

**DESCRIPTIONS OF THREE NEW SPECIES OF
FRESHWATER SHRIMPS (CRUSTACEA: DECAPODA:
ATYIDAE) FROM YUNNAN, SOUTHERN CHINA**

Yixiong Cai

*Department of Biological Sciences, National University of Singapore, Kent Ridge Road, Singapore 119260,
Republic of Singapore.*

Xianqiu Liang

Shanghai Fisheries University, 334 Jungonglu, Shanghai 200090, P. R. China

ABSTRACT. - Three new species of freshwater shrimps of the genus *Caridina*, viz. *C. feixiana*, *C. yilong* and *C. disjuncta*, are reported from Yunnan Province, southern China. The affinities of the three species and differences from allied taxa are discussed.

KEY WORDS. - New species, *Caridina*, Atyidae, Yunnan, China.

INTRODUCTION

In a recent study, the authors examined a number of atyid specimens from Yunnan Province of southern China, which are kept in Institute of Zoology, the Chinese Academy of Sciences, Beijing (IZAS) and Shanghai Fisheries University, Shanghai (SFU). The material include several new species of *Caridina*, three of which are described and figured here. Types are deposited at IZAS, Beijing, and SFU, Shanghai, P. R. China.

The abbreviation cl. is used as carapace length (measured from the postorbital margin to the posterior margin of carapace. All measurements are in millimetres. Notation for rostral formula follows that of Chace & Bruce (1993).

TAXONOMY

FAMILY ATYIDAE

Genus *Caridina* Milne Edwards, 1837

Caridina feixiana, new species

(Figs.1,2)

Material examined. - Holotype: female, cl. 5.0 mm. (YC0024—IZAS); Stream in Feixia cave, Gejiu County, Yunnan, China; coll. Wand Daqing, 4 Apr.1992.

Paratypes: two juveniles, data same as holotype.

Description. - Rostrum long, reaching distal end of scaphocerite; anterior half upturned, armed dorsally with 12 teeth, including 6 on posterior half of rostrum and another 6 on carapace, armed ventrally with 6 teeth anterior to first dorsal tooth. Antennal spine sharp, fused with inferior orbital angle. Pterygostomian margin broadly rounded.

Telson terminating in a projection. Dorsal surface with 5 pairs of spinules and posterior margin with 4 pairs of spines, lateral pair longer than intermediate pairs.

Eyes developed. Antennular peduncle 0.6 times as long as carapace, basal segment of antennular peduncle longer than half of antennular peduncle. Stylocerite reaching distinctly beyond end of basal segment of antennular peduncle. Scaphocerite slender, 4.6 times as long as wide.

Mouth parts as figured (Fig.1). Mandible with blunt teeth at extremity of incisor process. Maxillula with simple palp, lower lacinia broadly rounded, upper lacinia broadly elongated, inner edge straight, with dense setae and teeth. Maxilla with slender palp, upper endite subdivided, scaphocerite tapering with numerous long hooked setae posteriorly. Palp of 1st maxilliped stout, terminating in subacutely angle. Endopod of second maxilliped with fused dactylus and propodal segments. Third maxilliped extending to end of antennular peduncle, ending in single terminal claw; exopod reaching posterior one fourth length of penultimate segment. Epipods on first four pereopods.

First pereopod very stout, reaching to end of basal segment of antennular peduncle; merus 1.6 times as long as wide, carpus slightly wider than long; chela 1.7 times as long as broad, fingers shorter than palm. Second pereopod reaching to end of second segment of antennular peduncle; carpus 4.0 times as long as high; chela 2.8 times as long as broad; dactylus as long as palm. Third pereopod reaching distal end of antennular peduncle, with propodus 10 times as long as wide, 3.6 times as long as dactylus (claw included); dactylus with 6 accessory spines increasing in length and size distally on flexor margin. Fifth pereopod reaching slightly beyond end of basal segment of antennular peduncle, with propodus 11 times as long as wide; dactylus with 33 spinules on flexor margin.

Uropodal diaeresis with 12 spinules.

Habitat. - Stream in karst cave, the collection site is in total darkness (Daqing Wang, pers. comm.).

Etymology. - *Caridina feixiana*, is named after its type locality- Feixia cave.

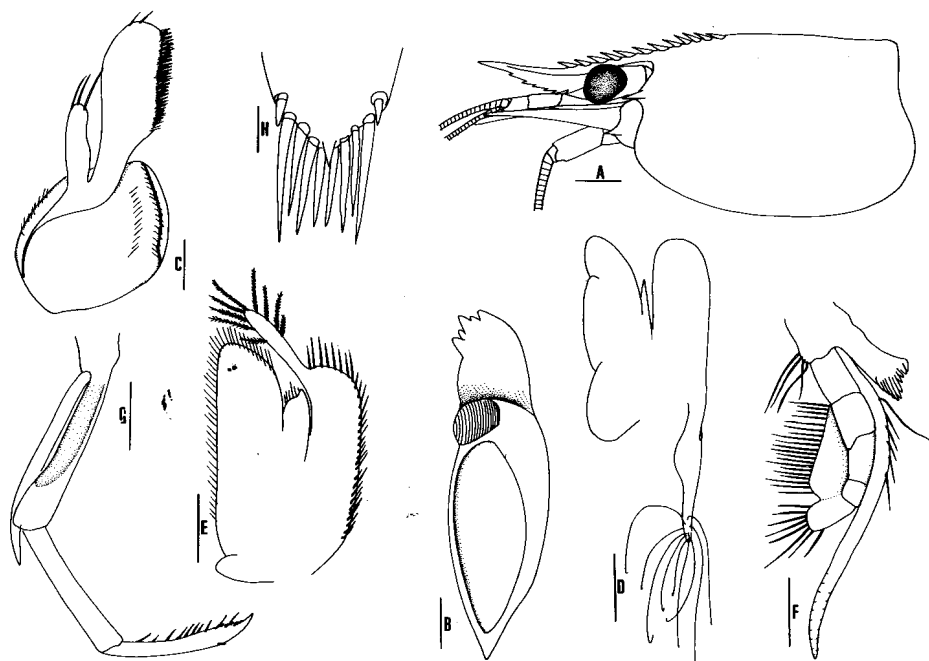


Fig. 1. *Caridina feixiana*, new species, holotype (male, cl. 5.0mm, IZAS). A. cephalothorax, B. mandible, C. maxillula, D. maxilla, E. first maxilliped, F. second maxilliped. G. third maxilliped, H. posterior margin of telson. Scale: A,D,E,F,G =2mm; B,C,D=0.5mm; H=0.2mm.

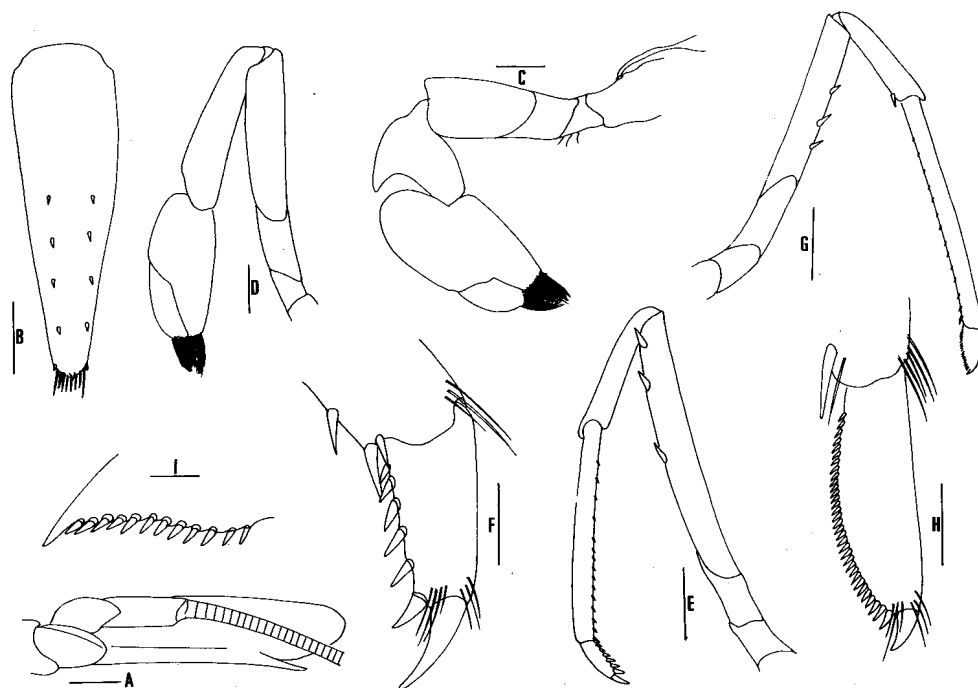


Fig. 2. *Caridina feixiana*, new species, (holotype male, cl. 5.0mm, IZAS). A. scaphocerite, B. telson, C. first pereiopod, D. second pereiopod, E. third pereiopod, F. dactylus of third pereiopod, G. fifth pereiopod, H. dactylus of fifth pereiopod, I. uropodal diaeresis. Scale: A,B,E,G=1mm; C,D=0.5mm; H,I=0.2mm.

Remarks. - *Caridina feixiana*, new species, is similar to *Caridina longa* Liang & Yan, 1985 in the rostral teeth arrangement and stout pereopods. It can be differentiated from the latter by its much stouter first pereopod, with the carpus wider than long (vs. 1.4 times longer than wide in *C. longa*), the telson armature, which has the lateral pair of distal spines distinctly longer than the intermediate pairs (vs. subequal in *C. longa*), and the form of rostrum (upturned vs. straight in *C. longa*).

***Caridina yilong*, new species**
(Fig.3)

Material examined. - Holotype: male, cl. 5.0 mm, Yilong Lake, Shiping County, Yunnan, coll. X. Liang & S. Yan, 12 May 1983 (SFU 83-57-01).

Paratypes: 7 males, cl.4.6-6.0 mm; 3 females, cl. 4.4-4.6 mm, data same as holotype.

Description. - Rostrum slightly downturned in male, upturned in female, reaching to base of 3rd segment of antennular peduncle or middle of this segment. Rostral formula: 4-6 (mode 5) + 6-9 (mode 8-9)/4-6 (mode 6). Pterygostomian margin broadly rounded.

Telson not terminating in a projection. Dorsal surface with 5-6 pairs of spinules, posterior margin with 8-10 spiniform setae, lateral pair longer than sublateral pair, subequal to 2 intermediate pairs.

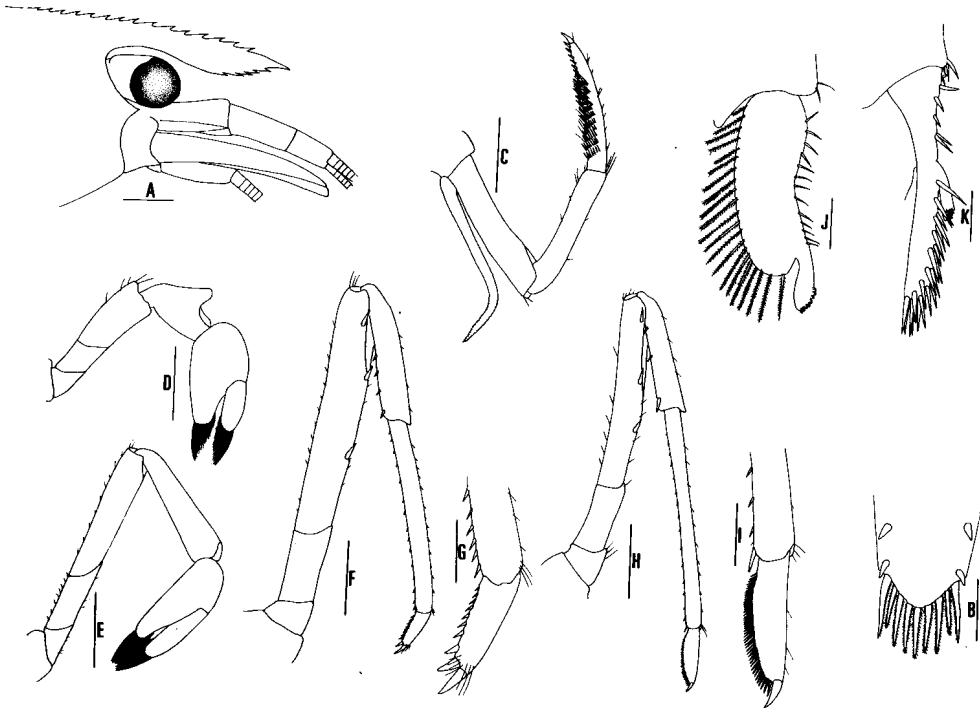


Fig. 3. *Caridina yilong*, new species, (holotype, male, cl.5.0mm, SFU). A. anterior portion of cephalothorax and appendages, B. posterior margin of telson, C. third maxilliped, D. first pereopod, E. second pereopod, F. third pereopod, G. dactylus of third pereopod, H. fifth pereopod, I. dactylus of fifth pereopod, J. endopod of male first pleopod, K. appendix masculina of male second pleopod. Scale: A =1 mm, B, J, K=0.2 mm, C,D,E, F, H=1 mm, G, H=0.3 mm.

Stylocerite long, reaching to or slightly beyond end of basal segment of antennular peduncle. Third maxilliped reaching slightly beyond end of antennular peduncle, ultimate segment as long as penultimate segment, but slightly shorter than antepenultimate segment.

First pereopod reaching to middle of 2nd segment of antennular peduncle, carpus 1.3 to 1.5 times as long as high; chela 1.9 to 2.0 times as long as broad, fingers slightly shorter than palm. Second pereopod reaching to end of antennular peduncle; carpus 4.0 to 4.2 times as long as high; chela slightly shorter than carpus, 2.5 to 2.6 times as long as broad; fingers 1.5 times as long as palm. Length of third pereopod sexually dimorphic, reaching beyond distal end of scaphocerite by half of dactylus length in male, but only reaching to or slightly beyond end of scaphocerite in female. Propodus 9 times as long as broad, 4.0 times as long as dactylus; with 5 accessory spines on flexor margin. Fifth pereopod reaching to or slightly beyond end of 2nd segment of antennular peduncle, with propodus 11 times as long as broad, 3.6 times as long as dactylus, with 40 to 43 spinules on flexor margin.

Endopod of male 1st pleopod sigmoid, with inner margin concave, with some short spinules on inner margin, long plumose setae on distal and outer margins. Appendix interna slender, half of its length reaching beyond distal margin of endopod. Appendix masculina of male 2nd pleopod slender, with numerous spinules on distal half of inner margin, reaching to half length of endopod or slightly beyond it. Appendix interna short, about 0.25 times as long as appendix masculina.

Uropodal diaeresis with 12 - 14 spinules.

Etymology. - The new species is named after its type locality—Yilong Lake, in Shiping County, southern Yunnan, used as a noun in apposition.

Habitat. - *Caridina yilong* was collected from the edge of Yilong Lake.

Remarks. - Taking the form of the stylocerite into account, *Caridina yilong*, new species, is most similar to *C. heterodactyla* Liang & Yan, 1985, and *C. longa* Liang & Yan, 1985. It can be distinguished from *C. heterodactyla* by having fewer rostral teeth (formula: 4-6 (mode 5) + 6-9 (mode 8-9)/4-6 (mode 6) vs. 8-10 (mode 9) +11-17/5-9); a telson which does not terminate in a projection (vs. projection present), and the short carpus of 1st pereopod, which is 1.3 to 1.5 times as long as high (vs. 2.0 to 2.3). *Caridina yilong* differs from *C. longa* by its short rostrum which reaches to the middle of the 3rd segment of the antennular peduncle (vs. reaches to end of antennular peduncle or beyond); a rostrum which is armed with teeth throughout the dorsal margin (vs. distal half of dorsal margin unarmed); the male endopod, having the appendix interna reaching distinctly beyond the distal end of the endopod (vs not reaching beyond), and the shorter appendix masculina which only reaches half the length of the endopod or beyond (vs. reaches to the end of the endopod).

Caridina disjuncta, new species

(Fig.4)

Material examined. - Holotype: male, cl. 4.8 mm, Shilin (Stone forest) village, Lunan County, central Yunnan, coll. X. Liang & S. Yan, 8 May.1983 (SFU 83-72-01).

Paratypes: 3 males, cl. 5.0 mm, 5 females, cl. 5.0 to 6.4 mm, 2 ovigerous females, cl. 6.0 mm, data same as holotype (SFU).

Description. - Rostrum straight, reaching to middle of 2nd segment of antennular peduncle or end of this segment, rostral formula 5- 6 (mode 6) + 4- 9 / 0-2 (mode 0). Teeth on dorsal margin arranged in two separated groups. Pterygostomian margin bluntly angular.

Telson terminating in a projection. Dorsal surface with 5-6 pairs of spinules, posterior margin with 8-10 spiniform setae, lateral pair longer than sublateral pair, subequal to other 2 intermediate pairs.

Stylocerite not reaching to end of basal segment of antennular peduncle. Third maxilliped reaching to or slightly beyond end of antennular peduncle, ultimate segment slightly longer than penultimate segment.

First pereiopod short, reaching to distal end of eye stalk, carpus 1.6 to 1.9 times as long as high; chela 2.0 to 2.3 times as long as broad, fingers 1.5 to 1.6 times as long as palm. Second pereiopod reaching to end of 2nd segment of antennular peduncle; carpus 4.2 to 4.8 times as long as high; chela slightly shorter than carpus, 2.7 to 2.9 times as long as broad; fingers 1.5 to 1.6 times as long as palm. Third pereiopod reaching slightly beyond distal end of scaphocerite; propodus 8.4 to 9.9 times as long as broad, 3.2 to 3.8 times as long as dactylus; with about 6-7 accessory spines on flexor margin. Fifth pereiopod reaching to end of antennular peduncle, with propodus 9 to 11 times as long as broad, 3.6 to 4.3 times as long as dactylus, with 40 to 45 spinules on flexor margin.

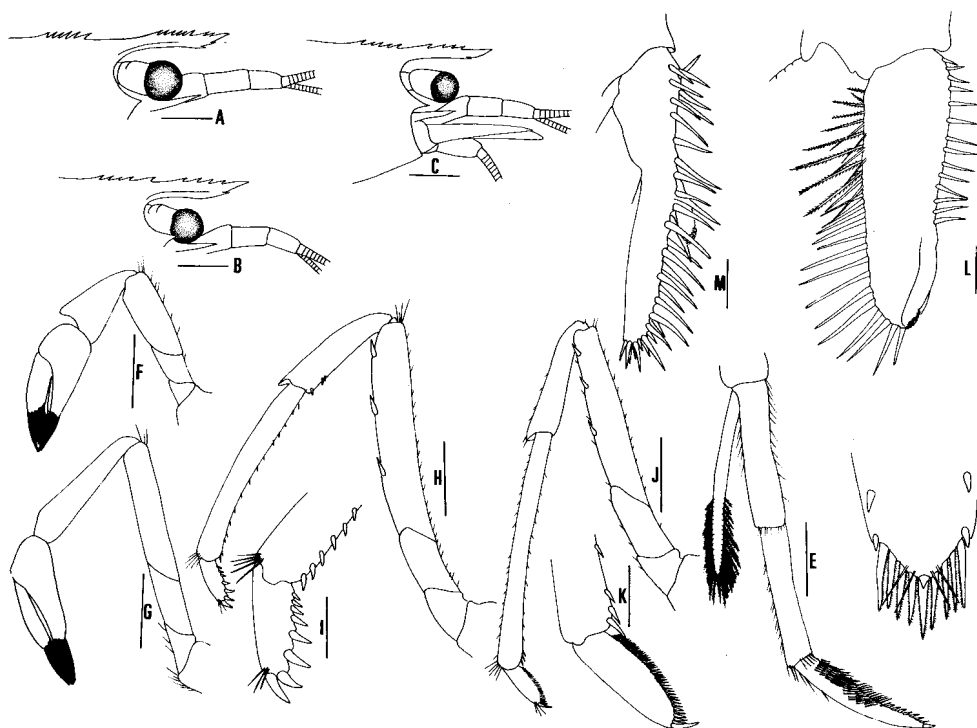


Fig. 4. *Caridina disjuncta*, new species, (holotype, male, cl.4.8mm, SFU). A-C. anterior portion of cephalothorax and appendages, D. posterior margin of telson, E. third maxilliped, F. first pereiopod, G. second pereiopod, H. third pereiopod, I. dactylus of third pereiopod, J. fifth pereiopod, K. dactylus of fifth pereiopod, L. endopod of male first pleopod, M. appendix masculina of male second pleopod. Scale: A, B, C=2 mm, D, L, M=0.2 mm, E, F, G, H, J=1 mm, I, K=0.3 mm.

Endopod of male first pleopod sub-triangular, 3.2 times as long as wide at base, with some shorter spinules on inner margin, long plumose setae on base of outer margins, with long simple setae on distal outer margin. Appendix interna slender, reaching to distal margin of endopod, and always turned backwards. Appendix masculina of male second pleopod slender, armed along inner margin with 2 rows of strong spines. Appendix interna short, about 0.25 times as long as appendix masculina.

Uropodal diaeresis with 15 - 16 spinules.

Egg large, size 1.15-1.25x0.78-0.84mm in diameter.

Habitat. - Found in a pond within the Shilin (stone forest) Tour Resort near Shilin village, Lunan County, Yunnan.

Etymology. - The name of the new species is derived from the Latin "disjunctus" for "separate", alluding to the teeth arrangement on the dorsal margin of the rostrum.

Remarks. - With regards to the short rostrum, structure of the sexual appendages, especially the appendix masculina of the male second pleopod which is armed with two rows of very strong teeth, *Caridina disjuncta*, new species, is related to *C. yunnanensis* Yu, 1938, and its allied species, viz. *C. disparidentata* Liang, Yan & Wang, 1984, and *C. mengziensis* Liang, Yan & Wang, 1987, but can easily be separated from these species by its unusual rostral teeth arrangement. Other than the form of the rostrum, *Caridina disjuncta* can be distinguished from *C. yunnanensis* by the small number of ventral rostral teeth (0-2 (mode 0) vs. 5-10 in *C. yunnanensis*), the stouter carpus of the first pereopod which is 1.6 to 1.9 times as long as high (vs. 2.0 to 2.1 times in *C. yunnanensis*), the propodus of third pereopod which is 3.2 to 3.8 times as long as dactylus (vs. 4.0 to 4.5 times in *C. yunnanensis*) and the large number of teeth on the uropodal diaeresis (15 to 16 vs. 12 to 14). It can also be distinguished from *C. disparidentata* by its smaller egg size (1.15-1.25x0.78-0.84mm vs. 1.31-1.40 x 0.81-0.98mm), having more spinules on the dactylus of fifth pereopod (40-45 vs. 37-40) and, stouter carpus of the first pereopod (1.6 to 1.9 times as long as high vs. 1.9 to 2.2 times). *Caridina disjuncta* is separated from *C. mengziensis* by its smaller egg size (1.15-1.25x0.78-0.84mm vs. 1.35-1.59x0.93-1.07mm), having more spinules on the dactylus of the fifth pereopod (40-45 vs. 35-40) and the longer fingers of the first pereopod (1.5 to 1.6 times vs. 1.1 to 1.2 times).

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LITERATURE CITED

- Chace, F. A., Jr. & A. J. Bruce, 1993. The Caridean Shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition 1907-1910, Part 6: Superfamily Palaemonoidea. *Smiths. Contr. Zool.*, **543**: i-vii, 1-152.

Cai & Liang: New species of freshwater shrimps southern China

- Liang, X., S. Yan & X. Wang, 1984. A new species of *Caridina* (Decapoda: Caridea) from Yunnan, China. *Acta Zootaxon. Sinica*, **9**(3):253-256, figs. 1-16.(in Chinese with English abstract)
- Liang, X. & S. Yan, 1985. Study on *Caridina* (Decapoda, Caridea) from Yunnan, China. *Ocean.Limn.Sinica*, **16**(3):196-206; figs. 1-4. (in Chinese with English abstract)
- Liang, X., S. Yan & Z. Wang, 1987. Description of a new species of *Caridina* from Yunnan, China. *Acta Zootaxon.Sinica*, **12**(2):133-135 ; figs. 1-9.(in Chinese with English abstract)
- Milne Edwards, H., 1837. Histoire Naturelle des Crustacés, comprenant l'anatomie, la physiologie et la classification de ces animaux, 2:1-532, atlas, pp.1-32, pl. 1-42.
- Yu, S. C., 1938. Study on Chinese *Caridina* with descriptions of five new species. *Bull. Fan. Mem. Inst. Biol. Zool. Ser.*, **8**(3):275-310, figs. 1-16.