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AGRAPHORURA SPELAEA N. SP. (COLLEMBOLA: ONYCHIURIDAE) FROM NORTH AMERICAN CAVES

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A new Agraphorura *species is described from North American caves (Idaho, USA) and seven additional taxa are referred to this genus. The new species can be distinguished from congeners by the unusual structure of antennal III sense organ. An identification key for all of the known species of* Agraphorura *is provided.*

The genus *Agraphorura* was established by Pomorski (1998) for *Onychiurus naglitshi* Gisin, 1960. Because of structure of furcal area he placed the genus in the tribe Thalassaphorurini and listed the following set of characters as diagnostic: lack of anal spines, 7 setae in distal whorl of tibiotarsi, granulated vesicles in postantennal organ and distinct sensilla on body and antenna. Among the known Onychiurinae the following can be classified into this genus. All of them were described originally in the genus *Onychiurus* Gervais, 1841. The biogeographic regions (Christiansen & Bellinger 1995) in which they occur are inserted in brackets.

Agraphorura naglitshi (Gisin, 1960) [2a, Europe]
A. portucalensis (Gama, 1964) comb. n. [5, Mediterranean]
A. gambiaria (Murphy, 1965) comb. n. [10, Sudanese Park Steppe]
A. xenonis (Ellis, 1976) comb. n. [5, Mediterranean]
A. eisi (Rusek, 1976) comb. n. [8, Pacific North American]
A. pseudojusti (Thibaud, Massaud, 1979) comb. n. [24, Caribbean]
A. acuitlapanensis (Palacios-Vargas, Deharveng, 1982) comb. n. [24, Caribbean]
A. fernandae (Oliveira, Thibaud, 1992) comb. n. [26, Amazon]
A. mariapetrae (Thibaud, 1993) comb. n [24, Caribbean]
A. spelaea n. sp., [8, Pacific North American]
While the genus is fairly widespread all of these species appear to be very localized and rare.

Agraphororа spelaea new species (Fig. 1 A-E, 2 A-G)

Description: Color white. Length (without antennae) of reproductive males – 0.85-0.95 mm. Body shape cylindrical (Fig. 1). Granulation of body surface generally uniform and fine, antennal bases not marked. Antennae nearly as long as head. Antennal segment IV with deeply sunken and relatively long subapical organite. Microsensillum on antennal segment IV large, situated in latero-external position at level of posterior row of setae (Fig. 1B). Antennal organ III with 5 guard setae, 5 very long, digital papillae, covering 2 large, bent and distinctly swollen sensory clubs. 2 sensory rods small, slightly bent, hidden under sensory clubs (Figs. 1B-1C). Microsensillum inserted slightly below antennal organ III. Postantennal organ relatively large and long with 20-21 granulated vesicles (Fig. 1D). Pseudocelli: dorsal 32/233/3335(4)3; ventral 3/011/1212**;** subcoxae 2/3/3. Parapseudocelli: ventral 0/000/101; femora 1/1/1. Labium AB type (Fig. 2B). Thoracic terga II and III with large lateral microsensilla. Dorsal chaetotaxy nearly symmetric, poorly differentiated into meso- and microchaetae (Fig. 1A). Sensilla very well differentiated and visible on body (Figs. 1E, 2A, 2G). Sensilla formula: dorsal 2/011/111121, ventral 2/000/0001, subcoxa2 0/0/1. Head with seta d_0. Thoracic tergum I with 4+4 setae, abdominal terga IV and V without medial setae, abdominal tergum VI with one medial seta. Subcoxae with 2/4/4 setae. No setae between legs on thorax I-III. Ventral tube without basal setae and 6+6 setae on the shaft. Claw I-III without inner tooth. Empodial appendage ends bluntly short of inner edge of the claw, with large, long basal lamella. Tibiotarsi I-III with distal whorl of 7 setae (Figs. 2C-2E). Male ventral organ absent. Furca reduced to small area of fine granulation located on abdominal sternum IV near border of abdominal sternum III, with 2+2 setulae arranged in two rows (Fig. 2F). Anal spines absent.

Holotype: repoductive male (mounted on slide), (9518) USA, Idaho, Blaine Co., Wagon Butte cave, 1475 m a.s.l., 13 VII 2000, from water pools and under rocks, leg. D. Hubbard (deposited in the collection of the Department of Systematic Zoology and Zoogeography, Wroclaw University). Paratypes: unreproductive male (mounted on slide), (9518), same data as holotype. Reproductive male (mounted on slide), (9517) Lincoln Co., Pot-o'-Gold cave, 1393 m a.s.l., 12 VII 2000, from surface of water pool, leg. D. Hubbard (deposited in the collection of the Illinois Natural History Survey and Department of Systematic Zoology and Zoogeography, Wroclaw University).

Derivatio nominis: The specific name is derived from Latin word "spelaeum" – cave, the habitat of the new species.

Remarks: The shape of furcal remnant, presence of 7 setae in the distal tibiotarsal whorl of setae and lack of anal spines shows that the new species belongs to the genus *Agraphorura*. Within the genus, it is characterized by the unusual structure of the antennal III sense organ and by the general shape and proportions of the unguiculus and empodial appendage. The

antennal III sense organ of *A. spelaea* has extremely enlarged sensory clubs. The claws of the new species are small and thin, while the empodial appendages are relatively large. Both characters are unique and probably are connected with the troglobitic mode of life. They never have been found in edaphic species of *Agraphorura*, even of the tribe Onychiurinae. *A. spelaea* n. sp. has an isolated position within the genus and probably is related to *A. pseudojusti* Thibaud & Massoud, 1979 and *A. mariapetrae* Thibaud, 1993 from Guadeloupe (Lesser Antilles). The new species and *A. pseudojusti* have 1+1 pseudocelli on thoracic sterna II and III, and a broad empodial lamella shows the similarity to *A. mariapetrae*.

Key to known species of *Agraphorura* (adults or subadults)

1. Antennal III sense organ with 5 papillae ..... 2.
-. Antennal III sense organ with 4 papillae ..... 5.

2. Abdominal terga I-III with 4+4 pseudocelli ..... *A. portucalensis* (Gama, 1964)
-. Abdominal terga I-III with 3+3 pseudocelli ..... 3.

3. Thoracic tergum I with 2+2 pseudocelli. Antennal III sense organ with 5 very long, digital papillae, covering 2 large, bent and distinctly swollen sensory clubs; 2 small sensory rods, softly bent, hidden under sensory clubs (Fig. 1C) ..... *A. spelaea* sp. n.
-. Thoracic tergum I with 1+1 pseudocelli. Antennal III sense organ with 5 typical papillae, 2 smooth sensory clubs and 2 typical sensory rods ..... 4.

4. Ventral pseudocellar formula 4/000/2222 ..... *A. xenonis* (Ellis, 1976)
-. Ventral pseudocellar formula 2/000/1212 ..... *A. naglitshi* (Gisin, 1960)

5. Thoracic tergum I with 4+4 setae ..... 6.
-. Thoracic tergum I with 5+5 setae ..... 7.

6. Ventral pseudocellar formula 3/000/0-1112, subcoxae with 1 pseudocellus, postantennal organ with 8 vesicles ..... *A. acuitlapanensis* (Palacios-Vargas, Deharveng, 1982)
-. Ventral pseudocellar formula 3/000/0212, subcoxae with 2 pseudocelli, postantennal organ with 11 vesicles ..... *A. gambiaria* (Murphy, 1965)

7. Abdominal sterna without pseudocelli ..... *A. eisi* (Rusek, 1976)
-. Abdominal sterna with pseudocelli ..... 8.

8. Ventral pseudocellar formula 3/011/122? ..... *A. pseudojusti* (Thibaud, Massoud, 1979)
-. Ventral pseudocellar formula 3/000/1212 ..... *A. mariapetrae* (Thibaud, 1993)
-. Ventral pseudocellar formula 3/000/2222 ..... *A. fernandae* (Oliveira, Thibaud, 1992)

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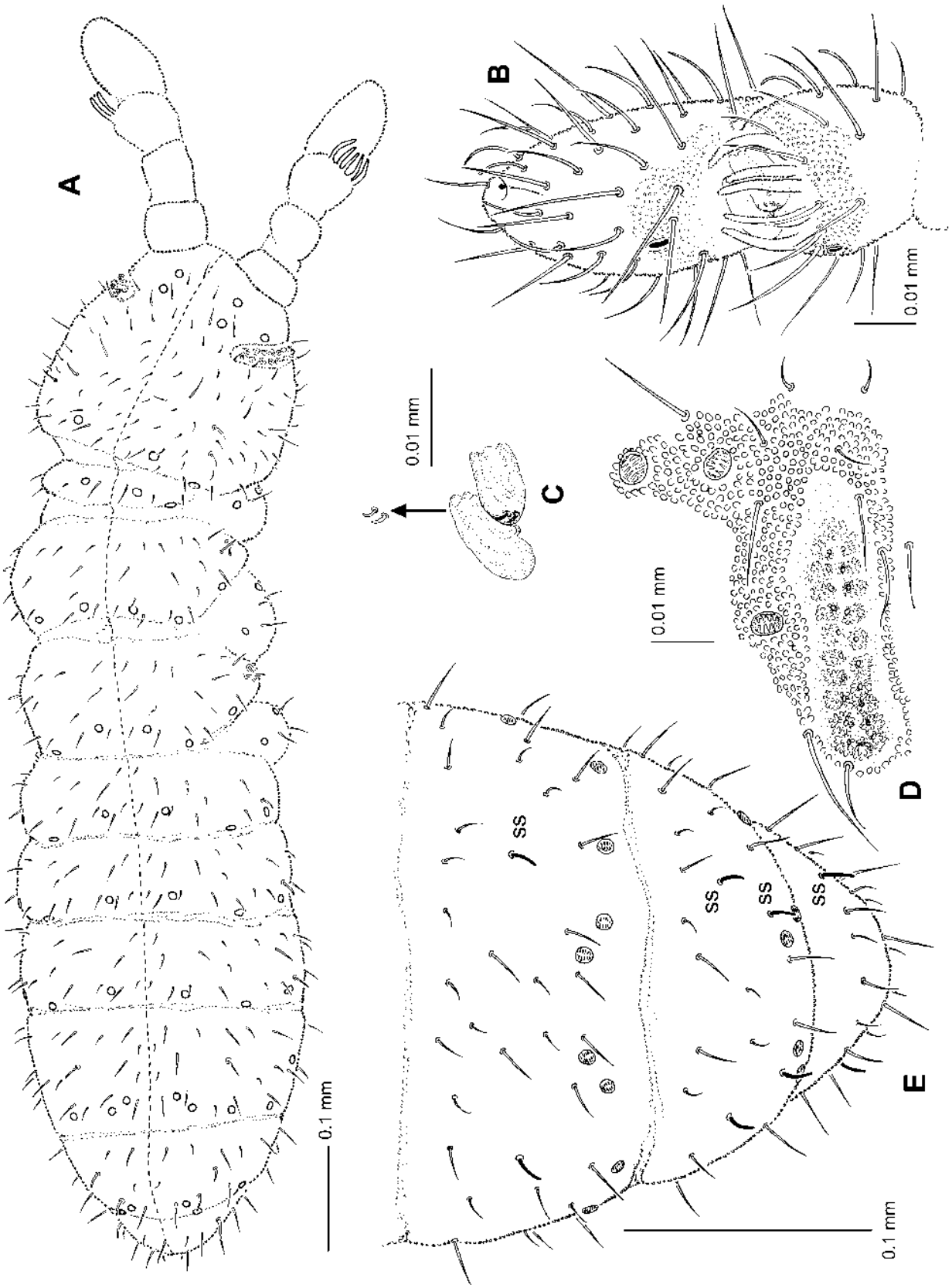

Figure 1. ***Agraphorura spelaea*** **sp. nov. A – habitus and dorsal chaetotaxy, B – antennomere III-IV with antennal III sense organ, C – antennal III sense organ – sensory clubs and sensory rods, D – postantennal organ and anterior cephalic pseudocelli, E – chaetotaxy of abdominal terga IV-VI, ss – sensilla.**

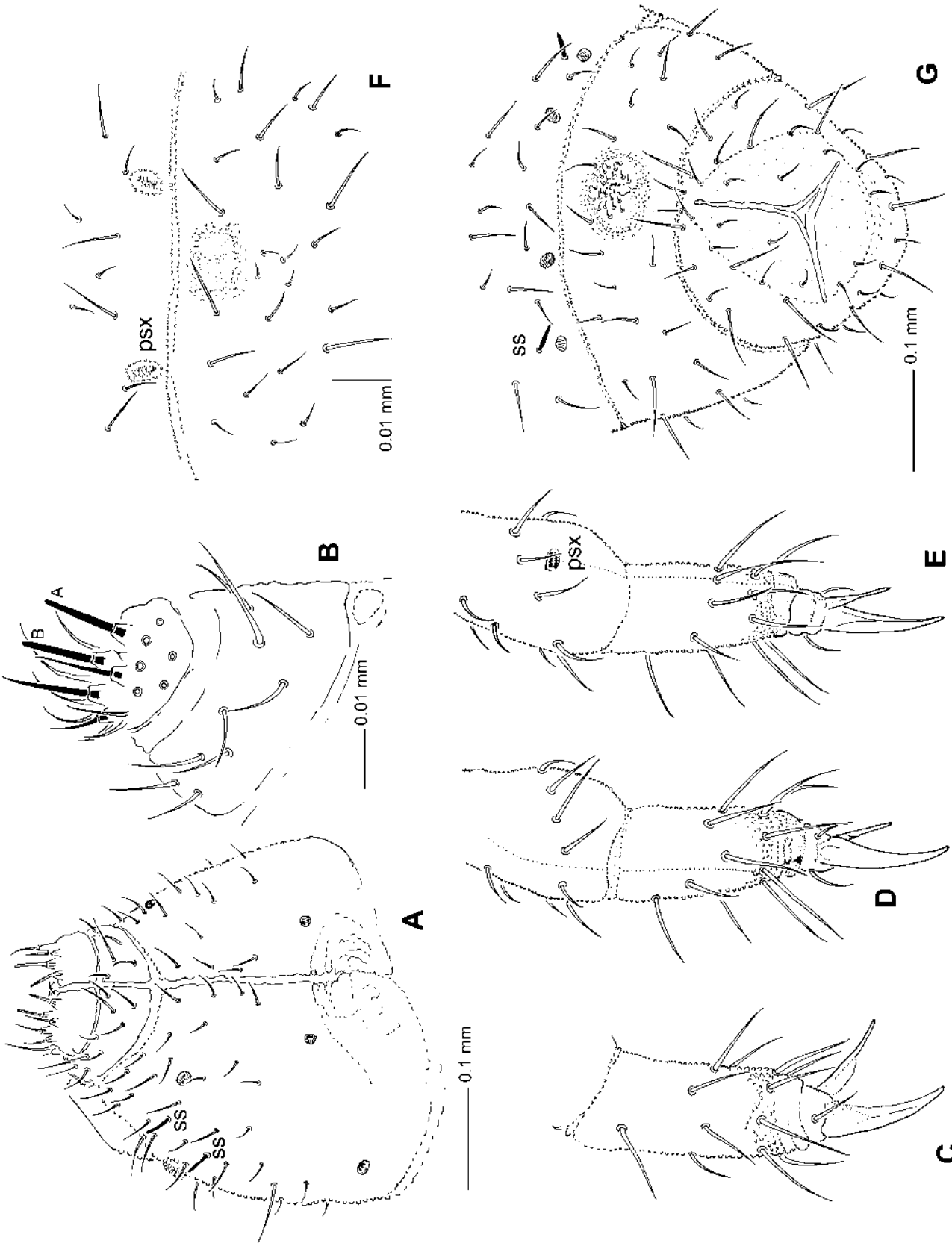

Figure 2. ***Agraphorura spelaea*** **sp. nov. A – ventral side of head, localization pseudocelli and chaetotaxy, ss – sensilla, B – right labium (AB type), C – tibiotarsal chaetotaxy and claw of hind leg, lateral view, D – femoral and tibiotarsal chaetotaxy of median leg , dorsal view, E – femoral and tibiotarsal chaetotaxy of median leg, ventral view, F – remnant of furca, psx – parapseudocelli, G – chaetotaxy of abdominal sterna IV-VI, ss – sensilla.**

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