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Research Paper

Caridinian Shrimp Resources of Kerala Waters (Decapoda, Atyidae)

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The paper discusses on the freshwater shrimp resources of the genus *Caridina* H. Milne Edwards of Kerala waters based on the collections from 41 research stations including estuarine regions, freshwater and hill streams. The study revealed certain interesting aspects. *C. williamsoni* Jalihal *et a*l. 1984, *C. gurneyi* Jalihal *et al*. 1984, *C. shenoyi* Jalihal *et al*. 1984, *C. kempi* Jalihal *et al*. 1984 are new records from Kerala waters, of which the last two species are being recorded out of the type locality for the first time. The paper also presents an extensive distributional range (new records) for other species of the genus within the state. Only four species have been reported from backwaters of Kerala, namely, *C. pseudogracilirostris* Thomas et al. 1973, *C. kempi* Jalihal *et al. C. nilotica* (Roux 1833) and *C. weberi* var. *sumatrensis* de Man 1892 and excepting the first their abundance is very poor. *C. williamsoni* is a common species in the freshwater zone. *C. natarajani* Tiwari and Pillai 1968 is confined to the southern regions of the state. The specimens of *C. nilotica* collected during the present study could not be identified to any of the varieties recorded so far and hence needs further investigation. *C. kempi* has been reported very rarely from brackish waters (Valapattanam backwater, abundant). The species, *C. gracilirostris* de Man 1892, *C. laevis* Heller, 1862 and *C. nilotica* var. *veliensis* Pillai 1964, recorded earlier could not be collected during the present study. *C. kempi* and *C. shenoyi* are rare species in Kerala waters. The paper also provides valuable diagnostic characters as well as a key for the identification of the species.

Key Words: *Caridina* shrimp resources; Key for identification; Atyidae; Kerala waters; New records; Distribution

Introduction

Kerala has vast inland water resources and this accommodates a good assemblage of crustaceans (prawns, shrimps, crabs and minute organisms like copepods, ostracods etc.). Among them shrimps and prawns predominate. The term shrimp is used here as opined by Holthuis [1]. Shrimps are benthic organisms, which play a major role in establishing ecological balance by consuming detritus. It also forms an important link in the food chain of aquatic organisms.

There are serious studies on the prawn resources of Kerala waters [2-16], however, similar studies on shrimps are lacking [11, 17-19]. Recognizing this fact the authors have made extensive surveys for shrimps in the brackish waters, fresh waters and hill streams of Kerala. The present paper discusses on the diversity, distribution, key for the identification of shrimps of Kerala waters.

Materials and Methods

Collections were made from 41 research stations (Table 1) for a period from 2002 July to 2003 July. Collections were made by using cast nets and also by dragging a rectangular piece of mosquito net (2M x 1M) along the banks. The specimens were preserved in 8% formalin. Relevant literature was consulted for the identification of the species up to the species level [17-23]. The specimens are deposited in the referral museum of freshwater prawns (Nos. - Fb. Cr. Dec. Atyidae Cari. 1 – 9) at the College of Fisheries, Cochin.

Results and Discussion

From the 41 research stations (Table 1), a total of 11 species have been collected and identified. The species are listed below –

1. *Caridina gurneyi* Jalihal, Shenoy & Sankolli, 1984
2. *Caridina kempi* Jalihal, Shenoy & Sankolli, 1984
3. *Caridina natarajani* Tiwari & Pillai, 1968
4. *Caridina nilotica* (Roux, 1833)
5. *Caridina pseudogracilirostris* Thomas, Pillai & Pillai, 1973
6. *Caridina shenoyi* Jalihal & Sankolli, 1984
7. *Cardina weberi* var. *sumatrensis* de Man, 1892
8. *Caridina williamsoni* Jalihal, Shenoy & Sankolli, 1984
9. *Caridina* spp (3 species)

In addition to the above list, 3 species have already been reported earlier *(Caridina laevis* Heller, 1862, *C. nilotica* (Roux) var. *veliensis* Pillai, 1964 and *C. gracilirostris* de Man, 1892). These species could not be collected during the present survey. Therefore, the total number of species inhabiting Kerala waters has gone up to 14.

The distribution pattern of the different species is given in Table 1. Salient diagnostic features of each species and a key for their identification are given below.

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Table 1. *Diversity and distribution pattern of various species of the genus Caridina* H. Milne Edwards, *in different water bodies of Kerala (**1-41**)*.

Sl. No.	Collection stations & station nos. (in brackets)		Diversity of species under the genus *Caridina*
	Brackish water regions		
1.	Nileswar	**(1)**	-
2.	Kavvayi	**(2)**	-
3.	Valapattanam	**(3)**	*C. kempi* Jalihal *et al.* 1984
4.	Elathur	**(4)**	-
5.	Kallayi	**(5)**	-
6.	Kadalundi	**(6)**	-
7.	Ponnani	**(7)**	-
8.	Chettuva	**(8)**	-
9.	Kodungalloor	**(9)**	-
10.	Kayamkulam	**(10)**	*C. pseudogracilirostris* Thomas *et al*. 1973
11.	Ashtamudi	**(11)**	-
12.	Paravur	**(12)**	-
13.	Edava-Nadayara	**(13)**	-
14.	Akathumuri	**(14)**	-
15.	Kadinamkulam	**(15)**	-
16.	Veli-Aukulam	**(16)**	*C.* sp.
17.	Cochin	**(17)**	*C. nilotica* (Roux 1833), *C. pseudogracilirostris* Thomas *et al.* 1973, *C. weberi* var. *sumatrensis* de Man 1892
	Freshwater regions		
18.	Machipura-Chandragiri River (R)	**(18)**	*C. williamsoni* Jalihal *et al.* 1984
19.	Payaswami-Chandragiri R	**(33)**	*C. kempi* Jalihal *et al.* 1984
20.	Vadasseri – Kavvayi R	**(19)**	*C. williamsoni* Jalihal *et al.* 1984
21.	Irutty-Valapattaham R	**(20)**	*C. kemp* Jalihal *et al.* 1984, *C. gurneyi* Jalihal *et al.* 1984, *C. williamsoni* Jalihal *et al.* 1984
22.	Kottackal-Kuttiyadi R.	**(21)**	*C. williamsoni* Jalihal *et al.* 1984
23.	Kuttiyadi-Kuttiyadi R.	**(34)**	*C. williamsoni* Jalihal *et al.* 1984
24.	Nilambur-Chaliyar R	**(35)**	*C. williamsoni* Jalihal *et al.* 1984, *C. kempi* Jalihal *et al.* 1984, *C. shenoyi* Jalihal *et al.* 1984
25.	Shornur-Bharathapuzha R	**(22)**	*C. kempi* Jalihal *et al.* 1984
26.	Chittar-Bharathapuzha R	**(36)**	*C. williamsoni* Jalihal *et al.* 1984, *C. shenoyi* Jalihal *et al.* 1984.
27.	Alwaye – Periyar R	**(23)**	*C. williamsoni* Jalihal *et al.* 1984, *C. kempi* Jalihal *et al.* 1984.
28.	Thattekkad-Periyar R	**(37)**	*C. williamsoni* Jalihal *et al.* 1984, *C. kempi* Jalihal *et al.* 1984
29.	Kottayam – Meenachil R	**(24)**	*C. natarajani* Tiwari & Pillai 1968
30.	Vadasserikkara –Pampa R	**(25)**	*C. kempi* Jalihal *et al.* 1984
31.	Thodupuzha-Muvattupuzha R	**(38)**	*C. williamsoni* Jalihal *et al.* 1984
32.	Chathannoor-Ithikkara R	**(26)**	*C. pseudogracilirostris* Thomas *et al.* 1973
33.	Punalur-Kallada R	**(39)**	*C. natarajani* Tiwari & Pillai 1968
34.	Attingal- Vamanapuram R	**(27)**	*C. pseudogracilirostris* Thomas *et al.* 1973, *C. nilotica* Tiwari & Pillai 1968 *C. weberi* var. *sumatrensis* de Man, 1892
35.	Kallar-Vamanapuram R	**(28, 40)**	*C. weberi* var. *sumatrensis* de Man, 1892, *C. natarajani* Tiwari & Pillai 1968
36.	Neyyattinkara-Karamana R	**(29)**	*C. natarajani* Tiwari & Pillai 1968
37.	Peppara-Karamana R	**(41)**	*C. natarajani* Tiwari & Pillai 1968
38.	Chinnar – Pambar R	**(30)**	*C. williamsoni* Jalihal *et al.* 1984
39.	Mukkali- Bhavani R	**(31)**	*C. williamsoni* Jalihal *et al.* 1984, *C. nilotica* (Roux 1833)
40.	Pulppally-Kabbini R	**(32)**	*C. williamsoni* Jalihal *et al.* 1984, *C. gurneyi* Jalihal *et al.* 1984, *C. shenoyi* Jalihal *et al*. 1984, *C. kempi* Jalihal *et al*. 1984.

Caridina gurneyi Jalihal, Shenoy & Sankolli, 1984

Rostrum moderately long, rostral formula: 16-30/3-11 (5-7 post-orbital teeth) (usually 19-25/5-8, 5-6 post-orbital); dactylus of third pereiopod with a strong terminal spine and 5-8 spines on posterior margin, and carpus, merus and ischium bear 1,5,1 spines respectively; dactylus of fifth pereiopod ends in a sharp spine and with 35-55 comb-like spinules on the posterior margin, and carpus, merus and ischium bear 1, 3, 0 spines respectively; dorsal surface of telson bears 4-7 (usually 4-5) pairs of spines, distal end nearly rounded with a sharp median point, bearing 5-10 long, blunt plumose processes; uropod diaeresis with 16-21 spinules.

Caridina kempi Jalihal, Shenoy & Sankolli, 1984

Rostrum moderately long, rostral formula: 17-28/3-12 (5-8 post-orbital teeth) (usually 19-25 / 4-8, 6 or 7 post-orbital); dactylus of third pereiopod ends in a strong terminal spine and 6-9 spines on posterior margin, and carpus, merus and ischium bear 1, 4, 1 spines; dactylus of fifth pereiopod ends in a sharp spine and with 35-55 comb-like spinules on its posterior margin, and carpus, merus and ischium with 1,4,1 spines respectively; dorsal surface of telson bears 5-7 pairs of spines, distal end broadly triangular with a median point and bearing 6-8 broad plumose processes; uropod diaeresis with 15-20 spinules.

Caridina natarajani Tiwari & Pillai, 1968

Rostrum moderately long, rostral formula: 15-31/2-8 (4 post-orbital teeth) (usually 18-23 /3-5, 4 post-orbital); dactylus of third pereiopod ends in a strong spine and 10 spines on the posterior margin, and carpus, merus and ischium bear 1, 3, 1 spines respectively; dactylus of

fifth pereiopod ends in a sharp spine and with 57-70 comb-like spinules on its posterior margin, and carpus, merus and ischium bear 1, 2-3, 0 spines respectively; dorsal surface of telson is armed with 4 pairs of spines, distal end bears 5-7 processes of which the middle one longest, plumose; uropod diaeresis bears 13 –15 movable spinules.

Caridina nilotica (Roux, 1833)

Rostrum long, rostral formula: 13-19/7-15 (2-3 post orbital teeth) (usually 16-18/11-14, 2-3 post-orbital); dactylus of third pereiopod ends in a strong terminal spine and 6-8 spines on its posterior margin, and carpus, merus and ischium bear 1, 3-4, 1 spines respectively; dactylus of fifth pereiopod ends in a sharp spine and with 50-55 comb-like spinules, and carpus, merus and ischium bear 1, 1-3, 0 spines respectively; dorsal surface of telson bears 4-5 pairs of spines, distal end with a sharp median point and 6-8 plumose processes; uropod diaeresis with 11-12 spinules.

Caridina pseudogracilirostris Thomas, Pillai & Pillai, 1973

Rostrum very long and slender, rostral formula: 7-10/ 23-37 (1 post-orbital tooth) (usually 7-10/25-29, 1 post-orbital); dactylus of third pereiopod ends in a sharp spine and 6 spines on its posterior margin, and carpus, merus and ischium bear 1, 3, 1 spines respectively; dactylus of fifth pereiopod ends in a sharp spine and bears 32-35 comb-like spinules, and carpus, merus and ischium bear 1, 2, 0 spines respectively; dorsal surface of telson bears 4-5 pairs of spines, distal end with 3 pairs of plumose processes; uropod diaeresis bears 6-9 spinules.

Caridina shenoyi Jalihal & Sankolli, 1984

Rostrum moderately long, rostral formula: 16-26/3-9 (5-8 post-orbital teeth) (usually 19-23 / 5-8, 5-6 post-orbital); dactylus of third pereiopod ends in a strong terminal spine and 6-8 spines on its posterior margin, and carpus, merus and ischium bear, 1, 4-6, 1 spines respectively; dactylus of fifth pereiopod ends in a sharp spine and with 39-54 comb-like spinules, and carpus, merus, ischium bear 1,3, 0 spines respectively; dorsal surface of telson bears 5-7 pairs of small spines, placed at regular intervals, distal end with a sharp, triangular median point and 6-8 long blunt plumose processes; uropod diaeresis with 17-23 spinules.

Caridina weberi* var. *sumatrensis de Man, 1892

Rostrum moderately long, rostral formula: 18-24/4-9 (5-6 post-orbital teeth) (usually 18-24/4-6, 5-6 post-orbital); dactylus of third pereiopod ends in a sharp spine and bears 5-6 spines on its posterior margin, and carpus, merus and ischium bear 1, 3-5, 0 spines respectively; dactylus of fifth pereiopod ends in a sharp point and with 27-51 comb-like spinules, and carpus, merus and ischium bear 1,3, 0 spines respectively; dorsal surface of telson bears 4-5 pairs of spines, distal end with 7-10 spines; uropod diaeresis with 18 spinules.

Caridina Williamsoni Jalihal, Shenoy & Sankolli, 1984

Rostrum extends beyond the antennular peduncle, rostral formula: 30-50/8-17 (3-5 post-orbital teeth) (usually 31-44 / 8-14, 3-4 post-orbital); dactylus of third pereiopod with one large terminal spine and 7-10 spines on the posterior margin, and carpus, merus and ischium bear 1,4,1 spines respectively; dactylus of fifth pereiopod ends in a sharp point and carries 30-57 comb-like spinules on its posterior margin, and carpus, merus and ischium bear 1,3, 0 spines respectively; dorsal surface of telson bears 4-6 pairs of spines, distal end with a triangular median point and 5-10 long plumose processes; uropod diaeresis bears 11-15 spinules.

Key for the identification of the species:

1. Rostrum long, exceeding beyond the antennular eduncle ... 2
   – Rostrum moderately long, not exceeding beyond the antennular peduncle ... 5
2. Upper margin of the rostrum with maximum11teeth **... 3**
   – Upper margin of the rostrum with more than 11 teeth ... 4
3. Distal end of telson ends in a median spine; endopod of first pleopod of male with appendix interna ... *C. gracilirostris*
   – Distal end of telson does not end in a median spine; endopod of first pleopod of male without appendix interna ... *C. pseudogracilirostris*
4. Rostrum broad, entire upper margin bears teeth, third abdominal segment with a prominent dorsal hump ... *C. williamsoni*
   – Rostrum slender, upper margin with teeth present only at the proximal part, abdomen with or without a hump ... *C. nilotica*
5. Upper margin of rostrum slightly convex ... 6
   – Upper margin of rostrum nearly straight, distal end sloping downwards ... 7
6. Dorsal surface of telson with 4 pairs of spines; distal end with 1-3 long plumose setae which are longer than the ones lateral to it ... *C. natarajani*
   – Dorsal surface of telson with 5-6 pairs of spines; distal end with setae of similar size ... *C. laevis*
7. Distal end of telson with a prominent median spine ... 8
   – Distal end of telson without a median spine ... *C. weberi* var. *sumatrensis*

8. Ischium of fourth and fifth pereiopods with a large spine ... *C. kempi*
   – Ischium of fourth and fifth pereiopods without any spine ... 9
9. Outer antennular flagellum of males with 8-10 and females with 6-7 segments bearing aesthetascs. Eggs small (0.33 – 0.44 x 0.57-0.68 mm) ... *C. shenoyi*
   – Outer antennular flagellum of males with 14-17 and of females with 7-11 segments bearing aesthetascs. Eggs large (0.50-0.65 x 0.75-0.90 mm) ... *C. gurneyi*

The study revealed certain interesting aspects. *C. williamsoni, C. gurneyi, C. shenoyi, C. kempi* are new records from Kerala waters, of which the last two species are being recorded out of the type locality for the first time [24]. The paper also presents an extensive distributional range (new records) for other species of the genus within the state. Only four species have been reported from backwaters of Kerala, namely, *C. pseudogracilirostris, C. kempi, C. nilotica* and *C. weberi* var. *sumatrensis* and excepting the first their abundance is very poor. *C. williamsoni* is a common species in the freshwater zone. *C. natarajani* is confined to the southern regions of the state. The specimens of *C. nilotica* collected during the present study could not be identified to any of the varieties recorded so far and hence needs further investigation. *C. kempi* has been reported very rarely from backwaters of Kerala (Valapattanam backwater, it is abundant). Among them *C. kempi* and *C. shenoyi* are rare species in Kerala waters and *C. gracilirostris, C. laevis* and *C. nilotica* var. *veliensis* recorded earlier could not be collected during the present study.

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