

Description of two known and one new species of the genus *Anaplectus* De Coninck & Schuurmans Stekhoven, 1933 (Nematoda: Plectida) from Europe, and a revised taxonomy of the genus

Oleksandr Holovachov*, Sven Boström**, Grażyna Winiszewska*** and
Ladislav Háněl****

*Department of Zoology, Biological Faculty, Ivan Franko National University of L'viv, Grushevsky str. 4, L'viv 79005, Ukraine,

**Swedish Museum of Natural History, Box 50007, SE-104 05 Stockholm, Sweden,

***Museum & Institute of Zoology, PAS, Wilcza 64, 00-679 Warszawa, Poland,

****Institute of Soil Biology AS CR, Na sádkách 7, CZ-370 05 České Budějovice, Czech Republic.

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Summary. Two known and one new species of *Anaplectus*, viz. *A. granulosus*, *A. atubulatus* and *A. brzeskii* sp. n. are described from material collected in Poland, Ukraine and Sweden. *A. granulosus* is studied by SEM for the first time. *A. brzeskii* sp. n. is characterised by a body length of 863-1131 µm in females and 764-1056 µm in males, lip region slightly offset from body contour, amphid located at level with anterior part of stegostom, spinneret present, vulva located in a depression, female with four caudal setae, male with three midventral tubular supplements, spicules 40-48 µm long with oval manubrium wider than shaft, and gubernaculum 10-13 µm long, plate-like with a single strong caudal appendix. An emended generic diagnosis, a species list and identification key are provided.

Key words: Key to species, morphology, new species, Plectidae, SEM, taxonomy.

De Coninck & Schuurmans Stekhoven (1933) proposed the genus *Anaplectus* for those species of *Plectus* Bastian, 1865, which "possess a crown of 4 cephalic setae and a set of preanal tubuli in the male sex". The genus was revised by Allen & Noffsinger (1968), who redescribed the poorly known type species *A. granulosus* (Bastian, 1965) De Coninck & Schuurmans Stekhoven, 1933 and two other known species, viz. *A. submersus* (Hirshmann, 1952) Maggenti, 1961 and *A. magnus* Brzeski, 1963. Allen & Noffsinger (1968) described three new species, viz. *A. porosus*, *A. similis* and *A. varicaudatus*, thus giving descriptions of six valid species. They also made a detailed review of the morphology, emended the generic diagnosis and proposed an identification key to the males of the genus. In the last 30 years seven new species have been added to the genus by different authors (Truskova, 1972, 1978; Zullini, 1973; Andrásy, 1986, 1987) and one of those species, *Plectus eurycerus* Massey, 1964, was transferred to *Anaplectus* by Andrásy (1984). In this paper two known and one new species of *Anaplectus* collected

in Poland, Ukraine and Sweden are described from studies by LM and *A. granulosus* also from studies by SEM. The taxonomy of the genus is revised and a key to the species is provided.

MATERIALS AND METHODS

Nematodes were extracted by a modified Baermann funnel method, relaxed by gentle heat, fixed in cold TAF, transferred to pure glycerine by a slow evaporation method and mounted on permanent slides in glycerine with paraffin wax as support for the coverslip. Females and males of *A. granulosus* from Ukraine and Sweden were prepared for SEM. They were postfixed in 1% osmium tetroxide (OsO₄) and transferred to pure acetone through an acetone/distilled water series. Specimens were critical point dried in liquid CO₂, mounted on stubs, gold-plated under vacuum to a thickness of 200 Å in a sputter, and examined in an Hitachi S-4300 SEM at an accelerating voltage of 10 kV. Coiled and curved structures were measured along the median line.

DESCRIPTIONS

Anaplectus granulosus (Bastian, 1865) De Coninck & Schuurmans Stekhoven, 1933 (Figs. 1-3)

Measurements. See Table 1.

Adult. Body almost cylindrical, gradually narrowing anteriorly in pharyngeal region and posteriorly on tail; ventrally arcuate, more so in posterior part. Cuticle annulated. Somatic setae absent, except for caudal setae in female. Lateral field consists of two wings, marked by four incisures; starting level with posterior part of corpus, extending almost to tail terminus. Hypodermal glands arranged in four sublateral rows (except for the anteriormost one) and open to the outside via pores, 91-106 in number along one side of entire body. Two coelomocytes present posterior to cardia, subventrally from anterior part of intestine. Glandular bodies (pseudocoelomocytes) present in lateral chord at level of intestine, 4-8 in number along one body side. Labial region truncate, slightly offset from body contour. Lip region consists of six separate lips with shorter interspersed "liplets". Labial sensilla indistinct, whereas their nerve endings visible. Nerve endings of inner labial sensilla open inside cheilostom, while those of outer labial sensilla open on anterior surface of lips. Cephalic sensilla setiform, originating on third or fourth body annule. Amphid a transverse slit, located at level with anterior part of stegostom. Cervical papilla present in both sexes, located a few annules posterior to amphid, at level with anteriormost body pore. Nerve ring surrounds anterior part of isthmus. Deirid present, papilliform; located inside lateral field posterior to nerve ring. Secretory-excretory system present, multicellular. Excretory cells surround posterior part of isthmus. Excretory duct cuticularized, excretory pore surrounded by a refractive ring, appearing as two semicircular sclerotizations in optical section. Cheilostom marked by lips, narrow, undifferentiated. Gymnostom shorter than wide, with sclerotized arcuate gymnorhabdia. Stegostom visibly subdivided into two parts: anterior broad cylindrical tube and posterior narrow part, enveloped by muscular pharyngeal tissue; posterior end marked by pharyngeal tubes. Dorsal gland orifice opens into stoma at base of cylindrical part of stegostom. Pharynx distinctly subdivided into corpus, isthmus and bulb. Corpus gradually widening posteriorly. Isthmus narrower than and separated from corpus

by a break in muscular tissue and cuticular lumen. Subventral gland orifices open into pharyngeal lumen at corpus-isthmus junction. The break of isthmus lumen slightly posterior to nerve ring level indicates a widening of pharyngeal radius, appearing like pharyngeal tubes in anterior part of corpus. Basal bulb oval, with grinder. Cardia cylindrical or conoid, glandular, enveloped by intestinal tissue. Intestine-rectum junction surrounded by three (two subventral and one dorsal) gland-like cells. Rectum short, with strongly cuticularized lumen. Tail conoid, ventrally arcuate, with bluntly rounded terminus. Caudal glands and spinneret present.

Female. Reproductive system didelphic, amphidelphic, ovary branches reflexed antidromously. Anterior genital branch on right-hand side and posterior genital branch on left-hand side of intestine. Oviduct rather short and narrow. Uterus long and broad, subdivided into spermatheca in proximal part, crustaformeria in central part and thick-walled tubular portion in distal part. Spermatheca carries oval (globular) spermatozoa in fertilized females. Cells of crustaformeria are characterised by a granular refractive content, and take part in formation of the outer (ornamented) layers of the egg shell. Both uteri open into a single ovijector. Vagina short and straight, uniformly cylindrical, without sclerotizations. Vulva pore-like, lips often slightly protruding or sometimes sunken, covered by a copulatory plug in fertilized females. Intrauterine egg measuring 58-69 x 25-31 μm ($n=3$) when outer ornamented layer of egg shell is still absent, and 69 x 28 μm ($n=1$) when egg shell is fully developed and its outer layer bears numerous thorns. One subventral and one dorsosublateral pair of small caudal setae located along posterior one-fourth of tail.

Male. Reproductive system diorchic, anterior testis outstretched, posterior testis reflexed. Anterior testis and *vas deferens* on right-hand side and posterior testis on left-hand side of intestine. Male external sexual characters composed of: generally three midventral precloacal tubular supplements, a single midventral precloacal papilliform sensillum, two subventral postcloacal papilliform sensilla and several pairs of small sensilla arranged anteriorly and posteriorly to cloaca (see below). Tubular supplements generally three (the number may in some specimens differ from one to four tubules), each connected to a large gland-like cell located on right-hand side of intestine. The gland-like cell of the posteriormost

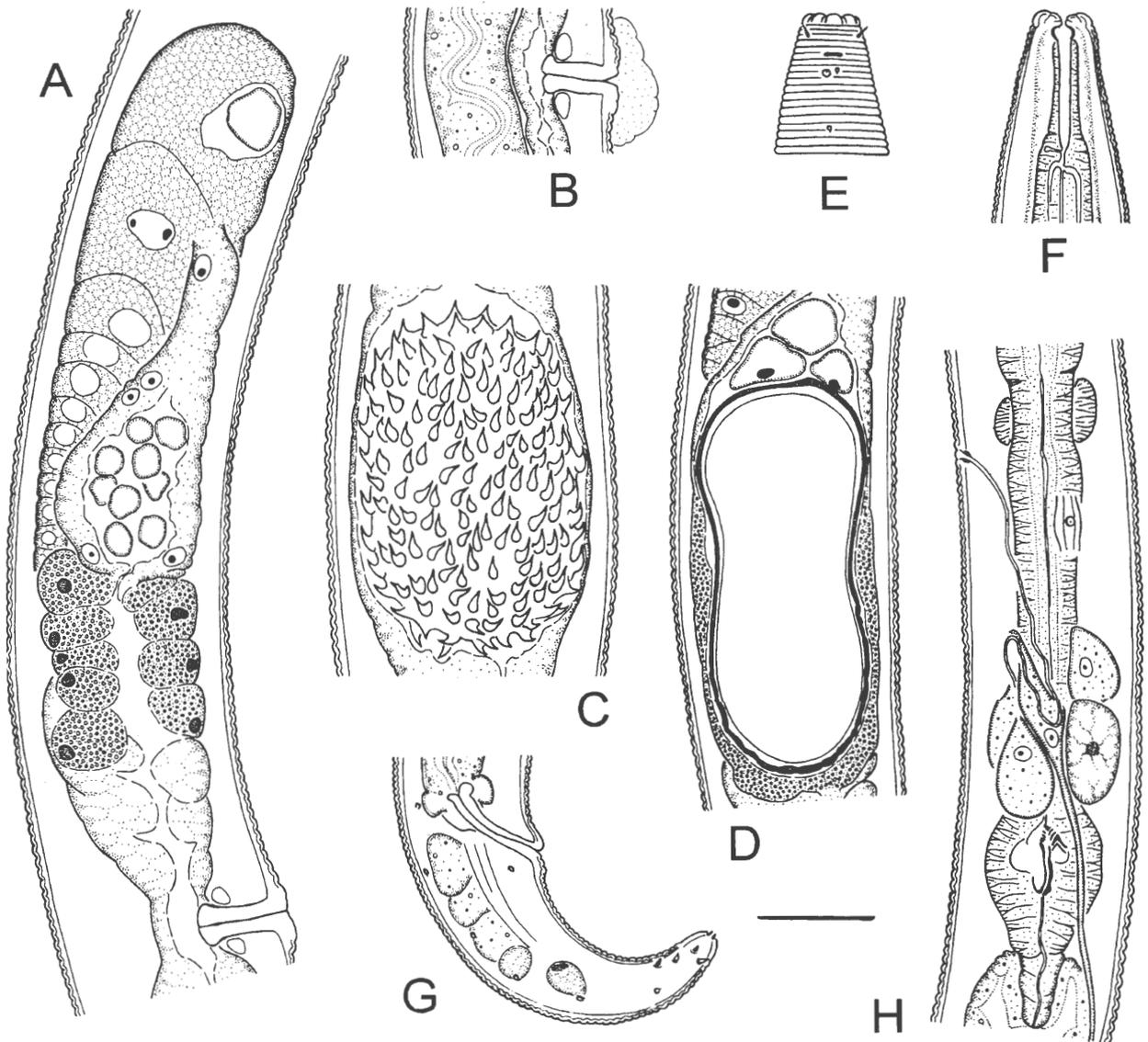


Fig. 1. *Anaplectus granulosis* (Bastian, 1865) De Coninck & Schuurmans Stekhoven, 1933. Females from Ukraine (A-H). A: Anterior genital branch; B: Vagina region, vulva covered by copulatory plug; C: Intrauterine egg with fully formed egg shell; D: Intrauterine egg moving through spermatheca and crustaformeria; E: Anterior end, surface view; F: Anterior end, median section; G: Female tail; H: Posterior part of pharynx and renette cells. Scale bar: A-H – 20 μ m.

tubule is larger than the remaining two. Midventral precloacal papilliform sensillum located between posteriormost tubular supplement and cloaca. Two postcloacal papilliform sensilla located subventrally close to tail tip, the right one is slightly anterior to the left one. Small sensilla arranged as follows: two-three opposed subventral pairs anterior to cloaca; one subventral pair at level with cloaca; three subventral pairs and three subdorsal pairs in a zig-zag pattern on tail; one lateral pair in

subterminal position on tail, close to spinneret. Spicules arcuate, with oval manubrium wider than shaft, gradually narrowing shaft and thin ventral velum. Gubernaculum plate-like with a single strong caudal appendix.

Material examined. Ukraine: L'viv, Khomets, grassland, soil, 24 September, 2002, legit O. Holovachov; Sweden: The Baltic island Gotland, Gustavsvik – Snäckgårdsbaden, sandy beach about

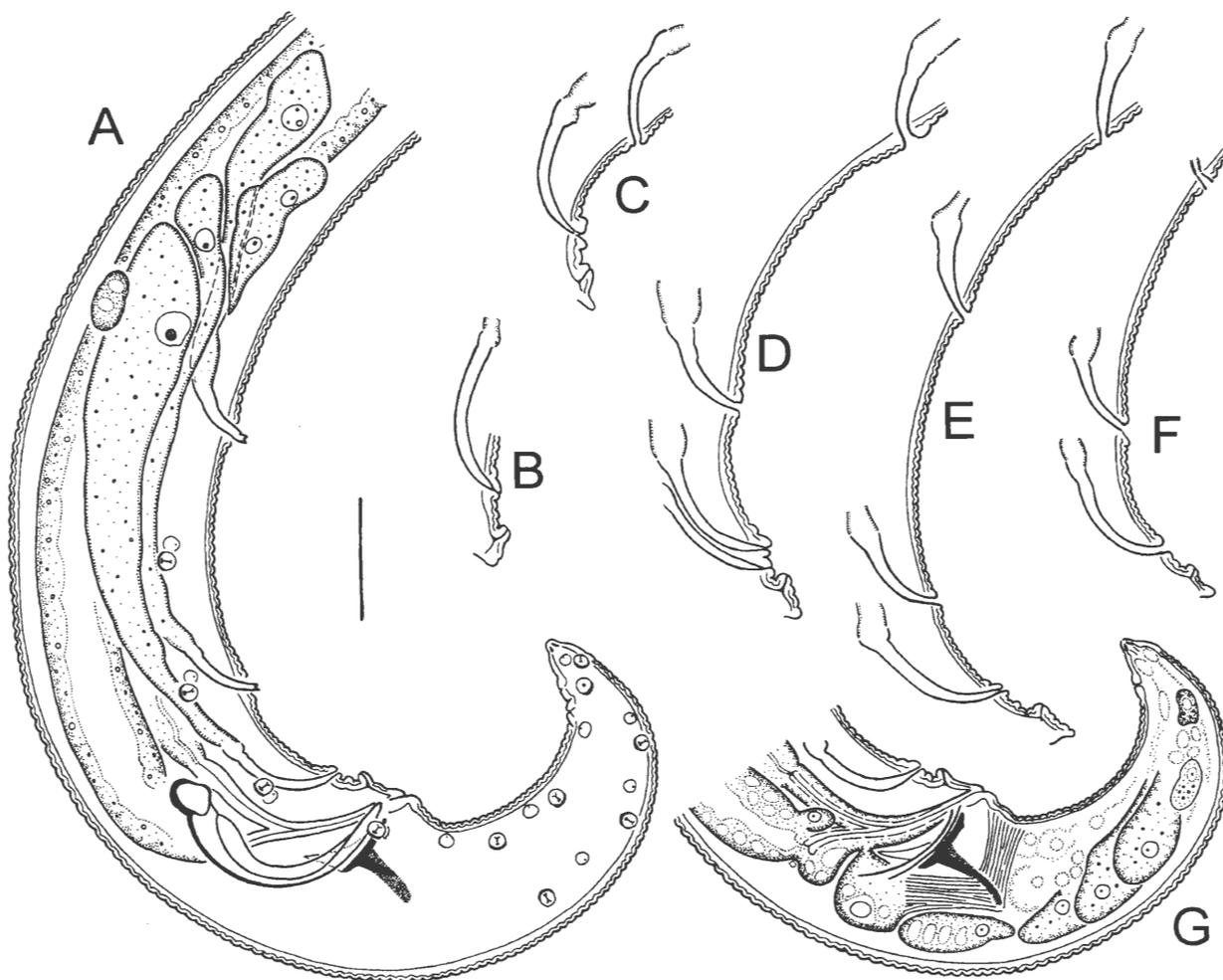


Fig. 2. *Anaplectus granulosis* (Bastian, 1865) De Coninck & Schuurmans Stekhoven, 1933. Males from Ukraine (A-G). A: Posterior body portion, combined view; B-F: Aberrant arrangement of tubular supplements; G: Cloacal region and tail, median section. Scale bar: A-G – 20 μ m.

3 km NE of Visby, dry sand with Sea Buckthorn (*Hippophaë rhamnoides* L.) and grasses, 19 August, 2002, legit S. Boström.

Diagnosis. *A. granulosis* is characterised by a body length of 0.8-1.0 mm. Labial region slightly offset from body contour. Amphid located at level with anterior part of stegostom. Excretory pore surrounded by a refractive ring. Spinneret present. Vulva pore-like, often slightly protruding. Female with four caudal setae. Male generally with three midventral precloacal tubular supplements (may vary from one to four). Small sensilla arranged as follows: two-three opposed subventral pairs anterior to cloaca; one subventral pair at level with cloaca; three subventral pairs and three subdorsal pairs in a zig-zag pattern on tail; one lateral pair in subterminal position on tail, close to spinneret. Spicules with oval manubrium wider than shaft.

Gubernaculum plate-like with a single strong caudal appendix.

Remarks. The specimens described here agree well with the redescription of *A. granulosis* by Allen & Noffsinger (1968) in general and detail morphology, although the morphometric ranges for the specimens of the recent material are smaller.

***Anaplectus atubulatus* Andrásy, 1987 (Fig. 4)**

Measurements. See Table 1.

Adult. Body almost cylindrical, gradually narrowing anteriorly in pharyngeal region and posteriorly on tail; ventrally arcuate, more so in posterior part. Cuticle annulated. Somatic setae absent, except for caudal setae in female. Lateral field

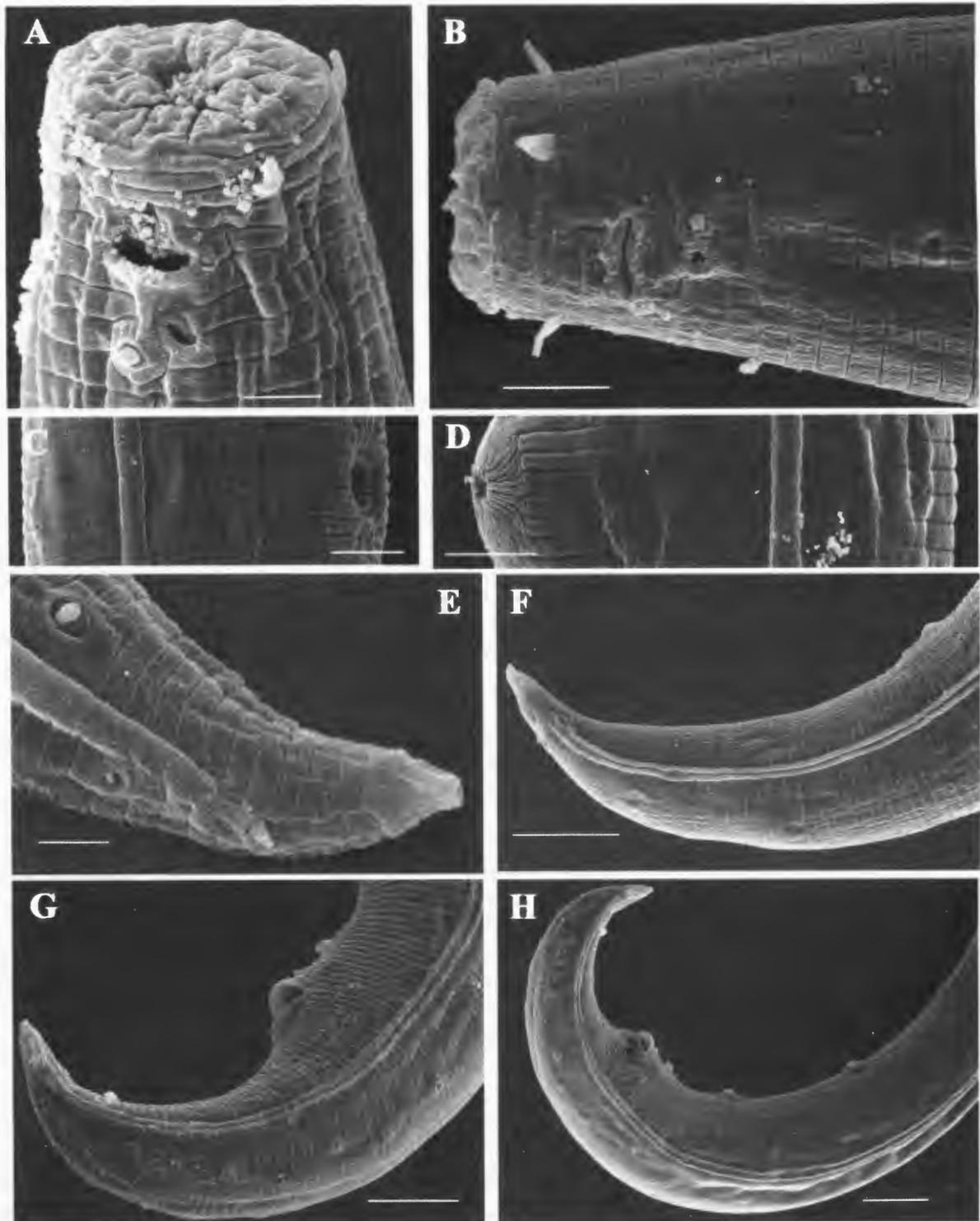


Fig. 3. *Anaplectus granulosis* (Bastian, 1865) De Coninck & Schuurmans Stekhoven, 1933 (SEM). Population from Ukraine (A, D-F). A: Labial region, lateral view (ventral side to the left); D: Vulva and lateral field; E: Male tail terminus, lateral view; F: Female tail, lateral view. Population from Sweden (B-C, G-H). B: Anterior end, lateral view (ventral side down); C: Vulva and lateral field; G: Male tail, dorso-lateral view; H: Male posterior end, lateral view. Scale bars: A, E – 2 μm ; B-D – 5 μm ; F-G – 10 μm ; H – 12.5 μm .

consists of two wings, marked by four incisures; starting at level with posterior part of corpus, extending almost to tail terminus. Hypodermal glands arranged in four sublateral rows (except for the anteriormost one) and opens to the outside via pores, 110-119 in number along one side of entire body. Two coelomocytes present posterior to cardia, subventrally from anterior part of intestine. Glandular bodies (pseudocoelomocytes) present in lateral chord at level of intestine, 4-9 in number along one body side. Labial region truncate, slightly offset from body contour. Lip region consists of six separate lips with shorter interspersed "liplets". Labial sensilla indistinct, whereas their nerve endings are visible. Nerve endings of inner labial sensilla open inside cheilostom, while those of outer labial sensilla open on anterior surface of lips. Cephalic sensilla setiform, originating on third body annule. Amphid a transverse slit, located at level with anterior part of stegostom. Cervical papilla present in both sexes, located a few annules posterior to amphid, at level with anteriormost body pore. Nerve ring surrounds anterior part of isthmus. Deirid present, papilliform; located inside lateral field posterior to nerve ring. Secretory-excretory system present, multicellular. Excretory cells surround posterior part of isthmus. Excretory duct cuticularized, excretory pore surrounded by a refractive ring, appearing as two semicircular sclerotizations in optical section. Cheilostom marked by lips, narrow, undifferentiated. Gymnostom shorter than wide, with sclerotized arcuate gymnorhabdia. Stegostom visibly subdivided into two parts: anterior broad cylindrical tube and posterior narrow part, enveloped by muscular pharyngeal tissue; posterior end marked by pharyngeal tubes. Dorsal gland orifice opens into stoma at base of cylindrical part of stegostom. Pharynx distinctly subdivided into corpus, isthmus and bulbus. Corpus gradually widening posteriorly. Isthmus narrower than and separated from corpus by a break in muscular tissue and cuticular lumen. Subventral gland orifices open into pharyngeal lumen at corpus-isthmus junction. The break of isthmus lumen slightly posterior to nerve ring level indicates a widening of pharyngeal radius, appearing like pharyngeal tubes in anterior part of corpus. Basal bulb oval, with grinder. Cardia cylindrical or conoid, glandular, enveloped by intestinal tissue. Intestine-rectum junction surrounded by three (two subventral and one dorsal) gland-like cells. Rectum short, with strongly cuticularized lumen. Tail conoid, ventrally arcuate, with bluntly rounded terminus. Caudal glands present, opening via a pore on tail terminus. Spinneret absent.

Female. Reproductive system didelphic, amphidelphic, ovary branches reflexed antidromously. Anterior genital branch on right-hand side and posterior genital branch on left-hand side of intestine. Oviduct rather short and narrow. Uterus long and broad, subdivided into spermatheca in proximal part, crustaformeria in central part and thick-walled tubular portion in distal part. Spermatheca carries oval (globular) spermatozoa in fertilized females. Cells of crustaformeria are characterised by a granular refractive content, and take part in formation of the outer (ornamented) layers of the egg shell. Both uteri open into a single ovjector. Vagina short and straight, uniformly cylindrical, without sclerotizations. Vulva transverse, slightly protruding, covered by a copulatory plug in fertilized females. Intrauterine egg measuring $66 \times 47 \mu\text{m}$, its shell (outer layer) with numerous thorns. One subventral and one dorso-sublateral pair of caudal setae located along posterior one-fourth of tail.

Male. Reproductive system diorchic, anterior testis outstretched, posterior testis reflexed. Anterior testis and *vas deferens* on right-hand side and posterior testis on left-hand side of intestine. Male external sexual characters composed of: three midventral precloacal tubular supplements, a single midventral precloacal papilliform sensillum, two subventral postcloacal papilliform sensilla and several pairs of small sensilla arranged anteriorly and posteriorly to cloaca (see below). Tubular supplements three, each connected to a large gland-like cell located on right-hand side of intestine. The gland-like cell of the posteriormost tubule is larger than the remaining two. Midventral precloacal papilliform sensillum located between posteriormost tubular supplement and cloaca. Two postcloacal papilliform sensilla located subventrally close to tail tip, the right one is slightly anterior to the left one. Small sensilla arranged as follows: two opposed subventral pairs anterior to cloaca; one subventral pair at level with cloaca; three subventral pairs and three subdorsal pairs in a zig-zag pattern on tail; one lateral pair in subterminal position on tail, close to tail terminus. Spicules arcuate, with oval manubrium wider than shaft, gradually narrowing shaft and thin ventral velum. Gubernaculum plate-like with a single strong caudal appendix.

Material examined. Poland: Rawka, moist sand near the road, 1 October, 1990, legit M.W. Brzeski; Olsztyn, near Częstochowa, *Quercus* sp., wet sand, 3 March, 1991, legit M.W. Brzeski.

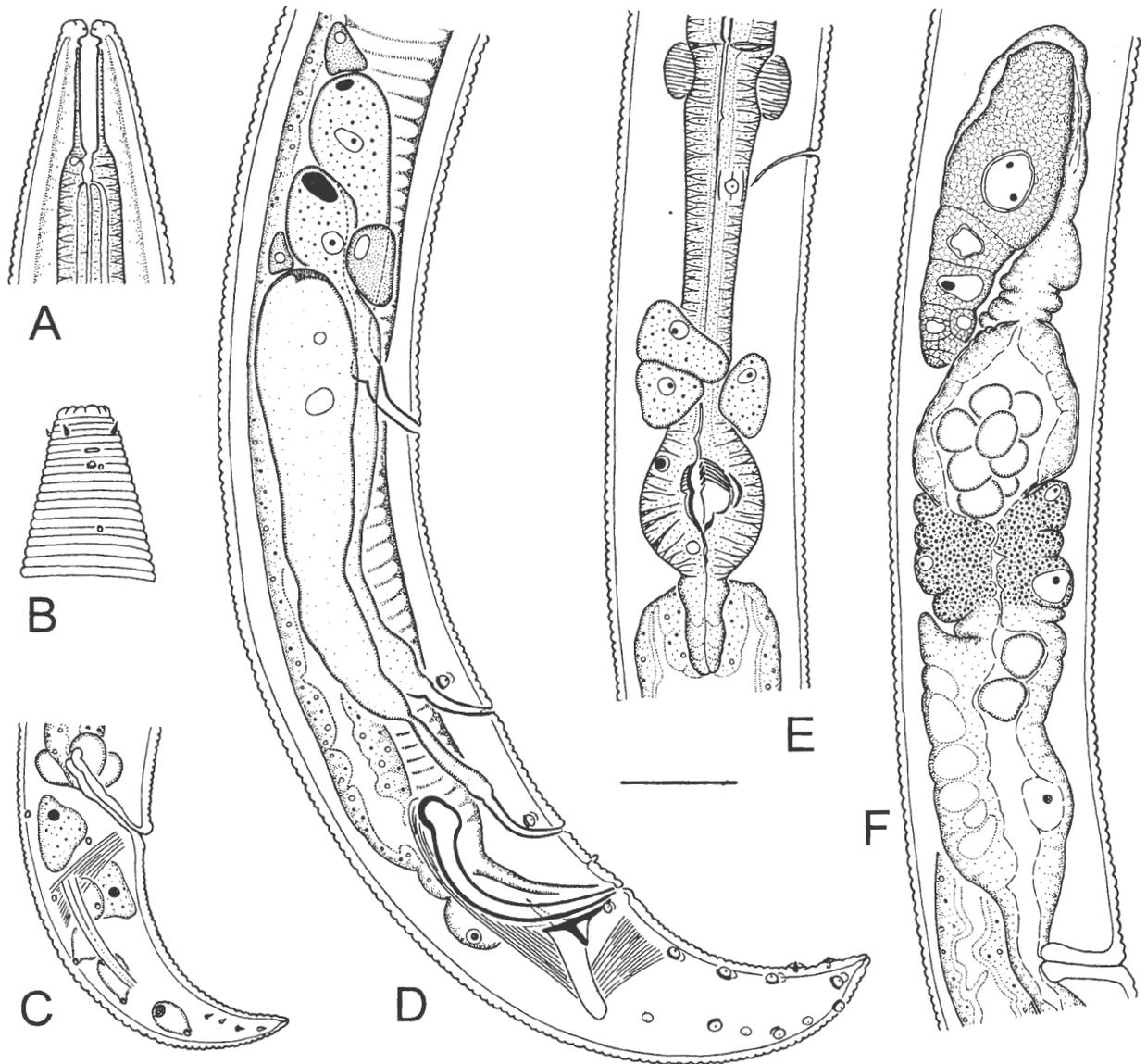


Fig. 4. *Anaplectus atubulatus* Andrassy, 1987. Population from Poland, Rawka (A-F). A: Anterior end, median section; B: Anterior end, surface view; C: Female tail; D: Male posterior body portion, combined view; E: Posterior part of pharynx and renette cells; F: Anterior genital branch. Scale bar: A-F – 20 μ m.

Diagnosis. *A. atubulatus* is characterised by a body length of 0.8-1.0 mm. Labial region slightly offset from body contour. Amphid located at level with anterior part of stegostome. Excretory pore surrounded by a refractive ring. Spinneret absent. Vulva slightly protruding. Female with four caudal setae. Male with three midventral precloacal tubular supplements. Small sensilla arranged as follows: two opposed subventral pairs anterior to cloaca; one subventral pair at level with cloaca; three subventral pairs and three subdorsal pairs in a zig-zag pattern on tail; one lateral pair in subterminal position on tail, close to tail terminus. Spicules with oval manubrium wider than shaft. Gubernaculum plate-like with

a single strong caudal appendix.

Remarks. This is the first record of the species after the original description. The specimens described here agree well with the description of *A. atubulatus* by Andrassy (1987) in general and detailed morphology except for 1) the number of small genital papillae of the male: two precloacal pairs, one adcloacal pair and seven caudal pairs vs one precloacal pair and six postcloacal pairs, and 2) postcloacal papilliform sensilla present vs absent. The recent material extends many morphometric ranges of the species, e.g. body length, body diameter, and length of pharyngeal region, tail, stoma, spicules etc.

Table 1. Measurements (in μm) of *Anaplectus granulosus* (Bastian, 1865) De Coninck & Schuurmans Stekhoven, 1933 and *A. atubulatus* Andr ssy, 1987. Measurements are in the form: mean \pm s.d. (range).

Species	<i>A. granulosus</i>		<i>A. atubulatus</i>			
	Ukraine, Lviv		Poland, Rawka		Poland, Olsztyn	
	10♀♀	10♂♂	6♀♀	4♂♂	4♀♀	2♂♂
Body length	902±56.6 (827-989)	927±50 (850-1009)	934±53.9 (867-1020)	924 (886-950)	936 (882-1000)	871; 827
Body diameter	34.8±3.0 (30-40)	31.2±0.8 (30-32)	33.9±3.0 (29-37)	33.6 (28-37)	38.3 (34-41)	42; 30
Neck length	178±7.9 (168-191)	181±7.2 (171-192)	197±8.4 (188-211)	196 (195-197)	190 (183-196)	182; 181
Tail length	48.0±2.5 (43-51)	57.7±4.5 (52-63)	51.3±2.8 (48.0-55.5)	53.3 (51.0-55.5)	56 (53-60)	63; 58
Anal body diameter	20.8±1.1 (19-22)	29.1±1.0 (28-31)	20.4±1.5 (19-22)	27.8 (27-30)	24.3 (23-26)	33; 28
a	26.1±2.1 (24-29.9)	29.7±1.4 (27.7-32.4)	27.7±2.1 (25.2-31.3)	27.8 (25.7-31.9)	24.6 (22.6-26.8)	20.7; 27.6
b	5.1±0.3 (4.4-5.5)	5.1±0.3 (4.6-5.3)	4.8±2.1 (4.5-5.1)	4.7 (4.5-4.8)	4.9 (4.8-5.1)	4.8; 4.6
c	18.8±1.0 (17.2-20.0)	16.1±1.1 (14.9-17.9)	18.2±1.9 (17.7-20.0)	17.4 (15.9-18.6)	16.7 (15.8-17.3)	13.8; 14.3
c'	2.3±0.1 (2.2-2.4)	2.0±0.1 (1.8-2.1)	2.5±2.2 (2.4-2.7)	1.9 (1.7-2.1)	2.3 (2.1-2.5)	1.9; 2.1
Labial region diameter	9.6±0.6 (9-10)	9.8±0.5 (9-10)	9.4±0.6 (9-10)	9.4 (9-10)	9.3 (9-10)	9; 10
Amphid location	7.9±0.6 (7-9)	7.6±0.5 (7-8)	8.0±0.8 (7-9)	8.1 (7-9)	7.3 (7-8)	7; 6
Cervical papilla	10.1±1.2 (8-11)	9.9±0.4 (9-10)	9.8±1.3 (8-11)	8.9 (8-11)	9 (8-10)	9; 9
Antermost body pore	10.3±0.8 (9-11)	10.3±0.5 (10-11)	10.0±1.2 (8-11)	9.7 (8-11)	9 (8-10)	9; 9
Stoma length	26.2±1.5 (24.5-29.0)	26.3±2.2 (23-31)	29.8±1.8 (28-32)	30.8 (29-33)	28.5 (26-31)	26; 26
Corpus length	64.3±3.6 (59-72)	63.6±3.2 (57-67)	70.6±3.8 (67-78)	69.4 (68-71)	67.3 (65-70)	66; 62
Isthmus length	65.8±4.4 (60-72)	66.7±3.4 (63-71)	71.9±3.9 (66-78)	70.6 (70-71)	69.5 (67-71)	65; 68
Bulbus length	23.1±1.2 (21.0-24.5)	24.0±0.9 (23.0-25.5)	25.6±1.4 (23-28)	25.6 (24.5-27.0)	24.5 (24-25)	25; 25
Cardia length	13.7±1.7 (10.0-15.5)	13.7±1.1 (12.0-15.5)	18.7±0.9 (18-20)	18.1 (17-19)	14.8 (12-18)	13; 16
Nerve ring (NR)	95.2±2.5 (92-100)	95.1±4.3 (91-106)	106±4.1 (100-111)	105 (103-107)	101 (97-104)	100; 95
Excretory pore (EP)	104±3.1 (99-109)	106±6.8 (99-120)	117±3.0 (114-122)	112 (111-112)	108 (104-116)	109; 102
Deirid (DEI)	116±3.2 (112-121)	118±6.4 (109-130)	126±3.6 (121-131)	123 (120-128)	119 (113-130)	?; 111
NR (% of neck)	53.6±1.0 (52.1-55.0)	52.5±1.8 (48.6-54.9)	53.6±2.3 (52.6-54.5)	53.6 (52.5-54.2)	53.1 (52.9-53.4)	54.9; 52.5
EP (% of neck)	58.4±2.6 (52.7-61.3)	58.8±2.3 (54.6-62.4)	59.1±1.4 (57.9-61.2)	57.0 (56.8-57.1)	57.0 (55.6-59.2)	59.9; 56.4
DEI (% of neck)	65.3±2.6 (60.9-68.1)	65.2±2.2 (60.1-67.6)	64.1±1.1 (62.1-65.3)	62.8 (61.0-65.3)	62.6 (59.8-66.3)	?; 61.3
V (%) or T (%)	52.8±1.2 (51.5-54.8)	61.8±2.6 (56.9-65.9)	51.8±0.8 (51.0-52.8)	60.3 (57.5-61.7)	50.7 (50.7-50.8)	56.0; 58.4
G1 (%) or spicula	16.9±1.7 (13.6-18.4)	41.6±2.6 (35.5-45.5)	15.6±1.3 (13.8-17.3)	43.3 (40-47)	15.4 (15.0-16.0)	39; 40
G2 (%) or gubernaculum	17.3±2.2 (12.4-20.4)	11.6±0.6 (11-12)	15.2±1.3 (13.4-16.0)	12 (11-13)	16.6 (13.4-20.3)	13; 12
Vagina or Post. tubule length	14.3±1.4 (12.0-15.5)	20.7±1.5 (18-22)	14.1±0.8 (13.0-14.5)	20.3 (20-21)	12 (10-15)	20; 19
Rectum or Distance ant. tubule to cloaca	17.2±2.7 (12-22)	90±9.7 (76-103)	19.3±1.7 (17-21)	96.7 (89-109)	22 (21-23)	105; 88

Table 2. Measurements (in μm) of *Anaplectus brzeskii* sp. n. Measurements are in the form: mean \pm s.d. (range).

Species	<i>A. brzeskii</i> sp. n.							
	Locality	Poland, Barwik			Ukraine (1738)		Ukraine (1741)	
		Holotype	27♀♀	7♂♂	5♀♀	2♂♂	4♀♀	1♂
Body length	1108	987 \pm 77.1 (863-1131)	913 \pm 93.4 (764-1056)	1046 \pm 70.4 (927-1092)	1011; 940	962 (881-1025)	879	
Body diameter	48	33.3 \pm 6.3 (27-48)	32.5 \pm 3.5 (28-39)	36.7 \pm 4.2 (31-42)	40; 34	35.3 (33-37)	37	
Neck length	200	184 \pm 11.2 (167-215)	179.9 \pm 8.1 (166-191)	198 \pm 14.4 (178-218)	195; 185	189 (176-199)	172	
Tail length	62	59.5 \pm 5.1 (50-68)	57.5 \pm 4.9 (51-67)	52 \pm 2.3 (49-53)	61; 61	54 (51-59)	62	
Anal body diameter	24.5	23.0 \pm 1.7 (21-26)	28.1 \pm 1.8 (25-30)	22.9 \pm 1.3 (21.0-24.5)	32; 30	22.2 (21.0-24.5)	32	
a	23.2	30.2 \pm 3.4 (23.3-35.8)	28.1 \pm 1.2 (27.1-30.4)	28.8 \pm 3.8 (25.9-35.1)	25.3; 27.3	27.3 (24.8-29.7)	24	
b	5.5	5.4 \pm 0.3 (4.9-6.0)	5.1 \pm 0.4 (4.6-5.6)	5.3 \pm 0.2 (5.0-5.5)	5.2; 5.1	5.1 (4.8-5.6)	5.1	
c	17.8	16.6 \pm 1.1 (14.4-18.2)	15.9 \pm 1.7 (13.6-18.4)	20.2 \pm 0.6 (19.4-20.9)	16.5; 15.4	17.8 (16.9-18.7)	14.1	
c'	2.5	2.6 \pm 0.2 (2.2-3.1)	2.1 \pm 0.2 (1.8-2.2)	2.3 \pm 0.2 (2.0-2.5)	1.9; 2.0	2.4 (2.4-2.6)	1.9	
Labial region diameter	10	9.0 \pm 0.5 (8-10)	9	9.0	10; 9	10.3 (10-11)	11	
Amphid location	9	8.4 \pm 0.9 (7-11)	8.2 \pm 1.1 (7-10)	9.3 \pm 1.0 (8-10)	11; 9	9.7 (9-10)	10	
Cervical papilla	11	10.9 \pm 1.2 (9-14)	10.6 \pm 1.5 (9-12)	11.8 \pm 1.7 (9-13)	12; 11	11.7 (11-12)	12	
Antermost body pore	12	11.1 \pm 1.1 (9-14)	11.0 \pm 1.4 (10-13)	12.5 \pm 1.8 (10.0-14.5)	13; 12	12.8 (12-13)	13	
Stoma length	25.5	23.8 \pm 0.9 (23.0-25.5)	22.9 (20-26)	24.0 \pm 2.6 (21-27)	22; 23	26.1 (22-30)	27	
Corpus length	74.5	74.0 \pm 4.2 (68-80)	68.3 (60.0-74.5)	73.7 (69-78)	72; 69	71.1 (67-77)	68	
Isthmus length	70	70.2 \pm 5.0 (65-78)	64.6 (56-70)	75.2 (70-83)	73; 70	66.4 (59-70)	61	
Bulbus length	28	26.6 \pm 1.8 (23-30)	25.5 \pm 1.0 (24-27)	25.6 (24.5-28.0)	24.5; 23	25.3 (22-28)	23	
Cardia length	17	13.6 \pm 2.4 (9-20)	14.0 \pm 3.0 (10-18)	14.8 (13.0-15.5)	14.5; 15.5	13.9 (12.0-15.5)	14.5	
Nerve ring (NR)	103	93.4 \pm 7.7 (80-109)	92.7 \pm 3.9 (87-99)	102 \pm 9.5 (89-111)	101; 96	103 (92-111)	96	
Excretory pore (EP)	104.5	97.8 \pm 7.6 (85-113)	97.7 \pm 5.1 (93-108)	114 \pm 11.9 (96-126)	110; 104	108 (98-119)	97	
Deirid (DE1)	115	109 \pm 7.4 (97-125)	109 \pm 6.8 (102-123)	125 \pm 11.3 (109-140)	122; 120	119 (106-129)	109	
NR (% of neck)	51.7	50.6 \pm 1.7 (47.7-53.3)	51.6 \pm 1.4 (50.3-54.1)	51.5 \pm 2.3 (50.0-55.6)	52.0; 51.8	54.2 (50.3-55.9)	55.5	
EP (% of neck)	52.2	53.0 \pm 1.7 (50.0-56.7)	54.3 \pm 2.0 (51.9-56.6)	57.3 \pm 2.7 (53.8-61.1)	56.6; 56.6	57.3 (54.5-59.8)	56.1	
DE1 (% of neck)	57.2	59.1 \pm 1.9 (55.1-62.9)	60.8 \pm 2.2 (58.5-64.5)	63.0 \pm 11.4 (61.3-64.4)	62.9; 65.1	62.7 (60.1-65.2)	63.2	
V (%) or T (%)	49.1	49.7 \pm 1.1 (47.4-51.4)	60.8 \pm 3.2 (55.0-64.6)	51.3 \pm 1.2 (49.9-52.4)	61.5; 59.1	52.7 (51.1-53.4)	60.9	
G1 (%) or spicula	17.9	18.1 \pm 1.1 (15.8-19.8)	43.7 \pm 3.1 (40-48)	15.4 \pm 1.4 (13.8-17.1)	47; 42	16.0 (13.1-18.4)	47	
G2 (%) or gubernaculum	18.9	18.7 \pm 1.6 (15.8-22.2)	12.0 \pm 1.1 (10-13)	16.1 \pm 0.8 (14.9-16.9)	13; 13	17.1 (15.6-18.7)	13	
Vagina or Post. tubule length	18	15.6 \pm 1.8 (12-20)	21.0 \pm 3.1 (16.0-25.5)	14.0 \pm 1.7 (12-17)	23; 25.5	14.7 (12-17)	22	
Rectum or Distance ant. tubule to cloaca	21	19.7 \pm 1.8 (17-24)	82.4 \pm 3.4 (78-89)	20.7 \pm 1.3 (19-22)	94.5; 79	18.9 (18-21)	82	

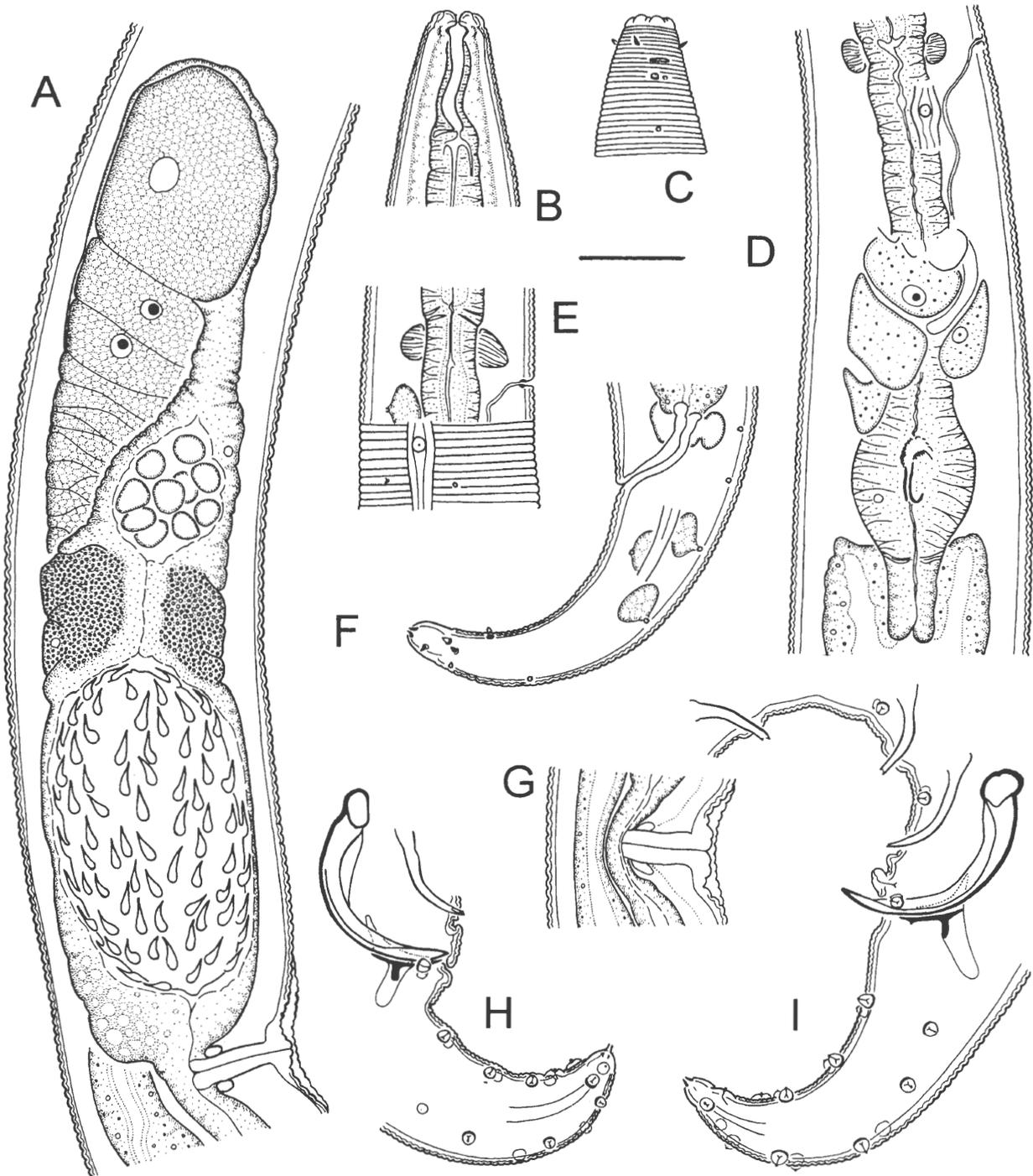


Fig. 5. *Anaplectus brzeskii* sp. n. Population from Poland (A-D, F, H-I). A: Anterior genital branch; B: Anterior end, median section; C: Anterior end, surface view; D: Posterior part of pharynx and renette cells; F: Female tail; H-I: Male posterior body portion, combined views. Population from Ukraine (E, G). E: Nerve ring, excretory pore and deirid; G: Vulva region. Scale bar: A-H – 20 μ m.

***Anaplectus brzeskii* sp. n.
(Fig. 5)**

Measurements. See Table 2.

Adult. Body almost cylindrical, gradually narrowing anteriorly in pharyngeal region and posteriorly on tail; ventrally arcuate, more so in posterior part. Cuticle annulated. Somatic setae absent, except for caudal setae in female. Lateral field

consists of two wings, marked by four incisures; starting at level with posterior part of corpus, extending almost to tail terminus. Hypodermal glands arranged in four sublateral rows (except for the anteriormost one) and open to the outside via pores, 114-128 in female and 104-108 in male along one side of entire body. Two coelomocytes present posterior to cardia, subventrally from anterior part of intestine. Glandular bodies (pseudocoelomocytes) present in lateral chord at level of intestine, 5-7 in number along one body side. Labial region truncate, slightly offset from body contour. Lip region consists of six separate lips with shorter interspersed "liplets". Labial sensilla indistinct, whereas their nerve endings are visible. Nerve endings of inner labial sensilla open inside cheilostom, while those of outer labial sensilla open on anterior surface of lips. Cephalic sensilla setiform, originating on fourth or fifth body annule. Amphid a transverse slit, located at level with anterior part of stegostom. Cervical papilla present in both sexes, located a few annules posterior to amphid, at level with anteriormost body pore. Nerve ring surrounds anterior part of isthmus. Deirid present, papilliform; located inside lateral field posterior to nerve ring. Secretory-excretory system present, multicellular. Excretory cells surround posterior part of isthmus. Excretory duct cuticularized, excretory pore surrounded by a refractive ring, appearing as two semicircular sclerotizations in optical section. Cheilostom marked by lips, narrow, undifferentiated. Gymnostom shorter than wide, with sclerotized arcuate gymnorrhabia. Stegostom visibly subdivided into two parts: anterior broad cylindrical tube and posterior narrow part, enveloped by muscular pharyngeal tissue; posterior end marked by pharyngeal tubes. Dorsal gland orifice opens into stoma at base of cylindrical part of stegostom. Pharynx distinctly subdivided into corpus, isthmus and bulb. Corpus gradually widening posteriorly. Isthmus narrower than and separated from corpus by a break in muscular tissue and cuticular lumen. Subventral gland orifices open into pharyngeal lumen at corpus-isthmus junction. The break of isthmus lumen slightly posterior to nerve ring level indicates a widening of pharyngeal radius, appearing like pharyngeal tubes in anterior part of corpus. Basal bulb oval, with grinder. Cardia cylindrical or conoid, glandular, enveloped by intestinal tissue. Intestine-rectum junction surrounded by three (two subventral and one dorsal) gland-like cells. Rectum short, with strongly cuticularized lumen. Tail conoid, ventrally arcuate, with bluntly rounded terminus. Caudal glands and spinneret

present.

Female. Reproductive system didelphic, amphidelphic, ovary branches reflexed antidromously. Anterior genital branch on right-hand side and posterior genital branch on left-hand side of intestine. Oviduct rather short and narrow. Uterus long and broad, subdivided into spermatheca in proximal part, crustaformeria in central part and thick-walled tubular portion in distal part. Spermatheca carries oval (globular) spermatozoa in fertilized females. Cells of crustaformeria are characterised by a granular refractive content, and take part in formation of the outer (ornamented) layers of the egg shell. Both uteri open into a single ovijector. Vagina short and straight, uniformly cylindrical, without sclerotizations. Vulva located in a prominent 5-8 μm deep depression, covered by a copulatory plug in fertilized females. Intrauterine egg measuring 65.8 x 27.5 (63-71 x 26-29) μm (n=6), its shell (outer layer) with numerous thorns. One subventral and one dorsosublateral pair of caudal setae located along posterior one-fourth of tail.

Male. Reproductive system diorchic, anterior testis outstretched, posterior testis reflexed. Anterior testis and *vas deferens* on right-hand side and posterior testis on left-hand side of intestine. Male external sexual characters composed of: three midventral precloacal tubular supplements, a single midventral precloacal papilliform sensillum, two subventral postcloacal papilliform sensilla and several pairs of small sensilla arranged anteriorly and posteriorly to cloaca (see below). Tubular supplements three, each connected to a large gland-like cell located on right-hand side of intestine. Midventral precloacal papilliform sensillum located between posteriormost tubular supplement and cloaca. Two postcloacal papilliform sensilla located subventrally close to tail tip, the right one is slightly anterior to the left one. Small sensilla arranged as follows: two opposed subventral pairs anterior to cloaca; one subventral pair at level with cloaca; three subventral pairs and three subdorsal pairs in a zig-zag pattern on tail; one lateral pair in subterminal position on tail, close to spinneret. Spicules arcuate, with oval manubrium wider than shaft, gradually narrowing shaft and thin ventral velum. Gubernaculum plate-like with a single strong caudal appendix.

Diagnosis. *Anaplectus brzeskii* sp. n. is characterised by a body length of 0.7-1.1 mm. Labial region slightly offset from body contour.

Amphid located at level with anterior part of stegostom. Excretory pore surrounded by a refractive ring. Spinneret present. Vulva located in a depression. Female with four caudal setae. Male with three midventral precloacal tubular supplements. Small sensilla arranged as follows: two opposed subventral pairs anterior to cloaca; one subventral pair at level with cloaca; three subventral pairs and three subdorsal pairs in a zig-zag pattern on tail; one lateral pair in subterminal position on tail, close to spinneret. Spicules with oval manubrium wider than shaft. Gubernaculum plate-like with a single strong caudal appendix.

Relationships. The new species resembles *A. octo* Zullini, 1973 and *A. tortus* Andrásy, 1987 by having vulva in a depression. It can be distinguished from *A. octo* by the stoma shape (single vs double chamber in gymnostom), a longer body (863-1131 μm vs 700-820 μm) and a relatively shorter tail ($c'=2.2-3.1$ vs $c'=3.3$). From *A. tortus* it differs by a longer stoma (22-30 μm vs 18-19 μm), a somewhat shorter female tail ($c'=2.2-3.1$ vs $c'=2.9-3.3$), shorter spicules (40-48 μm vs 50-52 μm), and differently shaped stegostom and female tail. In many morphometric and morphological features, the new species comes close to *A. granulatus*, from which it differs mainly by vulva located in a deep depression.

Type locality and habitat. Poland: Biebrzanski Park Narodowy, Barwik, *Caricetum elatae* Koch, *Phragmitetum communis* (Gams) Schmale, *Salix (caprea* L.) shrub rhizosphere near *Caricetum diandrae* (Almqvist) Jonas wetland meadow, 25-26 October, 2001, legit L. Háněl.

Other localities and habitats. Ukraine: Sumy Province, Nedrygailiv District, Velyki Budky Village, 14 August, 1997, legit O. Holovachov. Habitats: wet meadow, soil around roots of Asteraceae (sample no. 1738) and *Salix* sp. forest, wet soil around roots of Polygonaceae, Silverweed (*Potentilla anserina* L.) and Selfheal (*Prunella vulgaris* L.) (sample no. 1741).

Type material. Holotype female, fifteen female paratypes and five male paratypes deposited in Museum & Institute of Zoology, PAS, Warszawa, Poland; twelve female and two male paratypes deposited in the nematode collection of Institute of Soil Biology, České Budějovice, Czech Republic; five female and two male paratypes deposited in Department of Zoology, Biological Faculty, Ivan Franko National University of L'viv,

Ukraine; and four female and one male paratypes deposited in Department of Invertebrate Zoology, Swedish Museum of Natural History, Stockholm, Sweden.

Etymology. The new species is named in honour of the late Prof. M.W. Brzeski for his many contributions to nematology in general and to plectid systematics in particular.

***Anaplectus* De Coninck & Schuurmans
Stekhoven, 1933
= *Marinoplectus* Kreis, 1963**

Diagnosis (emended). Cuticle annulated. Somatic setae absent, except for caudal setae in female. Lateral field consists of two wings. Hypodermal glands open to the outside via pores. Coelomocytes present posterior to cardia. Glandular bodies present in lateral chord. Nerve endings of inner labial sensilla open inside cheilostom, those of outer labial sensilla open on anterior surface of lips. Lip region with six separate lips with shorter interspersed "liplets". Cephalic sensilla setiform. Amphid a transverse slit. Cervical papilla present in both sexes. Deirid present. Secretory-excretory system present, multicellular, excretory duct cuticularized. Cheilostom marked by lips, narrow, without sclerotized rhabdia. Gymnostom shorter than wide, with sclerotized arcuate gymnorhabdia. Stegostom with two parts: anterior broad cylindrical tube and posterior narrow part. Dorsal gland orifice opens into stoma at base of cylindrical part of stegostom. Pharyngeal tubes present. Pharynx subdivided into corpus, isthmus and basal bulb with grinder. Cardia glandular, enveloped by intestinal tissue. Intestine-rectum junction surrounded by three (two subventral and one dorsal) gland-like cells. Rectum short. Tail conoid, ventrally arcuate. Caudal glands present. Spinneret present or absent. Female reproductive system didelphic, amphidelphic, ovary branches reflexed antidromously. Uterus subdivided into spermatheca, crustiformeria and thick-walled tubular distal part. Vagina without sclerotizations, surrounded by a single sphincter muscle. Egg shell with numerous thorns. Two pairs of caudal setae present in female. Male reproductive system diorchic, anterior testis outstretched, posterior testis reflexed. Male external sexual characters composed of: generally two-four midventral precloacal tubular supplements, a single midventral precloacal papilliform sensillum, two subventral postcloacal papilliform sensilla and several pairs of small sensilla arranged in the following way: two-three

opposed subventral pairs anterior to cloaca; one subventral pair at level with cloaca; three subventral pairs and three subdorsal pairs in a zig-zag pattern on tail; one lateral pair in subterminal position on tail, close to spinneret. Spicules arcuate, with oval manubrium, gradually narrowing (conoid) shaft and thin ventral velum. Gubernaculum plate-like with one or two caudal appendices.

Type species:

A. granulatus (Bastian, 1865) De Coninck & Schuurmans Stekhoven, 1933

syn. *Plectus granulatus* Bastian, 1865; *Plectus schneideri* de Man, 1880; *Plectus tubifer* Cobb, 1914; *Plectus blanci* Hofmänner in Hofmänner & Menzel, 1914; *Marinoplectus tetrapapillatus* Kreis, 1963; *Anaplectus arenicola* Killick, 1964.

Other species:

A. atubulatus Andrassy, 1987

A. brzeskii sp. n.

A. eurycerus (Massey, 1964) Andrassy, 1984

syn. *Plectus eurycerus* Massey, 1964

A. grandepapillatus (Ditlevsen, 1928) Andrassy, 1973

syn. *Plectus granulatus* var. *grandepapillatus* Ditlevsen, 1928; *Anaplectus granulatus grandepapillatus* (Ditlevsen, 1928) Gerlach & Riemann, 1973; *Plectus submersus* Hirschmann, 1952; *Anaplectus submersus* (Hirschmann, 1952) Maggenti, 1961; *Anaplectus intermedius* Truskova, 1972

A. magnus Brzeski, 1963

A. octo Zullini, 1973

A. parasimilis Truskova, 1978

A. porosus Allen & Noffsinger, 1968

A. similis Allen & Noffsinger, 1968

A. subgranulosus Truskova, 1978

A. tortus Andrassy, 1986

A. varicaudatus Allen & Noffsinger, 1968

Key to species identification of the genus *Anaplectus*

1. Gymnostom in shape of a single chamber 3
 - Gymnostom in shape of a double chamber..... 2
2. Vulva in an elongated depression, tail elongated, $c'=3.3$ *A. octo*
 - Vulva flush with body contour, tail plump, $c'=2.0-2.5$ *A. eurycerus*
3. Cuticularized spinneret present 5
 - Cuticularized spinneret absent 4
4. Lip region set off; amphid located at level with stegostom *A. atubulatus*
 - Lip region not set off; amphid at level with

- gymnostom *A. varicaudatus*
- 5. Dorsal and ventral hypodermal glands and pores present anteriorly..... *A. porosus*
 - Dorsal and ventral hypodermal glands and pores absent..... 6
- 6. Manubrium not exceeding width of shaft 7
 - Manubrium distinctly exceeding width of shaft 10
- 7. Lip region set off; male usually with 2-3 tubular supplements 8
 - Lip region not set off; male usually with 4 tubular supplements 9
- 8. Body 0.8-1.1 mm long; $b=4.9-5.2$ *A. tortus*
 - Body 2.0-2.3 mm long; $b=8.0-9.7$ *A. magnus*
- 9. Posteriormost tubular supplement about 1/2 of spicule length *A. similis*
 - Posteriormost tubular supplement about equal to spicule length *A. grandepapillatus*
- 10. Precloacal subventral papilliform sensilla present 11
 - Precloacal subventral papilliform sensilla absent* 12
- 11. Vulva almost continuous with body contour *A. granulatus*
 - Vulva in longitudinally elongated 5-8 μm deep depression *A. brzeskii*
- 12. Posteriormost tubular supplement equal to 1/2 of spicule length *A. subgranulosus*
 - Posteriormost tubular supplement longer than 1/2 of spicule length *A. parasimilis*.

*Atypical condition for *Anaplectus*. The character may have been overlooked by the author – cf. figures 1, 3, 6 and 8 in the descriptions of *A. subgranulosus* and *A. parasimilis* by Truskova (1978).

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Holovachov O., Boström S., Winiszewska G., Háněl L. Описание двух известных и одного нового вида рода *Anaplectus* De Coninck & Schuurmans Stekhoven, 1933 из Европы и ревизия таксономии рода (Nematoda: Plectida).

Резюме. По материалу, собранному в Польше, Украине и Швеции, описаны два известных вида рода *Anaplectus*, (*A. granulosus* и *A. atubulatus*) и один новый вид - *A. brzeskii* sp. n. Впервые вид *A. granulosus* исследован в сканирующем электронном микроскопе. Новый вид *A. brzeskii* sp. n. характеризуется длиной тела 863–1131 мкм у самок и 764–1056 мкм у самцов, амфидами, расположенными на уровне передней части стегостомы, наличием спиннереты, вульвой, расположенной на дне углубления, наличием четырех хвостовых щетинок у самок и трех трубчатых суппLEMENTОВ у самцов, спикулами длиной 40–48 мкм с овальными головками, которые шире, чем само тело спикулы, пластинковидным рульком длиной 10–13 мкм, несущим мощный хвостовой отросток. Предложен дополненный диагноз рода, список видов и ключ для их определения.
