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## NEMATODES FROM ITALIAN SAND DUNES. 2. FOUR NEW AND A RARE SPECIES OF CHROMADORIDA

by

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**Summary.** Four new species and a known species of Chromadorida are described and illustrated. *Achromadora arenicola* sp. n. is characterized by medium size body, relatively small mouth cavity, amphids at stoma base, short rectum, absence of prerectum and of ventral precloacal papillae. *Paracyatholaimus papillatus* sp. n. is characterized by a rather short, conoid tail, spicules with a blunt distal end, gubernaculum lacking denticles, 6-8 ventral precloacal organs. *Synonchium mediterraneum* sp. n. is characterized by having mandibles with three teeth, a gubernaculum and ventral precloacal organs. *Synonchium siculum* sp. n. is characterized by having mandibles with three teeth, of which the apical is much larger than the lateral ones, a well developed spinneret, a gubernaculum and by lacking ventral precloacal organs. The rare species *Deontolaimus papillatus* de Man, 1880 is also described.

During a survey of nematodes of sand dunes of Sicily (Italy) four new and a rare species of Chromadorida were found, which are here described and illustrated.

### Materials and methods

Samples were collected with a plexiglas 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

#### ***ACHROMADORA ARENICOLA* sp. n.**

(Fig. 1)

Holotype female: L = 0.72 mm; a = 32; b = 7.5; c = 7.3; c' = 6.3; V = 46.

Paratype females (n = 2): L = 0.76-0.82 mm; a = 30; b = 6.7-7.6; c = 7.4-8; c' = 5.4-6.2; V = 46-47.5.  
Paratype males (n = 13): L = 0.65-0.85 (0.79±0.05) mm; a = 29-47 (30±5.8); b = 6.5-8.3 (7.1±0.4); c = 6.8-9.3 (7.7±0.7); c' = 4.5-7.4 (5.8±1).

*Female.* Body slender, tapering at both extremities, slightly ventrally curved. Cuticle annulated, bearing rows of punctations. Lip region rounded in outline, not set off from adjoining body. A circle of ten very thin cephalic setae is present, two lateral, four subdorsal and four subventral, six longer than the others. The longer setae 2.7-3.6 µm long., the shorter rather obscure. Numerous somatic setae are scattered along body. Mouth cavity funnel-shaped, 8.2-9.2 µm long and 3.6 µm wide, with a large dorsal tooth and two small subventral teeth. Amphids spiral, 2.7 µm wide (1/6 of corresponding body width), at level of stoma base. Pharynx 95-112 µm long, cylindroid, with a well developed basal bulb. Nerve ring at half pharynx length. Ex-

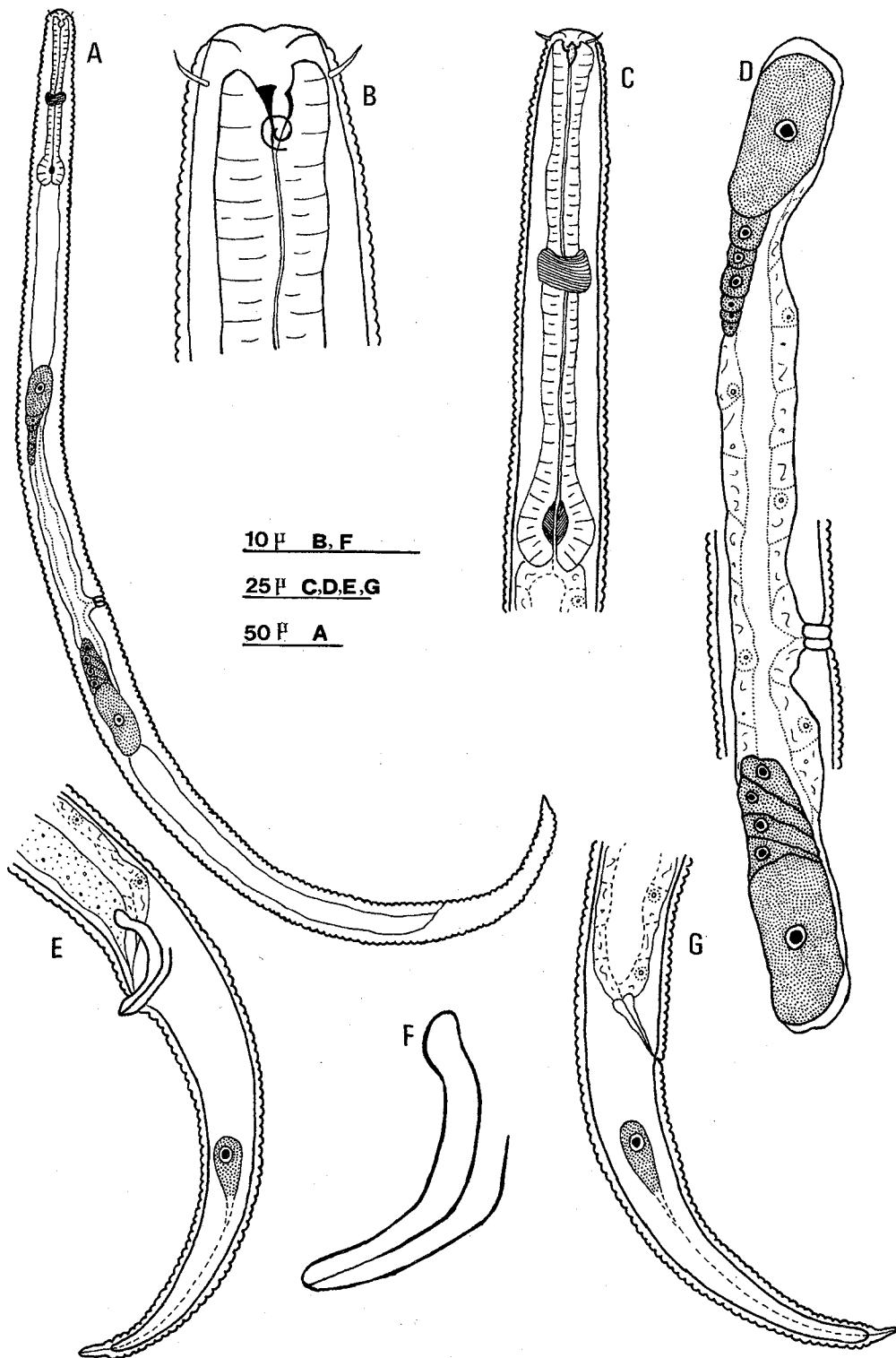


Fig. 1 - *Achromadora arenicola* sp. n.: A, female body; B, C, anterior ends; D, female genital apparatus; E, male tail; F, spicule; G, female tail.

cretory pore not seen. Genital apparatus paired and reflexed, vulva transverse, vagina short, thick-walled, not sclerotized. Rectum short, less than anal body width long; prerectum absent. Tail conoid, ventrally curved, 95-110  $\mu\text{m}$  long, 5-6 anal body widths, ending with a pointed terminal duct where the caudal glands open. Vulva-anus distance three tail lengths.

*Male.* Similar to female in most respects. The longer cephalic setae 3.2  $\mu\text{m}$  long. Mouth cavity 8.2-9.2  $\mu\text{m}$  long and 3.6  $\mu\text{m}$  wide. Amphid 2.7  $\mu\text{m}$  wide. Pharynx 95-122  $\mu\text{m}$  long. Testes paired. Spicules slender, cephalate at their proximal end, ventrally curved, 22.1-26.8  $\mu\text{m}$  long; gubernaculum 11.5-18.2  $\mu\text{m}$  long, more than half length of spicules. Ventral precloacal papillae absent. Tail 80-102  $\mu\text{m}$  long.

#### *Diagnosis and relationship*

*Achromadora arenicola* sp. n. is characterized by medium size body, mouth cavity relatively small, amphids at stoma base, rectum short, absence of prerectum and of ventral precloacal papillae. It is rather similar to *A. pseudomicoletzkyi* Van der Linde, 1938, from which it differs in the absence of prerectum, in the more anterior vulva and in the shorter vulva-anus distance.

#### *Type locality and habitat*

Mouth of River Simeto (Catania, Italy): dune sand.

#### *Type specimens*

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

### ***PARACYATHOLAIMUS PAPILLATUS* sp. n.**

(Fig. 2; Table I)

*Male.* Body slender, ventrally curved in fixed specimens. Cuticle annulated bearing rows of punctations. Lip region not set off from adjoining body, bearing an anterior circle of six labial

setae, 2.7-4.6  $\mu\text{m}$  long, and a posterior circle of ten cephalic setae, of which six are longer (7.3-8.2  $\mu\text{m}$  long) and four are shorter (2.7-4.6  $\mu\text{m}$  in length). Numerous somatic setae scattered along body. Amphids spiral, with 2 $\frac{1}{2}$  spires, the exterior one not well marked, located about one head width from anterior end, more than 1/3 as wide as head width (6.7-7.5  $\mu\text{m}$ ). Mouth cavity walls with twelve longitudinal cuticular folds, sometimes protruding from mouth. In the mouth cavity a large dorsal tooth pointing forward and two very small subventral teeth. Pharynx cylindroid expanding posteriorly in a small valveless bulb; pharynx 142-167  $\mu\text{m}$  long. Nerve ring located at about half pharynx length. Testes paired. Spicules slender, ventrally curved, 25-35  $\mu\text{m}$  long, cephalate at the proximal end, only slightly tapering at the distal end; gubernaculum distally expanded, without denticles, 15-22.5  $\mu\text{m}$  long, more than half spicule length. The ventral pre-cloacal organs in some specimens are protruded, papilliform, eight in number; in other specimens they are not protruded and appear like short setae: in these cases only four or five of them can be seen. Tail conoid, slightly ventrally curved, 85-107  $\mu\text{m}$ ; the caudal glands open in a protruding terminal duct.

*Female.* Similar to male in most respects. Labial and shorter cephalic setae 2.7-4.6  $\mu\text{m}$  long, longer cephalic setae 6.4-8.2  $\mu\text{m}$  long. Pharynx 137-167  $\mu\text{m}$  long. Gonads paired and reflexed; vulva lips prominent. Tail conoid, 95-127  $\mu\text{m}$  long with caudal glands opening in a protruding terminal duct.

#### *Diagnosis and relationship*

*Paracyatholaimus papillatus* sp. n. is characterized by the following features: tail rather short, conoid, spicules with a blunt distal end, gubernaculum lacking denticles, 6-8 ventral precloacal organs. It greatly resembles *P. pentodon* Riemann, 1966, from which it differs in the smaller and differently shaped amphid, in the more numerous ventral precloacal organs and in the shape of spicules.

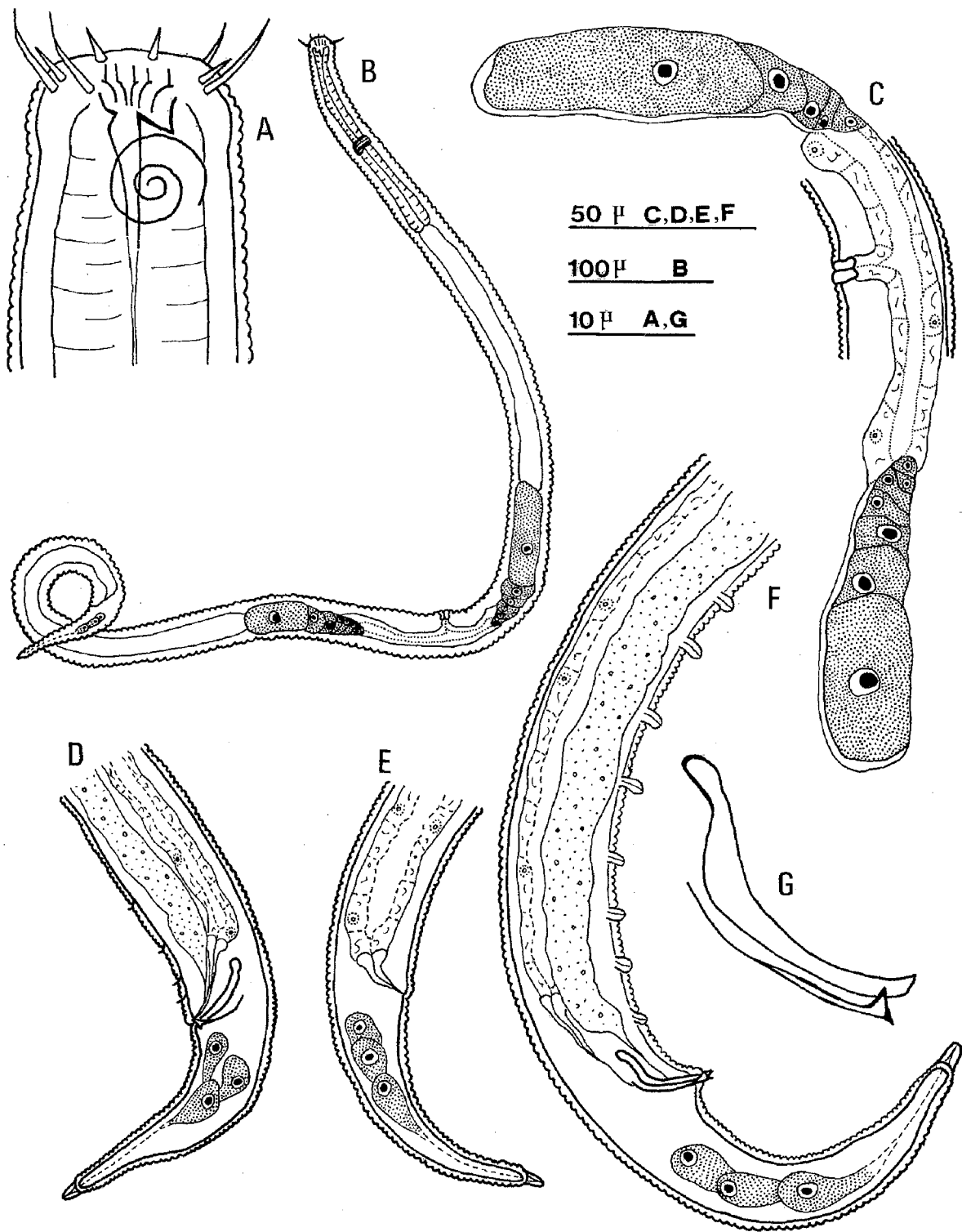


Fig. 2 - *Paracyatholaimus papillatus* sp. n.: A, anterior end; B, female body; C, female genital apparatus; D, F, male posterior ends; E, female posterior end; G, spicule.

TABLE I - *Measurements of Paracyatholaimus papillatus sp. n. (in  $\mu\text{m}$  except for L).*

	Holotype $\delta$	Simeto Paratypes 18 $\delta$ $\delta$	Paratypes 7 $\text{♀♀}$	Manfria $\delta$	3 $\text{♀♀}$	Portopalo 176 $\delta\delta$	121 $\text{♀♀}$	Selinunte 2 $\delta\delta$
L mm	1.34	1.06-1.44 (1.25 $\pm$ 0.1)	1.19-1.55 (1.33 $\pm$ 0.1)	0.9	0.66-0.88 (0.73 $\pm$ 0.1)	0.84-1.19 (1.04 $\pm$ 0.1)	0.83-1.15 (0.99 $\pm$ 0.1)	0.69-1.04
a	54	38-61 (46.3 $\pm$ 6.6)	31-36 (34.2 $\pm$ 2.4)	51	30-39 (34 $\pm$ 4.6)	34-48 (39.8 $\pm$ 4.6)	23-42 (31.3 $\pm$ 5.5)	35
b	8.5	7.4-9 (8.2 $\pm$ 0.6)	7.8-9.2 (8.6 $\pm$ 0.6)	6	4.3-6.4 (5.4 $\pm$ 1.1)	5.6-6.9 (6.2 $\pm$ 0.5)	5.7-7.6 (6.3 $\pm$ 0.6)	6.8
c	14.4	10.6-14.9 (12.7 $\pm$ 1.1)	9.9-13.1 (11.7 $\pm$ 1.3)	13.8	10.6-22 (14.5 $\pm$ 6.4)	11.2-13.6 (12.2 $\pm$ 1.1)	11.3-13.3 (12.4 $\pm$ 0.7)	9.5-12.2
c'	3.3	3.1-4.4 (3.8 $\pm$ 0.3)	3.6-4.8 (4.1 $\pm$ 0.6)	3.7	2.2-4.1 (3.2 $\pm$ 1)	3.2-4.3 (3.7 $\pm$ 0.4)	2.9-5 (3.8 $\pm$ 0.6)	3.7-4.1
V			46-52 (49.6 $\pm$ 2.4)		51-55 (53.1 $\pm$ 1.8)		50-53 (51.3 $\pm$ 0.9)	
amph.w.	6.7	6.7-7.5 (7.1 $\pm$ 0.6)	6.2-6.5 (6.3 $\pm$ 0.2)	4.9	?	5.9-6.2 (6 $\pm$ 0.2)	5.2-5.9 (5.5 $\pm$ 0.5)	?
pharynx	153	142-167 (152 $\pm$ 8.9)	137-167 (154 $\pm$ 13)	150	115-152 (135 $\pm$ 19)	147-182 (165 $\pm$ 14)	122-182 (158 $\pm$ 21)	152
tail	93	85-110 (99 $\pm$ 9.2)	95-127 (113 $\pm$ 14)	65	40-62 (54 $\pm$ 12)	72-90 (85 $\pm$ 5.4)	67-92 (70 $\pm$ 8.9)	72-85
spicules	25	25-35 (29 $\pm$ 3)		18.4		17.5-27.5 (23.1 $\pm$ 3.2)		20-25
gubern.	20	15-22.5 (20.2 $\pm$ 2.3)		10.1		10-17.5 (15.3 $\pm$ 2.8)		12.5
precl. org.	8	6-8		4		4-5		4

*Type locality and habitat*

Mouth of River Simeto (Catania, Italy): dune sand; other localities: Selinunte, Manfria and Portopalo.

*Type specimens*

Holotype and paratypes are deposited in the Dipartimento di Biologia Animale, University of Catania, Italy.

**SYNONCHIUM MEDITERRANEUM sp. n.**

(Fig. 3)

Holotype male: L = 2 mm; a = 24; b = 8.6; c = 44.4; c' = 0.7.

Paratype males (n = 2): L = 2.02-2.11 mm; a = 21-25; b = 8.8-10; c = 42-51; c' = 0.6-0.7.

*Male.* Body stout, cylindrical, straight in heat fixed specimens. Cuticle transversely striated (annules 1.2-1.4  $\mu\text{m}$  wide), bearing rows of punctations. Numerous lateral pores arranged in two rows along the lateral chords and irregularly distributed and numerous near the anterior and posterior extremities. Lip region truncate, not set off from adjoining body. Stoma in two parts: the anterior part internally surrounded by twelve sclerotized rib-like folds; the posterior part with three mandibles, 22.5  $\mu\text{m}$  long, each bearing three teeth at the distal end. Posterior part of stoma surrounded by anterior swollen

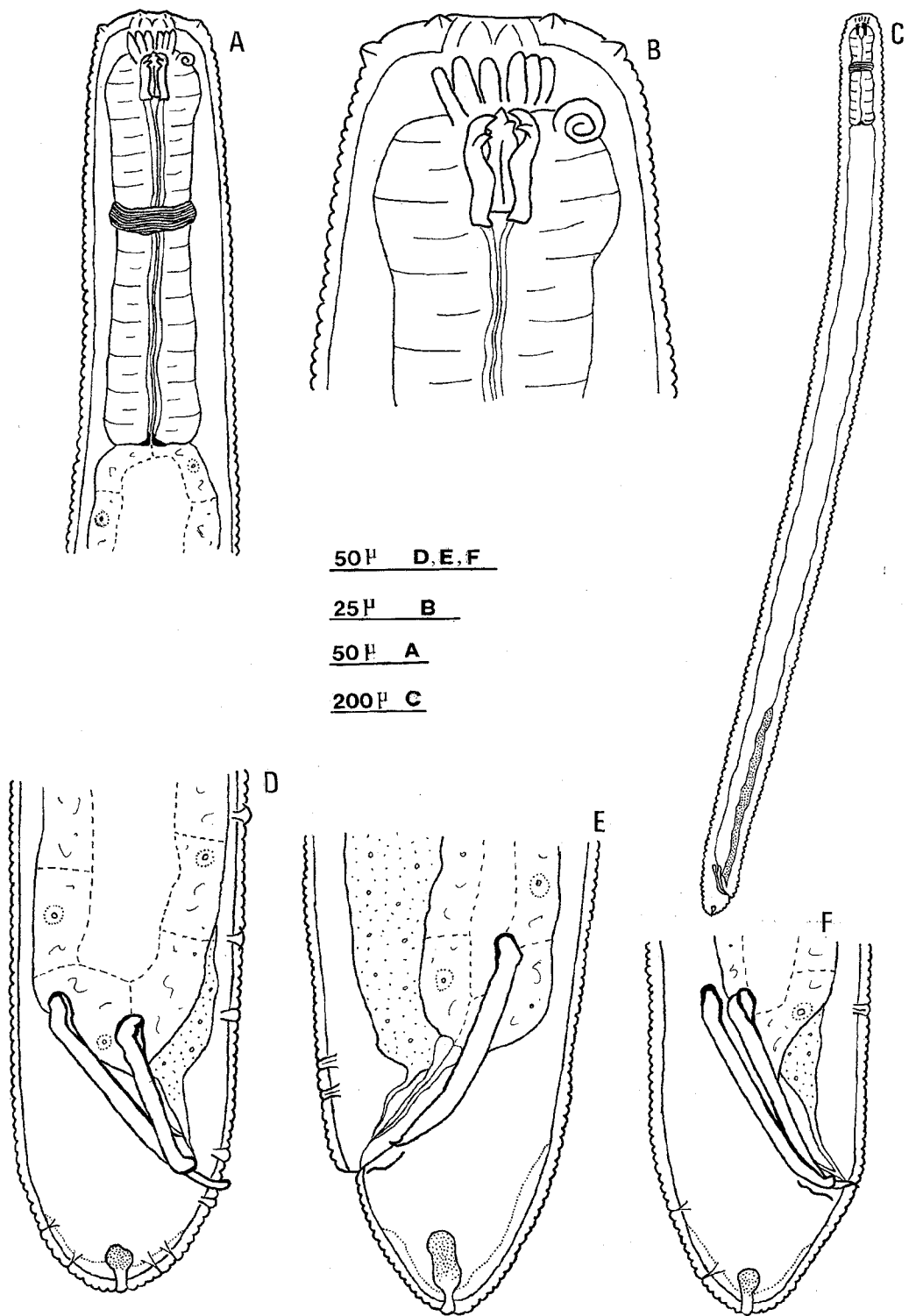


Fig. 3 - *Syonchium mediterraneum* sp. n.: A, B, anterior ends; C, male body; D, E, F, male posterior ends.

part of pharynx. Amphids spiral, wider (10-12.5  $\mu\text{m}$ ) than high (7.5-10  $\mu\text{m}$ ). Pharynx very short (210-230  $\mu\text{m}$  long), cylindrical; cardia with sclerotized valves. Nerve ring located at half pharynx length. Intestine cells with numerous small granules. In the intestinal lumen odontostyles of Dorylaimida and nematode spicules are visible. Testes rather obscure, paired and outstretched. Tail short and hemispheroid, 40-50  $\mu\text{m}$  long; spinneret rudimentary. Spicules asymmetrical, with the righthand spicule longer than the left-hand one: 74-77  $\mu\text{m}$  vs. 51-73  $\mu\text{m}$ . They are slightly ventrally curved, cephalate at their proximal ends, which are concave in the left-hand spicules. Gubernaculum small, 12.4-13.8  $\mu\text{m}$  long. One to four ventral precloacal papillae, different in size and variously located, are present: in the holotype a single barely evident papilla lies in front of the spicule anterior end; in another male there are two papillae near the cloacal aperture, while in a third male there is a papilla near the cloacal opening, a papilla in front of proximal end of spicules and two papillae anterior to it.

*Female.* Not found.

#### *Diagnosis and relationship*

*Synonchium mediterraneum* sp. n. is characterized by having mandibles with three teeth, a small gubernaculum and ventral precloacal organs. The species of *Synonchium* provided with mandibles with three teeth are *S. capense* Heyns *et* Swart, 1996, *S. depressum* Gerlach, 1954 and *S. siculum* sp. n.; *S. capense* differs from the new species in having the cuticle without punctations and in being devoid of gubernaculum; *S. depressum* differs in having a conoid tail, amphids much wider than long and in being devoid of gubernaculum; *S. siculum* differs in being larger, in having a well developed spinneret and spicules of different shape and in lacking precloacal organs.

#### *Type locality and habitat*

Portopalo (Siracusa, Italy): sand dune.

#### *Type specimens*

Holotype and paratypes are deposited in the collection of the Dipartimento di Biologia Animale, University of Catania, Italy.

### **SYNONCHIUM SICULUM sp. n.**

(Fig. 4)

Holotype female: L = 3.02 mm; a = 30; b = 7.9; c = 44.8; c' = 0.7; V = 64.4.

Paratype males (n = 5): L = 2.50-3.52 (2.94 $\pm$ 0.4) mm; a = 27-38 (32 $\pm$ 5); b = 7.3-8.3 (7.8 $\pm$ 0.4); c = 41.6-56.4 (49.9 $\pm$ 5.3); c' = 0.7-0.8 (0.7 $\pm$ 0.04).

*Female.* Body stout and cylindrical slightly ventrally curved in heat fixed specimens. Cuticle transversely striated (annules 2.5  $\mu\text{m}$  wide), bearing rows of punctations. Numerous lateral pores arranged in one row along the lateral chords and irregularly distributed and numerous near the anterior and posterior extremities. Lip region truncate, not offset from adjoining body. Stoma in two parts: the anterior part internally surrounded by twelve sclerotized rib-like folds; the posterior part with three mandibles, 37.5  $\mu\text{m}$  long, each bearing three teeth at the distal end: the apical tooth much larger than the two lateral ones. Posterior part of stoma surrounded by anterior swollen part of pharynx. Amphids spiral, ovoid, wider (17.5  $\mu\text{m}$ ) than high (12.5  $\mu\text{m}$ ). Pharynx very short (380  $\mu\text{m}$  long), cylindrical; cardia disc-like. Nerve ring located at 40% of pharynx length. Intestine cells with numerous small granules. In the intestinal lumen numerous diatomeae are present. Gonads paired and reflexed; vulva transverse; vagina not sclerotized. Tail short and hemispheroid, 67.5  $\mu\text{m}$  long, ending with a well developed spinneret.

*Male.* Very similar to female in most respects. Annules of cuticle 2.5  $\mu\text{m}$  wide; amphids 15-17.5  $\mu\text{m}$  wide and 10-12.5  $\mu\text{m}$  long. Mandibles 35-42.5  $\mu\text{m}$  long. Pharynx 320-430  $\mu\text{m}$  long. Testes paired and outstretched. Spicules slender even at the proximal end, 82.5-107.5  $\mu\text{m}$  long, slightly

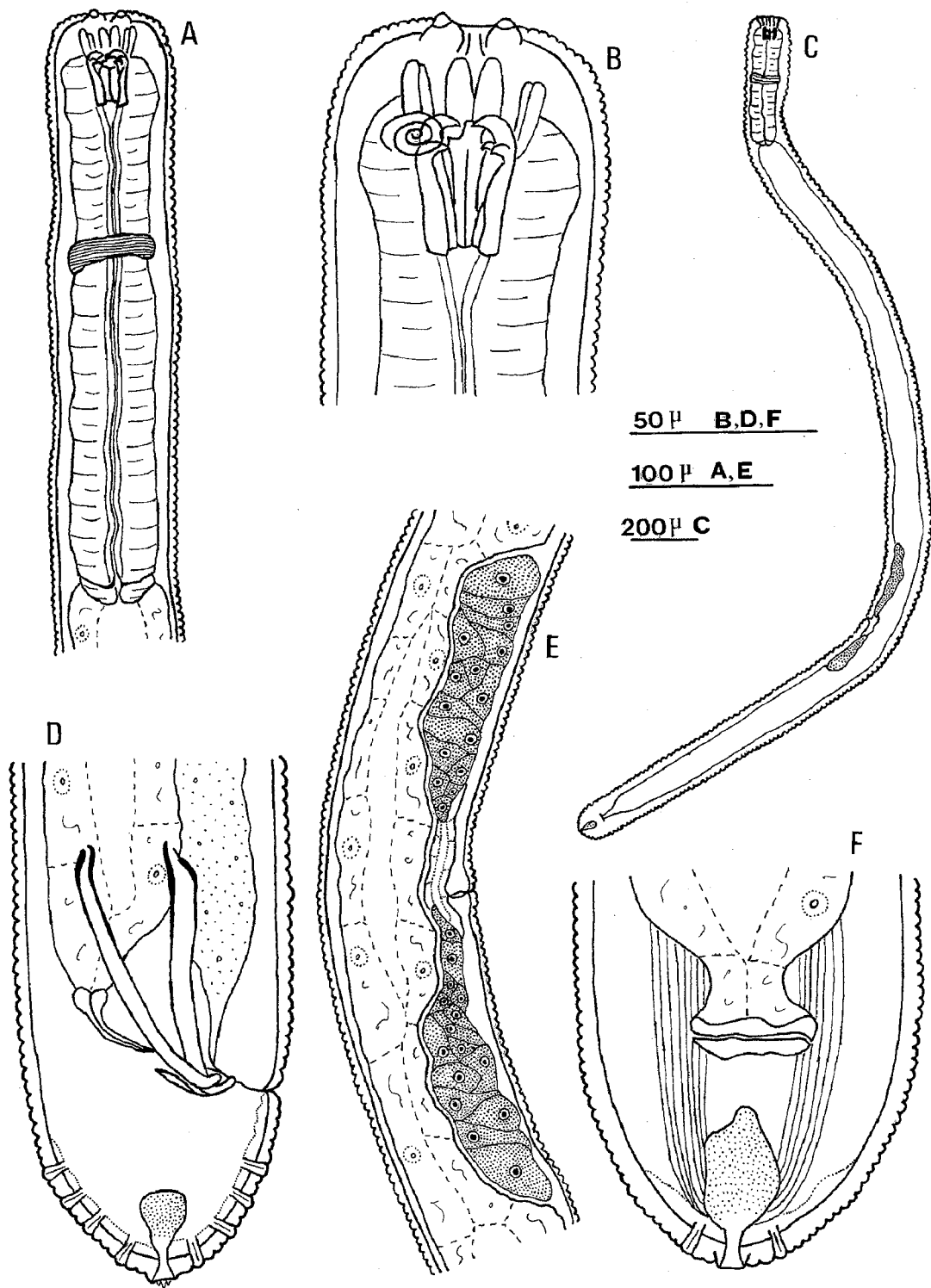


Fig. 4 - *Synonchium siculum* sp. n.: A, B, anterior ends; C, female body; D, male tail; E, female reproductive apparatus; F, female posterior end.



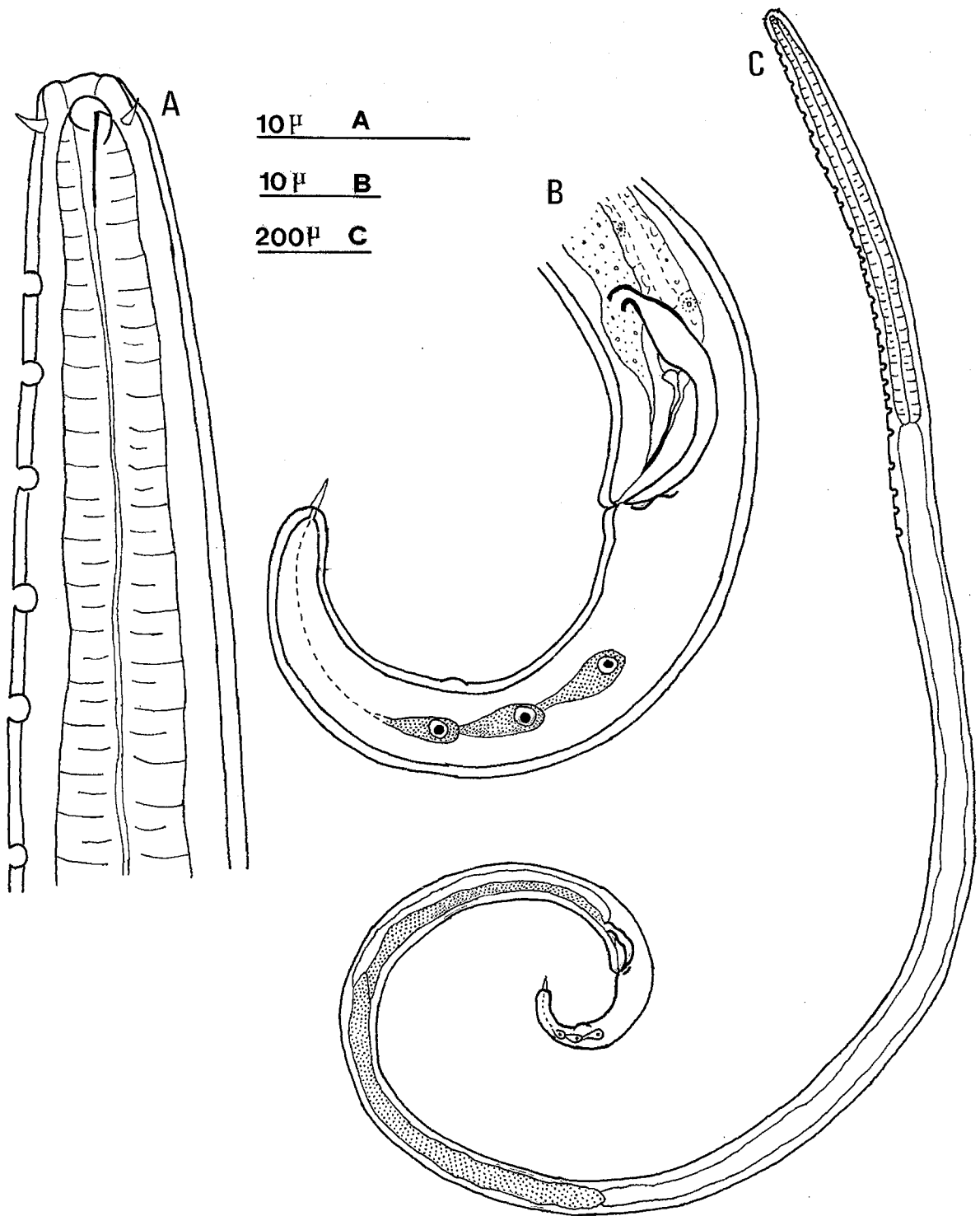


Fig. 5 - *Deontolaimus papillatus*: A, male anterior end; B, male tail; C, male body.

ventrally curved. A gubernaculum, 22.5-25  $\mu\text{m}$  long, is present. Tail as in female, 50-62.5  $\mu\text{m}$  long, bearing numerous pairs of papillae.

#### *Diagnosis and relationship*

*Synonchium siculum* sp. n. is characterized by having mandibles with three teeth, of which the apical much larger than the lateral ones, a well developed spinneret, a gubernaculum and being devoid of ventral precloacal organs. The other species having mandibles with three teeth differ from *S. siculum* sp. n. in the following characters: *S. capense* lacks gubernaculum and cuticular punctations and has precloacal organs and an indistinct spinneret; *S. depressum* has conoid tail, amphid much wider than long and lacks gubernaculum; *S. mediterraneum* has indistinct spinneret, precloacal organs and differently shaped spicules.

#### *Type locality and habitat*

Portopalo (Siracusa, Italy): dune sand.

#### *Type specimens*

Holotype and paratypes are deposited in the collection of the Dipartimento di Biologia Animale, University of Catania, Italy.

### **DEONTOLAIMUS PAPILLATUS de Man, 1880**

(Fig. 5)

Male: L = 0.95 mm; a = 69; b = 4.9; c = 13.5; c' = 5.1.

Body very slender, posteriorly ventrally curved in a spiral in heat fixed specimens. Cuticle 0.4  $\mu\text{m}$  thick, finely transversely striated. Lip region not set off from adjoining body, with four short cephalic setae 1.3  $\mu\text{m}$  long. Stoma rather narrow,

7.2  $\mu\text{m}$  long, funnel shaped; in its dorsal wall a sclerotized tickening, which in the past had erroneously been interpreted as a spear. Amphids spiral, 1.8  $\mu\text{m}$  wide, at level of anterior part of stoma. Pharynx cylindroid, 192  $\mu\text{m}$  long, slightly expanded posteriorly. Twenty nine ventral papillae are present, of which 24 are in the area of pharynx and five just posterior to it. First papilla 8.3  $\mu\text{m}$  from anterior end. Testes obscure. Spicules 23  $\mu\text{m}$  long, ventrally curved, with the proximal part wider than the distal one. A small gubernaculum is also present. Tail elongate conoid, ventrally curved, 70  $\mu\text{m}$  long, with three caudal glands opening in a pointed spinneret. A large post-anal papilla is evident at half tail length.

This rather rare species has been found in the coast of Massachusetts, in the island of Walcheren (North Sea), in the island of Sakhalin (Russia) and at the mouth of the River Simeto (Italy), in brackish soil or in sand dunes.

The authors are grateful to Prof. Magda Vincx, Instituut voor Dierkunde, University of Gent (Belgium) for helping in the identification of the material, for providing literature and for suggestions. The research was financially supported by M.U.R.S.T.

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