

VIERAEA	Vol. 31	1-7	Santa Cruz de Tenerife, diciembre 2003	ISSN 0210-945X
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Exotic ants in the Canary Islands (Hymenoptera, Formicidae)

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ESPADALER X. & V. Bernal (2003). Hormigas exóticas en las islas Canarias (Hymenoptera, Formicidae). *VIERAEA* 31: 1-7.

ABSTRACT. Exotic ants for the Canary Islands are examined. Based on recent own collections and revision of preserved material and published lists, twelve exotic ant species may be found in the Canaries. Two species, *Linepithema humile* (argentine ant) and *Paratrechina longicornis* (crazy ant) exist in all of the islands. The detection of the invasive garden ant *Lasius neglectus* and its limited extent call for an eradication programme. This species, *Paratrechina jaegerskioeldi* and *Tetramorium caldarium* are new additions to the Canarian fauna.

Key words: aliens, ants, Canary Islands, exotics, Formicidae, introduced, invasive, transferred

RESUMEN. Se examinan las especies de hormigas exóticas de las islas Canarias. Basándonos en recolecciones propias, revisión de material de colecciones y datos ya publicados, elevamos a doce las especies exóticas que se encuentran en las islas. Dos de ellas, *Linepithema humile* (hormiga argentina) y *Paratrechina longicornis* (hormiga loca) están presentes en todas las islas. La presencia limitada a una sola localidad de *Lasius neglectus*, permite pensar que la erradicación es factible; esta especie, junto con *Paratrechina jaegerskioeldi* y *Tetramorium caldarium*, son nuevas para la fauna canaria. Palabras clave: Islas Canarias, exóticas, Formicidae, hormigas, introducidas, invasoras

INTRODUCTION

Biological invasions have become so widespread as to constitute a significant component of the global environmental change (Vitousek *et al.*, 1996) and are viewed as one of the most important determinants of change in biodiversity at a global scale (Ruesink

et al., 1995). The redistribution of earth's species and the progressive homogenisation of biota in heavily human-influenced zones, are usually ecologically and economically damaging. The growing urbanisation process, international transport fluxes, explosive growth of agriculture in developing countries and the abandonment of rural areas in industrialised countries, are among the principal factors that lead to the introduction of non-native species in habitats that were initially far apart. The Canary Islands have also suffered from this worrisome trend (Rodríguez & Urioste, 2000).

We report here on the present knowledge about non-native ants (= alien, exotic, introduced, transferred species) in the Canary Islands. It is arguable if those species are to be considered as biological pollution: some species, in determinate contexts, do not represent a threat for local native elements and enhance local species richness. Furthermore, not all exotic ant species become invaders or pests. Notwithstanding, in our opinion, documenting the presence of such exotic species –invasive or not– may be interesting under a monitoring scheme or as a touchstone for the globalisation process and its accompanying disturbing homogenisation.

The last general works on ants from the Canary Islands (Wolf, 1980; Barquín, 1981) are now outdated. The work of Barquín (1981) contains a useful catalogue of ants, and mentions ten species as cosmopolitan in distribution. One of them (*Tapinoma erraticum*) is erroneously considered as cosmopolitan and two other names (*Cardiocondyla nuda* and *Tetramorium guineense*) deserve a reanalysis of the material in which they are based. In the recent and splendid catalogue of canarian biota (Izquierdo *et al.* 2001) the information concerning ants is mainly based in Hohmann *et al.* (1993), whose data are roughly the same as in Barquín (1981). Although this is not to be discussed here, many new distribution data, taxonomical reinterpretations and even new species have been accumulated during the last 20 years (X.E.; unpub. obser.) and is now under preparation to be published. This paper is partly based on that new information that is given when needed. In Table I are indicated those exotic ant species that have been mentioned in the Canary Islands. Each species is considered below in particular, with specific comments concerning biology, distribution or taxonomy.

RESULTS

1) *Cardiocondyla emeryi* Forel. This tiny cosmopolitan ant is present in La Gomera: Playa de Gran Rey, 5 May 1981 and Lanzarote: Costa Teguisse, October 1988 (A. Norris) (Seifert, 2003) and at La Palma: El Paso, 18 November 1997; X. Espadaler leg.

2) *Cardiocondyla nuda* (Mayr). Former identifications under this name (Barquín, 1981) belong in *Cardiocondyla mauritanica* Forel (revised material), that has also been found by us in other islands; this species is native to the southern Mediterranean and should not be viewed as an introduced species in the Canaries. The presence of *C. nuda* in the Canaries is still to be confirmed.

3) *Cardiocondyla obscurior* Wheeler. Tenerife: Puerto de la Cruz (Seifert 2003).

4) *Hypoponera punctatissima* (Roger). This widely distributed tramp species was mentioned from Tenerife by Emery (1893). From then it was never recorded, until very recently, when a single worker was collected in Sima Robada, 15 November 1999 (GIET

leg.) and a winged female was found in a pitfall trap at the laurisilva from the track Santa Úrsula, Reserva Las Palomas, 2 November 2001 (J. Delgado leg.).

5) *Lasius neglectus* Van Loon, Boomsma & Andrásfalvy. Tropical butterfly greenhouse (Mariposario) at Icod de los Vinos (7 August 2002; V. Bernal leg.). The ants were seen in long trails feeding at the artificial nectaries set up for the butterflies. This is the southernmost population detected for this species. It has expanded rapidly (Seifert, 2001) and some of its populations, under optimal climatic conditions, have attained pest status (Espadaler & Rey, 2001). The ants did not show the profile of enormous numbers invading everywhere that is usually found in European populations (Van Loon, Boomsma & Andrásfalvy, 1990; Seifert, 2000; Espadaler & Rey, 2001) but seemed somewhat limited in its thriving, perhaps due to the high temperature and humidity (tropical conditions) inside the greenhouse. According to the Butterfly Zoo managers, the ants enter the greenhouse from the exterior. One abandoned lot with dirt and a huge vegetation is next to the greenhouse. Trees in a park close to the greenhouse were occupied by *Lasius grandis*. The population detected in Tenerife seems to be small enough in spatial limits and actions should be undertaken as to its complete eradication, which seems feasible. Chemical spray control inside the greenhouse is likely inappropriate because of the larvae and adult butterflies; after the localisation of multiple nesting sites, a bating programme with delayed action toxicants would be the best strategy to follow. A proper maintenance of surroundings is also to recommend.

6) *Linepithema humile* (Mayr). The argentine ant is a nuisance everywhere (Williams, 1994) outside its origin, in Argentina (Tsutsui *et al.* 2001). In the Canaries it also has undoubtedly a pest status (Wheeler, 1927; Barquín, 1981). Samples from Fuerteventura are new additions to their fauna. Fuerteventura: at Cofete (24 May 1992) the argentine ant occupied a wide zone from Casa del Alemán up to 550 m; Betancuria, 22 May 1992; Castillo de Fustes, 25 May 1992 (X. Espadaler leg.). Lanzarote: La Atalaya, Haría, 30 March 1988 (R. Rodríguez leg.). Ye, 24 March 1988 (R. Rodríguez leg.). Mirador Pineda, 6 April 1993 (X. Espadaler leg.). Monte Corona, vineyards with *Opuntia ficus indica*, 8 April 1993 (X. Espadaler leg.). La Oliva, 18 June 2002 (P. Oromí leg.). The species is now present in all of the islands.

7) *Monomorium destructor* (Jerdon). Menozzi (1929) was the last author to mention this ant in the Canaries. Although a proper identification is not to doubt, the absence on any additional localities for this species in the work of Barquín (1981), the extense revision of Bolton (1987) and in any of the surveys done by one of us (X.E.) in all islands but Gomera, may indicate that this species is on the decline. A similar situation of decrease for this species has been described in the Florida Keys (Wetterer & O'Hara, 2002).

8) *Monomorium pharaonis* (L.). This domestic pest is known only from urban areas in Tenerife (Barquín, 1981). We have collected it at Puerto de La Cruz, 3 August, 2002 (V. Bernal leg.).

9) *Paratrechina jaegerskioeldi* (Mayr). This new record for the Canaries was found rather abundant at Puerto de la Cruz, in the flowerpots next to Lago Martiánez (3 August 2002; V. Bernal leg.) and at Candelaria (4 August 2002; V. Bernal leg.) on the trees at Paseo Marítimo. A few individuals were also found inside the Butterfly greenhouse (Mariposario) at Icod de los Vinos (5 August 2002; V. Bernal leg.). Winged males and females were present at the very abundant nests at the border of the green at Golf Sur zone (15 December

2002; X. Espadaler leg.). This Middle East native seems to be expanding westwards (Collingwood & Agosti, 1996).

10) *Paratrechina longicornis* (Latreille). This widely distributed pest ant is now present in the seven islands. Samples from El Hierro, La Palma and Fuerteventura are new to the islands. Hierro: Pie del Risco, Frontera, 150 m, *Opuntia ficus-indica*, *Nicotiana glauca*, 31 March 1989 (X. Espadaler leg.). La Palma: El Remo, 50 m, *Euphorbia regis-jubae*, *Senecio kleinia*, *Retama monocalpa*, 18 November 1997 (X. Espadaler leg.). Fuerteventura: Puerto del Rosario, 22 May 1992 (X. Espadaler leg.). Castillo de Fustes, 25 May 1992 (X. Espadaler leg.).

11) *Pheidole megagephala* (Fabricius). A sample from Lanzarote: Lago de lava, Timanfaya (Ashmole *et al.*, 1988; Martín & Oromí, 1990) had been misidentified as *Leptothorax canescens*, and belongs in *P. megagephala* (studied material). A sample from La Caleta, 8 November 1989 (R. Rodríguez leg.) contained winged queens. It is a new record for the island, as well as the following one from Fuerteventura: Cotillo, 21 May 1992 (X. Espadaler leg.). Additional records for Tenerife: Golf Sur, gardens, 11 December 2002 (X. Espadaler leg.); El Médano, at the port, 14 December 2002 (X. Espadaler leg.).

12) *Pheidole teneriffana* Forel. Although originally described from Tenerife, the species is certainly not very abundant in the Canaries (Barquín, 1981). Two nests were found at the base of planted trees in a public square close to the port at El Médano, Tenerife, 13 December, 2002 (X. Espadaler leg.).

13) *Tetramorium guineense* (Fabr.). This name is with certainty not to apply to any ant species from the Canary Islands. Bolton (1977) showed that the types belonged in the genus *Pheidole*. The present interpretation of former citations under that name (Wolf, 1980; Barquín, 1981; Izquierdo *et al.*, 2001) is unclear and could belong either to *T. bicarinatum* (Nylander), *T. simillimum* (F. Smith) or *T. caldarium* (Roger).

14) *Tetramorium caldarium* (Roger). La Palma: Cubo La Galga, 550 m, 19 November 1997 (Espadaler leg.); El Remo, 50 m, 18 November 1997 (Espadaler leg.); Tenerife (no other data), February 1993 (Cagniant leg.); Golf Sur, green border, 15 December 2002 (X. Espadaler leg.). To the best of our knowledge this is the first time this species is mentioned for the Canaries.

15) *Tetramorium simillimum* (F. Smith). Wolf (1980) mentions this species from the dunes near the lighthouse at Maspalomas (Gran Canaria). Its specific identity is to be confirmed as it could belong to the much more abundant *T. caldarium* (Bolton, 1979).

FINAL COMMENTS

Islands are especially prone to collect non-native ants (MacArthur & Wilson, 1967; Fowler *et al.* 1994). Those from the Canary Islands represent roughly a 20% of the myrmecofauna, a rather big percentage as compared with a 5% exotic ant species in the Iberian Peninsula (Espadaler & Collingwood, 2001), although not so much as the close to 50% from Madeira (unpub. obs.). A careful sampling of urban parks in the Canaries would be worth doing as this particular habitat was the most ant species rich in Madeira and the Azores (unpub. obs.; Wetterer, per. comm.). If we dismiss the doubtful species (*Cardiocondyla nuda*, *Tetramorium* “*guineense*” and *Tetramorium simillimum*; instead, we believe that *Monomorium destructor* is likely to be found established) the number of

exotic ants in the Canaries is eleven and for each island is: 3 El Hierro, 3 La Gomera, 5 La Palma, 12 Tenerife, 6 Gran Canaria, 5 Fuerteventura and 5 Lanzarote. This distribution is not different ($c^2 = 2.2$; $P = 0.89$) from the proportion of insects known in the islands (Izquierdo *et al.* 2001, p. 23). Functional groups composition of exotic ants from the Canary Islands (present work) and from the Iberian Peninsula (Espadaler & Collingwood, 2001) is not different ($c^2 = 0.28$; $P = 0.99$). As functional groups are based on habitat requirements and competitive interactions, this is probably more a reflection of highly alike ecological conditions that favour exotic ants —human modified habitats— than of biogeographical similitude (Andersen, 1997). The dry natural lowlands of the Canary Islands seem to be free from those introduced ants, that are strongly related with human disturbed habitats (urban parks and gardens, suburban habitats, roads, beaches and agricultural landscapes). As an example, a short tourist visit at two urban areas in Tenerife, without systematic intensive collecting, produced eleven ant species, of which seven were exotics. In 1982, at the Parque Nacional del Teide, *Linepithema humile* was limited to the visitor's house. Only two species (*Paratrechina longicornis*, *Linepithema humile*) seem, at present, to be of concern, though its effect on local fauna remains rather restricted to habitats already very degraded. The presence of both species in the seven major islands is indicative of the expansion potential they have. Efforts should be done to monitor its increase and towards its control if ever they reached preserved areas, with high levels of endemism.

	1	2	3	4	Islands where present
<i>Cardiocondyla emeryi</i> Forel	C	H	No	No	G*, P*, T, C, F, L*
<i>Cardiocondyla nuda</i> (Mayr) TO CONFIRM	C	N,H	No	No	T, C
<i>Cardiocondyla obscurior</i> Wheeler	C	H	No	No	T
<i>Hypoponera punctatissima</i> (Roger)	C	N,H	No	No	T
<i>Lasius neglectus</i> Van Loon, Boomsma & Andrásfalvy (**)	CCS	H	No	Yes	T*
<i>Linepithema humile</i> (Mayr)	DD	H	No	Yes	H, G, P, T, C, F*, L
<i>Monomorium destructor</i> (Jerdon) TO CONFIRM	GM	H	Yes	No	T
<i>Monomorium pharaonis</i> (L.)	GM	H	No	No	T
<i>Paratrechina jaegerskioeldi</i> (Mayr) (**)	O	H	No	No	T*
<i>Paratrechina longicornis</i> (Latreille)	O	H	No	Yes	H*, G, P*, T, C, F*, L
<i>Pheidole megacephala</i> (Fabricius)	GM	H	Yes	?	H, P, T, C, F*, L*
<i>Pheidole teneriffana</i> Forel	GM	H	Yes	?	T, C, F, L
<i>Tetramorium</i> sp. (as <i>T. guineense</i> (Fabr.))	O	H	No	No	G, P, T, C, F
<i>Tetramorium caldarium</i> (Roger) (**)	O	H, N	No	No	P*, T*
<i>Tetramorium simillimum</i> (F. Smith) TO CONFIRM	O	H	No	No	C

Table I. Non-native ants in the Canary Islands. 1. Functional groups. Functional groups are according to Andersen (1997) and Bestelmeyer & Wiens (1996). C (Cryptic); CCS (Cold climate specialist); DD (Dominant Dolichoderine); GM (Generalized Myrmicine); O (Opportunist). 2. Habitat. It indicates whether the species is found in natural (N) or human influenced (H) habitats. 3. Polymorphic species (Yes, No). 4: Potential threat, that is referred to native biota. Islands: El Hierro (H), La Gomera (G), La Palma (P), Tenerife (T), Gran Canaria (C), Fuerteventura (F), Lanzarote (L). Asterisks indicate a new record for the island (*) or for the Canaries (**). Information is based on Wolf (1980), Barquín (1981), Izquierdo *et al.* (2001) and own records.

ACKNOWLEDGMENTS

Henri Cagniant, Juan D. Delgado, Pedro Oromí and Rafael Rodríguez have provided us with many ant samples. Bernhard Seifert commented on *Cardiocondyla* identification. This research was supported in part by a DGESIC grant REN 2000-0300-CO2-01 and by The National Geographic Society (7241-02).

REFERENCES

- ANDERSEN, A.N. (1997). Functional groups and patterns of organization on North American ant communities: a comparison with Australia. *J. Biogeogr.* 24: 433-460.
- ASHMOLE, M.P., N.J. ASHMOLE & P. OROMÍ (1988). Arthropods of recent lava flows on Lanzarote. *Vieraea* 18: 171-187.
- BARQUÍN, J. (1981). *Las hormigas de Canarias (Taxonomía, ecología y distribución de los Formicidae)*. Secret. Publ. Univ. La Laguna. Col. Monograf. 3: 1-584.
- BESTELMEYER, H.T. & J.A. WIENS (1996). The effects of land use on the structure of ground-foraging ant communities in the Argentine Chaco. *Ecol. Appl.* 6: 1225-1240.
- BOLTON, B. (1977). The ant tribe Tetramoriini (Hymenoptera: Formicidae). The genus *Tetramorium* Mayr in the Oriental and Indo-Australian regions, and in Australia. *Bull. Br. Mus. Nat. Hist. (Ent.)* 36: 67-151.
- BOLTON, B. (1979). The ant tribe Tetramoriini (Hymenoptera: Formicidae). The genus *Tetramorium* Mayr in the Malagasy region and in the New World. *Bull. Br. Mus. Nat. Hist. (Ent.)* 38: 129-181.
- BOLTON, B. (1987). A review of the genus-group and revision of the Afrotropical *Monomorium* Mayr (Hymenoptera, Formicidae). *Bull. Br. Mus. nat. Hist. (Ent.)* 54: 263-452.
- COLLINGWOOD, C.A. & D. AGOSTI (1996). Formicidae (Insecta, Hymenoptera) from Saudi Arabia. Part 2. *Fauna Saudi Arabia* 15: 300-385.
- EMERY, C. (1893). Voyage de M. Ch. Alluaud aux îles Canaries. Formicides. *Ann. Soc. Entomol. Fr.* 62: 81-88.
- ESPADALER, X. & C.A. COLLINGWOOD (2001). Transferred ants (Hymenoptera, Formicidae) in the Iberian Peninsula. *Nouv. Rev. Ent. (N.S.)* 17: 257-263.
- ESPADALER, X. & S. REY (2001). Biological constraints and colony founding in the polygynic invasive ant *Lasius neglectus* (Hymenoptera, Formicidae). *Insectes soc.* 48: 159-164.
- FOWLER, H. G., M.N. SCHLINDWEIN & M.A. MEDEIROS (1994). Exotic ants and community simplification in Brazil: a review of the impact of exotic ants on native ant assemblages. In: WILLIAMS, D.F., ed. (1994). *Exotic ants: Biology, impact and control of introduced species*. Westview Press, Boulder. pp: 151-162.
- HOHMANN, H., F. LA ROCHE, G. ORTEGA & J. BARQUÍN (1993). Bienen, Vespene und Ameisen der Kanarischen Inseln. *Veöff. Überseemus. Bremen Natuwissr.* 12: 1-465.

- IZQUIERDO, I., J.L. MARTIN, N. ZURITA & M. ARECHAVALETA (2001). *Lista de especies silvestres de Canarias (hongos, plantas y animales terrestres)*. Consejería de Política Territorial y Medio Ambiente. Gobierno de Canarias. 437 pp.
- MARTÍN, J.L. & P. OROMÍ (1990). Fauna invertebrada de las lavas del Parque Nacional de Timanfaya (Lanzarote, Islas Canarias). *Ecología* 4: 297-312.
- MACARTHUR, R.H. & E.O. WILSON (1967). *The theory of island biogeography*. Princeton Univ. Press.
- MENOZZI, C. (1929). Formiche di Cuba e delle Isole Canarie. *Boll. Lab. Zool. Portici* 23: 1-5.
- RODRÍGUEZ, J.L. & J. URIOSTE (2000). Fauna exótica en Canarias. Bol. Asoc. Am. Mus. Cien. Nat. 2: <http://www.amigosmuseotenerife.org/boletines/b2/a26.htm>; accessed 21 November 2002
- RUESINK, J.L., I.M. PARKER, M.J. GROOM & P.M. KAREIVA (1995). Reducing the risk of nonindigenous species introductions. *BioScience* 45: 465-477.
- SEIFERT, B. (2000). Rapid range expansion in *Lasius neglectus* Hymenoptera, Formicidae) – an Asian invader swamps Europe. *Mitt. Mus. Nat. kd. Berl., Dtsch. Entomol. Z.* 47: 173-179.
- SEIFERT, B. (2003). The ant genus *Cardiocondyla* (Insecta: Hymenoptera: Formicidae) – a taxonomic revision of the *C. elegans*, *C. bulgarica*, *C. batesii*, *C. nuda*, *C. shuckardi*, *C. stambuloffii*, *C. wroughtonii*, *C. emeryi* and *C. minutior* species groups. *Ann. Naturhist. Mus. Wien* 104B: 203-338.
- TSUTSUI, N.D., A.V. SUAREZ, D.A. HOLWAY & T.J. CASE (2001). Relationship among native and introduced populations of the Argentine ant (*Linepithema humile*) and the source of introduced populations. *Mol. Ecol.* 10: 2151-2161.
- VAN LOON, A.J., J.J. BOOMSMA & A. ANDRÁSFALVY (1990). A new polygynous *Lasius* species (Hymenoptera: Formicidae) from Central Europe. I. Description and general biology. *Insectes soc.* 37: 348-362.
- VITOUSEK, P.M., C.M. D'ANTONIO, L.L. LOOPE & R. WESTBROOKS (1996). Biological invasions as global environmental change. *Amer. Sci.* 84: 468-478.
- WETTERER, J.K. & B.C. O'HARA (2002). Ants (Hymenoptera: Formicidae) of the Dry Tortugas, the outermost Florida Keys. *Fla. Ent.* 85: 303-307.
- WHEELER, W.M. (1927). The ants of the Canary Islands. *Proc. Am. Acad. Arts Sci.* 62: 93-120.
- WILLIAMS, D.F., ed. (1994). *Exotic ants: Biology, impact and control of introduced species*. Westview Press, Boulder.
- WOLF, H. (1980). Zur Kenntnis der Aculeaten-Fauna (Hymenoptera) von Gran Canaria und Teneriffa. *Vieraea* 9: 65-78.