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## New data on the genus *Hymenaphorura* (Collembola, Onychiuridae) from Europe

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European species of the genus *Hymenaphorura* BAGNALL, 1948 have been studied. Four new to science are described, one is re-described. Many localities of new species are recorded.

### INTRODUCTION

Within the genus *Hymenaphorura* BAGNALL, 1948 species close to *Hymenaphorura sibirica* (TULLBERG, 1876) are distinguished by the following characters:

1. Pseudocellar formula – 10/011/11112; arrangement of pseudocelli presented in Fig. 42,
2. Presence of «trochanteral pseudocelli»; arrangement presented in Fig. 42,
3. Presence of areas of coarser granulation, called granular areas, on dorsal body side,
4. Lack of medial chaetae on V abdominal tergite,
5. Presence of only two medial chaetae on VI abdominal tergite.

In my opinion this combination of characters justifies the «*sibirica* group», though in a sense narrower than that proposed by HANDSCHIN (1920).

In Europe the following nominal species are known at present which can be classified with the «*sibirica* group»:

*Hymenaphorura sibirica* (TULLBERG, 1876),  
*Hymenaphorura montana* (HANDSCHIN, 1920),  
*Hymenaphorura troglodytes* (BAGNALL, 1948),  
*Hymenaphorura subsimilis* (BAGNALL, 1948),  
*Hymenaphorura alpina* (STACH, 1946),  
*Hymenaphorura pseudosibirica* (STACH, 1954).

*H. sibirica* was described basing on specimens from Siberia. Later similar specimens were found in many places in Europe and hence BAGNALL (1948) proposed to classify individuals from Siberia and those found by LINNANIEMI (1912) in Finland as *H. sibirica*, and other European specimens as *H. troglodytes*. The opinion was not accepted by STACH (1954) and GISIN (1960), and *H. troglodytes* was consequently regarded as a synonym of *H. sibirica*. *H. submontana* and *H. subsimilis* were described very imprecisely, and GISIN (1960) provided them a note «species inquirenda». The same author considered *H. montana* and *H. alpina* to be synonyms of *H. sibirica*. He preserved the status of good species only for *H. pseudosibirica*, distinguished by the presence of a ventral organ. According to STACH (1954) only *H. sibirica* occurs in Poland, though it is not morphologically uniform. *H. sibirica* f. *dentifera* (STACH, 1934), characterized by the denticle on its claw, is a good example.

The above information suggests that in Europe a broad concept of *H. sibirica* is accepted, considering its wide variability with respect to granulation, chaetotaxy, and other morphological details. It is commonly accepted that the species has a wide circumboreal distribution area, comprising Canada and Alaska in N America, Scandinavia, Siberia and Japan, as well as European mountains. Another concept is accepted in the USA. Numerous descriptions (CHRISTIANSEN & BELLINGER, 1980) evidence the existence of several species close to *H. sibirica*.

Thanks to the kindness of Dr. MARIA WEINER from the Polish Academy of Sciences in Cracow, I had an opportunity to examine two paralectotypes of *H. sibirica*, labelled as follows: «Riksmuseets Entomologiska Afdelning, *Lipura sibirica* TULLB., Sibirien No 13, Colleg. Jenisiej exp. 75. Determ. T. TULLBERG. Paralectotypes, *Onychiurus sibiricus* (TULLBERG 1876), A. FJELLBERG design 1983». Their examination has enabled me to ascertain that the Polish materials of the genus *Hymenaphorura* represent species new to science. The view is also supported by experimental laboratory studies, and by observations made directly in the field. Besides, I have examined materials in the collection of Prof. JAN STACH (at present in the collection of the Department of Systematic and Experimental Zoology, Polish Academy of Sciences, Cracow), for which possibility I am greatly indebted to Prof. ANDRZEJ SZEPTYCKI and Dr. MARIA WEINER.

#### DIAGNOSTIC CHARACTERS

It follows from my observations that within the «*sibirica* group» the following morphological characters are of diagnostic value:

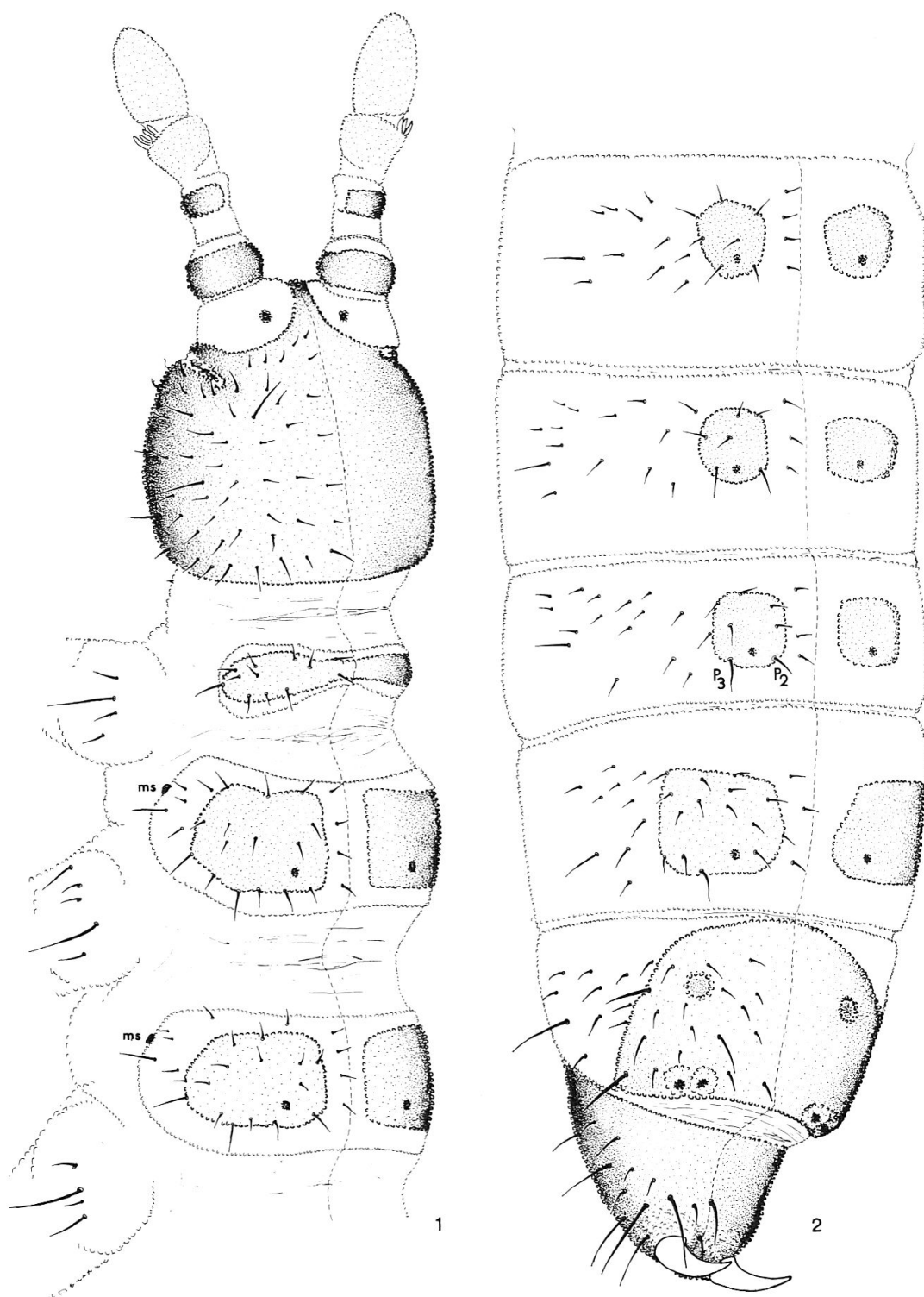
1. Chaetotaxy of abdominal tergites. The number and arrangement of macrochaetae, especially on V abdominal tergite, play the most important role.
2. Structure of the antennal sense organ. Particular attention should be paid to the shape of sensory clubs and papillae. The character on old material (from the 20-ies and 30-ies) is very badly preserved.
3. Structure of postantennal organ. The general shape of the organ, and the structure of vesicels are of importance. Regretfully, the latter character is badly preserved on old material.
4. Claw structure. The presence of denticle on the claw, and the length of empodial appendage are important.
5. Granulation of abdominal tergites. Size and shape of granular areas are important, as well as the number of granules surrounding the pseudocellus.

Of other morphological characters, attention should be paid to the general shape of the insect, its proportions, size and shape of abdominal spines, distance between them, total length of chaetae. These characters, because of their variability and various degree of preservation on slides, can be used only as accessory.

#### DESCRIPTIONS OF SPECIES

##### *Hymenaphorura nova* sp. n. (Figs. 1–8)

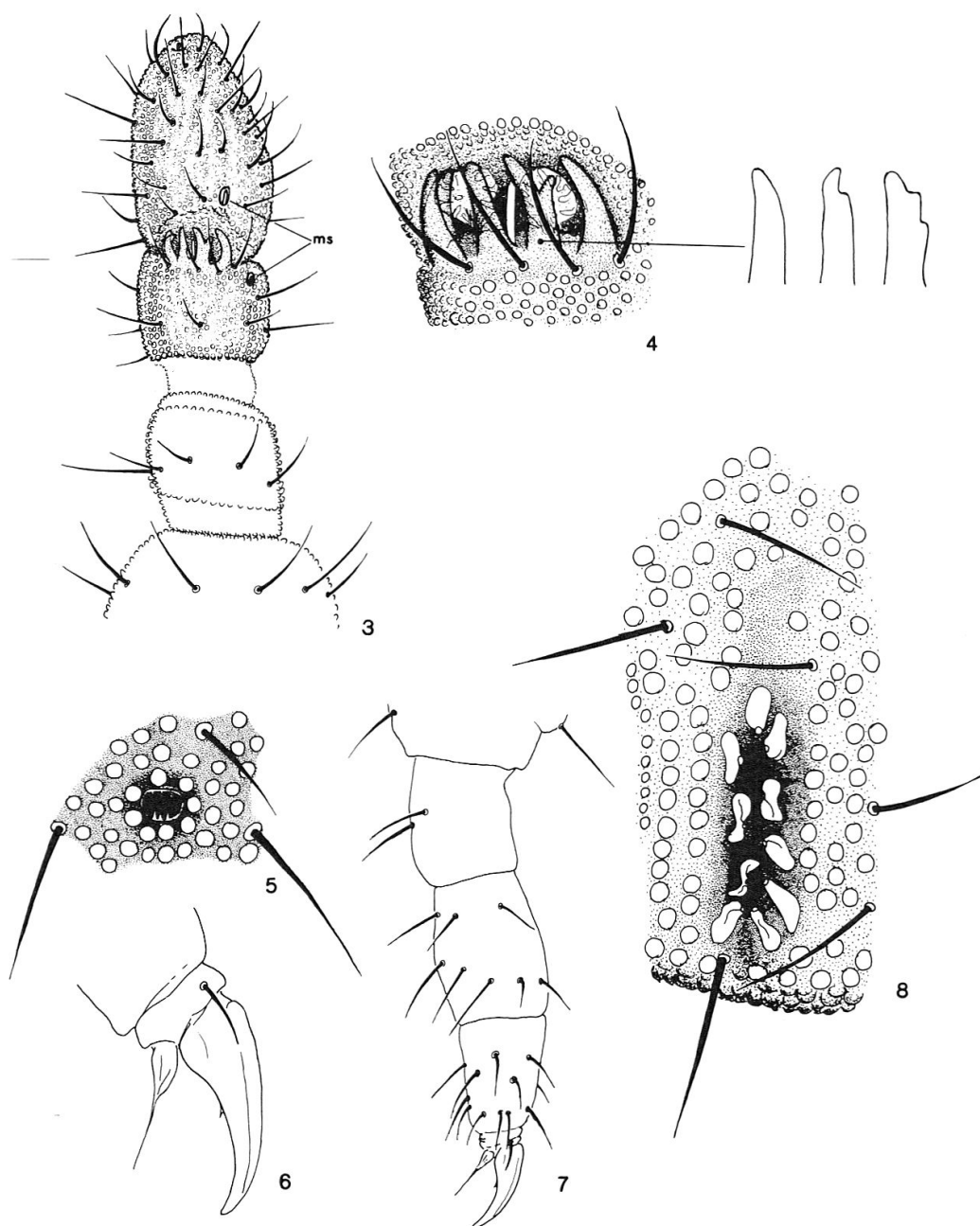
*Diagnosis.* In antennal III sense organ only 1 sensory rod, second external papilla forked. Setae relatively short, macrochaetae poorly distinct. On V abdominal tergite 3 + 3 macrochaetae. Anal spines strong, longer than the claw.



Figs. 1–2. *Hymenaphorura nova* sp. n. – dorsal chaetotaxy and localization pseudocelli: (1) head and I–III thoracic tergites; (2) I–VI abdominal tergites.

*Material.* Holotype female and 7 paratypes (5 ♀ and 2 ♂) on slides, and 10 paratypes in alcohol, 29th October 1988, Glucholazy (E Sudetes, Poland), soil from the bottom of an old (19th c.) aidt. Other material: 1 ♀, 1924–1936, Tatra





Figs. 3–8. *Hymenaphorura nova* sp. n.: (3) antenna; (4) antennal III sense organ; (5) granulation surrounding pseudocellus on the IV abdominal tergite; (6) claw; (7) leg of the first pair; (8) postantennal organ.

Mts (Carpathians, Poland), leg. J. STACH; 1 ♀ 18 October 1985, Mt. Milek, Kaczawskie Mts (W Sudetes, Poland), a scree, leg. R. J. POMORSKI.

*Description.* Body elongate, in the region of III and IV abdominal tergites somewhat broader. Length: holotype – 1.8 mm, paratypes 2.2–1.5 mm. Colour in alcohol white. Antennae roughly as long as head or slightly shorter. Antennal segment IV with subapical organ and 1 microsensilla in latero-external position, immediately above the antennal III sense organ (Fig. 3). Antennal III organ built of 4 guard setae, 1 smooth sensory rod, 2 finely granulated sensory clubs and 5

papillae one of which (the second external) is forked (Figs. 3, 4). One sensilla on the ventral side, slightly below the antennal organ III (Fig. 3). Postantennal organ situated in a deep, narrow and short groove, and composed of 10 (9–11) vesicels arranged as in Fig. 8.

Pseudocellar formula dorsally: 10/011/11112. Formula of «trochanteral pseudocelli» dorsally: 01/111/1111, ventrally: 01/000/22221. Two «trochanteral pseudocelli» on each subcoxa. The localization of the pseudocelli is presented in fig. 4. Dorsal chaetotaxy as in Figs. 1 and 2. Setae relatively short, macrochaetae poorly distinct. On I–IV abdominal tergites chaetae  $p_2$  and  $p_3$ , accompanied by pseudocelli, or roughly equal length (Figs. 2, 5). On the granular area on V abdominal tergite 3 + 3 poorly distinct macrochaetae (Figs 2, 43). Thoracal tergites II and III with microsensillae laterally (Fig. 1). On claw usually a small denticle. Empodial appendage with a small basal lamella, appendage length equal to  $\frac{2}{3}$  inner edge of the claw. Anal spines strong, curved and with anal papillae distinctly longer than the claw. On ventral side, between legs on meso- and metathorax, 1 + 1 setae. Granulation distinct, especially coarse on I and II antennal segments, head and granular areas on thorax and abdomen. Usually 8–9 primary granules surrounding pseudocellus (Fig. 5). Furcula entirely absent. Ventral organ in males absent.

*Variability.* Chaetotaxy of abdominal tergites, especially V, can be asymmetrical. The shape of the second external papilla in antennal III sense organ is variable, the papilla being usually forked. In 3 paratypes its shape is different (Fig. 4). In 4 paratypes claws on some legs lack the denticle.

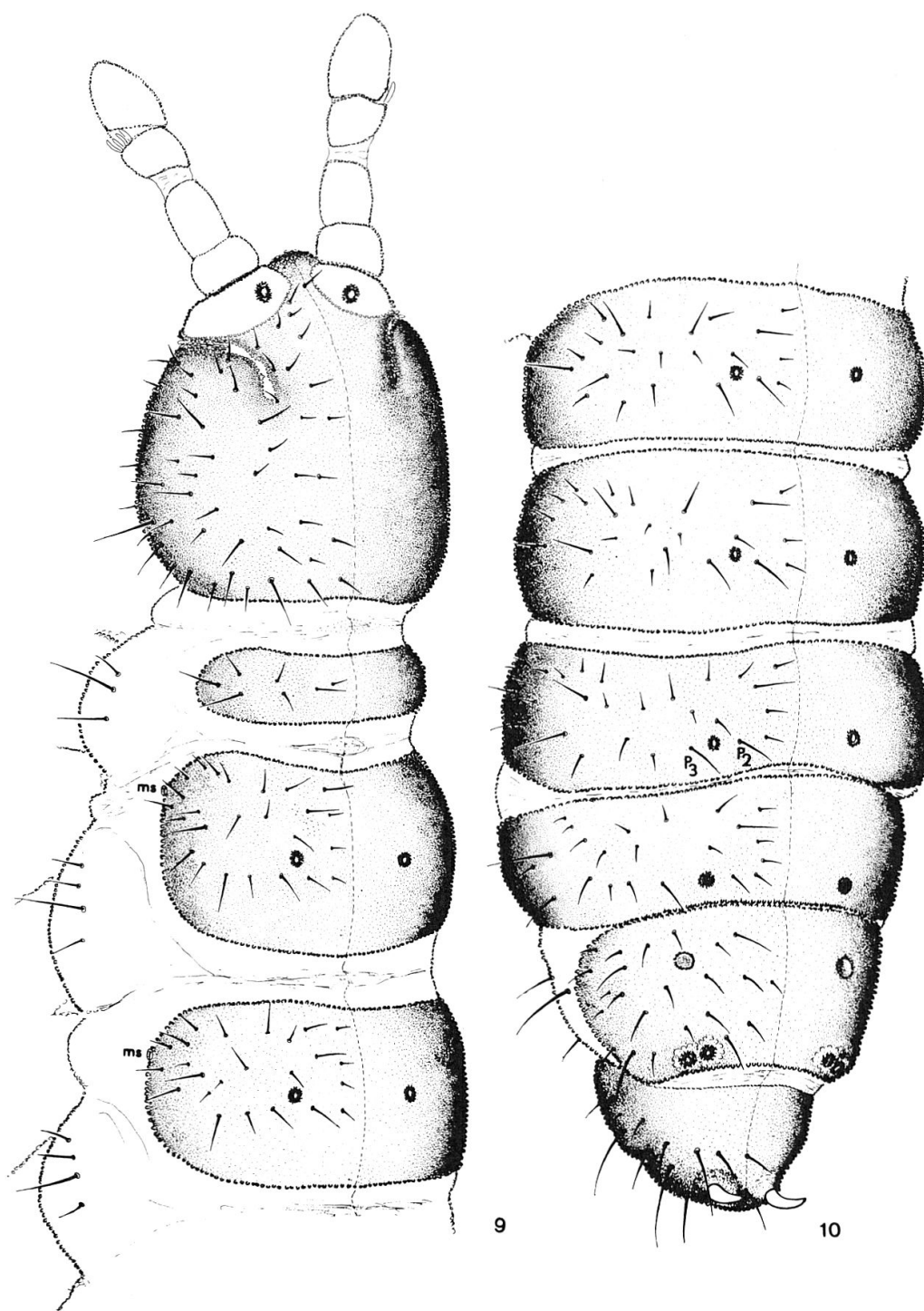
*Biology.* Bisexual, typically euedaphic species, living in the mountains and highlands, inhabiting deeper layers of soil and screes, probably associated with rocks of high calcium content.

*Derivatio nominis.* My «new» view on the genus *Hymenaphorura* started with this species.

#### *Hymenaphorura polonica* sp. n. (Figs. 9–16)

*Diagnosis.* Microsensilla on IV antennal segment situated usually at  $\frac{1}{3}$  segment height. Groove of postantennal organ prolonged on dorsal side of head. Setae relatively short, macrochaetae poorly distinct. Chaetotaxy usually asymmetrical. On V abdominal tergite 1 + 1 macrochaetae. Granulation coarse, granular areas occupying all tergites. Anal spines with papillae separated basally, shorter than the claw.

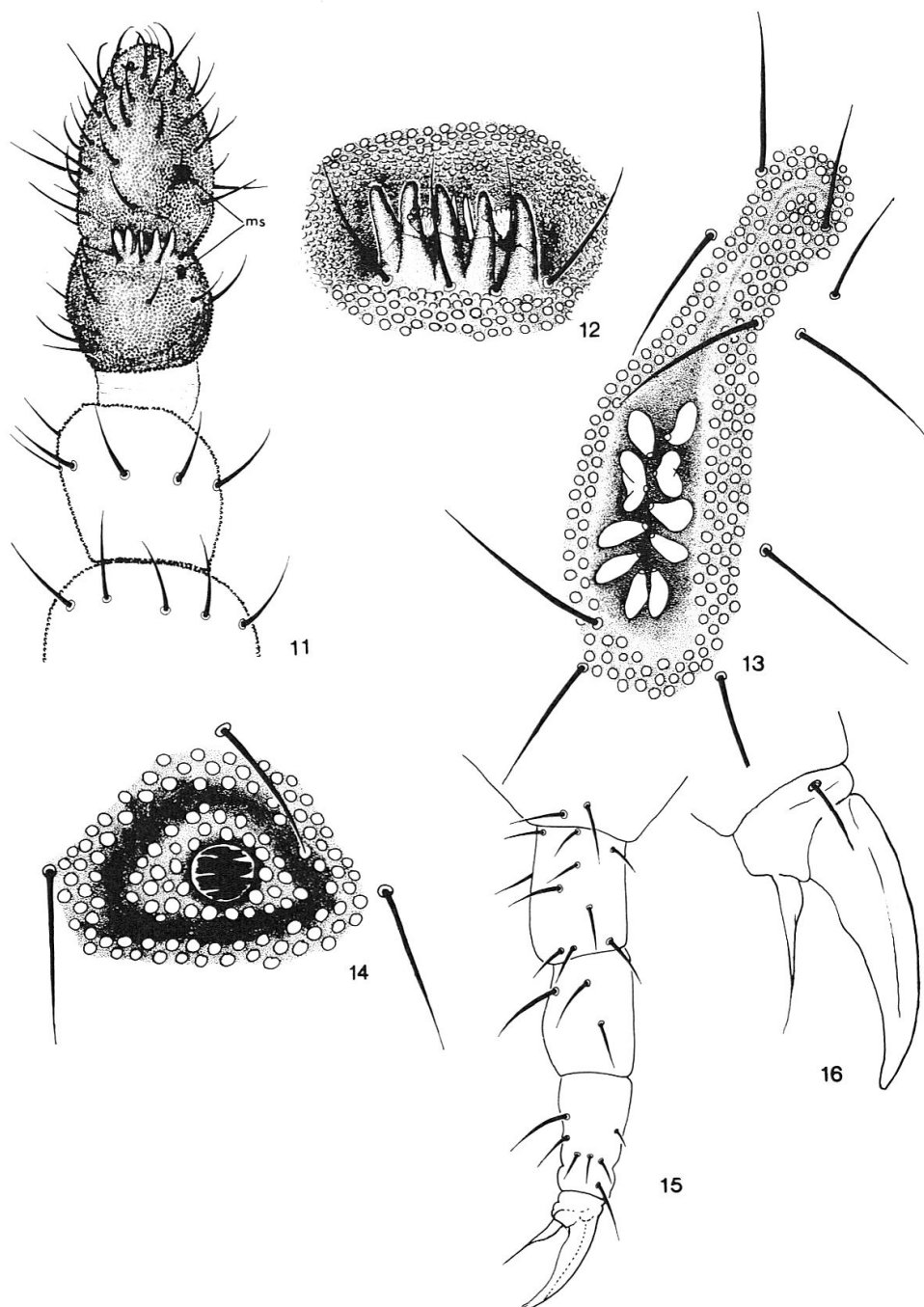
*Material.* Holotype female and 14 paratypes (♀) on slides, 14th November 1987, Ślęża Massif (Sudety Highlands, Poland), a rotten fallen spruce trunk, c. 700 m a.s.l., leg. R. J. POMORSKI. Other material: 36 specimens (35 ♀, 1 juv.), 1971–1976, Pieniny Mts (Carpathians, Poland), leg. M. WEINER; numerous specimens (♀ only), 17th May 1989, Glucholazy (E Sudetes, Poland), a rotten tree trunk in an old aidt, leg. R. J. POMORSKI; numerous specimens (♀ only), 1 September 1949, Cave Dziura, Tatra Mts (Carpathians, Poland), leg. J. MAKÓLSKI, coll. J. STACH; numerous specimens (♀ only), July–August 1919–1922, Czarny Dunajec, Nowy Targ Basin (Carpathians, Poland), under large stones and pieces of mouldy timber, leg. J. STACH, coll. J. STACH; 2 ♀, Cave Felslindl nr. Saass (Fränkischer Jura, Germany), leg. SPÖCKER, coll. J. STACH; 1 ♀, 8 October 1920, Cracow (Poland), under a stone in a garden, leg. J. STACH, coll. J. STACH; 1 ♀, 1940–1941, Admont (Styria, Austria), leg. H. FRANZ, coll.



Figs. 9–10. *Hymenaphorura polonica* sp. n. – dorsal chaetotaxy and localization pseudocelli: (9) head and I–III thoracic tergites; (10) I–VI abdominal tergites.

J. STACH; 6 ♀, 3 ♂, 21st July 1937, Zaroślak in Czarnohora (E Carpathians, USSR), rotten timber, c. 1350 m a.s.l., leg. J. STACH, coll. J. STACH.

*Description.* Body robust, dumpy, cylindrical, broadest in region of III abdominal segment. Length: holotype – 1.9 mm, paratypes 1.6–2.1 mm. Colour in alcohol white, usually with brown gut contents shining through. Antennae distinctly shorter than head. Antennal segment IV with subapical organ and micro-



Figs. 11–16. *Hymenaphorura polonica* sp. n.: (11) antenna; (12) antennal III sense organ; (13) post-antennal organ; (14) granulation surrounding pseudocellus on the IV abdominal tergite; (15) leg of the first pair; (16) claw.

sensilla in latero-external position, usually at  $\frac{1}{3}$  height of ant. IV (Fig. 11). Antennal organ III built of 4 guard setae, 2 smooth sensory rods, coarsely granulated, mulberry-like sensory clubs and 5 papillae (Fig. 12). On ventral side, slightly below the antennal organ, 1 sensilla (Fig. 11). Postantennal organ situated in a deep, narrow and very long groove prolonged on the dorsal side of head (Figs. 9, 13), and composed of 10 vesicels.

Pseudocellar formula dorsally: 10/011/11112. Formula of «trochanteral pseudocelli» dorsally: 01/111/1111, ventrally: 01/000/22221. On each subcoxa two «trochanteral pseudocelli». Localization of pseudocelli is presented in Fig. 42. Dorsal chaetotaxy as in Figs. 9 and 10. Setae relatively short, macrochaetae very poorly distinct. On I–IV abdominal tergites chaetae  $p_2$  and  $p_3$  accompanied by pseudocelli of roughly equal length (Figs. 10, 14). Granular area on V abdominal tergite with 1 + 1 poorly distinct macrochaetae (Figs. 10, 44). On II and III thoracic tergites laterally microsensillae (Fig. 9). Claw always without denticle (Figs. 15, 16). Empodial appendage with basal lamella, appendage length equal to  $\frac{1}{2}$ – $\frac{2}{3}$  inner edge of the claw. Anal spines weakly curved, with papillae shorter than the claw. Anal papillae separated basally. On ventral side between legs on meso- and metathorax 1 + 1 setae. Granulation coarse, especially on V abdominal tergite, granular areas occupying all head, all thoracic and abdominal tergites; usually 11–12 primary granules surrounding a deeply situated pseudocellus (Fig. 14). Furcula absent. Ventral organ in males absent.

*Variability.* Chaetotaxy of abdominal tergites, especially V, is always asymmetrical. The number of papillae in the antennal sense organ is also variable: of 34 examined specimens from the type locality, 2 had only 4 papillae, 3–6 papillae, and 26 a typical number of 5 papillae.

*Biology.* *H. polonica* inhabits mountains and highlands, living only in humid rotting timber. In Poland it forms parthenogenic populations. I found a bisexual population in the collection of Prof. J. STACH, in the material from Czarnohora in E Carpathians (USSR).

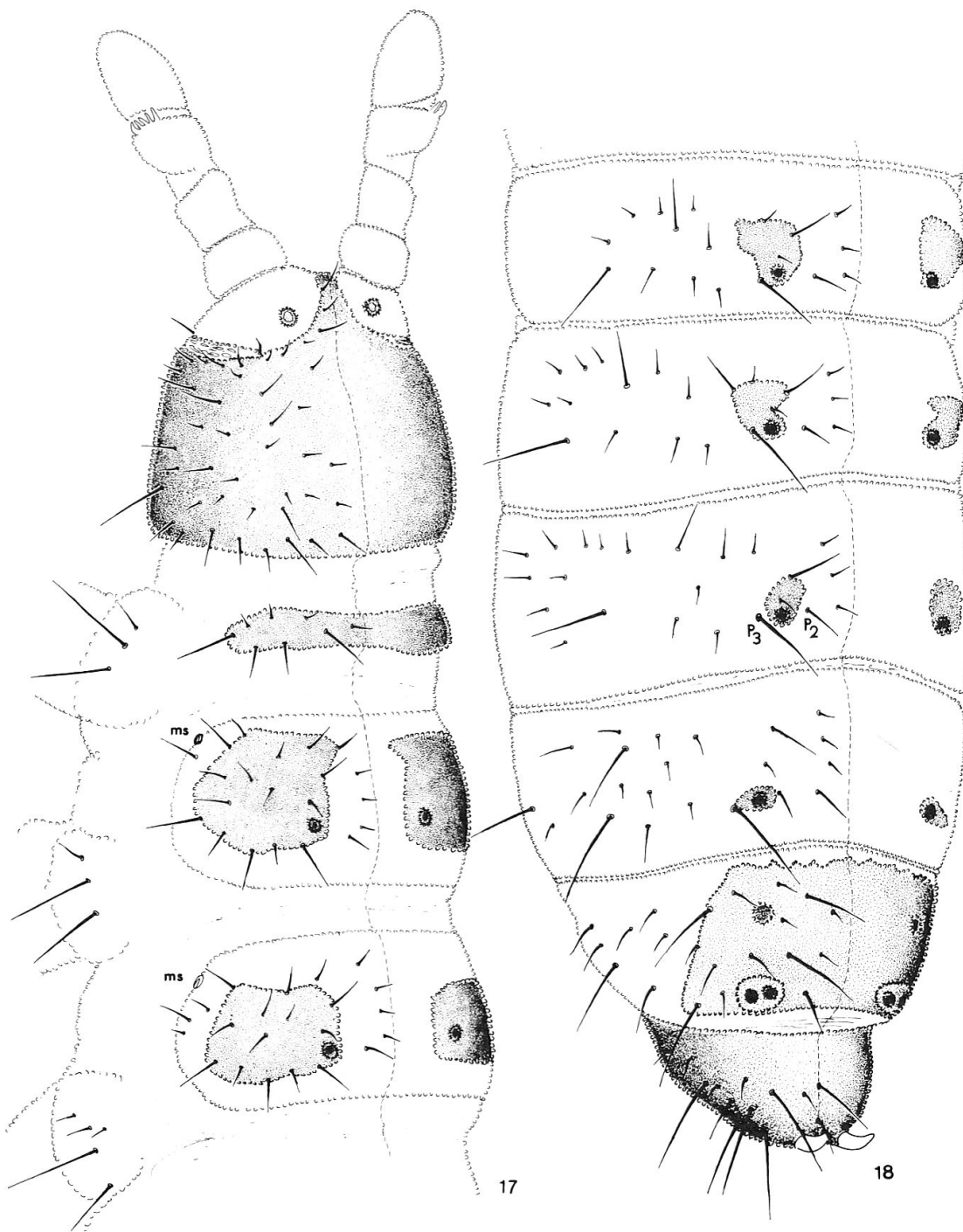
*Remarks.* Morphologically *H. polonica* is very similar to *H. pseudosibirica* from the cave Aggtelek in Hungary. An important difference consists in the presence of ventral organ in males of the latter species. The organ, according to STACH (1954), is built of c. 18 short, mostly weakly curved fine sensory setae grouped closely together in the middle of III abdominal sternite, and a pair of minute rods inserted comparatively far from that group. In the three males of *H. polonica* from Czarnohora the ventral organ is entirely absent. Another difference is the number of vesicels forming the postantennal organ; all the examined specimens of *H. polonica* have only 10 vesicels, while *H. pseudosibirica* has 12 vesicels. In my opinion specimens described by RUSEK (1966) from Moravia (cave Pukevní jeskyně) as *H. pseudosibirica*, are actually *H. polonica*.

*Derivatio nominis.* The species is very common in Poland.

#### *Hymenaphorura creatricis* sp. n. (Figs. 17–26)

*Diagnosis.* Dorsal chaetotaxy symmetrical, macrochaetae distinct. On I–IV abdominal tergites  $P_2$  shorter than  $P_3$ . On V abdominal tergite 4 + 4 macrochaetae. On claw always a denticle.

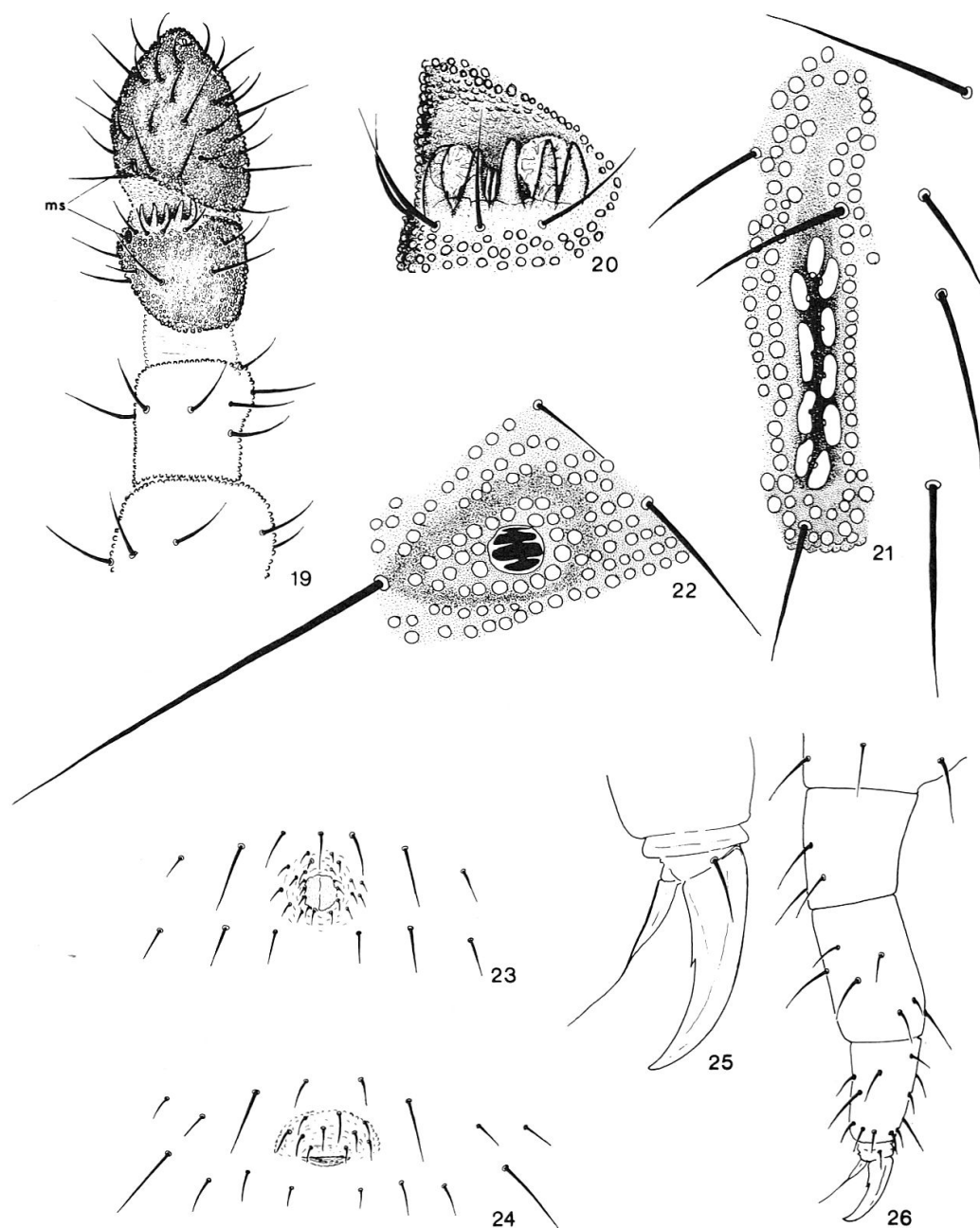
*Material.* Holotype female, 20 paratypes (8 ♂, 12 ♀) on slides, and numerous specimens in alcohol, 14 January 1988, Strzeliniec Wielki, Góry Stołowe (Sudetes, Poland), litter and moss in deep rock crevices, 919 m a.s.l., leg. M. WEICHSEL and R. J. POMORSKI. Other material: 5 specimens on slides and numerous specimens in alcohol, 1924–1936, Tatra Mts (Carpathians, Poland), leg. J. STACH, coll. J. STACH; 3 ♀; 22 July 1988, Ślęża Massif (Sudety Highlands, Poland), under moss on rocks, c. 700 m a.s.l., leg. R. J. POMORSKI; 6 specimens on slides and 16 specimens in alcohol from Cave Mánfa in Mecsek Mts (Hungary), 23 October 1931, leg. A. GEBHARDT, coll. J. STACH.



Figs. 17–18. *Hymenaphorura creatricis* sp. n. – dorsal chaetotaxy and localization pseudocelli: (17) head and I–III thoracic tergites; (18) I–VI abdominal tergites.

*Description.* Body robust and cylindrical, broadest in region of III abdominal segment. Length: holotype –1.7 mm, paratypes 1.3–1.8 mm. Colour in alcohol white, usually with black gut contents shining through. Antennae roughly as long as head. Antennal segment IV with subapical organ and 1 microsensilla in latero-external position, just above the antennal III sense organ (Fig. 19). Antennal III organ built of 4 guard setae, 2 sensory rods, 2 finely granulated sensory





Figs. 19–26. *Hymenaphorura creatricis* sp. n.: (19) antenna; (20) antennal III sense organ; (21) post-antennal organ; (22) granulation surrounding pseudocellus on the IV abdominal tergite; (23) male genital plate; (24) female genital plate; (25) claw; (26) leg of the first pair.

clubs and 5 papillae (Fig. 20). On ventral side, slightly below the antennal organ, 1 sensilla (Fig. 19). Postantennal organ situated in a deep long groove (Figs. 19, 21), and usually composed of 9 or 11 characteristic vesicels.

Pseudocellar formula dorsally: 10/011/11112. Formula of «trochanteral pseudocelli» dorsally: 01/111/1111, ventrally: 01/000/22221. On each subcoxa two «trochanteral pseudocelli». Localization of pseudocelli is presented in Fig. 42. Dorsal chaetotaxy usually symmetrical, as in Figs. 17 and 18. Macrochaetae distinct. On I–IV abdominal tergites chaetae  $p_2$  shorter than  $p_3$  (Figs. 18, 22).



Granular area on V abdominal tergite with 4 + 4 macrochaetae (Figs. 18, 45). On II and III thoracic tergites microsensillae (Fig. 17). On claw always a denticle (Figs. 25, 26). Empodial appendage roughly as long as the inner edge of claw, with basal lamella. Anal spines weakly curved, with anal papillae as long as the claw. On ventral side between legs on meso- and metathorax 1 + 1 setae. Granulation distinct, particularly on granular areas occupying all head and parts of thoracic and abdominal tergites. The smallest granular areas on I–IV abdominal tergites (Fig. 18). Usually 12–13 primary granules surrounding pseudocellus (Fig. 22). Furcula absent. Ventral organ in males absent. Male and female genital plates built in a way typical for the Onychiuridae (Figs. 23, 24).

*Variability.* I observed aberrations in the chaetotaxy and the number of pseudocelli. The chaetotaxy aberrations consist in a loss of a seta or an appearance of an additional seta. Pseudocellar aberrations are manifested in a similar way, but typical and additional pseudocelli are situated close together in one pseudocellar area. In the studied material pseudocellar aberrations were observed 4 times: two consisted in a loss of a pseudocellus on abdominal tergites, the other two – in an appearance of additional pseudocelli at bases of antennae.

*Biology.* *H. creatricis* is a bisexual species, living in the mountains at higher altitudes, in humid litter in rock crevices or in screes. It can be found also in caves.

*Derivatio nominis.* The name is derived from the Latin word «creatrix» – mother, and the species is dedicated to my mother.

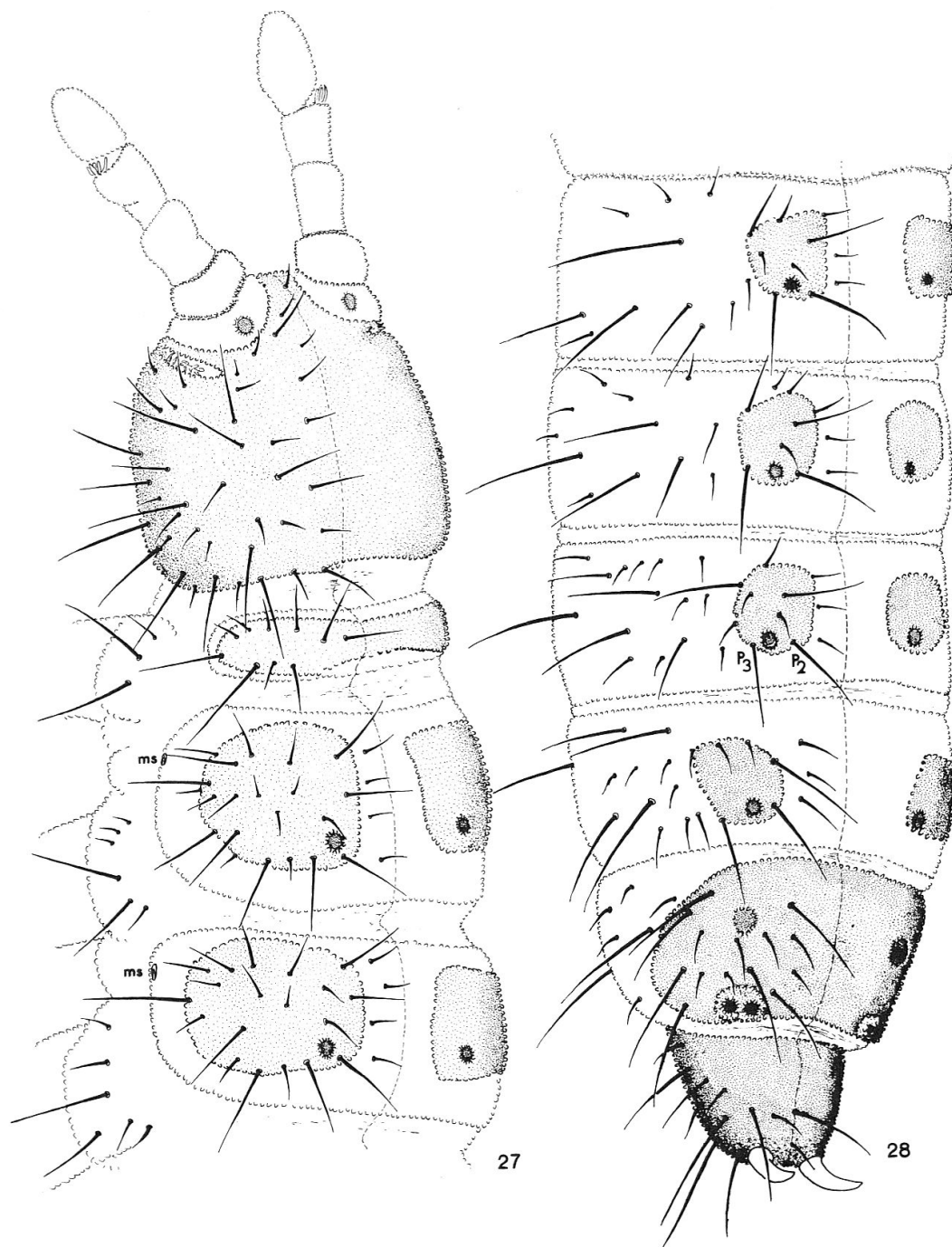
*Hymenaphorura liberta* sp. n. (Figs. 27–34)

*Diagnosis.* Setae relatively long, dorsal chaetotaxy symmetrical, macrochaetae distinct. On I–IV abdominal tergites  $p_2$  and  $p_3$  are macrochaetae. On V abdominal tergite 6 + 6 macrochaetae. Claw always with a big denticle.

*Material.* Holotype female and 6 paratypes (4 ♀, 2 ♂) on slides, several specimens in alcohol, January–December 1929–1931, Alushta (Crimea, USSR), beech forest in nature reserve, in litter and humus, 700–1100 m a.s.l., leg. W. BUKOWSKI, coll. J. STACH.

*Description.* Body robust and cylindrical, slightly broader in the region of III and IV abdominal tergites. Length: holotype –1.8 mm, paratypes –1.6–2.0 mm. Colour in alcohol white. Antennae roughly as long as head. Antennal segment IV with subapical organ and 1 microsensilla in latero-external position, just above the antennal III sense organ (Fig. 29). Antennal organ III built of 4 guard setae, 2 sensory rods, 2 finely granulated sensory clubs and 5 papillae (Fig. 30). On ventral side, slightly below the antennal organ, 1 sensilla (Fig. 29). Postantennal organ situated in a deep, long groove (Figs. 27, 33), and composed of 9–11 vesicles.

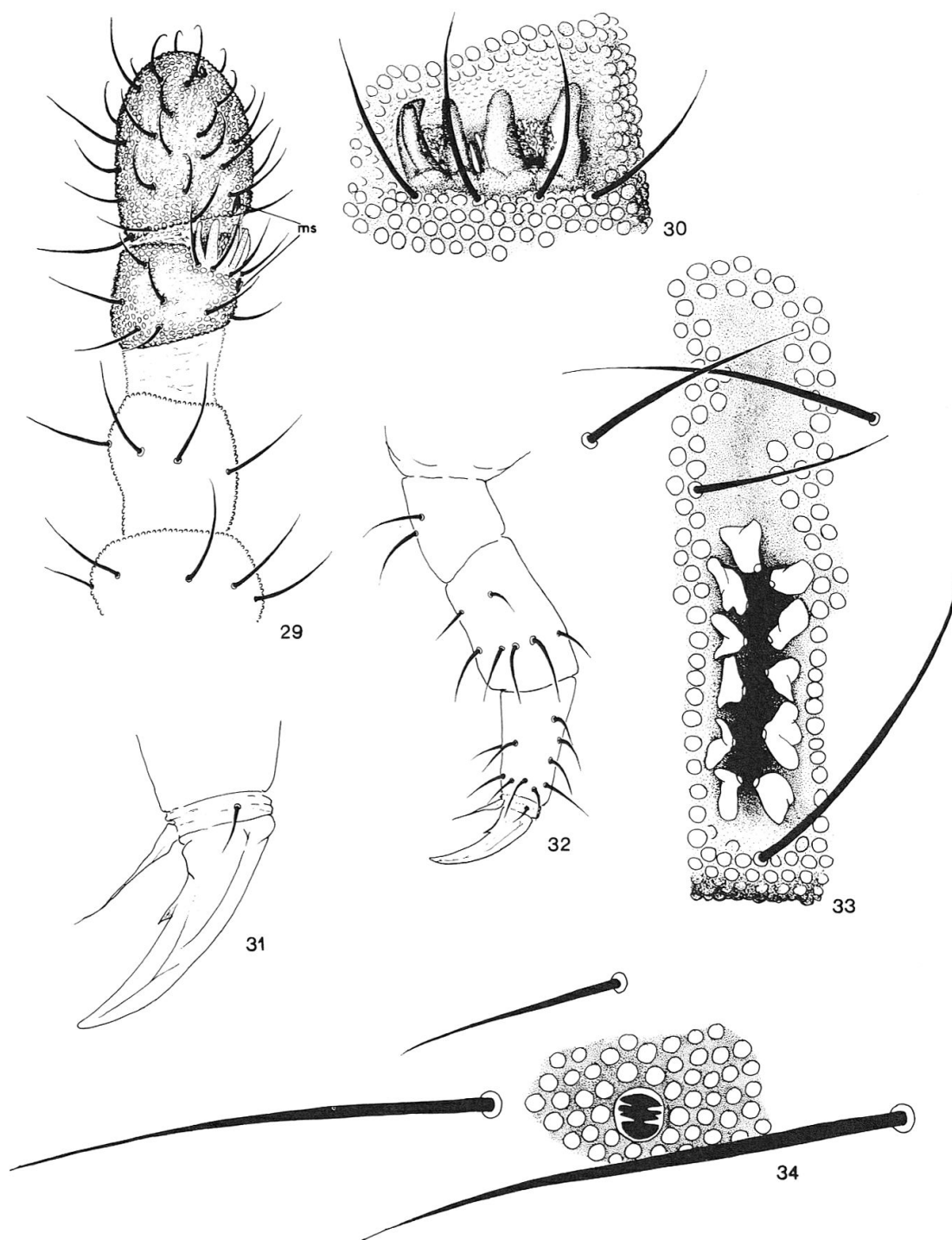
Pseudocellar formula dorsally: 10/011/11112. Formula of «trochanteral pseudocelli» dorsally: 01/111/1111, ventrally: 01/000/22221. On each subcoxa two «trochanteral pseudocelli». Localization of pseudocelli is presented in Fig. 42. Dorsal chaetotaxy usually symmetrical as in Figs. 27 and 28. Setae comparatively very long, macrochaetae very distinct. On I–IV abdominal tergites chaetae  $P_2$  and  $P_3$  are macrochaetae, roughly of equal length (Figs. 28, 34). Granular area on V abdominal tergite with 6 + 6 macrochaetae (Figs. 28, 46). On II and III thoracic tergites microsensillae (Fig. 27). On claw always a big denticle (Figs. 31, 32). Empodial appendage with basal lamella, appendage length equal to  $\frac{2}{3}$  inner



Figs. 27–28. *Hymenaphorura liberta* sp. n. – dorsal chaetotaxy and localization pseudocelli: (27) head and I–III thoracic tergite; (28) I–VI abdominal tergite.

edge of the claw. On side between legs on meso- and metathorax 1 + 1 setae. Granulation distinct, especially on granular areas occupying all head and parts of thoracic and abdominal tergites. Usually 10–11 primary granules surrounding pseudocellus (Fig. 34). Furcula absent. Ventral organ in males absent.

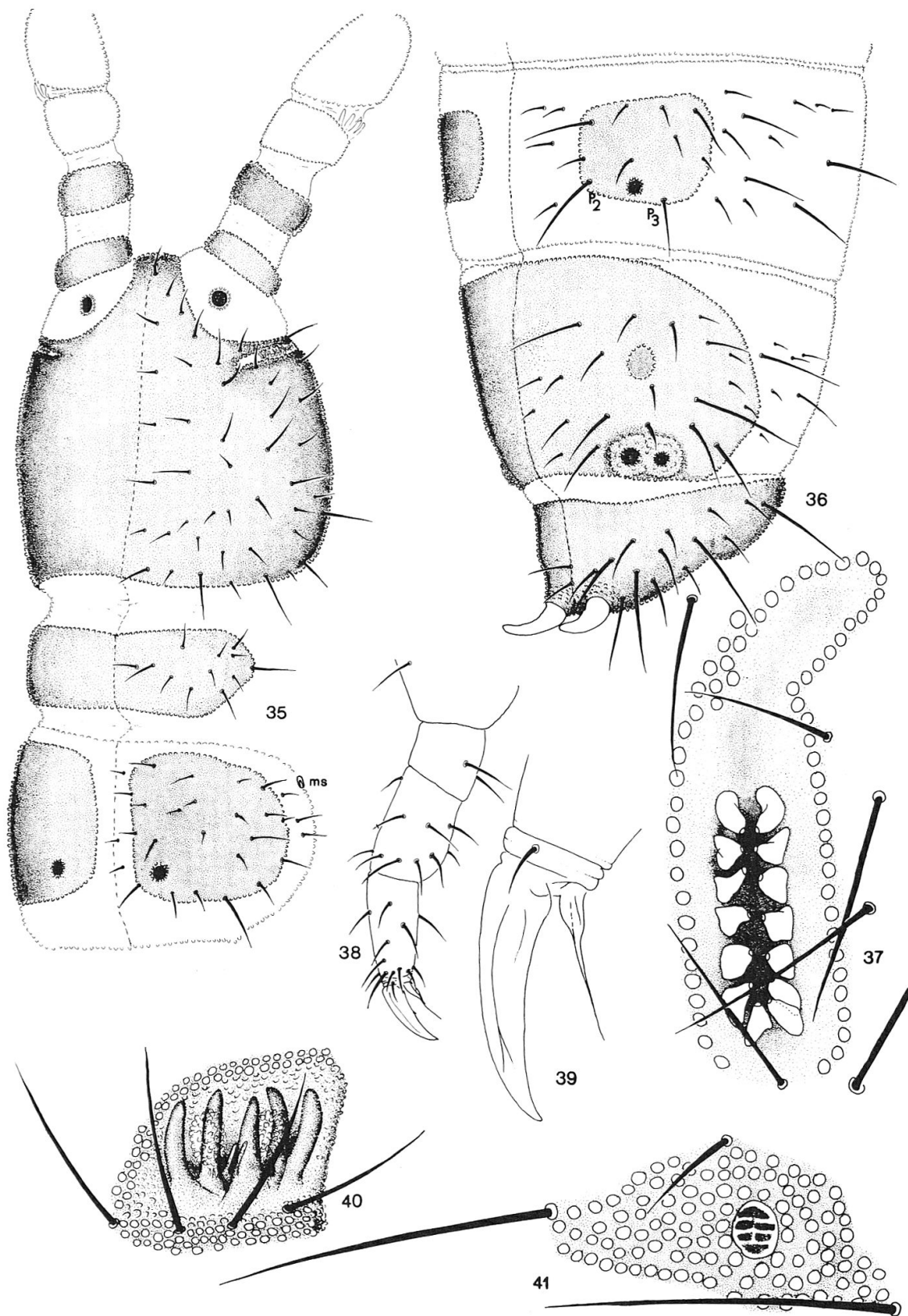
*Variability.* Only asymmetrical localization of some setae was observed in the material examined.



Figs. 29–34. *Hymenaphorura liberta* sp. n.: (29) antenna; (30) antennal III sense organ; (31) claw; (32) leg of the first pair; (33) postantennal organ; (34) granulation surrounding pseudocellus on the IV abdominal tergite.

*Biology.* Basing on data on labels it can be concluded that the species lives in litter in the mountains of Crimea at higher altitudes.

*Derivatio nominis.* The name *liberta* is derived from a Latin word «*libertus*» – a freed man. I dedicate this species to all slaves who have been recently set free.



Figs. 35–41. *Hymenaphorura alpina* (STACH, 1946): (35) chaetotaxy of the head and I–II thoracic tergites; (36) chaetotaxy of IV–VI abdominal tergites; (37) postantennal organ; (38) leg of the first pair; (39) claw; (40) antennal III sense organ; (41) granulation surrounding pseudocellus on the IV abdominal tergite.

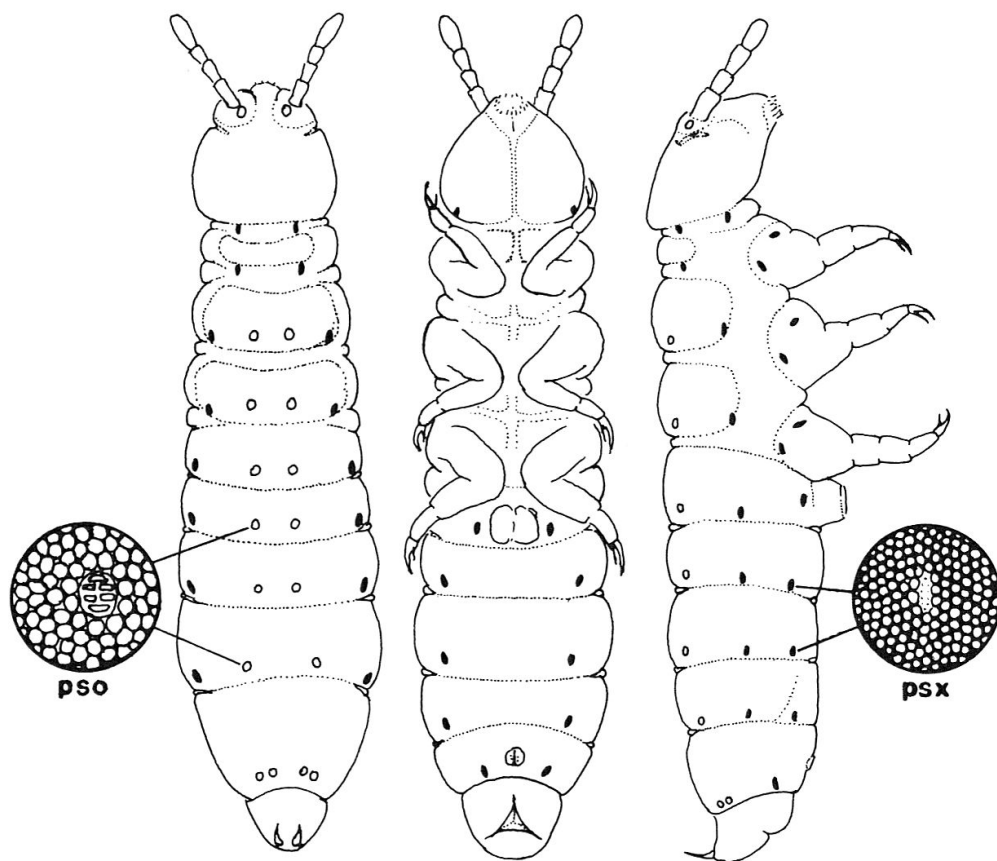


Fig. 42. Arrangement of pseudocelli (pso) and «trochanteral pseudocelli» (psx) in the species belonging to the «sibirica group».

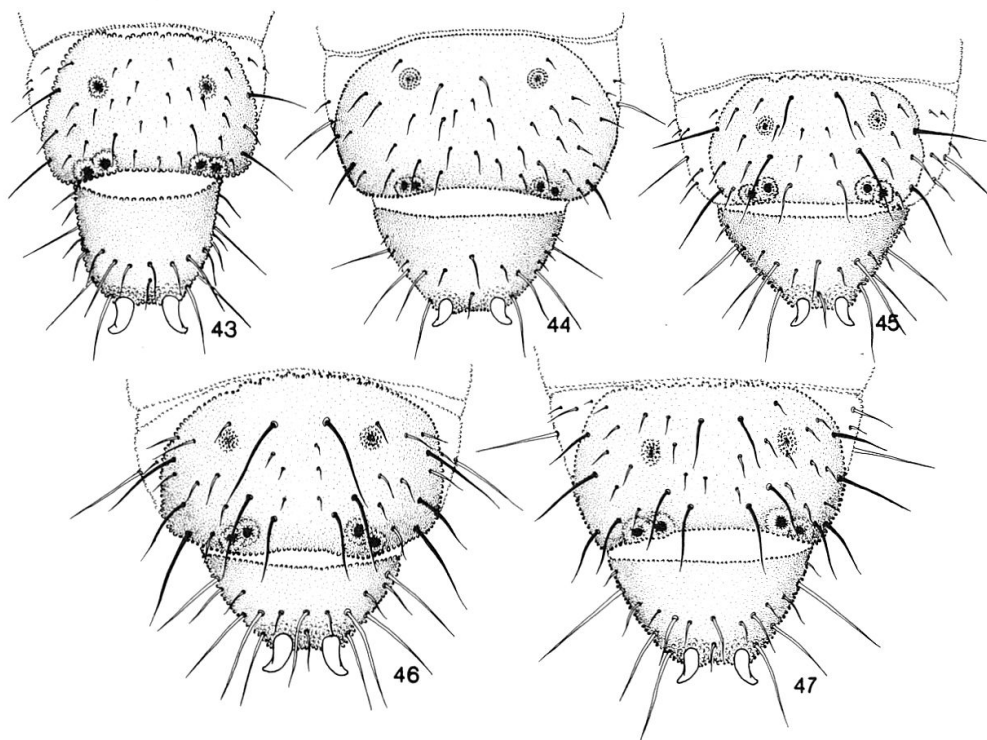
*Hymenaphorura alpina* (STACH, 1946)

**Diagnosis.** In III antennal sense organ papillae high. Postantennal organ composed of 14–17 vesicels, its groove prolonged on dorsal side of head. Dorsal chaetotaxy symmetrical, macrochaetae distinct. On I–IV abdominal tergites  $p_2$  somewhat longer than  $p_3$ . On V abdominal tergite 6 + 6 or 7 + 7 macrochaetae.

**Material.** Lectotype female and 2 paralectotypes (♀) on slides and 4 paralectotypes in alcohol, 1937–1938, Hohe Tauern and Grossglockner; Alps (Carinthia, Austria), leg. H. FRANTZ, coll. J. STACH.

**Redescription.** Body robust and cylindrical, broadest in the region of III abdominal segment. Length: lectotype –2.0 mm, paralectotypes 1.9–3.0 mm. Colour in alcohol white. Antennae roughly as long as head. Antennal segment IV with subapical organ and microsensilla in latero-external position, just above antennal III sense organ. Antennal III sense organ built of 4 guard setae, 2 narrow sensory rods, 2 coarsely granulated mulberry-like sensory clubs and 5 high papillae (Fig. 40). On ventral side, slightly below antennal organ, 1 sensilla. Postantennal organ situated in a deep very long groove distinctly prolonged on the dorsal side of head (Figs. 35, 37), and composed of 14–17 vesicels.

Pseudocellar formula dorsally: 10/011/11112. Formula of «trochanteral pseudocelli» dorsally: 01/111/1111, ventrally: 01/000/22221. On each subcoxa two



Figs. 43–47. Chaetotaxy of the V–VI abdominal tergites: (43) *Hymenaphorura nova* sp. n.; (44) *Hymenaphorura polonica* sp. n.; (45) *Hymenaphorura creatricis* sp. n.; (46) *Hymenaphorura liberta* sp. n.; (47) *Hymenaphorura alpina* (STACH, 1946).

«trochanteral pseudocelli». Localization of pseudocelli is presented in Fig. 42. Dorsal chaetotaxy of head, I and II thoracal and IV–VI abdominal segments as in Figs. 35 and 36. Macrochaetae distinct. On I–IV abdominal tergites chaetae  $p_2$  and  $p_3$  are macrochaetae,  $p_2$  being usually somewhat longer than  $p_3$  (Figs. 36, 41). Granular area on V abdominal tergite with 6 + 6 or 7 + 7 macrochaetae (Figs. 36, 47). On claw usually a small denticle (Fig. 38). On II and III thoracal tergites microsensillae. Empodial appendage roughly  $\frac{2}{3}$  length of inner edge of the claw, with basal lamella. Anal spines strongly curved, with papillae as long as the claw (Fig. 39). On ventral side between legs on meso- and metathorax 1 + 1 setae. Granulation distinct, especially on granular areas occupying I and II antennal segments, head, thoracal and abdominal tergites (Figs. 35, 36). Usually 11–12 primary granules surrounding pseudocellus (Fig. 41). Furcula absent. Males unknown.

**Variability.** One seta on V abdominal tergite is not always macrochaeta. Besides, in paralectotypes claws on some legs have no denticle (Fig. 39).

**Biology.** According to STACH (1946) the species seems to be endemic to the Alps, is probably restricted to the Hohe Tauern group and lives only at higher altitudes, in moss and under stones.

The types of *H. nova*, *H. polonica*, and *H. creatricis* are deposited at the Museum of Natural History, Wrocław University. The types of *H. liberta* and *H. alpina* are in the collection of the Institute of Systematic and Experimental Zoology, Polish Academy of Sciences, Cracow.



## RESUMÉ

Le présent travail discute les espèces européennes du genre *Hymenaphorura* BAGNALL, 1948, où on a distingué un groupe-espèce séparé de *H. sibirica*. Le travail contient quatre descriptions des espèces nouvelles (*H. nova*, *H. polonica*, *H. creatricis*, *H. liberta*) et qu'une redescription (*H. alpina*), ainsi que l'énumération des caractères pour le groupe-espèce ci-mentionné. On a constaté, que les caractères les plus importants pour ce groupe sont la chétotaxie et la granulation de la surface des tergites des abdominaux.

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