

## ***Caridina longiacuta*, a new species of freshwater atyid shrimp (Decapoda, Atyidae) from Hunan Province, China**

ZHAO-LIANG GUO<sup>1</sup> & XIAO-QING WANG<sup>2</sup>

<sup>1</sup> Department of Animal Science, Foshan Science and Technology College, Nanhai, 528231, Guangdong Province, Peoples Republic of China, e-mail: zlguo@fosu.edu.cn

<sup>2</sup> Department of Fisheries, Hunan Agriculture University, Changsha, 410128, Hunan Province, Peoples Republic of China, e-mail: wang8669@163.com

### **Abstract**

A new atyid species, *Caridina longiacuta*, is described and illustrated from Hunan Province, China. *Caridina longiacuta* is characterized by its long rostrum, long finger-like process on the anterolateral angle of basal antennular segment, the narrow scaphocerite, the segmental ratios of third maxilliped, the shape and spination of its posterior telsonic margin, and small eggs. Also, *Caridina cantonensis* Yu, 1938 is reported from Hunan Province for the first time.

**Key words:** Decapoda, Atyidae, *Caridina*, new species, China

### **Introduction**

Hunan Province is located in the middle reaches of the Yangtze River. This province possesses a complex water system, with four rivers the Xiangjiang River, Zijiang River, Yuanjiang River and Lishui River linking up with over 5200 branches of various lengths, that run into the Yangtze River through Dongting Lake. For the abundant rainfall, long duration of sunshine and short duration of frost, Hunan Province is suitable for the growth of animals. The atyid shrimps of this province are more diverse than any other part of China. So far, thirty-one species of atyid shrimps belonging to four genera have been recorded from Hunan Province (Cai, 1996; Guo & Choy, 1994; Guo, Choy & Gui, 1996; Guo & De Grave, 1997, 2004; Guo, He & Bai, 1992; Guo & Liang, 2003; Guo, Jiang & Zhang, 1992; Guo & Suzuki, 1996; Guo *et al.* 1992; Guo *et al.* 2002a, 2002b; Jiang, Guo & Zhang, 2002; Liang, 2004; Liang, Guo & Gao, 1993; Liang, Guo & Tang, 1999).

A small collection of atyid shrimps was collected from Yuanliping village, Yizhang County, Hunan Province, that is shown to be represents a new species of the *Caridina* and is herein described and illustrated in detail.

The following abbreviations are used throughout the text: tl, total length of body (measured from the rostral tip to the posterior margin of the telson); cl, carapace length (measured from the postorbital margin to the posterior margin of the carapace); rl, rostral length (measured from the rostral tip to the postorbital margin).

All type specimens have been deposited in the collections of the Foshan Science and Technology College (FSTC). Some representative paratypes have been deposited in the Shanghai Fisheries University (SFU).

### Material and methods

Specimens were collected by hand net (mesh size 0.5 mm) and then preserved in 75% alcohol. For each species three specimens of each sex were dissected. The drawings were made with the aid of drawing tube mounted on an Olympus BX-41 compound microscope.

### Systematics

#### Family ATYIDAE De Haan

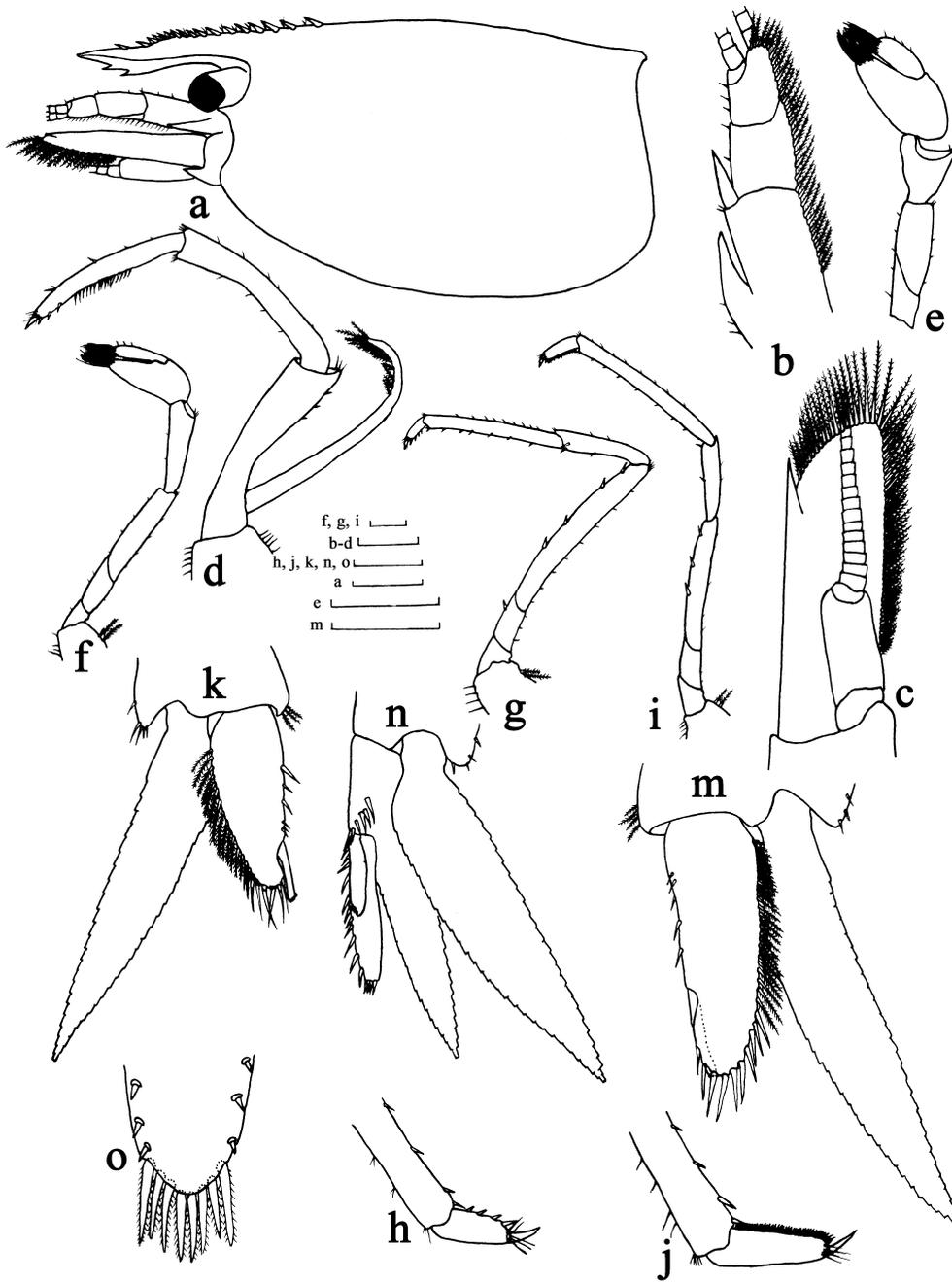
#### Genus *Caridina* H. Milne Edwards, 1837

#### *Caridina longiacuta*, new species (Fig. 1)

*Material examined*: Holotype. Adult male (FSTC, 92-08-01): tl 23.4 mm, cl 5.6 mm, rl 2.5 mm. Paratypes. 6 males (FSTC, 92-08-02 to 07): tl 17.2–21.4 mm, cl 4.0–5.2 mm, rl 1.7–2.3 mm; 14 females (FSTC, 92-08-08 to 21), tl 20.1–26.1 mm, cl 4.5–5.8 mm, rl 1.9–2.5 mm, near Yuanliping village, Yizhang County, Hunan Province (ca. 25°25'N, 112°57' E). 9 August 1992.

*Diagnosis*: Rostrum long, extending to end of antennular peduncle, dorsal border bearing 12–18 teeth, with 5–7 teeth situated behind the posterior orbital margin, 1–4 ventral teeth. Endopod of the first male pleopod is leaf-shaped, inner margin with a few thin marginal spiniform setae; appendix interna well developed, arising from distal 1/4–1/3 of endopod, just reaching end or half-length beyond the end of endopod. Appendix masculina rod-shaped, reaching about 0.85 times length of endopod, inner margin and tip bearing numerous stout hamate setae; appendix interna reaching about half of appendix masculina. Eggs 0.67–0.72 x 0.97–1.05 mm in diameter.

*Description*: Small, slender and sub-cylindrical, males reach 23.4 mm tl, females reach 26.1 mm tl.



**FIGURE 1.** *Caridina longiacuta* sp. nov. a. cephalothorax, holotype, male, cl 5.6 mm (FSTC, 92-08-01), b. antennular peduncle, c. scaphognathite, d. third maxilliped, e. first pereiopod, f. second pereiopod, g. third pereiopod, h. dactylus of third pereiopod, i. fifth pereiopod, j. dactylus of fifth pereiopod, k. male first pleopod, m. male first pleopod, n. male second pleopod, o. posterior portion of telson. b-k, n, o: paratype, male, cl 5.2 mm (FSTC, 92-08-02); m. paratype, male, cl 5.0 mm (FSTC, 92-08-03). Scale bars indicate 1.0 mm (a, e); 0.5 mm (b-d, f, g, i); 0.4 mm (m); 0.3mm (h, j, k, n, o).

Rostrum (Fig. 1a): Broad, 0.42–0.46 of cl, reaching tip of antennular peduncle, curving downwards; armed with 12–18 dorsal teeth, of which 5–7 situated on carapace behind the orbital margin, and 1–4 ventral teeth.

Eyes (Fig. 1a): Small, on short ocular peduncle; cornea globular, well developed.

Carapace (Fig. 1a): Smooth, glabrous. Lower orbital angle indistinct, almost fused to sharp antennal spine. Pterygostomian margin rounded, slightly produced forward; pterygostomian spine absent.

Antennule (Fig. 1b): Peduncle three-segmented, not reaching beyond scaphocerite; stylocerite about 0.72–0.81 times as long as proximal segment; second segment about 0.54–0.56 times as long as proximal segment, about 1.4 times as long as distal segment, anterolateral angle of basal antennular segment with long finger-like process, which is about 0.71–0.84 times of second segment. All segments with submarginal plumose setae.

Antenna (Fig. 1c): Peduncle about 0.45 times as long as scaphocerite; scaphocerite slightly longer than antennular peduncle, outer margin straight, asetose, ending in a strong sub-apical spine; length about 3.3 times width, inner and anterior margins with long plumose setae.

Mandibles, maxillula, maxilla, first and second maxilliped, and branchial formula typical for genus.

Third maxilliped (Fig. 1d): Reaches to tip of scaphocerite, endopod three-segmented, length of basal segment about 3.6 times width, slightly expanded distally; length of penultimate segment about 6.1 times width, about 1.1 times as long as basal segment; distal segment about 0.92 times as long as penultimate segment, ending in a large claw-like spine surrounded by simple setae, preceded by about 3–6 spines on distal fifth of posterior margin, proximally a clump of long and short simple, serrate setae; exopod reaches to about 1/4 of second segment of endopod, distal margin with long plumose setae.

First pereopod (Fig. 1e): Reaches tip of eyes; chela 1.9–2.0 times as long as wide, about 1.3–1.8 times length of carpus; movable finger 0.82–1.0 times length of palm; carpus excavated disto-dorsally, 1.2–1.5 times as long as wide, 0.57–0.75 times as long as chela and 0.72–0.84 times length of merus.

Second pereopod (Fig. 1f): More slender and longer than first pereopod, reaches end of second antennular peduncle; chela about 1.9–2.5 times as long as wide, about 0.83–1.1 times length of carpus; movable finger 2.9–4.1 times as long as wide, 1.2–1.7 times length of palm; carpus 3.2–4.3 times as long as wide, slightly excavated distally, about 0.93–1.2 times as long as chela and about 0.73–0.95 times as long as merus.

Third pereopod (Fig. 1g, h): The base of dactylus reaches beyond end of scaphocerite; dactylus 3.4–4.0 times as long as wide, ending in prominent claw-like spine surrounded by simple setae, behind which bears 3–5 spiniform setae; propodus about 3.2–3.9 times length of dactylus; carpus 0.61–0.72 times length of propodus; merus 1.9–2.4 times as long as carpus, with about 3–4 spiniform setae on postero-lateral margin.

Fourth pereopod: Reaches tip of first segment of antennular peduncle, somewhat similar to third pereopod.

Fifth pereopod (Fig.1i, j): Reaches the end of second antennular peduncle segment; dactylus 3.5–4.3 times as long as wide, ending in claw-like spine surrounded by simple setae, behind which bears comb-like row of 34–48 spiniform setae on posterior margin; propodus about 3.2–4.0 times length of dactylus; carpus 0.46–0.59 times as long as propodus; merus 1.4–1.7 times as long as carpus, with about 3 spiniform setae on posterior margin; ischium with one spiniform setae on posterior margin.

First pleopod (Fig.1k, m): Endopod in male is leaf-shaped, about 0.48–0.58 times as long as exopod, wider proximally, tip broadly rounded, about 2.6–2.9 times as long as maximal width, inner border with a few thin marginal spiniform setae, 1/5 distally of outer margin and tip with long and strong spiniform setae, basal part of the outer border with marginal long plumose; appendix interna well developed, arising from 1/4–1/3 distal part, reaches tip or half of length overreaches the tip of endopod.

Second pleopod (Fig.1n): Endopod in male about 0.85 times as long exopod, bearing numerous long spiniform setae on the proximal portion; appendix interna reaching half of appendix masculina; appendix masculina rod-shaped, reaching to about 0.73 times length of endopod, bearing a row of long spines on inner margin and distally.

Abdomen: Glabrous, sixth abdominal somite 0.48–0.50 times cl.

Telson (Fig.1o): 0.54–0.58 times cl, distinctly longer than sixth abdominal segment, tapering posteriorly, ending in rounded margin, dorsal surface with 4–5 pairs of stout movable spines including the pair at posterolateral angles; posterior margin with 3–4 pairs of intermedial plumose setae and a small median point, lateral pair usually stouts and longest; diaresis on exopod bearing 10–12 spinules.

Live coloration: When alive, body is light green colour and with numerous small red-dish dots.

Egg size: Small, eggs with size of 0.67–0.72 x 0.97–1.05 mm.

Etymology: The species name is derived from the Latin *longia*, long, and the Latin *acuta*, process, in reference to the anterolateral angle of basal antennular segment with long finger-like process.

Remarks: *Caridina longiacuta*, new species, most resembles *C. angustipes* Guo & Liang, 2003 in the shape of the endopod of the male first pleopod and appendix masculina of the male second pleopod. It can be distinguished from *C. angustipes* by the long rostrum (reaching beyond tip of antennular peduncle versus reaching tip of second antennular peduncle in *C. angustipes*); anterolateral angle of basal antennular segment with long finger-like process (more 2/3 of second segment length versus less 1/3 of second segment length in *C. angustipes*); the longer penultimate segment of third maxilliped (longer than the basal segment versus shorter than the basal segment in *C. angustipes*); the narrower scaphocerite (3.3 times as long as wide versus 2.8 times in *C. angustipes*); the posterior margin of telson with a small median point (versus without in *C. angustipes*); and smaller

eggs (eggs size 0.67–0.72 x 0.97–1.05 mm versus 1.06–1.20 x 1.58–1.71 mm in *C. angustipes*).

Habitat: The senior author collected the type specimens from a small stream at an elevation of 450–700 m near Yuanliping village, Yizhang County, Hunan Province (ca. 25°25' N, 112°57' E). The stream has a rocky bed, is about 15–30 m wide and 0.5–2.0 m deep. The shrimps live under stones and aquatic grass beds. The temperature was 25 and pH was 7.0.

Distribution: Only know from the type locality: Yizhang County, Hunan Province, China.

### ***Caridina cantonensis* Yu, 1938**

*Caridina cantonensis* Yu, 1938: 290, figures 7, 8 [type locality: Guangdong, China]–Cai & Ng, 1999:1610, figures 4, 5, 6C–E, 6H–N–Liang, 2004: 179, figure 87.

*Caridina yulinica* Cai & Ng, 1999:1620, figures 9–11 [type locality: Niuwo cave near Kuyang Town, Yulin, Guangxi, China].

*Caridina mutata* Cai & Ng, 1999:1624, figures 12, 13 [type locality: Fangcheng Town, Fangcheng County, Guangxi, China].

Material examined: 5 males (FSTC, 2001-07-01 to 05): cl 3.5–4.9 mm; 2 females (FSTC, 2001-07-06 to 7), cl 3.8–4.8 mm, near Mashi town, Jianghua County, Hunan province. 9 July 2001; 15 males (FSTC, 2004-07-01 to 15): cl 3.0–5.1 mm; 10 females (FSTC, 2004-07-16 to 25), cl 3.3–5.2 mm, near Suocheng town, Lanshan County, Hunan province. 13 July 2004.

Diagnosis: Rostrum short, extending to end of second segment of antennular peduncle, dorsal border bearing 9–17 teeth, with 5–7 teeth situated behind the posterior orbital margin, 2–6 ventral teeth. Endopod of the first male pleopod rectangular, wide distally, inner margin concave, with a few thin marginal spiniform setae, outer margin straight; appendix interna well developed, arising from middle of endopod, just reaching end of endopod. Appendix masculina glabrous, reaching about 1/2 of endopod, inner margin and tip bearing numerous long spines; appendix interna reaching about half of appendix masculina. Eggs 0.63–0.72 x 0.99–1.09mm in diameter.

Remarks: This species is an easily recognized atyid shrimp of Hunan Province distinguished by its unusually longer stylocerite, which reaching beyond end of basal segment of antennular peduncle. The taxonomy of this species was reviewed by Cai (1999). Liang (2004) subsequently synonymized *Caridina yulinica* and *Caridina mutata* with *Caridina cantonensis*. The present materials agree well with the previous description (Yu, 1938; Cai, 1999; Liang, 2004). It is a common atyid shrimp in southern China. This is the first record of the species from Hunan Province. It has been found in mountain streams, and usually collected together with *Marcobrachium nipponense* (De Haan, 1849). With the

striking reddish-brown transverse bands on the body, *Caridina cantonensis* has been cultivated in the aquarium in Guangdong and Shanghai in recent years.

Distribution: Guangdong, Guangxi, Hunan, and Hongkong; Vietnam.

### Acknowledgements

Gratefully acknowledged is extended to Prof. X. Q. Liang of Shanghai Fisheries University for substantial advice and encouragement. We also thank Prof. L. B. Holthuis, Dr Y. X. Cai, Dr. S. De Grave and Dr. S. Li for providing us with essential literature.

### References

- Cai, Y., (1996) A revision of the genus *Neocaridina* (Crustacea: Decapoda: Atyidae). *Acta Zootaxonomica Sinica*, 21, 129–160.
- Cai, Y. & Ng, N.K. (1999) A revision of the *Caridina serrata* species group, with descriptions of five new species (Crustacea: Decapoda: Caridea: Atyidae). *Journal of Natural History* 33, 1603–1638.
- Guo, Z.L., Jiang, H. & Zhang, M.S. (1992) A new species of *Caridina* (Decapoda, Atyidae) from Hunan, China. *Sichuan Journal of Zoology*, 11(2), 4–6.
- Guo, Z.L. & Suzuki, H. (1996) *Caridina mengaeoides*, a new freshwater atyid shrimp (Decapoda: Caridea: Atyidae) from Hunan Province, China. *Crustacean Research*, 25:98–103.
- Guo, Z.L. & Choy, S.C. (1994) *Caridina pedicultrata*, a new freshwater atyid shrimp (Caridea: Atyidae) from Hunan Province, China. *Memoirs of the Queensland Museum*, 35 (1), 123–127.
- Guo, Z.L., Choy, S.C. & Gui, Q.M. (1996) *Caridina semiblpisa*, a new species of troglonic shrimp (Crustacea: Decapoda: Atyidae) from Hunan Province, China. *The Raffles Bulletin of Zoology*, 44(1), 65–75.
- Guo, Z.L. & De Grave, S. (1997) Two new species of *Caridina* (Crustacea: Decapoda: Atyidae) from Hunan Province, China. *The Raffles Bulletin of Zoology*, 45(1), 123–133.
- Guo, Z.L. & De Grave, S. (2004) Atyid shrimps of the genus *Paracaridina* (Crustacea, Decapoda, Atyidae) from Hunan Province, China. *Hydrobiologia*, 513:197–204.
- Guo, Z.L., He, S.L. & Bai, H.Q. (1992) A new species of *Caridina* (Decapoda, Atyidae) from Hunan, China. *Journal of Hunan Agricultural College*, 18(3), 609–612.
- Guo, Z.L., He, S.L., Xu, M.J. & Gui, Q.M. (1992) A new species of *Caridina* (Decapoda, Atyidae) from Hunan, China. *Journal of Hunan Agricultural College*, 18(Suppl.), 717–720.
- Guo, Z.L., He, S.L., Xiao, T.Y. & Gui, Q.M. (2002a) Study on the genus *Caridina* (Crustacea, Decapoda, Atyidae) from Hunan Province, China. *Journal of Hunan Agricultural University (Natural Sciences)*, 28(5), 414–420.
- Guo, Z.L., He, S.L., Xiao, T.Y. & Gui, Q.M. (2002b) Study on the *Neocaridina*, *Mancicaris*, *Paracaridina* (Crustacea, Decapoda, Atyidae) from Hunan Province, China. *Journal of Hunan Agricultural University (Natural Sciences)*, 28(6), 474–478.
- Guo, Z.L. & Liang, X.Q. (2003) Two new species of freshwater shrimps from Hunan Province, China (Decapoda: Atyidae: Caridina). *Zoological Research*, 24 (1), 45–48.
- Jiang, A.Q., Guo, Z.L. & Zhang, Q.Q. (2002) *Caridina liangi*, a new freshwater atyid shrimp (Decapoda: Atyidae) from Hunan, China. *Journal of Hunan Agricultural University (Natural Sciences)*, 28(5), 414–420.

- Science*), 28(3), 220–223.
- Liang, X.Q. (2004) *Fauna Sinia, Invertebrata, Vol.36, Atyidae, Decapoda, Crustacea*. Science press, Beijing, China, 375 pp.
- Liang, X.Q., Guo, Z.L. & Tang, K.E. (1999) On new genera and new species of atyid shrimps (Decapoda, Caridea) from Hunan, China. *Journal of Fisheries of China*, 23 (Suppl), 69–72.
- Liang, X.Q., Guo, Z.L. & Gao, J. (1993) Study on *Caridina* (Decapoda, Caridea) from Hunan, China. *Journal of the Shanghai Fisheries University*, 2 (1), 41–47.
- Yu, S.C. (1938) Study on Chinese *Caridina* with descriptions of five species. *Bulletin of the Fan Memorial of the Institute of Biology, Zoology Series*, 8(3), 271–310.