

**REDESCRIPTION OF *Caridina cucphuongensis* Dang, 1980 (CRUSTACEA:  
DECAPODA: ATYIDAE) FROM CUC PHUONG NATIONAL PARK,  
NORTHERN VIETNAM**

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**ABSTRACT**

The freshwater shrimp species *Caridina cucphuongensis* (family Atyidae) was poorly described by Dang (1980). Moreover, the taxonomic status of this species is hard to verify as the types have been lost. This study provides a redescription of the species and designation of a neotype specimen. The *Caridina cucphuongensis* Dang, 1980 is characterized by short rostrum with large teeth on the dorsal margin, long stylocerite, subrectangular endopod of male first pleopod, and short appendix interna of the male second pleopod.

**Keywords:** *Caridina*, atyid, freshwater shrimps, Cuc Phuong, Ninh Binh, redescription.

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## INTRODUCTION

Freshwater shrimps of the family Atyidae have been studied in Vietnam from the beginning of the 20th century up to the present (Bouvier, 1904, 1919, 1925; Dang, 1967, 1975; Dang et al., 1980; Cai et al., 1999; Nguyen, 1999; Li & Liang, 2002; Dang & Do, 2007; Do & Dang, 2010, Dang & Ho, 2012; Do et al., 2020, 2021a, b). Until now, a total of 25 atyid species have been recorded from Vietnam (Do et al., 2020, 2021a, b). Dang (1980) described a subspecies *Caridina serrata cucphuongensis* (Dang et al., 1980) from the Cuc Phuong area, Northeast Vietnam. However, the author described only a very few characters of this subspecies with insufficient morphological illustrations. Dang

& Do (2007, 2008) and Dang & Ho (2012) elevated this subspecies to a distinct species *Caridina cucphuongensis* Dang, 1980. Unfortunately, the holotype specimen of this species has also been lost due to lack of care. This has caused difficulties for taxonomic studies of atyid shrimps in Vietnam. During recent surveys in the type locality of this species, Cuc Phuong National Park, several specimens whose morphology matches the original description have been collected. In this study, we redescribe this species with full morphological characters and accompanied by illustrations. A neotype specimen of this species is also designated for ensuring taxonomic stability.

## MATERIAL AND METHODS

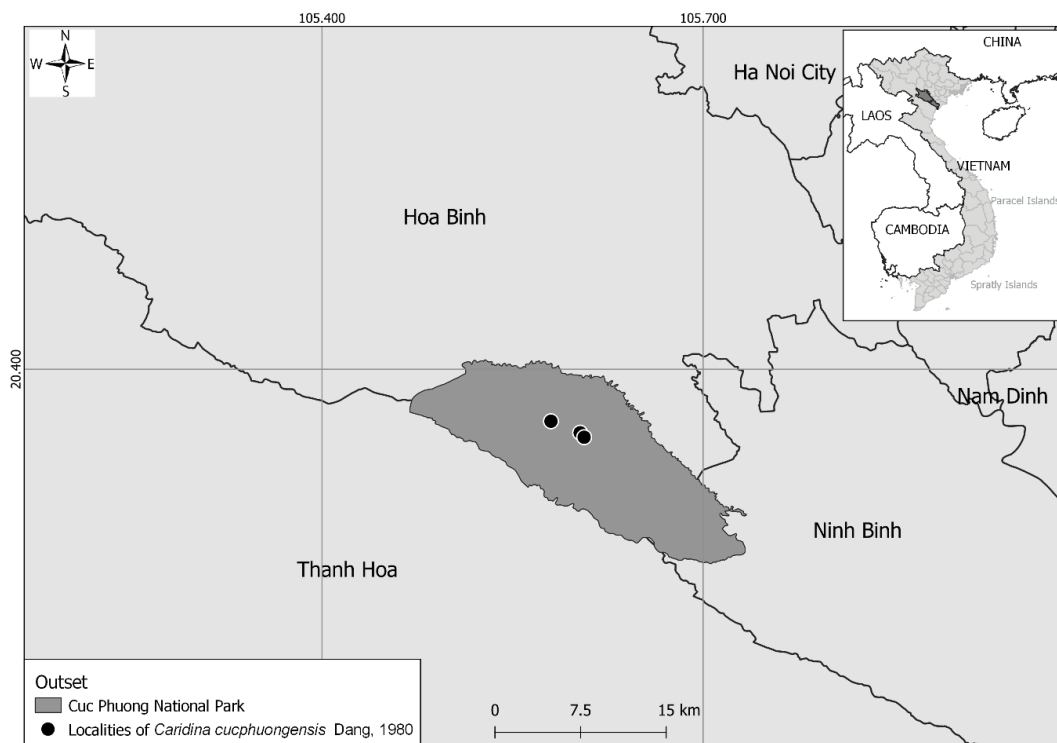


Figure 1. Collection sites of *Caridina cucphuongensis* Dang, 1980 from Cuc Phuong National Park

Specimens of *C. cucphuongensis* were collected by hand nets from Cuc Phuong National Park, Ninh Binh province, Northeast Vietnam (Fig. 1), the type area of this species. The specimens were preserved

in 70–95% ethanol. Parts of the body were illustrated by using a drawing tube attached to a Leica MZ 12 stereo microscope. The examined specimens are deposited at the Institute of Ecology and Biological

Resources, Vietnam Academy of Science and Technology, Vietnam and Museum für Naturkunde, Leibniz Institute for Evolution and Biodiversity Science, Berlin. All terminology used follows Chace (1997). The abbreviation cl is used for carapace length, measured from the postorbital margin to the posterior median margin of the carapace in mm. The rostral formula used in the present study is defined as (number of dorsal teeth on the carapace posterior to the orbital margin + number of dorsal teeth on the rostrum anterior to the orbital margin/number of ventral teeth of the rostrum).

Because the holotype has been lost, the designation of a neotype specimen of *C. cucphuongensis* is applied according to the International Code of Zoological Nomenclature (<https://www.iczn.org/the-code/the-code-online/>) to clarify the taxonomic status and the type locality. Our data and description are sufficient to ensure recognition of the specimen designated.

## TAXONOMY

### Family Atyidae De Haan, 1849

### Genus *Caridina* H. Milne Edwards, 1837

### *Caridina cucphuongensis* Dang, 1980 (Figs. 2–4)

*Caridina serrata cucphuongensis* Dang in Dang, Thai & Pham, 1980: 404–405; Fig. 230. [type locality: streams in Cuc Phuong area, Ninh Binh province, Northern Vietnam].

*Caridina cucphuongensis* Dang, 1980 in Dang & Ho, 2012: 116–117; fig.: 37.

### Examined material

Neotype: male, cl 4.1 mm, IEBR-FS 006, Vietnam, Ninh Binh, Cuc Phuong National Park, a small stream near the footpath to the one thousand year old tree (Vietnamese name: chò), 20°21'0.779''N - 105°36'11.675''E, coll. Thomas von Rintelen & Do Van Tu, 4 March 2017.

Other material: 5 males, cl 3.6–4.1 mm, 2 females, cl 4.2 and 4.4 mm, ZMB 30234, same data as neotype; 2 males cl 3.0 and 4.0 mm, 4 females cl 4.2–5.3 mm, 2 ovigerous

females cl 4.6 and 4.8 mm, ZMB 31774, Vietnam, Ninh Binh, Cuc Phuong National Park, a stream on footpath Bong, 20°21'33.2''N - 105°34'49.0''E, coll. Thomas von Rintelen, 7 May 2019; male, cl 3.8 mm, ZMB 31782, Vietnam, Ninh Binh, Cuc Phuong National Park, a stream near Bong, 20°20'48.0''N - 105°36'23.0''E, coll. Hoang Anh Tuan, 8 May 2019; ZMB 30752, Vietnam, Ninh Binh, Cuc Phuong National Park, a stream on footpath Bong, Khanh village, 20°21'33.2''N - 105°34'49.0''E, coll. Andreas Karge, 12 July 2009; ZMB 31776, Vietnam, Ninh Binh, Cuc Phuong National Park, a stream near Bong, limestone terraces, 20°21'18.8''N - 105°35'22.4''E, coll. Sarah Ehlers, 10 May 2019.

### Comparative material

*Caridina clinata* Cai, Nguyen & Ng, 1999: 2 males, cl 3.1 and 3.6 mm, ovigerous female, cl 3.7 mm, ZMB 30664, Vietnam, Ninh Binh, a small stream in Cuc Phuong National Park, 20°19'11.118''N - 105°37'42.168''E, coll. Thomas von Rintelen & Do Van Tu, 4 March 2017. *Caridina pacbo* Do, von Rintelen & Dang, 2020: male, cl 4.2 mm, IEBR-FS 003 (Holotype), Vietnam, Cao Bang province, Ha Quang District, Truong Ha Commune, Pac Bo Village, small stream in Khuoi Nam, 22°59'1.7''N - 106°02'31.2''E, coll. Do Van Tu, 25 May 2017. *Caridina tricincta* Do, von Rintelen & Dang, 2020: male, cl 5.3 mm, IEBR-FS 001 (Holotype), Vietnam, Tuyen Quang Province, Na Hang District, Khau Tinh Commune, 22°26'42.1''N - 105°23'09.1''E, coll. Nguyen Anh Tuan, 11 December 2012. *Caridina serrata* Stimpson, 1860: 10 males, cl 3.1–4.7, 5 females, cl 4.0–4.6, ZMB 30306, Vietnam, Quang Nam Province, Hoi An City, Cu Lao Cham Island, a small stream running into the reservoir, 15°56'34.9''N - 108°31'22.7''E, coll. Pham The Cuong, 10 May 2017.

### Description

#### *Cephalothorax and cephalic appendages*

Carapace length 3.0–5.3 mm (median 4.1 mm, n = 16). Rostrum straight, rather slender, just overreaching the eyes to

reaching to the beginning of second segment of antennular peduncle, 0.28–0.29 (median 0.29) times as long as carapace, rostral formula: 0–3+2–7/0–2, ventral teeth placed

distally. Suborbital angle acute, completely fused with antennal spine; pterygostomian margin rounded, slightly produced forward (Fig. 2A).

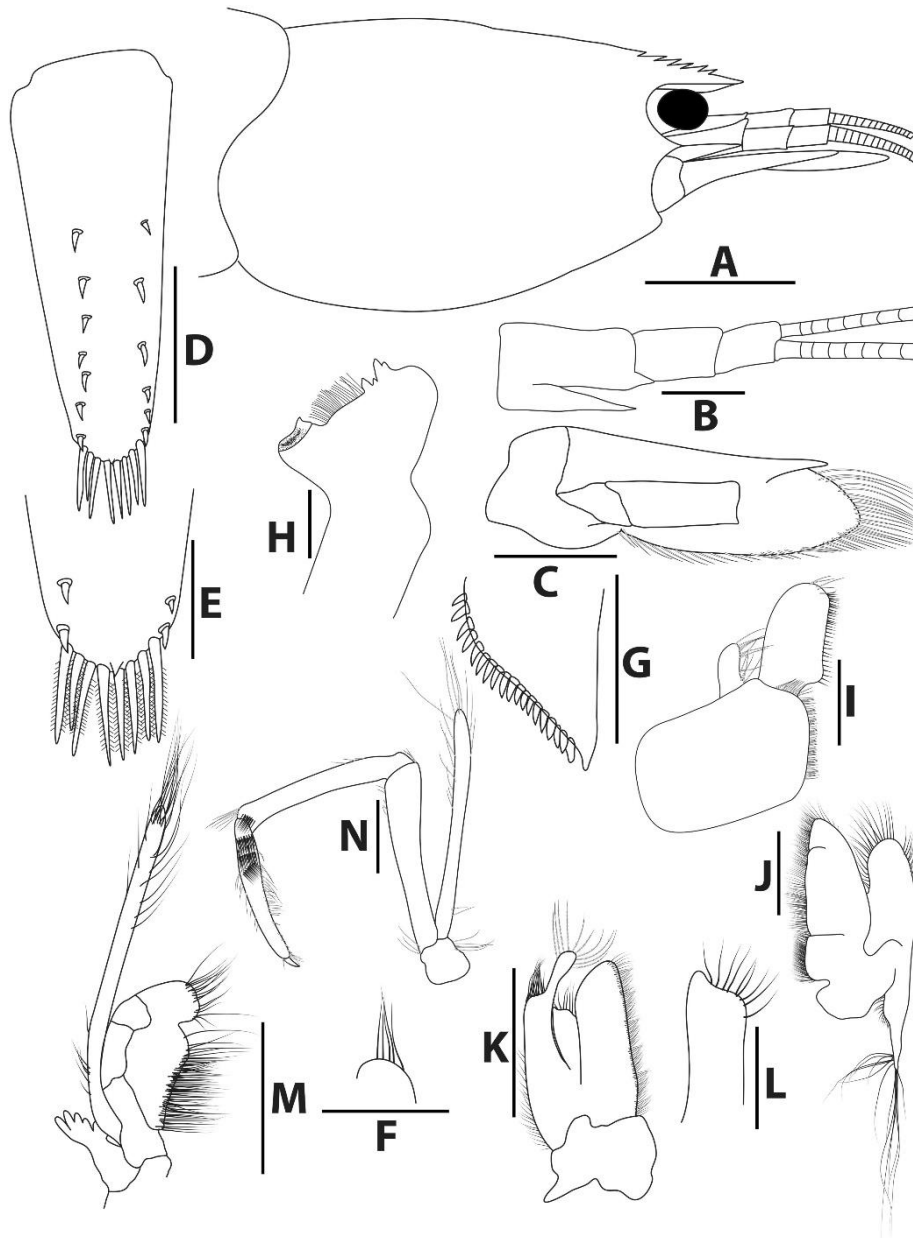


Figure 2. *Caridina cucphuongensis* Dang, 1980; male, cl 4.1 mm (ZMB 30234). A) Cephalothorax and cephalic appendages, lateral view; B) Antennular peduncle; C) Scaphocerite; D) Telson; E) Distal portion of telson; F) Preanal carina; G) Uropodal diaeresis; H) Mandible; I) Maxillula; J) Maxilla; K) First maxilliped; L) Distal end of palp of first maxilliped; M) Second maxilliped; N) Third maxilliped. Scale: A–C, F = 1 mm; E, G–N = 0.5 mm

Eyes well developed with globular cornea, anterior end reaching to 0.6 times length of basal segment of antennular peduncle (Fig. 2A). Antennular peduncle 0.55–0.65 (median 0.61) times as long as carapace; basal segment 1.67–2.0 (median 1.77) times as long as second segment, second segment 1.3–1.5 (median 1.5) times as long as third segment (Fig. 2B). Stylocerite reaching to the beginning of second segment of antennular peduncle (Fig. 2B). Scaphocerite rather angular, reaching beyond distal end of antennular peduncle, lateral tooth not reaching beyond distal margin, 2.5–2.93 (median 2.87) times as long as wide (Fig. 2C).

#### **Abdominal somites, telson and uropods**

Sixth abdominal somite 0.45–0.5 (median 0.48) times length of carapace, 1.46–1.64 (median 1.55) times as long as fifth abdominal somite, 0.85–0.95 (median 0.93) times length of telson. Telson length 2.0–2.33 (median 2.2) times as long as proximal wide, distal margin triangular, terminating in a short median projection, with 4–5 pairs of dorsal spiniform setae and one pair of dorso-subdistal spiniform setae; distal end with 3–4 pairs of spiniform setae, lateral pair longer than intermediate pairs, sublateral pair shortest (Figs. 2D, 2E). Preanal carina round, slightly bent backwards, with few setae, lacking a spine (Fig. 2F). Uropodal diaeresis with 18–21 (median 20) movable spiniform setae, outermost one slightly longer than lateral angle (Fig. 2G).

Incisor process of mandible ending in one row of 6–8 irregular teeth, molar process truncated (Fig. 2H). Lower lacinia of maxillula broadly rounded, upper lacinia elongated, with number of distinct teeth and setae on inner margin, palp stout with few simple setae at tip (Fig. 2I). Upper endites of maxilla subdivided, palp short, scaphognathite tapering posteriorly, with numerous long, curved setae at posterior margin (Fig. 2J). Distal end of palp of first maxilliped triangular, with a short projection; flagellum of the exopod very elongated, endopod high, reaching 0.9 times length of flagellum of exopod (Figs. 2K, 2L). Podobranch of second

maxilliped well developed, with finger-like projections (Fig. 2M). Third maxilliped reaching to distal end of antennular peduncle, ending in single terminal claw, exopod reaching 0.3 times length of penultimate segment; ultimate segment as long as penultimate segment (Fig. 2N).

#### **Pereiopods**

Epipods present on first four pereiopods. First pereiopod short, robust, reaching beyond end of basal segment of antennular peduncle; chela 2.0–2.23 (median 2.09) times as long as wide, 1.25–1.47 (median 1.3) times length of carpus; tips of fingers rounded, without hook; dactylus shorter than palm, 0.57–0.96 (median 0.92) times as long as palm; carpus excavated strongly anteriorly, 1.46–1.89 (median 1.71) times as long as wide, 0.90–0.95 (median 0.92) times length of merus; merus 2.29–2.86 (median 2.56) times as long as wide, longer than ischium (Fig. 3A). Second pereiopod long, slender, reaching to distal end of antennular peduncle; chela 2.56–3.0 (median 2.78) times as long as wide, 0.66–0.85 (median 0.74) times length of carpus; tips of fingers rounded, without hook; dactylus 1.33–1.74 (median 1.43) times as long as palm; carpus 4.83–5.83 (median 5.67) times as long as wide, 0.94–1.11 (median 1.02) times as long as merus; merus 5.64–6.8 (median 6.30) times as long as wide, longer than ischium (Fig. 3B). Third pereiopod slender, reaching beyond end of scaphocerite by its dactylus, terminating in one claw, with five to six accessory spiniform setae on flexor margin, dactylus 2.54–3.08 (median 2.86) times as long as wide (terminal claw and spiniform setae on flexor margin included), propodus 7.65–9.38 (median 8.75) times as long as wide, 3.51–3.94 (median 3.68) times as long as dactylus; carpus 4.9–5.05 (median 5.02) times as long as wide, 0.72–0.85 (median 0.78) times as long as propodus, 0.55–0.6 (median 0.58) times as long as merus; merus 6.07–7.08 (median 6.64) times as long as wide, bearing four strong, movable spiniform setae on posterior margin of outer surface; ischium without movable spiniform seta (Figs. 3C, 3D). Fifth pereiopod slender, reaching to

end of second segment of antennular peduncle, dactylus 3.3–3.9 (median 3.5) times as long as wide (terminal claw and spiniform setae on flexor margin included), terminating in one large claw, with 42–52 spiniform setae on flexor margin; propodus 11.23–12.67 (median 11.43) times as long as wide, 2.90–3.41 (median 3.20) times length of dactylus;

carpus 4.63–5.8 (median 5.11) times as long as wide, 0.48–0.56 (median 0.55) times as long as propodus, 0.5–0.62 (median 0.56) times as long as merus; merus 6.64–7.5 (median 7.22) times as long as wide, bearing 3–4 strong, movable spiniform setae on posterior margin of outer surface; ischium without movable spiniform seta (Figs. 3E, 3F).

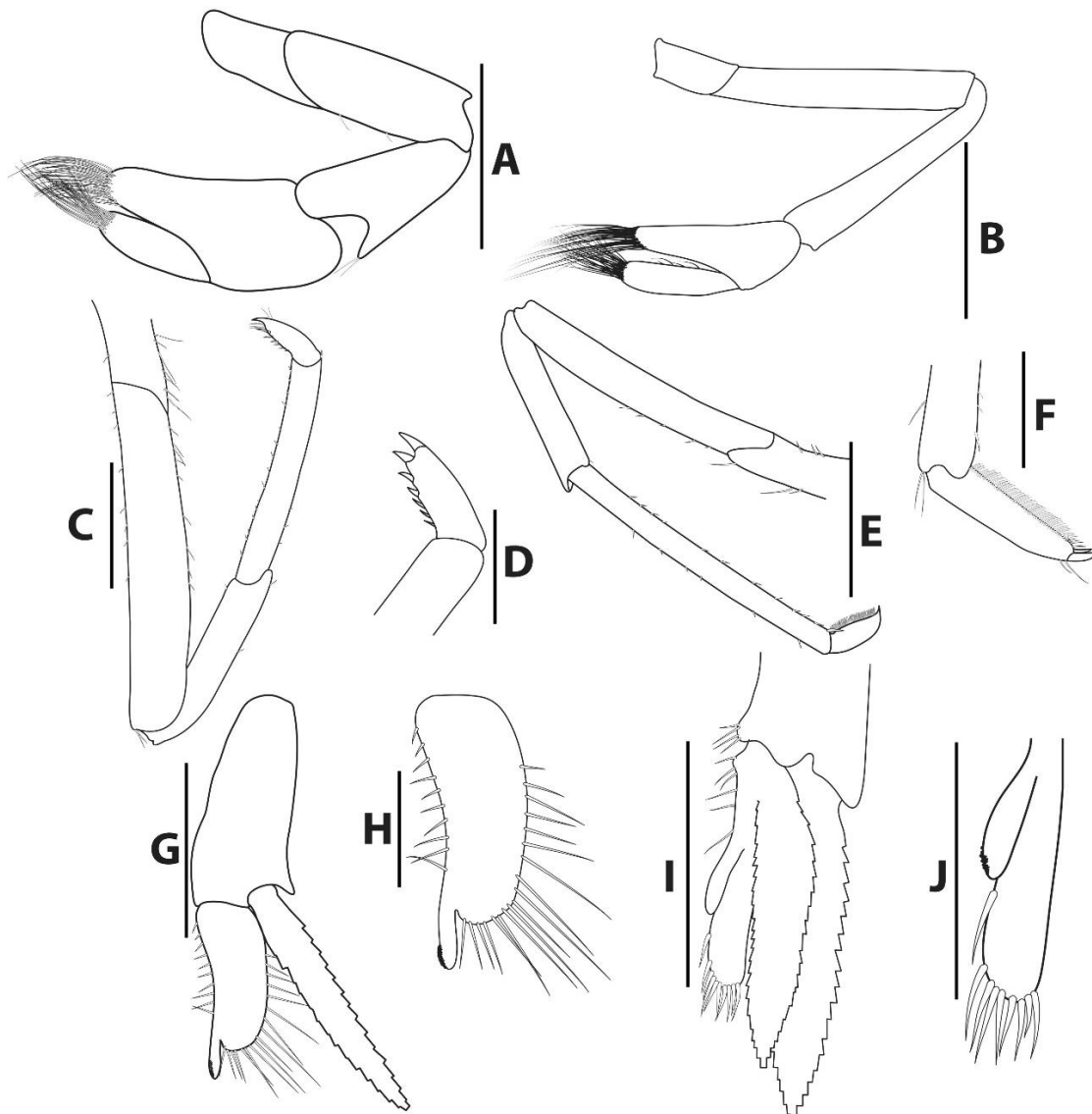


Figure 3. *Caridina cucphuongensis* Dang, 1980; male, cl 4.1 mm (ZMB 30234). A) First pereiopod; B) Second pereiopod; C) Third pereiopod; D) The same, dactylus; E) Fifth pereiopod; F) The same, dactylus; G) Male first pleopod; H) Endopod of male first pleopod; I) Male second pleopod; J) Appendix masculina and interna of male second pleopod.

Scale: A–J = 0.5 mm

### **Pleopods**

Endopod of male first pleopod extending to 0.6 times length of exopod, subrectangular in shape, anterior part not folded backwards, 2.5–2.82 (median 2.8) times as long as proximal width, inner margin concave, outer margin slightly convex, rounded distally, long plumose setae on outer and distal margins, strong and short setae on inner margin; with appendix interna exceeding terminal margin of endopod by 0.4 of its length (Figs. 3G, 3H). Appendix masculina of male second pleopod slender, reaching to proximal 0.7 times endopod length, 7.9 times as long as distal width, stick-shaped, slightly widened distally with some short spiniform setae on outer surface and some long spiniform setae on distal surface; appendix interna at middle of appendix masculina, narrow, small, extending

about 0.4 times length of appendix masculina (Figs. 3I, 3J).

### **Reproductive biology**

Two ovigerous females, ZMB 31774, cl 4.6 and 4.8 mm, undeveloped eggs  $1.08 \times 0.72$  mm, eggs with eyespots  $1.23 \times 0.81$  mm, ovigerous female with eyespots carries 23 eggs.

### **Coloration**

The body is yellowish to grey and dark grey in color. Dark grey spots present, sometimes look like as transverse stripes (Fig. 4).

### **Habitat**

This species was found in the streamlets with mixed sand, gravel, and rock substrate, and clear water flowing from the natural forest (Fig. 5).



Figure 4. *Caridina cucphuongensis* Dang, 1980, in situ photograph



Figure 5. Habitat of *Caridina cucphuongensis* Dang, 1980 in Cuc Phuong National Park.

**REMARKS**

*Caridina cucphuongensis* Dang, 1980 in Dang & Ho (2012) is characterized by several morphological characters such as short rostrum with large teeth on dorsal margin, long stylocerite, subrectangular endopod of male first pleopod, and short appendix interna of male second pleopod. However, the branchial formula of this species does not the same as that of generally found in *Caridina* but it is more similar to those of *Paracaridina* Liang, Guo & Tang, 1999 (5 pairs of well developed pleurobranchs; 2 pairs of arthrobranchs on third maxillipeds, with second pair strongly reduced in size; 1 pair of well developed podobranch on the second maxilliped, arthrobranch absent on the first pereopod, epipods well developed on third

maxillipeds and the first four pereopods). This character, however, is not unique to *Paracaridina* (von Rintelen et al., 2008). Moreover, there is weak support from genetic analysis to put this species under the genus *Paracaridina* (Do et al., 2021a). Therefore, we have retained this species under the genus of *Caridina*.

*Caridina cucphuongensis* somewhat resembles *C. serrata* Stimpson, 1860, *C. clinata* Cai, Quynh & Ng, 1999, *C. tricincta* Do, von Rintelen & Dang, 2020 and *C. pacbo* Do, von Rintelen & Dang, 2020 by possessing a short rostrum and the shape of endopod of male first pleopod. However, *C. cucphuongensis* can be easily distinguished from these species by the characters shown in Table 1.

Table 1. Main differences between *Caridina cucphuongensis* and similar species in Vietnam

Morphology characteristics	<i>C. cucphuongensis</i>	<i>C. serrata</i>	<i>C. clinata</i>	<i>C. tricincta</i>	<i>C. pacbo</i>
Rostrum formula	1-3+5-7/0-2	0-5+13-12/0-6	2-5+10-10/2-5	0-3+0-6/0-5	2-6+5-12/0-3
Stylocerite	Reaching to beginning of second segment of antennular peduncle	Reaching to the end of basal segment to middle of second segment of antennular segment.	Not reaching distal margin of basal segment of antennular segment.	Reaching distal end of basal segment of antennular peduncle.	Mostly reaching beyond the end of basal segment, sometimes to the middle of second segment of antennular peduncle.
Endopod of male first pleopod	2.5-2.82 (median 2.8) times as long as proximal width	2.5 times as long as proximal width		3.0-3.25 (median 3.0) times as long as proximal width	0.86-3.33 (median 3.09) times as long as proximal width
Appendix masculina of male second pleopod	Extending about 0.4 times length of appendix masculina	Extending about 0.3 times length of appendix masculina	Extending about 0.8 times length of appendix masculina	Extending about 0.9 times length of appendix masculina	Extending about 0.6 times length of appendix masculina
Uropodal diaeresis	18-21 (median 20) movable spiniform setae		14-17 movable spiniform setae	12-18 movable spiniform setae	



**Conservation status**

We have conducted many surveys and collected samples of atyid shrimp across Vietnam. However, so far this species has only been found in a few streamlets in the Cuc Phuong National Park. With a very narrow distribution, according to IUCN Red List Categories and Criteria (IUCN, 2019), this species could be classified as endangered if any threats should emerge. Good protection of forest cover as well as limiting impacts that can cause water pollution are important measures to conserve this species.

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**REFERENCES**

- Bouvier E. L., 1904. Crevettes de la famille des Atyidés: espèces qui font partie des collections du Muséum d'Histoire Naturelle. *Bulletin du Muséum national d'Histoire naturelle, Paris*, 1er Série, 104: 129–138.
- Bouvier E. L., 1919. Quelques espèces nouvelles de Caridines. *Bulletin du Muséum national d'Histoire naturelle*, 1919: 330–335. <https://doi.org/10.5962/bhl.part.7930>
- Bouvier E. L., 1925. Recherches sur la morphologie, les variations, la distribution géographique des Crevettes de la famille des Atyidés. Paul Lechevalier, *Encyclopédie Entomologique*, 4: 1–370.
- Cai Y. & Ng N. K., 1999. A revision of the *Caridina serrata* species group, with descriptions of five new species (Crustacea: Decapoda: Caridea: Atyidae). *Journal of Natural History*, 113(4): 1603–1638. <https://doi.org/10.1080/002229399299789>
- Cai Y., Nguyen X. Q. & Ng P. K. L., 1999. *Caridina clinata*, a new species of freshwater shrimp (Crustacea: Decapoda: Atyidae) from northern Vietnam. *Proceedings of the Biological Society of Washington*, 112(3): 531–535.
- Chace F. A. Jr., 1997. The caridean shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition, 1907–1910, Part 7: Families Atyidae, Eugonatonotidae, Rhynchocinetidae, Bathypalaemonellidae, Processidae, and Hippolytidae. *Smithsonian Contributions to Zoology*, 587: 1–106. <https://doi.org/10.5479/si.19436696.391.1>
- Dang N. T., 1967. New species and genera in the freshwater and brackish water Invertebrates of North Vietnam. *Journal of Biology-Geology*, 6(3–4): 155–156 (in Vietnamese with French summary).
- Dang N. T., 1975. The identities of North Vietnamese freshwater shrimps and crabs. *Journal of Biology-Geology*, 13(3): 65–78 (in Vietnamese with French summary).
- Dang N. T. & Do V. T., 2007. New species of *Caridina* (Crustacea, Decapoda, Atyidae) from Vietnam. *Journal of Biology*, 29(4): 1–12 (in Vietnamese with English abstract).
- Dang N. T. & Do V. T., 2008. Notes on the freshwater Atyid shrimps (Crustacea, Decapoda, Atyidae) of Vietnam and the region. *Journal of Biology*, 30(1): 1–12 (in Vietnamese with English abstract).
- Dang N. T. & Ho T. H., 2012. Freshwater Crabs and Shrimps from Vietnam (Palaemonidae, Atyidae, Parathelphusidae, Potamidae). Publishing House for Science and Technology, Hanoi, pp. 264 (in Vietnamese).
- Dang N. T., Thai T. B. & Pham V. M., 1980. The identities of freshwater invertebrates of North Vietnam. Publishing House for Science and Technology, Hanoi, pp. 573 (in Vietnamese).
- De Haan w., 1833–1850. Crustacea. In: Siebold, P.F. von (Ed.), *Fauna Japonica*,

- sive Descriptio Animalium, quae in Itinere per Japoniam, Juſu et Auspiciis Superiorum, qui Summum in India Batava Imperium Tenent, Suscepto, Annis 1823–1830. Collegit, Notis, Observationibus et Adumbrationibus Illustravit, Lugduni-Batavorum [Leiden], pp. 243.
- Do V. T. & Dang N. T., 2010. New *Caridina* (Atyidae-Crustacea) shrimps collected from Hai Van mountain pass. *Journal of Biology*, 32(4): 29–35 (in Vietnamese with English abstract).
- Do V. T., von Rintelen T. & Dang V. D., 2020. Descriptions of two new freshwater shrimps of the genus *Caridina* H. Milne Edwards, 1837 (Crustacea: Decapoda: Atyidae) from northern Vietnam. *Raffles Bulletin of Zoology*, 68: 404–420.
- Do V. T., Cao T. K. T. & von Rintelen T., 2021a. Deep into darkness: the first stygobitic species of freshwater shrimp of the genus *Caridina* (Crustacea: Decapoda: Atyidae) from Northern Vietnam. *Zootaxa*, 4933(3): 422–434. <https://doi.org/10.11646/zootaxa.4933.3.8>
- Do V. T., von Rintelen T. & Dang V. D., 2021b. Description of one new species of freshwater shrimp of the genus *Caridina* (Crustacea: Decapoda: Atyidae) from two karst caves of Northern Vietnam. *Zootaxa*, 4999(3): 228–242. <https://doi.org/10.11646/zootaxa.4999.3.3>
- IUCN Standards and Petitions Committee, 2019. Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Committee. Available from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed 10 July 2021).
- International Code of Zoological Nomenclature. Available from: <https://www.iczn.org/the-code/the-code-online/> (accessed 4 July 2021).
- Li S. Q. & Liang X. Q., 2002. Caridean prawns of northern Vietnam (Decapoda: Atyidae, Palaemonidae). *Acta Zootaxonomica Sinica*, 27(4): 707–716 (in Chinese with English summary).
- Liang X. Q., Guo Z. L. & Tang K. E., 1999. On new genus and new species of atyid shrimps (Decapoda, Caridea) from human, China. *Journal of fisheries of China*, 23(Supplement): 69–72.
- Milne Edwards H., 1837. Histoire Naturelle des Crustacés, Comprenant l’anatomie, la Physiologie et la Classification de ces Animaux. Librairie encyclopédique de Roret, 3: 1–638.
- Nguyen V. X., 1999. Several prawn and atyid species in some parts of southern Vietnam and some comments about the. *Journal of Agricultural and Forestry Science*, 11: 1–60 (in Vietnamese).
- Stimpson w., 1860. Prodromus descriptionis animalium evertibratorum, quae in Expeditione ad Oceanum Pacificum Septentrionalem, a Republic Federata missa, Cadwaladore Ringgold et Johanne Rodgers Ducibus, observavit et descripsit. Pars VIII, Crustacea Macrura. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 1860(22–47): 91–116.
- von Rintelen K., Karge A. & Klotz W., 2008. News from a small island – first record of a freshwater shrimp (Decapoda, Atyidae, *Caridina*) from Peleng, Banggai Islands, Indonesia. *Journal of Natural History*, 42: 2243–2256. <https://doi.org/10.1080/00222930802254680>