

Description of a new species of *Caridina* H. M. Edwards from the hill streams of southern Western Ghats, Tamil Nadu, India

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ABSTRACT

The paper describes a new species, *Caridina mathiassi* sp. nov., from the hill streams of Mahendragiri Estate, part of southern Western Ghats, Kanyakumari District, Tamil Nadu, India (8° 27' 32.27" N and 77° 23' 32.50" E) collected during summer months of 1999 and 2000. This species is abundant and closely related to *Caridina jaliwali* Mariappan and Richard, 2006 and *Caridina gurneyi* Jaliwal *et al.*, 1984. The diagnosis of the species include: shrimps of genus *Caridina* having a moderately long rostrum with 11-20 dorsal (4-6 post-orbital) and 2-7 ventral teeth; telson not ending in a median spine but with 4-10 spinules at distal and 3-5 pairs of spines at dorsal regions; carpus of first pereopod deeply excavated anteriorly; fourth pereopod with merus having 2-4, carpus having 1 large and 3-5 small spines and dactylus ending in a sharp spine and 5-7 spinules; fifth pereopod with merus having 2-4, carpus with 1 large and sometimes 3-4 small spines and dactylus having 30-40 spinules; endopod of first pleopod with long appendix interna subterminal, curved inwards; appendix masculina double the size of appendix interna or a little longer of male second pleopod; diaeresis of uropod with 16-22 spines; size of eggs ranging from 0.53-0.61 X 0.86-1.04 mm and fecundity ranging from 122-181.

Keywords: *Caridina mathiassi* sp. nov., India, Mahendragiri Estate, Southern Western Ghats, Taxonomic description

Introduction

The hill streams, Balamore River and Kilaviar, skirting through Mahendragiri and Balamore estates, Kanyakumari District, Tamil Nadu (8° 27' 32.27" N and 77° 23' 32.50" E), part of southern Western Ghats, was surveyed for prawns and shrimps during summer months of 1999 and 2000. It is a pristine environment, located at an elevation of 600 MSL. During the survey, a number of specimens of a new species of *Caridina* H. M. Edwards were collected and studied in detail. The present paper is a report of the same.

Materials and methods

The hill streams skirting through Mahendragiri and Balamore estates, Kanyakumari District, Tamil Nadu are pristine unexplored lotic ecosystems. These hill streams are rocky and interspersed with sandy bottom patches. Water is extremely clear with heavy torrential flow during monsoon months. It flows downhill and the streams pass Mahendragiri estate and the plains before entering the sea near Rajakkamangalam. Balamore River and Kilaviar flowing through the Balamore estate enter into the Perunchani and Pachipara dams respectively.

During the summer months of 1999 and 2000, a survey was conducted for prawns and shrimps in Balamore River and Kilaviar. Seventy six specimens of a new species of *Caridina* were collected from these hill streams.

These specimens were identified with the help of relevant literature (Jaliwal *et al.*, 1984; Jayachandran, 2005; Mariappan and Richard, 2006; Jayachandran *et al.*, 2008). The holotype, allotype and paratypes are deposited in the Regional Museum of Zoological Survey of India, Kozhikkode, Kerala (Registration numbers: Holotype – ZSI/WGRC/I.R-INV. 2059; Allotype - ZSI/WGRC/I.R-INV.2060; Paratype- ZSI/WGRC/I.R-INV. 2061).

Results and discussion

The species description and remarks are presented in detail (Fig. 1-7).

Caridina mathiassi sp. nov

Materials examined

Seventy six specimens ranging in size from 16 to 25 mm both males and females from the hill streams, Mahendragiri Estate, part of southern Western Ghats, Kanyakumari District, Tamil Nadu, India (8° 27' 32.27" N and 77° 23' 32.50" E) (13-14th, February, 1999 and 19th March, 2000).

Holotype

Male, total length – 19.25 mm; carapace length-8.0 mm; cephalothoracic length - 6.5 mm; rostral length - 3.0 mm

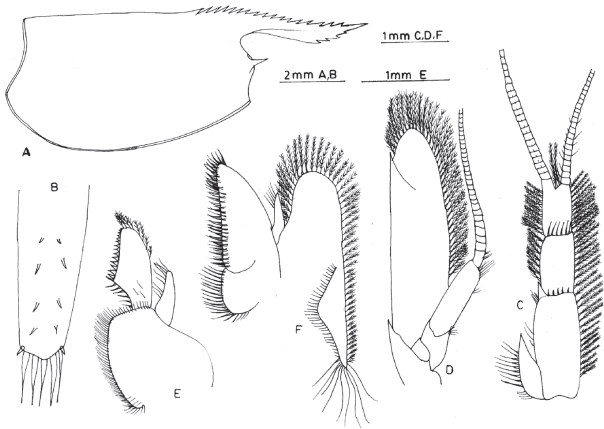


Fig. 1 A-F. *Caridina mathiassi* sp. nov. (Holotype 16.25 mm total length); A – carapace, B- telson, C- antennule, D- antenna, E- maxillula, F- maxilla

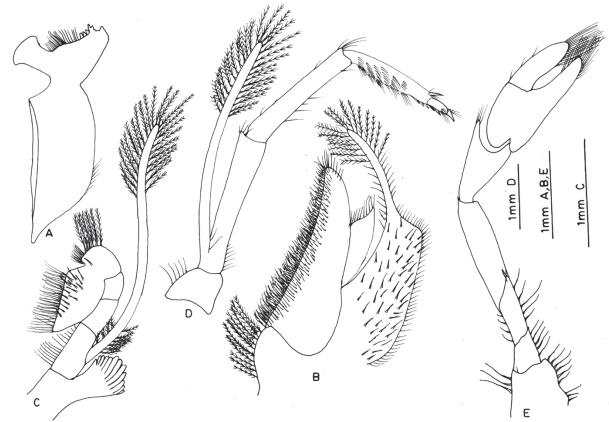


Fig. 2 A-E. *Caridina mathiassi* sp. nov. (Holotype 16.25 mm total length); A – mandible, B- first maxilliped, C- second maxilliped, D- third maxilliped, E- first pereiopod

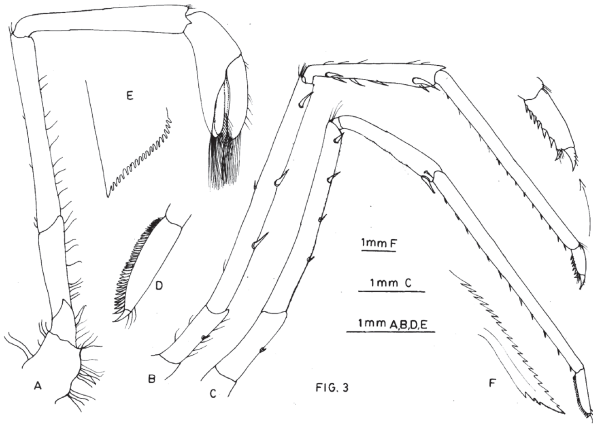


Fig. 3 A-F. *Caridina mathiassi* sp. nov. (Holotype 16.25 mm total length); A – second pereiopod, B- fourth pereiopod, C- fifth pereiopod, D- dactylus of fifth pereiopod enlarged, E- diresis of uropod, F- rostrum of paratype to show the variation

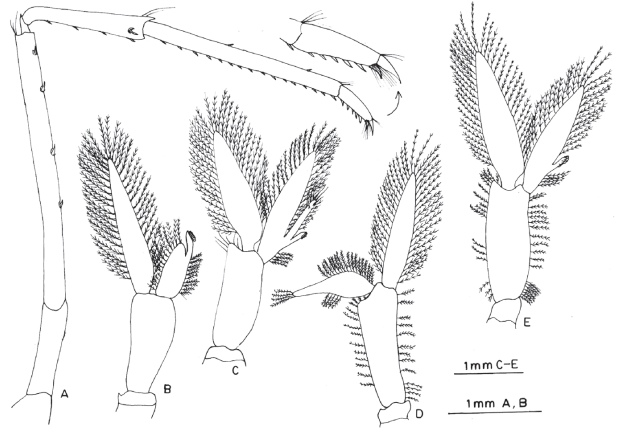


Fig. 4 A-E. *Caridina mathiassi* sp. nov. (Holotype 16.25 mm total length); A – third pereiopod, B- male first pleopod, C- male second pleopod, D- female first pleopod, E- female second pleopod

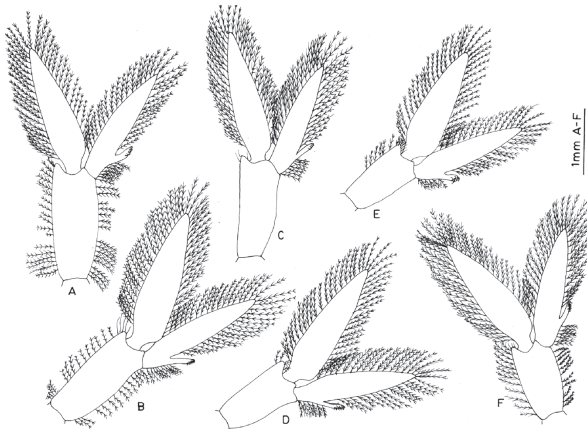


Fig. 5 A-F. *Caridina mathiassi* sp. nov. (Holotype 16.25 mm total length); A – female third pleopod, B- female fourth pleopod, C- male third pleopod, D- male fourth pleopod, E- male fifth pleopod, F- female fifth pleopod

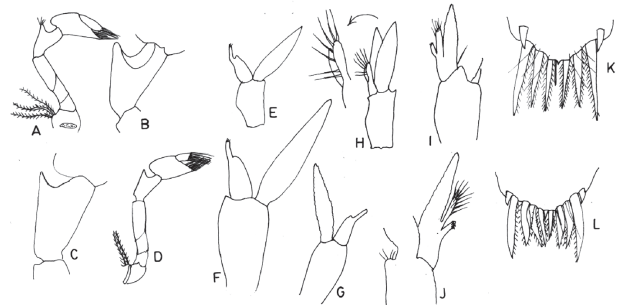


Fig. 6 A- E, G-I & K-L, 1st pereiopod, 1st pleopod, 2nd pleopod, telson of *Caridina jalihali* and *C. gurneyi* redrawn from Mariappan and Richard, 2006; Jalihal *et al.*, 1984, for comparison; A, B, E, H, L and C, D, G, I, K of *C. jalihali* and *C. gurneyi* respectively for characters – 1st pereiopod, 1st pleopod, 2nd pleopod and telson; F- 1st pleopod of *C. jalihali*, J - 2nd pleopod of *C. mathiassi* (present study).

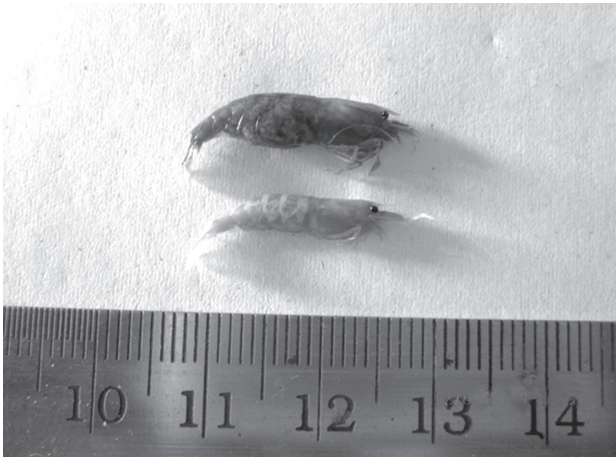


Fig. 7. Photograph of *Caridina mathiassi* sp. nov., female and male – 21 and 18 mm in total length respectively

Allotype

Female, total length - 24.5 mm; carapace length – 8.25 mm; cephalothoracic length - 6.0 mm; rostral length - 2.25 mm; length of telson - 2.75 mm.

Rostrum moderately long, extending upto the middle of distal segment of antennular peduncle, distal end sharp, upper margin with 11-20 equidistant teeth, of which 4-6 post-orbital (17 teeth in holotype), a small distal region edentulous (shape of rostrum slightly variable with gentle slopping and distal end either directed forwards or turned upwards). Ventral margin with 2-7 teeth (mostly 2-4) (4 in holotype); antennal spine sharp, pterygostomial angle pointed. Carapace with inferior orbital margins produced, with antennal spine (Fig. 1A; 3F).

Abdomen well developed, glabrous. Telson does not end in a median spine, distal margin with 4-10 spinules, laterally spinate; dorsal margin with 3-5 pairs of spines (Fig. 1B).

Eyes with cornea well developed. Three segments of the antennular peduncle progressively decrease in size; stylocerite well developed, broad basally and acute distally, reaching beyond middle of basal segment, outer lateral angle ending in a sharp spine; outer and inner margins fringed with plumose setae (Fig. 1C). Scaphocerite slightly more than three times as long as wide, disto-lateral spine sharp, well developed (Fig. 1D).

Mandible with a long, broad apophysis; molar process rounded, prominent; incisor process with a few teeth (usually 6) (Fig. 2A). Maxillula with broad setose palp; basal endite with prominent stiff short spines decreasing in size distally; coxal endite large, broad, with long stiff setae mesially (Fig. 1E). Maxilla with well developed broad setose palp; basal endite highly elongated, setose mesially; coxal endite closely setose; scaphognathite elongate,

anterior lobe rounded, fringed with long setae, posterior lobe tapering, bearing a bunch of long setae at tip (Fig. 1F).

First maxilliped with setose palp; basal endite highly elongate, densely setose, coxal endite setose mesially; exopod well developed, with distal elongate palp and basal caridean lobe; caridean lobe with stiff spinous setae (Fig. 2B). Second maxilliped with ischium and basis fused; carpus subequal to merus; propodus broad with long plumose setae at outer margins; dactylus with mesial margin with dense stiff setae mesially; flagellum very long and slender, distally setose; podobranch well developed (Fig. 2C). Third maxilliped highly developed; distal endopod segment ends in a sharp spine, followed by a row of spines (6-7) on inner margin and bunches of setae; flagellum long with plumose setae (Fig. 2D).

First pereopod slender, ischium with a sharp distal spine; merus longer than ischium and carpus; carpus with a deep distal excavation; chela articulating with ventral carpus; fingers longer than manus (1.1 times), robust and with well developed setal brushes at the distal end (Fig. 2E). Second pereopod slender, longer than 1st pereopod; ischium about half as long as merus; merus longer than carpus (1 : 1.3 times), finger spoon shaped, longer than palm (1 : 1.2 times) distal end with long setae (Fig. 3A). Third pereopod slender, ischium, merus, carpus, palm and dactylus in the ratio – 1 : 3 : 1.50 : 2.25 : 0.50; ischium with 0-1 spine (holotype without spine); merus with 3-4 spines; carpus with one subterminal and 4 lateral spines; propodus with a series of short spines and dactylus ends in a sharp point and with 4-7 lateral spines (Fig. 4A). Fourth pereopod slender, ischium, merus, carpus, propodus and dactylus in the ratio – 1 : 3.66 : 2 : 3.33 : 0.33; ischium with 0-1 spines; merus 2-4 (usually 3); carpus with 1 large subterminal and 3-5 small lateral spines; propodus with a series of small spines and dactylus ends in a sharp stout spine and with 5-7 lateral spines (Fig. 3B). Fifth pereopod with ischium, merus, carpus, propodus and dactylus in the ratio – 1 : 2.65 : 1.47 : 3.24 : 0.59; ischium with 0-1 spine, merus with 2-4 distal spines, carpus with one large subterminal spine (sometimes with 3-4 small spines), propodus with a series of small spines; dactylus ends in a sharp spine and with 30-40 denticles on the inner margin (Fig. 3C).

First and second pleopods sexually dimorphic; endopod of 1st pleopod of male short and broad with appendix interna overreaching it (Fig. 4B), whereas that of the female slender, long and without appendix interna (Fig. 4D); second pleopod of male with appendix interna and appendix masculina, appendix masculina reaches middle of endopod (Fig. 4C) whereas the female with appendix interna only (Figs. 4E, 6J); pleopods 3-5 normal in shape (Figs. 5A-F).

Uropod distinctly longer than telson; diaeresis on exopod with 16-22 spinules (Fig. 3E).

Egg size

0.51 X 0.61 mm – 0.86 X 1.04 mm in diameter. Fecundity ranges from 122 to 181 number (21.5 – 26.0 mm total length)

Remarks

Caridina mathiassi sp. nov., shows affinities with *C. gurneyi* Jalihal *et al.*, 1984 and *Cardina jaliwali* Mariappan and Richard, 2006. A comparison of characters are given in Table 1 and Fig. 1-6.

From *Caridina shenoyi* Jalihal and Sankolli, 1984, the new species can be separated based on the rostral formula and telson characters. *C. shenoyi* possesses rostral formula, 19-22 dorsal and 3-9 ventral, with 5-8 post-orbital teeth, in contradistinction the present new species possesses 11-20

dorsal and 2-9 ventral, with 4-6 post-orbital teeth. The telson of former species ends in a sharp median spine with 6 – 8 spinules and 5-7 pairs of dorsal spines whereas in *C. mathiassi*, it does not end in a median spine but with 4-10 spinules and 4-6 pairs of dorsal spines. In addition, the new species possessing a deep excavation of anterior carpus of first pereopods belong to the *Caridina serrata* Stimpson, 1860 group (Cai and Ng, 1999). The other species of this group include : *C. cantonesis* Yu, 1938; *C. sphyrapoda* Liang & Zhou, 1993; *C. nanaoensis* Cai & Ng, 1999; *C. apodosis* Cai & Ng, 1999; *C. yulinica* Cai & Ng, 1999; *C. wumingensis* Cai & Ng, 1999 and *C. mutata* Cai & Ng, 1999. However, the stylocerite of the new species does not exceed the basal segment of the antennular peduncle.

The species diagnosis includes: shrimp of genus *Caridina* having a moderately long rostrum with 11-20 dorsal (4-6 post-orbital), 2-7 ventral teeth; telson not ending

Table 1. A comparison of major characters of *C. jaliwali* Mariappan and, Richard, 2006; *C. gurneyi* Jalihal *et al.* 1984 and *C. mathiassi* sp. nov

Characters	<i>C. jaliwali</i> Mariappan and Richard, 2006	<i>C. gurneyi</i> Jalihal <i>et al.</i> , 1984	<i>C. mathiassi</i> sp. nov.
Length of rostrum	Moderately long	Moderately long	Moderately long
Dorsal teeth	15 – 29 of which 3-6 post-orbital (mostly 17-22; 4-6)	16-30 of which 5-7 post-orbital (mostly 19-25; 5-6)	11-20 of which 4-6 post-orbital (mostly 14-17; 5)
Ventral teeth	3-9 (mostly 5-7)	3-11 (mostly 5-8)	2-7 (mostly 2-4)
Telson	Ends in a median spine and with 6-10 plumose spinules and 4-5 setae; dorsal spines 5-6 pairs	Ends in a median spine and with 6-10 plumose spinules; dorsal spines 5-6 pairs	Does not end in a median spine and with 4-10 non-plumose spinules; dorsal spines 4-6 pairs
First pereopod	Carpus not deeply excavated anteriorly	Carpus deeply excavated anteriorly	Carpus deeply excavated anteriorly
Third pereopod	Dactylus ends in a sharp stout spine and with 8-10 spines laterally	Dactylus ends in sharp stout spine and with 7-8 spines laterally	Dactylus ends in a sharp stout spine and with 4-7 spines laterally
Fourth pereopod	Merus with 4, carpus with 1 large and a row of small spinules and dactylus ends in a sharp spine and 8-9 spines laterally	Merus with 5, carpus with 1 large and a row of small spinules and dactylus ends in a sharp spine and 5-8 spines laterally	Merus with 2-4, carpus with 1 large and 3-5 small spinules and dactylus ends in a sharp spine and 5-7 spines laterally
Fifth pereopod	Merus with 2-3, carpus with 1 large and 4 small spines and dactylus with 30-60 spinules	Merus with 2-4, carpus with 1 large and 3-4 small spines and dactylus with 30-40 spinules	Merus with 2-4, carpus with 1 large and sometimes 3-4 small spines and dactylus with 30-40 spinules
First pleopod	Endopod with a distinct appendix interna, either straight or inwardly curved	Endopod with a distinct appendix interna, straight	Endopod with a distinct appendix interna, curved inwards
Second pleopod	Appendix masculina about 1.4- 2.1 times as long as appendix interna	Appendix masculina about 1.29 – 1.4 times as long as appendix interna (occasionally double the size)	Appendix masculina double the size of appendix interna or a little more longer
Diaeresis of uropod	17-20	18-20	16-22
Egg size	0.6 – 0.67 X 0.88 – 1.07 mm	0.48 – 0.54 X 0.78 – 0.9 mm	0.53 – 0.61 X 0.86 – 1.04 mm
Fecundity	50 – 100	120-190	122 - 181

in a median spine but with 4-10 spinules at distal and 4-6 pairs of spines at dorsal regions; carpus of first pereopod deeply excavated anteriorly; fourth pereopod with merus having 2-4, carpus having 1 large and 3-5 small spines and dactylus ending in a sharp spine and 5-7 spinules; fifth pereopod with merus having 2-4 spines, carpus with 1 large and sometimes 3-4 small spines, dactylus having 30-40 spinules; endopod of first pleopod with distinct appendix interna, curved inwards; appendix masculina double the size of appendix interna or a little longer of male second pleopod; diaeresis of uropod with 16-22 spines; size of eggs ranging from 0.53-0.61 X 0.86-1.04 mm and fecundity ranging from 122-181 eggs. Females are larger than males.

Etymology

The species is named after late Dr. M. Mathias who rendered a great humanitarian service as a medical doctor to the people of Kanyakumari and adjacent districts as well as Kerala. Dr. Mathias was a great lover of nature.

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