

Two new species of the genus *Metacyatholaimus* (Nematoda, Cyatholaimidae) from the Adriatic Sea with a key to the species

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Abstract: Two new species of the genus *Metacyatholaimus* are described. *Metacyatholaimus adriaticus* sp. nov. is characterized in the male by the absence of pre-cloacal supplements, a reproductive system with indistinct posterior testis, *vas deferens* without prominent glandular region, spermatocytes round, and spicules with prominent triangular capitulum, and in the female by the absence of somatic setae. *Metacyatholaimus papillatus* sp. nov. is characterized in the male by the presence of 12-14 pre-cloacal supplements "Type 1" *sensu* Wieser & Hopper (1964), a reproductive system with testes well developed, *vas deferens* with prominent glandular region, spermatocytes conical, and in the female by the presence of somatic setae. The genus *Metacyatholaimus* is discussed and its diagnosis is emended. A key to species is provided.

Résumé : Description de deux nouvelles espèces du genre *Metacyatholaimus* (Nematoda, Cyatholaimidae) de la mer Adriatique, avec une clé des espèces. *Metacyatholaimus adriaticus* sp. nov. est caractérisée chez le mâle par l'absence de suppléments précloacaux et par certains caractères de l'appareil reproducteur (spicules avec un capitulum triangulaire proéminent, testicule postérieur indistinct, *vas deferens* sans région glandulaire visible, forme arrondie des spermatocytes), ainsi que par l'absence de soies somatiques chez la femelle. *Metacyatholaimus papillatus* sp. nov. est caractérisée chez le mâle par la présence de 12-14 suppléments précloacaux de "Type 1" *sensu* Wieser & Hopper (1964), de deux testicules bien développés, un *vas deferens* avec région glandulaire visible, des spermatocytes coniques, et la présence de soies somatiques chez la femelle. Une clé des espèces du genre est donnée. Le genre *Metacyatholaimus* est discuté, sa diagnose est modifiée.

Keywords : Nematoda, *Metacyatholaimus adriaticus* sp. nov., *M. papillatus* sp. nov.

Introduction

The genus *Metacyatholaimus* was erected by Schuurmans-Stekhoven (1942) based on description of one male specimen of *M. hirschi*. According to the original diagnosis, the genus *Metacyatholaimus* is closely related to *Longicyatholaimus*, but may be distinguished from it by the

presence of three longitudinal rows of dots on the lateral fields, a spiral oval-shaped amphid, and a minute buccal tooth. Wieser (1954) described a new species *Metacyatholaimus spatiosus*, transferred in this genus two species (*M. cylindribucca* and *M. pustulosus*) previously described as *Metachoniolaimus* by Schuurmans-Stekhoven (1950), and presented a key to genera of the subfamily Cyatholaiminae using the presence or absence of precloacal supplements as a basic differential character. Gerlach (1964) redescribed *Cyatholaimus brevicollis* Cobb, 1898, a species with sixteen precloacal supplements, and transferred it to

the genus *Metacyatholaimus*. Wieser & Hopper (1967) extended and emended the key of Wieser (1954) taking into account the size and structure of precloacal supplements at genus level. The authors did not give species lists of the genera, but classified *Metacyatholaimus* together with 3 other genera in the group characterized by the absence of precloacal supplements. In the Bremerhaven Checklist of Aquatic Nematodes (Gerlach & Rieman, 1973/74) that is a reference book concerning taxonomy of marine nematodes, *M. brevicollis* was considered as a valid species within the genus. De Bovée (1974) suggested the transfer of *Cyatholaimus brevicollis*, to the genus *Metacyatholaimus* proposed by Gerlach (1964) was doubtful due to the presence of precloacal supplements. Improving the original diagnosis of the genus *Metacyatholaimus*, Platt & Warwick (1983) introduced some additional features (teeth reduced or absent, lateral differentiation of 3-5 longitudinal rows of coarse punctuations, oesophageal bulb present, precloacal supplements absent), but they do not discussed the taxonomic position of *Metacyatholaimus brevicollis* (Cobb, 1898) *sensu* Gerlach (1964).

Seven species of the genus *Metacyatholaimus* have currently been described; one species, *M. pustulosus* (Schuurmans-Stekhoven, 1950) was synonymized by Wieser (1954) with the type species *M. hirschi* (Schuurmans-Stekhoven, 1942).

In the material collected during the last two decades at 14 sampling sites in the Adriatic Sea, we found a lot of specimens representing two species, morphologically similar, and resembling *Metacyatholaimus* species. That finding encouraged us to describe these two new species, to emend the genus diagnosis and to propose a key to species of *Metacyatholaimus*. *Metacyatholaimus adriaticus* sp. nov. is a fairly common species distinguished by relatively dense populations, while *M. papillatus* sp. nov. could be considered as a rather rare species.

Materials and methods

The two species were collected in the Adriatic Sea (Rovinj area, Lim Channel, offshore in the northern Adriatic, Bakar Bay, Raša Bay, port of Makarska, and port of Malinska) at 4-47 m depths and in various types of sediment (clay-silt, silt, clay-sandy-silt, sandy-silt, silty-sand and sand). The descriptions based on pure glycerine mounts, followed the methodologies recommended by Platt & Warwick (1983). The type material is deposited in the Nematoda collections of the Center for Marine Research (CMR) Rovinj, Croatia and the Muséum national d'Histoire naturelle (MNHN) Paris, France.

Systematics

Metacyatholaimus adriaticus sp. nov.

Fig. 1; Tables 1, 2.

Material studied

Holotype male (♂1) slide CMR 143; seven paratypes males: (♂2) slide MNHN 1102 AB, (♂3-8) slides CMR 144-149; four paratypes females (♀1-4) slides CMR 150-153.

Locality

Rovinj area: station RO-A (5 m, fine sand), station RO-2 (18 m silty-sand), station RO-6 (20 m, silty-sand); Lim Channel station LK 44 (30 m sandy-silt).

Description

Male

Body slender and cylindrical, regularly attenuated toward the extremities. Body length of medium size (see table 1). Cuticle annulated, with transverse rows of fine punctuations. Lateral differentiation begins at the level of amphids and consists of three longitudinal rows of coarser punctuations (Figs 1b, 3b₂). Two longitudinal lateral alae present, each consisting of two ridges, extending on the whole body length and provided with large dots (Fig. 1c). Median row of lateral differentiation situated in between the ridges. That row contains campaniform organs regularly distributed between each of the two nearest punctuations from the middle of oesophagus towards the mid-body region. From mid-body to cloacal region, arrangement of campaniform organs irregular, occurring each 2 to 8 punctuations (Fig. 1e).

Head end truncate to faintly rounded. Cephalic sense organs arranged in two circles. Six labial papillae often indistinct. Ten external labial and cephalic setae (6+4), 4 and 6 µm long, sometimes indistinct. Amphid with circular outline (7 or 9 µm), multispiral about 4 1/2 windings, occupying about 35-60% of corresponding body diameter (Fig. 1c). Adult males with longitudinal rows of somatic setae.

Buccal cavity cylindrical (about 7 µm deep) with twelve conspicuous cheilorhabdia, one small dorsal tooth and two minute subventral teeth. Anterior part of oesophagus cylindrical, gradually enlarged posteriorly to an inconspicuous terminal bulb, about 25% of total oesophagus length. Cardia about 10 µm long. Nerve ring situated at about 35% of oesophageal length, sometimes indistinct. Excretory pore situated at 41-50 µm from anterior end (Fig. 1b). Tail elongate, 5-7 anal body diameter, conical at proximal third, cylindrical at distal part, with small spinneret and two terminal setae (Figs 1d, 3b₃).

Spicules curved, with strong triangular capitulum. Gubernaculum boomerang like, with distal hook 2/3 of spicules length (Fig. 1f). Two opposite outstretched testes on right side of gut. Anterior testis easy to detect, filled with

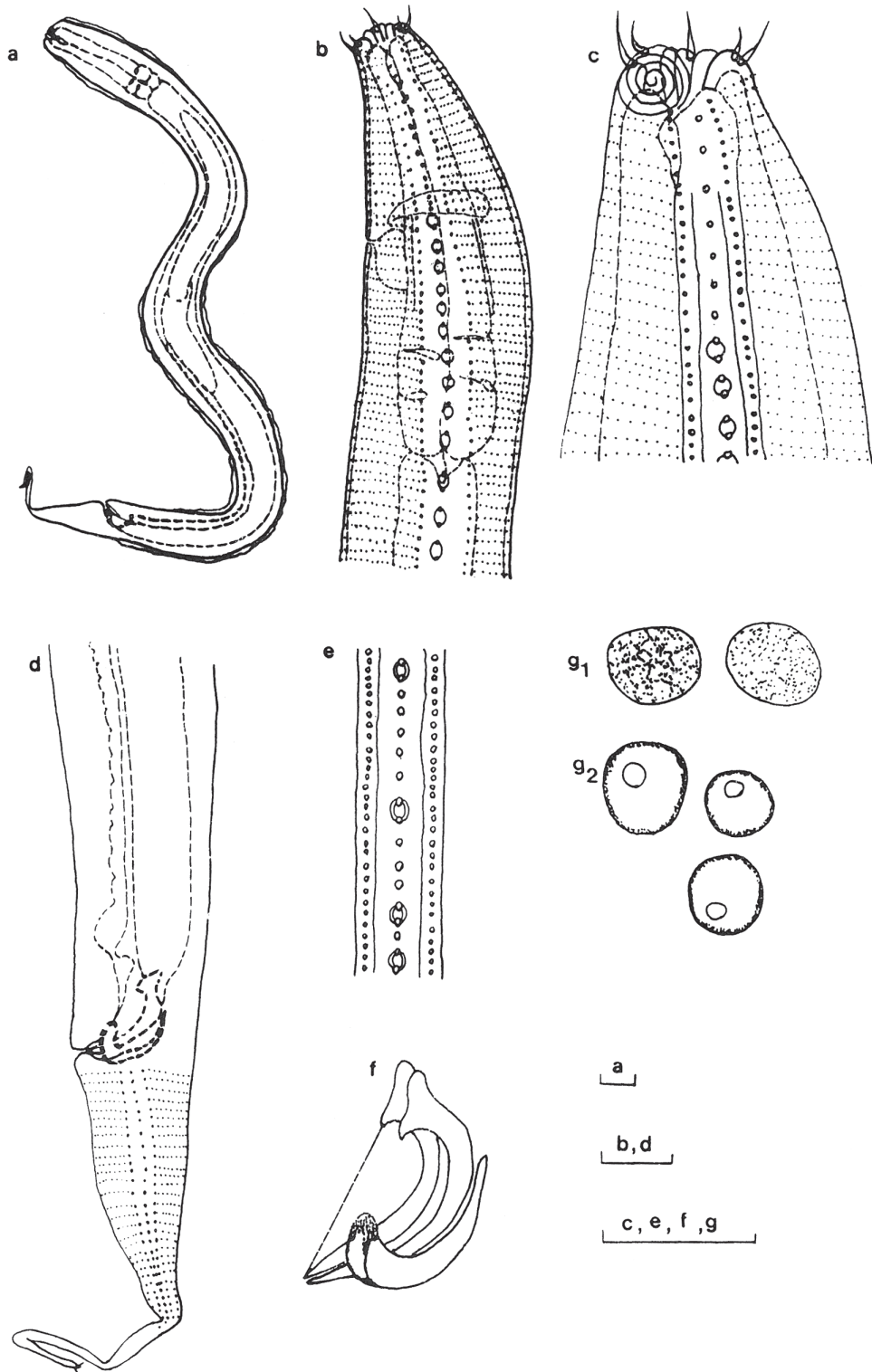


Figure 1. *Metacyatholaimus adriaticus* sp.nov. male. **a.** total view. **b.** lateral differentiation (regular pattern) in anterior part of the body. **c.** lateral view of cephalic region. **d.** posterior end. **e.** lateral differentiation (irregular pattern) at mid-body region. **f.** copulatory apparatus. **g₁** spermatocytes and **g₂** spermatids from anterior testis. Scale bars = 20 μ m.

Figure 1. *Metacyatholaimus adriaticus* sp. nov. mâle. **a.** vue d'ensemble. **b.** différenciation latérale (disposition régulière) au niveau de l'extrémité antérieure du corps. **c.** vue latérale de la région céphalique. **d.** extrémité postérieure. **e.** différenciation latérale (disposition irrégulière) dans la région médiane du corps. **f.** appareil copulateur. **g₁** spermatocytes et **g₂** spermatides du testicule antérieur. Echelles = 20 μ m.

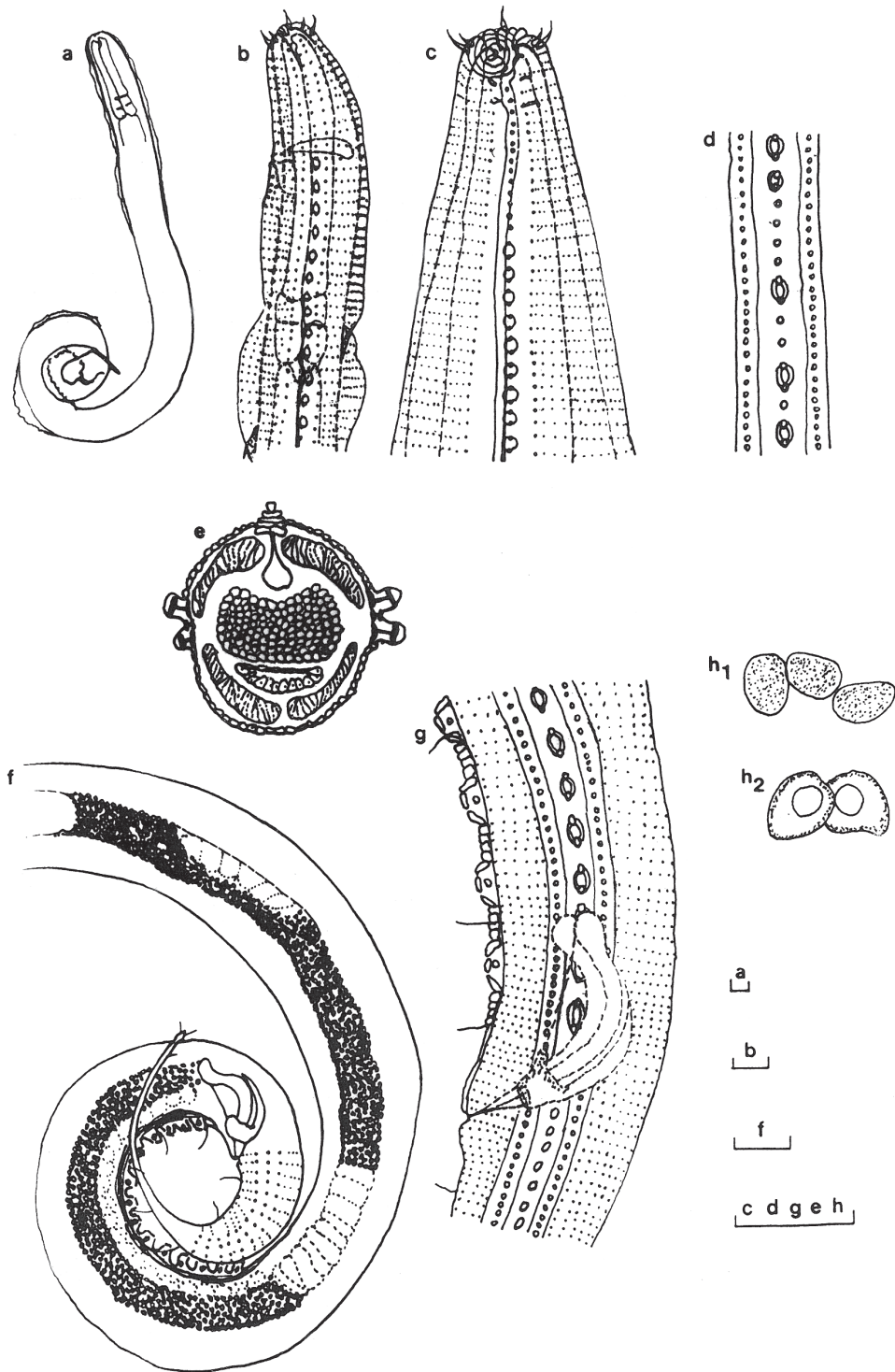


Figure 2. *Metacyatholaimus papillatus* sp. nov. male. **a.** total view. **b.** lateral differentiation in anterior part of the body. **c.** lateral view of cephalic region. **d.** lateral differentiation at mid- body region. **e.** cross section at precloacal supplement level. **f.** posterior end. **g.** copulatory apparatus and preanal papillae “*Pomponema*-like”. **h₁** spermatocytes and **h₂** spermatids. Scale bars = 20 µm.

Figure 2. *Metacyatholaimus papillatus* sp. nov. mâle. **a.** vue d'ensemble. **b.** différenciation latérale à l'extrémité antérieure du corps. **c.** vue latérale de la région céphalique. **d.** différenciation latérale dans la partie médiane du corps. **e.** coupe transversale au niveau des suppléments précloacaux. **f.** extrémité postérieure. **g.** appareil copulateur et suppléments préanaux de “type *Pomponema*”. **h₁**, spermatocytes et **h₂**, spermatides. Echelles = 20 µm.

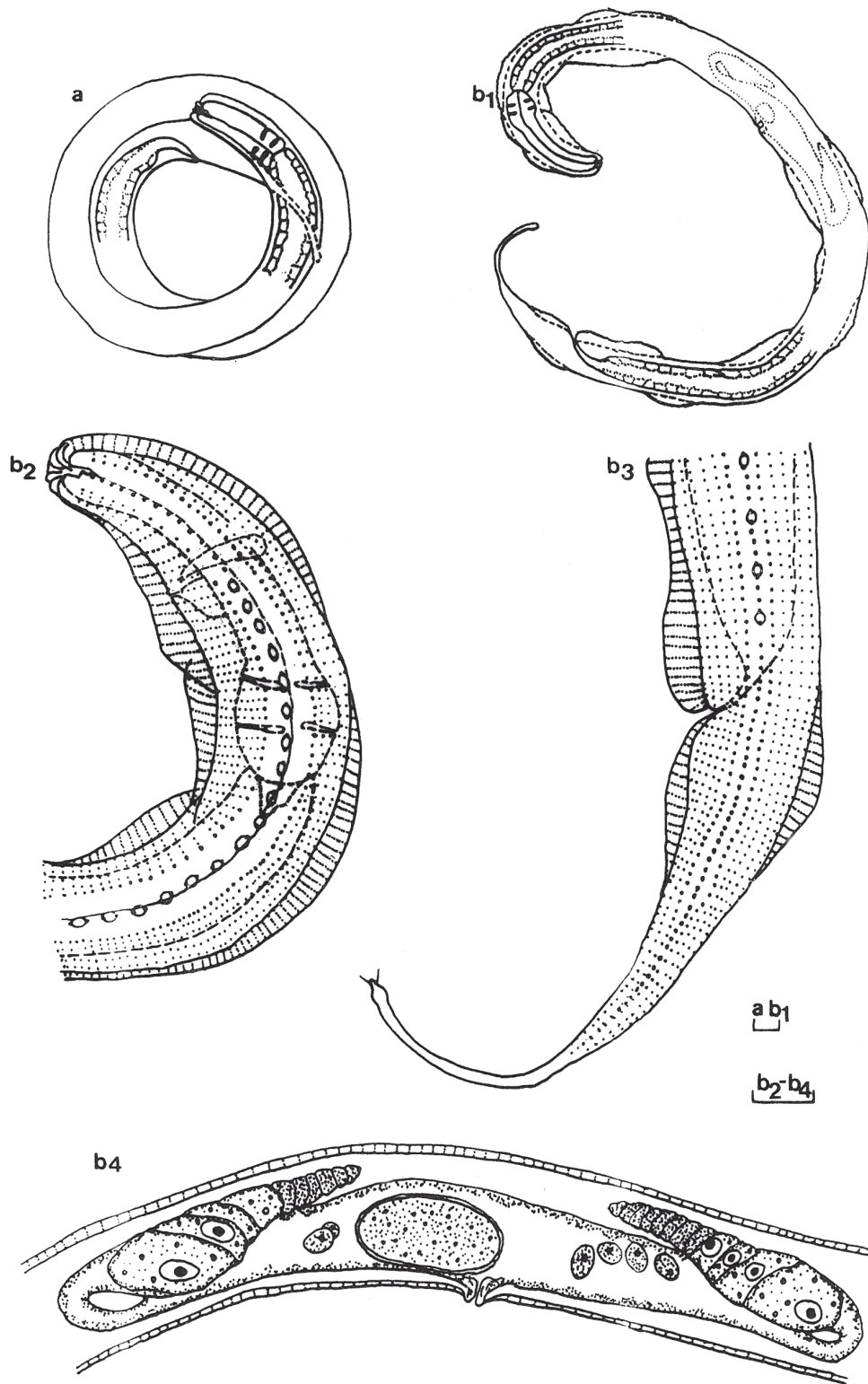


Figure 3. a. *Metacyatholaimus papillatus* sp. nov. female, total view. **b.** *Metacyatholaimus adriaticus* sp. nov. female: **b₁**, total view, **b₂**, detail of anterior part, **b₃**, detail of posterior part, **b₄**, lateral view of the reproductive system. Scale bars = 20 µm.

Figure 3. a. *Metacyatholaimus papillatus* sp. nov. femelle, vue d'ensemble. **b.** *Metacyatholaimus adriaticus* sp. nov. femelle : **b₁**, vue d'ensemble, **b₂**, détail de la partie antérieure, **b₃**, détail de la partie postérieure, **b₄**, appareil reproducteur en vue latérale. Echelles = 20 µm.

Table 1. Measurements (in μm) of adult specimens of *Metacyatholaimus adriaticus* sp. nov. and *M. papillatus* sp. nov.
Tableau 1. Dimensions (en μm) des spécimens adultes de *Metacyatholaimus adriaticus* sp. nov. et *M. papillatus* sp. nov.

Character/specimens	<i>Metacyatholaimus adriaticus</i>				<i>Metacyatholaimus papillatus</i>					
	Holotype	Paratypes males (n=7) Avg \pm sd (min-max)		Paratypes females (n=4) Avg \pm sd (min-max)		Holotype	Paratypes males (n=7) Avg \pm sd (min-max)		Paratypes females (n=2) Avg \pm sd (min-max)	
Total body length	1160	1029 \pm 113	(928-1268)	1096 \pm 96	(964-1184)	960	973 \pm 137	(810-1176)	978 \pm 122	(892-1064)
Head diameter	20	18 \pm 2	(15-20)	17 \pm 2	(15-19)	20	18 \pm 1	(16-20)	20 \pm 1	(19-20)
Oesophagus length	180	133 \pm 11	(120-152)	141 \pm 4	(136-144)	124	137 \pm 12	(120-156)	139 \pm 1	(138-140)
Body diameter (amphid)	40	42 \pm 7	(36-52)	40 \pm 6	(36-48)	32	35 \pm 6	(28-44)	36 \pm 0	(36-36)
Maximum body diameter	40	44 \pm 8	(36-56)	49 \pm 9	(40-60)	40	40 \pm 5	(35-48)	40 \pm 6	(36-44)
Anal body diameter	28	32 \pm 6	(24-40)	29 \pm 4	(24-32)	28	28 \pm 3	(21-32)	25 \pm 1	(24-26)
Spicula length (chord)	3	31 \pm 3	(27-36)	-		36	36 \pm 1	(36-38)	-	
Gubernaculum length	22	19 \pm 2	(16-22)	-		24	21 \pm 2	(20-24)	-	
Vulva from anterior	-	-		449 \pm 42	(404-504)	-	-		449 \pm 69	(400-498)
V (%)	-	-		38-43		-	-		45-47	
Tail length	148	180 \pm 23	(140-208)	169 \pm 11	(160-184)	148	178 \pm 24	(140-208)	176 \pm 11	(168-184)
De Man's ratio a	29	24 \pm 2	(23-27)	23 \pm 5	(20-30)	24	24 \pm 3	(19-29)	25 \pm 1	(24-25)
De Man's ratio b	6	8 \pm 1	(7-8)	8 \pm 1	(7-8)	8	7 \pm 1	(5-9)	7 \pm 1	(6-7)
De Man's ratio c	8	6 \pm 1	(5-7)	7 \pm 1	(6-7)	7	7 \pm 1	(6-8)	6 \pm 0	(6-6)

gametocytes (Fig. 1g). Posterior testis very difficult to observe and apparently empty. *Vas deferens* narrow, without prominent glandular region.

Female

Similar to male, but differs in the absence of somatic setae and presence of four cervical setae. Ovaries opposite and reflexed (Fig. 3b₄), spermathecae obscure.

Diagnosis

Cuticle with punctuations starting at level of cephalic setae, lateral differentiation comprising three longitudinal rows of dots, in which median row of coarser and widely spaced punctuations alternate with campaniform organs; these organs situated between ridges of lateral alae; circular, multispiral amphid (4.5 turns); female with four cervical setae and without somatic setae; male with somatic setae arranged in longitudinal rows; length and shape of spicules (27-34 μm , ventrally curved, without denticles, with velum and strong triangular capitulum) and gubernaculum (boomerang-like, rounded at distal end, 2/3 of spicules length); less developed posterior testis; narrow *vas deferens*

without a prominent glandular region, round spermatocytes and lack of precloacal supplements.

Differential diagnosis

Metacyatholaimus adriaticus sp. nov. is closely related to *M. hirshi* and *M. papillatus* sp. nov., by its morphology and most of the measured parameters. It differs from *M. hirshi* by longer spicules (\bar{x} = 31.5 μm versus 18.2 μm) and shape of capitulum; gubernaculum with well developed distal hook; circular amphid outline, vs. oval; absence of cervical setae in males, vs. present. The new species differs also from *M. papillatus* by several peculiarities of the male reproductive system, including absence of precloacal supplements. Spicules are hamate in both species, but a more prominent triangular capitulum is present in *M. adriaticus*. *Vas deferens* occupies almost half of body diameter in *M. papillatus* and has a prominent glandular region, while in *M. adriaticus* it is rather smaller with an inconspicuous glandular region. *M. papillatus* compared to *M. adriaticus* differs by well developed and easily detectable testes, smaller spermatids and somewhat conical

Table 2. Tabulate key to species of the genus *Metacyatholaimus*.**Tableau 2.** Clé tabulaire des espèces du genre *Metacyatholaimus*.

Species	Lateral differentiation: No. rows of dots / Campaniform organs	Amphid (shape, % c.b.d.; * buccal cavity (b.c.))	Spicules (shape, peculiarities)	Gubernaculum (shape, relation to spicules length)	Precloacal supplements
<i>M. hirschi</i>	3 / yes	oval, >50% c.b.d.; * b.c. shallow	rectangular curved, with velum, without denticles	curved plate, 2/3 of spicules length	no
<i>M. spatiosus</i>	5 / ?	circular, * b.c. shallow, rounded	straight, with ventral elevation and median list	plate-like, 2/3 of spicules length	no
<i>M. cylindribucca</i>	4 / yes	circular, 45% c.b.d., * b.c. cylindrical	curved, broadly truncate at the proximal end	plate-like, with distal tooth, ca. 50% of s. length	no
<i>M. brevicollis</i>	3 / yes	oval, * b.c. shallow rounded	slightly curved, widened at proximal third, capitulum inconspicuous	curved plate with dorsal elevation; <50% of s. length	16
<i>M. effilatus</i>	3-12 / no	circular, 50-60% c.b.d.; * b.c. tubular	regularly curved, capitulum inconspicuous	curved, canvas-like, >50% of spicules length	no
<i>M. chabaudi</i>	3 / yes	circular, 50-55% c.b.d.; * b.c. minute	curved, S-shaped, with velum, denticulated distally	curved, slipper-like, 1/3 of spicules length	no
<i>M. adriaticus</i>	3 / yes	circular, 35-60% c.b.d.; * b.c. cylindrical	curved, with velum and strong triangular capitulum	boomerang-like, rounded distal hook, 2/3 of s. length	no
<i>M. papillatus</i>	3 / yes	circular, >50 % c.b.d.; * b.c. cylindrical	curved, S-shaped, with velum, without denticles, capitulum rounded	boomerang-like, flattened distal hook, 2/3 of s. length	12-14

% c.b.d = percentage of corresponding body diameter.

(not round) spermatocytes. Females of *Metacyatholaimus papillatus* and *M. adriaticus* are virtually indistinguishable, and the only difference refers to the presence of somatic setae in *M. papillatus*. The main differences related to other *Metacyatholaimus* species having the same pattern of cuticular ornamentation are the absence of precloacal supplements compared to *M. brevicollis*, and details of copulatory apparatus, i.e. absence of denticles at the distal extremity of spicules, triangular (not forked) capitulum, and longer gubernaculum compared with *M. chabaudi* Gourbault 1980. Remaining *Metacyatholaimus* species (*M. cylindribucca* Schuurmans-Stekhoven 1950 and *M. effilatus* de Bovée 1974) can be distinguished by lateral differentiation consisting of more than three rows of punctuations (Table 2).

Remarks

The thin cuticle is desquamated from anterior part of head to end of cylindrical part of tail and this external change (Fig. 3b₁) is supposed to occur during the fixation process.

Such alteration is not observed in other nematode species from the same samples, while it affects all specimens of *M. adriaticus*, whatever the locality and season. Lateral alae are almost indiscernable on whole mounts, and become noticeable on examination of cross sections. Internal median row of lateral differentiation situated between ridges of lateral alae consists of coarse dots which alternate with campaniform organs "Type 1" *sensu* Inglis (1963). In earlier descriptions campaniform organs have either been overlooked or interpreted as gland cells and pores, features which are common in Cyatholaimidae. In *Metacyatholaimus*, campaniform organs have been described in *M. chabaudi*, *M. hirschi*, *M. brevicollis*, and *M. cylindribucca*. In *M. spatiosus* (Wieser, 1954) they might have been overlooked.

Metacyatholaimus papillatus sp. nov.

Figs 2, 3; Tables 1, 2.

Material studied

Holotype male (♂ 1) slide CMR 154, seven paratypes males:

(♂2) slide MNHN 1001 AB, (♂3-8) slides CMR 155-160; two paratypes females (♀1-2) slides CMR 161-162.

Locality

Rovinj area: station RO-2 (18 m, silty-sand), station RO-6 (20 m, silty-sand), station RO-8 (21 m, sandy-silt); Northern Adriatic offshore area: station SJ 107 (36 m, silty-sand)

Description

Male

Medium body size (see table 1). Cuticle annulated, with transverse rows of fine punctuations. Lateral differentiation begins at level of amphid and consists of three longitudinal rows of coarser punctuations. Median row situated between ridges of lateral alae, while external rows are part of them (Figs 2d, 2e). Median row contains campaniform organs regularly arranged between middle of oesophagus and mid-body region (Fig. 2b), but irregularly arranged towards first precloacal supplement (Fig. 2g).

Head rounded with 6 indistinct labial papillae, 6 external labial setae, and 4 cephalic setae. Amphid multispiral, circular outline 9 µm diameter, occupying somewhat less than 50% of corresponding body diameter (Fig. 2c)

Buccal cavity cylindrical, with twelve prominent cheilorhabdia, one dorsal tooth and two minute subventral teeth. Anterior cylindrical part of oesophagus gradually widening to a posterior bulb, measuring about 23% of total oesophagus length (Fig. 2b). Cardia 10 µm long. Nerve ring situated at about 40 % of oesophageal length, sometimes very difficult to observe. Excretory pore situated 35-46 µm from anterior end. Tail elongate, conico-cylindrical, 4 to 7 (avg. = 5.44) anal body diameter in length, with a small spinneret and two terminal setae (Fig. 2f).

Spicules curved, S-shaped with velum. Gubernaculum boomerang-like, with a distal hook, 2/3 of spicules long (Fig. 2f). Testis paired, opposite, stretched, situated on right side of gut. Both testes easy to detect. *Vas deferens* granulated, with prominent glandular region occupying almost half of corresponding body diameter. Precloacal supplements complex (type A, according to Wieser & Hooper, 1967), varying in number from 12 to 14 (Fig. 2f).

Female

In many respects similar to male. Somatic setae arranged longitudinally along lateral differentiation. Ovaries opposite and reflexed, spermathecae obscure.

Diagnosis

Metacyatholaimus papillatus sp. nov. is characterized by a cuticle with punctuations starting at level of cephalic setae; a lateral differentiation consisting of three longitudinal rows of dots, in which the median row of coarser and widely spaced punctuations alternate with campaniform organs; campaniform organs situated between the ridges of the

lateral alae; a circular multispiral amphid (4.5 turns). In female, presence of longitudinal rows of somatic setae. In male, absence of somatic setae; specific length and shape of spicules (36 µm, ventrally curved and S-shaped, without denticles, with velum and round form of capitulum) and gubernaculum (boomerang-like, flattened at distal end, 2/3 of spicules length); well developed testes; wide *vas deferens* with prominent glandular region; conical spermatocytes and 12-14 precloacal supplements "Pomponema-like", i.e. "Type A" *sensu* Wieser & Hopper (1964).

Differential diagnosis

The morphometric features of *M. papillatus* sp. nov. are very close to those of *M. adriaticus* sp. nov. and *M. hirschi*, but *M. papillatus* differs from both species by the presence of precloacal supplements of "Type A" *sensu* Hooper & Wieser (1964) and by some peculiarities of the male reproductive system (Table 2). The females of *M. papillatus* sp. nov. are distinguished by the presence of somatic setae. The relationship with *M. adriaticus* is already discussed in the differential diagnosis of that species. A comparison with *M. hirschi* revealed additional differences such as the shape of amphid, as well as the shape and size of spicules and gubernaculum. *M. papillatus* sp. nov. is different from *M. brevicollis* by the presence of complex precloacal supplements (consisting of several elements interconnected by a lamellated cuticula) (Fig. 2g). It differs also in the number and size of precloacal supplements which are more prominent, but less numerous in *M. papillatus*. Differences with other *Metacyatholaimus* species are reported in the dichotomous key to species.

Remark

The "sexual dependent coiling pattern of the body" appears in *M. papillatus* and affects the whole body length of females (Fig. 3a) but only the posterior part of males (Fig. 2a). Owing to their high constancy, these changes of body shape facilitate species identification.

Discussion and Conclusion

According to Wieser (1954) and Wieser & Hopper (1967) the genera within the subfamily Cyatholaiminae can be divided into two groups, based on the presence or absence in males of precloacal supplements. On the basis of their size and structure, the authors recognized three basic types of precloacal supplements, the last type being subdivided into two forms: A (large, complex), B (large to minute, cup-shaped), C-1 (large to medium, tubular) and C-2 (small, setose). "Type A" is represented by "large, complicated supplements, consisting of several elements and a lamellated cuticle between the supplements" and it was erected as the main diagnostic character in the genera *Pomponema* Cobb, 1917, *Nummocephalus* Filipjev, 1946,

Craspodema Gelach, 1956 and *Anaxonchium* Cobb, 1920 (Wieser & Hopper, 1967). The species *Metacyatholaimus brevicollis* (Cobb, 1898) sensu Gerlach (1964) just as the new species *M. papillatus*, exhibited all the characters of the genus *Metacyatholaimus*, except for the presence of “Type A” preloacal supplements. However, due to obvious disagreement in many other characters, both species may not be classified within stated genera, nor even placed into *Minolaimus* Vitiello, 1970, *Nannolaimoides* Ott, 1972 or *Parapomponema* Ott, 1972, subsequently erected genera distinguished by the same type of preloacal supplements. By the structure of preloacal supplements *M. brevicollis* and *M. papillatus* are close to *Pomponema* and *Nannolaimoides* species, but differ in many other characters. They do not possess many differential characters of the genus *Pomponema* such as: lateral differentiation of four longitudinal rows of dots; strongly cuticularized head region with punctations, appearing in lateral view as elongated rods with Y-shaped ends; strongly armed buccal cavity with a large pointed dorsal tooth; spicules with a central lamella (Platt & Warwick, 1988). In comparison with *Nannolaimoides*, those species differ by the pattern of cuticular ornamentation, i.e. regular lateral differentiation, weaker dorsal tooth and different structure of copulatory apparatus. In comparison to other genera possessing “Type A” supplements differences are even more conspicuous.

Except for preloacal supplements in *M. papillatus* sp. nov., all characters, including conspicuous similarity to *M. hirschi*, suggested that *M. papillatus* and *M. adriaticus* belong to the genus *Metacyatholaimus*. The striking

similarity of *M. brevicollis* encourage us to consider the absence of preloacal supplements as a rather facultative character of the genus *Metacyatholaimus*. As a result, we propose: (1) an extension to the key of Cyatholaiminae, presented by Wieser & Hopper (1967), of the third group which contains species with and without preloacal supplements, (2) a key to *Metacyatholaimus* species, (3) to consider *Metacyatholaimus brevicollis sensu* Gerlach (1964) as a valid species, and consequently (4) the inclusion of the two new species in the genus *Metacyatholaimus*.

The genus *Metacyatholaimus* includes at present species with preloacal supplements (*M. brevicollis* and *M. papillatus* sp. nov) and without these supplements (*M. hirschi*; *M. cylindribucca* Schuurmans Stekhoven, 1950; *M. spatiosus* Wieser, 1954; *M. effilatus* de Bovée, 1972; *M. chabaudi* Gourbault, 1980 and *M. adriaticus* sp. nov.).

Genus diagnosis emended

Cyatholaiminae. Cuticle with lateral differentiation of three to five longitudinal rows of dots or individualized heterogeneous field in which three to twelve rows of dots alternate along the longitudinal axis. Campaniform organs alternating with the coarsest dots in almost a regular order, present when the row consists of 3 or 4 points, or absent. Lateral alae present. Buccal cavity small, dorsal tooth small, 1-2 ventral teeth. Amphid, spiral or circular. Females didelphic with two opposed, reflexed ovaries. Males diorchic with two opposite outstretched testes. Preloacal supplements “Pomponema-like”, i.e. “Type 1” sensu Wieser & Hopper (1964), present or absent.

Dichotomous key to species of *Metacyatholaimus*

1. Lateral differentiation consisting of three longitudinal rows of dots 2
Lateral differentiation with more than three longitudinal rows of dots 6
2. Males with preloacal supplements 3
Males without preloacal supplements 4
3. Sixteen preloacal supplements; gubernaculum simple *M. brevicollis* (Cobb, 1898) Gerlach, 1964
Twelve - fourteen preloacal supplements; gubernaculum boomerang like *M. papillatus* sp. nov
4. Spicules denticulated at the distal end, anterior region unpunctuated *M. chabaudi* Gourbault, 1980
Spicules pointed at the distal end; punctations begin just posterior to amphid 5
5. Spicules length (chord) < 20 µm; gubernaculum slightly curved, plate like
(crescent), without a distal hook; amphid oval *M. hirschi* Schuurmans Stekhoven, 1942
Spicules length (chord) > 25 µm; gubernaculum boomerang like with a distal hook;
amphid circular *M. adriaticus* sp. nov.
6. Spicules straight, lateral differentiation consisting of 5 longitudinal rows of larger dots *M. spatiosus* Wieser, 1954
Spicules curved, lateral differentiation different 7
7. Gubernaculum plate like with a distal tooth, i.e. ventro-lateral wing like projection;
lateral differentiation of 4 longitudinal rows of dots *M. cylindribucca* (Schuurmans Stekhoven, 1950), Wieser 1954
Gubernaculum without distal tooth; lateral differentiation
with heterogeneous field of punctations (different number of dots in horizontal lines) *M. effilatus* de Bovée 1974

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