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NEMATODES FROM ITALIAN SAND DUNES. 5. TWO NEW SPECIES OF DORYLAIMIDA AND THREE KNOWN SPECIES OF ENOPLIDA

by

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Summary. Two new species of Dorylaimida, found in coastal sand dunes in Sicily (Italy), are described and illustrated. *Iotonchus paracutus* sp. n. is characterised by its large and wide mouth cavity with basal dorsal tooth, didelphic reproductive apparatus, elongate-conoid tail with finely rounded terminus, absence of spinneret, gubernaculum without lateral processes, ten to eleven ventral precloacal papillae. *Nygolaimus capitellus* sp. n. is characterised by its relatively small size, expanded and low lip region, odontostyle 5.0-5.5 μm long, with wide lumen, expanded part of pharynx enveloped by a thin sheath, vulva pre-equatorial, tail conoid with blunt terminus. Three known species are also described: *Trischistoma gracile* Andr ssy, 1985, the male of which is found for the first time, and the marine species of Enoplida *Oncholaimus oxyuris* Ditlevsen, 1911 and *Tripylodes acherusius* Gerlach, 1952.

During a survey of nematodes of coastal sand dune systems of Sicily (Italy) two new species of Dorylaimida (Nematoda) and three known species of Enoplida were found, which are here described and illustrated.

Materials and methods

Samples were collected with a plexiglass soil corer to a depth of 60 cm. Nematodes were extracted by centrifugation, killed and fixed in hot 4% formalin and processed to anhydrous glycerin. Measurements were made with the aid of a camera lucida.

Descriptions

***IOTONCHUS PARACUTUS* sp. n.**

(Fig. 1; Table I)

Female. Body large and robust, tapering at the posterior extremity. Body width at cardia 1.4-1.6 lip region widths. Cuticle finely transversely striated, 1.5-2.5 μm at mid-body. Amphidial fovea small, cup-like; amphidial opening 18-20% of corresponding body width. Lip region broader than adjoining body and set off by a constriction. Mouth cavity, heavily sclerotized, wide. Dorsal tooth located almost at its base. Pharynx cylindrical. Nerve ring located at 55-58% of pharynx

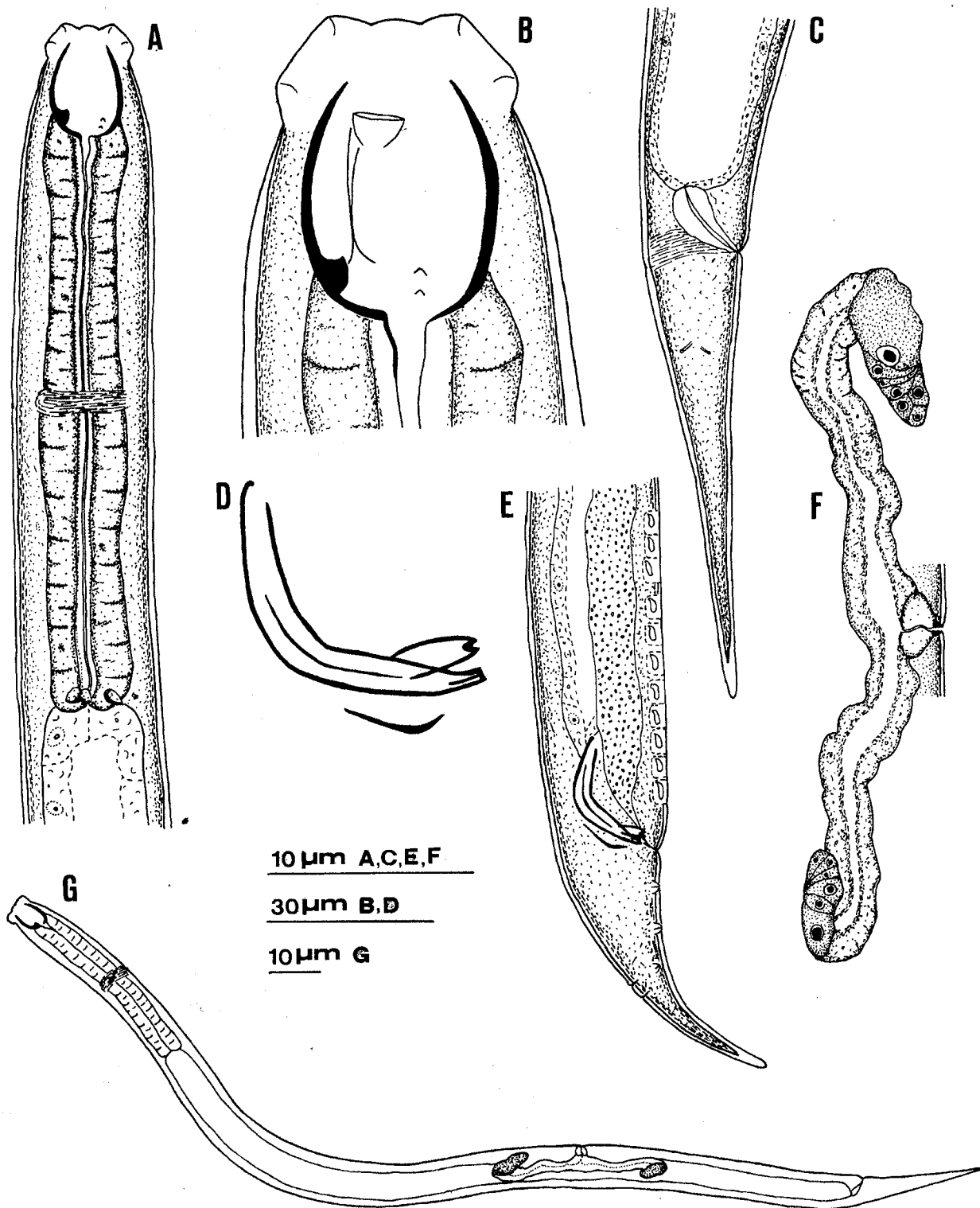


Fig. 1 - *Iotonchus paracutus* sp. n.: A, B, anterior end; C, female tail; D, spicule; E, male tail; F, female genital apparatus; G, female body.

TABLE I - *Measurements of Iotonchus paracutus n. sp. and Nygolaimus capitellus n. sp. from Italy* (All measurements in μm except L in mm).

Locality:	<i>Iotonchus paracutus</i>			<i>Nygolaimus capitellus</i>	
	Portopalo Holotype 1♀	Selinunte Paratype 1♀	Selinunte Paratype 2♂	Venicari Holotype 1♀	Venicari Paratype 1♀
L	2.18	1.86	1.59-1.6	1.08	1.07
a	26	23	23-24	36	31
b	5.1	5	4.6	4	3.7
c	9.4	10.9	10.6-11.3	49.9	50.9
c'	4.6	3.5	2.8-3	1.3	1.1
V	61.9	62.9		46.2	49.5
Ph-V/Ph	2.1	2		0.8	0.8
V-A/T	2.3	3		19.8	20.9
Amphid width	10	8.5	8-9	4	4.5
Buccal cavity height	67.5	57.5	52.5		
Buccal cavity width	40	35	30-32.5		
Lip height				5	5.5
Lip width				15	17.5
Odontostyle length				5	5.5
Body width	82.5	82.5	65-70	30	35
Pharynx length	430	370	345-347	270	282
Ant. part of pharynx length				128	140
Nerve ring to ant. end	250	210	182-190	79	82.5
Prerectum length				36	37
Rectum length	35	40		23	21
Anal body width	50	47.5	50	17.5	22
Tail length	230	170	140-150	23	21
Spicules length			57.5-62.5		
Gubernaculum length			22.5-25		
Precloacal papillae			11-10		

length. Pharyngo-intestinal junction tuberculate. In the intestinal lumen diatoms and odontostyles of dorylaims were present. Rectum 0.7-0.8 anal body widths long. Reproductive apparatus amphidelphic, with reflexed gonads. Vulva transverse; vagina with sclerotized pieces. Tail elongate-conoid, straight, with finely rounded terminus, about four anal body widths long. The spinneret is absent. Two pairs of papillae in the anterior third of tail.

Male. Similar to female in general aspect. Testes paired. Spicules ventrally curved, 1.1-1.2 times as long as cloacal body width. Accessory pieces, proximally bifurcated, 8 μm long. Gubernaculum simple, without lateral processes. A series of ten to eleven ventral precloacal papillae is present, ending in the proximity of the cloacal opening. Tail elongate-conoid as in female, but ventrally curved. Five pairs of papillae were seen as shown in Fig. 1. Spinneret absent.

Diagnosis and relationship

Iotonchus paracutus sp. n. is characterised by its large and wide mouth cavity with basal dorsal tooth, didelphic reproductive apparatus, elongate-conoid tail with finely rounded terminus, straight in female and ventrally curved in male, absence of spinneret, gubernaculum without lateral processes and ten to eleven ventral precloacal papillae. Because of the location of the dorsal tooth the new species is similar to *I. acutus* (Cobb, 1917) Andrásy, 1958, from which it mainly differs in the larger mouth cavity, posterior vulva and by having a longer female tail, straight, with rounded terminus (ventrally curved with pointed terminus in *I. acutus*). *I. acutus* was redescribed by Mulvey (1963) from California, by Heyns and Lagerway (1965), who first found males, and by De Bruin and Heyns (1992) from South Africa. The American and South-African specimens, which are very similar to each other, might not be *I. acutus*, since in the latter $V=44-49$, while in the former $V=61-68$. However, the male of *I. paracutus* sp. n. differs from those described by Heyns and Lagerway as *I. acutus* (1965) in the following aspects: shorter and thicker spicule, longer and more curved gubernaculum, wider space between the cloaca and the posteriormost ventral pre-cloacal papilla.

Type locality and habitat

Portopalo (Siracusa, Italy) and Selinunte (Trapani, Italy); sand dunes.

Type specimens

Holotype, a female and two male paratypes deposited in the collection of the Dipartimento di Biologia Animale, University of Catania, Italy.

Derivatio nominis

The specific epithet is composed by the Greek word *para*=near and by the Latin word *acutus*=pointed.

NYGOLAIMUS CAPITELLUS sp. n.

(Fig. 2; Table I)

Female. Body cylindroid, slightly ventrally curved in fixed specimens. Body width at cardia 1.5-1.6 lip region widths. Cuticle very thin, 1-1.5 μm at midbody. Amphidial fovea cup-like; amphidial opening 29-30% of corresponding body width. Lip region low, flat, wider than adjoining body and set off by a constriction; lips with prominent inner and outer papillae. Odontostyle deltoid, with relatively wide lumen, shorter than lip region width; its aperture 1/3 of its length. Pharynx gradually expanding at 47-49.6% of its length; the expanded part enveloped by a thin sheath. Location of pharyngeal glands as follows: ($n=2$): $DO=63.6-65.1\%$; $DN=66.4-66.9\%$; $S_1O=69.6-71.1\%$; $S_1N=71.4-72.1\%$; $S_2O_1=91.6\%$; $S_2N_1=92.6-94.1\%$; $S_2O_2=92.6\%$; $S_2N_2=94.1-94.5\%$. Nerve ring located at 30% of pharynx length. Cardia conoid, 11-12 μm long. The three cardiac glands well developed. Prerectum 1.6-2 anal body widths long; rectum 0.9-1.3 anal body widths long. Reproductive apparatus paired and reflexed. No sperms were present in uteri. Vulva transverse; vagina weakly sclerotised. Tail conoid with blunt terminus.

Male. Not found.

Diagnosis and relationship

Nygolaimus capitellus sp. n. is characterised by its small size (L about 1 mm), broad and flat lip region, odontostyle 5-5.5 μm long, with wide lumen, expanded part of pharynx enveloped by a thin sheath, vulva pre-equatorial, tail conoid with blunt terminus. In general aspect and size it resembles *N. gobabiensis* Heyns, 1968, from which it mainly differs in the more expanded lip region, anterior vulva ($V=46-49$ vs. 55), shorter odontostyle (5-5.5 μm vs. 7.3-7.5 μm) and presence of a pharyngeal sheath.

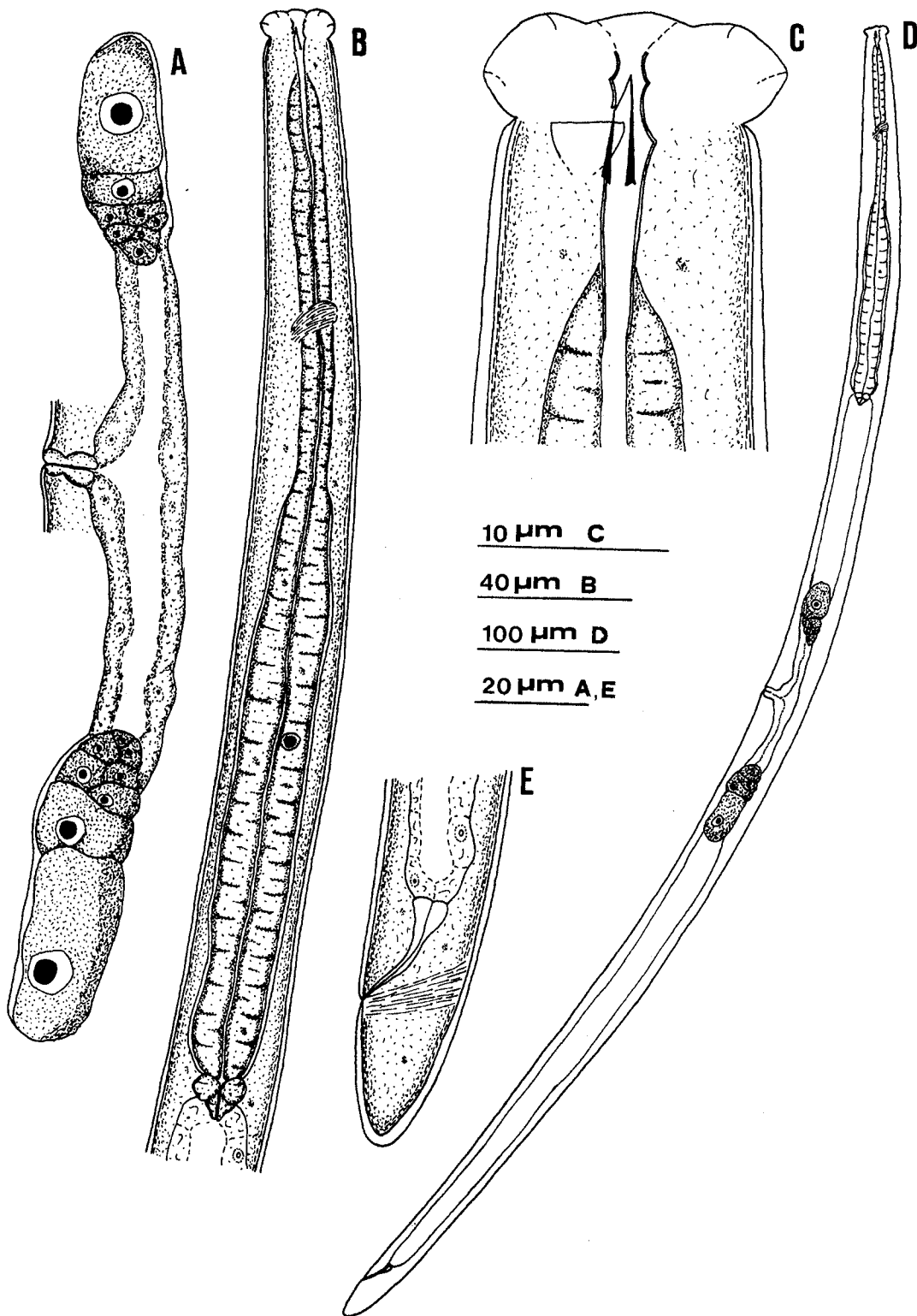


Fig. 2 - *Nygolaimus capitellus* sp. n.: A, female genital apparatus; B, C, anterior end; D, female body; E, female tail.

Type locality and habitat

Vendicari (Siracusa, Italy): sand dunes. Other locality: Portopalo (Siracusa, Italy).

Type specimens

Holotype and paratype deposited in the collection of the Dipartimento di Biologia Animale, University of Catania.

Derivatio nominis

The specific epithet is a Latin word meaning "column capital" and refers to the lip region shape.

***ONCHOLAIMUS OXYURIS* Ditlevsen, 1911**

(Fig. 3; Table II)

Male. Body long and slender, more or less curved ventrad in fixed specimens. Cuticle smooth, 1 μm thick at mid-body. Lip region low, truncate, not set off from the adjoining body, bearing six minute inner labial papillae, six outer labial setae 5.5-6.5 μm long and, in the same circle, four cephalic setae 7.5-8.0 μm long. Some short somatic setae are scattered along body surface, mainly in the caudal region. Buccal cavity wide and strongly sclerotized, armed with a large subventral tooth 10-11 μm long and with two smaller teeth, dorsal and subventral, respectively 4.5-5.5 μm and 5.5-6.5 μm long. Amphidial opening at the base of the buccal cavity; amphidial fovea stirrup-shaped, small, 16-20% of the corresponding body width. Pharynx muscular, cylindroid. Nerve ring at 50-52% of pharynx length. Distance of excretory pore to anterior end 83 μm , about three head widths. Spicules slender, about as long as cloacal body width. Gubernaculum absent. Near the cloacal opening there are two subventral rows of eight stiff bristles: four pre-cloacal and four post-cloacal. Some additional setae occur in the dorsal

surface of tail. Tail conoid, ventrally curved, sharply narrowing in the posterior half, where a characteristic well developed mammary-like papilla is present. Spinneret not prominent.

Female. Similar to male in its general features. Reproductive apparatus mono-prodelphic. Vulval lips without sclerotizations. Two or three eggs in the uterus of each female; their size 110-155 μm in length and 52-62 μm in width. Demanian system not clearly visible due to dark material filling intestine. Tail shape the same as in male, but without the big papilla and the bristles.

Discussion. Our specimens fit well the original description. The peri-cloacal bristles in our specimens are eight, while other authors report different numbers: five (Allgén, 1950), ten (Gerlach, 1957), 14 (De Coninck and Schuurmans Stekhoven, 1933). *O. oxyuris* is a widespread species, typical of brackish and coastal aquatic environments. It is reported for the first time from Italy.

Geographical distribution and ecology. Belgium, Denmark, Finland, Sweden, Congo, Northern Sea, Baltic Sea, Italy (mouth of River Simeto, Sicily). Coastal sandy bottoms, mangroves and *Zostera* spp. roots, dune sand.

***TRIPYLOIDES ACHERUSIUS* Gerlach, 1952**

(Fig. 4; Table II)

Male. Body long and slender. Cuticle annulated; cuticular rings about 1 μm thick. Lip region not set off from adjoining body, bearing six short inner labial setae 2.5-3.5 μm long, six outer labial setae 14.5-15.5 μm long and four cephalic setae, in the same circle with the outer labial setae, 10-11 μm long. Mouth cavity in two parts: the anterior one 14.0-14.5 μm long, the posterior 4.0-5.0 μm long provided with two subventral denticles. Amphidial fovea in the shape of a double spiral, its width 25-28% of the corresponding body diameter at the level of the posterior part of the mouth cavity. Pharynx

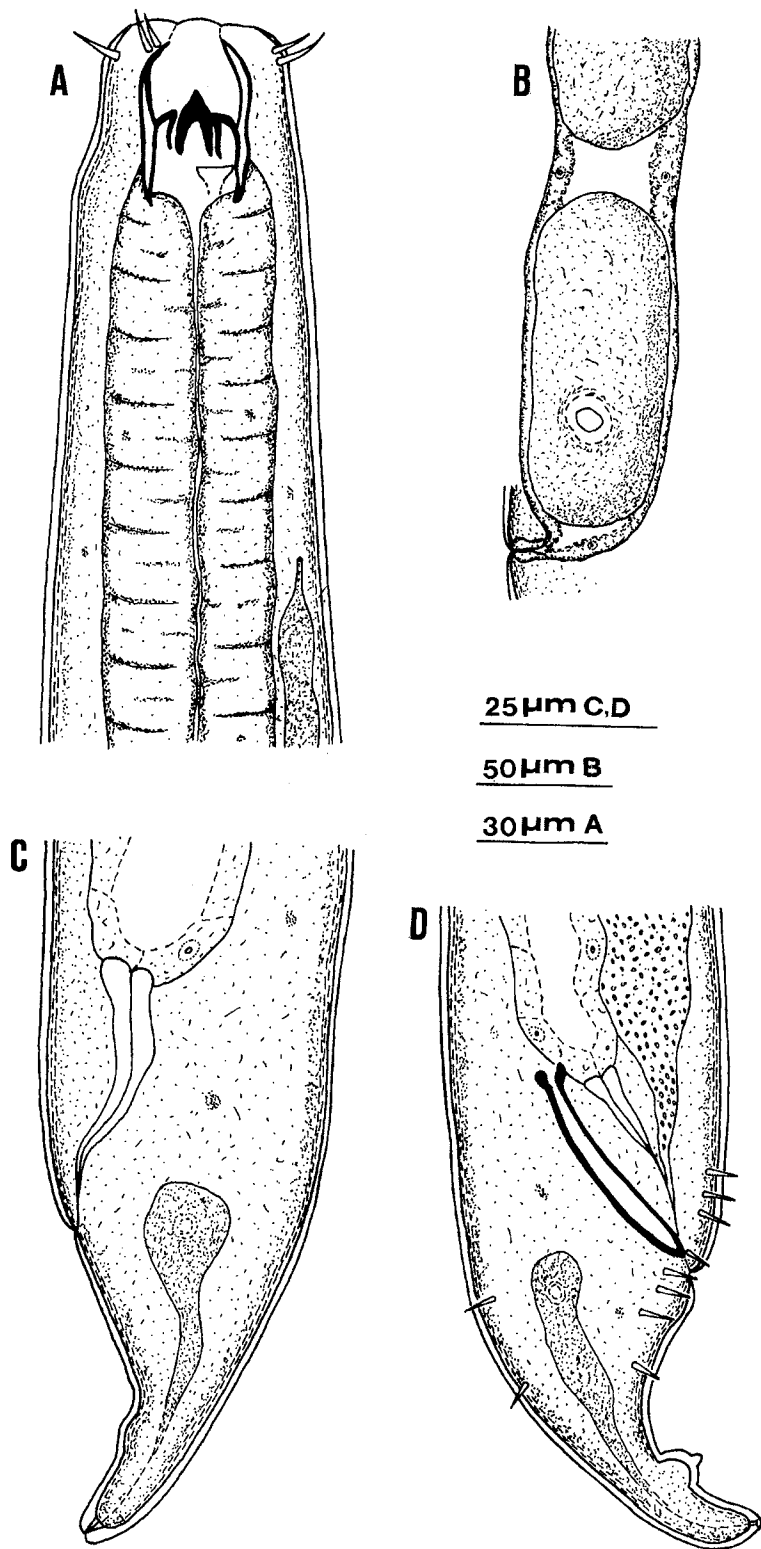


Fig. 3 - *Oncholaimus oxyuris*. A, anterior end; B, female genital apparatus; C, female tail; D, male tail.

cylindrical. Nerve ring at 40% of pharynx length. Spiculae strongly sclerotized, slightly undulate, 1.6-1.9 cloacal body widths long; gubernaculum also well sclerotized, 0.6-0.7 times as long as spicules. No pre-cloacal papillae. Tail elongate conoid, ventrally curved, with acute terminus. Along tail 7-8 bristles are scattered: two dorsal, three ventral, one or two subterminal and one on the tail tip.

Female. Not found.

Discussion. *T. acherusius* is a typically marine species, generally found in coastal sandy environments, both submerged and terrestrial. Our specimens fit well the original description, except for the shorter tail (*c'* 4 vs. 6) and the

outer labial setae (14.5-15.5 μm vs. 20 μm). It is reported for the first time from Italy.

***TRISCHISTOMA GRACILE* Andr assy, 1985**

(Fig. 5; Table III)

Female. Body slender, dorsally bent in fixed specimens. Cuticle smooth and thin, 0.5-1.0 μm thick at midbody. Lip region not set off from the adjoining body bearing sensilla in three rings: six inner labial papillae, six outer labial setae 4.5-6.5 μm long and four cephalic setae, shorter than the former (3.0-4.5 μm) and 5-6 μm far from them. Mouth cavity tubular, provided

TABLE II - *Measurements of Oncholaimus oxyuris Ditlevsen 1911 and Tripyloides acherusius Gerlach 1952 from Italy*
(All measurements are in μm except L in mm).

Locality:	<i>Oncholaimus oxyuris</i> Simeto		<i>Tripyloides acherusius</i> Portopalo
	3♀	2♂	3♂
L	3.12-3.22	3.72-3.75	0.88-1.17
a	57-61	71	20-28
b	6.5-7.7	8.1	4.2-4.4
c	44.4-52.9	53.5-67.7	9.5-10
c'	1.2-1.6	1.5-1.6	3.9-4.6
V	55-70.4		
Ph-V/Ph	3.4-3.8		
V-a/t	11.6-12.6		
Body width	52.5-55	52.5	42-45
Buccal cavity height	31-35	28.5-29.5	24-25.5
Buccal cavity width	16.5-18.5	15.5-16.5	
Amphid width	3.5-4	5.5-6.5	6.5-7.5
Amphid-ant. end	33-40	35-37.5	22-22.5
Pharynx length	410-480	460-470	200-275
Nerve ring to anterior end	235-240	230-245	95-121
Rectum length	57.5-65		
Anal body width	37.5-47.5	35-42.5	23.5-25.5
Tail length	60-72.5	55-70	92.5-117.5
Spicules length		40-47.5	42-45.5
Gubernaculum length			25.5-34

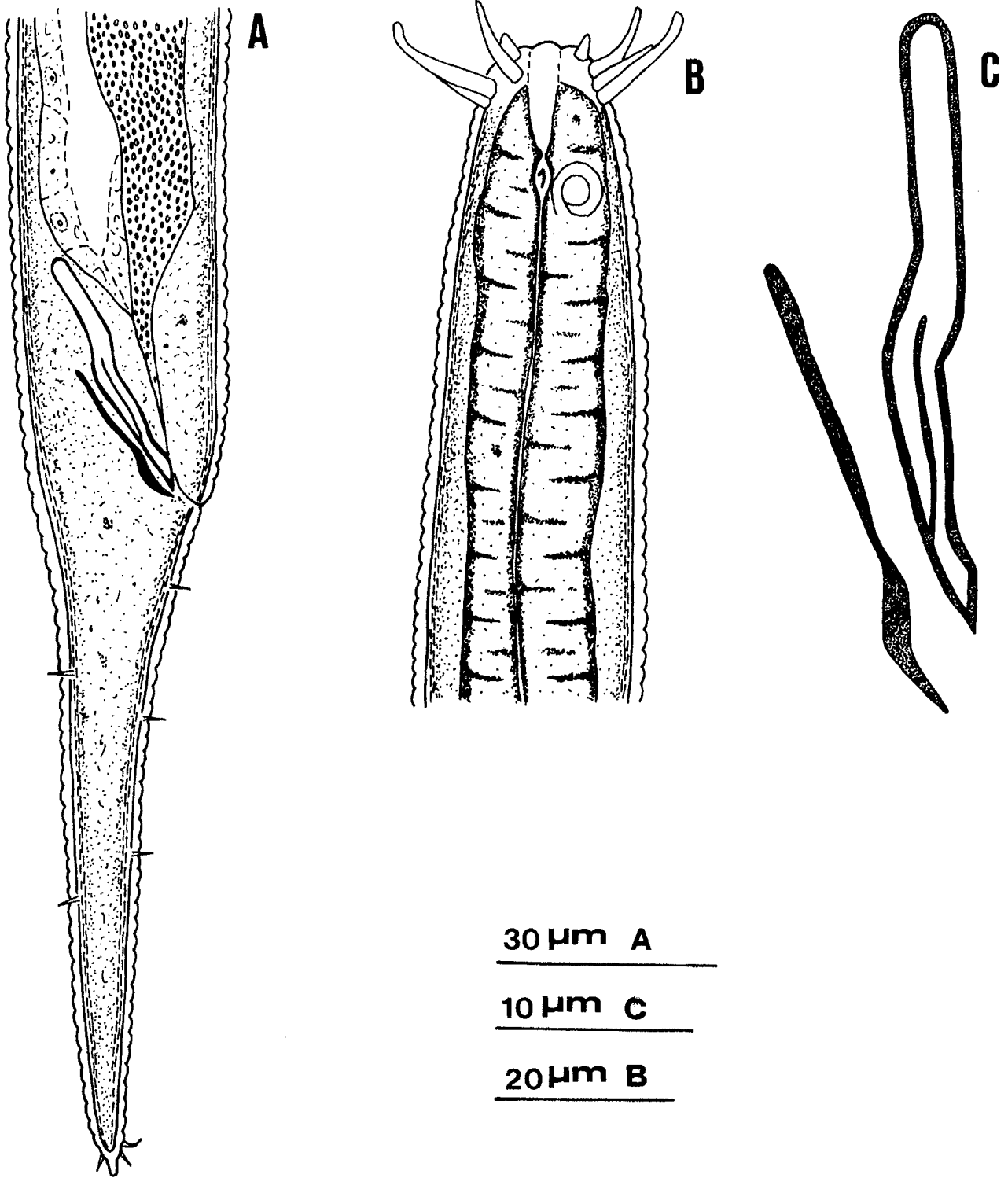


Fig. 4 - *Triploides acberusius*: A, male tail; B, anterior end; C, spicule.

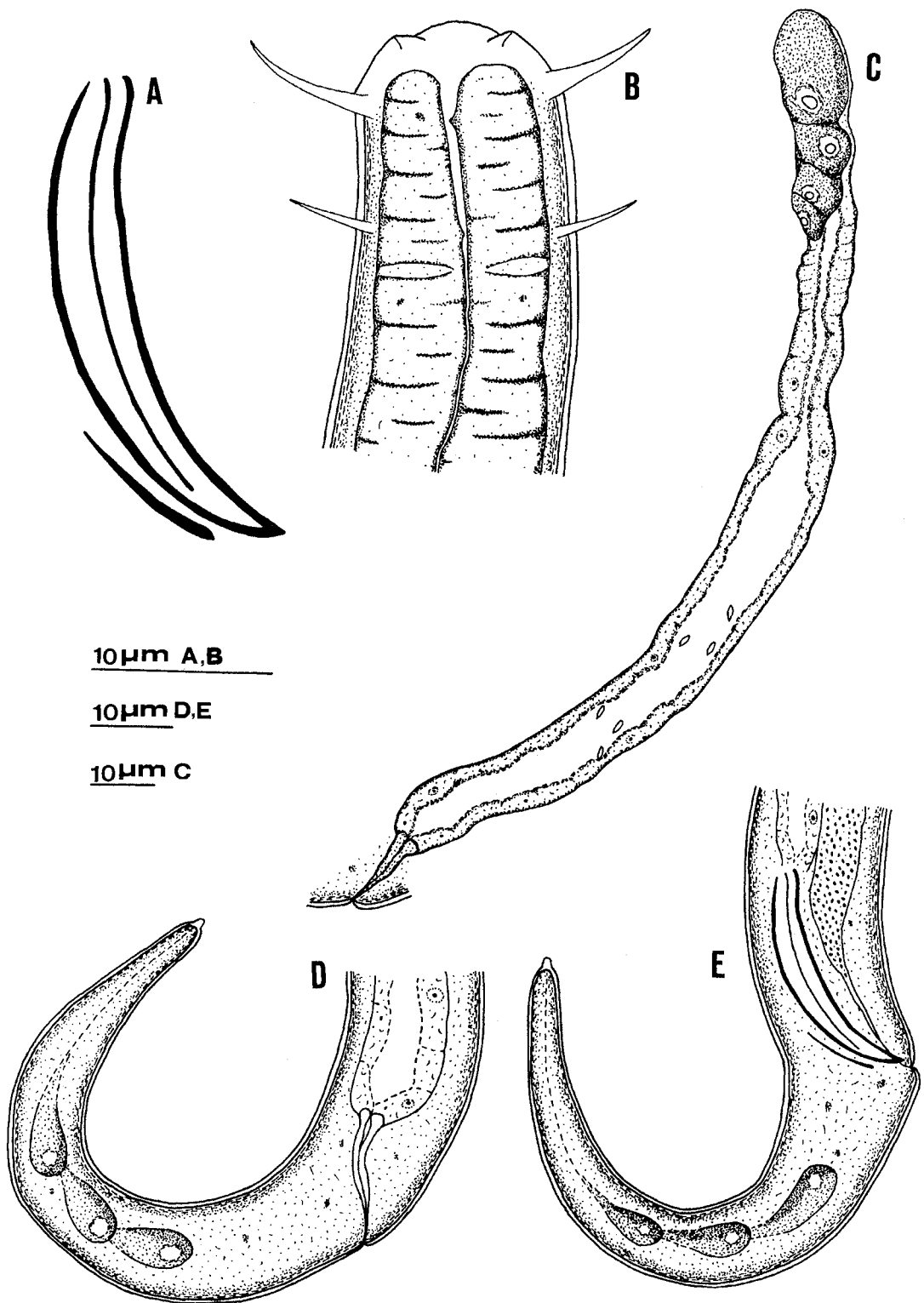


Fig. 5 - *Trischistoma gracile*. A, spicule; B, anterior end; C, female genital apparatus; D, female tail; E, male tail.

TABLE III - *Measurements of Trischistoma gracile Andr ssy 1985 from Italy* (All measurements in μm except L in mm).

Locality:	Siculiana	1♀	Irminio	Portopalo
	1♀		4♂	1♂
L	0.99	1.16	0.75-0.92 (0.85±0.1)	0.86
a	50	58	44-52 (46.7±3.5)	46
b	4.4	5	3.7-4.3 (3.9±0.2)	4.3
c	12.1	14	8.9-13.1 (10.5±1.8)	8.4
c'	5.2	4.7	4-5.1 (4.6±0.5)	6.1
V	77.1	73.2		
Buccal cavity height	11.5	20	11.5-17.5 (13.7±2.7)	16
Buccal cavity width	1	2	1-1.5 (1.2±0.3)	1
Body width	20	20	16.5-21 (18.1±1.9)	18.5
Nerve ring to anterior end	101	90	80-100 (88.7±8.5)	85
Pharynx length	225	230	200-222 (211±9)	197
Rectum length	14.5	19		
Anal body width	15.5	17.5	16.5-18.5 (17.5±0.9)	16.5
Tail length	81.5	82.5	69.5-95.5 (81.5±13.8)	101
Spicules length			25.5-32 (27.7±2.8)	28
Gubernaculum length			9-11 (10.3±1)	9.5

with tiny denticles not always evident. Amphid stirrup-shaped, small, generally obscure, located behind the cephalic setae. Pharynx cylindroid; nerve ring at 39-45% of its length. Rectum about as long as anal body width. Reproductive apparatus mono-prodelphic, reflexed. Vulva very posterior; vagina not sclerotized. In the uterus some sperms are visible.

Tail conoid, dorsally curved, ending with a spinneret.

Male. Similar to the female in general aspect. Testis monorchic. Spicules ventrally curved, 1.8-2.2 cloacal body widths long; a small gubernaculum is present; ventral precloacal organs absent. Tail dorsally curved as in female; in some specimens there is a double flexure.

Discussion. This population fits well the original description, based on a population from Hungary, except for the shape of the tail which in the Italian specimens is less tapering at its extremity and is not always S-shaped. The male of *T. gracile* is reported here for the first time.

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