

**A description of *Anoplostoma nhatrangensis* sp.n.
from mangrove habitats of Nha Trang, Central Vietnam,
with a review of the genus *Anoplostoma* Bütschli, 1874
(Nematoda: Enoplida)**

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ABSTRACT: *Anoplostoma nhatrangensis* sp.n. is described from a degrading mangrove habitat in the Nha Trang area, Central Vietnam. The new species is characterized by relatively long outer labial setae (81–120% c.b.d.); relatively long tail with longer posterior cylindrical portion (c 5.71–6.92, c' 8.96–11.8, distal tail part 63–90%); males without preanal bursal papillae and only a minute postanal bursal papilla besides the posterior bursal spine. *Anoplostoma nhatrangensis* sp.n. is most similar to the *A. heterurum* differing in certain morphometric values: a bit more stout body (a 33–45 versus 56), and relatively longer tail (c 5.9–6.6 versus 11 and c' 10–12 versus 6.5) with greater posterior slender cylindrical portion (82–90 versus 75%). A short taxonomic review of the *Anoplostoma* species is proposed. The genus contains twenty nominal species: fourteen of them are considered as valid; *A. brevispiculum* is considered as a species *incertae sedis* because its characters do not fit the generic diagnosis, *A. demani* as a *species inquirenda* because of incomplete data of the original description and *A. macrospiculum* as a junior synonym of *A. sunderbanae*. Tables of simplified images of male heads and tails as well as list of important morphometric values are proposed as a tool for quicker identification of *Anoplostoma* species.

KEY WORDS: *Anoplostoma*, free-living nematodes, mangroves, taxonomy, Vietnam.

**Описание *Anoplostoma nhatrangensis* sp.n. из
мангрового биотопа Нячанга, Центральный Вьетнам
с таксономическим обзором рода
Anoplostoma Bütschli, 1874 (Nematoda: Enoplida)**

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РЕЗЮМЕ: *Anoplostoma nhatrangensis* sp.n. обнаружена в деградирующем мангровом биотопе в районе Нячанга, Центральный Вьетнам. Новый вид характеризуется относительно длинными внешними губными щетинками (o.l.s. 6,5–9 μ m или 81–120% c.b.d.); относительно длинным хвостом с относительно большой задней тонкой цилиндрической частью (с 5,71–6,92, с' 8,96–11,8, dist.tail part 63–90%); наличием у самцов только одной пары маленьких постанальных папилл и пары заднебурсальных латеральных щетинок (шипов) при отсутствии преанальных бурсальных сенсилл. *A. nhatrangensis* sp.n. наиболее сходен с *A. heterurum*, от которой отличается некоторыми морфометрическими параметрами: более толстым телом (а 33–45 против 56) и относительно более длинным хвостом (с 5,9–6,6 против 11 and с' 10–12 против 6,5) с относительно большей задней цилиндрической частью (82–90 против 75%). Предлагается краткий таксономический обзор видов *Anoplostoma*. В составе рода двадцать номинальных видов, из них четырнадцать признаны валидными. В настоящей работе *A. brevispiculum* квалифицируется как вид *incertae sedis*, поскольку его признаки не соответствуют диагнозу рода; *A. demani* обозначен как *species inquirenda* по причине неполноты оригинального описания; *A. macrospiculum* признаётся младшим синонимом *A. sunderbae*. Для ускоренной идентификации видов сконструирован пикториальный ключ, состоящий из двух компонентов, упрощённых образов голов и хвостов самцов, и таблицы важнейших морфометрических характеристик.

КЛЮЧЕВЫЕ СЛОВА: *Anoplostoma*, Вьетнам, мангровые биотопы, морские свободноживущие нематоды, таксономия.

Introduction

The present report is the first of a series of papers on free-living nematodes of mangrove habitats in the Nha Trang area, Khanh Hoa Province, Central Vietnam. In this area, mangroves are disappearing rapidly and the small remaining mangrove stands show various levels of degradation. Our goal is to understand diversity and communities of free-living nematodes under various conditions of normal, vanishing and restored mangroves.

A bulk of nematode species found in the Nha Trang mangroves are new for science. Here we describe a new species belonging to *Anoplostoma*, a genus that includes many common intertidal or shelf species from various parts of world. We also present an annotated list of twenty nominal species and simplified figures of valid species together with their important morphometric diagnostic characters to facilitate identification of *Anoplostoma* species.

The first *Anoplostoma* species was described under the name *Symplocostoma viviparum* by

Bastian (1865); the genus *Anoplostoma* was established for this species by Bütschli (1874). *Anoplostoma viviparum* is the species most often reported, especially in the European seas. The genus *Anoplostoma* has been placed in the family Oncholaimidae Filipjev, 1916 on the basis of its very large buccal cavity with parallel sclerotized walls (e.g. Kreis, 1934). Gerlach and Riemann (1974) erected the new family Anoplostomatidae for the genus *Anoplostoma*. Later, the family Anoplostomatidae was supported by decisions of Belogurov and Alekseyev (1977) and by Lorenzen (1981). The latter author included the second genus *Chaetonema* in Anoplostomatidae. Morphological analysis (Lorenzen, 1981) as well as some molecular data (Pegova et al., 2004) both indicate a relation of *Anoplostoma* to the superfamily Enoploidea within the order Enoplida.

Material and methods

Samples of sediments were collected by a cylinder of 3 cm² area during the low tide and

fixed in situ with 4% formaldehyde solution on sea water. The meiofauna stained by Bengal rosa was isolated by decantation and filtration through a sieve of 70 μm mesh size. The nematodes were extracted and put into watch glasses with Seinhorst's solution I (ethanol-glycerin-water mixture in proportion 29:1:70) and the ethanol and water were allowed to evaporate slowly. Specimens were mounted into permanent glycerin slides with a paraffin ring, glass bead separators and Glyceel seals. These slides were then studied with an Olympus BX51 light microscope equipped with Nomarski optics. All measurements are in μm .

Abbreviations: a — body length divided by maximum body diameter; am.w. — width of the amphideal fovea, in μm ; am.w., % — width of the amphideal fovea, expressed as a percentage of the corresponding body diameter; b — body length divided by pharyngeal length; burs.al.l. — length of bursal alae, in μm ; c — body length divided by tail length; c' — tail length, expressed in anal diameters; calc* (calculated) — morphometric value calculated from drawings of published species descriptions; c.b.d. — corresponding body diameter; c.s. — length of cephalic setae, in μm ; diam.am. — body diameter at the level of amphids, in μm ; diam.ani — anal body diameter, in μm ; diam.ca. — body diameter at the level of cardia, in μm ; diam.c.s. — body diameter at the level of cephalic setae, in μm ; diam.midb. — midbody diameter, in μm ; diam.n.r. — body diameter at the level of nerve ring, in μm ; dis.am. — distance from the cephalic apex to the anterior margin of the amphideal fovea, in μm ; d.tail p., % — length of posterior cylindrical tail portion, expressed as a percentage of the entire tail; gub.l. — length of gubernaculum along the spiculum, in μm ; L — body length, in μm ; o.l.s. — length of outer labial setae, in μm ; o.l.s., % — length of outer labial setae, expressed as a percentage of the corresponding body diameter; spic.arc — spicule's length along the arch, in μm ; spic.chord — spicule's length along the chord, in μm ; st.l. — total stoma length, in μm ; st.w. — maximal stoma width, in μm ; V, % — distance of vulva from anterior end as percentage of body length.

Anoplostomatidae Gerlach et Riemann, 1974

Anoplostoma Bütschli, 1874

Anoplostomatidae. Body elongate spindle-shaped. Cuticle smooth. Triangular mouth opening surrounded by six inner labial papillae. Six longer outer labial setae and four cephalic setae form two circles very close one after another. Amphideal fovea equal in males and females, ovoid pocket-shaped with a small anterior aperture, situated posterior to the buccal cavity. Cephalic capsule formed by three longitudinal elements (muniments of Belogurov, Alekseyev, 1977) presenting sclerotized differentiations in the inner layer of the somatic perioral cuticle. Buccal cavity voluminous and toothless, formed by parallel sclerotized walls free of muscular tissue (gymnostom). Pharynx muscular throughout its length. Outlets of pharyngeal glands just posterior to the buccal cavity. Ventral pore known in a few species situated well behind buccal cavity. Two testes, anterior outstretched and posterior reflexed. Two antidromously reflexed ovaries. Males provided with paired bursal alae bearing posterior lateral spines and possibly small other papillae. Tail consists of anterior conical portion and posterior slender cylindrical flagellum.

Type species *Sympocostoma viviparum* Bastian, 1865. *Chaetonema* Filipjev, 1927, the only other genus of Anoplostomatidae differs from *Anoplostoma* by extreme sexual dimorphism in construction of amphids, presence of Steiner's organ - a structure of unknown function in the vicinity of the amphids, and absence of bursal alae in males.

Remarks to taxonomy and identification of *Anoplostoma* species

Species of *Anoplostoma* mostly are structurally very similar to one another and hence measurements are important. Apparently the main characters permitting species identification are length of the outer labial setae and tail length expressed as ratios c and c'. The species on figs 1 and 2 are arranged in a row of successive obvious decrease of the tail expressed in c'.

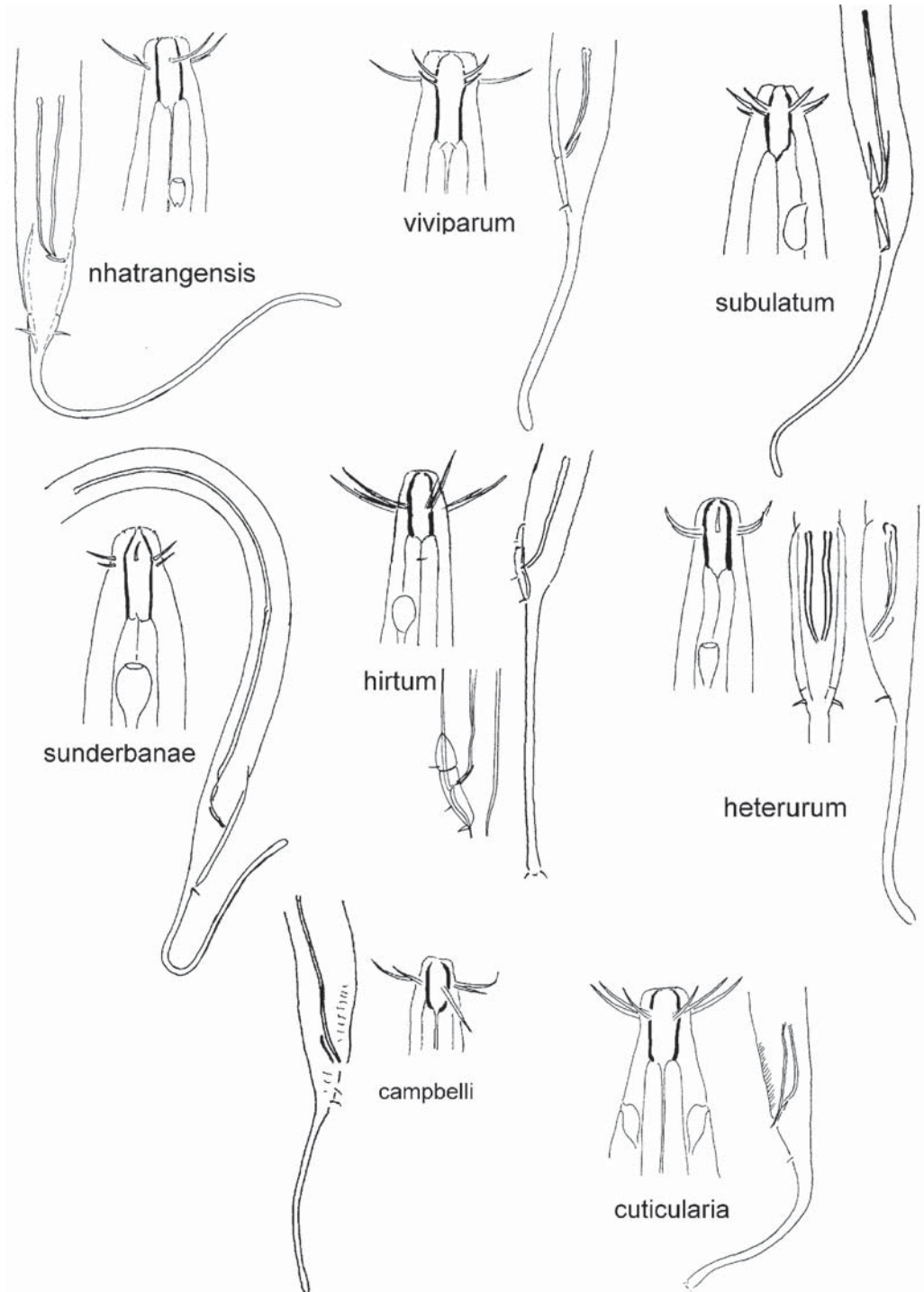
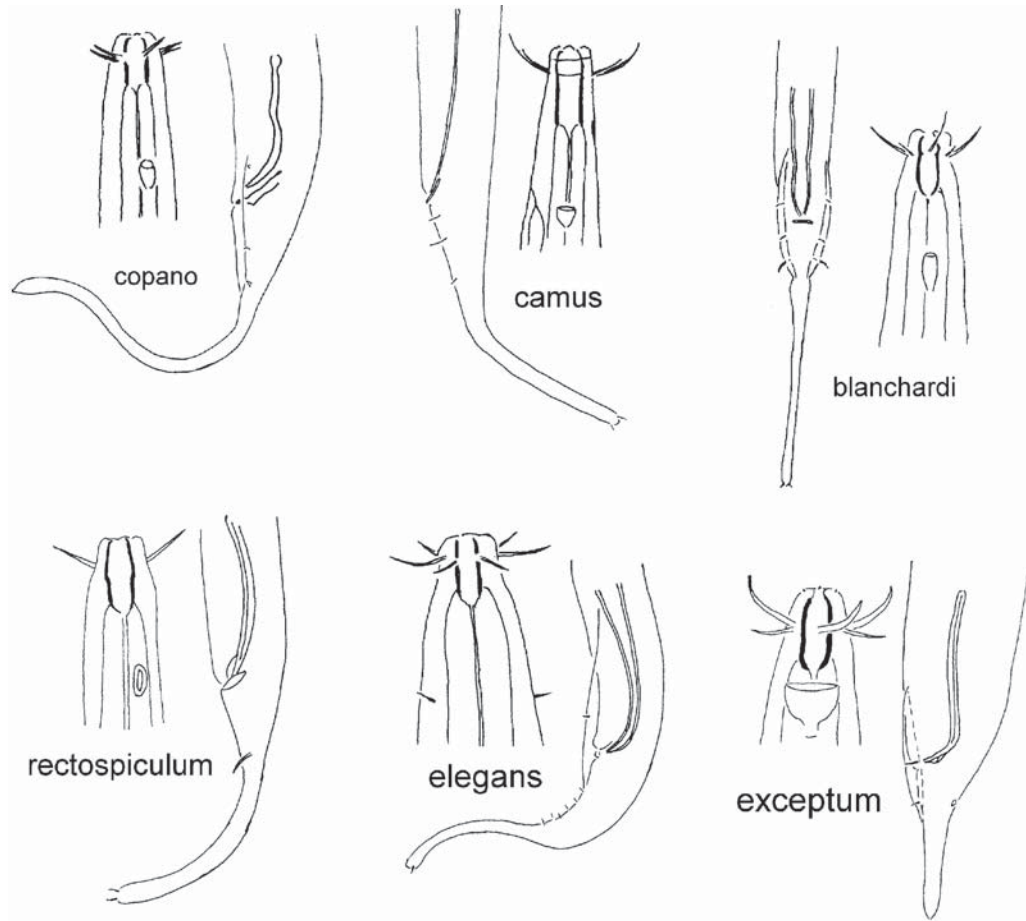


Fig. 1. Pictorial key for valid species of *Anoplostoma*. Part 1.

Рис. 1. Пикториальный ключ к определению валидных видов *Anoplostoma*. Часть 1.

Рис. 2. Пикториальный ключ к определению валидных видов *Anoplostoma*. Часть 2.Fig. 2. Пикториальный ключ к определению валидных видов *Anoplostoma*. Часть 2.

Males are more easily identified than females because they possess informative sexual structures as spicules, showing species specific differences in shape and length, and bursal alae with sensilla differing in number and arrangement according to the species. For example, *A. sunderbanae* is easily distinguished by its very long spicules, and number and position of bursal papillae. Females also may express species specific differences in reproductive branches, e.g. spermatheca can be present as shown by Rachor (1969) in figs 26, 27. Females of *A. viviparum* may be distinguished by their viviparity that is unknown or at least not evident in other species.

Table 1 summarizes the most important diagnostic characters for species identification of males of valid *Anoplostoma* species. Simplified images of male heads and tails presented in figures (Figs 1 and 2) may also serve as a tool for identification of *Anoplostoma* species. Images are modified from the following sources presenting the best published figures, mostly from original diagnoses: *A. blanchardi* from Hopper (1969); *A. campbelli* from Allgén (1932); *A. camus* from Wieser (1953); *A. copano* from Chitwood (1951); *A. cuticularia* from Belogurov, Alekseyev (1977); *A. elegans* from Kreis (1929); *A. exceptum* from Gerlach (1953);

Table 1. Diagnostic morphometric characters of males of valid *Anoplostoma* species.
Таблица 1. Отличительные морфометрические характеристики валидных видов *Anoplostoma*.

Species	Characters						
	L	a	c	o.l.s., %	spic., μm	c'	d.tail p., %
<i>A. blanchardi</i>	1080–1250	35	11–15	83–110*	50	4.6*	72*
<i>A. campbelli</i>	1650	37	11	138–144*	140	6.1*	85*
<i>A. camus</i>	1180–1520	22–37	13–14	129*	65	4–5	56*
<i>A. copano</i>	1120	28	6.2	100	48	5.8*	78*
<i>A. cuticularia</i>	1190–1420	27–39	8–9.5	132*	61–68	5–6	80*
<i>A. elegans</i>	2602–2880	47–48	12–16	100	145–190	4–4.5	60
<i>A. exceptum</i>	943–1144	21–29	11–17	100–113*	66–70	4–4.5*	81–84*
<i>A. heterurum</i>	1200	56*	11*	100	?	6.5*	75*
<i>A. hirtum</i>	1250–1560	46–47	8.3–12.5	207–208*	65–67	6–8.2*	89–94*
<i>A. nhatrangensis</i>	1091–1159	33–45	5.9–6.6	107–120	46–56	10–12	82–90
<i>A. rectospiculum</i>	1496–1837	30–41	11–14	88*	54–60	4.5	75
<i>A. subulatum</i>	1462	42	8	75*	86–101	7.3–9*	83*
<i>A. sunderbanae</i>	1090–1250	43–62	8–10	100 (60*)	inequal, 96–112, 224–288	6.5–9	80
<i>A. viviparum</i>	1600–2100	33–45	6.3–12	80–100	40–65	4.3–9.2	74

The morphometric data are summarized from illustrations and descriptions cited in the “Annotated list of species” above. * means the data were calculated from published pictures.

A. heterurum from Cobb (1914); *A. hirtum* from Gerlach (1956); *A. nhatrangensis* — original; *A. rectospiculum* from Galtsova (1976); *A. subulatum* from Gerlach (1957b); *A. sunderbanae* from Timm (1967); *A. viviparum* from de Man (1907).

Annotated list of *Anoplostoma* species

1. *Anoplostoma blanchardi* de Man, 1888.

See De Man (1888): 18–19, fig. 10–10c (North Sea); Hopper (1969): 673, fig. 4–6 (Nova Scotia, Atlantic coast of Canada). Both illustrated descriptions cited agree with one another in details. The species was also briefly recorded by other authors in the North Sea and in western part of the Baltic Sea (Gerlach, Riemann, 1974).

2. *Anoplostoma brevispiculum* Sergeeva, 1974. See Sergeeva (1974): 123, figs 7 a, b (Black Sea). The original description and figures are poor and miss important details. Further, the original description includes structures that are not characteristic of the genus, such as the absence of anterior setae, position of the amphideal fovea at stoma base, short spicules, absence of bursal alae.

3. *Anoplostoma campbelli* Allgén, 1932. See Allgén (1928): 274–275 (Campbell Island,

as *A. blanchardi*, opinion of De Coninck and Stekhoven, 1933: 57); Allgén (1932): 117–119, figs 13 a–d (Campbell Island, Pacific). The original description is based upon a single male specimen and a juvenile and lacks some measurements such as stoma length, distance from the apex to the amphideal fovea, length of the bursal alae. However, the species clearly differs from congeners by exceptionally long anterior setae and spicules. The identification of specimens from Macquarie Island as *A. campbelli* by Mawson (1958: 354, fig. 39 a–e) appears questionable because of their: 1) shorter outer labial setae (107 versus 150% c.b.d., both calculated from figures) and 2) shorter spicules (78 versus 140 μm) though their relative length in anal diameters and tail lengths are similar. The specimens recorded by Gerlach (1955: 261–262, no figures) from San Salvador also do not fit well to the original diagnosis of Allgén because of shorter spicules (62–90 μm).

4. *Anoplostoma camus* Wieser, 1953. See Wieser (1953): 103–104, fig. 61 a–c (Chile). Males are differentiated based on presence of three pairs of postanal setose sensilla, one pair of small papillae lateroventral spines, inconspicuous bursal alae, and probably by presence of a thin transversal ring in the buccal cavity.

5. *Anoplostoma copano* Chitwood, 1951. See Chitwood (1951): 626–627, figs 1 G–H (Gulf of Mexico). Original diagnosis is very brief but the figures are clear. Three pairs of genital papillae are indicated.

6. *A. cuticularia* Belogurov et Alekseyev, 1977. See Belogurov and Alekseyev (1977): 188–191, figs 1–3 (Sea of Japan). The species is similar to *A. viviparum* but differs by longer outer labial setae and oviparity. The authors described so called muniments which are possibly less distinct in other *Anoplostoma* species. The muniments are two subdorsal and one mid-ventral sclerotized H-shaped structures inserted into inner layer of the somatic cuticle at the level of outer labial and cephalic setae.

7. *Anoplostoma demani* Timm, 1952. See Timm (1952): 11, fig. 9 (Chesapeake Bay, east coast of USA). Original diagnosis is based on one female specimen. The description is very brief and contains some questionable details such as only six setae on the anterior end. We assume here *A. demani* as *species inquirenda*.

8. *Anoplostoma dubium* Allgén, 1959. See Allgén (1959): 78, fig. 71 a–c (Antarctica). The species has been designated as *species inquirenda* by Chitwood (1960: 357).

9. *Anoplostoma elegans* Kreis, 1929. See Kreis (1929): 37–39, fig. 10 a–c (English Channel). The species differs well from other *Anoplostoma* species by greater size of the body and organs, and a row of several postanal setae posterior to bursa on the conical part of the tail. An amphideal fovea is not depicted on the original figure, but its position is indicated as four cephalic diameters posterior to the apex.

10. *Anoplostoma exceptum* Schulz, 1935. See Schulz (1935): 440–442, Abb. 5–7 (Kiel Bay); Gerlach (1952): 323, 350, fig. Abb. 19 a–b (Kiel Bay, Mediterranean); Gerlach (1953): 538–539, Abb. 10 (Mediterranean); Blome (1982): 440–442, Abb. 34 E–G (North Sea). All descriptions agree with one another in detail. The species is easily identified because of its amphideal fovea situated close to the buccal cavity and short tail comparable with spicule's length.

11. *Anoplostoma heterurum* (Cobb, 1914). See Cobb (1914): 100–102, fig. 21 I–IV (Flor-

ida, fresh water pond, as *Oncholaimellus heterurus*, opinion of Kreis, 1934: 107). The species should be redescribed since the original description is tediously long and lacks some important dimensions. The habitat indicated by Cobb is unusual for *Anoplostoma*.

12. *Anoplostoma hirtum* Gerlach, 1956. See Gerlach (1956): 12, Abb. 6 a–d (Brazil); Gerlach (1958): 354–356, fig. 6 a–c (Madagascar). Gerlach (1958) designated the male specimen from Madagascar as „cf. *hirtum*” because of some dissimilar shape and slightly shorter bursal alae. We could not find any significant differences between both descriptions and hence assume Brazil and Madagascar specimens as conspecific.

13. *Anoplostoma macrospiculum* Sinha, Choudhury and Baqri, 1987. See Sinha *et al.* (1987): 539–540, fig. 1 (West Bengal). See *Anoplostoma sunderbanae*.

14. *Anoplostoma nhatrangensis* sp.n.

15. *Anoplostoma rectospiculum* Galtsova, 1976. See Galtsova (1976): 200, fig. 9 (White Sea, intertidal zone, North Russia). Validity of the species needs to be reconsidered because of its overall resemblance to *A. viviparum*. Bursal alae and their sensilla are not properly described in the original diagnosis, and its mode of reproduction (oviparity or viviparity) is not indicated in the original description.

16. *Anoplostoma subulatum* Gerlach, 1957. See Gerlach (1957): 138–140, Abb. 2 d–h (Brazil, mangroves). The species is characterized by somewhat shorter outer labial setae, weak bursal alae with papillae just anterior to the cloacal opening and long slender spicules.

17. *Anoplostoma sunderbanae* Timm, 1967. See Timm (1967): 1–2, 1 A–C (Bay of Bengal, Gulf of Thailand). The species is distinguished by extremely long and unequal spicules. At present, the only other species described with spicules very similar in shape and size is *A. macrospiculum* Sinha, Choudhury and Baqri 1987. The original description of *A. macrospiculum* is incomplete, particularly lacking data on body length and de Man's indices. A few measurements cited by Sinha *et al.* for *A. macrospiculum* such as stoma length and *c'* coincide

well with those of *A. sunderbanae*. The only feature which could be treated as a specific difference is terminal setae on the tail tip present on *A. macrospiculum* but not mentioned by Timm for *A. sunderbanae*. These setae could have been overlooked in the original diagnosis of *A. sunderbanae*. Here we consider both species conspecific and the name *macrospiculum* as a junior synonym of *sunderbanae*.

18. *Anoplostoma tenuicaudum* Allgén, 1959. See Allgén (1959): 80, fig. 73 a–b (Subantarctica, Falkland Islands). The species was described on insufficient material (only one juvenile specimen) and thus has been considered as *species inquirenda* by Chitwood (1960).

19. *Anoplostoma tenuisetum* Allgén, 1959. See Allgén (1959): 78–80, fig. 72 a–b (Subantarctica, South Georgia). Chitwood (1960) suggested this species may be conspecific with *A. campbelli*. Since this species was described on insufficient material (only two females and a juvenile) we consider *A. tenuisetum* as *species inquirenda*.

20. *Anoplostoma viviparum* (Bastian, 1865). The species is widely registered around the world; all findings and synonyms until 1973 were compiled by Gerlach and Riemann (1974). The findings reveal that the species is very abundant along the northern European coast where it is quite common especially in the intertidal zone but also occurs in brackish waters (English Channel, around the Britain and Ireland, North Sea, Baltic Sea, Norway Sea). The species was also repeatedly recorded in southern Europe, i.e. Mediterranean, Black Sea, Azov Sea and recently in the Caspian Sea (observation of first author). Further records were made in Atlantic coasts (Congo, Chesapeake Bay, Florida, Brazil) and along the Pacific coast of northern California. Some of the records have more or less detailed measurements and descriptions showing some differences among specimens of diverse localities. Apart from morphometric differences, the specimens may or may not have minute preanal bursal papillae (e.g. Platt, Warwick, 1973; Chitwood, 1960 *versus* Bütschli, 1874; Schneider, 1906; de Man, 1907; Stekhoven, 1942; Timm, 1952; Gerlach,

1957a, 1957b). Considering these minute structures may have been missed in earlier works, we assume the preanal bursal sensilla as characteristic of *A. viviparum*. Another significant diagnostic feature mentioned in almost all description is viviparity of this species.

Anoplostoma nhatrangensis sp.n.

Figs 3–4, Table 2.

TYPE MATERIAL. Holotype male, three paratype males, seven paratype females in slides deposited in the nematode collection of Department of Nematology, Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology, 18 Hoang Quoc Viet Rd., 10000 Hanoi, Vietnam.

TYPE LOCALITY. Central Vietnam coast, Khanh Hoa Province, south of Nha Trang City, Be estuary (12°23.033'N, 109°10.899'E), intertidal mangrove zone, silty sand, areas of burrows of the crabs *Uca* spp. and roots of *Rhizophora* mangrove trees. Collected 16.03.2008.

DESCRIPTION. Body elongate, spindle-shaped. Cuticle smooth. Anterior part of the head in front of the crown of setae separated with a slight but distinct constriction. Six non-prominent inner labial papillae arranged apically around the mouth. Anterior crown of sensilla made up of six long outer labial setae and four much shorter cephalic setae. Setae of both circles smooth (not segmented). Cephalic setae situated in slightly more lateral and posterior position in relation to outer labial setae.

No cervical or somatic setae visible. Locometanemes present over lateral fields.

Amphideal foveas well posterior to the lip region, pocket-shaped, ellipsoid in outline, with small transversally-ovoid anterior aperture, and ciliary processes discernible in corpus gelatum. Small mucus protuberances often emerge from the amphideal apertures.

Buccal cavity voluminous, cylindroid. Cheilostoma counter-cup-shaped, with sclerotized cheilorhabdions. Three sclerotized structures (muniments) inserted in the inner layer of the endocupola well visible at the level of anterior third of gymnostoma. Gymnostoma made up of parallel sclerotized gymnorhabdions. Stegostoma surrounded with the pharyngeal tis-

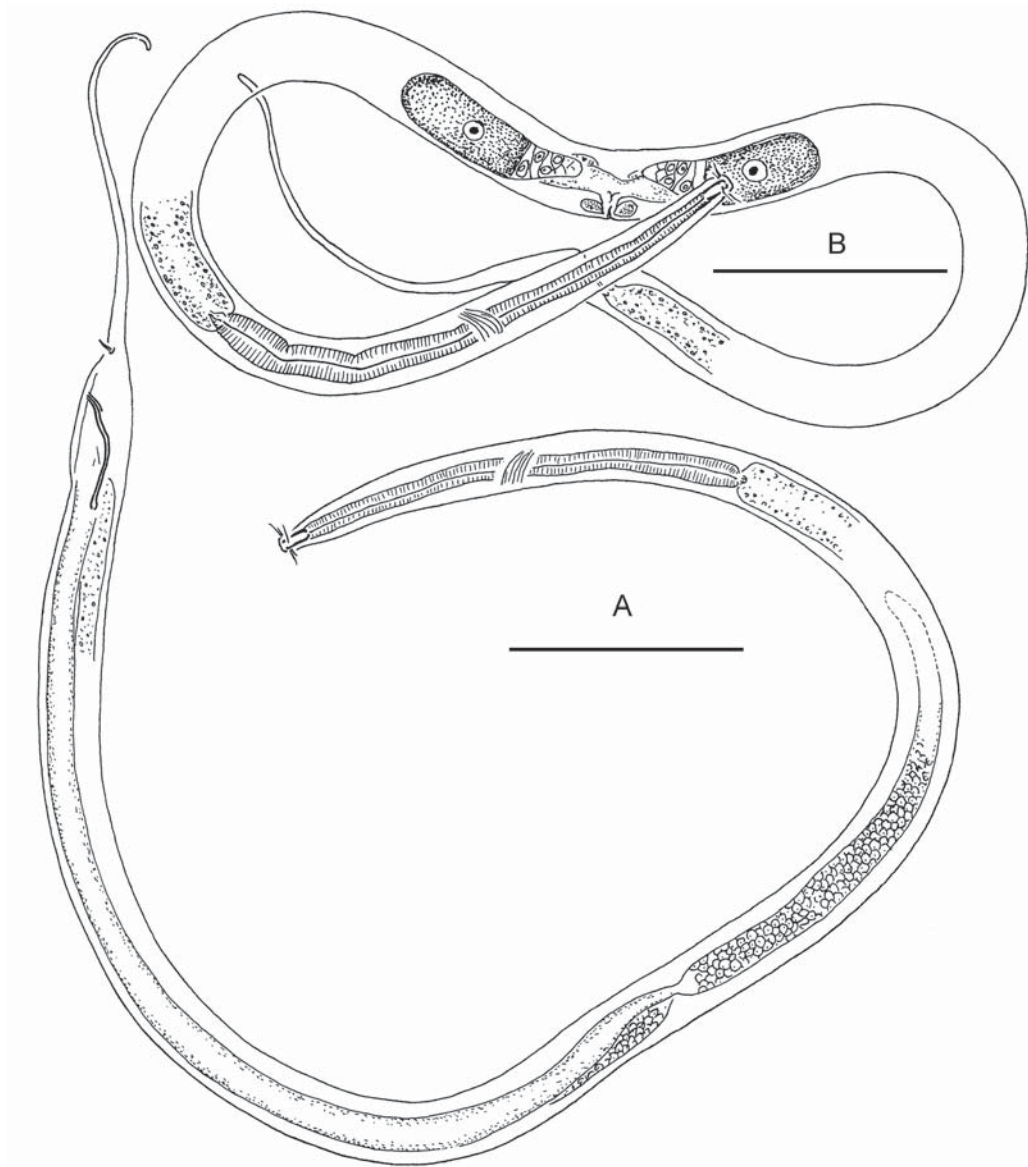


Fig. 3. *Anoplostoma nhatrangensis* sp.n., entire.
A — holotype male N1; B — paratype female. Scale bars: 100 μ m.
Рис. 3. *Anoplostoma nhatrangensis* sp.n., общий вид.
A — самец N1 (голотип); B — самка (паратип). Масштаб: 100 мкм.

sue cuff reduced to the stoma bottom where also some granular sclerotizations present.

Pharynx cylindroid, gradually broadened to the cardia, evenly muscular. Cardia small, triangular, inserted into the intestinal tissue.

Intestine may contain scarce coarse particulate material.

Ventral pore only discernible in one female where situated at a distance 57 μ m from the anterior end. No indication of renette cell.

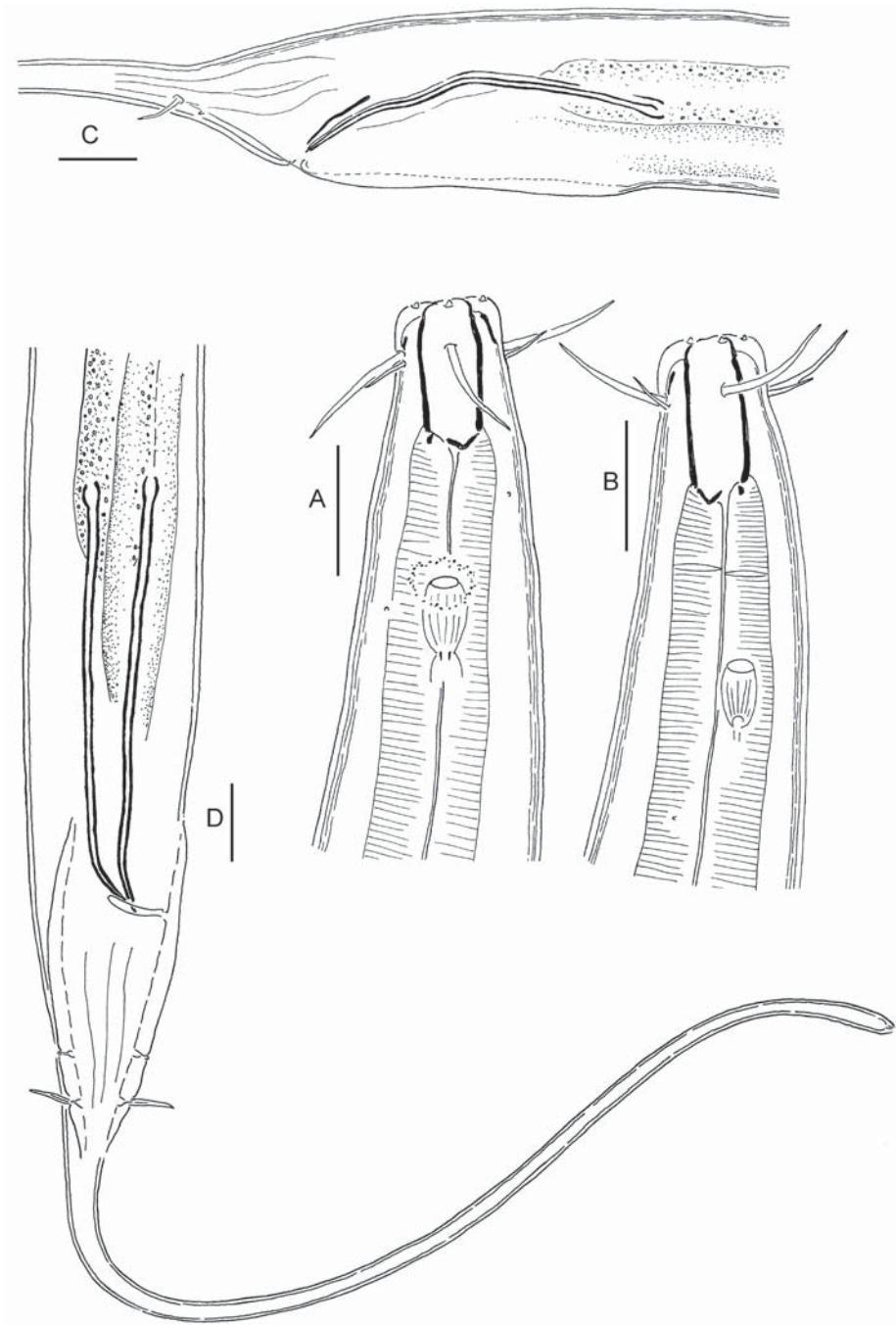


Fig. 4. *Anoplostoma nhatrangensis* sp.n., details.

A — anterior end of the holotype male; B — anterior end of the paratype female; C — posterior body of the paratype male; D — pericloacal body region of the holotype male; oblique ventral orientation. Scale bars: 10 μ m.

Рис. 4. *Anoplostoma nhatrangensis* sp.n., детали.

A — головной конец самца (голотип); B — головной конец самки (паратип); C — задняя часть тела самца (паратип); D — околоанальная область самца (голотип); латероventральная ориентация. Масштаб: 10 мкм.

Table 2 . Morphometrics of *Anoplostoma nhatrangensis* sp.n.
Таблица 2. Морфометрия *Anoplostoma nhatrangensis* sp.n.

Character	♂ holotype	Males (n=4)		Females (n=7)	
		min-max	mean±SD	min-max	mean±SD
L	1159	1091-1159	1124±29.9	969-1255	1154±99.8
A	44.6	33.1-44.6	36.4±5.48	29.4-38.7	35±3.33
B	5.8	4.81-5.92	5.4±0.59	4.43-5.6	4.88±0.38
C	6.18	5.92-6.92	6.39±0.44	5.71-6.37	6.06±0.26
V, %	—	—	—	44.6-47.6	45.9±1.04
diam.c.s.	7.5	7-7.5	7.38±0.25	6.5-8	7.5±0.58
diam.am.	15	12.5-15	13.3±1.19	12.5-14.5	13.5±0.71
diam.n.r.	23	23-27	24.8±1.71	23.5-26	24.9±0.86
diam.ca.	25	25-32	28.5±3.11	26-31	29.3±1.73
diam.midb.	26	26-33	31.3±3.5	29-38	33.1±3.24
diam.ani	17	15.5-17	16.1±0.63	16-19	17.4±1.02
o.l.s.	8.7	8-8.7	8.3±0.36	6.5-9	7.43±0.93
o.l.s., %	116.5	107-117	113±4.03	81-120	99.4±12.6
c.s.	3.25	3.25-4	3.56±0.31	2-4	3.14±0.63
am.w.	3.5	3.5-4	3.75±0.29	3-3.5	3.21±0.27
am.w., %	23.3	23.3-32	28.6±3.91	21.5-28	23.8±2.17
dis.am.	20.5	20.5-25	27.3±1.97	22-27	25±1.73
st.w.	4.5	4-5	4.5±0.41	3.5-5	4.21±0.49
st.l.	11	10-11	10.8±0.5	9.5-11.5	10.6±0.69
burs.al.l.	37	23-40	37.3±2.52	—	—
spic.chord	46	46-56	52.8±4.57	—	—
spic.arc	49	49-57	54±4.36	—	—
gub.l.	9	7-9	8±1	—	—
c'	10	9.16-11.8	10.5±1.15	8.96-11.8	10.6±1.14
d.tail p., %	90	82-90	85.6±3.63	63-80	73.8±5.52

Female reproductive system didelphic-amphidelphic, ovaries antiodromously reflexed, both to the left of the intestine in all females. No spermathecae present; no spermatozoa found in uteri. Vagina short, perpendicular to the longitudinal body axis. Vulvar glands present anterior and posterior to the vagina.

Male diorchic; both testes and vas deferens located left of the intestine. Spicules long and slender, slightly ventrally curved in distal third; distal ends pointed, proximal ends very weakly knob-like cephalated. Gubernaculum paired, as uncertain bar along distal quarter of spicule. Bursal alae variable in length, extending from conical part of tail to mid-level or proximal end of retracted spicules. Paired lateroventral spine-like setae 5 µm long located on posterior end of bursal alae. A minute papilla on the ala just anterior to the each lateroventral spine.

Tail conical anteriorly and filiform posteriorly with slightly swollen tip and terminal spinneret. Caudal gland cell bodies protruded anteriorly into preanal region. No terminal setae found possibly except for one female with very minute terminal setae hardly visible.

DIAGNOSIS. *Anoplostoma nhatrangensis* sp.n. characterized by relatively long outer labial setae (o.l.s. 6.5-9 µm or 81-120% c.b.d.); relatively long tail with longer posterior filiform portion (c 5.71-6.92, c' 8.96-11.8, d.tail p. 63-90%); males without preanal bursal papillae apart from a minute postanal bursal papilla just anterior to the posterior bursal spine.

DIFFERENTIAL DIAGNOSIS. *Anoplostoma nhatrangensis* sp.n. is most similar to the *A. heterurum* having no obvious structural differences. However, the morphometric values between two species show distinct gapes: *A.*

nhatrangensis sp.n. versus *A. heterurum* has a stouter body (a 33–45 versus 56), and relatively longer tail (c 5.9–6.6 versus 11 and c' 10–12 versus 6.5) with greater posterior slender cylindrical portion (82–90 versus 75%).

ECOLOGICAL REMARK. *Anoplostoma nhatrangensis* is very abundant in the site with roots of the mangrove tree *Rhizophora stylosa* (the third abundant species there) but also presents in lesser number in two other sites — in the site of pneumatophore roots of the mangrove tree *Avicennia* aff. *alba* and in the site with burrows of brachyuran crabs *Uca* sp. No females with ripe eggs in uteri were found in April–May 2008.

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