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NEW COLLEMBOLA SPECIES FROM THE FLOODPLAIN FORESTS OF THE TRANSCARPATHIAN LOWLAND (UKRAINE)

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New Collembola Species from the Floodplain Forests of the Transcarpathian Lowland (Ukraine). Kaprus¹ I. J., Tsalan J. V. — As a result of an ecological study of the springtails communities of floodplain oak forests (Transcarpathian Lowland), *Spinonychiurus epaphius* Kaprus¹ et Tsalan, sp. n. and *Tetracanthella pericarpatica* Kaprus¹ et Tsalan, sp. n. are collected and described. *S. epaphius* sp. n. belongs to species group of Onychiuridae with abdominal sternum III, divided into two subsegments. *A. T. pericarpatica* sp. n. new species is distinguished among similar taxa by reduced chaetotaxy of body.

Key words: Collembola, Onychiuridae, Isotomidae, new species, Transcarpathia, Ukraine.

Новые виды Collembola из пойменных лесов Закарпатской низменности (Украина). Капрус И. Я., Цалан Ю. В. — В результате экологических исследований сообществ ногохвосток в пойменных дубравах Закарпатской низменности собраны и описаны *Spinonychiurus epaphius* Капрус¹ et Tsalan, sp. n. и *Tetracanthella pericarpatica* Капрус¹ et Tsalan, sp. n. *S. epaphius* sp. n. принадлежит к группе видов Onychiuridae, имеющих два подсегмента на III стерните брюшка. Среди близких таксонов новый вид *Tetracanthella* выделяется редуцированной хетотаксией тела.

Ключевые слова: Collembola, Onychiuridae, Isotomidae, новый вид, Закарпатье, Украина.

Introduction

Springtails of flooded areas of Ukraine have been studied in the riparian forests (Kozlovsky et al., 2000; Bondatrenko-Borisova, Sandul, 2002; Tsalan, 2007) and bottom-land habitats of the Vereshchycia River (Kaprus¹, 1998). 125 species of springtails have been recorded as a result of our studies within the period 2005 to 2008 in the forest ecosystems of the Transcarpathian Lowland.

Among the material collected from flooded oak forests developed in lowland valley of Ukrainian Latorytzia River new interesting species from genera *Spinonychiurus* and *Tetracanthella* were found.

Material and methods

The specimens of new species were collected in wetland habitats developed in the lower reaches of Latorytzia River of the Transcarpathian Lowland. The description of natural conditions of this area under study was considered by R. Kish, E. Andrik and V. Mirutenko (2006).

The soil samples were taken by metal auger and extracted for five days in the modified Tulgren's apparatus. Material was fixed in 80% ethanol. The springtails were placed into Faure's solution and then identified.

The studied material is deposited in the State Natural History Museum of Ukrainian National Academy of Sciences, L'viv (SNHML).

In our study we used the symbols and abbreviations following L. Deharveng (1987) and R. J. Pomorski (1998).

Spinonychiurus Weiner, 1996

Diagnosis. Body shape cylindrical with or without anal spines. Postantennal organ with granulated vesicles. Sensilla on antennal organ IV slender, but well marked. Posterior pseudocelli on the head present. Number of pseudocelli on abdominal terga variable. Sensilla on the body well marked. Seta d0 on the head absent. Abdominal ter-

gum V with or without spines. Abdominal tergum VI with one or two medial chaetae. Abdominal sternum III divided into two subsegments. Furca reduced to finely granulated area with 2+2 setulae in two rows behind it. Tibiotarsi with distal whorl composed of 11 setae. Male ventral organ usually present, localized on ventral tube.

Taxonomic remarks. In the generic revision of Onychiurinae W. M. Weiner (1996) erected the genus *Spinonychiurus* with the type species *Onychiurus edinensis* Bagnall, 1935. This taxon has the following diagnostic characters: postantennal sense organ with compound vesicles, sensory clubs of antennal III sense organ is smooth and with ribs, sensilla on antennal segment IV is well marked, furca is reduced to a small area of fine granulation with 4 setulae arranged in two rows, seta d0 on the head and anal spines is present (Weiner, 1996). Examination of the type material of *Spinonychiurus edinensis* (Bagnall, 1935) allowed R. J. Pomorski to find other important features of this genus (personal communication). In particular, he discovered two subsegments on abdominal sternum III and the absence of d0 seta on the head. Together with R. J. Pomorski we consider these features to be the key in the separation of *Spinonychiurus* genus.

Later, *Onychiurus subedinensis* Arbea, Jordana, 1985 from Spain has been described. Due to above-mentioned diagnostic characters this species is related to *S. edinensis* and has to be included to the *Spinonychiurus* genus.

Because of structure of furcal area and distinct sensilla on the antennae this genus should be placed in the Thalassaphorurini Pomorski, 1998 tribe. *Spinonychiurus* Weiner, 1996 shares the absence of d0 seta on the head and the granulated vesicles in its postantennal sense organ with *Detriturus* Pomorski, 1998 and *Sensillonychiurus* Pomorski et Sveenkova, 2006, from which it differs in abdominal sternum III divided into 2 subsegments.

***Spinonychiurus epaphius* Kaprus' et Tsalan, sp. n. (fig. 1)**

Material examined. Holotype ♂, Ukraine, Transcarpathia district, Velyki Lazy village, near Latorytsa River, oak forest, soil, 14.04.2007 (Tsalan). Paratypes: 8 ♀ and 3 ♂, the same place as holotype (SNHML).

Diagnosis. Antennal segment IV with 5 slender, but well marked sensilla. Antennal III sense organ built of 5 guard setae, 5 papillae, 2 smooth sensory clubs with 5 ribs and 2 small sensory rods. Postantennal sense organ with 13–16 finely granulated vesicles. Pseudocellar formula dorsally: 5–6, 5 / 4–5, 8, 8–10 / 9–13, 9–12, 9–14, 9–14, 7–10; ventrally: 1/000/00000; all subcoxal with 4–5 pseudocelli and without parapseudocelli. Head without seta d0. Thoracic tergum I with 6 + 6 setae. Abdominal tergum IV with three medial unpaired setae. Furca reduced to small area of fine granulation with 2+2 posterior setulae arranged in two rows. Male ventral organ well developed only in adults with ductus ejaculatorius, situated on ventral tube, consisting of 3(4) + 3(4) thick, spine-like setae and on genital plate, consisting of 1 + 1 thick setae.

Description. Body length without antennae: males 0.79–0.96 mm, females 0.85–1.20 mm. Body white, cylindrical, without anal spines. Antennae approximately as long as head. Granulation of body uniform and fine, antennal bases not marked. Abdominal sternum III divided into two subsegments (fig. 1, 6).

Antennal segment IV with subapical organite and 5 slender, but well marked sensilla (fig. 1, 4). Microsensillum on antennal segment IV in latero-external position, situated on the same level with posterior setae row.

Antennal III sense organ consisting of 5 guard setae, 5 papillae, 2 smooth sensory clubs with 5 ribs and 2 small sensory rods (fig. 1, 2–4). Antennal segment III with a small microsensillum slightly below antennal organ III.

Postantennal sense organ relatively large, ca. 6.8 times as long as nearest pseudocellus with 13–16 finely granulated vesicles (fig. 1, 5).

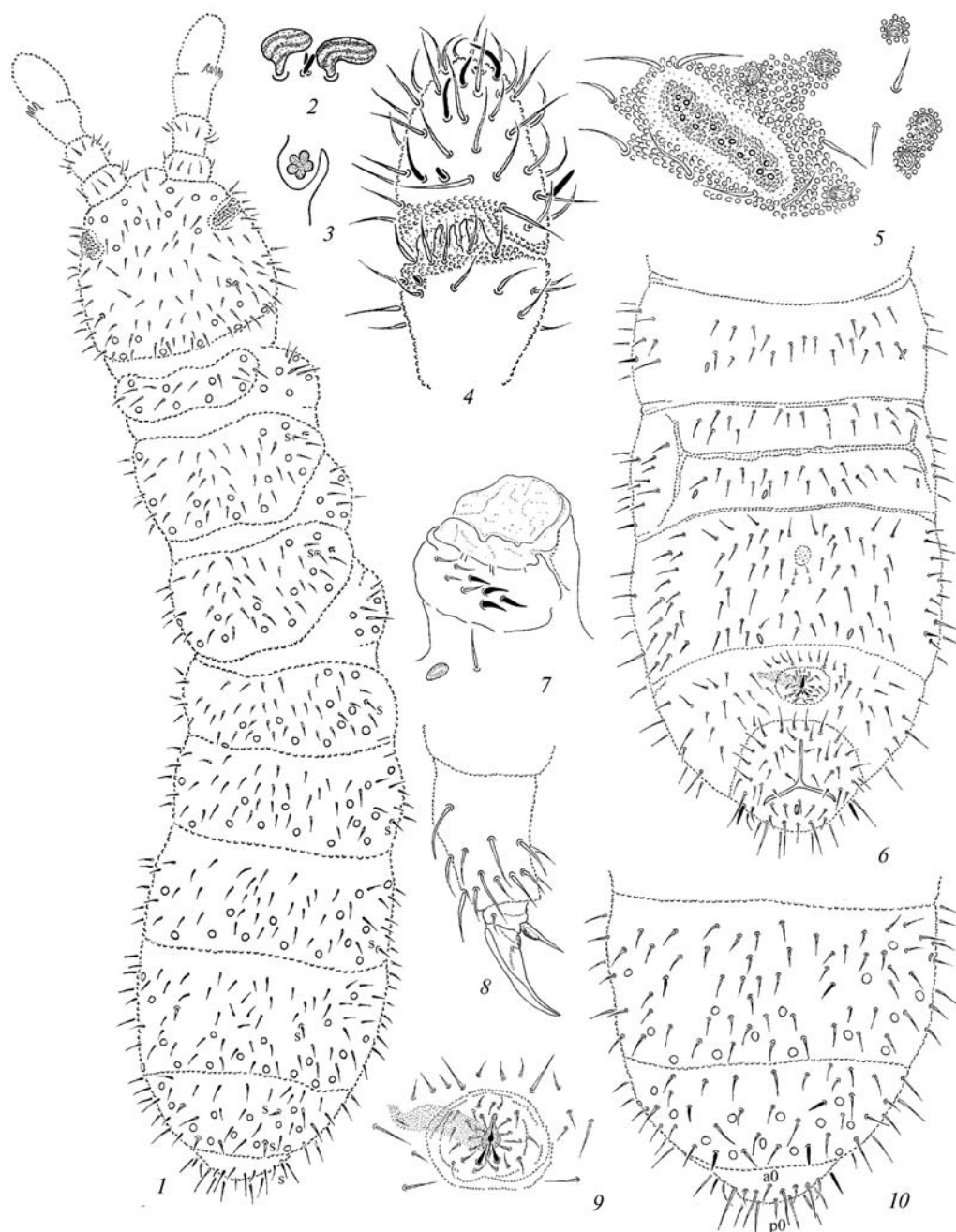


Fig. 1. *Spinonychiurus epaphius*: 1 — habitus and dorsal chaetotaxy; 2 — sensory clubs and sensory rods of antennal III sense organ; 3 — transversal section through sensory club and papilla of antennal III sense organ; 4 — antennal segments III and IV with antennal III sense organ; 5 — postantennal organ and anterior cephalic pseudocelli; 6 — chaetotaxy of abdominal sterna II–VI and localization of ventral parapseudocelli; 7 — ventral tube; 8 — tibiotarsal chaetotaxy and claw of leg III; 9 — male genital plate; 10 — chaetotaxy of abdominal terga IV, V and VI.

Рис. 1. *Spinonychiurus epaphius*: 1 — общий вид и дорсальная хетотаксия; 2 — сенсорные колбочки и сенсорные палочки антеннального органа на III сегменте; 3 — поперечное сечение через сенсорную колбочку и папиллу антеннального органа на III сегменте; 4 — III и IV сегменты усика с антеннальным органом; 5 — постантенный орган и ложные глазки в основании усиков; 6 — хетотаксия II–VI абдоминальных стернитов и локализация вентральных парасевдоцеллей; 7 — вентральная трубка; 8 — хетотаксия тибиятарзуса и коготок третьей ноги; 9 — генитальное поле самца; 10 — хетотаксия IV, V и VI абдоминальных тергитов.

Pseudocellar formula dorsally: 5–6, 5 / 4–5, 8, 8–10 / 9–13, 9–12, 9–14, 9–14, 7–10; ventrally: 1/000/00000; all subcoxal with 4–5 pseudocelli and without parapseudocelli (fig. 1, 1, 6, 10). Abdominal terga I–V with one medial unpaired pseudocellus. Formula of parapseudocelli ventrally: 2/000/212101 (fig. 1, 6). Labium A type. Maxillary outer lobe with two sublobal hairs.

Dorsal chaetotaxy nearly symmetric, not differentiated into macro- and microsetae (fig. 1, 1). Sensilla on dorsal side of body short and broadened. Sensillar formula dorsally 1/011/111121. Thoracic terga II and III with lateral microsensilla. Head without seta d0. Thoracic tergum I with 5–6+6 setae. Abdominal tergum IV with three medial unpaired setae. Abdominal tergum V with one medial unpaired seta (fig. 1, 10). Abdominal tergum VI with medial setae a0 and p0. Subcoxal of I, II, III pairs of legs with 4, 4, 4 setae, respectively (fig. 1, 1).

Ventral chaetotaxy of abdominal sterna II–VI as in fig. 1, 6. Between legs on pro-, meso- and metathorax 0+0, 1+1 and 1+1 setae, respectively. Tubus ventralis with 8–9+8–9 setae and with 1+1 setae at the base (fig. 1, 7). Furca reduced to a small area of fine granulation with 2+2 posterior setulae arranged in two rows (fig. 1, 6).

Claws without inner teeth. Empodial appendage as long as 1.7 inner edge of a claw, with small basal lamella (fig. 1, 8). Tibiotarsi with distal whorl composed of 11 setae. Male ventral organ well developed only in adults with ductus ejaculatorius, situated on ventral tube, consisting of 3(4) + 3(4) thick, spine-like setae and on the genital plate, consisting of 1+1 thick setae (fig. 1, 7, 9).

Remarks. *S. epaphius* sp. n. corresponds to the key diagnostic characters of the *Spinonychiurus* genus. This species differs distinctly in pseudocellar formula on ventral and dorsal side of body, in absence of anal spines and details of the body chaetotaxy from *S. edinensis* and *Spinonychiurus subedinensis* (Arbea, Jordana, 1985) **comb. n.** Thus, only three species indicated above we can attribute to the *Spinonychiurus* genus for today.

Biology. The species has been collected in wet habitats. It is bisexual.

Etymology. The species name derived from the Latin word “epaphius” — taxon that lives in flood-plain habitat.

Tetracanthella pericarpatica Kaprus' et Tsalan, sp. n. (fig. 2)

Material examined. Holotype ♂, Ukraine, Transcarpathia district, Velyki Lazy village, near Latorytza River, *Quercus* forest, litter, 28.10.2005 (Tsalan). Paratypes: 7 ♀, 3 ♂, and 4 juveniles, the same place as holotype (SNHML). Other material: 1 ♀, Ukraine, L'viv district, Lelechivka village, near Vereshyca River, mixed forest with *Pinus* and *Fagus*, litter, 28.05.1988 (Kaprus').

Diagnosis. 8+8 ocelli (G and H smaller than others), 2 prelabral setae and 4 sublobal hairs present. Macrochaetotaxy: 2, 2 / 2, 2, 3. Axial chaetom: 10 (12), 8 / 4, 4, 4, 4. Number of s-setae: 3, 3 / 2, 2, 2, 2, 4 (s), 1, 1 / 1, 1, 1, (ms). Seta on coxa I absent. Retinaculum with 3+3 teeth, no seta. Anterior subcoxa with 3–5 setae, posterior one with 2 (rarely 3) setae. Manubrium with 6–7+6–7 posterior setae. Dens with 2 posterior and 1 anterior setae. Mucro present.

Description. Total body length 1.20–1.35 mm. Bluish-black, including antennae. Polygons 1–3 times as long as mesoseta base on abdominal terga I–III but very large on abdominal tergum IV in some specimens. Canals between polygons well visible. Small smooth fields on abdominal tergum IV present (fig. 2, 4). 8+8 ocelli (G and H smaller than others) present (fig. 2, 1). Postantennal organ about 3.4 times longer than ocellus A. Two prelabral setae and 4 sublobal hairs present. The labial palp is typical for the genus. On the head 5 (4) pp—setae present (fig. 2, 1). Frontal seta ap absent.

Dorsal chaetotaxy reduced as in figure 2, 1. Macrosetae very long, blunt or slightly clavate. Macrochaetotaxy: 2, 2 / 2, 2, 3. Axial chaetotaxy: 10 (12), 8 / 4, 4, 4, 4. Number of s-setae: 3, 3 / 2, 2, 2, 2, 4 (s), 1, 1 / 1, 1, 1 (ms). On abdominal tergum

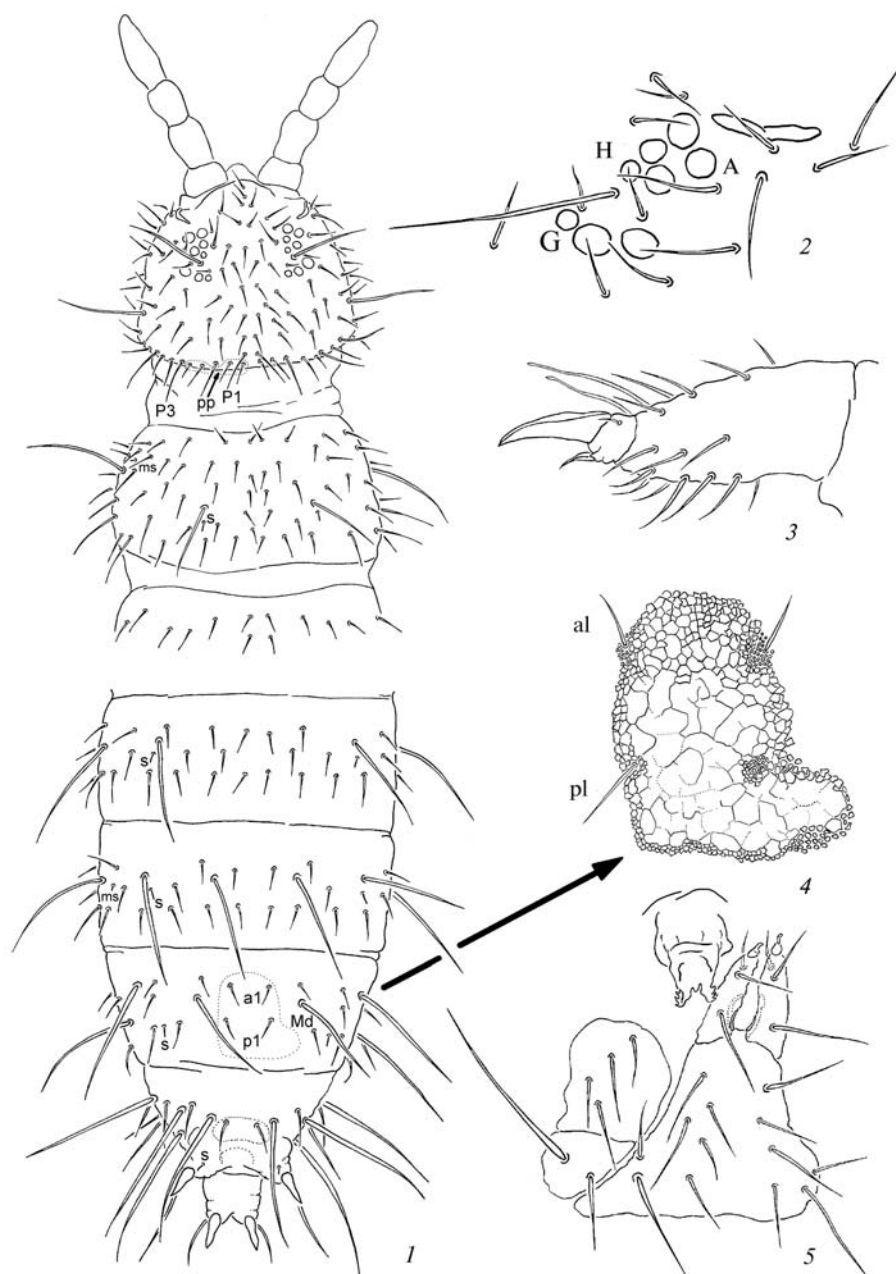


Fig. 2. *Tetracanthella pericarpatica*: 1 — habitus and dorsal chaetotaxy (without thoracic tergum III and abdominal tergum I); 2 — eyes and postantennal organ; 3 — tibiotarsal chaetotaxy and claw of leg III; 4 — reticulation of the integument in the axial area of abdominal tergum IV; 5 — furca, retinaculum and furcal subcoxae.

Рис. 2. *Tetracanthella pericarpatica*: 1 — общий вид и дорсальная хетотаксия (без III сегмента груди и I сегмента брюшка); 2 — глазки и постантенный орган; 3 — хетотаксия тибиятарзуса и коготок третьей ноги; 4 — ретикуляция кутикулы в аксиальной части IV абдоминального тергита; 5 — прыгательная вилка, зацепка и фуркальные субкокса.

IV, ratio Md : pl setae as 4.2–4.6. Medial microsetae situated behind the medial macrosetae on abdominal tergum V. 1+1 setae on thoracic sternum III present.

Seta on coxa I absent. Tibiotarsi dorsally with 1, 2, 2 clavate, ventrally with weakly differentiated tenent hairs. Tibiotarsi I, II, III with 21, 21 and 22 setae respectively.

Empodial appendage 2.4–2.7 times shorter than inner edge of the claw (fig. 2, 3). Retinaculum with 3+3 teeth, no seta. Anterior subcoxa with 3–5 setae, posterior one with 2 (rarely 3) setae (fig. 2, 5). Manubrium with 6–7+6–7 posterior setae. Dens with 2 posterior and 1 anterior setae, 1.1–1.3 times longer than claw III (fig. 2, 5). Mucro present, bidentate. Anal spines moderate, slightly curved, on rather tall papilla (fig. 2, 1).

Remarks. The new species has some characters of *wahlgreni*-group because of the macrochaetotaxy of thoracic terga II–III / abdominal terga I–III (2, 2 / 2, 2, 3), presence of 1+1 setae on thoracic sternum III, 2 prelabral setae and 4 sublobal hairs.

T. pericarpatica sp. n. is closely related to *Tetracanthella ksenemani* Nosek, 1964 and *Tetracanthella brevempodialis* Gisin, 1963. These three species have the same type of macrochaetotaxy of body and well developed furca (dens with 2 posterior and 1 anterior setae, mucro present). The new species differs from *T. ksenemani* in number of sublobal hairs, axial setae on abdominal tergum IV, in absence of seta on coxa I and also in chaetotaxy of furcal subcoxae and posterior side of manubrium. The new species differs from *T. brevempodialis* by larger body size, presence of 8+8 ocelli, 4 prelabral setae, 5 pp—setae on the head and 10 (12) axial setae on thoracic tergum II.

Biology. The species lives in wet forest. Bisexual.

Etymology. The species name derived from the Greek word “peri” — around and Latin word “carpaticus” — the Carpathians.

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