

Spider Parasitoids of the Tribe Ephialtini (Hymenoptera: Ichneumonidae: Pimplinae) in Italy and their Host Association

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Abstract: The list of ephialtine wasps (Hymenoptera: Ichneumonidae: Pimplinae) of Italy associated with spider hosts is presented here. Our comprehensive list includes twenty-seven species belonging to eleven genera compared to seventeen species and nine genera included in the previous checklist of the Italian fauna. Species can be separated into two ecological groups in accordance with the host type the first group includes pseudo-parasitoids attacking spider egg sacs; the second one includes koinobiont ectoparasitoids attacking adult spiders. The host association of wasps occurring in Italy was summarised from published and unpublished data. *Zatypota discolor* (Holmgren, 1860) is new for Italy. *Zaglyptus varipes* (Gravenhorst, 1829) and *Schizopyga podagrica* Gravenhorst, 1829 are recorded for the first time in South Italy and in Sardinia, respectively.

Key words: Checklist, *Polysphincta* group of genera, egg predator, koinobiont, spider host, new records.

Introduction

The association with spider hosts has been evolved as one of the most complex and intricate interaction of parasitoids. The largest group of parasitoids associated with spiders are pimpline wasps of the tribe Ephialtini. Twenty-eight genera are known to parasitize spiders (GAULD & DUBOIS 2006, YU et al. 2012, MATSUMOTO 2016). A phylogenetic study based on morphological characteristics conducted by GAULD & DUBOIS (2006) revealed that all groups of pimplines that use araneomorph spiders or their egg masses inside a silken sac as larval nourishment form a monophyletic clade within the Ephialtini. These spider parasitoids are clustered into two ecological groups in accordance with their host type. The first one is a paraphyletic genus group which includes spider egg mass parasitoids (pseudo-parasitoids), the second one is the *Polysphincta* genus-group which includes true spider parasitoids (YU et al. 2012). The first one thought to be the

ancestral sister-group to the second one (GAULD & DUBOIS 2006). Within the *Polysphincta* group, three major clades were recognized based on molecular analysis: the *Schizopyga* subgroup that utilizes spiders constructing egg-laying chambers or funnel webs as hosts and the *Acrodactyla* and *Polysphincta* groups that attack arial web spiders (MATSUMOTO 2016).

Studies on the biology of egg mass parasitoids is less than that in polysphinctines probably because of the invisibility or inconspicuousness of larvae inside spider egg sacs and the difficulty of identification of spider egg sacs. Attacking of two or more eggs is not recognized to be true parasitism in a narrow sense but called pseudo-parasitism instead (DUBOIS et al. 2002).

Wasps from *Polysphincta* genus-group (*sensu* GAULD & DUBOIS 2006) (Pimplinae, Ephialtini) consist exclusively of koinobiont ectoparasitoids of spi-

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ders. Larvae of these species keep their spider hosts alive during their development, attaching themselves externally to the opisthosoma or prosoma of the spider. Many species are known to manipulate the behaviour of their hosts (e.g., NIELSEN 1923, EBERHARD 2000, KORENKO et al. 2014, 2017, 2018, KLOSS et al. 2017, TAKASUKA et al. 2017).

Polysphinctines as a whole are associated with spiders from different taxonomic groups and with different foraging techniques. The host spectrum of a particular wasp species is usually restricted to a small group of taxonomically closely related species with similar behaviour. In all species, where sufficient data are available, the hosts always belong strictly to a single family (e.g., FITTON et al. 1987, KORENKO et al. 2011), except Australian taxon *Zatypota kauros* Gauld, 1984, which is known to attack spider hosts from at least two different families (KORENKO et al. 2018). Many genera are frequently encountered in the canopy where they are associated with orb-web weaving spiders inhabiting higher strata of the forests (e.g., STÜBEN et al. 2010, DI GIOVANNI et al. 2015a, KORENKO et al. 2015b, 2017). Polysphinctines show specific adaptations in many phenotypic traits, including complex behavioural repertoires that match the ecology of their hosts (e.g., EBERHARD 2000). One set of such behavioural adaptations probably evolved in interaction with aggressive defence behaviour of the spider hosts and has presumably resulted in the restricted host ranges of these parasitoids (e.g., DUBOIS et al. 2002, GAULD & DUBOIS 2006).

The first list of Italian Ichneumonidae is due to SCARAMOZZINO (1995) and included about 1,850 species. Taking into account for newly discovered species, new records and neglected ones, and for nomenclatorial changes, more than 2,260 species of ichneumonids have been reported for Italy so far (DI GIOVANNI et al. 2015b). However, low attention has been given to the ichneumonid fauna of southern Italy and major islands. Faunistic researches carried out in the last years (BAUER 2002, TURRISI et al. 2007, PAGLIANO 2009, RIEDEL & TURRISI 2013, ZWAKHALS & TURRISI 2014, DI GIOVANNI et al. 2015b, DI GIOVANNI & RESHCHIKOV 2016, DI GIOVANNI & RIEDEL 2017) have helped in filling the gaps and, at the same time, have suggested that the number of species of ichneumonids in Italy is still hugely underestimated. We present here a list of twenty-seven species belonging to eleven genera of Ephialtini parasitoids of spiders, based on literature data and new records from different Italian regions, including the first record of *Zatypota discolor* (Holmgren, 1860) for the country.

Materials and Methods

Description of genera and available host records were presented. Genera and species are listed in alphabetic order and divided into two ecological groups in accordance with their host type (pseudoparasitoids and true parasitoids).

For each species, we reported the distribution in Italy according to the division of Italy in four geographic regions as proposed by MINELLI et al. (2005) [N, S, Si, Sa]. For each region, the following abbreviations were used:

North Italy (N): Friuli-Venezia Giulia (FVG), Veneto (VEN), Trentino-Alto Adige (“South Tyrol”) (TAA), Lombardy (LOM), Aosta Valley (VAO), Piedmont (PIE), Liguria (LIG), Emilia-Romagna (EMR);

South Italy (S): Tuscany (TOS), Marche (MAR), Umbria (UMB), Lazio (LAZ), Abruzzo (ABR), Molise (MOL), Campania (CAM), Apulia (PUG), Basilicata (BAS), Calabria (CAL);

Si: Sicily (and smaller islands) (SIC);

Sa: Sardinia (and smaller islands) (SAR).

Generic records for Italy are indicated as ITA.

For literature data, the name used in the text is given in parentheses, if it differs from the valid species name. New available records have been added, based on further material from field samplings and public collections. Most of the new data originates from samplings by the first author (SK) in Piedmont and by the second author (FDG) in Piedmont vineyards and eastern Po Plain forests.

Samplings by the first author (SK) in Piedmont were carried out in province of Cuneo, (1) in a commercial hazelnut and apple orchard (Azienda A. Rivetto) close to Ornato (44°36'19.8"N, 8°00'38.7"E), (2) in a commercial apricot orchard (Chiamina) close to Verzulo (44°35'14.2"N, 7°29'50.1"E), (3) in an organic hazelnut orchard and the surrounding forest in Bottonasco (44°25'14.2"N, 7°23'39.8"E), (4) in forest edges with dominant *Corylus* sp., *Quercus* sp. and *Acer* sp. in Monterosso Grana (44°24'20"N, 7°19'17"E), and (5) at Terme di Valdieri, on bushes in rocky slope in bank of torrent Valasco (44°12'17.2"N, 7°15'48.7"E); in Province of Verbano-Cusio-Ossola, (6) in a deciduous forest on the bank of Lake Maggiore close to Fondotoce di Verbania (45°56'16"N, 8°29'37"E); in Province of Turin, (7) close to Macello, in bank vegetation of torrent Chisone (44°50'11.6"N, 7°23'51.2"E). All specimens were determined by SK, K. Holý (Prague, Czech Republic) and K. Zwakhals (Arkel, Netherlands), and preserved in the private collec-

Table 1. List of species of Ephialtini parasitoids of spiders in Italy, with new host records. In light grey changes with respect to the checklist of SCARAMOZZINO (1995); in dark grey new records in this paper.

No.	Taxon	N	S	Si	Sa	in Italy, obtained from
1	<i>Clistopyga incitator</i> (Fabricius, 1793)	x	x	x	x	
2	<i>Tromatobia lineatoria</i> (Villers, 1789)	x	x	x	x	
3	<i>Tromatobia ornata</i> (Gravenhorst, 1829)	x	x	x		
4	<i>Tromatobia ovivora</i> (Boheman, 1821)	x		x		
5	<i>Tromatobia variabilis</i> (Holmgren, 1856)	x				
6	<i>Zaglyptus multicolor</i> (Gravenhorst, 1829)	x	x	x		
7	<i>Zaglyptus varipes</i> (Gravenhorst, 1829)	x	x	x		
8	<i>Acrodactyla carinator</i> (Aubert, 1965)	x				<i>Tetragnatha montana</i> Simon, 1874
9	<i>Acrodactyla degener</i> (Haliday, 1838)	x				<i>Neriere montana</i> (Clerck, 1757)
10	<i>Acrodactyla quadrisculpta</i> (Gravenhorst, 1820)	x				<i>Tetragnatha</i> sp.
11	<i>Iania pictifrons</i> (Thomson, 1877)	x				
12	<i>Megaetaira madida</i> (Haliday, 1838)	x				
13	<i>Oxyrrhexis carbonator</i> (Gravenhorst, 1807)	x				
14	<i>Polysphincta boops</i> Tschek, 1869	x				
15	<i>Polysphincta longa</i> Kasparian, 1976	x				
16	<i>Polysphincta rufipes</i> Gravenhorst, 1829	x				
17	<i>Polysphincta tuberosa</i> Gravenhorst, 1829	x			x	<i>Araniella</i> sp.
18	<i>Schizopyga (Schizopyga) circulator</i> (Panzer, 1800)	x				
19	<i>Schizopyga (Schizopyga) frigida</i> Cresson, 1870	x				
20	<i>Schizopyga (Schizopyga) podagrica</i> Gravenhorst, 1829	x	x	x	x	
21	<i>Sinarachna pallipes</i> (Holmgren, 1860)	x				<i>Araneus (Atea)</i> sp.
22	<i>Zatypota albicoxa</i> (Walker, 1874)	x				<i>Parasteatoda</i> sp.
23	<i>Zatypota anomala</i> (Holmgren, 1860)	x				<i>Dictyna pusilla</i> Thorell, 1856
24	<i>Zatypota bohemani</i> (Holmgren, 1860)	x	x			
25	<i>Zatypota discolor</i> (Holmgren, 1860)	x				<i>Phylloneta</i> sp.
26	<i>Zatypota percontatoria</i> (Müller, 1776)	x		x		<i>Parasteatoda tepidariorum</i> (C.L. Koch, 1841), <i>Platnickina tinctoria</i> (Walckenaer, 1802), <i>Theridion pinastri</i> L. Koch, 1872, <i>Theridion varians</i> Hahn, 1833, <i>Theridion</i> sp.
27	<i>Zatypota picticollis</i> (Thomson, 1888)	x				<i>Zilla dioda</i> (Walckenaer, 1802)

tion of SK, Department of Agroecology and Crop Production, Czech University of Life Sciences Prague (Prague, Czech Republic) and in the private collection of K. Zwakhals (Arkel, Netherlands).

Samplings by the second author (FDG) were carried out in Piedmont, in Province of Cuneo, using Malaise traps nearby four vineyards of Azienda Gaja at (1) Barbaresco, San Lorenzo (44°43'26.6"N, 8°4'26.4"E), (2) La Morra, Cerequio (44°37'23.0"N, 7°56'9.5"E), (3) Roddi, Ravinali (44°39'45.3"N, 7°57'54.4"E), and (4) Treiso (44°41'29.7"N, 8°6'1.8"E). Further samplings in north-eastern Po Plain have been carried out in 2013 in Veneto and Friuli-Venezia Giulia, using Malaise trap placed in the understory of semi-natural and artificial oak-hornbeam forests. The material was identified by FDG and it is deposited in P.L. Scaramozzino's collection, Dipartimento

di Scienze Agrarie, Alimentari e Agro-alimentari, Università degli Studi di Pisa (Pisa, Italy) and in the private collection of FDG (Pisa, Italy).

An extensive list of new records per species is given in Appendix. The list of species per region and spider hosts they were obtained from in Italy has been summarised in Table 1.

Results

Spider egg parasitoids (pseudo-parasitoids)

This paraphyletic genus complex currently consists of three genera and 94 species all over the world (YU et al. 2012). All three genera were already documented in Italy (SCARAMOZZINO 1995). They are parasitoids of spider egg masses and thought to be the ancestral sister-group to the *Polysphincta* genus-group (GAULD & DUBOIS 2006).

***Clistopyga* Gravenhorst, 1829**

Widely distributed genus, with 34 species all over the world except Australia (YU et al. 2012). Six species occur in Europe (VAN ACHTERBERG et al. 2017). There is only sparse information on their biology and hosts. *Clistopyga incitator* (Fabricius, 1793) is associated with egg sacs of the spider *Segestria senoculata* (Linnaeus, 1758) (Segestriidae), which is found in holes and crevices in stone walls and under tree bark (NIELSEN 1929).

***Clistopyga incitator* (Fabricius, 1793)**

Distribution in Italy (Fig. 1A). [N S Si Sa].

TAA: BAUER 2002, PAGLIANO 2009; **LOM:** DI GIOVANNI et al. 2015a; **PIE:** PISICA & PAGLIANO 1982, Pagliano 2009; **LIG:** GRAVENHORST 1829b (= *Clistopyga haemorrhoidalis*), KIRCHNER 1867 (= *Clistopyga haemorrhoidalis*); **TOS:** CORCOS et al. 2017; **UMB:** PAGLIANO 2009; **SIC:** ZWAKHALS & TURRISI 2014; **SAR:** MARTELLI & ARRU 1958.

New records. FVG (Udine); VEN (Treviso, Venezia); PIE (Cuneo); TOS (Pisa); MAR (Ancona); SIC (Isola di Vulcano, Isola di Pantelleria); SAR (Sassari).

Notes: Specimens of *C. incitator* from Italy often display extensively light coloration with respect to European specimens, with head and body extensively red-marked to completely red, and face often completely yellow (var. *haemorrhoidalis* Gravenhorst, 1829).

***Tromatobia* Förster, 1869**

The genus includes 33 species with three subspecies distributed worldwide (Holarctic and Neotropical, partly Oriental, Australasian and Afrotropical regions) (YU et al. 2012). They have been reared alone or in broods from egg sacs of various spiders (FITTON et al. 1988). Wasps of this genus seem to be associated with egg masses mainly of the family Araneidae but also of Tetragnathidae and Linyphiidae (FITTON et al. 1987, 1988). Association with egg sacs of the wandering spiders from family Philodromidae was observed in *T. lineatoria* (FITTON et al. 1987). The ovipositing female does not harm the female spiders guarding egg sacs, and at least in *T. lineatoria* few young spiders were observed hatching from parasitized egg sacs (FITTON et al. 1988).

***Tromatobia lineatoria* (Villers, 1789)**

Distribution in Italy (Fig. 1B). [N S Si Sa].

LOM: DI GIOVANNI et al. 2015a; **LIG:** KIRCHNER 1867 (= *Pimpla oculatoria*); **TOS:** RIVOSECCHI & BETTINI 1958 (= *Pimpla oculatoria*); **LAZ:** RIVOSECCHI & BETTINI 1958 (= *Pimpla oculatoria*); **SIC:** ZWAKHALS & TURRISI 2014; **SAR:** COSTA 1886 (= *Pimpla oculatoria rubella*).

New records. FVG (Udine); VEN (Treviso, Venezia, Verona); PIE (Cuneo); TOS (Pisa); LAZ (Frosinone, Roma); ABR (Pescara); SIC (Palermo); SAR (Oristano).

Notes: specimens from Sardinia are reported as belonging to the subspecies *rubella* Costa, 1886 by YU et al. (2012). SCARAMOZZINO (1995) indicated *rubella* as synonym of *T. lineatoria* (Villers, 1789) (see also SCARAMOZZINO 1994).

***Tromatobia ornata* (Gravenhorst, 1829)**

Distribution in Italy (Fig. 1C). [N S Si].

PIE: PAGLIANO 2009; **LAZ:** PAGLIANO 2009; **SIC:** SICHEL 1860 (= *Pimpla ornata*), ZWAKHALS & TURRISI 2014.

New records. FVG (Udine); VEN (Treviso, Venezia, Verona); PIE (Cuneo).

***Tromatobia ovivora* (Boheman, 1821)**

Distribution in Italy (Fig. 1B). [N Si].

TAA: BAUER 1936 (= *Pimpla angens*), GIORDANI SOIKA 1942 (= *Pimpla ovivora*), PAGLIANO 2009; **LOM:** DI GIOVANNI et al. 2015a; **PIE:** Pagliano 2009; **SIC:** DE STEFANI 1894 (= *Pimpla angens*), 1895 (= *Pimpla angens*), PAGLIANO 2009.

New records. PIE (Cuneo).

***Tromatobia variabilis* (Holmgren, 1856) (Fig. 4A)**

Distribution in Italy (Fig. 1C). [N].

FVG: PAGLIANO 2009; **TAA:** BAUER 2002; **PIE:** PAGLIANO 2009.

New records. PIE (Cuneo).

***Zaglyptus* Förster, 1869**

The genus includes 24 described species with eight subspecies distributed worldwide (YU et al. 2012). They are parasitoids of both spiders and eggs of wandering spiders e.g. Eutichuridae, Clubionidae and Salticidae (FITTON et al. 1987). *Z. varipes* was reared from egg chambers of the wandering spiders *Clubiona* spp. (Clubionidae) (NIELSEN 1935, FITTON et al. 1988), *Cheiracanthium erraticum* (Walckenaer, 1802) (Eutichuridae) and in rare case *Sitticus floricola* (Koch, 1837) (Salticidae) (NIELSEN 1935). Wasp's larvae develop on both the egg mass and the paralysed adult spider. NIELSEN (1935) described that it was not consistent which the eggs of *Z. varipes* were deposited on spider's egg cocoon or on the paralysed spider itself and observed 24 cases of *C. erraticum* being parasitized by *Z. varipes* without spider's egg masses. All parasitized females of *C. erraticum* hiding in their chambers were stung to death and about 2 to 4 (up to 8) eggs were laid (NIELSEN 1935).

***Zaglyptus multicolor* (Gravenhorst, 1829)**

Distribution in Italy (Fig. 1D). [N S Si].

TAA: SMITS VAN BURGST 1915, 1918 (= *Polysphincta multicolor*), GIORDANI SOIKA 1942 (= *Polysphincta multicolor*), PAGLIANO 2009; **LOM:** MASI 1948 (= *Polysphincta multicolor*), PAGLIANO 2009, DI GIOVANNI et al. 2015a; **PIE:** Pagliano 2009; **LIG:** GRAVENHORST 1829b (= *Polysphincta multicolor*); **TOS:** CORCOS et al. 2017. **ABR:** PAGLIANO 2009; **SIC:** DE STEFANI 1895 (= *Pimpla ephippium*), ZWAKHALS & TURRISI 2014.

New records. FVG (Udine); VEN (Treviso, Venezia); PIE (Cuneo, Torino); TOS (Pisa); LAZ (Frosinone); SIC (Palermo, Vulcano).

***Zaglyptus varipes* (Gravenhorst, 1829) (Fig. 4B)**

Distribution in Italy (Fig. 1D). [N S Si].

TAA: SMITS VAN BURGST 1914, 1915, 1918 (= *Polysphincta varipes*); **LOM:** DI GIOVANNI et al. 2015a; **VAO:** Pagliano 2009; **PIE:** Pagliano 2009; **SIC:** ZWAKHALS & TURRISI 2014.

New records. TOS (Pisa). This is the first record for South Italy.

True parasitoids of spiders (*Polysphincta* genus-group)

GAULD & DUBOIS (2006) divided the *Polysphincta* genus-group into seven taxonomical groups, four of which occur in Italy.

***Acrodactyla* Haliday, 1838**

This moderately large genus currently includes thirty-two described species in the Holarctic and the Indo-Australian regions (YU et al. 2012). Seven of them occur in Europe (VAN ACHTERBERG et al. 2017). TOWNES (1969) divided the genus *Acrodactyla* sensu lato into three taxonomical groups. Each of these taxonomical groups has several unique morphological and ecological characteristics, including specific host range. The *Madida* genus-group already have been re-classified as the genus *Megaetaira* (GAULD & DUBOIS 2006). However, there is still a lack of strict taxonomical evidence with respect to the other

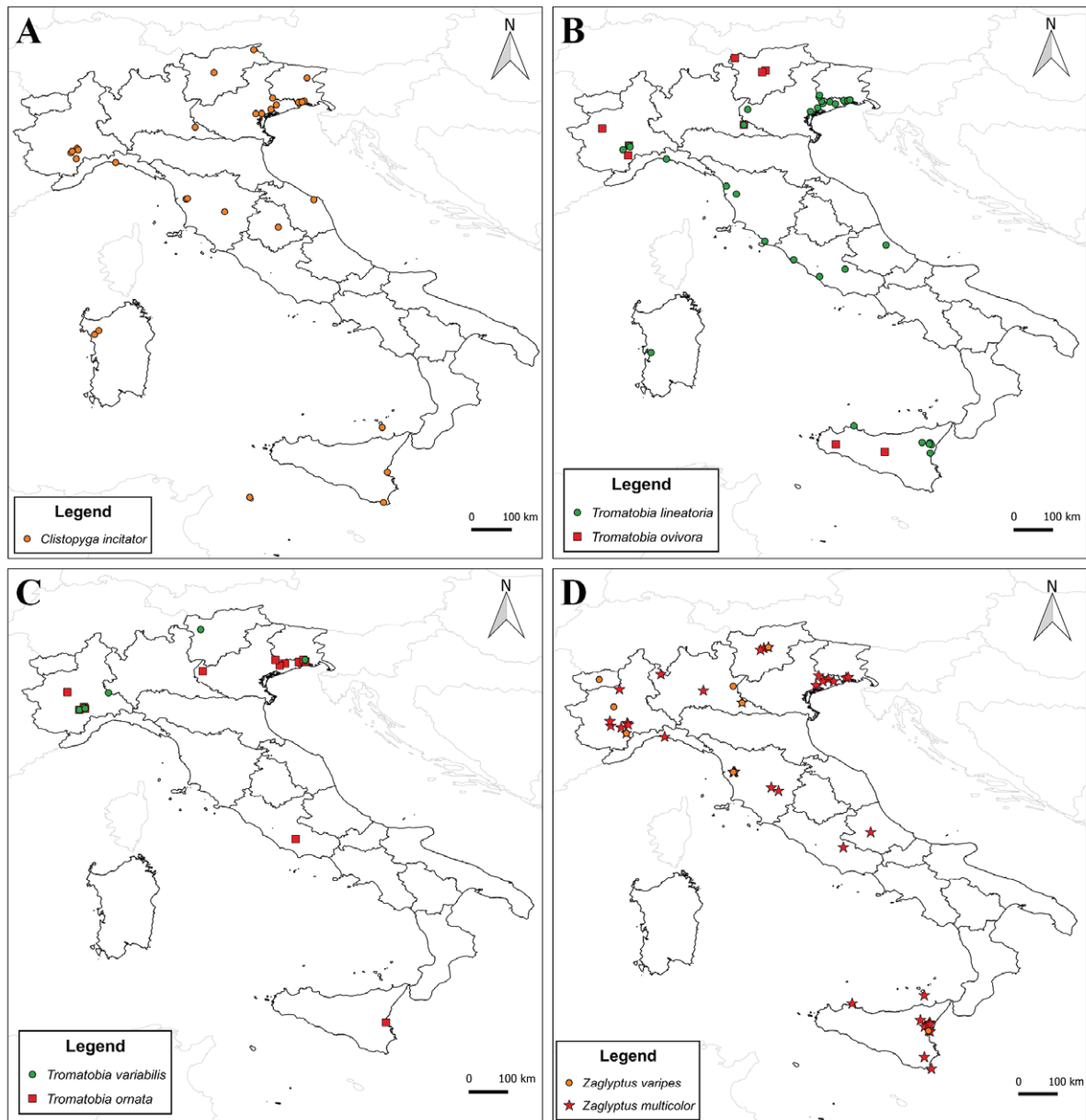


Fig. 1. Distribution maps in Italy of **A:** *Clistopyga incitator* (Fabricius, 1793); **B:** *Tromatobia lineator* (Villers, 1789) and *T. ovivora* (Boheman, 1821); **C:** *Tromatobia ornata* (Gravenhorst, 1829) and *T. variabilis* (Holmgren, 1856); **D:** *Zaglyptus* spp.

two genus-groups: the *degener* species-group (*Acrodactyla* s. str., e.g. *Acrodactyla degener*), which includes wasps associated with sheet-web weaving spiders from the family Linyphiidae (e.g. AUBERT 1969, FITTON et al. 1988, this study) and the *quadrisculpta* species-group (e.g. *A. quadrisculpta*), which includes wasps associated with orb-web weaving spiders from the genus *Tetragnatha* (Tetragnathidae) (NIELSEN 1937, AUBERT 1969, HOWELL & PIENKOWSKI 1972, FITTON et al. 1988, KORENKO et al. 2015a).

***Acrodactyla carinator* (Aubert, 1965)**

Distribution in Italy (Fig. 2A). [N].

PIE: KORENKO et al. 2015a (misidentified as *Acrodactyla quadrisculpta*).

New records. **PIE** (Verbano-Cusio-Ossola: larvae attached to *Tetragnatha montana* Simon, 1874).

***Acrodactyla degener* (Haliday, 1838)**

Distribution in Italy (Fig. 2A). [N].

PIE: PAGLIANO 2009. This species has been reported generically for Italy [ITA] in the checklist of SCARAMOZZINO (1995).

New records. **FVG** (Udine); **PIE** (Verbano-Cusio-Ossola: larva attached to *Neriene montana* (Clerck, 1757)).

***Acrodactyla quadrisculpta* (Gravenhorst, 1820)**

Distribution in Italy (Fig. 2A). [N].

ITA: TOWNES et al. 1965; **PIE:** GRAVENHORST 1829a (=Tryphon quadrisculptus), KIRCHNER 1867 (=Tryphon quadrisculptus).

New records. **PIE** (Torino: larvae attached to *Tetragnatha* sp.).

Iania Matsumoto, 2016

Different authors alternatively proposed the synonymy or

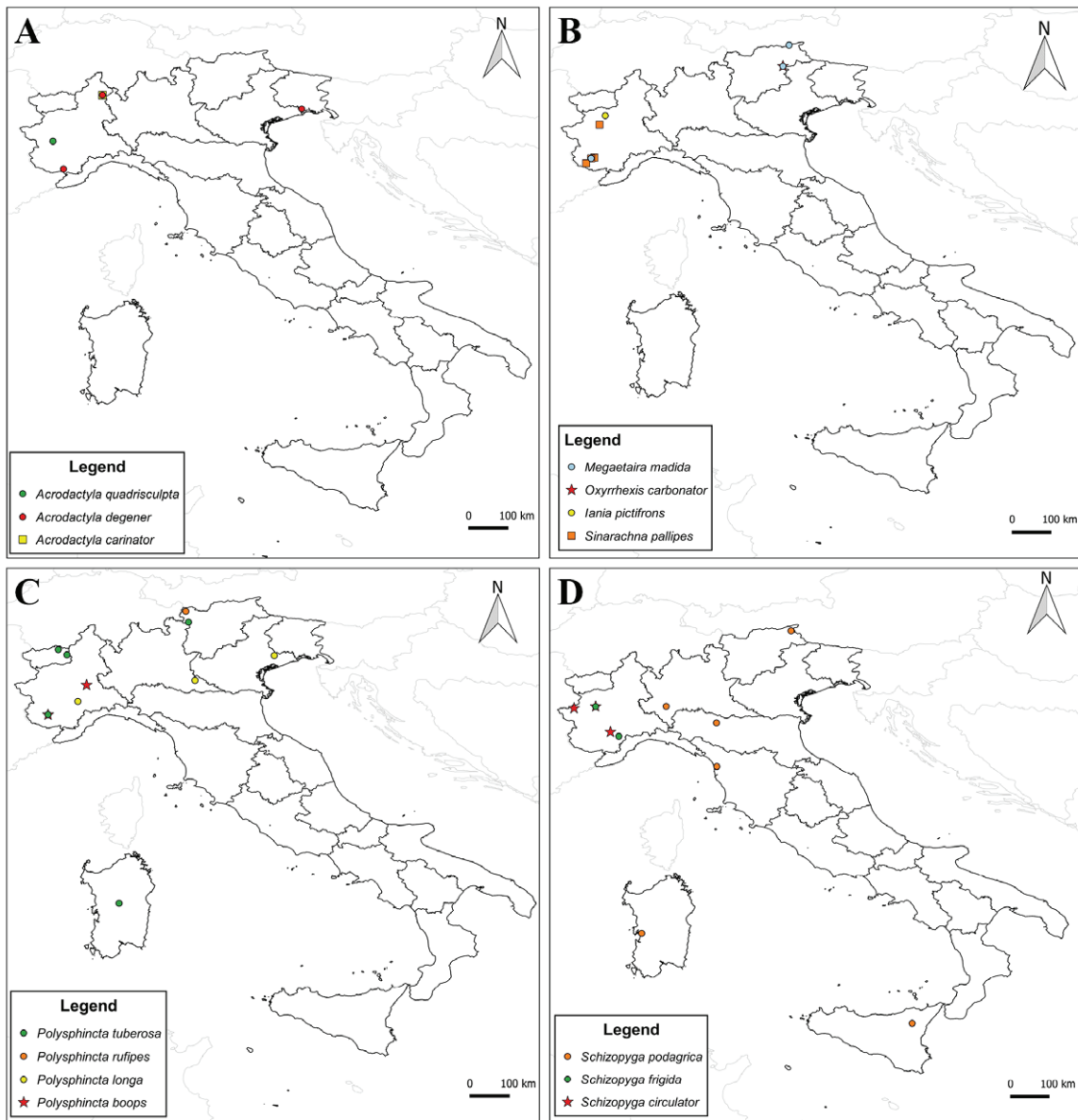


Fig. 2: Distribution maps in Italy of **A:** *Acrodactyla* spp. **B:** *Iania pictifrons* (Thomson, 1877), *Megaetaira madida* (Haliday, 1838), *Oxyrrhexis carbonator* (Gravenhorst, 1807) and *Sinarachna pallipes* (Holmgren, 1860); **C:** *Polysphincta* spp. (*P. tuberosa* Gravenhorst, 1829 only generically recorded for Sardinia); **D:** *Schizopyga* spp.

separation between the genera *Schizopyga* Gravenhorst, 1829 and *Dreischbachia* Townes, 1962. The two genera were synonymized by GAULD & DUBOIS (2006) due to the presence of intermediate morphological characters in both genera. SHAW (2006) retained the genus *Dreischbachia* based on differences in egg placement strategy, and two Afrotropical species previously assigned to *Schizopyga* were moved to *Dreischbachia* by VARGA & RESHCHIKOV (2018). MATSUMOTO (2016) confirmed the separation between *Schizopyga* and *Dreischbachia* based on molecular phylogenetic analysis and proposed the new genus *Iania* for the Palaearctic *Dreischbachia pictifrons* (*Schizopyga pictifrons* auct.) to maintain monophyly in *Schizopyga* subgroup (MATSUMOTO 2016).

***Iania pictifrons* (Thomson, 1877)**

Distribution in Italy (Fig. 2B). [N].

PIE: PAGLIANO 2009 (as *Dreischbachia pictifrons*).

***Megaetaira* Gauld & Dubois, 2006**

The genus is represented by one uncommon but presumably widely distributed species in Europe, including Great Britain. It was formerly known as *Acrodactyla madida*, but excluded from the *Acrodactyla* genus because it lacks several features of the remaining *Acrodactyla* species (GAULD & DUBOIS 2006). *Megaetaira madida* is associated with spiders of the genus *Metellina* from Tetragnathidae (*Metellina menzei* (Blackwall, 1869), *Metellina merianae* (Scopoli, 1863), and *Metellina segmentata* (Clerck, 1757)) (FITTON et al. 1988, KORENKO 2016). Several details on its biology are provided by NIELSEN (1923; as *Polysphincta clypeata* Holmgren, 1860).

***Megaetaira madida* (Haliday, 1838)**

Distribution in Italy (Fig. 2B). [N].

TAA: BAUER 2002 (= *Acrodactyla madida*); **PIE:** KORENKO 2016.

Oxyrrhexis Förster, 1869

This small Holarctic genus comprises four described species (YU et al. 2012), associated with spiders from family Theridiidae (e.g. FRITZÉN & FJELLBERG 2014). Only *Oxyrrhexis carbonator* was documented from Italy. This species is known to be associated with tangle web weavers from family Theridiidae: *Steatoda bipunctata* (Linnaeus, 1758) in North Europe (FRITZÉN & FJELLBERG 2014), and *Steatoda borealis* (Hentz, 1850) in North America (TOWNES & TOWNES 1960).

Oxyrrhexis carbonator (Gravenhorst, 1807)

Distribution in Italy (Fig. 2B). [N].

TAA: BAUER 2002. This species has been reported generically for Italy [ITA] in the checklist of SCARAMOZZINO (1995).

Polysphincta Gravenhorst, 1829

This large genus includes 27 described species, distributed widely in Holarctic and Neotropical regions (YU et al. 2012). The genus is presently represented by five valid taxa in Europe (VAN ACHTERBERG et al. 2017). All of them are known to be strictly associated with the family Araneidae (e.g. FITTON et al. 1988, YU et al. 2012), and their host spectrum seems to be specific (SCHMITT et al. 2012, FRITZÉN & SHAW 2014, KORENKO et al. 2014, 2017).

Polysphincta boops Tschek, 1869

Distribution in Italy (Fig. 2C). [N].

PIE: PAGLIANO 2009, KORENKO et al. 2014.

Polysphincta longa Kasparyan, 1976

Distribution in Italy (Fig. 2C). [N].

VEN: DI GIOVANNI et al. 2015b; **LOM:** DI GIOVANNI et al. 2015a (misidentified as *Polysphincta boops*).

New records. PIE (Cuneo).

Notes: *P. boops* and *P. longa* have been probably confused in the past due to morphological similarities (FRITZÉN & SHAW 2014). Both species are associated with orb web building spiders occurring in tree crowns, but *P. boops* is exclusively associated with spiders of genus *Araniella* (e.g. FITTON et al. 1988, FRITZÉN & SHAW 2014, KORENKO et al. 2014), whereas *P. longa* is associated only with *Araneus angulatus* Clerck, 1757.

Polysphincta rufipes Gravenhorst, 1829

Distribution in Italy (Fig. 2C). [N].

TAA: BAUER 1936.

Polysphincta tuberosa Gravenhorst, 1829

Distribution in Italy (Fig. 2C). [N Sa].

ITA: BLANCHARD 1840; **TAA:** BAUER 2002; **VAO:** BAUER 2002; **PIE:** GRAVENHORST 1829b. This species has been reported for Sardinia in the checklist of SCARAMOZZINO (1995).

New records. PIE (Cuneo: larva attached to *Araniella* sp.).

Schizopyga Gravenhorst, 1829, subg. **Schizopyga** Gravenhorst, 1829

The genus includes 11 species (YU et al. 2012; VARGA & RESHCHIKOV 2018), which are associated with wandering spiders from the families Miturgidae (*Cheiracanthium* spp.), Clubionidae (*Clubiona* spp.) and Gnaphosidae (*Drassodes lapidosus* (Walckenaer, 1802)) (BIGNELL 1894, NIELSEN 1935, FITTON et al. 1988, SHAW 2006).

Schizopyga circulator (Panzer, 1800)

Distribution in Italy (Fig. 2D). [N].

PIE: PAGLIANO 2009.

New records. PIE (Torino).

Schizopyga frigida Cresson, 1870

Distribution in Italy (Fig. 2D). [N].

TAA: BAUER 2002; **PIE:** PAGLIANO 2009.

Schizopyga podagrica Gravenhorst, 1829 (Fig. 4C)

Distribution in Italy (Fig. 2D). [N S Si Sa].

ITA: BLANCHARD 1840, TOWNES et al. 1965; **TAA:** BAUER 2002; **EMR:** GRAVENHORST 1829b, KIRCHNER 1867; **SIC:** ZWAKHALS & TURRISI 2014.

New records. LOM (Pavia); TOS (Pisa); SAR (Oristano). This is the first record for Sardinia.

Sinarachna Townes, 1960

A small genus with five described species and one subspecies from the northern hemisphere. Only two species are documented in Europe (VAN ACHTERBERG et al. 2017): *Sinarachna nigricornis* (Holmgren, 1860) widely distributed in the Palaearctic, and *S. pallipes* (Holmgren, 1860), widely distributed in the Holarctic, with a subspecies *S. pallipes strigis* (Howard, 1892) in Nearctic (YU et al. 2012).

Wasps of the genus *Sinarachna* seem to be associated exclusively with the family Araneidae; *S. nigricornis* is known to be associated with *Araneus diadematus* (Clerck, 1757) and *Araneus sturmi* (Hahn, 1831) (Araneidae) (FITTON et al. 1988). Host association with *Theridion* sp. (FITTON et al. 1988) was corrected as *Araneus* sp. by SHAW (1994). *S. pallipes* is known to be associated with *Araneus diadematus*, *Araneus quadratus* Clerck, 1757 (Araneidae) (NIELSEN 1928, AUBERT 1969), *Larinioides cornutus* (Clerck, 1757) (AUBERT 1969) and spiders of the genus *Araniella* (KORENKO et al. 2014). Host association with spiders from family Linyphiidae were also recorded by NIELSEN (1923) but the species in this paper turned out to be a misidentification of *Acrodactyla degener* (NIELSEN 1928). A recent study on the parasitoids of arboreal spiders in Italy additionally found strong host associations between *S. pallipes* and spiders of the genus *Araniella* (Araneidae): *A. cucurbitina* (Clerck, 1757), *A. displicata* (Hentz, 1847), *A. opisthographa* (Kulczyński, 1905) (KORENKO et al. 2014, 2017).

Sinarachna pallipes (Holmgren 1860)

Distribution in Italy (Fig. 2B). [N].

PIE: PAGLIANO 2009, KORENKO et al. 2014.

New records. PIE (Cuneo: larva attached to *Araneus* (*Atea*) sp.).

Zatypota Förster, 1869

This is the largest genus within the *Polysphincta* genus-group, comprising at least 50 described species and probably many undescribed ones in museum collections (GAULD & DUBOIS 2006, MATSUMOTO & TAKASUKA 2010, YU et al. 2012, FRITZÉN 2014). *Zatypota* wasps of different zoogeographical zones have several unique taxonomical characteristics, e.g. the dorsal absence of the occipital carina in Neotropical species, this never mediodorsally narrowly interrupted; or the lack of an epomia (an oblique ridge crossing the transverse furrow on the side of the pronotum) in Afrotropical species (GAULD & DUBOIS 2006). All *Zatypota* species are narrowly associated with a specific spider host or with a small group of closely related species from one family, with the only known exception of the Australian *Zatypota kauros* Gauld, 1984 (KORENKO et al. 2018). *Zatypota* species are known mainly as parasitoids of theridiid spiders (NIELSEN 1923, FITTON et al. 1988, GAULD & DUBOIS 2006, KORENKO & PEKÁR 2011, KORENKO et al. 2011). Only four *Zatypota* species are associated with spiders other than theridiids: *Zatypota sulcata* Matsumoto, 2010 in Japan is associated with Linyphiidae (MATSUMOTO & TAKASUKA 2010), *Zatypota picticollis* (Thomson, 1888) in Europe is associated with Araneidae (KORENKO et al. 2015b), and *Zatypota anomala* (Holmgren, 1860) in the Holarctic region is associated with Dictynidae (FITTON et al.

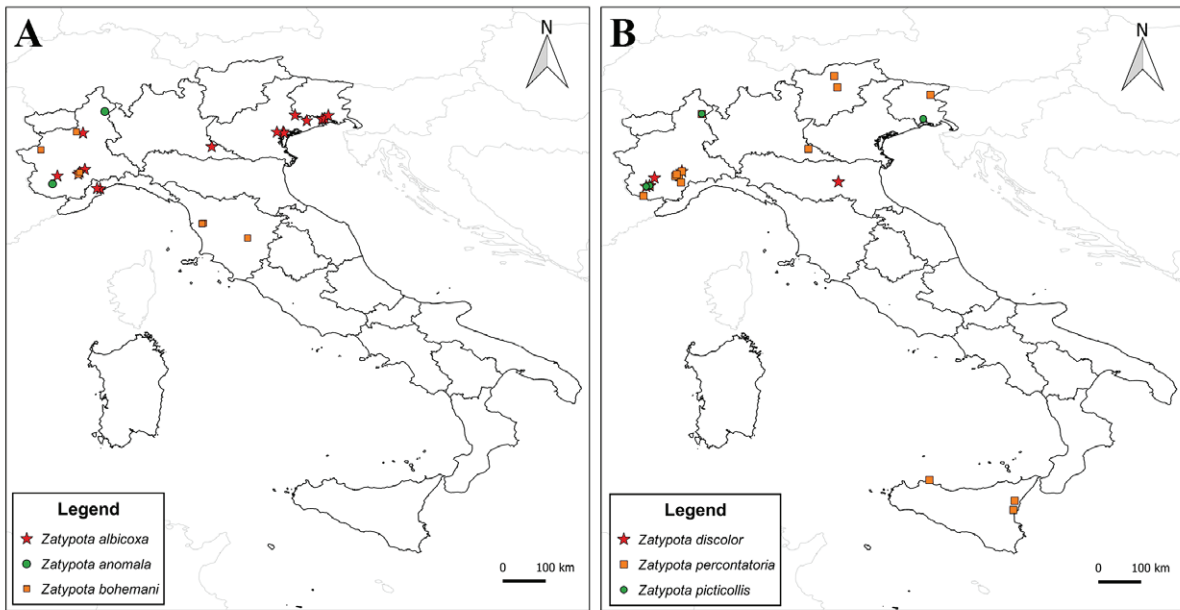


Fig. 3. Distribution maps in Italy of **A:** *Zatyptota albicoxa* (Walker, 1874), *Z. anomala* (Holmgren, 1860) and *Z. bohemani* (Holmgren, 1860); **B:** *Zatyptota discolor* (Holmgren, 1860), *Z. percontatoria* (Müller, 1776) and *Z. picticollis* (Thomson, 1888).

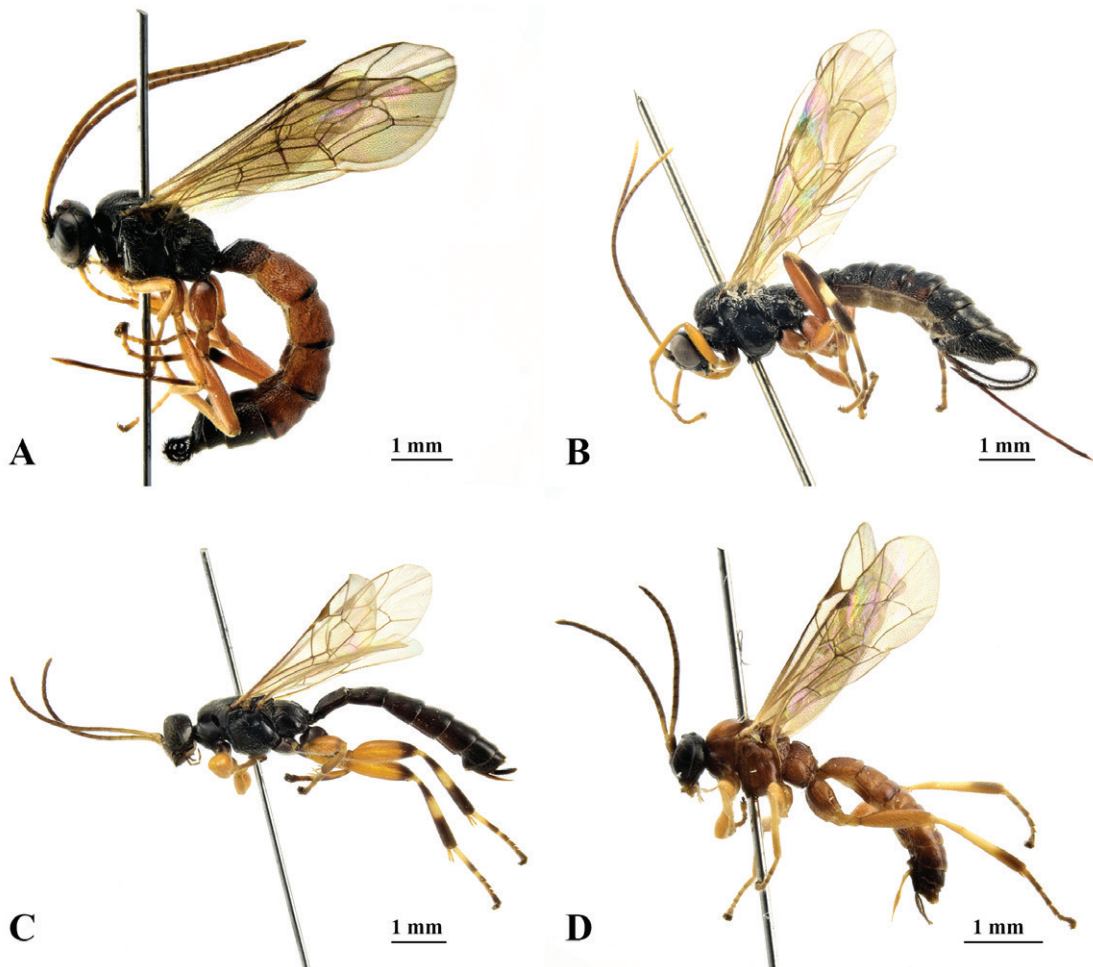


Fig. 4. **A:** *Tromatobia variabilis* (Holmgren, 1856), female from Piedmont, habitus, lateral view; **B:** *Zaglyptus varipes* (Gravenhorst, 1829), female from Lombardy, habitus, lateral view; **C:** *Schizopyga podagrica* Gravenhorst, 1829, female from Lombardy, habitus, lateral view; **D:** *Zatyptota discolor* (Holmgren, 1860), female from Piedmont, habitus, lateral view.

1987). A fourth species, *Zatypota kauros* in Australia, is oligophagous and attacks spiders from two host families (Theridiidae and Araneidae) (KORENKO et al. 2018). Species with different morphology and host association may be separated in a distinct genus, but extensive revision of this genus is required.

Eight wasps from this genus occur in Europe (FRITZÉN 2010, 2014, YU et al. 2012); six of them (*Zatypota percontatoria* (Müller, 1776), *Zatypota bohemani* (Holmgren, 1860), *Zatypota discolor* (Holmgren, 1860), *Zatypota kerstinae* Fritzén, 2010, *Zatypota albicoxa* (Walker, 1874), and *Zatypota flamma* Fritzén, 2014) seem to be strictly associated with tangle web weavers from the family Theridiidae. *Zatypota percontatoria*, *Z. bohemani*, *Z. discolor* and *Z. kerstinae* are associated with spiders from the genus *Theridion*, or closely-related genera (e.g. genera *Phylloneta*, *Neottiura*) with similar habits and behaviour which comprise the “*Theridion* group” (FITTON et al. 1987, 1988, KORENKO & PEKÁR 2011, KORENKO et al. 2011, FRITZÉN 2010). In contrast, *Z. albicoxa* and *Z. flamma* seem to be strictly associated with the genus *Parasteatoda* (e.g. FITTON et al. 1987, 1988, FRITZÉN 2014). Two *Zatypota* wasps, *Z. anomala* and *Z. picticollis*, occurring in Europe, are associated with spiders out of the family Theridiidae. Both these species were recently grouped with *Z. kauros*, which is also not associated only with spiders from family Theridiidae (Korenko et al. 2018). *Zatypota anomala* is associated with cribellate tangle web weaving spiders belonging to the family Dictynidae. This Holarctic species was transferred from the genus *Sinarachna* to the genus *Zatypota* by GAULD & DUBOIS (2006). VINCENT (1979) found this wasp to be associated with *Mallos pallidus* (Banks, 1904) in North America and the species was repeatedly reared from *Dictyna* sp. and *Dictyna pusilla* Thorell, 1856 and *Nigma flavescens* (Walckenaer, 1830) in Europe (MILLER et al. 2013, KORENKO 2017, KORENKO unpubl.). *Zatypota picticollis* is a species known from Central and Western Europe (ZWAKHALS 2006, KORENKO et al. 2015b), which attacks orb web weaving spiders from the family Araneidae (KORENKO et al. 2015b). The Araneid spiders *Cyclosa conica*, *Mangora acalypha* (Walckenaer, 1802) and *Zilla diodia* (Walckenaer, 1802) are known to be its hosts (ZWAKHALS 2006, KORENKO et al. 2015b, TAKASUKA et al. 2017). The final instar larva of *Z. picticollis* was found to induce unique changes in web architecture of all three host spiders. Under the influence of the final instar larva, the spiders build a specific web architecture which differs considerably from the capture web. In *C. conica*, the web lacks any sticky spiral, shows a reduction of radials and the stabilimentum is absent (KORENKO et al. 2015b).

***Zatypota albicoxa* (Walker, 1874)**

Distribution in Italy (Fig. 3A). [N].

LOM: DI GIOVANNI et al. 2015a; **PIE:** Pagliano 2009; **LIG:** BORDONI 2003, PAGLIANO 2009.

New records. **FVG** (Udine); **VEN** (Treviso, Venezia); **PIE** (Cuneo: larva attached to *Parasteatoda* sp.).

***Zatypota anomala* (Holmgren, 1860)**

Distribution in Italy (Fig. 3A). [N].

PIE: KORENKO 2017.

New records. **PIE:** (Verbano-Cusio-Ossola: larva attached to *Dictyna pusilla* Thorell, 1856).

***Zatypota bohemani* (Holmgren, 1860)**

Distribution in Italy (Fig. 3A). [N S].

PIE: PAGLIANO 2009; **TOS:** CORCOS et al. 2017.

New records. **PIE** (Cuneo); **TOS** (Pisa).

***Zatypota discolor* (Holmgren, 1860)** (Fig. 4D)

Distribution in Italy (Fig. 3B). [N].

New records. **PIE** (Cuneo: larvae attached to *Phylloneta* sp.); **EMR** (Bologna: larva attached to *Phylloneta* sp.). Species new for the Italian fauna.

***Zatypota percontatoria* (Müller, 1776)**

Distribution in Italy (Fig. 3B). [N Si].

TAA: SMITS VAN BURGST 1914 (= *Polysphincta percontatoria*), BAUER 2002; **LOM:** DI GIOVANNI et al. 2015a; **PIE:** Pagliano 2009; **SIC:** ZWAKHALS & TURRISI 2014.

New records. **FVG** (Udine); **PIE** (Cuneo: larvae attached to *Parasteatoda tepidariorum* (C.L. Koch, 1841), *Platnickina tincta* (Walckenaer, 1802), *Theridion pinastri* L. Koch, 1872, *Theridion varians* Hahn, 1833, *Theridion* sp.; Verbano-Cusio-Ossola: larvae attached to *Theridion varians* Hahn, 1833, *Theridion* sp.); **SIC** (Palermo).

***Zatypota picticollis* (Thomson, 1888)**

Distribution in Italy (Fig. 3B). [N].

FVG: DI GIOVANNI et al. 2015b; **PIE:** KORENKO et al. 2015b.

New records. **PIE** (Verbano-Cusio-Ossola: larva attached to *Zilla diodia* (Walckenaer, 1802)).

Discussion

In total, 27 species belonging to eleven genera and two ecological groups in accordance with host type of Ephialtini wasps associated with spiders have been summarised from Italy. Since the checklist of Italian fauna of Ichneumonidae (SCARAMOZZINO 1995), 9 species have been added to the list (BAUER 2002, BORDONI 2003, KORENKO et al. 2014, 2015a, 2015b, DI GIOVANNI et al. 2015a, 2015b, KORENKO 2016, 2017) and for 9 species known distribution in Italy has been extended (BAUER 2002, PAGLIANO 2009, KORENKO et al. 2014, ZWAKHALS & TURRISI 2014, CORCOS et al. 2017). The presence of two species previously recorded generically for Italy, *Acrodactyla degener* (Haliday, 1838) and *Oxyrrhexis carbonator* (Gravenhorst, 1807), has been confirmed (BAUER 2002, PAGLIANO 2009, this study). In this study, *Zatypota discolor* (Holmgren, 1860) is new for Italy (Piedmont, Emilia-Romagna), raising the number to 28 species of Ephialtini parasitoids of spiders in Italy. Two species, *Zaglyptus varipes* (Gravenhorst, 1829) and *Schizopyga podagrica* Gravenhorst, 1829, are recorded for the first time in South Italy (Tuscany) and in Sardinia respectively. Our study suggests that the knowledge of the group in Italy is still highly fragmented and that a lot of effort is needed to fill the gaps in faunistic records, in particular for southern regions and major islands.

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Appendix

Extensive list of new records in Italy per species

Clistopyga incitator (Fabricius, 1793)

Friuli-Venezia Giulia (Udine): Musi, P.L. Scaramozzino leg., 11-23.VII.1989, 2 ♀; Carlino, proprietà Villabruna, 21.VII-03.VIII.2013, 1 ♂ 3 ♀; Marano Lagunare, proprietà Villabruna, 21.VII-03.VIII.2013, 1 ♂ 5 ♀; Palazzolo dello Stella, Nogali Braide, Bosco Brussa, 21.VII-03.VIII.2013, 4 ♂.

Veneto (Treviso): Cessalto, S. Maria di Campagna, Bosco S. Marco, 23.VII-05.VIII.2013, 1 ♀; Gaiarine, loc. Francenigo, Bosco Otello, 23.VII-05.VIII.2013, 1 ♂; Meolo, 23.VII-05.VIII.2013, 1 ♀; **Veneto** (Venezia): Mestre, impianto Bosco di Carpenedo, 22.VII-04.VIII.2013, 1 ♂; Mirano, fraz. Villamagno, Bosco del Parauro, 22.VII-04.VIII.2013, 1 ♀.

Piedmont (Cuneo): Barbaresco, S. Lorenzo, 18.V-07.VI.2016, 3 ♀, 07-27.VI.2016, 1 ♀, 27.VI-18.VII.2016, 3 ♀, 12.VIII-07.IX.2016, 3 ♀, 07-30.IX.2016, 1 ♂ 6 ♀, 30.IX-17.X.2016, 1 ♂ 6 ♀; La Morra, Cerequio, 18.V-07.VI.2016, 1 ♂, 07-27.VI.2016, 2 ♂, 27.VI-18.VII.2016, 1 ♂, 18.VII-12.VIII.2016, 1 ♀, 12.VIII-07.IX.2016, 3 ♂ 2 ♀, 07-30.IX.2016, 1 ♂ 4 ♀, 30.IX-17.X.2016, 1 ♂ 7 ♀; Roddi, Ravinali, 18.V-06.VI.2016, 2 ♀, 06-29.VI.2016, 1 ♀, 18.VII-09.VIII.2016, 5 ♀; Treiso, 18.V-03.VI.2016, 1 ♀, 03-29.VI.2016, 1 ♀, 01.IX-05.X.2016, 1 ♂ 1 ♀, 05-17.X.2016, 4 ♀.

Tuscany (Pisa): Crespina, La Serra, vineyard, A. Loni leg., 13.VI.2013, 2 ♀, 02.VII.2013, 1 ♂ 1 ♀, 27.VIII.2013, 2 ♀, 08.X.2013, 8 ♀; Crespina, Poggio al Casone, vineyard, A. Loni leg., 27.VIII.2013, 1 ♀, 08.X.2013, 1 ♀.

Marche (Ancona): Selva di Gallignano, G. Giovagnoli leg., 20.IX.2010, 1 ♀.

Sicily (Isole Eolie, Vulcano): M. Mei leg., 28.VI-18.VII.2008, 3 ♀; **Sicily** (Isola di Pantelleria): Khaddiuggia, 19-28.VIII.2014, on *Plumbago* sp., 1 ♀.

Sardinia (Sassari): Villanova Monteleone, Sa Serra, P. Niolu leg., 23.VII.2009, 1 ♀.

Tromatobia lineatoria (Villers, 1789)

Friuli-Venezia Giulia (Udine): Carlino, Bosco Bolderatis, 09-21.VI.2013, 1 ♀; Carlino, proprietà Villabruna, 21.VII-03.VIII.2013, 2 ♀; Marano Lagunare, proprietà Villabruna, 21.VII-03.VIII.2013, 1 ♀; Precenicco, Bosco Bando, 09-21.VI.2013, 1 ♀.

Veneto (Treviso): Cessalto, S. Maria di Campagna, 23.VII-05.VIII.2013, 7 ♀; Gaiarine, loc. Francenigo, 23.VII-05.VIII.2013, 2 ♀; Gaiarine, loc. Francenigo, Bosco Crasere, 23.VII-05.VIII.2013, 1 ♀; Gorgo al Monticano, Bosco di Cavalier, 09-19.V.2013, 1 ♀, 23.VII-05.VIII.2013, 1 ♀; Meolo, 23.VII-05.VIII.2013, 5 ♀; **Veneto** (Venezia): Concordia Sagittaria, fraz. Sindacale, Bosco delle Lame, 21.VII-03.VIII.2013, 6 ♀; Mestre, Bosco di Zaher, 22.VII-04.VIII.2013, 8 ♀; Portogruaro, fraz. Lison, Bosco del Merlo, 23.VII-05.VIII.2013, 2 ♀. **Veneto** (Verona): near Monte, Stramonte, 05.V.2014, 500m, 2 ♀.

Piedmont (Cuneo): Barbaresco, S. Lorenzo, 18.V-07.VI.2016, 1 ♂ 3 ♀, 18.VII-12.VIII.2016, 1 ♂ 1 ♀, 07-30.IX.2016, 1 ♂ 1 ♀; La Morra, Cerequio, 18.V-07.VI.2016, 1 ♀, 27.VI-18.VII.2016, 1 ♀, 18.VII-12.VIII.2016, 1 ♀; Treiso, 01.IX-05.X.2016, 1 ♂.

Tuscany (Pisa): Crespina, Poggio al Casone, vineyard, A.

Loni leg., 08.X.2013, 1 ♀; P. N. San Rossore, A. Loni & P.L. Scaramozzino leg., on *Daphne gnidium*, 30.V.2017, 1 ♂ 1 ♀, 13.VI.2017, 1 ♂, 07.VI.2017, 2 ♂.

Lazio (Frosinone): Serrone, M. Gigli leg., black light trap, 15-16.VII.2010, 1 ♂; **Lazio** (Roma): Pomezia, cork oaks, M. Mei leg., 23.IX.2010, 1 ♀.

Abruzzo (Pescara): Pianella, A. Morelli leg., 10-18.VIII.2014, 1 ♀.

Sicily (Palermo): Riserva di Capo Gallo, A. Reshchikov leg., 12.IV.2013, 1 ♂.

Sardinia (Oristano): 15.VIII.1977, 1 ♀, 10.I.1978, 1 ♀.

Tromatobia ornata (Gravenhorst, 1829)

Friuli-Venezia Giulia (Udine): Carlino, Bosco Pra Quain e Venchiaratis, 21.VII-03.VIII.2013, 1 ♀; Carlino, proprietà Villabruna, 21.VII-03.VIII.2013, 1 ♀; Precenicco, Bosco Bando, 21.VII-03.VIII.2013, 1 ♀; S. Giorgio di Nogaro, fraz. Zellina, Bosco Boscat, 09-21.VI.2013, 1 ♀.

Veneto (Treviso): Cessalto, Bosco Olmè, 23.VII-05.VIII.2013, 1 ♀; Mansuè, Bosco di Basalghelle, 23.VII-05.VIII.2013, 2 ♀; **Veneto** (Venezia): Portogruaro, fraz. Lison, Bosco del Merlo, 10-22.VI.2013, 2 ♀; **Veneto** (Verona): near Monte, Stramonte, 05.V.2014, 500m, 1 ♀.

Piedmont (Cuneo): Barbaresco, S. Lorenzo, 18.V-07.VI.2016, 9 ♀, 07-27.VI.2016, 1 ♀, 27.VI-18.VII.2016, 5 ♀, 18.VII-12.VIII.2016, 1 ♀, 07-30.IX.2016, 1 ♀; Roddi, Ravinali, 18.VII-09.VIII.2016, 3 ♀; Treiso, 29.VI-19.VII.2016, 1 ♀, 01.IX-05.X.2016, 1 ♀.

Tromatobia ovivora (Boheman, 1821)

Piedmont (Cuneo): Barbaresco, S. Lorenzo, 18.V-07.VI.2016, 1 ♀.

Tromatobia variabilis (Holmgren, 1856)

Piedmont (Cuneo): Barbaresco, S. Lorenzo, 07-30.IX.2016, 1 ♀; Roddi, Ravinali, 18.VII-09.VIII.2016, 2 ♀; Treiso, 08.VIII-01.IX.2016, 1 ♀, 01.IX-05.X.2016, 1 ♀.

Zaglyptus multicolor (Gravenhorst, 1829)

Friuli-Venezia Giulia (Udine): Carlino, Bosco Bolderatis, 21.VII-03.VIII.2013, 1 ♀; Carlino, proprietà Villabruna, 21.VII-03.VIII.2013, 1 ♀; Marano Lagunare, proprietà Villabruna, 21.VII-03.VIII.2013, 1 ♀.

Veneto (Treviso): Cessalto, Bosco Olmè, 23.VII-05.VIII.2013, 1 ♂; Mansuè, Bosco di Basalghelle, 23.VII-05.VIII.2013, 1 ♀; Meolo, 23.VII-05.VIII.2013, 4 ♂; **Veneto** (Venezia): Concordia Sagittaria, fraz. Sindacale, Bosco delle Lame, 21.VII-03.VIII.2013, 1 ♀; Portogruaro, fraz. Lison, Bosco del Merlo, 23.VII-05.VIII.2013, 1 ♀.

Piedmont (Cuneo): Barbaresco, S. Lorenzo, 27.VI-18.VII.2016, 1 ♂, 12.VIII-07.IX.2016, 4 ♀, 07-30.IX.2016, 1 ♂ 5 ♀, 30.IX-17.X.2016, 1 ♀; La Morra, Cerequio, 07-30.IX.2016, 2 ♀; Roddi, Ravinali, 18.VII-09.VIII.2016, 4 ♂ 13 ♀, 05-17.X.2016, 4 ♀; Treiso, 19.VII-08.VIII.2016, 1 ♀, 08.VIII-01.IX.2016, 1 ♀, 01.IX-05.X.2016, 13 ♀, 05-17.X.2016, 5 ♀; **Piedmont** (Torino): Chiaverano, Bienca, A. Casale leg., X-XI.1985, 1 ♀.

Tuscany (Pisa): Crespina, Ceppaiano, vineyard, A. Loni leg., 08.X.2013, 3 ♀; Crespina, La Serra, vineyard, A. Loni leg., 08.X.2013, 5 ♀; Crespina, Poggio al Casone, vineyard, A. Loni leg., 08.X.2013, 1 ♀.

Lazio (Frosinone): Serrone, 650m, M. Gigli leg., black light trap, 28.VIII.2010, 1 ♂ 1 ♀.

Sicily (Palermo): Riserva di Capo Gallo, A. Reshchikov leg., 12.IV.2013, 1 ♂; **Sicily** (Vulcano): M. Mei leg., 28.VI-18.VII.2008, 1 ♀.

Zaglyptus varipes (Gravenhorst, 1829)

Tuscany (Pisa): Crespina, Ceppaiano, vineyard, A. Loni leg., 08.X.2013, 2 ♀; Crespina, La Serra, vineyard, A. Loni leg., 08.X.2013, 5 ♂ 2 ♀; Crespina, Poggio al Casone, vineyard, A. Loni leg., 27.VIII.2013, 1 ♀.

Acrodactyla carinator (Aubert, 1965)

Piedmont (Verbano-Cusio-Ossola): Fondotoce di Verbania, bank of Lago Maggiore, larvae attached to *Tetragnatha montana*, leg. 28.X.2014, adults emerged 20-21.XI.2014, 2 ♂.

Acrodactyla degener (Haliday, 1838)

Friuli-Venezia Giulia (Udine): Precenicco, Bosco Bando, 21.VII-03.VIII.2013, 1 ♀, A. Varga det.

Piedmont (Verbano-Cusio-Ossola): Fondotoce di Verbania, bank of Lago Maggiore, larva attached to *Neriere montana*, leg. 28.X.2014, adult emerged 23.XII.2014, 1 ♂.

Acrodactyla quadrisculpta (Gravenhorst, 1820)

Piedmont (Torino): close to Macello, bank of torrent Chisone, larvae attached to *Tetragnatha* sp., leg. 26.VIII.2014, adults emerged 08.IX.2014, 1 ♂ and 11.IX.2014, 1 ♀ respectively.

Polysphincta longa Kasparyan, 1976

Piedmont (Cuneo): Barbaresco, S. Lorenzo, 07-27.VI.2016, 1 ♀.

Polysphincta tuberosa Gravenhorst, 1829

Piedmont (Cuneo): Bottonasco, organic apple orchard, larva attached to *Araniella* sp., leg. 29.X.2014, adult emerged 21.I.2015, 1 ♀.

Schizopyga circulator (Panzer, 1800)

Piedmont (Torino): Giaglione di Susa, G. Bassi leg., 26.VII-02.VIII.1990, 1 ♀.

Schizopyga podagrica Gravenhorst, 1829

Lombardy (Pavia): G. Pace leg., 17.IX.1984, 1 ♀.

Tuscany (Pisa): P. N. San Rossore, P.L. Scaramozzino leg., on *Daphne gnidium*, 15.IV.2016, 1 ♀.

Sardinia (Oristano): 20.VII.1978, 1 ♀.

Sinarachna pallipes (Holmgren 1860)

Piedmont (Cuneo): Bottonasco, organic apple orchard (Cascina Rosa), larva attached to *Araneus (Atea)* sp., leg. 29.X.2014, adult emerged 28.I.2015, 1 ♂.

Zatypota albicoxa (Walker, 1874)

Friuli-Venezia Giulia (Udine): Muzzana del Turgnano, Selva di Avronchi, 09-21.VI.2013, 1 ♀; Palazzolo dello Stella, Nogali Braide, Bosco Brussa, 21.VII-03.VIII.2013, 1 ♀; Porpetto, Bosco Sgobitta, 21.VII-03.VIII.2013, 1 ♀; Precenicco, Bosco Bando, 21.VII-03.VIII.2013, 1 ♀.

Veneto (Treviso): Gaiarine, fraz. Francenigo, Bosco Otello, 10-22.VI.2013, 1 ♀, 23.VII-05.VIII.2013, 1 ♀; **Veneto** (Venezia): Mestre, Bosco di Carpenedo, 22.VII-04.VIII.2013, 2 ♀; Mestre, Bosco dell'Osellino, 22.VII-04.VIII.2013, 2 ♀; Mirano, fraz. Villamagno, Bosco del Parauro, 22.VII-04.

VIII.2013, 1 ♀; Portogruaro, fraz. Lison, Bosco del Merlo, 23.VII-05.VIII.2013, 2 ♀.

Piedmont (Cuneo): Chiamina, commercial apricot orchard close to Verzulo, larva attached to *Parasteatoda* sp., leg. 05.XI.2009, adult emerged 13.XII.2009, 1 ♀; Barbaresco, S. Lorenzo, 07-30.IX.2016, 2 ♀; La Morra, Cerequio, 12.VIII-07.IX.2016, 3 ♀, 07-30.IX.2016, 1 ♀, 30.IX-17.X.2016, 3 ♀; Roddi, Ravinali, 18.VII-09.VIII.2016, 3 ♀.

Zatypota anomala (Holmgren, 1860)

Piedmont (Verbano-Cusio-Ossola): Fondotoce di Verbania, bank of Lago Maggiore, larva attached to *Dictyna pusilla*, leg. 28.X.2014, adult emerged 01.XII.2014, 1 ♂.

Zatypota bohemani (Holmgren, 1860)

Piedmont (Cuneo): La Morra, Cerequio, 12.VIII-07.IX.2016, 1 ♂, 30.IX-17.X.2016, 1 ♂; Roddi, Ravinali, 18.VII-09.VIII.2016, 1 ♀.

Tuscany (Pisa): Crespina, Ceppaiano, vineyard, A. Loni leg., 08.X.2013, 2 ♀; Crespina, La Serra, vineyard, A. Loni leg., 08.X.2013, 1 ♀; Crespina, Poggio al Casone, vineyard, A. Loni leg., 08.X.2013, 1 ♀.

Zatypota discolor (Holmgren, 1860)

Piedmont (Cuneo): Bottonasco, organic apple orchard, larva attached to *Phylloneta* sp., leg. 4.XI.2009, adult emerged 29.XII.2009, 1 ♂, larvae attached to *Phylloneta* sp., leg. 29.X.2014, adults emerged 01-23.II.2015, 1 ♂ 2 ♀; Chiamina, commercial apricot orchard close to Verzulo, larvae attached to *Phylloneta* sp., leg. 05.XI.2009, adults emerged 16.XII.2009-20.I.2010, 6 ♂ 7 ♀; Cuneo, Monterossa Grana, deciduous forest ecotone, larvae attached to *Phylloneta* sp., leg. 02.XI.2011, adults emerged 16.II-06.III.2012, 3 ♀; Barbaresco, S. Lorenzo,

12.VIII-07.IX.2016, 1 ♀.

Emilia-Romagna (Bologna): quartiere S. Donato, P. Di Pompeo leg., 25.IX.2018, larva attached to *Phylloneta* sp., 1 ♂.

Zatypota percontatoria (Müller, 1776)

Friuli-Venezia Giulia (Udine): Sella Carnizza, P.L. Scaramozzino leg., 19.VII.1989, 1 ♀.

Piedmont (Cuneo): Bottonasco, organic apple orchard, larvae attached to *Platnickina tinctoria*, *Theridion varians*, *Theridion* sp., leg. 04.XI.2009, adults emerged 16.XII.2009-20.I.2010, 8 ♂ 17 ♀, 02.XI.2011, adults emerged 05.II-20.III.2012, 9 ♂ 6 ♀; larva attached to *Parasteatoda tepidariorum*, leg. 02.XI.2011, adult emerged 7.II.2012, 1 ♂; larva attached to *Theridion* sp., leg. 29.X.2014, adult emerged 28.I.2015, 1 ♂; Azienda A. Rivetto close to Ornato, organic apple and hazelnut orchard, larvae attached to *Theridion varians*, *Theridion* sp., *Theridion pinastri*, leg. 03-07.XI.2009, adults emerged 26.XII.2009-20.I.2010, 6 ♂ 4 ♀; Valdieri, bush in rocky slope in bank of torrent Valasco, larva attached to *Theridion* sp., leg. 27.VIII.2014, adult emerged 12.XI.2014, 1 ♀; Barbaresco, S. Lorenzo, 07-30.IX.2016, 1 ♂, 18.VII-12.VIII.2016, 1 ♀; La Morra, Cerequio, 12.VIII-07.IX.2016, 1 ♀; Roddi, Ravinali, 06-29.VI.2016, 1 ♀; **Piedmont** (Verbano-Cusio-Ossola): Fondotoce di Verbania, bank of Lago Maggiore, larva attached to *Theridion* sp., leg. 30.X.2012, adult emerged 9.I.2013, 1 ♀; larva attached to *Theridion varians*, leg. 28.X.2014, adult emerged ?.XII.2014, 1 ♂.

Sicily (Palermo) Riserva di Capo Gallo, A. Reshchikov leg., 12.IV.2013, 1 ♂.

Zatypota picticollis (Thomson, 1888)

Piedmont (Verbano-Cusio-Ossola): Fondotoce di Verbania, bank of Lago Maggiore, larva attached to *Zilla dioda*, leg. 28.X.2014, adult emerged 19-30.XII.2014, 1 ♂ 1 ♀.