



THE IBERIAN *Leptothorax* Mayr, 1855 (HYMENOPTERA, FORMICIDAE): DISCOVERY OF A NEW SPECIES AND FIRST RECORD OF *L. atlantis* Santschi, 1911

JEAN-MARC HENIN¹

MARIA R. PAIVA²

C. A. COLLINGWOOD³

Abstract : A new species of the genus *Leptothorax* Mayr 1855, was discovered during a partial survey of the ant fauna, conducted in pine stands across the coastal area of the Peninsula of Setúbal, Portugal. Another species of the same genus, *L. atlantis* Santschi 1911, was recorded for the first time in Europe. Both species were found in sites with sandy soils and in areas subjected to moderate anthropogenic pressures.

Key-words: Formicidae, *Leptothorax caparica*, *Leptothorax atlantis*, first records, pine stands, Setúbal Peninsula, Portugal.

Sumário: O Género *Leptothorax* Mayr, 1855 (Hymenoptera, Formicidae) na Península Ibérica: Primeiros Registos de uma Espécie Nova e da Presença de *L. atlantis* Santschi, 1911. No decorrer de uma prospecção de Formicidae, efectuada em pinhais da orla costeira da Península de Setúbal, foi descoberta uma espécie nova pertencente ao género *Leptothorax* Mayr, 1855. Foi também registada, pela primeira vez na Europa, a presença de outra espécie do mesmo género, *L. atlantis* Santschi, 1911. Ambas as espécies foram encontradas em solos arenosos e em locais sujeitos a pressões antropogénicas moderadas.

Palavras chave: Formicidae, *Leptothorax caparica*, *Leptothorax atlantis*, pinhal, Península de Setúbal, Portugal.



¹ Unité de Gestion et Économie forestières, Faculté universitaire des Sciences agronomiques de Gembloux BE- 5030 - Belgique. E-mail: henin.jm@fsagx.ac.be

² GUECKO/DCEA, FCT, Universidade Nova de Lisboa, PT-2825-516 Campus de Caparica, Portugal. E-mail: mrp@mail.fct.unl.pt

³ Liverpool City Museum. UK-L3 8EN - United Kingdom.

Introduction

Portugal is a geographical region with a high percentage of endemisms, comparatively to its size, considering higher plants and vertebrates (e.g. WIERINGA, 1995). A similar trend can be expected to occur regarding the invertebrate fauna, although the overwhelming majority of taxa have been insufficiently studied. Such is the case of the Formicidae, for which only a few references were published in the 20th century. In 1932, SANTSCI listed 32 species; in the following decades, localised sampling was done by SCHMITZ (1955), COLLINGWOOD and YARROW (1969) and COLLINGWOOD (1976). More extensive yet incomplete surveys were conducted in forest ecosystems, namely pines, oaks and eucalyptus stands, and in arable habitats by PAIVA *et al.* (1990), CAMMELL *et al.* (1996) and WAY *et al.* (1997). Identification keys for the Iberian ant fauna were produced by COLLINGWOOD (1976) and COLLINGWOOD and PRINCE (1998).

In the course of studies aiming at establishing trophic relationships between ants and phytophagous insects in pine ecosystems, a limited survey was conducted in stands bordering the western coast of the Peninsula of Setúbal, at the edge of Caparica coast. Results will be published elsewhere, while here we report exclusively on two important findings from a taxonomic perspective.

Materials and Methods

A survey of the ant fauna was conducted in a pine stand located in Herdade da Apostiça, latitude: 38° 32' N; longitude: 09° 09' W; altitude: 35 m a.s.l. The stand originated by natural regeneration after fire, the main tree species represented being *Pinus pinaster*, with some *P. pinea* intermingled. The shrub layer was dominated by *Thymus vulgaris* L., *Cistus salvifolius* L. and *Lavandula stoechas* L.. In the herbaceous layer the dominant species were *Therocistus guttatum* (L.) and *Carpobrotus edulis* (L.). The soil is sandy and relatively shallow, which partially accounts for the small size and poor condition of the trees.

Ant sampling was done by setting up sugar baits along transects, as described by CAMMELL *et al.* (1996) and PAIVA *et al.* (1998). The baits were controlled 30 minutes and one hour after being set in place, and the ants collected for later identification in the laboratory. Several surveys were conducted between March and September 2000.

Results

In the Spring of 2000, two original *Leptothorax* species were discovered. The first species was collected on April 6th and identified as *Leptothorax atlantis* Santschi, 1911, although the profile of the petioles' frontal part of some of the workers is slightly curved, which does not exactly correspond to the drawings of CAGNIANT and ESPADALER (1997). Later in the season, in June and September, several nests of this species were observed at the same site, on the fossil dunes of Arrábida, surrounding the lagoon of Albufeira, in a 50 years old stand of *P. pinaster*. So far, this small Myrmicinae had been recorded only in North-Africa. The specimens of *L. atlantis* collected are kept in the personal collection of C. COLLINGWOOD.

A second original species belonging to the *L. rottenbergii* (Emery, 1870) group, was caught on June 20th. According to the description of SANTSCI

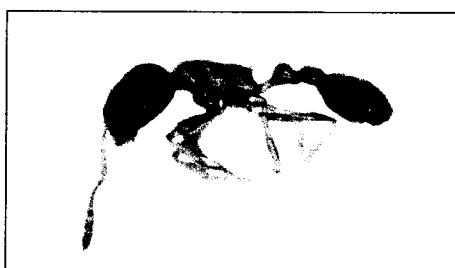
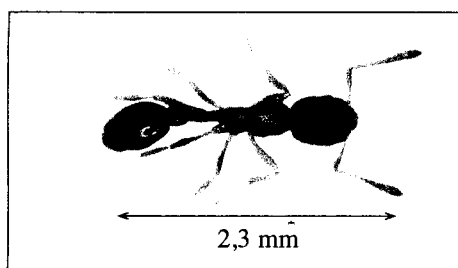
(1909), it is very similar to the Canarian *L. risii* Forel, 1892. However, several characteristics of pilosity, petiole and thorax profile, size and epinotal spines distinguish the four specimens that we collected and have thus named *Leptothorax caparica* sp. n.. Some workers were picked up from a nest, located about 4 kms away from the fossil dunes, in a path bordering a house, on bare ground. According to BOLTON (1987, in COLLINGWOOD and KUGLER, 1994), the following parameters and indices have been measured to characterise the species: total length (TL), head length (HL), head width (HW), cephalic index [$CI = (HW \times 100) / HL$], scape length (SL) and scape index [$SI = (SL \times 100) / HW$] - Table 1.

Ant	TL (mm)	HL (mm)	HW (mm)	CI	SL (mm)	SI
Holotype	2.277	0.582	0.440	75.5	0.442	100.6
Paratype 1	2.186	0.597	0.448	75.1	0.449	100.1
Paratype 2	2.317	0.615	0.445	72.4	0.414	93.0
Paratype 3	2.590	0.614	0.460	75.0	0.455	98.8
Mean	2.342	0.602	0.448	74.5	0.440	98.1

Table 1 - Measurements of the relevant characters and indices calculated for the workers of *Leptothorax caparica*.

The main characteristics of the workers are (see also Figures 1 and 2):

- Shiny dark brown gaster; head and 3-segmented antennal club dull brown; alitrunk, legs, scape and funiculus dull clear brown / yellowish; petiole and post-petiole slightly darker than alitrunk;
- whole body slightly to thickly pubescent (depending on specimen and body-part), but without erect hairs;
- short propodeal spines, directed to the gaster;
- slight but distinct metanotal impression;
- very rounded petiole with a tiny toothlike ventral extension, near and directed to the alitrunk;
- head and alitrunk finely and densely punctuated; gaster smooth.



Figures 1 and 2 - Photographs of the dorsal view (© B.Jourez) and profile view (© B.Jourez), respectively, of *Leptothorax caparica*.

The holotype and paratype 1 are kept in the collections of the Department of Zoology, Faculté universitaire des Sciences agronomiques de Gembloux (Belgium); the second paratype is kept in the City Museum of Liverpool (England); the third paratype is kept in the collection of GUECKO/DCEA, FCT, Universidade Nova de Lisboa (Portugal).

Discussion

We have considered *L. caparica* as belonging to the *L. rottenbergi* group, taking into account the following characteristics: - General morphological aspect similar to the other species of the group; 2 - Presence of a rounded pipe-shaped petiole, which is an important characteristic of this group (CAGNIANT and ESPADALER, 1997); 3 - Reduced pilosity; 4 - Ecological characteristic: ground-nesting, which in the *Leptothorax* genus is an archaic characteristic typical of the *rottenbergii* group (BERNARD, 1968).

Leptothorax is a monomorphic genus, showing reduced variation in size among the workers. The workers that we collected have an average length of 2.3 mm (varying between 2.2 mm and 2.6 mm), thus being clearly smaller than those of the other species of the *L. rottenbergi* group which, according to CAGNIANT and ESPADALER (1997) measure between 3.0 and 4.0 mm. Two species might be considered as closely related to the workers of *L. caparica*, *L. risii* Forel and *L. anacanthus* Santschi. However, both species can be clearly distinguished since *L. risii* workers measure between 3.0 and 3.7 mm, have an "important whitish pilosity" (SANTSHI, 1909) and lack the interruption of the thorax profile at meso-epinotum level, seen in the profile of *L. caparica*, which shows a broken line - Figure 2. Furthermore the epinotal spines point upwards, while those of *L. caparica* point backwards. So far *L. risii* was found on the Canary Islands only (CAGNIANT and ESPADALER, 1997). Regarding *L. anacanthus*, this species has larger workers, measuring up to 4.6 mm, a profile of the petiole different from that of *L. caparica* and spines even shorter than in *L. risii* (SANTSHI, 1909).

28 species of the genus *Leptothorax* are distributed in the Iberian Peninsula (COLLINGWOOD, 1976), from which 11 only have been recorded from Continental Portugal (COLLINGWOOD and PRINCE, 1998). Our survey detected the presence of *L. atlantis* for the first time in Europe, which belongs to the group *angustulus* containing mainly tree dwelling species. This species generally lives in oak stands, although it can also be found in sparse cedar stands (CAGNIANT and ESPADALER, 1997). However, *L. atlantis* is not dependent on aphids or other Homoptera, that are generally relatively specialised in the plant(s) they colonise. This independence from honeydew producers may potentially allow the ants to have less specific requirements regarding suitable habitat characteristics, which probably explains its presence in a pine stand.

The species new to science that we found was named *L. caparica* in accordance to the general area where it was collected, and furthermore as a token to the Faculty of Sciences and Technology, located on the Campus of Caparica. The two findings reported bring to 13 the number of *Leptothorax* species recorded in Continental Portugal. But most probably the ant fauna of this country includes many

other species which still remain to be found. We would like to conclude with ESPADALER and LÓPEZ-SORIA (1991) by suggesting “the rarity in Mediterranean ant species may be explained by the insufficient sampling of adequate microhabitats, or by the inconspicuousness of social parasitic species. So, previous published species lists of ants from Mediterranean habitats might be rather incomplete”.

ACKNOWLEDGEMENTS

We thank Mrs. Evelyne MOURA and M.Sc. Ana Paula MARTINHO for support with the field work. We are most grateful to Instituto para a Cooperação Científica e Tecnológica, Lisbon, Portugal, for a scholarship awarded to the first author. This research project was sponsored by PRAXIS XXI, contract nr. 2/2.1/BIA/221/94, and by Centro de Ciência DCEA/ FCT/ UNL, Portugal.

REFERENCES

- BERNARD, F. (1968) *Les Fourmis (Hymenoptera: Formicidae) d'Europe occidentale et septentrionale*. Masson, Paris. 411 pp.
- CAGNIANT, H. & ESPADALER, X. (1997) Les *Leptothorax*, *Epimyrma* et *Chalepoxenus* du Maroc (Hymenoptera: Formicidae). Clé et catalogue des espèces. *Annales de la Société Entomologique de France*, **33**: 259-284.
- CAMMEL, M. E., WAY, M. J. & PAIVA, M. R. (1996) Diversity and structure of ant communities associated with oak, pine, eucalyptus and arable habitats in Portugal. *Insectes Sociaux*, **43**: 37-46.
- COLLINGWOOD, C. A. (1976) A provisional list of Iberian *Formicidae* with a key to the worker caste. *Eos*, **52**: 65-95.
- COLLINGWOOD, C. A. & KUGLER, J. (1994) *Solenopsis dentata* (Hymenoptera Formicidae): a new species from Israel. *Israel Journal of Entomology*, **28**: 119-122.
- COLLINGWOOD, C. A. & PRINCE, A. (1998) A Guide to the Ants of Continental Portugal. Supl. 5, *Boletim da Sociedade Portuguesa de Entomologia*: 49 pp.
- COLLINGWOOD, C. A. & YARROW, I. H. H. (1969) A survey of Iberian *Formicidae* (Hymenoptera). *Eos*, **44**: 53-101.
- ESPADALER, X. & LÓPEZ-SORIA, L. (1991) Rareness of certain Mediterranean ant species: fact or artifact? *Insectes Sociaux*, **38**: 365-377.
- PAIVA, M. R., WAY, M. J. & CAMMEL, M. E. (1990) Estudo preliminar sobre a distribuição das formigas nos sistemas florestais em Portugal. *Boletim da Sociedade Portuguesa de Entomologia*, **4**: 197-208.
- PAIVA, M. R., WAY, M. J. & CAMMEL, M. E. (1998) A formiga argentina *Linepithema (Iridomirmex) humile* (Mayr.) - factores ecológicos restritivos da sua expansão em Portugal continental. *Boletim da Sociedade Portuguesa de Entomologia*, **7**: 17-25.
- SANTSCHI, F. (1909) *Leptothorax rottenbergi* et espèces voisines. *Revue Suisse de Zoologie*, **17**: 459-482.
- SANTSCHI, F. (1932) Fourmis du Portugal. *Memórias e Estudos do Museu Zoológico da Universidade de Coimbra*, sér. 1, **59**: 1-3.
- SCHMITZ, H. (1955) Ein Verzeichnis portugiesischer Ameisen (Formicidae, Hymenoptera). *Broteria*, **24**: 27-37.

- WAY, M. J., CAMMELL, M. E., PAIVA, M. R. & COLLINGWOOD, C. A. (1997) Distribution and dynamics of the argentine ant *Linepithema (Iridomyrmex) humile* (Mayr) in relation to vegetation, soil conditions, topography and native competitor ants in Portugal. *Insectes Sociaux*, **44**: 415 -433.
- WIERINGA, K. (ed.) (1995) *Report for the Review of the Fifth Environmental Action Programme*. European Environmental Agency, Copenhagen. 152 pp.