2003) and comparisons with specimens in my reference collection. All ants were collected and identified by the author. Thirteen sites were visited (Fig. 1 & Table I).

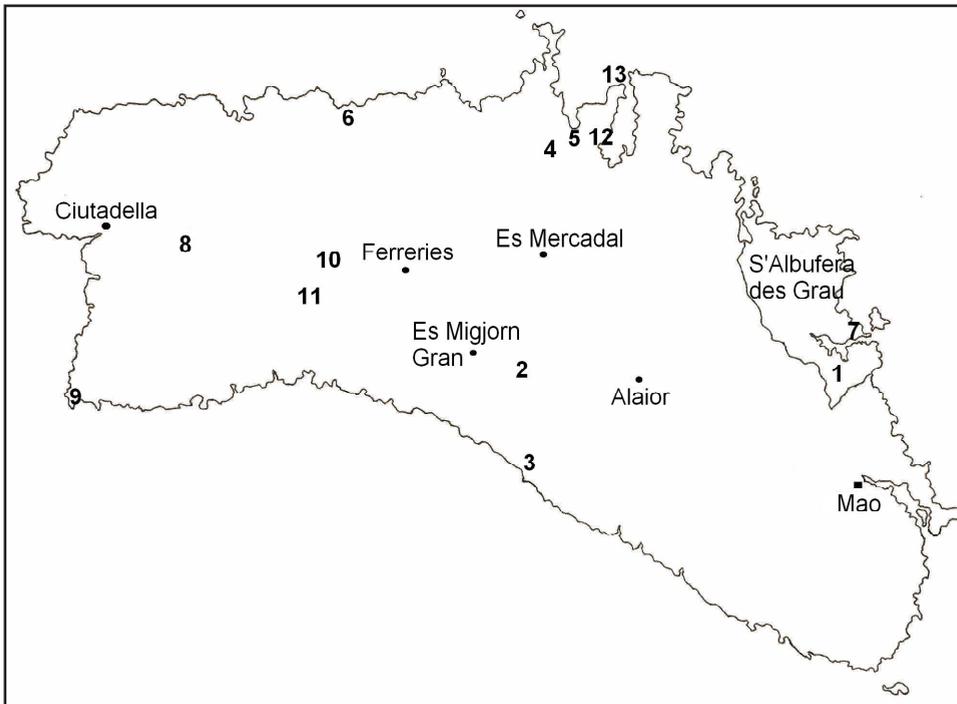


Figura 1. Map of Minorca showing collecting sites.

Figure 1. Mapa de Menorca mostrando las localidades de recolección.

1. S'Albufera des Grau Nature Reserve; 2. Santa Catalina, es Migjorn Gran; 3. Son Bou; 4. Tirant marsh, Fornells; 5. Cala Tirant; 6. Cala del Pilar; 7. Cala des Grau; 8. es Tudons, Ciutadella; 9. Cap d'Artrutx; 10. Son Bell-Lloquet nou, Ferreries; 11. Barranc d'Algendar; 12. Ses Salines, Fornells; 13. Cap de Fornells

Table I. Data for collecting sites in Minorca.**Tabla I.** Datos correspondientes a las localidades muestreadas en Menorca.

Map reference no.	Place Name	GPS & Elevation	Habitat description
1	S'Albufera des Grau Nature Reserve	39°56'N 4°15'E, 20m asl	Brackish lake surrounded by scrub (<i>Quercus ilex</i> , <i>Pistacia lentiscus</i> , <i>P. terebinthus</i> , <i>Olea europea</i>) and small patches of pine-wood (<i>Pinus halepensis</i>). Reedbeds at the western end
2	Santa Catalina, es Migjorn Gran	39°56'N 4°04'E, 90m asl	Farmland and meadows
3	Son Bou	39°54'N 4°04'E, 5m asl	Sand dune habitat with <i>Ammophila arenaria</i>
4	Tirant marsh, Fornells	40°01'N 4°05'E, 3m asl	Wet meadow dominated by <i>Tamarix</i> sp., grasses, <i>Juncus</i>
5	Cala Tirant	40°02'N 4°06'E, 2m asl	Sand dune habitat with <i>Ammophila arenaria</i> , <i>Juiperus phoenicea</i> , <i>Pinus halepensis</i>
6	Cala del Pilar	40°02'N 3°58'E, 50m asl	Sand dune succession with extensive oak woodland habitat. Dominant species include <i>Quercus ilex</i> , <i>Pinus halepensis</i> , <i>Pistacia lentiscus</i>
7	Cala des Grau	39°57'N 4°15'E, 3m asl	Beach adjacent to S'Albufera des Grau with wooded habitat consisting of <i>Pinus halepensis</i> and <i>Salicornia</i> marsh
8	es Tudons, Ciutadella	40°00'N 3°53'E, 50m asl	Pasture land on open, stony ground with some <i>Pistacia lentiscus</i>
9	Cap d'Artrutx	39°55'N 3°49'E, 5m asl	Rocky coast with bare, open ground and littoral vegetation
10	Son Bell-Lloquet nou, Ferreries	39°59'N 3°59'E, 130m asl	Small <i>Quercus ilex</i> patch with many stones adjacent to farmland
11	Barranc d'Algendar	39°58'N 3°58'E, 65m asl	Green valley with woodland consisting of <i>Ficus</i> , <i>Pistacia lentiscus</i> , <i>Rhamnus</i> , <i>Corylus avellana</i> , <i>Ulmus minor</i>
12	Ses Salines, Fornells	40°02'N 4°07'E, 2m asl	small area of salt pans with saltmarsh vegetation and area of woodland/scrub mosaic to the west
13	Cap de Fornells	40°03'N 4°07'E, 30m asl	Rocky cliff with bare ground and little vegetation

RESULTS

Unless otherwise stated only workers were found. 27 species were recorded during this survey. They were:

Ponerinae

Hypoponera eduardi (Forel, 1894)

Commonly encountered in dry oak forests and damp areas. 4.VI.2008 and 6.VI.2008 Tirant marsh, Fornells; under stones. 7.VI.2008 Son Bell-Lloquet nou, Ferreries; found in colonies with *Plagiolepis pygmaea* and *Tetramorium meridionale*, and free-living under stones. 7.VI.2008 Barranc d'Algender; damp, shaded area under stones.

Hypoponera punctatissima (Roger, 1859)

1 worker 7.VI.2008 Son Bell-Lloquet nou, Ferreries; in a nest of *Solenopsis* sp. The identity of the species was verified following SEIFERT (2003). New to the ant fauna of Minorca.

Myrmicinae

Aphaenogaster subterranea (Latreille, 1798)

3.VI.2008 S'Albufera des Grau; within twigs of *Quercus ilex*. 5.VI.2008 Cala del Pilar; amongst leaf litter under oak. 7.VI.2008 Barranc d'Algender; damp, shaded area under stones.

Crematogaster scutellaris (Olivier, 1792)

Very regularly encountered. 2.VI.2008 S'Albufera des Grau; beating *Olea europea*, *Pistacia lentiscus* and *Quercus* sp. 3.VI.2008 Santa Catalina, es Migjorn Gran; beating vegetation. 4.VI.2008 and 6.VI.2008 Tirant marsh, Fornells; beating vegetation including *Tamarix*. 4.VI.2008 Cala Tirant; on *Juniperus* and *Pinus* sp. 5.VI.2008 Cala del Pilar; on *Quercus ilex*, *Pistacia lentiscus*. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; on *Q. ilex* and *P. lentiscus*. 7.VI.2008 Barranc d'Algender; beating vegetation. 8.VI.2008 Ses Salines, Fornells; beating vegetation.

Messor bouvieri Bondroit, 1918

The most common *Messor* Forel, 1890 species encountered. 5.VI.2008 Cala del Pilar; nests on open, sandy ground. 6.VI.2008 el Toro, es Mer-

cadal, 358m. 6.VI.2008 Tirant marsh, Fornells; nests within a wet meadow. 7.VI.2008 Cap d'Artrutx; nests on bare ground. 7.VI.2008 Barranc d'Algendar. 8.VI.2008 Ses Salines, Fornells; on open, stony ground. 8.VI.2008 Cap de Fornells; on open, stony ground.

***Messor structor* (Latreille, 1798)**

3.VI.2008 Santa Catalina, es Migjorn Gran; nest found on farmland under a cow pat. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; nest with workers and 6 queens under a stone. 7.VI.2008 Barranc d'Algendar. 8.VI.2008 Ses Salines, Fornells; open, stony ground adjacent to small woodland.

***Monomorium salomonis* (Linnaeus, 1758)**

5.VI.2008 Cala del Pilar; nest with 2 queens under stones on sandy, stony ground. 6.VI.2008 Tirant marsh, Fornells; nests on open dry ground. 7.VI.2008 es Tudons, Ciutadella; nest with 2 queens and 1 male under stone in farmland with stony ground hedged with *Pistacia lentiscus*.

***Myrmica aloba* Forel, 1909**

4.VI.2008 and 6.VI.2008 Tirant marsh, Fornells; two nests with workers found under grass tussocks surrounded by *Tamarix* and *Juncus* sp.

***Pheidole pallidula* (Nylander, 1849)**

3.VI.2008 Santa Catalina, es Migjorn Gran; under stones in farmland. 5.VI.2008 Cala del Pilar; nests within sand dunes. 6.VI.2008 Tirant marsh, Fornells; nests under stones. 7.VI.2008 es Tudons, Ciutadella. 7.VI.2008 Barranc d'Algendar. 8.VI.2008 Ses Salines, Fornells; under stones. 8.VI.2008 Cap de Fornells; under stones on rocky, bare ground.

***Solenopsis fairchildi* Wheeler, 1926.**

8.VI.2008 Cap de Fornells; two nests found under small stones. Mallorca is the type locality for this species and specimens collected accord well with Wheeler's (1926) description.

***Solenopsis* sp.**

2.VI.2008 and 3.VI.2008 S'Albufera des Grau; under *Quercus ilex*. 3.VI.2008 Santa Catalina; sieving leaf litter under *Quercus*. 4.VI.2008 Tirant marshes. 5.VI.2008 Cala del Pilar; under small stones amongst *Quercus*. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; under small stones amongst *Q. ilex*. *Solenopsis latro* Forel, 1894 has previously been recorded from Minorca (CÓMIN DEL RÍO & DE HARO VERA, 1980) but I have not been able to determine my specimens with confidence due to the difficulties

surrounding identification of the worker caste of the subgenus *Diplorhoptrum* Mayr, 1855.

***Temnothorax algiricus* (Forel, 1894)**

2.VI.2008 S'Albufera des Grau; beating vegetation including *Olea europaea*, *Pistacia lentiscus* and *Quercus ilex*. 5.VI.2008 Cala del Pilar; beating vegetation. 6.VI.2008 Cala des Grau; commonly found beating vegetation. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; workers and 1 queen within twigs of *Quercus ilex*. New to the ant fauna of Minorca.

***Temnothorax recedens* (Nylander, 1856)**

The most common *Temnothorax* Mayr, 1861 species encountered. 2.VI.2008 and 3.VI.2008 S'Albufera des Grau; beating vegetation and nests with queens within sticks of *Quercus ilex*. 3.VI.2008 Santa Catalina, es Migjorn Gran; workers and queen found sieving leaf litter under *Q. ilex*. 5.VI.2008 Cala del Pilar; beating vegetation. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; workers within twigs of *Q. ilex*.

***Temnothorax specularis* Emery, 1916.**

4.VI.2008 Tirant marsh, Fornells; 2 workers found, one on ground and one beating *Tamarix*. 4.VI.2008 Cala Tirant; one queen found beating vegetation. 6.VI.2008 Tirant marsh, Fornells; one worker found sweeping long grasses.

***Tetramorium caespitum* (Linnaeus, 1758)**

4.VI.2008 Cala Tirant; 10 workers found in leaf and pine litter on sandy soil.

***Tetramorium meridionale* Emery, 1870**

The most commonly encountered *Tetramorium* Mayr, 1855 species. 2.VI.2008 S'Albufera des Grau; under stones. 3.VI.2008 Santa Catalina, es Migjorn Gran. 4.VI.2008 Tirant marsh, Fornells. 6.VI.2008 Tirant marsh, Fornells; nest with 6 queens and 1 male. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; under stones on farmland. 8.VI.2008 Ses Salines, Fornells; under stones on grassy bank next to road. 8.VI.2008 Cap de Fornells; under stones on cliff with littoral vegetation.

***Tetramorium semilaeve* (André, 1883)**

3.VI.2008 S'Albufera des Grau; nests with sexuals found under stones. 7.VI.2008 Cap d'Artrutx; under stones on bare ground.

Formicinae

Camponotus lateralis (Olivier, 1792)

Most frequently encountered *Camponotus* Mayr, 1861 species. 2.VI.2008 S'Albufera des Grau; beating vegetation and within sticks of *Q. ilex*. 4.VI.2008 and 5.VI.2008 Tirant marsh, Fornells; beating vegetation. 4.VI.2008 Cala Tirant; beating *Pinus* and *Juniperus*. 5.VI.2008 Cala del Pilar; workers and 3 queens on trees. 6.VI.2008 Cala des Grau. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; 1 queen and 1 male beating *Pistacia lentiscus* and *Quercus ilex*. 7.VI.2008 Barranc d'Algendar; beating vegetation. 8.VI.2008 Ses Salines, Fornells; beating vegetation.

Camponotus ruber Forel, 1894

3.VI.2008 Santa Catalina, es Migjorn Gran; nest found with workers and 1 queen in a twig of *Olea*. This species is given as *Camponotus sicheli* Mayr, 1866 by Cómin del Río & De Haro Vera (1980). I have followed Cagniant (1996), who considers the species from mainland Spain and the Balearics to be *C. ruber*, with *C. sicheli* referring to completely black populations in Algeria and Tunisia. Before then, *C. ruber* was included within *C. sicheli*.

Camponotus truncatus (Spinola, 1808)

2.VI.2008 S'Albufera des Grau; 2 workers found beating vegetation. 3.VI.2008 Santa Catalina, es Migjorn Gran; 1 worker found beating vegetation.

Lasius grandis Forel, 1909

4.VI.2008 Tirant marsh, Fornells. Workers and sexuals found under rock in grassy marshland. 5.VI.2008 Cala del Pilar; beating vegetation. 7.VI.2008 Barranc d'Algendar; beating vegetation.

Lasius lasioides (Emery, 1869)

2.VI.2008 and 3.VI.2008 S'Albufera des Grau. 5.VI.2008 Cala del Pilar; beating vegetation. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; beating vegetation. 7.VI.2008 Barranc d'Algendar; beating vegetation.

Plagiolepis pygmaea (Latreille, 1798)

Very common species. 2.VI.2008 S'Albufera des Grau; beating vegetation, in sticks, under stones and amongst roots. 3.VI.2008 Santa Catalina, es Migjorn Gran; under stones. 5.VI.2008 Cala del Pilar; beating vegetation. 6.VI.2008 Tirant marsh, Fornells; beating vegetation, under stones. 7.VI.2008

Son Bell-Lloquet Nou, Ferreries; beating vegetation, nest with workers and 2 queens found under stones. 8.VI.2008 Ses Salines, Fornells. 8.VI.2008 Cap de Fornells; under small stones.

***Plagiolepis schmitzii* Forel, 1895**

4.VI.2008 Cala Tirant; beating vegetation. 5.VI.2008 Cala del Pilar; nest under stone with sexuals.

Dolichoderinae

***Linepithema humile* (Mayr, 1868)**

Extremely common in anthropogenic areas, on waste land, disturbed land and farmland. 2.VI.2008 S'Albufera des Grau; found everywhere within the reserve but especially common at the entrance. 2.VI.2008 es Mercadal; 5 males found within a house. 3.VI.2008 Son Bou; found in very high density. The only species recorded at this location. 5.VI.2008 Cala del Pilar; nests found with sexuals under stones, beating vegetation. 6.VI.2008 Cala des Grau; commonly seen. 7.VI.2008 Cap d'Artrutx; commonly seen on ground. 8.VI.2008 Ses Salines de Fornells; commonly seen on ground, under stones and beating vegetation.

***Tapinoma erraticum* (Latreille, 1798)**

2.VI.2008 S'Albufera des Grau; under stones near water. 4.VI.2008 Cala Tirant; nests within sand. 6.VI.2008 Tirant marsh, Fornells; under stones by roadside. 8.VI.2008 Cap de Fornells; under stones.

***Tapinoma nigerrimum* (Nylander, 1856)**

7.VI.2008 es Tudons, Ciutadella; under stones. 7.VI.2008 Son Bell-Lloquet Nou, Ferreries; frequently found under stones in farmland.

DISCUSSION

New Species to Minorca

COMÍN DEL RÍO & DE HARO VERA (1980) only list *Temnothorax recedens* and *T. specularis* from the island and these are the only two species of the genus to have been recorded until the present. *Temnothorax algiricus* was first recorded in the Balearic Islands from Mallorca by GÓMEZ

(2004). *T. algiricus* is a member of the *angustulus* group, closely related to *Temnothorax angustulus* (Nylander, 1856), which has a Mediterranean distribution (BERNARD, 1968). The species was originally found on Mallorca by ROGER (1863) and was then reported by COLLINGWOOD & YARROW (1969). However, both authors identified it as *T. angustulus*, which GÓMEZ (2004) revised as *T. algiricus*. The species is arboreal, nesting in dead twigs on trees. *T. algiricus* has also been recorded from Algeria, Morocco and Tunisia (CAGNIANT & ESPADALER, 1997), as well as one record from mainland Spain in Almeria (TINAUT *et al.*, 1995). It is interesting that *T. algiricus* has not been previously recorded from Minorca, even as *T. angustulus*. It was encountered frequently whilst beating vegetation, although in small numbers. Furthermore, it appears to be fairly widespread, making recent colonisation unlikely.

Hypoponera punctatissima has a cosmopolitan distribution (SEIFERT, 2003). Even though it is widespread, it is cryptic and locally rare, and therefore hard to locate. It is considered to be a tramp species either of African or western European origin (MCGLYNN, 1999) and is referred to as an invasive in the DAISIE (2008) catalogue of invasive species in Europe. It was described from a hothouse in Poland (ROGER, 1859; CZECHOWSKI *et al.*, 2002). *H. punctatissima* had previously only been recorded from Mallorca in the Balearics and may not be native to the islands (GÓMEZ & ESPADALER, 2006). These authors found one winged queen in Bahia Azul, Mallorca, and another queen in Pascual Comín del Río's collection (1987), previously identified as *H. eduardi*. COMÍN DEL RÍO (1988) first cited this species from Mallorca, but GÓMEZ & ESPADALER (2006) identified one of his specimens as *Ponera testacea* Emery, 1915, with the second specimen unable to be located. This paper provides the first record for Minorca of a species that could easily have been missed previously due to its cryptic habits.

Species not recorded in this Survey

Previous surveys of Minorca recorded species that were not encountered during this study. These include three large and conspicuous species belonging to the genera *Aphaenogaster* Mayr, 1853 and *Messor*. *Aphaenogaster gemella* Roger, 1862 was last recorded by WHEELER (1926) as *A. testaceopilosa* var. *gemella* Roger, from Port Mahon. It was described by ROGER (1862) from Mallorca, where it was restricted to cities and ports and never found in the wild, indicating that it was probably introduced some decades earlier (GÓMEZ & ESPADALER, 2006). COMÍN DEL RÍO & DE HARO

VERA (1980) did not record this species. GÓMEZ & ESPADALER (2006) state that they have never encountered it in the Balearics despite intensive sampling, and conclude that its presence is very improbable. *Aphaenogaster senilis* Mayr, 1853 and *Messor barbarus* (Linnaeus, 1767) were not encountered either despite visiting the locations given by COMÍN DEL RÍO & DE HARO VERA (1980). ESPADALER (*pers. comm.*) has never found *Messor barbarus* from any of the Balearic Islands and suggests that it was probably never present. This species is hard to miss due to its size and ecology. It is likely that, even if it was once present, it no longer exists on the island. There is also some doubt as to the continued presence of *Aphaenogaster senilis* on Minorca. ESPADALER (*pers. comm.*) has never encountered this species on the island. Either the population has diminished or it is altogether absent.

It was not possible to survey all the areas of the island so naturally some species were not recorded. Towns, port areas, gardens and golf courses were not visited so *Cardiocondyla mauritanica* Forel, 1890, *Tetramorium caldarium* (Roger, 1857) and *Tapinoma madeirense* Forel, 1895 were not found. *C. mauritanica* and *T. madeirense* have been reported from irrigated lawns and a golf course in Fornells, and *T. caldarium* is known from the town of Ciutadella (GÓMEZ & ESPADALER, 2006). Species without anthropogenic habits that were not recorded were: *Crematogaster auberti* Emery, 1869, *Monomorium subopacum* (F. Smith, 1858), *Ponera coarctata* (Latreille, 1802) and *Myrmecina graminicola* (Latreille, 1802), the last of which has only been recorded from Mahon by COLLINGWOOD & YARROW (1969). The latter two species have cryptic habits and are easily missed, whereas COMÍN DEL RÍO & DE HARO VERA (1980) found *C. auberti* to be extremely localised. *Bothriomyrmex meridionalis* Roger, 1863 was not found despite actively looking for the species at locations given by COMÍN DEL RÍO (1977) and COMÍN DEL RÍO & DE HARO VERA (1980). This species could have been overlooked, since members of this genus are not easily located at certain times of the year (*pers. obs.*) and COMÍN DEL RÍO & DE HARO VERA (1980) provide only a handful of records.

Two species of *Lasius* Fabricius, 1804 which have been reported from the island were not recorded during this survey, but this may be the result of misidentification of specimens collected during previous surveys. *Lasius alienus* (Schenck, 1852) and *Lasius niger* (Linnaeus, 1758) were reported from Minorca by COMÍN DEL RÍO (1977) and COMÍN DEL RÍO & DE HARO VERA (1980), from many locations. Specimens collected by those authors should be checked against *L. lasioides* and *L. grandis* respectively, as confusion between these species was common before SEIFERT'S

(1992) revision. It is likely that these last two species are the only *Lasius* on Minorca.

The Argentine Ant *Linepithema humile*

A serious concern on Minorca is the ever increasing presence of the Argentine ant *Linepithema humile*. The richest sites in ant diversity were those where *L. humile* was absent, whereas the poorest sites were where *L. humile* was very abundant. Only *L. humile* was found at the dunes of Son Bou, where it was extremely abundant, despite many hours spent searching for other species (as reported by GÓMEZ & ESPADALER, 2005). At the S'Albufera d'Es Grau nature reserve, *L. humile* was found throughout most the reserve, but especially at the entrance and around the interpretation centre. I recorded 15 ant species from the reserve, but only *L. humile* is present around the entrance. GÓMEZ & ESPADALER (2005) also surveyed the reserve and found complete domination by *L. humile* within the pinewood, with no other species present. Action needs to be taken to conserve the diversity of ant species within the reserve. However, the many difficulties associated with prevention and control of infestation are discussed in GÓMEZ & ESPADALER (2005). Within the Parc de S'albufera, Mallorca, *L. humile* is the only ant species found (GÓMEZ & ESPADALER, 2006), even though 22 species were known to exist there (COMÍN DEL RÍO, 1988). This is evidence of displacement of native ant species. Within the near future this ant will no-doubt dominate most of the S'Albufera d'Es Grau, displacing native ants.

Changes in Abundance and Distribution of Ants on Minorca

I only found one species of *Monomorium* Mayr, 1855, *M. salomonis*, on Minorca, despite COMÍN DEL RÍO & DE HARO VERA (1980) having reported that *M. subopacum* was the more widespread and abundant of the two species. The same authors reported *Camponotus ruber* (given as *C. sichelii*) as the most abundant species of the genus *Camponotus* on the island. In contrast, I found only a single nest of the species, at Santa Catalina, and found *Camponotus lateralis* to be the most abundant and widespread member of the genus by far. COMÍN DEL RÍO & DE HARO VERA (1980) also found *Pheidole pallidula* in almost all sites they sampled, including anthropogenic habitats. I found *P. pallidula* at seven of the thirteen sites sampled. Nests were not frequently encountered and abundance was certainly

far lower than in mainland Spain. This is most likely due to competition with *Linepithema humile*, which may also explain the decrease or disappearance of *Aphaenogaster senilis*. *A. senilis* and *P. pallidula* are completely absent in parts of Gibraltar that are dominated by *L. humile*, most likely due to competition (GUILLEM & BENSUSAN, 2009).

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