

Description of *Acrobelloides arctowskii* sp. n. (Rhabditida: Cephalobidae) from King George Island, Antarctica

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Summary. A new species of *Acrobelloides*, *A. arctowskii* sp. n., is described from soil around roots of *Deschampsia antarctica* on King George Island, South Shetland Islands, Antarctica. The new species adds to the Antarctic terrestrial nematode fauna and resembles most closely *A. arenicola* Abolafia & Peña-Santiago, 2003 by having acute labial probolae, five incisures in lateral field and an acute conoid tail. It differs from *A. arenicola* in its longer body ($L = 804\text{--}1101\ \mu\text{m}$ vs $L = 476\text{--}729\ \mu\text{m}$), longer post-vulval uterine branch ($43\text{--}65\ \mu\text{m}$ vs $24\text{--}40\ \mu\text{m}$), strongly protruding vulval lips (vs continuous with body contour), longer spicules ($41\text{--}48\ \mu\text{m}$ vs $24\text{--}27\ \mu\text{m}$) and longer gubernaculum ($21\text{--}27\ \mu\text{m}$ vs $14\text{--}15\ \mu\text{m}$).

Key words: *Acrobelloides*, Antarctica, Cephalobidae, morphology, new species, SEM.

The Antarctic peninsula and its archipelago have long attracted scientists studying biology and geology in this remote part of the world. The first scientific programme carried out in the maritime Antarctic zone was the Belgian expedition (Expédition Antarctique Belge) on the S.Y. Belgica in 1897–1899. Terrestrial nematodes collected by this expedition were described by de Man (1904) and the first descriptions of terrestrial nematodes from the continental Antarctic zone were made by Steiner (1916). The most recent review of the Antarctic nematode fauna compiled by Andrassy (1998) lists two endemic species (both of monotypic genera) of the family Cephalobidae found in the continental Antarctic zone, i.e. *Scottinema lindsayae* Timm, 1971 and *Chiloplacoides antarcticus* Heyns, 1994. Cephalobids have also been recorded from the maritime zone, viz. *Cervidellus* sp. (Spaull, 1973) and *S. lindsayae* (Mouratov *et al.*, 2001).

Samples were collected in the neighborhood of the Polish Antarctic Station, 'Henryk Arctowski', on King George Island in December 2003. Among the nematodes sampled, a population of the genus *Acrobelloides* was found to represent a new species, which is described below, adding to the endemic terrestrial nematode fauna of Antarctica.

MATERIAL AND METHODS

The present study is based on specimens extracted from samples in the rhizosphere of *Deschampsia antarctica*. The samples were collected by Prof. S. Rakusa-Suszczewski (Department of Antarctic Biology of PAS, Warszawa, Poland) in the neighbourhood of the Polish Antarctic Station on King George Island, in the South Shetland Islands and put at our disposal by Dr. G. Winiszewska (Museum i Instytut Zoologii of PAS, Warszawa, Poland). Specimens were extracted by a decanting and sieving method, fixed in 4% formaldehyde, processed to pure glycerin by a slow evaporation method and mounted on permanent Cobb slides in glycerin with paraffin wax as support for the cover-slip. Coiled and curved structures were measured along the median line. Stoma length was measured from the mouth opening to the pharyngeal tubuli. Measurements are given in the format: mean \pm standard deviation and range (where appropriate). For SEM studies, some specimens were postfixed in 1% osmium tetroxide (OsO_4) and transferred to pure acetone through an acetone/distilled water series. Specimens were critical point dried in liquid CO_2 , mounted on stubs, sputter-coated with gold to a

thickness of 200 Å and examined in Hitachi S-4300 SEM at an accelerating voltage of 10 kV.

DESCRIPTION

Acrobelloides arctowskii sp. n.

(Figs 1-2)

Measurements (Table 1).

Adult. Body slightly arcuate ventrad in females, strongly curved ventrally in posterior body part in males. Body gradually narrowing anteriorly along pharyngeal region and posteriorly on tail. Cuticle coarsely annulated, annuli 3.2-4.8 µm wide just anterior to vulva. In some specimens the cuticle shrank, probably because of 'overheating' during preparation of slides, and the labial probolae bent outward. Lateral alae with four wings, resulting in five longitudinal lines along most of the body, as observed with LM, originating anterior to nerve ring and reaching almost to tail tip. Lip region with four cephalic and six labial papillae; amphid opening rounded, surrounded by a cuticular ridge,

located dorso-laterally on the base of each lateral lip. Three pairs of asymmetrical lips, one dorsal and two ventro-laterals. Pairs of lips separated by U-shaped primary axils; without guarding pieces. Secondary axils demarcated by narrow incisures separating the two lips of each pair; without guarding pieces. Each lip asymmetrically triangular, extending forward into setiform cephalic probola along the primary axils. Each labial probola elongate conoid, with filiform forwardly directed terminus. One specimen with bluntly rounded cephalic and typical pointed labial probolae, and one specimen with both cephalic and labial probolae bluntly rounded. Stoma 1.4-1.9 times as long as labial region diameter, with distinct divisions into cheilostom, gymnostom and stegostom. Cheilorhabdia longitudinally oval (bacilliform) in median section. Gymnostom short, with distinct plate-like gymnorhabdia. Stegostom distinctly subdivided into four sets of rhabdia. Dorsal gland orifice located between meta- and telostegorhabdia. Pharyngeal corpus cylindrical, metacarpus somewhat fusiform, isthmus clearly delineated from

Table 1. Measurements (in µm) of *Acrobelloides arctowskii* sp. n.

Number & sex	Holotype	Paratypes 6 ♀♀	Paratypes 12 ♂♂
Body length	1085	945±99.2 (856-1101)	948±77.6 (804-1069)
Body diameter	40	36.7±4.7 (32-45)	32.6±3.5 (24.5-40.0)
Neck length	216	195±12.0 (180-210)	191±9.4 (172-206)
Tail length	78	79.3±13.4 (65-97)	61.7±4.8 (53-71)
Anal or cloacal body diameter	25.5	22.0±2.6 (20-27)	26.9±1.8 (23-29)
a	27.1	26.0±2.7 (22.1-30.1)	29.4±4.0 (22.1-39.0)
b	5.0	4.8±0.3 (4.4-5.2)	5.0±0.3 (4.5-5.5)
c	14.0	12.1±1.2 (10.7-13.8)	15.4±1.1 (13.7-17.6)
c'	3.0	3.6±0.4 (3.2-4.1)	2.3±0.1 (2.1-2.5)
Labial region diameter	11	10.4±0.6 (10-11)	9.7±0.5 (9-10)
Labial probolae length	7	5.9±0.9 (4.5-7.0)	5.8±0.8 (4.5-7.0)
Stoma length	17	16.3±1.2 (15.5-18.0)	15.8±1.1 (14.5-18.0)
Corpus length	131	119±5.3 (111-125)	115±6.2 (106-127)
Isthmus length	37	35.2±6.0 (28-43)	31.9±2.6 (28-36)
Corpus/isthmus ratio	3.6	3.4±0.5 (2.8-4.0)	3.6±0.3 (3.2-4.1)
Bulbus length	24.5	24.6±1.3 (23-27)	23.2±1.2 (21-26)
Bulbus diameter	20	19.8±1.1 (19-21)	18.2±1.1 (17-20)
Nerve ring	177	154±9.6 (140-165)	156±11.2 (133-169)
Excretory pore	187	163±12.5 (146-177)	167±13.5 (141-182)
Deirid	217	186±15.4 (163-205)	191±15.8 (161-210)
Nerve ring (% of neck length)	82.0	78.6±1.6 (76.2-80.8)	81.4±3.5 (76.5-87.2)
Excretory pore (% of neck length)	87.0	83.4±3.9 (76.8-86.6)	87.4±5.2 (80.0-97.0)
Deirid (% of neck length)	101	95.0±3.6 (90.6-99.5)	99.7±5.8 (92.3-109.0)
Nerve ring (no. of annules)	48	48 (46-49)	46 (44-49)
Excretory pore (no. of annules)	50	50 (48-52)	49 (46-53)
Deirid (no. of annules)	58	57 (53-59)	56 (53-60)
Phasmid	25.5	26.0±6.0 (19-35)	28.0±3.1 (22-32)
Phasmid (% of tail length)	32.6	31.6±3.6 (28.2-36.9)	45.3±3.6 (37.8-51.9)
V or T, %	65.6	64.9±1.1 (63.7-66.5)	55.0±2.2 (51.5-59.3)
Vulval body diameter	45	38.0±4.7 (35-47)	—
Vagina or Spicules	14.5	11.6±0.6 (11-12)	44.5±1.9 (41-48)
Spermatheca or Gubernaculum	78	82.5±21.6 (56-105)	23.9±1.3 (21-27)
PUB	56	56.9±7.3 (43-65)	—
PUB/BD	1.4	1.6±0.2 (1.3-1.8)	—
Rectum or Mucro	28	26.2±3.2 (23-31)	4.6±1.5 (3-7)
Rectum/ABD	1.1	1.2±0.1 (1.1-1.3)	—

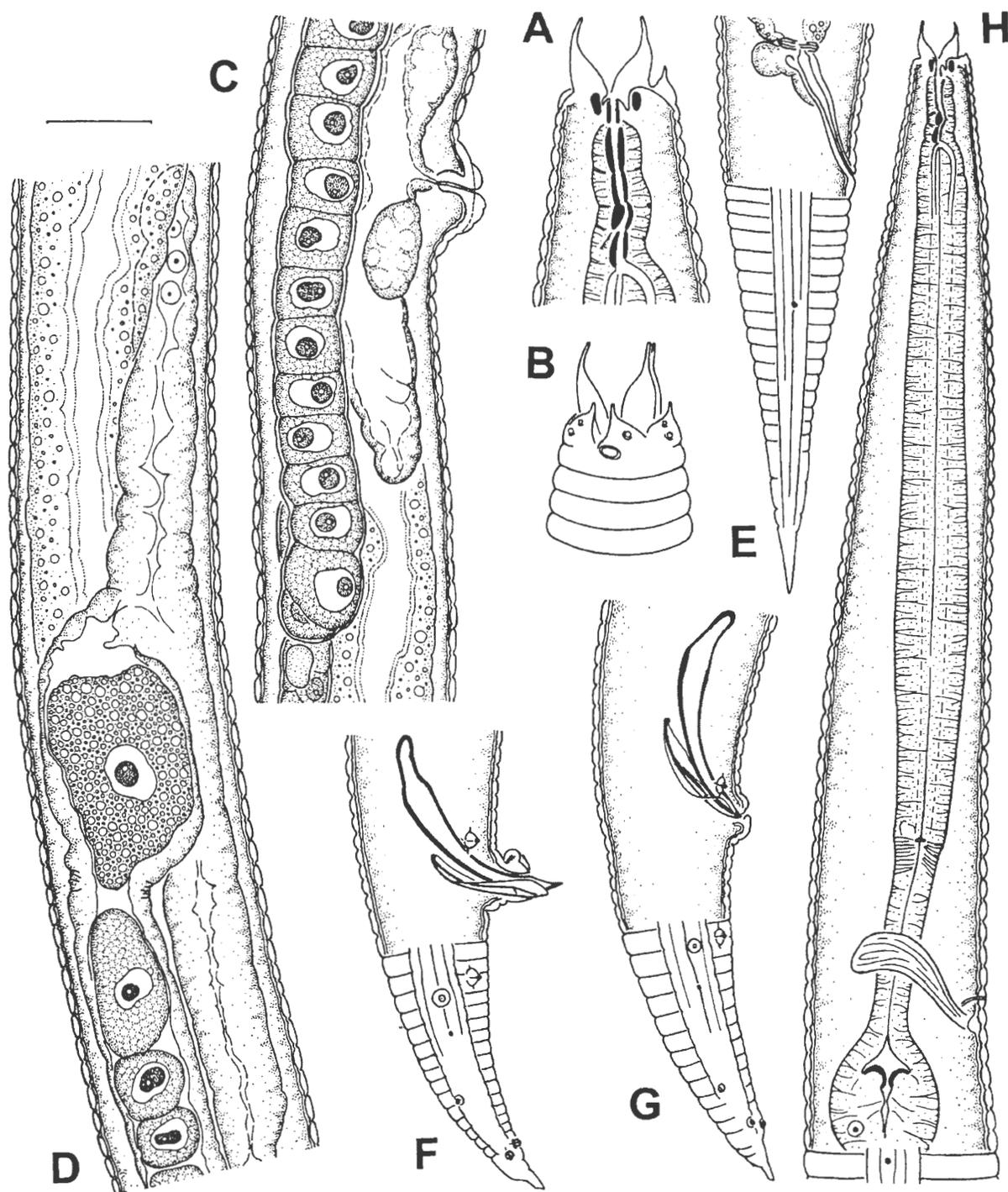


Fig. 1. *Acrobeloides arctowskii* sp. n. A: anterior end, median section; B: anterior end, surface view; C: vulval region; D: anterior part of female gonad; E: female tail; F-G: male caudal region; H: pharyngeal region. Scale bar: A-B – 10 μ m, C-H – 20 μ m.

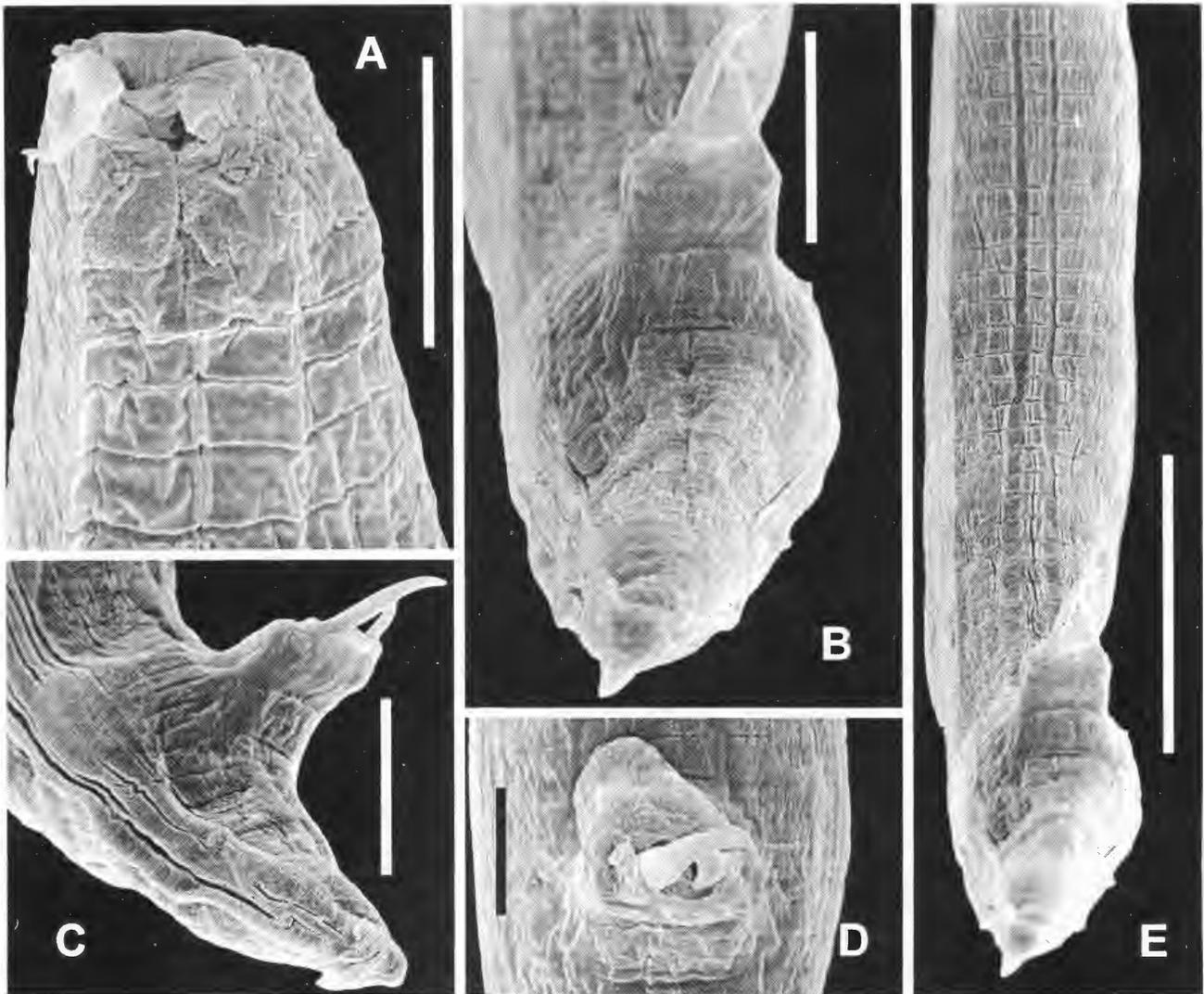


Fig. 2. *Acrobeloides arctowskii* sp. n. A: anterior end, ventral view (labial probolae collapsed and partly cover stoma opening); B: male tail, ventral view; C: male tail, right lateral view; D: cloacal region, ventral view; E: male posterior body part, ventral view, showing submedian ventral grooves. Scale bar: A, D – 6 μ m, B – 12 μ m, C – 15 μ m, E – 30 μ m.

and narrower than corpus. Basal bulb oval, with strongly developed grinder. Nerve ring encircling middle of isthmus. Excretory pore located 1-5 annules posterior to nerve ring. Deirid located within the 'dorsosublateral' band of lateral alae, near level of pharyngo-intestinal junction, 5-9 annules posterior to excretory pore.

Female. Reproductive system monodelphic, prodelphic, dextral in position. Vulva strongly protruding; vagina 0.3 times vulval body diameter long. Two pairs (one anterior and one posterior) of large vaginal glands present near vagina-ovijector junction (Fig. 1C). These structures were also described in *A. bodenheimeri* (Steiner, 1936) Thorne, 1937 by Siddiqi *et al.* (1992), De Ley *et*

al. (1999) and Abolafia & Peña-Santiago (2003), in *A. longiuterus* (Rashid & Heyns, 1990) Siddiqi, De Ley & Khan, 1992 by Rashid & Heyns (1990), in *A. camberenensis* (De Ley, Geraert & Coomans, 1990) Siddiqi, De Ley & Khan, 1992 by De Ley *et al.* (1990), and in *A. saeedi* Siddiqi, De Ley & Khan, 1992 by Siddiqi *et al.* (1992). Anterior uterus longer than corresponding body diameter. Spermatheca comparatively large, containing spermatozoa in some females. Oviduct poorly differentiated, emerging dorsally from uterus-spermatheca junction, leading to ovary. Ovary with double flexure, located somewhat posterior to post-vulval uterine branch extremity. Post-vulval uterine branch 1.3-1.8 times longer than vulval

body diameter. Rectum slightly longer than anal body diameter. Phasmid at about one-third of tail length. Tail conoid, with about 16-20 prominent ventral annules, which become hardly discernible posteriorly. Tail tip acute, hyaline.

Male. Reproductive system monorchic, testis ventrally reflexed. Spicules 1.5-1.8 times as long as cloacal body diameter, arcuate ventrad, with hemispherical manubrium. Gubernaculum canoe-shaped, nearly half of spicule length. Phasmid somewhat anterior to middle of tail. Two submedian ventral grooves extending from cloaca about 30 annules anteriorly. Genital papillae distributed as follows: three pairs of subventral precloacal papilla; a single midventral papilla on anterior cloacal lip; one lateral pair and one subventral pair just anterior to phasmid; one subdorsal pair, one lateral pair, and one subventral pair near tail terminus. Tail slightly curved ventrad, conical, with short blunt mucro.

Etymology. The new species is named after the Polish geologist and oceanographer Henryk Arctowski who participated in the Belgian expedition to Antarctica in 1897-1899.

Type locality and habitat. Antarctica, South Shetland Islands, King George Island, west slopes of the Panorama ridge; 58°29'30"W, 61°05'S; soil around roots of *Deschampsia antarctica*; 1 December 2003; legit S. Rakusa-Suszczewski.

Type specimens. Holotype female, three female and seven male paratypes deposited in the nematode collection of the Museum i Instytut Zoologii, PAN, Warszawa, Poland. Three female and seven male paratypes deposited in the nematode collection of the Department of Invertebrate Zoology, Swedish Museum of Natural History, Stockholm, Sweden. Three female and seven male paratypes deposited in the nematode collection of the first author.

Differential diagnosis. *Acrobelloides arctowskii* sp. n. strongly resembles *A. arenicola* Abolafia & Peña-Santiago, 2003 by having acute labial probolae, five incisures in the lateral field and an acute conoid tail. It differs from *A. arenicola* in longer body (L = 804-1101 µm vs L = 476-729 µm), longer post-vulval uterine branch (43-65 µm vs 24-40 µm), strongly protruding vulval lips (vs continuous with body contour), longer spicules (41-48 µm vs 24-27 µm) and longer gubernaculum (21-27 µm vs 14-15 µm). The new species differs from *A. uberrinus* Anderson, 1965 (which has similar labial region and lateral field structure) in its longer body (L = 804-1101 µm vs L = 430-480 µm), presence vs absence of post-vulval uterine branch, shape of tail (elongate conoid with acute terminus vs conoid

with blunt and sometimes mucronate terminus), longer spicules (41-48 µm vs 22 µm) and longer gubernaculum (21-27 µm vs 11 µm). Finally, it differs from *A. ellesmerensis* Yeates, 1967 (which has similar labial region and tail structure) in its longer body (L = 804-1101 µm vs L = 569-647 µm), longer post-vulval uterine branch (1.3-1.8 vs <0.5 body diameters long), larger number of incisures in lateral field (five vs four), and setose vs rounded shape of cephalic probolae.

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Holovachov, O., Boström, S. Описание *Acrobeloides arctowskii* sp. n. (Rhabditida: Cephalobidae) с острова Короля Георга, Антарктика.

Резюме. В статье описывается новый вид рода *Acrobeloides* *A. arctowskii* sp. n., обнаруженный в почве вокруг корней *Deschampsia antarctica*, о-в Короля Георга, Южные Шетландские о-ва, Антарктика. Он дополняет фаунистический список почвенных нематод Антарктики. Имея заостренные губные проболы, пять линий в боковом поле и заостренно-конический хвост, новый вид наиболее близок к *A. arenicola* Abolafia & Peña-Santiago, 2003, от которого отличается более длинным телом (L = 804-1101 μ m против L = 476-729 μ m), длинным пост-вульварным выростом матки (43-65 μ m против 24-40 μ m), сильно выпуклыми губами вульвы (не выделяются за контур тела), более длинными спикулами (41-48 μ m против 24-27 μ m) и рульком (21-27 μ m против 14-15 μ m).
