Arthropoda Selecta 35(1): 32–40 © ARTHROPODA SELECTA, 2026

A new hyporheic species of *Phyllognathopus* Mrázek, 1893 (Crustacea: Copepoda: Harpacticoida: Phyllognathopodidae) from central Vietnam

Новый гипорейный вид рода *Phyllognathopus* Mrázek, 1893 (Crustacea: Copepoda: Harpacticoida: Phyllognathopodidae) из центрального Вьетнама

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KEY WORDS: hyporheic zone, Southeast Asia, stygobites, Phyllognathopodidae, taxonomy, Vietnam.

КЛЮЧЕВЫЕ СЛОВА: гипорейная зона, Юго-восточная Азия, стигобиты, Phyllognathopodidae, таксономия, Вьетнам.

ABSTRACT. An undescribed species of the genus *Phyllognathopus* Mrázek, 1893 was discovered during a survey of harpacticoid copepods from the hyporheic zone of the Suoi Da Stream and Cu De River in central Vietnam. The new species, *Phyllognathopus danangensis* sp.n., is morphologically similar to *P. viguieri* (Maupas, 1892), but can be distinguished from *P. viguieri* by: i) the absence of a proximal surface seta on the coxa of the maxillule; ii) the long pinnate posterolateral caudal seta (III); iii) the non-transformed inner terminal caudal seta (V); iv) the subapical insertion of the outermost seta on the exopod of P5 of the female. It also differs from other congeners, such as *P. paludosus*, *P. volcanicus*, *P. paracamptoides*, and *P. vietnamensis*, by a smooth anal operculum, three-segmented exopod of P4, and equal length of exopodal lobe and baseoendopod of P5.

How to cite this paper: Tran N.-S., Dam M. A., Trinh-Dang M., Pham T.P., Brancelj A. 2026. A new hyporheic species of *Phyllognathopus* Mrázek, 1893 (Crustacea: Copepoda: Harpacticoida: Phyllognathopodidae) from central Vietnam // Arthropoda Selecta. Vol.35. No.1. P.32–40. doi: 10.15298/arthsel.35.1.05

РЕЗЮМЕ. В ходе исследования фауны гарпактикоидных копепод гипорейной зоны ручья Суой Да и реки Ку Де в северном Вьетнаме обнаружен не описанный ранее вид рода *Phyllognathopus* Mrázek, 1893. Новый вид, *Phyllognathopus danangensis* sp.n., по морфологии наиболее близок к *P. viguieri* (Maupas, 1892), но отличается следующими признаками: i) отсутствием проксимальной поверхностной щетинки на коксе максиллулы; ii) длинной перистой постеролатеральной каудальной щетинкой (III); iii) нетрансформированной внутренней терминальной каудальной щетинкой (V); iv) субапикальной врезкой самой наружной щетинки на экзоподите P5 у самки. От других близких видов, таких как *P. paludosus*, *P. volcanicus*, *P. paracamptoides* и *P. vietnamensis*, новый вид отличается гладким анальным оперкулюмом, трехсегментным экзоподитом P4 и равной длиной лопасти экзоподита и базеоэндоподита P5.

Introduction

Da Nang City, located in central Vietnam, is recognized as a high-biodiversity region due to the presence of several protected areas, including the Ba Na–Nui Chua Nature Reserve, Son Tra Nature Reserve, Nam Hai Van Landscape Protection Area, as well as two major rivers: Han and Cu De Rivers [Vo *et al*., 2010]. The nature reserve of Son Tra peninsula, located in the northeastern part of the city, covers approximately 3,871 hectares. The latest investigations have recorded 245 animal species, including 20 mammals, 82 birds, 31 reptiles, 16 amphibians, and 96 insects in the terrestrial part of the ecosystem [Hoang *et al*., 2019]. Among them, six species have been recorded as globally threatened species from Son Tra Peninsula: *Ophiophagus hannah* (Cantor, 1836), *Cuora mouhotii* (Gray, 1862), *Psittacula alexandri* (Linnaeus, 1758), *Pygathrix nemaeus* (Linnaeus, 1771), *Pitta nympha* Temminck et Schlegel, 1850, *Nycticebus pygmaeus* Bonhote, 1907 [Tran *et al*., 2019]. However, the investigations of aquatic invertebrates, including class Copepoda, have been limited and remain significantly underrepresented compared to the area's overall biodiversity potential.

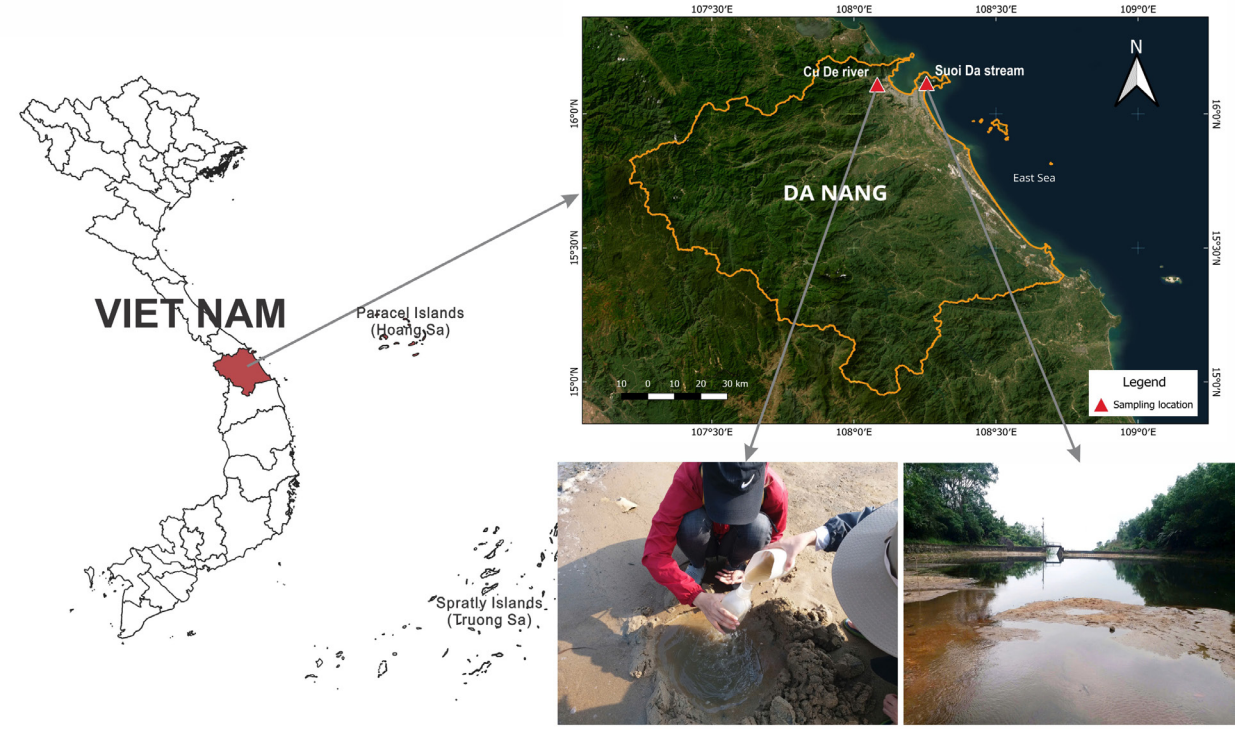

Fig. 1. The sampling locations of *Phyllognathopus danangensis* sp.n., Da Nang City, central Vietnam.
Рис. 1. Места сбора *Phyllognathopus danangensis* sp.n., город Дананг, центральный Вьетнам.

To date, a total of 19 copepod species have been described from Vietnam, which is relatively low compared to about 40 species recorded from nearby Thailand [Brancelj *et al*., 2013; Lopez, Papa, 2020; Watiroyram *et al*., 2021; Tran *et al*., 2021, 2025a,b,c,d]. The list of new species for science recorded from Vietnam includes: *Boholina reducta* Tran et Chang, 2020; *Elaphoidella quangnamensis* Tran, Phung et Watiroyram, 2025; *E. vietnamica* Borutzky, 1967; *Hadodiaptomus dumonti* Brancelj, 2005; *Mesocyclops ferjemurami* Hołyńska et Vu, 2000; *M. sondoongensis* Tran et Hołynska, 2015; *M. yenae* Hołyńska, 1998; *Metacyclops amicitiae* Kołaczynski, 2015; *Microarthridion thanhi* Tran et Chang, 2013; *Nannodiaptomus haii* Tran et Brancelj, 2017; *N. phongnhaensis* Dang et Ho, 2000; *Nitocra quangnamensis* Tran, Trinh-Dang, Nguyen et Brancelj, 2025; *N. vietnamensis* Tran et Chang, 2013; *Parastenocaris sontraensis* Tran, Trinh-Dang et Brancelj, 2021; *P. vugiaensis* Tran, Trinh-Dang et Brancelj, 2021; *Phyllognathopus vietnamensis* Tran, Nguyen et Brancelj, 2025; *Pseudograeteriella longifurcata* Sanoamuang, Boonyanusith et Brancelj, 2019; *P. longiaesthetascus* Sanoamuang, Boonyanusith et Brancelj, 2019; *Schizopera vietnamica* Tran, Pham, Dam et Boonyanusith, 2025 [Brancelj *et al.*, 2013; Tran *et al*., 2021, 2025a,b,c,d]. Among these, only two species, *Parastenocaris sontraensis* and *Phyllognathopus vietnamensis* were described from Danang city [Tran *et al*., 2021, 2025a,b,c,d]. For this reason, a research group from Faculty of Biology, Agriculture and Environmental Science, The University of Danang – University of Science and Education has started to work on benthic/interstitial community of Copepoda in the whole area. During a field survey conducted in July 2023, another new species belonging to the genus *Phyllognathopus* was discovered and is described hereafter.

Material and Methods

The samples were collected from a hyporheic zone of the Suoida stream on the Son Tra peninsula and Cude river, Da Nang City, central Vietnam (Fig. 1). By spade, a hole about 100 cm in diameter, was dug to the water table about one meter from the stream following Karaman-Chappuis method [Chappuis, 1954]. Water from the hole was filtered using a filtering bottle with a mesh size of 60 µm [Brancelj, 2004]. About ten liters of water was filtered. Immediately after collecting, samples were labelled and stored in 4% formalin solution.

Samples were sorted under a 508 Carl Zeiss stereomicroscope at 40 times magnification and stored in 70% ethanol prior to further investigation. Several specimens were dissected in pure glycerol under a stereomicroscope at 40–100 times magnification. Afterwards, they were mounted in pure glycerol on a glass slide and sealed under a cover glass with transparent nail varnish. Whole specimens were stored in 70% ethanol.

All appendages and body ornamentation were examined at 1000-times magnification under an Axio Lab A1 Carl Zeiss compound microscope. Sensilla and pores patterns on the cephalothorax and somite surfaces were not studied in detail. All drawings were made using the Corel Draw 19.0 graphics program.

All specimens examined in this study are deposited in the Zoological Collection of Duy Tan University, Da Nang City, Vietnam (ZC-DTU). Abbreviations used hereafter: Enp — endopod; Exp — exopod; Exp-n/Enp-n — exopod segment n/

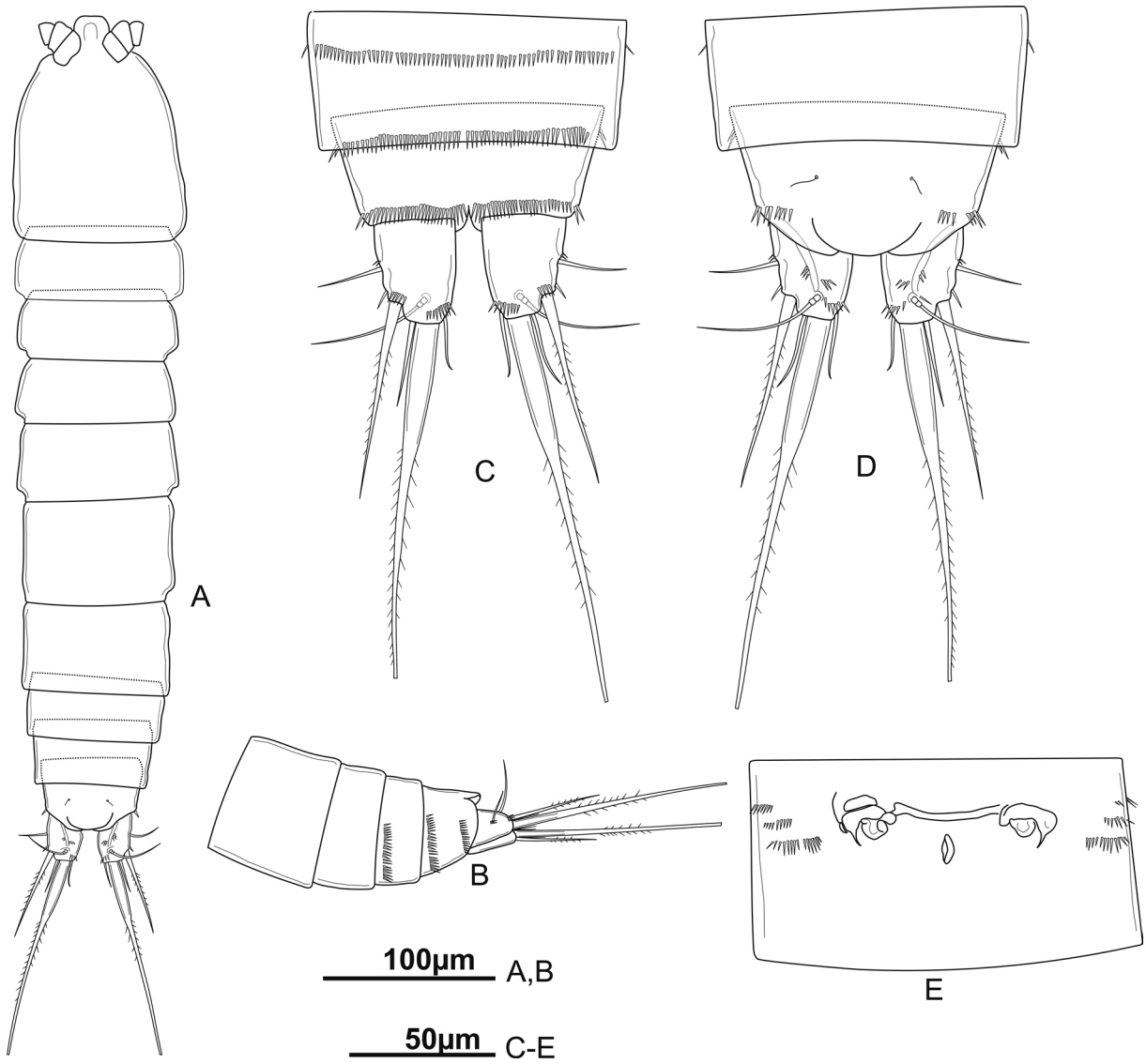

Fig. 2. *Phyllognathopus danangensis* sp.n., holotype (female): A — habitus, dorsal view; B — urosomite, lateral view; C — urosomite 4 and anal somite with caudal rami, ventral view; D — idem, dorsal view; E — genital double-somite with P6, ventral view.

Рис. 2. *Phyllognathopus danangensis* sp.n., голотип самка: A — внешний вид, дорсально; B — уросомит, латерально; C — уросомит 4 и анальный сомит с каудальными ветвями, вентрально; D — то же, дорсально; E — генитальный двойной сомит с плавательными P6, вентрально.

endopod segment n; P1–P6 — swimming legs 1–6; ae — aesthetasc. The descriptive terminology follows Huys & Boxshall [1991] and Boxshall & Halsey [2004].

Taxonomy

Order: Harpacticoida Sars, 1903
Family: Phyllognathopodidae Gurney, 1932
Genus: *Phyllognathopus* Mrázek, 1893

Phyllognathopus danangensis Tran N.-S. et Brancelj sp.n.

Figs 2–5.

TYPE LOCALITY. Specimens were collected from a hyporheic zone along the banks of the Suoi Da stream, Son Tra Peninsula (coordinates: 16°06′51″ N, 108°15′21″, altitude 40 m a.s.l.) and Cu De river (16°06′31″N, 108°05′02″E), Da Nang City, central Vietnam (Fig. 1).

MATERIAL EXAMINED. Holotype: adult female, completely dissected, mounted on one slide; access No.: ZC-DTU-COPEPODA-0009. Paratypes: seven adult females in a plastic tube in 70% alcohol; collected on the same date and same location as holotype; access No.: ZC-DTU-COPEPODA-0010. All material deposited at the Zoological Collection of Duy Tan University, Da Nang City, Vietnam.

DESCRIPTION. Holotype female. Body length, measured from tip of rostrum to posterior margin of caudal rami, 524 µm; length of paratype females: 506–524 µm; n = 3. Habitus cylindrical, tapered toward the end, no clear separation between prosome and urosome (Fig. 2A). Naupliar eye and hyaline integumental window not discernable in preserved specimens. Rostrum subrectangular, large, surpassing the second segment of antennule. First pedigerous somite free, not fused to cephalosome. Genital and first abdominal somites fused, forming genital double-somite, with three rows of small spinules laterally.

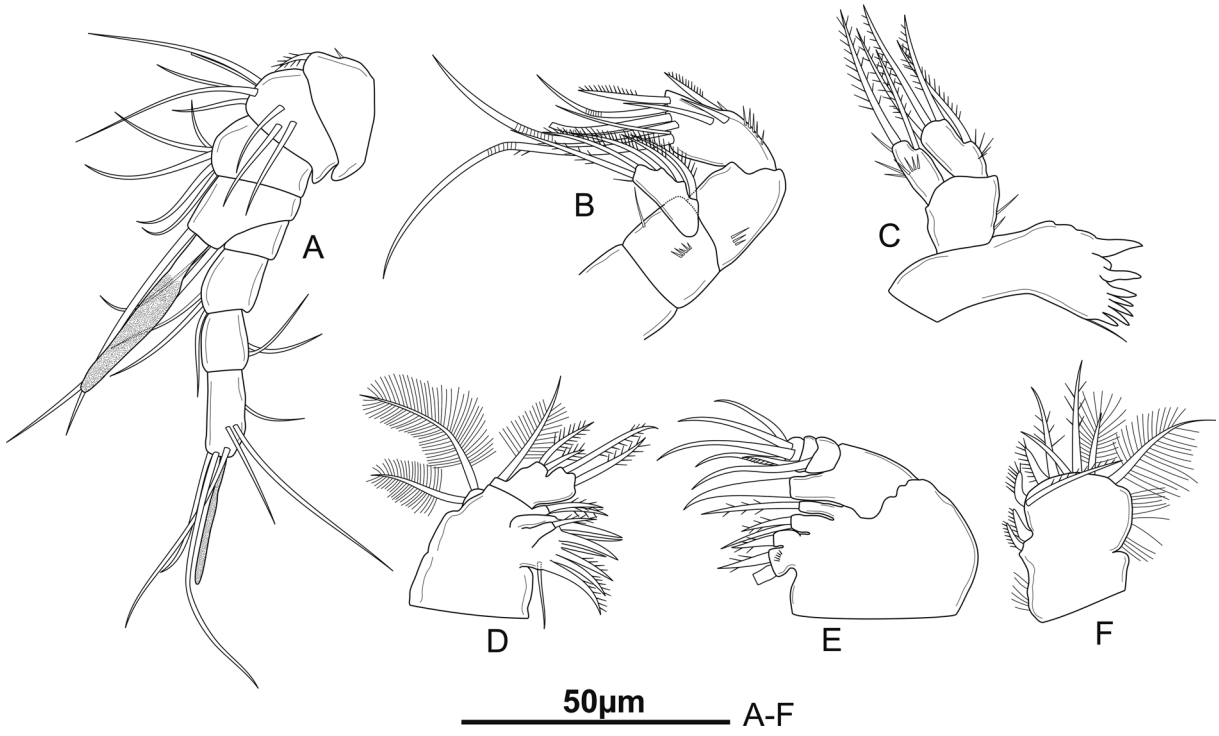

Fig. 3. *Phyllognathopus danangensis* sp.n., holotype (female): A — antennule; B — antenna; C — mandible; D — maxillule; E — maxilla; F — maxilliped.

Рис. 3. *Phyllognathopus danangensis* sp.n., голотип самка: A — антеннула; B — антенна; C — мандибула; D — максиллула; E — максилла; F — максиллипед.

Genital field simple, with small copulatory pore at the middle of double-somite (Fig. 2E). All prosome and urosome somites with smooth dorsal free margin. Last urosomite and anal somite with row of spinules ventrally each, extending laterally; additional row of spinules on anal somite ventrally and laterally, close to insertion of caudal rami (Fig. 2B, C). Anal operculum convex, free margin smooth; two sensilla inserted near base of anal operculum (Fig. 2D).

Caudal rami parallel; each ramus sub-cylindrical, slightly tapering toward the end; about 1.4 times as long as wide; six armature elements: two lateral, three apical and one dorsal (Fig. 2C, D). Two groups of spinules ventro-laterally, just above insertions of setae III and VI. Three groups of spinules on furcal ramus dorsally, extending from medial dorsal side anteriorly to inner-lateral side posteriorly. Anterolateral accessory seta (I) not discernible. Anterolateral seta (II) smooth, inserted at 1/2 length of caudal ramus, about 0.7 times as long as caudal ramus. Posterolateral seta (III) robust, pinnate, about twice as long as caudal ramus. Outer terminal seta (IV) smooth, as long as caudal ramus. Inner terminal seta (V) robust, about 5 times as long as caudal ramus, pinnate on distal part; with no fracture plane, broad at base with significant narrowing after 1/3 of its length. Terminal accessory seta (VI) shortest, smooth. Dorsal seta (VII) articulated, inserted at 3/4 length of caudal ramus, smooth, about twice as long as ramus.

Antennule (Fig. 3A). Eight-segmented, not reaching middle of cephalosome. First segment with short spiniform pinnate seta. Aesthetasc on segment IV well developed, long, not surpassing tip of apical segment: Aesthetasc on last segment shorter and thinner than aesthetasc on segment IV. Armature formula: 1, 8, 5, 3+ae, 0, 3, 2, 6+ae.

Antenna (Fig. 3B). Comprising coxa, basis, one-segmented Exp and two-segmented Enp. Coxa unarmed, about 0.5 times as long as wide. Basis with few spinules on surface and outer margin; about 0.8 times as long as wide. Exp about twice as long as wide, with five elements: three short unipinnate setae laterally, two unipinnate setae apically. Enp-1 with few spinules on surface near inner margin. Enp-2 with one row of spinules on inner margin at 1/3 of its length; with nine elements: three spines at 2/3 length of segment along outer margin; one short unipinnate spine, one smooth seta and four geniculate setae, unequal in length, apically.

Mandible (Fig. 3C). Comprising coxa, basis, one-segmented Exp and one-segmented Enp. Coxa robust, elongated; gnathobase robust, with large chitinised tooth ventrally followed by several teeth decreasing in size dorsally; with seta on distal corner. Basis with few spinules laterally. Exp with one seta apically and one pinnate seta subapically, with transversal row of spinules laterally. Enp with one pinnate seta laterally; one pinnate and two smooth setae apically; row of spinules along inner margin.

Maxillule (Fig. 3D). Arthrite incorporated into praecoxa, with seven spiniform setae inserted on free margin distally; one seta on anterior surface and one stout curved spine on short peduncle. Coxal epipodite and endite with plumose setae each. Exp and Enp incorporated into basis, bearing five plumose setae.

Maxilla (Fig. 3E). Short, robust; syncoxa with four endites, with two, one, two and one spiniform setae, respectively. Endite on basis with strong curved claw-like spine and spiniform unipinnate seta. Enp three-segmented with one, one and four setae respectively, unequal in length.

Maxilliped (Fig. 3F). One-segmented, with six elements apically: two plumose setae, unequal in length, accompanied with two pinnate, one unipinnate and one smooth seta. One long unipinnate seta accompanied with three unipinnate stout spines along inner margin. Lateral margins with row of long spinules.

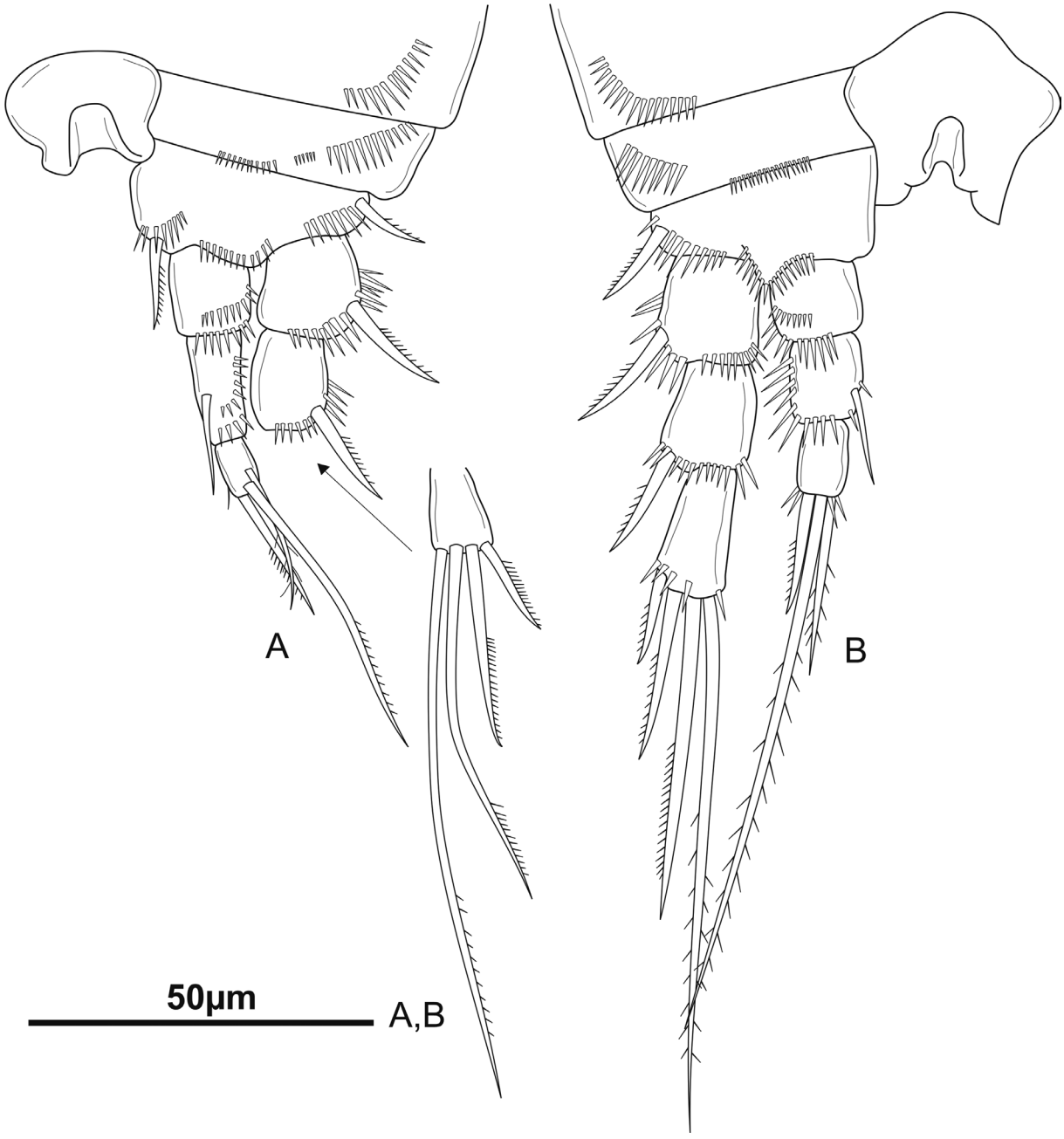

Fig. 4. *Phyllognathopus danangensis* sp.n., holotype (female): A — P1; B — P2.
Рис. 4. *Phyllognathopus danangensis* sp.n., голотип самка: A — P1; B — P2.

P1–P3 with three-segmented Exp and Enp; P4 with three-segmented Exp and two-segmented Enp. Intercoxal sclerites (couplers) with concave free margin without ornamentation. P1 coxa with three sets of spinules unequal in lengths, coxae of P2–P3 with two sets of spinules each, unequal in size, that of P4 unornamented. Armature formula of P1–P4 as in Table 1.

P1 (Fig. 4A). Basis with strong, robust spine on inner and outer margins, with several rows of spinules unequal in size along outer, distal and inner margins. Exp longer than Enp. Exp-1 and Exp-2 as long as wide, with one robust outer spine each, with robust spinules on outer and distal margins. Exp-3 about 1.3 times as long as wide, with four elements: two long non-geniculate unipinnate setae unequal in length, both longer than Exp; two unipinnate spines unequal in length, shorter than Exp. Enp-1 as long as wide, with rows of spines along distal margin. Enp-2 with smooth seta at 1/2 segment length and two rows of spinules along inner margin. Enp-3 with one pinnate seta on inner margin, one unipinnate seta and one unipinnate spine apically, spine about 2/3 of Enp length.

P2 (Fig. 4B). Basis with strong unipinnate spine on outer margin; row of several robust spinules on outer and distal margins. Exp-1 and Exp-2 with strong unipinnate spine on outer margin each, as long as segment bearing it; row of robust spinules unequal in length on outer and distal margins. Exp-3 about 1.5 times as long as wide, with four elements apically: one short unipinnate spine on outer margin, one unipinnate

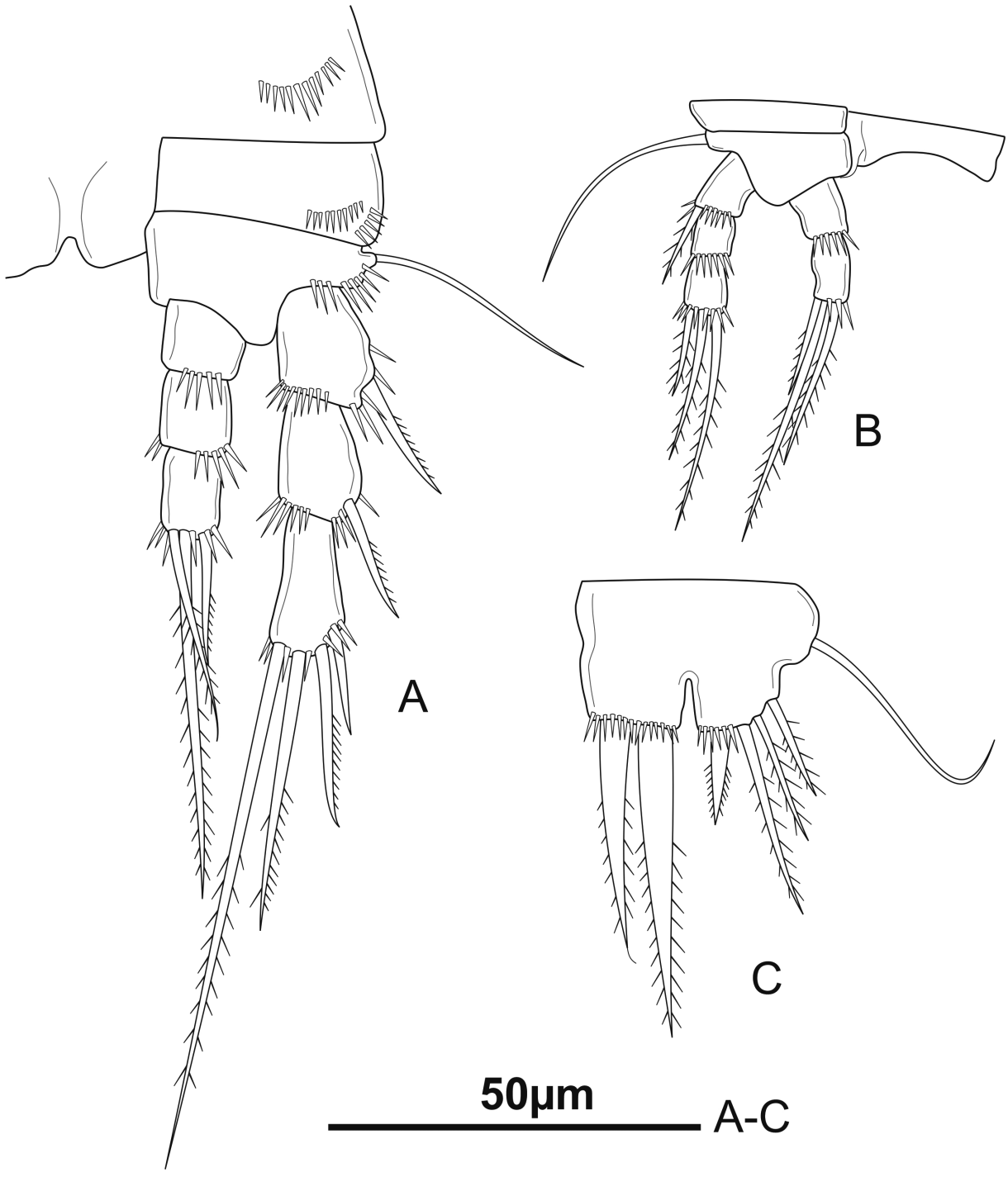

Fig. 5. *Phyllognathopus danangensis* sp.n., holotype (female): A — P3; B — P4; C — P5.
Рис. 5. *Phyllognathopus danangensis* sp.n., голотип самка: A — P3; B — P4; C — P5.

spine, one unipinnate spiniform setae and one long pinnate seta. Enp-1 with two rows of spinules unequal in length on outer and distal margins. Enp-2 with short smooth spiniform seta at 2/3 length on inner margin; row of robust spinules on outer and distal margin. Enp-3 with three elements apically: one bipinnate spiniform seta; one long bipinnate seta, about twice as long as Enp; one short robust unipinnate spine; several spinules inserted just above insertions of elements.

P3 (Fig. 5A). Basis with smooth seta laterally, accompanied with row of robust spinules. Exp-1 and Exp-2 as in P2. Exp-3 about 1.8 times as long as wide, with four elements: one smooth outer spine subapically; one unipinnate spine and two pinnate setae unequal in length apically. Enp-1 and Enp-2 as long as wide, with row of robust spinules on distal margin. Enp-3 with three elements apically: one unipinnate spine, two pinnate setae, unequal in length; longer seta about 1.6 times length of Enp.

P4 (Fig. 5B). Basis with long smooth seta laterally. Exp longer than Enp. Exp-1 with a strong pinnate seta, about 0.7 times as long as Enp, with row of spinules on distal margin. Exp-2 with row of spinules on distal margin. Exp-3 with three

Table 1. Armature formula of swimming P1–P4 of *Phyllognathopus danangensis* sp.n. (inner-outer seta/spine; inner-apical-outer seta/spine; Arabic numerals represent setae; Roman numerals represent spines).
Таблица 1. Формула вооружения плавательных P1–P4 у *Phyllognathopus danangensis* sp.n. (внутренние-наружные щетинки/шипы; внутренние-апикальные-наружные щетинки/шипы; щетинки указаны арабскими цифрами, шипы — римскими).

Swimming leg	Coxa	Basis	Exp			Enp		
			1	2	3	1	2	3
P1	0-0	I-I	0-I	0-I	0-2,II-0	0-0	1-0	1-I,1-0
P2	0-0	0-I	0-I	0-I	0-2,I-I	0-0	1-0	0-2,I-0
P3	0-0	0-1	0-I	0-I	0-2,I-I	0-0	0-0	0-2,I-0
P4	0-0	0-1	0-1	0-0	0-3-0	0-0	0-3-0	

setae apically, unequal in length; outermost shortest. Enp-1 about 1.3 times as long as wide, with a row of spines on distal margin. Enp-2 with concave outer margin, with three pinnate setae unequal in length apically; longest one about 2.5 times as long as Enp.

P5 (Fig. 5C). Exp and baseoendopod fused, equal in length, each with a row of robust spinules on distal margin. Baseoendopod with long, smooth seta on outer margin; two long robust pinnate setae unequal in length apically, inner one shorter. Exp with three plumose setae on outer margin, length increasing inward; strong, robust short pinnate spine at inner corner.

P6 (Fig. 2E). Simple plate, with short, bare spine on each side of genital pore.

Male unknown.

Variations: no variations were observed, but body length.

ETYMOLOGY. The species is named after the Da Nang City in the central part of Vietnam, from where it was collected. The specific epithet, *danangensis* is modified from the name of the city, meaning "from Da Nang".

Discussion

To date, nine species belonging to the genus *Phyllognathopus*, including *P. camptoides* Božic, 1965, *P. chappuisi* (Delachaux, 1924), *P. inexspectatus* Galassi, De Laurentiis et Fiasca, 2011, *P. insularis* Chappuis, 1940, *P. paludosus* Mrázek, 1893, *P. paracamptoides* Božic, 1968, *P. vietnamensis* Tran, Nguyen et Brancelj, 2025, *P. volcanicus* Barclay, 1969, and *P. viguieri* (Maupas, 1892), have been recorded from a wide variety of habitats. Species of this genus demonstrate remarkable ecological adaptability. They are inhabitants of freshwater habitats, where they are common in the epibenthic layers of sediments in ponds, streams, and lakes, as well as in hyporheic zones of rivers or karst groundwater systems [Wells, 2007; Galassi *et al*., 2011; Tran *et al*., 2025a]. They also inhabit semi-terrestrial microhabitats, such as phytotelmata, wet leaf litter, moist soils, mosses and pitcher plants [Reid, 2001].

The new species is assigned to the genus *Phyllognathopus* based on the following combination of diagnostic characters: i) somite bearing P1 not fused to cephalothorax (in total ten body segments in female); ii) antennule 8-segmented in female; iii) maxilliped flat and leaf-like, with several setae; iv) P1–P3 with three-segmented exopods and endopods; v) P5 in female with fused baseoendopod/exopod lobe, the endopodal lobe with two long pinnate setae and exopodal armature with four elements [Wells, 2007; Galassi *et al*., 2011; Thorp, Rogers, 2017].

Phyllognathopus danangensis sp.n. is similar to *P. viguieri* in the following characters: i) anal operculum with smooth free margin; ii) Enp-3 of P4 with three setae; iii) length of exopod and baseoendopod equal in length; iv) Exp and baseoendopod of P5 with four and two elements respectively. However, the new species differs from *P. viguieri* in several diagnostic features: i) maxillule without proximal surface seta on coxa *vs*. present in *P. viguieri*; ii) posterolateral caudal seta (III) long and pinnate *vs*. short, stout, and spiniform in *P. viguieri*; iii) inner terminal caudal seta (V) pinnate, not transformed *vs*. transformed as enlarged proximal section of seta, unipinnate in *P. viguieri*; iv) outermost seta Exp of P5 in female inserted subapically *vs*. apically in *P. viguieri* [Wells, 2007; Galassi *et al*., 2011; Tran *et al*., 2025a].

Phyllognathopus danangensis sp.n. also shares morphological characters in female with its congeners *P. paludosus* and *P. volcanicus* (Table 2) including: i) Exp of P4 three-segmented; ii) three apical setae on Enp-2 of P4; iii) Exp and baseoendopod of P5 equal in length. However, *P. danangensis* sp.n. can be clearly distinguished from these congeners by following characters: i) free margin of anal operculum smooth *vs*. spinules on free margin in *P. paludosus*; ii) caudal ramus length/width ratio about 1.2 *vs.* about 1.4 in *P. paludosus* and about 2.2 in *P. volcanicus*; iii) posterolateral seta (III) of caudal ramus long and pinnate *vs.* short, stout, spiniform in *P. paludosus* and long, spiniform in *P. volcanicus*; iv) second inner seta on Exp of P5 longest *vs*. the third seta in *P. paludosus* and the first seta in *P. volcanicus*; v) P6 in female with one short bare spine *vs*. one long bare seta and two spines in *P. paludosus* [Maupas, 1892; Mrázek, 1893; Barclay, 1969; Chang, Yoon, 2007; Galassi *et al*., 2011; Tran *et al*., 2025a].

Among the remaining six congeners, *P. chappuisi*, *P. camptoides*, *P. insularis*, *P. inexspectatus*, *P. paracamptoides*, *P. vietnamensis*, the new species shares some morphological characters: i) free margin of anal operculum smooth as in *P. chappuisi*, ii) Enp of P4 distal segment bearing three setae, as in *P. chappuisi*, *P. camptoides*, *P. insularis* and *P. vietnamensis* (Table 2). However, *P. danangensis* sp.n. can be distinguished from these species by following characters: i) free margin of anal operculum smooth *vs.* six strong spines on free margin in

Table 2. Differentiating characters of the species of the genus *Phyllognathopus* (females only).
Таблица 2. Отличительные признаки видов рода *Phyllognathopus* (только самки).

Species	Anal operculum	Caudal ramus	caudal ramus		P4 Exp/Enp	P4 Enp distal segment	P5 Exp	P5 Exp lobe	P5 Exp from inward
	free margin	length/ width	seta III	seta V	No. of segments	No. of setae	outermost seta	relative length	the longest seta
P. camptoides Bozic, 1965	4 strong spines	1.4	long, unipinnate	pinnate, not enlarged proximally	2/2	3	apically	equal to baseoendopod	first
P. chappuisi (Delachaux, 1924)	smooth	uk	uk	uk	2/2	3	uk	uk	uk
P. danangensis sp.n.	smooth	1.2	long, pinnate	pinnate, enlarged proximally, not transformed	3/2	3	subapically	equal to baseoendopod	second
P. inexspectatus Galassi et De Laurentiis, 2011	22 strong spinules	1.9	short, stout, spiniform	pinnate, not enlarged proximally	2/2	2	subapically	shorter than baseoendopod	second
P. insularis Chappuis, 1940	cilia-like spinules	2.4	short, smooth	smooth, not enlarged proximally	2/2	3	subapically	shorter than baseoendopod	second
P. paludosus Mrázek, 1893	10–16 small spines	1.4	short, stout, spiniform	unipinnate, enlarged proximally, not transformed	3/2	3	subapically	equal to baseoendopod	third
P. paracamptoides Bozic, 1968	6 strong spines	1.5	long, pinnate	unipinnate, not enlarged proximally	2/1	2	apically	longer than baseoendopod	first
P. vietnamensis Tran, Nguyen et Brancelj, 2025	10–12 small spines	1.6	long, pinnate	unpinnate, not transformed	2/2	3	apically	longer than baseoendopod	third
P. viguieri (Maupas, 1892)	smooth	1.5	short, stout, spiniform	unipinnate, very enlarged proximally, transformed	3/2	3	apically	equal to baseoendopod	second
P. volcanicus Barclay, 1969	smooth	2.2	long, spiniform	smooth, not enlarged proximally	3/2	3	subapically	equal to baseoendopod	first

Transformed — very enlarged proximal section of seta; uk — unknown.

P. paracamptoides, four strong spines in *P. camptoides,* cilia-like spinules in *P. insularis,* about 20 strong spinules in *P. inexspectatus*, 10–12 small spines in *P. vietnamensis*; ii) number of segments on Exp/Enp of P4: 3/2 in the new species but 2/1 in *P. paracamptoides* and 2/2 in *P. chappuisi*, *P. camptoides*, *P. insularis*, *P. inexspectatus*, *P. vietnamensis*; iii) Exp of P4 distal segment with three setae *vs.* two setae in *P. inexspectatus* and *P. paracamptoides*; iv) female Exp of P5 lobe and baseoendopod equal in length *vs.* Exp lobe longer than baseoendopod in *P. paracamptoides* and *P. vietnamensis,* shorter in *P. insularis* and *P. inexspectatus*; v) Exp of P5 with robust short pinnate innermost spine *vs*. short, slender seta in *P. insularis*; short pinnate seta in *P. inexspectatus*; long pinnate seta in *P. paracamptoides* and *P. vietnamensis* [Chappuis, 1940; Bozic, 1965, 1968; Galassi *et al*., 2011; Tran *et al*., 2025a].

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

Acknowledgements. This research was funded by Funds from the Ministry of Education and Training, Vietnam; grant number B2023.DNA.16 for Vietnamese authors.

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Responsible editor K.G. Mikhailov