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Cervidellus vinciguerrae sp. n. (Nematoda: Cephalobidae) from Tierra del Fuego and notes on the genus *Cervidellus* Thorne, 1937

Mirella CLAUSI

Dipartimento di Biologia Animale, Università di Catania, via Androne 81, 95124 Catania, Italy.

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Summary – A new species of the genus *Cervidellus* Thorne, 1937, *Cervidellus vinciguerrae* sp. n., was found in moss and soil samples from Tierra del Fuego. The new species is characterized by having cuticle with transverse annules and longitudinal striations, lip region slightly set off, cephalic probolae asymmetrical with margins having two tines in the primary axils and three tines in the secondary axils, labial probolae 7.5-8 µm long with a single bifurcation at half their length, excretory pore and cell variable in location, post-vulval uterine branch of the reproductive apparatus with three or four small oocytes; tail conoid, ending with a smooth mucro. The structure of the cephalic probolae of the genus *Cervidellus* is discussed. © Orstom/Elsevier, Paris

Résumé – Cervidellus vinciguerrae *sp. n. (Nematoda : Cephalobidae) provenant de la Terre de Feu et notes sur le genre* Cervidellus *Thorne, 1937* – Une nouvelle espèce du genre *Cervidellus* Thorne, 1937, *Cervidellus vinciguerrae* sp. n., a été trouvée dans des mousses et des échantillons de sol de la Terre de Feu. La nouvelle espèce est caractérisée par la cuticule pourvue de striations transversales et longitudinales, la région céphalique légèrement séparée du reste du corps, des proboles céphaliques asymétriques avec deux excroissances sur leurs bords dans les axiles primaires et trois excroissances sur le bord des axiles secondaires, des proboles labiales longues de 7–8 µm avec une unique fourche à la moitié de leur longueur, le pore excréteur et la cellule excrétrice en position variable, la branche utérine postvulvaire de l'appareil reproducteur contenant trois à quatre petits ovocytes, la queue conoïde se terminant par un petit mucron. Quelques remarques sont également faites sur la structure des proboles céphaliques dans le genre *Cervidellus*. © Orstom/Elsevier, Paris

Keywords: *Cervidellus*, nematodes, new species, taxonomy, Tierra del Fuego.

Prof. Maria T. Vinciguerra (Dipartimento di Biologia Animale, Università di Catania) collected several moss and soil samples for a nematode survey of Tierra del Fuego (Argentina and Chile). Three samples yielded several specimens of a new species of the genus *Cervidellus* Thorne, 1937, which is described and illustrated here after study under light and scanning electron microscopy.

The samples, collected in 1988 in different localities of Tierra del Fuego, were moss and lichens with sand from a dune system near Capo S. Pablo, forest soil in the National Park (Argentina), and moss from a sandy beach in the Bahia Inutil (Chile). For light microscope (LM) observation, the specimens were fixed in 4% formaldehyde and mounted in dehydrated glycerin (Seinhorst, 1962). For scanning electron microscope (SEM) observation, some glycerin-embedded specimens were first washed with gradually added distilled water, then dehydrated in a gradual series of ethanol solutions with ethanol concentrations increasing to 100%. They were subsequently critical point dried with CO_2, mounted on stubs, and coated with gold.

*Cervidellus vinciguerrae** sp. n.

(Figs 1, 2, 3D)

MEASUREMENTS

See Table 1.

DESCRIPTION

Female: Body variously ventrally curved in hot fixed specimens. Cuticle 1.2-1.4 µm thick, transversely annulated, with longitudinal striations only rarely continuous from one annule to the next. Annules 2.3-3.2 µm wide at mid-body. Lateral field starting as a single wing at 35-44 % of pharynx length, then a double wing (with three longitudinal lines) from 50-57 % of pharynx length until phasmids, then merging again into a single wing till the end of tail. Lip region slightly set off, 11-12 µm wide, with six labial papillae, four cephalic papillae, and two small rounded amphids. Six cephalic probolae, 6-7 µm high, asymmetrically triangular, with long tines along their mar-

* Specific name from Prof. M.T. Vinciguerra who collected the nematodes.

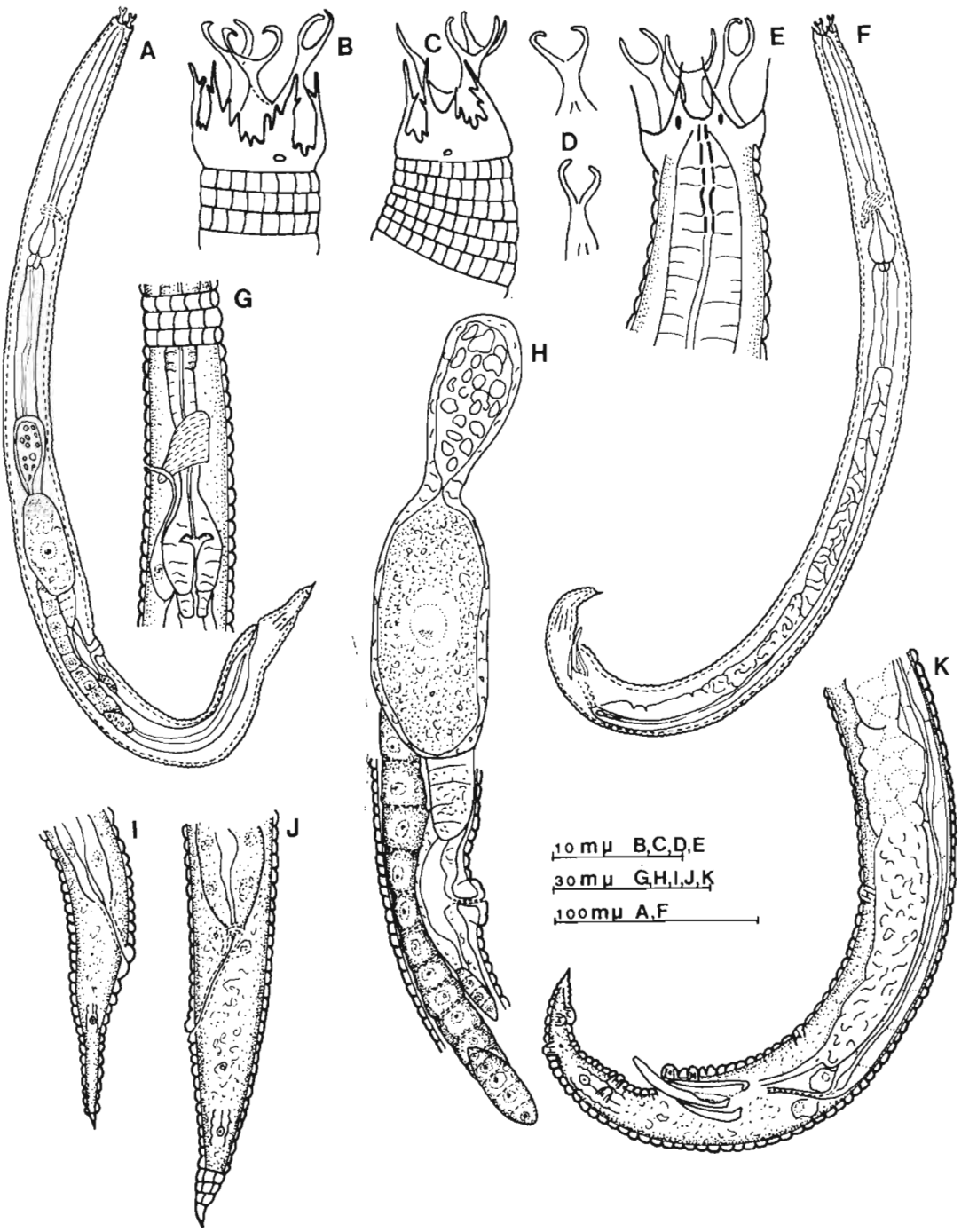

Fig. 1. Cervidellus vinciguerrae *sp. n.. A: Female body; B, C, E: Anterior ends; D: Labial probolae; F: Male body; G: Details of pharynx; H: Female reproductive apparatus; I, J: Female tails; K: Male posterior end.*

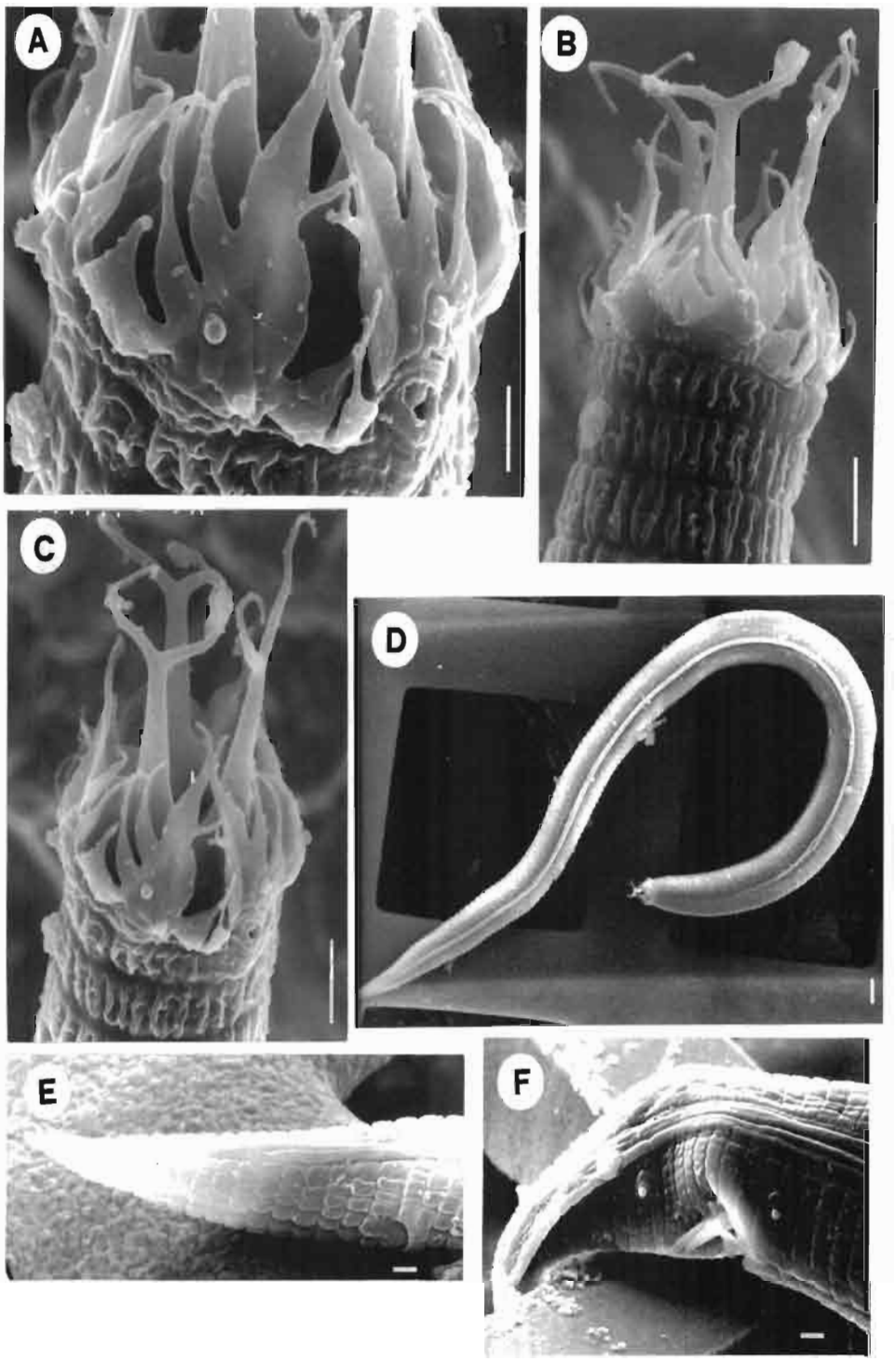

Fig. 2. Cervidellus vinciguerrae *sp. n. A: Male cephalic probolae; B, C: Male anterior end; D: Female body; E: Female tail; F: Male tail. (Scale bars: A = 1 μm; B, C, E, F = 2 μm; D = 8 μm).*

Table 1. *Measurements of different populations of* Cervidellus vinciguerrae *sp. n. (All measurements in μm except L in mm).*

	Capo S. Pablo (Argentina)			Bahia Inutil National Park (Chile)	
	Holotype	Females	Males	Females	Males
n		7	7	3	4
L	0.489	0.52 ± 0.02 (0.486-0.541)	0.49 ± 0.03 (0.453-0.539)	0.49 ± 0.025 (0.481-0.516)	0.51 ± 0.04 (0.46-0.54)
a	22.0	22.5 ± 4.1 (18-27)	21.6 ± 2.3 (18.1-24.6)	18.9 ± 1.5 (17.8-20.6)	23 ± 1.9 (21.9-25.8)
b	3.8	3.9 ± 0.1 (3.7-4)	3.8 ± 0.2 (3.5-4)	4 ± 0.3 (3.7-4.2)	4.0 ± 0.2 (3.8-4.3)
c	13.9	14.1 ± 1.2 (13.4-15.7)	12.7 ± 0.4 (12-13.1)	14.5 ± 1 (13.7-15.6)	13.9 ± 0.9 (13-14.3)
c'	2.9	2.6 ± 0.4 (2.1-3.2)	2.1 ± 0.2 (1.8-2.4)	2 ± 0.2 (1.8-2.1)	2.5 ± 0.2 (2.4-2.8)
V	66.2	65.1 ± 1.7 (63.5-68.4)		66.6 ± 2.3 (64.9-69.3)	65.3 ± 0.4 (64.9-65.8)
G'	23.8	18.9 ± 1.4 (16.8-2)		19.3 ± 4.5 (16-24.5)	20.3 ± 3.8 (16.5-24)
V-A/T	3.7	4.2 ± 0.3 (3.7-4.6)		4.2 ± 0.6 (3.7-4.8)	4 ± 0.2 (3.7-4.2)
Pharynx	119.0	124.4 ± 4.5 (117-128)	119 ± 7.7 (105.2-130)	114.8 ± 4.1 (111.5-119.4)	116 ± 4.1 (91-121.4)
Tail	35.0	37.3 ± 2.5 (33.6-40)	38.5 ± 2.6 (34.5-41)	33. 7 ± 3.2 (30-36)	36.4 ± 2.5 (33.6-39)
Max. body diam.	22.0	23.8 ± 4.2 (20-27)	22.8 ± 1.8 (20-25)	26 ± 2.9 (22.7-28)	22.2 ± 1.5 (21-22.7)
Anal body diam.	12.0	14.6 ± 1.9 (12-16.5)	18.3 ± 1.2 (17-20)	16.9 ± 2.8 (14.5-20)	14.4 ± 1.1 (13.6-16)
Stoma	9.0	9.4 ± 0.7 (8.5-10)	9 ± 0.8 (8.2-10)	9.4 ± 1 (8.3-10)	9.1 ± 0.3 (9-9.5)
Corpus	67.2	70.1 ± 3.9 (62.7-73.6)	68.3 ± 3.7 (65.4-75.4)	66.6 ± 7.7 (61-75.4)	66.9 ± 2.8 (65-71)
Isthmus	27.2	26.1 ± 1.8 (24.5-28)	26.9 ± 1.8 (24.5-30)	25.6 ± 3.3 (23.3-28)	23.9 ± 2.5 (21-26)
Bulbus	15.4	18.3 ± 1.5 (16.8-21)	17.3 ± 1.2 (15.4-18.2)	15.4 ± 1.1 (14.5-15.37)	16.0 ± 0.8 (15.4-17)
Exc. pore from ant. end	102	111 ± 4.7 (104-116)	99 ± 12 (99-111)	102 ± 8.5 (94-111)	105 ± 4.7 (102-112)
Exc. pore in % of pharynx	74	82 ± 3 (78-85)	77.5 ± 6.7 (68-85)	85.5 ± 12.3 (76.5-99.5)	80 ± 3.8 (75-83)
Nerv. ring from ant. end	98	102 ± 3.5 (97-107)	94 ± 7.9 (82-104)	94.2 ± 5.2 (90-100)	99 ± 4.5 (93-103)
Nerv. ring in % of pharynx	73	74 ± 2.3 (70-74.5)	73.5 ± 3.5 (68-77)	78 ± 5.3 (72.5-83)	75.6 ± 2.7 (72.5-79)
Deirid from ant. end	116	124 ± 3.9 (121-129)	118.5 ± 4 (116.5-126)	112 ± 4.8 (108-115)	117 ± 3 (114-121)
Deirid in % of pharynx	87	92.7 ± 1.4 (91-94.5)	93.5 ± 1 (92.8-95.4)	94 ± 4 (91.5-97)	92 ± 2.9 (87.7-94.3)
Rectum	12.7	17.4 ± 1.8 (15.4-19)		15.2 ± 1.88 (14-16.5)	16.0 ± 1.4 (14.5-17.3)
Spermath.	33.0	32.1 ± 6.9 (27.2-40)		21.4 ± 4.4 (18.3-24.5)	21.5 ± 7.8 (16-27)

End of Table 1 next page.

Table 1. *(cont.).*

	Capo S. Pablo (Argentina)			Bahia Inutil National Park (Chile)	
	Holotype	Females	Males	Females	Males
PUB	22.7	21.8 ± 5.2 (16-26)		28.1 ± 2.8 (25.4-31)	24.9 ± 0.9 (23.6-25.4)
Spicules			25.4 ± 1.9 (22.7-27.3)		
Gubernaculum			15.1 ± 1.7 (13-18.2)		
Phasmids from anus	13.0	16.5 ± 2.6 (13-20)	15.2 ± 1.5 (12.7-17)	14 ± 3.3 (11.7-16.3)	16.8 ± 3.1 (13.6-21)
Phasmids in % of tail	37.0	45.2 ± 6 (37-52.4)	40 ± 4.2 (35.4-47)	39.6 ± 10 (32.5-46.7)	46.6 ± 11.3 (42-62.2)

gins. Primary axils U-shaped, about 2 µm wide, serrated by two pointed tines per cephalic probola on each side; one is smaller and more slender, located in the apical part, and the other is triangular and located in the basal part of the axil. Secondary axils more broadly U-shaped, about 5-6 µm wide, serrated by three long and slender tines per cephalic probola on each side; basal tines identical with those of the primary axils. Each cephalic probola extending into a long pointed apical tine. Three well-developed labial

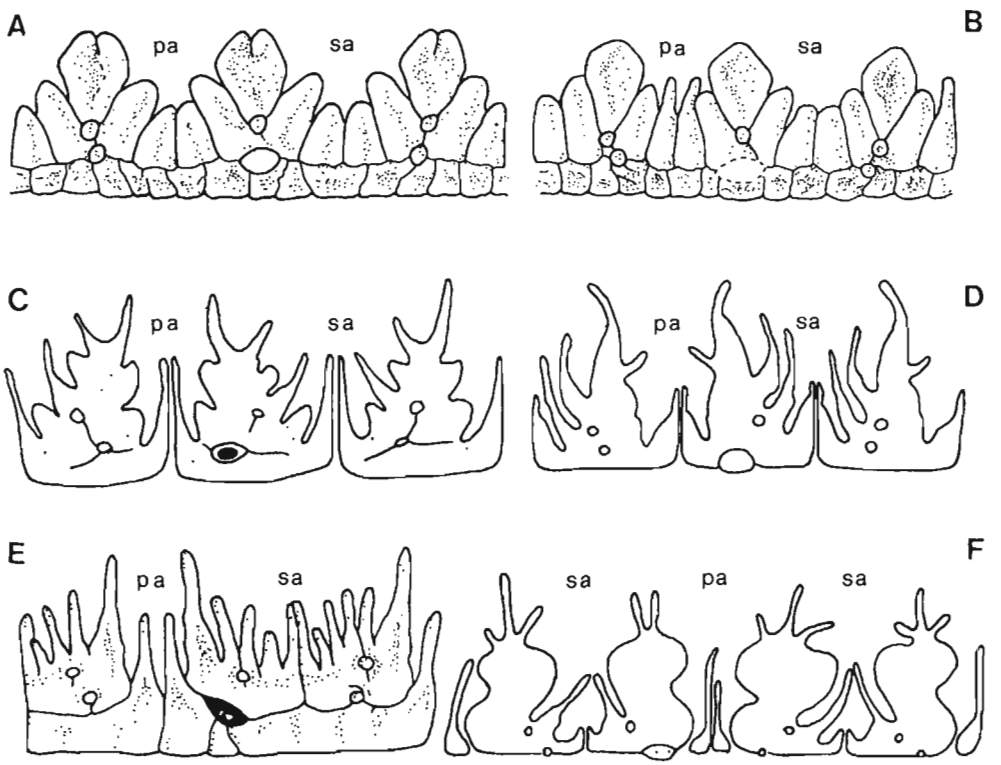

Fig. 3. *Cephalic patterns in species of* Cervidellus. *A:* C. vexilliger*; B: Aberrant specimen of* C. neftasiensis*; C:* C. capraeolus*; D:* C. vinciguerrae *sp. n.; E:* C. laticollaris*; F:* C. doorsselaeri. *(pa = primary axil; sa = secondary axil; A, B: after Boström & De Ley, 1996; C: after De Ley* et al.*, 1990; E: after De Ley & Vandebroek, 1992; F: after De Clerck & De Ley, 1990).*

probolae, 7.5-8 µm long, with a single bifurcation at 45% of their length; the two branches being curved, diapason-like. Three tangential ridges extending between the labial probola bases. Cheilorhabdia rounded, refractive; five more rhabdia also visible. Corpus cylindroid, 2.3-3 times as long as isthmus. Excretory pore opening at level of nerve ring. Nerve ring located at about half of the isthmus length. Deirids at 35-55 % of bulb length. Cardia 4.5-6.5 µm long. Intestinal walls thick; rectum 0.8-1.3 anal body diameters long. Reproductive apparatus cephaloboid. Vulva lips thick and protruding. Vagina 8-10 µm long. Spermatheca 0.7-2 vulval body diameters, often empty. Two females with one mature egg each; eggs measuring 51 × 22 and 58 × 18 µm. Post-vulval uterine branch 0.6-1.2 vulval body diameters long, with three to four small oocytes. Tail conoid, generally straight, with terminal mucro.

Male: Similar to female in most respects. Reproductive apparatus monorchic, spicules cephaloboid, 1.2-1.6 times as long as anal body diameter. Three pairs of ventrolateral precloacal papillae and one midventral papilla on precloacal lip; five pairs of papillae located on tail as follows: two pairs (one lateral and one ventrosublateral) located just anterior to phasmids and three pairs (one dorsosublateral, one lateral and one ventrosublateral) near the tail tip. Tail conoid, ventrally curved, with a conspicuous terminal mucro.

DIAGNOSIS AND RELATIONSHIPS

C. vinciguerrae sp. n. is characterized by the transversely annulated cuticle with irregular longitudinal striations, six cephalic probolae asymmetrically triangular, each with two long tines in the primary axil and three long tines in the secondary axil, labial probolae with a single bifurcation at about half of their length, excretory pore at level of nerve ring, post-vulval uterine branch with three to four small oocytes, tail conoid, straight in female, ventrally curved in male, ending with a mucro.

It differs from all the other species of *Cervidellus* by the shape of the cephalic probolae. Observed with light microscope it resembles *C. cancellatus* (Thorne, 1925) Boström & De Ley, 1996, but differs from it mainly in the shape of the labial probolae, which is very peculiar in *C. cancellatus* .

TYPE LOCALITY AND HABITAT

Moss and lichens with sand from dunes, near Capo S. Pablo, Tierra del Fuego, Argentina.

TYPE SPECIMENS

Holotype, three female and four male paratypes in the collection of the Dipartimento di Biologia Animale, University of Catania, Italy; one female and one male paratype in the following collections: Instituut voor Dierkunde, University of Gent, Belgium; Swedish Museum of Natural History, Stockholm, Sweden; Allatrendszertani Intézet, University of Budapest, Hungary.

Discussion

Based on the most recent SEM studies on species of Cephalobidae, Boström and De Ley (1996) rejected the genus *Ypsylonellus* Andrássy, 1984 and proposed emended diagnoses for the genera *Cervidellus* Thorne, 1937 and *Stegelletina* Andrássy, 1984. As redefined, the main diagnostic character of *Stegelletina* is the presence of a single guarding process and absence of other tines in the primary axils. This genus presents a great homogeneity in the lip region structure, since in all the species there is a marked difference between the primary axils, with guarding processes, and the secondary axils, without processes; moreover the cephalic probolae are always asymmetrical and closer to one another at the secondary axils.

The main diagnostic character of the redefined genus *Cervidellus* is having an even number of tines in the primary axils, sometimes including two guarding pieces. In this genus, however, there is no homogeneity in the lip region structure. In the species studied by SEM so far, three groups of species with different patterns of cephalic structure (cephalic probolae and axils) can be recognized, which seem to follow an evolutionary trend. In the first group (Fig. 3 A, B), including *C. vexilliger* (de Man, 1880) Thorne, 1937 and *C. spitzbergensis* Boström, 1987, primary and secondary axils do not differ from each other, the guarding processes are not different from the other tines and the cephalic probolae are symmetrical, with the same number and shape of tines on both sides. In *C. neftasiensis* Boström, 1986, the same situation was observed excepted in one scanned specimen where the guarding pieces of the primary axils are different from the other tines. In the second group (Fig. 3 C, D), including *C. capraeolus* (De Ley *et al.*, 1990) Boström & De Ley, 1996 and *C. vinciguerrae* sp. n., the primary and secondary axils are different, since the cephalic probolae are asymmetrical, with different number and shape of tines on each side; the guarding processes of the primary axils are similar to those of the secondary axils but different from the other tines of the cephalic probolae. In the third group (Fig. 3 E, F), including *C. doorsselaeri* (De Clerk & De Ley, 1990), Boström & De Ley, 1996 and *C. laticollaris* (De Ley & Vandebroek, 1992) Boström & De Ley, 1996, the primary and secondary axils are different and the cephalic probolae are markedly asymmetrical as in the second group, but the pair of guarding processes at each primary axil is different also from that of the secondary axil and is kept apart also from the cephalic probolae.

Considering the above-mentioned differences, if we consider that the pattern of the cephalic structure is a valid diagnostic character –and it does seem to be the best character for the differentiation of some genera of Cephalobidae that are closely related to each other– it is questionable whether *Cervidellus* should be considered as a single genus. Even if we do not give great significance to the differentiation of the guarding processes (since *C. neftasiensis* includes specimens with and without differentiated guarding pieces), still, if the study of all the species attributed to *Cervidellus* species with symmetrical cephalic probolae and shows a clear cut difference between species with asymmetrical cephalic probolae, this latter group might be considered as a separate taxon.

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