

Four new species of Mononchida (Nematoda) from tropical regions

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Abstract. Four new nematode species of the order Mononchida are described from the tropics. *Mononchus syrmatius* sp. n. from Ecuador is simply distinguished by the unusually long and slender tail. *Cobbonchus aequatorialis* sp. n. from Ecuador is especially characterized by the digitiform tail. *Iotonchus nepotum* sp. n. from Papua New Guinea is differentiated by the small body and very short, digitiform tail. *Miconchus papillifer* sp. n. from Ecuador differs from the other prodelphic species by the shape and length of the tail and the number and arrangement of the advulval papillae.

Four new species of mononchid nematodes are presented herein, two of the family Mononchidae and another two of the family Anatonchidae. They were obtained from soil samples collected in two tropical regions of Earth, Ecuador and Papua New Guinea.

MATERIAL AND METHODS

The nematodes were sampled by Hungarian scientists during their collecting trips in 1969 and 1988, respectively. The samples were fixed *in situ* with FAA, and then washed out in the laboratory by flotation techniques. The nematodes were picked out by hand, and fixed again with FAA. Subsequently they were processed to pure glycerine by a slow method, and finally mounted on permanent glass slides.

Measurements were taken by ocular micrometer, curved structures were measured along the curved medial line. Drawings were made with the aid of a drawing tube attachment. For the moment, all nematode specimens, holotypes and paratypes, are preserved in the nematode collection of the author, but later they will be deposited at the collection of the Zoological Department of the Hungarian Natural History Museum, Budapest.

It may be mentioned that also the older slides (39 years) contained fresh-like animals.

DESCRIPTIONS

Mononchus syrmatius sp. n.

(Fig. 1 A–D)

Holotype female: L = 1.65 mm; a = 32; b = 3.6; c = 4.3; c' = 14; V = 49 %; buccal capsule 42 × 20 μm.

Paratype females (n = 5): L = 1.59–1.68 mm; a = 32–35; b = 3.5–3.9; c = 4.2–5.0; c' = 13–15; V = 47–50 %.

General description. Body moderately slender, 48–55 μm wide at mid-region, irregularly coiled or twisted upon relaxation. Cuticle smooth and very thin, ± 1 μm all along the body. Lip region rounded, almost continuous with adjoining body, 25–27 μm wide, lips less separate, papillae in two circles, prominent. Body at posterior end of oesophagus 2.0–2.2 times as wide as head. Amphids small, caliciform with oval apertures, close to the anterior end of buccal capsule.

Buccal cavity (the chitinized capsule) oblong, barrel-shaped, 38–42 × 19–21 μm inclusive walls, twice as long as wide or 1.5–1.6 times as long as the labial diameter, occupying ± 9 % of oesophagus length. Dorsal tooth strong with apex pointed forward and located at 29–32 % of buccal capsule. Vento-sublateral transverse ribs weak, op-

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posite to the tooth apex or shifted a little more anterior. Oesophagus nearly cylindrical, 427–463 μm long, occupying 26–28 % of body length. Nerve ring encircling oesophagus at about one-fourth of its length. Oesophago-intestinal valve non-tuberculate. Intestine with wavy walls, rectum about equal to anal body width. Distance between posterior end of oesophagus and vulva shorter (0.7–0.8 times) than oesophagus, or as long as 7.0–7.6 body diameters.

Female. Genital apparatus amphidelphic. Vulva transverse with sclerotized outer lips measuring 10 μm in width and similarly sclerotized inner lips measuring 8–9 μm ; vagina 20–22 μm , extending more than one-third (35–36 %) body width. Advulval papillae lacking. Each genital branch 2.2–3.2 body widths long or occupying 7–9 % of body length. One gravid female possessing a large, thin-shelled egg measuring 112 \times 38 μm , as long as 2.2 body diameters. Vulva–anus distance equal to 1.1–1.6 tail lengths. Tail unusually long and slender, 344–390 μm , occupying 20–24 % of entire length of body, first conoid, then slowly tapering, whip-like with a little swollen 4.5–5.0 μm thick tip bearing two minute papilla-like projections. Caudal glands moderately developed, spinneret terminal.

Male. Not found.

Differential characters and relationships. A moderately long representative of the genus with very thin cuticle, large buccal cavity, comparatively posteriorly located dorsal tooth, well sclerotized vulva, large egg and unusually long tail.

In a paper on the taxonomy of Mononchidae (Andrássy, 1993), I registered 14 species within the genus *Mononchus* Bastian, 1865. The number of valid species increased to 18 to the present. Regarding its tail length (13–14 anal body diameters), *Mononchus syrmatius* sp. n. is here and now the longest-tailed representative of the genus, and can be distinguished at the first glance from all other species the tails of which varying in length between 2 to 8 (exceptionally to 11) anal body diameters.

The longest-tailed species, *M. sandur* Eisen-
dle, 2008, was described quite recently from the

Austrian Alps. Its tail is longer (7–11 anal body diameters) than in the other species of the genus. *Mononchus syrmatius* sp. n. differs, however, also from it by the wider lip region (25–27 vs. 18–24 μm), the longer buccal capsule (38–42 vs. 28–35 μm) and, last but not least, by the more longer and slender tail (344–390 μm or $c' = 13$ –15 vs. 224–306 μm or $c' = 7$ –11).

Type specimens. Holotype female on slide No. 13176. Paratypes: five females and two juveniles; all in the collection of the author.

Type habitat and locality. Wet moss from a large trunk in a rain-forest, Laguna San Marcos, Prov. Pichincha, Ecuador; collected April, 1988 by A. Zicsi and Cs. Csuzdi.

Etymology. The species name is derived from the Greek/Latin word *σύρμα* or *syrma*, and means: a tail or train (of a dress); *syrmatius* = long-tailed, long-trained.

***Cobbonchus aequatorialis* sp. n.**

(Fig. 2 A–D)

Holotype female: L = 1.76 mm; a = 32; b = 3.1; c = 32; $c' = 1.4$; V = 64 %; buccal capsule 40 \times 20 μm .

Paratype females (n = 4): L = 1.67–1.87 mm; a = 28–32; b = 2.8–3.1; c = 31–37; $c' = 1.4$ –1.5; V = 65–69 %.

General description. Body fairly large, curved or twisted after fixation, 57–64 μm wide at mid-region, slightly but rapidly widened at three regions: firstly just posterior to oesophagus, secondly at the genital region, and thirdly immediately prior to anus. Cuticle smooth, thin, 2.0–2.5 μm . Labial region somewhat widened, 28–30 μm wide, lips hardly separated, labial papillae conspicuous. Body at posterior end of oesophagus 1.6–1.8 times as wide as head. Amphids cup-shaped, located at the first sixth or fifth of the buccal cavity length.

Buccal capsule oblong, barrel-shaped, 40–42 \times 20–21 μm , twice as long as wide or 1.3–1.5

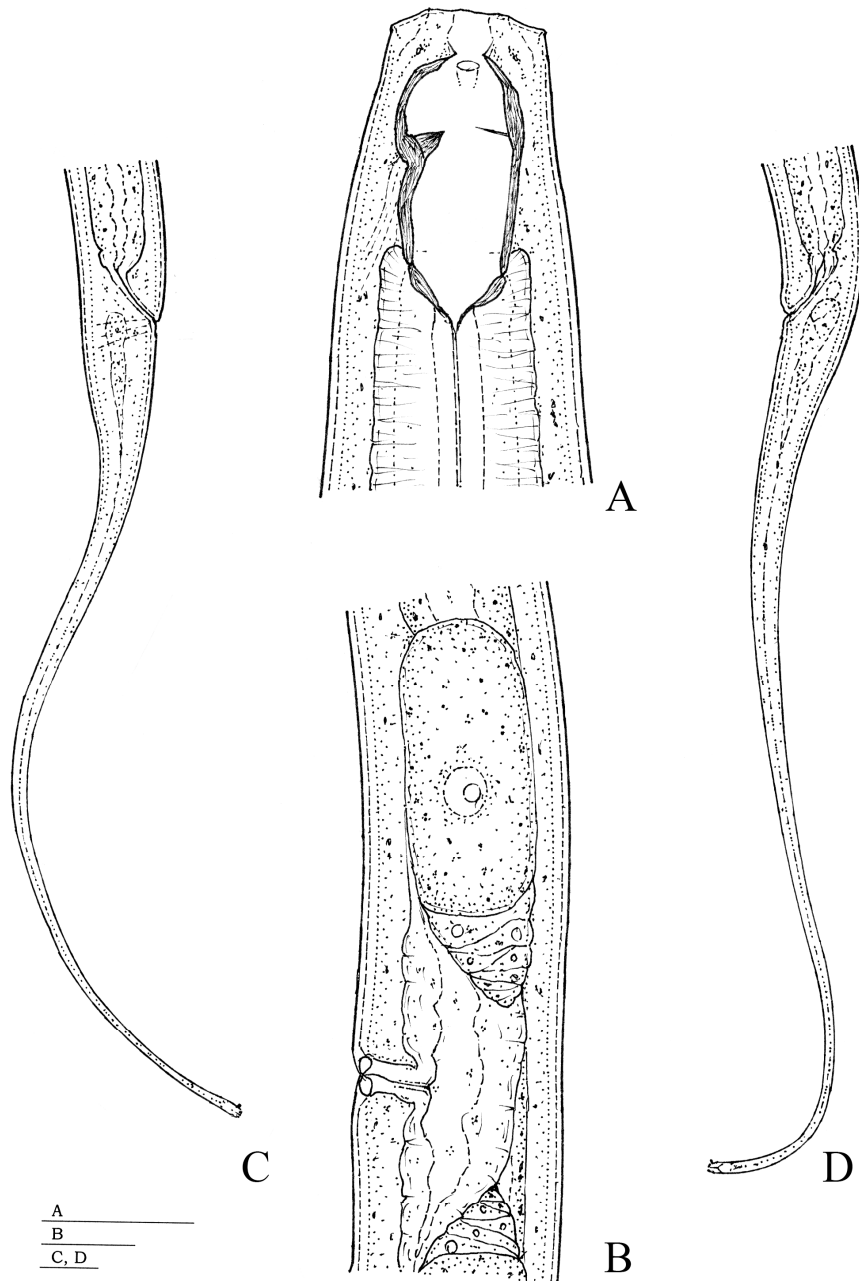


Figure 1. *Mononchus syrmatus* sp. n. A: anterior end; B: vulval region with anterior genital tract; C–D: female tails. (Scale bars 25 μm each)

times as long as labial diameter, occupying 6–7 % of entire length of the oesophagus. Its dorsal wall somewhat thicker than ventral wall. Dorsal tooth only slightly stronger than subventral teeth, its apex located at 46–50 %, apices of subventral teeth at 54–62 % of buccal length; subventral teeth never levelling exactly, but lying 2–3 % of buccal length from each other (e.g. 54 and 56 %, 60 and 62 %, respectively). Oesophagus muscular and nearly cylindrical, very long, 556 to 635 μm , occupying 32 to 36 % of entire length of body. Not only the postparietalia, but also the basal parts of the interparietalia are embedded in oesophageal tissues. Nerve ring at 21–23 % of the total neck region. Oesophago-intestinal junction non-tuberculate. Intestine wide-lumened, its cells polygonal and arranged in 12–15 longitudinal rows. Rectum shorter than anal body width. Distance between posterior end of oesophagus and vulva equal to one oesophagus length or 10–11 body diameters.

Female. Reproductive system amphidelphic. Vulva a short transverse slit with small sclerotized inner lips, vagina short, extending to one-fourth of the corresponding body width. No advulval papillae. Anterior gonad 2.2–2.8 body widths long or 8–9 % of body length, posterior gonad 3.0–3.5 body widths long or 10–11 % of body length. One large (two body widths long) egg measuring 122–130 \times 26–27 μm . Vulva–anus distance 9.6 to 11.4 times as long as tail. Tail short, 50–56 μm , ± 3 % of body length, characteristic in shape: broadly conoid to its half length, then rapidly narrowing, digitiform and ending in a mammiform tip. The digitiform part 28–36 μm long and 12–15 μm wide at its beginning. Caudal glands very large, the two anterior glands lying by the dorsal side of rectum. Anterior anal lip overhanging.

In the body cavity of two females, somewhat posterior to vulva, five and six tiny nematodes, respectively, were observed. They distinctly lied out of the intestine. Probably, they were small parasitic nematodes (mermithids?).

Male. Not found.

Differential characters and relationships. A

bigger species with teeth lying in medial position, very long oesophagus, cuticularized vulval lips, paired gonads and characteristically shaped tail.

In a paper dealing with the taxonomy of Mononchidae (Andrássy, 1993) I listed 27 species of the genus *Cobbonchus* Andr ssy, 1958. Meanwhile three further species were added to this sum. *Cobbonchus aequatorialis* sp. n. may be compared with those species of the genus that possess buccal teeth of medial position, and amphidelphic gonads. Of these, the new species most resembles *Cobbonchus coetzeae* Andr ssy, 1970 (described from South Africa), but differs from it in having a shorter and less slender body (1.67–1.87 mm, $a = 28\text{--}32$ vs. 2.2 mm, $a = 47$), more posteriorly located teeth (dorsal: 46–50 %, subventral: 54–62 % vs. dorsal: 36 %, subventral: 49 %), a longer oesophagus (one-third vs. one-fourth of body length), sclerotized vulval lips, a less curved and shorter tail (1.4–1.5 vs. 2.0–2.5 anal body widths) and a mammiform tail tip.

The species described hitherto under the name *Cobbonchus* or transferred to it from the old genus *Mononchus* suit well the genus characters. The only exception is *Cobbonchus longicaudatus* Jairajpuri, Ahmad & Sturhan, 1998. In having an unusually strong dorsal tooth – it is much larger than the subventral teeth – and a long, filiform tail ($c' = 7\text{--}8$ vs. 0.5–2.3 in the other species), this species seems to be rather strange for *Cobbonchus*. By virtue of its offset head, more or less funnel-shaped buccal cavity and the so large dorsal tooth, it appears to belong to the family Mylonchulidae rather than to the Mononchidae, where it will probably represent a separate genus.

Type habitat and locality. Moss from a trunk in a rain forest, Lago Agrio, Prov. Napo, Ecuador, collected April, 1988 by A. Zicsi and Cs. Csuzdi.

Type specimens. Holotype female on slide No. 13230. Paratypes: four females and two juveniles. All in the collection of the author.

Etymology. The species name *aequatorialis* (Latin) = equatorial.

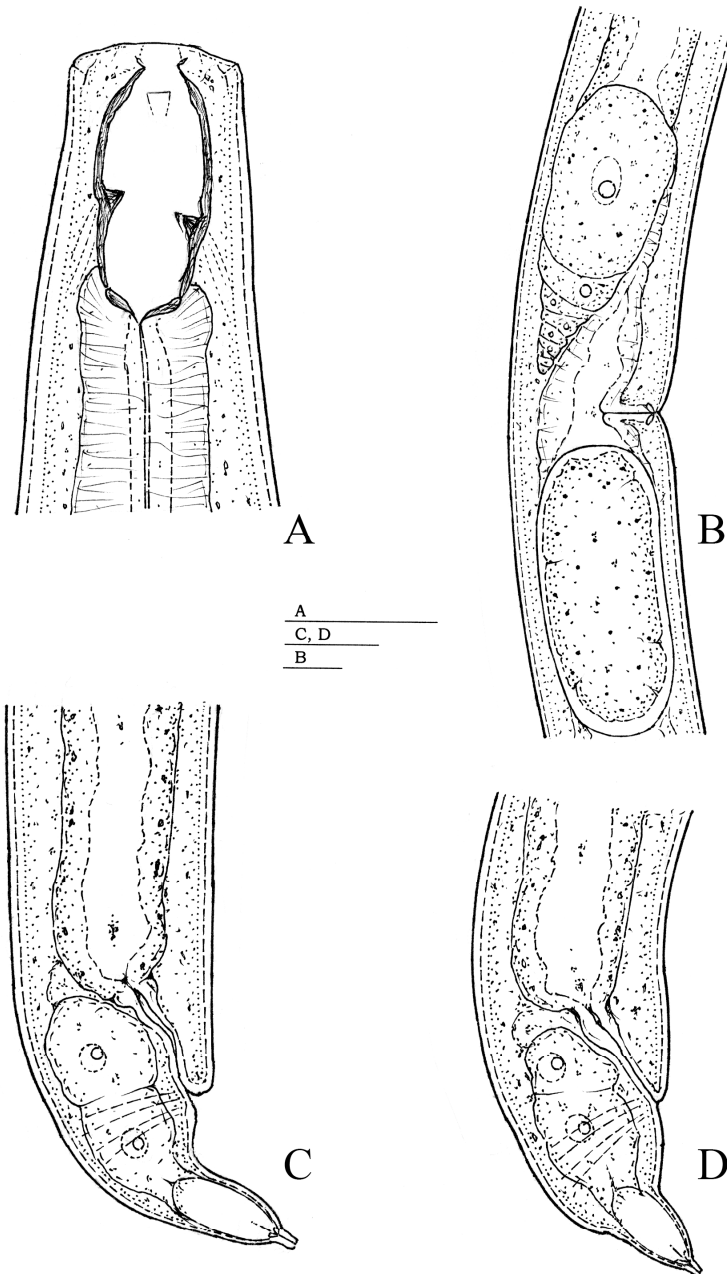


Figure 2. *Cobbonchus aequatorialis* sp. n. A: anterior end; B: genital region; C–D: female posterior ends. (Scale bars 25 μ m each)

***Iotonchus nepotum* sp. n.**

(Fig. 3 A–D)

Holotype female: L = 1.11 mm; a = 25; b = 3.8; c = 16; c' = 2.2; V = 66 %; buccal capsule 39×22 µm.

Paratype females (n = 6): L = 1.03–1.21 mm; a = 22–25; b = 3.1–3.8; c = 13–16; c' = 2.2–2.8; V = 66–70 %.

General description. A very small species within the genus. Habitus more or less C-shaped when fixed, more strongly curved posteriorly, body 41–48 µm wide at middle. Cuticle smooth, 1.5–2.0 µm thick. Head broad, rounded, 27–30 µm wide at level of posterior papillae. Lips moderately separate, papillae protruding. Body at posterior end of oesophagus 1.4–1.5 times as wide as head. Amphid small, aperture situated at the beginning of buccal capsule.

Buccal capsule large and roomy, barrel-shaped, 36–40×22–23 µm, 1.6–1.8 times as long as wide or 1.3–1.4 times as long as labial diameter, occupying 12–14 % of oesophagus length (measured from head). Buccal walls moderately thick. Dorsal tooth quite on the basis of interparietale, forward directed with apex located at 80–83 % of buccal length. No other armature. Oesophagus 294–336 µm long or 26–32 % of the total body length, surrounding ahead the postparietale (ventral) and the postparietale + tooth (dorsal). Oesophago-intestinal valve with lobe-like tubercles. Distance between posterior end of oesophagus and vulva equalling 1.2–1.5 oesophagus lengths or 8.5–10.2 body diameters. Rectum arched, about as long as anal body diameter.

Female. Genital system mono-prodelphic without posterior uterine sac. Vulva transverse with non-sclerotized inner lips. Vagina oblique. Advulval papillae not present. Gonad as long as 3.4–4.6 body diameters, occupying 13–18 % of body length. Uterus about equal to one body width, oviduct slender. Ovary dorsally directed, oocytes few in number. No uterine eggs observed. Vulva–anus distance 3.6–4.0 times as long as tail.

Tail short, 60–80 µm, 6–7 % of entire length of body, more or less finger-shaped, ventrally curved with rounded terminus. Caudal glands small, terminal pore (spinneret) minute. Anal lips swollen.

Male. Not observed.

Differential characters and relationships. A very small species of *Iotonchus* possessing a wide head, roomy buccal cavity, dorsal tooth of basal position, prodelphic female genital organ, lacking postvulval sack, and short, digitiform tail.

Iotonchus Cobb, 1916 is by far the richest genus not only in the family Anatonchidae, but within the whole order Mononchida. While in a paper dealing with the taxonomy of Anatonchidae (Andrássy, 1994), I registered 47 valid species, Vinciguerra and Orselli (2006) already listed 72 good species. This number recently amounts to 85. It may be mentioned that some years ago Siddiqi (2001) alone described eleven new *Iotonchus* species.

The majority (more than 60 %) of the representatives of *Iotonchus* are amphidelphic. The prodelphic species (27 in number) can be divided on the basis of presence or absence of postvulval uterine branch into two groups. *Iotonchus nepotum* sp. n. belongs to the second group and is well characterized by its small body and short tail. In having a very short tail, it can be distinguished from every member of both prodelphic groups (c' = 2.2–2.8 vs. 4 to 20). On the other hand, *I. nepotum* is also distinctive by its very short body (1.0–1.2 mm). There are only three prodelphic species that are nearly as small as our new one: *I. chantaburensis* Buangsuwon & Jensen, 1966 (0.8–1.0 mm), *I. singaporensis* Ahmad, Baniyammuddin & Jairajpuri, 2005 (1.0–1.2 mm) and *I. pusillus* Loof, 2006 (0.7–1.3 mm). *Iotonchus nepotum* sp. n. clearly differs from all of them in having a much shorter tail, and – owing to the shortness of the tail – a more posteriorly located vulva (V = 66–70 vs. 59–66 %).

Type habitat and locality. Humus and soil from a primary rain forest, in the vicinity of the small town Kiunga, western Papua New Guinea, collected July, 1969 by J. Balogh.

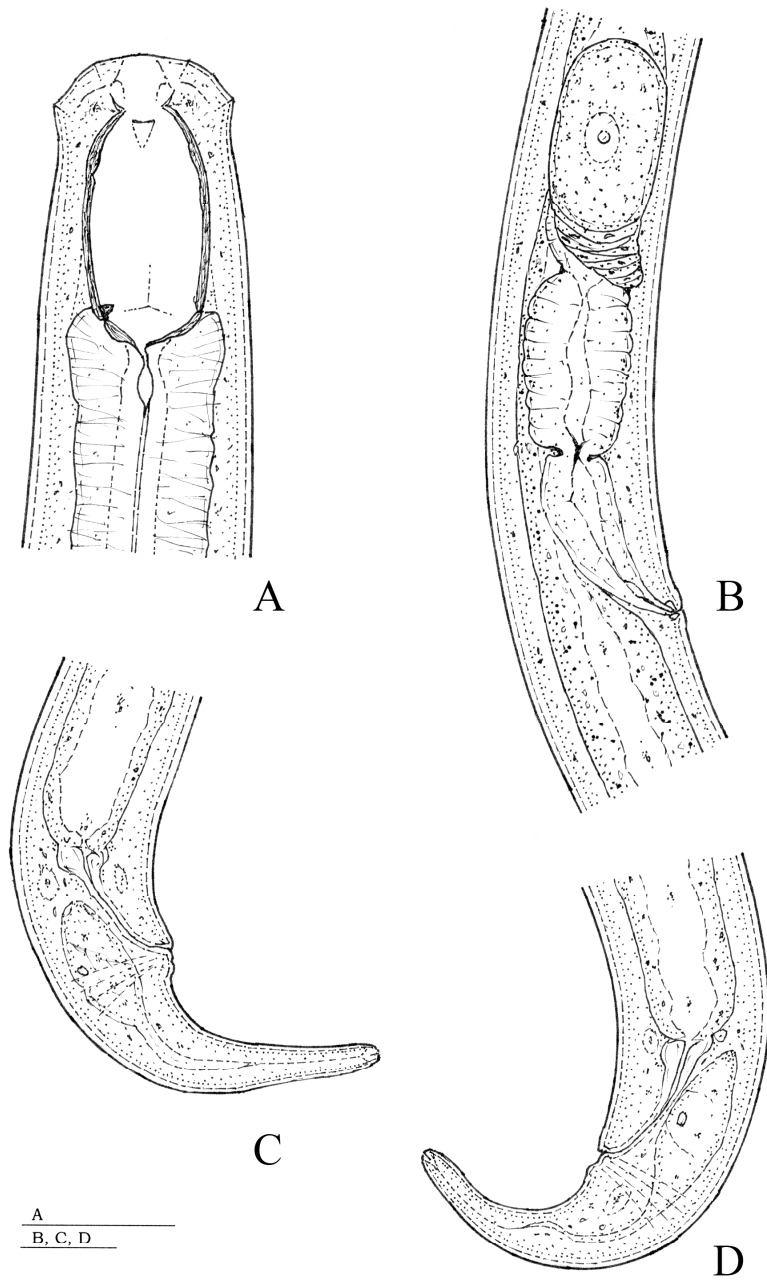


Figure 3. *Iotonchus nepotum* sp. n. A: anterior end; B: genital tract; C–D: female posterior ends. (Scale bars 25 µm each)

Type specimens. Holotype female on slide No. 13617. Paratypes: six females and three juveniles. All in the collection of the author.

Etymology The Latin word *nepos* means: a grandchild (*nepotum*: plural genitive). This species is dedicated to the grandchildren of the present author, Judit, Ádám and Zsuzsa (Judith, Adam and Susan).

***Miconchus papillifer* sp. n.**

(Fig. 4 A–E)

Holotype female: L = 2.16 mm; a = 31; b = 3.9; c = 12.5; c' = 4.5; V = 78 %; buccal capsule 42×28 µm.

Paratype male: L = 1.98 mm; a = 32; b = 4.2; c = 18; c' = 2.6.

General description. Medium-sized, body almost straight, only posteriorly curved, 64–69 µm wide at middle, clearly widened in both sexes just behind oesophagus, and markedly narrowed in females immediately behind vulva. Cuticle apparently smooth, 2.5 µm thick in general, 3.5 µm thick on dorsal side of tail. Labial region truncate, distinctly broader than adjoining body, 40–44 µm wide. Lips large, separated, anterior papillae prominent, posterior papillae less conspicuous. Amphid aperture at level of beginning of the buccal cavity, small. Body at posterior end of oesophagus only 1.3–1.4 times wider than head.

Buccal capsule very roomy, basally flattened, 42×26 µm (female) or 38×28 µm (male), nearly 8 % of the total neck length, thin-walled. Teeth pre-basal in position, lying at about 2/3 of buccal cavity, equally developed. Apex of dorsal tooth at 54 % (female) or 59 % (male), apices of subventral teeth at 54 and 56 % (female) or 63 and 66 % (male); the subventral teeth not levelling exactly with each other. Oesophagus 480–550 µm long, 24–25 % of entire length of body; neck region completely cylindrical. Ventral wall in posterior half of oesophagus with the usual pearl-shaped structure. Oesophago-intestinal junction possessing three conspicuous tubercles. Intestine

wide-lumened. Rectum nearly equal in length to the anal body width. Distance between posterior end of oesophagus and vulva as long as 2.1 oesophagus lengths or 16 body widths.

Female. Prodelphic, postvulval sack practically absent. Vulva a transverse slit, vulval lips well sclerotized, anterior lip stronger than posterior. Vagina oblique, about half as long as corresponding body diameter. Gonad 2.7 times as long as body width, or 9 % of body length. One large egg: 155×58 µm, 2.7 times as long as wide or 2.2 times as long as body diameter. Anterior vulval lip strongly swollen. Advulval papillae present not only on the ventral but also on the dorsal side of body: ventrally four papillae (three prevulval and one postvulval), dorsally also four papillae. Vulva–anus distance equal to 1.7 tail lengths. Tail 170 µm long, occupying 8 % of entire length of body, strongly curved ventrally, in anterior half conoid, in posterior half nearly cylindrical; terminus rounded. Caudal glands poorly developed, spinneret a minute terminal tube on the tip of tail.

Male. Testes two. Spermatozoa small, spindle-shaped. Spicula 80 µm long, about as long as 3/4 tail length. Precloacal supplements eleven: eight large + three weakly developed. Tail similar to that of female, cylindrical in its posterior half and rounded on tip.

Differential characters and relationships. A medium-sized species of the genus *Miconchus* with broad head, large buccal cavity, pre-basally arranged teeth, enlarged anterior vulval lip, prodelphic gonad, lacking postvulval uterine sack, ventral and dorsal papillae on vulval region, relatively few male supplements, and with strongly curved, in posterior half cylindrical tail.

In a paper on the taxonomy of Anatonchidae (Andrássy, 1994), I enumerated 23 species within the genus *Miconchus* Andrásy, 1958; momentarily 30 species are known. The majority of them are amphidelphic. *Miconchus papillifer* sp. n. clearly differs from the four prodelphic species as follows:

From *M. digiturus* (Cobb, 1893) Andrásy,

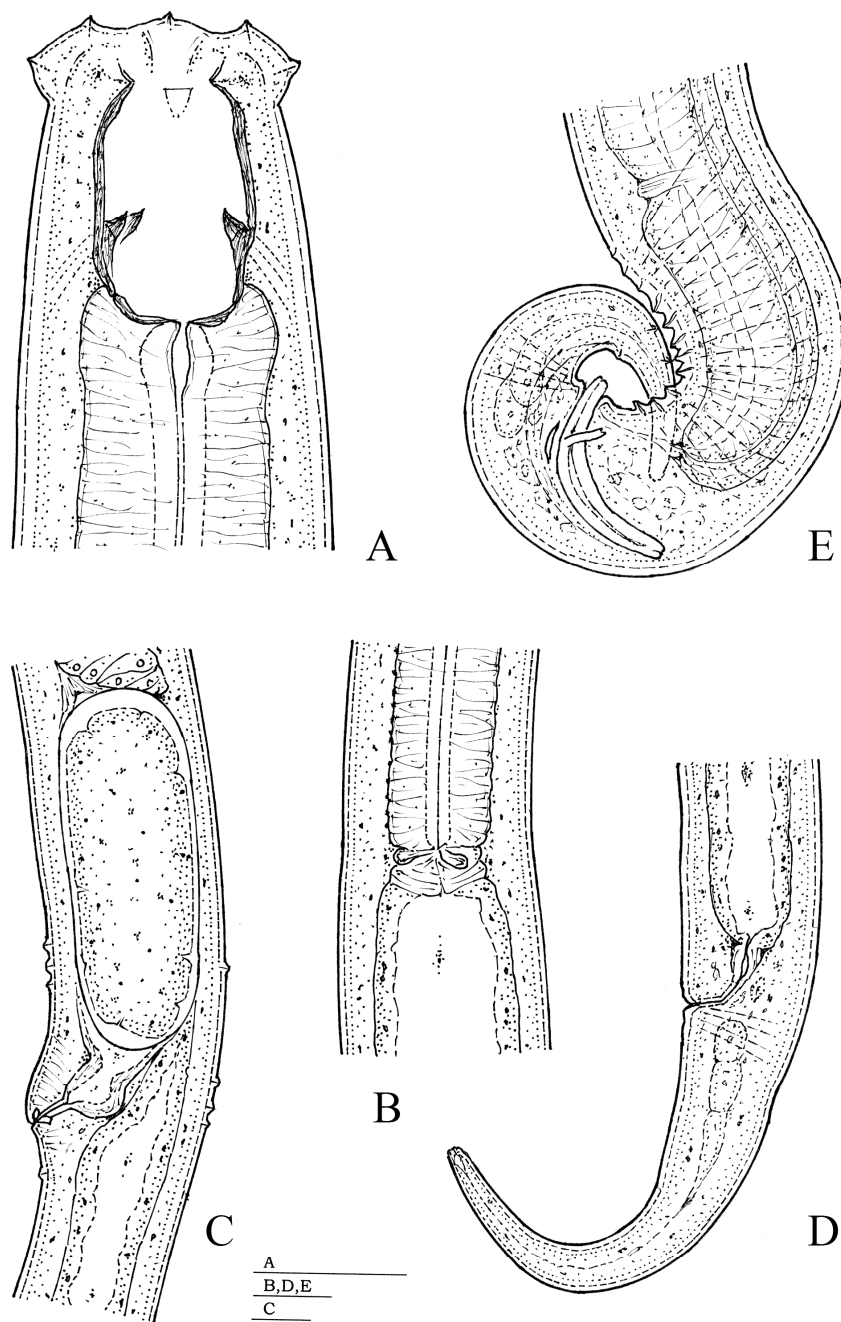


Figure 4. *Miconchus papillifer* sp. n. A: anterior end; B: cardiac region; C: vulval region (look at the four ventral and four dorsal papillae); D: female tail; E: male posterior region. (Scale bars 25 µm each)

1958 (as redescribed by Mulvey, 1962 as well as by Jensen and Mulvey, 1968): body longer (2.2 vs. 1.4–1.9 mm), postvulval sack absent, ventral advulval papillae more numerous (4+4 vs. 1), supplements fewer (11 vs. 12–17), tail longer (170 μm , vs. 130–140 μm) and cylindrical in its second half.

From *M. gomezi* Zullini, Loof & Bongers, 2002: tooth apices more anterior (dorsal: 54–59 % vs. 76–77 %), postvulval uterine sack absent (vs. present, 1.9–2.5 body widths long), advulval ventral papillae more in number (4+4 vs. 2), tail longer (170 μm , $c' = 4.8$ vs. 115–129 μm , $c' = 3.3$ –3.8) and not uniformly conoid, supplements fewer (9 vs. 13).

From *M. japonicus* Khan, Araki & Bilgrami, 2000: body larger (2.2 vs. 1.4–1.6 mm), tooth apices more anterior (dorsal: 54–59 % vs. 71–76 %), vulva more posterior (78 % vs. 69–73 %), vulval papillae present, tail cylindrical posteriorly with rounded terminus (vs. uniformly conoid with pointed terminus).

From *M. triodontus* Buangsuwon & Jensen, 1966: body longer (2.2 vs. 1.6–1.8 mm), vulva further back (78 % vs. 68–74 %), postvulval sack absent (vs. present, twice as long as body width), tail longer (170 μm , $c' = 4.8$ vs. 95–140 μm , $c' = 3$) and other shaped.

Miconchus papillifer sp. n. unambiguously differs from each species listed above in the number and arrangement (dorsal too!) of papillae on the vulval region as well as in the length and shape of tail.

Miconchus japonicus Khan, Araki & Bilgrami, 2000 from Japan and *M. koreanus* Jairajpuri, Tahseen & Choi, 2001 from South Korea agree in every respect with each other; thus, L = 1.4–1.6/1.3–1.7 mm, c = 9–12/10–12, V = 69–73/69–72 %, teeth basal with apices located at 71–76/71–73 % of buccal cavity length, gonad prodelphic, postvulval uterine sac and advulval papillae absent, tail of the same shape and of nearly equal length, caudal spinneret absent. No doubt, the two species are identical. Since *M. japonicus* was described in December, 2000 and *M. kore-*

anus in June, 2001, the valid name of the species remains *Miconchus japonicus*.

Zullini, Loof and Bongers (2002) described a species under the name “*Miconchus digiturus* (Cobb, 1893)” from Costa Rica, on the basis of four female specimens. Their animals differ from the descriptions of Cobb (1893, 1917), Mulvey (1962) and Jensen and Mulvey (1968) in some respects. The buccal cavity is larger (39–42 vs. 35–36 μm), the apices of teeth are located more posterior (77–81 % vs. 50–54 %), and there is no postvulval uterine sac (vs. present, as long as one body diameter). Owing to these differences the conspecificity of Cobb’s *digiturus* and the Costa Rican specimens can be queried.

Type habitat and locality. Meadow soil from 15 cm depth, Papallacta, Prov. Napo, Ecuador, collected August, 1988 by A. Zicsi and Cs. Csuzdi.

Type specimens. Holotype female on slide No. 13262. Paratype: one male. Both specimens in the collection of the author.

Etymology. The species name *papillifer* (= papillae-bearing) refers to the unusual number and position (ventral and dorsal) of papillae on the vulval region.

Acknowledgements. I am indebted to my colleagues and friends for collecting the nematodes described, namely to the late Prof. J. Balogh, as well as to Prof. A. Zicsi and Dr. Cs. Csuzdi.

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