

HYPOGASTRURA POMORSKII SP. N.
FROM KYRGYZSTAN AND NOTES
ON THE RELATED SPECIES *H. TATRICA* (STACH, 1949)
(COLLEMBOLA: HYPOGASTRURIDAE)

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Hypogastrura pomorskii sp. n. is described from Kyrgyzstan. The new species belongs to the *H. sahlbergi* group and can be easily distinguished from its relatives by the lobed apical vesicle on antennal segment IV; the thin, usually pointed, sometimes indistinctly truncate or clavate tibiotarsal apical seta A_1 , equal to or shorter than the inner edge of the claws; and a ratio dens/mucro of 4–5.5. Additional morphological data on the related species *Hypogastrura tatrlica* STACH, 1949 are provided, based on inspection of numerous specimens from the type series.

Key words: taxonomy, springtails, *Hypogastrura pomorskii* sp. n., *Hypogastrura tatrlica*

INTRODUCTION

Hypogastrura BOURLET, 1839 is a large collembolan genus comprising 166 hemiedaphic species (BELLINGER *et al.* 2010). The genus is cosmopolitan, but the majority of species live in the temperate zone of the northern hemisphere. Examining the Kyrgyz material collected by ROMUALD J. POMORSKI in 2005–2006, I found specimens which generally resembled *Hypogastrura tatrlica* (STACH, 1949). Inspection of the type material revealed gaps in the description of *H. tatrlica*, and the Kyrgyz specimens turned out to represent a new species.

MATERIAL AND METHODS

The specimens were cleared in potassium hydroxide and chloral phenol, subsequently mounted on slides in Swan's medium (distilled water, chloral hydrate, glacial acetic acid, glucose, gum arabic), and studied under a Nikon Eclipse E600 phase contrast microscope. Figures were drawn with the camera lucida. The morphological terminology follows FJELLBERG (1984, 1998, 1999), CHRISTIANSEN & BELLINGER (1998) and THIBAUD *et al.* (2004).

Hypogastrura pomorskii sp. n.
(Figs 1–10)

Type material. Holotype: female on slide, Kyrgyzstan, Tien Shan, Barskoon valley, 3,550 m a.s.l., mosses near glacier, 26. VII. 2005, leg. R. J. POMORSKI. Paratypes: 18 females and 15 males on slides, 15 adults and 28 juveniles in alcohol, same data as holotype.

Other material examined. 13 males, 12 females, 3 juveniles on slides, Kyrgyzstan, Tien Shan, Ara-bel valley, 3,800m a.s.l., mosses, 14. VI. 2006, leg. R. J. POMORSKI. All material deposited in the collection of the Department of Biodiversity and Evolutionary Taxonomy, Wrocław University, Poland.

Description. Body length up to 1.5 mm. Colour dark bluish-black. Granulation fine and uniform, 8–12 granules between setae p_1 on abd. V (Fig. 2). Head with slightly protruding tegumentary humps between setae d_2 , sd_1 and oc_2 .

Chaetotaxy of head typical of the genus, with 2 + 2 v-setae. Setae short and smooth. Trunk sensilla (s) 2–3 times longer than ordinary setae, fine and smooth. Dorsal chaetotaxy of thoracic terga II–III and abdominal terga III–VI as in Figs 1–2 and 10. Thoracic tergum I with 3 + 3 setae. Thoracic tergum II with setae m_{1-6} . Thoracic tergum III with setae m_{1-2} , m_{4-6} . Setae p_3 and p_7 on abdominal tergum IV present, abdominal tergum V with setae p_2 . Subcoxae I, II, III with 1, 3–5, 3–5 setae respectively. Microsensillum on thoracic tergum II present. Thoracic and abdominal terga usually with some additional setae (plurichaetosis).

Antennal segment IV with weakly trilobed apical vesicle (Fig. 4), subapical organite (or), microsensillum (ms), 7–11 (usually 8–9) slightly curved long and moderately thick sensilla. Antennal III-organ with two long (outer) and two short (inner) curved sensilla (Fig. 5). Microsensillum on antennal segment III present. Antennal segment I with 8 setae (seta p' present).

Ocelli 8 + 8. Postantennal organ with 4 (rarely 5) lobes typical of the genus, equal to or slightly larger than the proximate ocellus. Large accessory boss present (Fig. 3). Labrum with 4 apical papillae. Labral setae 5, 5, 4, prelabrals 4. Maxillary head and labium of the *tullbergi* type. Outer lobe of maxilla with 2 sublobal hairs.

Tibiotarsi I, II, III with 19, 19, 18 setae respectively. Apical seta A_1 equal to or shorter than inner edge of claws, thin, usually pointed, sometimes indistinctly truncate or clavate. Claws with inner tooth. Empodial appendage with broad basal lamella and apical filament reaching to the middle of the claw (Fig. 6).

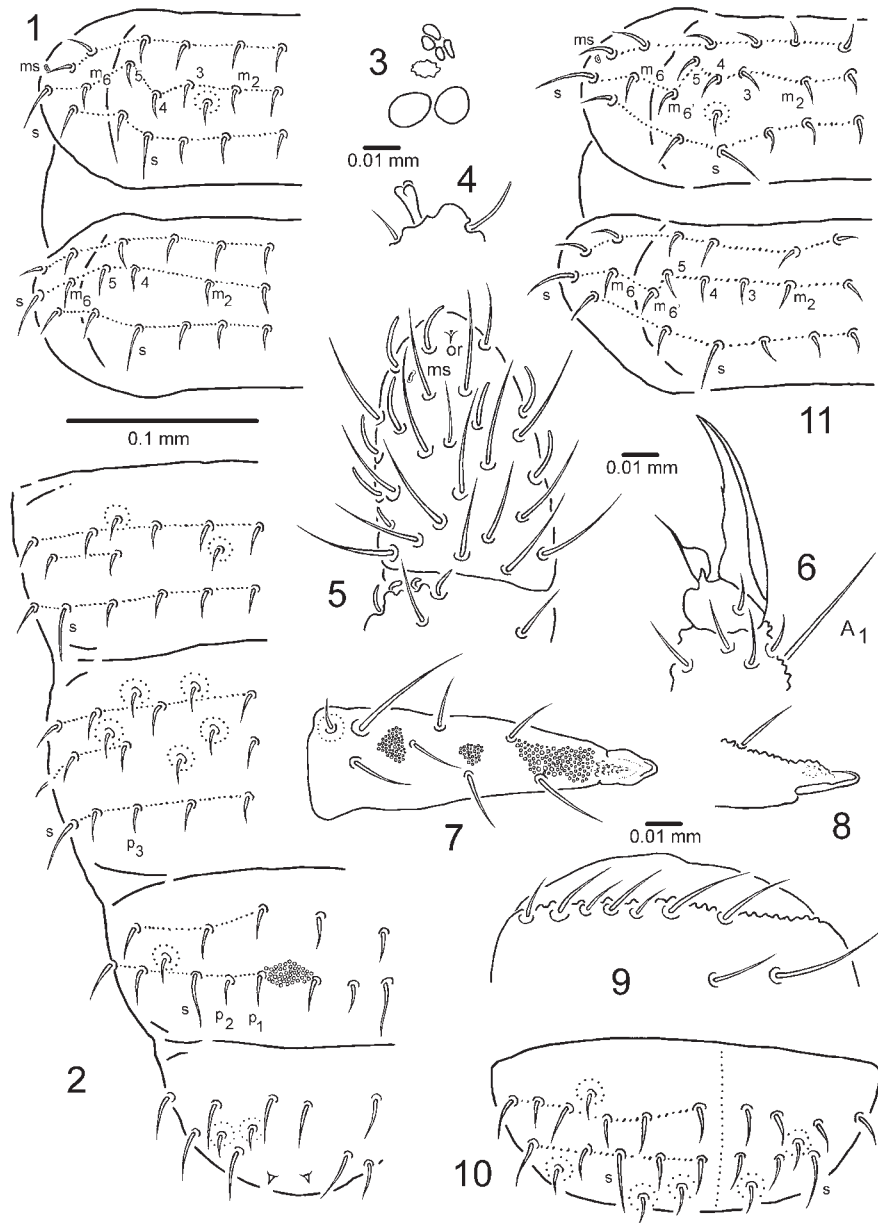
Ventral tube with 7–11 (usually 8–9) setae on each side (5–9 in upper and 2 in lower row) (Fig. 9). Retinaculum with 4 + 4 teeth.

Furca well developed. Dorsal side of dens with fine, uniform granulation and usually 7 setae, sometimes 1–2 additional setae proximal to the basal macrochaeta. Mucro short and wide with low lateral, apically fusing lamellae. Ratio dens/mucro 4–5.5 (Figs 7–8).

Anal spines very small, situated on low basal papillae (Fig. 2). Vento-lateral anal flaps with numerous additional setae.

Etymology. Dedicated to the collector of the type series ROMUALD J. POMORSKI, the excellent specialist in Collembola, who passed away in January, 2010.

Discussion. *Hypogastrura pomorskii* sp. n. belongs to the *sahlbergi* group defined as follows: well differentiated antennal segment IV sensilla arranged in two groups: 3 dorsal and 3 or usually more lateral, fine skin granulation (more than



Figs 1–11. 1–10 = *Hypogastrura pomorskii* sp. n. 1 = chaetotaxy of thoracic terga II–III; 2 = chaetotaxy of abdominal terga III–VI; 3 = postantennal organ, accessory boss and neighbour ocelli; 4 = apical vesicle on antennal segment IV; 5 = chaetotaxy of antennal segments III–IV; 6 = tibiotarsus I, claws and empodial appendage; 7 = dens and mucro; 8 = mucro, lateral view; 9 = chaetotaxy of ventral tubus; 10 = strongly plurichaetotic chaetotaxy of abdominal tergum V; 11 = *Hypogastrura tatrica* (STACH, 1949), chaetotaxy of thoracic terga II–III

6 granules between setae p_1 on abdominal tergum V), labrum with apical papillae, broad basal empodial lamella, no more than 1, 1, 1 tenent hairs, more than 4 + 4 setae on ventral tube, quadridentate retinaculum, dens with fine granulation and without prominent ventro-apical swelling, mucro without distinct subapical tooth (BABENKO & THIBAUD 1990, BABENKO & BULAVINTSEV 1993, BABENKO *et al.* 1994, THIBAUD *et al.* 2004, SKARŻYŃSKI 2009). The group includes *H. austriaca* BABENKO & THIBAUD, 1990 (Austria: Burgenland, BABENKO & THIBAUD 1990), *H. fjellbergi* BABENKO & BULAVINTSEV, 1993 (Russia: Novaya Zemlya, Taimyr, USA: Alaska, BABENKO & BULAVINTSEV 1993, BABENKO *et al.* 1994), *H. gennargentui* DALLAI, 1970 (Italy: Sardinia, DALLAI 1970), *H. sahlbergi* REUTER, 1895 (Europe, Palaearctic?, REUTER 1895, LINNANIEMI 1912, GISIN 1949, LEINAAS 1981, BABENKO *et al.* 1994), *H. szeptyckii* SKARŻYŃSKI, 2006 (Poland: Krakowsko-Wieluńska Upland, Pieniny Mountains, Carpathians, Ukraine: Czornohora, Carpathians, SKARŻYŃSKI 2006, SKARŻYŃSKI & BABENKO 2009), *H. tatratica* (STACH, 1949) (Poland: Tatra Mountains, Carpathians, Slovak Republic: Nizke Tatry Mountains, Carpathians, STACH 1949, NOSEK 1967) and *H. tchabensis* BABENKO, 1994 (Russia: foreland of Caucasus, BABENKO *et al.* 1994). Main differences between *H. pomorskii* sp. n. and other known species of the group are summarized in Table 1.

The new species is most similar to *H. tatratica* in having a lobed apical vesicle on antennal segment IV and nearly the same complete chaetotaxy affected by plurichaetosis. The main difference is the presence of setae m_6 on thoracic terga II–III and m_3 on thoracic tergum III in *H. tatratica*. Moreover, the two species can be distinguished by the different size and structure of the tibiotarsal tenent hairs which are thick, clavate and clearly longer than inner the edge of the claws in *H. tatratica*, the dens/mucro ratio (3–3.5 in *H. tatratica*); the size and number of cylindrical sensilla on antennal segment IV (7–9 in *H. tatratica*, rather short and thick); the number of setae on the ventral tube (7–9 in *H. tatratica*, usually 7–8); and the constant absence of additional setae proximal to the basal macrochaeta of the dens in *H. tatratica*.

The shape of the apical vesicle and the high number of well differentiated sensilla on antennal segment IV resemble the conditions in *H. aushensis* SKARŻYŃSKI & BABENKO, 2009 from the Caucasus and *H. madera* CHRISTIANSEN & BELLINGER, 1980 from North America which are members of related species groups, the *crassaegranulata* group sensu SKARŻYŃSKI and BABENKO (2009) and the *packardi* group sensu CHRISTIANSEN and BELLINGER (1998). They clearly differ in body granulation (*H. pomorskii* and *H. madera*: fine, *H. aushensis*: coarse); size and structure of tibiotarsal tenent hairs (thick, clavate and distinctly longer than the inner edge of the claws in *H. aushensis* and *H. madera*); the dens/mucro

Table 1. Morphological data for species of the *H. sahlbergi* group. Compiled from DALLAI (1970), BABENKO and THIBAUD (1990), BABENKO *et al.* (1994) and SKARŻYŃSKI (2006). Abbreviations: ant.4 – number of cylindrical sensilla on antennal segment IV, av – trilobed apical vesicle on antennal segment IV, A₁ – clavate tibiotarsal apical seta A₁, tcl – inner tooth of claws, e/cl – ratio empodium/claws, d/m – ratio dens/mucro, m₂ – presence of setae m₂ on thoracic tergum II, m₆ – presence of setae m₆ on thoracic terga II-III, vt – number of setae on one side of ventral tubus, plu – plurichaetosis.

Species	ant.4	av	A ₁	tcl	e/cl	d/m	m ₂	m ₆	Vt	Plu
<i>austriaca</i>	8–10	–	–/+	+	0.3	3–4?	?	?	10–15	+
<i>fjellbergi</i> *	7	–	+/-	+	0.5	3–4?	+	–	7–9	–
<i>gennargentui</i>	8	–	+	–	0.5	4	?	?	8	–
<i>pomorskii</i>	7–11	+	–/+	+	0.5	4–5.5	+	+	7–11	+
<i>sahlbergi</i>	8–10	–	+	+	0.5	3–4	+/-	–	8–11	–
<i>szeptyckii</i>	6–7	–	+	+	0.5	2.5–3.5	–	–	5	–
<i>tatrica</i>	7–9	+	+	+	0.5	3–3.5	+	+	7–9	+
<i>tchabensis</i>	10–12	–	+	+	0.5	4?	+	+	7–9	+

*Probably a cyclomorphic species, with a winter form having tooth-like granules and a ventro-apical swelling on the dens and a subapical tooth on the mucro

ratio (3–3.5 in *H. aushensis* and *H. madera*); the shape of the mucro (*H. pomorskii* and *H. madera* without subapical tooth, *H. aushensis* with a small subapical tooth); the number of ventral tube setae (*H. aushensis*: 5, *H. madera*: 4?); and a dens with large granules distally and a ventro-apical swelling in *H. madera* (CHRISTIANSEN & BELLINGER 1998, SKARŻYŃSKI & BABENKO 2009).

Hypogastrura tatrica (STACH, 1949) (Fig. 11)

Material examined: 73 syntypes on slides (formerly in alcohol), Tatra Mountains, “Za Mniczem” valley, near the summit of “Mnich II”, about 2,050m a.s.l., in great numbers under stones on the border of a snow field, 14. VII. 1925, leg. W. ROSZKOWSKI, deposited in the collection of the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Kraków, Poland.

H. tatrica is a nivicolous and oreophilous species known so far from the highest ranges of the Northern Carpathians (STACH 1949, NOSEK 1967). The redescription by BABENKO *et al.* (1994) was based on only a few syntypes from STACH’s collection. The investigation of numerous specimens yielded new morphological data. *H. tatrica* has – unique among *Hypogastrura* – a complete chaetotaxy of the thoracic terga II–III: setae m_{1–5} and both m₆ and m₆ setae are frequently present (Fig. 11). Plurichaetosis is striking: the abdominal terga, but also ventro-lateral

anal flaps and thoracic terga II–III bear additional setae. The number of ventral tube setae is 7–9 (usually 7–8), and the number of cylindrical sensilla on antennal segment IV likewise 7–9 (usually 7–8). Morphological characters of *H. tatrca* and other members of the *sahlbergi* group are presented in Table 1.

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