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Gutless marine nematodes of the genus *Astomonema* Ott *et al.*, 1982

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Abstract : A new gutless species in the genus *Astomonema* Ott *et al.,* 1982 (Nematoda, Siphonolaimidae) : *A. otti* n. sp. common in silty sublittoral sand from Bakar Bay in North Adriatic Sea is described. *A. obscura* (Boucher & Helleouët, 1977), a rare species from sublittoral fine sand in the Bay of Morlaix (West Channel), is redescribed. The following nomenclatural changes are proposed: *Siphonolaimus obscurus* Boucher and Helléouët, 1977, and *Rhabdocoma brevicauda* Vitiello, 1971 are transfered to the genus *Astomonema.*

Resumé : Description d'une espèce nouvelle du genre *Astomonema* Ott *et al,* 1982 (Nematoda, Siphonolaimidae) : *A. otti* n.sp. abondante dans les sables vaseux sublittoraux de la Baie de Bakar en Mer Adriatique. Redescription de *A. obscura* (Boucher & Helléouët, 1977) rencontrée dans les sables fins sublittoraux de la Baie de Morlaix en Manche Occidentale. Les changements de nomenclature suivants sont proposés : *Siphonolaimus obscurus* Boucher et Helléouét, 1977 et *Rhabdocoma brevicauda* Vitiello, 1971 sont transférés dans le genre *Astomonema.*

INTRODUCTION

Mouthless nematodes have been reported by Hope (1977) but, as far as we know, with the exception of some deep-sea Mermithidae (Rubtzov and Platonova, 1974), only two such genera have so far been described i.e. *Rhaptothyreus* Hope and Murphy, 1969 representing a new family of uncertain taxonomic position and *Astomonema* Ott *et al,* 1982 in the Siphonolaimidae.

During a comparison of the nematode sublittoral assemblages from Mediterranea and English Channel, we found a dense population of a new species of the genus *Astomonema,* in the first five centimeters of sandy-silt sediment from the North Adriatic. *Siphonolaimus obscurus* Boucher and Helléouët, 1977 a rare species from sublittoral fine sand from the Bay of Morlaix (West Channel) has the same organization of the cephalic region and a similar association with procaryotic symbionts.

The two species are not particularly associated with anoxic sediments. *Astomonema obscura* was found in poor organic content fine sand in a strong tidal current area. It occupies a wide depth range in the sand column and is not particularly concentrated under the redox potential discontinuity. *Astomonema otti* comprised 30 % of the total nematode population in sandy-silt sediment (station n°3) off Bakar Bay. For both species, no obvious association with macrofaunal biogenic structures was observed as was the case for the species described by Ott *et al,* (1982).

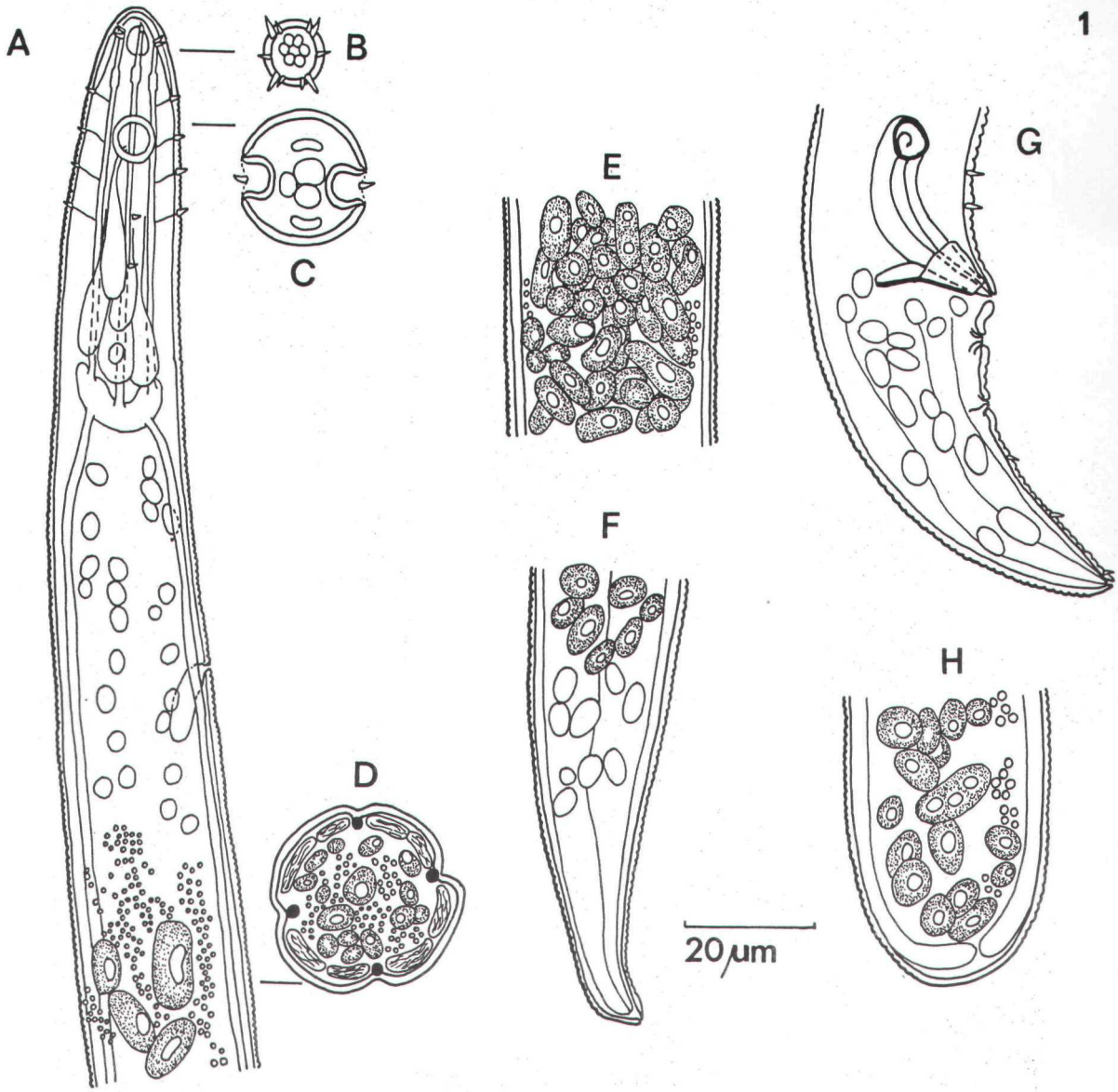

Fig. 1 : A : Anterior region of male ; B : Transverse section at the cephalic setae level ; C : Transverse section at the amphidial level ; D : Transverse section at the hypothetical oesophagus-intestine connection ; E : Mid-body region ; F : Tail region of juvenile ; G : Posterior region of male ; H : Tail region of female (broken tail).

PLATE I. *Astomonema otti* n.sp.

A,B : Head region (v.c. = vacuolated cells ; a : amphid ; p.n. = papillae nerves ; a.g. = amphidial gland ; c.s. = cephalic setae ; cer.s. = cervical setae)
C : Mid body region with densely packed procaryotic symbionts.
D : Female broken tail with dense packed symbionts.
E : Copulatory apparatus (sp - spicula ; g — gubernaculum : p.s. = precloacal seta ; p.p. = post cloacal papilla).

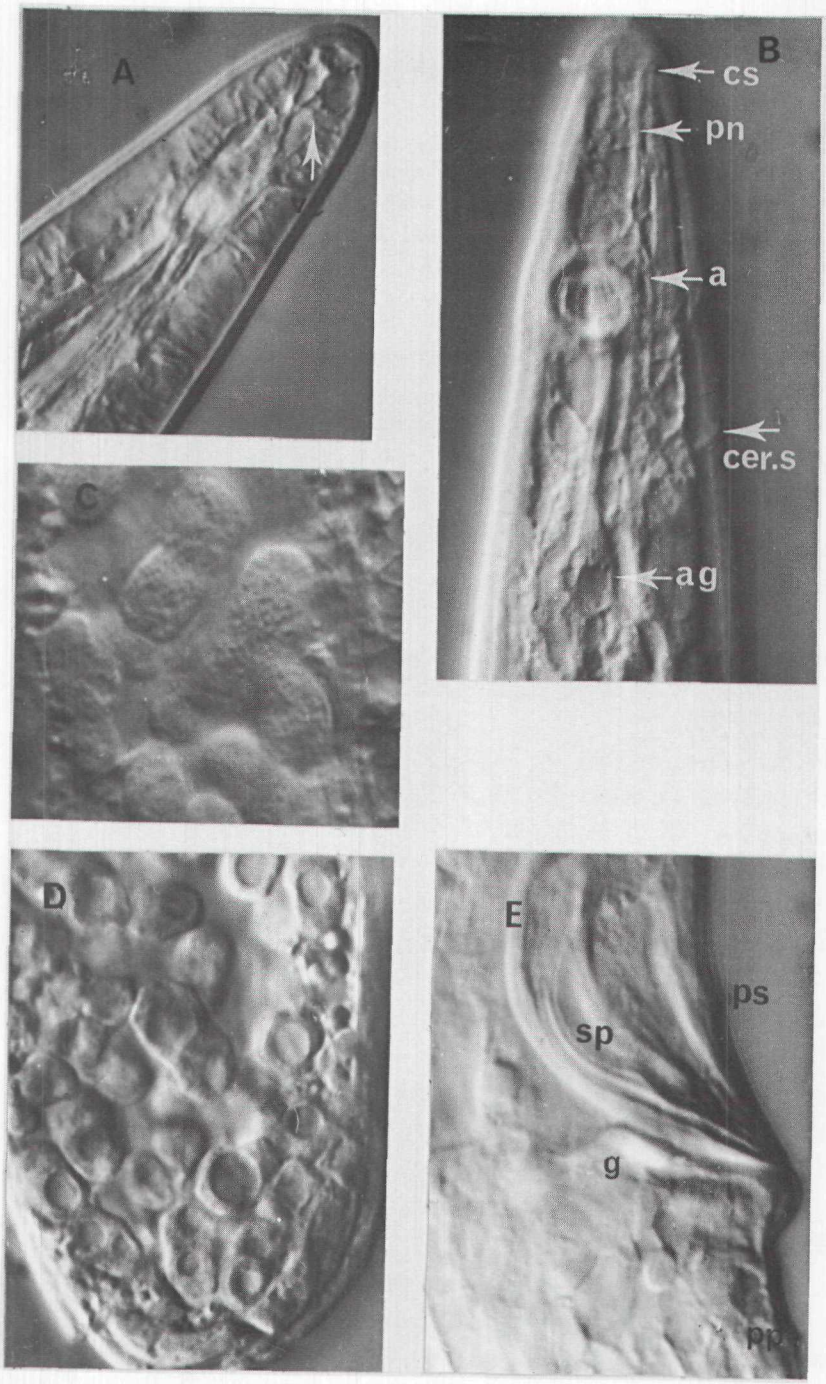

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PLATE I

Astomonema otti n.sp.

(Figure 1A,H and Plate I A,E)
Material examined : a large collection of males, females and juveniles.
Holotype : 1 male 1110AB ; Paratypes : 2 males 1111AB, 1112AB, 2 females 1113AB, 1114AB. Collections of the Museum National d'Histoire Naturelle Paris.

Locality

Bakar Bay (Northern Adriatic Sea, Yugoslavia), sandy-silt sediment, 40 meters depth.

Mesurements in µm

6 males and 3 females.
Total length : 2842, 2700, 1070, 3410, 2600, 1603, 4000, 4450, 4210.
Distance of the gut from the anterior part : 130, -, 108, 70, 140, 75, -, -,-.
Head diameter : 7,10, 5,10,10, 8,10,10, 8.
Length of cephalic setae : 1.4, -, -, 1.4, 1.4, -, 1.4, -, -,.
Amphid diameter (% of corresponding body diameter) : 7(47), 7(50), 8(44), 8(57), 8(44), -, 7(39), 8(47),-.
Maximum body diameter : 40, 40, 30, 40, 35, 32, 40, 40, 45.
Tail length (anal body diameter) : 115(30), 60(30), 35(17), 65(32), 70(32), -, -, -, -.
Length of spicula : 28, 25, 30, 35, 30, -, -, -, -.
Apophysis length : 7,10, -, 10, 5, -, -, -, -.
Distance of vulva from anterior end : -, -, -, -, -, -, 2600, 2200, 2120.
De Man coefficient :a = 71.0, 67.5, 35.7, 85.3, 74, 50, 100,111.2, 93.5 ; c = 24.7, 45, 30.6, 52.5, 37.1, -,-,-,-; V = -, -, -, -, -, -, 60 %, 49 %, 50 %.

Description

Body slender, almost cylindrical, with great length variations, especially in the females. Maximum body diameters vary from 30 µ.m in juveniles, to 45 µm in adults. Cuticle finely striated.

Head region

In all examined specimens, no visible mouth opening (Plate I A). A few transverse sections show only six small vacuoles at the lip positions (Figure 1B).
Six labial setae are 0.5 µm long, and four cephalic setae measure 1.4 µm (Figure 1A, Plate 1B). Three crowns of 4 cervical submedian setae (0.5 |im long) are visible at the amphidial level. One more crown of 6 cervical setae is under the amphid, and later on 2 lateral setae are present. Amphids are circular with well developed amphidial glands. Amphid distance from the anterior part varies from 15 p. µ in juveniles, to 20 µm in adults, but in most of the specimens this measurement is

18 |im. Transverse sections at the amphidial level show amphidial glands and three vacuolated cells in the oesophagal position (Figure 1A, C).

In all adult specimens the nervous system is well developed. The lateral view shows papillal nerves connecting the labial and cephalic setae with the nerve ring (Figure 1A, Plate 1B). Sometimes it is very difficult to see the nerve ring which is embedded in the somatic tissue. Dorsal and ventral nerves can be seen from the nerve ring down to the caudal region, (Figure 1A, D). Excretory pore with a small gland appears 100 (µm from anterior part.

Anterior region, from procaryotic symbionts appearance to head, corresponding probably to the oesophagus length in *Siphonolaimus* species, is usually strongly vacuolated and measures from 70 µm to 140 µm.

Gut region

No intestinal structures are visible. The gut is full with procaryotic symbionts, more densely packed in the mid-body region (Figure 1E, Plate I,C). Cells are ovoid (10 x 5 µm or rounded (5x5 µm).

Tail region

No visible anal opening in all examined females and juveniles. Many of them have a damaged broken tail (Figure IH, Plate I,D).

Male tail is conical (2.1 to 3.8 anal body diameter long), with two caudal glands generally hidden by symbiotic cells. Spicula are curved with well cuticularized capitulum. Their chord varies from 0.83 to 0.95 anal body diameter, gubernaculum with dorsocaudal apophysis of 0.18 to 0.33 anal body diameter. One testis right in position relative to gut. One precloacal seta, and two to three postcloacal papillae (Figure 1G, Plate I,E).

Females gonads

Two outstreched ovaries, vulva situated at 49 % to 60 % of total body length.

Astomonema obscura (Boucher & Helléouët, 1977)

(Figure 1A, D and Plate II A,F)

Material examined : 4 males, 2 females and 4 juveniles.

Holotype : R10319AB ;

Paratypes: R798AB-R1247AB. Collection of the Museum National d'Histoire Naturelle Paris.

Locality

Bay of Morlaix (North Brittany), fine sand, 19 meters depth (Pierre Noire Station), described in Boucher (1980).

Measurements (in µm)

See original description + male described R 1247AB.
Total length : 2975 ;
Distance of the gut from the anterior part : 110 ;
Head diameter : 8 ;
Length of cephalic setae : 10 ;
Amphid diameter (% of corresponding body diameter) : 8 (67) ;
Maximum body diameter : 18 ;
Tail length (anal body diameter) : 65 (17) ;
Length of spicules : 15 ;
Length of gubernaculum : a = 165 ; c = 45.

Description

Long slender body finely annulated. No visible oesophagal and intestinal structure. The gut is full of procaryotic endosymbionts from the posterior part of the excretory gland to the anterior part of the caudal glands. They look like cylindrical (8x2 µm) or ovoid (5x4 µm) granular bodies (Figure 2A,C and Plate II F).

Head region

No mouth opening in adults, even in apical view. In first juvenile stage a faint opening is visible. The anterior part of the head is occupied by two vacuolated cells embedded in granular tissue (Figure 2B and Plate II B).
One crown of 6 external labial setae 8 µm long at the same level as the 4 cephalic setae 10 µm long. One crown of 4 submedian cervical setae at the amphid level and 2 lateral setae under the amphid. A second crown of 6 cervical setae ; no other somatic setae (Plate II A). Circular amphid with clearly visible amphidial glands 32 |im in dorsal or ventral view (Figure 2 B and Plate II D). A mucus secretion is sometimes present.
The linings of the papilla nerves connecting the labial and cephalic setae to the nerve ring are clearly visible as described by Zur Strassen (1904) in *Siphonolaimus weissmanni*. They could give the impression of a stylet like structure which in fact is not present (Plate II C).
The excretory pore opens 105 µm from the anterior end and the gland is 75 µm long.

Tail region

Tail region is 3.8 anal diameter long, similar to the type description. Five postcloacal papillae and sometimes a precloacal papilla (Figure 2D and Plate II E). Two outstreched ovaries in females. One right testis in males.

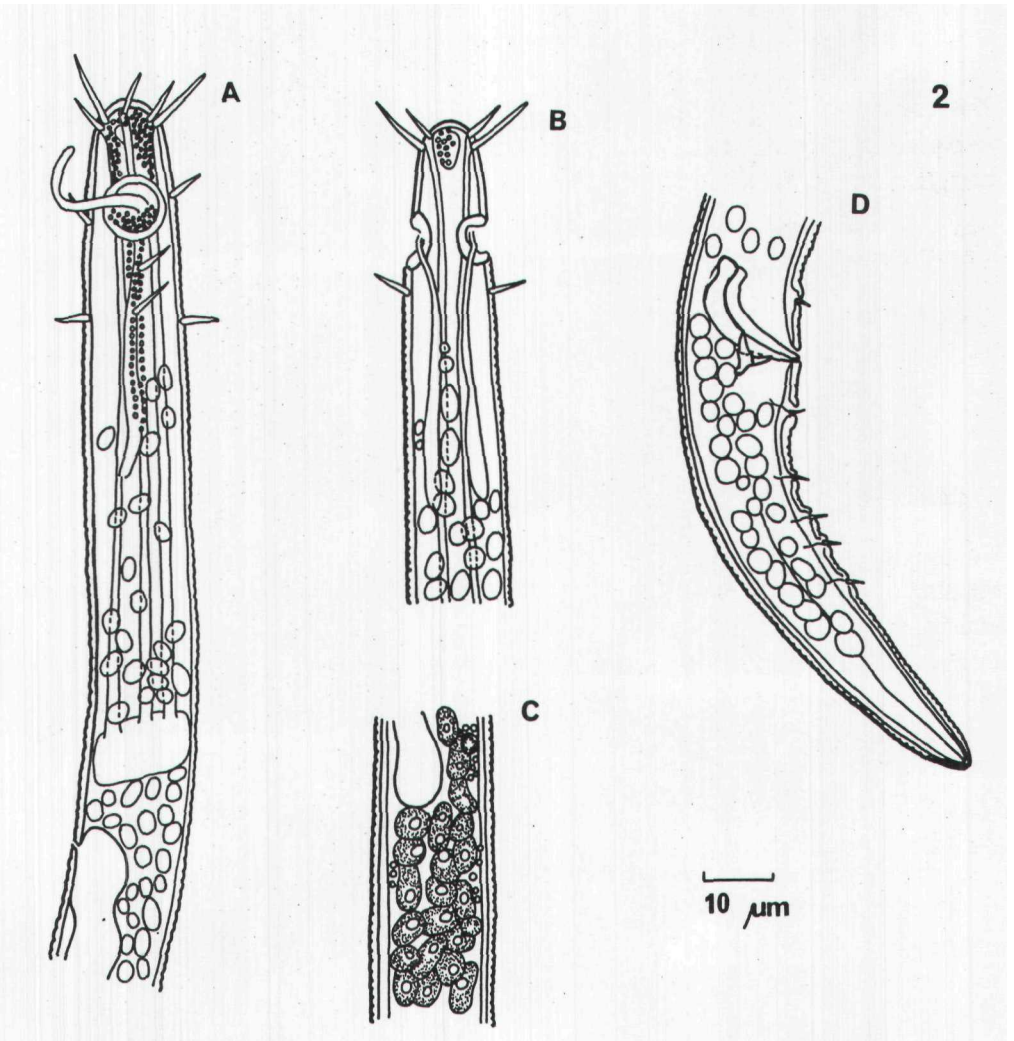

Fig. 2 - *Astomonema obscura :* A : head region of male ; Dorsal or lateral view of head ; C : Mid body region ; D : Tail region of male.

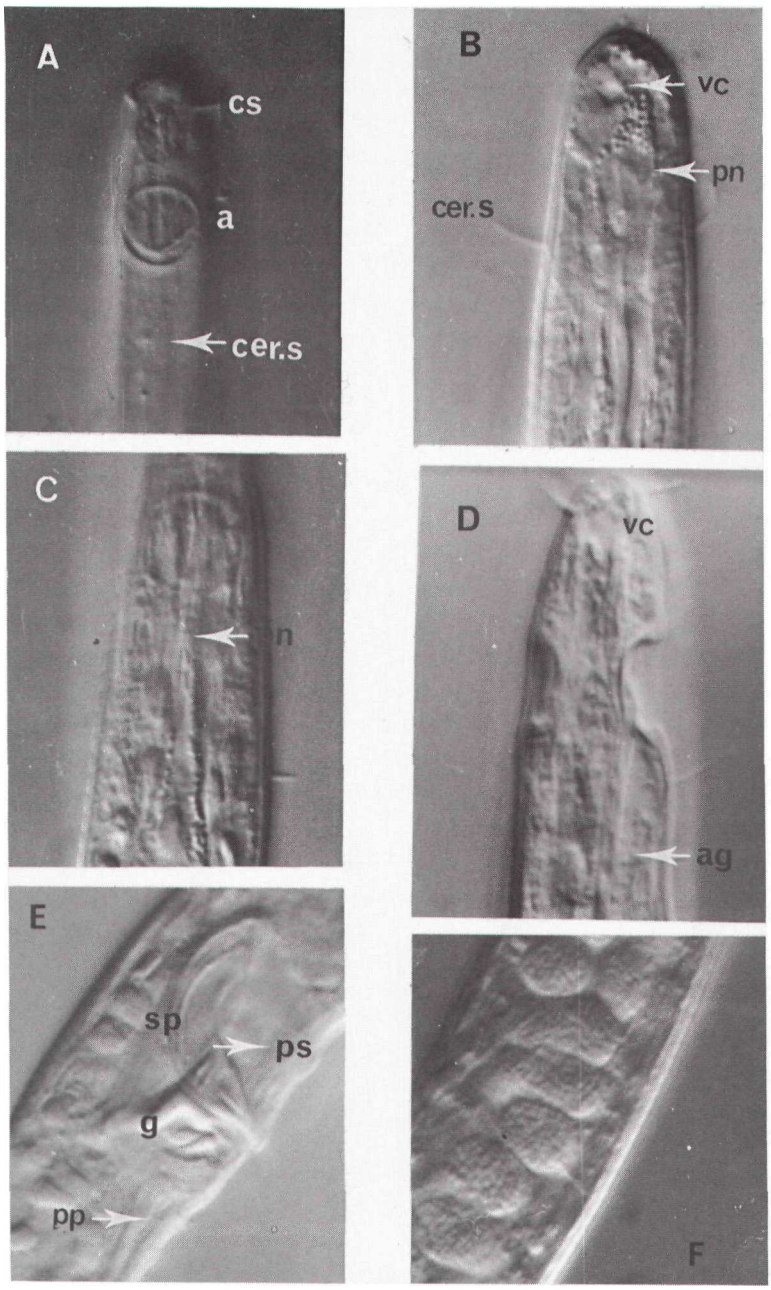

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PLATE II

DISCUSSION

The genus *Astomonema* (Nematoda, Siphonolaimida) Ott *et al.,* 1982 is characterized by mouthless specimens, associated with microorganisms. The oesophagus can be seen only in the juvenile stages. The anterior part of the body is vacuolated, and the intestine full of procaryotic symbionts without a visible lumen. The type genus is *Astomonema jenneri* Ott *et al.,* 1982.

As for *A. jenneri,* adults and juveniles of the new described species show no interrupion of the cutícula at the anterior end of the body. The cutícula is thickened at the anterior mouth tip and the strongly vacuolated epidermis is continuous over the rounded head. Small juveniles have the cuticular tube in the position of the mouth opening seen at the apical view.

Astomonema obscura (syn. *Siphonolaimus obscurus* Boucher and Helléouët, 1977) is redescribed in this paper. This species, previously attributed to the genus *Siphonolaimus* by Boucher and Helléouët (1977) as many accessory characters were similar to those of Siphonolaimidae, belongs to the genus *Astomonema* as proposed by Ott *et al.,* (1982) : extremely long and slender body, amphids with conspicuous amphidial glands, large nerve ring with big papillae nerve, absence of somatic setae except cervical and caudal bristles, faint annulation of the cutícula. One diagnostic character, however differs from the Siphonolaimidae in the sense of Lorenzen (1981). We found two female gonads as Ott *et al,* (1982) did in *Astomonema jenneri.*

Three new species can be added to the genus : *Astomonema obscura* (syn. *Siphonolaimus obscurus* Boucher and Helléouët, 1977), *Astomonema brevicauda* (syn. *Rhabdocoma brevicauda,* Vitiello, 1971) and the new described species *Astomonema otti.* The main characteristics for each species are summarized in the Table 1.

Astomonema otti n.sp. differs from *A. jenneri* and *A. obscura* in the length of cephalic and cervical setae. This new species is close to *A. brevicauda,* but Vitiello (1971) did not record the same pattern of cervical setae and the postcloacal papillae.

*1 Drawing 1c (Ott *et al,* 1982) shows this pattern + 2 small submedian setae. It seems that description is not complete as what the authors called median setae are in fact submedian. In that case the pattern would be 4 + 2 or 4 + 6.

*2 Drawing of the plate VII-17b (Vitiello, 1971) shows one submedian seta. The real pattern could be 4 + 2.

*3 In text, Ott *et al,* (1982) do not mention postcloacal papillae but drawing 1E, F shows 5 to 7 postcloacal structures similar to papillae.

PLATE II. *Astomonema obscura*

A,B,C, : Head region (a = amphid ; c.s. = cephalic setae ; v.c. = vacuolated cells ; p.n. = papillae nerve ; cer.s. = cervical setae).
D : Dorsal or ventral view of head region (a.g. = amphidial gland ; v.c. = vacuolated cells).
E : Copularoty apparatus (p.s. = precloacal seta; p.p. = postclocal papilla; sp = spicula; g = gubernaculum).
F : Mid-body region with densely packed procaryotic symbionts.

TABLE 1. Main characteristics of four Astomonema species.

Measurements (µm)	*A. jenneri*	*A. obscura*	*A. otti*	*A. brevicauda*
Cephalic setae	2(6.5-9)+4(10-12)+ 4(2-4)	6(5) + 4(10)	6(0.5)+4(1.4)	6+4(1.8)
Cervical setae	2 + 2(6-11)*[1]	6+6 (5-6)	4 + 4 + 4 + 6+1(0.5)	2*[2]
Amphid diameter	8-10	5.5-7	7-8	7.4-8
Amphid distance from anterior part	9-12	10-13	17-20	12-23
Head diameter	13-16	7.5-8	10-13	7
Length	6270-15200	3000-5000	1600-4450	688-2702
Postcloacal papillae		5	2-3	0

A. obscura in close to *A. jenneri* in the cephalic setae pattern and length, but differs in body diameter and length, and arrangement of cervical setae.

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