



Taxonomy notes and new occurrence data of four species of atyid shrimp (Crustacea: Decapoda: Atyidae) in Vietnam, all described from China

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Abstract

Background

Freshwater shrimp of the family Atyidae De Haan, 1849 have been studied in Vietnam for more than a century. A total of 24 species of atyid shrimps from the genera *Caridina* H. Milne Edwards, 1837, *Neocaridina* Kubo, 1938, *Atyopsis* Chace, 1983 have been recorded from Vietnam. With 22 species, the majority are from the genus *Caridina*. In 2013, Karge and Klotz mentioned the occurrence of four yet undescribed species belonging to *Paracaridina* Liang, Guo & Tang, 1999 in Vietnam without taxonomic details.

In general, studies of freshwater atyids in Vietnam are limited and most Vietnamese taxa await a taxonomic revision. The available data do not fully reflect their estimated species diversity in the country and distribution data are deficient. Here, we focus on four species of atyid shrimps from two genera, viz. *Caridina cantonensis* Yu, 1938, *C. lanceifrons* Yu, 1936, *C. serrata* Stimpson, 1860 and *Neocaridina palmata* (Shen, 1948), all described from China and have been reported to occur in Vietnam. The previous reports on the occurrence of these species in Vietnam are largely unreliable due to taxonomic confusion. To contribute to the knowledge of these taxa, we provide the first verified distribution records of the four species in the country with some taxonomic remarks.

New information

This study shows the first taxonomically-verified distribution data of four atyid shrimp species originally described from China, but also reported from Vietnam, albeit under various species names and, in some cases, erroneously. These data allow the first meaningful discussion of the distribution in light of the reproductive strategy of these four species and, in conjunction with the taxonomic remarks, will contribute to the knowledge of these taxa. As a result of this research and data from previous studies, we now consider all four species as widespread and non-endemic, but land-locked (with a complete freshwater life cycle). In Vietnam, all four species are confined to the northern half of the country. Beyond Vietnam, we provide the first records for *Caridina lanceifrons* from southern Thailand, which suggests a major sampling gap in Indochina.

Keywords

freshwater fauna, *Caridina*, *Neocaridina*, taxonomy, distribution

Introduction

Freshwater shrimps of the family Atyidae (De Haan 1849) have a global distribution in the tropics and subtropics. Atyids are old (von Rintelen et al. 2012) and diverse with ca. 440 species (De Grave et al. 2015). The highest diversity of atyids is found in Southeast Asia (here including southern China) with more than 210 species in 13 genera (De Grave et al. 2008). Atyid shrimps are, alongside palaemonids, the only diverse group of shrimps in freshwater (De Grave et al. 2015) and play an important ecological role as primary consumers and aid in detritus decomposition (Dudgeon and Wu 1999, Crowl et al. 2001, Williams 2002, Yam and Dudgeon 2006).

Most recent taxonomic research on atyids – traditional and integrative – has focused on Southeast Asia, but the atyid fauna of Indochina including Vietnam has been largely neglected. Virtually all of the few studies in this region have been conducted in Vietnam and all are purely taxonomic. At present, 24 described atyid species from four genera, including *Caridina* Milne Edwards, 1837 (Milne Edwards 1837), *Paracaridina* Liang, Guo &

Tang, 1999 (Liang et al. 1999), *Neocaridina* Kubo, 1938 (Kubo 1938) and *Atyopsis* Chace, 1983 (Chace 1983), have been recorded from Vietnam (Bouvier 1904, Bouvier 1905, Bouvier 1919, Bouvier 1925, Dang 1967, Dang 1975, Dang et al. 1980, Cai 1996, Cai et al. 1999, Nguyen 1999, Li and Liang 2002, Nguyen 2003, Dang and Do 2007a, Dang and Do 2007b, Dang and Do 2008, Do and Dang 2010, Dang and Ho 2012, Karge and Klotz 2013, Do et al. 2020, Do et al. 2021). The majority (22 species) come from the genus *Caridina* (Karge and Klotz 2013, Do et al. 2020, Do et al. 2021). The number of species is likely going to increase when more studies are done. However, the taxonomic status of all species described by Vietnamese taxonomists is hard to verify, as all types have been lost due to lack of care (the species described by Dang (1975), Dang et al. (1980), Dang and Do (2007a), Do and Dang (2010)).

The taxonomic confusion in atyids in general and Vietnamese taxa, in particular, does not only make it difficult to obtain accurate estimates of species diversity, but also prevents the use of existing data for biogeographic or evolutionary studies, as species distribution cannot be reliably assessed.

Four species, *Caridina cantonensis* Yu, 1938, *C. lanceifrons* Yu, 1936, *C. serrata* Stimpson, 1860 and *Neocaridina palmata* (Shen, 1948), were originally described from China (Stimpson 1860, Shen 1948, Yu 1936, Yu 1938). Today, these are known to be widely distributed in China (Liang 2004). Vietnamese authors published taxonomic studies on the atyid shrimps of Vietnam including descriptions of new species, such as *Caridina flavilineata* Dang, 1975, *C. vietriensis* Dang & Do, 2007, *C. pseudoflavilineata* Do & Dang, 2010 and *Caridina denticulata vietnamensis* Dang, 1967. These authors also recorded *Caridina cantonensis* and *C. serrata* from Vietnam (Dang 1975, Dang et al. 1980, Dang and Do 2007a, Dang and Do 2007b, Dang and Ho 2012). However, Cai (1996) synonymised *Caridina denticulata vietnamensis* with *Neocaridina palmata palmata* (Shen, 1948), Li and Liang (2002) and Liang (2004) considered *Caridina flavilineata* Dang, 1975 as junior synonyms of *C. lanceifrons* Yu, 1936 (Li and Liang 2002, Liang 2004). Dang and Ho (2012) resurrected *C. flavilineata* and *N. vietnamensis* as distinct species compared to the species described from China. Based on the description and the figures in Dang (1975), Dang et al. (1980), Dang and Do (2007a), Do and Dang (2010), we found that three species of the genus *Caridina* (*C. flavilineata*, *C. vietriensis* and *C. pseudoflavilineata*) are similar to *C. lanceifrons* Yu, 1936, while *Neocaridina vietnamensis* is hardly distinguishable from *N. palmata* (Shen, 1948). In order to contribute to the taxonomic debate on the atyid shrimp fauna of Vietnam and China, only a proper revision could really solve it. A sampling campaign was conducted to cover as many locations in Vietnam as possible, especially in the northern part of the country. Our paper aims to address the relevant taxonomic issues and provide new occurrence data in Vietnam of four species of atyid shrimps originally described from China.

Materials and methods

We collected atyid specimens in different habitats including rivers, streams, lakes and caves from the mainland to islands throughout Vietnam between 2003 and 2020. The

collected sites were partially chosen for their accessibility (Fig. 1, Suppl. material 1). The collecting methods included catching by hand-nets both during the daytime and at night. At each site, at least 10 specimens were collected. To document their live colouration, specimens were then photographed with a Nikon D5600 Digital Camera and afterwards preserved in 90% ethanol. During the field surveys, other activities included observing living animals in their natural habitats, recording coordinates and photographing habitats. Additionally, we interviewed local people on their personal knowledge of the shrimp fauna to gain further information on species composition and distribution in local streams and rivers.

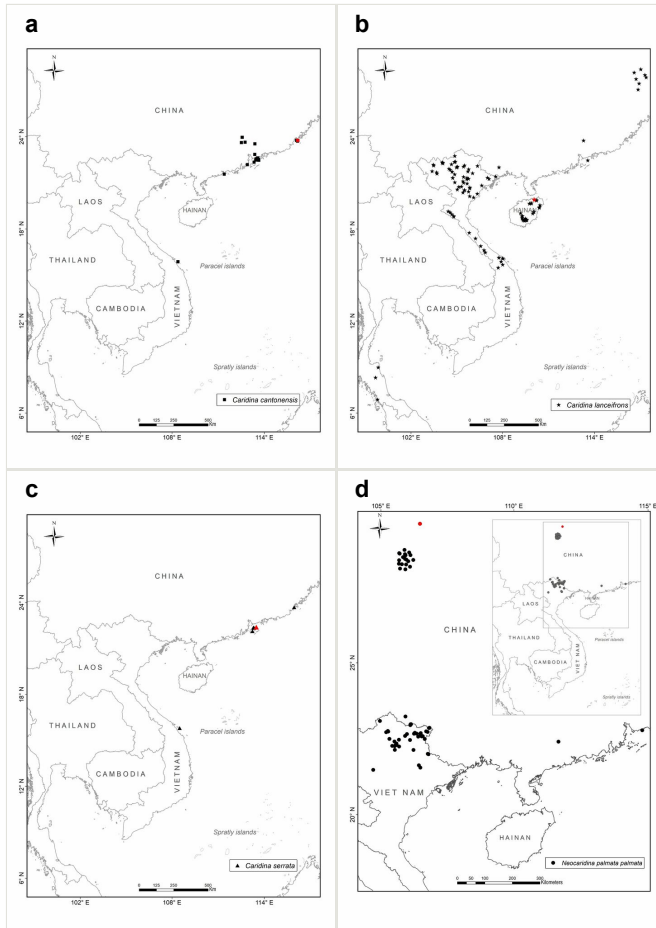


Figure 1.

Map of collecting sites of atyid shrimps in Vietnam, China and Thailand. Details are shown in Suppl. material 1. Type localities are in red colour.

a: *Caridina cantonensis* [doi](#)

b: *Caridina lanceifrons* [doi](#)

c: *Caridina serrata* [doi](#)

d: *Neocaridina palmata palmata* [doi](#)

All collected samples were identified to species level, based on existing descriptions. The specimens were dissected and observed by using a Leica MZ 12 stereomicroscope. Voucher specimens are deposited in the Institute of Ecology and Biological Resources (IEBR), Vietnam Academy of Science and Technology (VAST), Ha Noi, Vietnam, the Museum für Naturkunde (MfN), Berlin, Germany (collection codens: ZMB), Ha Noi University of Science (HUS) and Oxford University Museum of Natural History (OUMNH). In addition to the data of the collected samples in Vietnam, we used records of the four species from China and other areas from the collection of Museum für Naturkunde (MfN), Berlin, Germany and the literature. For the latter, we only used records that could be georeferenced with reasonable accuracy and precision (< ca. 1 km radius across point locality) from authors who are experts on atyids. Based on these criteria, all records from Shen (1948), Zheng (1989), Cai and Yuan (1996), Cai and Ng (1999), Cai (2014) have been included. Liang (2004) contains a number of additional localities, but we have refrained from including them as they could not be georeferenced and the maps are not precise enough. The maps for *Caridina cantonensis* and *Neocaridina palmata* are thus not complete for China.

In the description, 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 + the number of dorsal teeth on the rostrum anterior to the orbital margin/number of ventral teeth of the rostrum.

Taxon treatments

Caridina cantonensis Yu, 1938

Nomenclature

Caridina cantonensis Yu, 1938: 290, figs. 7–8. [Type locality: Qing'ao Village, Nan'ao County, Guangdong Province, China; neotype designation by Cai and Ng (1999)].

Caridina mutata Cai & Ng, 1999: 1624; figs. 12–13. [Type locality: mountain stream near Fangcheng Town, Fangcheng County, Guangxi Province, China]

Materials

- a. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Cu Lao Cham; country: Vietnam; countryCode: VN; stateProvince: Quang Nam; county: Hoi An; locality: Stream near Bai Huong, Cu Lao Cham Island; decimalLatitude: 15.93944; decimalLongitude: 108.52; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-5-9; year: 2017; month: 5; day: 9; catalogNumber: ZMB 30253; recordedBy: Do Van Tu; disposition: in collection;

- identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- b. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Cu Lao Cham; country: Vietnam; countryCode: VN; stateProvince: Quang Nam; county: Hoi An; locality: Stream near on the road to Bai Huong, Cu Lao Cham Island; decimalLatitude: 15.94417; decimalLongitude: 108.5125; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-5-9; year: 2017; month: 5; day: 9; catalogNumber: ZMB 30309; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- c. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: Conghua, small stream and trickle; decimalLatitude: 23.575; decimalLongitude: 113.4374; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-4-1; year: 2012; month: 4; day: 1; catalogNumber: OUMNH 201307016; recordedBy: Werner & Maria Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: OUMNH; collectionCode: OUMNH; basisOfRecord: PreservedSpecimen
- d. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: Near Quing Yuan city; decimalLatitude: 23.56641; decimalLongitude: 113.17765; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-4-1; year: 2012; month: 4; day: 1; catalogNumber: ZMB 28041; recordedBy: Werner Klotz, Yixiong Cai, Chris Lukhaup; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- e. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Kau Sai Chau Island, stream at E shore (Stream "B"); decimalLatitude: 22.3575; decimalLongitude: 114.3186; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-5-28; year: 2015; month: 5; day: 28; catalogNumber: ZMB 31788; recordedBy: Zheng, M.Q. (1989); disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- f. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong

- Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Kau Sai Chau Island, stream at E shore (Stream "A"); decimalLatitude: 22.359; decimalLongitude: 114.3185; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-5-20; year: 2015; month: 5; day: 20; catalogNumber: ZMB 31790; recordedBy: Julia Chan, Thomas von Rintelen; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- g. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Kau Sai Chau Island, stream at E shore (Stream "C" upstream); decimalLatitude: 22.3535; decimalLongitude: 114.3223; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-5-28; year: 2015; month: 5; day: 28; catalogNumber: ZMB 31793; recordedBy: Julia Chan; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- h. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: Spring near Lixi Town (near Ying De); decimalLatitude: 23.9059; decimalLongitude: 113.2457; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2010-3-18; year: 2010; month: 3; day: 18; catalogNumber: ZMB 32144; recordedBy: Werner & Maria Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- i. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: Conghua, small stream and trickle; decimalLatitude: 23.575; decimalLongitude: 113.4374; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2010-3-21; year: 2010; month: 3; day: 21; catalogNumber: ZMB 32145; recordedBy: Werner & Maria Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- j. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: Small mountain stream near Lixi Town (near Ying De); decimalLatitude: 23.9067; decimalLongitude: 113.2521; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2010-3-19; year: 2010; month: 3; day: 19; catalogNumber: ZMB 32146; recordedBy: Werner & Maria Klotz; disposition: in collection; identifiedBy: Do Van Tu;

- dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- k. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: Small mountain stream near Lixi Town (near Ying De); decimalLatitude: 23.9095; decimalLongitude: 113.2597; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2010-3-19; year: 2010; month: 3; day: 19; catalogNumber: ZMB 32147; recordedBy: Werner & Maria Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- l. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: Henquin island, Zhuhai, San Die Quan spring; decimalLatitude: 22.11369; decimalLongitude: 113.50278; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-4-5; year: 2009; month: 4; day: 5; catalogNumber: ZMB 32183; recordedBy: Werner Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- m. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Hongkong Island, Lung Hang Stream; decimalLatitude: 22.4035; decimalLongitude: 114.3209; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-4-7; year: 2009; month: 4; day: 7; catalogNumber: ZMB 32185; recordedBy: Werner Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- n. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; decimalLatitude: 22.38333; decimalLongitude: 114.1; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-8-1; year: 2009; month: 8; day: 1; catalogNumber: ZMB 32186; recordedBy: pet trade; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- o. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Lantau

- Island, Stream at Pui O; decimalLatitude: 22.2485; decimalLongitude: 113.9828; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-4-9; year: 2009; month: 4; day: 9; catalogNumber: ZMB 32192; recordedBy: Werner Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- p. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Stream at Ha Miu Tin; decimalLatitude: 22.5033; decimalLongitude: 114.2643; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-4-8; year: 2009; month: 4; day: 8; catalogNumber: ZMB 32195; recordedBy: Werner Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- q. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Stream near Sheung Miu Tin; decimalLatitude: 22.5023; decimalLongitude: 114.26; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2019-4-8; year: 2019; month: 4; day: 8; catalogNumber: ZMB 32196; recordedBy: Werner Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- r. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Tai Mo Shan; decimalLatitude: 22.409; decimalLongitude: 114.1372; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2010-3-23; year: 2010; month: 3; day: 23; catalogNumber: ZMB 32307; recordedBy: Andreas Karge; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- s. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: W of Shenzhen (ca. 1h); decimalLatitude: 22.74862; decimalLongitude: 114.06034; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-4-15; year: 2015; month: 4; day: 15; catalogNumber: ZMB 29690; recordedBy: Chris Lukhaup; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- t. scientificName: *Caridina cantonensis* Yu, 1938; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *cantonensis*; scientificNameAuthorship: Yu, 1938; country: China; countryCode: CN; stateProvince: Guangdong; locality: Shenzhen city boundary; decimalLatitude: 22.74929; decimalLongitude: 114.06058; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-4-15; year: 2015; month: 4; day: 15; catalogNumber: ZMB 29756; recordedBy: Chris Lukhaup; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

Description

Material examined for description. *Caridina cantonensis* Yu, 1938: 7 males, cl 3.5–4.1, 4 females, cl 4.0–4.8 (ZMB 30253), Vietnam: Quang Nam Province, Hoi An City, Cu Lao Cham Island, a stream near Bai Huong, 15°56'22"N 108°31'12"E, coll. Do Van Tu, 9 May 2017; 3 males, cl 3.6–4.0, 2 females, cl 4.2–4.4 (ZMB 30309), Vietnam: Quang Nam Province, Hoi An City, Cu Lao Cham Island, a small stream ca. 3 km to Bai Huong, 15°56'39"N 108°30'45" E, coll. Do Van Tu, 9 May 2017.

Cephalothorax and cephalic appendages. Carapace length 3.5–4.8 mm. Rostrum straight, slightly bent downwards, reaching to middle or the end of second segment of antennular peduncle, 0.38–0.46 (median 0.43) times as long as carapace, rostral formula: 4–5+9–12/3–5 ($n = 10$), teeth normal (Fig. 2a). Suborbital angle acute, completely fused with antennal spine; pterygostomial margin rounded (Fig. 2a). Eyes well developed with globular cornea, anterior end reaching to 0.7 times length of basal segment of antennular peduncle (Fig. 2a). Antennular peduncle 0.54–0.67 (median 0.60) times as long as carapace; basal segment 1.38–1.83 (median 1.57) times as long as second segment, second segment 1.4–2.0 (median 1.55) times as long as third segment (Fig. 2b). Stylocerite reaching almost to middle (0.4 times length) of second segment of antennular peduncle (Fig. 2b). Scaphocerite reaching beyond distal end of antennular peduncle, 3.0–4.0 (median 3.46) times as long as wide (Fig. 2a, c).

Abdominal somites, telson and uropods. Sixth abdominal somite 0.5–0.6 (median 0.57) times length of carapace, 1.50–2.0 (median 1.67) times as long as fifth abdominal somite, 0.86–1.05 (median 1.0) times length of telson. Telson length 2.1–2.75 (median 2.44) times as long as proximal width, distal margin triangular, terminating in a short median projection, with 5–6 pairs of dorsal spiniform setae and one pair of dorso-subdistal spiniform setae; distal end with 4 pairs of spiniform setae, lateral pair slightly shorter than intermediate pairs (Fig. 2d). Pre-anal carina low, with few setae, lacking a tooth or spine. Uropodal diaeresis with 18 movable spiniform setae, outermost one slightly shorter than lateral angle (Fig. 2e).

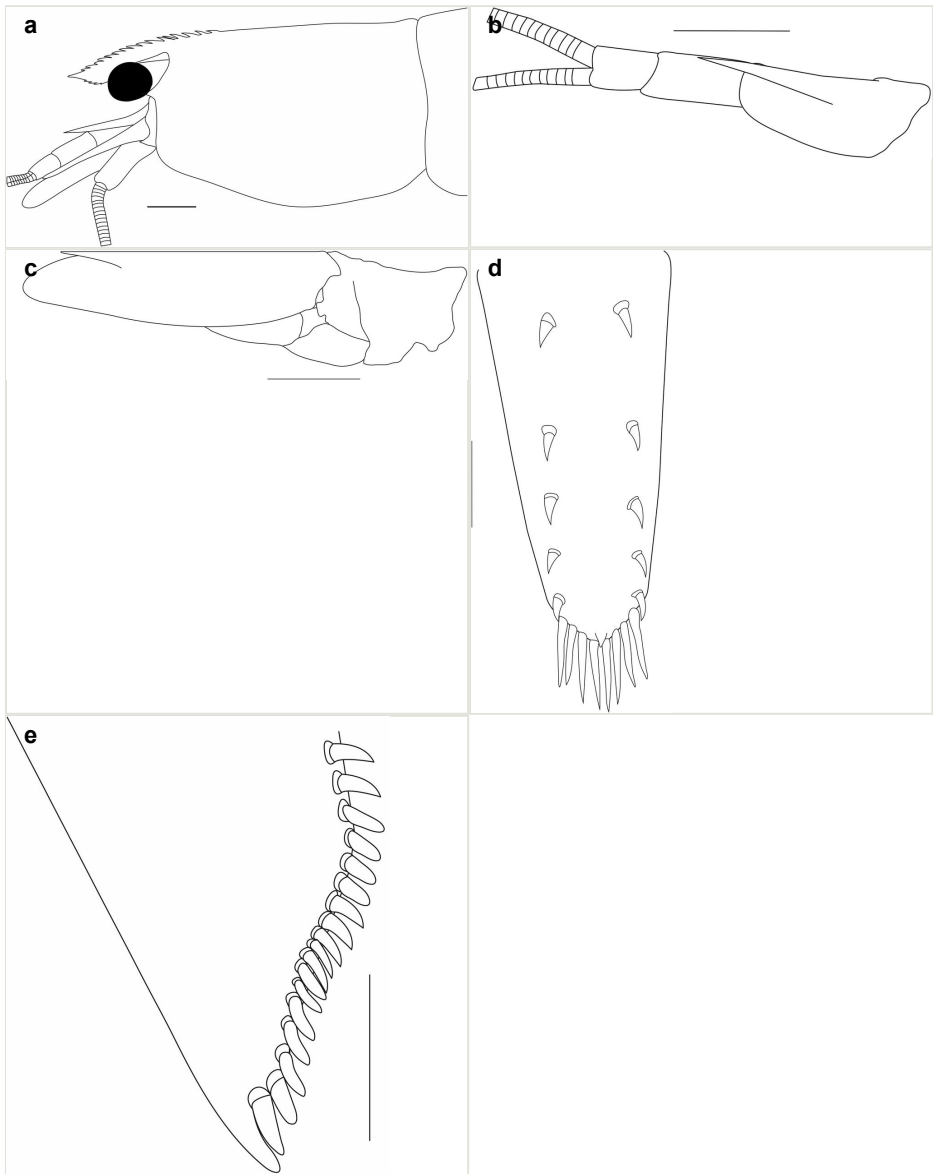


Figure 2.

Caridina cantonensis Yu, 1938; male, cl 4.1 mm (ZMB 30253). Scale: A–C = 1 mm, D = 0.5 mm, E = 0.2 mm.

a: Cephalothorax and cephalic appendages [doi](#)

b: Antennular peduncle [doi](#)

c: Scaphocerite [doi](#)

d: Telson [doi](#)

e: Uropodal diaeresis. [doi](#)

Pereiopods. Epipod present on first four pereiopods. First pereiopod short, robust, reaching beyond end of basal segment of antennular peduncle; chela 2.0–2.2 (median 2.0) times as long as wide, 1.33–1.67 (median 1.42) times length of carpus; tips of fingers rounded, without hooks; dactylus slightly longer than palm, 1.0–1.1 (median 1.1) times as long as palm in males and shorter than palm, 0.8–0.86 (median 0.83) times as long as palm in females; carpus excavated anteriorly, 1.5–1.88 (median 1.65) times as long as wide, 0.67–0.8 (median 0.8) times length of merus; merus 2.14–3.0 (median 2.5) times as long as wide, longer than ischium (Fig. 3a). Second pereiopod long, slender, reaching to distal end of antennular peduncle; chela 2.22–2.63 (median 2.42) times as long as wide, 0.66–0.8 (median 0.73) times length of carpus; tips of fingers rounded, without hooks; dactylus 1.22–1.30 (median 1.26) times as long as palm; carpus 4.5–5.3 (median 4.67) times as long as wide, 1.09–1.19 (median 1.14) times as long as merus; merus 4.18–5.0 (median 4.65) 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 four to five accessory spiniform setae on flexor margin, dactylus 2.83–3.6 (median 3.2) times as long as wide (terminal claw and spiniform setae on flexor margin included), propodus 9.0–10.9 (median 9.42) times as long as wide, 3.5–4.47 (median 3.88) times as long as dactylus; carpus 4.25–5.0 (median 4.75) times as long as wide, 0.61–0.67 (median 0.67) times as long as propodus, 0.45–0.63 (median 0.5) times as long as merus; merus 5.71–6.8 (median 6.19) times as long as wide, bearing four strong, movable spiniform setae on posterior margin of outer surface; ischium with one movable spiniform seta (Fig. 3c). Fifth pereiopod slender, reaching to end of second segment of antennular peduncle, dactylus 3.2–3.6 (median 3.2) times as long as wide (terminal claw and spiniform setae on flexor margin included), terminating in one large claw, with 25–28 spiniform setae on flexor margin; propodus 13.7–14.69 (median 13.71) times as long as wide, 3.13–5.33 (median 5.22) times length of dactylus; carpus 4.2–4.75 (median 4.50) times as long as wide, 0.48–0.56 (median 0.55) times as long as propodus, 0.4–0.51 (median 0.46) times as long as merus; merus 5.45–6.0 (median 6.0) times as long as wide, bearing 3–4 strong, movable spiniform setae on posterior margin of outer surface (Fig. 3d).

Pleopods. Endopod of male first pleopod extending to 0.6 times length of exopod, rectangular in shape, anterior part folded backwards, 2.0–2.73 (median 2.53) times as long as proximal width, inner margin concave, outer margin concave or slightly straight, rounded distally, long plumose setae on outer and distal margins, medium-length setae on inner margin; with appendix interna exceeding terminal margin of endopod by 0.3 of its length (Fig. 3e). Appendix masculina of male second pleopod slender, sub-cylindrical, reaching to proximal 0.5 times endopod length, 4.7 times as long as distal width, finger-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 0.5 times length of appendix masculina (Fig. 3f).

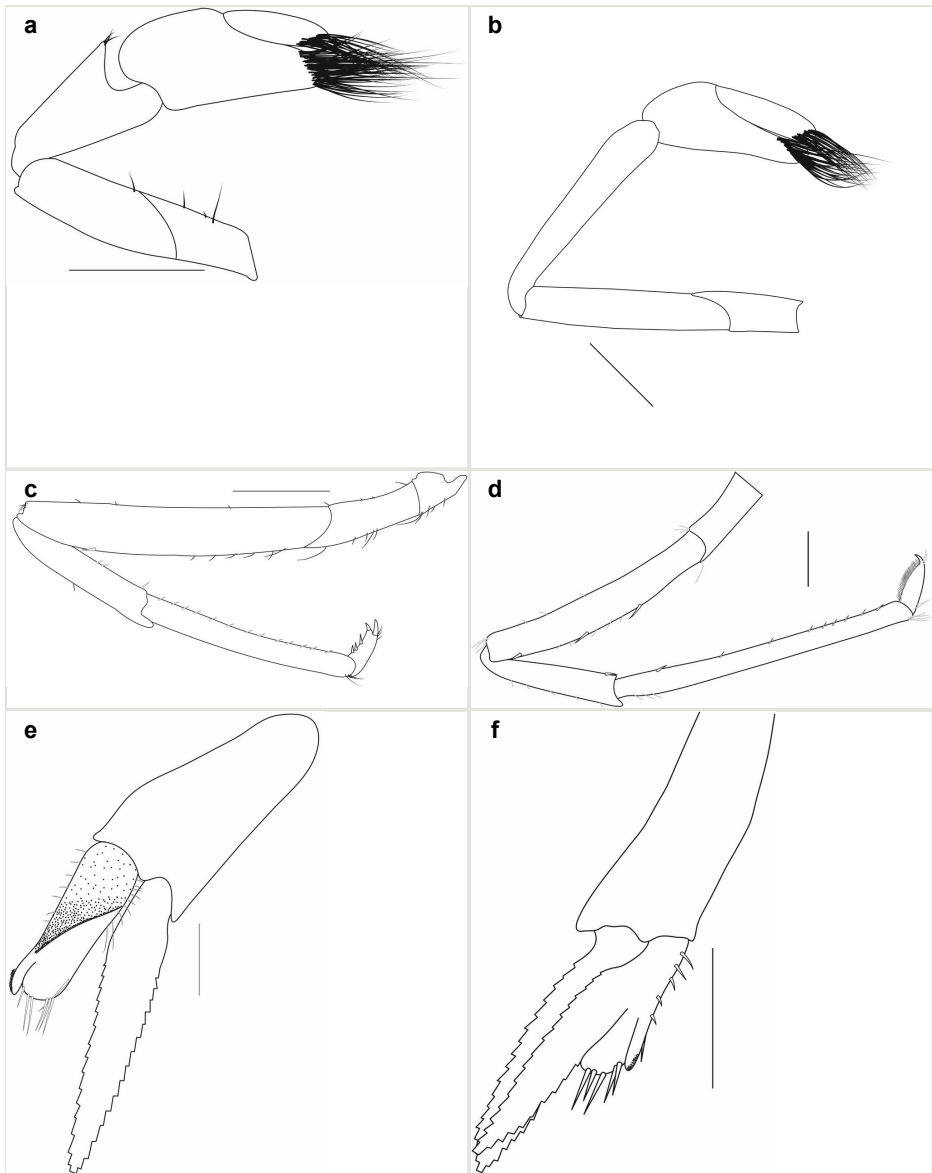


Figure 3.

Cardina cantonensis Yu, 1938; male, cl 4.1 mm (ZMB 30253). Scale: A–D = 1 mm; E, F = 0.2 mm.

a: First pereiopod [doi](#)

b: Second pereiopod [doi](#)

c: Third pereiopod [doi](#)

d: Fifth pereiopod [doi](#)

e: Male first pleopod [doi](#)

f: Male second pleopod. [doi](#)

Colouration. Body yellowish, few irregular small black spots present on ventrolateral parts of carapace and abdominal somites (Fig. 4).



Figure 4. doi

Live colouration of *Caridina cantonensis* Yu, 1938, collected on Cu Lao Cham Island, Hoi An City, Quang Nam Province.

Distribution

Cu Lao Cham, in north-central Vietnam (Fig. 1a). Guangdong, Guangxi and Hong Kong, China (Liang 2004).

Notes

Dang et al. (1980) recorded *C. cantonensis* from Chi Lang District, Lang Son Province, North Vietnam, near the border to China. We could neither find this species amongst our samples surrounding this area nor from many survey sites in the mainland of northern Vietnam. Our samples from Lang Son Province are not just a distinct species compared to *C. cantonensis*, especially in the anterior region of the endopod of male first pleopod (straight vs. folded backwards), but belong to an undescribed species. As this species has not been known from China until now, a description would be out of the focus of this paper. However, we discovered *C. cantonensis* at Cu Lao Cham Island off the central coast of Vietnam (Fig. 1a). The population in Vietnam showed no differences when compared to the original description (Yu 1938) and the later re-descriptions in Cai and Ng (1999) and Liang (2004), except the lower number of spiniform setae on flexor margin of the dactylus of the fifth pereiopod (25–28 vs. 38–45, Fig. 3c, cf. Yu (1938): fig. 8h). In China, this species is known from Guangdong and Guangxi Provinces and from Hong Kong Island. It is only found in streams and, based on egg-size (Table 1), it can be considered as land-locked (Dudgeon 1987). In our study, this species was only found on one small island in central Vietnam, far from the

type locality (Fig. 1). An introduction of this species, for example, along with fish fry from fish farming, cannot be ruled out.

Species	Egg size (mm)	Distribution in Vietnam
<i>Caridina cantonensis</i> Yu, 1938	0.85–0.95 × 0.55–0.6	Only occurs on Cu Lao Cham, a small Island in north-central Vietnam
<i>Caridina lanceifrons</i> Yu, 1936	0.8–0.9 × 0.5– 0.6	Widely distributed in North Vietnam
<i>Caridina serrata</i> Stimpson, 1860	1.0 × 0.6	Only occurs on Cu Lao Cham Island
<i>Neocardina palmata palmata</i> (Shen, 1948)	1.0–1.1 × 0.7	Confined to the northeast of Vietnam

Caridina lanceifrons Yu, 1936

Nomenclature

Caridina lanceifrons Yu, 1936: 89, figs. 4–7. [Type locality: near the lighthouse at Hai-kiu-sche in the salt water; neotype locality: pond near Qiongsan City, Haikou, Hainan, China (designation by Cai (2014)).

Caridina lanceifrons — Liang and Zheng (1988): 15; Zheng (1989): 8; Liang and Zhou (1993): 231; Liang et al. (1993): 41; Li (1997): 454; Li and Liang (2002): 709; Cai (2014): 217–220, figs. 6–7.

Caridina flavilineata Dang, 1975: 70–71, fig. 5. [Type locality: Nam Ha = Ha Nam and Nam Dinh Provinces, northern Vietnam]; Dang and Do (2008): 8–10, fig. 5; Dang and Ho (2012): 154–156, fig. 53.

Caridina vietriensis Dang & Do, 2007: 9–10, figs. 7–8. [Type locality: Viet Tri City, Phu Tho Province, Vietnam].

Caridina pseudoflavilineata Do & Dang, 2010: 31–34, figs. 3–4. [Type locality: Hai Van mountain pass, Thua Thien Hue Province, Vietnam].

Materials

- a. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Thai Nguyen; county: Pho Yen; municipality: Dac Son; locality: Cau River, along Road TL 261 Pho Yen - Đại Từ, crossing road from

- right - left, flowing out off the Nui Coc reservoir, Red River basin, Eastface of Tao Dao National Park; decimalLatitude: 21.42178; decimalLongitude: 105.83862; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-4-8; year: 2012; month: 4; day: 8; catalogNumber: ZMB 32411 or 32312; recordedBy: Marco Endruweit, Wang Jing; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- b. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Nam; county: Duy Xuyen; locality: My Son (Ruin City); decimalLatitude: 15.7634; decimalLongitude: 108.12458; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-7-17; year: 2009; month: 7; day: 17; catalogNumber: ZMB; recordedBy: Andreas Karge; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- c. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Tri; locality: Dakrông River near Dakrong, 20 km South of Dakrong bridge; decimalLatitude: 16.5735; decimalLongitude: 106.95983; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2006-10-21; year: 2006; month: 10; day: 21; catalogNumber: ZMB 29493; recordedBy: Frank Köhler; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- d. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Nghe An; locality: Highway 7 between Con Cuong and Laos; decimalLatitude: 19.215; decimalLongitude: 104.5475; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2006-10-21; year: 2006; month: 10; day: 21; catalogNumber: ZMB 29494; recordedBy: Frank Köhler; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- e. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Moi; municipality: Cao Ky; locality: River parallel highway Thai Nguyen - Bac Kan, 13km South of Bac Kan; decimalLatitude: 22.03498; decimalLongitude: 105.85088; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2006-3-21; year: 2006; month: 3; day: 21; catalogNumber: ZMB 29495; recordedBy: Frank Köhler; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type:

- PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- f. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Binh; county: Minh Hoa; decimalLatitude: 17.87483; decimalLongitude: 105.867; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2006-10-21; year: 2006; month: 10; day: 21; catalogNumber: ZMB 29496; recordedBy: Frank Köhler; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- g. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hoa Binh; county: Da Bac; decimalLatitude: 20.88603; decimalLongitude: 105.15267; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-3-14; year: 2015; month: 3; day: 14; catalogNumber: ZMB 29638; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- h. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Quan Binh; municipality: Bang Lang; decimalLatitude: 22.36506; decimalLongitude: 104.63511; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-11-16; year: 2012; month: 11; day: 16; catalogNumber: ZMB 29640; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- i. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Yen Bai; county: Van Chan; decimalLatitude: 21.47856; decimalLongitude: 104.73222; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-11-20; year: 2012; month: 11; day: 20; catalogNumber: ZMB 29646; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- j. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Binh; locality: Stream near km 28, Phong Nha-Ke Bang National Park; decimalLatitude: 17.49628; decimalLongitude:

- 106.29108; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2014-4-22; year: 2014; month: 4; day: 22; catalogNumber: ZMB 29647; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- k. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Thai Binh; locality: Thanh Tan; decimalLatitude: 20.43108; decimalLongitude: 106.43853; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2010-6-5; year: 2010; month: 6; day: 5; catalogNumber: ZMB 29652; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- l. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hoa Binh; locality: Village 15 km from Hoa Binh, small creek, downstream; decimalLatitude: 20.90833; decimalLongitude: 105.33611; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-7-6; year: 2015; month: 7; day: 6; catalogNumber: ZMB 29658; recordedBy: Jens Kühne; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- m. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hoa Binh; locality: Village 15 km from Hoa Binh, small creek, upstream; decimalLatitude: 20.90861; decimalLongitude: 105.33667; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-7-6; year: 2015; month: 7; day: 6; catalogNumber: ZMB 29659; recordedBy: Jens Kühne; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- n. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hoa Binh; locality: Song Da Catchment, below Coffeeshop on the street No 6; decimalLatitude: 20.71278; decimalLongitude: 105.04194; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-7-10; year: 2015; month: 7; day: 10; catalogNumber: ZMB 29662; recordedBy: Jens Kühne; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- o. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae;

- taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Tuyen Quang; county: Son Duong; locality: Pho Day River (Song Pho Day) mainchannel, Lô-Gâm River subbasin, Red River basin, westface of Tam Dao National Park; decimalLatitude: 21.53797; decimalLongitude: 105.48437; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-4-11; year: 2012; month: 4; day: 11; catalogNumber: ZMB 29758; recordedBy: Marco Endruweit, Wang Jing; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- p. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Thai Nguyen; county: Pho Yen; decimalLatitude: 21.48103; decimalLongitude: 105.72652; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-4-8; year: 2012; month: 4; day: 8; catalogNumber: ZMB 29761; recordedBy: Marco Endruweit, Wang Jing; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- q. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ninh Binh; locality: River in limestone area Northeast of Cuc Phuong National Park; decimalLatitude: 20.27252; decimalLongitude: 105.91127; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-3-4; year: 2017; month: 3; day: 4; catalogNumber: ZMB 30228; recordedBy: Thomas von Rintelen, Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- r. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hoa Binh; county: Kim Boi; locality: Bo; decimalLatitude: 20.66833; decimalLongitude: 105.53528; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-4-23; year: 2017; month: 4; day: 23; catalogNumber: ZMB 30258; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- s. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Da Nang; locality: Stream on Lang Van; decimalLatitude: 16.16778; decimalLongitude: 108.14222; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-5-5; year:

- 2017; month: 5; day: 5; catalogNumber: ZMB 30264; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- t. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Nghe An; locality: Khe Kem water fall, Pu Mat National Park; decimalLatitude: 18.97044; decimalLongitude: 104.80075; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-5-18; year: 2017; month: 5; day: 18; catalogNumber: ZMB 30266; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- u. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Nghe An; county: Ky Son; municipality: Muong Xen; locality: Muong Xen; decimalLatitude: 19.28122; decimalLongitude: 104.42111; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-3-9; year: 2017; month: 3; day: 9; catalogNumber: ZMB 30268; recordedBy: Le Hung Anh; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- v. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Tri; county: Huong Hoa; municipality: Huong Linh; locality: Ku Vo; decimalLatitude: 16.72072; decimalLongitude: 106.86354; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-6-25; year: 2017; month: 6; day: 25; catalogNumber: ZMB 30275; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- w. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Vinh Phuc; locality: Me Linh Station for Biodiversity; decimalLatitude: 21.38967; decimalLongitude: 105.71271; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-3-16; year: 2017; month: 3; day: 16; catalogNumber: ZMB 30279; recordedBy: Nguyen Tong Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- x. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus:

- Caridina*; specificEpithet: **lanceifrons**; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hai Phong; county: Thuy Nguyen; locality: NT4; decimalLatitude: 20.97348; decimalLongitude: 106.75721; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-1-1; year: 2017; month: 1; day: 1; catalogNumber: ZMB 30284; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- y. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: **lanceifrons**; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Binh; county: Le Thuy; municipality: Kim Thuy; locality: Ho Rum; decimalLatitude: 16.99901; decimalLongitude: 106.64663; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-5-25; year: 2017; month: 5; day: 25; catalogNumber: ZMB 30286; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- z. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: **lanceifrons**; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hoa Binh; county: Lac Son; municipality: Nhan Nghia; decimalLatitude: 20.51861; decimalLongitude: 105.44417; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-4-23; year: 2017; month: 4; day: 23; catalogNumber: ZMB 30288; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- aa. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: **lanceifrons**; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Yen Bai; county: Van Yen; locality: Nhay, Chau Que Thuong; decimalLatitude: 22.0719; decimalLongitude: 104.46180; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-9-18; year: 2017; month: 9; day: 18; catalogNumber: ZMB 30292; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ab. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: **lanceifrons**; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Lao Cai; decimalLatitude: 22.42587; decimalLongitude: 104.02684; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-9-16; year: 2017; month: 9; day: 16; catalogNumber: ZMB 30294; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- ac. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Nam; county: Phuc Son; locality: Phuoc Son; decimalLatitude: 15.56702; decimalLongitude: 107.82195; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-6-29; year: 2017; month: 6; day: 29; catalogNumber: ZMB 30299; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ad. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hoa Binh; county: Kim Boi; municipality: Hop Kim; locality: Boi river; decimalLatitude: 20.66067; decimalLongitude: 105.55772; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-4-23; year: 2017; month: 4; day: 23; catalogNumber: ZMB 30307; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ae. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Bac Quang; municipality: Tan Thanh; decimalLatitude: 22.54697; decimalLongitude: 104.91033; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-11-16; year: 2012; month: 11; day: 16; catalogNumber: ZMB 30318; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- af. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Thai Nguyen; county: Vo Nhai; municipality: Phu Thuong; locality: Mo Ga stream; decimalLatitude: 21.77583; decimalLongitude: 106.12058; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2019-6-9; year: 2019; month: 6; day: 9; catalogNumber: ZMB 30350; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ag. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Son La; county: Quynh Nhai; municipality: Pac Ma; locality: Entrance of a cave; decimalLatitude: 21.7545; decimalLongitude: 103.62372;

- geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2019-7-3; year: 2019; month: 7; day: 3; catalogNumber: ZMB 30355; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ah. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Son La; county: Quynh Nhai; municipality: Pac Ma; decimalLatitude: 21.75449; decimalLongitude: 103.62372; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2019-7-3; year: 2019; month: 7; day: 3; catalogNumber: ZMB 30356; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ai. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Son La; county: Quynh Nhai; municipality: Muong Chien; decimalLatitude: 21.83467; decimalLongitude: 103.59315; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2019-7-3; year: 2019; month: 7; day: 3; catalogNumber: ZMB 30357; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- aj. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Yen Bai; county: Van Chan; locality: Cat Thinh; decimalLatitude: 21.47307; decimalLongitude: 104.72254; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2019-7-5; year: 2019; month: 7; day: 5; catalogNumber: ZMB 30358; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ak. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Tuyen Quang; county: Ham Yen; municipality: Phu Luu; locality: Kieng stream; decimalLatitude: 22.17092; decimalLongitude: 105.01269; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-10-28; year: 2018; month: 10; day: 28; catalogNumber: ZMB 30365; recordedBy: Nguyen Tong Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- al. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus:

- Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Tuyen Quang; county: Ham Yen; municipality: Phu Luu; locality: Nam Luong stream 2; decimalLatitude: 22.21023; decimalLongitude: 105.05780; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-10-29; year: 2018; month: 10; day: 29; catalogNumber: ZMB 30366; recordedBy: Nguyen Tong Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- am. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Tuyen Quang; county: Ham Yen; municipality: Phu Luu; locality: Khang stream; decimalLatitude: 22.16812; decimalLongitude: 104.99143; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-10-28; year: 2018; month: 10; day: 28; catalogNumber: ZMB 30370; recordedBy: Nguyen Tong Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- an. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Vi Xuyen; locality: Stream near Thanh Thuy border (4 km); decimalLatitude: 22.91206; decimalLongitude: 104.873; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2019-2-23; year: 2019; month: 2; day: 23; catalogNumber: ZMB 30378; recordedBy: Dang Van Dong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ao. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Lang Son; decimalLatitude: 22.25292; decimalLongitude: 106.4735; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2019-4-27; year: 2019; month: 4; day: 27; catalogNumber: ZMB 30383; recordedBy: Dang Van Dong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ap. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ninh Binh; locality: River in limestone area Northeast of Cuc Phuong National Park; decimalLatitude: 20.27252; decimalLongitude: 105.91127; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-3-4; year: 2017; month: 3; day: 4; catalogNumber: ZMB 30662; recordedBy: Thomas von Rintelen, Do Van Tu; disposition: in collection;

- identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- aq. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Da Nang; locality: Small cave pool behind hot spring, off road Da Nang - Praq; decimalLatitude: 15.96194; decimalLongitude: 108.01972; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; catalogNumber: ZMB 30672; recordedBy: Jens Kühne; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ar. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Phu Tho; locality: Xuân Sơn National Park, Đồng Sơn, Thân stream, site 2; decimalLatitude: 21.18762; decimalLongitude: 104.87303; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2013-8-29; year: 2013; month: 8; day: 29; catalogNumber: ZMB 30725; recordedBy: Tran Anh Duc; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- as. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Nghe An; county: Con Cuong; locality: Tùng Hương village, Khe Thoi stream; decimalLatitude: 19.08928; decimalLongitude: 104.66718; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-12-21; year: 2012; month: 12; day: 21; catalogNumber: ZMB 30726; recordedBy: Ngo Xuan Quang; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- at. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Nghe An; locality: Pù Mát National Park, Khe Kôm stream, site 4; decimalLatitude: 18.9389; decimalLongitude: 104.80595; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-12-20; year: 2012; month: 12; day: 20; catalogNumber: ZMB 30727; recordedBy: Ngo Xuan Quang; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- au. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Ninh; county: Mong Cai;

- decimalLatitude: 21.54096; decimalLongitude: 107.73986; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-1-24; year: 2018; month: 1; day: 24; catalogNumber: ZMB 31576; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- av. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Lai Chau; decimalLatitude: 22.27960; decimalLongitude: 103.38803; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-4-29; year: 2018; month: 4; day: 29; catalogNumber: ZMB 31587; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- aw. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Lai Chau; decimalLatitude: 22.32786; decimalLongitude: 103.35493; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-4-30; year: 2018; month: 4; day: 30; catalogNumber: ZMB 31589; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ax. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Lang Son; decimalLatitude: 21.47528; decimalLongitude: 107.16556; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-3-18; year: 2018; month: 3; day: 18; catalogNumber: ZMB 31594; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ay. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Quang Ninh; county: Tien Yen; locality: Khe Cau; decimalLatitude: 21.38944; decimalLongitude: 107.27306; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-3-19; year: 2018; month: 3; day: 19; catalogNumber: ZMB 31597; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- az. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus:

- Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Moi; decimalLatitude: 21.89644; decimalLongitude: 105.79489; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-3-16; year: 2018; month: 3; day: 16; catalogNumber: ZMB 31598; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ba. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Thua Thien-Hue; locality: Bach Ma National Park, Khe Phen Tren; decimalLatitude: 16.21725; decimalLongitude: 107.87695; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-6-6; year: 2018; month: 6; day: 6; catalogNumber: ZMB 31609; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bb. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Thua Thien-Hue; locality: Bach Ma National Park, Khe Su; decimalLatitude: 16.22428; decimalLongitude: 107.882; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2018-6-11; year: 2018; month: 6; day: 11; catalogNumber: ZMB 31611; recordedBy: Virginia Duwe; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bc. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Da Nang; locality: Hai Van Pass (Southeast); decimalLatitude: 16.16935; decimalLongitude: 108.12638; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-7-16; year: 2009; month: 7; day: 16; catalogNumber: ZMB 31624; recordedBy: Andreas Karge; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bd. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Nam; county: Kim Bang; decimalLatitude: 20.57350; decimalLongitude: 105.83371; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-5-31; year: 2020; month: 5; day: 31; catalogNumber: ZMB 32285; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- be. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Nam Dinh; county: Nghia Hung; decimalLatitude: 20.19045; decimalLongitude: 106.18031; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-5-31; year: 2020; month: 5; day: 31; catalogNumber: ZMB 33800; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bf. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Bac Quang; verbatimElevation: 342 m; decimalLatitude: 22.51194; decimalLongitude: 104.84938; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-10-12; year: 2020; month: 10; day: 12; catalogNumber: ZMB 33811; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bg. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Bac Quang; verbatimElevation: 262 m a.s.l.; decimalLatitude: 22.50507; decimalLongitude: 104.85352; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-10-12; year: 2020; month: 10; day: 12; catalogNumber: ZMB 33812; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bh. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; verbatimElevation: 277 m a.s.l.; decimalLatitude: 22.21619; decimalLongitude: 105.49067; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7-26; year: 2020; month: 7; day: 26; catalogNumber: ZMB 33795; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bi. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; verbatimElevation: 300 m a.s.l.; decimalLatitude: 22.29353; decimalLongitude: 105.55729; geodeticDatum:

- WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7-29; year: 2020; month: 7; day: 29; catalogNumber: ZMB 33794; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bj. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Dien Bien; locality: Muong Cha; decimalLatitude: 21.90375; decimalLongitude: 103.27797; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2021-1-13; year: 2021; month: 1; day: 13; catalogNumber: ZMB 33796; recordedBy: Nguyen Dinh Tao; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bk. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Noi; county: Phu Xuyen; decimalLatitude: 20.78683; decimalLongitude: 105.92394; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7; year: 2020; month: 7; catalogNumber: HUS; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: HUS; collectionCode: HUS; basisOfRecord: PreservedSpecimen
- bl. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Hung Yen; county: Khoai Chau; decimalLatitude: 20.84383; decimalLongitude: 105.92075; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7; year: 2020; month: 7; catalogNumber: ZMB 33814; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bm. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Noi; county: Son Tay; decimalLatitude: 21.15839; decimalLongitude: 105.48942; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7; year: 2020; month: 7; catalogNumber: ZMB 33816; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bn. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country:

- Vietnam; countryCode: VN; stateProvince: Yen Bai; county: Van Yen; decimalLatitude: 21.88031; decimalLongitude: 104.67986; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7; year: 2020; month: 7; catalogNumber: HUS; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: HUS; collectionCode: HUS; basisOfRecord: PreservedSpecimen
- bo. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Lao Cai; county: Bao Thang; decimalLatitude: 22.45364; decimalLongitude: 104.02578; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7-16; year: 2020; month: 7; day: 16; catalogNumber: ZMB 33818; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bp. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Lao Cai; decimalLatitude: 22.48606; decimalLongitude: 103.97786; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7; year: 2020; month: 7; catalogNumber: ZMB 33819; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bq. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Yen Bai; county: Van Yen; decimalLatitude: 21.87769; decimalLongitude: 104.67942; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7-17; year: 2020; month: 7; day: 17; catalogNumber: ZMB 33821; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- br. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Lao Cai; decimalLatitude: 22.48533; decimalLongitude: 103.97714; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7-15; year: 2020; month: 7; day: 15; catalogNumber: HUS; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: HUS; collectionCode: HUS; basisOfRecord: PreservedSpecimen
- bs. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country:

Vietnam; countryCode: VN; stateProvince: Vinh Phuc; county: Vinh Tuong; decimalLatitude: 21.25083; decimalLongitude: 105.44683; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7-19; year: 2020; month: 7; day: 19; catalogNumber: ZMB 33823; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- bt. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Yen Bai; county: Van Yen; decimalLatitude: 22.00508; decimalLongitude: 104.54206; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7-16; year: 2020; month: 7; day: 16; catalogNumber: HUS; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: HUS; collectionCode: HUS; basisOfRecord: PreservedSpecimen
- bu. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Ha Noi; county: Dan Phuong; decimalLatitude: 21.10503; decimalLongitude: 105.73303; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7; year: 2020; month: 7; catalogNumber: ZMB 33825; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bv. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Vietnam; countryCode: VN; stateProvince: Yen Bai; county: Van Yen; locality: Au Lau; decimalLatitude: 21.70664; decimalLongitude: 104.86636; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2020-7; year: 2020; month: 7; catalogNumber: ZMB 33826; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bw. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: China; countryCode: CN; stateProvince: Hainan; locality: Shilinghe River, 1 km North of Bacun (upstream), off the major road 40 Baoting - Lingshui, Wuzhishan Mountain South face, confluence of two streams, streams left and right of road, Lingshuihe River basin, Baoting County; decimalLatitude: 18.75328; decimalLongitude: 109.73838; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2011-7-27; year: 2011; month: 7; day: 27; catalogNumber: ZMB 32691; recordedBy: Marco Endruweit, Wang Jing; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- bx. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: China; countryCode: CN; stateProvince: Hainan; locality: Hillstream at road Baisha - Nankai, crossing road from right to left, between Nanmeicun and Nanlancun, tributary to Nankaihe River, a southern tributary of the large Songtao Reservoir, Nandujiang River basin; decimalLatitude: 19.10608; decimalLongitude: 109.42007; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2011-7-30; year: 2011; month: 7; day: 30; catalogNumber: ZMB 29689; recordedBy: Marco Endrueit, Wang Jing; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- by. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: China; countryCode: CN; stateProvince: Guangdong; locality: Mountains nr Tangshan; decimalLatitude: 23.66126; decimalLongitude: 114.02508; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-4-1; year: 2015; month: 4; day: 1; catalogNumber: ZMB 29755; recordedBy: Chris Lukhaup; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- bz. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Thailand; countryCode: TH; stateProvince: Nakhon Si Thammarat; locality: Sichon, main river; decimalLatitude: 9.00778; decimalLongitude: 99.82167; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-2-1; year: 2017; month: 2; day: 1; catalogNumber: ZMB 30684; recordedBy: Jens Kühne; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ca. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Thailand; countryCode: TH; stateProvince: Nakhon Si Thammarat; locality: River after limestone cave (-200m), Ban Wat Menao Wan (Ban Chang Klang), Amper Chandi; decimalLatitude: 8.33417; decimalLongitude: 99.65139; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2015-3-1; year: 2015; month: 3; day: 1; catalogNumber: ZMB 32403; recordedBy: Jens Kühne; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- cb. scientificName: *Caridina lanceifrons* Yu, 1936; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus:

Caridina; specificEpithet: *lanceifrons*; scientificNameAuthorship: Yu, 1936; country: Thailand; countryCode: TH; stateProvince: Satun; locality: Amphoe Langhuu, near Manang; decimalLatitude: 6.9; decimalLongitude: 99.8; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2012-1-1; year: 2012; month: 1; day: 1; catalogNumber: ZMB 32405; recordedBy: Jens Kühne; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

Description

Material examined for description. 1 female, cl 3.5 (ZMB 33800), Vietnam: Nam Dinh Province, Nghia Hung District, Nghia Son Commune, Quan Lieu, 20°11'25.619"N 106°10'49.109" E, [= type locality of *Caridina flavilineata* Dang, 1975], coll. Do Van Tu, 31 May 2020; 2 males, cl 3.5–3.6, 3 females, cl 4.6–5.6 (ZMB 33823), Vietnam: Vinh Phuc Province, Vinh Tuong District, 21°15'03.0"N 105°26'48.6"E, [= type locality of *Caridina vietriensis* Dang & Do, 2007], coll. Do Van Tu, 19 July 2020; 5 males, cl 2.6–5.0, 12 females, cl 2.8–5.3 (ZMB 30264), Vietnam: Da Nang City, Lang Van Commune, 16°10'4"N 108°8'32"E, [= near the type locality of *Caridina pseudoflavilineata* Do & Dang, 2010], coll. Do Van Tu, 5 May 2017.

Cephalothorax and cephalic appendages. Carapace length 2.6–5.3 mm. Rostrum straight, reaching near to or slightly beyond end of antennular peduncle, 0.45–0.96 (median 0.6) times as long as carapace, rostral formula: 4–6+10–16/1–5 (n = 10), teeth normal (Fig. 5a). Suborbital angle acute, completely fused with antennal spine; pterygostomian margin rounded (Fig. 5a). Eyes well developed with globular cornea, anterior end reaching to 0.7 times length of basal segment of antennular peduncle (Fig. 5a). Antennular peduncle 0.6–0.63 (median 0.61) times as long as carapace; basal segment 1.56–2.33 (median 2.0) times as long as second segment, second segment 1.2–1.67 (median 1.4) times as long as third segment (Fig. 5b). Stylocerite reaching to 0.72 times length of basal segment of antennular peduncle (Fig. 5b). Scaphocerite reaching beyond distal end of antennular peduncle, 3.0–4.33 (median 3.41) times as long as wide (Fig. 5c).

Abdominal somites, telson and uropods. Sixth abdominal somite 0.38–0.62 (median 0.44) times length of carapace, 1.36–1.64 (median 1.62) times as long as fifth abdominal somite, 0.6–1.0 (median 0.86) times length of telson. Telson length 2.33–3.85 (median 2.81) times as long as proximal width, distal margin triangular, terminating in a short median projection, with 5–6 pairs of dorsal spiniform setae and one pair of dorso-subdistal spiniform setae; distal end with 4–5 pairs of spiniform setae, lateral pair longer than intermediate pairs (Fig. 5d). Preanal carina high, with few setae, lacking spine. Uropodal diaeresis with 14–22 (median 16) movable spiniform setae, outermost one slightly shorter than lateral angle (Fig. 5e).

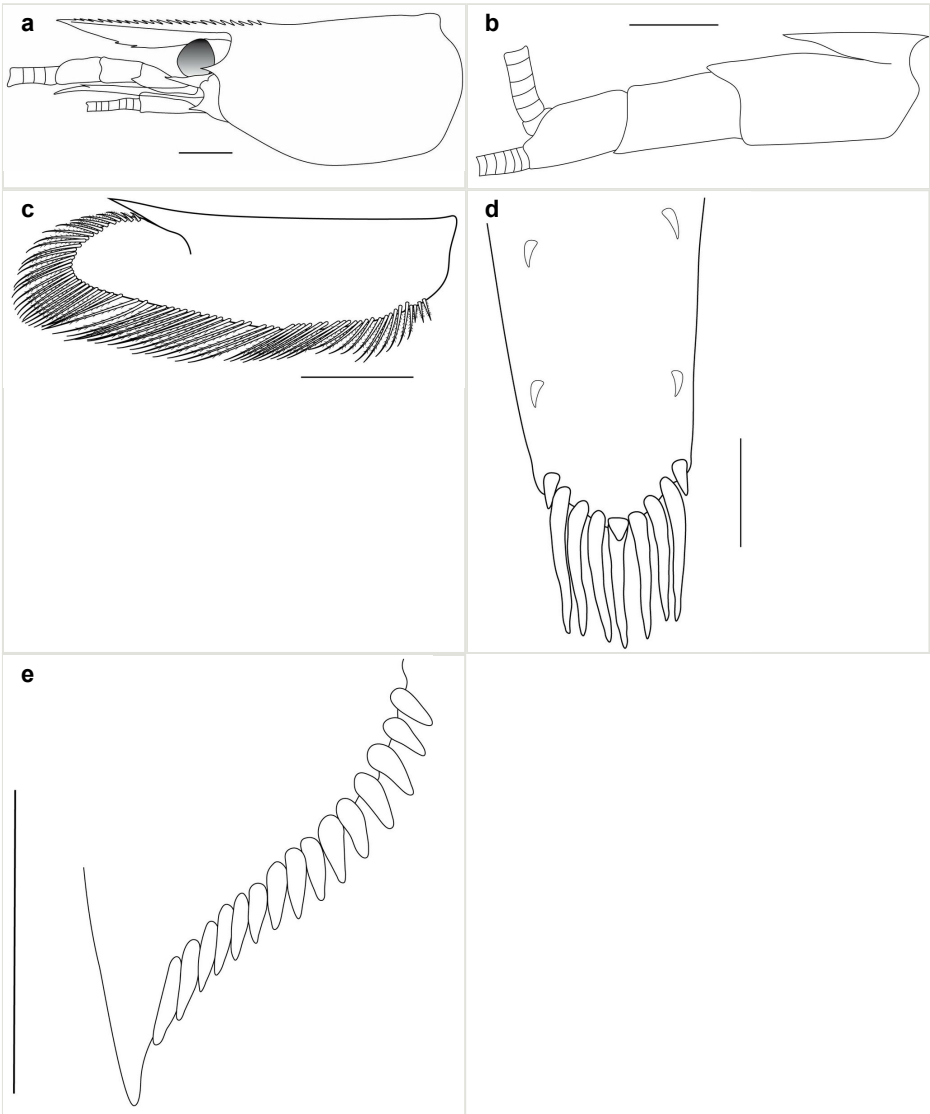


Figure 5.

Caridina lanceifrons Yu, 1936; male, cl 4.3 mm (ZMB 30390). Scale: A–C = 1 mm, D = 0.5 mm, E = 0.2 mm.

a: Cephalothorax and cephalic appendages, lateral view [doi](#)

b: Antennular peduncle [doi](#)

c: Scaphocerite [doi](#)

d: Telson [doi](#)

e: Uropodal diaeresis. [doi](#)

Pereiopods. Epipod present on first four pereiopods. First pereiopod short, robust, reaching to distal end of eyestalk; chela 1.89–2.4 (median 2.19) times as long as wide, 1.24–2.09 (median 1.44) times length of carpus; tips of fingers rounded, with hook; dactylus slightly longer than palm, 1.0–1.33 (median 1.11) times as long as palm; carpus excavated anteriorly, 1.22–2.0 (median 1.85) times as long as wide, 0.65–0.86 (median 0.8) times length of merus; merus 2.57–3.25 (median 2.86) times as long as wide, longer than ischium (Fig. 6a). Second pereiopod long, slender, reaching to middle of second segment of antennular peduncle; chela 2.46–3.29 (median 2.56) times as long as wide, 0.73–0.96 (median 0.85) times length of carpus; tips of fingers rounded, without hook; dactylus 1.09–1.89 (median 1.36) times as long as palm; carpus 4.0–5.0 (median 4.5) times as long as wide, 1.0–1.05 (median 1.04) times as long as merus; merus 4.2–5.25 (median 5.2) times as long as wide, longer than ischium (Fig. 6b). Third pereiopod slender, reaching to end of scaphocerite by its dactylus, terminating in two claws, with 5–7 accessory spiniform setae on flexor margin, dactylus 2.75–3.5 (median 2.9) times as long as wide (terminal claws and spiniform setae on flexor margin included), propodus 8.0–10.29 (median 9.0) times as long as wide, 3.25–5.29 (median 4.62) times as long as dactylus; carpus 3.75–5.0 (median 4.42) times as long as wide, 0.5–0.69 (median 0.58) times as long as propodus, 0.36–0.53 (median 0.47) times as long as merus; merus 5.83–7.33 (median 6.69) times as long as wide, bearing 3–5 strong, movable spiniform setae on posterior margin of outer surface; ischium with one movable spiniform seta (Fig. 6c). Fifth pereiopod slender, reaching to end of second segment of antennular peduncle, dactylus 2.33–3.5 (median 2.9) times as long as wide (terminal claw and spiniform setae on flexor margin included), terminating in one large claw, with 22–38 spiniform setae on flexor margin; propodus 12.0–14.0 (median 13.1) times as long as wide, 4.14–5.71 (median 4.8) times length of dactylus; carpus 4.33–6.25 (median 5.0) times as long as wide, 0.47–0.56 (median 0.49) times as long as propodus, 0.54–0.69 (median 0.64) times as long as merus; merus 5.33–6.73 (median 5.92) times as long as wide, bearing 3–4 strong, movable spiniform setae on posterior margin of outer surface (Fig. 6d).

Pleopods. Endopod of male first pleopod extending to 0.4 times length of exopod, subtriangular in shape, 2.09–2.88 (median 2.32) times as long as proximal width, rounded distally, long plumose setae on outer and distal margins, medium-length setae on inner margin; with appendix interna exceeding terminal margin of endopod by 0.5 times its length (Fig. 6e). Appendix masculina of male second pleopod slender, sub-cylindrical, reaching to proximal 0.6 times endopod length, 6.67 times as long as distal width, finger-shaped, with some short spiniform setae on outer surface and some long spiniform setae on distal surface; appendix interna at the middle of appendix masculina, narrow, small, extending about 0.5 times length of appendix masculina (Fig. 6f).

Colouration. Body yellowish (Fig. 7a), females sometimes black or dark green with dorsal yellow stripe (Fig. 7b).

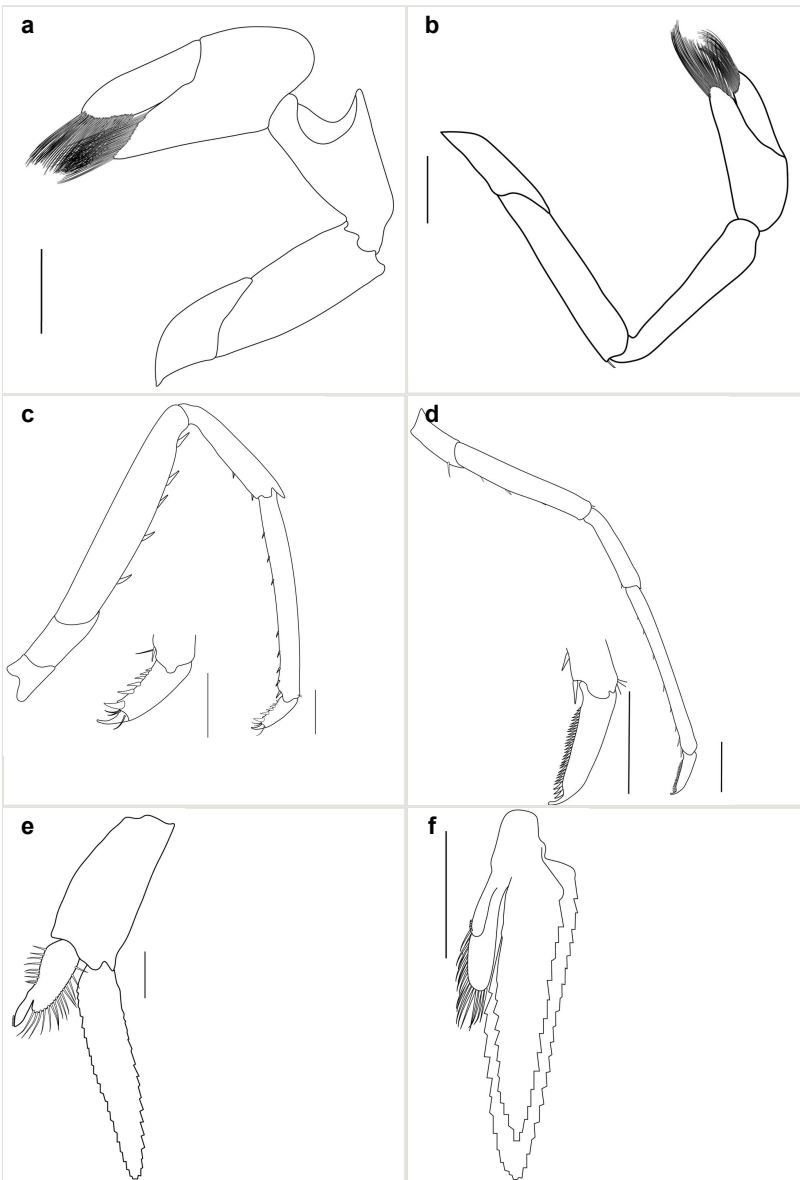


Figure 6.

Caridina lanceifrons Yu, 1936; male, cl 4.3 mm (ZMB 30390). Scale: A–D = 1 mm; E, F = 0.2 mm.

- a: First pereiopod [doi](#)
 b: Second pereiopod [doi](#)
 c: Third pereiopod dactylus of third pereiopod [doi](#)
 d: Fifth pereiopod and dactylus of fifth pereiopod [doi](#)
 e: Male first pleopod [doi](#)
 f: Male second pleopod. [doi](#)

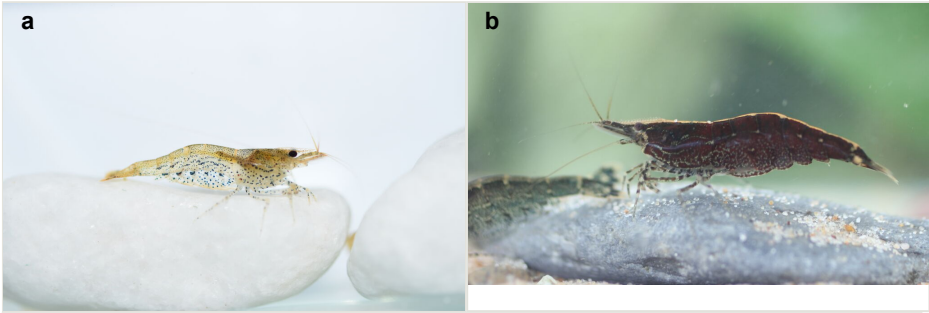


Figure 7.

Live colouration of *Caridina lanceifrons* Yu, 1936; collected in Pu Mat National Park, Nghe An Province.

a: Body yellowish [doi](#)

b: Female body dark green with dorsal yellow stripe. [doi](#)

Distribution

This species is widely distributed in northern Vietnam (no further south than Quang Nam Province in central Vietnam). In China, the species were found in Fujian, Guangdong, Guangxi, Hainan and Hunan (Liang 2004). Our study also provides the first record for *Caridina lanceifrons* from Thailand, where it has been found in the southern Provinces of Nakhon Si Thammarat and Satun (Fig. 1b). This apparently disjunct distribution seems indicative of a major sampling gap in Thailand, Laos and potentially Cambodia. However, the absence of this species from southern Vietnam is unlikely to be an artefact, as this part of the country has been surveyed extensively by the first author. This is the species with the widest distribution range when compared to other land-locked species in Vietnam (Fig. 1b).

Ecology

This species inhabits mountain streams and rivers. We could not collect any specimens of this species from estuarine environments. In addition, based on egg-size (Table 1), we consider it as a land-locked species.

Taxon discussion

The populations in Vietnam showed no significant difference when compared to the original description of *Caridina lanceifrons* Yu, 1936 in Yu (1936) or the re-descriptions by Liang (2004) and Cai (2014).

Three species described from Vietnam have been considered synonyms of *Caridina lanceifrons*:

According to Li and Liang (2002), *Caridina flavilineata* Dang, 1975 is a junior synonym of *Caridina lanceifrons* Yu, 1936. Dang and Do (2008) and Dang and Ho (2012)

commented that, although *C. flavilineata* is very close to *C. lanceifrons*, they can be distinguished by differences in some morphological characteristics, especially in body colour, egg size, appendix masculina, appendix interna and rostrum. By examination of many specimens of *C. flavilineata* collected throughout North Vietnam, including from the area of the type locality (ZMB 30390, ZMB 33800), we found that a black or dark green body colour, especially a yellow stripe, is only present in females and is not consistently found in every population; the egg size is similar to *C. lanceifrons* ($0.9\text{--}0.95 \times 0.5\text{--}0.6$ compared to $0.84\text{--}0.9 \times 0.56\text{--}0.62$), the appendix masculina, the appendix interna and the rostrum did not show any significant differences. After checking many specimens from Vietnam, Liang (2004) also stated that there is no difference between these species. *Caridina lanceifrons* is very common in south China, especially in Hainan, Guangdong, Guangxi and (presumably) Fujian (Liang 2004). In the Longzhou River that flows through North Vietnam, this species is abundant. Therefore, it can move upstream and is widely distributed throughout North Vietnam. Based on specimens collected from many sites in Vietnam and the descriptions by Dang (1975) and Yu (1936), we agree with Li and Liang (2002) and Liang (2004) and Cai (2014) that *C. flavilineata* Dang, 1975 is a junior synonym of *Caridina lanceifrons* Yu, 1936.

Dang and Do (2007a) described *Caridina vietriensis* from North Vietnam. According to these authors, this species differs from *C. flavilineata* in the rostrum, the endopod of the male's first pleopod and body colour. However, they did not point out these differences clearly. They also did not compare *Caridina vietriensis* with *C. lanceifrons*. Based on the descriptions given by Dang and Do (2007a) and examination of specimens (ZMB 33823) collected from Phu Tho Province, the area of the type locality and surrounding zones, we here consider *C. vietriensis* as a synonym of *C. lanceifrons*.

Do and Dang (2010) also described *Caridina pseudoflavilineata* from the same locality as *C. haivanensis* Do & Dang, 2010 at Hai Van mountain pass. Unfortunately, we could not find this species again at the type locality during two of our surveys. These authors did not compare *C. pseudoflavilineata* with *C. lanceifrons*, but they compared it with *C. flavilineata*. They suggested that *C. pseudoflavilineata* can be distinguished from *C. flavilineata* by the shorter and sharper rostrum, the higher number of spiniform setae on the dactylus of the fifth pereopod and uropodal diaeresis, the shape of endopod of male first pleopod and the larger eggs. However, based on the description and illustrations by these authors and the examination of specimens collected at some distance from the type localities, Thua Thien-Hue, Da Nang and Quang Nam, we here conclude that *Caridina pseudoflavilineata* Do & Dang, 2010 is identical to *C. lanceifrons*. The rostrum reaching to the end of the third segment of antennular peduncle with a sharpened tip, the subtriangular endopod of male first pleopod, the dactylus of the fifth pereopod with 25–28 spiniform setae and uropodal diaeresis with 14–15 movable spiniform setae are the characteristics of *C. lanceifrons* (Do and Dang (2010): figs. 3–4, cf. Yu (1936): figs. 5–6, Liang (2004): fig. 128, Cai (2014): Fig. 6). There is not any obvious character distinguishing these two species, except that the

eggs of *C. lanceifrons* are slightly smaller than those of *C. pseudoflavilineata* (0.9–0.8 × 0.5–0.6 mm vs. 1.1 × 0.5 mm).

Caridina serrata Stimpson, 1860

Nomenclature

Caridina serrata Stimpson, 1860: 29. [Type locality: hill above Bekhers, Hong Kong Island, Hong Kong, China; neotype designation by Cai and Ng (1999)].

Caridina serrata — Ortmann (1894): 406; Bouvier (1905): 76; Bouvier (1925): 258, fig. 593; Kemp (1918): 289, fig. 12; Cai and Ng (1999): figs. 2, 3, 6B and 6G.

non *Caridina serrata serrata* — Dang in Dang et al. (1980): 402, fig. 229.

non *Caridina serrata* — Liang and Yan (1983): 253; Liang and Yan (1985): 198; Liang and Yan (1986): 201; Dudgeon (1985): 141; Dudgeon (1987): 339, figs. 1–7; Hung et al. (1993): 498, figs. 9C and 12A–G; Shy and Yu (1998): 59.

Materials

- a. scientificName: *Caridina serrata* Stimpson, 1860; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *serrata*; scientificNameAuthorship: Stimpson, 1860; island: Cu Lao Cham; country: Vietnam; countryCode: VN; stateProvince: Quang Nam; county: Hoi An; locality: Stream running into reservoir, Cu Lao Cham Island; decimalLatitude: 15.94303; decimalLongitude: 108.52297; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2017-5-10; year: 2017; month: 5; day: 10; catalogNumber: ZMB 30306; recordedBy: Pham The Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- b. scientificName: *Caridina serrata* Stimpson, 1860; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *serrata*; scientificNameAuthorship: Stimpson, 1860; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Lantau Island, middle course of river; decimalLatitude: 22.2267; decimalLongitude: 113.8801; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2011-3-18; year: 2011; month: 3; day: 18; catalogNumber: OUMNH 201307023; recordedBy: Werner & Maria Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: OUMNH; collectionCode: OUMNH; basisOfRecord: PreservedSpecimen
- c. scientificName: *Caridina serrata* Stimpson, 1860; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *serrata*; scientificNameAuthorship: Stimpson, 1860; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Lantau Island, Pui O Sanwai Tsuen; decimalLatitude: 22.2452; decimalLongitude: 113.9769; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net;

- eventDate: 2013-2-26; year: 2013; month: 2; day: 26; catalogNumber: ZMB 31764; recordedBy: Christoph D. Schubart, Larissa Kawasch, Brian H.Y. Ip; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- d. scientificName: *Caridina serrata* Stimpson, 1860; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *serrata*; scientificNameAuthorship: Stimpson, 1860; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Tributary of the Pok Fu Lam Reservoir, close to mouth into reservoir; decimalLatitude: 22.2662; decimalLongitude: 114.1422; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-4-6; year: 2009; month: 4; day: 6; catalogNumber: ZMB 32189; recordedBy: Werner Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- e. scientificName: *Caridina serrata* Stimpson, 1860; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *serrata*; scientificNameAuthorship: Stimpson, 1860; country: China; countryCode: CN; stateProvince: Guangdong; locality: Xiasliao stream, near Xishan Town, Nan'ao County; decimalLatitude: 23.44215; decimalLongitude: 116.99551; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2005-2-5; year: 2005; month: 2; day: 5; catalogNumber: ZMB 29473; recordedBy: Yixiong Cai; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- f. scientificName: *Caridina serrata* Stimpson, 1860; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *serrata*; scientificNameAuthorship: Stimpson, 1860; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Lantau Island, North side; decimalLatitude: 22.26679; decimalLongitude: 113.93352; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2009-8-9; year: 2009; month: 8; day: 9; catalogNumber: ZMB 32190; recordedBy: Chris Lukhaup; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- g. scientificName: *Caridina serrata* Stimpson, 1860; taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Species; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Caridina*; specificEpithet: *serrata*; scientificNameAuthorship: Stimpson, 1860; island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Lantau Island, upper course of river; decimalLatitude: 22.26214; decimalLongitude: 113.96688; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 2011-1-11; year: 2011; month: 1; day: 11; catalogNumber: ZMB 32306; recordedBy: Shen, C.J. (1948); disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

Description

Material examined for description. 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.

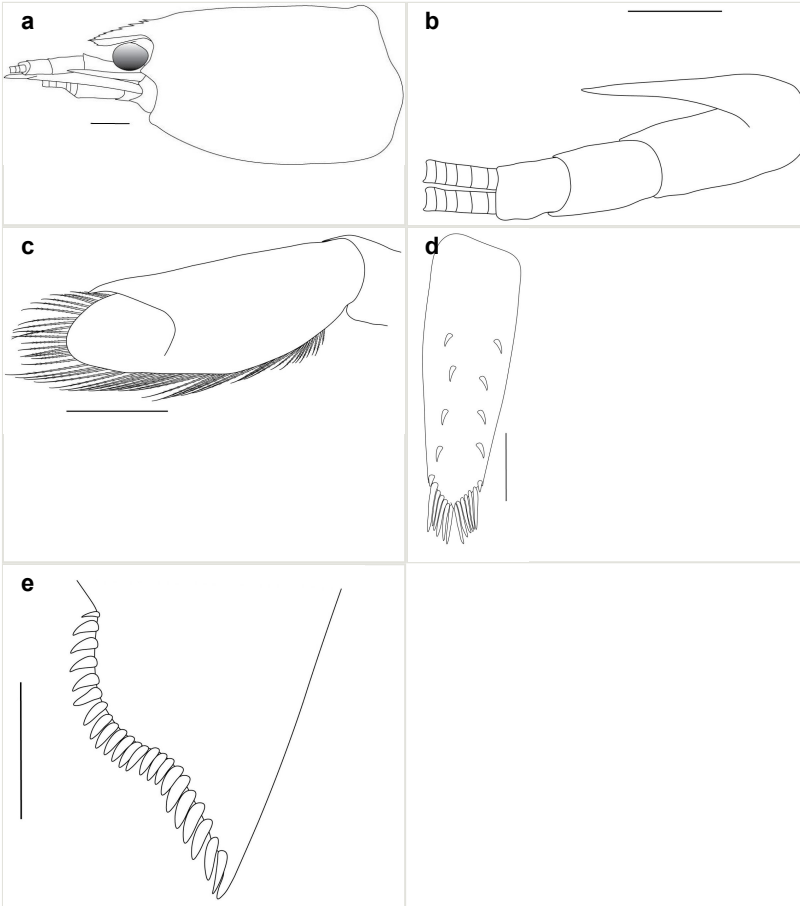


Figure 8.

Caridina serrata Stimpson, 1860; cl 4.0 mm (ZMB 30306). Scale: A–C = 1 mm, D = 0.5 mm, E = 0.2 mm.

- a: Cephalothorax and cephalic appendages, lateral view [doi](#)
- b: Antennular peduncle [doi](#)
- c: Scaphocerite [doi](#)
- d: Telson [doi](#)
- e: Uropodal diaeresis [doi](#)

Cephalothorax and cephalic appendages. Carapace length 3.1–4.7 mm. Rostrum short, straight or slightly curved downwards, reaching to the end of basal segment of antennular peduncle, 0.38–0.46 (median 0.43) times as long as carapace, rostral formula: 0–4+3–10/0–2 ($n = 10$), teeth normal (Fig. 8a). Suborbital angle acute, completely fused with antennal spine; pterygostomial margin rounded (Fig. 8a). Eyes well developed with globular cornea, anterior end reaching to 0.6 times length of basal segment of antennular peduncle (Fig. 8a). Antennular peduncle 0.48–0.51 (median 0.5) times as long as carapace; basal segment 1.83–2.0 (median 1.83) times as long as second segment, second segment 1.2–1.5 (median 1.33) times as long as third segment (Fig. 8b). Stylocerite reaching to about middle (0.4 times length) of second segment of antennular peduncle (Fig. 8b). Scaphocerite reaching beyond distal end of antennular peduncle, 3.57–3.64 (median 3.57) times as long as wide (Fig. 8c).

Abdominal somites, telson and uropods. Sixth abdominal somite 0.41–0.49 (median 0.42) times length of carapace, 1.44–1.67 (median 1.52) times as long as fifth abdominal somite, 0.85–1.0 (median 0.9) times length of telson. Telson length 2.14–2.5 (median 2.36) times as long as proximal width, 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 4 pairs of spiniform setae, lateral pair slightly longer than intermediate pairs (Fig. 8d). Pre-anal carina rounded, with few setae, lacking tooth or spine. Uropodal diaeresis with 20–22 movable spiniform setae, outermost one slightly shorter than lateral angle (Fig. 8e).

Pereiopods. Epipod present on first four pereiopods. First pereiopod short, robust, reaching beyond end of basal segment of antennular peduncle; chela 1.69–2.0 (median 1.92) times as long as wide, 1.39–1.56 (median 1.47) times length of carpus; tips of fingers rounded, with hook; dactylus shorter than palm, 0.67–0.92 (median 0.75) times as long as palm; carpus excavated anteriorly, 1.67–1.80 (median 1.73) times as long as wide, 0.78–0.9 (median 0.79) times length of merus; merus 2.11–2.56 (median 2.22) times as long as wide, longer than ischium (Fig. 9a). Second pereiopod long, slender, reaching beyond end of scaphocerite; chela 2.25–2.79 (median 2.56) times as long as wide, 0.58–0.9 (median 0.64) times length of carpus; tips of fingers rounded, without hook; dactylus 1.33–1.57 (median 1.5) times as long as palm; carpus 5.0–6.67 (median 5.78) times as long as wide, 1.14–1.13 (median 1.14) times as long as merus; merus 5.11–5.83 (median 5.75) times as long as wide, longer than ischium (Fig. 9b). Third pereiopod slender, reaching beyond end of scaphocerite by its dactylus, terminating in two claws, with four to five accessory spiniform setae on flexor margin, dactylus 3.0–4.0 (median 3.5) times as long as wide (terminal claw and spiniform setae on flexor margin included), propodus 9.0–9.7 (median 9.0) times as long as wide, 3.75–4.86 (median 3.75) times as long as dactylus; carpus 4.2–5.0 (median 4.43) times as long as wide, 0.62–0.78 (median 0.69) times as long as propodus, 0.46–0.64 (median 0.57) times as long as merus; merus 5.5–6.57 (median 6.0) times as long as wide, bearing four strong, movable spiniform setae on posterior margin of outer surface; ischium with one movable spiniform seta (Fig. 9c). Fifth pereiopod slender, reaching to end of basal segment of antennular peduncle, dactylus 2.17–2.67 (median 2.42) times

as long as wide (terminal claw and spiniform setae on flexor margin included), terminating in one large claw, with 37–42 spiniform setae on flexor margin; propodus 10–12 (median 10.72) times as long as wide, 6.25–8.31 (median 7.17) times length of dactylus; carpus 3.8–5.0 (median 4.5) times as long as wide, 0.36–0.46 (median 0.42) times as long as propodus, 0.51–0.65 (median 0.61) times as long as merus; merus 5.83–6.2 (median 5.59) times as long as wide, bearing 3–4 strong, movable spiniform setae on posterior margin of outer surface (Fig. 9d).

Pleopods. Endopod of male first pleopod extending to 0.7 times length of exopod, sub-rectangular in shape, 2.45–2.75 (median 2.6) times as long as proximal width, inner margin concave, outer margin slightly convex, rounded distally, long plumose setae on outer and distal margins, medium-length setae on inner margin; with appendix interna exceeding terminal margin of endopod by 0.4 times its length (Fig. 9e). Appendix masculina of male second pleopod slender, finger-shaped, not widened distally, reaching to proximal 0.7 times endopod length, 3.8 times as long as distal width, some short spiniform setae on outer surface and some long spiniform setae on distal surface; appendix interna at the middle of appendix masculina, extending about 0.5 times length of appendix masculina (Fig. 9f).

Distribution: *Caridina serrata* Stimpson, 1860 was recorded from Hong Kong Island only by Cai and Ng (1999), but was later also reported from Lantau island, Hong Kong and (as *C. nanaoensis*) from Nanao Island, China (Klotz and von Rintelen 2014). Here, we present the first record of this species in Cu Lao Cham Island from central Vietnam (Fig. 1c).

Ecology: Although this species up to now was only recorded from streams on small islands (which are on the continental shelf, i.e. would have been connected to the mainland during glacial maxima; see, for example, Voris 2000), it can be considered a land-locked species, based on egg-size (Table 1).

Taxon discussion

Dang et al. (1980) recorded two subspecies of *Caridina serrata*, namely *C. serrata serrata* and *C. serrata cucphuongensis*. In 1999, Cai and Ng revised the *C. serrata* species group and stated that *Caridina serrata serrata* Dang, 1980 does not belong to this species because of the length of the rostrum and it is also not a member of the *C. serrata* species group as the stylocerite is not over-reaching the basal segment of the antennular peduncle. *Caridina serrata cucphuongensis* was discussed as being different from *C. serrata* (Cai and Ng 1999) and was elevated to full species rank (Cai et al. 1999). Dang and Do (2007a) described *C. pseudoserrata* from North Vietnam and assigned the specimens identified as *C. serrata serrata* by Dang et al. (1980) to their new species.

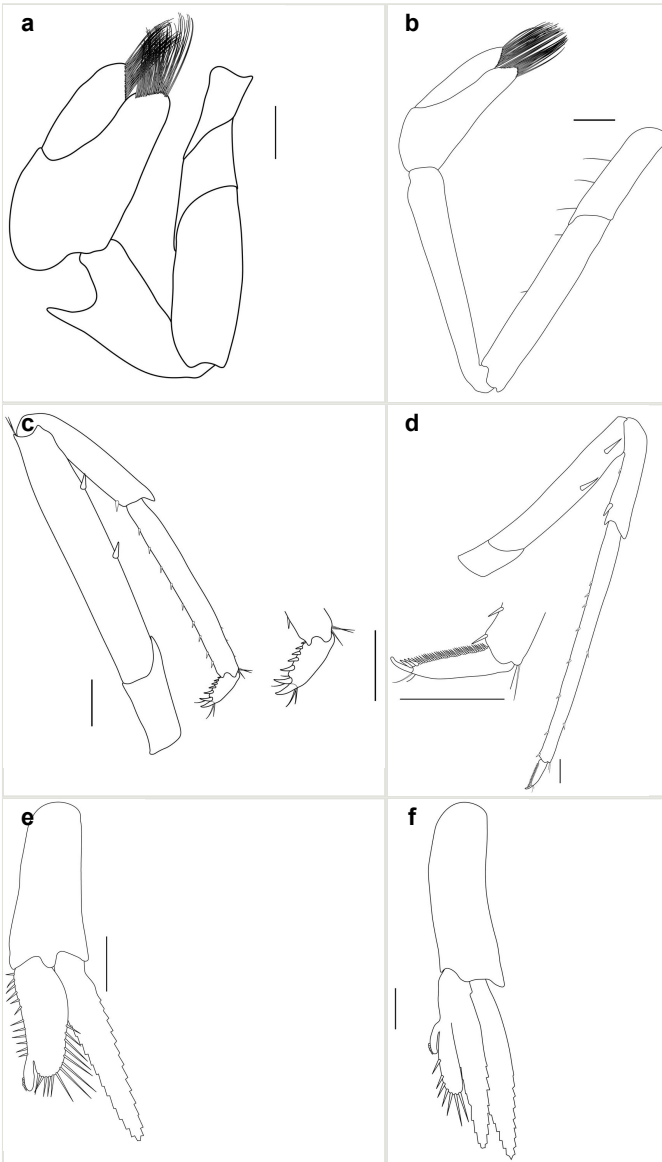


Figure 9.

Caridina serrata Stimpson, 1860; cl 4.0 mm (ZMB 30306). Scale: A–D = 1 mm; E, F = 0.2 mm.

a: First pereiopod [doi](#)

b: Second pereiopod [doi](#)

c: Third pereiopod and dactylus of third pereiopod [doi](#)

d: Fifth pereiopod and dactylus of fifth pereiopod [doi](#)

e: Male first pleopod [doi](#)

f: Male second pleopod. [doi](#)

Neocaridina palmata palmata* (Shen, 1948)*Nomenclature**

Caridina palmata Shen, 1948: 120, plate 12, fig. j. [Type locality: Sha-ping-pa, Chungking, China].

Caridina elongata Shen, 1948: 121, plate 13, figs. a–e. [Kweilin, China]

Caridina denticulata vietnamensis Dang, 1967: 157, fig. 4. [Cao Bang and Lang Son provinces, Vietnam].

Caridina vietnamensis — Dang (1975): 72; Dang in Dang et al. (1980): 410–412, fig. 234.

Caridina denticulata — Liang and Yan (1986): 197; Liang et al. (1993): 41; Liang and Zhou (1993): 231.

Neocaridina palmata palmata — Cai (1996): 144.

Neocaridina palmata — Li (1997): 455; Li and Liang (2002): 708.

Neocaridina vietnamensis — Dang and Do (2008): 8; Dang and Ho (2012): 159–163, fig. 55.

Materials

- a. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Hoa An; municipality: Hoa An; decimalLatitude: 22.66519; decimalLongitude: 106.17389; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 11/13/2012; year: 2012; month: 11; day: 13; catalogNumber: ZMB 29649; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- b. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Quang; municipality: Truong Ha; decimalLatitude: 22.947; decimalLongitude: 106.04167; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 11/13/2012; year: 2012; month: 11; day: 13; catalogNumber: ZMB 29653; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- c. scientificName: *Neocardina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocardina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Lang Son; decimalLatitude: 21.54556; decimalLongitude: 106.38611; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; catalogNumber: ZMB 29685; recordedBy: Jens Kühne; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- d. scientificName: *Neocardina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocardina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Quang; municipality: Truong Ha; locality: Pac Ma stream behind Hai Hoa motel, Pac Bo; decimalLatitude: 22.97331; decimalLongitude: 106.05269; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/24/2017; year: 2017; month: 5; day: 24; catalogNumber: ZMB 30251; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- e. scientificName: *Neocardina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocardina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Quang; municipality: Truong Ha; locality: Pac Ma stream behind Hai Hoa motel, Pac Bo; decimalLatitude: 22.97331; decimalLongitude: 106.05269; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/24/2017; year: 2017; month: 5; day: 24; catalogNumber: ZMB 30256; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- f. scientificName: *Neocardina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocardina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Quang; municipality: Lung Nam; locality: Stream on the road to Thin Tang village; decimalLatitude: 22.97611; decimalLongitude: 106.06863; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/25/2017; year: 2017; month: 5; day: 25; catalogNumber: ZMB 30272; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- g. scientificName: *Neocardina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocardina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*;

scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Tuyen Quang; county: Lam Binh; municipality: Thuong Lam; decimalLatitude: 22.49585; decimalLongitude: 105.30359; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 08/31/2017; year: 2017; month: 8; day: 31; catalogNumber: ZMB 30278; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- h. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Quang; municipality: Lung Nam; locality: Stream on the road to Thin Tang village; decimalLatitude: 22.97611; decimalLongitude: 106.06863; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/25/2017; year: 2017; month: 5; day: 25; catalogNumber: ZMB 30281; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- i. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Tuyen Quang; county: Lam Binh; municipality: Thuong Lam; decimalLatitude: 22.49585; decimalLongitude: 105.30359; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 08/31/2017; year: 2017; month: 8; day: 31; catalogNumber: ZMB 30289; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- j. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Trung Khanh; locality: Ban Gioc waterfall; decimalLatitude: 22.85298; decimalLongitude: 106.72369; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/26/2017; year: 2017; month: 5; day: 26; catalogNumber: ZMB 30291; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- k. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Cao Bang; locality: Bang River, in Cao Bang city;

decimalLatitude: 22.66503; decimalLongitude: 106.26267; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/25/2017; year: 2017; month: 5; day: 25; catalogNumber: ZMB 30300; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- l. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Cao Bang; locality: Bang River, in Cao Bang city; decimalLatitude: 22.66503; decimalLongitude: 106.26267; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/25/2017; year: 2017; month: 5; day: 25; catalogNumber: ZMB 30302; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- m. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Trung Khanh; municipality: Dam Thuy; locality: Stream running out of cave, Ban Gun-Khuoi Ky; decimalLatitude: 22.84524; decimalLongitude: 106.70173; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/26/2017; year: 2017; month: 5; day: 26; catalogNumber: ZMB 30303; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- n. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Trung Khanh; locality: Ban Gioc waterfall, Trung Khanh; decimalLatitude: 22.85298; decimalLongitude: 106.72369; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/26/2017; year: 2017; month: 5; day: 26; catalogNumber: ZMB 30305; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- o. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Quang; municipality: Lung Nam; locality: Stream near the road to Thin Tang village; decimalLatitude: 22.97640; decimalLongitude: 106.05789; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol:

- hand net; eventDate: 05/25/2017; year: 2017; month: 5; day: 25; catalogNumber: ZMB 30315; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- p. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Quang Yen; municipality: Tu Do; locality: Ban Moi village, 5 m from cave entrance; decimalLatitude: 22.66360; decimalLongitude: 106.39370; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 06/04/2019; year: 2019; month: 6; day: 4; catalogNumber: ZMB 30344; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- q. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Phuc Hoa; municipality: Luong Thien; locality: Lung Co, mouth of cave; decimalLatitude: 22.57913; decimalLongitude: 106.48076; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 06/03/2019; year: 2019; month: 6; day: 3; catalogNumber: ZMB 30347; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- r. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Ba Be; municipality: Cao Thuong; decimalLatitude: 22.46747; decimalLongitude: 105.63759; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 06/05/2019; year: 2019; month: 6; day: 5; catalogNumber: ZMB 30348; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- s. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Quang Yen; municipality: Tu Do; locality: Ban Moi village, 5 m from cave entrance; decimalLatitude: 22.66360; decimalLongitude: 106.39370; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 06/04/2019; year: 2019; month: 6; day: 4; catalogNumber: ZMB 30349; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu;

- dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- t. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Lang Son; county: Huu Lung; municipality: Yen Thinh; decimalLatitude: 21.62204; decimalLongitude: 106.33551; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 06/08/2019; year: 2019; month: 6; day: 8; catalogNumber: ZMB 30352; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- u. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Bac Me; municipality: Minh Ngoc; locality: Stream in Lung Cang village (LC1); decimalLatitude: 22.71736; decimalLongitude: 105.18694; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 10/17/2019; year: 2019; month: 10; day: 17; catalogNumber: ZMB 30359; recordedBy: Do Van Tu, Dang Van Dong, Le Hung Anh; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- v. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Bac Me; municipality: Lac Nong; locality: Bac Me, small stream (LN1); decimalLatitude: 22.73851; decimalLongitude: 105.26039; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 10/16/2019; year: 2019; month: 10; day: 16; catalogNumber: ZMB 30361; recordedBy: Do Van Tu, Dang Van Dong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- w. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Bac Me; municipality: Lac Nong; locality: Very small stream (LN2); decimalLatitude: 22.74025; decimalLongitude: 105.23611; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 10/16/2019; year: 2019; month: 10; day: 16; catalogNumber: ZMB 30362; recordedBy: Do Van Tu, Dang Van Dong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- x. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Bac Me; municipality: Lac Nong; locality: Stream in Khen village; decimalLatitude: 22.75570; decimalLongitude: 105.24593; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 10/18/2019; year: 2019; month: 10; day: 18; catalogNumber: ZMB 30364; recordedBy: Do Van Tu, Dang Van Dong, Le Hung Anh; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- y. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Thach An; municipality: Kim Dong; decimalLatitude: 22.56444; decimalLongitude: 106.31917; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 04/28/2019; year: 2019; month: 4; day: 28; catalogNumber: ZMB 30382; recordedBy: Dang Van Dong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- z. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Hoa An; decimalLatitude: 22.69306; decimalLongitude: 106.20361; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 04/29/2019; year: 2019; month: 4; day: 29; catalogNumber: ZMB 30384; recordedBy: Dang Van Dong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- aa. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Yen Bai; county: Van Chan; decimalLatitude: 21.47856; decimalLongitude: 104.73222; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 11/20/2012; year: 2012; month: 11; day: 20; catalogNumber: ZMB 30661; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ab. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN;

- stateProvince: Bac Kan; county: Na Ri; municipality: Cu Le; locality: Stream by the road; decimalLatitude: 22.1275; decimalLongitude: 106.14972; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 08/23/2012; year: 2012; month: 8; day: 23; catalogNumber: ZMB 30728; recordedBy: Tran Anh Duc; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ac. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Quang Yen; municipality: Hanh Phuc; locality: Stream in Thom Dan; decimalLatitude: 22.57448; decimalLongitude: 106.44124; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/27/2017; year: 2017; month: 5; day: 27; catalogNumber: ZMB 31566; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ad. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Phuc Hoa; municipality: My Hung; locality: Stream from Nguom Khuoi Khua Cave at mouth of cave, Na Rieng; decimalLatitude: 22.48633; decimalLongitude: 106.55091; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/27/2017; year: 2017; month: 5; day: 27; catalogNumber: ZMB 31568; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ae. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Quang Yen; municipality: Hanh Phuc; locality: Stream in Hanh Phuc, Quang Uyen; decimalLatitude: 22.60187; decimalLongitude: 106.43682; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/27/2017; year: 2017; month: 5; day: 27; catalogNumber: ZMB 31572; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- af. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Lang Son; decimalLatitude: 21.98199; decimalLongitude: 106.67419997222; geodeticDatum: WGS84; georeferenceProtocol: GPS;

- samplingProtocol: hand net; eventDate: 03/11/2018; year: 2018; month: 3; day: 11; catalogNumber: ZMB 31579; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ag. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Lang; municipality: Duc Quang; locality: Coong village; decimalLatitude: 22.71833; decimalLongitude: 106.65583; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/28/2018; year: 2018; month: 7; day: 28; catalogNumber: ZMB 31590; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ah. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Lang Son; decimalLatitude: 21.99478; decimalLongitude: 106.65314; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 03/11/2018; year: 2018; month: 3; day: 11; catalogNumber: ZMB 31591; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ai. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Lang; municipality: Kim Loan; locality: Tung Kit village; decimalLatitude: 22.73806; decimalLongitude: 106.60222; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/31/2018; year: 2018; month: 7; day: 31; catalogNumber: ZMB 31593; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- aj. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Quang Yen; municipality: Phuc Sen; decimalLatitude: 22.681; decimalLongitude: 106.41139; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 06/27/2018; year: 2018; month: 6; day: 27; catalogNumber: ZMB 31596; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- ak. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Ngan Son; locality: Stream behind Ban Dam lake, Ban Chang; decimalLatitude: 22.45528; decimalLongitude: 106.02925; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 03/17/2018; year: 2018; month: 3; day: 17; catalogNumber: ZMB 31599; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- al. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Lang Son; decimalLatitude: 21.98199; decimalLongitude: 106.67420; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 03/11/2018; year: 2018; month: 3; day: 11; catalogNumber: ZMB 31607; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- am. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Ha Quang; municipality: Lung Nam; locality: Stream near the road to Thin Tang village; decimalLatitude: 22.97640; decimalLongitude: 106.05789; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/25/2017; year: 2017; month: 5; day: 25; catalogNumber: ZMB 30312; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- an. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Ha Giang; county: Quan Ba; verbatimElevation: 827 m a.s.l.; decimalLatitude: 23.08654; decimalLongitude: 104.96605; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 10/13/2020; year: 2020; month: 10; day: 13; catalogNumber: ZMB 33829; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ao. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode:

- ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Nguyen Binh; decimalLatitude: 22.5925; decimalLongitude: 105.85472; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/21/2020; year: 2020; month: 5; day: 21; catalogNumber: ZMB 33779; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ap. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Nguyen Binh; decimalLatitude: 22.65306; decimalLongitude: 105.92278; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 05/22/2020; year: 2020; month: 5; day: 22; catalogNumber: ZMB 33830; recordedBy: Do Van Tu; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- aq. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; municipality: Xuan Lac; verbatimElevation: 760 m a.s.l.; decimalLatitude: 22.29314; decimalLongitude: 105.51742; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/24/2020; year: 2020; month: 7; day: 24; catalogNumber: ZMB 33780; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong'; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ar. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; verbatimElevation: 760 m a.s.l.; decimalLatitude: 22.29406; decimalLongitude: 105.51778; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/24/2020; year: 2020; month: 7; day: 24; catalogNumber: ZMB 33781; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong'; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- as. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; verbatimElevation: 342 m a.s.l.; decimalLatitude: 22.23546; decimalLongitude: 105.51070; geodeticDatum: WGS84;

- georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/25/2020; year: 2020; month: 7; day: 25; catalogNumber: ZMB 33782; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong'; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- at. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; decimalLatitude: 22.25667; decimalLongitude: 105.48694; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/25/2020; year: 2020; month: 7; day: 25; catalogNumber: ZMB 33783; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong'; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- au. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; verbatimElevation: 277 m a.s.l.; decimalLatitude: 22.21619; decimalLongitude: 105.49067; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/26/2020; year: 2020; month: 7; day: 26; catalogNumber: ZMB 33784; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong'; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- av. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; verbatimElevation: 307 m a.s.l.; decimalLatitude: 22.34364; decimalLongitude: 105.55027; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/27/2020; year: 2020; month: 7; day: 27; catalogNumber: ZMB 33785; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong'; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- aw. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; verbatimElevation: 380 m a.s.l.; decimalLatitude: 22.32851; decimalLongitude: 105.52499; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/28/2020; year: 2020; month: 7; day: 28; catalogNumber: ZMB 33786; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong'; disposition: in collection; identifiedBy: Do Van Tu;

- dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ax. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Bac Kan; county: Cho Don; verbatimElevation: 300 m a.s.l.; decimalLatitude: 22.29353; decimalLongitude: 105.55729; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 07/29/2020; year: 2020; month: 7; day: 29; catalogNumber: ZMB 33787; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ay. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: Vietnam; countryCode: VN; stateProvince: Cao Bang; county: Nguyen Binh; decimalLatitude: 22.5925; decimalLongitude: 105.85472; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 10/06/2020; year: 2020; month: 10; day: 6; catalogNumber: ZMB 33778; recordedBy: Do Van Tu, Dang Van Dong, Nguyen Tong Cuong; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- az. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); island: Hong Kong; country: China; countryCode: CN; stateProvince: Hong Kong; locality: Nam Chung, below weir of Ping Nam stream; small trickle with mud and leaves; decimalLatitude: 22.5144; decimalLongitude: 114.2073; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 01/01/2011; year: 2011; month: 1; day: 1; catalogNumber: OUMNH.ZC 2013-07-042; recordedBy: Werner Klotz; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen
- ba. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: China; countryCode: CN; stateProvince: Guangdong; locality: Gao Zhou Shi; decimalLatitude: 22.28532; decimalLongitude: 111.25777; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 03/29/2012; year: 2012; month: 3; day: 29; catalogNumber: ZMB 28040; recordedBy: Werner & Maria Klotz, Yixiong Cai; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

- bb. scientificName: *Neocaridina palmata palmata* (Shen, 1948); taxonomicStatus: accepted; kingdom: Animal; phylum: Arthropoda; class: Malacostraca; order: Decapoda; family: Atyidae; taxonRank: Subspecies; vernacularName: atyid shrimp; nomenclaturalCode: ICZN; genus: *Neocaridina*; specificEpithet: *palmata*; infraspecificEpithet: *palmata*; scientificNameAuthorship: (Shen, 1948); country: China; countryCode: CN; stateProvince: Guangxi; county: Napo; locality: Road after Delong Xiang, stream left of road, along road, at km marker 18, Gâm River subbasin, Red River basin; decimalLatitude: 23.23307; decimalLongitude: 105.87193; geodeticDatum: WGS84; georeferenceProtocol: GPS; samplingProtocol: hand net; eventDate: 01/04/2012; year: 2012; month: 1; day: 4; catalogNumber: ZMB 29762; recordedBy: Marco Endrueit; disposition: in collection; identifiedBy: Do Van Tu; dateIdentified: 2020; type: PhysicalObject; institutionCode: ZMB; collectionCode: ZMB; basisOfRecord: PreservedSpecimen

Description

Material examined for description. 5 males, cl 3.3–3.6, 5 females, cl 5.0–7.0 (ZMB 30303), Vietnam: Cao Bang Province, Trung Khanh District, Dam Thuy Commune, Ban Gun-Khuoi Ky Village, 22°50'42.88"N 106°42'6.22"E, [near type locality of *Caridina denticulata vietnamensis* Dang, 1967], coll. Do Van Tu, 36 May 2017.

Cephalothorax and cephalic appendages. Carapace length 3.3–7.0 mm. Rostrum straight, slightly narrow, normally reaching the end of third segment of antennular peduncle, sometime reaching beyond the end of antennular peduncle, 0.58–0.74 (median 0.63) times as long as carapace, rostral formula: 3–4+8–13/3–6 ($n = 10$), teeth normal (Fig. 10a). Suborbital angle acute, completely fused with antennal spine; pterygostomial margin rounded, armed with a small spine (Fig. 10a). Eyes well developed with globular cornea, anterior end reaching to 0.7 times length of basal segment of antennular peduncle (Fig. 10a). Antennular peduncle 0.5–0.77 (median 0.68) times as long as carapace; basal segment 1.64–1.78 (median 1.71) times as long as second segment, anterolateral angle reaching 0.3 times length of the second segment, second segment 1.13–1.83 (median 1.43) times as long as third segment (Fig. 10b). Stylocerite reaching to beyond middle (0.8 times length) of basal segment of antennular peduncle (Fig. 10b). Scaphocerite reaching beyond distal end of antennular peduncle, 2.92–3.33 (median 3.15) times as long as wide (Fig. 10c).

Abdominal somites, telson and uropods. Sixth abdominal somite 0.46–0.54 (median 0.5) times length of carapace, 1.52–2.09 (median 1.67) times as long as fifth abdominal somite, shorter than telson, 0.7–0.91 (median 0.9) times length of telson. Telson length 2.69–3.67 (median 3.0) times as long as proximal width, distal margin obtuse angle, terminating in a short median projection, with 5–6 pairs of dorsal spiniform setae and one pair of dorso-subdistal spiniform setae; distal end with 4–5 pairs of spiniform setae, lateral pair slightly shorter than intermediate pairs (Fig. 10d). Pre-anal carina high, with few setae, lacking tooth or spine. Uropodal diaeresis with 12–14 movable spiniform setae, outermost one shorter than lateral angle (Fig. 10e).

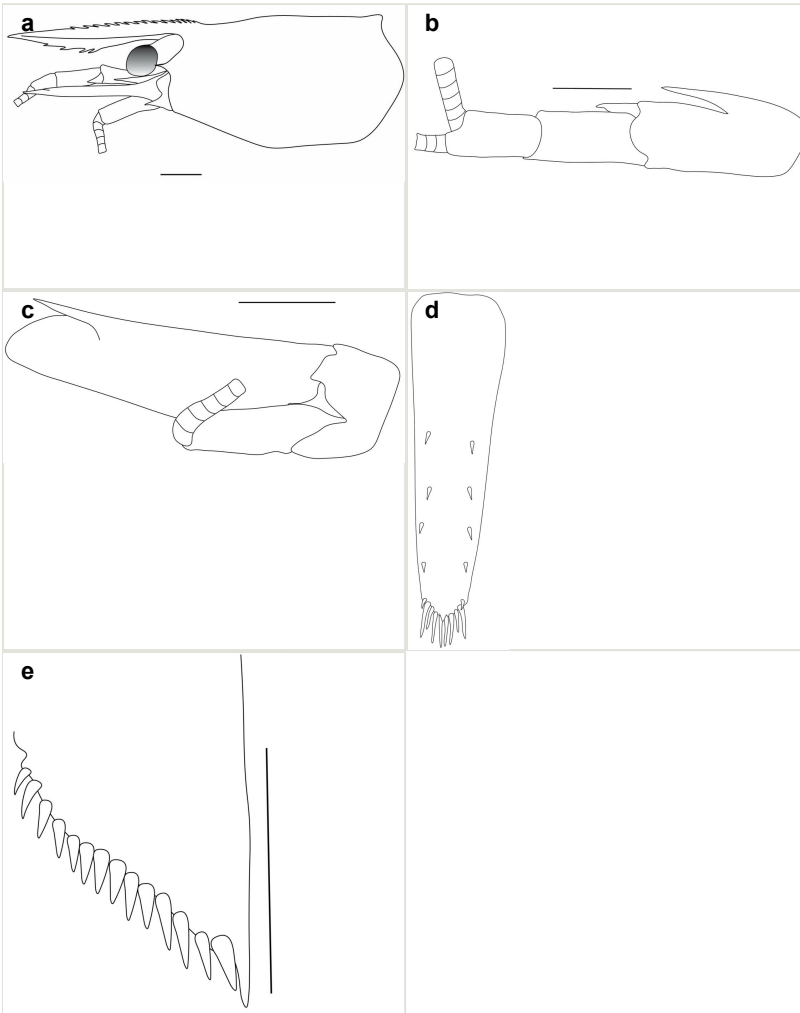


Figure 10.

Neocaridina palmata palmata (Shen, 1948); male, cl 5.3 mm (ZMB 30303). Scale: A–C = 1 mm, D = 0.5 mm, E = 0.2 mm.

a: Cephalothorax and cephalic appendages, lateral view [doi](#)

b: Antennular peduncle [doi](#)

c: Scaphocerite [doi](#)

d: Telson [doi](#)

e: Uropodal diaeresis. [doi](#)

Pereiopods. Epipod present on first four pereiopods. First pereiopod short, robust, reaching to distal end of basal segment of antennular peduncle; chela 1.91–2.21 (median 2.0) times as long as wide, 1.24–1.40 (median 1.36) times length of carpus; tips of fingers rounded, with hook; dactylus slightly longer than palm, 1.0–1.09 (median 1.04) times as long as palm; carpus excavated anteriorly, 1.50–1.67 (median 1.54) times as long as wide, 0.75–0.91 (median 0.79) times length of merus; merus 2.13–

2.86 (median 2.37) times as long as wide, longer than ischium (Fig. 11a). Second pereopod long, slender, reaching to middle of second segment of antennular peduncle; chela 2.4–3.0 (median 2.55) times as long as wide, 0.83–0.86 (median 0.85) times length of carpus; tips of fingers rounded, without hook; dactylus 1.2–1.5 (median 1.36) times as long as palm; carpus 4.38–4.67 (median 4.0) times as long as wide, slightly longer than merus, 1.0–1.06 (median 1.04) times as long as merus; merus 4.15–4.86 (median 4.5) times as long as wide, longer than ischium; coxa with a curved spine in male specimens (Fig. 11b). Third pereopod slender, reaching to middle of third segment of antennular peduncle, with 6–8 accessory spiniform setae on flexor margin, dactylus 2.75–2.83 (median 2.78) times as long as wide (terminal claws and spiniform setae on flexor margin included), terminating in two claws, propodus 8.0–9.33 (median 8.17) times as long as wide, 2.59–3.42 (median 3.36) times as long as dactylus; dactylus and distal portion of propodus expanded in male specimens, propodus more strongly curved in males than in females; carpus 3.14–4.0 (median 3.67) times as long as wide, 0.61–0.88 (median 0.62) times as long as propodus, 0.44–0.61 (median 0.46) times as long as merus; merus 4.17–6.78 (median 4.59) times as long as wide, bearing three strong, movable spiniform setae on posterior margin of outer surface, merus stouter in males than in females; ischium with one movable spiniform setae (Fig. 11c, d). Fifth pereopod slender, reaching to end of basal segment of antennular peduncle, dactylus 3.9–4.89 (median 4.4) times as long as wide (terminal claw and spiniform setae on flexor margin included), terminating in one large claw, with 45–63 spiniform setae on flexor margin; propodus 9.17–9.4 (median 9.2) times as long as wide, 2.2–3.0 (median 2.4) times length of dactylus; carpus 3.57–4.17 (median 4.0) times as long as wide, 0.45–0.54 (median 0.51) times as long as propodus, 0.60–0.67 (median 0.66) times as long as merus; merus 4.22–5.25 (median 4.5) times as long as wide, bearing 3 strong, movable spiniform setae on posterior margin of outer surface (Fig. 11e).

Endopod of male first pleopod extending to 0.8 times length of exopod, expanded into pear shape, 1.42–1.67 (median 1.45) times as long as proximal width, with tiny spiniform setae on distal margin of dorsal surface; outer margin lined with about 5–6 short setae; appendix interna reduced as a small protrusion or short finger at base of inflated part, without an arc of shorter process at the base of inner border (Fig. 12a, b). Appendix masculina of male second pleopod stout, taper-shaped, reaching to proximal 0.6 times endopod length, 1.5 times as long as distal width, inner and distal surface covered with many long, stout spiniform setae; appendix interna at the middle of appendix masculina, extending about 0.9 times length of appendix masculina (Fig. 12c, d).

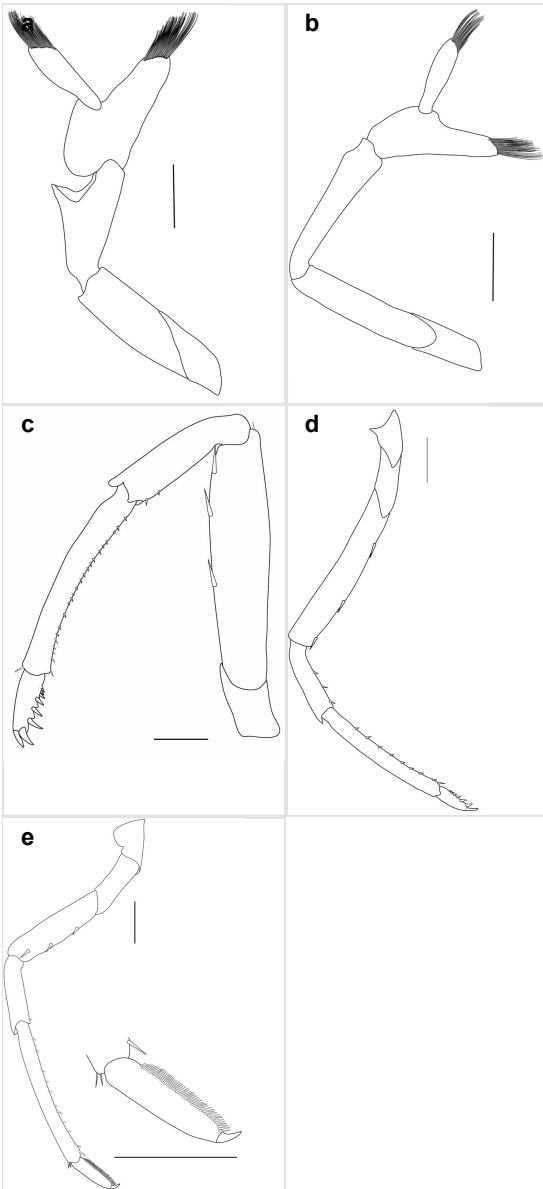


Figure 11.

Neocardina palmata palmata (Shen, 1948); male, cl 5.3 mm (ZMB 30303). Scale: A–E= 1 mm

a: First pereiopod [doi](#)

b: Second pereiopod [doi](#)

c: Third pereiopod [doi](#)

d: Third pereiopod (female, cl 5.4) [doi](#)

e: Fifth pereiopod. [doi](#)

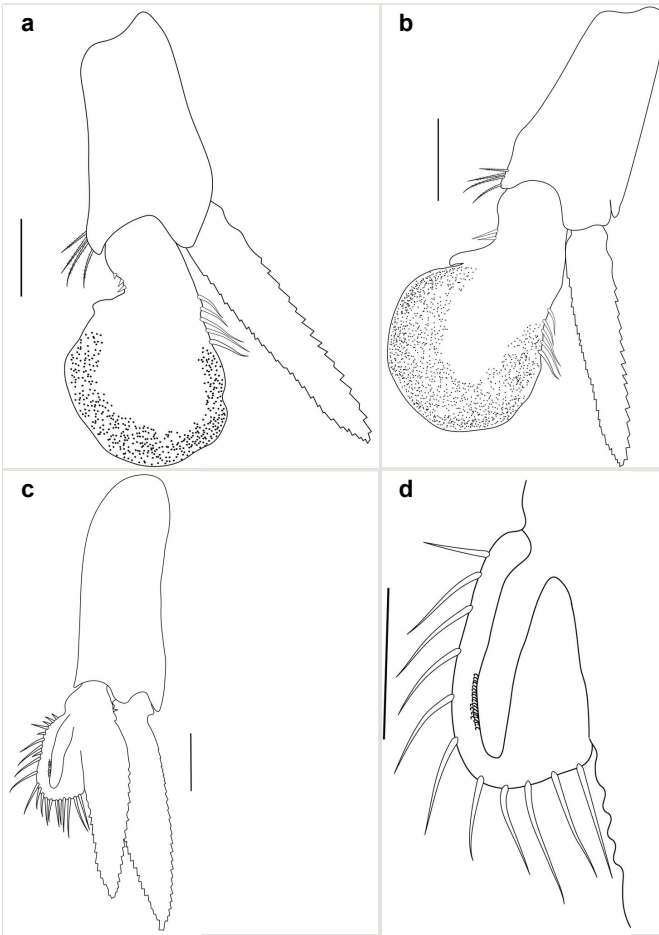


Figure 12.

Neocaridina palmata palmata (Shen, 1948); males, cl 5.3 mm (ZMB 30303). Scale: A–D = 0.2 mm.

a: Male first pleopod with appendix interna reduced as a small protrusion at base of inflated part [doi](#)

b: Male first pleopod with appendix interna as short finger at base of inflated part [doi](#)

c: Male second pleopod [doi](#)

d: Appendix masculina and interna of male second pleopod. [doi](#)

Colouration. Body bluish or brown, few pale longitudinal stripes present on dorsal part of abdominal somites in large individuals (Fig. 13).

Distribution

In Vietnam, this species is distributed in the mountainous areas of the northeast and some parts of northwest Vietnam (Fig. 1d). In China, the species occurs in the following

Provinces: Hubei, Jiangxi, Fujian, Guangdong, Guangxi, Guizhou, Anhui, Zhejiang (Liang 2004); and Hong Kong.



Figure 13. [doi](#)

Live colouration of *Neocaridina palmata palmata* (Shen, 1948); collected from Phia Oac-Phia Den National Park, Cao Bang Province, details of the samples are given in the supplementary data.

Ecology

Living in mountain streams and based on egg-size, this species can be considered a land-locked species (Table 1).

Taxon discussion

Dang (1967) described *Caridina denticulata vietnamensis* from northern Vietnam. In subsequent publications, he raised this subspecies to species level as *C. vietnamensis* (Dang 1975, Dang et al. 1980). Cai (1996) synonymised it with *Neocaridina palmata palmata* (Shen, 1948). Subsequently, Dang and co-authors moved it to the genus *Neocaridina* (*N. vietnamensis*) (Dang and Do 2007b, Dang and Do 2008, Dang and Ho 2012). Li and Liang (2002) followed Cai (1996) to consider *C. denticulata vietnamensis* as junior synonyms of *Neocaridina palmata palmata* (Shen, 1948). However, Dang and Do (2008) and Dang and Ho (2012) stated that *N. vietnamensis* can be distinguished from *N. palmata* or a subspecies of this species by the endopod of the male first pleopod (round shape and stable vs. variable); appendix masculina of male second pleopod (perpendicular vs. rounded) and appendix interna (reaching nearly to the tip of appendix masculina vs. not reaching to the tip of appendix masculina) and larger egg size ($1-1.25 \times 0.65-0.85$ mm) (Dang and Do 2008, Dang and Ho 2012). These authors also mentioned the differences in the endopod of the first pleopod and the appendices masculina and interna. Nevertheless, Liang (2004) stated that the shape of the endopod of the first pleopod is very variable in *N. palmata*, even in the specimens

collected from the same localities. According to this author, *N. palmata* can be distinguished from *N. denticulata* De Haan, 1849 by the third pereopod. In both sexes, it differs in length and shape (vs. length and shape of third pereopod being similar between male and female); the dactylus and distal portion of the propodus of the third pereopod of male is inflated (vs. the dactylus and distal portion of the propodus of the third pereopod of the male is not inflated); the propodus of the third pereopod of the male is curved (vs. the propodus of the third pereopod of the male is straight). He also noted that this species lives in streams, rivers, reservoirs, ditches and small ponds. It is distributed in the middle reaches of the Yangtze River and central China, south and southwest China and North Vietnam. Due to its wide distribution, humid climate and different living environments, the appendix masculina often shows morphological variation and subspecies differentiation. Our specimens collected from different sampling sites in northeast Vietnam showed that all of them belong to the subspecies *N. palmata palmata*.

Analysis

We clarified four species of atyid freshwater shrimps in Vietnam, three from the genus *Caridina* (*C. cantonensis*, *C. lanceifrons* and *C. serrata*) and one from the genus *Neocaridina* (*N. palmata palmata*) that were originally described from China (Table 1). We considered *Caridina flavilineata* Dang, 1975, *C. vietriensis* Dang & Do, 2007 and *C. pseudoflavilineata* Do & Dang, 2010 as synonyms of *C. lanceifrons* Yu, 1936 and *Neocaridina vietnamensis* Dang, 1975 as a synonym of *N. palmata palmata* (Shen, 1948). Egg-size and distribution data (Table 1) suggest abbreviated larval development and a complete life cycle in freshwater (Vogt 2013). In general, in Vietnam, all four species are confined to North Vietnam (Fig. 1). It is rather surprising that the only species amongst these extending further south (*Caridina lanceifrons* in southern Thailand) does not occur in southern Vietnam.

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Author contributions

The researchers involved in this project were Dr. Do Van Tu from the Institute of Ecology and Biological Resources (IEBR; sample collection, taxonomic identification, data management, writing the manuscript), Dr. Le Hung Anh, M.A. Dang Van Dong, M.A.

Nguyen Tong Cuong from IEBR, Mr. Phan Doan Dang from Institute of Tropical Biology, Phan Thi Yen-PhD student from Graduate University of Science and Technology (sample collection, sorting, identification and drawing) and Dr. Hoang Ngoc Khac from the Ha Noi University of Natural Resources and Environment (HUNRE; sample collection and sorting), Dr. Tran Anh Tuan (IEBR; map drawing), Dr. Kristina von Rintelen and Dr. Thomas von Rintelen from the Museum für Naturkunde (MfN; data processing and management and writing the manuscript), Werner Klotz from the Medizinische Universität Innsbruck (taxonomic identification, writing the manuscript).

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Supplementary material

Suppl. material 1: New occurrence data of four species of atyid shrimps in Vietnam.

[doi](#)

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Data type: Occurrences

Brief description: The data were created from the field surveys from 2003 to 2020. The collection dates and collectors of several samples could not be identified because their labels were lost.

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