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RESEARCH

# Five New Records of Ants (Hymenoptera: Formicidae) From Morocco

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**ABSTRACT.** A recent catalogue of the rich ant fauna of Morocco included 214 species, with later studies adding an additional 12 species. Following recent fieldwork in the north of Morocco, we report five new records for the country (*Plagiolepis pygmaea* Latreille, 1798*, Ponera testacea* Emery, 1895*, Strumigenys tenuipilis* Emery, 1915*, Temnothorax pardoi* Tinaut, 1987, and *Tetramorium parvioculum* Guillem & Bensusan, 2009) and we present new data on the distribution and natural history of six additional species. This work brings the total number of ants known from Morocco to 233, taking into account two species which were omitted in the list of Cagniant.

**Key Words**: Formicidae, Morocco, checklist, distribution, faunistic

Morocco has a wide diversity of habitats that are influenced by an equally wide variety of climatic conditions (Benabid 2000). The geomorphology of the country with the high mountains of the Atlas range, the sandy and stony deserts, and the Mediterranean vegetation systems of maquis, phrygana, and steppe all contribute to this diversity. The Atlantic coast of Morocco is subject to relatively cool sea breezes, contrasting sharply with the arid landscapes in the interior, which are hotter and more hostile when compared to the Mediterranean coast of the country. There is also a diversity of forest vegetation affected by marked differences in rainfall and day–night temperature fluctuations (Benabid 2000). All these factors have contributed to a high diversity of insect fauna with high endemisms. The myrmecofauna is no exception and it is no surprise that species new for the country are recorded on a regular basis (Cagniant 2006). The first author has embarked on a systematic approach to investigate the ant fauna of Morocco by sampling the different habitats in the country, taking into account season, altitude, aridity, geology and vegetation types and animal farming practices. It is anticipated that this approach to the study of Morocco's myrmecofauna over the long term will give a better picture of the composition and distribution of the fauna.

In the most recent published list of the ants found in Morocco, Cagniant (2006) gave 214 species in 38 genera. Subsequently, 12 additional species have been added to the list as follows: Delabie (2007) added *Pheidole teneriffana*; Cagniant (2009) added *Cataglyphis marroui*, *Cataglyphis espadaleri*, *Cataglyphis fossilis*, *Monomorium destructor*, *Monomorium lameerei, Messor medioruber striaticeps*, and *Tetramorium bicarinatum*; Taheri et al. (2010) added *Temnothorax kraussei*; Taheri and Reyes-López (2011) added *Strumigenys membranifera* and Cagniant (2013) added *Plagiolepis crosi*, and *Aphaenogaster koniari*. It should be noted that two species found in Morocco; *Lasius flavus*, appearing in the list of Cagniant and Espadaler (1993) and *Aphaenogaster sicardi*, listed in two publications of Cagniant (1996, 2013) were omitted in the revised list of Cagniant (2006).

This article deals with five species that are new records for the country and six species for which there is interesting additional information about their natural history and distribution.

## Methods

We sampled ants in three regions of Morocco: First in the North-West, in the region of Tangiers-Tetouan where we focused on several areas: (1) Mediona and Cap Spartel within the province of Tangiers, (2) Al Hamra and Balota within the province of Tetouan, and (3) Dardara, Fifi, Talassemtane National Park, and Bouhachem Natural Park within the province of Chefchaouen. Second, we surveyed the eastern region where we focused on two areas: (1) Site of Béni Snassen within the province of Berkan and (2) Temsamane within the province of Driouch. The third region of interest was Marrakech-Tensift-El Haouz situated in the South-West of Morocco, where the Okaimden Mountain in the province of Al-Haouz, was surveyed (Fig. 1).

For collections of ants from nests, specimens were collected under direct vision using an aspirator and forceps. A Berlese funnel technique was also utilized for extracting ants from soil and leaf litter and at a few sites we used pitfall traps. Specimens were studied under a Leica S4D stereomicroscope and identified using available keys (Cagniant 1996, 2009)

Taxonomic nomenclature follows Bolton (2014).

## Results

Below, our collections are organized as follows: A2808: (3w, 1q); where A2808 refers to the collection code of Reyes-López, and where (3w, 1q) refers to 3 workers and 1 queen. This information is followed by the date, locality, GPS coordinates, and altitude in meters above sea level.

## New records

***Plagiolepis pygmaea***, Formicinae

Material and Data: **A2816**: Nest; 11 June 2011; Talassemtane National Park, Tazaout; 35° 7.95′ N, 05° 06.76′ W; 1,680 m; **A1627**: (14w); 15 July 2010; Talassemtane National Park, Jbel Bouslimame, Spanish Fir, *Abies pinsapo,* forest; pitfall trap; 35° 07.05′ N, 05° 08.16′ W; 1,500 m.

This species was found in Rabat and Casablanca by Cagniant (1962). Although it was described as a rare exotic of European origin, introduced to Morocco through human activities, Cagniant has never mentioned this species again. The workers that we examined, correspond to the latest description of this species (Sharaf et al. 2011), in having funicular segments 2 and 3 of equal length, and distinctly broader than long, and 9 ommatidia in the longest row of the eyes. As Jbel Bouslimame is in a protected area, very remote from human settlements, we suspect *P. pygmaea* is indigenous to Morocco.

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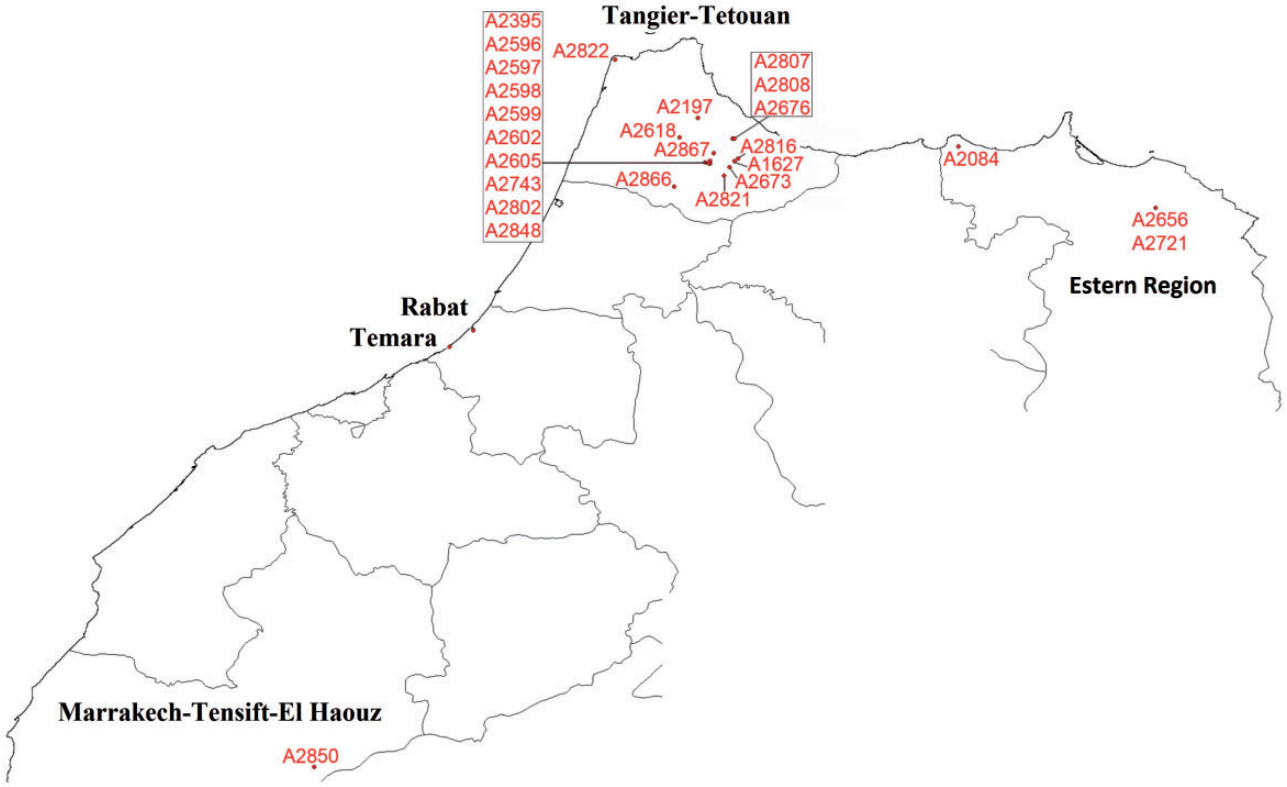



**Fig. 1.** The provinces and localities where sampling was undertaken for this study.

***Ponera testacea***, Ponerinae

Material and data: **A2808**: (3w, 1q); 16 May 2011; Talassemtane National Park, Akchour; 35° 15.88′ N, 05° 08.83′ W; 566 m; **A2807**: (18w); 05 June 2011; Talassemtane National Park, Tazaout; 35° 15.90′ N, 05° 08.19′ W; 1,475 m; **A2743**: (1w); 11 September 2011; Bouhachem Natural Park; 34° 59.51′ N, 04° 49.21′ W; 1,390 m; **A2676**: (4w, 3q); 5 June 2011; Talassemtane National Park, Tazaout; 35° 15.90′ N, 05° 08.19′ W; 1,475 m; **A2673**: (2w); 29 May 2011; Talassemtane National Park; 35° 04.78′ N, 05° 10.10′ W; 890 m. **A2618**: (10w); 12 July 2011; Bouhachem Natural Park; 35° 16.33′ N, 05° 29.47′ W; 1,152 m.

It seems this species is widespread in the North of Morocco. We found a multitude of them, including whole nests, in leaf litter and soil samples, and under rocks and moss. The main place where we found this species is the Talassemtane National Park (Chefchaouen). Dr. X. Espadaler (unpublished data) previously collected it in Morocco at: (1) Bab-bou-Idir, 25 May 1986, 1,500 m, *Q. canariensis*, *Q. ilex*; Espadaler leg.; and, (2) Tazzeka, Taza, 29 March 1997, 1,400 m, C. Hernando leg.

***Strumigenys tenuipilis***, Myrmicinae

Material and data: **A2596**: (1w); 13 July 2011; Chefchaouen, *Quercus suber* forest; 35° 06.10′ N, 05° 18.20′ W; 488 m; **A2598**: (4w); 14 June 2011; Dardara, *Quercus suber* forest; 35° 07.24′ N, 05° 17.60′ W; 374 m. Extracted from leaf litter and soil samples using the Berlese funnel method. At Dardara, several workers of *S. baudueri* were collected simultaneously with *S. tenuipilis*.

This species was originally described as *Strumigenys baudueri* Emery var. *tenuipilis* Emery, 1915, from workers collected in Italy and southern France. It was given species status by Brown (1953, p. 132) as *S. tenuipilis*. After further changes in generic placement, however, Baroni Urbani and de Andrade (2007) have argued that it, along with many dacetines, should revert to the original *Strumigenys*. There are no reports from the African continent. In Morocco, *S. baudueri*, *P. argiola* (Cagniant 2006) and recently *P. membranifera* (Taheri andReyes-López 2011), all of which are now placed in *Strumigenys*, have been recorded from Morocco.

***Temnothorax pardoi***, Myrmicinae

Material and data: **A2822**: (14w); 04 September 2011; Tangers, Mediona, Cap Spartel; 35° 46.57′ N, 05° 54.42′ W; 214 m; **A2821**: (1w); 13 September 2011; Chefchaouen, Fifi; 35° 01.39′ N, 05° 12.25′ W; 1,190 m. Extracted from samples of soil and leaf litter using the Berlese funnel method.

This species was described from workers captured in the south of the Iberian Peninsula (Tinaut 1987). The holotype comes from Granada (Sierra de Alfaguara, Spain). There are other records of this species being found in different areas of the Iberian Peninsula, including Portugal (Tinaut 1987). *Temnothorax pardoi* is morphologically similar to *Temnothorax racovitzai* and *Temnothorax spinosus*. The Mediona habitat is a replanted pine forest. The present finding is important because up to now this species has been considered as endemic to the Iberian Peninsula. We intend to survey the coastal areas of the Tingitane Peninsula (North of the Rif) in order to precisely delimit the area of its distribution.

***Tetramorium parvioculum***, Myrmicinae

Material and data: **A2599:** (19w); 14 June 2011; Chefchoauen, Dardara, cork oak forest; 35° 07.24′ N, 05° 17.60′ W; 374 m; **A2597:** (6w); 13 July 2011; Bouhachem, *Quercus suber* woodland; 35° 06.10′ N, 05° 18.20′ W; 488 m; **A2605**: (2w); 11 July 2011; Chefchaouen, Dardara, Akerat, cork oak forest; 35° 06.10′ N, 05° 18.20′ W; 488 m.

*T. parvioculum* was described only recently from Gibraltar, on the southern tip of the Iberian Peninsula (Guillem and Bensusan 2009). It has since been found on both sides of Gibraltar, namely in Spain and in Morocco (Guillem et al. 2011). This species is not easy to find because of its hypogaeic habitat. It is found under stones and by sifting soil and leaf litter.

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## New Data on Distribution and Natural History

***Aenictus vaucheri***, Dorylinae

Material and data: **A2602**: (10 w) Nest; 13 July 2011; Chefchaouen, Akerrat forest, cork oak forest; 35° 06.10′ N, 05° 18.20′ W; 488 m; **A2197**: Nest; Tetouan, Al Hamra; 35° 23.83′ N, 05° 22.27′ W; 139 m; **A2866**: Nest; 30 April 2011; near Balota; mosaic of scrub and open woodland with *Pistacia lentiscus*, *Quercus suber*, *Calicotome villosa*, *Cistus* spp.; 34° 57.13′ N, 05° 31.66′ W, 140 m.

This species is common in three separate locations in Morocco. Two are from the Atlantic coast area of the Tingitane Peninsula and the other from the Atlas of Beni Mellal (Cagniant 2006). Despite its hypogaeic habitat, Cagniant considered this species to be very common in Koumch (the region of Beni Mellal).

***Aphaenogaster pallida* group**, Myrmicinae

In Morocco, the *pallida* group (see Schulz 1994) is represented by two species given below: *foreli* and *leveillei*. According to Cagniant (1996), they seem to be distributed throughout the whole south of the Mediterranean Basin. However, due to their subterranean existence, records are scarce and those which have been cited (from elsewhere in Morocco) are not georeferenced. For this reason, any new data will be valuable.

***Aphaenogaster foreli***

Material and data: **A2721**: (6w); 03 April 2011; Berkan, SIBE of Béni Snassen; 34° 48.91′ N, 02° 24.30′ W; 729 m.

***Aphaenogaster leveillei***

Material and data: **A2084**: (11w); 12 February 2011; Driouch, Temsanane, Abelkhache, open area surrounded by fields of crops; 35° 12.86′ N, 003° 41.23′ W; 385 m; **A2656**: (1w); 2 April 2011; pitfall traps; 34° 48.90′ N, 02° 24.30′ W; 732 m.

***Aphaenogaster sardoa***

Material and data: **A2802**: Nest; 22 September 2011; Chefchaouen, Dardara, cork oak forest; 35° 06.24′ N, 05° 17.65′ W; 433 m; **A2848**: Nests; 26 February 2012; Chefchaouen, Akarat, forest of Hayouna; 35° 06.64′ N, 07° 19.43′ W; 722 m. **A2850**: Nest; 20 February 2012; Marrakech, Jbel Okaimdem; 31° 11.75′ N, 07° 51.35′ W; 2,170 m.

This species has been found in the Tingitane Peninsula and in the Middle Atlas (Cagniant 1964, De Haro and Collingwood 1994), as well as in Tunisia and Algeria. Our record from Marrakech indictes that this species exists at much higher altitude (2,170 m) than previously recorded (200–800 m).

***Linepithema humile***, Dolichoderinae

Material and data: **A2867**: 4 January 2012; Chefchaouen city; 35° 10.07′ N, 05° 16.13′ W; 591 m; 15 September 2012; Rabat city, Hassan; 34° 01.045′ N, 6° 49.522′ W; 15 September 2012; Temara, Harhoura (Road to Skhirat); 33° 54.520′ N, 6° 58.672′ W.

*L. humile* is an invasive species that has been recorded many times in Morocco, principally in some coastal areas of the Tingitane Peninsula (Tangiers and Cape Spartel, Cagniant 1964; Martil and Cabo Negro, De Haro and Collingwood 1994). We can now confirm the widespread presence of this species in Rabat and Temara (especially in public gardens). So far, this species does not seem to have encroached into wild habitats. Unfortunately, the spread of *L. humile* is often uncontrollable both globally and locally. We have found it in various places in the town of Chefchaouen, especially in gardens and in the walls of buildings.

***Proceratium algiricum***, Proceratiinae

Material and data: **A2395**: (2w); 14 June 2011; Chefchaouen, Dardara, *Quercus suber* forest; 35° 07.24′ N, 05° 17.60′ W; 374 m.

This species has been recorded in Morocco from the central zone, the Middle Atlas, and Chefchaouen (Cagniant, 2006). Our findings confirm that it also inhabits the Rif area.

## Discussion

The ant fauna of Morocco is particularly diverse with 233 species, when compared to only 180 species in both Algeria and Tunisia (Cagniant 2006), but it remains less than the recorded 295 species in the Iberian Peninsula (Roig and Espadaler 2010). The rate at which ant species are added to the list of the Moroccan fauna would suggest that there remain more to be discovered. Our investigations also suggest that several species previously thought to be restricted in distribution or in choice of habitat are in fact more widespread and less selective (such as *T. pardoi* or *T. parvioculum*). It is difficult to speculate how climate change and an array of anthropogenic factors including farming practice will influence the ant fauna. For this reason, frequent and regular field work is required, with accurate data particularly of the macro and micro habitats where ant species are thriving, if we are to understand ant ecology in Morocco.

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