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The Scatopsidae (Diptera) of Sardinia, with description of a new species*

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Abstract

Eleven species of the family Scatopsidae are reported from Sardinia, 10 of which for the first time, from collections made in the Marganai area (Carbonia-Iglesias province) and some additional material. *Swammerdamella spinigera* **sp. nov.**, closely related to *S. pediculata* (Duda, 1928), is described and figured. The state of knowledge of the Sardinian fauna and its affinities are discussed.

Key words: Diptera, Scatopsidae, Italy, Sardinia, faunistics, new species, new records

Introduction

Scatopsidae are minute to small, rather strongly built midges which occur in various habitats. They are more frequent and diverse in open, temperate, fresh and marshy areas. The immature stages of only few genera and species have been described. All known larvae are saprophagous, living in different kinds of decaying organic matter, e.g. rotting plants, dead wood, under bark of dead trees, in fungi, soil, leaf litter, dung, etc. (see Haenni and Vaillant (1994) for a review of the immature stages of the family).

About 350 species of scatopsid midges are known worldwide and about 100 of them have been recorded in Europe (Haenni 2004b). The Italian fauna is still very poorly known with only 16 species recorded from the country as a whole (Haenni 2004b). No Scatopsidae were reported from Sardinia by Dahl *et al.* (1995). Two species are quoted from the island in Fauna Europaea (Haenni 2004b): *Swammerdamella acuta* Cook, 1956 and *S. brevicornis* (Meigen 1830), although the record of the former is based upon a labelling error (see below under *S. acuta*).

Material and methods

Most of the material treated in this paper was collected in the framework of a project carried out by the Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale "Bosco Fontana", Verona (CNBFVR) in the period 2003–2006 (*cf.* Mason *et al.* 2006). Most of the material is preserved in 70° ethanol in the CNBFVR collection, except a small part which is now in the author's collection in Muséum d'Histoire Naturelle, Neuchâtel (MHNN). A few additional Sardinian specimens and additional Italian material from various collections have been studied. The genitalia of dissected males and females have been cleared in 10% KOH and are preserved in glycerin in a microvial attached to the same pin or put in the same vial as the source specimen. Holotype label data are quoted verbatim, i.e. without interpretation; a slash (/) indicates the end of a line of print or handwriting; significant supplementary or qualifying information is given in square brackets.

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In the faunistic list, species are listed in alphabetical order and numbered consecutively, except for one species, of doubtful occurrence in Sardinia, which is left unnumbered. The original description and principal papers treating the taxonomy, with relative nomenclatural combinations, are listed under each species. Literature sources for Italian regional distributions are quoted under each species. Recent records resulting from material collected by CNBFVR are listed according to the recent re-arrangement of the administrative regions of Sardinia; other data are reported in full with the province as given on the label. Sampling sites of material collected by CNBFVR are abbreviated as follows:

C31: Carbonia-Iglesias province, Domusnovas, Lago Siuru, 322 m, UTM 32 S 467069 4357916, Malaise trap, leg. D. Avesani, M. Bardiani, D. Birtele, P. Cerretti, M. Mei & D. Whitmore.

C70: Carbonia-Iglesias province, Iglesias, Marganai, near Case Marganai, 660 m, UTM 32S 0463341 4556196, car net, leg. D. Birtele, P. Cerretti, G. Nardi, M. Tisato & D. Whitmore.

C82: Carbonia-Iglesias province, Iglesias, Monti Marganai, Tintillonis, 480 m, UTM 32 S 463010 4355249, Malaise trap, leg. D. Birtele P. Cerretti, G. Nardi, M. Tisato & D. Whitmore.

C85: Carbonia-Iglesias province, Iglesias, Marganai, 540 m, near *Foeniculum vulgare*, Malaise trap, leg. D. Birtele, P. Cerretti, E. Minari, M. Tisato, D. Whitmore.

S1: Carbonia-Iglesias province, Iglesias, near Colonia Beneck, 636m, UTM 32S 0462391 4355441, Malaise trap, leg. G. Chessa.

S2: Carbonia-Iglesias province, Domusnovas, Sa Duchessa, 371 m, UTM 32 S 464990 4358384, Malaise trap, leg. G. Chessa.

S3: Carbonia-Iglesias province, Domusnovas, Valle Oridda, 592 m, UTM 32S 0466973 4362228, Malaise trap, leg. G. Chessa.

SAR1: Carbonia-Iglesias province, Iglesias, Marganai, 700 m, UTM 32S 0462853 4355582, Malaise trap [unless otherwise specified], leg. G. Chessa.

Terminology of the external morphology and terminalia follows Haenni (1997). The genitalia of each dissected specimen are included in glycerin, in a microvial preserved in the same vial as the source specimen. Illustrations were prepared using a drawing tube mounted on a Leica MZ12.5 stereoscopic microscope. Chorotypes used in this paper are those proposed by Vigna Taglianti *et al*. (1999), based on distributions provided by Krivosheina and Haenni (1986) and Haenni (2004b).

Acronyms of depositories are as follows:

CNBFVR	Centro Nazionale per lo Studio e la Conservazione della Biodiversità Forestale “Bosco Fontana”, Verona, Italy
FBUB	University of Bielefeld, Germany
BCP	Miroslav Barták collection, Prague, Czech Republic
ETHZ	Entomological collection, Eidgenössische Technische Hochschule, Zurich, Switzerland
MHNG	Muséum d’Histoire Naturelle, Genève, Switzerland
MHNN	Muséum d’Histoire Naturelle, Neuchâtel, Switzerland

Faunistic list

1. *Anapausis* sp. gr. *soluta* (Loew)

Records. SAR 1: 30.IX–17.X.2005, 1 ♀ (CNBFVR).

Notes. This specimen clearly belongs to the *soluta*-group recently revised by Chandler (1999), who elevated to specific level several older “varieties” of *A. soluta*. The features of the terminalia of the above

Sardinian specimen differ from those of all known species and it may thus belong to a new, still undescribed taxon. However, since identification of females alone is generally problematic in the genus *Anapausis* Enderlein, the description should await discovery of additional material of the male sex.

2. *Rhegmoclemina lunensis* Haenni & Godfrey, 2009

Records. C31: 12–17.VII.2006 1 ♂ (CNBFVR).

Chorotype. A probable European element.

Italian distribution. Only known from Sardinia.

Ecology. Unknown.

Notes. This single male from Sardinia appears to be conspecific with this species recently described from England (Haenni & Godfrey 2009).

3. *Scatopse notata* (Linnaeus, 1758)

Tipula notata Linnaeus, 1758: 588
Scatopse notata (L.): Duda 1928: 32
Scatopse notata (L.): Cook 1974: 71
Scatopse notata (L.): Freeman 1985: 41

Records. S1: 21.III–4.IV.2006, 1 ♀ (CNBFVR).

Other records. Liguria (Imperia): Ospedaletti, [no other data], G. Huguenin leg., 7 ♂♂ 4 ♀♀ (ETHZ). Venetia (Verona): Dossobuono, 1.IV.2001, D. Birtele leg., 1 ♂ 1 ♀ (CNBFVR).

Chorotype. Cosmopolitan, although absent in the intertropical regions. Of Palaearctic (or Holarctic) origin, but has been spread in the southern hemisphere by trade and human activities.

Italian distribution. Mainland Italy, Sicily (Dahl *et al*. 1995), Lombardy (Haenni 2002), Liguria, Venetia, Sardinia (present paper).

Ecology. This species is one of the commonest scatopsids, living as well in the field as under anthropogenic conditions. The larvae develop in various decaying organic matter and especially dung (Haenni & Vaillant 1994).

Notes. New record for Sardinia.

4. *Apiloscatopse flavicollis* (Meigen, 1818)

Scatopse flavicollis Meigen, 1818: 302
Scatopse flavicollis Meig.: Duda, 1928: 20
Apiloscatopse flavicollis (Meig.): Cook 1974: 93
Apiloscatopse flavicollis (Meig.): Freeman 1985: 44

Records. S2: 17–31.X.2006, 1 ♂. **SAR 1**: 30.IX–17.X.2005, 1 ♀; 17.X–3.XI.2005, pitfall trap, 1 ♀ (all CNBFVR).

Chorotype. W-Palaearctic.

Italian distribution. Northern Italy (Dahl *et al*. 1995), Sardinia.

Ecology. A frequent species in the whole of Europe, common in autumn in forested areas. It may present mass occurrences like other species of the genus *Apiloscatopse* Cook.

Notes. New record for Sardinia.

5. *Reichertella geniculata* (Zetterstedt, 1850)

Scatopse geniculata Zetterstedt, 1850: 3401
Scatopse geniculata Zett.: Duda 1928: 24
Reichertella geniculata (Zett.): Cook, 1974: 84
Reichertella geniculata (Zett.): Freeman 1985: 42

Records. S1: 19.IX–3.X.2006, 1 ♂, 2 ♀♀; 3–17.X.2006, m, 7 ♂♂ 5 ♀♀; 17–31.X.2006, 1 ♂ 2 ♀♀. **S2**: 17.IX–3.X.2006, 1 ♂; 3–17.X.2006, 27 ♂♂ 31 ♀♀; 17–31.X.2006, 6 ♂♂ 2 ♀♀ (all CNBFVR).

Other records. Venetia (Venezia): Marango di Caorle, 3.X.2004, M. G. Paoletti leg., 4 ♀♀ (MHNN).

Chorotype. European.

Italian distribution. Northern Italy (Dahl *et al*. 1995), Venetia, Sardinia (present paper).

Ecology. A frequent species over most of its range, in open and semi-open habitats. Larvae have not been described so far but have been reared from decaying vegetable matter, *viz*. rotten dead leaves (Haenni unpublished).

Notes. New record for Sardinia.

6. *Colobostema* sp.

Records. S1: 16–30.V.2006, 2 ♂♂; 30.V–13.VI.2006, 1 ♂; 13–27.VI.2006, 1 ♂; 5–19.IX.2006, 1 ♂; 19.IX–3.X.2006, 1 ♂. **S2**: 16–30.V.2006, 1 ♀; 30.V–13.VI.2006, 2 ♂♂; 25.VII–8.VIII.2006, 1 ♀; 22.VIII–5.IX.2006, 2 ♂♂; 5–19.IX.2006, 5 ♂♂; 19.IX–3.X.2006, 2 ♂♂; 17–31.X.2006, 1 ♂ (all CNBFVR).

Chorotype. A possible Sardinian endemic.

Italian distribution. Sardinia.

Ecology. A possible endemic or W-Mediterranean element.

Notes. This very distinctive new species will be described elsewhere in a revision of the W-Palaearctic species of the genus *Colobostema* Enderlein (Haenni unpublished).

7. *Coboldia fuscipes* (Meigen, 1830)

Scatopse fuscipes Meigen, 1830: 314
Scatopse fuscipes Meig.: Duda 1928: 21
Coboldia fuscipes (Meig.): Cook 1974: 70
Coboldia fuscipes (Meig.): Freeman 1985: 36

Records. C82: 11–12.VI.2004, 1 ♀. **SAR1**: 30.VI–16.VII.2004, pitfall trap, 4 ♂♂ 2 ♀♀; 16.VIII–8.IX.2004, pitfall trap, 1 ♂; 20.V–16.VI.2005, pitfall trap, 1 ♂; 5.VIII–13.IX.2005, pitfall trap, 2 ♂♂; 29.IV–20.V.2006, pitfall trap, 1 ♂ (all CNBFVR).

Other records. Piedmont (Verbano-Cusio-Ossola): Domodossola, 271m, 7.V.1979, J.-P. Haenni leg., 1 ♂ (MHNN). Liguria (Imperia): Ospedaletti, [no other data], G. Huguenin leg., 1 ♂ (ETHZ). Venetia (Verona): Verona, 15.VI.2004, F. Mason leg., 1 ♂ (MHNN). Marches (Ascoli Piceno): San Benedetto del Tronto, 10 km N, 3.VIII.1988, M. Barták leg., 1 ♂ 4 ♀♀ (BCP).

Chorotype. Cosmopolitan. *Coboldia fuscipes* is present on all continents, apparently widespread by trade and human activities. The origin of this species remains unknown.

Italian distribution. Mainland Italy (Dahl *et al*. 1995), Lombardy (Haenni 2004a), Campania (Haenni 2007), Piedmont, Liguria, Venetia, Marches, Sardinia (present paper).

Ecology. This cosmopolitan species may be found as well in the field as under anthropogenic conditions. The larvae develop in a wide variety of decaying organic matter, both animal or vegetal (Haenni & Vaillant

1994).

Notes. New record for Sardinia.

8. *Rhexoza* sp.

Records. C85: 3–4.IX.2003, 1 ♀. **S1**: 4–18.IV.2006, 2 ♂♂; 18.IV–2.V.2006, 1 ♂ 1 ♀; 30.Vz–13.VI.2006, 6 ♂♂ 1 ♀; 27.VI–11.VII.2006, 1 ♂; 11–25.VII.2006, 2 ♂♂; 25.VII–8.VIII.2006, 7 ♂♂ 1 ♀; 8–22.VIII.2006, 2 ♂♂; 22.VIII–5.IX.2006, 1 ♀; 5–19.IX.2006, 6 ♂♂ 6 ♀♀; 19.IX–3.X.2006, 2 ♂♂ 9 ♀♀; 3–17.X.2006, 1 ♂ 1 ♀; 17–31.X.2006, 2 ♂♂ 3 ♀♀. **S2**: 30.V-13.VI.2006, 1 ♂; 8-22.VIII.2006, m, 1 ♂ 1 ♀. **S3**: 16–30.V.2006, 2 ♂♂; 8–22.VIII.2006, 1 ♀; 19.IX–3.X.2006, 1 ♂; 17–31.X.2006, 1 ♂ 1 ♀ (all CNBFVR).

Chorotype. A probable W-Mediterranean element.

Italian distribution. Only known from Sardinia.

Ecology. Unknown.

Notes. The abundant Sardinian material belongs to a distinctive new species close to *Rhexoza subnitens* (Verrall) which was known until now only from Castilla y León in Spain and is being described elsewhere.

[*Swammerdamella acuta* Cook, 1956]

Swammerdamella acuta Cook, 1956: 20
Swammerdamella acuta Cook: Cook 1972: 628
Swammerdamella acuta Cook: Freeman 1985: 36

Notes. This species was recorded from Sardinia in Fauna Europaea (Haenni 2004b) based upon a male specimen labelled “Sardinia: Costa Caldera 19-23.IX.1980, H. Arter [legit]” (MHNN). It appears however that this is an erroneous labelling, since this locality is not in Sardinia but in Liguria [Costa Calderaia, San Colombano Certenoli commune, Genoa province]. Accordingly, *S. acuta* must be deleted from the Sardinian list.

9. *Swammerdamella brevicornis* (Meigen, 1830)

Scatopse brevicornis Meigen, 1830: 314
Scatopse brevicornis Meig.: Duda 1928: 15
Swammerdamella brevicornis (Meig.): Cook 1972: 628
Swammerdamella brevicornis (Meig.): Freeman 1985: 36

Records. C31: 12–17.VII.2006, 2 ♂♂ 3 ♀♀. **C70**: 7.VI.2004, 5 ♂♂ 3 ♀♀; 8.VI.2004, 51 ♂♂ 19 ♀♀. **S3**: 21.III–4.IV.2006, 1 ♂; 17–31.X.2006, 1 ♂ (all CNBFVR). Sassari: Monteforte, V.1989, J. Prinz legit, 3 ♂♂ 2 ♀♀ (FBUB, MHNN); Bono (7.5 km SSE), 5.V.1989, J. Prinz legit, 2 ♂♂ 1♀ (FBUB).

Other records. Lombardy (Mantua prov.): Marmirolo, Bosco della Fontana, 50m, 25.V.2001, B. Merz & F. Mason leg., 2 ♂♂, 3 ♀♀ (MHNG). Venetia (Belluno prov.): Lago di Santa Croce, 1.VIII.1988, M. Barták leg., 1♀ (BCP). Latium (Latina prov.): P. N. [= Parco Nazionale del] Circeo, Sabaudia, Pantani dell’Inferno, 2.IX.2004, B. Merz, P. Cerretti & G. Nardi leg., 1 ♀ (MHNG).

Chorotype. W-Palaearctic element.

Italian distribution. Northern Italy, Sicily (Dahl *et al*. 1995), Trentino-Alto Adige (Hellrigl 1996), Lombardy, Venetia, Latium, Sardinia (present paper).

Ecology. Although a common and widespread species in various habitats over the whole of its range, its larval stages and biology are still unknown.

Notes. The quotation of *S. brevicornis* from Sardinia in Fauna Europaea (Haenni 2004b) was based upon the still unpublished above specimens from Monteforte and Bono (Sassari).

10. *Swammerdamella* sp.

Records. S1: 19.IX–3.X.2006, 1 ♂; 3–17.X.2006, 1 ♀. **S2**: 3–17.X.2006, 1 ♂ (all CNBFVR).

Chorotype. A probable W-Mediterranean element.

Italian distribution. Only known from Sardinia.

Ecology. Unknown.

Notes. These Sardinian specimens are clearly conspecific with a very distinctive new species collected in numbers by the author at lower elevations in the foothills of the Sierra Nevada and Sierra de Cazorla (Andalucia, Spain), which is being described elsewhere. See note below *S. spinigera*.

11. *Swammerdamella spinigera* sp. nov.

(Figs 1–9)

Type locality. Italy, Sardinia (province Carbonia-Iglesias), Domusnovas, Sa Duchessa, 371 m, UTM 32S 464990 4358384.

Type material. Holotype ♂ labelled: "I-Sardegna (Carbonia-Iglesias) / Domusnovas, sa Duchessa, 371 m / UTM WGS84 32S 464990 4358384 / 3–17.X.2006, Malaise trap S2 / G. Chessa legit / Progetto Sardegna – CNBF" [print], "*Swammerdamella spinigera* sp. nov. ♂ / HOLOTYPE / J.-P. Haenni 2007" [hand written, red label], in good condition, preserved in alcohol, terminalia dissected (CNBFVR).

Paratypes: 1 ♀, same data as holotype (dissected); 1 ♂, same data as holotype but 17–31.X.2006. Paratypes preserved in alcohol, in good condition (CNBFVR).

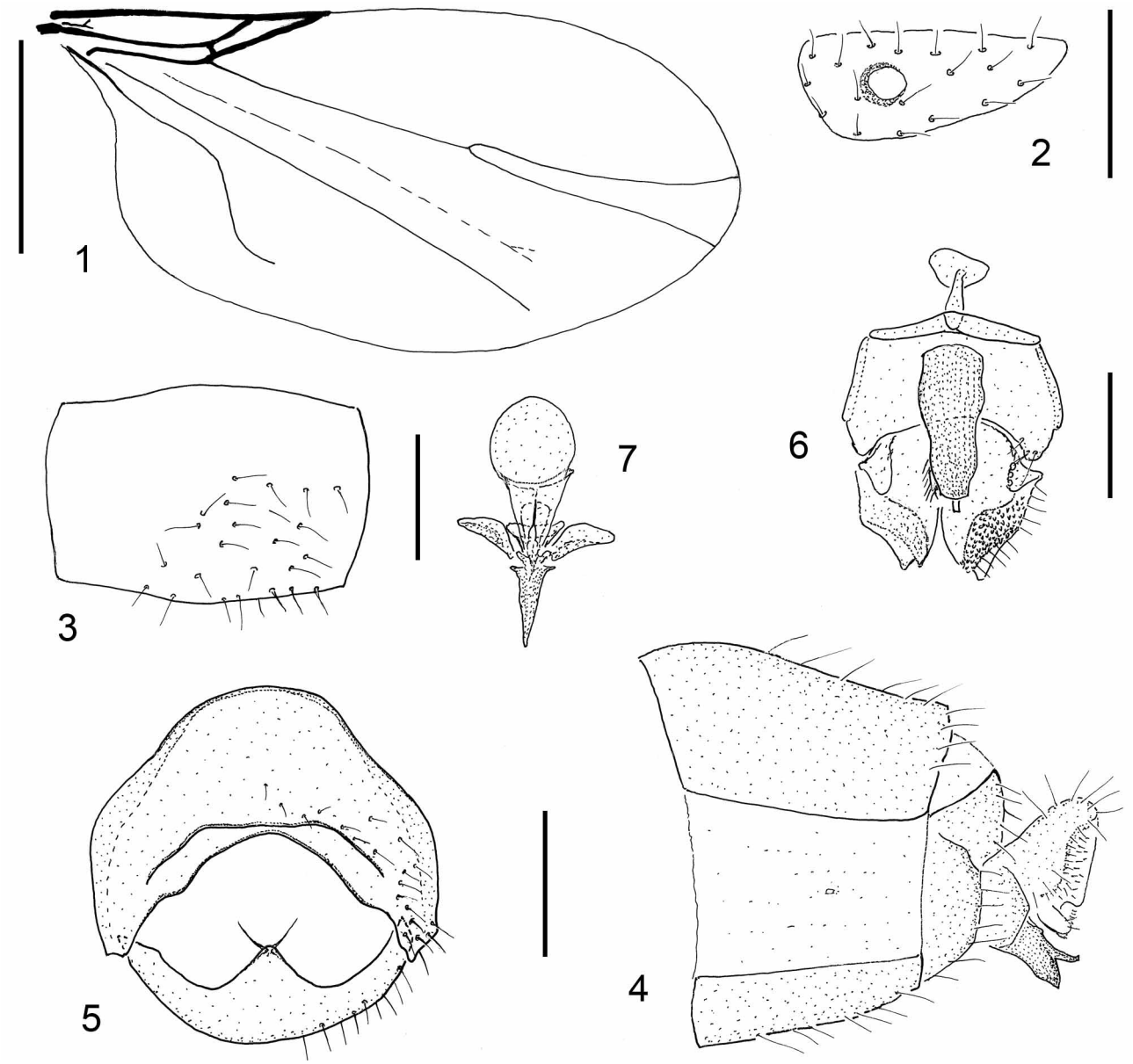
Diagnosis. The shape of tergite 6 of male, with posterior margin simple, gently curved (Fig. 3), not produced posteriorly into a more or less triangular projection, is unique among the European species of *Swammerdamella* Enderlein. The new species is closely related to *S. pediculata* (Duda, 1928) from Central Europe and to the above-mentioned new species from Spain, as may be seen by the long narrow M fork on wing (Fig. 1) and the shape of the genital capsule, especially the strongly sclerotized aedeagal plate (Fig. 4). The male genital structures (Fig. 6), with hardly developed lateral projections and posterior lobes densely beset with short spinulae, allow an easy separation from these species. In the female, the poor knowledge of the genital structures of most species of the genus does not allow to give diagnostic characters for *S. spinigera*.

Description. Male. 1.5 mm long (in alcohol). Shining black in general colour, with contrasting yellow tarsi. Head shining black, higher than long; antenna longer than head height, clavate, with 8 flagellomeres, gradually shortening and widening towards apex, the penultimate flagellomere more than twice as broad as long, the last one rounded, about 2.5 times longer than preceding one, nearly as broad as long; palpus large, broadly triangular at base, pointed at apex. Thorax. Notum shining black, with irregularly arranged rather coarse dark pilosity, also present on scutellum; margin of scutellum devoid of setae except basally; pleurae shining, largely devoid of pilosity except on elongate triangular spiracular sclerite (Fig. 2). Wing (Fig. 1) 1.6 mm long, hyaline, membrane entirely covered with dense, minute, light micropilosity; radial veins short, ending in the vicinity of the middle of wing, light brown; 9 dorsal setae on basal portion of R, 5 dorsal setae on R_{4+5}, no dorsal setae on R_1; posterior veins translucent; fork of M long and narrow, nearly as long as stem, the branches diverging markedly only near apex of wing. Halter brown, with somewhat lighter brownish stem; legs concolorous with body except tarsi yellow, strongly contrasting; anterior femora with a posteroventral irregular row of elongate setae. Abdomen. Tergites 1–6 shining black, with sparse coarse dark pilosity, denser and longer on posterior tergites; tergite 1 narrow, with a weakly sclerotized median longitudinal line; tergite 6

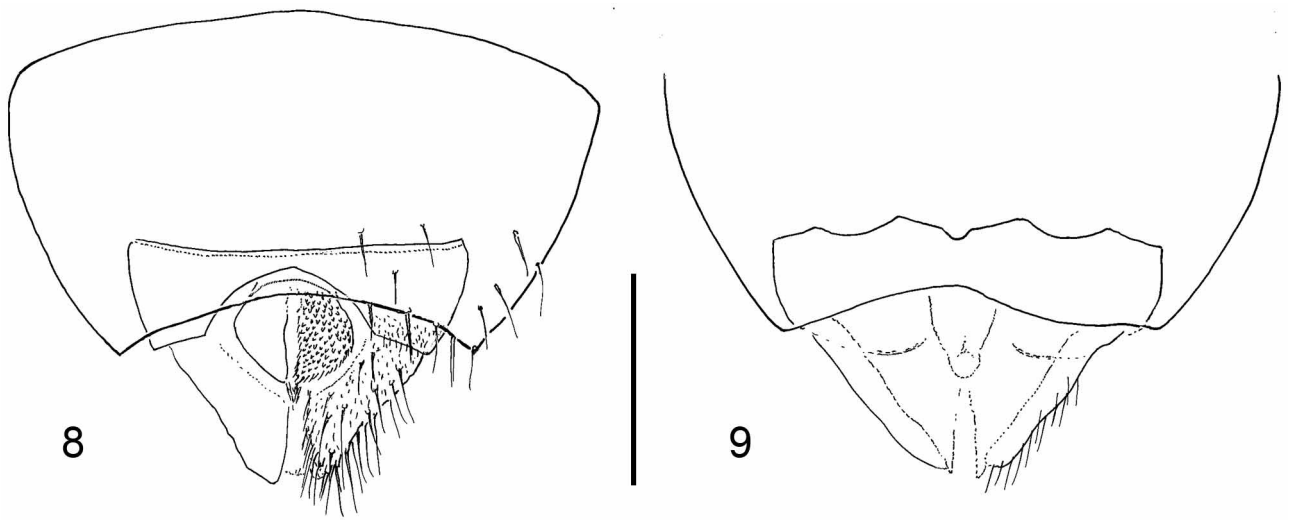
(Fig. 3) simple, with posterior margin gently convex; sternites 2–6 present, beset with dark pilosity as tergites; sternite 7 (Fig. 5) shining, smooth, with complex posterior margin; tergite 7 (Fig. 5) bearing a pair of elongate acute projections posteriorly; genital capsule with hardly developed lateral projections, yellowish apical lobes densely beset with short spinulae, and heavily sclerotized aedeagal plate and aedeagal complex (Figs 4, 6). Sperm pump as in Fig. 7.

Female. 1.6 mm long. Wing 1.7 mm long. As male in general colour and morphology except antennae, less clavate apically. Genitalia. Tergite 8 short, incised posteriorly to accommodate the cerci (Fig. 8); cerci separated on all their length, covered with minute spinose setulae on entire surface and with usual setulae along apical margin only (Fig. 8); tergite 9 produced posteriorly into 2 lateral lobes encompassing the cerci; sternite 8 more strongly sclerotized on undulated anterior margin, weakly sclerotized posteriorly (Fig. 9).

Etymology. The name *spinigera*, a feminine adjective meaning 'bearing spines', refers to the unusual spinulation of the ventral lobes of the genital capsule and the acute projections of tergite 7 of the male of the new species.



FIGURES 1–7. *Swammerdamella spinigera* sp. nov. (♂, holotype). **1.** Wing, scale bar: 0.5 mm. **2.** Spiracular sclerite, scale bar: 0.05 mm. **3.** Tergite 6, scale bar: 0.1 mm. **4.** Tip of abdomen in lateral view, scale bar: 0.1 mm. **5.** Segment 7 (sternite above), scale bar: 0.1 mm. **6.** Genital capsule in ventral view, scale bar: 0.1 mm. **7.** Sperm pump, scale bar: 0.1 mm.



FIGURES 8–9. *Swammerdamella spinigera* sp. nov. (♀, paratype, sa Duchessa), scale bar: 0.1 mm. **8.** Terminalia in dorsal view. **9.** Terminalia in ventral view.

Chorotype. A possible W-Mediterranean element.

Italian distribution. Presently only known from Sardinia.

Ecology. Unknown.

Notes. This species and the preceding one both belong to the *S. pediculata*-group of species of *Swammerdamella*, which are characterized by the 8-segmented flagellomere of antennae, the elongated M fork about as long as M stem, and by the genital structures. Besides the Palaearctic *S. pediculata* (Duda) and *S. genypodis* Cook, the group also includes the Nearctic *S. pygmaea* (Loew) and *S. confusa* Cook.

Discussion

The present material includes 11 species and thus represents a very significant increase of our knowledge of Sardinian Scatopsidae, which was extremely poor until now. Indeed, no less than 10 species are new records for the island. Little less than half of them are widespread taxa: *Coboldia fuscipes* and *Scatopse notata* are cosmopolitan, while *Apiloscatopse flavicollis*, *Reichertella geniculata* and *Swammerdamella brevicornis* are common European (or W-Palaearctic for the latter) species with a wide distribution. It is more difficult to discuss the other taxa, as several of them have been recognized only recently and their distribution is still insufficiently known. *Rhegmoclemina lunensis*, known elsewhere only from England, may be an up to now overlooked European element. The Mediterranean component is represented by at least 2 species, namely the new *Rhexoza* Enderlein and the new *Swammerdamella* Enderlein, that are otherwise known only from Spain. Three taxa, *Colobostema* sp., *Swammerdamella spinigera* sp. nov. and the *Anapausis* species are possible endemic Sardinian species, although they may well also represent Mediterranean elements with a wider distribution.

Even if based upon a single survey of a limited region only, the fauna of Scatopsidae of Sardinia appears nevertheless to present a very interesting and original assemblage of species. It should however be noticed that the occurrence of several other scatopsid species may be expected on the island. This also highlights the very poor state of our general knowledge of the family in the Mediterranean region. Indeed, Sardinia, with 11 recorded taxa, appears to be much better known when compared with other large islands, e.g. Corsica (5 species), Sicily (2 species) or Crete (2 species) (Haenni 2004b). In this respect, the fauna of Italy as a whole remains extremely poorly known since only 16 species of Scatopsidae had been recorded until now. The

present survey brings this number to 21, which is probably only one third of the real number of expected species.

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