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THE ANT FAUNA (HYMENOPTERA, FORMICIDAE) OF SALENTO (APULIA, SOUTH EAST ITALY): FIRST REPORTS, NEW OCCURRENCES, AND AN UPDATED SPECIES LIST

RIASSUNTO

Alcune indagini faunistiche nel Salento (Puglia, Sud-Est Italia) hanno fornito interessanti dati sulle formiche di questo territorio. *S*ono qui segnalate per la prima volta per il Salento 24 specie: *Aphaenogaster ichnusa, A. splendida, Camponotus universitatis, Cryptopone ochracea, Formica cunicularia, F. gagates, Hypoponera punctatissima, Lasius casevitzi, L. lasioides, Monomorium monomorium, Nylanderia jaegerskioeldi, Plagiolepis pallescens, P. xene, Solenopsis SAL-1, S. SAL-2, S. SAL-3, Temnothorax flavicornis, T. lichtensteini, T. mediterraneus, T. parvulus, Tetramorium bicarinatum, T. immigrans, T. indocile, T. semilaeve*. Escludendo *Aphaenogaster ichnusa, Formica gagates, Monomorium monomorium* e *Tetramorium semilaeve* le altre 20 sopracitate specie sono qui segnalate per la prima volta anche per la regione Puglia. La presenza delle specie tropicali *Nylanderia jaegerskioeldi e Tetramorium bicarinatum* è data da una recente introduzione accidentale. I risultati ottenuti con questo studio incrementano la mirmecofauna salentina sia nel numero delle specie che nella distribuzione di alcune di esse. Infine, in appendice è pubblicata la lista aggiornata delle 58 specie di formiche note per l'area salentina.

SUMMARY

Some faunal surveys in Salento (Apulia region, South East Italy) have given some interesting data on ants of this territory. The 24 first reports from Salento are given: *Aphaenogaster ichnusa,* A. *splendida, Camponotus universitatis,*

Cryptopone ochracea, Formica cunicularia, F. gagates, Hypoponera punctatissima, Lasius casevitzi, L. lasioides, Monomorium monomorium, Nylanderia jaegerskioeldi, Plagiolepis pallescens, P. xene, Solenopsis SAL-1, S. SAL-2, S. SAL-3, Temnothorax flavicornis, T. lichtensteini, T. mediterraneus, T. parvulus, Tetramorium bicarinatum, T. immigrans, T. indocile, T. semilaeve,. Excluding *Aphaenogaster ichnusa, Formica gagates, Monomorium monomorium* and *Tetramorium semilaeve,* the above mentioned 20 species are reported for the first time also from Apulia region. The presence of the tropical species *Nylanderia jaegerskioeldi and Tetramorium bicarinatum* is due to recent accidental import. The findings obtained within this study, increases the Salento myrmecofauna in terms of both the number of species and distribution. In the appendix an updated checklist of the 58 ant species known from Salento are also provided.

INTRODUCTION

The Salento (South East Italy) (Fig.1) is the most southern area of the Apulia region (the other Apulian areas are: Daunia, Gargano and Murge) and politically includes the Lecce province, part of Brindisi and a small area of that of Taranto. As stated in Durante and Potenza (2016), from an orographic and phytogeographical point of view, the Salento is defined, according to Baldacci (1962) and Marchiori and Tornadore (1988), as the area south of a line joining the town of Torre Sabina (just north of Torre Guaceto) on the Adriatic Sea to the town of Taranto on the Ionian Sea, following the 200 m elevation contour for part of its length. (we remark that some areas of Taranto province, while lying below or on that contour, are not included in this study, because they are *de facto* phy-

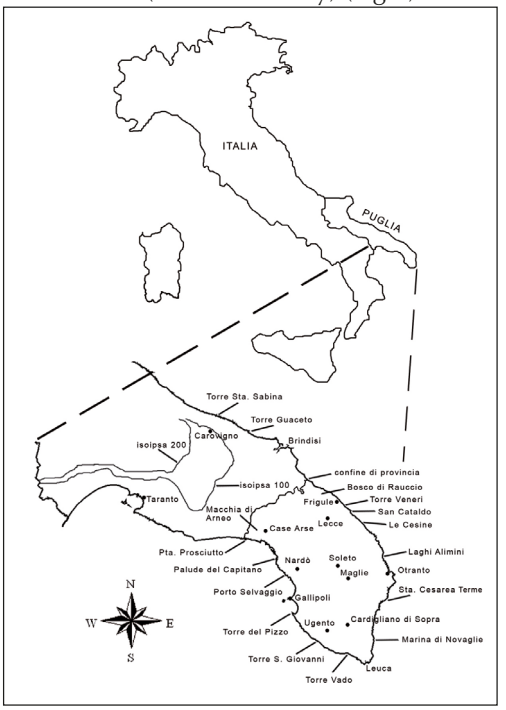


Fig. 1. Map of Salento (Durante 2016).

togeographically different from the rest of the Salento peninsula). The Salento peninsula is also subdivided into the northern Salento (the area lying between the 200m contour in the North and the 100m contour in the South) and the southern Salento (from the 100m contour in the North to Cape of Santa Maria di Leuca in the South). The Salento Peninsula is the most easterly part of Italy (Capo d'Otranto: 40° 06′ 26″ N; 18° 31′ 14″ E). In terms of orography, it is generally flat with ridges of up to 200 m a.s.l (the Salento Serre) converging towards Cape of Leuca. In terms of climate, Southern Salento differs from its Northern counterpart due to a lower degree of humidity and a higher annual mean temperature. These differences however do not result in sharply contrasting environments.

From a zoological point of view, the Salento is very interesting because it is most easterly part of Italy (Cape of Otranto 18° 31′ E) at only 76 km from Albanian coast, acting as a natural bridge for trans-Adriatic or trans-Ionian migrations. Unfortunately, faunal studies on Salento and the Apulian or Southern Italian fauna are very few, and often older.

In this contest the knowledge of ants (Formicidae) are not an exception and the Salento subregion in particular, has been almost completely neglected. Only a few ant species have been reported from single Salento localities almost always published in old papers (e.g.: Costa G. 1874, Forel 1911, Emery 1914a,b, Emery 1915, Emery 1916). Recently, the work of Consani (1951) listed 18 species, while 26 species are from the general catalogue of Baroni Urbani (1971a) on Italian Formicidae. More recently, some interesting species have been added to the list by Scupola (2006; 2016; 2017; 2019) as first records: genus *Formica* Linnaeus, 1758; *Ponera testacea* Emery 1895, *Aphaenogaster ovaticeps* (Emery, 1898, as *A. muelleriana* Wolf, 1915); and *Strumigenys membranifera* Emery, 1869.

From the knowledge above about Salento's myrmecofauna it has been almost completely neglected and very limited, a situation due to the scarcity of methodical research by the entomologists as also noted by Scupola (2016) with reference to the genus *Formica* Linnaeus, 1758. It is obvious that an increase of ant data for this region is needed. Therefore, for this reason, a series of researches in the field has been started by the authors, with the aim to updated knowledge on this interesting ant fauna, as much as possible.

MATERIAL AND METHODS

Our research are mostly centred on the Southern Salento (Lecce province). Several habitats were investigated: towns (buildings, gardens and parks); farms and farmland with crops (including olive groves and vineyards); uncultivated areas (abandoned crop fields; occasional grazing lands); residual en-

vironments (ravines, small wild areas in or around crops, roads or buildings); and wild environments (protected areas, pseudo-steppes, oak- pine- and mixed forests, Mediterranean scrub, inland and coastal garrigues, retrodunal habitats), with the caveat that the term "wild" in the Salento never denotes a wild place as such, as the entire region is relatively small and very highly anthropized. In detail below are the twenty-four localities listed in alphabetical order with the environments investigated by staff of the Museum of Natural History of Salento (MSNS) and Antonio Scupola (AS) during his short stays, mainly in the southern Ionian coast:

1 Acquarica del Capo – (AS): disturbed area (border town and private garden), uncultivated and cultivated area (Olive).
2 Andrano – (AS): coastal pine wood.
3 Baia dei Turchi (Otranto) – (AS): coastal pine wood.
4 Calimera – (MSNS): *Quercus ilex* wood and open areas with Mediterranean scrub (MSNS park); crops (*Olea europaea*); uncultivated areas.
5 Cutrofiano – (MSNS): anthropized environment (crops and town).
6 Frigole – (MSNS): wood.
7 Gallipoli – (AS): larger rocks on beach internal edges.
8 Laghi Alimini (Otranto) – (AS; MSNS): soil and vegetation in the coastal pine wood (*Pinus halepensis*, *Quercus ilex*, *Eucalyptus* sp.) and Mediterranean scrub.
9 Lecce – (MSNS): urban area.
10 Lido Marini (Presicce-Acquarica del Capo) – (AS): small dunes.
11 Pescoluse (Salve) – (AS): dunes.
12 Roca Vecchia – (MSNS): anthropized enviroment on the coast; degraded coastal garigue.
13 Salve – (MSNS): mixed wood (*Pinus halepensis*, *Quercus ilex*, *Quercus coccifera*) in a small ravine; garrigue on the coast.
14 San Cataldo – (MSNS): pine wood (*Pinus halepensis*) and Mediterranean scrub in a strongly anthropized environment.
15 San Donato di Lecce – (MSNS): mixed wood (*Quercus ilex* 50%) surrounded by crops and uncultivated areas.
16 San Foca – (MSNS): retrodunal environment (*Juniperus oxycedrus macrocarpa*, *Pinus halepensis*).
17 San Gregorio (Morciano di Leuca) – (AS): cliff.
18 Sant'Andrea (Melendugno) (Le) – (AS; MSNS): in pine wood.
19 Santa Cesarea Terme – (AS): coastal pine wood.
20 Santa Maria al Bagno (Nardò) – (MSNS): garrigue on the coast.
21 Santa Maria di Leuca – (AS): cliff near town.
22 Torre Colimena – (MSNS): pine wood (*Pinus halepensis*) and Mediterranean scrub; garrigue on the coast.

23 Torre Rinalda – (MSNS) : wood of Rauccio (holm oak forest).
24 Torre Vado, loc. Postu Vecchiu (Morciano di Leuca) – (AS): anthropized area (border town near the beach and private garden in the hill).

To this list, "cave Abisso di Castro Marina" should be added. Here a single ant specimen was found, and occasionally collected by the Salento speleologist Salvatore Inguscio.

Ants were collected mainly by sight using soft forceps and an entomological aspirator. Other techniques included light trapping (with 165 w or 250 w blended lamps) and pitfall traps made of 10 cm-high plastic vials embedded in the ground with about 2 cm of 70% ethanol on the bottom as a medium. The specimens both in alcohol and dry mounted, are housed in the Natural History Museum of Salento and in Scupola's private collection.

Abbreviations and symbols
ASPC – Antonio Scupola personal collection – Verona (Italy)
MSNM – Natural History Museum of Milan (Italy)
MSNS – Natural History Museum of Salento – Calimera (Italy)
♀ – gyne
♂ – male
♃ – soldier
☿ – worker
– number of vial code of the MSNS and number pin code in ASPC.

The pictures were taken using Canon 600D camera equipped with Laowa 25mm f/2.8 2.5-5X ultra macro lens. The images in different focus layers where assembled and computed using the Combine ZP free software.

Measurements and indices
All measurements were given in millimetres.
CL – cephalic length; the maximum length of the head in dorsal view, excluding the mandibles.
CW – cephalic width; the maximum width of the head behind eyes in full face view.
CS – cephalic size, the arithmetic mean: (CL+CW)/2.
CI – head index: (CW/CL) x100.
PoOC – postocular distance, measured from behind the eyes, at the midpoint of CW imaginary horizontal line to posterior margin of head, in dorsal view.
SL – scape length, excluding basal neck.
SI – scape index: (SL/CW) x100.
ML – mesosoma length; the length of the mesosoma in lateral view, from the point at which the pronotum meets the cervical shield to the posterior base

of the propodeal lobes or teeth.
MW– mesosoma width, in gynes the maximum width of the mesosoma (scutum) in dorsal view.
DPS – propodeal spines distance; the distance of the apexes of the propodeal spines in dorsal view.
PSL – propodeal spines length; the length of the spine measured from the base to apex, in lateral view.
SPST – distance from the center of cuticular ring of the propodeal spiracle to spine apex.
NOH – maximum height of the petiolar node in lateral view, measured from the uppermost point of the petiolar node perpendicular to a reference line set from the petiolar spiracle to the point of intersection between dorso-caudal slope and dorsal profile of caudal part of the petiole.
TBL – tibial length; the total length of the metatibia in lateral view.
TL – total length; the approximative outstretched length of the ant from the mandibular apex to the gastral apex.

RESULTS

The present paper provides accounts of 44 species, 24 of which have been reported here for the first time from Salento, and among these also 20 from the Apulia region also. Now, the total of Salento ant species amounts to 58. The genera, species and localities are listed alphabetically. An updated Salento ants checklist has been provided in the appendix (Tab. 4).

COLLECTED ANT SPECIES LIST

1) ***Aphaenogaster campana* Emery, 1878**

Materials: Acquarica del Capo, 29.VII.2015, neighborhood road Curti Vecchi, 39.924926, 18.25744, colony 15.210C, leg. Scupola A. (☿☿) (ASPC # 1175); Calimera, 3.X.2018, leg. Giannuzzi F. (☿☿) (ASPC # 433; MSNS # 3); Calimera, 21.V.2020, leg. Giannuzzi F., (☿☿) (ASPC # 84; MSNS # 24); Otranto, loc. Baia dei Turchi, VI.2017, (☿, on the edge of coastal pine wood) (ASPC # 2666); Frigole, 25.VII.2021, leg. Mangiullo A., (☿☿, forest) (ASPC # 819, 5211; MSNS # 198); Frigole, 5.VII.2021, leg. Mangiullo A., (☿☿, forest) (ASPC # 5222; MSNS # 192); Frigole, 25.VII.2021, leg. Mangiullo A., (☿☿, forest) (ASPC # 5259; MSNS # 193); Frigole, 25.VII.2021, leg. Mangiullo A., (☿☿, forest) (ASPC # 817; MSNS # 196); Salve, 22.VIII.2020, leg. Durante A., (☿☿) (ASPC # 869; MSNS # 125); Salve, 22.VIII.2020, leg. Durante A., (☿☿)

(ASPC # 4239; MSNS # 128); San Donato di Lecce, 5.IV.2020 leg. Durante A., (☿☿, nest to edges to the forest) (ASPC # 437, 885; MSNS # 31); idem, 8.IV.2020 leg. Durante A., (☿, errant near to wall of a rural house) (ASPC # 919, 954; MSNS # 30); idem, 3.V.2020 leg. Durante A., (☿☿, nest along the pathway in to the olm oak) (ASPC # 440; MSNS # 32); Torre Rinalda, 25.VII.2021, leg. Mangiullo A., (☿☿) (ASPC # 5309; MSNS # 208).

Very common species in Salento. Reported from Albania and southern Italy (Apulia, Calabria and Campania) (Baroni Urbani, 1971a; Boer, 2013). The report from Comino (Maltese islands) probably due to misidentification with other species (Boer, 2013). In Apulia *A. campana* together with the uncommon *A. picena* are the only two taxa belong the *Aphaenogaster sardoa* species-group (Schifani *et al*., 2022).

2) ***Aphaenogaster ichnusa* Santschi, 1925**

Materials: Frigole, 25.VII.2021, leg. Mangiullo A., (☿☿, forest) (ASPC # 816; MSNS # 194); Laghi Alimini, IV.2000, 40.202311, 18.457806, leg. Scupola A. (☿)(ASCP #1324); Laghi Alimini; 1.VIII.2020, leg. Durante A., (☿☿, ♂♂) (ASPC # 870, 5319; MSNS # 92); Laghi Alimini, 1.VIII.2020, leg. Durante A., (☿☿, ♂♂) (ASPC # 5212, 5315; MSNS # 91); Sant'Andrea, 17.VIII.1991, 40.250611, 18.440417, leg. Scupola A. (☿☿, ♀♀) (ASPC #1186, 1354, 1355).

Cryptic species very similar to *Aphaenogaster subterranea* and recently raised to species level by Galkowski *et al*. (2019) based off of the weak or absent sculpture on lateral sides of the pronotum, less developed propodeal spines, and molecular investigations. In Italy *A. ichnusa* is found in central and southern regions and islands. Considered common from coasts to hilly areas as opposed to the affine *A. subterranea* that it is less thermophilic, montane in south Italy (and common in the plains of North Italy). The altitudinal preference between these two species is very evident in Sicily where there are vicariants (Schifani and Alicata, 2018). New to Salento.

3) ***Aphaenogaster ovaticeps* (Emery, 1898)**

Materials: Calimera, 20.VII.2021, leg. Pellegrino G., (☿☿, ♂♂) (ASPC # 1804, 5099; MSNS # 149); Calimera, 21.VII.2021, leg. Pellegrino G., (♀♀) (ASPC # 5331; MSNS # 156).

This nocturnal Balkan species was reported from Apulia for the first time by Scupola (2017, as *Aphaenogaster muelleriana* Wolf, 1915), based on

specimens found in Torre Vado (Lecce province). Salata *et al.* (2021) in the recent revision of the *Aphaenogaster splendida* species-group have considered *A. muelleriana* as junior synonym of *A. ovaticeps* (Emery, 1898). In Italy *A. ovaticeps* was accidentally introduced in Liguria (Genoa, Loc. Typ) and in Venice, where they acclimatized. A report from Chiavari (Scupola, 2017) confirms that the species is also spreading in Liguria. The populations from extreme North East Italy (Trieste and Gorizia), and in the South East Italy (Salento) have natural origin facilitated by geographical proximity to Balkan populations and from natural bridges formed in the past during the geologic history of the Adriatic sea.

4) ***Aphaenogaster splendida* (Roger, 1859)**

Materials: Cutrofiano, 30.VII.2020, leg. Pellegrino G., (♀♀, ♂♂) (ASPC # 4952, 5044; MSNS # 98); Calimera, 8.VII.2021, leg. Pellegrino G., (♀♀) (ASPC # 4240; MSNS # 146).

Nominal species of the *Aphaenogaster splendida* species-group, recently revised by Salata *et. al.*, (2021). In Italy this nocturnal species is sporadically reported from Friuli, Lazio, Campania, Calabria, Sardinia Sicily and Pantelleria (Baroni Urbani, 1971a; Mei, 1995; Scupola, 2017; Salata *et. al.*, 2021). New to Apulia.

5) ***Camponotus aethiops* (Latreille, 1798)**

Materials: Calimera, 17.VI.2020, leg. Pellegrino G., (☿☿) (ASPC # 832; MSNS# 47); Calimera, 21.V.2020, leg. Giannuzzi F., (☿☿) (ASPC # 1225; MSNS # 28); Calimera, 20.VII.2021, leg. Pellegrino G., (♀♀) (ASPC # 1810; MSNS # 155); Calimera, 8.VII.2021, leg. Pellegrino G., (♀♀) (ASPC # 4237; MSNS # 146); Calimera, 21.VIII.2020, leg. Pellegrino G.,(☿☿) (ASPC # 5379; MSNS # 121); Cutrofiano, 30.VII.2020, leg. Pellegrino G., (♂♂) (ASPC # 5262; MSNS# 100); Frigole, , 25.VII.2021, leg. Mangiullo A., (☿☿,♀) (ASPC # 811, 861; MSNS # 200); Frigole 25.VII.2021 leg. Mangiullo A., (☿☿) (ASPC # 5263; MSNS # 201); Torre Rinalda, 25.VII.2021, leg. Mangiullo A., (☿☿) (ASPC # 5316; MSNS # 210).

Species very common in Italy. Hitherto, in Salento they have been reported from Galatone (Costa G., 1874 as *Formica pubescens*), San Basilio (Berlese, 1904), Brindisi (Forel, 1911) and Santa Maria di Leuca (Consani, 1951).

6) ***Camponotus nylanderi* Emery, 1921**

Materials: Acquarica del Capo, leg. Scupola A. (☿ ☿) (ASPC # 968, 969); Calimera, 21.5.2020, leg. Giannuzzi F., (☿ ☿) (MSNS # 26); Calimera, 17.VI.2020, leg. Pellegrino G., (☿ ☿) (ASPC # 448; MSNS 47); Calimera, 23.VI.2020 Durante A., (☿ ☿, nest under stone in olm oak) (ASPC # 453; MSNS # 52); Calimera, 21.VII.2021 Pellegrino G., (☿ ☿) (ASPC # 1554, 5480; MSNS # 156); Frigole, 25.VII.2021. Leg. Mangiullo A., (☿ ☿) (ASPC # 5265; MSNS # 191). Salve, 22.VIII.2020, leg. Durante A., (☿ ☿) (ASPC # 483; MSNS # 126).

Large bicoloured species, present in southern Italy (Apulia, Calabria, Sicily and Aeolian island) (Baroni Urbani, 1971a). In Salento they have been reported from Castro marina (Consani, 1951) and Galatone (Costa G., 1874, as *Polyergus rufescens,*) The latter locality is probably a misidentification with that of *Camponotus nylanderi*, as Baroni Urbani indicated (1971a), see comment on *Formica gagates* also. On the other hand, the species is common in Salento, but having *C. nylanderi* crepuscular and nocturnal habits, it is probably difficult to observe them. They nest under large stones or in the dry stone walls (AS personal observ.)

7) ***Camponotus piceus* (Leach, 1825)**

Materials: Frigole, 25.VII.2021, leg. Mangiullo A. (MSNS # 197) (wood); Salve, 22.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 5313; MSNS # 125); Torre Vado, loc. Postu Vecchiu, 20.VII.2017, leg. Scupola A., (☿ ☿) (ASPC # 804, 5227).

The only known Salento report of *Camponotus piceus* is in Brindisi (Forel, 1911 as *Camponotus lateralis* var. *atricolor* (Nylander, 1849); Baroni Urbani, 1971a). Uncommon to collect, the nest is also it's hard to see because it is formed by a small circular hole in the ground and without debris around it. The worker guarding to the nest is often occluding the entrance hole with the head (AS pers. observ.) (Fig. 2). A behaviour which is somewhat reminiscent of that of *Colobopsis*.

Fig. 2. Nest of *Camponotus piceus* with the worker guarding the entrance (Photo by A. Scupola).

8) ***Camponotus universitatis* Forel, 1890**

Materials: Santa Maria di Leuca, 8-9.VI.1991, leg. Borsato W., (♀) (ASPC # 967).

This species is social parasite of ants *Camponotus aethiops* Latreille, 1798 and *C. pilicornis* Roger, 1859, (Espadaler, 1981; Guillem *et al,.* 2014; Tinaut *et al,.* 1992). Very rare, it is known from scattered localities from France (Montpellier, loc. Typ.) (Forel, 1890; Espadaler, 1981); Switzerland (Forel, 1904; 1915; Kutter, 1936); Italy (Würmli, 1969); Albania (Andoni, 1977) Spain (Tinaut *et al,.* 1992), Bulgaria (Lapeva-Gjonova and Kiran, 2012), Turkey (Karaman *et al,.* 2015). It should be noted that this species and the Turkish congeneric *C. ruseni* Karaman, 2012, are the only two social parasite known in the hyper-diverse ant genus *Camponotus*. Where Italy is concerned, *C. universitatis* is known only from Calabria where the workers are found in a nest of *Camponotus aethiops* in the Paola village (Cosenza province) (Würmli, 1969) and in the South West Sardinia where we can found two gynes taken in the Marganai forest (Natural Park of Mount Linas, Marganai-Oridda, Sud Sardinia province) (Rigato and Toni 2011). It is interesting to highlight that, according to the original description the gyne of *C. universitatis,* has a 10-toothed mandible (Tinaut *et al.,* 1992), whereas we found only 7 teeth in the Salento specimen. Biomolecular researches on our specimen by Rabeling and collaborators, which is currently in progress, will clarify it's real taxonomic status. The Salento specimen was taken and isolated and not associated with a host species. New to Apulia and third report from Italy.

9) ***Cataglyphis italica* (Emery, 1906)**

Materials: Acquarica del Capo, 29.VII.2015, neighbourhood road Curti Vecchi, 39.924926, 18.25744, colony 15.210B, leg. Scupola A., (☿☿) (ASPC # 1179, 1180); Calimera, 6.X.2018, leg. Giannuzzi F., (☿☿) (ASPC # 836; MSNS 5); Calimera, 20.VII.2021,leg. Pellegrino G., (☿☿) (ASPC # 923; MSNS 152); Cutrofiano, 17.VII.2020, leg. Pellegrino G., (☿☿ errant in garrigue) (ASPC # 834; MSNS 71); Otranto, loc. Baia dei Turchi, VI.2017, leg. Scupola A., (☿☿on the edge of pine wood) (ASPC # 2667); San Donato di Lecce, 5.IV.2020, leg. Durante A. (☿☿) (ASPC # 5571; MSNS 107); Torre Rinalda, 25.VII.2021, leg. Mangiullo A., (☿, forest) (ASPC # 963, 805; MSNS 204).

Heliophilous species endemic from the Apulia region. In Salento despite being a common species they are reported from Brindisi, Galatone and Lecce only (Costa G., 1874; Forel, 1911; Emery, 1914b). The nest in sunny soils, in the open ground.

10) ***Colobopsis truncata*** **(Spinola, 1808)**

Materials: Acquarica del Capo, VII.2001, 39°55'N 18°15'E, (♃) (ASPC # 1009); Torre Vado, loc. Postu Vecchiu, 24.VI.2017, leg. Scupola A., (☿) (ASPC # 2938); Cutrofiano, 12.6.2020, leg. Pellegrino G., (♀, at ligth) (ASPC # 431).

Species first reported from Salento by Schifani *et al*. (2021b) based on specimens collected by Scupola from Torre Vado and Acquarica del Capo in Lecce province. The new samples confirms its presence ulteriorly.

11) ***Crematogaster scutellaris*** **(Olivier, 1792)**

Materials: Acquarica del Capo, 7.VIII.1996, leg. Scupola A., (☿☿) (ASPC # 1003, 1007); Acquarica del Capo, VII.2001, leg. Scupola A., (☿☿) (ASPC # 1005, 1006); Acquarica del Capo, 29.VII.2015, neighbourhood road Curti Vecchi, 39.924926, 18.25744, colony 15.210D, leg. Scupola A. (☿☿) (ASPC # 1136); Andrano, (coastal pine wood) VII.2014, leg. Pantaleo, (☿) (ASPC # 47); Laghi Alimini, VI.2000, leg. Scupola A., (☿☿) (ASPC # 1008); Laghi Alimini, 1.VIII.2020, leg. Durante A. (☿☿) (ASPC # 886; MSNS # 89); San Donato di Lecce, 17.III.2020, leg. Durante A. (☿☿) (ASPC # 830; MSNS # 1); San Donato di Lecce, 5.X.2020, leg. Durante A. (♂♂) (ASPC # 4246, 4292, 5431; MSNS # 137); San Donato di Lecce, 5.X.2020, leg. Durante A. (♀♀) (ASPC # 1820, 5269; MSNS # 138); San Donato di Lecce, 6.X.2020, leg. Durante A. (♂♂) (ASPC # 5272, 5314;; MSNS # 141); San Donato di Lecce, 6.X.2020, leg. Durante A. (♀♀) (ASPC # 1570, 5424; MSNS # 142); San Donato di Lecce, 13.XI.2021, leg. Durante A. (♀♀) (ASPC # 5274; MSNS # 219).

Very common arboricolous ant throughout Italy and islands. In Apulia sporadically reported from: Gargano, Bari (Forel, 1911; Emery, 1914a), Tremiti islands (Cecconi, 1908; Consani, 1951). In Salento it is incredibly reported from Castro marina only (Consani, 1951). The nest found in the dead parts of the trees in particular figs and olives.

12) ***Crematogaster sordidula*** **(Nylander, 1848)**

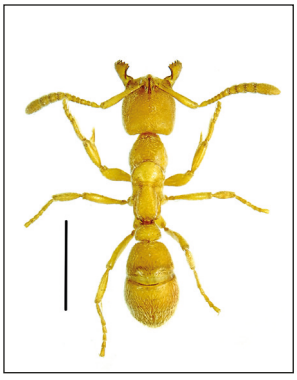
Materials: Acquarica del Capo, VII.2015, neighbourhood road Curti Vecchi, 39.55'N 18.15'E, leg. Scupola A. (☿) (ASPC # 5224).

Mediterranean terricolous uncommon species. In Italy known from many regions of the peninsula and Sicily. In Salento it is reported from Alessano and Castro marina by Consani (1951).

13) ***Cryptopone ochracea* (Mayr, 1855)**

Materials: Otranto, loc. Frassanito, 25.X.2020, leg. Giannuzzi F., (♀) (ASPC# 5324); Castro Marina, Cave Abisso di Castro Marina, 6.XI.2021, leg. Inguscio S., (☿) (ASPC # 914).

Hypogeic and hygrophilous uncommon Ponerine ant species, until now they have not been reported from Apulia by Baroni Urbani (1971a). The worker (Fig. 3), collected in a cave from Castro Marina (Fig. 4) is an exceptional report but most likely accidental. The ants are rarely reported from caves and often collected just beyond the entrance of the cave; in addition, in some cases the presence is considered occasional. The few species taken in the caves belong the genera *Aphaenogaster, Hypoponera, Leptogenys*. In general, these species do not exhibit adaptations to the cave life, except for the lighter body colour and eyes reduction. Only the *Leptogenys khammouanensis* Roncin and Deharveng, 2003 from Laos and Japanese *Aphaenogaster gamagumayaa* Naka and Maruyama, 2018 are considered true troglobiotic ants (Naka and Maruyama, 2018; Roncin and Deharveng, 2003). In Europe only *Hypoponera ragusai* (Emery, 1894), *H. punctatissima* Roger, 1859 and *Aphaenogaster cardenai* Espadaler, 1981 are reported from caves (Baroni Urbani, 1962; Mei, 1992; Tinaut, 2001; Tinaut and Pérez, 2011; Bolton and Fisher, 2011). The Salento occurrence of *Cryptopone* from a cave need confirmation with new additional data. New to Apulia.



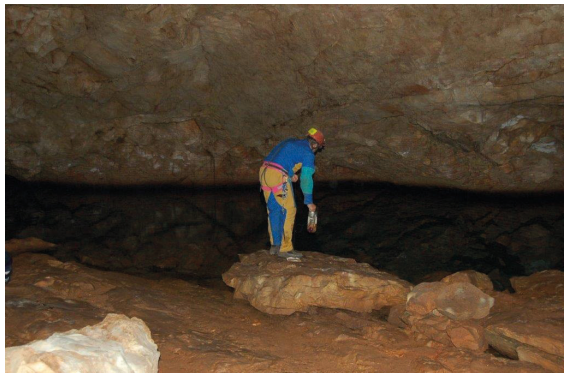


Fig. 3-4: 3 – *Cryptopone ochracea* (left). 4 – Cave "Abisso di Castro Marina" (rigth). (Photos by S. Inguscio).

14) ***Formica gagates*. Latreille, 1798**

Materials: Calimera, 23.III.2020, leg. Giannuzzi F., (☿ ☿) (ASPC # 882, 883; MSNS 18); Calimera, 21.VII.2021, leg. Pellegrino G., (☿ ☿) (ASPC # 1505, 1557; MSNS # 156).

Common species widespread in Europe and Caucaso. In Italy they are common in the Northern and the Central part of the peninsula, while in the South the species are reported in few and old reports from the Campania region (Naples, Coppola mount near Castellamare di Stabia and Portici near Naples) and from the Calabria region (Palizzi and Pollino mount) (Baroni Urbani, 1971a). Instead, in Apulia the only report (old) know for *Formica gagates* is located in the promontory of Gargano (Emery, 1914a). Now, the present first record from Salento confirms its presence in Apulia. *F. gagates* is thermophilic or xerotermophilous, and lives in shady places (often in extended forest of *Quercus* ssp. or mixed woods, also fragmented). The nuptial flight occurs from July to August. An interesting indirect observation on this species concerns symbiotic relations with the slave-maker ant *Polyergus rufescens* (Latreille, 1798). The latter is not present in South Italy, but in the old work of Costa G. (1874) there is a citation which concerns one specimen of *P. rufescens* taken in Galatone (Lecce province) in July 1852. It should be noted however that Baroni Urbani (1971a) speculates a possibly misidentification of this specimen, and assigns it to *Camponotus nylanderi*. However Costa G., in his work, gives a short description of the genus, he writes: "narrow arched or very pointed mandibles" and "body all faded brick red color, and somewhat polished, second tergite brownish red in colour". This description matches perfectly with *P. rufescens* and exclude *C. nylanderi* which are clearly bicoloured and have triangular mandibles. It is obvious that finding specimens of *Polyergus* in Salento is strongly needed, to resolve this interesting taxonomic problem. New to Salento.

15) ***Formica cunicularia* Latreille, 1798**

Materials: Cutrofiano, 5.VIII.2020, leg. Pellegrino G. (☿ ☿) errant in a cultivation (ASPC # 430, 833; MSNS 112); Laghi Alimini, VI.2000, (in pine wood) leg. Scupola A. (☿ ☿) (ASPC as *Formica* sp. (prope) *clara*); Laghi Alimini, 1.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 867; MSNS # 93); Lido Pineta (in pine wood) loc. between Torre San Giovanni and Torre Mozza, 25-29.VII.2015, leg. Scupola A. (☿ ☿) (ASPC as *Formica* sp. (prope) *clara*). Torre Vado, loc. Postu Vecchiu, VII.2016, leg. Scupola A. (☿ ☿) (ASPC # 1129, 1130).

Very common species in Italy, but not reported from Apulia until now (see Baroni Urbani, 1977; Scupola, 2016). Our determination is based on pilosity, body colour, morphological measures and the discriminant functions as proposed by Seifert (2018) to distinguish *F. cunicularia* from *F. clara* Forel, 1886. Using the discriminant, our results gave us $D < 0$, data that matched with those of *F. cunicularia*. Concerning the colour of our specimen's body, the identifica-

tion appears uncertain because the colour is strongly variable and approaching to that of *Formica* sp. (prope) *clara,* the other taxon reported in the same area by Scupola (2016). Now applying the discriminant to *F.* sp. (prope) *clara*, the result matched with *F. cunicularia*. In addition, the colour differences from the two Salento entities are intergradient, in particular the ochre area of the cheeks on head that in *F.* sp. (prope) *clara*, they are larger (with the exception of a specimen from Lido dei Pini (Ugento) where the clear pigmentation is red uced and similar to our specimens of *F. cunicularia,* with the ochre pigment not reaching or just at the base of the compound eyes). The clypeus is light in *F.* sp. (prope) *clara*, but in one specimen of Torre Vado it is darker like as in our *F. cunicularia*. The mesosoma in both entities appears always extensively clear (ochre), and with only a weak brown patch on promesonotal dorsum. There is an exception of one specimen of *F.* sp. (prope) *clara* where the patch is more extended also on the sides (note that generally the typical *F. cunicularia* is darker with dark sides of mesosoma and often with a narrow reddish ochre patch among the lateral pronotum and mesopleurae). The pilosity in both Salento entities have 0-1 standing setae on pronotal dorsum and 0 on mesonotum, therefore matching with typical *F. cunicularia*. At this point, it is our opinion that *F.* sp. (prope) *clara* must be redetermined as *F. cunicularia*. To conclude it should be noted also that the Salento *F. cunicularia* populations are composed of lighter populations only. In this regard Seifert (2018) points out that *F. cunicularia* samples have *clara*-type pigmentation, even if <5 %. New to Apulia.

16) ***Hypoponera punctatissima* (Roger, 1859)**

Materials: Cutrofiano, 30.VII.2020, leg. Pellegrino G., (♀) (ASPC # 1712; MSNS # 101); Cutrofiano, 20.VIII.2020, leg. Pellegrino G., (♀) (ASPC # 5225; MSNS # 131).

Widespread tramp species (Bolton and Fisher, 2011). The Italian occurrences are very rare and concern two old reports of Emery from the Lombardy region and Bologna (Emery, 1916) and two more recent reports from caves in Sardinia and Sicily (Bolton and Fisher, 2011). The males are ergatoids. New to Apulia.

17) ***Lasius emarginatus* (Olivier, 1792)**

Materials: Laghi Alimini, 1.VIII.2020, leg. Durante A., (☿☿) (ASPC # 862; MSNS # 93).

Very common species in Italy but uncommon in Salento, probably due to the scarcity of humid environments probably. In fact, Consani (1951) reported this species only for two localities (Castromarina and Alessano). Our specimens where collected in the coastal pine wood.

18) ***Lasius lasioides*** **(Emery, 1869)**

Materials: Calimera, 4.X.2020, leg. Durante A., (☿ ☿) (ASPC # 1516; MSNS # 136); San Donato di Lecce, 28.V.2020, leg. Durante A., (☿ ☿) (ASPC # 951; MSNS # 103); San Donato di Lecce, 10.IV.2020, leg. Durante A., (☿ ☿) (ASPC # 856, 958; MSNS # 110).

Species diffused in all Mediterranean area. Listed in the catalog of Baroni Urbani (1971a) as synonym of *L. alienus*. In general reported from central and southern Italy (Emery 1869, from Naples (loc. Typ.); Seifert, 1992, 2020), Sardinia (Rigato and Toni, 2011), Sicily (Schifani and Alicata, 2018) and Pantelleria (Mei, 1995). New to Apulia.

19) ***Lasius casewitzi*** **Seifert and Galkowski, 2016**

Materials: Frigole, 25.VII.2021, Mangiullo A., (☿ ☿) (Forest) (ASPC # 5276, 5322; MSNS 195).

Recently described as cryptic species of the *L. paralienus* species-complex, and considered endemic to Corsica (Seifert and Galkowki, 2016; Lebas and Galkowski, 2021). Recent new data extend the diffusion in North East Italy (Trieste) (Seifert, 2020b) and Sicily (Schar *et al.,* 2020). New to Apulia.

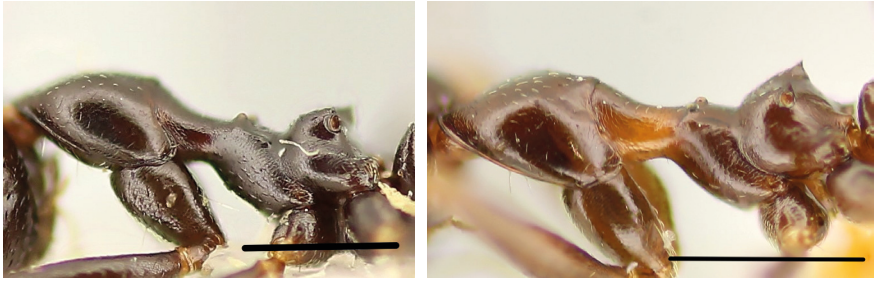
20) ***Lepisiota nigra*** **(Dalla Torre, 1893)**

Materials***:*** Acquarica del Capo, VIII.1984, loc. Madonna della grotta, leg. Scupola A., (☿ ☿, errant on flat rock slab between olive trees) (ASPC # 1131, 1132, 1133, 1134); Gallipoli, southern beach, 40.044421, 18.008316, 31.VII.2017, colony 15.212A, on rocks, leg. Scupola A. (☿ ☿) (ASPC # 1176); Morciano di Leuca, loc. San Gregorio (near cliff), 27.VII.2015, leg. Scupola A. (☿) (ASPC # 3048); Nardò, loc. Santa Maria al Bagno, 18.VII.2020, leg. Pellegrino G. (☿ ☿) (ASPC # 4096; MSNS # 75); Otranto, laghi Alimini, VIII.1987, leg. Scupola A. (☿ ☿, on the rocks in the beach) (ASPC # 970); Salve, 22.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 4147; MSNS # 123); Salve, 22.VIII.2020, leg. Durante A. (ASPC # 4284; MSNS # 128).

Uncommon diurnal ant, living along the coasts in southern Italy. In Salento Consani (1951) reported the species from Castro marina and Leuca marine localities. The nest is always located in the cracks of large marine rocks (in proximity to water, AS pers. observ.). The very interesting report of four specimens collected not far away from loc. Madonna della grotta (between Acquarica del Capo to Specchia) about 15 km from the ionic coast. This data indicates that the species is not linked to the sea rocks but they search for rocky environments in particular with very large outcropping stones well exposed to sun. The Salento *Lepisiota nigra* present some little differences compared to the populations from Campania and northern Apulia (Gargano). These differences reside in the body size, scapes, mesosomal colour (Figs. 5-9) and some biometric measures as follow (Tab.1):

Tab.1. Measures in mm and indices of the Apulian *Lepisiota nigra*.

	L. nigra from Gargano (n. 4 workers) (min-max)	*L. nigra* from Salento (n. 4 workers) (min-max)
Mesothorax colour	black	reddish
CL	0.720 – 0.756	0.640 – 0.720
CW	0.496 – 0.512	0.512 – 0.608
CI	65.9 – 68.8	79.2 – 84.4
SL	0.960 – 1.024	0.864 – 0.944
SI	193.5 – 206	155.2 –175.3
ML	1.115 – 1.168	1.008 – 1.088
TBL	1.040 – 1.072	0.776 – 0.928



Figs. 5-6, *Lepisiota nigra: 5* – mesosoma of specimen from Gargano (left). 6 – mesosoma of specimen from Salento (right). (Photos by A. Scupola). Scale bars 0.5 mm.

Figs 7-8, *Lepisiota nigra*: 7 – Scape of specimen from Gargano (left). 8 – Scape of specimen from Salento (right). (Photos by A. Scupola). Scale bars 0.25 mm.

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

Materials: Acquarica del Capo, VII. 2001, leg. Scupola A., (♂) (ASPC # 1975); Cutrofiano, 30.VII.2020, leg. Pellegrino G., (♂) (ASPC # 5271; MSNS # 100); Presicce, loc. Lido Marini, leg. Scupola A., 29.VI.2017, (☿ ☿) (ASPC # 2940); San Cataldo di Lecce, 29.VII.2020, 40°23'16"N 18°17'56"E, leg. Durante A. (☿ ☿) (ASPC # 446; # 449; MSNS 94); Santa Cesarea Terme (in pine wood), VII.2014, (☿ ☿) leg. Pantaleo, (ASPC # 46); San Foca, 16.VII.2020, leg. Giannuzzi F., (☿ ☿) (ASPC # 432; MSNS # 56).

Introduced species, also known as The Argentine ant, native from south America. In Italy at the beginning of the last century (Paoli, 1922; not 1920 as cited by Baroni Urbani 1971a) they spread quickly in the central and southern part of the peninsula (in particular along the coasts) and islands. Notoriously polygynic, this species lives in disturbed areas where they exhibits unicolonial popolutions formed by large, multiple queen colonies interconnected. *Linepithema humile* is deleterious for the native ant species and in some cases strongly reduces or exterminates the local myrmecofauna and the invertebrate communities too (Gómez and Espadaler, 2005; Wetterer, 2012). In Salento this ant is generically reported from the Lecce province (Melis, 1956) or from Lecce (Martelli, 1964; Melis, 1957). Now, this species is having more outbreaks in Salento, but it seems to be contrasted in its diffusion by the Dolichoderine ant *Tapinoma magnum* Mayr, 1861 (a polyginic species with the same habits but more aggressive). In this regard, AS (pers. observ.) have noted that in some houses with private garden, when colonies of *Tapinoma* are present no *Linepithema* are found and vice versa. In natural environments other antagonists that contrast the Argentine ant are *Tapinoma simrothi* Krausse, 1811, *Crematogaster scutellaris* and possibily *Pheidole pallidula* (Gómez and Espadaler, 2005).

22) ***Messor capitatus* (Latreille, 1798)**

Materials: Acquarica del Capo, VIII.1987, leg. Scupola (☿ ☿) ASPC # 4339, 5478); Lecce, 6.X.2020, leg. Durante A. (♀ ♀) (ASPC # 5273, 5226; MSNS # 143); San Donato di Lecce, 24.V.2020, leg. Durante A. (☿ ☿, errant on rural courtyard) (ASPC # 835; MSNS # 37); San Donato di Lecce, 24.V.2020, leg. Durante A. (☿ ☿, nest along the pathway to edges of olm oak) (ASPC # 438, 439; MSNS # 33); San Donato di Lecce, 3.V.2020, leg. Durante A. (☿ ☿, nest in the meadow) (ASPC # 853; MSNS # 36); Santa Maria di Leuca, 8-9. VI.1991 leg. Borsato W. (☿) (ASPC # 4083).

Very common granivorous species (harvester ant) diffused in the Italian peninsula and islands, but also present sporadically in some xerotermic oasis along the prealpine area from Piedmont to Veneto (Scupola, 2018). Brindisi and Alessano are the only occurrences from Salento (Forel, 1911; Consani, 1951), but this rarity is due to a lack of targeted collections only.

23) ***Messor ibericus* Santschi, 1925**

Materials: Acquarica del Capo, VIII.1987, leg. Scupola A., (☿ ☿) (ASPC # 4244, 4247, 4287, 5328); Acquarica del Capo, VII.2001, 39°55'0"N, 18°15'0"E, leg. Scupola A., (☿ ☿) (ASPC # 5095); Calimera, 17.VI.2020, leg. Durante A., (☿ ☿) (ASPC # 434, 854; MSNS # 48); Calimera, 20.VII.2020, leg. Pellegrino G., (☿ ☿) (ASPC # 1421; MSNS # 153); Calimera, 2-3.X.2018, leg. Giannuzzi F.(☿ ☿) (ASPC # 445; MSNS # 7); Gallipoli, loc. Rivabella, 18.VIII.2020, leg. Pellegrino G., (♀ ♀) (ASPC # 1509, 1502; MSNS # 117); Laghi Alimini, VI.2000, leg. Scupola, (☿) (ASPC # 4335).

A harvester ant common in Italy, but in the south of the peninsula it is less easy to see, perhaps for his crepuscular and nocturnal foraging activities (to note that in the northern Italy this species is diurnal, AS personal observ.). Until now in Salento, they where reported from Brindisi only (Forel, 1911). Nests in shaded places or in houses with private garden (AS pers. observ.).

24) ***Messor wasmanni* Krausse, 1910**

Materials: Acquarica del Capo, VIII.1987, leg. Scupola A., (☿) (ASPC # 4131); Acquarica del Capo, VII.1998, leg. Scupola A. (☿) (ASPC # 4045); Acquarica del Capo, 29.VII.2015, neighbourhood road Curti Vecchi, 39.924926, 18.25744, colony 15.210A, leg. Scupola A. (☿ ☿) (ASPC # 186, 1135); Gallipoli, loc. Rivabella, 10.VIII.2020, leg. Pellegrino G. (♀ ♀) (ASPC # 4187; MSNS # 117); Morciano di Leuca, loc. San Gregorio (near cliff), 7.VII.2015, colony 15.208G, (☿ ☿) (ASPC #3093); Pescoluse, (Salve), 6.VII.1998, (dune), leg. Scupola A. (☿ ☿) (ASPC # 4145); San Donato di Lecce, 4.IV.2020, leg. Durante A. (☿ ☿) (ASPC # 441, 442; MSNS # 29); San Donato di Lecce, 13.III.2021, leg. Durante A. (☿ ☿) (ASPC # 4033, 5525; MSNS # 145); Torre Rinalda, 25.VII.2021, leg. Mangiullo A. (☿ ☿) (ASPC # 904; MSNS # 214).

Harvester ant, common and diffused along the Italian peninsula and in Sardinia (but not in Sicily). In literature this large bicoloured *Messor* is reported from Santa Maria di Leuca and Castro marina only (Consani, 1951);

however, the lack of occurrences is due to deficiency of targeted collections only, in fact easily found in Salento.

25) ***Monomorium monomorium*** **Bolton, 1987**

Materials: Acquarica del Capo, VIII.1987, leg. Scupola (☿☿) (ASPC # 5423, 5570); Acquarica del Capo, VI.2000 leg. Scupola (☿☿) (ASPC #5374, 5472,5521); Acquarica del Capo, VII.2001, neighborhood road Curti Vecchi, 39.924926, 18.25744, leg Scupola A. (☿☿) (ASPC # 5358); Morciano di Leuca, loc. San Gregorio (near cliff), 27.VII.2015, leg. Scupola A. (☿) (ASPC # 3147); Torre Vado, loc. Postu Vecchiu, 24.VI.2017, (☿) (ASPC # 2937).

Rarely collected due to its very tiny size, *Monomorium monomorium* in Apulia is reported from Gargano promontory only (Emery, 1914a as *M. minutum* Mayr*,* 1855). The specimens are always collected in olive grove fields characterized by compact and bare soil with few herbs. New to Salento and has a confirmed presence in the Apulian region.

26) ***Nylanderia jaegerskioeldi*** **(Mayr, 1904)**

Materials: Torre Vado, 24.07.2022, at light, legg. Scupola M. and Cavalieri C., (♂) (ASPC # 5321).

Introduced African species reported also, from Madeira, Canary Islands and scattered localities in the Mediterranean (Morocco, Iberian peninsula, Balearic island, Italy, Ionian island, Turkey) (Lapolla *et al.*, 2011; Gómez, 2017). In Italy it is recently introduced: Sicily and Pantelleria island (Schifani and Alicata, 2018). New to Apulia.

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

Materials: Acquarica del Capo, VI.2000, leg. Scupola A., (♂) (ASPC # 5359); Acquarica del Capo, 26.VI.2017, (☿☿), leg. Scupola A. (☿☿) (ASPC # 2889); Calimera, 2-3.X.2018, leg. Giannuzzi F. (☿☿) (ASPC # 447; MSNS # 7); Calimera, 8.VII.2020, leg. Pellegrino G., (♀♀) (ASPC # 1524; MSNS # 146); Cutrofiano, 30.VII.2020, leg. Pellegrino G. (♀♀, ♂♂) (ASPC # 824, 910, 5216; MSNS # 100); Morciano di Leuca, loc. San Gregorio (near cliff), 27.VII.2015, leg. Scupola A., (☿☿, 2♀) (ASPC # 295); San Donato di Lecce, 14.VIII.2020, leg. Durante A. (☿☿) (ASPC # 1761; MSNS # 120); San Donato di Lecce,

29.IV.2020, leg. Durante A. (☿ ☿) (ASPC # 450; MSNS # 39); San Donato di Lecce, 5.IV.2020, leg. Durante A. (☿ ☿) (ASPC # 443, 482; MSNS # 40); Torre Vado, loc. Postu Vecchiu, 27.VII.2015, colony 15.208A, (☿, ♀) (ASPC # 236); Torre Vado, loc. Postu Vecchiu, VII.2016, (♀) (ASPC # 2424).

Very common species present throughout Italy and islands. In Salento it's easy to find but in literature is reported from these three localities only: Alessano, Monte Sardo (Consani, 1951), Brindisi (Forel, 1911). All the Salento *Pheidole pallidula* populations have normal specimens light in color, but one of the authors (AS) had observed a nest with blackish brown specimens, inside a house in Surbo (Lecce). The obscure morph is present here and there all over Italy and islands, but seems to be an ecological adaptation, still to be investigated.

28) ***Plagiolepis pallescens* Forel, 1888**

Materials: Acquarica del Capo, VI. 2000, leg. Scupola A. (☿ ☿) (ASPC # 562, 971, 972, 973); Lecce, 16.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 5215; MSNS # 132); San Donato di Lecce, 8.IV.2020, leg. Durante A. (☿ ☿) (ASPC # 444, 831, 881; MSNS # 41); San Donato di Lecce, 29.IV.2020, leg. Durante A. (☿ ☿) (ASPC # 5318; MSNS # 111); Torre Colimena, 26.VI.2020, leg. Durante A. (☿ ☿) (ASPC # 1226; MSNS # 64).

Polygynous little ant not reported from Apulia region by Baroni Urbani (1971a). *Plagiolepis pallescens* was studied by Salata *et al*. (2018) and partially by Seifert (2020). Occur from North Africa, Europe, Central Asia to Korea. Easy to confuse with the similar common species *P. pygmaea,* but the latter have short quadrate 3rd funicular segment much shorter than 4th and dense pubescence on dorsum of first gaster tergite, while in *P. pallescens* the two funicular segments are elongated, equal or subequal in length, and the pubescence on dorsum of first tergite widely-spaced. *Plagiolepis pallescens* forms small colonies in nests located under stones. The nuptial flights between June to August. New to Apulia.

29) ***Plagiolepis pygmaea* (Latreille, 1798)**

Materials: Sant'Andrea, 27.VI.2021, leg. Mangiullo A. (☿ ☿) (ASPC # 823; MSNS # 179).

Tiny ant, very common in all Italian regions. In Apulia is reported only

from Brindisi (Forel, 1911) e Castromarina (Consani, 1951). In Salento seems less frequent of the affine *P. pallescens*.

30) ***Plagiolepis (Paraplagiolepis) xene* Staercke, 1936**

Materials: Acquarica del Capo, VI.2000, leg. Scupola A. (♀) (ASPC # 974).

Rare workerless inquiline species of *Plagiolepis pygmaea,* here reported for the first time from Apulia. In the rest of Italy, they are known in Piedmont (Val Susa) (Staercke, 1936), Lombardy (Mantova) (coll. MSNM); Tuscan archipelago (Isolotto (islet) dei Topi near Elba island) (Baroni Urbani, 1968), Pontine islands (Zannone island, Ponza island) (Baroni Urbani, 1974), Veneto (Bussolengo) (Scupola, 1994); Sardinia (Alà dei Sardi) (Loi, 1913), Sicily (Palermo province) (Schifani, 2017) and from Acitrezza near Catania (coll. MSNM). In Salento the host *P. pygmaea* is uncommon, so it's possible that in this area *P. xene* have parasitic relationships with *P. pallescens*. In this regard it should be noted that Kutter (1977) report as host *P. vindobonensis* Lomnicki, 1925, a species now considered synonym of *P. pallescens* (Salata *et al.*, 2018). New to Apulia.

31) ***Solenopsis* sp. SAL-1**

Materials: Acquarica del Capo, VIII.1987, leg. Scupola (♀♀, ♂♂) (ASPC # 860, 872, 903, 924, 956, 5210, 5217, 5308, 5311, 5312); Acquarica del Capo 7.VIII.1991, leg. Scupola (♀♀) (ASPC # 812); Cutrofiano, 30.VII.2020, leg. Pellegrino G., (♀, ♂♂) (MSNS # 102).

Very interesting species. Baroni Urbani (1971a) listed in Apulia the common *Solenopsis fugax* (Latreille, 1798) only. So far, however, all samples gathered during our research in the Salento area, clearly belong to another species. Our specimens, here informally coded as *Solenopsis* SAL-1, consisting of alates (gynes associated to males), that are distinguishable from *S. fugax* for the following characteristics: **gynes** (Fig. 9) with minor size (TL around 4,43 mm vs *S. fugax* TL 4,7-6 mm), body clearly bicoloured with head and mesosoma paler brown that contrast both with deep yellow gaster (gynes of *S. fugax* are blackish brown in color). **Males** (Fig. 10) with TL around 3.28 mm, body black in colour, with frons smooth at sides (in *S. fugax* sides totally wrinkled and carinated longitudinally) and wing short (WGL/ML = 1.38 vs WGL/ML 3.45 of *S. fugax*). The taxonomic status of *Solenopsis* sp. SAL-1, however is not easy to define, because the genus *Solenopsis* Westwood,

1840 in West Palaearctic for a long time, needed revision. In addition, the taxonomy of some West Palaearctic species is based only on workers, notoriously a caste with individuals morphologically very similar among the various taxa; a situation that makes their taxonomic identification very problematic. Only the alates are more characteristics and informative. Recently Galkoswki *et al*. (2010) proposed four provisional morphological groups to divide the Western European *Solenopsis,* namely *S. fugax* group (formed by *S. fugax*, and ten controversial French species described by Bernard (1978), but now considered synonyms of *S. fugax,* see Antcat.org), *S. debilior* group (formed by *S. debilior* Santschi, 1934 only); *S. lusitanica* group (formed by *S. lusitanica* Emery, 1915; *S. gallica* Santschi, 1934; *S. balachowski* Bernard, 1959, the latter considered synonym of *fugax,* see Antcat.org), finally *S. orbula* group (formed by *S. orbula* Emery, 1875 only). Unfortunately, the East Mediterranean and the North East African species were not considered. Comparing the *Solenopsis* SAL-1 gynes, we found none with none match with the species of Galkowski's clusters except for *S. orbula*. In fact, the gynes in *S. fugax, S. debilior* and *S. lusitanica* groups are bigger (CW 0.85 to 0.90 mm and MW 0.80 to >1.00) and all blackish brown in colour (Galkowski *et al.,* 2010) while the minor sizes and the lighter gaster match with those of *S. orbula*. Note however that the head in *Solenopsis* SAL-1 is clearly shorter in respect to *S. orbula,* the latter with a considerably longer head (CW/CL 0.75, Galkowski *et al.*, 2010). Hence we give some measures concerning the gynes of these two species (Tab.2).

Tab. 2. Measures in mm and indices of the gynes of *Solenopis orbula* and *S. SAL-1*.

	Solenopsis orbula (1 gyne from Argentario, Tuscany)	*Solenopsis* SAL-1 (3 gynes from Acquarica del Capo, Salento) (min-max)
CL	0.784	0.688 – 0.768
CW	0.560	0.592 – 0.640
CI	71.4	81.2 – 90.9
SL	0.448	0.448 – 0.464
SI	80	70– 74.3
MW	0.520	0.576 – 0.608
ML	1.216	1.280 – 1.312

Analysing other species, first of all, we found the plethora of Santschi's Tunisian species, but all strongly in need of revision. Considering the great geographic distance between Tunisia and the Apulia, we consider unlikely that there are relations among the *Solenopsis* of the two areas. Furthermore, the North East African *S. lou* Forel, 1902 and *S. cooperi* Donisthorpe, 1947, both with bicoloured gynes (gaster lighter than head and mesosoma) but immediately distinguishable from *Solenopsis* Sal-1, for the much larger sizes of *S. lou* (TL 5.30-5.60) and the lighter brown to yellowish brow head and mes-

osoma, minor CI (73-79) and great ocelli of *S. cooperi* (Sharaf *et al.,* 2009). The remaining *Solenopsis,* most reported from East Mediterranean are: *S. crivellari* Menozzi, 1936, from Karpathos island, and Crete (Salata *et al.,* 2020), *S. kochi* Finzi, 1936 from Egypt (a very larger species), *S. latro* Forel, 1894 (a Maghrebian entity reported sporadically from East Mediterranean), *S. latro* ssp. *msilana* Forel, 1894 from Maghreb also, *S. latro* ssp. *sicula* Emery, 1915 from Sicily and finally *S. wolfi* Emery, 1915 from the Balkan area. Most of these species are described only as workers. The Italian subspecies *S. latro* ssp. s*icula* have blackish brown gynes (Schifani *et al*., 2021), and do not match with *Solenopsis* SAL-1. It is evident that in this situation assigning a particular species of the Salento specimens, without a general revision of the genus *Solenopsis* from West Palaearctic, especially based on biomolecular investigations, is premature, and prudently here we prefer to indicate them with an informal codes only. New to Apulia.

Figs. 9-10, *Solenopsis SAL-1*: 9 – gyne, (left). 10 – male, (right). (Photo by A. Scupola). Scale bars 1 mm.

32) ***Solenopsis* sp. SAL-2** (= SAL-1 ?)

Materials: San Cataldo di Lecce, 1.VIII.2020, leg. Durante A., (☿ ☿) (ASPC # 1605, 5213; MSNS # 96).

Some workers are found not associated with the alates. These specimens (Fig. 11) have TL = 1.85 mm, and are pale yellow in colour. Based on the original description and picture present in Antweb.org, the workers of *S. sp. SAL-2*, appear more similar to *S. latro* s.str.. in gaster colour (paler yellow), size and head shape. However, it should be noted that the presence of the Maghrebian *S. latro* (loc. Typ. Algeria) in the East Mediterranean (Balkan and Turkey in particular) in our opinion is uncertain, because the sporadically known reports are old and require confirmation. In addition, we do not exclude that *S. latro* s.str from the East Mediterranean is a different unidentified entity, to which it may belong the *Solenopsis* SAL-2 also. Moreover we

hypothesize that the specimens of *Solenopsis* SAL-2 are probably the workers of *Solenopsis* SAL-1, but only the discovery of nests with all the castes present will solve the problem of the exact attribution. So prudently here we prefer indicate these Salento workers with an informal codes only.

Fig. 11, *Solenopsis SAL-2:* worker, (Photo by A. Scupola). Scale bar 0.25 mm.

33) ***Solenopsis* sp. SAL-3**

Materials: Roca Vecchia, 7.IX.2020, leg. Giannuzzi F., (♂♂) (ASPC # 871; MSNS # 139).

Males of this taxon (Fig. 12) are similar to those *Solenopsis* SAL-1, but differing in the bigger CW (0.59 vs 0.65 in the *S.* SAL-1) and for the profile of the scutellum in lateral view bulging and protused (depressed and weakly protused in *S.* SAL-1). To be noted that the males of the *S. fugax,* the only species reported from Apulia (Baroni Urbani, 1971a) until now, are completely different in size and body shape compared to males of *S. SAL-1* and S. *SAL-3*. In fact, the male of *S. fugax* has a larger size (TL 4.41 – 4.92 vs 3.07- 3.28 in *S. SAL-1* and *S. SAL-3*), in addition, the head and pronotal sculpture is strong (with striae and fovee) while in the *S.* SAL1 and *S. SAL-3* is totally absent or very weak. New to Salento.

Fig. 12. *Solenopsis SAL-3*: male, (Photo by A. Scupola). Scale bar 1 mm.

34) ***Tapinoma magnum* Mayr, 1861**

Materials: Acquarica del Capo, leg. Scupola A. (☿ ☿) (ASPC); Laghi Alimini, 1.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 1669; MSNS # 87); Laghi Alimini, 1.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 5579; MSNS # 85); Presicce, loc. Lido Marini, 29.VI.2017, (☿) (ASPC # 2939); San Donato di Lecce, 4.IV.2020, leg. Durante A. (☿ ☿) (ASPC # 431, 4297; MSNS # 108); San Donato di Lecce, 8.V.2020, leg. Durante A. (☿ ☿) (ASPC # 480, 481, 484; MSNS # 43); San Donato di Lecce, 15.VII.2021, leg. Durante A. (☿ ☿) (ASPC # 5383; MSNS # 147).

The Italian populations of this polimorfic dolichoderine ant was known as *Tapinoma nigerrimum* Nylander, 1856 until revision by Seifert *et al*. (2017). Very common species in Salento in particular in the disturbed area (sidewalks, private or public gardens and in small dunes along the anthropized beaches). Brindisi is the only report known from literature (Forel, 1911). As for other Salento ant species, the lack of reports is due to absence of targeted collections only. The *Tapinoma magnum* is in strong competition with local populations of the invasive Argentine ant (see comment on *Linepithema humile*).

35) ***Temnothorax licthensteini* (Bondroit, 1918)**

Materials: Salve, 22.VIII.2020, leg. Durante (☿ ☿) (ASPC # 4808; MSNS # 124).

This widely distributed Mediterranean species is not reported from Apulia in the catalogue of Baroni Urbani (1971a). *T. lichtensteini* it is characterized by long to very long propodeal spines and bent to apexes. In a recent revision of this species, based on morphometric and biomolecular analysis, Csősz *et al*. (2014) they have identified three distinct lineages. The first two (both co-presents in Italy) widely distributed, are identified as "western" and "eastern" clusters, and characterized by incomplete speciation and for this reason both are not formally raised to species level. On the contrary, the third lineage, is a well-supported cluster, endemic to Peloponnese, and described formally as *T. laconicus* Csősz *et al.,* 2014. In this contest, the Salento specimens, relying on the general morphology and the ratio SPST/CS 0.370, match with *T. lichtensteini* (SPST/CS < 0.384). New to Apulia.

36) ***Temnothorax exilis*** (Emery, 1869)

Materials: Torre Vado, loc. Pescoluse (nest B, in dune), 6.VII.1998, leg. Scupola A. (☿ ☿) (ASPC # 859, 809, 815).

In Italy *Temnothorax exilis* is reported from central and southern regions and islands, but in Salento is cited only from Castro marina (Consani, 1951). Revised by Baroni Urbani (1971b) and Salata *et al*. (2018b) this species is variable in body colour (dark brown to bicoloured) and sculpture (especially in the development of striations on the posterior dorsum of head and dorsum of mesosoma, often both totally smooths). Salata *et al*. (2018b) postulated that in Greece there are 7 morphospecies present. Our Salento specimens are more sculpted in respect to Corsican and Sardinian specimens and therefore it is possible that they belong to one of the future taxa hypothesized by Salata and collaborators.

37) ***Temnothorax flavicornis*** **(Emery, 1870)**

Materials: Sant'Andrea, 27.VI.2021, leg. Mangiullo A. (☿☿) (ASPC # 5325; MSNS # 186); Cutrofiano, 30.VII.2020, leg. Pellegrino G. (♀♀) (ASPC # 858, 5275; MSNS # 99).

The workers and gynes of this rare yellow species are characterized by 11-segmented antennae (12 in the other T*emnothorax* except in some parasitic species as *T. ravouxi* (André, 1896) etc.). *T. flavicornis* is reported from scattered localities: France, Italy, Switzerland, Balkan area (Bulgaria, Croatia, Montenegro, Repubblic of North Macedonia, Serbia, Slovenia), Greece and Turkey (Galkowski, 2011; Lapeva-Gjonova *et al*., 2014; Borowiec and Salata, 2022). New to Apulia.

38) ***Temnothorax mediterraneus*** Ward, Brady, Fischer and Schultz, 2015

Materials: Acquarica del Capo, VII.2001, 39°55'N 18°15'E, leg. Scupola A., (☿) (ASPC # 2900).

Thyrrenian species (= *T. kraussei* Emery, 1916, Ward *et al*. 2015) reported from Spain and Andorra (Espadaler and Collingwood, 1982), Corsica, Sardinia, Sicily (Emery 1916), Malta (Schembri and Collingwood, 1995); Montenegro (Petrov, 2006; Karaman, 2011). On Anteweb.org they are reported also from Marocco. The citations of Croatia (Galkowski and Cagniant, 2017) need confirmation. *T. mediterraneus* belong the *T. angustulus* species group as postulated by Galkowski and Cagniant (2017). We noted, that in respect to the Corsican specimens our Salento specimens (plus a specimen from Calabria in ASPC) presents little biometric differences as follow (Tab.3).

Tab. 3. Measurement in mm and indices of *Temnothorax mediterraneus*.

	T. mediterraneus (1 worker from Salento)	*T. mediterraneus* (1 worker from Calabria)	*T. mediterraneus* (3 workers from Corsica) (min-max)
CL	0.672	0.672	0.680 – 0.704
PSL	0.112	0.120	0.144 – 0.152
PSL/CL	0.160	0.176	0.208 – 0.216
DPS	0.192	0.176	0.144 – 0.160
DPS/CL	0.280	0.256	0.208 – 0.224

In effect the distance of propodeal spines appears larger in the Salento specimens and the propodeal spines are a little longer in the Corsican specimens. Also, in the Italian specimens the mesosomal sculpture is coarser. It is possible that individuals from south Italy (and from Balkan area ?) are a different taxon in respect to Corsican *T. mediterraneus*. In the current state of our knowledges we need new Italian materials to support this hypothesis. New to Apulia.

39) ***Temnothorax parvulus* (Schenck, 1852)**

Materials: Calimera, 20.VII.2021, leg. Pellegrino G., (☿☿, ♀) (ASPC # 1606; MSNS # 154).

Species belonging to the *T. nylanderi* species group. These Salento specimens are identified as *T. parvulus* based on measurements and indices especially (see Csősz *et al.*, 2015). The ratios SPST/CS 0.30, PoOC/NOH 3.12, PoOC/CL 0.41, CL/CWb 1.20, match with the value given from Csősz and collaborators. On the other hand, we have noticed some morphological differences in respect to typical *T. parvulus,* in particular, median frons area not smooth, the vertexal head sculpture not only areolate (little longitudinal carinulae are present), metanotal sulcus very incospicuous, surface of clypeus with various carinulae near the median carina. It is possible that these little differences listed fall within the variability of the species (and that in *Temnothorax* is very accentuated). Further materials and studies are needed in future to confirm the present determination. New to Apulia.

40) ***Tetramorium diomedaeum* Emery, 1908**

Materials: Acquarica del Capo, VIII.1987, leg. Scupola A. (☿☿) (ASPC # 962); Acquarica del Capo, VII.2001, 39°55′ N 18°15′E, leg. Scupola A. (☿☿,♀) (ASPC # 866, 906, 953, 4348); Acquarica del Capo, VI.2000, leg. Scupo-

la A. (☿ ☿) (ASPC # 865); Salve, 22.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 803; MSNS # 130); Salve, 22.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 1567; MSNS # 129); Pescoluse (Salve) (dune), 6.VII.1998, leg. Scupola A. (♀) (ASPC # 5266).

Very characteristic yellow to light brown and weakly sculpted species, diffused from Italy to east Mediterranean. *T. diomedeum* belong the *T. ferox* species-complex (Csősz and Schulz, 2010) and appear similar to *T. aegeum* Radchenko, 1992, from Azerbaijan, but the latter is characterized by first gastral tergite with imbricate microsculpture in particular in the gynes (in *T. diomedeum* the surface is smooth). Other similar species are the Caucasian *T. densopilosum* Radchenko and Arakelian, 1990, and the western Paleartic *T. ferox* Ruzsky, 1903, both, however have a head and mesosoma more sculpted. In Italy, there is possible confusion with the *T. semilaeve,* however, the propodeal spines in the workers of *T. diomedeum* are very lower of the horizontal imaginary line of the promesonotum in profile. Also, the nodes in T. *diomedeum* are wider than in T. *semilaeve* (PW/ML 0.316 vs 0.281 of *T. semilaeve*) (Sanetra *et al.,* 1999). The nest of *T. diomedeum* are under stones in arid environment, or near the base of dry stone wall (AS pers. observ.). Rarely collected in Italy, reported from Marche, Apulia, Tremiti islands, Sicily and Sardinia. (Baroni Urbani, 1971a). In Salento is uncommon and until now reported from Castromarina, Alessano and Leuca only (Consani, 1951).

41) ***Tetramorium immigrans*** **Santschi, 1927**

Materials: Pescoluse (Salve), 6.VII.1998, (dune), leg. Scupola A. (☿ ☿) (ASPC # 857, 864).

The workers have been determined using Wagner *et al*. (2017) and the on-line keys on the *Tetramorium caespitum* species complex (in webapp of the University of Innsbruck). With respect to specimens from North Italy, our specimens have the carinulae on lateral and posterior side of postpetiole a little more accentuated. On the contrary, the longitudinal carinae on dorsum of mesosoma are very regular and not at all sinuous, typical of this species. *T. immigrans* is widespread in south Europe to Caucasus, and introduced in the Americas (Wagner *et al*., 2017). The Salento workers are found under a little plant in a dune and this coincides with the environmental preferences of this species. In fact, *T. immigrans* is termophilous and prefer dried environments, often sandy or rochy grasslands, in addition they are very common in open disturbed areas and above all in towns (in gardens, roads, sidewalks, stone walls). New to Salento.

42) ***Tetramorium indocile* Santschi, 1927**

Materials: Laghi Alimini, VI.2000, leg. Scupola A. (☿) (ASPC # 913); Acquarica del Capo, VIII.1987 (☿ ☿) (ASPC # 5220, 5270).

Other species belonging to the *Tetramorium caespitum* species complex and determined using the keys as the previous species. To be noted that in the two specimens from Acquarica del Capo, we have found two little morphological differences. In these specimens the body is light brown in colour (instead of dark brown to black), the propodeal spine is much protruded (SPST/CS = 0.23) and in particular the dorsum of postpetiole is microreticulate with some longitudinal thin carinulae at sides, and without the large smooth discal area typical in this species. The measurements indices and very reduced number of postocular carinae (head in lateral view) matches with *T. indocile*. Also, we have used the key of Seifert (2018) and also here the result macth with *T. indocile* (Discriminant < 0 vs > 0 in T. *caespitum*). This species is widespread from Iberian peninsula to Caucasus and present in central Asia (Kyrgyzstan). In Italy it is reported from scattered localities: Mazia/Matsch in Trentino Alto Adige, Velino mountain in Abruzzo and Morano Calabro in Calabria (Wagner *et al.*, 2017); Madonie in Sicily (Schifani and Alicata, 2018). New to Salento.

43) ***Tetramorium semilaeve* André, 1883**

Materials: Acquarica del Capo, VIII. 1987, leg. Scupola A. (☿ ☿) (ASPC # 802, 952, 1002); Acquarica del Capo, VI.2000, leg. Scupola A. (☿, ♂, ♀) (ASPC # 873, 907, 855, 5218); Acquarica del Capo, VII.2001, 39°55'N 18°15'E, leg. Scupola A. (☿ ☿, ♀, ♂♂) (ASPC # 905, 912, 5221, 5323); Laghi Alimini, 1.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 4180; MSNS # 90); Laghi Alimini, 1.VIII.2020, leg. Durante A. (☿ ☿) (ASPC # 1417; MSNS # 88); Torre Rinalda, 25.VII.2021, leg. Mangiullo A. (☿ ☿) (ASPC # 916, 960; MSNS # 207).

Species diffused in central and southern Italy and islands. Despite being a very common species, it is reported from Apulia from Grumo Appula near Bari (Baroni Urbani, 1968) and from Tremiti islands (Caprara e Pianosa dell'Adriatico) (Cecconi, 1910; Emery 1925b; Baroni Urbani 1968) only. New to Salento.

44) ***Tetramorium bicarinatum* (Nylander, 1846)**

Materials: Calimera, 8.XII.2021, leg. Durante A. (☿ ☿) (ASPC # 5261, 822; MSNS # 218, in the MSNS reptile house); Calimera, 29.VIII.2021, leg. Du-

rante A. (☿ ☿) (ASPC # 808, 922; MSNS # 167, in the MSNS butterfly house).

Introduced ant species considered invasive (Wetterer, 2009). In Italy reported from scattered locality due to accidental introduction: Lombardy (Limonta and Colombo, 2003); Calabria (Jucker *et al.,* 2008; Borowiec and Salata, 2015), Sicily (Schifani and Alicata, 2018). Until now there aren't reports off site from the Salento Museum.

DISCUSSIONS

Despite this study the knowledge of the ant fauna of Salento is still not satisfactory. The number of ant species rose to 58 (see updated list in appendix), but many Salento territories are still to be investigated. In addition, a number of particular environments (little relict woods, coastal humid zones, indoor semiarid or arid grassland, coastal garrigue and the calcareous hills known as Serre salentine in the South Salento) are waiting to be studied in more depth. On this subject it is presumable that many novelties are expected in the future. To give an example, *Stigmatomma impressifrons* Emery, 1869 has been seen by AS in the field in the 70s (loc. Acquarica del Capo), but unfortunately has not been collected, and so it needs confirmation.

Various species present taxonomic problems. For example *Lasius alienus* (Foerster, 1850) cited by Forel (1911 as *L. niger alienus*) is surely a misidentification and new samples are desirable to solve the problem. Some species do not have well defined taxonomic state. It is the case of some sexuals of the genus *Tetramorium* very difficult to assign to a species. New samples with associated workers are desirable to identify them. The same situation for the genus *Solenopsis* where citation of *Solenopsis fugax* needs confirmation, while the other Salento *Solenopsis* are still indeterminable and here identified by informal codes only (*Solenopsis* SAL-1, *S.* SAL-2, *S.* SAL-3). In this regard, unfortunately without a revision of the Mediterranean *Solenopsis* it is impossible to resolve this taxonomic problem for now. Other problems can be solved only with the help of biomolecular research. For example, *Formica cunicularia* and *Tetramorium indocile* that in Salento present specimens lighter to normal colour or *Temnothorax mediterraneus* and *Lepisiota nigra* that have little morphological and biometric differences compared to the typical form of the species. Particular attention must be given to the transadriatic species whose presence is always possible in Salento. For example the *Polyergus rufescens* (cited by Costa G. in 1874) despite being a species outside its Italian range, a possible presence may result from a migration from the Balkan areas where *Polyergus* is present. The interesting findings of the introduced species *Nylanderia jaegerskioldi*, *Linepithema humile*, *Hypopon-*

era punctatissima and *Tetramorium bicarinatum,* all in great expansion in the world. Some of these species in particular *Nylanderia* and *Linepithema*, can become a known problem for the indigenous ant fauna.

The Salento ants (Fig. 13) are characterized by the predominance of the Myrmicinae species with 28 taxa (48.27 %). Follow Formicinae with 19 (32.75 %), and Ponerinae and Dolichoderinae both with 3 (each 5.17 %). As regards to the geographic distribution, the species (informal coded species excluded) based on the chorotypes most represented (Tab. 4), are thus grouped: Mediterranean (MED 18.18 %), South European (SEU 10.09 %), West Mediterranean (WME 10.09 %). Also, well represented are the chorotypes South West European (EWS), East Mediterranean (EME), Italian endemic (ITAL) each of 9.09 %, and the Asiatic European (ASE 5.45 %). It is interesting the representation of Cosmopolitan represented by introduced species that reach 7.27 %. The remaining chorotypes of each does not exceed 1.81 %. The Mediterranean elements in a broad sense are predominant with 72.72 % of the total vs 20 % of the European in broad sense or widely spread (e.g. West Palaearctic). The species present in Europe and the Mediterranean but with eastern gravitation (ASE, EME, MES, TEM, TUE) constitute the 36.36 % while those with a western gravitation (ESW, TYRR, WME) are 30,74 %. It should be noted that the African species (AFM) are represented by only 1 species and the North African element are not present.

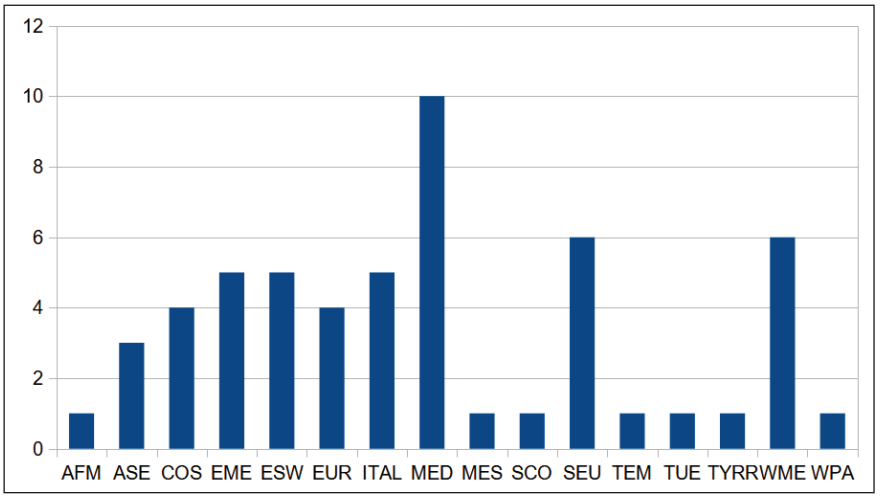


Fig. 13. Number of species based on the chorotypes. The acronyms follow Vigna Taglianti *et al*. (1993), Vigna Taglianti *et al*. (1999), Stoch and Vigna Taglianti (2006), and in part Parenzan 1994.

APPENDIX

Salento updated ants list

The checklist (tab. 4) is made with the data here presented and those reported from literature. The subfamilies and relative species are arranged in alphabetical order (in bold the species new to Salento).

Tab. 4. The Salento ant check-list.

	Taxa	Chorotypes	References
	DOLICHODERINAE		
1	*Bothriomyrmex costae*	ITAL	Emery 1869, 1925a
2	*Linepithema humile*	COS	Melis 1956, 1957; Martelli 1964
3	*Tapinoma magnum*	WME	Forel 1911
	FORMICINAE		
4	*Acropyga paleartica*	EME	Scupola *et al.* 2022
5	*Camponotus aethiops*	WPA	Costa G. 1874 (as *Formica pubescens*); Berlese 1904; Forel 1911; Consani 1951
6	*Camponotus dalmaticus*	EME	Consani 1951
7	*Camponotus lateralis*	MED	Forel 1911; Consani 1951
8	*Camponotus nylanderi*	ITAL	Costa G. 1874 (as *Polyergus rufescens*); Consani 1951
9	*Camponotus piceus*	ESW	Forel 1911
10	***Camponotus universitatis***	SEU	this work
11	*Cataglyphis italica*	ITAL	Costa G. 1974; Forel 1911; Emery 1914b, 1915, 1916
12	*Colobopsis truncata*	TEM	Schifani *et al.*, 2021b
13	***Formica cunicularia***	ASE	this work and Scupola 2016 (as *Formica* sp. (prope) *F. clara*)
14	***Formica gagates***	SEU	this work
15	*Lasius alienus*	EUR	Forel 1911
16	***Lasius casevitzi***	TYRR	this work
17	*Lasius emarginatus*	EUR	Consani 1951
18	***Lasius lasioides***	MED	this work
19	*Lepisiota nigra*	MES	Consani 1951
20	***Nylanderia jaegerskioeldi***	AFM	this work
21	***Plagiolepis pallescens***	ASE	this work
22	*Plagiolepis pygmaea*	ASE	Forel 1911; Consani 1951
23	***Plagiolepis xene***	ESW	this work
24	*Polyergus rufescens*	SEU	Costa G. 1874
	MYRMICINAE		

25	*Aphaenogaster campana*	ITAL	Consani 1951
26	***Aphaenogaster ichnusa***	ESW	this work
27	*Aphaenogaster ovaticeps*	EME	Scupola 2017 (as *Aphaenogaster muelleriana*)
28	*Aphaenogaster picena (= A. ionia)*	ITAL	Emery 1915, 1916; Forel 1911; Consani 1951; Boer 2013
29	***Aphaenogaster splendida***	MED	this work
30	*Crematogaster scutellaris*	WME	Consani 1951
31	*Crematogaster sordidula*	MED	Consani 1951
32	*Messor capitatus*	WME	Forel 1911; Consani 1951
33	*Messor ibericus (= M. structor)*	SEU	Forel 1911
34	*Messor wasmanni*	EME	Consani 1951
35	***Monomorium monomorium***	MED	this work
36	*Pheidole pallidula*	ESW	Forel 1911; Consani 1951
37	*Solenopsis fugax*	SEU	Forel 1911
38	***Solenopsis* sp_SAL-1**	---	this work
39	***Solenopsis* sp. SAL-2**	---	this work
40	**Solenopsis sp. SAL-3**	---	this work
41	*Strumigenys membranifera*	COS	Scupola 2017
42	*Temnohorax rottenbergii*	MED	Forel 1911
43	*Temnothorax angustulus*	WME	Consani 1951
44	*Temnothorax exilis*	MED	Consani 1951
45	***Temnothorax flavicornis***	EME	this work
46	***Temnothorax lichtensteini***	SEU	this work
47	***Temnothorax mediterraneus***	ESW	this work
48	***Temnothorax parvulus***	EUR	this work
49	*Temnothorax racovitzai*	WME	Consani 1951 (as *Temnothorax massiliensis*)
50	***Tetramorium bicarinatum***	COS	this work
51	*Tetramorium diomedeum*	MED	Consani 1951
52	***Tetramorium immigrans***	SCO	this work
53	***Tetramorium indocile***	TUE	this work
54	***Tetramorium semilaeve***	WME	this work
PONERINAE			
55	***Cryptopone ochracea***	MED	this work
56	*Hypoponera abeillei*	MED	Schifani *et al.* 2021
57	***Hypoponera punctatissima***	COS	this work
58	*Ponera testacea*	EUR	Scupola 2006

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REFERENCES

Antweb. Version 8.76.4. – California Academy of Science, online at https://www.antweb.org. Accessed 23 June 2022.

Andoni V., 1977 – Kontribut mbi himenopterët e familjes Formicidae të vendit tonë. Buletin i Shkencave të Natyres. Tiranë, 31 (2): 93-101.

Baldacci O., 1962 – Puglia. In: Almagià R. (ed.)., Le Regioni d'Italia, Vol.14., UTET, Torino.

Baroni Urbani, C., 1962 – Studi sulla mirmecofauna d'Italia. I. Redia, 47: 129-138.

Baroni Urbani, C., 1968 – Studi sulla mirmecofauna d'Italia – VII. L'isola di Montecristo. Atti Società Toscana di Scienze Naturali, 75: 95-107.

Baroni Urbani C., 1971a – Catalogo delle specie di Formicidae d'Italia (Studi sulla mirmecofauna d'Italia X). Memorie della Società Entomologica Italiana, 50: 5-287.

Baroni Urbani C. 1971b – Studien zur Ameisenfauna Italiens XI. Die Ameisen des ToskanischenArchipels. Betrachtungen zur Herkunft der Inselfaunen. Revue Suisse de Zoologie, 78: 1037-1067.

Baroni Urbani C., 1974 – Studi sulla mirmecofauna d'Italia. XII. Le isole Pontine. Fragmenta Entomologica, 9: 226-252.

Berlese A., 1904 – Illustrazione iconografica degli Acari mirmecofili. Redia , I, (II): 299-474.

Bernadou A., Fourcassié V., Espadaler X., 2013 – A preliminary checklist of the ants (Hymenoptera, Formicidae) of Andorra. ZooKeys 277: 13–23 (2013) DOI: 10.3897/zookeys.277.4684.

Bernard F., 1978 – Révision des *Diplorhoptrum* de France, fourmis plus différenciées par l'écologie que par leurs formes (Hym. Formicidae). Annales de la Société Entomologique de France (n.s.)13: 543-577.

Bolton B., Fisher B.L., 2011 – Taxonomy of Afrotropical and West Palaearctic ants of the ponerine genus *Hypoponera* Santschi. Zootaxa 2843: 1-118.

Boer P., 2013 – Revision of the European ants of the *Aphaenogaster testaceopilosa*-group (Hymenoptera: Formicidae). Tijdschrift voor Entomologie 156: 57-93.

Borowiec L., Salata S. 2015 – *Pheidole symbiotica* WASMANN, 1909, an enigmatic

supposed social parasite, is a nematode-infested form of *Pheidole pallidula* (NYLANDER, 1849) (Hymenoptera: Formicidae: Myrmicinae). Sociobiology, 62 (2): 181-186.

Borowiec L., Salata S., 2022 – Notes on ants (Hymenoptera: Formicidae) of Thassos Island, Greece. Annals of the Upper Silesian Museum in Bytom Entomology, 31 (online 002): 1–15. Issn 0867-1966, e Issn 2544-039x (online) Bytom, 17.02.2022 http://doi.org/10.5281/zenodo.6123287.

Cecconi G., 1908 – Contributo alla fauna della Isole Tremiti. Bollettino dei Musei di Zoologia ed Anatomia comparata della Regia Università di Torino, XXIII, n. 583: 53 pp.

Cecconi G., 1910 – Contributo alla fauna dell'isola di Pianosa nell'Adriatico. Bollettino dei Musei di Zoologia ed Anatomia comparata della Regia Università di Torino, XXV, n. 627: 9 pp.

Consani M., 1951 – Formiche di Puglia e delle Isole Tremiti. Memorie di Biogeografia Adriatica, II: 25-32.

Costa G., 1874 – Fauna salentina ossia enumerazione di tutti gli animali che trovasi nelle diverse contrade nella provincia di Terra d'Otranto e nelle acque de' due mari che la bagnano, contenente la descrizione dei nuovi o poco esattamente conosciuti. Lecce, Tipografia Ed. Salentina, vol II: 337-624 pp.

Csősz S., Schulz A., 2010 – A taxonomic review of the Palaearctic *Tetramorium ferox* species-complex (Hymenoptera, Formicidae). Zootaxa 2401: 1-29.

Csősz S., Seifert B., Müller B., Trindl A., Schulz A., Heinze J., 2014 – Cryptic diversity in the Mediterranean *Temnothorax lichtensteini* species complex (Hymenoptera: Formicidae). Organism Diversity and Evolution 14: 75–88. DOI 10.1007/s13127-013-0153-3.

Csősz S., Heinze J, Mikó I., 2015. – Taxonomic Synopsis of the Ponto-Mediterranean Ants of *Temnothorax nylanderi* Species-Group. PLoS ONE 10(11): e0140000. doi:10.1371/journal. pone.014000.

Durante A., 2016. Farfalle diurne del Salento. Edizioni Grifo, Lecce: 143 pp.

Durante A., Potenza L., 2016 – Hadenini and Glottulini of the Salento (South Italy) (Lepidoptera, Noctuidae). Thalassia Salentina, 38: 81-98.

Emery C., 1869 – Genus *Bothriomyrmex*. Annali del Museo Zoologico della Regia Università di Napoli, V: 117-118.

Emery C., 1914a – Wissenschaftliche Ergebnisse der Bearbeitung von O. Leonhard's Sammlungen. 5. Südeuropäische Ameisen (Hym.). Entomologische Mitteilungen. Berlin-Dahlem, 3: 156-159.

Emery C., 1914b – Nota sulle formiche della collezione sarda e della collezione dell'Italia meridionale, radunate da Achille Costa, e conservate nel Museo Zoologico della Regia Università di Napoli. Annali del Museo Zoologico della Regia Università, Napoli (n.s.), 4 (18): 1-3.

Emery C., 1915 – Contributo alla conoscenza delle formiche delle isole italiane. Descrizioni di forme mediterranee nuove o critiche. Annali Museo civico di Storia Naturale, Genova, ser. 3A, VI (XLVI): 244-270.

Emery C., 1916 – Fauna entomologica italiana. I. Hymenoptera-Formicidae. Bulletino della Società entomologica Italiana, XLVII (1915): 79-275.

Emery C., 1925a. – Les espèces europèpéennes et orientales di genre *Bothriomyrmex*. Bulletin Société Vaudois des Sciences Naturelles, 56 (216): 1-22.

Emery C., 1925a. – Notes critiques de Myrmécologie. Annales et Bulletin de la Société Entomologiques de Belgique. LXV: 177-191.

Espadaler X., 1981 – *Camponotus universitatis* Forel, 1890, retrouvé en France. Vie Milieu, 31:341-342.

Espadaler X., 1997 – Catàleg de les formigues (Hymenoptera: Formicidae) dels països catalans. Ses. Entom. ICHN-SCL, Barcelona, IX (1995): 23-42.
Espadaler X, Collingwood C. A., 1982 – Notas sobre *Leptothorax* Mayr, 1855, con descripción de *L. gredosi*, n.sp. (Hymenoptera, Formicidae). Boletín Asociación Española de Entomología, Salamanca 6 (1): 41-48.
Forel A., 1890 – Une nouvelle fourmi. Naturaliste 12: 217-218.
Forel A.,1904 – Miscellanea myrmécologiques. Revue Suisse de Zoologie, 12: 1-52
Forel A., 1911 – Fourmis nouvelles ou intéressant. Bulletin de la Société Vaudoise des Sciences Naturelle, XLVII (173): 311-400.
Forel A., 1915 – Die ameisen der Schweiz. Mitteilungen der Schweizerischen Entomologischen Gesellschaft XII, h. 7/8:1-77.
Galkowski C., 2011 – Une liste des fourmis (Hymenoptera, Formicidae) récoltées dans la région de Grasse, avec la mention d'une nouvelle espèce de la faune de France. Bulletin de la Société linnéenne de Provence, 62 : 41-44.
Galkowski C., Casevitz-Weulersse J., Cagniant H., 2010 – Redescription de *Solenopsis fugax* (Latreille, 1798) et notes sur les *Solenopsis* de France (Hymenoptera, Formicidae). Revue Française d'Entomologie (Nouvelle Série) 32 (3-4): 151-163.
Galkowski C., Cagniant H., 2017 – Contribution à la connaissance des fourmis du groupe *angustulus* dans le genre *Temnothorax* (Hymenoptera, Formicidae) Revue de l'Association Roussillonnaise d'Entomologie, tome XXVI (4): 180-191.
Galkowski C., Aubert C., Blatrix R., 2019 – *Aphaenogaster ichnusa* Santschi, 1925, bona species, and redescription of *Aphaenogaster subterranea* (Latreille, 1798) (Hymenoptera, Formicidae). Sociobiology 66: 420- 425. DOI:10.13102/sociobiology.v66i3.3660.
Gómez K. 2017 – Two species of exotic ants (Hymenoptera: Formicidae) new to Malta. Boletín de la Sociedad Entomológica Aragonesa, 61: 233-235.
Gómez K., Espadaler X., 2005 – La hormiga argentina (*Linepithema humile*) en las islas Baleares. Listado preliminar de las hormigas de las islas Baleares. Documents Tècnics de Conservaciò 13: 1-68.
Guillem R.M., Drijfhout F., Martin S.J., 2014. Chemical deception among ant social parasites. Current Zoology 60 (1): 62-75.
Jucker C., Rigato F., Regalin R. 2008 – Exotic ant records from Italy (Hymenoptera Formicidae).
Bollettino di Zoologia agraria e di Bachicoltura, 40 (1): 99-107.
Karaman M. G. 2011 – A catalogue of the ants (Hymenoptera, Formicidae) of Montenegro. Podgorica: Catalogues 3, Volume 2, Montenegrin Academy of Sciences and Arts, 140 pp.
Karaman C., Kiran K., Aksoy V., Camlitepe Y., 2015 – First record of the South European rare parasitic ant species *Camponotus universitatis* Forel (Hymenoptera, Formicidae) in Asia. Journal of the Entomological Research Society, 17(1), 45.
Kutter H., 1936 – Neue Schweizerameisen. Mitteilungen der Schweizerischen Entomologischen Gesellschaft, 16: 722.
Kutter H. 1977 – Hymenoptera, Formicidae. Insecta Helvetica. Fauna 6: 1-298.
Lapeva-Gjonova A., Kiran K., 2012 – Ant fauna (Hymenoptera, Formicidae) of Strandzha (Istranca) Mountain and adjacent Black Sea coast. North-Western Journal of Zoology 8(1):72-84.
Lapeva-Gjonova A., Kiran K., Karaman C., 2014 – First Records of *Temnothorax flavicornis* (Emery, 1870) (Hymenoptera: Formicidae) in Bulgaria and Turkey. Acta Zoologica Bulgarica 66 (4): 571-574.
Lapolla J. S., Hawkes P. G., Fisher B. L., 2011 – Monograph of *Nylanderia* (Hymenoptera: Formicidae) of the World, Part I: *Nylanderia* in the Afrotropics. Zootaxa, 3110: 10-36.

Lebas C., Galkowski, C. 2021 – Description de la reine et du mâle de *Lasius casevitzi* Seifert & Galkowski, 2016 (Hymenoptera, Formicidae). Bull. Soc. Linn. Bordeaux 156, nouv. série n° 49 (4): 386-390.

Limonta L., Colombo M., 2003 – Record of *Pheidole megacephala* (F.), *Pheidole nodus* Smith and *Tetramorium bicarinatum* Nylander (Hymenoptera, Formicidae), tropical species, in nursery imported plants. Bollettino di Zoologia agraria e di Bachicoltura, 35: 287-289.

Loi A., 2013 – Osservazioni sulla mirmecofauna e l'afidofauna della quercia da sughero in Sardegna. - Doctoral Thesis at the University of Sassari, 72 pp.

Marchiori S., Tornadore N., 1988 – Aspetti quantitativi e qualitativi della flora del Salento (Puglia meridionale - Italia). Thalassia Salentina, 18: 21-46.

Martelli G.M., 1964 – Per la difesa di alcune colture (Note pratiche di Entomologia agraria) Quaderno tecnico, 1: 113 pp.

Mei M., 1992 – Su alcune specie endogee e criptobiotiche della mirmecofauna italiana. Fragmenta entomologica, Roma, 23 (2): 411-422.

Mei M., 1995 – Arthropoda di Lampedusa, Linosa e Pantelleria (Canale di Sicilia, Mar Mediterraneo). Hymenoptera Formicidae (con diagnosi di due nuove specie). Il Naturalista Siciliano (4)19 (suppl.): 753-772.

Melis A., 1956 – Elenco delle principali specie animali che hanno prodotto infestazioni degne di nota in Italia durante l'anno 1955. Redia (Appendice), 41: III-XII.

Melis A., 1957 – Elenco delle principali specie animali che hanno prodotto infestazioni degne di nota in Italia durante l'anno 1956. Redia (Appendice), 42: III-XVII.

Naka t., Maruyama m., 2018 – *Aphaenogaster gamagumayaa* sp. nov.: the first troglobiotic ant from Japan (Hymenoptera: Formicidae: Myrmicinae). Zootaxa 4450 (1): 135–141. DOI/10.11646/zootaxa.4450.1.10.

Paoli G., 1922 – Un metodo di difendere le piante contro gli assalti della formica dell'Argentina. La Costa Azzurra agricolo-Floreale , A, II, (6): 1-4.

Parenzan P., 1994 – Proposta di codificazione per una gestione informatica dei corotipi W-paleartici, con particolare riferimento alla fauna italiana. Entomologica, 28: 93-98.

Petrov I., 2006 – The ants of Serbia and Montenegro. Posebna Izdanja. Srpska Akademija Nauka i Umetnosti 656: 1-136.

Rigato F., Toni I., 2011. Short notes 21. Hymenoptera, Formicidae. Pp. 873-882 in: Nardi, G.; Whitmore, D.; Bardiani, M.; Birtele, D.; Mason, F.; Spada, L.; Cerretti, P. (eds.) 2011. Biodiversity of Marganai and Montimannu (Sardinia). Research in the framework of the ICP Forests network. Conservazione Habitat Invertebrati, 5. Sommacampagna, Verona: Cierre Edizioni, 896 pp.

Roncin, E., Deharveng L., 2003 – *Leptogenys khammouanensis* sp. nov. (Hymenoptera: Formicidae). A possible troglobitic species of Laos, with a discussion on cave ants. Zoological Science (Tokyo). 20 (7): 919-924.

Salata S., Borowiec L., Radchenko A. G., 2018 – Description of *Plagiolepis perperamus*, a new species from East-Mediterranean and redescription of *Plagiolepis pallescens* Forel, 1889 (Hymenoptera: Formicidae). Annales Zoologici (Warszawa), 68 (4): 809-824.

Salata S., Borowiec L., Trichas A., 2018b – Taxonomic revision of the cretan fauna of the genus *Temnothorax* Mayr, 1861 (Hymenoptera: Formicidae), with notes on the endemism of ant fauna of Crete. Annales Zoologici (Warszawa), 68(4): 769-808.

Salata S., Borowiec L., Trichas A., 2020. Review of ants (Hymenoptera: Formicidae) of Crete, with keys to species determination and zoogeographical remarks. Monographs of the Upper Silesian Museum 12: 5-296.

Salata S., Karaman C., Kiran K., Borowiec L., 2021 – Review of the *Aphaenogaster splendida* species-group (Hymenoptera: Formicidae). Annales Zoologici 71: 297-343. DOI:10.3161/00034541ANZ2021.71.2.008.

Sanetra M., Güsten R., Schulz A., 1999 – On the taxonomy and distribution of Italian *Tetramorium* species and their social parasites (Hymenoptera Formicidae). Memorie della Società Entomologica Italiana 77 (1998): 317-357.

Schär S., Menchetti M., Schifani E., Hinojosa J.C., Platania L., Dapporto L., Vila R., 2020. Integrative biodiversity inventory of ants from a Sicilian archipelago reveals high diversity on young volcanic islands (Hymenoptera: Formicidae). Organisms Diversity, Evolution 20, 405–416. doi:10.1007/s13127-020-00442-3.

Schembri S.P., Collingwood C. A., 1995 – The myrmecofauna of the Maltese Islands. Remarks and additions (Hymenoptera Formicidae). Bollettino della Società Entomologica Italiana 127:153-158.

Schifani E., 2017 – First record of the vulnerable social parasite ant *Plagiolepis grassei* in Italy (Hymenoptera: Formicidae). Fragmenta entomologica, 49 (1): 61-64.

Schifani E., Alicata A., 2018 – Exploring the myrmecofauna of Sicily: thirty-two new ant species recorded, including six new to Italy and many new aliens (Hymenoptera, Formicidae). Polish Journal of Entomology, 87 (4): 323-348.

Schifani E., Csősz S. Viviano R., Alicata A., 2021 – Ant diversity on the largest Mediterranean islands: on the presence or absence of 28 species in Sicily (Hymenoptera, Formicidae). Atti della Società italiana di Scienze naturali, Museo civico Storia naturale, Milano, 8 (1): 55-70. DOI: 10.4081/nhs.2021.532.

Schifani E., Giannetti D., Csősz S., Castellucci F., Luchetti A., Castracani C., Fiorenza A. Spotti F.A., Mori A.. Grasso D.A., 2021b. Is mimicry a diversification-driver in ants? Biogeography, ecology, ethology, genetics and morphology define a second West-Palaearctic *Colobopsis* species (Hymenoptera: Formicidae). Zoological Journal of the Linnean Society, 2021, XX, 1-27.

Schifani E., Alicata A, Menchetti M., Borowiec L., Fisher B.L., Karaman C., Kiran K., Oueslati W., Salata S., Blatrix R., 2022 – Revisiting the morphological species groups of West-Palearctic *Aphaenogaster* ants (Hymenoptera: Formicidae) under a phylogenetic perspective: toward an evolutionary classification. Arthropod Systematics & Phylogeny 80, 2022, 627–648. DOI 10.3897/asp.80.e84428

Scupola A., 1994 – Contributo alla mirmecofauna italiana. Bollettino del Museo civico di Storia Naturale di Verona, 18 (1991): 133-136.

Scupola A., 2006 – *Ponera coarctata* var. *crassisquama* Emery,1916 a new synonym of *P. testacea* Emery, 1895 (Hymenoptera, Formicidae). Bollettino del Museo di Storia Naturale di Verona, 30 Botanica-Zoologia, 161-164.

Scupola A., 2016 – First records of the ants genus *Formica* Linnaeus, 1758 (Hymenoptera Formicidae) from the coastal pine woods of Salento peninsula (Apulia, southern Italy). Thalassia salentina, 38: 137-141.

Scupola A., 2017 – *Aphaenogaster muelleriana* Wolf, 1915 (Hymenoptera Formicidae) in Salento (South East Italy). Biodiversity Journal, 8 (1): 3-8.

Scupola, A. 2018 – La formiche del Veneto. The ants of Veneto. WBA Handbooks 9. WBA Project Ed. Verona. 336 pages.

Scupola A., 2019. – The *Strumigenys membranifera* (Emery, 1869) in Salento (Apulia) and updating its occurrence in Italy (Hymenoptera Formicidae). Bollettino del Museo Civico di Storia Naturale di Verona, 43, Botanica Zoologia: 25-27.

Scupola A., Durante A., Giannuzzi F., Pellizzari G., 2022 – The coccid-tending ant genus *Acropyga* Roger and its obligate associated myrmecophilous scale insect genus *Eumyrmococcus* Silvestri new to Italy (Hymenoptera: Formicidae; Hemiptera: Xenococcidae). Fragmenta entomologica, 54 (1): 89–94. DOI: 10.13133/2284-4880/722.

Seifert B., 2018 – The Ants of Central and North Europa. Lutra Verlags- und Vertriebsgesellschaft, Tauer: 408 pp.

Seifert B., 2020 – Revision of the *Plagiolepis schmitzii* group with description of *Pl. invadens* sp. nov. – a new invasive supercolonial species. Deutsche Entomologische Zeitschrift 67 (2): 83–196 DOI 10.3897/dez.67.53199.

Seifert B., 2020b – A taxonomic revision of the Palaearctic members of the subgenus *Lasius* s.str. (Hymenoptera, Formicidae). Soil Organisms 92(1): 15-86 (doi:10.25674/so92iss1pp15.

Seifert B., Galkowski C., 2016 – The Westpalaearctic *Lasius paralienus* complex (Hymenoptera: Formicidae)contains three species. Zootaxa 4132 (1): 044–058. DOI: 10.11646/zootaxa.4132.1.4.

Seifert B., D'Eustacchio D., Kaufmann B. E, Centorame M., Modica M., 2017 – Four species within the supercolonial ants of the *Tapinoma nigerrimum* complex revealed by integrative taxonomy (Hymenoptera: Formicidae). Myrmecological News 24: 123-144.

Sharaf M.R., Taylor B., Klingenberg C., 2009 – Ants of the genus *Solenopsis* Westwood, 1840 in Egypt with a description of the worker caste of *S. cooperi* Donisthorpe, 1947. Zootaxa 2004: 49-58.

Stärcke A., 1936 – Retouches sur quelques fourmis d'Europe. I. *Plagiolepis xene* nov. sp. et *Pl. vindobonensis* Lomnicki. Entomologische Berichten (Amsterdam) 9: 277-279.

Stoch F., Vigna Taglianti A., 2006. I corotipi della fauna italiana. In: Ruffo S., Stoch F. (ed.), Checklist e distribuzione della fauna italiana. Memorie del Museo Civico di Storia Naturale di Verona, serie 2, Sezione Scienze della Vita 17: 25-28.

Tinaut A., 2001 – *Hypoponera ragusai* (Emery, 1895) una hormiga cavernícola nueva para la península Ibérica (Hymenoptera, Formicidae). Graellsia, 57(1), 3-8.

Tinaut, A., Espadaler X., Jimenez J., 1992 – *Camponotus universitatis* Forel, 1891, en la Peninsula Iberica. Descripcion de sus sexuados (Hymenoptera, Formicidae). Nouvelle Revue d'Entomologie 9: 233-238.

Tinaut A., Pérez T., 2011 – *Aphaenogaster cardenai* Espalader, 1981, una hormiga ligada con las cavidades. Actualización de su distribución (Hymenoptera, Formicidae). Monografias Bioespeleológicas. 6: 4-6.

Vigna Taglianti A., Audisio P.A., Belfiore C., Biondi M., Bologna M.A., Carpaneto G.M., De Biase A., De Felici S., Piattella E., Racheli T., Zapparoli M., Zoia S., 1993. Riflessioni di gruppo sui corotipi fondamentali della fauna W-paleartica ed in particolare italiana. Biogeographia, Lavori della Società Italiana di Biogeografia, (n.s.), 16 (1992): 159-179.

Vigna Taglianti A., Audisio P.A., Biondi M., Bologna M.A., Carpaneto G.M., De Biase A., Fattorini S., Piattella E., Sindaco R., Venchi A., Zapparoli M., 1999. A proposal for a chorotype classification of the Near East fauna, in the framework of the Western Palearctic region. Biogeographia, Lavori della Società Italiana di Biogeografia, (n.s.), 20: 31-59.

Wagner H.C., Arthofer W., Seifert B., Muster C., Steiner F.M., Schlick-Steiner B.C., 2017 – Light at end of the tunnel: Integrative taxonomy delimits cryptic species in the *Tetramorium* complex (Hymenoptera: Formicidae). Myrmecological News, 25: 95-129.

Ward P. S., Brady S. G., Fisher B. L., Schultz T. R., 2015 – The evolution of myrmicine ants: phylogeny and biogeography of a hyperdiverse ant clade (Hymenoptera: Formicidae). Systematic Entomology, 40: 61-81. DOI: 10.1111/syen.12090.

Wetterer J. K., 2009 – Worldwide spread of the penny ant, *Tetramorium bicarinatum* (Hymenoptera: Formicidae). Sociobiology 54 (3) (2009): 811-830.

Wetterer J.K., 2012. Worldwide spread of the Argentine ant, *Linepithema humile* (Hymenoptera: Formicidae). Myrmecological News 12: 187-194.
Würmli M., 1969 – Due interessanti reperti mirmecologici per la fauna d'Italia (Hymenoptera, Formicidae). Bollettino della Societa` Entomologica Italiana, 99–101: 208-210.