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Exotic ants from the Maghreb (Hymenoptera, Formicidae) with first report of the hairy alien ant *Nylanderia jaegerskioeldi* (Mayr) in Algeria

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Abstract

Exotic ants from the Maghreb (Hymenoptera, Formicidae) with first report of the Hairy Alien Ant Nylanderia jaegerskioeldi *(Mayr) in Algeria*.– We compiled 16 exotic ant species found in the Maghreb in wild ecosystems, gardens and urban areas. Five of these introduced species are considered major ecological and agricultural household pest species that have become established above all in Morocco. During our investigation in a citrus orchard of ITMAS Heuraoua, Algiers, we detected two exotic ants, *Nylanderia jaegerskioeldi* (Mayr, 1904) and *Strumigenys membranifera* Emery, 1869, plus nine native ant species. The Formicinae ant *N. jaegerskioeldi* is recorded for the first time in Algeria, taking the number of exotic ants in the country to 11. This is the fourth known record in North Africa. A brief comparison between the exotic ant fauna of Algeria, Morocco, Tunisia and neighboring countries highlights the need to improve the limited knowledge of ants in North Africa.

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Key words: Tramp ants, Maghreb, *Nylanderia jaegerskioeldi,* Queen

Resumen

Hormigas exóticas del Magreb (Hymenoptera, Formicidae) con primer registro de la hormiga velluda alóctona Nylanderia jaegerskioeldi *(Mayr) en Argelia*. Documentamos 16 especies exóticas de hormigas distribuidas en ecosistemas naturales, jardines y áreas urbanas del Magreb. Cinco de las especies introducidas y establecidas constituyen plagas importantes desde los puntos de vista ecológico, agrícola y doméstico, especialmente en Marruecos. Durante nuestra investigación en una huerta de cítricos de ITMAS Heuraoua, Argel, registramos dos hormigas exóticas, *Nylanderia jaegerskioeldi* (Mayr, 1904) y *Strumigenys membranifera* Emery, 1869, así como nueve especies de hormigas autóctonas. La hormiga *N. jaegerskioeldi*, de la subfamilia Formicinae, fue registrada por primera vez en Argelia, lo que eleva a 11 el número de hormigas exóticas presentes en el país. Este es el cuarto registro conocido en el Norte de África. Una breve comparación entre la fauna de hormigas exóticas de Argelia, Marruecos, Túnez y países vecinos pone de relieve la necesidad de mejorar el limitado conocimiento sobre las hormigas en el Norte de África.

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Palabras clave: Trampas para hormigas, Magreb, *Nylanderia jaegerskioeldi,* Reina

Resum

Formigues exòtiques del Magrib (Hymenoptera, Formicidae) amb primer registre de la formiga peluda al·lòctona Nylanderia jaegerskioeldi *(Mayr) a Algèria*. Documentem 16 espècies exòtiques de formigues distribuïdes en ecosistemes naturals, jardins i àrees urbanes del Magrib. Cinc de les espècies introduïdes i establertes constitueixen plagues importants des dels punts de vista ecològic, agrícola i domèstic, especialment al Marroc. Durant la nostra recerca en una horta de cítrics d'ITMAS Heuraoua, Alger, vam registrar dues formigues exòtiques, *Nylanderia jaegerskioeldi* (Mayr, 1904) i *Strumigenys membranifera* Emery, 1869, així com nou espècies de formigues autòctones. La formiga *N. jaegerskioeldi*, de la subfamília Formicinae, va ser registrada per primera vegada a Algèria, cosa que eleva fins a 11 el nombre de formigues exòtiques presents al país. Aquest és el quart registre conegut al Nord d'Àfrica. Una breu comparació entre la fauna de formigues exòtiques d'Algèria, el Marroc, Tunísia i els països veïns posa en relleu la necessitat de millorar el limitat coneixement sobre les formigues al Nord d'Àfrica.

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Paraules clau: Paranys per a formigues, Magrib, *Nylanderia jaegerskioeldi,* Reina

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Introduction

A large number of plant and animal species have been transferred to new locations either deliberately (e.g. for food, medicine, landscaping, or as pets) or unintentionally (e.g. in ballast water, via potted plants, top soil, or redwood) (Vitousek et al., 1997). We refer to such organisms that have completed the first step of the introduction process (i.e., initial 'dispersal') as non–native, alien, or exotic species. Ants are no exception, and most regions of the world are now known to harbor at least a few non–native species. Of the approximately 14,000 described species of ants (http://www.antcat.org/), over 200 have established populations outside their known native range and even more species have been detected but not established (Sarnat et al., 2016).

Many established non–native species (i.e. species that have completed the second step of the dispersal process or 'exotic established species' in Wittenborn and Jeschke (2011)) possess invasive attributes and constitute a major part of the global environmental change. Such species have the potential to spread, often considerably, after establishment and can affect native ecosystems, causing devastating ecological consequences (e.g. Mack et al., 2000; Mooney and Hobbs, 2000; Pimentel et al., 2005).

Along the destruction of native habitat, the impact of exotic species is considered one of the two major ongoing causes leading to the decline and extinction of species (Wilson, 1992). Several ant species are known to have major ecological impacts in exotic locales (Hölldobler and Wilson, 1990; Williams, 1994). When these species invade, they commonly

undergo enormous population explosions and come to dominate widespread areas. Ants are one of the most resourceful invaders (Samways, 2007). At least 150 species of ants have been recorded as invasive taxa introduced through human activities, mainly through commerce (McGlynn, 1999), and substantially affecting ecosystems in many countries (Samways, 2007), usually by directly competing with native and endemic species (Blight, 2014).

Invasive exotic species, including ants, cause extirpation of native plants and animals (Erickson, 1971; Holmes and Cowling, 1997; Way et al., 1997), alter relationships among them (Mooney and Drake, 1986; Williamson, 1996) and interrupt ecosystem processes (Vitousek, 1986). Identifying and describing patterns of invasion of non–native species can be crucial to efforts aiming to stop and eradicate these species (Bergelson et al., 1993). For example, identifying the role of disturbance in exotic species' establishment and spread will inform management strategies, while revealing relationships of the invader with the abiotic environment and with biotic communities may aid in setting containment and eradication goals. Since invasive species can have cascading trophic effects throughout communities (Allen et al., 1994; Suarez et al., 2000; Christian, 2001), predicting areas of potential spread by invaders and understanding the possible effects should help mitigate their consequences.

According to Trager (1984), Formicinae ants of the genus *Paratrechina* (now split into *Nylanderia, Paraparatrechina* and *Paratrechina* by LaPolla et al., 2010) are common members of almost all continental ant faunas where suitable habitats can be found. The genus *Nylanderia* Emery includes 110 species and 27 subspecies (Antweb, 2018), with greatest diversity in tropical Asia and Australia. It is absent from most of Europe and from desert regions in other continents. About 14 indigenous species and three introduced species are known from tropical Africa (LaPolla et al., 2011) but the Afrotropical *Nylanderia* fauna remains poorly known. *Nylanderia* species are found throughout the continent of Africa, with the majority of species being from the equatorial rainforests. *Paratrechina* species have been cited as exhibiting a great propensity for successful invasions (Wilson and Taylor, 1967; Trager, 1984; Zenner–Polania, 1994; Passera, 1994; Fellowes, 1999; Freitag et al., 2000; Wetterer, 2007; Wetterer and Keularts, 2008).

In this paper we comment on the present understanding of non–native ants (= alien, exotic, introduced, transferred species) in Maghreb (Algeria, Morocco, Tunisia). The ant fauna of Maghreb is still poorly known and knowledge of exotic ants is scant. Here we report the exotic ants of Maghreb including one non–native ant species, *Nylanderia jaegerskioeldi* (Mayr, 1904), for the first time in Algeria. A second tramp species, *Strumigenys membranifera* Emery, 1869 was also recorded, this being the second record for Algeria. It is a minute dacetine predator and has been successfully distributed worldwide through commerce and human activities (Wetterer, 2011). Originally a Pantropical species, it now is found outside the tropics (Bolton, 2000). The species has successfully established in a wide range of habitats including forests, cultivated fields, pastures, and even manicured gardens and lawns (Deyrup, 1997).

Material and methods

We attempted to document all ant species ever collected in Maghreb, based on published accounts, the FORMIS database and examination of http//www.antweb.org, and established the percentage of exotics within the total number of known ant species. In addition, sampling was performed in agricultural ecosystem and urban area in two locations of Algiers (Algeria): the first at the Institute of Technology on Specialized Agriculture (ITMAS Heuraoua) in a citrus orchard and the second at the High National Veterinary School (ENSV El–Harrach). The study site of ITMAS Hueraoua is located in the East area of Sahel–Mitidja, 30 km from the centre of Algiers; and bordered to the north by the Algerian Sahel, to the east by Lake Reghaia, to the west by Ain–Taya and Rouïba finally to the south by the commune of Rouïba. This station has geographical coordinates of 3º 19' 00" E and 36º 46' 60" N; elevation

Fig. 1. General view of the citrus grove sampling site for ITMAS Heuraoua (Algiers, Algeria).
Fig. 1. Vista general del punto de muestreo con algunos cítricos situado en ITMAS Heuraoua (Argel, Argelia).

42 m. The soil type is fine sandy clay and slightly basic. The local climate is subhumid temperate (Bounab, 2009). It occupies a total area of 31.6 ha of which market gardening is the most dominant followed by arboriculture and cereal crops, forage and cultivation under plastic. The agricultural area is estimated at 17.25 ha, with four ha being citrus established for 60 years with around 180 trees *(Citrus sinensis*) with four varieties. For our study we chose the variety Washington Navel (fig. 1). The trees were watered regularly during dry periods. Diverse adventive plants in association with citrus trees were scored, for example: oxalis Bermuda Buttercup (*Oxalis cernua* Thunb.), Bermudagrass (*Cynodon dactylon* (L.) Pers.) and S*olanum* sp. The second study site of ENSV is located in El Alia–Oued Smar 14 km east of Algiers at the same time it is a part of Mitidja and Algerian Sahel where the urban area occupies a very small portion place around 10 m^2 of surface. This station has geographical coordinates of 36º 42' 13" N and 3º 10' 20" E; elevation 52 m.

Sampling was carried out at ITMAS Heuraoua on a monthly basis from January 2016 to October 2017. Standard pitfall traps consisted of a 10.4 cm diameter metal container placed with its top at the same level as the surrounding ground, and holding a solution of water plus a drop of liquid detergent to break the surface tension. Ten traps were placed under the trees in single line also, separated by almost 5 m. They were left for 48 hours before being gathered and emptied of their contents. This is a well–known method (e.g. Hernández–Ruiz and Castaño–Meneses, 2006; Berville et al., 2015). On November 2018 at ENSV El–Harrach, we intentionally collected the ants directly to survey exotic species inside the building.

Ant samples were sorted to species level based on morphological characters. The specimens were studied under a Leica stereomicroscope and all except *N. jaegerskioeldi* were identified by M. F. using available keys (Cagniant, 1996, 1997, 2009). Digital images were prepared using Keyance digital with 4x microscope objective. Voucher specimens are kept at the Higher National Agronomic School Algiers.

Results

Data (table 1 and GBIF dataset: Doi: 10.15470/dgay4r) show that the set of exotic ants in Maghreb are in number fourteen species and belong to 11 genera. Subsequently, two additional

Table 1. First reports of exotic ant species in Algeria, Tunisia, and Morocco (North Africa).

Tabla 1. Primeros registros de especies exóticas de hormigas en Argelia, Túnez y Marruecos (Norte de África).

Species	**Algeria**	**Tunisia**	**Morocco**	**Putative native range**
Cardiocondyla emeryi			1992	Africa (Wetterer, 2012)
Hypoponera punctatissima		Santschi (1923)	Santschi (1921)	Africa and Europe (Bolton and Fisher, 2011)
Linepithema humile	1923 (Frisque, 1935) and Barech et al. (2015)	≤ 2005 (Wetterer et al., 2009)	≤ 1964 (Taheri and Reyes–Lopez, 2015)	Subtropical South America (Wetterer et al., 2009)
Lioponera longitarsus	Barech et al. (2017) in olive grove Nouara M'sila	Santschi (1910) as *L. noctambula*	Guillem et al. (2012) as *Cerapachys*	South–East Asia (Antweb, 2018)
Monomorium pharaonis	1862 (Roger, 1862) noted by Bernard (1967)	≤ 1940 (F. Santschi, MCZ) in Wetterer (2010)	≤ 1962 (Cagniant, 1962) Taheri and Reyes–López (2018)	Tropical Asia (Wetterer, 2010)
Nylanderia jaegerskioeldi	ITMAS Heuraoua, citrus grove Algiers, new record ENSV Harrach Algiers, new record		Taheri et al. (2017) in Tangier	Afrotropical (LaPolla et al., 2011)
Paratrechina longicornis	Cagniant (1970)		Taheri et al. (2010)	Indo–Malayan (Wetterer, 2015)
Pheidole indica (= *P. teneriffana*)		1908 (Santschi, 1908)	1992 (Delabie, 2007)	Indo–Malayan (Sarnat et al., 2015)
Pheidole megacephala	≤ 1883 (André, 1883)	1889 (Forel 1890) in Wetterer (2012)	≤ 1888 (Saunders, 1888) in Wetterer (2012)	Afrotropical (Sarnat et al., 2015)
Strumigenys membranifera	Chemala et al. (2017) in Aïn Moussa, Ouargla, wild ecosystem	≤ 1904 (Forel, 1904) as *S. membranifera santschii*	Taheri et al. (2017) in Marrakesh	Afrotropical (Wetterer, 2015)
Tetramorium bicarinatum	Bernard (1960) as *T. guineense*	< 1965 (Bernard, 1965) as *T. guineense*	< 1962 (Cagniant, 1962) as *T. guineense*	S. E. Asian (Wetterer, 2009b)
Tetramorium caldarium			1993 (Cagniant and Espadaler, 1993)	Afrotropical (Wetterer, 2015)
Tetramorium lanuginosum	Barech et al. (2011) in INA Algiers, irrigated garden	≤ 1890 (Emery, 1891) as *T. striatidens*	Taheri and Reyes–López (2018) in Al-Hoceima, Casablanca, Larache, Nador	Indomalayan (Wetterer, 2015)
Trichomyrmex destructor (= *Monomorium destructor*)	André (1883: 333) as *Monomorium gracillimum*	≤ 1908 (Emery, 1908) as *M. gracillimum*	Figuig (Cagniant, 2009)	Palaearctic (Wetterer, 2015)

Fig. 2–3. Worker of *Nylanderia jaegerskioeldi*: 2, body in lateral view (total length 3.9 mm); 3, head profile view (head length 0.6 mm).
Fig. 2–3. Obrera de la especie Nylanderia jaegerskioeldi*: 2, vista lateral del cuerpo (longitud total: 3,9 mm); 3, vista del perfil de la cabeza (longitud de la cabeza: 0,6 mm).*

species which were not mentioned yet recently have been added to the list as follows: *Tetramorium simillimum* added by Bernard (1967) in Algeria and *Monomorium monomorium.*added by Bernard (1967) in Algeria and by Cagniant (2006) in Agadir and Marrakesh (Morocco). It is debatable whether this last species is exotic or native; and due to taxonomic problems it remains unclear (Bolton, 1987). The tramp ants indicated above are, not unexpectedly, similarly present in the three countries of Maghreb. The exotic ant species component is approximately 5.9% in Morocco (Taheri and Reyes-López, 2018), 4.35% in Algeria and 5.6% in Tunisia. In order to calculate those proportions regarding Algeria, Tunisia and Italy we used faunistic lists of online database by http//www.antweb.org, as having a total number of known ant species. In addition, we obtained the numbers of exotic ants from (table 1) and published papers.

One non–native ant species, *Nylanderia jaegerskioeldi,* is a new record for Algeria, collected at ITMAS Heuraoua Algiers, June 2017; three workers, one queen and at ENSV El Harrach Algiers on Nov 2018; two workers (fig. 2–5). *Strumigenys membranifera* is a second record for Algeria, July 2016; one queen. This brings the number of known exotic ants in Algeria to 11. The nest was not detected for either species. Other ant species regarded as native were found in the same flowerpot at ITMAS Heraoua: *Tetramorium semilaeve (*André, 1883); *Tapinoma nigerrimum* (Nylander, 1856); *Plagiolepis barbara pyrenaica* Emery, 1921; *Pheidole pallidula* (Nylander, 1849); *Tapinoma simrothi* Krausse, 1911; *Crematogaster scutellaris* (Olivier, 1792); *Aphaenogaster depilis* Santschi, 1911; *Cardiocondyla mauritanica* Forel, 1890; and *Cataglyphis viatica* (Fabricius, 1787). In the survey at the second site ENSV we collected a worker of the native *Tetramorium biskrense* Forel.

Fig. 4–5. Queen of *Nylanderia jaegerskioeldi*: 4, body in lateral view (total length 5.8 mm); 5, head in full face view (head length 0. 79 mm).
Fig. 4–5. Reina de la especie Nylanderia jaegerskioeldi*: 4, vista lateral del cuerpo (longitud total: 5,8 mm); 5, vista frontal completa de la cabeza (longitud de la cabeza: 0,79 mm).*

Discussion

Wetterer (2015) considered 42 cosmopolitan ants are spreading, with multiple well–established populations and great population explosions causing serious ecological and economic problems in both the old and new world. Through human commerce, 12 of these species have become a major ecological, agricultural and/ or household pest species. However, to date, these invasive ant species have seemingly remained restricted to climates with warm winters and have not been able to penetrate any cold–temperate region, with the exception of a few species like *M. pharaonis* (Czechowski et al., 2002) and *T. melanocephalum* (Wetterer, 2009a), which inhabit heated premises in temperate Europe. Five of those exotic pest species have been documented recently in Maghreb, especially in Morocco: *Linepithema humile, Monomorium pharaonis, Paratrechina longicornis, Pheidole megacephala* and *Trichomyrmex destructor* (Taheri and Reyes-López, 2018). In Algeria and Tunisia, on the contrary, it seems that the only pest species that has been recorded recently is *Linepithema humile,* reported by Barech et al. (2015) and Wetterer et al. (2009). *Linepithema humile* had been restricted to the lowlands, and almost exclusively to urban areas and, to a lesser extent, agricultural lands (Wetterer et al., 2007). Furthermore, the Argentine ant is an important ecological and agricultural pest in areas with Mediterranean climates, including not only around much of the Mediterranean region, but also southern California, southern Africa, and southern Australia (Wetterer et al., 2009). It seems likely that the four remaining exotic pest species may occur in houses in both Algeria and Tunisia, but this has yet to be demonstrated.

The proportion of transferred ants from Maghreb represents roughly 5.3 % of the myrmecofauna, a percentage rather similar to the 5 % of exotic ant species in the Iberian Peninsula (Espadaler and Collingwood, 2001 updated) and 4.65 % in Italy (Jucker et al., 2008). However, these are relatively small numbers in comparison to the much higher exotic ant component of several Atlantic archipelagos: 33 % from the Canary Islands (Espadaler and Collingwood (2001) updated 57 % for the Azores (Wetterer et al., 2004); 64 % for Madeira (Wetterer et al., 2007). The rate at which ant species are added to the accurate list of the Maghreb exotic fauna would suggest that there remain more species to be discovered.

In Algeria, as in other countries with a warm climate, ants are abundant. They are found everywhere, in the forest, in open areas, along sides of permanent or temporal watercourses, in dry areas, on clay and on rocky habitats (Cagniant, 1973). Compared with other countries of North Africa, Cagniant (2006) indicated some 180 ant species known from both Algeria and Tunisia. Recently, Barech et al. (2016) added a checklist of 24 species belonging to 14 genera and four subfamilies (Dolichoderinae, Dorylinae, Formicinae and Myrmicinae) of the myrmecological fauna in a saline lake area. Morocco has some 237 ant species (Cagniant, 2009; Taheri et al., 2010; Taheri and Reyes–López, 2011, 2015, 2018; Guillem et al., 2012, 2015).

According to Miravete et al. (2013) regions in similar latitudes or in the same biogeographic realm are more likely to have similar climates and habitats which might increase the odds of the success of introduced species. Morocco has a rich ant fauna, and 14 (5.9 %) of the species are actually widespread tramp ants considered as non–native: *Cardiocondyla emeryi* Forel, *Hypoponera punctatissima* (Roger)*, Linepithema humile* (Mayr), *Lioponera longitarsus* (Mayr), *Monomorium pharaonis* (Linnaeus), *Nylanderia jaegerskioeldi* (Mayr), *Paratrechina longicornis* (Latreille), *Pheidole megacephala* (Fabricius), *Pheidole indica* (Mayr), *Strumigenys membranifera* (Emery), *Tetramorium bicarinatum* (Nylander), *Tetramorium caldarium* (Roger) *Tetramorium lanuginosum* (Mayr), *Trichomyrmex destructor* (Jerdon) (Taheri et al., 2018). Eleven genera and most of their species have been recorded outside of their native habitat in the three countries and according to Andersen (1997) and Bestelmeyer and Wiens (1996), they belong to the functional groups including cryptics (e.g. *Hypoponera punctatissima*), opportunists (e.g. *Paratrechina longicornis, Nylanderia jaegerskioeldi*) and generalized Myrmicine (e.g. *Pheidole megacephala*). From the alien species encountered in Algeria and Tunisia (see table 1), we conclude that the three countries have eight non–native species in common.

Maghreb countries are not immune to the invasion of pest or tramp ants. Even though climate change and an array of anthropogenic factors could have an impact on the ant fauna it is hard to speculate further.

In neighboring countries, some of these pest or tramp ants are known, such as the two notorious invasive ants, the big–headed ant (*Pheidole megacephala*) and the Argentine ant (*Linepithema humile*). Both are also known from Madeira, where theyrespectively underwent population explosions in the 1850s and 1890s.. Researchers have long assumed that these invaders spread across all of Madeira and exterminated most or all native ants, although no research has documented such impact (Wetterer, 2006). In a companion study, Wetterer et al. (2007) concluded that *P. megacephala* and *L. humile* probably never spread beyond coastal lowland areas, which make up < 10 % of Madeira's land area. In 2002, Wetterer et al. (2006) found that native ants dominated most of Madeira; *P. megacephala* and *L. humile* were restricted to ~0.3 % and ~6 % of Madeira's land area, respectively. The Argentine ant, after having invaded Madeira, would quickly make its appearance on the European continent. In fact, after the records of *L. humile* in Madeira, starting before 1858, the next earliest exotic records all come from mainland Portugal (1890–96: Schmitz, 1897; Coutinho, 1929), suggesting that *L. humile* may have spread from South America to southern Europe (and perhaps to other parts of the world) via Madeira and then Portugal (see Wetterer and Wetterer, 2006). Besides this, the presence of other invasive species such as *Paratrechina longicornis* (Latreille, 1802) has been described as potentially threatening in the Canarian archipelago (Espadaler and Bernal, 2003). More research is needed to analyse not only where various invasive species may be able to become established based on climatic requirements, but also their potential long–term impact, which may be either catastrophic (e.g. in Hawaii and Bermuda) or minimal (e.g. in the Azores and Madeira).

As result of our investigation, two exotic species were collected at ITMAS Heuraoua Algiers: *Nylanderia jaegerskioeldi* and *Strumigenys membranifera.* This increases the number of non–native ants reported in Algeria to 11 species (about 4.35 % of Algerian myrmecofauna). Both species are already known from Morocco (Taheri et al., 2017). In Tunisia the list of known exotic ants to date is just ten (5.6 %), including the inconspicuous species *Strumigenys membranifera* which was discovered by Forel (1904; as *S. membranifera santschii*). In our study, the ants were restricted to anthropogenic–disturbed localities and confined to a small portion of a citrus grove. *Nylanderia jaegerskioeldi* in the Canary Islands was quite abundant in flowerpots at Puerto de la Cruz (Espadaler and Bernal, 2003). Exotic ants have been found to exhibit preferences towards disturbed habitats, with their relative abundance and activity being related to the degree of disturbance and the amount of exotic vegetation (Tschinkel, 1988; Suarez et al., 1998; King and Tschinkel, 2006).

LaPolla et al. (2011) considered *N. jaegerskioeldi* as native to the Afrotropics and reported that it is "found across equatorial Africa, northward through North Africa, to as far west as the Canary Islands". In North Africa, *N. jaegerskioeldi* is known from Egypt (Emery, 1910) and Libya (Menozzi, 1934). Outside Africa, there are widespread records of *N. jaegerskioeldi* from the eastern Mediterranean and the Middle East, including Cyprus (Emery, 1910), Greece (Collingwood, 1993), Iraq (Abdul–Rassoul et al., 1978), Israel (Menozzi, 1933), Lebanon (Kugler, 1988), Oman (Collingwood, 1988), Saudi Arabia (Collingwood, 1985), Syria (Emery, 1910), and the United Arab Emirates (Collingwood et al., 1997). It is considered a common pest in the houses in the Arab Emirates (Collingwood et al., 1997), where it seems to seek damp and humid places (bathrooms and kitchens). It is considered a recently arrived exotic species in southern Spain (Espadaler and Collingwood, 2001; Reyes–López et al., 2008), the Balearic Islands (Gómez and Espadaler, 2006), and Madeira (Wetterer et al., 2007). It might be possible to consider this species as a natural –non–exotic– component of the fauna. However, we feel it should be treated as exotic based on the following indirect evidence. First, the genus *Nylanderia*, with 110 species, 27 subspecies (Bolton, 2018), had never been recorded for Algeria. Second, the habitat in Algeria where we found it is heavily anthropized; in spite of the many published papers on agricultural fields in Algeria, we think that if it was a native species, it is highly unlikely that it would be present only in one agricultural grove.

According to Deyrup (1997), *Strumigenys membranifera* often occurs in disturbed open areas, such as lawns and pastures. A queen of this species was recently collected from the wild ecosystem of Ouargla region, Algeria (Chemala et al., 2017). Among the 873 dacetine species, only three species have achieved wide distributional ranges: *S. rogeri* Emery, 1890; *S. emmae* (Emery, 1890) and *S. membranifera*, see Bolton (1983*)*. Though widespread, these minute dacetines are most inconspicuous (Chemala et al., 2017).

The exotic ants seem to be of lesser importance in relation to mainland Algeria, Tunisia and Morocco. This may indicate either i) comparatively better–preserved biotopes in mainland or ii) a higher resistance to establishment of exotic species in the Mediterranean mainland, probably because of the dry, harsher summer climate, or iii) a higher prevalence of exotics in the islands, a well–established fact (Simberloff, 1995). Exotic species tend to become established in regions with climatic conditions that are similar to their region of origin (Williamson, 1996). This is not to say that we should blandly accept the present state of this issue in the Maghreb. Ants are often inconspicuous immigrants, and may remain unnoticed for many years after their arrival in an area. This is most likely the case with the recent finding of *N. jaegerskioeldi* in Algeria. This species has been present in North Africa at least since the 1910s when it was first discovered in Egypt.

The occurrence of both *N. jaegerskioeldi* and *S. membranifera* in Algeria does not seem at present to be of concern, though its effect on local fauna is still unexplored. It will be interesting to track the process of these species in Algeria to see whether they continue to spread and become a major long–term economic and ecological pest. Alternatively, they may become a minor pest, smoothly integrate with native species or disappear completely. More efforts are needed to reveal the presence of yet undiscovered species in Algeria and, by extension, the Maghreb.

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