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Fur mites of the genus *Schizocarpus* Trouessart (Acari: Chirodiscidae) parasitizing the Eurasian beaver *Castor fiber belorussicus* Lavrov (Rodentia: Castoridae) in NE Poland (Suwałki)

ANDRE V. BOCHKOV[1,2,5], ANNA LABRZYCKA[3], MACIEJ SKORACKI[3] & ALEXANDER P. SAVELJEV[4]

[1]*Zoological Institute of the Russian Academy of Sciences, Universitetskaya Embankment 1, 199034 Saint Petersburg, Russia. E-mail: andrevbochkov@gmail.com*

[2]*Museum of Zoology, University of Michigan, 1109 Geddes Ave., Ann Arbor, Michigan 48109 USA*

[3]*Adam Mickiewicz University, Faculty of Biology, Umultowska 89, 61–614 Poznan, Poland*

[4]*Zhitkov Russian Research Institute of Game Management and Fur Farming, Russian Academy of Agricultural Sciences, Engels street 79, 610000 Kirov, Russia*

[5]*Corresponding author*

Abstract

Twenty species of the genus *Schizocarpus* Trouessart, 1896 (Acari: Chirodiscidae) are recorded from six live individuals of the Eurasian beaver *Castor fiber belorussicus* Lavrov (Rodentia: Castoridae) captured by modified fish-traps near Wiżajny village (Suwałki, north-eastern Poland). Eight species are described as new: *Schizocarpus heatherae* **sp. nov**., *S. faini* **sp. nov**., *S. klompeni* **sp. nov**., *S. parahumilis* **sp. nov**., *S. gozdziewskii* **sp. nov**., *S. pseudonumerosus* **sp. nov**., *S. zurowskii* **sp. nov**., and *S. testiculatus* **sp. nov**. Twelve previously described species are as follows: *S. brachyurus* (Dubinina, 1964), *S. capitis* (Dubinina, 1964), *S. curtus* Fain and Lukoschus, 1985, *S. fedjushini* (Dubinina, 1964), *S. insignis* Fain and Lukoschus, 1985, *S. intercalatus* Fain and Lukoschus, 1985, *S. numerosus* (Dubinina, 1964), *S. parvus* (Dubinina, 1964), *S. pygidialis* Fain and Lukoschus, 1985, *S. radiatus* Fain and Lukoschus, 1985, *S. subhexapilis* Fain and Lukoschus, 1985, and *S. subparvus* (Dubinina, 1964). Data on geographical distribution and microhabitats of *Schizocarpus* spp. detected on *C. f. belorussicus* in the Suwałki population are summarized in table format.

Key words: Chirodiscidae, ectoparasitic mites, Eurasian beaver, Poland, *Schizocarpus*, systematics

Introduction

Fur mites of the genus *Schizocarpus* Trouessart, 1896 (Acariformes: Chirodiscidae) are permanent ectoparasites inhabiting the undercoat of beavers (Rodentia: Castoridae) (Bochkov 2010). They are strongly specialized morphologically for living in the fur of hosts (Labrzycka 2006). In these mites, the idiosoma is subcylindrical, the cuticle between coxal fields I and II bears striated membranes, and the two anterior pairs of legs consist of only two articulated segments and have distinctly developed tarsal flaps (Fig. 1).

Forty-eight species of *Schizocarpus* have been described so far from the two extant beaver species, the Eurasian beaver *Castor fiber* Linnaeus and the American beaver *Castor canadensis* Kuhl. More than ten mite species can simultaneously parasitize a host individual where they inhabit different fur zones (Dubinina 1964; Fain *et al*. 1984; Fain & Lukoschus 1985; Fain & Whitaker 1988; Dubinina *et al*. 1993; Bochkov & Dubinina 2011). There are no *Schizocarpus* spp. common to these beaver species. The records of *S. mingaudi* Trouessart, 1896, a common parasite of *C. canadensis*, on the Eurasian beaver are the result of incorrect determination (for old references see Dubinina 1964) or transfers of this mite to *C. fiber* from *C. canadensis* that co-occurred with them in captivity (Bochkov & Dubinina 2011). To date, 30 *Schizocarpus* spp. are known from Eurasian beavers belonging to different allopatric populations (Fain & Lukoschus 1985; Bochkov & Dubinina 2011).

The Eurasian beaver was almost exterminated by the beginning of 1920s and only several relic populations have survived. The descendants of each of these relic populations are currently considered separate subspecies.

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They are *C. f. fiber* Linnaeus (Norway: Telemark), *C. f. galliae* Geoffroy (Delta of Rhone River), *C. f. albicus* Matschie (middle part of Elbe River), *C. f. orientoeuropaeus* Lavrov (Voronezh-Don river system), *C. f. belorussicus* Lavrov (Dnepr river system with Berezina and Pripyat Rivers and Neman River), *C. f. pohlei* Serebrennikov (Konda and Sosva Rivers), *C. f. tuvinicus* Lavrov (Upper Yenissei and Azas Rivers), and *C. f. birulai* Serebrennikov (Bulgan, Chovd, and Tes Rivers) (Lavrov 1981; Durka *et al*. 2005). To date, only mites from *C. f. orientoeuropaeus* and *C. f. albicus* have been more or less satisfactorily explored (Dubinina 1964; Fain & Lukoschus 1985; Bochkov & Dubinina 2011). Based on these studies it can be predicted that faunas of *Schizocarpus* spp. on each of these host subspecies are significantly different.

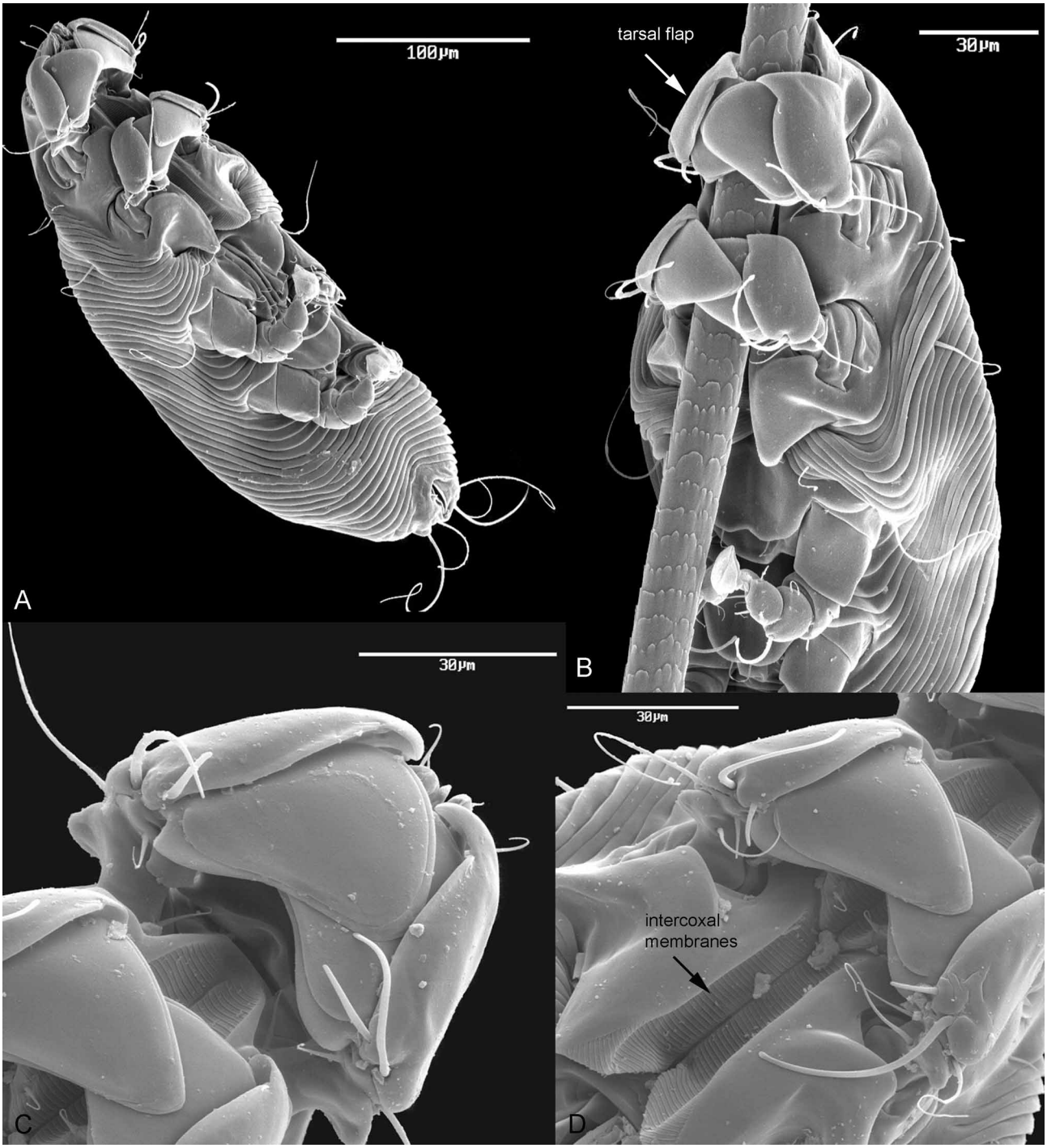

FIGURE 1. *Schizocarpus* sp., female: A—Ventral view; B—attached to the host hair; C—Anterior legs; D—cuticle posterior to legs II (SEM).

The Eurasian beaver is native to Poland. Beavers inhabiting watersheds of the Vistula River (Poland) were described as *Castor fiber vistulanus* Matschie (see discussion in Gabrys & Wazna [2003]). This subspecies was completely extirpated by 1945 in contemporary borders of Poland (Dzięciołowski & Gozdziewski 1999) and the present Polish populations of beavers are descendants of migrants from Belorussia, Lithuania, and Kaliningrad Province of Russia. The first beavers re-entered Poland via the tributary of Neman, Czarna Hancza River and, therefore, should be formally assigned to *C. f. belorussicus*. Nevertheless, the subspecies status of beavers in Poland is not completely clear, because Belarussian beavers are probably heterogeneous in respect to the Neman population, whose beavers could constitute their own subspecies (A.P. Saveljev, unpublished data).

In Poland, mites of the genus *Schizocarpus* have been examined from beavers in Popielno village (west-central Poland) by Haitlinger (1991), who recorded three *Schizocarpus* spp.: *S. numerosus* (Dubinina, 1964), *S. fedjushini* (Dubinina, 1964), and *S. brachyurus* (Dubinina, 1964). Later on, Kadulski (1998) found ten *Schizocarpus* spp. from the same locality; all of them, with exception for *S. mingaudi*, were previously described from beavers in Russia by Dubinina (1964). He recollected three species recorded by Haitlinger (1991) and additionally recorded seven species: *S. brevicauda*, *S. capitis*, *S. latus*, *S. minor*, *S. mingaudi*, *S. parvus*, and *S. subparvus*. In both of these papers dealing with beaver mites from Poland, the work by Fain and Lukoschus (1985) was not referenced, which suggests that the authors missed this key publication on the genus *Schizocarpus*. For this reason, the results of parasitological investigations on beavers from Popielno seem to be highly questionable, because these authors could have incorrectly determined many *Schizocarpus* spp. to be morphologically very similar to the species described by Dubinina (1964). Moreover, the record of the Canadian beaver mite *S. mingaudi* by Kadulski (1998) is an obvious misidentification. Our present examination of *Schizocarpus* spp. from Wiżajny village (north-eastern Poland) revealed many species described by Fain and Lukoschus (1985) as well as several new species, at least some of which should be present on beavers from Popielno. For these reasons the results obtained by Haitlinger (1991) and Kadulski (1998) should be viewed with caution, and re-examination of mites from beavers in Popielno is highly desirable.

In this work we give the results of an examination of *Schizocarpus* specimens collected from *C. f. belorussicus* beavers captured near Wiżajny village (Poland). Twenty *Schizocarpus* spp. were recorded, among them eight species that are new to science (Table 1). Below we provide descriptions of these new species and records of all recognized species. Data on the geographical distribution and localization of *Schizocarpus* spp. found on *C. f. belorussicus* from the Suwałki population are summarized in Table 1.

Material and methods

All specimens used in this work were collected by AL from six live individuals of *Castor f. belorussicus* captured specially for this project by modified fish-traps near Wiżajny village (54°21'50"N, 22°52'6"E), Suwałki County, Podlaskie Voivodeship, Poland in 17–18 April 2003. Samples of the undercoat from 14 microhabitats on the beaver body were combed out with a fine-tooth comb (see Fig. 2 for sampling scheme) and put in separate vials containing 70% ethanol. Mites were selected from the fur samples in laboratory conditions using a dissecting microscope, cleared in lactophenol and mounted in Hoyer's medium. Drawings were made with a Leica microscope equipped with DIC optics and a camera lucida. For purposes of scanning electron microscopy (SEM), mites were prepared using the standard critical point drying method and sputtered with gold. The SEM images were made with a scanning electron microscope Zeiss DSM 940A.

In the genus *Schizocarpus*, species diagnostics is entirely based on male characters; most of them concerning opisthosomal structures (Fain *et al*. 1984; Fain & Lukoschus 1985). In this work, we do not use the species groups that were established by Fain and Lukoschus (1985) for *Schizocarpus* spp. associated with the Eurasian beaver, because most new species described below are inconsistent in their character state compositions with diagnoses of these groups. For example, some species simultaneously possess setae *ad2*, a characteristic feature of the *hexapilis* group, and a wheel-shaped corolla of the adanal suckers, which is normally present in the *radiatus* group.

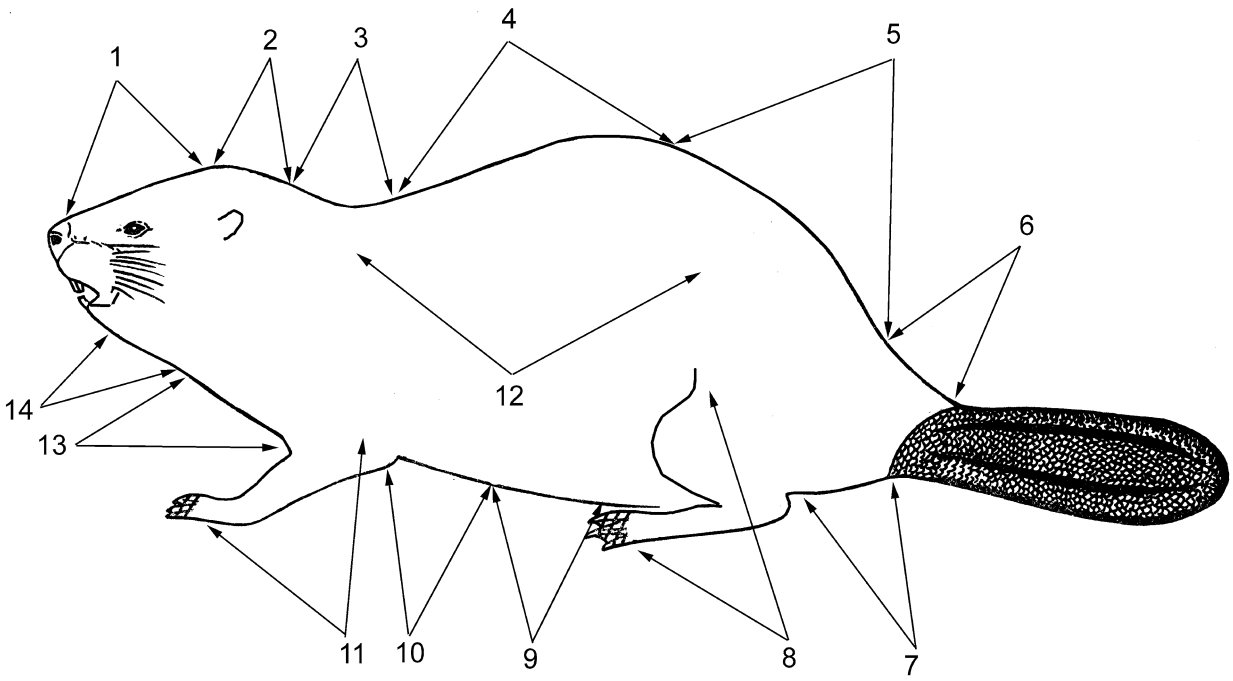

FIGURE 2. Scheme of undercoat samplings.

TABLE 1. *Schizocarpus* spp. parasitizing *Castor fiber belorussicus* Lavrov in Poland (Suwałki)

Mite species	Host subspecies	Locality	Microhabitat	Reference
S. numerosus (Dubinina, 1964)	*C. f. orientoeuropaeus*	Russia (Voronezh Reserve)	Dorsum, rarely on flanks	Dubinina (1964)
	C. f. albicus	Germany (Elbe River)	Head	Fain and Lukoschus (1985)
	C. f. belorussicus	Poland (Suwałki)		Present paper
S. pseudonumerosus **sp. nov.**	*C. f. belorussicus*	Poland (Suwałki)	Head and neck, rarely on anterior legs	Present paper
S. capitis (Dubinina, 1964)	*C. f. orientoeuropaeus*	Russia (Voronezh Reserve)	Head and neck	Dubinina (1964)
	C. f. albicus	Germany (Elbe River)		Fain and Lukoschus (1985)
	C. fiber unknown subspecies	Europe (?)		
	C. f. belorussicus	Poland (Suwałki)		Present paper
S. fedjushini (Dubinina, 1964)	*C. f. orientoeuropaeus*	Russia (Voronezh Reserve)	Mostly on flanks	Dubinina (1964)
	C. fiber unknown subspecies	Europe(?)	Mostly on head	Fain and Lukoschus (1985)
	C. f. belorussicus	Belorussia (Berezina River)	Unknown	Fedjushin (1935)
		Poland (Suwałki)	Head and neck	Present paper
S. brachyurus (Dubinina, 1964)	*C. f. orientoeuropaeus*	Russia (Voronezh Reserve)	Head venter, abdomen, legs	Dubinina (1964)
	C. f. belorussicus	Poland (Suwałki)		Present paper

continued next page

TABLE 1. (continued)

Mite species	Host subspecies	Locality	Microhabitat	Reference
S. curtus Fain and Lukoschus, 1985	*C. fiber* unknown subspecies	Europe(?)	Throat, chest	Fain and Lukoschus (1985)
	C. f. belorussicus	Poland (Suwałki)	Neck	Present paper
S. parvus (Dubinina, 1964)	*C. f. orientoeuropaeus*	Russia (Voronezh Reserve)	Unknown	Dubinina (1964)
	C. f. belorussicus	Poland (Suwałki)	Unknown	Present paper
S. subparvus (Dubinina, 1964)	*C. f. orientoeuropaeus*	Russia (Voronezh Reserve)	Unknown	Dubinina (1964)
	C. f. belorussicus	Poland (Suwałki)	Unknown	Present paper
S. faini **sp. nov.**	*C. f. belorussicus*	Poland (Suwałki)	Anterior legs	Present paper
S. parahumilis **sp. nov.**	*C. f. belorussicus*	Poland (Suwałki)	Throat	Present paper
S. pygidialis Fain and Lukoschus, 1985	*C. fiber* unknown subspecies	Europe(?)	Tail base	Fain and Lukoschus (1985)
	C. f. orientoeuropaeus	Russia (Voronezh Reserve)		Bochkov and Dubinina (2011)
	C. f. belorussicus	Poland (Suwałki)	Unknown	Present paper
S. intercalatus Fain and Lukoschus, 1985	*C. fiber* unknown subspecies	Europe(?)	Head	Fain and Lukoschus (1985)
	C. f. belorussicus	Poland (Suwałki)		Present paper
S. testiculatus **sp. nov**.	*C. f. belorussicus*	Poland (Suwałki)	Abdomen	Present paper
S. radiatus Fain and Lukoschus, 1985	*C. fiber* unknown subspecies	Europe(?)	Dorsum, flanks, posterior legs	Fain and Lukoschus (1985)
	C. f. belorussicus	Poland (Suwałki)		Present paper
	C. f. orientoeuropaeus	Russia (Voronezh Reserve)	Unknown	Bochkov and Dubinina (2011)
S. heatherae **sp. nov.**	*C. f. belorussicus*	Poland (Suwałki)	Unknown	Present paper
S. klompeni **sp. nov.**	*C. f. belorussicus*	Poland (Suwałki)	Posterior legs, rarely on neck dorsum	Present paper
S. gozdziewskii **sp. nov.**	*C. f. belorussicus*	Poland (Suwałki)	Dorsum and flanks	Present paper
	C. f. orientoeuropaeus	Russia (Voronezh Reserve)	Unknown	Bochkov and Dubinina (2011)
S. zurowskii **sp. nov.**	*C. f. belorussicus*	Poland (Suwałki)	Abdomen	Present paper
S. subhexapilis Fain and Lukoschus, 1985	*C. fiber* unknown subspecies	Europe(?)	Chest, throat, head	Fain and Lukoschus (1985)
	C. f. belorussicus	Poland (Suwałki)		Present paper
	C. f. orientoeuropaeus	Russia (Voronezh Reserve)	Unknown	Bochkov and Dubinina (2011)
S. insignis Fain and Lukoschus, 1985	*C. fiber* unknown subspecies	Europe (?)	Ears	Fain and Lukoschus (1985)
	C. f. albicus	Germany (Elba River)		
	C. f. birulai	Mongolia (Bulgan River)		
	C. f. belorussicus	Poland (Suwałki)	Unknown	Present paper

In species descriptions, the scheme for opisthosomal setation follows Griffiths *et al*. (1990) as applied recently by Bochkov and Dubinina (2011). All measurements are in micrometers (µm) and were taken as follows: body

length = the total length from the palpal extremities to the posterior border of the opisthosoma, excluding the membrane; body width = the width at the midlevel between legs II and III (see Fig. 3A); length of hysteronotal shield = maximum length measured along the longitudinal line running via base of seta *d1*; width of hysteronotal shield = measured at the midlevel of the shield (Fig. 4A); the diameter of adanal sucker includes the corolla (see Fig. 3C). The corolla of the adanal suckers, which are most probably derivatives of setae *ad3*, correspond to two of the types recognized by Fain *et al*. (1984): type A—the external margin is smooth (Fig. 3E), type E—the external margin is rough and with short protrusions, "wheel-shaped" (Fig. 3D). Setae *ps3* can be in the median position, i.e., approximately at the longitudinal level of the adanal suckers, or in the lateral position, i.e., clearly antero-lateral to the adanal suckers.

The systematics of beaver subspecies is given according to Heidecke (1986) and Helgen (2005).

Specimen depositories are cited using the following abbreviations:

AMU	Adam Mickiewicz University, Poznan, Poland;
UMMZ	Museum of Zoology, University of Michigan, Ann Arbor, USA;
ZISP	Zoological Institute, Russian Academy of Sciences, Saint-Petersburg, Russia.

Systematics

Family Chirodiscidae Trouessart

Genus *Schizocarpus* Trouessart, 1896

1. *Schizocarpus testiculatus* sp. nov.
(Fig. 4)

Description. MALE (holotype). Body 370 long (365–380 in 10 paratypes) and 175 wide (175–180); body length/width ratio about 2.1:1. Idiosoma slightly flattened dorso-ventrally. Hysterosoma subparallel sided. Hysteronotal shield 90 long and 70 wide. Anterior margin of hysteronotal shield uneven and slightly concave in median part. Setae *d1* situated on anterior margin of hysteronotal shield or immediately anterior to this margin, distance *d1-d1* 55. Setae *e1* situated posterior to hysteronotal shield. Distance *e1-e1* about 70. Setae *h1* widely separated from each other, distance *h1-h1* about 1.5 times longer than *e1-e1*. Setae *f2* situated dorsally, distance *h1-f2* about 12. Setae *h3* widely separated from each other, distance *h3-h3* 90. Opisthosomal membranes moderately developed, about 25 long. Setae *ps3* situated laterally, anterior to transverse level of adanal suckers. Adanal shields poorly sclerotized, only external borders of these shields distinctly sclerotized. Setae *ad1* represented by alveoli and situated immediately anterior to adanal suckers. Adanal suckers situated in posterior half of adanal shields, 20–25 in diameter, with smooth corolla (type A), each surrounded by highly sclerotized punctate ring, this ring at least 3 times narrower then adanal suckers. Setae *ps1* situated on distinct peduncles which fused basally and located between adanal suckers. Adanal setae *ad2* absent. Ventral anal sclerite distinct. Lengths of some setae: *f2* 20, *h1* 15, *h2* 125, *h3* 60, *ps2* 70, *ps3* 45. Tarsus III 25 long and 12 wide; tarsus IV 15 long and 13 wide.

Type material. Holotype male (ZIN T-Chir-13) and 13 male paratypes (ZIN AVB-2011-0504-001, #1-13) from *Castor fiber belorussicus* [beaver #6], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, coll. A. Labrzycka; 2 male paratypes (ZIN AVB-2011-0504-002, #1, 2) same data [beaver # 5]; 6 male paratypes (ZIN AVB-2011-0504-003, #1-6), same data [beaver #4].

Type depositions. Holotype and most paratypes—in ZISP, 2 paratypes—in AMU, and 2 paratypes—in UMICH.

Microhabitat. Abdomen.

Distribution. Type locality only.

Etymology. This specific epithet derives from *testis* (testicle, Latin) to refer a similar shape of the basally fused peduncles bearing setae *ps1*.

Differential diagnosis. This new species differs from all other *Schizocarpus* spp. with the idiosoma slightly flattened dorso-ventrally by the distinct basally fused peduncles bearing setae *ps1*. It is close to *S. minor* (Dubinina,

1964) having pedunculate setae *ps1* closely situated to each other but not fused by their bases. The new species, however, differs from *S. minor* by several features. In *S. testiculatus* **sp. nov.**, setae *e1* are located posterior to the hysteronotal shield (vs. on the shield in *S. minor*), setae *ps3* are located laterally, at the same transverse level as adanal setae *ad1* (vs. median position), the adanal shields are not punctated (vs. distinctly punctated), and setae *ad1* are situated anterior to the adanal suckers (vs. posterior).

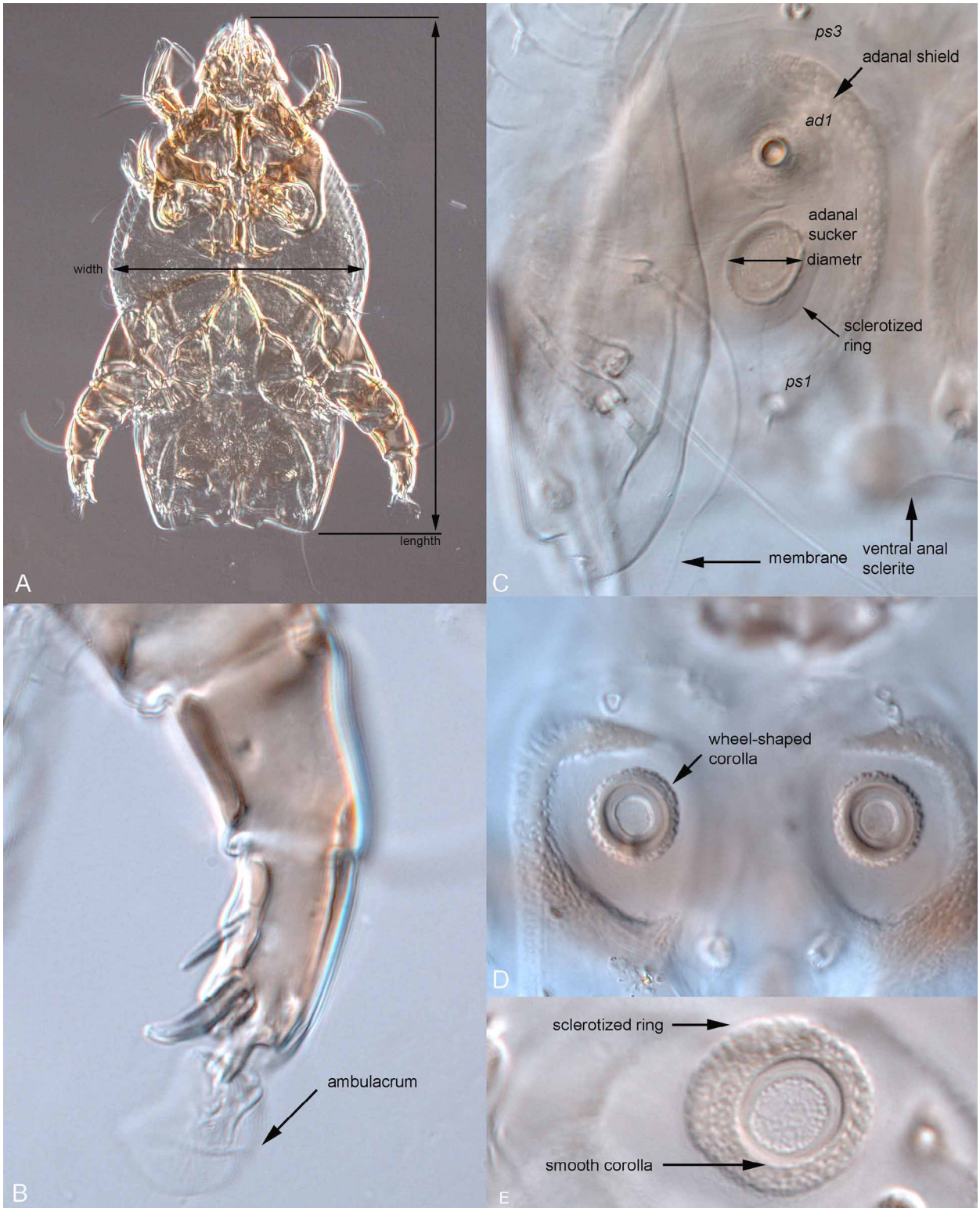

FIGURE 3. Details of *Schizocarpus* spp., male: A—*S. parahumilis* **sp. nov.** in ventral view; B—same, leg III, in ventral view; C—adanal shield of *S. pseudonumerosus* **sp. nov.**; D—adanal shields of *S. radiatus* Fain and Lukoschus, 1985; E—adanal sucker of *S. capitis* (Dubinina, 1964) (Photo with Leica microscope).

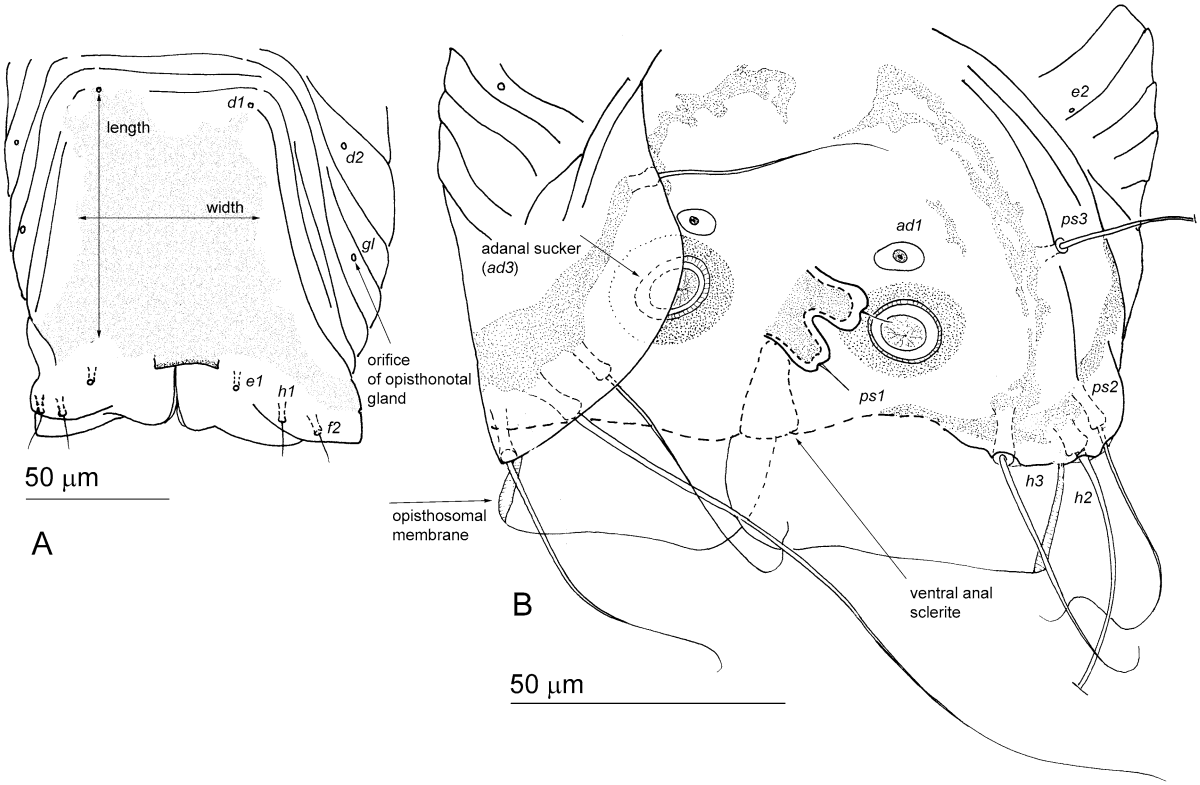

FIGURE 4. *S. testiculatus* **sp. nov.**, male: A—opisthosoma in dorsal view; B—same, in ventral view.

2. *Schizocarpus faini* sp. nov.

(Fig. 5)

Description. MALE (holotype). Body 310 long (300–310 in 10 paratypes) and 150 wide (145–150); body length/width ratio about 2.1:1. Idiosoma slightly flattened dorso-ventrally. Hysterosoma subparallel sided. Hysteronotal shield 80 long and 90 wide. Anterior margin of hysteronotal shield slightly concave. Setae *d1* situated close to anterior margin of this shield, distance *d1-d1* 40. Setae *e1* situated close to posterior margin of hysteronotal shield. Distance *e1-e1* about 40. Setae *h1* widely separated from each other, distance *h1-h1* about 1.4 times longer than *e1-e1*. Setae *f2* situated ventrally, close to *h3*, distance *h3-f2* about 8. Setae *h3* situated medially closely to each other, distance *h3-h3* about 15. Opisthosomal membranes very short, about 5 long. Setae *ps3* situated medially. Adanal shields roughly rounded outline and distinctly sclerotized. Minimal distance between these shields 10. Setae *ad1* represented by alveoli and situated immediately anterior to adanal suckers. Adanal suckers situated in posterior half of adanal shields, 8–10 in diameter, with smooth corolla (type A), each surrounded by highly sclerotized punctate ring, which 1.1–1.3 times wider then these suckers. Setae *ps1* situated on distinct peduncles located antero-lateral to adanal suckers, at same transverse level or slightly posterior to setae *ad1*. Distance between adanal sucker and corresponding peduncle bearing *ps1* 1.5–1.6 times longer than peduncle width. Bases of corresponding setae *ad1* and *ps1* connected by heavily sclerotized band. Adanal setae *ad2* absent. Ventral anal sclerite indistinct. Lengths of some setae: *h1, f2, h3, ps3* 7–9, *h2* 55, *ps2* 45. Tarsus III 25 long, 12 wide; tarsus IV 12 long and 11 wide.

Type material. Holotype male (ZIN T-Chir-14) and 15 male paratypes (ZIN AVB-2011-0504-004, #1-15) from *Castor fiber belorussicus* [beaver #6], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 18 April 2003, coll. A. Labrzycka; 1 male paratype (ZIN AVB-2011-0504-005), same data [beaver # 5].

Type depositions. Holotype and most paratypes—in ZISP, 2 paratypes—in AMU, and 2 paratypes—in UMICH.

Microhabitat. Anterior legs.

Distribution. Type locality only.

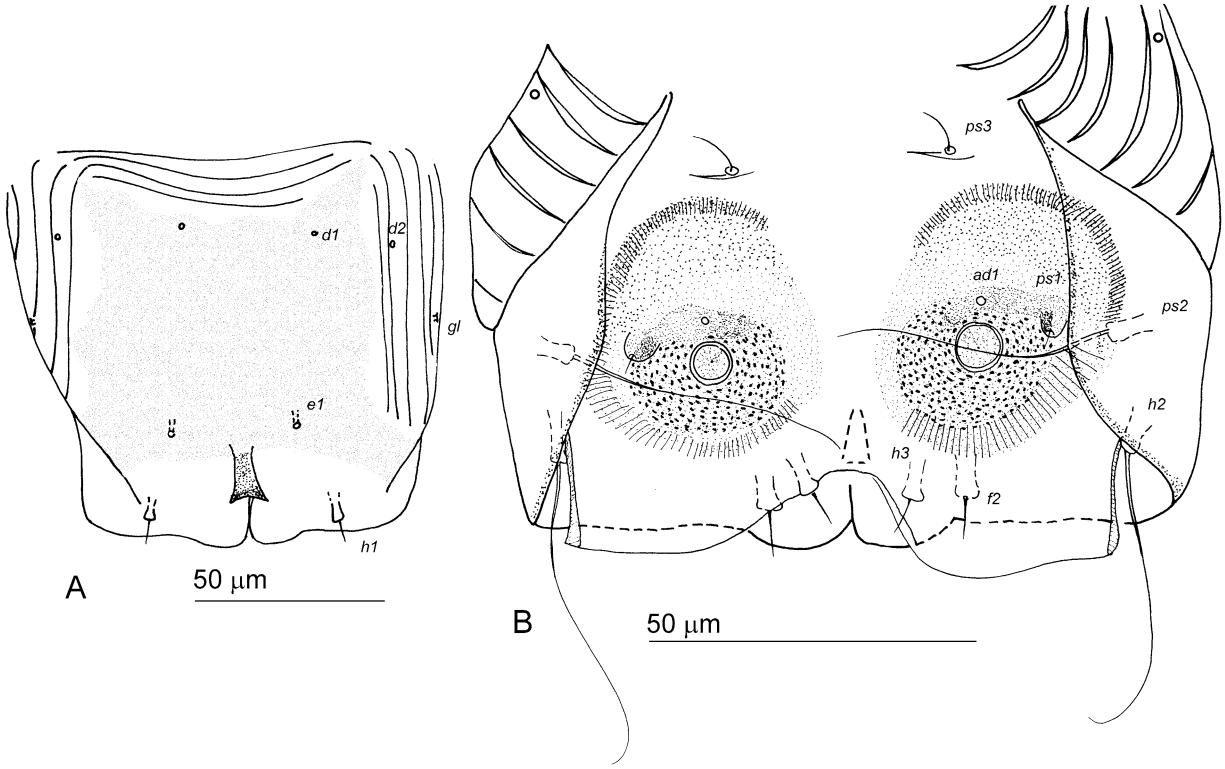

FIGURE 5. *S. faini* **sp. nov.**, male: A—opisthosoma in dorsal view; B—same, in ventral view.

Etymology. This species is dedicated to the great Belgian acarologist Prof. Alex Fain (1912–2009).

Differential diagnosis. This new species is close to *S. pusillus* Fain and Lukoschus, 1985. In both these species, the idiosoma is slightly flattened dorso-ventrally, setae *ps3* are situated at the same longitudinal level with the adanal suckers, setae *ad1* and *ps1* are located directly anterior and antero-lateral to the adanal suckers, respectively, and bases of these setae of each side are connected by the heavily sclerotized band. These species differ from each other by the following features. In *S. faini* **sp. nov.**, setae *ps1* are located on the peduncles and distinctly lateral to the adanal suckers; setae *h3* are situated close to each other, distinctly mesal to the adanal suckers; and setae *f2* are located at the same longitudinal level with the adanal suckers or slightly mesal to them. In *S. pusillus*, setae *ps1* are not pedunculate and are located very close to the adanal suckers, almost at the same longitudinal level with them; setae *h3* are widely separated from each other and located at the same longitudinal level with the lateral borders of the adanal suckers, and setae *f2* are located laterally, near the lateral margins of the adanal shields.

3. *Schizocarpus pseudonumerosus* sp. nov.
(Fig. 3C, 6)

Description. MALE (holotype). Body 350 long (330–360 in 10 paratypes) and 160 wide (155–160); body length/width ratio about 2.2:1. Idiosoma slightly flattened dorso-ventrally. Hysterosoma subparallel sided. Hysteronotal shield 80 long and 75 wide. Anterior margin of hysteronotal shield uneven, with median concavity. Setae *d1* situated on anterior margin of this shield or immediately anterior to this margin, distance *d1-d1* 40. Setae *e1* situated posterior to hysteronotal shield. Distance *e1-e1* 35. Setae *h1* widely separated from each other, distance *h1-h1* 85. Setae *f2* situated ventro-laterally, anterior to level of setae *ps2* bases. Setae *h3* situated laterally, distance *h3-h3* 80. Opisthosomal membranes distinctly developed, 40 long. Setae *ps3* situated medially. Each adanal shield consisting of highly sclerotized large lateral arc and central plate connected by its anterior margin with inner end of this arc; outer end of lateral arc situated at same transverse level with bases of setae *ps2*. Central plate elongated and well sclerotized, excluding distinct non-punctate areas around setae *ad1* and adanal suckers. Minimal distance between these shields 7. Setae *ad1* represented by alveoli and situated anterior to and at same longitudinal level as adanal

suckers. Distance between adanal sucker and seta *ad1* subequal to diameter of adanal suckers. Adanal suckers situated in median part of central plate, 10–12 in diameter, with smooth corolla (type A), without external sclerotized ring around. Setae *ps1* non pedunculate, situated on central plate distinctly posterior and slightly mesal to adanal suckers. Setae *ad1* , *ps1* and adanal suckers constituting almost straight longitudinal row. Adanal setae *ad2* absent. Ventral anal sclerite distinct. Lengths of some setae: *h1* 16, *h2* 195, *h3* 30, *f2* 40, *ps3* 20, *ps2* 35. Tarsus III 25 long, 15 wide; tarsus IV 15 long, 10 wide.

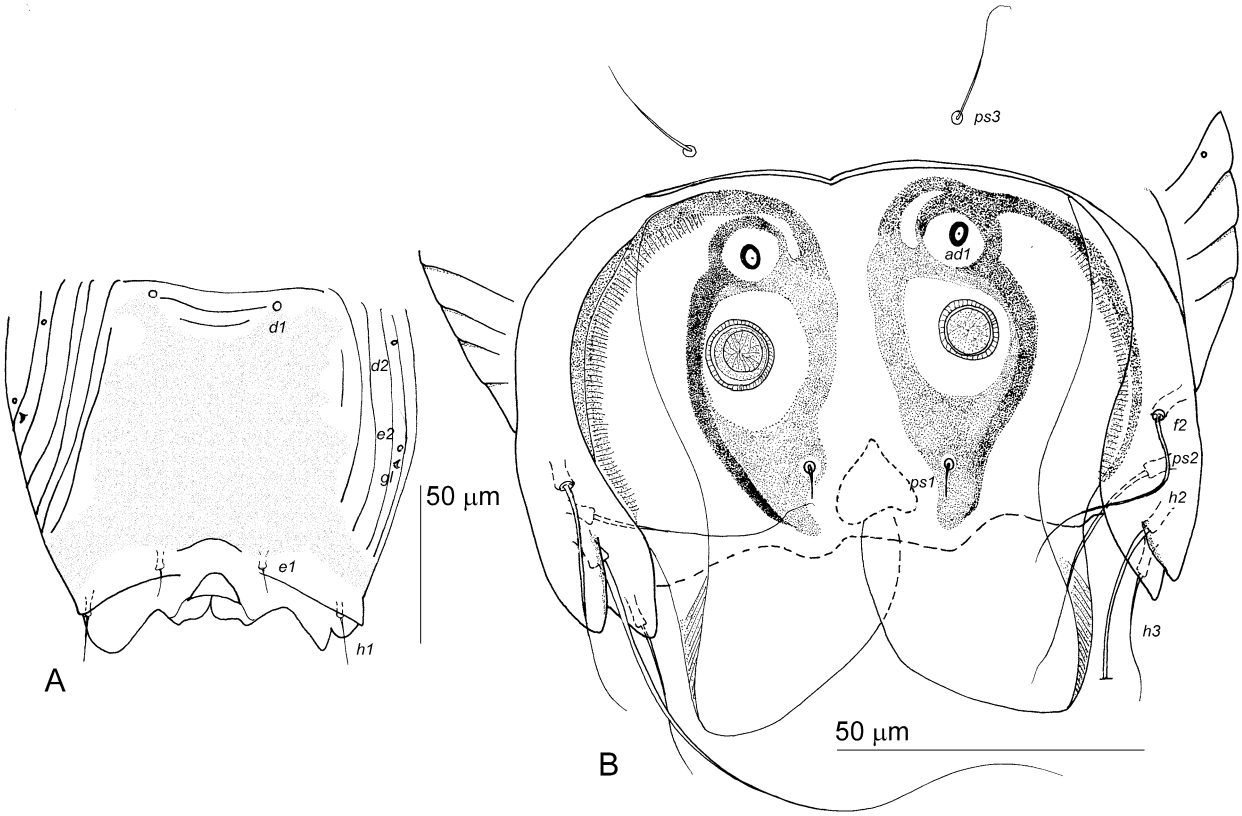

FIGURE 6. *S. pseudonumerosus* **sp. nov.**, male: A—opisthosoma in dorsal view; B—same, in ventral view.

Type material. Holotype male (ZIN T-Chir-16) and 40 male paratypes (ZIN AVB-2011-0504-006, #1-40) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka; 3 male paratypes (ZIN AVB-2011-0504-007, #1-3), same data, 18 April 2003 [beaver #3]; 23 male paratypes (ZIN AVB-2011-0504-008, #1-23), same data [beaver #4]; 5 male paratypes (ZIN AVB-2011-0304-009, #1-5), same data [beaver #5]; 4 male paratypes (ZIN AVB-2011-0304-010, #1-4), same data [beaver #6].

Type depositions. Holotype and most paratypes—in ZISP, 4 paratypes—in AMU, and 4 paratypes—in UMICH.

Microhabitat. Head and neck dorsally; few mites on anterior legs.

Distribution. Type locality only.

Etymology. The specific name indicates the similarity of this species to *S. numerosus*.

Differential diagnosis. This species is close to *S. numerosus* (Dubinina, 1964). In both species, the idiosoma is slightly flattened dorso-ventrally, setae *d1* are located on the anterior margin of the hysteronotal shield, setae *e1* are located off the hysteronotal shield, setae *ps3* are situated at the same longitudinal level with the adanal suckers, setae *f2* are situated ventro-laterally and anterior to the level of setae *ps2*, and three pairs of the opisthosomal ventral setae—*ad1*, adanal suckers, and *ps1* constitute almost a straight longitudinal row. These species differ from each other by the following characters. In *S. pseudonumerosus* **sp. nov.**, setae *ad1* are situated distinctly anterior to the adanal suckers, and setae *ps1* are not pedunculate. In *S. numerosus*, setae *ad1* are situated distinctly posterior to the adanal suckers, even posterior than setae *ps1*; and setae *ps1* are pedunculate.

4. *Schizocarpus heatherae* sp. nov.
(Fig. 7)

Description. MALE (holotype). Body 410 long and 225 wide; body length/width ratio about 1.8:1. Idiosoma egg-shaped, strongly convex dorsally. Hysteronotal shield 90 long and 85 wide. Anterior margin of hysteronotal shield uneven, without median concavity. Setae *d1* situated on anterior margin of this shield, distance *d1-d1* 50. Setae *e1* situated posterior to hysteronotal shield. Distance *e1-e1* 70. Setae *h1* situated ventro-terminally, widely separated from each other, distance *h1-h1* 65. Setae *f2* absent. Setae *h3* situated laterally, distance *h3-h3* 100. Opisthosomal membranes moderately developed, 20 long. Setae *ps3* situated laterally, slightly posterior to transverse level of adanal suckers. Adanal shields roughly rounded in outline, with distinctly sclerotized borders and non-punctate central area. Minimal distance between these shields 7. Setae *ad1* represented by true setae, situated posterior and at same longitudinal level with adanal suckers. Distance between adanal sucker and seta *ad1* subequal to diameter of adanal suckers. Adanal suckers situated in anterior half of adanal shields, 15 in diameter, with slightly and unevenly dentate corolla (type E), without external sclerotized ring around. Setae *ps1* non pedunculate, situated close to each other on common small sclerotized plate, approximately at same transverse level with setae *ad1*. Adanal setae *ad2* absent. Ventral anal sclerite distinct. Lengths of some setae: *h1* microsetae, *h2* 135, *h3* broken, *ps3* 30, *ps2* 95. Tarsus III 35 long, 12 wide; tarsus IV 20 long, 15 wide.

Type material. Holotype male (ZIN T-Chir-15) from *Castor fiber belorussicus* [beaver #6], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 18 April 2003, coll. A. Labrzycka.

Type depositions. Holotype—in ZISP.

Microhabitat. One specimen from flank.

Distribution. Type locality only.

Etymology. This species is dedicated to the well known Canadian acarologist Dr. Heather Proctor (University of Alberta, Edmonton, Canada).

Differential diagnosis. This species is close to *S. latus* (Dubinina, 1964). In both species, the idiosoma is egg-shaped, the corolla of adanal suckers is dentate and setae *ps3* are situated laterally. These species differ from each other by the following characters. In *S. heatherae* **sp. nov.**, setae *f2* are absent, setae *ad1* are filiform, situated at the same longitudinal level with the adanal suckers and far posterior to them, and setae *ps1* are not pedunculate and located close to each other on common sclerotized plate. In *S. latus*, setae *f2* are present, setae *ad1* are represented by alveoli and situated mesal to the adanal suckers and at the same transverse level with them, and setae *ps1* are pedunculate, widely separated from each other and located on the adanal shields.

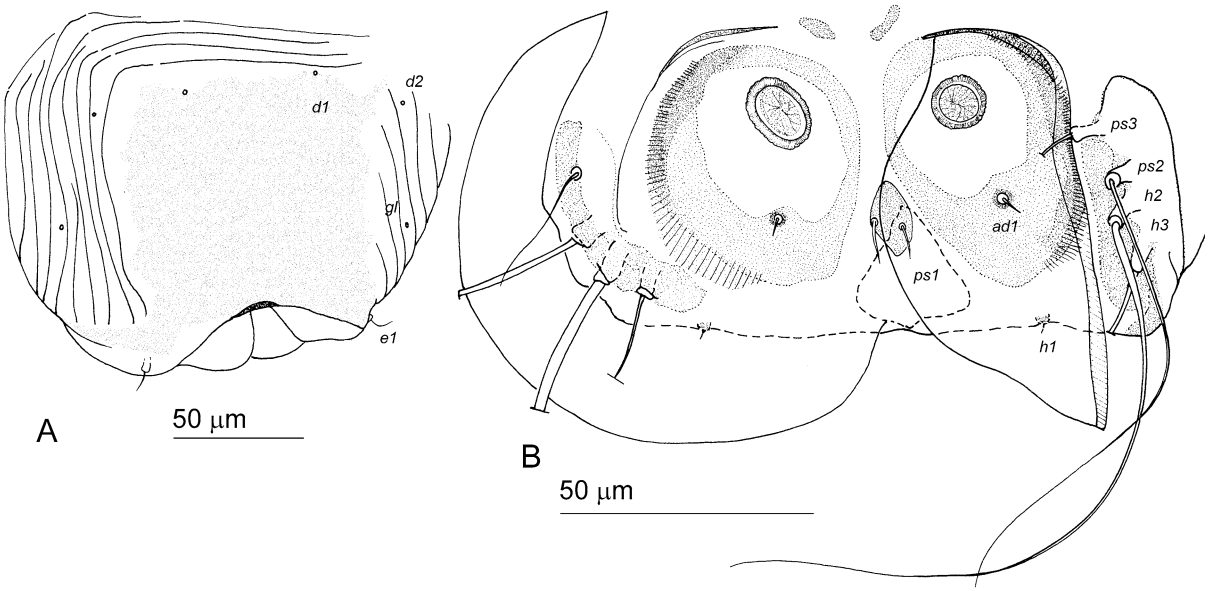

FIGURE 7. *S. heatherae* **sp. nov.**, male: A—opisthosoma in dorsal view; B—same, in ventral view.

5. *Schizocarpus klompeni* sp. nov.
(Fig. 8)

Description. MALE (holotype). Body 380 long (370–385 in 10 paratypes) and 200 wide (200–210); body length/width ratio 1.9:1. Idiosoma egg-shaped, strongly convex dorsally. Hysteronotal shield 110 long and 100 wide. Anterior margin of hysteronotal shield widely concave. Setae *d1* situated in anterior angles of this shield, distance *d1-d1* 80. Setae *e1* situated on hysteronotal shield distinctly anterior from its posterior margin, distance *e1-e1* 35. Setae *h1* widely separated from each other, distance *h1-h1* 100. Setae *f2* absent. Setae *h3* situated ventro-laterally, distance *h3-h3* 80. Opisthosomal membranes moderately developed, about 25 long. Setae *ps3* situated laterally, anterior to transverse level of adanal suckers. Adanal shields comma-shaped, with distinctly sclerotized external and weakly sclerotized internal borders and not punctated central areas. Minimal distance between these shields 20. Setae *ad1* represented by alveoli, situated between or on inner margins of adanal shields, at same transverse level as adanal suckers. Distance between adanal sucker and seta *ad1* subequal to diameter of adanal suckers or 1.3 times longer. Adanal suckers situated in anterior half of adanal shields, 15 in diameter, with dentate corolla (type E), without external sclerotized ring around. Setae *ps1* on short peduncles about as wide as they long, situated between adanal shields near their inner margin, significantly postero-mesal to adanal suckers. Adanal setae *ad2* represented only by alveoli, situated at posterior angles of adanal shields, at same transverse level as setae *ps1*. Ventral anal sclerite distinct. Lengths of some setae: *h1* 15, *h2* 160, *h3* 35, *ps3* 60, *ps2* 105. Tarsus III 28 long, 15 wide; tarsus IV 15 long, 18 wide.

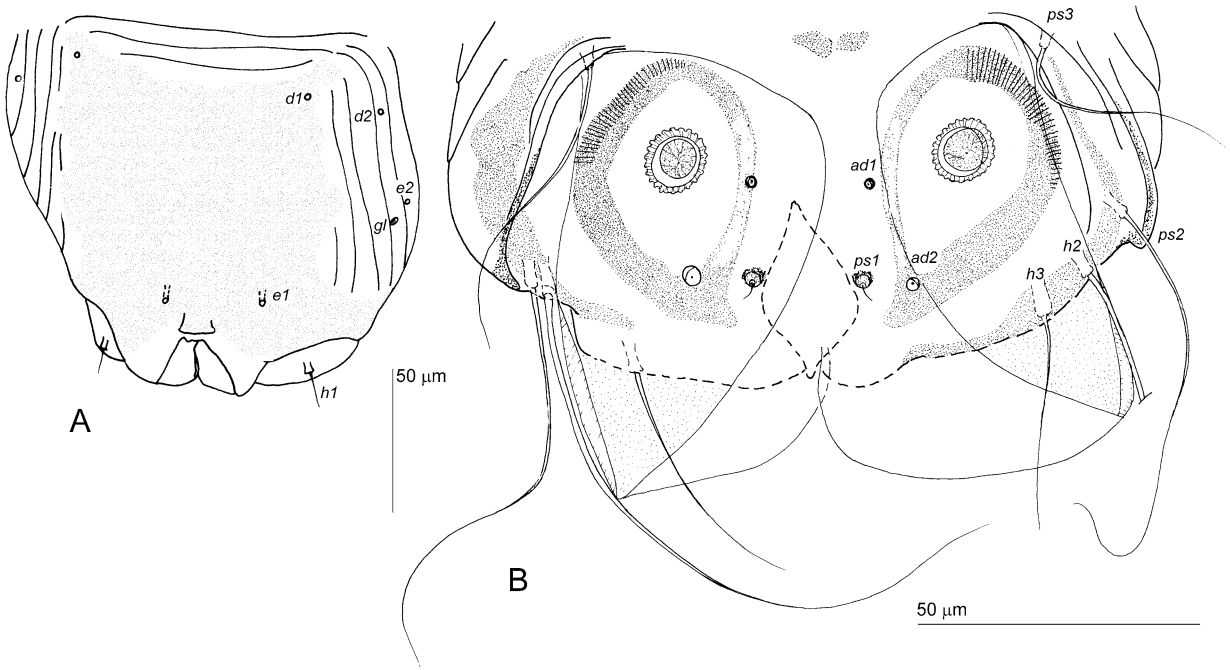

FIGURE 8. *S. klompeni* **sp. nov.**, male: A—opisthosoma in dorsal view; B—same, in ventral view.

Type material. Holotype male (ZIN T-Chir-20) and 20 male paratypes (ZIN AVB-2011-0504-015, #1-20) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka; 12 male paratypes (ZIN AVB-2011-0504-016, #1-12), same data, 18 April 2003 [beaver #3]; 4 male paratypes (ZIN AVB-2011-0504-017, #1-4), same data [beaver #5]; 2 male paratypes (ZIN AVB-2011-0504-018, #1, 2), same data [beaver #6].

Type depositions. Holotype and most part of paratypes—in ZISP, 4 paratypes—in AMU, 2 paratypes in UMICH.

Microhabitat. Posterior legs, few specimens on neck dorsally.

Distribution. Type locality only.

Etymology. The species is dedicated to the well known acarologist Dr. Hans Klompen (Ohio State University, Columbus, USA).

Differential diagnosis. This new species is close to *S. heatherae* **sp. nov.** In both species, the idiosoma is egg-shaped, the corolla of the adanal suckers is dentate, setae *ps3* are situated laterally and setae *f2* are absent. These species differ from each other by the following characters. In *S. klompeni* **sp. nov.**, setae *e1* are located on the hysteronotal shield, the adanal shields are comma-shaped and elongated, setae *ad1* are represented only by alveoli and located at the same transverse level as the adanal suckers, setae *ps1* are pedunculate and situated distinctly far from each other, setae *ad2* are present, and tarsi IV are wider than long. In *S. heatherae* **sp. nov.**, setae *e1* are located off the hysteronotal shield, the adanal shields are roughly rounded in outline, setae *ad1* are with short filiform bodies and are located distinctly posterior to the adanal suckers, setae *ps1* are non-pedunculate and situated close to each other on a common sclerite, setae *ad2* are absent, and tarsi IV are longer than wide.

6. *Schizocarpus gozdziewskii* sp. nov.

(Fig. 9)

Schizocarpus sp., Bochkov & Dubinina 2011: 64

Description. MALE (holotype). Body 380 long (370–385 in 10 paratypes) and 200 wide (200–210); body length/width ratio about 1.9:1. Idiosoma egg-shaped, strongly convex dorsally. Hysteronotal shield 70 long and 85 wide. Anterior margin of hysteronotal shield concave. Setae *d1* situated close to anterior margin of this shield, distance *d1-d1* 90. Setae *e1* situated on hysteronotal shield, distinctly anterior to its posterior margin. Distance *e1-e1* 55. Setae *h1* situated laterally, widely separated from each other, distance *h1-h1* 100. Setae *f2* absent. Setae *h3* widely separated from each other, distance *h3-h3* 90. Opisthosomal membranes moderately developed, 20 long. Setae *ps3* situated laterally, almost at same transverse level as adanal suckers. Adanal shields roughly rounded in outline; their borders well sclerotized, central area not punctate, additional small non-punctate areas present around setae *ad1*. Minimal distance between these shields 7. Setae *ad1* represented by alveoli and situated on inner borders of adanal shields, postero-mesal or almost at same transverse level as adanal suckers. Distance between adanal sucker and seta *ad1* subequal to diameter of adanal suckers or 1.5 times longer. Adanal suckers situated in anterior half of adanal shields, 15 in diameter, with dentate corolla (type E), without external sclerotized ring. Setae *ps1* non-pedunculate, situated on internal border of adanal shields, posterior to setae *ad1*. Adanal setae *ad2* present, situated on inner border of adanal shields between levels of setae *ad1* and *ps1*, slightly mesal to these setae and closer to *ps1* than to *ad1*. Ventral anal sclerite distinct. Lengths of some setae: *h1* 11, *h2* 180, *h3* 35, *ps3* 40, *ps2* 140. Tarsus III 35 long, 17 wide; tarsus IV 20 long, 15 wide.

Type material. Holotype male (ZIN T-Chir-18) and 14 male paratypes (ZIN AVB-2011-0504-011, #1-14) from *Castor fiber belorussicus* [beaver #5], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 18 April 2003, coll. A. Labrzycka; 2 male paratypes (ZIN AVB-2011-0504-012, #1, 2), same data [beaver #3]; 3 male paratypes (ZIN AVB-2011-0304-013, #1-3), same data [beaver #6]; 13 male paratypes (ZIN AVB-2011-0504-012, #1-13), same data, 17 April 2003 [beaver #2].

Type depositions. Holotype and most paratypes—in ZISP, 2 paratypes—in AMU, and 2 paratypes—in UMICH.

Microhabitat. Dorsum and flanks.

Distribution. Described from *C. f. belorussicus* from Poland (Suwałki) and from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve).

Etymology. This species is dedicated to the well known Polish theriologist, Mr. J. Gozdziewski (the Polish Hunting Association, Suwałki).

Differential diagnosis. This new species is close to *S. klompeni* **sp. nov.** In both of these species, the idiosoma is egg-shaped, the corolla of the adanal suckers is dentate, setae *ad2* are present, setae *ps3* are situated laterally and setae *f2* are absent. These species differ from each other by the following characters. In *S. gozdziewskii* **sp. nov.**, the adanal shields are ovoid, the inner borders of the adanal shields are distinctly sclerotized, setae *ps1* are non-pedunculate and situated slightly postero-lateral to *ad2*, setae *ad2* are setiform, and tarsi IV are longer than wide. In *S. klompeni* **sp. nov.**, the adanal shields are elongated, the inner borders of the adanal shields are poorly sclerotized, setae *ps1* are pedunculate, situated mesal to *ad2* and at the same transverse level; setae *ad2* are represented only by alveoli, and tarsi IV are wider than long.

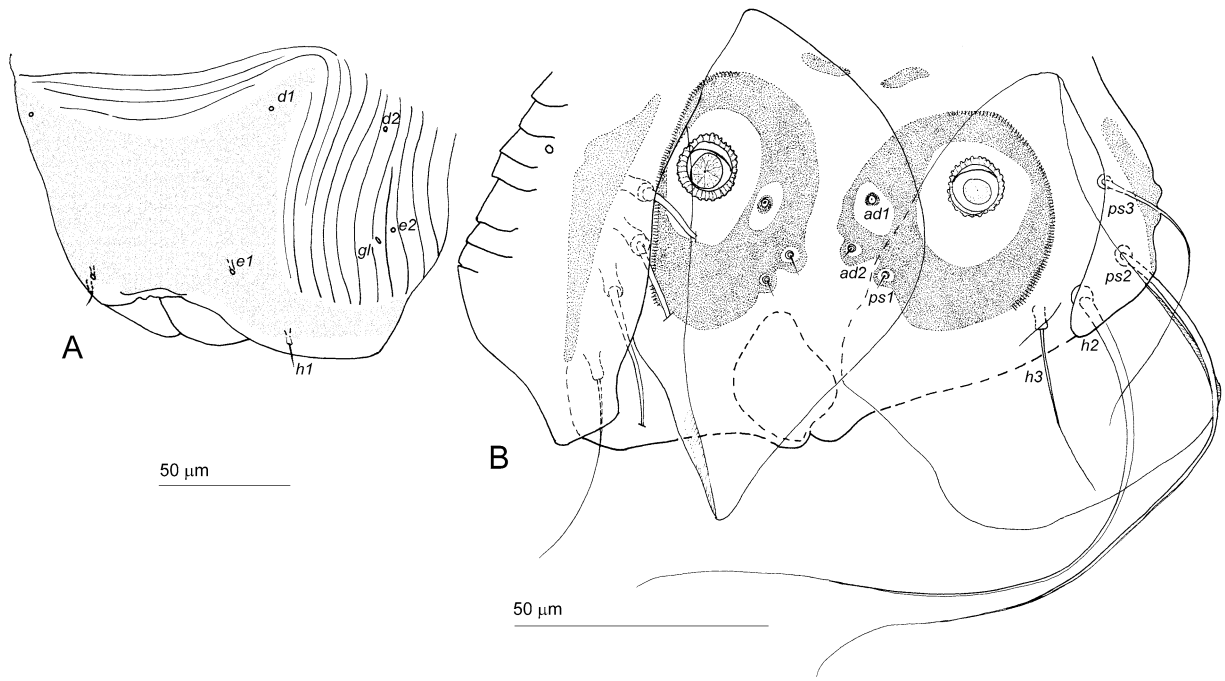

FIGURE 9. *S. gozdziewskii* **sp. nov.**, male: A—opisthosoma in dorsal view; B—same, in ventral view.

7. *Schizocarpus zurowskii* sp. nov.
(Fig. 10)

Description. MALE (holotype). Body 370 long (365–370 in 4 paratypes) and 175 wide (170–180); body length/width ratio about 2.1:1. Idiosoma egg-shaped, strongly concave dorsally. Hysteronotal shield 90 long and 80 wide. Anterior margin of hysteronotal shield almost straight. Setae *d1* situated in anterior angles of this shield, distance *d1-d1* 70. Setae *e1* situated on hysteronotal shield, anterior to its posterior margin. Distance *e1-e1* 50. Setae *h1* situated laterally, widely separated from each other, distance *h1-h1* 80. Setae *f2* absent. Setae *h3* widely separated from each other, distance *h3-h3* 90. Opisthosomal membranes moderately developed, 15 long. Setae *ps3* situated laterally, almost at same transverse level as adanal suckers. Adanal shields roughly rounded in outline and slightly elongated, with distinctly sclerotized borders, not punctate in central area. Minimal distance between these shields 7. Setae *ad1* represented by alveoli, situated on adanal shields anterior to adanal suckers and at same longitudinal level with them. Distance between adanal sucker and seta *ad1* slightly less than diameter of adanal suckers. Adanal suckers situated in median part of adanal shields, 8 in diameter, with dentate corolla (type E), without external sclerotized ring. Setae *ps1* non pedunculate, situated between adanal shields postero-mesal to adanal suckers, distance of adanal suckers-setae *ps1* 1.5 times longer than diameter of adanal suckers. Adanal setae *ad2* represented only by alveoli, situated posterior to level of setae *ps1* and slightly lateral to these setae, close to posterior-mesal border of adanal shields. Ventral anal sclerite distinct. Lengths of some setae: *h1* 6, *h2* 130, *h3* 26, *ps3* 50, *ps2* 100. Tarsus III 26 long, 14 wide; tarsus IV 15 long, 14 wide.

Type material. Holotype male (ZIN T-Chir-19) and 5 male paratypes (ZIN AVB-2011-0504-014, #1-5) from *Castor fiber belorussicus* [beaver #5], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 18 April 2003, coll. A. Labrzycka.

Type depositions. Holotype and 4 paratypes—in ZISP, 1 paratype—in AMU.

Microhabitat. Abdomen.

Distribution. Type locality only.

Etymology. This species is dedicated to the famous Polish theriologist Dr. W. Zurowski (1935-1992).

Differential diagnosis. In this new species, as in *S. klompeni* **sp. nov.** and *S. gozdziewskii* **sp. nov.**, the idiosoma is egg-shaped, the corolla of the adanal suckers is dentate, setae *f2* are lost, setae *ps3* are situated laterally, and

setae *ad2* are present. The new species is close to *S. gozdziewskii* **sp. nov.** In both species, setae *d1* are situated closer to the lateral borders of the hysteronotal shield than to each other, and setae *ps1* are non-pedunculate. These species differ from each other by the following characters. In. *S. zurowskii* **sp. nov.**, setae *ad1* are situated distinctly anterior to the adanal suckers and setae *ad2* are represented by alveoli and located posterior to setae *ps1*, both pairs of these setae are off the adanal shields, and the length and width of tarsi IV are subequal. In *S. gozdziewskii* **sp. nov.**, setae *ad1* are situated at the same transverse level as the adanal suckers, setae *ad2* are setiform and located anterior to *ps1*, both pairs of these setae are on the adanal shields, and tarsi IV are longer than wide.

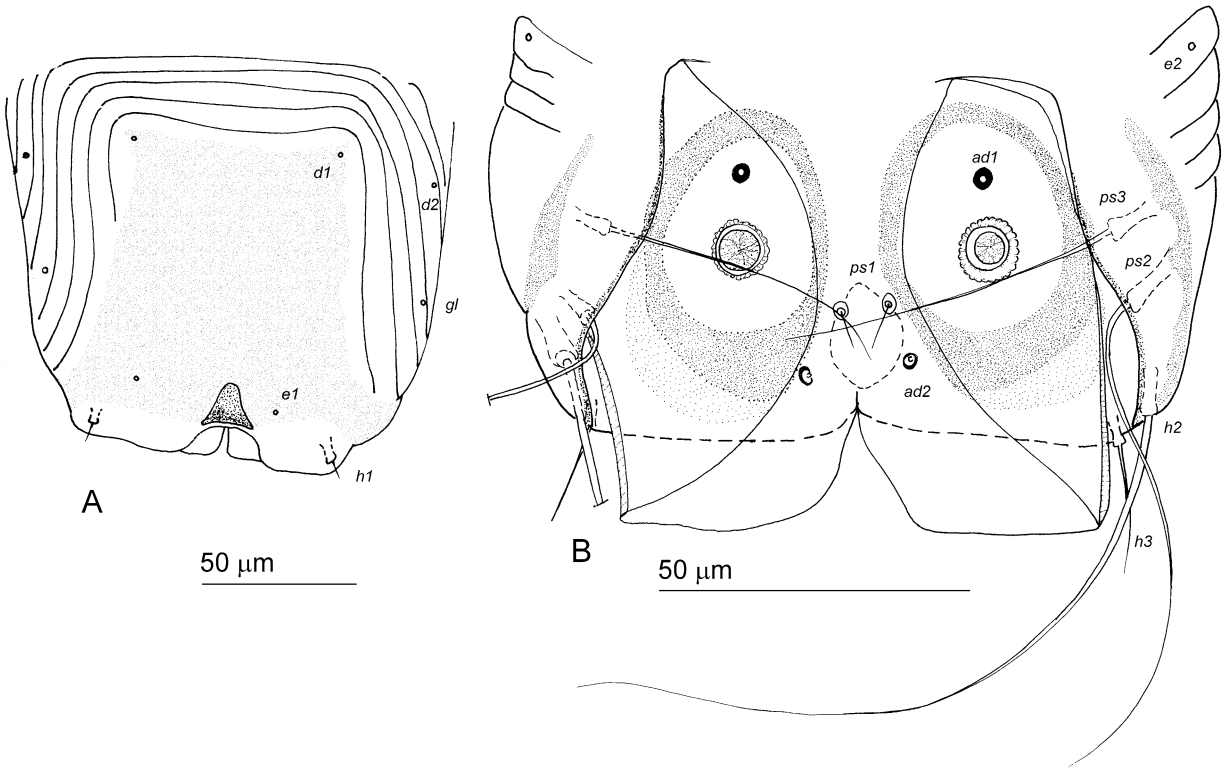

FIGURE 10. *S. zurowskii* **sp. nov.**, male: A—opisthosoma in dorsal view; B—same, in ventral view.

8. *Schizocarpus parahumilis* sp. nov.
(Fig. 3A, B, 11)

Description. MALE (holotype). Idiosoma slightly flattened dorso-ventrally. Hysterosoma subparallel sided. Body 325 long (320–330 in 3 paratypes) and 140 wide (135–140); body length/width ratio about 2.3:1. Hysteronotal shield 85 long and 80 wide. Anterior margin of hysteronotal shield widely concave. Setae *d1* situated in anterior angles of this shield, distance *d1-d1* 65. Setae *e1* situated on hysteronotal shield, distance *e1-e1* 35. Setae *h1* situated medially, close to each other, distance *h1-h1* 40. Setae *f2* absent. Setae *h3* widely separated from each other, distance *h3-h3* 60. Opisthosomal membranes weakly developed, 10 long. Setae *ps3* situated medially. Adanal shields irregularly shaped, completely punctate. Minimal distance between these shields 25. Adanal suckers situated in anterior half of adanal shields, about 7 in diameter, with smooth corolla (type A), each surrounded by wide and highly sclerotized punctate ring, subequal in width to these suckers. Setae *ad1* represented by alveoli and situated on inner margins of adanal shields and distinctly postero-mesal to adanal suckers. Setae *ps1* pedunculate, situated postero-lateral to adanal suckers, slightly anterior to level of setae *ad1*. Narrow transverse sclerotized band present in posterior half of adanal shield encompassing peduncle bearing *ps1* and seta *ad1* but not reaching *ad1*. Adanal alveoli *ad2* present, situated mesal to *ps1* in bases of their peduncles. Ventral anal sclerite small but distinct. Lengths of some setae: *h1* 6, *h2* 55, *h3* 4, *ps3* 7, *ps2* 50. Tarsus III 20 long, 14 wide; tarsus IV 10 long, 9 wide.

Type material. Holotype male (ZIN T-Chir-20) and 3 male paratypes (ZIN AVB-2011-0504-019, #1-4) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka.

Type depositions. Holotype and 3 paratypes—in ZISP, 1 paratype—in AMU.

Microhabitat. Throat.

Distribution. Type locality only.

Etymology. The specific name indicates the similarities with *S. humilis* and is a noun in apposition.

Differential diagnosis. This species is very close to *S. humilis* Fain and Lukoschus, 1985 and differs from it mainly by the presence of indistinct alveoli of setae *ad2* near the bases of pedunculate setae *ps1*; these alveoli are absent in *S. humilis*.

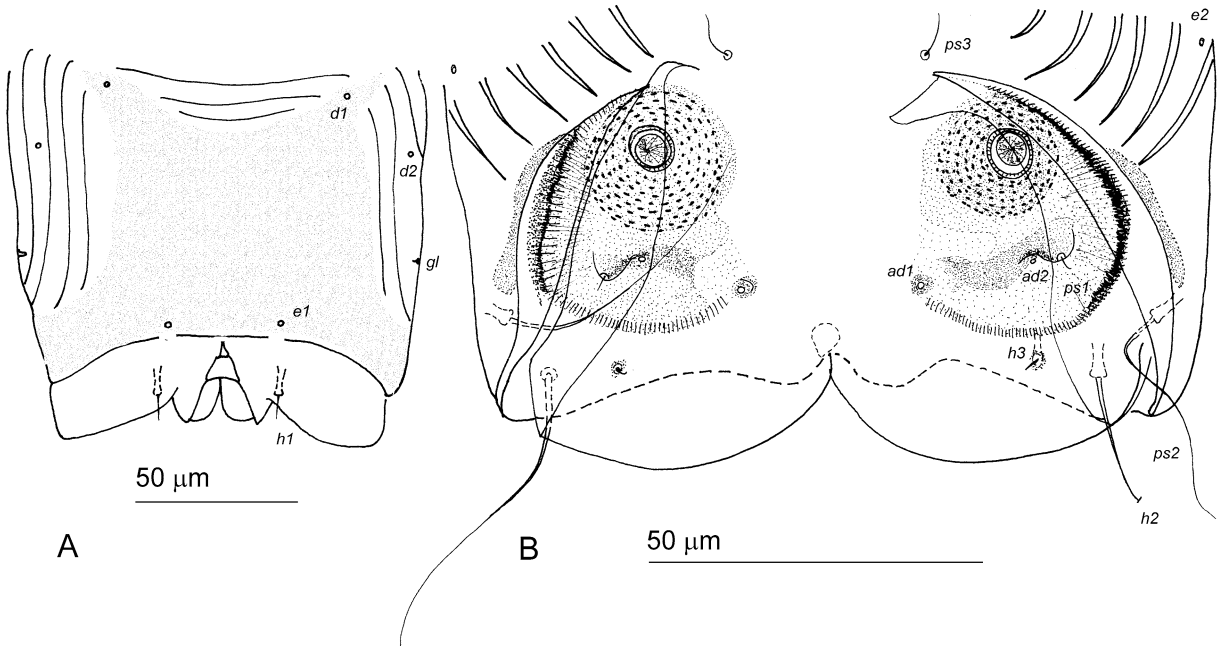

FIGURE 11. *S. parahumilis* **sp. nov.**, male: A—opisthosoma in dorsal view; B—same, in ventral view.

9. *Schizocarpus radiatus* Fain and Lukoschus, 1985

(Fig. 3D)

Schizocarpus radiatus Fain and Lukoschus, 1985: 64, figs. 5, 73, 74, 80; Bochkov & Dubinina 2011: 63

Material. 41 males (ZIN AVB-2011-0504-020, #1-41) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka; 3 males (ZIN AVB-2011-0504-021, #1-3), same data, 18 April 2003 [beaver #3]; 6 males (ZIN AVB-2011-0504-022, #1-6), same data [beaver #4]; 13 males (ZIN AVB-2011-0504-023, #1-13), same data [beaver #5]; 7 males (ZIN AVB-2011-0504-023, #1-7], same data [beaver #6].

Microhabitat. Posterior part of back, flanks, and posterior legs.

Distribution. Described from the Eurasian beaver (undetermined subspecies) from unknown locality in Europe (Fain & Lukoschus 1985), from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Bochkov & Dubinina 2011), and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

10. *Schizocarpus intercalatus* Fain and Lukoschus, 1985

Schizocarpus intercalatus Fain and Lukoschus, 1985: 46, figs. 13, 16, 17

Material. 5 males (ZIN AVB-2011-0504-024, #1-5) from *Castor fiber belorussicus* [beaver #6], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 18 April 2003, coll. A. Labrzycka; 1 male (ZIN AVB-2011-0504-025), same data [beaver #5].

Microhabitat. Head dorsally.

Distribution. Described from the Eurasian beaver (undetermined subspecies) from unknown locality in Europe (Fain & Lukoschus 1985) and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

11. *Schizocarpus capitis* (Dubinina, 1964)

(Fig. 3E)

Histiophorus capitis Dubinina, 1964: 121, fig. 8, 1–4
Schizocarpus capitis, Fain & Lukoschus 1985: 48, figs. 20, 21, 26; Dubinina *et al*. 1993: 451

Material. 8 males (ZIN AVB-2011-0504-026, #1-8) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka; 3 males (ZIN AVB-2011-0504-027, #1-3), same data, 18 April 2003 [beaver #3]; 38 males (ZIN AVB-2011-0504-028, #1-38), same data [beaver #4]; 7 males (ZIN AVB-2011-0504-029, #1-7), same data [beaver #5]; 5 males (ZIN AVB-2011-0504-030, #1-5), same data [beaver #6].

Microhabitat. Head and neck dorsally.

Distribution. Described from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Dubinina 1964), from *C. f. albicus* from Germany (Elba River) and *C. fiber* (undetermined subspecies) from unknown locality in Europe (Fain & Lukoschus 1985), and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

12. *Schizocarpus brachyurus* (Dubinina, 1964)

Histiophorus brachyurus Dubinina, 1964: 125, fig. 10, 1–4
Schizocarpus brachyurus, Fain & Lukoschus 1985: 66; Dubinina *et al*. 1993: 451; Bochkov & Dubinina 2011: 57, figs. 2B, 3B

Material. 22 males (ZIN AVB-2011-0504-031, 1-22) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka.

Microhabitat. Anterior legs.

Distribution. Described from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Dubinina 1964) and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

13. *Schizocarpus fedjushini* (Dubinina, 1964)

Histiophorus fedjushini Dubinina, 1964: 123, fig. 9.1–4
Schizocarpus fedjushini, Fain & Lukoschus 1985: 45, figs. 8, 9, 11; Dubinina *et al*. 1993: 451
Schizocarpus mingaudi Trouessart, 1896, Fedjushin 1935: 337, fig. 110 (incorrect determination)

Material. 1 male (ZIN AVB-2011-0504-032) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka; 4 males (ZIN AVB-2011-0504-033, #1-4), same data, 18 April 2003 [beaver #4]; 13 males (ZIN AVB-2011-0504-034, #1-13), same data [beaver #5]; 11 males (ZIN AVB-2011-0504-034, #1-11), same data [beaver #6].

Microhabitat. Head and neck dorsally.

Distribution. Described from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Dubinina 1964), from *C. fiber* (undetermined subspecies) from unknown locality in Europe (Fain & Lukoschus 1985), and from *C. f. belorussicus* from Belorussia (Berezina River) (Fedjushin 1935), and Poland (Suwałki) (present paper).

14. *Schizocarpus numerosus* (Dubinina, 1964)

Histiophorus numerosus Dubinina, 1964: 119, figs. 6, 7.1–4
Schizocarpus numerosus, Fain & Lukoschus 1985: 45, figs. 6, 7, 10; Dubinina *et al*. 1993: 451

Material. 5 males (ZIN AVB-2011-0504-035, #1-5) from *Castor fiber belorussicus* [beaver #3], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, coll. A. Labrzycka; 14 males (ZIN AVB-2011-0504-036, #1-14), same data [beaver #4]; 23 males (ZIN AVB-2011-0504-037, #1-23), same data [beaver #5]; 17 males (ZIN AVB-2011-0504-038, #1-17), same data [beaver #6].

Microhabitat. Head and neck dorsally.

Distribution. Described from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Dubinina 1964), from *C. f. albicus* from Germany (Elba River) (Fain & Lukoschus 1985), and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

15. *Schizocarpus curtus* Fain and Lukoschus, 1985

Schizocarpus curtus Fain and Lukoschus, 1985: 60, figs. 48, 49, 60

Material. 3 males (ZIN AVB-2011-0504-039, #1-3) from *Castor fiber belorussicus* [beaver #6], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 18 April 2003, coll. A. Labrzycka.

Microhabitat. Neck dorsally.

Distribution. Described from *C. fiber* (undetermined subspecies) from unknown locality in Europe (Fain & Lukoschus 1985) and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

16. *Schizocarpus parvus* (Dubinina, 1964)

Histiophorus parvus Dubinina, 1964: 134, fig. 15, 1
Schizocarpus parvus, Fain & Lukoschus 1985: 66; Dubinina *et al*. 1993: 451; Bochkov & Dubinina 2011: 56, fig. 1

Material. 1 male (ZIN AVB-2011-0504-040) from *Castor fiber belorussicus* [beaver #5], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, coll. A. Labrzycka.

Microhabitat. A single specimen from abdomen.

Distribution. Described from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Dubinina 1964) and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

17. *Schizocarpus subparvus* (Dubinina, 1964)

Histiophorus subparvus Dubinina, 1964: 134, fig. 15, 2
Schizocarpus subparvus, Fain & Lukoschus 1985: 66; Dubinina *et al*. 1993: 451; Bochkov & Dubinina 2011: 59, 2C, 4A

Material. 1 male (ZIN AVB-2011-0504-041) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka.

Microhabitat. A single specimen from neck dorsally.

Distribution. Described from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Dubinina 1964) and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

18. *Schizocarpus pygidialis* Fain and Lukoschus, 1985
(Fig. 12A, B)

Schizocarpus pygidialis Fain and Lukoschus, 1985: 48, figs. 22–24; Bochkov & Dubinina 2011: 63

Material. 1 male (ZIN AVB-2011-0504-042) from *Castor fiber belorussicus* [beaver #3], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 18 April 2003, coll. A. Labrzycka; 1 male (ZIN AVB-2011-0504-043), same data [beaver #5]; 1 male (ZIN AVB-2011-0504-044), same data [beaver #6].

Microhabitat. One specimen from tail base; two specimens, probably accidental, on head and anterior leg, respectively.

Distribution. Described from the Eurasian beaver (undetermined subspecies) from unknown locality in Europe (Fain & Lukoschus 1985), from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Bochkov & Dubinina 2011), and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

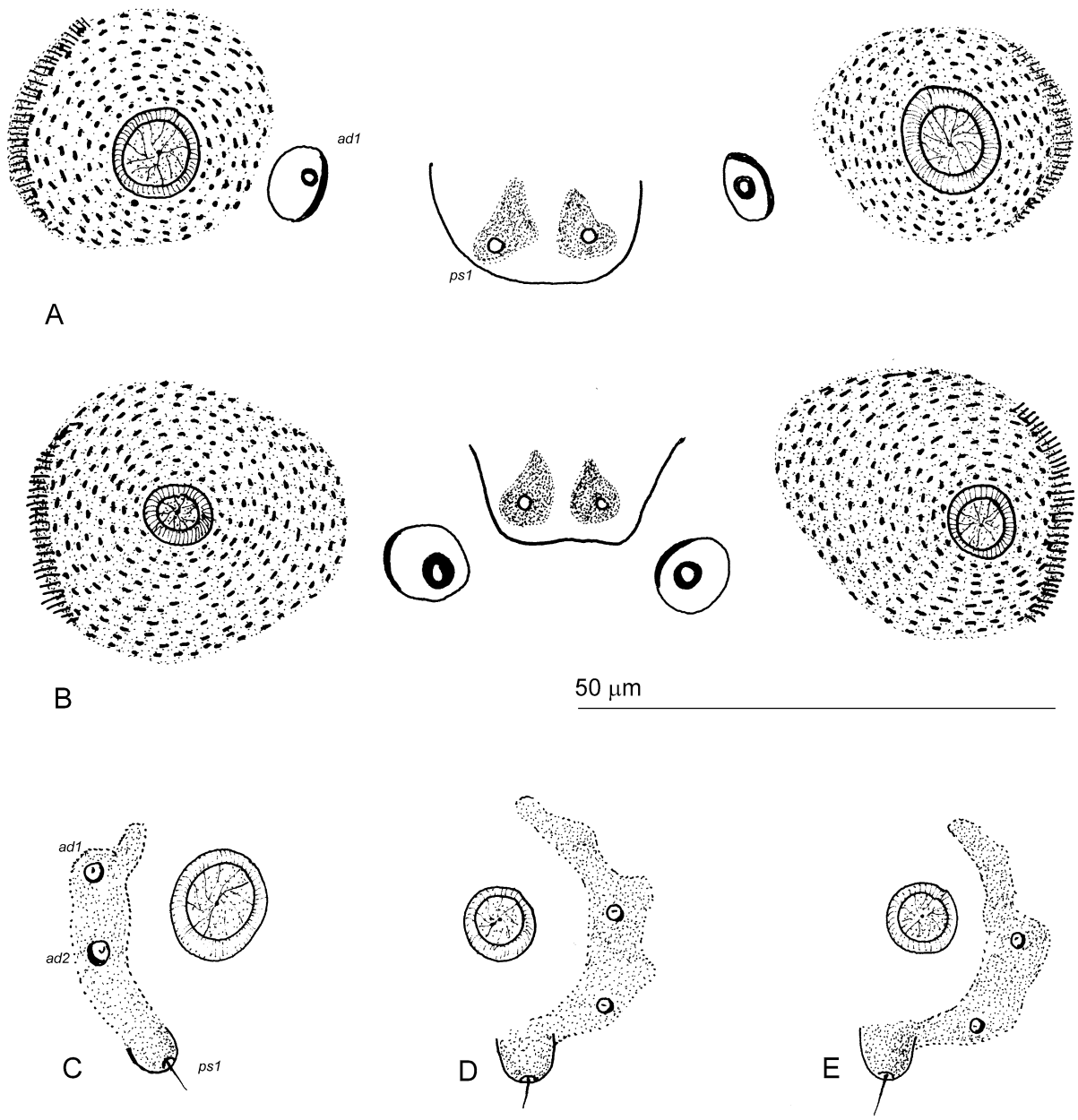

FIGURE 12. Variation in positions of ventral opisthosomal setae in males of *Schizocarpus* spp.: A, B—*S. pygidialis* Fain and Lukoschus, 1985; C–E—*S. subhexapilis* Fain and Lukoschus, 1985.

19. *Schizocarpus subhexapilis* Fain and Lukoschus, 1985
(Fig. 12C–E)

Schizocarpus subhexapilis Fain and Lukoschus, 1985: 64, figs. 65, 66, 71; Dubinina *et al*. 1993: 451; Bochkov & Dubinina 2011: 63.

Material. 1 male (ZIN AVB-2011-0504-045) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka; 1 male (ZIN AVB-2011-0504-046), same data, 18 April 2003 [beaver #4]; 8 males (ZIN AVB-2011-0504-047), same data [beaver #5]; 2 males (ZIN AVB-2011-0504-048), same data [beaver #6].

Microhabitat. Throat.

Distribution. Described from the Eurasian beaver (undetermined subspecies) from unknown locality in Europe (Fain & Lukoschus 1985), from *C. f. orientoeuropaeus* from Russia (Voronezh Reserve) (Bochkov & Dubinina 2011), and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

20. *Schizocarpus insignis* Fain and Lukoschus, 1985

Schizocarpus insignis Fain and Lukoschus, 1985: 65, figs. 78, 79

Material. 1 male (ZIN AVB-2011-0504-049) from *Castor fiber belorussicus* [beaver #2], **POLAND**: Podlaskie Voivodeship, Suwałki County, near Wiżajny village, 54°21'50"N, 22°52'6"E, 17 April 2003, coll. A. Labrzycka.

Microhabitat. A single specimen from neck dorsally.

Distribution. Described from *C. fiber* (undetermined subspecies) from unknown locality in Europe, from *C. f. albicus* from Germany (Elba River), from *C. f. birulai* from Mongolia (Bulgan-gol River) (Fain & Lukoschus 1985), and from *C. f. belorussicus* from Poland (Suwałki) (present paper).

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References

Bochkov, A.V. (2010) A review of mammal associated Psoroptidia (Acariformes: Astigmata). *Acarina*, 18, 99–260.

Bochkov, A.V. & Dubinina, H.V. (2011) Mites of the genus *Schizocarpus* (Acariformes: Chirodiscidae) parasitizing the Eurasian beaver *Castor fiber* (Rodentia: Castoridae) in the Voronezh National Reserve. *Acarina*, 19, 53–66.

Dubinina, H.V. (1964) Mites of the genus *Histiophorus* (Listrophoridae) parasites of beavers. *Parazitologicheskiy Sbornik*, 22, 111–152. [In Russian]

Dubinina, H.V., Bochkov, A.V. & Bobrovskaja, V.I. (1993) Notes on systematics of mites of the genus *Schizocarpus* (Acariformes: Chirodiscidae). *Parazitologiya*, 27, 450–453. [In Russian with English summary]

Durka, W., Babik, W., Ducroz, J.-F., Heidecke, D., Rosell, F., Samjaa, R., Saveljev, A., Uleviceus, A. & Stubbe, M. (2005) Mitochondrial phylogeography of the Eurasian beaver *Castor fiber* L. *Molecular Ecology*, 14, 3843–3856.

Dzięciołowski, R. & Gozdziewski, J. (1999) The reintroduction of European beaver, *Castor fiber*, in Poland. A success story. *In*: Busher, P.E & Dzieciolowski, R.M. (Eds). *Beaver Protection, Management, and Utilization in Europe and North America*. Kluwer Academic Press, New York, 31–35.

Fain, A. & Lukoschus, F.S. (1985) The genus *Schizocarpus* Trouessart, 1896 (Acari, Chirodiscidae) from the beaver *Castor fiber* L. An example of multiple speciation. *Entomologische Abhandlungen des Staatliches Museum für Tierkunde Dresden*, 49, 35–68.

Fain, A. & Whitaker, J.O.Jr. (1988) Mites of the genus *Schizocarpus* Trouessart, 1896 (Acari, Chirodiscidae) from Alaska and Indiana, USA. *Acarologia*, 29, 395–409.

Fain, A, Whitaker, J.O.Jr. & Smith, M.A. (1984) Fur mites of the genus *Schizocarpus* Trouessart, 1896 (Acari, Chirodiscidae) parasitic on the American beaver *Castor canadensis* in Indiana, U.S.A. *Bulletin and Annales de la Société royale Belge*

d'Entomologie, 120, 211–239.

Fedjushin, A.V. (1935) *Riverine beaver* [*Rechnoy bobr*]. Glavpushnina, Moscow, 342 pp. [In Russian]

Gabrys, G. & Wazna, A. (2003) Subspecies of the European beaver *Castor fiber* Linnaeus, 1758. *Acta Theriologica*, 48, 433–439.

Griffiths, D.A., Atyeo, W.T., Norton, R.A. & Lynch, C.A. (1990) The idiosomal chaetotaxy of astigmatid mites. *Journal of Zoology (London)*, 220, 1–32.

Haitlinger, R. (1991) Arachnid occurring on European beaver (*Castor fiber* L.) in Poland. *Wiadomosci Parazytologizne*, 37, 107–109.

Heidecke, D. (1986) Taxonomische Aspekte der Artenschutzes am Beispiel der Biber Eurasiens. *Hercynia, N.F. (Leipzig)*, 22, 146–161.

Helgen, K.M. (2005) Family Castoridae. *In*: Wilson, D.E. & Reeder, D.M. (Eds). *Mammal Species of the World. A Taxonomic and Geographic Reference*. Third edition. Johns Hopkins University Press, Baltimore, 842–843.

Kadulski, S. (1998) Ectoparasites of the beaver *Castor fiber* L. from Popielno. *Wiadomosci Parazytologizne*, 44, 729–736.

Lavrov, L.S. (1981) *Bobry Palearktiki*. VSU Press, Voronezh. 272 pp. [In Russian]

Labrzycka, A. (2006) A perfect clasp – adaptation of mites to parasitize mammalian fur. *Biological Letters*, 43, 109–118.

Trouessart, E.L. (1896) Description de *Schizocarpus mingaudi* (Arachn.), nouveau sarcoptide pilicole vivant sur le *Castor*. *Bulletin de la Société Entomologie de France*, 4, 91–97.