



Two new species of *Nicomache* (Polychaeta: Maldanidae) from the Southwest Atlantic

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Abstract

Two new maldanid polychaetes were collected from the Ponta do Cabo Branco beach, Paraíba, Brazil, and represent the first record of the genus *Nicomache* for the southwest Atlantic. *Nicomache (Nicomache) lanai* sp. nov. has 22 setigerous segments, two pre-anal asetigerous segments, a dark beige colour on setigers 4–17, an anteriorly rounded prostomium forming a tall, arched keel, elliptical nuchal grooves that open posteriorly, 4–7 acicular spines on setigers 1–3, and an anal funnel with triangular equal-sized anal cirri, with concave sides. *Nicomache (Nicomache) brasiliensis* sp. nov. also has 22 setigerous and two pre-anal asetigerous segments, but the entire body is light-pink coloured. The prostomium is rounded anteriorly, but is longer, broadening posteriorly, forming a low, straight subterminal keel. This species has parallel nuchal grooves, with a sharp anterior angle, has only 4–6 acicular spines on setigers 1–3, and an anal funnel with short tapering, equal-sized anal cirri with convex sides.

Key words: Easternmost marine coast of Brazil, Annelida, *Nicomache*, new species

Resumo

Duas novas espécies de *Nicomache* (Polychaeta: Maldanidae) do sudoeste do Atlântico. Dois poliquetas maldanídeos foram coletados da Praia da Ponta do Cabo Branco, Paraíba, Brasil, representando o primeiro registro do gênero *Nicomache* para o sudoeste do Atlântico. *Nicomache (Nicomache) lanai* sp. nov. possui 22 segmentos setígeros, dois segmentos assetígeros pré-anais, uma cor bege escura nos setígeros 4–17, um prostômio redondo anteriormente, formando uma quilha alta e arqueada, sulcos nucais elípticos e abertos posteriormente, 4–7 espinhos aciculares nos setígeros 1–3, um funil anal com lados côncavos, bordejados por cirros triangulares e de tamanhos iguais. *Nicomache (Nicomache) brasiliensis* sp. nov. também possui 22 segmentos setígeros, dois segmentos assetígeros pré-anais, o corpo inteiramente cor de rosa-clara. O prostômio redondo anteriormente, porém grande e amplo posteriormente, formando uma quilha baixa, reta e sub-terminal. Esta espécie possui sulcos nucais paralelos, com um ângulo agudo; possui 4–6 espinhos aciculares nos setígeros 1–3, um funil anal com lados convexos, bordejados com cirros anais curtos, afilados e de tamanhos iguais.

Palavras-chave: Costa marinha mais leste do Brasil, Annelida, *Nicomache*, novas espécies.

Introduction

The family Maldanidae includes sedentary polychaetes known as bamboo worms. They occur from the intertidal region to the deep sea (Arwidsson 1907). Their tubes are constructed either horizontally, with sand and mucous under rocks, or vertically in sandy bottoms. The genus *Nicomache* Malmgren, 1867 is the type genus for the subfamily Nicomachinae Arwidsson, 1907, which contains two subgenera, *Nicomache (Nicomache)*

and *Nicomache* (*Loxochona*) (Arwidsson 1907). Their bodies are cylindrical, with a relatively small number of elongated, fragile segments (18–24) (Imajima & Shiraki 1982). Characters used to identify species of *Nicomache* are the form of the prostomium, nuchal grooves, number of spines per bundle in anterior setigers, form of the setae, form and number of asetigerous pre-anal segments, and structure of the anal funnel. Differences in these characters are diagnostic for species of the genus (Table 1). At present, 16 species of *Nicomache* are known. Augener (1931) cited *Nicomache* for the South Atlantic, but no Brazilian species were identified. *Nicomache lumbricalis* Fabricius, 1780, a species originally described from Greenland, was reported from the Subantarctic region by Branch (1994). In this paper, we describe two new species of *Nicomache* for the north-east coast of Brazil.

TABLE 1. Morphological characters for 18 known species of *Nicomache*, including new species described in this paper.

Species	Prostomium	Nuchal grooves	No. of setigers	Acicular spines	Notopodial capillaries	Rostrate hooks	No. of asetigers	Anal funnel	References	Geographical distribution
<i>N. (Nicomache) lanai</i> sp. nov.	Rounded anteriorly, forming arched cephalic keel	Elliptical, opening posteriorly	22	4–7 strongly pointed, on setigers 1–3	3 kinds: Long, smooth, thin; long, bristled, with bifurcate tips, shaft yellow, transparent; smooth, unilimbate	With 7–8 teeth above main fang; long, thin fibrils below main fang; manubrium prominent in center of uncinus	2	Cup-like, bordered by 21 symmetrical and triangular cirri	This paper	Cabo Branco, João Pessoa, Paraíba, Brazil
<i>N. (Nicomache) brasiliensis</i> sp. nov.	Rounded anteriorly, forming straight, subterminal keel, expanded posteriorly	Parallel, shallow, with acute angle anteriorly	22	4–6 strongly pointed, on setigers 1–3	3 kinds: long, smooth, with strong, yellow, transparent shaft; long, bristled, with bifurcate tips; smooth, unilimbate	With 5–7 teeth above main fang; subterminal tuft of five fibrils below fang	2	With convex sides, bordered by 21 cirri	This Paper	Cabo Branco, João Pessoa, Paraíba, Brazil
<i>N. (Nicomache) antillensis</i> Augener, 1922	With rounded, prominent, dorsal keel, occupying of circle	Forming an inverted V-shape, with equal sides, 1/3 size of prostomium	20–22	3–5, stout, on setigers 1–3	3 kinds: smooth, diminute; limbate; spinulose	With 6–7 teeth above main fang, and 5 prominent fibrils	2	Funnel deep, bordered by 22 cirri	Augener, 1922; Treadwell, 1924; Jiménez-Cueto & Salazar-Vallejo, 1997	Gulf of California and Caribbean Sea
<i>N. (Nicomache) lumbricalis</i> Fabricius, 1780	Rounded anteriorly, forming hook-like projection overhanging mouth	Nuchal grooves as long parallel slits, with anterior ends curved outwards	22	1 stout, straight, on setigers 1–3	3 kinds: Slender, limbate; long, limbate; long filaments spinose	With 3–4 teeth above main fang; small accessory teeth	2	Cup-shaped, bordered by 17–31 asymmetrical cirri	Arwidsson, 1907; Fauvel, 1928; Monro, 1930; Pettibone, 1954; Day, 1967; Branch, 1994; Imajima & Shiraki, 1982; Imajima, 1997; 2001;	Arctic; North Atlantic; North Pacific; Bering Sea to N. W. Japan; W. Canada to California; Antarctica
<i>N. (Nicomache) monroi</i> Hartman, 1967	Rounded, red-coloured, with high keel	Straight, parallel	Not mentioned	1–2 large, untoothed, on setigers 1–3	2 kinds: stout, bordered with hirsute tip; long, slender, pinnate; simple	With 3 teeth above main fang; 4 thin fibrils	2	Cup-like, bordered by 30 cirri	Monro, 1930; Hartman, 1967	Antarctica: Bismarck Strait, Palmer Archipelago
<i>N. (Nicomache) plimmertonensis</i> Augener, 1926	Rounded, forming longitudinal keel	Straight, forming angle of 90	24	One strong, smooth, and curved, on setigers 1–3	2 kinds: Thin, brilliant and long; short bristles	With 5–6 teeth above main fang; numerous fibrils	2	Cup-like, but with convex sides; numerous short anal cirri	Augener, 1926	Plimmerton Coast

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TABLE 1 (continued)

Species	Prostomium	Nuchal grooves	No. of setigers	Acicular spines	Notopodial capillaries	Rostrate hooks	No. of asetigers	Anal funnel	References	Geographical distribution
<i>N. (Loxochona) canadensis</i> McIntosh, 1913	Obliquely truncate, forming nose-like keel	Hook-shaped, with apices parallel to keel, curving posteriorly, forming acute angle	22–23	1–2 powerful, simple, straight, on setigers 1–3	One kind: Long, slightly curved, striated shafts, gently tapering	With 4 teeth above main fang, and numerous smooth fibrils; strong curved manubrium	2	With asymmetrical borders, cup-shaped, bordered by 15 cirri	McIntosh, 1913; Treadwell, 1948	Gulf of Saint Lawrence, Canada
<i>N. (Nicomache) maculata</i> Arwidsson, 1911	Bluntly truncate, rounded, sometimes with shovel-like short projection	Parallel to keel, curved at anterior end	22	1–2, golden coloured, close to side, on setigers 1–3	2 kinds: strong bristles, with distinct wings and tapered tips devoid of spikes; slender forms with long, fine, hair-like tips	With 5 teeth above the main great fang	1	Slightly oblique and bordered by 19–21 cirri or triangular processes	Arwidsson, 1911; McIntosh, 1913; Fauvel, 1928	North Sea, Shetland Islands
<i>N. (Nicomache) minor</i> Arwidsson, 1907	Short and thick, rounded and with well defined median keel	S-shaped, more or less flattened at curves	23	1 stout, blunt-tipped, on setigers 1–3	2 kinds: thin bi-limbate; laterally spinulose	With 6–8 acute teeth; large gular bristles	1	Circular and funnel-shaped, bordered by 20 unequal cirri, some reduced to simple elevations	Arwidsson, 1907; Uschakov, 1955; Imajima & Shiraki, 1982; Imajima, 1994; 2001	Norway; Okhotsk Sea; Bering Sea; Japan
<i>N. (Nicomache) mossambica</i> Day, 1951	Strap-shaped, with short dorsal keel	Nearly parallel at both extremities	37	1–4, straight, on setigers 1–3	2 kinds: fine, minutely spinulose; stout, narrow winged	With 6–7 teeth above main fang; numerous fibrils	1	Large, cylindrical, bordered by 25–30 small papillae	Day, 1951, 1967	Africa: Delagoa Bay; Moambique
<i>N. (Nicomache) personata</i> Johnson, 1901	Head setigers 1–4 chocolate-coloured, with white band across the head and surrounding setigers	Short, more or less S-shaped	22	1 stout, with slender tips, on setigers 1–3	3 kinds: thick bi-limbate; distally spinose; long, slender, finely pinnate	With 7 teeth above main fang; long gular bristles	1	Circular, bordered by 20 short triangular papillae, some reduced to simple elevations	Johnson, 1901; Hartman, 1948; Uschakov, 1955; Imajima, 1964; Hobson & Banse, 1981; Imajima & Shiraki, 1982	Pacific coast of North America: Alaska to Vancouver Isl., Canada; Japan
<i>N. (Loxochona) quadrispinata</i> Arwidsson, 1907	Cephalic region short, thick, with a compressed, high keel	Slightly curved	22	1 strong, stout, on setigers 1–4	4 kinds: thick, limbate; pilose; thinner, laterally spinose; filamentous, pinnate	With 3 small, acute teeth; few gular bristles	1	Cup-like, but inclined, bordered by 13–18 short, symmetrical cirri	Arwidsson, 1907; Wesenberg-Lund, 1950; Imajima & Shiraki, 1982	Norway; Greenland; Japan
<i>N. (Loxochona) trispinata</i> Arwidsson, 1907	Head forming fine keel	Short, arched	23	1 strong, curved, on setigers 1–3	2 kinds: smooth, pointed; wavy bristles with strong and clear denticles	With 3–6 teeth, few gular bristles	1	Oblique, bordered by 25 triangular cirri	Arwidsson, 1907; Fauvel, 1928; Amoureux, 1982	Norway
<i>N. (Loxochona) arwidssoni</i> Blake, 1985	Rounded anteriorly, with cephalic keel	Curved	19–21	1–2 blunt-tipped, on setigers 1–3	One kind: simple, with smooth shafts and clear narrow sheaths	With 4 teeth of diminishing sizes, with well-developed tuft of fibrils; prominent manubrium on shaft	1	With irregular borders containing 25 papillae	Blake, 1985	Galapagos Rift, hydrothermal vents

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TABLE 1 (continued)

Species	Prostomium	Nuchal grooves	No. of setigers	Acicular spines	Notopodial capillaries	Rostrate hooks	No. of asetigers	Anal funnel	References	Geographical distribution
<i>N. (Loxochona) ohtai</i> Miura & Hashimoto, 1991	Rounded anteriorly, arched, defined keel	Located on both sides of keel, curved, diverging anteriorly	31–35	2–6, stout, on setigers 1–3	3 kinds: stout, bi-limbate; spirally spinulose; short, slender, wavy	With 3–4 teeth above main fang, many spines or convex side and several sub-rostral fibrils	1	Asymmetrical bordered by 18–22 papillae of different sizes	Miura & Hashimoto, 1991	Western North Pacific, cold-seep communities of Hatsushima, Sagami Bay, Japan
<i>N. ? interstricta</i> Ehlers, 1908	Large, pointed anteriorly, triangular	Forming deep, circular depressions	19	1 stout, on setigers 1–3	One kind: smooth, acute, limbate	With teeth above main fang, numerous fibrils; curved manubrium	4	Pygidium without anal funnel, with indistinct transverse wrinkles	Ehlers, 1908	Bangkam, Indonesia
<i>N. ? inornata</i> Moore, 1903	Prostomial lobe pointed, dorsally curved, median border continuous with lateral border of cephalic shield	Not mentioned	14 on anterior fragment	1 stout, tapering to blunt point, on setigers 1–4	2 kinds: large, fibrillated, with tip acute, or with curved, short flange; fringed	With 4–6 teeth above main fang, numerous fibrils	Not mentioned	Not mentioned	Moore, 1903; Imajima & Hartman, 1964	Suruga Bay, Japan
<i>N. (Loxochona) venticola</i> Blake & Hilbig, 1990	Ample, rounded anteriorly, forming arched cephalic keel at posterior margin	Curved	29–30	4–6 heavy, straight, on setigers 1–3	One kind: simple, with smooth shafts and clear narrow sheaths	With 2–3 teeth above main fang, numerous fibrils; prominent manubrium	Absent	With irregular borders; 22 anal papillae	Blake & Hilbig, 1990	Hydrothermal vents of the northeastern Pacific

Material and Methods

Specimens are from the intertidal region of Ponta do Cabo Branco, João Pessoa, Paraíba, Brazil. Specimens were collected during low tides (0.0–0.2 m). Menthol and magnesium chloride at 7.5% were used to anesthetize specimens, and they were preserved in 10% formalin. Specimens were observed with a Zeiss stereomicroscope. Setae, uncini, and acicular spines were observed with an Olympus BX41 compound microscope. All illustrations were drawn using a camera lucida. Measurements are in millimeters. We provide a comparative table (Table 1) for all previously described species and the two new species. We compare our new species with those congeners having two pre-anal asetigerous segments. All specimens have been deposited in the Collection of Marine Invertebrates of the Department of Systematics and Ecology of the Federal University of Paraíba (CIM-POL-UFPB).

Systematics

Family Maldanidae Malmgren, 1867

Subfamily Nicomachinae Arwidsson, 1907

Arwidsson 1907; Day 1967; Rouse 1990

Diagnosis. Nuchal grooves straight or curved. No cephalic plate. Pygidium a foliaceous plate or sunken in a funnel that is crenulate or rimmed with cirri. Segments without collars. Neuropodial hooks usually in single row.

Genus *Nicomache* Malmgren, 1866

Arwidsson 1907; Day 1967; Fauchald 1977.

Type species: *Sabella lumbricalis* Fabricius, 1780, by monotypy.

Emended diagnosis: Head without cephalic shield; anal plate with well-developed edge dorsally and ventrally; nuchal grooves straight and parallel, curved, or divergent; all rostral uncini in single row; acicular spines on setigers 1–3, rarely on 1–4; anal funnel with distal margin in lateral view straight, or slightly truncate obliquely; anal plate with unequal anal cirri.

Remarks. Arwidsson (1907) reorganized the genus *Nicomache* into two subgenera on the basis of the shape of the anal funnel in lateral view. *Nicomache* (*Nicomache*) is characterized by having a straight, non-oblique distal margin in lateral view, while *Nicomache* (*Loxochona*) is diagnosed as having a distally obliquely truncate anal funnel in lateral view. Imajima & Shiraki (1982) describe some species of this genus, which confirm this classification scheme. Another important diagnostic character refers to edge of the anal plate. This edge is well developed both dorsally and ventrally in *Nicomache*. In *Petaloproctus* Quatrefages, 1865 only the ventral edge is well developed, while the dorsal edge is reduced (Arwidsson 1907; Imajima & Shiraki 1982).

Nicomache (*Nicomache*) *lanai* sp. nov.

(Fig. 1 A–K)

Material examined. Holotype: Adult female from Ponta do Cabo Branco beach (07°09'16"S; 34°47'00"W), João Pessoa, Paraíba Brazil (CIM-POL-UFPB 238). Paratypes: two specimens from same locality (CIM-POL-UFPB 26, 255).

Diagnosis. Prostomium rounded anteriorly, forming a high, arched cephalic keel; nuchal grooves elliptical, opening posteriorly. A dorsal peristomial furrow extends from either side of mouth behind the prostomium. Colour dark beige on setigers 4–17. Four to 7 acicular spines on setigers 1–3 (1:4; 2:5; 3:7). Posterior end terminating in cup-shaped anal funnel, with triangular, equal-sized anal cirri and concave sides.

Description. Body complete, with 22 setigers and two pre-anal asetigerous segments; total length 110 mm; segments become gradually larger. Setiger 1–4 with 2 mm wide, setiger 5 and subsequent setigers 4 mm wide, continuing until first asetigerous segment. Posterior region 4 mm long, formed by two asetigerous segments and anal funnel. Prostomium fused to peristomium, forming a well-defined head. Prostomium rounded anteriorly, forming a high arched keel (Fig. 1A). Short curved nuchal organs opening posteriorly (Fig. 1B). Peristomium with several transverse folds, extending beyond posterior edge of prostomium; ocelli and pigment spots absent. Mouth ventral, with two well-developed lips, anterior lip larger, slightly pigmented, with numerous dark spots anteriorly, overlapping unpigmented posterior lip.

Setigers 1–3 light-yellow, with anterior borders inflated. Neuropodia of setigers 1–3 with honey-coloured, strongly pointed acicular spines (1: 4, 2: 5, 3: 7) (Fig. 1C). Posterior half of setigers 4–17 with dark beige pigment, after which colour changes to light yellow. Parapodial lobes light yellow throughout. Posterior to setiger 4, neuropodia with a simple row of rostrate uncini. Each uncinus with a main fang and 7–8 accessory teeth; long, thin fibrils below main fang (Fig. 1D, 1E); each uncinus perpendicular to body wall; long anterior shaft, manubrium prominent on center of uncinus; shorter and curved posterior shaft; each uncinus with darkly coloured patch. After setiger 4, neuropodia with a variable number of uncini: 4: 30, 5: 36, 6: 43, 7: 49, 8: 49. Notopodia of setigers 1–22 with fascicles of long and narrow capillary setae. These capillaries arise from a short torus and are of three kinds: long, thin, and smooth (Fig. 1F); long, bristled, with or without bifurcate tips, shaft yellow, transparent and smooth (Figs. 1G, 1H); and smooth unilimbate, with margins hatched, and with very narrow apices, shaft strong, yellow, transparent (Fig. 1I).

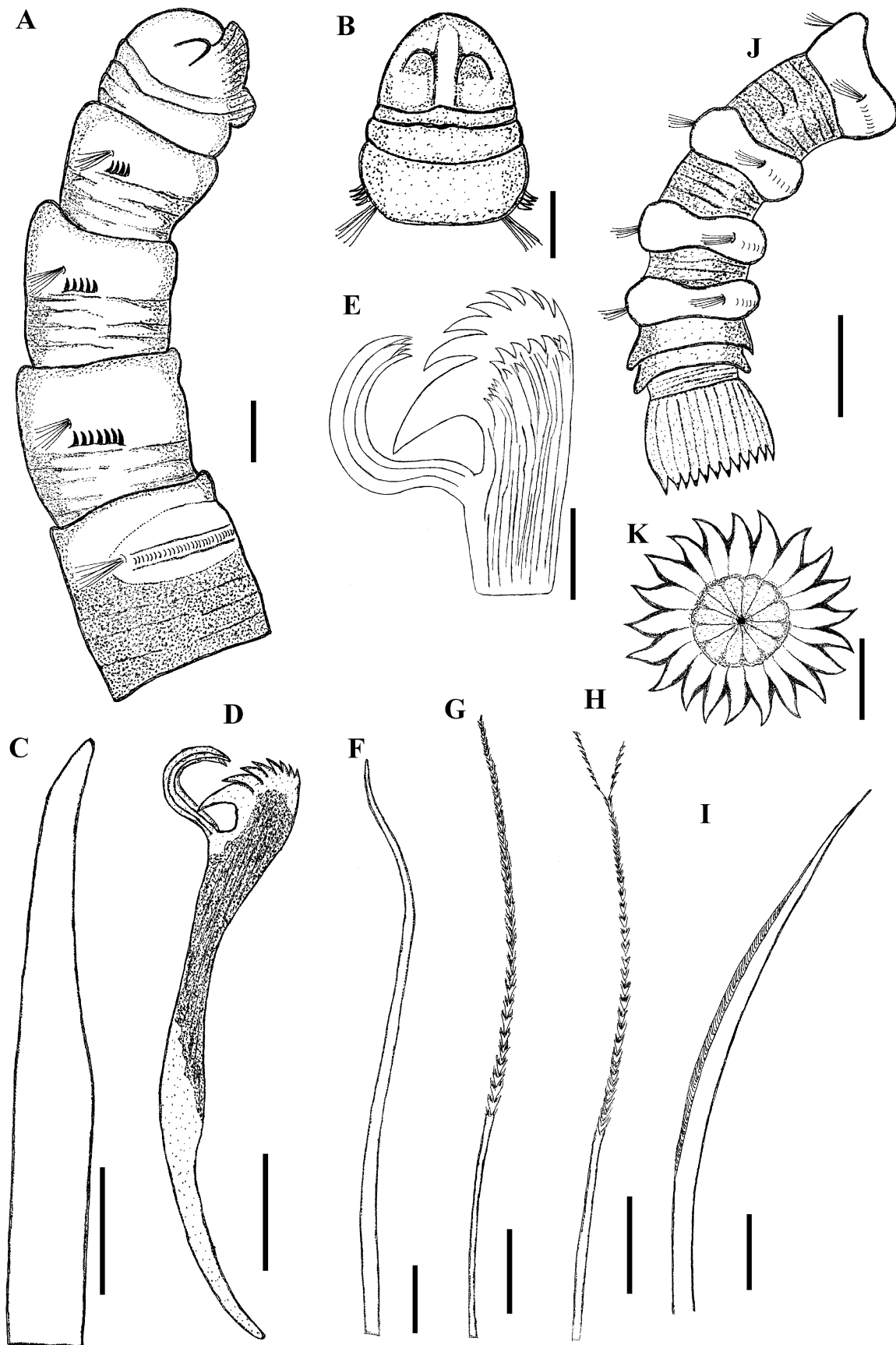


FIGURE 1. *Nicomache (Nicomache) lanai* sp. nov. A, anterior end of holotype, lateral view. B, head, dorsal view. C, spine from setiger 1. D, rostrate uncinus from middle setiger. E, distal ends of middle uncini. F, long smooth capillary seta from setiger 1. G, bristled capillary seta from setiger 3. H, bristled bifurcate capillary seta from setiger 17. I, uni-limbate capillary seta from setiger 4. J, posterior end of holotype. K, anal plate, posterior view. Scales bars: 1(J) 2 mm; 1(A, B, K): 1mm; 1(C, D, E, F, G, H, I): 0,5 mm.

Two short, equal, pre-anal asetigerous segments present, anterior one with a posterior border overlapping posterior segment. Anal funnel cup-like, bearing 21 sub-triangular equal-sized anal cirri (Fig. 1J); anus terminal, located in center of funnel, pillow-shaped, bordered by numerous digitiform papillae of different sizes (Fig. 1K).

Tube up to 200 mm long, 10 mm wide, composed of grains of sand, fragments of sea-urchin spines, and pieces of mollusk shells pasted to a fine and resistant yellowish membrane. The tubes form galleries extending below one or several rocks.

Habitat. Specimens live under intertidal rocks.

Etymology. The species name is for Dr. Paulo da Cunha Lana, Professor of the Universidade Federal do Paraná, who has contributed much to the knowledge of Brazilian polychaetes.

Remarks. *Nicomache (Nicomache) antillensis* Augener, 1922 differs from *N. (Nicomache) lanai* sp. nov. by having the prostomium forming a rounded and little prominent dorsal keel, the nuchal grooves almost perpendicular to the keel and slightly curved near the apex with the shape of an inverted V, for presenting a variable number of setigers (22–23), by having 3–5 acicular spines on setigers 1–3, and for having an anal funnel with convex sides bordered by numerous similar cirri (Augener 1922; Treadwell 1924; Jiménez-Cueto & Salazar-Vallejo 1997). *Nicomache (Nicomache) lumbricalis* (Fabricius, 1780) differs from *N. (Nicomache) lanai* sp. nov. by having a hook-like prostomial projection overhanging the mouth, nuchal grooves long and parallel slits with their anterior ends curved outwards, by having one acicular spine on setigers 1–3, and by always having 23 setigers. The two species are similar in the concave, cup-shaped anal funnel (Arwidsson 1907; Fauvel 1928; Monro 1930; Treadwell 1948; Pettibone 1954; Day 1967; Imajima & Shiraki 1982; Branch 1994; Imajima 1997, 2000). *Nicomache (Nicomache) monroi* Hartman, 1967 differs from *N. (Nicomache) lanai* sp. nov. by having reddish anterior segments, a prostomium forming a high cephalic keel, straight and parallel nuchal grooves, and by having 1–2 acicular spines on setigers 1–3. The two species are similar in the nature of the cup-shaped anal funnel, but differ in the shape of the anal cirri (Monro 1930; Hartman 1967). *Nicomache (Nicomache) plimmertonensis* Augener, 1926 differs from *N. (Nicomache) lanai* by having straight nuchal grooves that form an angle of 90° anteriorly, 24 setigers, one spine on setigers 1–3, and a long anal funnel with sides strongly curved outwards (Augener 1926). *Nicomache (Loxochona) canadensis* McIntosh, 1913 differs from *N. (Nicomache) lanai* sp. nov. by having an obliquely truncate prostomium that forms a nose-shaped keel in lateral view, hooked nuchal grooves with one of the tips parallel to the keel, curved posteriorly and with the anterior part forming a sharp angle, and no more than two acicular spines on setigers 1–3. The two latter species are similar in having a concave anal funnel, but in *N. (Loxochona) canadensis* the borders are asymmetric (McIntosh, 1913; Treadwell, 1948).

***Nicomache (Nicomache) brasiliensis* sp. nov.**

(Fig. 2 A–J)

Material examined. Holotype: Adult female, Ponta do Cabo Branco beach (07°09'06"S; 34°47'00"W), João Pessoa, Paraíba, Brazil (CIM-POL-UFPB 111). Paratype: Same locality (CIM-POL-UFPB 112).

Diagnosis. Prostomium rounded anteriorly, long, forming a low straight keel that becomes larger posteriorly; nuchal grooves straight, pointed anteriorly. A very thin furrow is present behind the prostomium. Colour uniformly light pink. Four to six acicular spines on setigers 1–3 (1: 4, 2: 4, 3: 6). Posterior end terminating in anal funnel, bordered by about 24 similar anal cirri.

Description. Body complete, with 22 setigers and two pre-anal asetigerous segments. Body 120 mm long. Setigers 1–4 with 3 mm wide; subsequent segments up to 5 mm wide. Posterior region with 2 pre-anal asetigerous segments and anal funnel 3.5 mm long. Prostomium fused to peristomium, with a well-defined head. Prostomium rounded anteriorly, forming a low, straight, subterminal keel, becoming broader posteriorly (Fig. 2A).

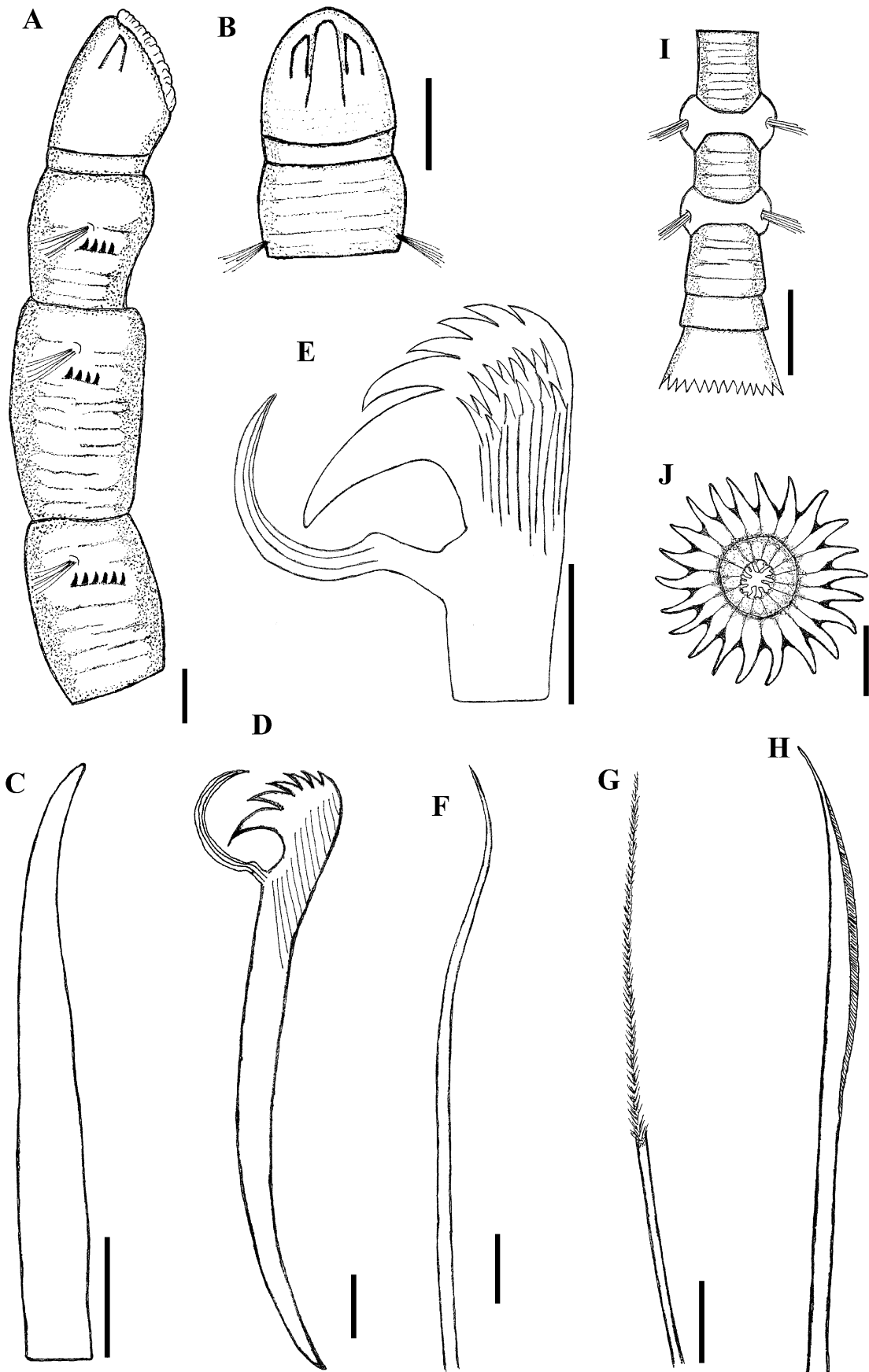


FIGURE 2. *Nicomache (Nicomache) brasiliensis* sp. nov. A, anterior end of holotype, lateral view. B, head, dorsal view. C, spine from setiger 1. D, rostrate uncinus from middle setiger. E, distal ends of middle uncini. F, long smooth capillary seta from setiger 1. G, bristled capillary seta from setiger 3. H, unilimbate capillary seta from setiger 4. I, posterior end of holotype. J, anal plate, posterior view. Scales: 1(I) 2mm; 1(A, B, J): 1mm; 1(C, D, E, F, G, H): 0,5 mm.

Two parallel nuchal grooves present on either side of prostomium, each with a sharp anterior angle (Fig. 2B). Peristomium with a narrow furrow extending from one side of mouth to the other, passing over dorsal region, behind prostomium. Ocelli and pigment spots absent. Mouth ventral, with narrow lips and a few crenulations surrounding mouth.

Neuropodia of setigers 1–3 with yellow strong sharp acicular spines (1: 4; 2: 5; 3: 6) (Fig. 2C). Neuropodia of setigers 4–22 with a simple row of rostrate uncini. Each uncinus with a main fang, 5–7 accessory teeth, and a subterminal tuft of five long, thin fibrils below fang; long anterior shaft, with an indistinct manubrium and less curved posterior shaft (Fig. 2D, 2E); all uncini are light-yellow. From setiger 4, neuropodia with a variable number of uncini: 4: 27, 5: 33, 6: 43, 7: 43. Notopodia of setigers 1–22 with fascicles of three kinds of capillary setae: long, smooth, with strong, yellow, transparent shaft (Fig. 2F); long, bristled, with simple or sometimes bifurcate tips, strong and dark-yellow shaft (Fig. 2G); and smooth unilimbate, with margins hatched, and with very narrow apices, shaft strong, yellow, transparent (Fig. 2H).

Two pre-anal asetigerous segments are present. Posterior end ending in an anal funnel, bordered by 21 similar anal cirri (Fig. 2I); anus terminal, located on an elevated mound (Fig. 2J).

Tube 170 mm long, composed of sand grains, fragments of urchin spines and pieces of mollusk shells pasted onto a thin, very resistant yellow membrane.

Habitat. Tubes under stones in the intertidal region.

Etymology. The new species is dedicated to the country in which it was discovered.

Remarks. *Nicomache (Nicomache) lanai* sp. nov. differs from *N. (Nicomache) brasiliensis* sp. nov. by having a prostomium with a tall and arched cephalic keel, elliptical nuchal grooves that open posteriorly (Fig. 1A), 4–7 acicular spines on setigers 1–3, and by having a cup-shaped anal funnel with concave sides. *N. (Nicomache) antillensis* differs from *N. (Nicomache) brasiliensis* sp. nov. by having a prostomium with a rounded, low dorsal keel, nuchal grooves nearly perpendicular to the keel, with a slight curve at the apex in the form of an inverted V, and by having 3–5 acicular spines in setigers 1–3. The latter species are similar in the form of the anal funnel, being bordered by cirri of similar sizes (Augener 1922; Treadwell 1924; Jiménez-Cueto & Salazar-Vallejo 1997). *N. (Nicomache) lumbricalis* differs from *N. (Nicomache) brasiliensis* sp. nov. by having a prostomium with a hook-like projection over the mouth, nuchal grooves as long, parallel slits with their anterior ends curved outwards, by having only one acicular spine on setigers 1–3, by the variable number of setigerous segments, and by having a cup-shaped anal funnel with concave sides (Arwidsson 1907; Fauvel 1928; Monro 1930; Treadwell 1948; Pettibone 1954; Day 1967; Imajima & Shiraki 1982; Branch 1994; Imajima 1997, 2000). *N. (Nicomache) monroi* differs from *N. (Nicomache) brasiliensis* sp. nov. by having red-coloured anterior segments, a prostomium with a high cephalic keel, straight and parallel nuchal grooves, 1–2 acicular spines in setigers 1–3, and a convex, cup-shaped anal funnel. This latter species differs, however, in the shape of the anal cirri (Monro, 1930; Hartman, 1967). *N. (Nicomache) plimmertonensis* Augener, 1926 differs from *N. (Nicomache) brasiliensis* by having the prostomium tall and arched, straight nuchal grooves that form an angle of 90 anteriorly, 24 setigers, one acicular spine on setigers 1–3, and a long anal funnel with sides prominently curved outwards (Augener, 1926). *N. (Loxochona) canadensis* differs from *N. (Nicomache) brasiliensis* sp. nov. by having an obliquely truncate prostomium, forming a nose-shaped keel in lateral view, hooked nuchal grooves with one of the tips parallel to the keel, curving posteriorly, and forming a narrow angle anteriorly, two acicular spines on setigers 1–2, and a concave anal funnel with symmetric borders (McIntosh 1913; Treadwell 1948).

Discussion

One problem encountered in *Nicomache* systematics concerns the anterior region formed by the prostomium and peristomium. Several authors refer to a little-defined prostomium (Augener 1926; Hartman 1967; Jime-

nez-Cueto & Salazar-Vallejo 1997) or to a keel-shaped prostomium fused to the peristomium (Pettibone 1954; Imajima & Shiraki 1982; Fauchald & Rouse 1997). There do not appear to be any precise descriptions of the peristomium. We define the anterior region as a prostomial-peristomial structure, based on the fusion of the prostomium to the peristomium. The head of the maldanids is reduced due to loss of prostomial and peristomial appendages, which is true for many polychaete families. In *Nicomache* the prostomium is present as a keel of different shapes and sizes in the various species. The peristomium may be defined in different ways: as an area that surrounds the mouth or the roof of the mouth, as delimited by the lips forming an elongate segment (Fauchald & Rouse 1997), or even as forming rings posterior to the prostomium (Eibye-Jacobsen 1994). We define the prostomial-peristomial region as that part of the body occurring anterior to the first setigerous segment. We individuate the prostomium as the cephalic keel, and the peristomium as forming the lips, the roof of the mouth, and the grooves that surround the head-region posterior to the prostomium.

The species of *Nicomache* need to be revised in order to clarify diagnostic characters. We doubt that *N. inornata* Moore, 1903 belongs to *Nicomache*, because the posterior region is not described, and this region is of diagnostic importance for the group. *N. interstricta* Ehlers, 1908, even though having been described from complete individuals, does not belong to *Nicomache*. This species has a terminal pigydium without an anal plate and funnel, has indistinct transverse wrinkles, and has four asetigerous pre-anal segments (Ehlers, 1908). In the remaining species of *Nicomache* there are never more than two pre-anal asetigerous segments. We suggest that *N. interstricta* belongs to the genus *Lumbriclymene* Sars, 1872, of the subfamily Lumbriclymeninae Arwidsson, 1907. This is in agreement with Imajima & Shiraki, (1982), that transfer *Nicomache japonica* McIntosh, 1885 to *Lumbriclymene japonica* (McIntosh, 1885). Ehlers, (1908) also compared *N. interstricta* with *N. japonica*. The species needs to be reexamined in order to fully confirm our deduction.

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