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New *Onychiurinae* from Crimea (*Collembola: Onychiuridae*)

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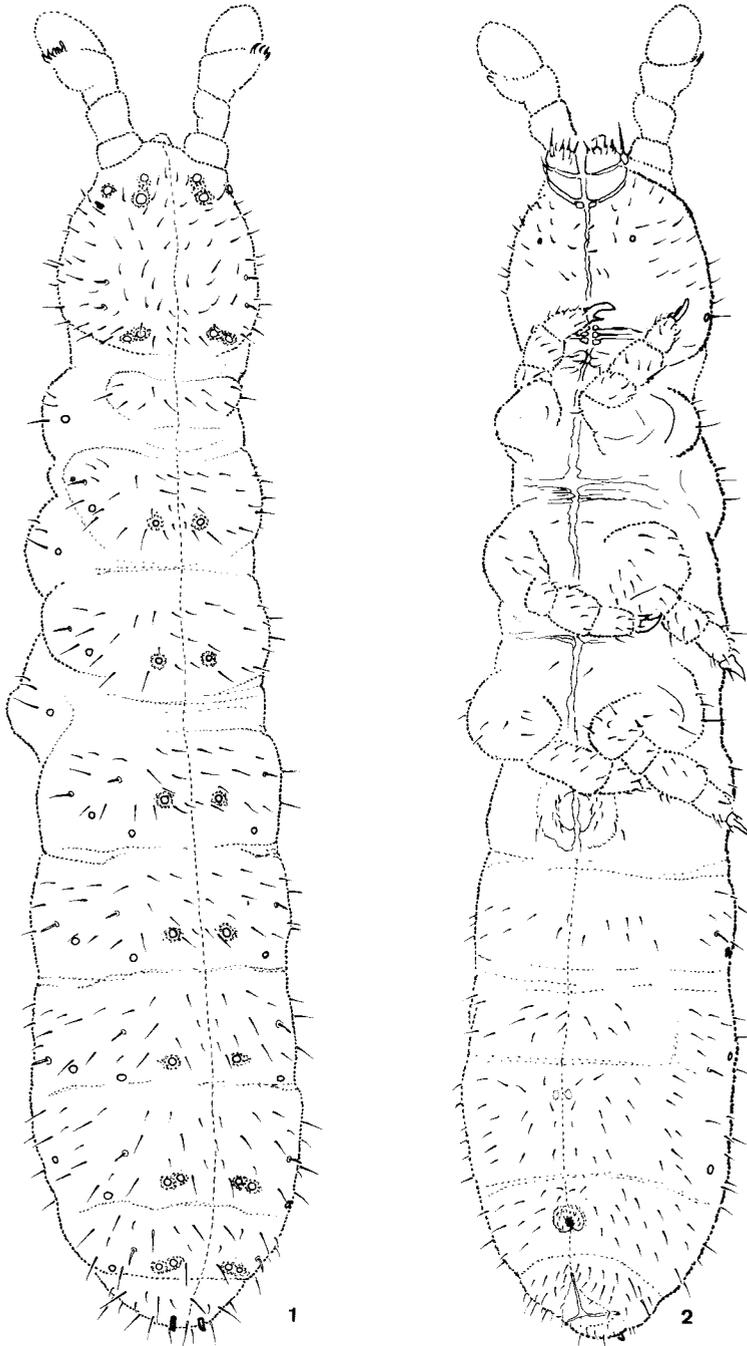
ABSTRACT. Two new taxa of *Onychiurinae*, collected in the Crimean Mountains, are described and illustrated. *Micraptorura daii* sp. n., lives in litter of beech forests and among roots of grasses on subalpine meadows. It is characterised by reduction of furca to an area of fine granulation with 1 + 1 setulae posteriorly (without cuticular furrow) and only 6 setae in distal verticil on tibiotarsi. Both characters are exceptional among *Oligaphorurinae*. I instar larva of *M. daii* sp. n. is described. *Protaphorura ajudagi* sp. n. commonly lives in humid litter of beech and oak forests. It belongs to a group of *Protaphorura* species without pseudocelli on subcoxae 1 and characterised by specific structure of male ventral organ.

Key words: Entomology, taxonomy, new species, *Collembola*, *Onychiuridae*, *Onychiurinae*, Ukraine, Crimea.

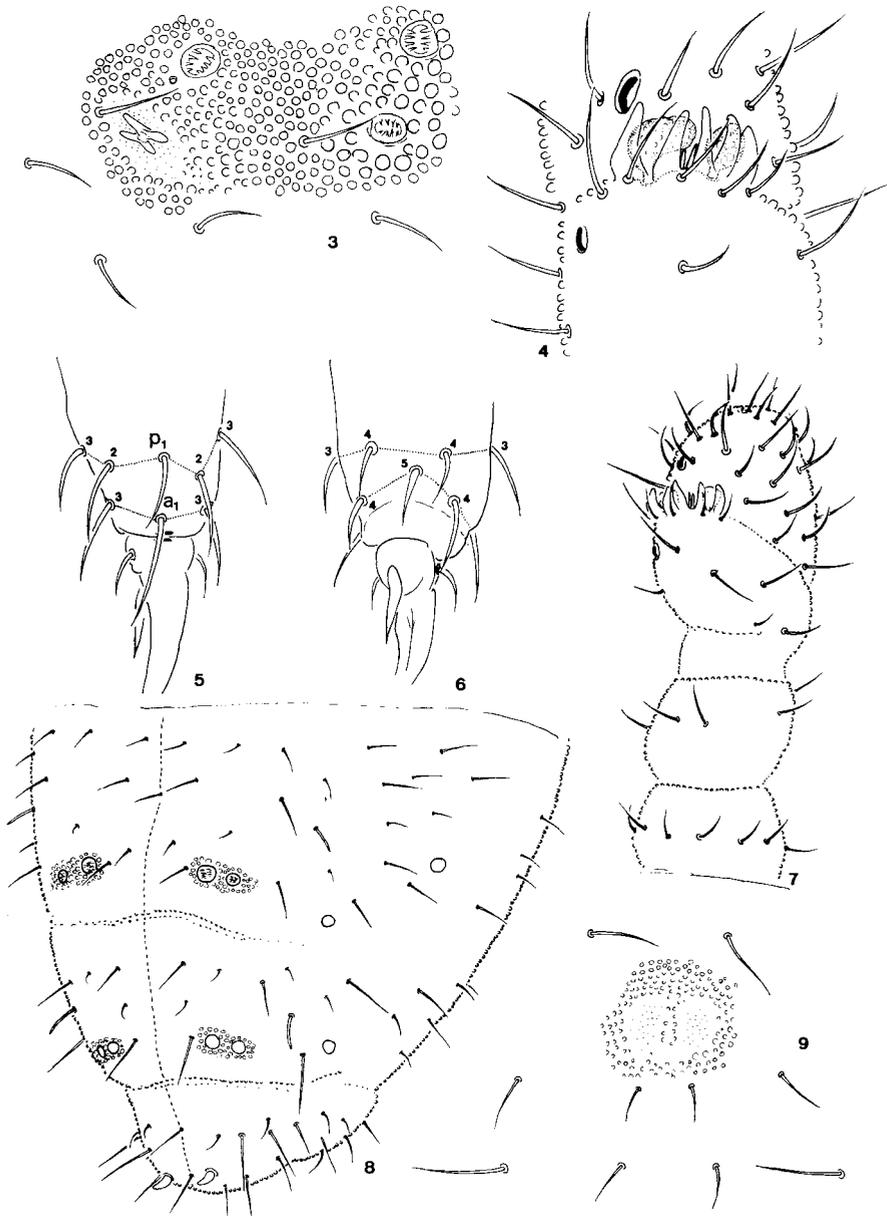
Micraptorura daii sp. n.

TYPE MATERIAL

Holotype - female on slide, paratypes - 5 males, 7 females on slides; litter and roots of grasses on mountain meadow, Nikitskij Pereval, ca. 1450 m a.s.l., neighbourhood of Jalta, Crimea, Ukraine, 12. 09. 1997, leg. R. J. POMORSKI, D. SKARŻYŃSKI, I. KAPRUS' (preserved in R. J. POMORSKI and D. SKARŻYŃSKI's collection).



1-2. *Micraphorura daii* sp. n.: 1 - dorsal chaetotaxy, position of ps; 2 - ventral chaetotaxy, position of ps



3-9. *Micraphorura daii* sp. n.: 3 - postantennal organ and pseudocelli; 4 - antennal III sense organ; 5-6 - chaetotaxy of tibitarsi I and II pairs of legs, respectively dorsal and ventral view; 7 - left antenna; 8 - chaetotaxy and position of pseudocelli of abdominal terga IV-VI; 9 - furcal area

OTHER MATERIAL

Numerous specimens in alcohol, 6 juvenile specimens (larvae of I and II instars) on slides; litter and roots of grasses on mountain meadow, Nikitskij Pereval, ca. 1450 m a.s.l., neighbourhood of Jalta, Crimea, Ukraine, 12. 09. 1997, leg. R. J. POMORSKI, D. SKARŻYŃSKI, I. KAPRUS', 6 spp. litter in beech forest, Partizanskoye near Gurzuf, 10. 09. 1997, Crimea, Ukraine, leg. R. J. POMORSKI, D. SKARŻYŃSKI, I. KAPRUS'.

DESCRIPTION

Colour in alcohol white. Size without antennae: males - 0.7 mm, females - 0.7-0.9 mm. Shape of body cylindrical, with bent anal spines, sunken without papillae (figs 1, 2, 8). Antennae as long as head, forming a club. Furca reduced to area of fine granulation with 1+1 setulae posteriorly (fig. 9). Granulation homogenous, with coarse granules around all dorsal pseudocelli, especially well visible on head and abd. terga IV-V. Usually 10-12 grains around each pseudocellus.

Antennal segment IV with subapical organite and relatively big microsensillum located in one row with posterior setae. On III antennal segment microsensillum localised laterally, slightly below AIIIIO (figs 4, 7).

AIIIIO consists of: 5 papillae; 2 sensory rods; 2 rather smooth, spherical sensory clubs (internal straight, external bigger and bent); 5 guard setae (figs 4, 7).

PAO located in small cuticular depression, slightly longer than pseudocellus, built of 1 three- or four-lobed vesicle. The lobes are elongated (fig. 3).

Pseudocellar formula (pso) dorsally 32/022/33343, ventrally 2/000/0000. Parapseudocelli invisible. Each subcoxal with 1 pseudocellus. Localisation of pso is presented in figs 1, 2 and 8.

Dorsal chaetotaxy symmetrical, setae relatively short, well differentiated into macrochaetae and microchaetae. In adults sensilla poorly marked - 2/011/22211. Dorsal chaetotaxy of head without seta d_0 . Abd. tergum IV with medial seta m_0 , abd. tergum VI with 2 medial setae. Only th. tergum II with lateral microsensillum. Subcoxae with 3, 3(4), 3(4) setae. Ventral abd. chaetotaxy as fig. 2, between legs on pro-, meso- and metathorax with 0, 1, 1 setae. Tubus ventralis usually with 7 + 7 setae and 2 + 2 setae at base.

Claw without denticle. Empodial appendage without distinct basal lamella, relatively short, length equal 1/2, inner edge of the claw (fig. 12). Distal verticil of setae on tibiotarsi asymmetrical, with 6 setae (figs 5, 6).

Male ventral organ absent.

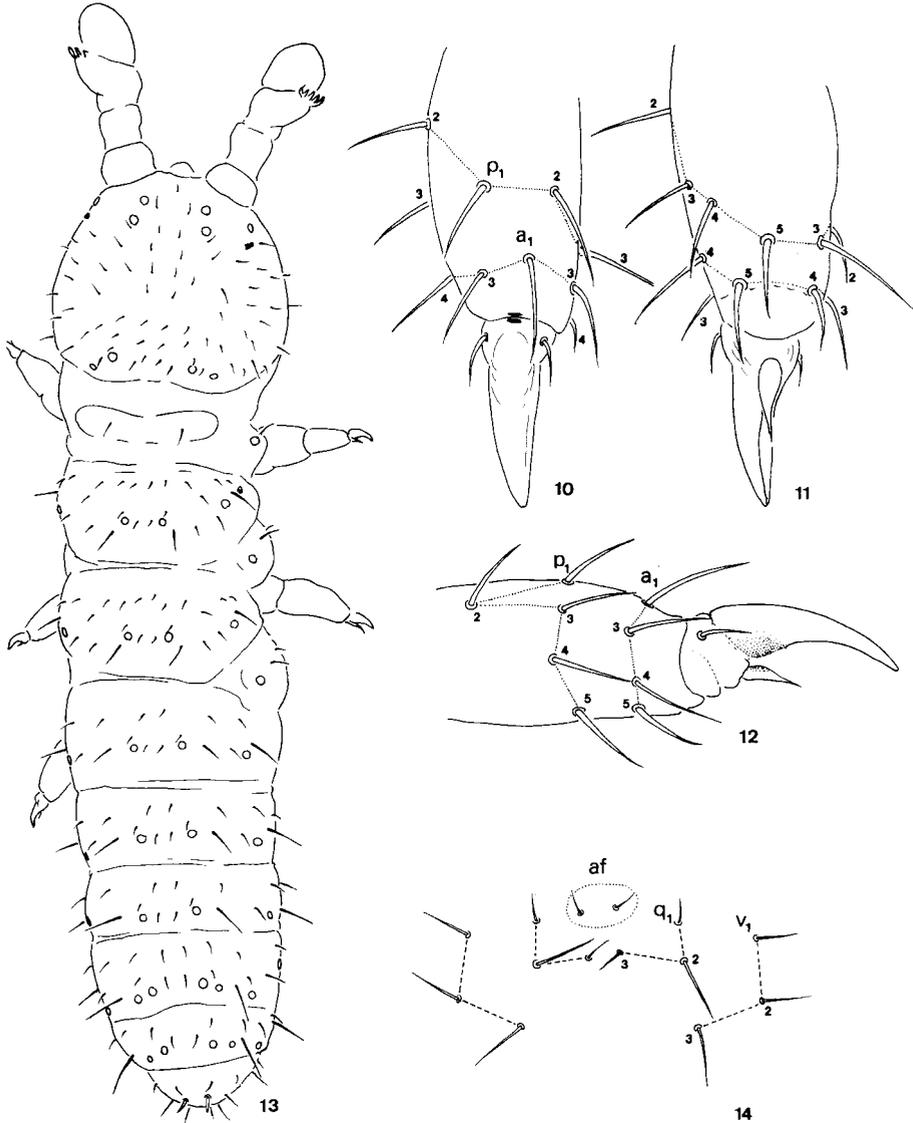
DESCRIPTION OF I INSTAR LARVA (fig. 13)

Length without antennae 0.38 mm.

Antennal segment IV free, with subapical organ and microsensillum located just above antennal III sense organ. Antennal segment III: p-chaetotaxy - 12 setae, a-chaetotaxy - 6 setae, of which 5 accompany antennal III sense organ. Antennal III sense organ built of 2 sensory rods, 2 sensory clubs and 5 papillae.

Microsensillum located slightly below antennal sense organ. Antennal segment II: p-chaetotaxy - 12 setae. Antennal segment I: p-chaetotaxy - 7 setae.

Chaetotaxy of head capsule: d-chaetotaxy - 4 setae + medial seta a_0 , sd-chaetotaxy - 4 setae (sd_1 and sd_6 absent), o-chaetotaxy - 2 setae, v-chaetotaxy - 2



10-14. *Micraphorura daii* sp. n.: 10-12 - chaetotaxy of tibitarsi III pair of leg, dorsal, ventral and lateral view; 13 - dorsal chaetotaxy and position pseudocelli of I instar larva; 14 - chaetotaxy of abdominal sternum IV of I instar larva, af - area furcalis

setae, c-chaetotaxy - 4 setae, p-chaetotaxy - 6 setae (p_3 - macrochaeta). Pseudocelli: 2 + 2 pseudocelli (*ac*) on area antennalis, 1 + 1 pseudocellus (*b*) slightly posterad, beyond area antennalis; 2 + 2 pseudocelli (*ab*) somewhat apart on posterior margin of head capsule, ventrally 2 + 2 pseudocelli (*qv*). Postantennal organ (PAO): small, consists of 3-4 simple vesicles.

Thoracic tergum I: 1 seta; thoracic tergum II: a-chaetotaxy - 4 setae, p-chaetotaxy - 5 setae, l-chaetotaxy - 3 setae + microsensillum; 2 + 2 pseudocelli (*ac*); thoracic tergum III: a-chaetotaxy - 4 setae, p-chaetotaxy - 5 setae, l-chaetotaxy - 3 setae, 2 + 2 pseudocelli (*ac*).

Leg of I pair: subcoxal - 1 pseudocellus + 1 seta; subcoxa2 - 3 setae; trochanter - 6 setae (t_7 absent); femur - 13 setae, f_2 - very short seta sensuality; tibiotarsus - 2 irregular verticils of setae: a-verticil - 7 setae; p-verticil - 6 setae.

Leg of II pair: subcoxal - 1 pseudocellus + 2 setae; subcoxa2 - 4 setae; trochanter - 6 setae (t_7 absent); femur - 13 setae, f_2 - seta sensuality; tibiotarsus - 2 irregular verticils of setae: a-verticil - 7 setae; p-verticil - 6 setae.

Leg of III pair: subcoxal - 1 pseudocellus + 2 setae; subcoxa2 - 4 setae; trochanter - 6 setae (t_7 absent); femur - 11 setae, f_2 - seta sensuality, setae f_8 and f_9 reduced; tibiotarsus - 2 irregular verticils of setae: a-verticil - 7 setae; p-verticil - 6 setae.

Because of the reduction and asymmetry, homology of the tibiotarsal setae with reference to other *Onychiurinae* is difficult to ascertain. An attempt at determination of tibiotarsal setae is presented in figs. 5, 6, 10, 11, 12.

Abdominal tergum I: a-chaetotaxy - 3 setae, p-chaetotaxy - 5 setae; 2 + 2 pseudocelli (*ac*). Abdominal tergum II: a-chaetotaxy - 4 setae, p-chaetotaxy - 5 setae; 2 + 2 pseudocelli (*ac*). Abdominal tergum III: a-chaetotaxy - 4 setae, p-chaetotaxy - 5 setae; 2 + 2 pseudocelli (*ac*). Abdominal tergum IV: a-chaetotaxy - 4 setae, p-chaetotaxy - 5 setae; 4 + 4 pseudocelli (*abcd*). Abdominal tergum V: a-chaetotaxy - 3 setae, p-chaetotaxy - 4 setae (p_3 displaced anterad); 3 pseudocelli (*abc*). Abdominal tergum VI: a-chaetotaxy - 4 setae, p-chaetotaxy - 2 setae (p_1 - anal spines).

Abdominal sternum I: tubus ventralis - 5 setae (3/2). Abdominal sternum II: 1 seta (*v*). Abdominal sternum III: 1 seta (*v*). Abdominal sternum IV: l-chaetotaxy - 3 setae, v-chaetotaxy - 3 setae, q-chaetotaxy - 3 setae, area furcalis with 1+1 setulae (fig. 14). Abdominal sternum V: 1 seta (*v*).

BIOLOGY

M. daii is bisexual species, living commonly among roots of grasses on subalpine meadows and in beech and pine forest litter in the Crimean Mountains.

DISCUSSION

Most morphological characters of the adults, especially the structure of postantennal organ and antennal III sense organ, lack of microsensillum on thoracic tergum III, chaetotaxy of abdominal tergum VI and the general structure

of furcal remnant place the new species within the tribe *Oligaphorurini* in the genus *Micraphorura* (BAGNALL, 1949). However, morphology of I instar larvae shows characters, which are absent in known larvae of *Oligaphorurini*, and even in all the subfamily *Onychiurinae* POMORSKI (1996). The following can be regarded as exceptional: number of setae in asymmetrical distal verticil on tibiotarsi reduced to 6, structure of furcal area (only 1+1 setulae below area of fine granulation) and 2 + 2 pseudocelli on I-III thoracic terga (full number of pseudocelli 3 + 3 is visible after second moult, just in III instar larvae). Such a set of characters can be a basis for placing the species in a new generic taxon, but in our opinion this would be premature. Provisionally the new species is classified in the genus *Micraphorura*.

M. daii sp. n. is closely related to *Oligaphorura hackeri* CHRISTIAN, 1986. Thanks to the courtesy of Prof. Erhard CHRISTIAN, we would examine of paratypes of this species (Kranichberghöhle b. Gloggnitz, Niederösterreich. leg. E. CHRISTIAN, 19.10. 1980, 3 of 6 paratypes - male and 2 females). The condition of the paratypes (fixed in alcohol) is not good. We checked only morphology of antennae, legs and partly dorsal chaetotaxy of the body. Unfortunately the structure of furcal remnant was impossible to observe, and the confirmation of the generic appurtenance of this species is necessary. However we found the following similarities and affinities. Both species have the same dorsal and ventral pseudocellar formulae, very similar structure of postantennal organ and antennal III sense organ. Distinct differences are visible in claws and tibiotarsi. *O. hackeri* has very long empodial appendage (as long as inner edge of claw) with broad basal lamella and 9 setae in distal verticil on tibiotarsi (CHRISTIAN 1986: fig. 1E). In *M. daii* sp. n. empodial appendage is short, without basal lamella and distal verticil of tibiotarsi includes only 6 setae.

DERIVATIO NOMINIS

The new species is dedicated to the Ukrainian Highway Patrol (DAI) for never ceasing protection and care for our security during our trip to Crimea.

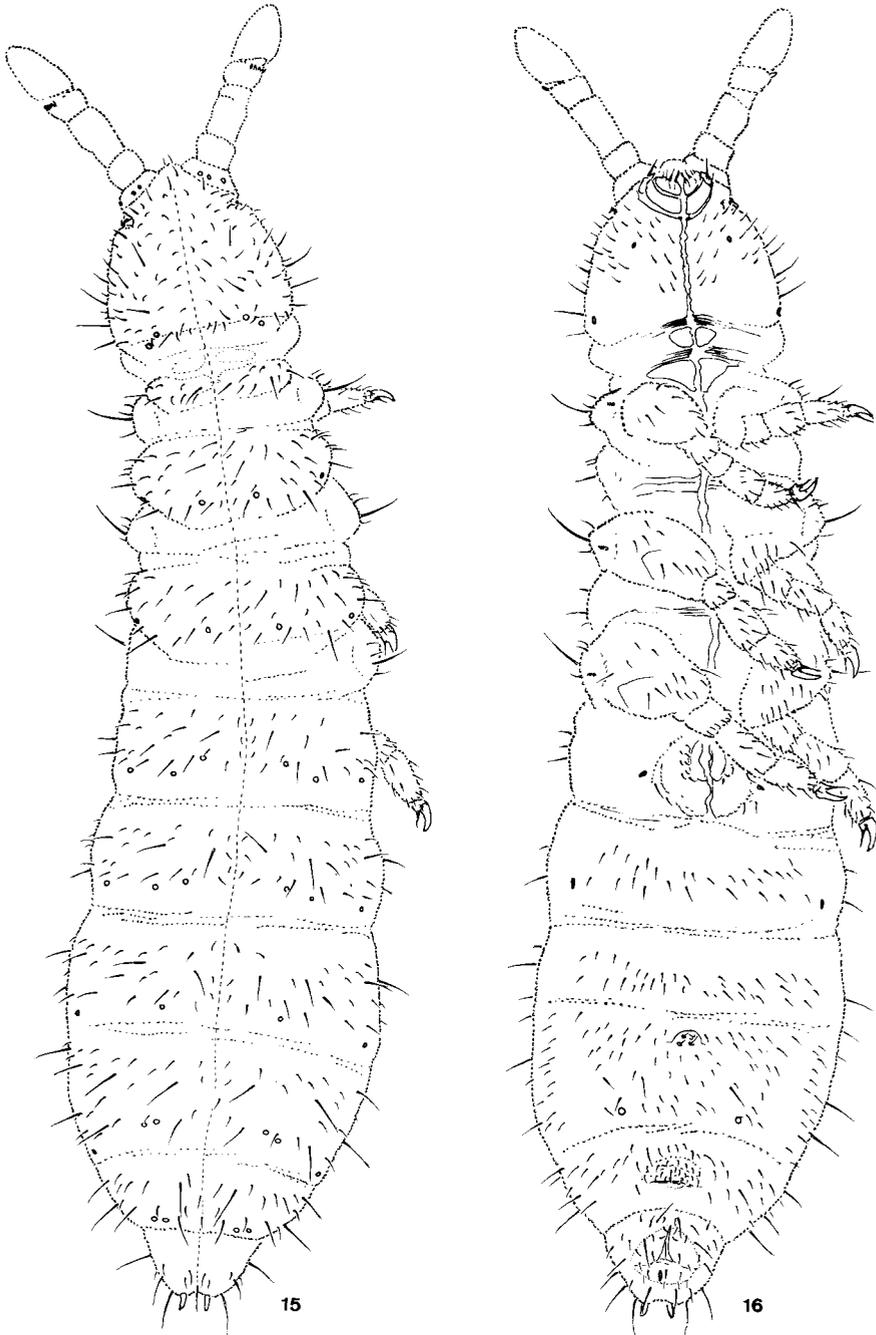
Protaphorura ajudagi sp. n.

TYPE MATERIAL

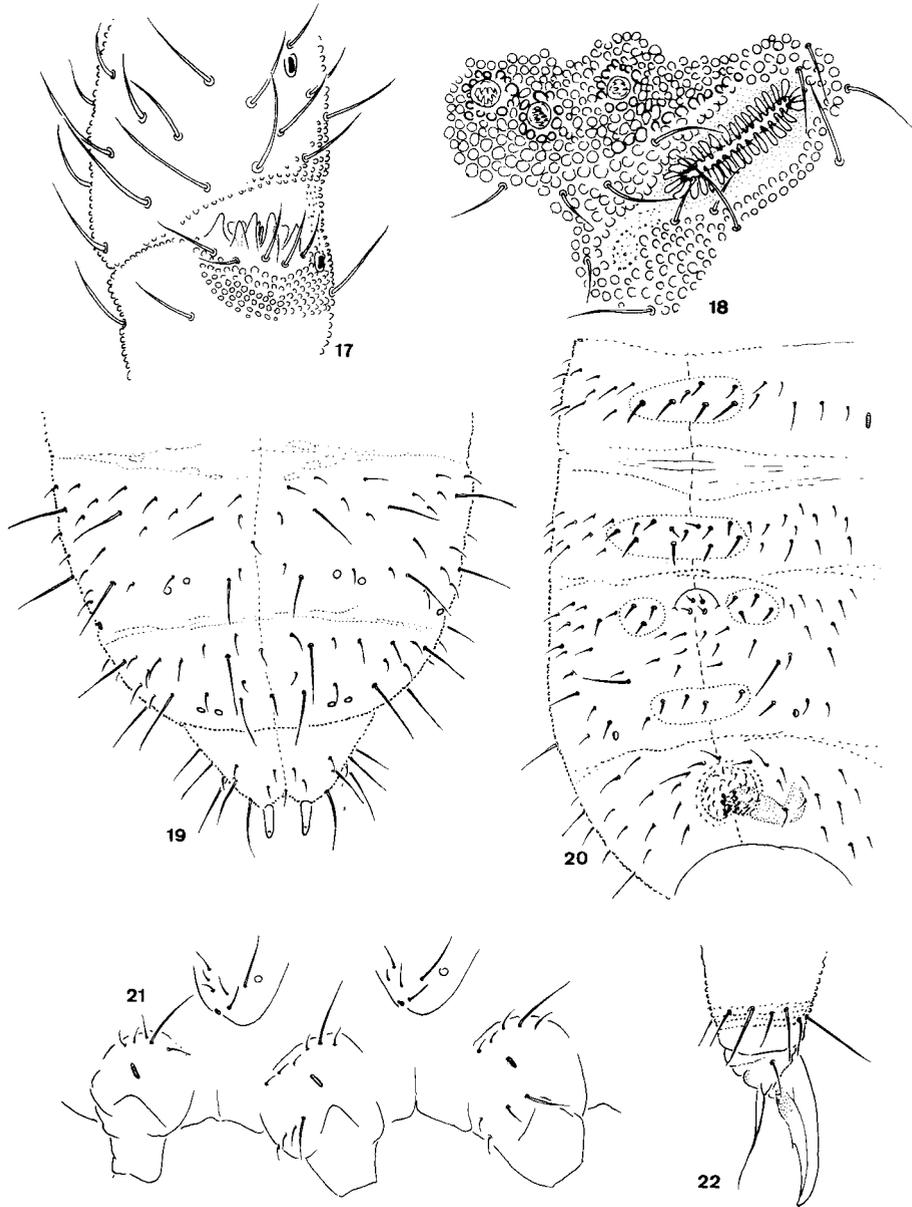
Holotype - female (on slide) and paratypes - 8 males, 6 females (on slides); Partizanskoye near Gurzuf, litter in beech forest, 9. 09. 1997, Crimea, Ukraine, leg. R. J. POMORSKI, D. SKARŻYŃSKI, I. KAPRUS' (preserved in R. J. POMORSKI and D. SKARŻYŃSKI's collection).

OTHER MATERIAL

16 spp. (males, females, juveniles on slides); litter in beech forest, Partizanskoye near Gurzuf, 9. 09. 1997, Crimea, Ukraine, leg. R. J. POMORSKI, D. SKARŻYŃSKI, I. KAPRUS'.



15-16. *Protaphorura ajudagi* sp. n.: 15 - dorsal chaetotaxy, position of pso; 16 - ventral chaetotaxy, position of pso and psx



17-22. *Protaphorura ajudagi* sp. n.: 17 - antennal III sense organ; 18 - postantennal organ and pseudocelli, 19 - chaetotaxy and position of pseudocelli of abdominal terga IV-VI; 20 - chaetotaxy of abdominal sterna II-V of adult male with ventral organ; 21 - position of psx on subcoxae I of all pair of legs; 22 - claw and distal verticil of setae on tibiotarsus of leg of III pair

DESCRIPTION

Colour in alcohol white. Length without antennae: holotype - 1.55, males - 1.3-1.4 mm, females 1.5-1.7 mm. Body shape cylindrical, with strong anal spines set on distinct papillae (figs 15, 16, 19). Antennae approximately as long as head. Furca reduced to cuticular pocket with 2+2 setulae (fig. 20). Granulation more or less uniform, distinct. Area antennalis well marked.

Antennal segment IV with a subapical organite. Microsensillum on antennal segment IV in latero-external position, c.1/3 length from the base. Antennal segment III with microsensillum slightly below antennal III sense organ (fig. 17). Thoracic terga II and III with microsensilla laterally.

Antennal III sense organ built of 5 guard setae, 2 sensory rods, 2 straight and smooth sensory clubs and 5 papillae (fig. 17).

Postantennal sense organ (PAO) consists of 30-36 simple vesicles (fig. 18).

Pseudocellar (pso) formula dorsally: 32/022/33232; ventrally: 2/000/0001(0); on subcoxa no pseudocelli. Formula of parapseudocelli (psx) ventrally: 0/000/110001^m (unpaired anal lobe with 1 psx), all subcoxa1 with 1 parapseudocellus. Position of pso and psx is presented in figs. 15, 16, 19, 20, 21.

Dorsal chaetotaxy, usually symmetrical, well differentiated into macrochaetae and microchaetae as in figs 15, 19. Head without seta d_0 , abd. tergum V with seta p_0 and p_1 setae, abd. tergum VI with 1 medial seta. Straight lines, passing through bases of short setae situated above anal spines, convergent (fig. 19). Between legs on pro-, meso- and metathorax no setae. Tubus ventralis with ca. 8 + 8 setae and 2 + 2 setae at base. Ventral abdominal chaetotaxy as in fig. 16.

Claws always with teethes. Empodial appendage narrow without basal lamella, relatively long. Appendage length equal to the inner edge of the claw. Tibiotarsi with symmetrical distal verticil, composed of 11 setae (fig. 22).

Male ventral organ present, fully developed only in adult males with ductus ejaculatorius (in subadults invisible), built of areas with thickened setae on abdominal sterna II, III and IV. On abdominal sterna II and III the areas are located in medial part and contained 2 + 2 relatively large setae with few shorter setae above. On abdominal sternum IV the areas with thickened short setae are located on both sides of furcal fold and medially above hind margin (fig. 20).

BIOLOGY

P. ajudagi sp. n. is associated with humid litter and moss of beech and oak forests of the Crimean Mountains. Bisexual.

DISCUSSION

The new species belongs to a group of *Protaphorura* species without pseudocelli on subcoxa1 and is closely related to *Protaphorura kopetdagi* Pomorski, 1994, described from Turkmenia. Both species are generally very similar in their body shape and structure of most of morphological characters, but they can be distinguishing by the number of pseudocelli on thoracic tergum III

(*P. ajudagi* - 2 + 2 pso, *P. kopetdagi* - 3 + 3 pso) and structure of the male ventral organ. Male ventral organ of *P. kopetdagi* includes only 2 + 2 thickened setae on abdominal sterna II and III respectively, while the same organ in *P. ajudagi*, besides 2 + 2 thickened setae on abdominal sterna II and III, includes additional areas of thickened setae on abdominal sternum IV.

DERIVATIO NOMINIS

The name is derived from "Ajudag", the name of a huge rock on the Black Sea coast near Gurzuf, which is an inspiration of poets and collembologists.

ACKNOWLEDGEMENTS

We wish to express our sincere thanks to Prof. Erhard CHRISTIAN for the loan of the type material of *O. hackeri*.

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REFERENCES

- CHRISTIAN, E., 1986. *Onychiurus (Oligaphorura) hackeri* n. sp., ein cavernicoler Springschwanz aus Niederösterreich (*Hexapoda: Collembola*). Ann. Naturhist. Mus. Wien, **87**, B: 177-180.
- POMORSKI, R. J., 1994. *Protaphorura kopetdagi* n. sp. from Turkmenia (*Collembola: Onychiuridae*). Genus, **5**, 3: 193-195.
- POMORSKI, R. J., 1996. The first instar larvae of *Onychiuridae* - a systematic study (*Collembola: Onychiuridae*). Genus, **7**, 1: 1-102.