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Two new species of the family Aporcelaimidae (Nematoda: Dorylaimida)

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ABSTRACT. Two new aporcelaimid nematode species are described. *Aporcella magna* sp. n. from Chile differs from the other three species of the genus by its large body shape, on average 4.7 mm. *Aporcelinus vulvatus* sp. n. from Papua New Guinea is distinguished from the eleven known species of the genus by the long body (on average 2.6 mm), long odontostyle and protruded vulva.

Key words: nematology, taxonomy, *Aporcella*, *Aporcelinus*, Aporcelaimidae, new species, Chile, Papua New Guinea.

INTRODUCTION

This paper provides descriptions of two new nematode species, one belonging to the genus *Aporcella* ANDRÁSSY, 2002, the other to *Aporcelinus* ANDRÁSSY, 2009 (Dorylaimida: Aporcelaimidae).

One of the most important distinguishing characters of the genus *Aporcella* ANDRÁSSY, 2002 within the family Aporcelaimidae is the unsclerotized region of the vulval lips. This is an unusual phenomenon in aporcelaimoid nematodes occurring only in another genus, *Tubixaba* MONTEIRO & LORDELLO, 1980. *Aporcella* differs from *Tubixaba* in having a large stylet aperture (two-thirds vs one-third), a narrower vagina and a different location of the posterior pharyngeal gland nuclei (lying in two-thirds vs nearly in the middle of glandularium). When I described the type (and then only) species, *Aporcella gibberocaudata* ANDRÁSSY, 2002 from Chile, I noted that some representatives of the genera *Aporcelaimus* THORNE & SWANGER, 1936 and/or *Aporcelaimellus* HEYNS, 1965 likely are congeneric with *A. gibberocaudata*. Thus, in

my book (2009), I transferred an *Aporcelaimellus* species to *Aporcella*, as *Aporcella parapapillata* (BOTHÁ & HEYNS, 1990).

Another species of the South African authors, *Aporcelaimus pseudospiralis* BOTHÁ & HEYNS, 1990 seems to be very closely related to the hereunder described new species, *Aporcella magna* sp. n. They are similar in several respects, e.g. in the large habitus, strongly separated lip region, massive odontostyle with large aperture, location of most pharyngeal gland nuclei, unsclerotized vulval labia and shape of the conoid tail. Therefore the South African species is herewith transferred to the present genus as *Aporcella pseudospiralis* (BOTHÁ & HEYNS, 1990) **comb. n.**

Together with the presently described new nematode, *Aporcella* includes four species (see Table 1). The genus is distributed in the southern Hemisphere, namely in southern Africa and South America.

The genus *Aporcelinus* ANDRÁSSY, 2009 of the family Aporcelaimidae can be characterized by the thin and two-layered cuticle of different refraction, well offset lip region, odontostyle as long as or longer than labial width, cardia possessing a dorsal lobe, eggshell thick and waved, ventromedial supplements of male exceedingly small, hardly discernible, continuous with the adanal pair, and by the short and pointed tail in both sexes. Especially the shape and arrangement of the male supplements combined with the very thin cuticle are the main distinguishing characters of this genus. By virtue of the cuticular structure, *Aporcelinus* can be compared with two aporcelaimid genera, *Aporcelaimellus* HEYNS, 1965 and *Makatinus* HEYNS, 1965. It differs from *Aporcelaimellus* by the much thinner cuticle not thickened even in the supplementar region of male (as usual in other dorylaimid/aporcelaimid nematodes), absence of cervical lacunae, presence of a cardial lobe, very small male supplements not showing a precloacal space between the adanal pair and the ventral series, as well as by the pointed tail. It differs from *Makatinus* by the same structures as enumerated above, and furthermore by the presence of only one pair of adcloacal supplements (vs two to five pairs).

When erecting the genus (2009), I enumerated nine species, of which seven were transferred from other genera and two described as new. Still in the same year (2009) I added another new species to the genus. Shortly after, ÁLVAREZ-ORTEGA and PEÑA-SANTIAGO (2011) also transferred a species to this genus.

Including the presently described new species, *Aporcelinus* contains twelve species (see Table 2). The genus is distributed on each continent except Australia.

Aporcella magna sp. n.

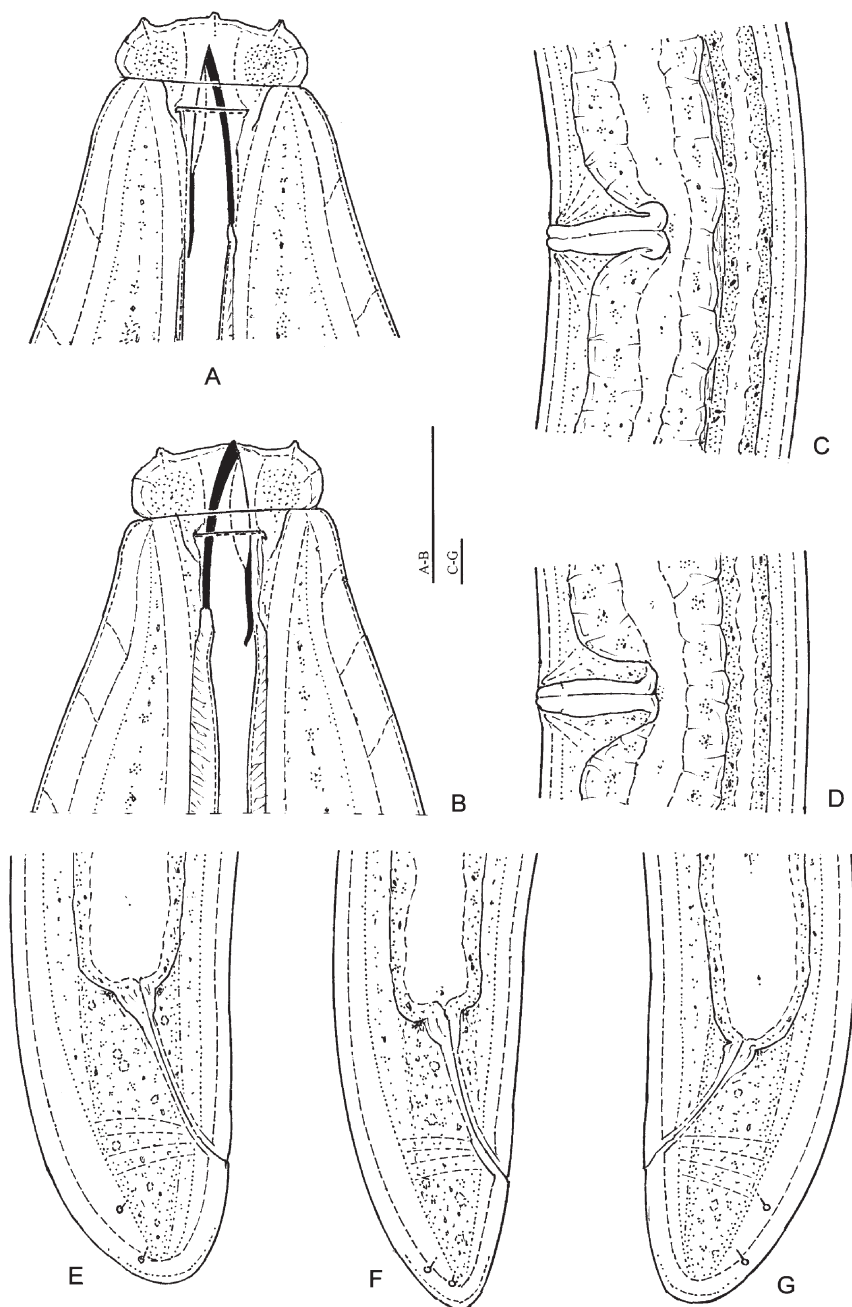
(Fig. 1)

ETYMOLOGY

The species name *magna* (= large, Latin) refers to the habitus of the new species.

TYPE MATERIAL

Holotype female on slide No. 15018 (Chile), from sandy soil near a brook, in the region of Cuesta El Melón, Valle Central, Santiago Metropolitan Region, Chile; collected



1 A-G. *Aporcella magna* sp. n. A-B – anterior end, C-D - vulval region, E-G - female tail. (Scale bars = 20 μ m)

in November 1965 by the present author. Preserved in the Department of Systematic Zoology and Ecology of ELTE University, Budapest.

Paratypes: four females and two juveniles of the same habitat and locality.

DIAGNOSIS AND RELATIONSHIPS

Large nematode, on average 4.72 mm, with fairly slender habitus, sharply offset head, short and massive odontostyle with large aperture and dorsal side distinctly longer than ventral side, small or inconspicuous pharyngeal nuclei, amphidelphic gonad, unsclerotized vulva, narrow vagina, relatively small egg, and conoid-rounded tail.

Aporcella magna sp. n. simply differs from *A. gibberocaudata* ANDRÁSSY, 2002 and *A. parapapillata* (BOTHÁ & HEYNS, 1990) ANDRÁSSY, 2009 by the much longer body (4.5–5.0 vs 2.1–2.2 and 2.1–2.5 mm, respectively) and from the former also by the shape of the tail (conoid vs broadly rounded with a deep dorsal depression and mammillate peg). The new species comes closer to *A. pseudospiralis* (BOTHÁ & HEYNS, 1990) comb. n., but it can be separated from the related species by the longer and more slender body (4.5–5.0 vs 3.6–4.4 mm; $a = 37\text{--}44$ vs $31\text{--}35$), the shorter stylet aperture (hardly $2/3$ vs almost $3/4$), the not swollen vulval lips (vs distinctly swollen), the more broadly rounded tip of the tail and the AS2 nucleus lying more back, at middle (vs in the first third) of the glandularium.

MEASUREMENTS

Holotype female: $L = 4.88$ mm; $a = 42$; $b = 5.0$; $c = 88$; $c' = 0.8$; $V = 55\%$.

Paratype females ($n = 4$): $L = 4.48\text{--}5.00$ mm; $a = 37\text{--}44$; $b = 4.9\text{--}5.2$; $c = 66\text{--}96$; $c' = 0.6\text{--}1.0$; $V = 51\text{--}55\%$.

DESCRIPTION

General characters. Large and fairly slender nematodes, nearly half a centimetre long and $102\text{--}120\text{ }\mu\text{m}$ wide at mid-region; habitus at posterior region mostly curved ventrad. Cuticle very finely transversely striated, but practically smooth under light microscope, $5\text{--}7\text{ }\mu\text{m}$ thick on most body regions and $10\text{--}13\text{ }\mu\text{m}$ thick on tail, consisting of an outer thin and an inner thicker layer with slightly different refraction. Lip region sharply separated by a deep constriction, $24\text{--}26\text{ }\mu\text{m}$ wide and $8\text{--}10\text{ }\mu\text{m}$ high, lips hardly differentiated, rather angular in outline, anterior labial papillae mammiform. Body at posterior end of pharynx 4.0–4.6 times as wide as lip region. Amphid cup-shaped, its aperture situated in the constriction, about three-quarters of corresponding body wide.

Odontostyle short and massive, $5\text{--}6\text{ }\mu\text{m}$ thick, thicker than cuticle at the same level, $24\text{--}27\text{ }\mu\text{m}$ long on dorsal side (and $21\text{--}23\text{ }\mu\text{m}$ on ventral side), about equal to lip region width (either a little shorter or a little longer), occupying $2.3\text{--}2.8\%$ of pharyngeal length. Aperture large, $16\text{ }\mu\text{m}$, $60\text{--}65\%$ of stylet length. Guiding ring simple, plicate, located well before the middle of odontostyle. Pharynx 888 to $1020\text{ }\mu\text{m}$ long, gradually widened at $44\text{--}48\%$ of its length. Because of the thickness and dark brown colour of the pharynx the gland nuclei are difficult to recognize. $D = 48\text{--}50\%$ ($9.5\text{--}10$

% of total body length), AS1 inconspicuous, AS2 = 47–49 %; PS1–2 obscure. Glandularium 450–530 μm long. Cardia short, conoid.

Female. Amphidelphic with equally developed genital branches; each 5.2–5.7 body widths long or occupying 12–13 % of body length. Vulva transverse with unsclerotized lips. Vagina narrow, 48–55 μm long, reaching 40–50 % of corresponding body diameter. Uterus without spermatozoa. One female possessing one uterine egg, 148 \times 70 μm . Distance between posterior end of pharynx and vulva 1.5–1.8 times as long as pharynx. Vulva–anus distance equal to 30–42 tail lengths. Rectum 1.0–1.3, prerectum 2.4–3.5 times the anal body width long. Tail conoid with rounded tip, 50–60 μm long, occupying 1.0–1.5 % of entire length of body.

Male. Not found.

Juvenile. Two premature (fourth stage) juvenile specimens were observed, they resembled the females in general shape. Interestingly, none of them was (seemingly?) provided with replacement odontostyle in the oesophageal tissue.

***Aporcelinus vulvatus* sp. n.**

(Figs. 2–4)

ETYMOLOGY

The species epithet *vulvatus* (Latin) refers to the strongly sclerotized and protruded vulva.

TYPE MATERIAL

Holotype female on slide No. 15025 (New Guinea), from fallen leaves in a rain forest, Kiunga by the Fly River, Western Province, Papua New Guinea; collected in September 1969 by J. Balogh. Preserved in the Department of Systematic Zoology and Ecology of ELTE University, Budapest.

Paratypes: 10 females, 16 males and 7 juveniles, in the same material as holotype.

DIAGNOSIS AND RELATIONSHIPS

A comparatively long representative of the genus *Aporcelinus*, on average 2.60 (female) or 2.45 (male) mm long, possessing very thin cuticle, lip region separated, odontostyle longer than labial width, aperture nearly half of stylet length, vulva transverse, heavily sclerotized and protruded, eggs with undulate shell, spermatozoa globular, spicula large, ventromedial supplements quite small, 10–13, tail similar in both sexes, longer than anal body diameter, generally straight with sharp tip.

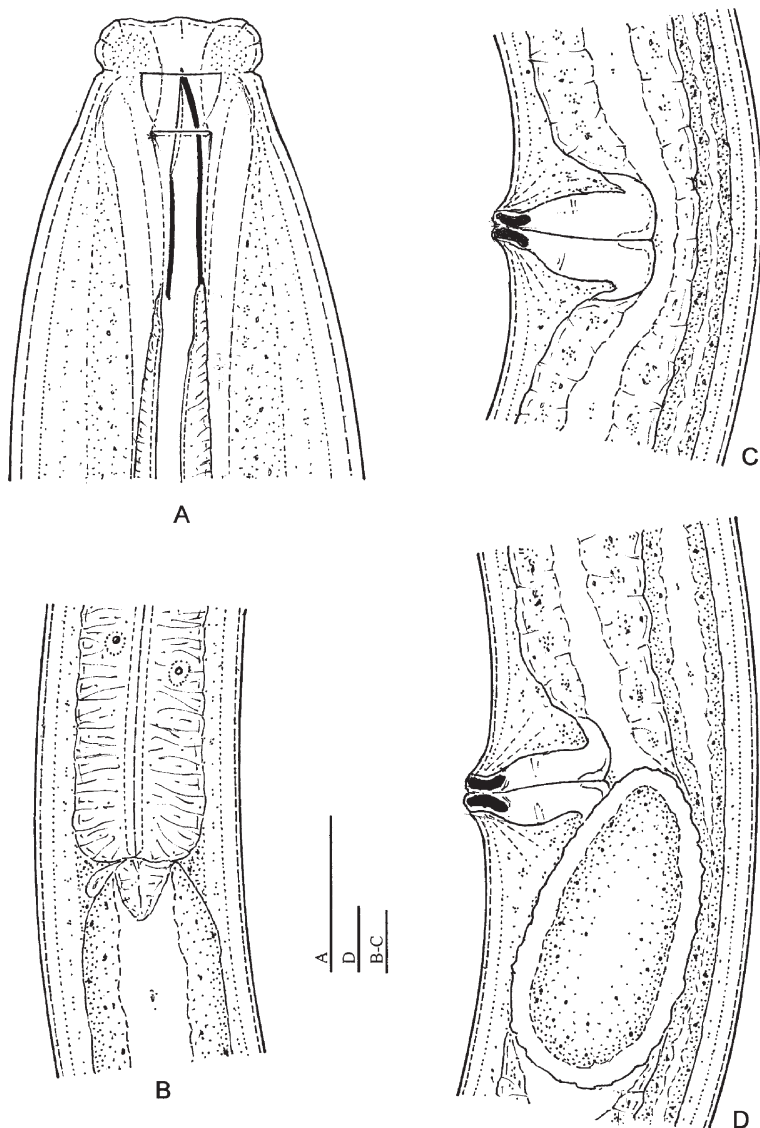
In having a long body, comparatively long odontostyle and strongly protruded vulva, *Aporcelinus vulvatus* sp. n. differs from every known species of the genus. Its females are 2.4–2.8 mm long while those in other species 1.9–2.3 mm. As for the length of odontostyle, only *A. mamillatus* (WILLIAMS, 1959) ÁLVAREZ-ORTEGA & PEÑA-SANTIAGO, 2011 has a similarly long odontostyle (25–28 μm vs 18–26 μm in other species), but its body and tail are distinctly shorter (1.7–2.1 mm, and 0.7–0.9 anal body width, respectively).

MEASUREMENTS

Holotype female: L = 2.64 mm; a = 34; b = 4.6; c = 51; c' = 1.4; V = 50 %.

Paratype females (n = 8): L = 2.37–2.77 mm; a = 35–40; b = 3.9–4.7; c = 43–52; c' = 1.5–1.8; V = 50–53 %.

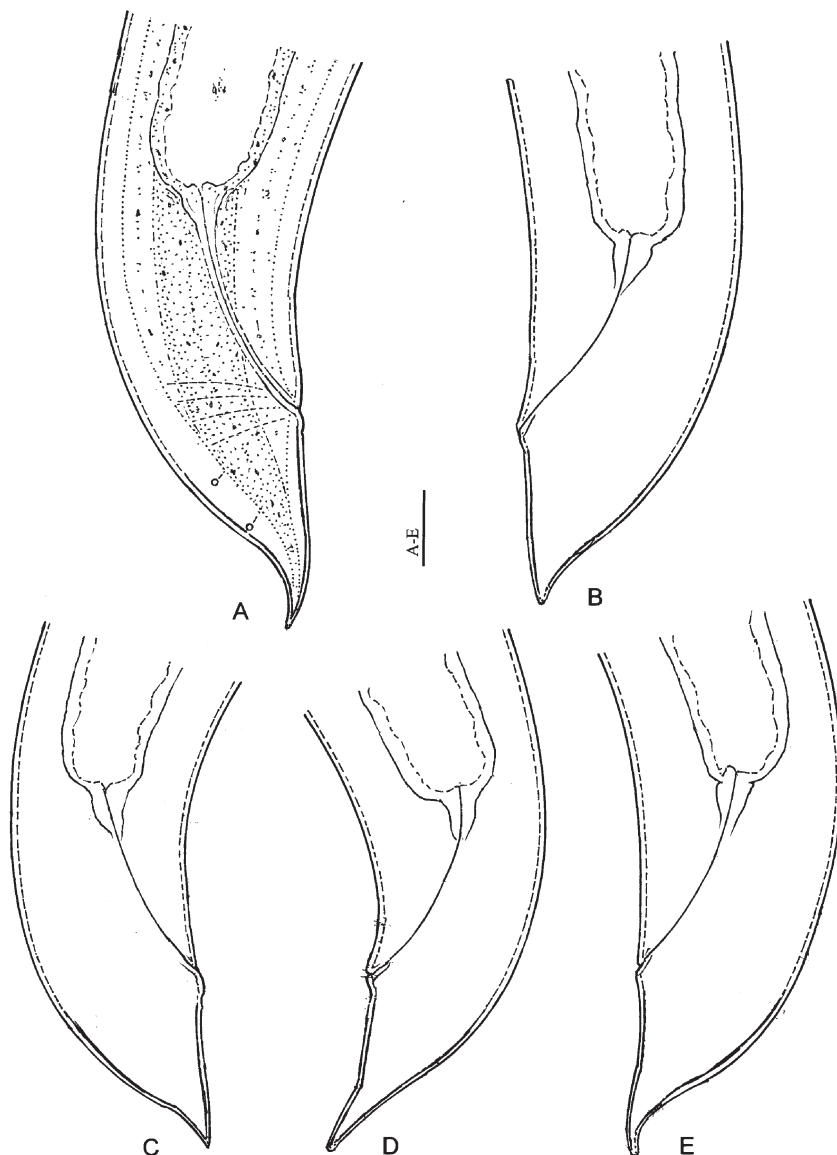
Paratype males (n = 10): L = 2.22–2.68 mm; a = 30–42; b = 3.5–4.6; c = 45–60; c' = 1.1–1.5.



2 A–D. *Aporcelinus vulvatus* sp. n. A – anterior end, B – cardial region, C–D - vulval region. (Scale bars = 20 μm)

DESCRIPTION

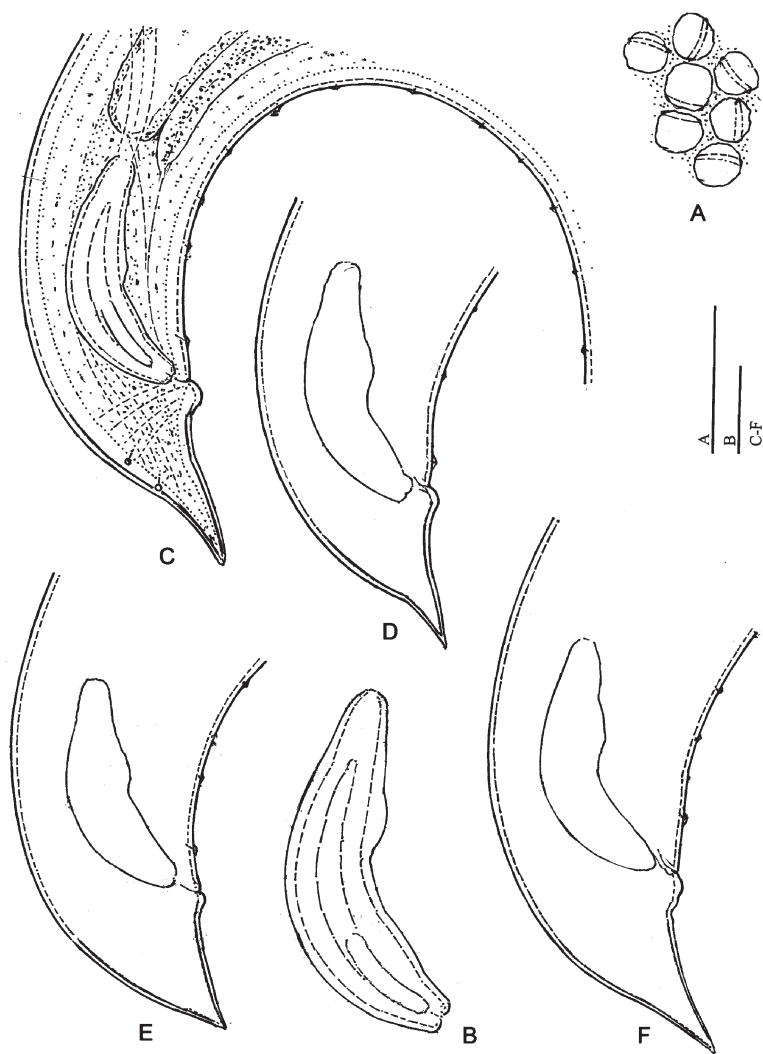
General characters. Body more or less C-shaped, curved ventrad, especially in posterior region of male, fairly slender, 56–78 μm wide at middle. Cuticle very thin, 1.6–2.0 μm on most body regions, not thickened in the supracaudal region of male, smooth under light microscope, consisting of the usual two layers of different refraction.



3 A–E. *Aporcelinus vulvatus* sp. n. A - female posterior end, B–E - female tail. (Scale bar = 20 μm)

Lip region 19–22 μm wide and 6–8 μm high, offset by a constriction, lips rounded, moderately separated. Body at posterior end of pharynx 2.8–3.3 times as wide as lip region. Amphid fovea caliciform, its aperture about half as wide as corresponding body.

Odontostyle fairly strong, 3.5–4.0 μm thick, much thicker than cuticle at the same level, 25–28 (mostly 26) μm long, 1.3–1.5 times longer than lip region width, occupying 4.0–4.8 % of pharyngeal length. Aperture 12–14 μm long, about half of stylet length. Guiding ring simple, plicate, located 14–15 μm from labial field, before the middle of odontostyle. Pharynx varying in length from 550 to 660 μm , gradually enlarged at



4 A–F. *Aporcelinus vulvatus* sp. n. A - spermatozoa, B - spiculum, C - male posterior end, D–F - male tail. (Scale bars 20 μm)

55–57 % of its length. Pharyngeal gland nuclei rather difficult to observe; D = 56–60 %, AS1 indistinct, AS2 = 38–45 %, PS1–2 = 70–76 %. Glandularium 220–260 µm long. Cardia short, tongue-like with a short glandular lobe on its dorsal side.

Female. Reproductive system amphidelphic, gonads equally developed, each 5.0–6.5 body diameters long or occupying 15–18 % of body length. Vulva transverse with well sclerotized, oblong labia, distinctly protruding from body contour in every female specimen. Vagina thick and long, 43–48 µm, extending inwards 52–62 % of corresponding body diameter. Mature females with one to three uterine eggs; these latter ovoid, 96–112×44–52 µm with thick and irregularly outlined eggshell. Distance between posterior end of pharynx and vulva 1.1–1.4 times as long as pharynx. Vulva–anus distance equal to 19–24 tail lengths. Rectum 1.5–1.7, prerectum 2.5–4.0 times the anal body width long. Tail straight or slightly bent dorsad, 52–60 µm long, 1.4–1.8 times as long as anal body diameter, or occupying 1.7–2.2 % of entire length of body, first conoid then strongly tapered and pointed or finely rounded on tip.

Male. Diorchic, each testis 3.8–4.4 body widths long or occupying 10–12 % of body length. Spermatozoa globular with thin “collar”, 5–6 µm in diameter. Spicula strong, 72–84 µm long in curvature; lateral guiding pieces slender, 22–25 µm long. Ventromedial supplements minute, often hardly discernible, 10–13 in number (10 in nine, 11 in four, 12 in two males and 13 in one male). Prerectum beginning within the range of supplements, at level of the sixth to eighth supplement counting from the precloacal region. Tail similar to that of female, mostly straight, 43–54 µm long, occupying 1.7–2.2 % of entire length of body.

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Table 1. Main morphometric characters of *Aporcella* species

<i>Aporcella</i>	L	a	b	c	c'	V	Lipr. w.	Odontost.	Tail	Spicula	Suppl.
<i>gibberocaudata</i> Andrássy, 2002	♀ 2.1–2.2 ♂ 2.2	20–23 22	3.8–4.1 4.0	50–74 43	0.4–0.5 0.7	54–58	23–25	26–29	30–45	105	7
<i>magna</i> sp. n.	4.5–5.0 –	37–44	4.9–5.2	66–96	0.6–1.0	51–55	24–26	24–27	50–60	–	–
<i>parapapillata</i> (Botha & Heyns, 1990)	2.1–2.5 2.3–2.4	29–33 24–30	3.9–4.9 4.2–4.5	62–75 60–64	0.9–1.0 0.9–1.0	52–56	18–20	16–19	32–35	80–88	15–17
<i>pseudospiralis</i> (Botha & Heyns, 1990)	3.6–4.4 –	31–35	4.5–5.0	58–73	0.9–1.1	50–53	23–27	23–26	57–68	–	–
Range (mostly females)	2.1–5.0	20–44	3.8–5.2	50–75	0.4–1.1	50–58	18–27	16–29	30–68	80–105	7–17

Table 2. Main morphometric characters of *Aporcelinus* species

<i>Aporcelinus</i>	L	a	b	c	c'	V	Lipr. w.	Odontost.	Tail	Spicula	Suppl.
<i>altitudinalis</i> Andrássy, 2009	1.9-2.3 1.7	29-31 25	4.0-4.4 4.2	50-63 43	1.0-1.1 1.1	54-55	18-19	23-24	36-38	68	12
<i>amazonicus</i> (Andrássy, 2004)	1.6-1.7 —	21-25	3.5-4.4	30-50	1.0-1.5	44-49	18-19	22-26	40-48	—	—
<i>americanus</i> (Andrássy, 1986)	1.2-1.7 1.3-1.7	21-32 20-30	3.5-4.4 4.0-4.2	29-50 30-46	1.3-1.8 1.0-1.4	46-55	14-17	20-21	43-45	66-68	13-16
<i>decimus</i> Andrássy, 2009	1.3-1.4 —	21-27	4.1-4.6	25-32	1.7-2.1	51-54	14	18-20	44-51	—	—
<i>diadematus</i> (Cobb in Th & Sw, 1936)	1.4-1.6 1.2	23-27 25	3.3-4.3 4.0	25-32 26	1.7-2.0 1.7	50-57	16-18	20-21	45-55	?	9-10
<i>granuliferus</i> (Cobb, 1893)	1.4-1.8 1.5-1.6	20-30 22-34	3.8-4.3 3.4-4.6	25-40 35-56	1.3-1.8	48-54	17-19	20-22	48-50	50-54	8-10
<i>infundibulicaudatus</i> (Andrássy, 1991)	1.2-1.8 1.2-1.7	22-28 23-27	3.4-4.5 3.7-4.2	34-58 34-40	1.2-1.5 1.0-1.4	51-55	17-21	20-24	35-46	50-60	9-12
<i>irritans</i> (Cobb in Th & Sw, 1936)	1.4 1.4	21 32	3.6 4.7	36 36	1.3-1.4	50	14	20	?	?	7
<i>mamillatus</i> (Williams, 1959)	1.5-2.1 1.7	20-30 22	3.4-4.6 3.9	50-74 52	0.7-0.9	45-54	19-20	22-29	27-34	(66)	12
<i>mediterraneus</i> Andrássy, 2009	1.6-2.0 —	30-38	3.8-4.1	29-36	2.0-2.4	52-55	17-18	20-22	54-66	—	—
<i>seychellensis</i> (Andrássy, 2009)	0.9-1.1 —	18-20	3.1-3.5	25-29	1.1-1.4	45-52	14-18	20-21	36-40	—	—
<i>viuvatus</i> sp. n.	2.4-2.8 2.2-2.7	34-40 30-42	3.9-4.7 3.5-4.6	43-52 45-60	1.4-1.8 1.1-1.5	50-53	19-22	25-28	52-60	72-84	10-13
Range (mostly females)	0.9-2.8	18-40	3.1-4.7	25-74	0.7-2.4	44-57	14-21	18-29	27-66	50-85	7-16