

Scatopsidae (Diptera) reared from graminoid plants in the Czech Republic, with description of a new species of *Swammerdamella*

Jean-Paul Haenni & Jindřich Roháček

Scatopsidae (Diptera) reared from graminoid plants in the Czech Republic, with description of a new species of *Swammerdamella*. – Acta Mus. Siles. Sci. Natur., 69: 259-276, 2020.

Abstract: Ten species of Scatopsidae (Diptera) have been reared from tussocks of 7 species of Cyperaceae, 2 species of Juncaceae, 4 species of Poaceae and from dead specimens of 1 species of Typhaceae gathered in meadow, boggy meadow, alder forest and shores of a pond and a montane brook from 3 localities in the Czech Silesia (Czech Republic). One of them, *Swammerdamella jindrichi* Haenni sp. n. is described as new. Information is given for the first time on the sites of development of immature stages for several species, notably of genera *Ferneiella* and *Thripomorpha*.

Key words: Scatopsidae, *Swammerdamella*, new species, taxonomy, biology, habitat and plant association, graminoid plants, Silesia, Czech Republic

Introduction

The investigations conducted in the Czech Silesia (Northern Moravia) by the second author (JR) within the study of host-plant association of Anthomyzidae (see Roháček 2009, 2013) and other acalyptrate Diptera yielded abundant material of other families of Diptera of which only Mycetophilidae and Keroplatidae (Ševčík & Roháček 2008) have been studied so far. Quite important numbers of specimens of Scatopsidae were obtained during this research. Our knowledge of the immature stages and the sites of larval development of scatopsid species is still very fragmentary. The available information was summarized by Haenni & Vaillant (1994) and since then, only few additional data have been published (N. P. Krivosheina 2000, Papp 2002, El-Serwy & Haenni 2008, Köhler 2011, M. Krivosheina 2012, Haenni & Pollini 2015). New rearing records are given in the present contribution, bringing first insight into sites of development for several scatopsid species for which no information was available until now. In addition, a new species of *Swammerdamella* has been revealed in the reared material of Scatopsidae which is described and illustrated below and its relationships are discussed.

Material and methods

Material. A total of 2026 specimens [278 + 1748 *C. fuscipes*] of Scatopsidae have been obtained from rearing experiments originally devoted to the study of host-plant associations of Anthomyzidae (cf. Roháček 2009) and other acalyptrate Diptera by junior author (JR). All were identified by senior author (JPH) and are deposited in MHNN (= Muséum d'Histoire Naturelle, Neuchâtel, Switzerland) and SMOC (= Silesian Museum, Opava, Czech Republic).

Rearing methods. Individual (one-species) samples = tussocks or series of plant specimens (*Typha*, previous year plants were used, cf. Fig. 17) of graminoid plants (species listed below) including a root ball with soil (about 25 x 25 cm) were transported from the field in plastic bags (Fig. 1) and subsequently placed (single plant species per box) in plastic breeding boxes (Figs 3, 4) equipped with a collecting head of similar construction to that used in Malaise traps (cf. Fig. 2) and containing a 0.5 l PE bottle filled with 75% ethanol in which all emerged insects were caught, killed and preserved. The reared material was emptied at about monthly intervals.

Plant species. Scatopsidae have been reared from tussocks (Figs 12, 15, 17, 18, 21, 22, 24-29) or single plants (*Typha*, Fig. 17) of 14 monocot species:

Carex acuta L. (Cyperaceae), samples B3, B13

Carex brizoides (Cyperaceae), sample B12

Carex elongata L. (Cyperaceae), sample B17

Carex hirta L. (Cyperaceae), sample B20
Carex sylvatica Huds. (Cyperaceae), B22
Carex vesicaria L. (Cyperaceae), samples B14, B21
Scirpus sylvaticus L. (Cyperaceae), samples B4, B16
Juncus conglomeratus L. (Juncaceae), sample B19
Juncus effusus L. (Juncaceae), sample B11
Calamagrostis arundinacea (L.) Roth (Poaceae), sample B25
Deschampsia cespitosa (L.) P. B. (Poaceae), sample B24
Glyceria maxima (Hartman) Holmberg (Poaceae), samples B5, B23
Holcus lanatus L. (Poaceae), sample B18
Typha latifolia L. (Typhaceae), sample B15

Localities. Samples of these plants were collected in three localities covering six habitats:

- (1) Czech Republic: N. Moravia (Silesia): Polanka nad Odrou, Přemyšov Nature Reserve, 49°47'24"N 18°11'23"E, 212 m, boggy (fen) meadow (Figs 11, 12): 10.vii.2008 (samples B3 *Carex acuta*, B4 *Scirpus sylvaticus*, B5 *Glyceria maxima*); 11.v.2009 (samples B13 *Carex acuta*, B14 *Carex vesicaria*, B15 *Typha latifolia*, B16 *Scirpus sylvaticus*, B17 *Carex elongata*); 4.vi.2009 (samples B21 *Carex vesicaria*, B23 *Glyceria maxima*). Same locality, 214 m, (dry) meadow: 11.v.2009 (sample B18 *Holcus lanatus*); 4.vi.2009 (sample B20 *Carex hirta*). Same locality, 214 m, partly inundated alder (*Alnus*) forest (Fig. 19): 4.vi.2009 (samples B19 *Juncus conglomeratus*, B22 *Carex sylvatica*, B24 *Deschampsia caespitosa*).
- (2) Czech Republic: N. Moravia (Silesia): Karviná-Doly, Mokroš pond, 49°49'17"N 18°29'35"E, 256 m, partly forested and boggy pond shore (Fig. 13): 29.vii.2008 (samples B11 *Juncus effusus*, B12 *Carex brizoides*).
- (3) Czech Republic: N. Moravia (Silesia): Hrubý Jeseník Mts, Kouty nad Desnou env., Zámčisko, 50°03'51"N 17°11'54"E, 950 m, shore of montane brook (Fig. 14): 21.vii.2009 (sample B25 *Calamagrostis arundinacea*).



Figs 1–4: Rearing of Diptera from graminoid tussocks. **1** – plastic bags with samples of collected plants and **2** rearing boxes; **2** – detail of collecting head of the rearing box; **3** – tussock of *Carex* placed in (open) rearing box; **4** – series of closed rearing boxes. Photos by J. Roháček and J. Ševčík.

Results

Description of a new species

***Swammerdamella jindrichi* Haenni sp. n.**

(Figs 5-10)

Type material: Holotype, male: Czech Republic: N. Moravia: Polanka nad Odrou, Přemyšov Nature Reserve, 49°47'24"N 18°11'23"E, 212 m, boggy meadow, 11.5.2009, J. Roháček leg., reared from sample B15 of *Typha latifolia*, emerged 11.5-9.6.2009; labelled: «*Swammerdamella jindrichi* sp. n. holotype ♂ J.-P. Haenni 2020», preserved in glycerine in a pinned plastic microvial, in perfect condition, dissected with terminalia cleared and dissected, preserved in glycerine in a second microvial attached to the same pin as specimen, deposited in SMOC. Paratypes: 12 males, 11 females, same data as holotype; 2 males, 1 female, same data as holotype but emerged 9.6-9.7.2009; all paratypes preserved in glycerine as the holotype, deposited in SMOC, except some of them in MHNN.

Diagnosis: The new species is recognizable in male sex by the shape of 6th tergite (Fig. 5), with posterior margin medially prolonged into an acute narrowly triangular median lobe, associated with shape of genital capsule (Fig. 7), which has lateral arms long, truncate apically and posterior projections bent inwardly at apex; in female by cerci large, rounded, reaching nearly level of lateral lobes of tergite 9 posteriorly (Fig. 8). Main diagnostic characters distinguishing it from the closely related *S. brevicornis* are given in Table 1.

Table 1: Diagnostic characters of *Swammerdamella brevicornis* and *S. jindrichi* sp. n.

	<i>S. brevicornis</i> (Meigen, 1830)	<i>S. jindrichi</i> sp. n.
male pregenital tergite 6	roughly heart-shaped, with anterior margin medially slightly indented, posterior margin prolonged into a broad triangular projection (Cook 1956: 23, fig. 4A)	roughly square-shaped, with anterior margin nearly straight or regularly convex, posterior margin prolonged medially into an acute, narrow median projection (Fig. 5)
male genital capsule (ventral view)	lateral arms longer, irregularly narrowing towards pointed apex, posterior projections diverging at apex (Cook 1956: 18, fig. 1B)	lateral arms shorter, obliquely truncate apically, posterior projections converging apically (Fig. 5)
female terminalia (dorsal view)	cerci small, widely overwhelmed by the very oblique lateral lobes of tergite 9 (Cook 1956: 25, fig. 5A)	cerci large, hardly overwhelmed by the lateral lobes of tergite 9 (Fig. 8)
palpus	elongate, acute apically	moderately long, obtusely rounded apically

Description: Specimens appearing brown in general colour (but colours faded due to previous alcohol conservation), most probably black or blackish-brown as all other European species of *Swammerdamella*). **Male.** 1.3-1.4 mm. Brown in general colour, dull with unapparent brownish pilosity, slightly lighter tarsi and hyaline wings. Head dark brown; antenna with lighter pedicel, about as long as head height, slightly widening towards apex, with flagellum 7-segmented, flagellomeres wider than long, last flagellomere clearly longer than two preceding ones together. Palpus elongate, broad on basal two thirds, then narrowing and obtusely rounded apically, labella shorter than palpus, stout apically. Thorax narrow, notum and scutellum dull brown, with brownish pilosity, a row of much longer marginal setae on scutellum; pleura lighter brown, partly shining. A row of 7-8(-10) supraalar setae, hardly longer than adjacent notal pilosity; anterior spiracular sclerite elongate, triangular, obliquely truncate posteriorly, with

anterior spiracular opening; anepisternum with a group of setae on the upper anterior corner of the sclerite. Wing (Fig. 10) 1.1 mm long, with membrane hyaline, somewhat iridescent, anterior veins brown, posterior veins translucent; venation similar to that of *S. brevicornis*, with median fork short, three times shorter than its stem, and branches strongly diverging at apex of wing; CuA sigmoid. Halter brown, with one seta on stem. Legs with tarsi slightly lighter than femora and tibiae; tibiae with an indistinct lighter median ring. Abdomen dull with brownish pilosity. Tergite 6 (Fig. 5) with posterior margin medially produced into a narrow, pointed triangular projection. Sternite 6 with unmodified posterior margin. Segment 7 retracted into segment 6; tergite 7 with lateral arms apically only slightly enlarged, rounded, ventral process long, elbowed, with longest arm slender, narrowing towards apex, shortest arm weakly developed; sternite 7 ending laterally in obtusely acute arms; genital capsule (Fig. 7) slightly longer than wide, with penis valves reaching half length of slender, apically truncate lateral arms (gonocoxites), paired posterior projections with apical lobes incurved, converging apically; aedeagal plate rectangular with rounded corners; aedeagus short.

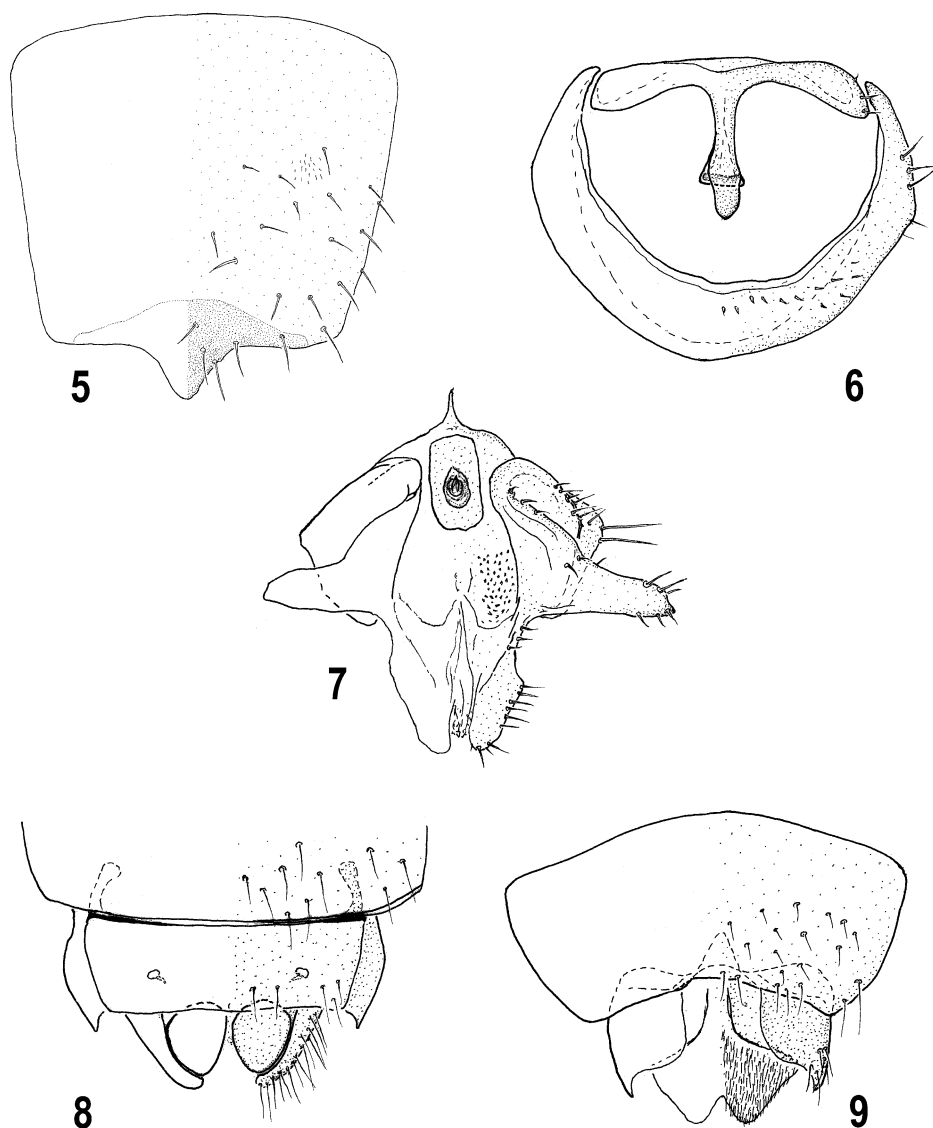
Female. 1.4-1.8 mm, wing 1.3-1.5 mm. Similar to male in general colour and morphology. Tergite 7 unmodified, with straight posterior margin, sternite 7 very slightly concave medially. Terminalia (Figs 8-9): genital segment slightly lighter than rest of abdomen; tergite 8 bearing a pair of lateral discal large spiracular openings, medially very slightly emarginate, cerci rounded, somewhat elongate, prominent but only slightly overwhelmed by lateral lobes of tergite 9; sternite 8 deeply divided into two lobes broadly separated medially, with inner margin straight, parallel for a short distance, and posterior margin oblique (Fig. 9); sternite 9 bilobed basally; spermatheca rounded as usual.

Distribution: The new species is presently known only from the type-locality in Silesia (Czech Republic).

Biology: All known specimens were obtained by rearing from old (a previous year) specimens of *Typha latifolia* sampled in a boggy meadow in the Přemyšov Nature Reserve (Fig. 17).

Derivation of name: The new species is named after its collector, my dear colleague, the renowned Czech dipterist Dr Jindřich Roháček, in recognition of his important contributions to the knowledge of systematics, faunistics and biology of many families of Diptera.

Discussion: *S. jindrichi* sp. n. belongs to the *S. brevicornis*-group as defined by Cook (1956) (M-fork on wing very short, much shorter than stem, 7-segmented antennal flagellum, tarsi not contrasting, sternum 6 of male unmodified). *S. jindrichi* sp. n. is the second European species of this group of species which includes *S. brevicornis* (Meigen, 1830) (widespread in the West Palearctic) and two additional Nearctic species, namely *S. obtusa* Cook, 1956 (eastern part of the USA and Canada) and *S. pusilla* (Walker, 1848) (Alaska, Canada, northern USA) (Cook 1956). Its genital characters place the new species very close to *S. brevicornis*. The differences between the two species are small but the main diagnostic characters (see Table 1) have been found remarkably constant in the material examined. By the shape of the male tergite 6 the new species superficially looks like *S. acuta* Cook, 1956 (widespread in Europe, except Mediterranean) which, however, belongs to the *S. bispinosa*-group (Cook 1956).



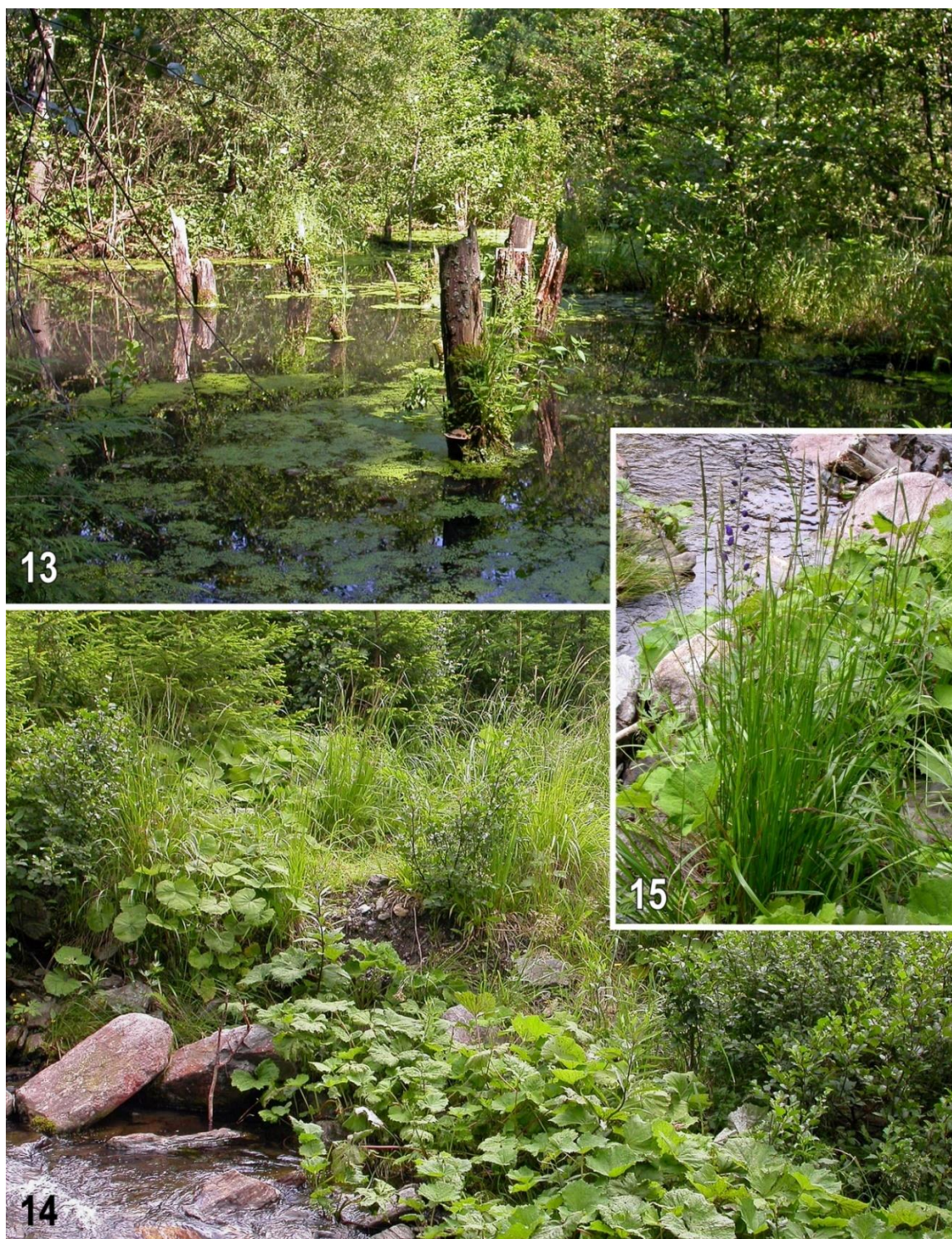
Figs 5–9: *Swammerdamella jindrichi* Haenni sp. n. **5** – male tergite 6; **6** – male tergite 7 (above) and sternite 7 (caudal view); **7** – male genital capsule (ventral view); **8** – female terminalia (dorsal view); **9** – female terminalia (ventral view).



Fig. 10: *Swammerdamella jindrichi* Haenni sp. n., male wing.



Figs 11–12: Habitats from which plant samples were taken for rearing experiments, locality Přemyšov Nature Reserve. **11** – boggy meadow dominated by *Glyceria maxima*; **12** – boggy meadow dominated by *Carex* species. Photo by J. Roháček.



Figs 13–15: Habitats from which plant samples were taken for rearing experiments. **13** – locality Mokroš, boggy pond shore; **14** – locality Zámčisko, shore of montane brook; **15** – tussock of flowering *Calamagrostis arundinacea* in the latter locality. Photo by J. Roháček.

Survey of reared scatopsid species

Genera and species of Scatopsidae are listed in alphabetical order. The data are arranged according to the following format for each species: locality (see material and methods for complete data), sample number, type of habitat, plant species, date of collecting/date of emergence, number of specimens. European distribution is given according to Haenni (2013). The results are summarized in Table 2.

Table 2: Species of Scatopsidae emerged from samples of graminoid plant species collected in three localities of the Czech Silesia (Czech Republic), viz. Přemýšov Nature Reserve, Mokroš and Zámčisko in 2008-2009.

species of graminoids	species of Scatopsidae										Number of reared species
	<i>Anapausis helvetica</i>	<i>Coboldia fuscipes</i>	<i>Ferneiella incompleta</i>	<i>Reichertella nigra</i>	<i>Scatopse notata</i>	<i>Swammerdamella jindrichi</i>	<i>Swammerdamella brevicornis</i>	<i>Thripomorpha bifida</i>	<i>Thripomorpha freyi</i>	<i>Thripomorpha verralli</i>	
<i>Calamag. arundinacea</i>		X						X			2
<i>Carex acuta</i>		X	X				X	X	X		5
<i>Carex brizoides</i>					X						1
<i>Carex elongata</i>		X			X		X	X	X		5
<i>Carex hirta</i>		X			X		X	X			4
<i>Carex sylvatica</i>		X									1
<i>Carex vesicaria</i>	X	X		X			X	X	X		7
<i>Deschampsia caespitosa</i>		X									1
<i>Glyceria maxima</i>		X		X			X	X		X	5
<i>Holcus lanatus</i>	X	X									2
<i>Juncus conglomeratus</i>		X									1
<i>Juncus effusus</i>		X									1
<i>Scirpus sylvaticus</i>	X	X						X			3
<i>Typha latifolia</i>		X		X		X			X	X	5

***Anapausis helvetica* Haenni, 1984**

Material examined: 11 specimens

Přemyšov Nature Reserve:

B4, boggy meadow, ex *Scirpus sylvaticus*, 10.7.2008/9.7-3.9.2009, 1 female;

same, but 10.7.2008/3.9-2.10.2009, 1 female;

B14, boggy meadow, ex *Carex vesicaria*, 11.5.2009/9.7-7.8.2009, 1 male;

B16, boggy meadow, ex *Scirpus sylvaticus*, 11.5.2009/9.6-9.7.2009, 1 female;

same, but 11.5.2009/9.7-7.8.2009, 1 male, 1 female;

same, but 11.5.2009/7.8-23.9.2009, 1 male, 2 females;

B18, meadow, ex *Holcus lanatus*, 11.5.2009/11.5-9.6.2009, 1 female;

same, but 11.5.2009/9.7-7.8.2009, 1 male.

A. helvetica is widespread in temperate and boreal Europe [AND, F, CH, I, D, CZ, SK, N, SF] and was recently also recorded from mountains of Central Spain (Carles-Tolrá & al. 2020). In the Czech Republic it was recorded till now only from one locality in Moravia (Martinovský 1997) and one locality in Bohemia (Haenni & Barták 2006). In Slovakia it is known from 4 localities (Kozánek & Roller 1997). This species is present in a wide variety of environments at various altitudes and no precise ecological requirements could be outlined till now. In the present study it was recovered from tussocks of three different plant species, two sedges (*Carex*, *Scirpus*, Figs 28, 29) and one grass (*Holcus*, Fig. 22) from herbaceous environments, bringing thus the first rather precise information about the possible site of development of the immature stages of this species.

***Ferneiella incompleta* (Verrall, 1886)**

Material examined: 1 specimen

Přemyšov Nature Reserve:

B3, boggy meadow, ex *Carex acuta*, 10.7.2008/28.4-9.6.2009, 1 female.

F. incompleta is present, though rather uncommon, in temperate and boreal Europe [GB, IR, F, B, NL, D, CH, CZ, SK, H, S, SF]. Records from the Czech Republic are given by Barták (1995), Martinovský (1997), Haenni & Barták (2000), and Haenni *et al.* (2005), from Slovakia by Martinovský (1997) and Haenni (2009). This species seems strictly bound to marshy grounds, especially boggy meadows, peat-bogs and riverine forests (especially alder (*Alnus*)). The unique above-mentioned emergence from a *Carex acuta* tussock (Fig. 27) is in accordance with our preceding knowledge and confirms the association of this species with damp biotopes, where the immature stages probably develop.

***Reichertella nigra* (Meigen, 1804) Fig. 16**

Material examined: 108 specimens

Přemyšov Nature Reserve:

B14, boggy meadow, ex *Carex vesicaria*, 11.5.2009/7.8-23.9.2009, 4 males, 7 females;

B15, boggy meadow, ex *Typha latifolia*, 11.5.2009/7.8-23.9.2009, 1 male;

B21, boggy meadow, ex *Carex vesicaria*, 4.6.2009/3.8-3.9.2009, 1 female;

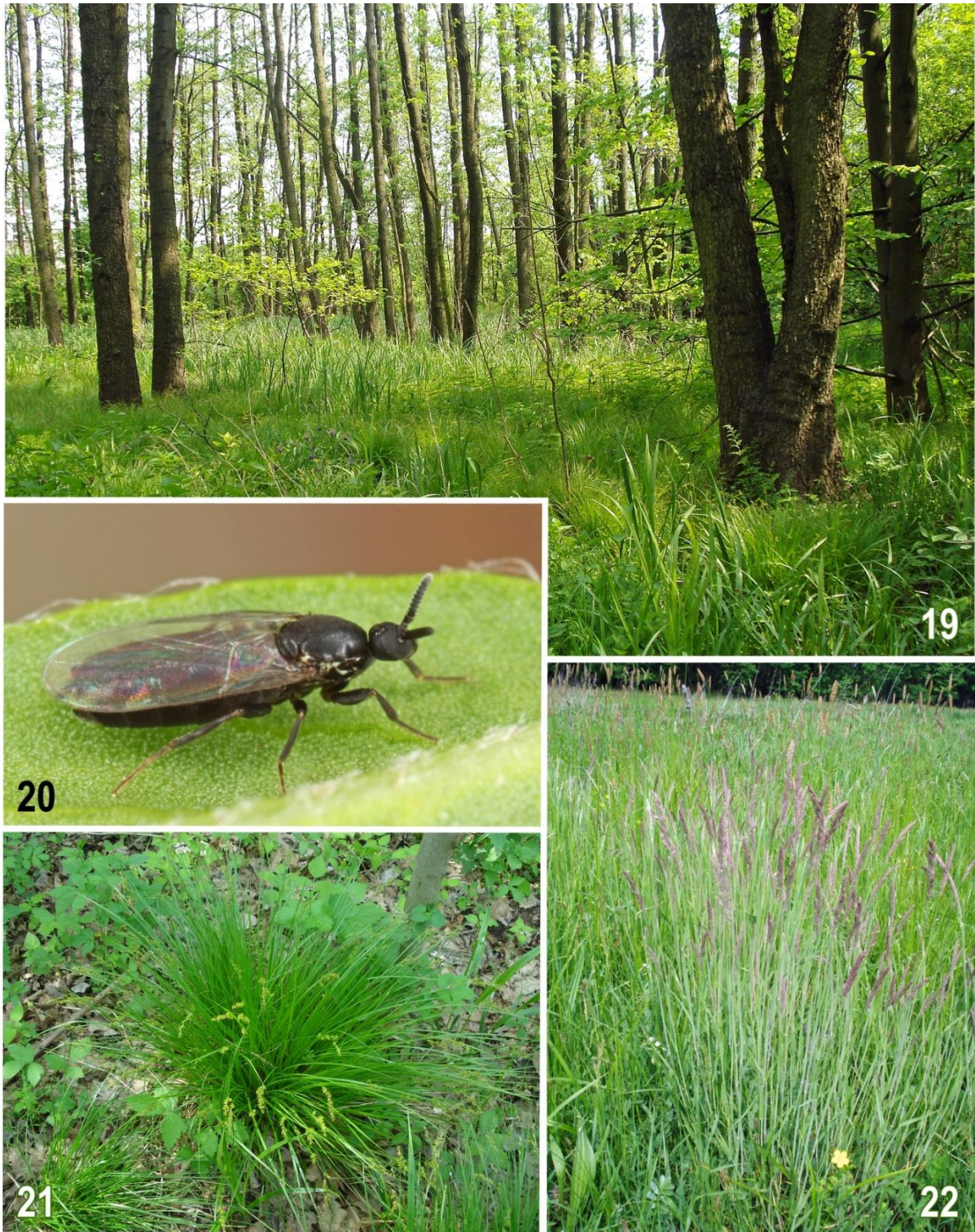
B23, boggy meadow, ex *Glyceria maxima* (Fig. 18), 4.6.2009/3.8-3.9.2009, 57 males, 28 females;

same, but 4.6.2009/3.9-2.10.2009, 2 males, 8 females.

R. nigra is a widespread European species [E, F, CH, B, NL, D, A, DK, CZ, SK, H, PL, LT, MN, SR, GR]. It is common in the Czech Republic (Barták, 1995, Martinovský 1997, Haenni & Barták 2000, Haenni & al. 2005) and Slovakia (Martinovský 1997, Kozánek & Roller 1997, Haenni 2009a), more frequently found in lowlands. It is often caught in numbers in humid environments, like alluvial forests and damp meadows. The immature stages remain unknown, but Fritz (1983a) recorded the emergence of *R. nigra* in various humid biotopes (reed-beds, marshy meadows, riverine forests) from the alluvial floodplain of Northern Upper-Rhine (Germany), while Haenni & Pollini (2015) recorded numerous emergences of this species from dense *Filipendulion* (hydrophilous tall herbs fringe community). The present study confirms thus the existing information for this species. The majority of specimens were reared from *Glyceria maxima* (Fig. 18).



Figs 16–18: Scatopsidae and its host plants. **16** – adults of *Reichertella nigra* in dead stem of *Typha latifolia*; **17** – a previous year growth of *Typha latifolia* in Přemyšov Nature Reserve; **18** – flowering *Glyceria maxima* in Přemyšov Nature Reserve. Photo by J. Roháček.



Figs 19–22: Scatopsidae and their habitat and host plants in Přemyšov Nature Reserve. **19** – inundated alder forest; **20** – *Coboldia fuscipes*, male; **21** – *Carex elongata*, flowering tussock in this alder forest; **22** – *Holcus lanatus*, flowering tussock in (dry) meadow. Photo by J. Roháček.

***Scatopse notata* (Linnaeus, 1758) Fig. 23**

Material examined: 3 specimens

Přemyšov Nature Reserve:

B17, boggy meadow, ex *Carex elongata*, 11.5.2009/23.9-6.11.2009, 1 female;

B20, meadow, ex *Carex hirta*, 4.6.2009/2.10-6.11.2009, 1 female;

Mokroš:

B12, pond shore, ex *Carex brizoides*, 29.7.2008/1.3-28.4.2009, 1 female.

S. notata is a cosmopolitan species, widespread and common in the whole of Europe, including the Czech Republic. This anthropogenic species is also frequently found under natural conditions in very diverse environments. The larvae can develop in a wide variety of decaying organic matter, both of vegetal and animal origin (Laštovka & Haenni 1981, Haenni & Vaillant 1994). Only a few specimens were obtained from 3 *Carex* species (see Figs 21, 24) during our rearing experiments.

***Swammerdamella brevicornis* (Meigen, 1830)**

Material examined: 49 specimens

Přemyšov Nature Reserve:

B13, boggy meadow, ex *Carex acuta*, 11.5.2009/9.6-9.7.2009, 1 female;

same, but 11.5.2009/7.8-23.9.2009, 1 male;

B14, boggy meadow, ex *Carex vesicaria*, 11.5.2019/9.7-7.8.2009, 1 male, 2 females;

same, but 11.5.2019/7.8-23.9.2009, 2 females;

B17, boggy meadow, ex *Carex elongata*, 11.5.2019/7.8-23.9.2009, 1 male, 1 female;

B20, meadow, ex *Carex hirta*, 4.6.2009/30.6-3.8.2009, 2 females;

same, but 4.6.2009/3.8-3.9.2009, 7 males, 6 females;

same, but 4.6.2009/3.9-2.10.2009, 5 males, 9 females;

B23, boggy meadow, ex *Glyceria maxima*, 4.6.2009/30.6-3.8.2009, 1 female; same, but 4.6.2009/3.8-3.9.2009, 6 males, 2 females; same, but 4.6.2009/3.9-2.10.2009, 1 male, 1 female.

S. brevicornis is one of the commonest and widespread scatopsid species in Europe and the West Palaearctic as a whole where it can be found in all kinds of environments. It is very common in the Czech Republic and Slovakia. However the immature stages of this species are still unknown and we do not know precisely where they develop, except for one mention from boggy ground in France: one specimen emerged from a soil sample of an eutrophic bog (pH 6.5–7.2), with mosses *Mnium seligeri*, *Sphagnum contortum* and *Drepanocladus vernicosus*, and sedges *Carex limosa* and *C. rostrata* (Brunhes & Haenni 1982). In the present study specimens were reared from samples of 4 different sedge species (*Carex*, Figs 21, 27, 28) and from one grass species (*Glyceria*, Fig. 18).

***Swammerdamella jindrichi* Haenni sp. n.**

Material examined: 27 specimens

Přemyšov Nature Reserve:

B15, boggy meadow, ex *Typha latifolia*, 11.5.2009/11.5-9.6.2009, 13 males, 11 females;

same, but 11.5.2009/9.6-9.7.2009, 2 males, 1 female;

The new species was only reared from dead (previous year) plants of *Typha latifolia* (Fig. 17).

***Thripomorpha bifida* (Zilahi-Sebess, 1956)**

Material examined: 19 specimens

Přemyšov Nature Reserve:

B4, boggy meadow, ex *Scirpus sylvaticus*, 10.7.2008/28.4-9.6.2009, 2 males;

B5, boggy meadow, ex *Glyceria maxima*, 10.7.2008/28.4-9.6.2009, 1 male;

B13, boggy meadow, ex *Carex acuta*, 11.5.2009/9.6-9.7.2009, 2 females;

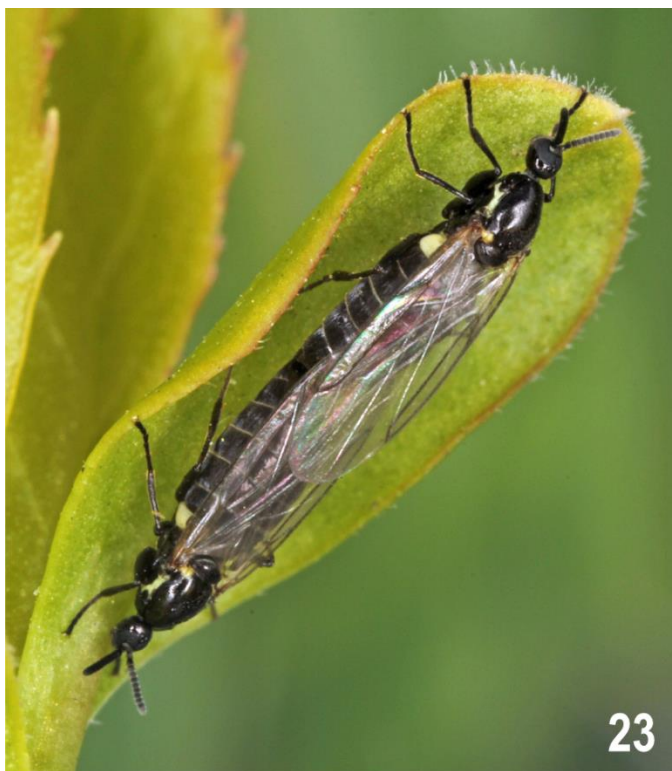
B14, boggy meadow, ex *Carex vesicaria*, 11.5.2009/9.6-9.7.2009, 6 males, 4 females;

B17, boggy meadow, ex *Carex elongata*, 11.5.2009/9.6-9.7.2009, 2 males;

B20, meadow, ex *Carex hirta*, 4.6.2009/30.6-3.8.2009, 1 male.

Zámčisko:

B25, at brook, ex *Calamagrostis arundinacea*, 21.7.2009/24.8-23.9.2009, 1 male.



Figs 23–26: Scatopsidae and their host plants in Přemyšov Nature Reserve, inundated alder forest. **23** – *Scatopse notata*, mating pair; **24** – flowering *Carex brizoides*; **25** – flowering *Carex sylvatica*; **26** – flowering tussock of *Deschampsia cespitosa*. Photo by J. Roháček.



Figs 27–29: Host plants of Scatopsidae in Přemyšov Nature Reserve, boggy meadow. **27** – flowering tussocks of *Carex acuta*; **28** – flowering *Carex vesicaria*; **29** – flowering *Scirpus sylvaticus*. Photo by J. Roháček.

T. bifida is a common, widespread species in temperate and boreal Europe [GB, F, CH, NL, D, CZ, SK, H, PL, LT, S, N, R]. Records from the Czech Republic (Martinovský 1997, Haenni & Barták 2000), and from Slovakia (Martinovský 1997, Haenni 2009a) are numerous. It is frequently found in damp meadows and all kind of humid environments. The results of the present study give the first precise indications about the larval sites of development of this species, which has been found emerging from tussocks of five different sedge species (*Carex* and *Scirpus*) and 2 species of grasses (one species each of *Calamagrostis* and *Glyceria*, Figs 15 and 18 respectively).

***Thripomorpha freyi* (Cook, 1969)**

Material examined: 46 specimens

Přemyšov Nature Reserve:

B3, boggy meadow, ex *Carex acuta*, 10.7.2008/28.4-9.6.2009, 1 female;
 B13, boggy meadow, ex *Carex acuta*, 11.5.2009/11.5-9.6.2009, 4 males, 3 females;
 B14, boggy meadow, ex *Carex vesicaria*, 11.5.2009/11.5-9.6.2009, 17 males, 15 females;
 B15, boggy meadow, ex *Typha latifolia*, 11.5.2009/11.5-9.6.2009, 3 males;
 B17, boggy meadow, ex *Carex elongata*, 11.5.2009/9.7-7.8.2009, 2 males;
 B21, boggy meadow, ex *Carex vesicaria*, 4.6.2009/4.6-30.6.2009, 1 male.

T. freyi is a still poorly known, uncommon species with an apparently boreo-montane distribution in Europe [F, D, CZ, LT, SF]. Previous records from the Czech Republic are rare (Martinovský 1997, Haenni & Barták 2000). The present study documents for the first time the developing site of the still unknown immature stages of this species. I has been reared from tussocks of three different species of sedges (*Carex*, most abundantly from *C. vesicaria*, Fig. 28) and one species of *Typha* (Fig. 17), all sampled in a boggy meadow.

***Thripomorpha verralli* (Edwards, 1934)**

Material examined: 14 specimens

Přemyšov Nature Reserve:

B15, boggy meadow, ex *Typha latifolia*, 11.5.2009/9.6-9.7.2009, 1 female;
 B21, boggy meadow, ex *Carex vesicaria*, 4.6.2009/30.6-3.8.2009, 8 males, 4 females;
 B23, boggy meadow, ex *Glyceria maxima*, 4.6.2009/4.6-30.6.2009, 1 male.

T. verralli is a common temperate and boreal European species [GB, IR, F, CH, NL, D, A, CZ, SK, DK, N, S, SF] bound to humid environments, especially damp meadows. Quite numerous records have been published from the Czech Republic (Martinovský 1997, Haenni & Barták 2000) and Slovakia (Martinovský 1997, Haenni 2009a). Nothing is known about its immature stages, but Fritz (1983b) recorded the emergence of this species in damp meadows and riverine grassy vegetation [Schilfröhricht] in Germany and Haenni & Pollini (2015) from various marshy herbaceous formations in Southern Switzerland. The present study confirms this association, with adults emerged from grass tussocks of one species each of a sedge (*Carex*, Fig. 28), a grass (*Glyceria*, Fig. 18) and a *Typha* (Fig. 17) sampled in a boggy meadow.

***Coboldia fuscipes* (Meigen, 1830) Fig. 20**

Material examined: 1748 specimens.

Přemyšov Nature Reserve:

B3, boggy meadow, ex *Carex acuta*
 B4, boggy meadow, ex *Scirpus sylvaticus*
 B5, boggy meadow, ex *Glyceria maxima*
 B13, boggy meadow, ex *Carex acuta*
 B14, boggy meadow, ex *Carex vesicaria*
 B15, boggy meadow, ex *Typha latifolia*
 B16, boggy meadow, ex *Scirpus sylvaticus*
 B17, boggy meadow, ex *Carex elongata*
 B18, meadow, ex *Holcus lanatus*
 B19, alder forest, ex *Juncus conglomeratus*
 B20, meadow, ex *Carex hirta*
 B21, boggy meadow, ex *Carex vesicaria*

B22, alder forest, ex *Carex sylvatica*
B23, boggy meadow, ex *Glyceria maxima*
B24, alder forest, ex *Deschampsia caespitosa*
Mokroš:
B11, pond shore, ex *Juncus effusus*
Zámčisko:
B25, at brook, ex *Calamagrostis arundinacea*

C. fuscipes is a common, widespread, cosmopolitan species, the larvae of which can develop in a very diverse range of decaying media, both of vegetal and animal origin, in dung, fungi, etc. It is very common in the whole of Europe. Its abundance in emergences of many samples of the present study is certainly due, at least partly, to secondary infestation of samples (a phenomenon already experienced separately by both authors in other studies involving fungal and soil samples, cf. Roháček & Ševčík 2013). However, the emergence of adult specimens shortly after sampling seem to indicate that these rearing records are probably primary. If so, *C. fuscipes* can be considered to have larvae also developing in tussocks of the following monocot plants in field: *Carex acuta*, *C. elongata*, *C. hirta*, *C. sylvatica*, *C. vesicaria*, *Scirpus sylvaticus* (Fig. 25), *Juncus glomeratus*, *Deschampsia cespitosa* (Fig. 26), *Glyceria maxima*, *Holcus lanatus* and, possibly, *Calamagrostis arundinacea* (Fig. 15).

Discussion

Ten species of Scatopsidae have been reared in the course of this study, representing about one fifth of the species known to occur in the Czech Republic (cf. Haenni 2009b). From a faunistic point of view, noteworthy are the unexpected discovery of a new species of *Swammerdamella*, and the third Czech record of *A. helvetica*.

Regarding the knowledge of ecological and development requirements of individual species of Scatopsidae, interesting results have been gathered in the present study. All known scatopsid larvae are saprophagous (Haenni & Vaillant 1994) and there is probably no precise association of the larvae of the scatopsid species emerged in the present study with individual living plant species. However, a precise location in boggy meadows of development sites of immature stages can now be ascertained for three species of the genus *Thripomorpha* (*T. bifida*, *T. freyi*, *T. verralli*) and for *Ferneiella incompleta* whose adults were already known as dwelling in marshy habitats. A quite similar method was used in high altitude peat-bogs of the French Massif Central, resulting in information on sites of larval development for 7 species of scatopsids (Brunhes & Haenni 1982), but individual species of scatopsids were related to phytosociological associations (characterized by different pH), instead of individual plant species as in the present study. Two other species of *Thripomorpha* (*T. halteratum* (Meigen, 1838) (under the synonymous name *Rhegmoclema halteratum*) and *T. paludicola* Enderlein, 1905 (under the synonymous name *R. edwardsi* (Collin, 1954)) were then obtained, with the conclusion that marshy environments can now be considered as true habitats for 5 species (among the 9 European species) of the genus. This is probably also the case for both European species of *Ferneiella*, as the second species of this genus, *F. brevifurca* (Enderlein, 1912) has repeatedly been captured in damp meadows, especially in reed (*Phragmites*) marshes in Central Europe (Switzerland, France, Czech Republic; Haenni, unpubl. data) and to *Reichertella nigra*, although this species has apparently wider ecological requirements, being found both in open and wooded damp habitats. On the other hand *Anapausis helvetica* and *Swammerdamella brevicornis* are not exclusive inhabitants of damp meadows, and the extent of their ecological requirements remains unclear, although their development in marshy soils may be inferred from the present study. This is evidently also the case for *Scatopse notata* and *Coboldia fuscipes*, both cosmopolitan and able to develop in numerous organic media in a wide variety of environments. The new *Swammerdamella* species, *S. jindrichi* sp. n. emerged only from dead *Typha* specimens during this study and it could possibly be closely bound to

the stands of plants of this genus for its development. The discovery of this undescribed species is quite puzzling and it would thus be of great interest to investigate stands of *Typha* in other localities in search of this species.

Acknowledgements: The dipterological research of JR was supported by the Ministry of Culture of the Czech Republic with institutional financing of long-term conceptual development of the research institution (the Silesian Museum, MK000100595).

References

- Barták M. (1995): Diptera communities of “Osecká” dump near Duchcov and its environment. Pp. 5-16. In Bitušik P. (ed.): *Dipterologica bohemoslovaca* 7, Technical University in Zvolen, Zvolen, 202 pp.
- Brunhes J. & Haenni J.-P. (1982): Gîtes larvaires et phénologie de quelques Scatopsidae (Diptera, Nematocera) des tourbières du Cézallier (Massif Central, France). – *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 55: 181-185.
- Carles-Tolrá M., Jiménez-Valverde A., Ledesma E. & Ortuño V.M. (2019): Three dipteran species newly recorded in the mesovoid shallow substratum in the Sierra de Guadarrama National Park, Spain (Diptera: Scatopsidae and Sphaeroceridae). – *Boletín de la Sociedad Entomológica Aragonesa* 64: 137-142.
- Cook E.F. (1956): A contribution toward a monograph of the Scatopsidae (Diptera). Part IV, the genus *Swammerdamella* Enderlein. – *Annals of the Entomological Society of America* 49(1): 15-29.
- El-Serwy S.A. & Haenni J.-P. (2008): New record of family Scatopsidae (Diptera) associated with lepidopterous stem-borers of sugarcane in Egypt. – *Egyptian Journal of Agricultural Research* 86(6): 2227-2232.
- Fritz H.-G. (1983a): Strukturanalyse der Diptera/Nematocera (Mücken) in ephemeren Lebensräumen des nördlichen Oberrheingebietes. – *Verhandlungen der Gesellschaft für Ökologie* 10(1981): 307-311.
- (1983b): Wenig bekannte und neue Diptera/Nematocera (Insecta) aus der nördlichen Oberrheinaue. – *Andrias* 3: 9-24.
- Haenni J.-P. (2009a): Scatopsidae. Pp. 94-96. In: Roháček J. & Ševčík J. (eds): *Diptera of the Poľana Protected Landscape Area - Biosphere Reserve (Central Slovakia)*. State Nature Conservancy of the Slovak Republic, Administration of the Protected Landscape Area – Biosphere Reserve Poľana, Zvolen, 340 pp.
- (2009b): Scatopsidae Newman, 1834. In: Jedlička L., Kúdela M. & Stloukalová V. (eds): *Checklist of Diptera of the Czech Republic and Slovakia*. Electronic version 2. <http://www.edvis.sk/diptera2009/families/scatopsidae.htm>
- (2013): Fauna Europaea: Scatopsidae. In: Beuk P. & Pape T. (eds): *Fauna Europaea: Diptera Nematocera*. Fauna Europaea version 2.6.2. <http://www.faunaeur.org/>
- Haenni J.-P. & Barták M. (2000): Scatopsidae. In: Barták M. & Vaňhara J. (eds.): *Diptera in an industrially affected region (North-Western Bohemia, Bilina and Duchcov environs)*, I. – *Folia Facultatis Scientiarum naturalium Universitatis Masarykiana Brunensis, Biologia* 104: 105-109.
- (2006): Faunistic records from the Czech Republic (Diptera: Scatopsidae). – *Entomofauna Carpathica* 18: 85.
- Haenni J.-P., Barták M. & Kubík Š. (2005): Scatopsidae. Pp. 90-93. In: Barták M. & Kubík Š. (eds): *Diptera of Podyjí National Park and its environs*. Česká zemědělská univerzita, Praha, 436 pp.
- Haenni J.-P. & Pollini L. (2015): Description of a new species of *Parascatopse* Cook from Switzerland, with taxonomic notes on other European species of the genus (Diptera, Scatopsidae). – *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 88(1-2): 65-72.
- Haenni J.-P. & Vaillant F. (1994): Description of dendrolimnobia larvae of Scatopsidae (Diptera) with a review of our knowledge of the preimaginal stages of the family. – *Mitteilungen der Schweizerischen Entomologischen Gesellschaft* 67: 43-59.
- Köhler A. (2011): Notes on the biology of *Holoplagia lucifuga* (Loew) (Diptera: Scatopsidae). – *Studia Dipterologica* 17(2010)(1-2): 81-90.
- Kozánek M. & Roller L. (1997): A study of scatopsid (Diptera: Scatopsidae) communities in Slovakia. – *Biologia, Bratislava* 52(5): 637-646.
- Krivosheina M. G. (2012): [Keys to the Palaearctic families and genera of nematocerous larvae (Diptera, Nematocera).] Moscow, KMK Scientific Press, 244 pp. + 28 plates [in Russian, with keys and legends of figures in English]
- Krivosheina N. P. (2000): Additional data on the species of the genus *Aspistes* Meigen, with description of the larva of *Aspistes antidactylatis* Cook (Diptera, Scatopsidae). – *International Journal of Dipterological Research* 11(3): 133-139.
- Laštovka P. & Haenni J.-P. (1981): *Scatopse globulicauda* sp. n. from the European Alps, with notes on *S. notata* (Diptera, Scatopsidae). – *Acta Entomologica Bohemoslovaca* 78: 340-347.

- Martinovský J. (1995): Scatopsidae. Pp. 69-71. In Roháček J., Starý J., Martinovský J. & Vála M. (eds): *Diptera Bukoských vrchov*. [Diptera of the Bukovské Hills]. SAŽP-Správa CHKO a BR Východné Karpaty, Humenné, 232 pp.
- (1997): Contribution to the knowledge of Scatopsidae (Diptera) from the Czech and Slovak Republics, with descriptions of two new species. – *Časopis Slezského zemského Muzea, Opava (A)* 45(1996): 193-210.
- Papp L. (2002): Dipterous guilds of small-sized feeding sources in forests of Hungary. – *Acta Zoologica Academiae Scientiarum Hungaricae* 48(Supplement 1): 197-213.
- Roháček J. (2009): A monograph of Palaearctic Anthomyzidae (Diptera) Part 2. – *Časopis Slezského zemského Muzea, Opava (A)*, 58 (Supplement 1): 1-180.
- (2013): New host-plant, habitat and distributional records of West Palaearctic Anthomyzidae (Diptera). – *Časopis Slezského zemského Muzea, Opava (A)* 62: 23-43.
- Roháček J. & Ševčík J. (2013): Diptera associated with sporocarps of *Meripilus giganteus* in an urban habitat. – *Central European Journal of Biology* 8(2): 143-167
- Ševčík J. & Roháček J. (2008): Fungus gnats (Diptera: Mycetophilidae and Keroplatidae) reared from grass and sedge tussocks in the Czech Republic. – *Časopis Slezského zemského Muzea, Opava (A)* 57: 175-178.

Dvoukřídli čeledi pamuchnicovití (Diptera: Scatopsidae) vychovaní z travovitých rostlin v České republice, s popisem nového druhu rodu *Swammerdamella*

Celkem deset druhů dvoukřídлых z čeledi pamuchnicovití (Scatopsidae) bylo vychováno z trsů sedmi druhů šáchorovitých (Cyperaceae), dvou druhů sítinovitých (Juncaceae), čtyř druhů lipnicovitých (Poaceae) a z odumřelých rostlin jednoho druhu orobincovitých (Typhaceae), které byly odebrány z pěti biotopů (louka, mokřadní louka, podmáčená olšina, břeh rybníka, břeh horského potoka) na třech lokalitách v Českém Slezsku. Jeden z nich, *Swammerdamella jindrichi* Haenni sp. n., je popsán jako nový pro vědu. Studie přináší také první informace o místech vývoje (biotopech) larev několika druhů čeledi Scatopsidae, především z rodů *Ferneiella* a *Thripomorpha*.

Authors' addresses: Jean-Paul Haenni, Muséum d'histoire naturelle, Rue des Terreaux 14,
CH-2000 Neuchâtel, Switzerland.
E-mail: jean-paul.haenni@unine.ch

Jindřich Roháček, Silesian Museum, Nádražní okruh 31,
CZ-746 01 Opava, Czech Republic.
E-mail: rohacek@szm.cz