

A new species of bristletails of the genus *Silvestrichiloides* Mendes, 1990 (Microcoryphia: Machilidae) from Kyrgyzstan

Новый вид щетинохвосток рода *Silvestrichiloides* Mendes, 1990 (Microcoryphia: Machilidae) из Кыргызстана

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KEY WORDS: Fergana Ridge, Western Tien-Shan, mountain steppe, Apterygota, morphology, taxonomy, key to species.

КЛЮЧЕВЫЕ СЛОВА: Ферганский хребет, Западный Тянь-Шань, горная степь, первичнобескрылые насекомые, морфология, таксономия, видовой ключ.

ABSTRACT. A new species *Silvestrichiloides kyrgyzicus* **sp.n.** is described from Fergana Ridge (Western Tien-Shan). It differs from other species of this genus: *S. gussakovskii* (Kaplin, 1982) from Tadjikistan and *S. berkarensis* Kaplin, 2021 from South Kazakhstan in the structure of paired ocelles, maxillary and labial palps, legs, urostyles and urocoxites IX, parameres VIII; *S. berkeri* (Paclt 1960) in the number of ovipositor divisions, digging spines on posterior gonapophysis and in the structure of apical palpomere of labial palp.

РЕЗЮМЕ. Описан новый вид *Silvestrichiloides kyrgyzicus* **sp.n.** с Ферганского хребта (Западный Тянь-Шань). Он отличается от других видов этого рода: *S. gussakovskii* (Каплин, 1982) из Таджикистана и *S. berkarensis* Каплин, 2021 из Южного Казахстана строением парных глазков, нижнечелюстного и нижнегубного щупиков, ног, грифельков и кокситов IX сегмента брюшка, парамер VIII сегмента; *S. berkeri* (Пахт 1960) количеством члеников яйцеклада, копательных шипов на его задних гонапофизах и строением апикального членика нижнегубно щупика.

Introduction

The fauna of bristletails of the genus *Silvestrichiloides* Mendes 1990 [Mendes, 1990] includes four described species: *S. beckeri* (Paclt, 1960) from South Kazakhstan (Turkestan Region) [Paclt, 1960], *S. gussakovskii* (Kaplin, 1982) from Tadjikistan [Kaplin, 1982], *S. asiaticus* Kaplin, 1999 from Uzbekistan [Kaplin, 1999] and *S. berkarensis* Kaplin, 2021 from South Kazakhstan (Zhambyl Region) [Kaplin, Shakula, 2021].

Examination of bristletails collected by P.V. Ruchko in Kyrgyzstan (Jalal-Abad Region) has revealed one new species of the genus *Silvestrichiloides*, its description is given below.

Material and methods

A collected male of new species was preserved in 70% ethanol. The holotype is mounted in Faure's solution on permanent microscope slides. The studied specimen is deposited in the collection of the All-Russian Institute of Plant Protection, St Petersburg-Pushkin (VIZR).

The following abbreviations are used: d — distance between the border of the sensory field and the basis of the femur; LF — length of femur; LSF — length of sensory field; WF — width of femur; WSF — width of sensory field.

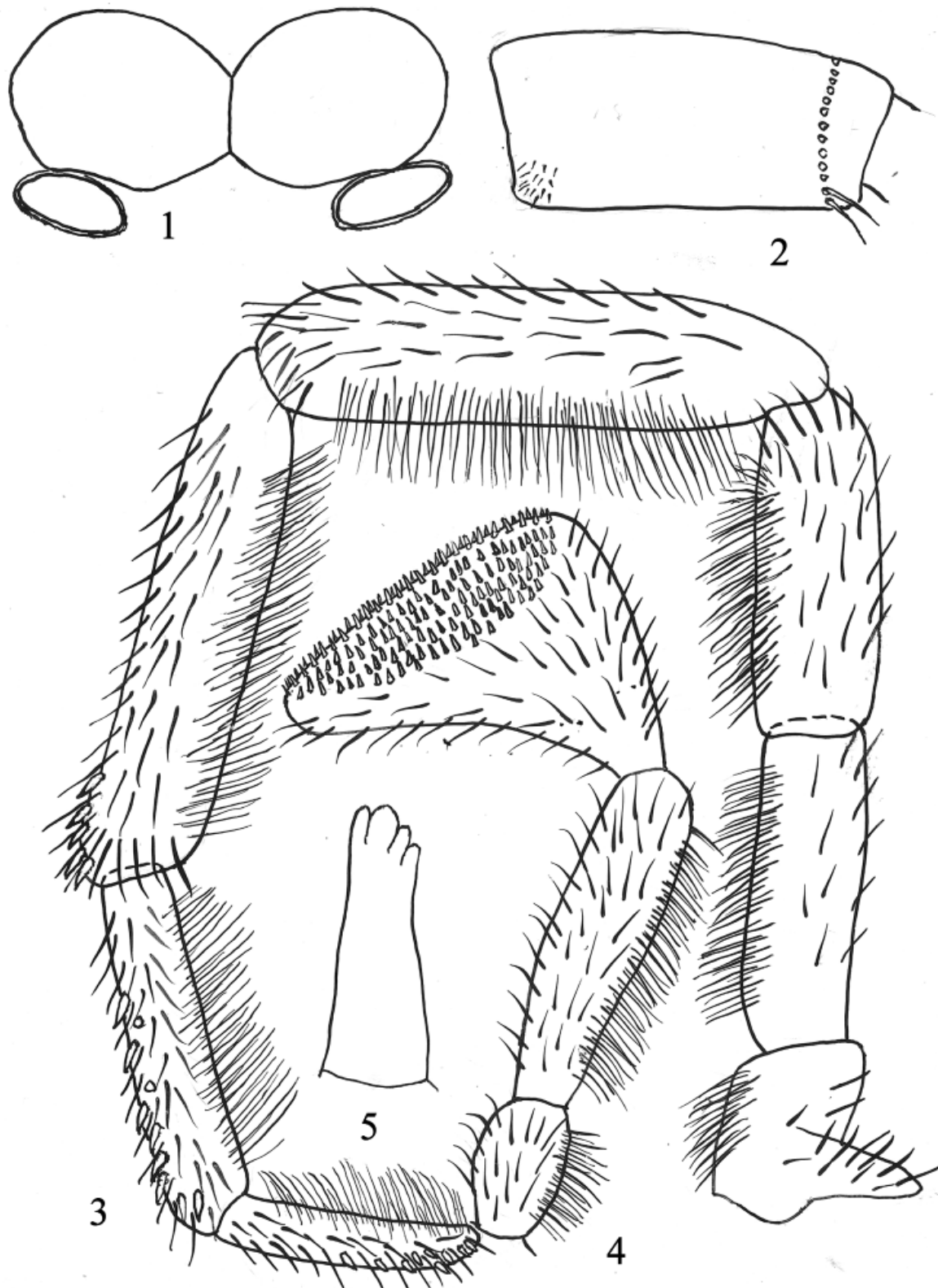
Results and discussion

Order Microcoryphia Verhoeff, 1904
Family Machilidae Grassi, 1888
Subfamily Machilinae Grassi, 1888
Genus *Silvestrichiloides* Mendes, 1990

Type species: *Silvestrichilis beckeri* Paclt, 1960

Silvestrichiloides kyrgyzicus Kaplin **sp.n.**
Figs 1–14.

MATERIAL. Holotype, ♂ (slides), Kyrgyzstan: Jalal-Abad Region, Suzak District, Fergana Ridge (western Tien-Shan), river Urumbash, 1585 m a. s. l., mountain steppe, leg. P.V. Ruchko, 20. VIII.2022, 41°48'24"N, 73°28'10"E (VIZR).



Figs 1–5. *Silvestrichiloides kyrgyzicus* sp.n., holotype (male): 1 — compound eyes and paired ocelli; 2 — basal article (scapus) of antenna; 3 — maxillary palpus; 4 — labial palpus; 5 — apex of mandible. Scale bar: 0.1 mm.

Рис. 1–5. *Silvestrichiloides kyrgyzicus* sp.n., голотип (самец): 1 — сложные глаза и парные глазки; базальный членик (скапус) усика; 3 — нижнечелюстной шупик; 4 — нижнегубной шупик; 5 — апекс верхней челюсти. Масштабные линейки: 0,1 мм.

DESCRIPTION. Body length: 13.5 mm. Body width: 3.1 mm. Cercus length: 3.2 mm. Caudal filament: about 16 mm. Total eyes width: 1.29 mm. Eye length: 0.55 mm. Paired ocellus width and length: 0.35 mm and 0.14 mm, respectively. Coxal stylus length: 0.74–0.84 mm. Antennae slightly shorter than body. General body color whitish. Antennal base, frons, gena, occiput, basal parts of mandibles, maxilles, lower labium, paraprocts and epiproct with brown-violet pigment of weak and medium intensity. Scales color on the upper and lower surfaces of the body brownish or light brownish, respectively. Basal article (scapus) of antennae relatively long with small sensory setae at its base (Fig. 1). Ratio of its length to width about 2.3. Distal chains of flagellum divided into 15–17 annuli. Cercus approximately 0.24 body length, 10–11-segmented with a rounded sclerotized apex.

Compound eyes green (in alcohol). Ratio of length to width of compound eye about 0.86; ratio of length of contact line to length of eye about 0.42 (Fig. 2). Paired ocellus sublateral, ovoid, light brown with narrow white border, about 2.5 times as wide as long. Distance between inner margins of paired ocelli about 0.53 and between their outer margins 0.94 total width of compound eyes. Frons between the paired ocelli not especially convex. Clypeus with numerous thin long setae.

Apical palpomere of maxillary palp about 0.74 times as long as preceding one. Their 5th palpomere about 0.96 times as long as 4th palpomere. Dorsal surface of 7th, 6th and 5th palpoeres of maxillary palp with 8–9, 9–10 and 4–5 hyaline spines, respectively (Fig. 3). Ventral surface of 1–7th palpoeres of maxillary palp as well as dorsal surface of 1–2nd palpoeres of labial palp with relatively numerous and long ciliary setae. Apical palpomere of labial palp triangularly oval, 0.77 times as long as wide (Fig 4). Mandibles with four distal teeth (Fig. 5).

Ratio of length of 3rd tarsomere to total length of hind tarsus 0.29. Ratio of length to width of fore, middle and hind tarsus, tibia and femur as in table 1. Fore femur widened. Ratios of total lengths of hind to fore and middle legs about 1.10.

Fore femur with opened, well-developed sensory field, including numerous simple, relatively short sensilla connecting to the distal row of strong chaetae (Fig. 6). The metric relations found in the sensory field and femur are as follows: LSF/WSF: 2.00, LSF/LF: 0.63, WSF/WF: 0.64, d/LF: 0.36, d/LSF: 0.55, d/WSF: 1.08. Undersurface of tarsus and tibia of all legs with two rows of pigmented spine-like setae, some of which on the

first tarsomere of the middle leg and on the second tarsomere of all legs thickened, shortened, and protruding vertically (Figs 6, 8, 10, 11; Table 2). Uppersurface of tarsus and tibia of middle leg and undersurface of femur of all legs with numerous long thin setae (Figs 7–9, 12). Ratios of length of styli to width of middle and hind coxae, respectively about 1.55 and 1.52.

Table 1. Ratios of length to width of tarsi, tibiae and femora of male *Silvestrichiloides kyrgyzicus* sp.n.

Таблица 1. Отношения длины к ширине лапок, голеней и бедер самца *Silvestrichiloides kyrgyzicus* sp.n.

Segments	Pair of legs		
	fore	middle	hind
Tarsus	5.93	5.10	6.71
Tibia	2.85	3.13	4.88
Femur	2.04	2.75	3.48

Table 2. Number of elongate and short erect (+) protruding vertically pigmented spines on legs of male *Silvestrichiloides kyrgyzicus* sp.n.

Таблица 2. Количество удлинённых и вертикально выступающих коротких (+) пигментированных щетинок на ногах самца *Silvestrichiloides kyrgyzicus* sp.n.

Segments		Pair of legs		
		fore	middle	hind
Tarsomeres	1	6	5 + 5	7–8
	2	4 + 6	6 + 6	12 + 7
	3	3	6	8
Tibia	3	12	17–18	
Femur	0	0	0	

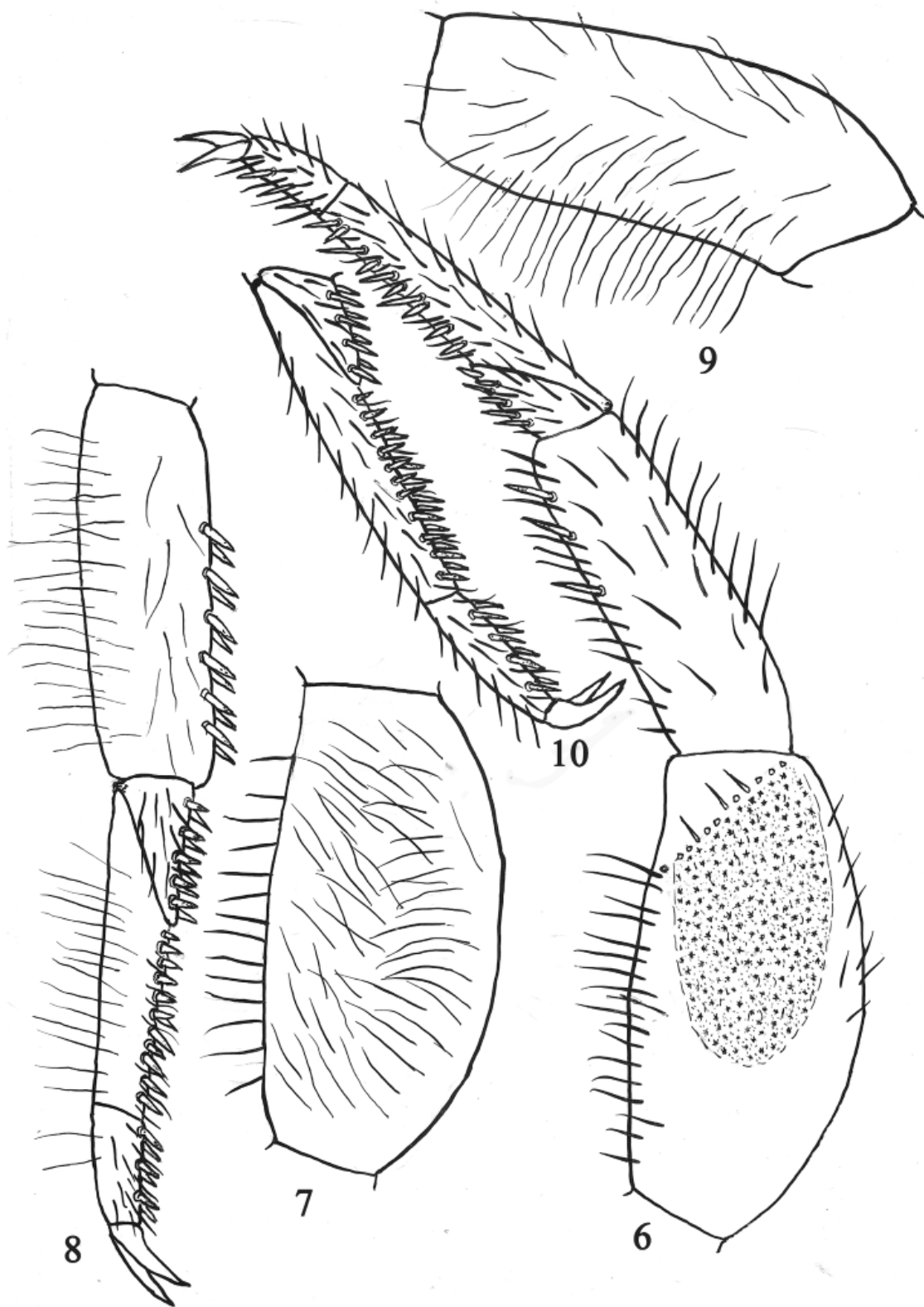
Urocoxites I–VII with 1 + 1 eversible vesicles. Ratios of lengths of urosternites, urocoxites, urostyli (without apical spines), apical spines and posterior angle of urosternites are given in table 3. Thoracic tergites, urotergites I–II, urosternites and urocoxites I–VIII without sublateral spines. Urocoxites IX with 11 + 11 sublateral hyaline spines. Number of sublateral hyaline spines on urotergite III 0 + 1, IV 3 + 4; V 4 + 5; VI and VII 7 + 7; VIII 9 + 10; IX 8 + 9; X 5 + 5 (Table 3).

Male genitalia with parameres on urites VIII and IX. Parameres VIII with 1 + 5, IX with 1 + 6 divisions (Figs 13, 14). Ratios of lengths of parameres VIII and IX 1.5. Parameres IX surpassing apex of penis, clearly not attaining level of apex of urocoxites IX. Ratio of distance between apices of

Table 3. Ratios of lengths of urosternites, urocoxites, urostyli (without apical spines), apical spines and posterior angle of urosternites, number of macrochaetae on urocoxites and urotergites in male *Silvestrichiloides kyrgyzicus* sp.n.

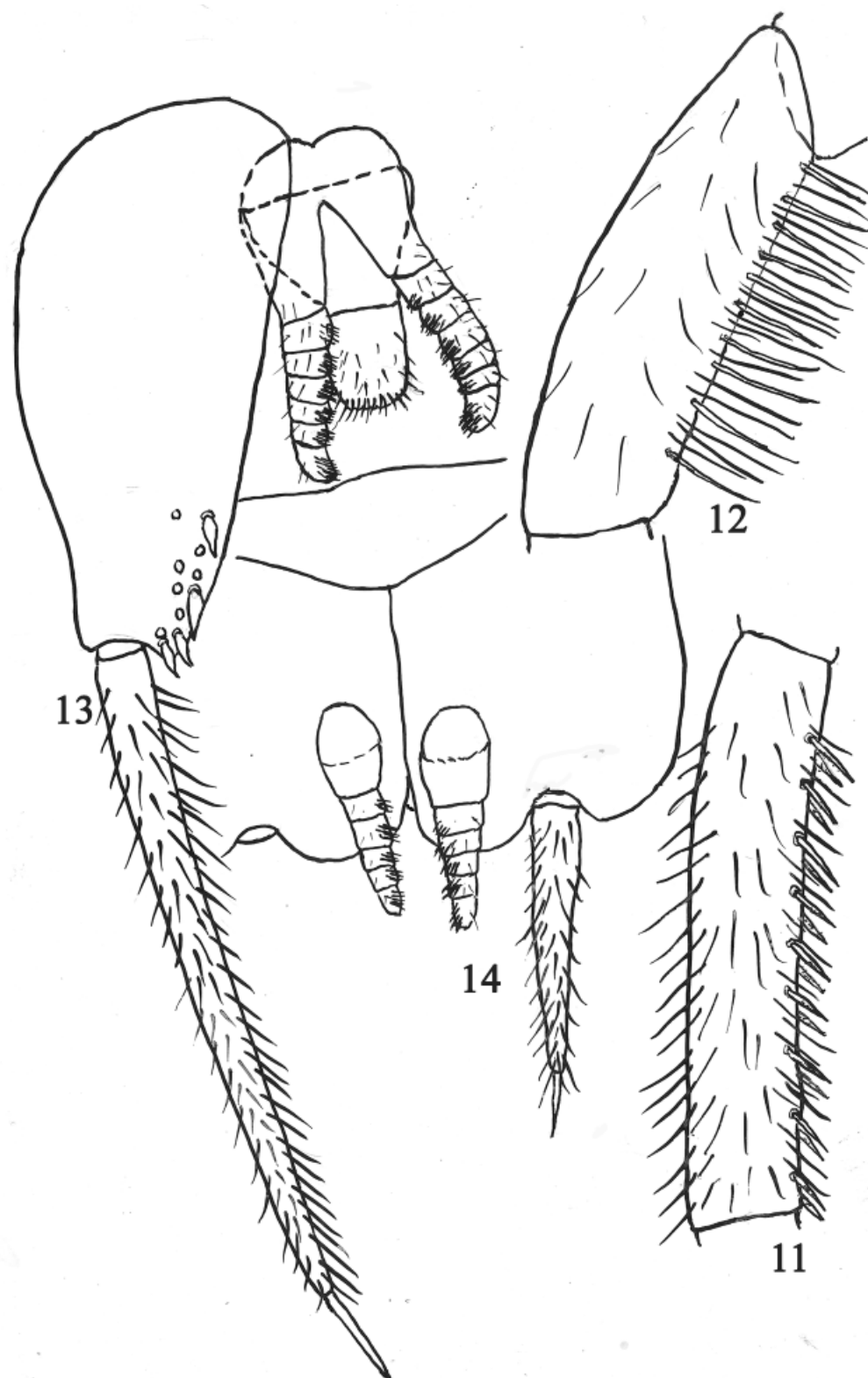
Таблица 3. Отношения длин стернитов, кокситов, грифельков (без апикальных игл) и апикальных игл; вершинные углы стернитов и количество макрохет на кокситах и тергитах брюшка у самца *Silvestrichiloides kyrgyzicus* sp.n.

Urites	Urosternite / urocoxite	Stylus / urocoxite	Apical spine / stylus	Posterior angle of urosternite, degrees	No. of macrochaetae	
					urocoxite	urotergite
I	0.38	–	–	115	0	0
II	0.54	0.66	0.22	100	0	0
III	0.54	0.66	0.24	100	0	0 + 1
IV	0.54	0.53	0.26	97	0	3 + 4
V	0.54	0.53	0.24	95	0	4 + 5
VI	0.54	0.53	0.28	94	0	7 + 7
VII	0.53	0.55	0.28	94	0	7 + 7
VIII	0.31	0.68	0.23	118	0	9 + 10
IX	–	1.22	0.16	–	11 + 11	8 + 9
X	–	–	–	–	–	5 + 5



Figs 6–10. *Silvestrichiloides kyrgyzicus* sp.n., holotype (male): 6 — tarsus, tibia and femur of fore leg, external surface; 7 — fore femur, internal surface; 8 — tarsus and tibia of middle leg; 9 — middle femur, internal surface; 10 — hind tarsus. Scale bar: 0.1 mm.

Рис. 6–10. *Silvestrichiloides kyrgyzicus* sp.n., голотип (самец): 6 — лапка, голень и бедро передней ноги, внешняя поверхность; 7 — переднее бедро, внутренняя поверхность; 8 — лапка и голень средней ноги; 9 — среднее бедро, внутренняя поверхность; 10 — задняя лапка. Масштабные линейки: 0,1 мм.



Figs 11–14. *Silvestrichiloides kyrgyzicus* sp.n., holotype (male): 11 — hind tibia; 12 — hind femur; 13 — urocoxite IX, with parameres and penis; 14 — urosternite and urocoxites (part) VIII with parameres. Scale bar: 0.1 mm.

Рис. 11–14. *Silvestrichiloides kyrgyzicus* sp.n., голотип (самец): 11 — задняя голень; 12 — заднее бедро; 13 — урококсит IX, с параметрами и пенисом; 14 — уростернит с урококситами (часть) VIII и передними параметрами. Масштабные линейки: 0,1 мм.

Table 4. Main morphological differences between males of *Silvestrichiloides kyrgyzicus* sp.n. and its closest congeners (after Kaplin [1982, 2021]).**Таблица 4.** Основные морфологические различия между самцами *Silvestrichiloides kyrgyzicus* sp.n. и их ближайшими родственниками (по: Kaplin [1982, 2021]).

Morphological characters	<i>S. gussakovskii</i> (Kaplin, 1982)	<i>S. berkarensis</i> Kaplin, 2021	<i>S. kyrgyzicus</i> sp.n.
Ratio of width to length of paired ocellus	2.3	1.7	2.5
Ratio of length to width of apical palpomere of labial palp	0.57	0.82	0.77
Ratio of lengths of apical and preapical palpomeres of maxillary palp	0.81	0.90	0.74
Number of hyaline spines on dorsal surface of 5th palpomere of maxillary palp	5–6	3	4–5
Ratio of length to width of fore femur	1.90	1.80	2.04
Ratio of lengths of urostylus (without apical spines) and urocoxite IX	1.45	1.30	1.22
Inner sublateral hyaline spines on urocoxites IX	7–9 + 7–9	9–10 + 9–10	11 + 11
Number of divisions in parameres VIII	1 + 6	1 + 3–4	1 + 5

parameres of urocoxites IX to width of distal division of penis about 2.3. Basal division of penis about 1.26 times as long as its distal division.

ETYMOLOGY. The name of the new species derives from the name of its type locality (Kyrgyzia).

COMPARATIVE REMARKS. *Silvestrichiloides kyrgyzicus* sp.n. differs from other species of this genus in the structure of paired ocellus, maxillary and labial palps, legs, urostyles and urocoxites IX, parameres VIII (Table 4).

A KEY TO THE SPECIES OF THE GENUS *SILVESTRICHILOIDES*
MENDES, 1990

- 1 (7) Females.
- 2 (3) Number of ovipositor divisions about 38, number of digging spines on posterior gonapophysis 7, ratio of length to width of apical palpomere of labial palp about 0.76. — Kazakhstan, Turkestan Region; Tajikistan, Nurabad District *S. beckeri* (Paclt, 1960)
- 3 (2) Number of ovipositor divisions less than 38, number of digging spines on posterior gonapophysis less than 7, ratio of length to width of apical palpomere of labial palp more than 0.76.
- 4 (5) Number of ovipositor divisions 27–28, number of digging spines on posterior gonapophysis 4–5, ratio of length to width of apical palpomere of labial palp about 1.20. — Kazakhstan, Zhambyl Region, Zhualy District *S. berkarensis* Kaplin, 2021
- 5 (6) Number of ovipositor divisions 28–30, number of digging spines on posterior gonapophysis 5, ratio of length to width of apical palpomere of labial palp about 1.07. — Uzbekistan, Babatag *S. asiaticus* Kaplin, 1999
- 6 (5) Number of ovipositor divisions 36–37, number of digging spines on posterior gonapophysis 6, ratio of length to width of apical palpomere of labial palp about 0.93. — Tajikistan, Kondara Gorge *S. gussakovskii* (Kaplin, 1982)
- 7 (1) Males.
- 8 (9) Ratio of length to width of apical palpomere of labial palp about 0.60 *S. beckeri* (Paclt, 1960).
- 9 (8) Ratio of length to width of apical palpomere of labial palp more than 0.60.

10 (13) Ratio of length to width of apical palpomere of labial palp about 0.8. Ratio of lengths of urostylus (without apical spines) and urocoxite IX 1.2–1.3. Mandibles with four distal teeth. Number of divisions in parameres VIII 1 + 3–5.

11 (12) Ratio of width to length of paired ocellus 1.7. Number of divisions in parameres VIII 1 + 3–4 *S. berkarensis* Kaplin, 2021

12 (11) Ratio of width to length of paired ocellus 2.5. Number of divisions in parameres VIII 1 + 5. — Kyrgyzstan: Jalal-Abad Region *S. kyrgyzicus* sp.n.

13 (10) Ratio of width to length of paired ocellus 2.3. Ratio of length to width of apical palpomere of labial palp about 0.57. Ratio of lengths of urostylus (without apical spines) and urocoxite IX 1.45. Mandibles only with three clearly expressed distal teeth. Number of divisions in parameres VIII 1 + 6 *S. gussakovskii* (Kaplin, 1982)

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