An inventory of the spider species of Barcelonnette (France), with taxonomic notes on *Piniphantes agnellus* n. comb. (Araneae, Linyphiidae)

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ABSTRACT

We present an inventory of the spider species of the municipality of Barcelonnette (Alpes-de-Haute-Provence, France), based on the material collected during the “Explor’Nature Barcelonnette” event, organised by the Mercantour National Park, from 30th June to 2nd July 2017. We report a total of 120 species, representing 83 genera and 25 families. For each species we provide faunistic/taxonomical remarks and detailed information about sampling localities, distribution, preferred habitat. Most of the species have a Palearctic distribution, followed by European and Holarctic chorotypes. We recorded a small percentage of endemic species, including rare elements occurring only in high-alpine habitats, such as *Drassodex simoni* Hervé, Roberts & Murphy, 2009 and *Vesubia jugorum* (Simon, 1881). Twenty-six species are recorded for the first time in the Alpes-de-Haute-Provence Department. Two species, *Chrysso nordica* (Chamberlin & Ivie, 1947) and *Urozetes trifidus* Tünева, 2003, are recorded for the first time in France. The sampling carried out in wet grasslands provided the highest number of species, followed by riparian habitats and shrublands. In addition, we provide a revision of the taxonomic position of *Piniphantes agnellus* (Maurer & Thaler, 1988) n. comb., including the first description of the male and illustrations of the palp morphology. Remarks on the ecology of the species and new drawings of the female genitalia are also given. Although the biological diversity of the study area is largely unknown, this faunal inventory enhances the knowledge of the biological richness of the area of Barcelonnette.

KEY WORDS  
INTRODUCTION

In 2017, for the first time in the history of the French national parks, the municipality of Barcelonnette joined the Mercantour National Park. In order to improve the knowledge of the biodiversity of this district and to prove its involvement in conservation policies, the Mercantour National Park organised a summer event focused on taxonomic inventories and biodiversity awareness. The “Explor’Nature Barcelonnette” event brought together more than 50 taxonomists in the newly annexed territories of the Park to study the biodiversity of the area, with special focus on the lesser known taxa. During this event, scientists worked relentlessly to record the highest number of taxa in all available habitats, from stream beds to the highest summits. Local people were also involved in the event, with field-trips led by taxonomists and evening events aiming at sharing the results of the fieldwork carried out during the day.

This kind of event was a good example of collaboration between scientists, managers of the protected area, administrative representatives and the local population. The success of the event has led the Mercantour National Park to organise more “Explor’Nature” events in other municipalities included in its territory, especially for those participating in the “Atlas de la Biodiversité des Communes” program (ABC, “District Biodiversity Atlas” in english).

The present work represents the outcome of the field activities carried out by our team of arachnologists. We present the first inventory of the spider species (Arachnida, Araneae) of the Barcelonnette municipality, based on the material collected by the authors from 30th June to 2nd July 2017. Furthermore, we provide new taxonomic information on a species of Linyphiid spider collected during the inventory, whose male was previously unknown.

MATERIAL AND METHODS

STUDY AREA

Located in the Southern French Alps, Barcelonnette is a small municipality of less than 3000 inhabitants, covering a surface of 1642 hectares, extending on the northern and the southern slopes of the river Ubaye, in a bowl-shaped basin (Fig. 1). From an administrative point of view, Barcelonnette is situated in the North-East of the Alpes-de-Haute-Provence Department, embedded in the Provence-Alpes-Côte d’Azur (PACA) Region. Its neighbouring municipalities are Saint-Pons (N-NW), Faucon-de-Barcelonnette (N-NE), Enchastrayes (SE) and Uvernet-Fours (S-SW). Located in the widest portion of the Ubaye valley, near the confluence of the Ubaye and Bachelard rivers, Barcelonnette is a crossway between the region of Gap/Durance and Italy. The mountains around Barcelonnette have peaks ranging between 2800 and 3100 m a.s.l., and the town itself is 1132 m a.s.l. high. Located on the left bank of the Ubaye river, Chapeau de Gendarmerie is the highest peak included in the territory of the municipality, reaching 2682 m a.s.l. On the right bank of the river, the altitude is lower, reaching 1972 m a.s.l. in the locality of Rocher Blanc. The lowest altitude is 1122 m a.s.l., at the confluence of the Ubaye and Bachelard rivers.

The area of Barcelonnette has been the subject of many scientific activities for more than two decades, especially in the field of geomorphology (Flageollet et al. 1999; Greiving & Angnrand 2014; van Westen et al. 2014). The “Explor’Nature Barcelonnette” event has allowed other disciplines to focus on this area, and to disclose its high biological diversity.

THE SPIDER SPECIES INVENTORY OF BARCELONNETTE

The inventory here presented follows in alphabetical order, for the nomenclature we referred to the latest version of the
World Spider Catalog (WSC 2018). For each species we provided the list of material collected and examined (Material), the chorotype (Chorotype) and the habitat in which it was collected (Macrohabitat). When necessary, remarks and taxonomical notes were also reported (Notes). All specimens were examined and identified, whenever possible, to species level using a Leica M80 stereoscopic microscope (up to 60 × magnification). Measurements were taken from digital pictures made with a Leica EC3 digital camera and calculated with the Leica LAS EZ 3.0 software (Leica Microsystems, Switzerland). All measurements are given in millimetres.

Based on the dominant land use, we grouped the sampling localities in thirteen categories of macrohabitats (Table 1): alpine grasslands, wet grasslands, alpine pastures, alpine prairies, rocky lands, broadleaved forests, coniferous forests, mixed forests, shrublands, caves, riparian habitats, ruderal areas and urban habitats. In view of the ecological continuity of the sampled habitat, we considered a buffer of 100 m from the boundary of the municipality, thus including in the study area a few sampling stations which are formally outside the administrative area of Barcelonnette.

“Alpine prairies” are ungrazed or lightly grazed grasslands above 1900 m a.s.l., while “Alpine pastures” are grazed grasslands at intermediate elevations (1600-1900 m). “Alpine grasslands” are grazed grasslands below 1600 m a.s.l., including dry and semi-dry alpine grasslands. “Wet grasslands” are grasslands in which springs and seepages create wet habitats, at intermediate elevations in the localities of La Salce (ARA_17) and Penelle (ARA_23). “Rocky lands” are alpine screes occurring above 2000 m a.s.l. Deciduous forests are included in the category “broadleaved forests”. Mixed forests mainly of *Populus* L. and *Pinus* L. occurring at low/middle elevation, around 1400 m a.s.l., are included in the macrohabitat “mixed forests”, while *Abies alba* Mill. woods in the Bois de Gaudissart area (ARA_16) are included in “coniferous forests”. Grasslands with low vegetation and bushes are included in the category “shrublands”. In this work, the category “caves” is used to classify talus caves (*sensu* White & Culver 2012), i.e., caverns and crevices forming between boulders piled up on mountain slopes, found along the pathway to the Chapeau de Gendarme (ARA_01). “Riparian habitats”, considered as an interface...
between terrestrial and aquatic ecosystem, encompass streams and the Ubaye river banks, sometimes with the presence of pebbles. Gravel, stream banks, bushes, roadsides, stone walls, wet ditches and fallow lands occurring at two different sites in Les Allemands, at 1400 and 1455 m a.s.l. respectively, are grouped within the “ruderal areas” macrohabitat. The specimens collected in the urban area of Barcelonnette and in the vicinity of the Séolane Center (ARA_02), on walls of buildings and on urban structures, are grouped in the category “urban habitats.”

We assigned chorotypes using the approach of Isaia et al. (2015) and Pantini & Isaia (2018), referring to the works of Vigna Taglianti et al. (1993, 1999) and Stoch & Vigna Taglianti (2005) (see Table 2 for the chorotype codes).

We provide the following information on the sampling event for all specimen collected: toponym of closest locality, details about habitat, altitude, date, number and sex of individuals. All specimens mentioned were collected by the authors. The specimens are preserved in 70% ethanol and the material is stored in the Marco Isaia collection (coll. MI) at the Department of Life Sciences and Systems Biology of the University of Turin and in the collection of the Muséum national d’Histoire naturelle, Paris (MNHN).

### Table 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Locality</th>
<th>Macrohabitat</th>
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<th>Altitude (m a.s.l.)</th>
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### Table 2

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<td>PAL</td>
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<td>ASE</td>
<td>5</td>
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<td>Turanic-European</td>
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<td>Turanic-European-Mediterranean</td>
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<td>15</td>
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<td>European-Mediterranean</td>
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<tr>
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<td>WEU</td>
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</tr>
<tr>
<td>Mediterranean</td>
<td>MED</td>
<td>1</td>
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<td>Western</td>
<td>WME</td>
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<td>Mediterranean</td>
<td>ALPW</td>
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<td>Western Alpine</td>
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**Abbreviations**

coll. MI Marco Isaia collection, Torino;


**Morphological description**

AMÉ Anterior Median Eyes;

ALE Anterior Lateral Eyes;

Mt Metatarsus;

PME Posterior Median Eyes;

PLE Posterior Lateral Eyes;

TLL Total Leg Length;

Tml position of the first metatarsal trichobothrium.

**RESULTS: SPIDER SPECIES INVENTORY OF BARCELONNETTE**

*Agelenidae* C. L. Koch, 1837

*Agelena labyrinthica* (Clerck, 1757)

Material. — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 2 ♀, MNHN.

Chorotype. — PAL.

Macrohabitat. — Ruderal areas.

*Coelotes pabulator* Simon, 1875

Material. — La Méa, rocky lands, 2409 m, 02.VII.2017, Isaia & Mammola leg., 3 ♀, coll. MI.

Chorotype. — ALPW.

Macrohabitat. — Rocky lands.
NOTE. — Endemic species of the Western Alps, occurring preferably at higher altitudes under stones, in scree and alpine prairies with rocky debris.

*Eratigena fueslini* (Pavesi, 1873)

**Material.** — Ubaye river, dry riverbed with pebbles, 1146 m, 30.VI.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — EUR.

**Macrohabitat.** — Riparian habitats.

*Textrix denticulata* (Olivier, 1789)

**Material.** — Ubaye river, dry riverbed with pebbles, 1146 m, 30.VI.2017, Isaia, Mammola & Milano leg., 1 ♀, 1 ♂, coll. MI; Chemin de Gaudissard, stream, 1230 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, MNHN.

**Chorotype.** — EUR.

**Macrohabitat.** — Riparian habitats.

**Family AMAUROBIIDAE** Thorell, 1870

*Amaurobius ferox* (Walckenaer, 1830)

**Material.** — Bois de Gaudissart, Silver fir woods, 1414 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; La Salce, mixed forest of *Populus* and *Pinus*, 1406 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — OLA.

**Macrohabitat.** — Coniferous forests, mixed forests.

**Family ANYPHAENIDAE** Bertkau, 1878

*Anyphaena accentuata* (Walckenaer, 1802)

**Material.** — Bois de Gaudissart, Silver fir woods, 1414 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 juv., coll. MI; Chemin de Gaudissard, stream, 1230 m, 01.VII.2017, Isaia, Mammola & Milano leg., 3 juv., coll. MI.

**Chorotype.** — TUE.

**Macrohabitat.** — Coniferous forests, riparian habitats.
Family ARANEIDAE Clerck, 1757

*Aculepeira carbonaria* (L. Koch, 1869)  
(Fig. 2)

**Material.** — La Méa, rocky lands, 2409 m, 02.VII.2017, Isaia & Mammola leg., 4 juv., coll. MI.  
**Chorotype.** — PAL.  
**Macrohabitat.** — Rocky lands.  
**Note.** — High alpine species, generally occurring at high elevation in rocky lands.

*Aculepeira ceropegia* (Walckenaer, 1802)  
(Fig. 3)

**Material.** — La Salce, xeric grasslands, 1535 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, MNHN; Les Amoz, grasslands with bushes, 1177 m, 30.VI.2017, Rollard leg., 1 juv., coll. MI.  
**Chorotype.** — PAL.  
**Macrohabitat.** — Alpine grasslands, shrublands, wet grasslands, ruderal areas, riparian habitats.

*Araneus diadematus* Clerck, 1757

**Material.** — Les Amoz, grasslands with bushes, 1177 m, 30.VI.2017, Rollard leg., 1 juv., MNHN.  
**Chorotype.** — OLA.  
**Macrohabitat.** — Shrublands.

*Araniella cucurbitina* (Clerck, 1757)  
(Fig. 4)

**Material.** — La Salce, xeric grasslands, 1535 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, MNHN; Les Amoz, dry riverbed with pebbles, 1146 m, 30.VI.2017, Isaia, Mammola & Milano leg., 3 ♀, MNHN; Séolane Center, on walls of buildings, 1152 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.  
**Chorotype.** — PAL.  
**Macrohabitat.** — Alpine grasslands, wet grasslands, ruderal areas, riparian habitats.  
**Note.** — Uncommon species, rarely found (Nentwig et al. 2018).

*Cyclosa conica* (Pallas, 1772)

**Material.** — Les Amoz, wet grasslands, 1212 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, MNHN; pathway to Chapeau de Gendarme, shrublands, 2047 m, 02.VII.2017, Isaia & Mammola leg., 1 ♀, col. MI.  
**Chorotype.** — OLA.  
**Macrohabitat.** — Wet grasslands, shrublands.

*Mangora acalypha* (Walckenaer, 1802)

**Material.** — Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, MNHN; Les Allemands, ruderal areas, 1455 m, 01.VII.2017, Rollard leg., 2 ♀, MNHN.  
**Chorotype.** — PAL.  
**Macrohabitat.** — Alpine grasslands, ruderal areas.

*Neoscona adianta* (Walckenaer, 1802)

**Material.** — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 1 ♀, MNHN.  
**Chorotype.** — PAL.  
**Macrohabitat.** — Ruderal areas.

*Nuctenea umbratica* (Clerck, 1757)

**Material.** — Ubaye river, dry riverbed with pebbles, 1146 m, 30.VI.2017, Isaia, Mammola & Milano leg., 3 ♀, MNHN; Séolane Center, on walls of buildings, 1152 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, col. MI.  
**Chorotype.** — SIE.  
**Macrohabitat.** — Riparian habitats, urban habitats.

*Zilla diodia* (Walckenaer, 1802)

**Material.** — Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 2 ♀, MNHN.  
**Chorotype.** — SIE.  
**Macrohabitat.** — Alpine grasslands.

Family CLUBIONIDAE Wagner, 1887

*Clubiona corticalis* (Walckenaer, 1802)

**Material.** — La Salce, mixed forest of *Populus* and *Pinus*, 1406 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.  
**Chorotype.** — TUE.  
**Macrohabitat.** — Mixed forests.  
**Note.** — According to Nentwig et al. (2018), this species occurs preferably below 1200 m a.s.l. Our finding at 1400 m a.s.l. extends the current known altimetric distribution range of the species.
Family Dictynidae O. Pickard-Cambridge, 1871

Brigittea latens (Fabricius, 1775)

Material. — Les Amoz, grasslands with bushes, 1177 m, 30.VI.2017, Rollard leg., 3 ♀, 2 ♂, MNHN; Ubaye river, river banks, 1120 m, 02.VII.2017, Milano leg., 1 ♀, 1 ♂, coll. MI.

Chorotype. — SIE.

Macrohabitat. — Shrublands, riparian habitats.

Note. — This species is rarely found, mostly on small bushes and low plants (Nentwig et al. 2018).
Dictyna arundinacea (Linnaeus, 1758)

**Material.** — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 3 ♀, MNHN; Ubaye river, river banks, 1120 m, 02.VII.2017, Milano leg., 1 ♀, coll. MI; Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 2 ♀, MNHN.

**Chorotype.** — OLA.

**Macrohabitats.** — Ruderal areas, riparian habitats, wet grasslands.

Dictyna pusilla Thorell, 1856

**Material.** — Les Amoz, low vegetation, 1212 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — SIE.

**Macrohabitats.** — Shrublands.

Nigma flavescens (Walckenaer, 1830)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — PAL.

**Macrohabitats.** — Wet grasslands.

**Note.** — Foliage-dweller species, not frequent according to Nentwig et al. (2018).

Family Dysderidae C. L. Koch, 1837

Dysdera cribra Simon, 1882

**Material.** — Bois de Gaudissart, Silver fir woods, 1414 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — ALPW.

**Macrohabitats.** — Coniferous forests.

**Note.** — The identification of the species of the genus *Dysdera* Latreille, 1804 based only on female is hardly possible due to the similarity in female genitalic features (Deeleman-Reinhold & Deeleman 1988; Řezáč et al. 2008).

Dysdera ninii group

**Material.** — Col Alaris, alpine pastures, 1724 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Macrohabitats.** — Alpine pastures.

**Note.** — The identification of the species of the genus *Dysdera* Latreille, 1804 based only on female is hardly possible due to the similarity in female genitalic features (Deeleman-Reinhold & Deeleman 1988; Řezáč et al. 2008).

Family Gnaphosidae Pocock, 1898

Drassodes lapidosus (Walckenaer, 1802)

**Material.** — Ubaye river, dry riverbed with pebbles, 1146 m, 30.VI.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI; La Salce, xeric grasslands, 1535 m, 01.VII.2017, Isaia, Mammola & Milano leg., 3 ♀, MNHN; Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 3 ♀, coll. MI; Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Les Allemands, ruderal areas, 1455 m, 01.VII.2017, Rollard leg., 1 ♀, MNHN; La Gravette, grasslands, 1130 m, 03.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — PAL.

**Macrohabitats.** — Riparian habitats, alpine grasslands, shrublands, ruderal areas.

Drassodes simoni Hervé, Roberts & Murphy, 2009

**Material.** — La Méa, rocky lands, 2409 m, 02.VII.2017, Isaia & Mammola leg., 2 ♀, coll. MI; Chapeau de Gendarme, rocky lands, 2661 m, 02.VII.2017, Isaia & Mammola leg., 1 ♀, coll. MI.

**Chorotype.** — ALPW.

**Macrohabitats.** — Rocky lands.

**Note.** — Endemic of the Maritime Alps. This species occurs in high alpine habitats, such as screes and alpine prairies. This species has recently been described by Hervé et al. (2009) from material collected in the French Maritime Alps (Mercantour National Park).

Drassyllus praeficus (L. Koch, 1866)

**Material.** — Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; La Gravette, grasslands, 1130 m, 03.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — SIE.

**Macrohabitats.** — Alpine grasslands.

**Note.** — Rarely found according to Nentwig et al. (2018).

Gnaphosa lucifuga (Walckenaer, 1802)

**Material.** — Salce basse, xeric grasslands, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Penelle, wet grasslands, 1120 m, 02.VII.2017, Rollard leg., 1 ♀, MNHN.

**Chorotype.** — PAL.

**Macrohabitats.** — Riparian habitats, alpine grasslands, shrublands, ruderal areas.

Gnaphosa nigerrima L. Koch, 1877

**Material.** — Col Alaris, alpine pastures, 1724 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — PAL.

**Macrohabitats.** — Alpine pastures.

**Note.** — Rarely found according to Nentwig et al. (2018).

Micaria formicaria (Sundevall, 1831)

**Material.** — La Salce, xeric grasslands, 1535 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Peiroulier, broad-leaved forests, 1357 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI; La Gravette, grasslands, 1130 m, 03.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.
Spider species of Barcelonnette (France)

**Trachyzelotes pedestris** (C. L. Koch, 1837)

**Material.** — Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, MNHN.

**Chorotype.** — EUR.

**Macrohabitat.** — Alpine grasslands.

**Note.** — This species, as many other of the genus *Micaria* Westring, 1851, is an ant mimic.

**Urozelotes trifidus** Tüneva, 2003

(Fig. 5)

**Material.** — Ubaye river, dry riverbed with pebbles, 1146 m, 30.VI.2017, Isaia, Mammola & Milano leg., 2 ♀, 1 ♂, coll. MI.

**Chorotype.** — EUR?

**Macrohabitat.** — Riparian habitats.

**Note.** — New record for France. This species was previously known exclusively for Southern Urals (Russia) (Tünева 2003). Considering the habitat where the specimens were collected, the presence of this species in France may be regarded as an anthropogenic introduction or, alternatively, a new data of occurrence of a rare, but widely distributed species. We herein provide diagnostic drawings for the species identification (Fig. 5).

**Family Hahniidae** Bertkau, 1878

**Antistea elegans** (Blackwall, 1841)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 4 ♀, 1 ♂, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Wet grasslands.

**Family Linyphiidae** Blackwall, 1859

**Agyneta mollis** (O. Pickard-Cambridge, 1871)

**Material.** — La Gravette, grasslands, 1130 m, 03.VII.2017, Isaia, Mammola & Milano leg., 2 ♂, coll. MI.

**Chorotype.** — ASE.

**Macrohabitat.** — Alpine grasslands.
**Diplocephalus cristatus** (Blackwall, 1833)

**Material.** — La Méa, rocky lands with snow, 2532 m, 02.VII.2017, Isaia & Mammola leg., 3 ♀, 2 ♂, coll. MI.

**Chorotype.** — EUR.

**Macrohabitat.** — Rocky lands.

**Frontinellina frutetorum** (C. L. Koch, 1834)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 2 ♀, coll. MI; Col Alaris, alpine pastures, 1724 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — SIE.

**Macrohabitat.** — Wet grasslands, alpine pastures, shrublands.

**Hilaira excisa** (O. Pickard-Cambridge, 1871)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, 2 ♂, coll. MI.

**Chorotype.** — EUR.

**Macrohabitat.** — Wet grasslands.

**Note.** — Hygrophilic species, generally found in very humid moss, in shaded habitats (Nentwig et al. 2018)

**Linyphia hortensis** Sundevall, 1830

**Material.** — La Salce, mixed forest of *Populus* and *Pinus*, 1406 m, 01.VII.2017, Isaia, Mammola & Milano leg., 2 ♀, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Mixed forests.

**Linyphia triangularis** (Clerck, 1757)

**Material.** — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 2 ♀, 2 ♂, MNHN; Les Amoz, grasslands with bushes, 1177 m, 30.VI.2017, Rollard leg., 1 juv., MNHN.

**Chorotype.** — PAL.

**Macrohabitat.** — Ruderal areas, shrublands.

**Neriene radiata** (Walckenaer, 1841)

**Material.** — Chemin de Gaudissard, stream, 1230 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 1 ♂, MNHN.

**Chorotype.** — OLA.

**Macrohabitat.** — Riparian habitats, ruderal areas.
Piniphantes agnellus (Maurer & Thaler, 1988) n. comb.

Material. — France. Provence-Alpes-Côte d’Azur, Alpes-de-Haute-Provence, Barcelonnette, pathway to Chapeau de Gendarme, talus caves, 2047 m, 02.VII.2017, Isaia & Mammola leg., 9 ♀, coll. MI.

Other material. — Italy. Piemonte, Province of Cuneo, Valdieri, Galleria di Valscura, alpine scree, 2100 m, 12.VII.2009, Isaia leg., 1 ♂ (sub L. agnellus in Isaia et al. 2015; coll. MI); Piemonte, Province of Cuneo, Terme di Valdieri, pathway to Fremamorta, alpine prairies with rocky debris, 2200 m, 11.VI.2016, Isaia leg., 3 ♀, coll. MI; Piemonte, Province of Cuneo, La Minière de Vallauria, waterfall scree, 1508 m, 13.VI.2005, Hervé leg., 2 ♀, ARM061, MNHN; Provence-Alpes-Côte d’Azur, Alpes-Maritimes, Tende, La Minière de Vallauria, waterfall scree, 1508 m, 13.VI.2005, Hervé leg., 2 ♀, ARM061, MNHN; Provence-Alpes-Côte d’Azur, Alpes-Maritimes, Terme di Valdieri, Lago Soprano della Sella, alpine prairies, 2300 m, 01.VIII.2004, Hervé leg., 2 ♀, ARM016, MNHN; Provence-Alpes-Côte d’Azur, Alpes-Maritimes, Tende, La Minière de Vallauria, waterfall scree, 1508 m, 13.VI.2005, Hervé leg., 2 ♀, ARM061, MNHN; Provence-Alpes-Côte d’Azur, Alpes-Maritimes, Terme di Valdieri, Allos, Sommets des Garrets, western slope, alpine scree, 2670 m, 08.IX.2005, Hervé leg., 2 ♀ 1 ♂, ARM139, MNHN.

Chorotype. — ALSW.

Macrohabitat. — Caves, rocky lands.

Note. — The collection of this rare species in the frame of this work gives us the opportunity to clarify its taxonomic position and to describe the so far unknown male, collected in the frame of previous researches. We hereby provide an exhaustive taxonomical note and information about its current known distribution and provide new diagnostic drawings for male and female (Figs 6, 7, 8).

Type material. — Holotype, female. Leg. Maurer 06.VIII.1986, Museum of Natural History of Genève (not examined).

Type locality. — Boulder fields in the vicinity of Lac de l’Agnel (Tende, France), Alpes-Maritimes, 2530 m, in rock field.

Description of the male

(Fig. 6) — Piniphantes agnellus (Maurer & Thaler, 1988) n. comb. (Linyphiidae): male from Valdieri (Italy): A, palp, lateral view; B, cymbium, dorsal view. Abbreviations: C, cymbium; E, embolus; FLP, finger-like protrusions; L, lamella characteristic; P, paracymbium; Su, distal suprategular apophysis. Scale bar: 0.12 mm. Illustration by Stefano Mammola.
not elevated with a few bristles interspersed among the eyes. Clypeus 0.04 long, slightly indented under the eyes, then convex, with one bristle just below the head region. Eyes normally developed, with pigment and black margins. AME smallest. PLE, PME and ALE almost equal in diameter. ALE and PLE contiguous. PLE–PME distance: 0.011, ALE–AME distance: 0.012, PME–PME distance: 0.013. Eye diameters: AME: 0.015, PME: 0.020, ALE: 0.021, PLE: 0.210. Sternum heart-shaped, yellowish with blackish shades. Chelicerae 0.10 long, light brownish, with 18-20 lateral striidulatory ridges and armed with four contiguous posterior teeth grouped close to the base of the fang (the distal bigger) and three anterior teeth, equally distributed along the cheliceral margin, the median bigger. Legs uniformly light yellowish. Leg I: femur 0.56, other articles missing; leg II: femur 0.39, patella 0.09, tibia 0.65, metatarsus 0.42, tarsus 0.36, TLL 1.91; leg III: femur 1.84, patella 0.11, other articles missing; leg IV: femur 0.48, patella 0.12, other articles missing. Abdomen 0.54 long, 0.38 wide; light-brownish, darker than the prosoma. Palp (Fig. 6): femur 0.12, patella 0.04, tibia 0.03, cymbium 0.12. Cymbium faintly convex, roughly rectangular when seen from above, ending proximally with a straight border, perpendicular to the main axis (Fig. 6B). Paracymbium U-shaped in lateral view, bearing some hairs on the proximal part, apical part gradually narrowed anteriorly (Figs 6A, 7D). Distal supra-tegular apophysis directed upwards, with a sharp end (Fig. 7C). Proximal part of the embolus with elongated projection bearing numerous finger-like protrusions (Fig. 7A). Embolus sickle shaped, thumb well-developed. Embolus proper bifid (Fig. 7A). Lamella characteristica duck-head shaped with an upper sclerotized horizontal branch and a lower one, smaller and less sclerotized (Fig. 7B).

**Spination (Based on all males examined)**

Femur I with one prolateral spine; femur II, III and IV with no spines. Patella I-IV with one dorsal spine. Tibia I with two dorsal, one prolateral, and one retrolateral spines; tibia II with one dorsal, one prolateral and one retrolateral spines;
Spider species of Barcelonnette (France)

ECOLOGY AND DISTRIBUTION
Specimens of *P. agnellus* n. comb. have been collected primarily in talus caves and rocky areas at medium-high altitudes, between 1900 and 2600 m a.s.l. Mammola *et al*. (2018) consider the species as a troglophile element. The distribution of the species is centred on the Alpine districts of Maritime Alps and Ligurian Alps. However, the record of one male in Champlas Janvier (Cottian Alps) lets envisage a wider distribution, extending north.

TAXONOMICAL REMARKS
In the original description, Maurer & Thaler (1988) assigned the newly described species to the genus *Lepthyphantes* Menge, 1866. In the lack of males, the diagnosis—and presumably the genus assignment—was based on the morphology of the epigyne, bearing some characteristic lateral extensions at the base of the proscape. The occurrence of males of a possible undescribed species together with females of former *Lepthyphantes agnellus* at two sites (Galleria Valscura, Valdieri, Maritime Alps, and Monte Grai, Triora, Ligurian Alps) allowed to pair males and females. Moreover, the match was confirmed by morphological characters shared by males and females, such as chaetotaxy, cheliceral teeth, stridulatory ridges, abdominal pattern and ocular pattern.

Some years after the description of *L. agnellus*, Saaristo & Tanasevitch (1993, 1996) reclassified the genus *Lepthyphantes* using a typological approach, examining the morphology of the genital organs, especially males. As a result, most of the European *Lepthyphantes* species were transferred or assigned to new genera. On the other hand, given the lack of males, *L. agnellus* was not transferred to any of the newly created genera.

Our finding of the unknown male now allows the placement of this species within the genus *Piniphantes* Saaristo & Tanasevitch, 1996. According to the original description, the genus *Piniphantes* includes small Linyphiids, having in males an elongated projection at the proximal part of the embolus.
bearing numerous finger-like protrusion (Saaristo & Tanasevitch 1996). Such character is particularly remarkable in our case (Fig. 7A). Moreover, other details given in the genus description (Saaristo & Tanasevitch 1996) match our case, such as chaetotaxy and lack of abdominal pattern.

The species is then assigned to the genus Piniphantes, with representatives in the area of Tian Shian Mountains (Central Asia) (5 species: P. cinereus (Tanasevitch, 1986), P. macer (Tanasevitch, 1986), P. plumatus (Tanasevitch, 1986), P. uzbekistanicus (Tanasevitch, 1983), P. zonsteini (Tanasevitch, 1989)), Himalaya (one species, P. himalayensis (Tanasevitch, 1987)), Centro-Asiatic-European region (one species, P. pinicola (Simon, 1884)) and Corsica (one species, P. cirratus (Thaler, 1986)).

According to the morphology of the male genitalia, P. agnellus n. comb. is similar to P. cirratus, for which the only holotype male is known, preventing any comparison of the female.

Pocadicnemis juncea Locket & Millidge, 1953

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 2 ♀, coll. MI.

**Chorotype.** — ASE.

**Macrohabitat.** — Wet grasslands.

**Note.** — This species occurs mostly in open areas, preferring humid conditions (Nentwig et al. 2018).

Tenuiphantes cristatus (Menge, 1866)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — SIE.

**Macrohabitat.** — Wet grasslands.

Turinyphia clairi (Simon, 1884)

**Material.** — Pathway to Chapeau de Gendarme, talus caves, 2047 m, 02.VII.2017, Isaia & Mammola leg., 1 ♂, 1 ♀, 1 juv., coll. MI.

**Chorotype.** — WEU.

**Macrohabitat.** — Caves.

**Note.** — Troglophile species according to Mammola et al. (2018), primarily inhabiting cave entrances and artificial subterranean habitats such as military bunkers. Apart from subterranean habitats, the species is also found in beech forests and shaded habitats (Isaia et al. 2017). Its presence outside French and Italian Maritime Alps (i.e., in Portugal) is regarded as doubtful by Pantini & Isaia (2018).

Walckenaeria antica (Wider, 1834)

**Material.** — La Salce, mixed forest of Populus and Pinus, 1406 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — ASE.

Walckenaeria antica (Wider, 1834)
Macrohabitats. — Wet grasslands.

Note. — The identification of specimens of the lugubris group based on morphological characters is hardly feasible. However, the collection of a male in association with females made the identification of the species possible. See also notes about Pardosa lugubris group.

Pardosa amentata (Clerck, 1757)

Material. — Ravin de Alaris, alpine prairies, 1980 m, 02.VII.2017, Isaia & Mammola leg., 4 ♀, 1 ♂, coll. MI.

Chorotype. — SIE.

Macrohabitat. — Alpine prairies.

Pardosa bifasciata (C. L. Koch, 1834)

Material. — Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

Chorotype. — PAL.

Macrohabitat. — Shrublands.

Pardosa blanda (C. L. Koch, 1833)

Material. — Col Alaris, alpine pastures, 1724 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Chapeau de Gendarme, rocky lands, 2661 m, 02.VII.2017, Isaia & Mammola leg., 4 ♀, 1 ♂, coll. MI; La Méa, rocky lands with snow, 2532 m, 02.VII.2017, Isaia & Mammola leg., 1 ♂, coll. MI; Ravin de Alaris, alpine prairies, 1980 m, 02.VII.2017, Isaia & Mammola leg., 1 ♀, 1 ♂, MNHN.

Chorotype. — SEU.

Macrohabitat. — Alpine pastures, rocky lands, alpine prairies.

Pardosa hortensis (Thorell, 1872)

Material. — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 1 ♀, MNHN; Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 1 ♀, MNHN; Ubaye river, river banks, 1120 m, 02.VII.2017, Milano leg., 1 ♂, coll. MI.

Chorotype. — PAL.

Macrohabitat. — Ruderal areas, shrublands, wet grasslands, riparian habitats.

Pardosa lugubris group

Material. — Chemin de Gaudissard, stream, 1230 m, 01.VII.2017, Isaia, Mammola & Milano leg., 2 ♀, coll. MI; La Salce, mixed forest of Populus and Pinus, 1406 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Péroulier, broadleaved forests, 1357 m, 01.VII.2017, Isaia, Mammola & Milano leg., 3 ♀, 1 ♂, coll. MI.

Macrohabitat. — Riparian habitats, mixed forests, broadleaved forests.

Pardosa mixta (Kulczyński, 1887)

Material. — La Méa, rocky lands with snow, 2532 m, 02.VII.2017, Isaia & Mammola leg., 1 ♂, coll. MI.

Chorotype. — TUE.

Macrohabitat. — Rocky lands.

Pardosa monticola (Clerck, 1757)

Material. — Les Amoz, grasslands with bushes, 1177 m, 01.VII.2017, Rollard leg., 1 ♀, MNHN.

Chorotype. — PAL.

Macrohabitat. — Shrublands.

Pardosa nigra (C. L. Koch, 1834)

Material. — Chapeau de Gendarme, rocky lands, 2661 m, 02.VII.2017, Isaia & Mammola leg., 3 ♂, coll. MI; La Méa, rocky lands with snow, 2532 m, 02.VII.2017, Isaia & Mammola leg., 2 ♂, coll. MI.

Chorotype. — EUR.

Macrohabitat. — Rocky lands.

Note. — This species occurs frequently in alpine screes at higher altitudes.

Pardosa paludicola (Clerck, 1757)

Material. — Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 1 ♀, MNHN.

Chorotype. — PAL.

Macrohabitat. — Wet grasslands.

Note. — Hygrophilic species, preferentially found in dump areas (Nentwig et al. 2018).

Pardosa palustris (Linnaeus, 1758)

Material. — La Gravette, grasslands, 1130 m, 03.VII.2017, Isaia, Mammola & Milano leg., 3 ♀, 1 ♂, coll. MI.

Chorotype. — OLA.

Macrohabitat. — Alpine grasslands.
Pardosa prativaga (L. Koch, 1870)

**Material.** — Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 1 ♀, MNHN.

**Chorotype.** — SIE.

**Macrohabitat.** — Wet grasslands.

Pardosa pullata (Clerck, 1757)

**Material.** — Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 2 ♀, MNHN.

**Chorotype.** — SIE.

**Macrohabitat.** — Wet grasslands.

Pardosa wagleri (Hahn, 1822) (Fig. 9)

**Material.** — Ubaye river, dry riverbed with pebbles, 1146 m, 30.VI.2017, Isia, Mammola & Milano leg., 3 ♀, 4 ♂, coll. MI; Ubaye river, river banks, 1120 m, 02.VII.2017, Milano leg., 1 ♂, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Riparian habitats.

**Note.** — This species is frequently associated to riverbeds and dump areas, up to 1400 m a.s.l. (Nentwig et al. 2018).

Pirata piraticus (Clerck, 1757)

**Material.** — Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 1 ♀, MNHN.

**Chorotype.** — OLA.

**Macrohabitat.** — Wet grasslands.

**Note.** — Hygrophilic species, frequently found near water.

Trochosa hispanica Simon, 1870

**Material.** — Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — TUM.

**Macrohabitat.** — Shrublands.

Xerolycosa nemoralis (Westring, 1861)

**Material.** — La Salce, xeric grasslands, 1535 m, 01.VII.2017, Isia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Alpine grasslands.

Ero aphana (Walckenaer, 1802)

**Material.** — Les Amoz, low vegetation, 1212 m, 01.VII.2017, Isia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — EUR.

**Macrohabitat.** — Shrublands.

**Note.** — Araneophagic species (Roberts 1995).

Ero furcata (Villers, 1789)

**Material.** — Peiroulier, broadleaved forests, 1357 m, 01.VII.2017, Isia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Broadleaved forests.

**Note.** — Araneophagic species (Roberts 1995).

Zora spinimana (Sundevall, 1833)

**Material.** — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 1 ♀, MNHN.

**Chorotype.** — PAL.

**Macrohabitat.** — Ruderal areas.

Oxyopes heterophthalmus (Latreille, 1804)

**Material.** — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 1 ♀, MNHN.

**Chorotype.** — PAL.

**Macrohabitat.** — Ruderal areas.

Oxyopes lineatus (Latreille, 1806)

**Material.** — La Salce, mixed forest of Populus and Pinus, 1406 m, 01.VII.2017, Isia, Mammola & Milano leg., 1 ♀, coll. MI; Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isia, Mammola & Milano leg., 1 ♀, MNHN; Ubaye river, river banks, 1120 m, 02.VII.2017, Milano leg., 2 ♀, 3 ♂, coll. MI.

**Chorotype.** — TUE.

**Macrohabitat.** — Mixed forests, alpine grasslands, riparian habitats.
Family Philodromidae Thorell, 1870

Philodromus aureolus (Clerck, 1757)

**Material.** — Chemin de Gaudissard, stream, 1230 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — PAL.

**MacroHabitat.** — Riparian habitats.

Philodromus cespitum (Walckenaer, 1802)

**Material.** — Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 1 ♀, MNHN; Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — OLA.

**MacroHabitat.** — Wet grasslands, shrublands.

Philodromus emarginatus (Schrank, 1803)

**Material.** — Ubaye river, river banks, 1120 m, 02.VII.2017, Milano leg., 1 ♀, coll. MI.

**Chorotype.** — PAL.

**MacroHabitat.** — Riparian habitats.

Philodromus fuscolimbatus Lucas, 1846

**Material.** — Les Allemands, ruderal areas, 1455 m, 01.VII.2017, Rollard leg., 1 ♂, MNHN.

**Chorotype.** — MED.

**MacroHabitat.** — Ruderal areas.

Philodromus vagulus Simon, 1875

**Material.** — Ravin de Alaris, alpine prairies, 1980 m, 02.VII.2017, Isaia & Mammola leg., 1 ♀, coll. MI.

**Chorotype.** — EUR.

**MacroHabitat.** — Alpine prairies.

**Note.** — Rare, biology mostly unknown (Nentwig *et al.* 2018).

Thanatus atratus Simon, 1875

**Material.** — Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — PAL.

**MacroHabitat.** — Shrublands.
**Tibellus oblongus** (Walckenaer, 1802)

**Material.** — Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — OLA.

**Macrohabitat.** — Alpine grasslands.

**Family Pholcidae** C. L. Koch, 1850

**Pholcus phalangioides** (Fuesslin, 1775)

**Material.** — Séolane Center, on walls of buildings, 1152 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, MNHN.

**Chorotype.** — COS.

**Macrohabitat.** — Urban habitats.

**Family Phrurolithidae** Banks, 1892

**Phrurolithus festivus** (C. L. Koch, 1835)

**Material.** — Bois de Gaudissart, Silver fir woods, 1414 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Coniferous forests.

**Note.** — This species, as many other of the genus *Phrurolithus* C.L. Koch, 1839 is an ant mimic and is often found in association with ants.

**Family Pisauridae** Simon, 1890

**Pisaura mirabilis** (Clerck, 1757) (Fig. 11)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, 3 ♂, 1 juv., MNHN; Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 4 ♂, 1 ♂, 1 juv., MNHN.

**Chorotype.** — PAL.

**Macrohabitat.** — Wet grasslands.

**Evarcha arcuata** (Clerck, 1757)

**Material.** — La Méa, rocky lands with snow, 2532 m, 02.VII.2017, Isaia & Mammola leg., 1 ♀, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Rocky lands.

**Note.** — This species occurs in dry locations up to 2600 m a.s.l. (Nentwig et al. 2018)

**Heliophanus lineiventris** Simon, 1868

**Material.** — La Méa, rocky lands with snow, 2532 m, 02.VII.2017, Isaia & Mammola leg., 1 ♀, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Rocky lands.

**Note.** — Rarely found, mostly on rocky borders of flowing waters (Nentwig et al. 2018).

**Heliophanus kochii** Simon, 1868

**Material.** — Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — EUM.

**Macrohabitat.** — Alpine grasslands.
Fig. 10. — Vesubia jugorum (Simon, 1881) (Lycosidae). Average body length of the female: 15-20 mm. Photo credit: Francesco Tomasinelli, Parc national du Mercantour.
**Pellenes tripunctatus** (Walckenaer, 1802)

**Material.** — Les Amoz, grasslands with bushes, 1177 m, 30.VI.2017, Rollard leg., 1 ♀, MNHN.

**Chorotype.** — SIE.

**Macrohabitat.** — Shrublands.

**Pseudeuophrys lanigera** (Simon, 1871)

**Material.** — La Méa, rocky lands with snow, 2532 m, 02.VII.2017, Isaia & Mammola leg., 2 ♂, coll. MI.

**Chorotype.** — EUR.

**Macrohabitat.** — Rocky lands.

**Family** **Segestriidae** Simon, 1893

**Segestria senoculata** (Linnaeus, 1758)

**Material.** — Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 juv., coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Alpine grasslands.

**Family** **Sparassidae** Bertkau, 1872

**Micrommata virescens** (Clerck, 1757)  
(Fig. 12)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 2 ♀, 1 ♂, Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 1 ♀, MNHN.

**Chorotype.** — PAL.

**Macrohabitat.** — Wet grasslands.

**Family** **Tetragnathidae** Menge, 1866

**Metellina meriana** (Scopoli, 1763)

**Material.** — La Salce, mixed forest of *Populus* and *Pinus*, 1406 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — EUR.

**Macrohabitat.** — Mixed forests.

**Tetragnatha extensa** (Linnaeus, 1758)

**Material.** — Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 6 ♀, 2 ♂, MNHN.

**Chorotype.** — OLA.

**Macrohabitat.** — Wet grasslands.

**Note.** — On herbaceous plants in humid, open habitats, always near water (Nentwig et al. 2018).

**Family** **Theridiidae** Sundevall, 1833

**Chrysso nordica** (Chamberlin & Ivie, 1947)

**Material.** — Ubaye river, river banks, 1120 m, 02.VII.2017, Milano leg., 1 ♀, coll. MI.

**Chorotype.** — OLA.

**Macrohabitat.** — Riparian habitats.

**Note.** — New record for France. The species is known for North America, Hungary, Ukraine to East Russia, Kazakhstan and Mongolia (Dondale et al. 1997; Marusik et al. 2000; Szinetár et al. 2002). The presence of this species in France seems plausibly related to anthropogenic introduction.

**Dipoea melanogaster** (C. L. Koch, 1837)

**Material.** — Col Alaris, alpine pastures, 1724 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — OLA.

**Macrohabitat.** — Alpine pastures.

**Note.** — This is a relatively rare species (Nentwig et al. 2018). It appears to be an arboreal species with a distinct habitat on pine and oak trunks, even though were found occasionally in the understorey (Simon 1997). *D. torva* is a specialist ant predator.

**Dipoea torva** (Thorell, 1875)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, 3 ♂, coll. MI.

**Chorotype.** — OLA.

**Macrohabitat.** — Wet grasslands.

**Note.** — This species is generally associated to wetlands, namely bogs and swamp (Le Peru 2011; Nentwig et al. 2018).

**Enoplognatha caricis** (Fickert, 1876)

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, 3 ♂, coll. MI.

**Chorotype.** — OLA.

**Macrohabitat.** — Wet grasslands.

**Enoplognatha latimana** Hippa & Oksala, 1982

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, 3 ♂, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Wet grasslands.
Fig. 11. — *Pisaura mirabilis* (Clerck, 1757) (Pisauridae). Average body length of the female: 12-15 mm. Photo credit: Francesco Tomasinelli, Parc national du Mercantour.
**Enoplognatha mandibularis** (Lucas, 1846)

*Material.* — La Salce, mixed forest of *Populus* and *Pinus*, 1406 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

*Chorotype.* — SIE.

*Macrophytotype.* — Mixed forests.

**Enoplognatha ovata** (Clerck, 1757)

*Material.* — Chemin de Gaudissard, stream, 1230 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, 1 ♂, coll. MI; Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 2 ♀, MNHN.

*Chorotype.* — OLA.

*Macrophytotype.* — Riparian habitats, ruderal areas.

**Episinus algiricus** Lucas, 1846

*Material.* — Les Amoz, low vegetation, 1212 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

*Chorotype.* — WME.

*Macrophytotype.* — Shrublands.

*Note.* — This species is apparently confined to the western Mediterranean (Knoflach et al. 2009).

**Heterotheridion nigrovariegatum** (Simon, 1873)

*Material.* — La Salce, xeric grasslands, 1535 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

*Chorotype.* — PAL.

*Macrophytotype.* — Alpine grasslands.

*Note.* — This species occurs in dry and semi-dry habitats (Le Peru 2011).

**Lasaeola tristis** (Hahn, 1833)

*Material.* — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 1 ♀, MNHN.

*Chorotype.* — TUE.

*Macrophytotype.* — Ruderal areas.

**Neottiura suaveolens** (Simon, 1880)

*Material.* — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

*Chorotype.* — EUR.

*Macrophytotype.* — Wet grasslands.

*Note.* — According to Nentwig et al. (2018) this species occurs commonly in warm, dry meadows and in litter layer of warm habitats. However, Knoflach (1999) and Le Peru (2011) recorded this species also in wetlands.

**Parasteatoda lunata** (Clerck, 1757)

*Material.* — Les Amoz, grasslands with bushes, 1177 m, 30.VI.2017, Rollard leg., 1 juv., MNHN; Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Sólane Center, on walls of buildings, 1152 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, 1 ♂, MNHN.

*Chorotype.* — PAL.

*Macrophytotype.* — Shrublands, urban habitats.

**Phylloneta impressa** (L. Koch, 1881)

*Material.* — Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 2 ♂, 1 juv., MNHN; Salce basse, grass with low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Sólane Center, on walls of buildings, 1152 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, 1 ♂, coll. MI; Ubaye river, river banks, 1120 m, 02.VII.2017, Milano leg., 2 ♂, MNHN.

*Chorotype.* — OLA.

*Macrophytotype.* — Ruderal areas, shrublands, urban habitats, riparian habitats.

**Robertus truncorum** (L. Koch, 1872)

*Material.* — Col Alaris, alpine pastures, 1724 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

*Chorotype.* — CEU.

*Macrophytotype.* — Alpine pastures.

*Note.* — Rarely found, this species occurs in subalpine region (Nentwig et al. 2018).

**Theridion varians** Hahn, 1833

*Material.* — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

*Chorotype.* — OLA.

*Macrophytotype.* — Wet grasslands.
Family **Thomisidae** Sundevall, 1833

**Misumena vatia** (Clerck, 1757)

**Material.** — Les Amoz, grasslands with bushes, 1177 m, 30.VI.2017, Rollard leg., 1 juv., MNHN; La Salce, xeric grasslands, 1535 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 2 ♀, MNHN; Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 1 juv., MNHN.

**Chorotype.** — OLA.

**Macrohabitat.** — Shrublands, alpine grasslands, ruderal areas, wet grasslands.

**Ozyptila praticola** (C. L. Koch, 1837)

**Material.** — Chemin de Gaudissard, stream, 1230 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — OLA.

**Macrohabitat.** — Riparian habitats.

**Ozyptila rauda** Simon, 1875

**Material.** — Ubaye river, dry riverbed with pebbles, 1146 m, 30.VI.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — SIE.

**Macrohabitat.** — Riparian habitats.

**Note.** — This species is rarely found (Nentwig et al. 2018).

**Synema globosum** (Fabricius, 1775)

**Material.** — La Salce, mixed forest of *Populus* and *Pinus*, 1406 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Mixed forests.

**Thomisus onustus** Walckenaer, 1805

(Fig. 13)

**Material.** — Les Allemands, ruderal areas, 1455 m, 01.VII.2017, Rollard leg., 1 ♂, MNHN; Les Allemands, ruderal areas, 1400 m, 01.VII.2017, Rollard leg., 1 ♀, 1 ♂, MNHN; Salce basse, grass with...
low vegetation, 1225 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 juv., coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Ruderal areas, shrublands.

**Xysticus cristatus** (Clerck, 1757)

**Material.** — Penelle, wet grasslands, 1277 m, 02.VII.2017, Rollard leg., 2 ♂, MNHN.

**Chorotype.** — PAL.

**Macrohabitat.** — Wet grasslands.

**Xysticus kochi** Thorell, 1872

**Material.** — Salce basse, xeric grasslands, 1255 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI.

**Chorotype.** — SIE.

**Macrohabitat.** — Alpine grasslands.

**Xysticus ninnii** Thorell, 1872

**Material.** — La Salce, wet grasslands, 1514 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♀, coll. MI; La Salce, xeric grasslands, 1555 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 ♂, coll. MI.

**Chorotype.** — SIE.

**Macrohabitat.** — Wet grasslands, alpine grasslands.

**Family Uloboridae** Thorell, 1869

**Hyptiotes paradoxus** (C. L. Koch, 1834)

**Material.** — Les Amoz, low vegetation, 1212 m, 01.VII.2017, Isaia, Mammola & Milano leg., 1 juv., coll. MI.

**Chorotype.** — PAL.

**Macrohabitat.** — Shrublands.

**Note.** — This species is mostly reported from spruce forests, especially in low mountain ranges, where it builds webs on lower twigs of trees (Wiehle 1953).
DISCUSSION

This work provides the first inventory of the spider species recorded in the municipality of Barcelonnette. So far, data on the local spider fauna are available only at regional level, for the Alpes-de-Haute-Provence Department, with 292 species specifically recorded within the Department (Simon 1874a, b, 1875a, b, c, 1876, 1878, 1879, 1881, 1882, 1884a, b, 1898, 1913, 1914, 1926, 1929, 1932, 1937; Pickard-Cambridge 1875; Peyerimhoff 1906; Jeannel 1926; Dresco 1962, 1966, 1987; Luczack & Vedovini 1964; Kraus & Baur 1974; Dresco & Hubert 1975; Brignoli 1978; Müller 1985; Wunderlich 1995; Bomsans 1997; Metzner 1999; Bomsans & van Keer 1999; Le Peru 2007). This number raises up to 610 species when considering common species, distributed in the whole of France according to Simon (1914, 1926, 1929, 1932, 1937). On the contrary, no specific data is available in literature for the Barcelonnette area, except for sporadic observations reported by Pickard-Cambridge (1875) and Simon (1926) from the area between Embrun and Barcelonnette. Simon (1926) reported the occurrence of Walkeaeria furcillata (Menge, 1869), while Pickard-Cambridge (1875) recorded the presence of *Anteoncus vaporarius* (O. Pickard-Cambridge, 1875) and *Diplocephalus cristatus* (Blackwall, 1833).

As the result of the sampling carried out during the “Explor'Nature” event, specimens belonging to 120 species, 83 genera and 25 families have been collected. The final species count also includes specimens of doubtful identification such as females of *Pardosa lugubris* group and *Dysdera ninnii* group.

In terms of species richness, the family Lycosidae dominates with 22 species (18%), followed by Theridiidae (16 species, 13%) and Linyphiidae (13 species, 11%). See Fig. 14 for further details. Twenty-six species are recorded for the first time in the Alpes-de-Haute-Provence Department, raising the total number of species known for this Department to 318 (Table 3).

Two species (*Chrysso nordica* (Chamberlin & Ivie, 1947) and *Urozelotes trifidus* Tuneva, 2003) are recorded for the first time in France. *Chrysso nordica*, is a theridiid with Holartic distribution. It was found in North America, from Alaska to the Northwest Territories south to California and Colorado in the Nearctic (Dondale et al. 1997), while its Palearctic range embeds Ukraine, Hungary, South Ural throughout South Siberia to the Magadan Area, Mongolia and China (Marusik et al. 2000). This species is characteristic of the steppes, dry meadows and dry saline areas, and was reported in dry, acidic sandy grasslands (Charitonov 1950; Azhaganova 1968; Marusik et al. 2000; Szinetár et al. 2002). This species was elsewhere reported in very disturbed sites (Szinetár et al. 2002), an observation that supports the hypothesis of an anthropogenic introduction in France. In our case, the species was collected in riparian habitats, alongside the Ubaye riverbed, attesting the role of these habitats as potential source of introduction of alien species. Riparian habitats are considered to be particularly susceptible to invasions of non-native species, as observed for many alien plant species, like *Ailanthus altissima* (Mill.) Swingle, *Fallopia japonica* (Houtt.) Ronse Decraene, *Fallopia sachalinensis* Ronse Decraene, *Heracleum mantegazzianum* Sommier & Levier, *Impatiens glandulifera* Royle (Pyšek & Prach 1993; Kowarik & Säumel 2007; Gutiérrez Sommier & Levier, 2001; Richardson et al. 2007).

*Urozelotes trifidus* is a gnaphosid species recently described and found only in the steppe zone of the South Urals, Russia (Tuneva 2003). This species was collected in the same habitat as *C. nordica*, that may lead to hypothesis an anthropogenic introduction also in this case. However, we can not exclude that this could be a rare native species previously overlooked in France.

Regarding chorotypes, more than half of the species collected (55%) have a Palearctic distribution, while Holarctic and European elements share a percentage of 16%. Tritanic-European-Mediterranean species are represented by 6% of the total, while Mediterranean species are only 2% and Cosmopolitan 1%. By contrast, Endemic species represent 4% of the total (Fig. 15). These are all alpine species, and most of them were found above 2000 m a.s.l., in rocky lands and between boulders on mountain slopes. Among them, *Vesuvia jugorum* (Simon, 1881), a large-sized lycosid occurring ex-

<table>
<thead>
<tr>
<th>Family</th>
<th>Species</th>
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<tbody>
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<td>Dichtyidae</td>
<td>Dictyna pusilla Thorell, 1868</td>
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<td>Gnaphosida</td>
<td>Gnaphosa nigerina L. Koch, 1877</td>
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<td>Micia fri formicaria (Sundevall, 1831)</td>
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<td><em>Urozelotes trifidus</em> Tuneva, 2003</td>
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<td>Linyphiidae</td>
<td>Hilariella excisa (O. Pickard-Cambridge, 1871)</td>
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<td>Pinniphatrus agellus (Maurer &amp; Thaler, 1988) n. comb.</td>
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<td>Linyphia hortensis Sundevall, 1830</td>
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<td>Lycosidae</td>
<td>Pardosa alacris (C. L. Koch, 1833)</td>
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<td>Pardosa mixta (Kulczyński, 1887)</td>
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<td>Pardosa pullata (Clerck, 1757)</td>
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<td>Vesubia jugorum (Simon, 1881)</td>
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<td>Philodromus vagulus Simon, 1875</td>
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<td>Philodromus fuscolimbatus Lucas, 1846</td>
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<td>Philodromus cespitum (Walckenaer, 1802)</td>
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<td>Salticidae</td>
<td>Thanatus atratus Simon, 1875</td>
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<td>Helyophasia lineiventris Simon, 1868</td>
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<td>Theridiidae</td>
<td>Chrysso nordica (Chamberlin &amp; Ivie, 1947)</td>
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<td>Dipoena torva (Thorell, 1875)</td>
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<td>Enoplognatha carica (Pickert, 1876)</td>
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<td>Enoplognatha latmana Hippa &amp; Öksala, 1982</td>
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<td></td>
<td>Episinus algicicus Lucas, 1846</td>
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<td>Heterothrinid nigrovigature (Simon, 1873)</td>
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<td>Neoturrita suaveolens (Simon, 1880)</td>
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<tr>
<td>Thomisidae</td>
<td>Misumena vatia (Clerck, 1757)</td>
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</table>

Table 3. — List of new records for the Alpes-de-Haute-Provence Department. Bold species are new for France.
clusively in alpine rocky lands above 2300 m, exhibits a very limited number of populations documented in literature in the South-Western Alps, mainly Maritime Alps (Mammola et al. 2016). The species is classified as Endangered and formally listed in the IUCN Red List of Threatened Species (IUCN 2018), on the basis of its limited geographic range and the estimate of the reduction of its natural habitat in the near future. The present work records its presence in the Barcelonnette area at 2361 m a.s.l., near to the Chapeau de Gendarme peak, thus representing one of westernmost data for the species, and the first record of the species for the area. Another endemic species, Drassodex simoni Hervé, Roberts & Murphy, 2009, was found in the same locality. This species was already recorded for the Alpes-de-Haute-Provence Department, where it was found in Lac d’Allos, Col de la Cayolle, Uvernet-Fours and Allos (Hervé et al. 2009), but never before in the Barcelonnette area. A further endemic species found in alpine rocky lands is Piniphantes agnells n. comb., collected in talus caves on the pathway to Chapeau de Gendarme. In the same caves, the presence of Turinyphia clairi was further documented. This is a rare species, endemic of the SW-Alps and often associated with subterranean habitats (Isaia et al. 2017). Another remarkable endemic species restricted to the Western Alpine region, is Dysdera cribrata (Dysderidae), found in silver fir woods in the Bois de Gaudissart. This species was already known by the Alpes-de-Haute-Provence Department (Simon 1882, 1914 ; Isaia & Chiarle 2015), but never recorded before in the Barcelonnette area.

The fieldwork carried out within the “Explor’Nature” event has been conducted in several habitat types within the study area. For each habitat, the sampling effort and the time spent for the collection of individuals were different. In order to maximise the sampling efficiency in a limited period of time, biological prospections were primarily focused on areas in which a higher species richness was a priori expected based on our expertise. Grasslands are in general regarded among the most biological diverse habitats, especially in term of arthropod diversity (Muller et al. 1998; Butaye et al. 2005; WallisDeVries & van Sway 2009). Among them, wet grasslands constitute an optimum habitat rich in spider species (Marc et al. 1999). Similarly, we also paid special attention to riparian habitats. As expected, wet grasslands were characterized by the highest species richness (29 species collected), followed by riparian habitats and shrublands, both with 25 species. In terms of abundance of specimens, wet grasslands were the richest macrohabitat (67 specimens collected), followed by riparian habitats (54 specimens), ruderal areas and rocky lands (39 specimens) (Fig. 16). Collections performed in riparian habitats revealed an array of interesting species, including two new species for France and several records of rare species, among which Briguettea latens (Dictynidae) and Ozyptila rauda (Thomisidae). Riparian habitats show the highest diversity of spider families, followed by shrublands and ruderal areas (Fig. 17). Rocky lands showed the highest diversity of endemic species, hosting three out of a total of five endemic species collected in the whole study area, namely Coelotes pabulator, D. simoni and V. jugorum. Wet grasslands and rocky lands hosted the highest richness of lycosids, while diversity of theridiids is higher in shrublands and wet grasslands (Fig. 17). Despite the low number of individuals collected, coniferous forests, broadleaved forests and mixed forests seem to be the most promising habitats in terms of the abundance/species richness ratio, and thus deserve particular attention in future studies. Variation in sampling efforts in the investigated macrohabitats directly affected the number of species found, preventing the possibility of comparisons among different habitats.

The “Explor’Nature Barcelonnette” has proved to be a valuable tool for improving the knowledge of local biodiversity, for investigating the biological richness of an area, up to now never explored from this perspective, and for raising public awareness of the need to conserve biodiver-
Faunal inventories are essential for analyses of species distributions, relationships between local and regional diversity, patterns of endemism, and for the identification of diversity hot-spots, vulnerable habitats, and priority sites for conservation (Doak & Mills 1994; Haila & Margules 1996; Summerville et al. 2004; Summerville & Crist 2005). As far as spiders are concerned, in recent years there have been similar examples of spider inventories, aimed at uncovering the spider diversity in a specific region (Hore & Uniyal 2008; Haddad & Russell-Smith 2010; Rubio 2016; Cardoso et al. 2017; Lamont et al. 2017). The presence of rare and endemic species, including a red-listed species, and new records for France, highlights the importance of this kind of events, aiming to increase the knowledge of the biology and the ecology of various animal taxa, and to implement such data in conservation programs.
Acknowledgements

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