Paolo Fontana* - Federico Marangoni** - Petr Kočárek*** - Paola Tirello**** - Giacomo Giovagnoli***** - Loris Colacurcio******

Updated knowledge on Italian Dermaptera with the report of a new alien species: *Forficula smyrnensis* Audinet-Serville, 1838

Abstract: The Dermaptera species number reported for the Italian fauna (27 species) is the most conspicuous among the European Union. The knowledge on Italian Dermaptera is among the most accurate in Europe, above all thanks to the large number of well-known entomologists who, over two centuries, have dedicated themselves to it in depth. Half of the species of Dermaptera known for Italy have indeed been described by Italian entomologists. Four species are alien and some of which have long been acclimatized in Italy. Among these, *Forficula smyrnensis* Audinet-Serville, 1838, is reported here for the first time from Italy, found in the Marche, Veneto and Emilia Romagna Regions in 2011, 2018 and 2020 respectively. The last record could suggest an acclimatization of this species in Italy. The knowledge of Italian Dermaptera was already very wide and accurate in 1994 when the 36th issue of the Checklist of the Italian fauna was published and even more so after the revision of 2005. The recent revision of the genus *Chelidurella* Verhoeff, 1902 on a molecular basis has substantially confirmed the great complexity for this genus in Italy and the ongoing research on the genus *Chelidura* Latreille, 1825 in the central-western Alps could unveil a similar complexity.

Riassunto: *Le attuali conoscenze sui Dermaptera italiani con segnalazione di una nuova specie aliena:* Forficula smyrnensis *Audinet-Serville, 1838.*
Il contingente dei Dermatteri segnalati per la fauna italiana è il più cospicuo tra i paesi dell'Unione Europea. Le specie segnalate per l'Italia sono 27, poco meno delle 29 note per la Penisola Iberica; 21 sono i Dermatteri della Francia e 16 quelli della Grecia. Le conoscenze sui Dermatteri italiani sono tra le più accurate in Europa, soprattutto grazie al grande numero di acclarati entomologi che vi si sono dedicati in modo approfondito nell'arco di due secoli. La metà delle specie di Dermatteri note per l'Italia è stata infatti descritta da entomologi italiani. Oltre un quarto delle specie italiane (6) risultano essere endemiche mentre ben 4 sono aliene, alcune delle quali sono da lungo tempo acclimatate in Italia. Tra queste specie aliene viene qui segnalata *Forficula smyrnensis* Audinet-Serville, 1838, rinvenuta nel 2011 nelle Marche, nel 2018 in Veneto e nel 2020 in Emilia Romagna e quest'ultimo dato potrebbe suggerire per questa specie la sua acclimatazione in Italia. Le conoscenze dei dermatteri italiani erano già molto ampie ed accurate nel 1994 quando venne pubblicato il fascicolo 36 della Checklist della fauna italiana e ancor di più dopo la revisione del 2005. La recente revisione del genere *Chelidurella* Verhoeff, 1902 su base molecolare ha sostanzialmente confermato la grande complessità per questo genere in Italia e le ricerche in corso sul genere *Chelidura* Latreille, 1825 nelle Alpi centro-occidentali potrebbero svelare una situazione analoga.

Key words: Dermaptera, Forficulidae, earwig, *Forficula smyrnensis*, distribution, Italy, Europe.

Introduction

The Dermaptera of the Italian fauna constitute the largest contingent among the countries of the European Union. Italy with 27 species is the second in Europe, only the Iberian Peninsula (Spain and Portugal) counts 29 species, while the political territory of Spain (with Canary Islands and Madeira) counts 45 species. Other countries with a significant number of species are France with 22 species and Greece with 16. The species known in the European continent, including also the Canary Islands and Madeira, are in total 87 and among the countries not belonging to the European Union, the Dermaptera known for Russia are 34 and those of Ukraine are 14 (Tab. 1 and Fig. 1).

One of the reasons why the Italian Dermaptera are so well known derives largely from the extensive group of Italian scholars who have dedicated themselves to this order of insects: Franco Andrea Bonelli (1784-1830), Giuseppe Genè (1836-1890),

*Paolo Fontana, Edmund Mach Foundation, San Michele all'Adige (TN), Italy; World Biodiversity Association, Italy.
E-mail: paolo_api.fontana@fmach.it
**Federico Marangoni, University of Verona, Department of Biotechnology, Italy.
***Petr Kočárek, University of Ostrava, Department of Biology and Ecology, Czech Republic.
****Paola Tirello, University of Padua, Department of Agronomy, Food, Natural resources, Animals and Environment, Italy.
*****Giacomo Giovagnoli, Polytechnic University of Marche, Italy.
*****Loris Colacurcio, Zola Predosa (BO), Italy.

Tab. 1. The number of species of Dermaptera known for European countries obtained from available Checklists and updated literature.

Country/geographic area	Species
Europe (with Canary Is. and Madeira)	87
Russia	34
Italy	27
Spain and Portugal	29
Spain (with Canary Is. and Madeira)	45
France	22
Turkey	20
Greece	16
Ukraine	14
Austria	11
Romania	10
Germany	9
Switzerland	9
Croatia	9
Bosnia And Herzegovina	9
Slovenia	8
Czech Republic	7
Slovakia	7
Hungary	7
Serbia	7
Bulgaria	7
Sweden	6
United Kingdom	6
Poland	6
Denmark	6
Lithuania	5
Belarus	5
Albania	5
Belgium	4
Norwey	3
Ireland	3
Finland	2
Macedonia	2

Achille Costa (1823-1898), Alfredo Borelli (1857-1943), Felice Capra (1896-1991), Teresita Paulucci Maccagno (1900-1999), Antonio Galvagni (1924-2015) and Augusto Vigna Taglianti (1943-2019). Among them (Fig. 2) many have contributed by describing new species or by delineating the geographical distribution of Italian species. Teresita Paulucci Maccagno deserves a particular mention as she was a true pioneer in the study of the taxonomic value of the male genitalia of Dermaptera (Maccagno, 1933). Alfredo Borelli was one of the greatest specialists of Dermaptera worldwide. There are 165 taxa nowadays attributed to him and another 35 of the taxa he described have been put into synonymy, at least according to the Dermaptera Species File online (http://dermaptera.speciesfile.org/), which to tell the truth it is not very well updated. Antonio Galvagni carried out very in-depth research on the genus *Chelidurella* Verhoeff, 1902 and contributed to the interpretation of its vast morphological variability, as we will see. The great Italian zoologist and biogeographer Augusto Vigna Taglianti, in addition to having studied and described new species of Italian and foreign Dermaptera (Vigna Taglianti, 1993 and 1999), has studied these insects in depth from a biogeographical point of view (Vigna Taglianti, 1994) as well as having compiled and updated the Checklist of the Italian fauna (Failla *et al*., 1994; Vigna Taglianti, 2001 and 2005). Vigna Taglianti has studied in particular the Dermaptera of the Apennines (Vigna Taglianti, 1999 and Fontana *et al*., 2004) and of the Western Alps (Vigna Taglianti, 2009), having in mind to revise the genus *Chelidura* Latreille, 1825 (in collaboration with Paolo Fontana) but unfortunately this remained an unconcluded purpose. His clear vision on the taxonomic structure and on the biogeographical aspects of the genus *Chelidura* (Chemini & Vigna Taglianti, 2002) are in fact today amply confirmed by the first molecular analyzes (Fontana *et al*., in press).

If the knowledge on Italian Dermaptera is very deep, an adequate synthesis of such knowledge is still lacking and, above all, tools for their identification are lacking. Unfortunately (but probably fortunately), the volume of the Fauna of Italy relating to Dermaptera has not yet been written, but it is planned to carry out it as soon as the taxonomic situation of the genus *Chelidura* will be clarified. The only key available for the Italian Dermaptera, even if mainly focused on northern Italian species, as well as a clear exposition of the techniques related to the study of this order of

insects, is present in the volume on the Orthopteroids of Veneto region (Fontana *et al*., 2002). The third volume of "Die Orthopteren Europas" monograph (Harz & Kaltenbach, 1976) is still very useful for the identification of European species, except for the species described after 1976.

Recent knowledge on the Dermaptera of the Italian fauna

Making a comparison between the surfaces of Russia (17,100,000 km^2) and Italy (301,338 km^2) and their species of Dermaptera, it is observed that in Russia there is one species every 500.000 km^2 while in Italy one every 11.000 km^2. The diversity of Italian Dermaptera is obviously due to its great diversity of environments and to its complex geological and climatic history (Ruffo & Stock, 2005), but also to the complexity of three genera that together make up about two-thirds of the Italian Dermaptera, namely the genus *Chelidurella* Verhoeff, 1902, which counts as many as 8 species, the genus *Forficula* Linnaeus, 1758, which with the new report of *Forficula smyrnensis* Audinet-Serville, 1838 counts other 5 species (2 species formerly assigned to the genus *Forficula* are now assigned to the genus *Guanchia* Burr, 1911), and the genus *Pseudochelidura* Verhoeff, 1902, that is present in Italy with two endemic species

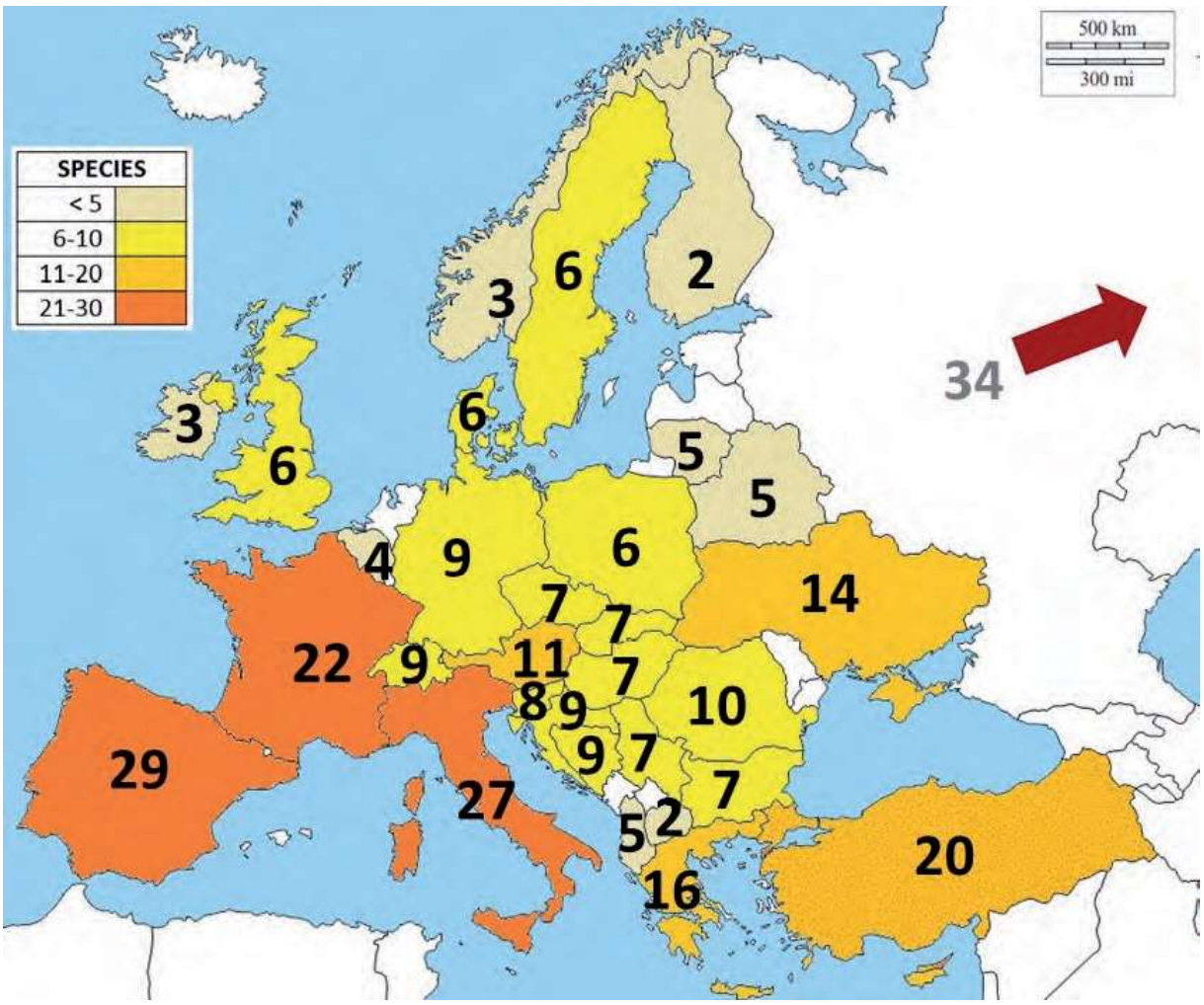


Fig. 1. Number of Dermaptera species in the European countries.

(Fig. 3). Then all endemic Italian taxa of Dermaptera belong to these three genera, namely *Chelidurella caprai* Vigna Taglianti, 1993, *Chelidurella poggii* Capra, 1982, *Pseudochelidura orsinii* (Gené, 1833), *Pseudochelidura galvagnii* Vigna Taglianti, 1999, *Forficula apennina* Costa, 1881 and *Forficula silana* Costa, 1881 (Fig. 4).

Following a new research based on molecular as well morphological analyses and relating to the most widespread species of Dermaptera in Europe and Italy, *Forficula auricularia* Linnaeus, 1758 resulted presently belonging to at least 4 different species: the morphologically diagnosable *Forficula aeolica* González-Miguéns & García-París, 2020, the cryptic taxa *Forficula mediterranea* González-Miguéns & García-París 2020, *Forficula dentata* Fabricius, 1775 and *Forficula auricularia* Linnaeus, 1758 sensu stricto (González-Miguéns *et al*., 2020). According to González-Miguéns *et al*. (2020), *Forficula auricularia* Linnaeus, 1758 is present in Czech Republic, Hungary, Italy, Romania, Sweden, France (in sympatry with *F. dentata*), Turkey, Canada, USA and Australia; *Forficula aeolica* González-Miguéns & García-París, 2020 is present in Spain and Morocco, *Forficula dentata* Fabricius, 1775 in Portugal, Spain Andorra, Great Britain, France (in sympatry with *Forficula auricularia*), Chile and USA, and *Forficula mediterranea* González-Miguéns & García-París, 2020 in Iberian Peninsula and Morocco. Therefore, only the true *Forficula auricularia* would be present in Italy but it is clear that the Italian *Forficula auricularia* complex should be deeply investigated in Italy and its islands too.

The recent revision of the genus *Chelidurella* (Kirstová *et al*., 2020) has practically confirmed the

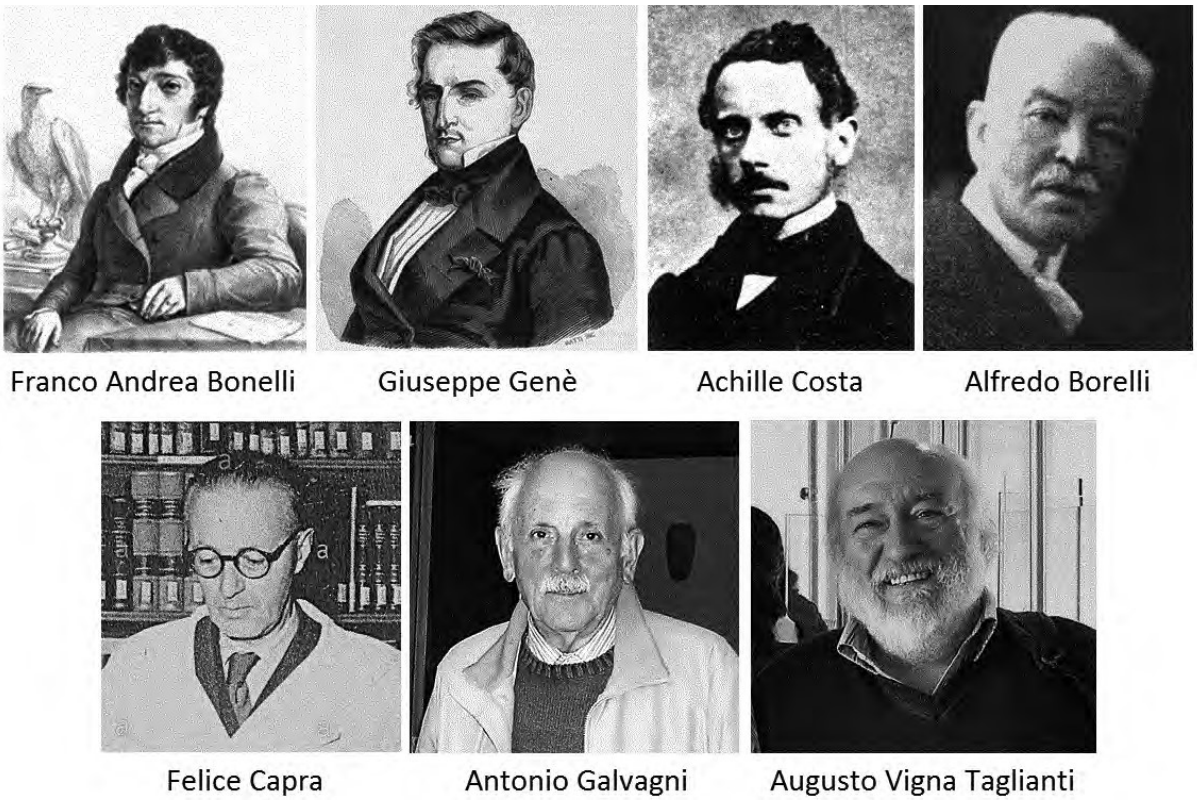


Fig. 2. Portraits of the Italian Dermapeterologists: Franco Andrea Bonelli (1784-1830), Giuseppe Genè (1836-1890), Achille Costa (1823-1898), Alfredo Borelli (1857-1943), Felice Capra (1896-1991), Antonio Galvagni (1924-2015) and Augusto Vigna Taglianti (1943-2019). Unfortunately, any portrait of Teresita Paulucci Maccagno (1900-1999) is known.

structure of this complex genus outlined by Antonio Galvagni in the course of his wide and accurate studies on this genus (Galvagni, 1994, 1995, 1996 and 1997). Kirstová *et al*. (2020), with their careful investigation, have confirmed on a molecular basis the identity of three genera in recent times joined under the genus *Chelidura* Latreille, 1825, namely *Chelidura* latreille, 1825, *Chelidurella* Verhoeff, 1902 and *Mesochelidura* Verhoeff, 1902. The study has brought to the synonymy of *Chelidurella guentheri* Galvagni, 1994 with *C. acanthopygia* (Gené, 1832) and of *C. tatrica* Chládek, 2017 with *C. thaleri* Harz, 1980 and to the description of two new species, *Chelidurella galvagnii* Kirstová & Kočárek, 2020, until now known only from Austria, and of *C. pseudovignai* Kočárek & Kirstová, 2020, known from northeastern Italy (Friuli Venezia Giulia), Austria and Slovenia. The approach used by Kirstová *et al*. (2020) was applied for the revision of the genus *Chelidura* which, as mentioned, Augusto Vigna Taglianti had been planning to carry out for many years and it is now on going (Fig. 5).

Fig. 3. (a) The most common species of the genus *Chelidurella*, *C. acanthopygia*, Italy, Colli Euganei, Veneto (Padua), photo by Andrea Cogo. (b) *Pseudochelidura orsinii*, Italy, Abruzzo (l'Aquila), Gran Sasso, Monte Aquila, photo by P. Fontana.

Fig. 4. (a) *Forficula apennina*, Italy, Abruzzo (l'Aquila), Gran Sasso, Monte Aquila, photo by P. Fontana. (b) *Forficula silana*, Italy, Abruzzo (L'Aquila), Civitella Alfedena, photo by P. Fontana.

Fig. 5. *Chelidura aptera* lago del Mucrone. Photo by P. Fontana.

Forficula smyrnensis Audinet-Serville, 1838
new for the Italian fauna

At least three allochthonous species, with a wide subcosmopolitan, intertropical diffusion, up to date appear to have been introduced in Italy with crops: *Euborellia annulipes* (Lucas, 1847), known in Italy since 1837, but after 1930 widespread also in smaller Tuscan islands, *Nala lividipes* (Dufour, 1820), known since 1915 in Sicily and Sardinia and since 1977 on the Lazio coast and *Euborellia annulata* (Fabricius, 1787), previously known as *Euborellia stali* (Dohrn, 1864), found since 2002 in Lombard nurseries (Vigna Taglianti, 2005). To these three alien species now we add *Forficula smyrnensis* Audinet-Serville, 1838, found in Italy in single specimens, both females, the first time in the Marche in 2011 and more recently in Veneto in 2018. A new record (2020) from Emilia Romagna is concerning several specimens (5-6 females and 1 male) under the bark of an oak and this could suggest an areal acclimatization in Italy of the species.
Forficula smyrnensis is widespread in the eastern Mediterranean basin (from Yugoslavia to the Caucasus and to Israel), and was reported from Corsica without further details by Brunner von Wattenwyl (1882); the Corsican specimen is still in the Naturhistorisches Museum in Vienna. This same record is reported by Chopard (1923), by Albouy & Caussanel (1990) and by Braud *et al*. (2002). Any new catches seem to have confirmed this report from Corsica. On the basis of the consolidated distribution of this species, the Corsica report seems reasonably to be framed in a phenomenon of passive introduction, as it is also probable for the three Italian records (Fig. 6). However, given the presence of this species in the Balkans, the finding of *Forficula smyrnensis* on the Adriatic side of Italy could also be interpreted as an example of trans-Adriatic fauna (Gridelli, 1950).
Forficula smyrnensis is a medium-large species for the genus and is characterized by lively coloring. The head is often orange, the pronotum is yellowish and the tegmina are of a blackish-brown with two clear and pale-yellow oval spots. The portion of the wings protruding from the short tegmina is quite long and very clear, sometimes white. The abdomen is dark brown and the cerci are blackish-brown. Antennae brown, paler in the basal segments and the legs are yellowish. The cerci of the female are very long for the genus and those of the male are generally more or less as long as the tegmina and the protruding part of the wings together. The shape of the cerci is simple, slightly arched and without teeth in the median portion; they are instead dilated in a sort of denticulation at their base (Fig. 7).

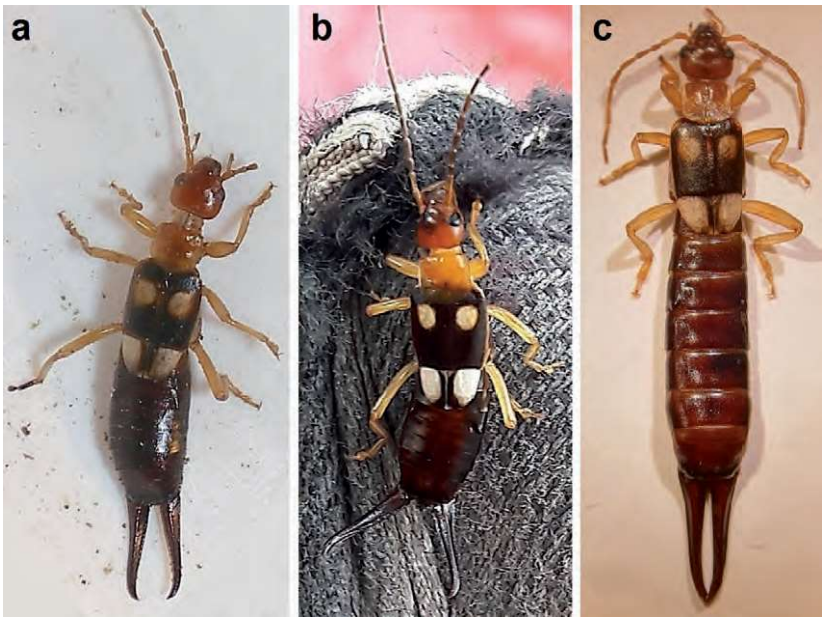
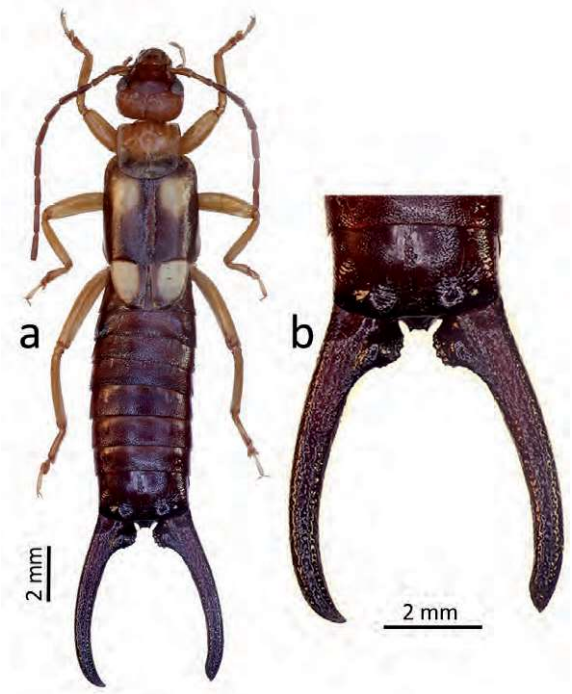


Fig. 6. The females specimens of *Forficula smyrnensis* collected in Italy. (a) Italy, Marche (Ancona), Offagna, 12.XI.2011, photo by G. Giovagnoli. (b) Italy, Veneto (Treviso), Montebelluna, Via Calmaggiore, 29.V.2018, photo by P. Tirello. (c) Italy, Emilia Romagna (Bologna), Zola Predosa, Gessi, 21.XI.2020, photo by Loris Colacurcio.



Examined material (Fig. 8): Italy, Veneto (Treviso), Montebelluna, Via Calmaggiore, 29.V.2018, leg. P. Tirello, 1 female (P. Tirello private collection); Italy, Emilia Romangna (Bologna), Zola Predosa, Gessi, 3 females, 21.XI.2020, leg. L. Colacurcio (L. Colacurcio private collection); Italy, Marche (Ancona), Offagna, 12.XI.2011, leg. G. Giovagnoli, 1 female (G. Giovagnoli private collection); Italy, Marche (Ancona), Osimo, Monte Cerno (Monte della Crescia), 340 m, 45°30'49'' N, 13°25'57'' E, 6.II.2011, leg. G. Giovagnoli, 1 female (ex coll. E. Ruzzier, now in the coll. of the Fondazione Museo Civico di Rovereto).

Fig. 7. *Forficula smyrnensis* male, Bulgaria, Primorsko env., 19.VI.1997, J. Simandl leg., coll. P. Kočárek. (a) overall view of the male and (b) detail of the cerci, photo Petr Kočárek.

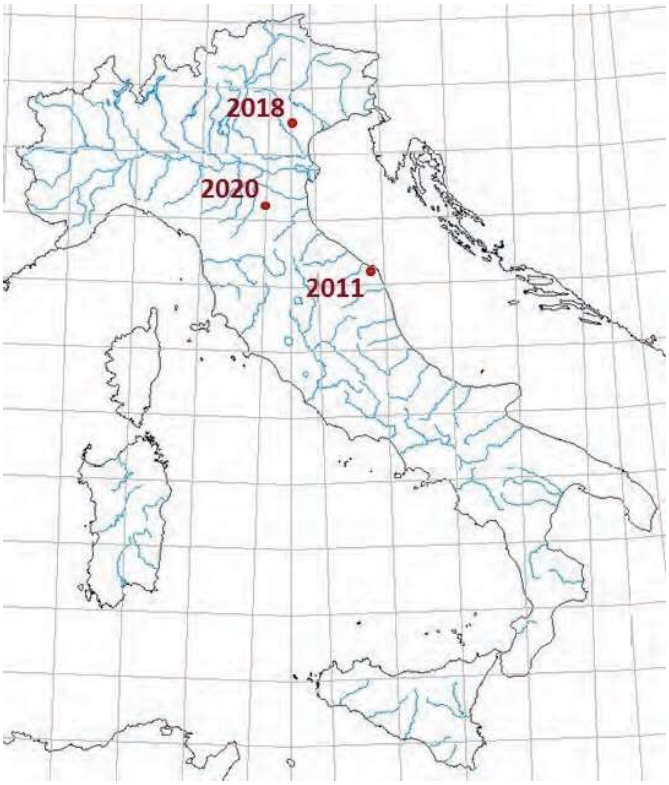


Fig. 8. The three Italian locations where *Forficula smyrnensis* was collected (the two sites in the Marche region are only a few kilometers away from each other).

Updated Dermaptera checklist
of the Italian fauna with regional distribution

Family **Anisolabididae**

Anisolabis Fieber, 1853

Anisolabis maritima (Bonelli in Gené, 1832) (**N**, **S**, **Si**, **Sa**)

Italian regional distribution: Friuli Venezia Giulia, Veneto, Liguria, Tuscany, Abruzzo, Lazio, Campania, Calabria, Sicily, Sardinia

Euborellia Burr, 1910

Euborellia annulipes (Lucas, 1847) (**N**, **S**, **Si**, **Sa**)

Italian regional distribution: Friuli Venezia Giulia, Veneto, Piedmont, Liguria, Emilia Romagna, Tuscany, Abruzzo, Lazio, Campania, Calabria, Sicily, Sardinia.

Euborellia moesta (Gené, 1837) (**N**, **S**, **Sa**)

Italian regional distribution: Friuli Venezia Giulia, Veneto, Lombardy, Piedmont, Liguria, Emilia Romagna, Tuscany, Umbria, Marche, Lazio, Abruzzo, Campania, Sardinia.

Euborellia annulata (Fabricius, 1787) (**N**)

Italian regional distribution: Lombardy

Family **Labiduridae**

Nala Zacher, 1910

Nala lividipes (Dufour, 1820) (**S**, **Si**, **Sa**)

Italian regional distribution: Lazio, Sicily, Sardinia.

Labidura Leach, 1815

Labidura riparia (Pallas, 1773) (**N**, **S**, **Si**, **Sa**)

Italian regional distribution: Friuli Venezia Giulia, Veneto, Lombardy, Piedmont, Liguria, Emilia Romagna, Tuscany, Marche, Umbria, Abruzzo, Lazio, Campania, Apulia, Basilicata, Calabria, Sicily, Sardinia.

Family **Spongiphoridae**

Labia Leach, 1815

Labia minor (Linnaeus, 1758) (**N**, **S**, **Si**)

Italian regional distribution: Trentino-South Tyrol, Veneto, Lombardy, Piedmont, Liguria, Emilia Romagna, Tuscany, Marche, Lazio, Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria, Sicily, Sardinia

Family **Forficulidae**

Anechura Scudder, 1876

Anechura bipunctata (Fabricius, 1781) (**N, S**)

Italian regional distribution: Lombardy, Piedmont, Aosta Valley, Abruzzo.

Chelidura Latreille, 1825

Chelidura aptera (Megerle in Charpentier, 1825) (**N**)

Italian regional distribution: Piedmont.

Chelidurella Verhoeff, 1902

Chelidurella acanthopygia (Gené, 1832) (**N, S**)

Italian regional distribution: Friuli Venezia Giulia, Trentino-South Tyrol, Veneto, Lombardy, Piedmont, Emilia Romagna, Tuscany.

Chelidurella caprai Vigna Taglianti, 1993 (**S**) [**E**]

Italian regional distribution: Campania, Basilicata, Calabria.

Chelidurella mutica (Krauss, 1886) (**N**) [**E**]

Italian regional distribution: Trentino-South Tyrol, Veneto, Lombardy.

Chelidurella poggii Capra, 1982 (**N**) [**E**]

Italian regional distribution: Friuli Venezia Giulia, Trentino-South Tyrol.

Chelidurella thaleri Harz, 1980 (**N**)

Italian regional distribution: Friuli Venezia Giulia, Trentino-South Tyrol, Veneto, Lombardy.

Chelidurella vignai Galvagni, 1995 (**N**)

Italian regional distribution: Friuli Venezia Giulia, Trentino-South Tyrol, Veneto.

Chelidurella fontanai Galvagni, 1996 (**N**)

Italian regional distribution: Aosta Valley, Piedmont, Liguria, Emilia Romagna.

Chelidurella pseudovignai Kočárek & Kirstová, 2020 (**N**)

Italian regional distribution: Friuli Venezia Giulia.

Pseudochelidura Verhoeff, 1902

Pseudochelidura orsinii (Gené, 1833) (**N**, **S**) [**E**]

Italian regional distribution: Piedmont, Liguria, Tuscany, Marche, Umbria, Abruzzo, Lazio, Molise, Campania.

Pseudochelidura galvagnii Vigna Taglianti, 1999 (**S**) [**E**]

Italian regional distribution: Marche, Lazio, Abruzzo.

Apterygida Westwood, 1840

Apterygida albipennis (Megerle in Charpentier, 1825) (**N**, **S**)

Italian regional distribution: Trentino-South Tyrol, Veneto, Lombardy, Piedmont, Aosta Valley, Liguria, Emilia Romagna, Tuscany, Marche, Umbria, Abruzzo, Lazio, Molise, Apulia, Calabria.

Forficula Linnaeus, 1758

Forficula apennina Costa, 1881 (**S**) [**E**]
ITALIAN REGIONAL DISTRIBUTION: Lazio, Abruzzo, Calabria.

Forficula auricularia Linnaeus, 1758 (**N**, **S**, **Si**, **Sa**)
ITALIAN REGIONAL DISTRIBUTION: Friuli Venezia Giulia, Trentino-South Tyrol, Veneto, Lombardy, Piedmont, Aosta Valley, Liguria, Emilia Romagna, Tuscany, Marche, Umbria, Lazio, Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria, Sicily, Sardinia.

Forficula decipiens Gené, 1832 (**N**, **S**, **Si**, **Sa**)
ITALIAN REGIONAL DISTRIBUTION: Friuli Venezia Giulia, Veneto, Lombardy, Piedmont, Liguria, Emilia Romagna, Tuscany, Marche, Lazio, Abruzzo, Campania, Molise, Apulia, Basilicata, Calabria, Sicily, Sardinia.

Forficula silana Costa, 1881 (**S**, **Si**) [**E**]
ITALIAN REGIONAL DISTRIBUTION: Abruzzo, Molise, Lazio, Basilicata, Calabria, Sicily.

Forficula smyrnensis Audinet-Serville, 1839 (**N, S**)
ITALIAN REGIONAL DISTRIBUTION: Veneto, Emilia, Romagna, Marche

Guanchia *Burr, 1911*

Guanchia obtusangula (Krauss, 1904) (**N**, **S**, **Si**)
ITALIAN REGIONAL DISTRIBUTION: Veneto, Tuscany, Umbria, Lazio, Abruzzo, Molise, Campania, Apulia, Basilicata, Calabria, Sicily.

Guanchia pubescens (Gené, 1837) (**N**, **S**, **Si**, **Sa**)
ITALIAN REGIONAL DISTRIBUTION: Veneto, Lombardy, Piedmont Liguria, Emilia Romagna, Tuscany, Marche, Lazio, Abruzzo, Campania, Calabria, Sicily, Sardinia.

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