FREE-LIVING NEMATODES FROM ALBANIA, INCLUDING THE DESCRIPTION OF THREE NEW SPECIES

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Summary. Very little was known about the free-living nematode fauna of Albania but, thanks to collections made by the Hungarian Natural History Museum, 58 nematode species have now been identified in the country. Among them, three species proved to be new to science. *Eudorylaimus illyricus* sp. n. is a relatively small representative of the genus with slightly offset head, short odontostyle, longitudinally directed and hardly sclerotized vulva, moderate number of male supplements, and with a short tail, curved at the tip. *Eudorylaimus par* sp. n. is characterized by the shape and size of the body, thin cuticle, strongly offset head, length of the odontostyle, the number of supplements, and by the shape and structure of the tail. *Aporcelaimellus crassus* sp. n. is characterized by the long and plump body, strongly offset head, short odontostyle and especially by the shape of the tail. The relationships of the new species are discussed. Apart from them, some rare species are also presented: *Prionchulus oxycercus, Eudorylaimus maritus, Enchodelus groenlandicus, Heterodorus brevidentatus* and *Pungentus clavatus.*

Key words: *Aporcelaimellus crassus* sp. n., *Eudorylaimus illyricus* sp. n., *E. par* sp. n., *E. maritus*, *Enchodelus groenlandicus, Heterodorus brevidentatus, Prionchulus oxycercus, Pungentus clavatus*.

Albania (in home language: Shqipëria), lying in the Mediterranean region of south-eastern Europe, is one of the smaller countries of the continent. It extends to 28,750 square kilometres, and has a coastline of 362 km on the Adriatic and Ionian Seas. Its western part is a 20-50 km wide lowland, but 70 % of the country, 70-120 km in width, is mountainous. More than forty peaks reach over 2,000 m above sea level, the highest of them, Korab, with an altitude of 2,753 m. The climate is continental.

There are large lakes in the country. Among them, Lake Ohrid, lying on the Albanian-Macedonian border, is the largest and deepest lake of the Balkan Peninsula. It has a maximum depth of 286 m and a variety of unique – in part endemic – flora and fauna.

Politically, Albania is divided into 36 districts (periferi in Albanian). The territory belongs to the East Mediterranean Province of the Mediterranean Region and the Illyrian Province of the Circumboreal Region. More than one-third of Albania is forested, and can be subdivided into three eco-regions: the Illyrian deciduous forests, Pindus Mountains mixed forests, and Dinaric Mountains mixed forests. These floristically very rich forests are home to a wide range of animals, invertebrates and vertebrates alike.

There is little information on the occurrence of free-living (non-animal parasitic) nematodes from Albania. Schneider (1943) and later Gerlach and Meyl (1957) reported on some nematode species from Lake Ohrid. Although their nematodes were sampled on the eastern (then Yugoslavian, now Macedonian) shore, they should still be listed here. Schneider (1943) found three species (named following modern nomenclature):

Mesotheristus crassissimus (Ditlevsen, 1911) Wieser, 1956
Punctodora ohridensis Schneider, 1943
Domorganus bathybius (Schneider, 1943) Lorenzen, 1981

Gerlach and Meyl (1957) recorded the following fifteen species from Lake Ohrid:

Monhystera paludicola de Man, 1880
Mesotheristus setosus (Bütschli, 1874) Wieser, 1956
Chromadorina bioculata (Schultze, 1857) Wieser, 1954
Punctodora ohridensis Schneider, 1943
Ethmolaimus pratensis de Man, 1880
Hofmaenneria brachystoma (Hofmänner, 1917) Schneider, 1940
Aphanolaimus aquaticus Daday, 1897
Paraplectonema pedunculatum (Hofmänner, 1913) Strand, 1934
Glauxinema armatum (Hofmänner, 1913) Andrássy, 1984
Ironus tenuicaudatus de Man, 1876
Epitobrilus medius (Schneider, 1916) Tsalolikhin, 2001
Semitobrilus pellucidus (Bastian, 1865) Tsalolikhin, 1981
Tripyla filicaudata de Man, 1880
Dorylaimus stagnalis Dujardin, 1845
Paractinolaimus macrolaimus (de Man, 1880) Andrássy, 1964

From the Albanian inland, the economically most important plant-parasitic nematodes have been studied by local authors, principally by Jovani (1994). To the best of my knowledge, fourteen plant nematode species have been recorded from Albania so far. They are:

Aphelenchoides besseyi Christie, 1942
Ditylenchus destructor Thorne, 1945
Ditylenchus dipsaci (Kühn, 1857) Filipjev, 1936
Pratylenchus penetrans (Cobb, 1917) Filipjev *et* Schuurmans Stekhoven, 1941
Pratylenchus thornei Sher *et* Allen, 1953
Helicotylenchus pseudorobustus (Steiner, 1914) Golden, 1956
Helicotylenchus vulgaris Yuen, 1964

Rotylenchulus macrodoratus Dasgupta, Raski *et* Sher, 1968
Heterodera schachtii Schmidt, 1871
Globodera rostochiensis (Wollenweber, 1923) Skarbilovich, 1959
Meloidogyne incognita (Kofoid *et* White, 1919), Chitwood, 1949
Tylenchulus semipenetrans Cobb, 1913
Xiphinema index Thorne *et* Allen, 1950
Xiphinema pachtaicum (Tulaganov, 1938) Kirjanova, 1951.

MATERIALS AND METHODS

During systematic zoological investigations conducted by the Hungarian National History Museum in Albania, J. Kontschán, Z. Fehér and D. Murányi also collected, in October, 2004, several nematode samples, and offered them for study to the present author. The nematodes, mostly soil dwellers but with some aquatic species, originated from two districts, Mat and Tiranë in

Table I. Localities and habitats in Central and South Albania where the nematode samples were collected.

No.	**Central Albania**
1	Priferi Mat, 5 km E of Qafa e Shtamës along the road from Burrel to Krujë, 970 m asl; soil from a secondary oak forest.
2	Periferi Mat, 4 km SE of Qafa e Shtamës, 1100 m asl; beech forest, soil near a brook.
3	Periferi Mat, Quafa e Shtamës, 22 km from Burrel along the road to Krujë, 1240 m asl; natural beech forest, *a)* soil, *b)* fallen leaves.
4	Periferi Mat, Ura e Vashës, in the gorge of Lumi i Matit, 350 m asl; *a)* soil on limestone rocks, *b)* mosses from a spring.
5	Periferi Mat, 5.5 km N of Gurri i Bardhë, along the road from Klos to Elbasan, 740 m asl; grassland with limestone rocks, cow dung.
6	Periferi Mat, 4 km S of Gurri i Bardhë, 920 m asl; mud from a brook.
7	Periferi Mat, 14 km S of Gurri i Bardhë, along the road from Klos to Elbasan, 1360 m asl; soil from a natural beech forest.
8	Periferi Mat, 3 km N of Qafa e Shtyllës, 1500 m asl; grassland with limestone rocks, *a)* grassy soil, *b)* soil from around beech trees.
9	Periferi Tiranë, along the Klos–Elbasan road, 1380 m asl; grassland with limestone rocks, soil and grass roots.
10	Periferi Tiranë, along the Klos–Elbasan road, 1420 m asl; soil from a natural beech forest.
	South Albania
11	Periferi Tepelenë, gorge of a brook, 1 km from Progonat, along the road from Tepelenë to Progonat, 950 m asl; *a)* moss from a brook, *b)* soil, *c)* moss from soil.
12	Periferi Tepelenë, a gorge 2 km W of Progonat, 740 m asl; moss from a spring on limestone rocks.
13	Periferi Tepelenë, a cave 2 km W of Progonat, over the gorge, 800 m asl; soil with mosses from the cave.
14	Periferi Tepelenë, 7 km S of Tepelenë, Uji i Ftohtë, 165 m asl; degraded gallery forest near a spring, *a)* wet soil, *b)* liver moss from the soil.
15	Periferi Tepelenë, 7 km S of Tepelenë, by the bank of Lumi i Drinosit, 150 m asl; mosses from the river.
16	Periferi Gjirokastër, 4 km SW of Poliçan, by the bank of a brook, along the road from Libohovë to Sheper, 490 m asl; *a)* soil, *b)* moss from a trunk.
17	Periferi Delvinë, Syri i Kaltër, 7 km W of Muzinë, 150 m asl; oak forest near a spring, mosses from the spring.
18	Periferi Delvinë, a lake below Syri i Kaltër, 150 m asl; *a)* wet soil from the shore, *b)* moss from a trunk.

Fig. 1. Map of Albania showing the five districts (periferi) where nematodes were sampled.

Central Albania on the one hand, and three districts, Tepelenë, Gjirokastër and Delvinë, in South Albania on the other (Fig. 1). The majority of them were sampled in mountainous regions.

The collecting sites and habitats are listed in Table I.

The nematode samples were fixed *in situ* with 4% formaldehyde solution. In the laboratory, the nematodes were extracted by flotation techniques and sieving. They were then picked out by hand, and fixed again in FAA. Subsequently, they were processed to pure glycerine by a slow method, and finally mounted on permanent glass slides.

At present, the type specimens are preserved in the nematode collection of the author, but later they will be deposited in the Zoological Collection of the Hungarian Natural History Museum, Budapest.

RESULTS

In studying the samples, 58 nematode species were identified, out of which seventeen belonged to the class Torquentia, nine to Secernentia and thirty-two to Penetrantia. Although the majority of the observed species fitted the general picture of the European fauna, some rare species, including three new ones, were also found. These latter are discussed in detail below.

The nematode species recently discovered in Albania and the serial numbers of their localities are enumerated in Tables II-IV.

Table II. Observed species of the class Torquentia and their localities.

Families and species	No. of localities
Monhysteridae	
Eumonhystera dispar (Bastian, 1865) Andrássy, 1981	4b, 12, 15
Eumonhystera simplex (de Man, 1880) Andrássy, 1981	12
Eumonhystera vulgaris (de Man, 1880) Andrássy, 1981	6, 17
Geomonhystera villosa (Bütschli, 1873) Andrássy, 1981	18b
Cylindrolaimidae	
Cylindrolaimus bambus Andrássy, 1968	18a
Bastianiidae	
Bastiania gracilis de Man, 1876	3a
Plectidae	
Anaplectus granulosus (Bastian, 1865) De Coninck *et* Schuurmans Stekhoven, 1933	3a, 3b, 5, 8a, 16a, 18a
Plectus cirratus Bastian, 1865	1, 8b
Plectus longicaudatus Bütschli, 1873	3a
Plectus opisthocirculus Andrássy, 1952	11a, 12, 18a
Plectus parietinus Bastian, 1865	16b
Plectus rhizophilus de Man, 1880	3b, 7, 17
Ceratoplectus armatus (Bütschli, 1873) Andrássy, 1984	3a, 6
Wilsonema otophorum (de Man, 1880) Cobb, 1913	18b
Microlaimidae	
Prodesmodora loksai Andrássy, 1989	18b
Cyatholaimidae	
Achromadora ruricola (de Man, 1880) Micoletzky, 1925	6, 11a, 18a
Chromadoridae	
Chromadorina viridis (von Linstow, 1876) Wieser, 1954	15

Table III. Observed species of the class Secernentia and their localities.

Families and species	No. of localities
Cephalobidae	
Acrobeloides nanus (de Man, 1880) Anderson, 1968	9
Chiloplacus symmetricus (Thorne, 1925) Thorne, 1937	9, 16a
Cervidellus vexilliger (de Man, 1880) Thorne, 1937	7
Acrobeles ciliatus von Linstow, 1877	16a
Tylenchidae	
Filenchus discrepans (Andrássy, 1954) Andrássy, 1972	8b
Coslenchus costatus (de Man, 1921) Siddiqi, 1978	2, 3a
Telotylenchidae	
Paratrophurus hungaricus Andrássy, 1973	9
Criconematidae	
Criconemoides informis (Micoletzky, 1922) Taylor, 1936	8a, 10
Criconema annuliferum (de Man, 1921) Micoletzky, 1925	8b, 11b

PRIONCHULUS OXYCERCUS **Zell, 1985**
(Fig. 2)

Females (n = 5). L = 2.28-2.63 mm; a = 26-28; b = 3.8-4.1; c = 13-14; c' = 3.7-4.0; V = 62-64%.

Body large and moderately slender, more or less arcuate ventrally after fixation; 82-98 µm wide at middle. Cuticle smooth, rather thin, 2.5-3.0 µm over all the body. Lip region 42-44 µm wide, lips well developed, conoid. Body at posterior end of oesophagus 1.8-2.0 times as wide as head. Amphid cup-like, small. Buccal capsule (the sclerotized section of mouth cavity) large, 47-48 × 27-28 µm. Dorsal tooth strong with its tip located at 23-26% of the buccal capsule. Sub-ventral ridges with several fine and dense denticles pointing forward. Oesophagus strongly muscular over entire length, 614-644 µm long. Distance between posterior end of oesophagus and vulva 1.5-1.6 times greater than oesophagus itself. Oesophageal gland nuclei prominent, both AS nuclei lying close to each other: D = 57-60%; AS1 = 54-57%, AS2 = 57-60%, PS1 = 87-90%, PS2 = 88-91%. Glandularium 230-264 µm long.

Vulva transverse with well sclerotized inner lips. Vagina strong, 34-36 µm long, shorter than half width of corresponding body. Female genital organ of Type I: comparatively short, each ovary more than half as long as corresponding branch of gonads (see Andrássy, 1985: Comments). Genital branches equal in length, 3.0-3.3 body widths long or occupying 11-12% of body length. Tail conoid, ventrally curved, uniformly tapered to its finely sub-digitate, occasionally slightly dorsally curved tip. Tail 176-190 µm long, occupying 7.0-7.5% of entire length of body.

The shape of the tail (sub-digitate on tip) especially characterizes this mononchid species. Winiszewska and Susulovsky (2003) studied the type specimens of Zell (1985) and compared them with other European representatives of the species. At the same time, they synonymized *P. oxycercus* Zell, 1985 with *P. bastiani* Zell, 1985, and provided Zell's *P. bastiani* – being a homonym of *Mononchus* (now: *Prionchulus*) *bastiani* de Man, 1876 – with the new name *P. zelli* Winiszewska *et* Susulovsky, 2003. As I mentioned recently (Andrássy, 2009), this latter action was, however, superfluous since – accepting the synonymization – *P. oxycercus* has a page priority over *P. bastiani,* hence the former will be the valid name of the species.

The present specimens fit the descriptions of Zell (1985) on the one hand, and of Winiszewska and Susulovsky (2003) on the other, except for the tail, which is somewhat longer (3.7-4.0 *vs.* 2.4-3.5 anal body diameters).

Prionchulus oxycercus lives in both terrestrial and aquatic habitats and is seemingly restricted to Europe (Germany, Poland, Czech Republic, Spain and Ukraine). The Albanian specimens were found in a brook at locality No. 6.

EUDORYLAIMUS ILLYRICUS **sp. n.**
(Fig. 3)

Holotype female. L = 1.22 mm; a = 25; b = 3.4; c = 29; c' = 1.5, V = 51%.

Females (n = 3). L = 1.08-1.14 mm; a = 22-24; b = 3.4-3.6; c = 32-35; c' = 1.1-1.3; V = 52-54%.

Males (n = 3). L = 1.04-1.27 mm; a = 23-28; b = 3.8-4.0; c = 32-35; c' = 1.0-1.2.

Table IV. Observed species of the class Penetrantia and their localities.

Families and species	No. of localities
Tripylidae	
Tripyla affinis de Man, 1880	3b, 10
Tripyla minuta (Brzeski, 1963) Brzeski *et* Winiszewska-Slipińska, 1993	16b
Tripylina arenicola (de Man, 1880) Brzeski, 1963	11b
Alaimidae	
Alaimus acutus Thorne, 1939	3a, 6a, 9
Alaimus primitivus de Man, 1880	7
Mononchidae	
Clarkus papillatus (Bastian, 1865) Jairajpuri, 1970	7, 16a
Coomansus parvus (de Man, 1880) Jairajpuri *et* Khan, 1977	10
Mononchus truncatus Bastian, 1865	1
Prionchulus muscorum (Dujardin, 1845) Cobb, 1916	13, 16a
Prionchulus oxycercus Zell, 1985	6
Mylonchulidae	
Mylonchulus brachyuris (Bütschli, 1873) Cobb, 1917	3a, 7, 8a, 18a
Anatonchidae	
Miconchus studeri (Steiner, 1914) Andrássy, 1958	4a, 7, 8b
Dorylaimidae	
Mesodorylaimus subtiliformis (Andrássy, 1959) Andrássy, 1959	7
Mesodorylaimus subtilis (Thorne *et* Swanger, 1936) Andrássy, 1959	6, 14
Actinolaimidae	
Paractinolaimus macrolaimus (de Man, 1880) Andrássy, 1964	11c
Qudsianematidae	
Allodorylaimus infundibulicaudatus Andrássy, 1991	9, 18b
Chrysonema holsaticum (Schneider, 1925) Andrássy, 1990	
Eudorylaimus illyricus sp. n.	16a
Eudorylaimus maritus Andrássy, 1959	8b
Eudorylaimus par sp. n.	10
Eudorylaimus rugosus (Andrássy, 1957) Andrássy, 1959	7
Microdorylaimus longicollis (Brzeski, 1964) Andrássy, 1986	18a
Labronema pulchrum Vinciguerra *et* Zullini, 1980	16a
Aporcelaimidae	
Aporcelaimellus amylovorus (Thorne *et* Swanger, 1936) Heyns, 1965	8a
Aporcelaimellus crassus sp. n.	3a
Aporcelaimellus pycnus (Thorne, 1939) Baqri *et* Khera, 1975	9
Aporcelaimellus samarcandicus (Tulaganov, 1949) Baqri *et* Khera, 1975	1
Paraxonchiidae	
Paraxonchium leptocephalus (Altherr, 1954) Altherr *et* Loof, 1969	8a, 9
Nordiidae	
Enchodelus groenlandicus (Ditlevsen, 1927) Thorne, 1939	8b, 11b
Heterodorus brevidentatus (Thorne, 1939) Andrássy, 2009	16b
Pungentus clavatus Ahmad *et* Jairajpuri, 1979	8a
Pungentus pungens Thorne *et* Swanger, 1936	16a

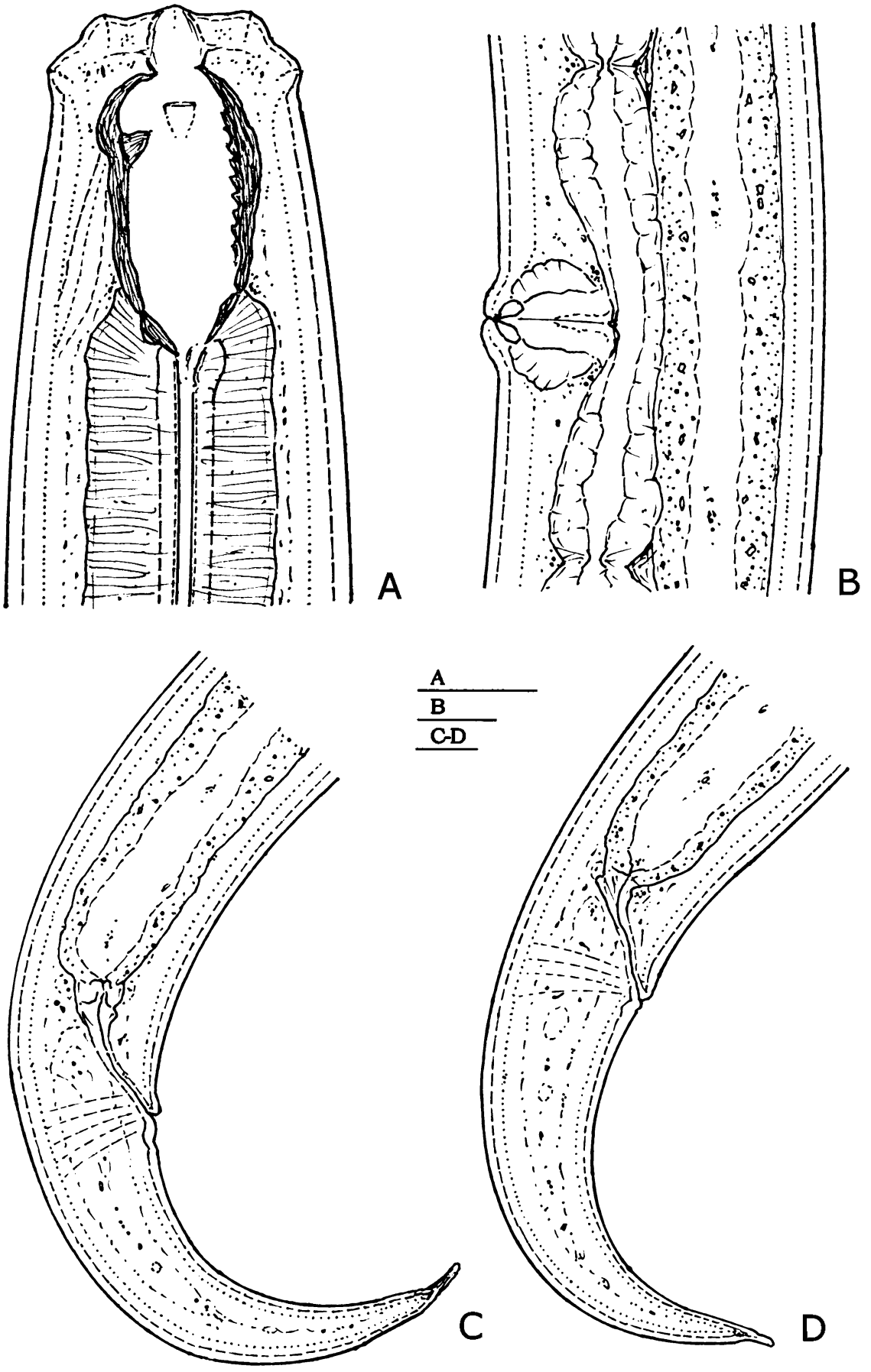

Fig. 2. *Prionchulus oxycercus* Zell, 1985. A: anterior end; B: vulval region; C-D: female posterior regions. (Scale bars 20 µm each).

General description. Body comparatively small and moderately slender, 45-50 µm wide at middle. Cuticle smooth, 2.5-3.5 µm thick. Lip region 13-15 µm wide, offset by a depression, lips angular. Body at posterior end of oesophagus 3.2-3.3 (female) or 2.8-3.0 (male) times as wide as head. Amphid about half as wide as corresponding body. Odontostyle 15-17 µm long, 1.1-1.3 times as long as labial width; aperture occupying

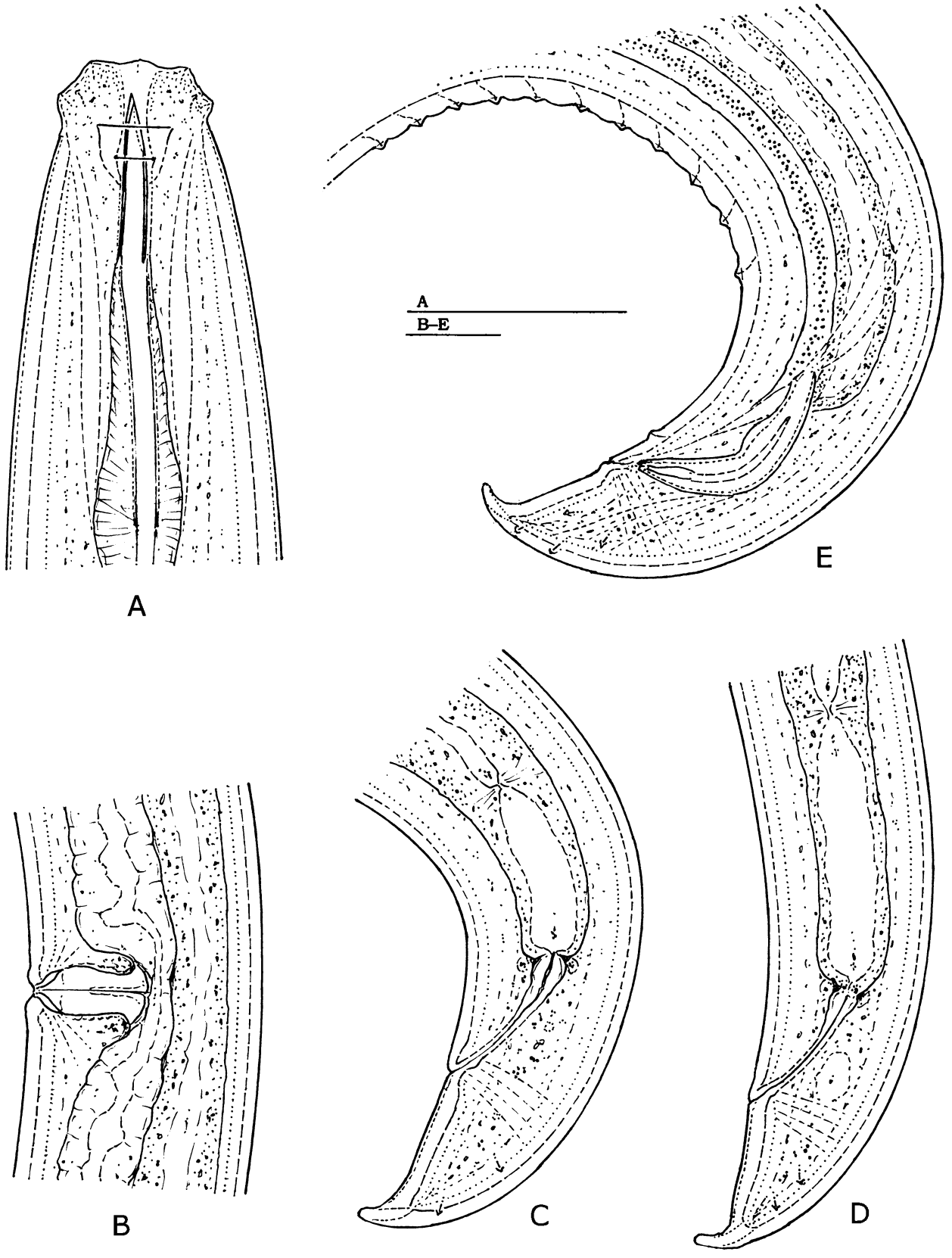

Fig. 3. *Eudorylaimus illyricus* sp. n. A: anterior end; B: vulval region; C-D: female tails; E: male posterior part. (Scale bars 20 µm each).

about one-third of stylet length. Oesophagus 280-350 µm long, enlarged somewhat behind its middle. Distance between posterior end of oesophagus and vulva 0.7-0.9 times as long as oesophagus. Oesophageal gland nuclei clearly discernible. Dorsal nucleus located at 62-67% of oesophagus length or at 16-18% of total body length. AS1 = 22-26%, AS2 = 43-45%; PS nuclei at different levels, and the anterior one larger than the posterior: PS1 = 65-70 %, PS2 = 71-76 %. Glandularium 104-134 µm long.

Female. Vulva longitudinal, hardly sclerotized. Vagina 28-32 µm, as long as or longer than half body width. Anterior gonad 3.8-5.0 body widths long or occupying 16-20% of body length, posterior gonad 4.2-4.4 body widths long or occupying 15-18% of body length. Uterine egg not observed. Pre-rectum 1.5-2.0 anal body widths long. Vulva-anus distance equal to 13-15 tail lengths. Tail 31-42 µm long, 2.8-3.4% of total body length, straight on ventral contour, only its tip curved ventrally. Tail tip finely rounded with a central stripe.

Male. Spermatozoa fusiform. Spicula 46-48 µm long. Ventromedial supplements 10-11, spaced, their row 128-135 µm long. Pre-rectum beginning within the range of supplements. Tail similar to that of female, 26-35 µm long, its tip ventrally curved and more or less rounded.

Main characters and relationships. Eudorylaimus illyricus is a relatively small representative of the genus with slightly offset head, short odontostyle, longitudinal and hardly sclerotized vulva, long vagina, moderate number of male supplements, and with a short tail curved at the tip. In length of the body, number of the supplements and shape and length of the tail, the new species is close to *E. arcus* (Thorne *et* Swanger, 1936) Andrássy, 1959 and *E. bombilectus* Andrássy, 1962. It can be distinguished from *E. arcus* by the weaker odontostyle, the longitudinal vulva and the bent tip of the tail. It differs from *E. bombilectus* in the thin odontostyle, longitudinal and hardly sclerotized vulva and the strongly curved tip of the tail.

Type specimens. Holotype female on slide No.14949. Paratypes: three females, three males and two juveniles. All in the collection of the author.

Type habitat and locality. Periferi Gjirokastër, 4 km SW of Poliçan, by the bank of a brook, along the road from Libohovë to Sheper, 490 m asl; soil, collected in October, 2004, by J. Kontschán.

Etymology. Named after Illyria or Illyricum, the north-western region of the Balkan Peninsula, which also includes Albania.

EUDORYLAIMUS MARITUS **Andrássy, 1959**
(Fig. 4)

Female. L = 2.20 mm; a = 37; b = 4.0; c = 40; c' = 1.5; V = 48%.

*Male*s (n = 2). L = 2.12-2.24 mm; a = 35-36; b = 3.7-4.1; c = 46-55; c' = 1.2-1.4.

General description. Large and slender species; body 59-62 µm wide at middle. Cuticle smooth and thick, 4-5 µm at mid-region of body. Lip region 19-21 µm wide, slightly offset, lips angular, separate. Body at posterior end of oesophagus 3.0-3.4 times as wide as head. Amphids wider than one half corresponding body width. Odontostyle 24-28 µm long, about 1.3 times longer than labial diameter; aperture occupying one-third of its length. Oesophagus 560-620 µm long, expanded somewhat posterior to its middle. Distance between oesophagus terminus and vulva somewhat shorter than oesophagus.

Female. Vulva a transverse slit with well sclerotized inner lips. Vagina strong, 38 µm long, occupying more than one-half of corresponding body width. Anterior gonad 4.4 body widths long or 12% of body length, posterior gonad 6.6 body widths long or 17% of body length. No uterine egg observed. Pre-rectum as long as 1.6 anal body diameters with a dorsal blind sack. Vulva-anus distance equal to 18 tail lengths. Tail short, 52 µm, only 2.4% of entire length of body, ventrally curved and sharply pointed on its tip. Ventral wall of tail possessing some blisters.

Male. Pre-rectum beginning within the range of supplements, proximal end dorsally sack-like. Spermatozoa spindle-shaped. Spicula 70-76 µm long. Ventromedial supplements very small, 8-9 in number. Tail similar to that of female, 48-52 µm long, ventrally curved, with some blisters in ventral cuticle.

This species is characterized by the large and fairly slender body, thick cuticle, slightly differentiated head, moderate number of supplements, and by the short, ventrally bent and sharply pointed tail provided with cuticular blisters.

Eudorylaimus maritus is a terricolous species inhabiting mosses and the soil. I described it from Hungary (Andrássy, 1959, 1960), and it was subsequently found in some other countries of Europe, *viz.* in Germany, Sweden, Poland, Bulgaria, Italy, Moldavia and Russia. The Albanian specimens were collected in the locality No. 8b, from soil in a beech forest.

EUDORYLAIMUS PAR **sp. n.**
(Fig. 5)

Holotype female. L = 1.98 mm; a = 28; b = 3.7; c = 32; c' = 1.4; V = 53%.

Females (n = 2). L = 1.90-1.96 mm; a = 28-30; b = 3.7-4.0; c = 30-33; c' = 1.4-1.6; V = 52-53%.

Males (n = 2). L = 1.80-1.86 mm; a = 30-32; b = 3.6-3.8; c = 30–31, c' = 1.6-1.7.

General description. Body nearly 2 mm long, moderately slender, 60-70 µm wide at middle. Cuticle smooth, 2.5-3.0 µm thick on mid-body, somewhat thinner than odontostyle at the same level. Lip region 20-21 µm wide, well offset by a depression, lips angular. Body at posterior end of oesophagus 2.8-3.3 times as wide as head. Amphids occupying nearly two-thirds of corresponding body width. Odontostyle 26-27 µm long, 1.2-1.3 times

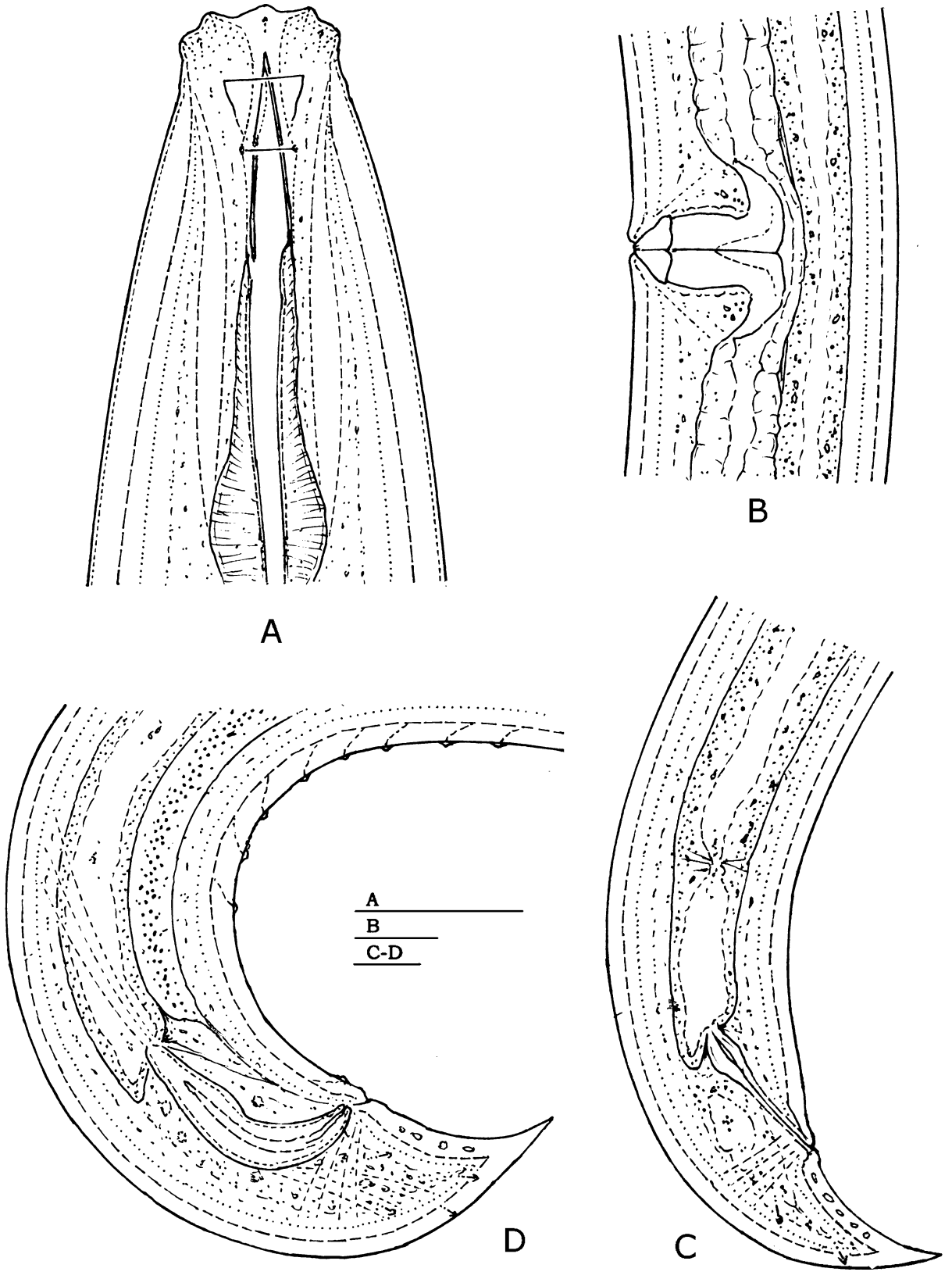

Fig. 4. *Eudorylaimus maritus* Andrássy, 1959. A: anterior end; B: vulval region; C: female posterior end; D: male posterior end. (Scale bars 20 µm each).

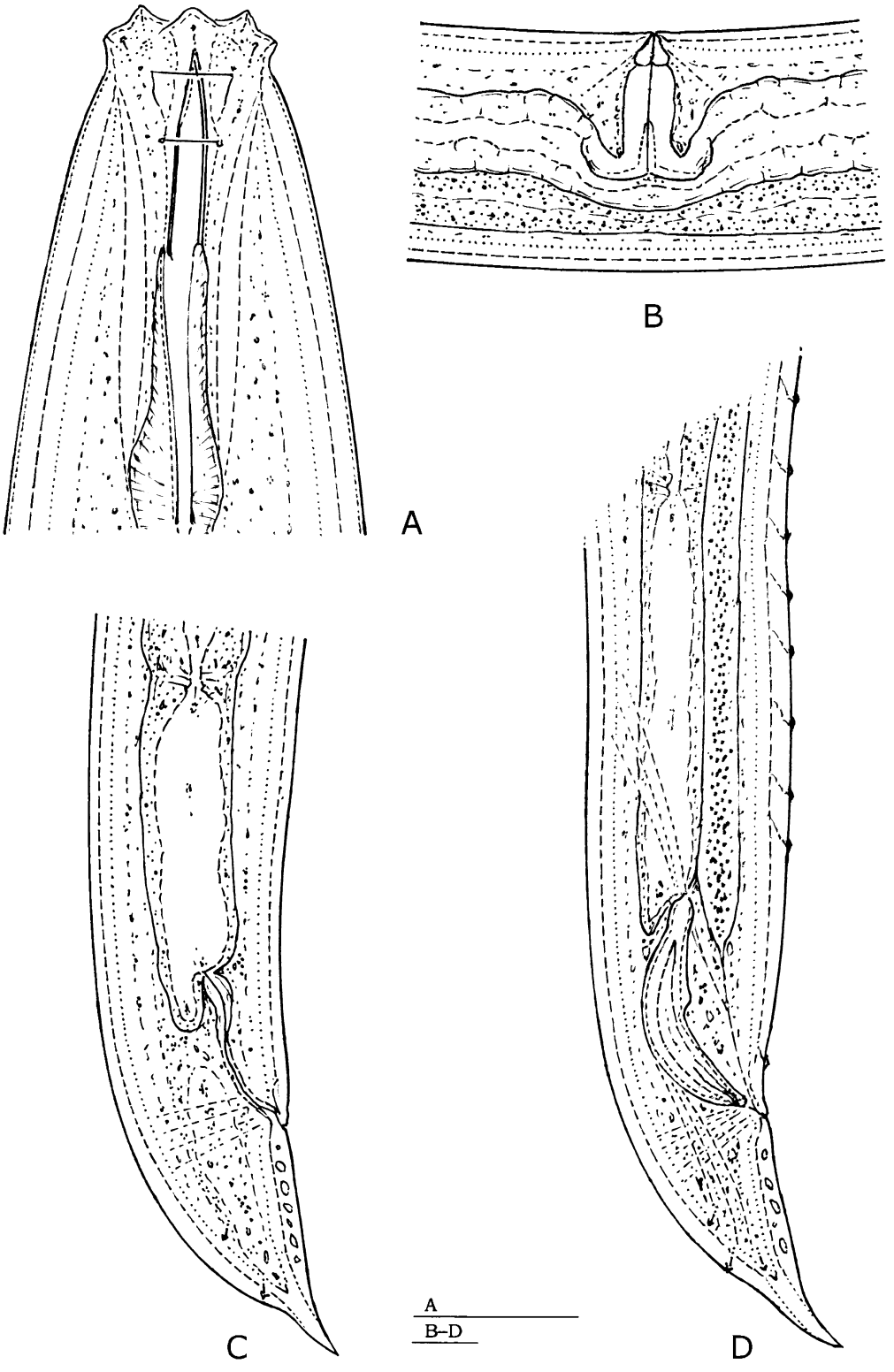

Fig. 5. *Eudorylaimus par* sp. n. A: anterior end; B: vulval region; C: female posterior end; D: male posterior end. (Scale bars 20 µm each).

longer than labial diameter, with aperture occupying one-third of stylet length. Oesophagus 518-530 µm long, widened at its middle. Oesophageal gland nuclei clearly discernible, except for nucleus AS1. Dorsal nucleus lying at 60-62% of oesophagus length or at 15-17% of total body length. Other nuclei: AS2 = 38-39%, PS1 = 70-73%, PS2 = 72-74%. Glandularium 197-210 µm long. Distance between posterior end of oesophagus and vulva equal to the length of oesophagus.

Female. Vulva transverse with heavily sclerotized inner lips. Vagina 45 µm, longer than half body width. Anterior gonad 4.5 body widths long or 16% of body length, posterior gonad 4.7 body widths long or 17% of

body length. Uterine eggs not observed. Pre-rectum as long as 2, rectum as long as 1.2 anal body widths, the former possessing a distinct caudal blind sack. Vulva-anus distance equal to fourteen tail lengths. Tail 62-65 µm long, strongly tapered behind its middle, its ventral contour first almost straight, but ventrally curved on its sharp tip. Ventral cuticle of tail with some blisters; tip of tail with an "empty" central zone.

Male. Pre-rectum beginning within the range of supplements. Spermatozoa fusiform, 7-8 µm long. Spicula 80-82 µm long. Ventromedial supplements eight, small, separate, their row occupying 130 µm. Tail similar to that of female, 64-65 µm long, curved only on its tip.

Main characters and relationships. This new species is characterized by the shape and size of the body, thin cuticle, strongly offset head, length of the odontostyle, number of supplements, and by the shape and structure of the tail. It strongly resembles *Eudorylaimus maritus* Andrássy, 1959 and *E. maritoides* Zell, 1986. It differs from *E. maritus* by the thinner cuticle (2.5-3.0 *vs*. 4-5 µm), more strongly separated head, longer spicula (80-82 *vs*. 70-77 µm) and by the hardly bent tail possessing a central "empty" zone. It differs from Zell's (1986) species by the shorter body (1.9-2.0 *vs*. 2.5-2.7 mm), and the hardly curved tail of different structure.

Type specimens. Holotype female on slide No. 14952. Paratypes: two females and two males. All in the collection of the author.

Type habitat and locality. Periferi Tiranë, along the Klos-Elbasan road, 1420 m asl; soil from a natural beech forest, collected in October, 2004 by J. Kontschán.

Etymology. Latin *par* means: a pair or a couple, referring to the fact that both female and male specimens occurred in the type population.

APORCELAIMELLUS CRASSUS **sp. n.**
(Fig. 6)

Holoype female. L = 2.38 mm; a = 21; b = 4.6; c = 46; c' = 1.2; V = 48%.

Females (n = 4). L = 2.30-2.62 mm; a = 21-23; b = 4.1-4.5; c = 41-49; c' = 1.1-1.3; V = 47-51%.

General description. A robust nematode of large size; body 94-115 µm wide at mid-region. Cuticle smooth and thick, 4-6 µm on mid-body and 6-8 µm on tail, consisting of the usual two layers (under light microscope): an outer, thinner and transparent and an inner, "darker" (not transparent) and thicker layer. Labial region 19-21 µm wide, somewhat sunk and strongly separated from adjacent body by a deep constriction. Body at posterior end of oesophagus 4.2-5.3 times as wide as head. Amphid about as wide as half the corresponding body width. Odontostyle relatively short, 24-26 µm, 1/20-1/24 of oesophagus length, about 1.2 times as long as labial width, thicker than cuticle at same level. Aperture occupying more than half of stylet length. Guiding apparatus aporcelaimoid, dorsally thicker than ventrally. Oesophagus 480-625 µm long, widened somewhat before its middle. Distance between posterior end of oesophagus and vulva 1.1-1.2 times as long as oesophagus. Oesophageal gland nuclei, because of the heavy muscular tissue, moderately distinct. Dorsal nucleus located at 51-57% of oesophagus length or at 12-13% of entire length of body. AS1 = 21-24%, AS2 = 45-48%, PS1 = 70-72%, PS2 = 72-73%. Glandularium 220-235 µm long.

Female. Vulva transverse with strongly sclerotized inner lips; vagina 40-42 µm, occupying less than half of corresponding body diameter. Gonads quite short, each 2.2-2.5 body widths long or occupying 9-12% of body length. Uterine egg not observed; no spermatozoa in uterus. Pre-rectum 2.5-3.0, rectum 1.2-1.4 anal body widths long. Vulva-anus distance equal to 20-25 tail lengths. Tail 40-58 µm long or 2.0-2.3% of total body length, as long as or a little longer than anal body diameter, straight, distinctly concave on its dorsal contour and rounded on tip. Outer layer of cuticle (along with the terminal lacuna) thicker than inner layer.

Male. Not found.

Main characters and relationships. Body large and plump, head strongly offset with sunken lips, odontostyle short with large aperture, female genital tract short, tail somewhat longer than anal body diameter, concave on dorsal contour and narrowly rounded on tip.

In several morphological structures the new species is most closely related to *Aporcelaimellus alius* Andrássy, 2002, which was described from sedge roots and wet grassy soil in the Fertő-Hanság National Park, Hungary (Andrássy, 2002). *Aporcelaimellus crassus* can be distinguished from its relative by the longer and thicker body (2.3-2.6 *vs*. 1.8-2.2 mm long; 94-115 *vs*. 82-90 µm wide at middle), somewhat longer odontostyle (24-26 *vs*. 21-23 µm), longer pre-rectum (2.5-3.0 *vs*. 1.5-2.2 anal body widths), and particularly by the shape of the tail. The latter is longer and more conoid (c' = 1.1-1.3 *vs*. 0.7-1.0) and narrowly rounded on tip (*vs*. rather broadly rounded).

Type specimens. Holotype female on slide No. 14953. Paratypes: six females and three juveniles. All in the collection of the author.

Type habitat and locality. Periferi Mat, Quafa e Shtamës, 22 km from Burrel along the road to Krujë, 1240 m asl; soil from a natural beech forest, collected in October, 2004 by J. Kontschán.

Etymology. From the Latin *crassus* = thick or fat.

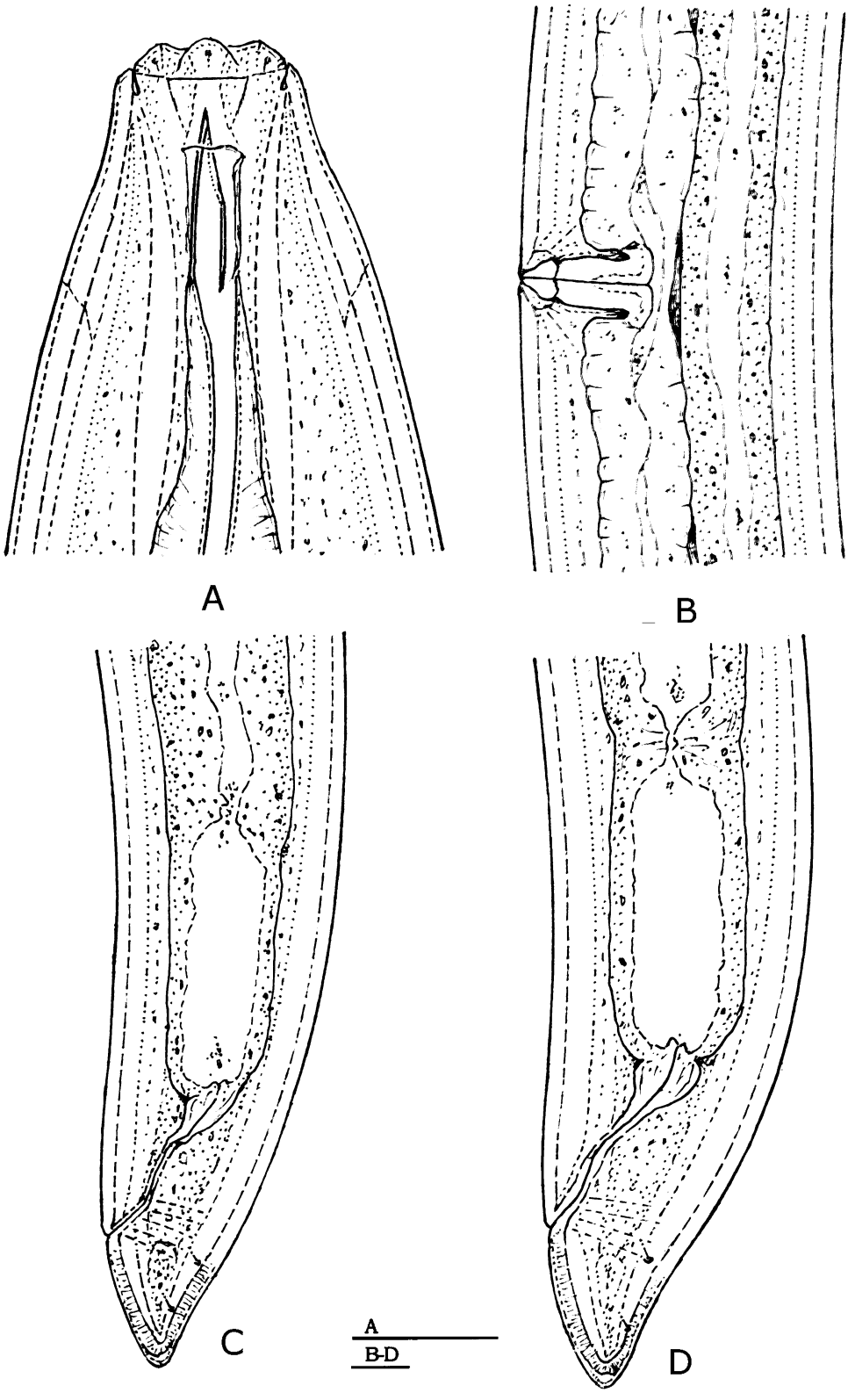

Fig. 6. *Aporcelaimellus crassus* sp. n. A: anterior end; B: vulval region; C-D: female posterior ends. (Scale bars 20 µm each).

ENCHODELUS GROENLANDICUS
(Ditlevsen, 1927) Thorne, 1939
(Fig. 7)

Females (n = 2). L = 1.54-1.68 mm; a = 22-23; b = 4.0-4.6; c = 40-46; c' = 0.7-0.8; V = 44-45 %.

Body 77-80 µm wide at middle. Cuticle 3-4 µm thick on mid-body and 8-9 µm on tail. Lip region rounded, offset by a slight depression, 19-20 µm wide. Body at posterior end of oesophagus 3.5-3.6 times as wide as head. Odontostyle long and thin, 50-51 µm, 2.5-2.6 times as long as labial width; odontophore 52-54 µm

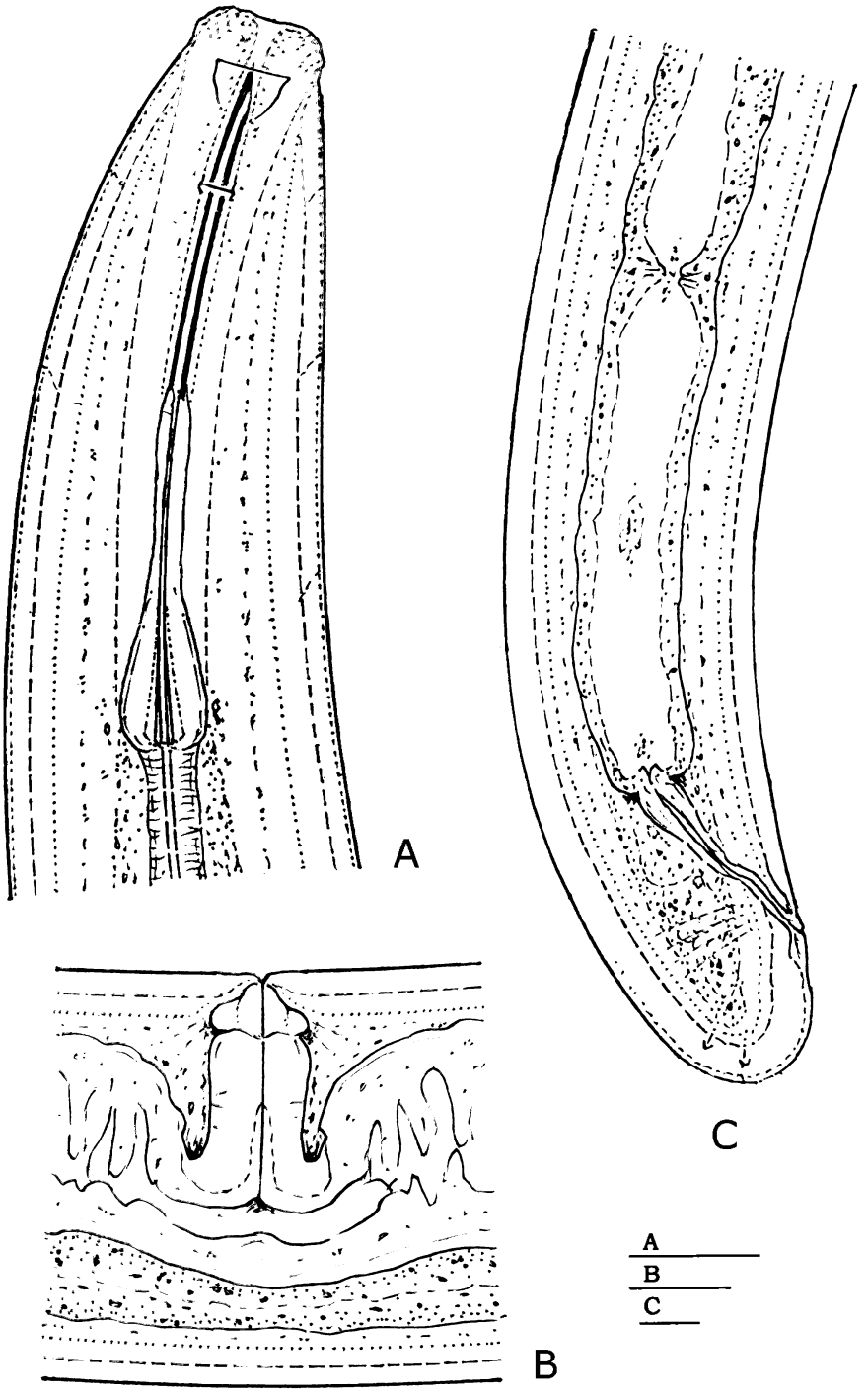

Fig. 7. *Enchodelus groenlandicus* (Ditlevsen, 1927) Thorne, 1939. A: anterior end; B: vulva and vagina; C: female posterior region. (Scale bars 20 µm each).

long. Oesophagus widened at 62-63%. Dorsal nucleus located at 64-68% of oesophagus length or 14-16% of entire length of body. AS1 = 22-26%, AS2 = 28-32%, PS1 = 53-56%, PS2 = 56-57%; AS nuclei small, rather inconspicuous, PS nuclei prominent. Glandularium 115-133 µm long.

Vulva a transverse slit with large and heavily sclerotized inner lips. Vagina strong, 40-44 µm long, extending well over half a body diameter. Each genital branch about four body widths long. Tail 28-30 µm long, broadly rounded, hemispheroid.

The present specimens fit well the morphological characters of *Enchodelus groenlandicus* as recently described by Guerrero and Peña-Santiago (2008). This is the second record of this rare species after its original description; *E. groenlandicus* has previously been reported from terrestrial habitats in Greenland and Spain.

The Albanian specimens were observed in terrestrial habitats at localities No. 8b and 11b.

HETERODORUS BREVIDENTATUS
(Thorne, 1939) Andrássy, 2009
(Fig. 8)

Females (n = 6). L = 1.48-1.85 mm; a = 28-34; b = 5.2-6.0; c = 32-36; c' = 1.7-1.8; V = 49-52%.

Body moderately slender, mostly C-shaped upon fixation. Cuticle thin and apparently smooth. Lip region separated by a depression, 11-13 µm wide; lips amalgamated. Body at posterior end of oesophagus 3.3-4.0 times as wide as head. Odontostyle small and thin, 12-13 µm, about as long as labial width; odontophore simple. Oesophagus 285-310 µm long, expanded at 62-64%. Dorsal nucleus located at 70-74% of oesophagus length or at 12-14% of entire length of body. AS1 = 21-25%, AS2 = 28-33%. Posterior pair of nuclei unusually large and located far from posterior margin of cylindrus: PS1 = 48-54%, PS2 = 48-56%. Glandularium 84-94 µm long.

Pre-rectum as long as 2.3-3.3 anal body diameters, rectum as long as or slightly longer than the latter diameter. Vulva transverse with heavily sclerotized inner lips, vagina 32-34 µm long, occupying more than half body diameter. Female genital tract well developed and long, Gonads 4.8-6.4 times as long as mid-body width, or occupying 15-18% of total length of body. Tail conoid, ventrally curved, 45-52 µm long, only 3% of total length of body.

On the basis of the original specimens of Thorne (1939) and the freshly collected Spanish and Romanian specimens, good re-descriptions are due to Guerrero and Peña-Santiago (2007), Guerrero *et al.* (2007), and Ciobanu *et al.* (2009). According to them, *H. brevidentatus* is closely related to *H. morgensis* (Loof, 1989) Andrássy, 2009, but differs from the latter by the more anteriorly located dorsal oesophageal nucleus (67-72 *vs.* 80-82%), and the strongly sclerotized vulval lips. The Albanian specimens fit the descriptions of the Spanish/Romanian authors, except for the smooth cuticle (*vs.* faintly striated), the shape of the vulval sclerotization and the very long gonads. In the length of the body they are closer to the American specimens (1.45-1.70 mm), but in the length of the odontostyle to the European ones (1.15-1.30 µm, while 1.45-1.70 µm in American specimens).

Distribution. *Heterodorus brevidentatus,* a rather rare representative of the genus, has hitherto been recorded from Europe (Hungary, Romania, Italy, Spain) and North America (United States). The present specimens were found in mosses at locality No. 16b.

PUNGENTUS CLAVATUS
Ahmad *et* Jairajpuri, 1979
(Fig. 9)

*Female*s (n = 2). L = 1.69-1.74 mm; a = 35-36; b = 3.7-3.8; c = 38-40; c' = 0.7; V = 39-40%.

Body slender, 47-49 µm wide at middle; nearly straight after fixation. Cuticle smooth, 3 µm wide at mid-

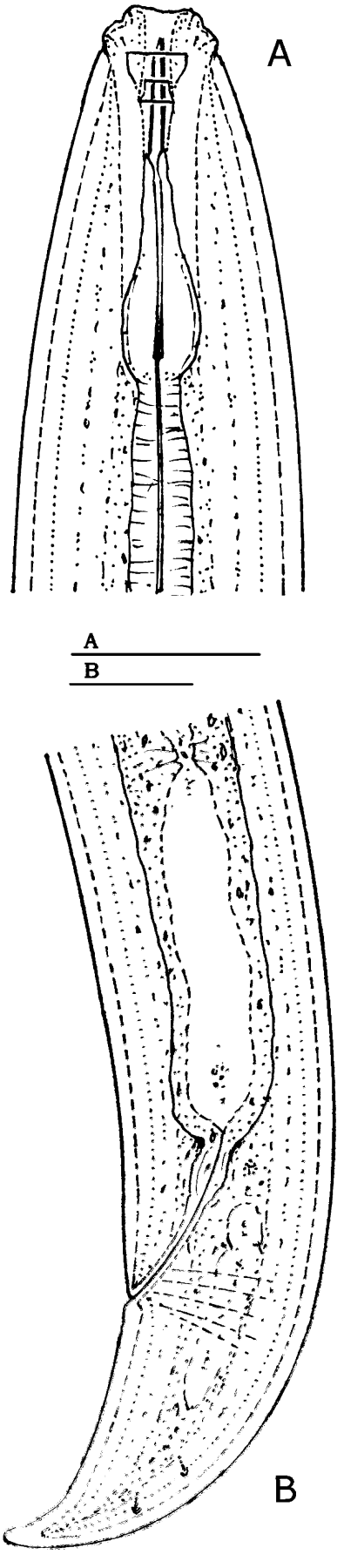

Fig. 8. *Heterodorus brevidentatus* (Thorne, 1939) Andrássy, 2009. A: anterior end; B: female posterior end. (Scale bars 20 µm each).

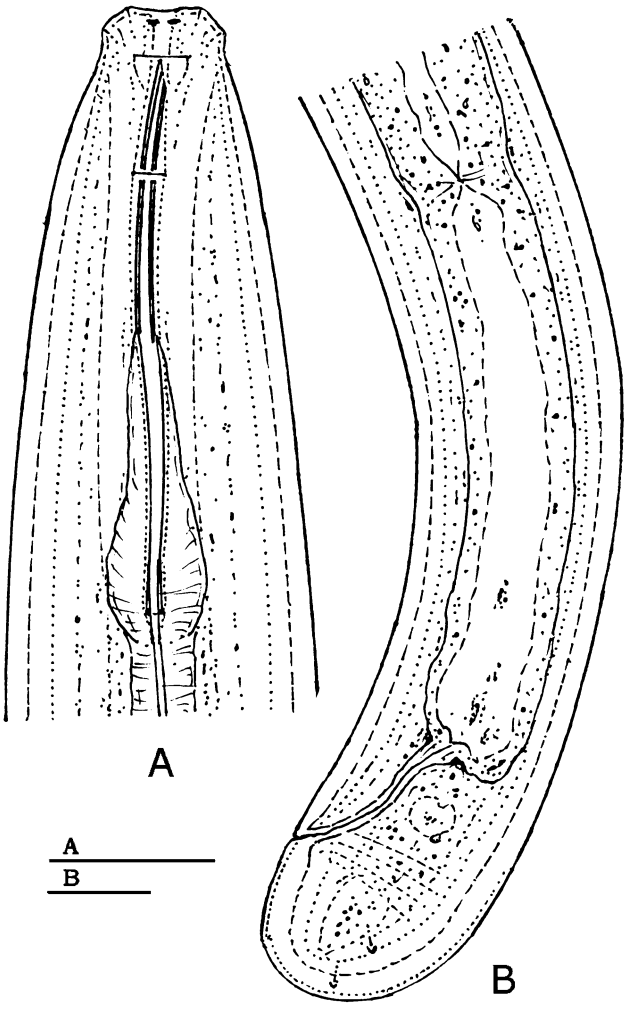

Fig. 9. *Pungentus clavatus* Ahmad *et* Jairajpuri, 1979. A: anterior end; B: female posterior region. (Scale bars 20 µm each).

body and 6-7 µm on tail. Lip region rounded, 14 µm wide, lips amalgamated. Body at posterior end of oesophagus 3.4-3.6 times as wide as head. Four small sclerotized platelets present at the entrance of mouth cavity. Odontostyle long and slender, slightly sinuate, 32-34 µm, 2.2-2.4 times as long as labial width. Odontophore rodlike. Guide ring double but thin. Oesophagus 448-456 µm long, widened at 47-48%. Dorsal oesophageal nucleus located at 52-54% of oesophagus length or 14% of entire length of body. AS1 = 20-22%, AS2 = 24-26%, PS1 = 65-66%, PS2 = 66-67%. Glandularium 204-208 µm long. Pre-rectum 3.2-4.4 times as long as anal body width, rectum shorter than anal body diameter.

Female genital organ mono-opisthodelphic. Vulva transverse with sclerotized inner lips; vagina 25-27 µm long, equal to half body width. Anterior uterine sac shorter than half a body width. Posterior gonad 5.0-5.4 body widths long or occupying 14-15% of total body length. Vulva-anus distance equal to 33-36 tail lengths. Tail 28-30 µm long, hemispheroid, distinctly clavate with very thick cuticle.

The present specimens agree well with the original description of Ahmad and Jairajpuri (1979). *Pungentus clavatus* is easily recognized by the shape of its tail.

It is a fairly rare species, hitherto observed in Europe (Poland, Spain, Italy), Asia (India) and North America (Canada). The Albanian specimens came from a grassy soil at locality No. 8a.

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