ACTA ENTOMOLOGICA MUSEI NATIONALIS PRAGAE
Published 15.viii.2008 Volume 48(1), pp. 197-208 ISSN 0374-1036

A survey of Pterophoridae (Lepidoptera) of North-Eastern Sicily with new distributional records

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Abstract. A survey of north-eastern Sicilian biotopes allowed us to increase the number of the Pterophoridae known on the island to a total of 59 species. The genus *Adaina* Tutt, 1905, and seven species, *Adaina microdactyla* (Hübner, 1813), *Wheeleria spilodactyla* (Curtis, 1827), *Capperia celeusi* (Frey, 1866), *Capperia fusca* (Hofmann, 1898), *Stenoptilia grisescens* Schawerda, 1933, *Stenoptilia mariaeluisae* Bigot & Picard, 2002, and *Stenoptilia pelidnodactyla* (Stein, 1837), are new for Sicily, and basic ecological data are given for these species. Some old records are confirmed and notes and comments on others are given.

Key words. Microlepidoptera, Pterophoridae, plume-moths, checklist, new records, faunistics, host plant, Italy, Sicily

Introduction

The Pterophoridae are called Plume Moths because of a feather-like appearance of their wings. They possess a cleft in the fore wing and a double cleft in the hind wing, lacking only in the subfamily Agdistinae with uncleft wings. Nearly 1,200 species of the Pterophoridae belonging to 90 genera are known worldwide, and are found in almost all biotopes (Gielis 2003).

The data on the pterophorid biology in the Mediterranean have been nearly entirely given from the south of France and Corsica by French authors (Nel 1986, 1987, 2002; Gibeaux & Nel 1991). The family has not been studied in detail in Italy and especially in Sicily, and the knowledge of the Italian Pterophoridae is still incomplete and fragmentary. Only Prola & Racheli (1984) and Racheli & Angeloni (1990) attempted to give an inclusive picture of the Italian fauna of the Pterophoridae.

The checklist of the Italian species and subsequent additional studies have reported a total of 120 species and 31 genera in Italy, of which 52 species and 22 genera have been found in

Sicily (Arenberger et al. 1995; Arenberger 1995, 2002, 2005; Romano & Romano 1995; Gielis 2003; Bella & Ferrauto 2005; Huemer 2001a,b; Trematerra et al. 2006; Bella & Marchese 2007; Bella 2007). However, the data from Sicily are scarce and mostly old (Ghiliani 1842; Zeller 1841, 1847; Minà-Palumbo & Failla-Tedaldi 1889; Ragusa 1905; Mariani 1939). The data are also sometimes not exact, since they are based on previous unverified reports and often concern one or a few poorly identified localities or refer only to 'Sicily'. Recent reports are very scarce (Romano & Romano 1995; Bella & Ferrauto 2005; Trematerra et al. 2006; Bella & Marchese 2007; Bella 2007).

The data from various biotopes of north-eastern Sicily, presented in this paper, confirm some old records and clarify the status of other species. More faunistic and ecological details are given in Marchese (in press).

Material and methods

The data come from the provinces of Catania and Messina in north-eastern Sicily. We have investigated a wide range of different environments (such as costal dune zones, woods, and humid areas) in the mouth of the River Simeto and the districts of Mount Etna, the Peloritani Mountains, and the Nebrodi Mountains (Fig. 1).

The specimens were collected using a butterfly net in the afternoon until sunset and screened (80V) and un-screened (250V) mercury lamps used to light a white canvas at night.

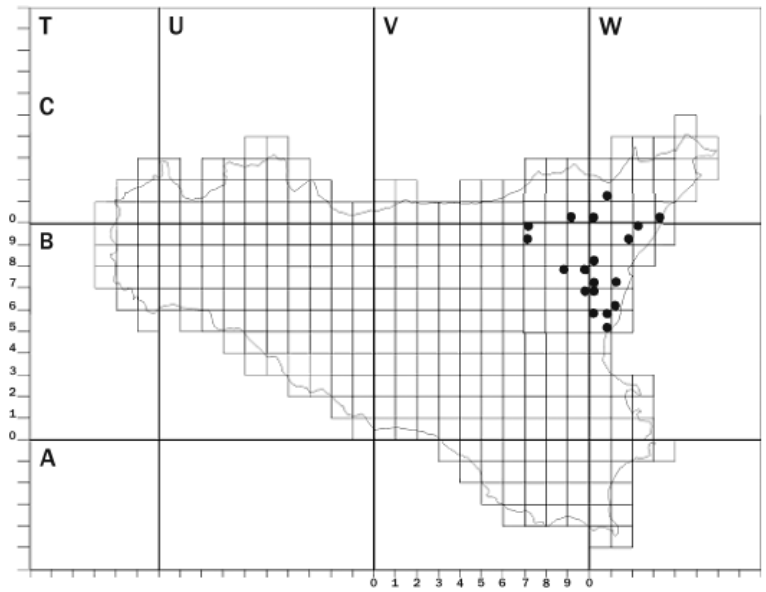


Fig. 1. Map of Sicily with UTM grid system. Dots covering 25 km^2 (5 × 5 km) within the small 10 km × 10 km squares represent the collecting sites; a single dot can represent more than one site.

Twenty-three collecting sites were visited more than once (Fig. 1). All the specimens were collected by Giovanni Marchese and are preserved in his collection (Catania, Italy; GMCI). The authors collaborated to identify the specimens.

The site locations are specified using the Universal Transverse Mercator grid codes (UTM; Sicily lies in the 33S zone) with 1 km accuracy (two letters denote the largest square of 100 x 100 km, the first two numbers the smaller squares of 10 x 10 km, and the last two numbers the smallest squares of 1 km x 1 km). Ecological notes for the adults and the host plants of the larvae are taken from the literature (Arenberger 1995, 2002, 2005; Gielis 1996, 2003) and completed by our observations. The distributional range in Italy and worldwide is also given.

Results

Data from the literature and our own collecting show the presence of 59 species of the Pterophoridae in Sicily, seven of them based only on old records. One genus and seven species are reported for the first time for the island and 12 species are new for the north-eastern part. Thus the number of species known from north-eastern Sicily increases to 49 (Table 1).

It should be stressed that Karsholt & Gielis (1995), after having designated the lectotype, considered *Calyciphora albodactyla* (Fabricius, 1794) as a valid species and not a synonym of *Porrittia galactodactyla* (Denis & Schiffermüller, 1775) as in Arenberger (1995). Moreover, Karsholt & Gielis (1995) listed *Pterophorus xerodactylus* Zeller, 1841, among the synonyms of *C. albodactyla*; therefore, *Calyciphora xerodactyla* (Zeller, 1841) in the checklist of the Italian fauna (Arenberger et al. 1995) should be referred to as *C. albodactyla*.

New records

Adaina microdactyla (Hübner, 1831)

(Figs. 2-3)

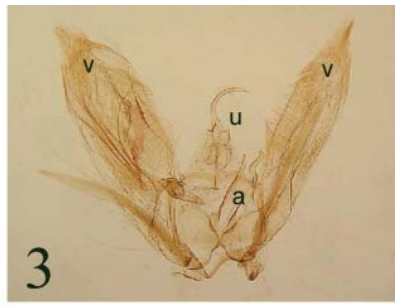
Material examined. District of Peloritani Mts.: Bottaro stream (Mongiuffi), 430 m a.s.l., WB2936, 4.viii.2004, 1 ♀. District of Nebrodi Mts.: Pellera stream (Roccella Valdemone), 740 m a.s.l., WC0010, 6.viii.2004, 1 ♂ (GMCI).

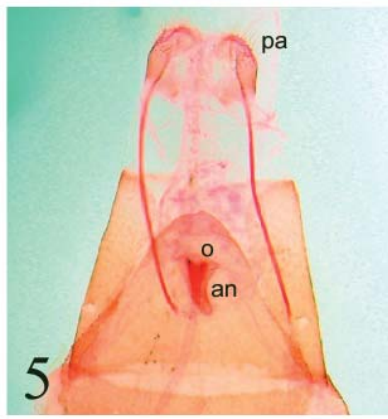
Biology. Adults: wingspan 10-17 mm. This species flies from May to August and can fly up to 2,500 m a.s.l. in north-eastern Sicily. Our specimens were captured in August using a light trap close to a riparian habitat. Larval host plant: *Eupatorium cannabinum* L. (Asteraceae).
Range in Italy. Throughout the peninsula; Sardinia; Sicily (new genus and species record).
Distribution. Palaearctic, Oriental, and Australian regions.

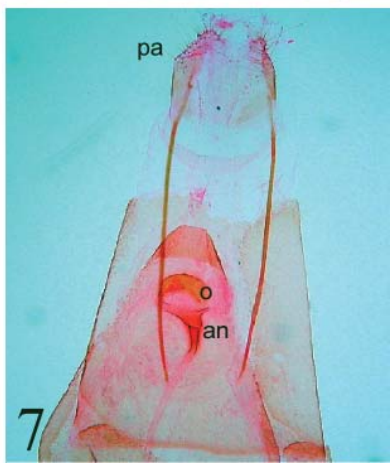
Capperia celeusi (Frey, 1866)

(Figs. 4-5)

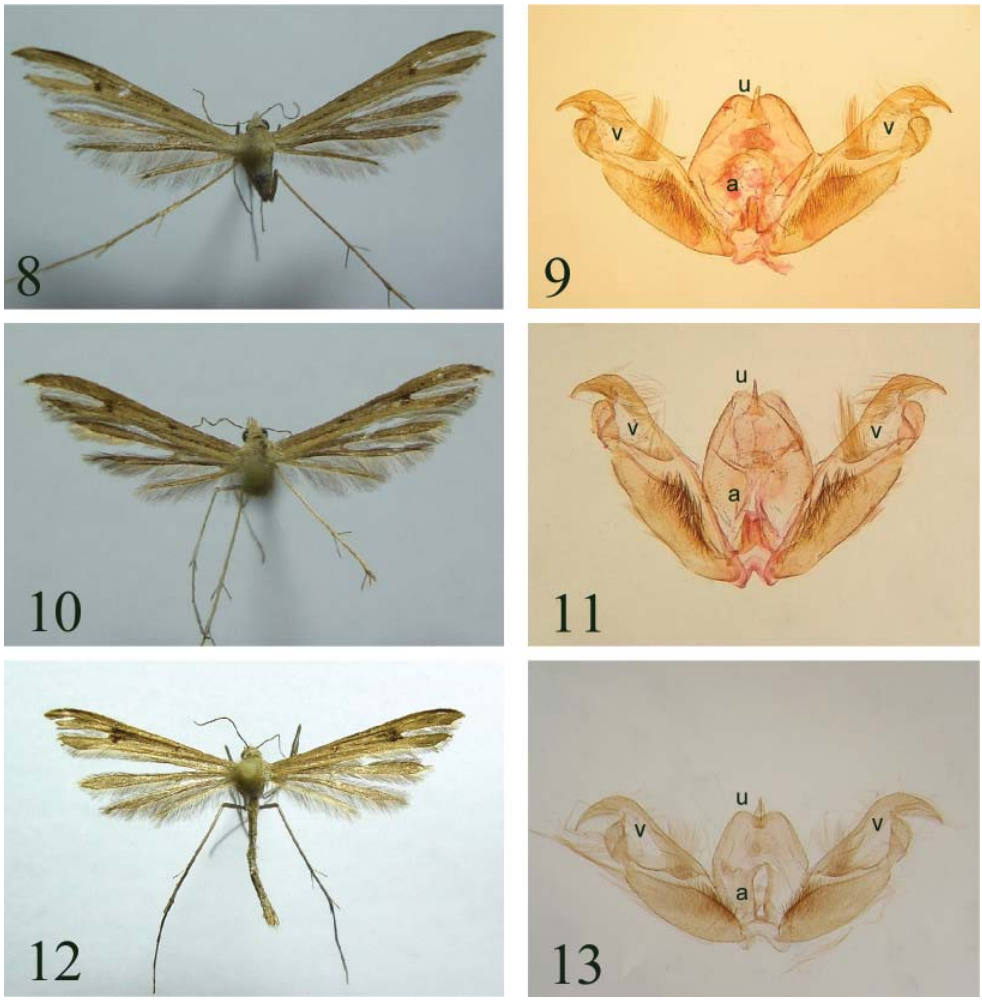
Material examined. District of Mt. Etna: Mount S. Leo (Belpasso), 1,000 m a.s.l., VB9687, 13.vii.2005, 1 ♂ 1 ♀; 18.vii.2005, 1 ♀; Piano delle Ginestre (Bronte), 1,000 m a.s.l., VB8787, 18.vi.2005, 1 ♀; 24.vii.2004, 1 ♀. District of Nebrodi Mts.: Pellera stream (Roccella Valdemone), 740 m a.s.l., WC0010, 17.vii.2004, 1 ♀; Floresta, 1,230 m a.s.l., VC9024, 1.viii.2005, 1 ♀ (GMCI).





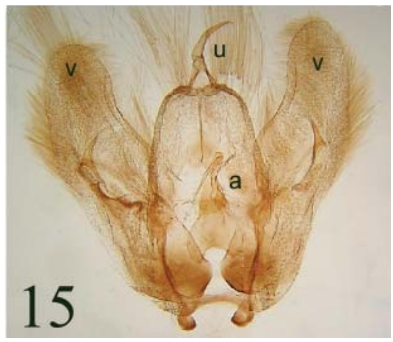


Figs. 2-7. *Adaina microdactyla* (Hübner, 1813), male. 2 – body, dorsal view; 3 – genitalia. *Capperia celeusi* (Frey, 1866), female. 4 – body, dorsal view; 5 – genitalia. *Capperia fusca* (Hofmann, 1898), female. 6 – body, dorsal view; 7 – genitalia. Abbreviations: a – anellus; an – antrum; o – ostium; pa – papilla analis; u – uncus; v – valve.



Figs. 8-13. *Stenoptilia grisescens* Schawerda, 1933, male. 8 – body, dorsal view; 9 – genitalia. *Stenoptilia mariae-luisae* Bigot & Picard, 2002, male. 10 – body, dorsal view; 11 – genitalia. *Stenoptilia pelidnodactyla* (Stein, 1837), male. 12 – body, dorsal view; 13 – genitalia. Abbreviations: a – anellus; u – uncus; v – valve.

Biology. Adults: wingspan 16-18 mm. It flies from March to August, living up to 1,800 m a.s.l. The adults are present in north-eastern Sicily from June to July. It flies at sunset and during the night near its host plants. Larval host plant: monophagous on *Teucrium chamaedrys* L. (Lamiaceae).
Range in Italy. Northern Italy; Sicily (new record). Not common.
Distribution. Turanian-Euro-Mediterranean.



Figs. 14-15. *Wheeleria spilodactyla* (Curtis, 1827), male. 14 – body, dorsal view; 15 – genitalia. Abbreviations: a – anellus; u – uncus; v – valve.

Capperia fusca (Hofmann, 1898)

(Figs. 6-7)

Material examined. District of Mt. Etna: Catania city, 30 m a.s.l., WB0572, 1.vii.2004, 1 ♀ (GMCI).

Biology. Adults: wingspan 12-15 mm. Adults occur up to 2,000 m a.s.l. from May to September. The only specimen was collected at night on a wall lit by a street lamp. Larval host plants: oligophagous on *Stachys* spp. and *Marrubium vulgare* L. (Lamiaceae).
Range in Italy. The whole peninsula; Sicily (new record).
Distribution. Turanian-European.

Stenoptilia grisescens Schawerda, 1933

(Figs. 8-9)

Material examined. District of Mt. Etna: Mount S. Leo (Belpasso), 1,000 m a.s.l., VB9687, 15.vi.2005, 1 ♀; 21.vi.2004, 1 ♀; 23.vi.2004, 2 ♂♂; 22.vii.2004, 3 ♂♂ 2 ♀♀; 27.vii.2005, 1 ♂; 17.viii.2004, 1 ♂ 1 ♀; Piano delle Ginestre (Bronte), 1,000 m a.s.l., VB8787, 8.ix.2005, 1 ♀; Rifugio Galvarina (Biancavilla), 1,878 m a.s.l., VB9766, 28.vi.2004, 1 ♀; 19.vii.2004, 1 ♀. District of Peloritani Mts.: Mouth of the Stream Agrò (S. Alessio Siculo), 1 m a.s.l., WB3918, 2.viii.2004, 1 ♀. District of Nebrodi Mts.: Stream Pellera (Roccella Valdemone), 740 m a.s.l., WC0010, 17.vii.2004, 1 ♂; 6.viii.2004, 1 ♀ (GMCI).

Biology. Adults: wingspan 16-20 mm. Adults fly from July to September; in north-eastern Sicily we observed adults from June to September. It flies among grass at dusk; our specimens were captured at light during the night. Larval host plant: probably monophagous on *Misopates orontium* (L.) Rafin. (Scrophulariaceae).
Range in Italy. Piedmont, Latium; Sardinia; Sicily (new record).
Distribution. Mediterranean-Macaronesian.
Remark. In the Italian checklist (Arenberger et al. 1995), *S. grisescens* is indicated as a synonym of *S. arida* (Zeller, 1847) (type locality: Messina); the latter species is widespread in the entire peninsula and on the islands. Bigot & Picard (2002) considered *S. grisescens* as a valid species and gave a key to identify the species belonging to the *grisescens* group (*S. grisescens*, *S. mariaeluisae* Bigot & Picard, 2002, *S. inopinata* Bigot & Picard, 2002, and *S. gallobritannidactyla* Gibeaux, 1985); the key is based on the characters of the male

uncus and the ostium bursae and post-vaginal lamella of females. However, Gielis (2003) still indicated *S. grisescens* as a synonym of *S. arida*. Arenberger (2005) agreed with Bigot & Picard (2002) in considering *S. grisescens* a valid species, and confirmed its presence in Italy in Piedmont, Latium, and Sardinia. Trematerra et al. (2006) reported *S. grisescens* from Molise and considered it by mistake as a new record for Italy. Arenberger (2005) confirmed the presence of *S. arida* in Latium, Liguria and Sicily. However, most of the records of *S. arida* from Italy should be verified. Our data demonstrate the presence of *S. grisescens* in Sicily; the characters of the genitalia for both males and females are as described by Nel (2003) and Arenberger (2005).

Stenoptilia mariaeluisae Bigot & Picard, 2002

(Figs. 10-11)

Material examined. District of Mt. Etna: Catania city, 30 m a.s.l., WB0572, 26.vi.2006, 1 ♀; Mount S. Leo (Belpasso), 1,000 m a.s.l., VB9687, 21.vi.2004, 1 ♂ 3 ♀♀; 22.vii.2004, 1 ♂ 1 ♀; 27.vii.2005, 1 ♂ 3 ♀♀; 17.viii.2004, 1 ♀. District of Nebrodi Mts.: Stream Pellera (Roccella Valdemone), 740 m a.s.l., WC0010, 13.ix.2004, 1 ♀; Floresta, 1,230 m a.s.l., VC9024, 25.v.2006, 1 ♀ (GMCI).

Biology. Adults: wingspan 18-19 mm. In north-eastern Sicily the species flies from June to September and can be observed up to ca. 1,200 m a.s.l. It flies at dusk, together with *S. grisescens*, hiding in grass if disturbed; some specimens were collected at a light trap. Larval host plant: probably monophagous on *Kickxia spuria* (L.) Dumort. (Scrophulariaceae).
Range in Italy. Friuli Venezia Giulia; Latium; Sicily (new record).
Distribution. Holo-Mediterranean.
Remark. Nel (2003) and Arenberger (2005) considered *S. mariaeluisae* a valid species and Arenberger (2005) found it in Friuli Venezia Giulia and Latium. On the other hand, Gielis (2003) considers it a synonym of *S. arida*. As stated above, all records of *S. arida* from Italy should be checked. Our findings confirm the presence of *S. mariaeluisae* in Sicily; the characters of male and female genitalia are identical to those described by Bigot & Picard (2002) for the holotype and the allotype; see also Nel (2003) and Arenberger (2005).

Stenoptilia pelidnodactyla (Stein, 1837)

(Figs. 12-13)

Material examined. District of Nebrodi Mts.: Floresta, 1,230 m a.s.l., VC9024, 25.v.2006, 5 ♂♂ 5 ♀♀; 31.v.2005, 2 ♀♀ (GMCI).

Biology. Adults: wingspan 19-24 mm. The adults fly from April to September, reaching up to 2,000 m a.s.l. In north-eastern Sicily it has been observed only in May. Our specimens were captured at dusk while flying over the grass in a field near a rocky habitat. Larval host plant: probably monophagous on *Saxifraga granulata* L. (Saxifragaceae).
Range in Italy. Northern and central parts of the peninsula; Sicily (new record).
Distribution. Siberian-Euro-Maghrebinian.

Wheeleria spilodactyla (Curtis, 1927)

(Figs. 14-15)

Material examined. District of Mt. Etna: Piano delle Ginestre (Bronte), 1,000 m a.s.l., VB8787, 25.vi.2004, 1 ♂; 18.vi.2005, 5 ♂♂ 7 ♀♀; 8.ix.2005, 1 ♂ 1 ♀; 19.ix.2005, 2 ♂♂ (GMCI).

Biology. Adults: wingspan 17-24 mm. The adults fly from April to October. In north-eastern Sicily they have been collected in June and September. This species is attracted by artificial light but is easier to find at sunset on *Marrubium vulgare*. The pupae are very hairy with a cryptic appearance, and are thus hardly recognizable on the host plants. Larval host plants: *Marrubium vulgare* L. and *Ballota nigra* L. (Lamiaceae).
Range in Italy. Trentino Alto-Adige; Molise; Sardinia; Sicily (new record).
Distribution. Euro-Mediterranean. Introduced in the 1990s to Australia to control *Marrubium vulgare*, taken there in the early 19th century.
Remarks. Male genitalia are similar to those in specimens from Spain (Arenberger 1995), Great Britain (Gielis 1996), and France (Nel 2003).

Confirmations of old records

Some species have been known from Sicily only from old records, often without a precise locality or only labelled as 'Sicily'. These data were later repeated by more recent authors and/or in the world and Palaearctic catalogues of the family. Our investigations in north-eastern Sicily confirm the presence of the following species (Table 1): *Pterophorus pentadactylus* (Linnaeus, 1758), *Merrifieldia baliodactyla* (Zeller, 1841), *Oidaematophorus lithodactylus* (Treitschke, 1833), *Stenoptilodes taprobanes* (Felder & Rogenhofer, 1875), *Platyptilia farfarella* Zeller, 1867, *Agdistis paralia* Zeller, 1847, and *Agdistis meridionalis* Zeller, 1847. The latter two species were described from Sicily by Zeller (1847). *Stenoptilodes taprobanes* and *Platyptilia farfarella*, for which only imprecise reports existed, have been recorded in several specimens. This demonstrates how scarce the reports for the pterophorid fauna of Sicily have been so far.

Discussion

Species with unconfirmed occurrence. Among the previously reported species not found during this research, three are very likely living in Sicily; these species were last recorded by Mariani (1939), are present in northern and central Italy, and may sometimes reach the extreme south of the peninsula:

Amblyptilia punctidactyla (Haworth, 1811), reported from Catania (Minà-Palumbo & Failla-Tedaldi 1889) and Casteldaccia and its surroundings in western Sicily (Mariani 1939);

Platyptilia tesseradactyla (Linnaeus, 1761), reported by Mariani (1939) from various sites in Sicily (Sant'Agata di Militello, Casteldaccia and its surroundings, and Grotta Calda near Caltanissetta); and

Platyptilia gonodactyla (Denis & Schiffermüller, 1775), reported by Mariani (1939) only from Pizzenti near Monreale, western Sicily.

On the other hand, the following four species were reported already in the 19th century and their presence in Sicily has to be verified:

Geina didactyla (Linnaeus, 1758) lives in colder climate and is present only in northern Italy; the report from Sicily without a precise locality (Ghiliani 1842) is very likely incorrect;

Table 1. List of the Sicilian species of the Pterophoridae. Literature = data for north-eastern Sicily found in the literature; field survey = species collected by us. * = new species for Sicily; ** = new genus and species for Sicily. The species not marked by **X** are known from Sicily, but not recorded its north-eastern part.

Species	North-eastern Sicily	
	Literature	Field survey
Subfamily Pterophorinae Zeller, 1841		
Pterophorus ischnodactylus (Treitschke, 1835)	X	
Pterophorus pentadactylus (Linnaeus, 1758)		X
Merrifieldia baliodactyla (Zeller, 1841)		X
Merrifieldia leucodactyla (Denis & Schiffermüller, 1775)	X	
Merrifieldia malacodactyla (Zeller, 1847)	X	X
Wheeleria obsoleta (Zeller, 1841)		
Wheeleria spilodactyla (Curtis, 1827) *		X
Tabulaephorus punctinervis (Constant, 1885)	X	X
Calyciphora albodactyla (Fabricius, 1794)	X	X
Puerphorus olbiadactylus (Millière, 1859)	X	X
Emmelina monodactyla (Linnaeus, 1758)	X	X
Adaina microdactyla (Hübner, 1813) **		X
Hellinsia carphodactyla (Hübner, 1813)	X	X
Hellinsia distincta (Herrich-Schäffer, 1855)		
Hellinsia inulae (Zeller, 1852)		X
Hellinsia osteodactyla (Zeller, 1841)		
Oidaematophorus giganteus (Mann, 1855)	X	
Oidaematophorus lithodactylus (Treitschke, 1833)		X
Stangeia siceliota (Zeller, 1847)	X	X
Megalorhipida leucodactyla (Fabricius, 1794)	X	X
Geina didactyla (Linnaeus, 1758)		
Oxyptilus chrysodactylus (Denis & Schiffermüller, 1775)		
Oxyptilus parvidactylus (Haworth, 1811)	X	
Oxyptilus distans (Zeller, 1847)	X	X
Oxyptilus laetus (Zeller, 1847)	X	X
Oxyptilus tristis (Zeller, 1841)	X	
Capperia celeusi (Frey, 1866) *		X
Capperia fusca (Hofmann, 1898) *		X
Capperia hellenica Adamczewski, 1951	X	X
Capperia marginella (Zeller, 1847)	X	
Capperia zelleri Adamczewski, 1951	X	X

(continued on the next page)

Table 1. (continued)

Species	North-eastern Sicily	
	Literature	Field survey
Stenoptilia arida (Zeller, 1847)	X	
Stenoptilia bipunctidactyla (Scopoli, 1763)	X	
Stenoptilia grisescens Schawerda, 1933 *		X
Stenoptilia mariaeluisae Bigot & Picard, 2002 *		X
Stenoptilia pelidnodactyla (Stein, 1837) *		X
Stenoptilia pterodactyla (Linnaeus, 1761)	X	
Stenoptilia stigmatodactyla (Zeller, 1852)		
Stenoptilia zophodactyla (Duponchel, 1838)	X	X
Amblyptilia acanthadactyla (Hübner, 1813)		X
Amblyptilia punctidactyla (Haworth, 1811)	X	
Lantanophaga pusillidactyla (Walker, 1864)		X
Stenoptilodes taprobanes (Felder & Rogenhofer, 1875)		X
Platyptilia calodactyla (Denis & Schiffermüller, 1775)	X	
Platyptilia farfarella Zeller, 1867		X
Platyptilia gonodactyla (Denis & Schiffermüller, 1775)		
Platyptilia tesseradactyla (Linnaeus, 1761)	X	
Cnaemidophorus rhododactylus (Denis & Schiffermüller, 1775)		X
Subfamily Agdistinae Tutt, 1907		
Agdistis adactyla (Hübner, 1819)		
Agdistis frankeniae (Zeller, 1847)	X	
Agdistis hartigi Arenberger, 1973		
Agdistis heydeni (Zeller, 1852)	X	X
Agdistis manicata Staudinger, 1859		
Agdistis melitensis Amsel, 1954		X
Agdistis meridionalis (Zeller, 1847)		X
Agdistis paralia (Zeller, 1847)	X	X
Agdistis protai Arenberger, 1973		X
Agdistis satanas Millière, 1876		X
Agdistis tamaricis (Zeller, 1847)	X	X

Oxyptilus chrysodactylus (Denis & Schiffermüller, 1775) and *Agdistis adactyla* (Hübner, 1819) occur in northern Italy, and only one old report of each species from the Madonie Mountains in western Sicily exists (Minà Palumbo & Failla Tedaldi 1889); and

Stenoptilia pterodactyla (Linnaeus, 1761), reported by Minà Palumbo & Failla Tedaldi (1889) from some sites (Palermo, Madonie Mountains, and Messina). This common species

is found throughout the whole peninsula and may be present also in Sicily even if not confirmed by recent reports.

Species described from Sicily with poor locality data. Apart from *Agdistis paralia* and *A. meridionalis*, of which we have recent records, eight more species from Zeller's collection dating from the first half of the 19th century have been described from eastern Sicily. Zeller described nine of them in 1841 and 1847, while *Capperia zelleri* Adamczewski, 1951, was described from Catania and is the only endemic Sicilian species (Adamczewski 1951). Zeller (1847) provided only vague localities in his descriptions, usually provinces (*Oxyptilus distans*, *Capperia marginella*, *Agdistis meridionalis*, *Agdistis paralia*, and *Stangeia siceliota* with the type locality 'Syracuse'; *Oxyptilus laetus*, *Stenoptilia arida*, and *Agdistis frankeniae* with the type locality 'Messina'). For *Wheeleria obsoleta*, Zeller (1841) indicated the type locality only as 'Sicilien', and all subsequent authors repeated this information.

Conclusions

New reports of the genus *Adaina* Tutt, 1905, and seven species demonstrate that the current knowledge of the family Pterophoridae in Sicily is still poor and more studies are needed in the hitherto not investigated districts of the island to fill the gaps. In fact, the few existing studies have shown scarce reports, often old, in the Palermo area, the Madonie Mountains, and some places in northern and western Sicily. Reports from central and southern Sicily are almost absent. No faunistic and ecological studies on the group have ever been carried out in Sicily, except for one study in eastern Sicily (Marchese, in press), which also provided data for this paper.

Owing to its orography and size, Sicily has very diverse and often well preserved habitats. It is beyond doubt that it has a greater biodiversity than it appears today; nevertheless, the 59 species of the Pterophoridae known from Sicily already constitute nearly 50 % of all species known from Italy.

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