



*Rec. zool. Surv. India* : 107(Part-2) : 93-101, 2007

## FRESHWATER PRAWN AND SHRIMP (CRUSTACEA : DECAPODA) DIVERSITY IN SINGAPERUMALKOIL PADDY FIELD NEAR CHENNAI

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**Key words** : Singaperumalkoil, Paddy field, Freshwater prawns, *Caridina*, *Macrobrachium*, diversity.

Collections of freshwater prawns and shrimps were made from a paddy field located in Singaperumalkoil near Chennai from April 1998 to March 2000, yielded ten species belonging to two families viz., Palaemonidae and Atyidae. The genus *Macrobrachium* of the family Palaemonidae is represented by five species, namely, *M. lamarrei lamarrei* (H. Milne Edwards, 1837), *M. malcolmsonii* (H. Milne Edwards, 1844), *M. peguense* (Tiwari, 1952), *M. scabriculum* (Heller, 1952) and *M. unikarnatae* Jalihal *et al.*, 1988, of which *M. peguense* and *M. unikarnatae* are new records to Tamilnadu. The genus *Caridina* of the family Atyidae is also represented by five species, namely, *C. gracilipes* De Man, 1892, *C. gurneyi* Jalihal *et al.*, 1984, *C. kunnathurensis* Richard & Chandran, 1994, *C. williamsoni* Jalihal *et al.*, 1984 and *C. typus* H. Milne Edwards, 1837.

### INTRODUCTION

The paddy field at Singaperumalkoil is situated about 50 km south of Chennai. On either side of the main road from Chennai to Chingelput up to the bifurcation leading to Sriperumpudur, there are very fertile rice fields. Here cultivation of rice is carried out throughout the year (Three cycles) especially because of the abundant water availability. Unique limnological conditions prevail in the rice fields dissimilar to other natural aquatic habitats although they share some features of marshes, shallow lakes and ponds. Although biological cycles are interrupted by cultivation, colonization in the aquatic phase can be rapid by zooplankton, benthos and nektonic animals along with phytoplankton and macrophytes. There is a rapid buildup of diversity of aquatic organisms after the planting of rice. Although this profusion of species may be short-lived their production biologically can be very high. But no detailed account is available on the faunal composition of paddy fields during aquatic and semi aquatic phases. Hence studies pertaining to aquatic and semi

aquatic phases of rice fields were undertaken with special reference to prawn and shrimp diversity. Though the studies were carried out in an area of 4.5 ha of paddy field behind Singaperumalkoil railway station, yet they were confined mostly to an easily accessible plot of 100 sq. m.

### MATERIAL AND METHODS

From April 1998 to March 2000 regular monthly collections of prawns along with other aquatic organisms like fish, crab and molluscs were made in the paddy field located at Singaperumalkoil. Prawns were collected by using a net cloth of 2 m length and 1 m width. For each sample the net was operated for four times. Collected prawns were fixed in 4% formalin and preserved in 70% alcohol. Later the specimens were identified to species (Jalihal *et al.*, 1984 and 1988, Richard & Chandran, 1994 and Jayachandran, 2001) and details of population studies will be published elsewhere.

### TAXONOMIC NOTE OF PRAWNS COLLECTED

Phylum	ARTHROPODA
Subphylum	CRUSTACEA
Class	MALACOSTRACA
Order	DECAPODA
Superfamily	ATYOIDEA De Hann, 1849
Family	ATYIDAE De Hann, 1849
Genus	<i>Caridina</i> H. Milne Edwards, 1837

### Key to the Identification of species under *Caridina*

1. Rostrum as long as or slightly longer than the antennal scale ..... 2
  - Rostrum distinctly shorter than the antennal scale ..... 3
2. Rostrum with spines arranged throughout the length of the dorsal margin without distal gap ..... *C. williamsoni*
  - Rostrum with spines compactly arranged on the proximal part of the dorsal margin but leaving a wide gap distally ..... 4
3. Dorsal margin of the rostrum smooth without spine ..... *C. typus*
  - Dorsal margin of the rostrum with 17–25 spines ..... *C. gurneyi*
4. The distal wide gap of the dorsal margin of the rostrum always interrupted by 0–5 small teeth and without any sub terminal teeth ..... *C. kunnathurensis*
  - The distal wide gap of the dorsal margin of the rostrum mostly without intermediate spines, rarely it may be interrupted by 1 or 2 small spines and always posses a sub terminal tooth ..... *C. gracilipes*

***Caridina gracilipes* De Man, 1892**

1892. *Caridina nilotica* var. *gracilipes*, De Man, *Max. Weber Zool. Ergeb.*, **2** : 387.  
 1994. *Caridina gracilipes* Richard & Chandran, *J. Bombay nat. Hist. Soc.*, **91**(2) : 242-259.  
 1997. *Caridina gracilipes* Mariappan, *Ph.D. Thesis*, Unpublished, Madras University.

*Material examined* : 12GG, 12EE and 2 juveniles.

*Diagnostic characters* : Rostrum straight, equal to or slightly longer than the antennal scale. Rostral formula 17–24/14–17. Dorsal margin of the rostrum with a distal gap which is occasionally interrupted by one or two teeth. The tip of the rostrum is provided with one or two sub apical teeth rarely this is absent in some animal. Carpus of the first cheliped with slight anterior excavation and is 2.25 times as long as its breadth. Carpus of the second cheliped without any excavation and 5.3 times as long as its breadth. Propodus of the third pereopod 4.4 times as long as dactylus. Dactylus is 3.33 times as long as its breadth. Fifth pereopod with propodus 3.37 times as long as dactylus and dactylus 4 times as long as its breadth. First pleopod of male with a well developed appendix interna. A dorsal hump is observed on the 3<sup>rd</sup> abdominal segment. Exopod of the uropod with 10 to 12 spines.

*Distribution* : Pondichery, Tamilnadu.

***Caridina gurneyi* Jalihal *et al.*, 1984**

1984. *Caridina gurneyi* Jalihal *et al.*, *Rec. zool. Surv. India, Occ. Paper*, **69** : 1-40.  
 1994. *Caridina gurneyi* Richard & Chandran, *J. Bombay nat. Hist. Soc.*, **91**(2) : 242-259.  
 1997. *Caridina gurneyi* Mariappan, *Ph.D. Thesis*, Unpublished, Madras University.

*Material examined* : 11EE (3 berried).

*Diagnostic characters* : Rostrum straight, reaches  $\frac{1}{2}$  to  $\frac{3}{4}$ th of the antennular peduncle. Rostral formula 17–25/5–9 (3–6). The spines are arranged compactly both in the dorsal and ventral surface throughout the length of the rostrum except its tip. Carpus of the first cheliped with deep anterior excavation and is 2 times as long as its breadth. Carpus of the second cheliped without any excavation and 3.29 times as long as its breadth. Propodus of the third pereopod 4.6 times as long as dactylus. Dactylus is 2.67 times as long as its breadth, merus possess 5 spines and ischium has 1 spine. Propodus of the fifth pereopod 4.13 times as long as dactylus. Dactylus is 3.75 times as long as its breadth, merus possess 4 spines and ischium is without any spine. First pleopod of male with a well developed appendix interna. No dorsal hump is observed on the 3<sup>rd</sup> abdominal segment. Exopod of the uropod with 15 to 18 spines.

*Distribution* : Karnataka, Tamilnadu.

***Caridina kunnathurensis* Richard & Chandran, 1994**

1994. *Caridina kunnathurensis* Richard & Chandran, *J. Bombay nat. Hist. Soc.*, **91**(2) : 242-259.  
 1997. *Caridina kunnathurensis* Mariappan, *Ph.D. Thesis*, Unpublished, Madras University.

*Material examined* : 138GG, 288EE and 40 juveniles.

*Diagnostic characters* : Rostrum slightly upturned distally, equal to or slightly longer than the antennal scale. Rostral formula 15–30/6–16 with 3–5 spines on the carapace. Dorsal margin of the rostrum with a distal gap which is often interrupted by 1–6 teeth. Carpus of the first cheliped with slight excavation and is 2.1 times as long as its breadth. Carpus of the second cheliped without any excavation and 5.3 times as long as its breadth. Propodus of the third pereopod 4.67 times as long as dactylus. Dactylus is 2.67 times as long as its breadth. Propodus of the fifth pereopod 3.7 times as long as dactylus. Dactylus is 3.89 times as long as its breadth. First pleopod of male with well developed appendix interna over reaching the enopod. Posterior margin of the telson with 4 to 5 pairs of plumose process. The exopod of the uropod with 10–12 movable spines.

*Distribution* : Tamilnadu.

***Caridina williamsoni* Jalihal et al., 1984**

1947. *Caridina nilotica* var. *chouhani* Chopra and Tiwari, *Rec. Ind. Mus.*, **45** : 213-224.

1984. *Caridina williamsoni* Jalihal et al., *Rec. zool. Surv. India, Occ. Paper*, **69** : 1-40.

1997. *Caridina williamsoni* Mariappan, *Ph.D. Thesis*, Unpublished, Madras University.

*Material examined* : 11GG, 26EE (18 berried) and 10 juveniles.

*Diagnostic characters* : Rostrum straight, equal to or slightly longer or shorter than the antennal scale. Rostral formula 30–45/7–12. In the dorsal margin of the rostrum spines are arranged throughout the length of the rostrum without any gap. In the ventral margin spines are arranged leaving  $\frac{1}{4}$  of the distal end. Carpus of the first cheliped with slight anterior excavation and is 2 times as long as its breadth. Carpus of the second cheliped without any excavation and 4.67 times as long as its breadth. Propodus of the third pereopod 4.13 times as long as dactylus and the dactylus is 3.3 times as long as breadth. Fifth pereopod with propodus 3.5 times as long as dactylus and dactylus 3 times as long as its breadth. First pleopod of male with a well developed appendix interna. A dorsal hump is observed on the 3<sup>rd</sup> abdominal segment. Exopod of the uropod with 9 to 15 spines.

*Distribution* : Karnataka, Orissa, Tamilnadu.

***Caridina typus* H. Milne Edwards, 1837**

1837. *Caridina typus* H. Milne Edwards, *His. Nat. Crust.*, **2** : 1-532.

1999. *Caridina typus* Delphin & Richard, *J. Bom. nat. Hist. Soc.*, **96**(3) : 427-432.

*Material examined* : 1G.

*Diagnostic characters* : Rostrum smooth sloping down and reaches  $\frac{3}{4}$ th of the second antennular segment. The dorsal surface of the rostrum is characterized by the absence of spines, and the ventral edge of the rostrum carries 5 spines. Carpace is much longer than the rostrum (nearly 2.7 times).

Appendix masculina stronger and reaches more than  $\frac{3}{4}$ th of the endopod of second pleopod. The exopod of the uropod bears 17 movable spines.

*Distribution* : Andaman Islands, Tamilnadu.

*Remarks* : This species was reported for the first time to the Indian main land by Delphin and Richard (1999) from Kanyakumari district. For the second time its presence in Indian mainland is confirmed during the present study.

Superfamily PALAEMONOIDEA Refinesque, 1815  
 Family PALAEMONIDAE Refinesque, 1815  
 Subfamily PALAEMONINAE Refinesque, 1815  
 Genus ***Macrobrachium*** Bate, 1868

**Key to the Identification of Paddy Field *Macrobrachium***

1. Second cheliped is simple and not sexually dimorphic ..... 2
  - Second cheliped strong, well developed and sexually dimorphic ..... 3
2. Rostrum shorter than or sub equal to the antennal scale ..... 4
  - Rostral length varies considerably, generally longer than antennal scale. In adult male appendix masculina of second pleopod slender and equal to or slightly longer than the endopod ..... *M. lamarrei lamarrei*
3. The second chelipeds of the same animal (male) itself is unequal, either left or right leg well developed ..... *M. scabriculum*
  - The second chelipeds of the same animal (male) is similar and both the chelipeds are well developed ..... *M. malcolmsonii*
4. Exopod of the uropod with a accessory sub apical spine ..... *M. unikarnatakæ*
  - Exopod of the uropod without accessory sub apical spine ..... *M. peguense*

***Macrobrachium lamarrei lamarrei* (H. Milne Edwards, 1837)**

1837. *Palaemon lamarrei* H. Milne Edwards, *Hist. Nat. Crustacea*, **II** : 397.  
 2001. *Macrobrachium lamarrei lamarrei* Jayachandran, *Palaemonid Prawns Biodiversity, Taxonomy, Biology and Management*. Oxford & IBH Publishing Co. Pvt. Ltd. Calcutta, 1-624.  
 2004. *Macrobrachium lamarrei lamarrei* Roy et al., *Zool. Surv. India, State Fauna Series, Fauna of Manipur*, **10** : 119-123.

*Material examined* : 338GG, 700EE.

*Diagnostic characters* : Rostrum with small crest over the orbital region. Rostral formula 4–13/4–8 (1–2). In the dorsal margin of the rostrum the proximal group of 5 to 10 teeth is separated

from the 1 or 2 sub apical teeth by a wide gap. Carapace mostly shorter than the rostrum rarely it is equal to the rostrum. The second cheliped are simple and similar in both the sex. In this the fingers are more or less equal the palm, carpus is longer than the chela (1.55 to 2.07 times). The important character which differentiate the present species from other closely related species is its longer slender appendix masculina which overreaches the endopod or at least equal to or very slightly shorter (in young males) than the endopod of the second pleopod. The exopod of the uropod is without accessory spine. Number of eggs ranges from 31–64 and the size of the egg ranges  $1.4\text{--}1.6 \times 1.0\text{--}1.2$ .

*Distribution* : Common in India.

*Remarks* : This is a very common species in Tamilnadu. In the paddy field this species dominates all the other species in number as well as its availability in all the seasons.

***Macrobrachium malcolmsonii*** (H. Milne Edwards, 1844)

1844. *Palaemon malcolmsonii* H. Milne Edwards, In : *Jacquemont Voyage, Inde*, 4(2) : 8.

2001. *Macrobrachium malcolmsoni* Jayachandran, Palaemonid Prawns Biodiversity, Taxonomy, Biology and Management. *Oxford & IBH Publishing Co. Pvt. Ltd. Calcutta*, 1-624.

*Material examined* : 1G (144 mm) and 1E (berried, 95 mm).

*Diagnostic characters* : Upper margin of the rostrum with 11 to 12 teeth of which 3 teeth present on the carapace. Ventral margin of the rostrum with 6 teeth. Carapace smooth. The second cheliped is strong and well developed in the males and over reaches the antennalscale by its entire chela and 4/5th of the carpus. In the second cheliped fingers are shorter than palm, carpus shorter than the chela but longer palm. Merus shorter than carpus and palm but longer than fingers. The movable finger is covered with pubescent hairs except its tip, and is provided with two prominent denticles. The immovable finger has one strong and two weak denticles. The entire cheliped is tuberculate and is shorter than its total body length (0.64 times of its total body length).

*Distribution* : All over India.

***Macrobrachium peguense*** (Tiwari, 1952)

1952. *Palaemon peguense* Tiwari, *Ann. Mag. Nat. Hist.*, V (ser. 12) : 27.

2001. *Macrobrachium peguense* Jayachandran, Palaemonid Prawns Biodiversity, Taxonomy, Biology and Management. *Oxford & IBH Publishing Co. Pvt. Ltd. Calcutta*, 1-624.

2005. *Macrobrachium peguense* Raghunathan & Valarmathi, *Rec. zool. Surv. India*, 105 (part 3-4) : 51-56.

*Material examined* : 10GG and 8EE.

*Diagnostic characters* : Rostrum always longer than the antennular peduncle and slightly shorter than or rarely equal to the antennal scale. Rostral formula  $6\text{--}10/3\text{--}5$  usually with  $7\text{--}9/3\text{--}4$ , with one or two post orbital teeth. In the lower margin of the rostrum, teeth are equidistant but in the

upper margin though the teeth are equidistant slight variations in distance are also observed. The upper margin is with or without sub apical teeth if present also it is not widely separated from the remaining teeth.

The second cheliped is equal on both the sides and similar in both the sexes. It is sub equal to the half of the total body length. It over reaches the antennal scale by the entire chela and 1/5<sup>th</sup> of the carpus. In males the length of the cheliped is 1 or 2 mm shorter than the half of the total body length, but in females it is 0.3 to 3.6 mm longer than the half of the total body length. Carpus is distinctly longer than the merus. Chela is sub equal to the carpus. Mostly carpus is slightly longer (0.1–1.1 mm) than the chela, occasionally it is equal to or slightly (0.1–1.1 mm) shorter than the chela. Finger is always shorter than the palm (0.6–0.8 mm) with delicate hairs at the tip. Cutting edges of both movable and immovable fingers of males are smooth without any tubercles. But in the case of females cutting edge of the movable finger usually armed with 2 minute tubercle like teeth, while that of the fixed finger with a smaller tooth fitting in the gap between those of the movable finger when closed, rest of the cutting edge smooth. Palm is mostly longer than the half of the carpus but in rare cases it is slightly (0.05–0.2 mm) shorter than the half of the carpus, irrespective of size and gender. Carpus is always longer than the merus, cylindrical and is 6.8 to 11.6 (average = 9.35) times as long as its distal diameter. The number of eggs varies from 67–122 and size of the eggs ranges from 1.2–1.8 × 0.9–1.5 mm. The length of the berried female lies between 37–44 mm.

*Distribution* : Myanmar, Karnataka.

*Remarks* : This species is a new report to Tamilnadu. Earlier this species was described from Myanmar by Tiwari (1952), later it was recorded from Bilgiri Rangasamy temple Wild Life Sanctuary (Raghunathan and Valarmathi, 2005).

#### ***Macrobrachium scabriculum* (Heller, 1952)**

1852. *Palaemon scabriculus* Heller, *Verh. Zool.-bot. Ges. Wien.*, **12** : 527.

2001. *Macrobrachium scabriculum* Jayachandran, *Palaemonid Prawns Biodiversity, Taxonomy, Biology and Management. Oxford & IBH Publishing Co. Pvt. Ltd. Calcutta*, 1-624.

*Material examined* : 1E.

*Diagnostic characters* : Rostrum, short sloping down and nearly reaches the antennular peduncle. The rostral formula is 13–14/3(4). The second pereopod is strongly unequal, the right one is larger than the left. The carapace is scabrous with minute prickles and its length is 2 times of the length of the rostrum. The largest second pereopod is longer than the total body length. The palm and the proximal part of the finger are covered with wooly hairs. The movable finger is provided with 17 tubercles. In the larger second pereopod the finger is shorter the palm but longer than the remaining segments, carpus is longer than the ischium but shorter than the merus, palm and the finger.

The immovable finger is provided with 18 tubercles of which the proximal first one is largest. The size of the tubercles decreases towards the distal end. The fingers are compressed and slightly curved at the tip. The smaller second pereopod is provided with long velvety hairs throughout its entire length even in the cutting edges of the finger. In this finger is sub equal to the palm the remaining proportions are like the larger second pereopod. The exopod of the uropod is provided with a accessory sub apical spine.

*Distribution* : Karnataka, Kerala, Pondichery, Orissa, Tamilnadu.

***Macrobrachium unikarnatakae* Jalihal et al., 1988**

1988. *Macrobrachium unikarnatakae* Jalihal et al., *Rec. zool. Surv. India, Occ. Paper*, **112** : 21.

2001. *Macrobrachium unikarnatakae* Jayachandran, Palaemonid Prawns Biodiversity, Taxonomy, Biology and Management. *Oxford & IBH Publishing Co. Pvt. Ltd. Calcutta*, 1-624.

*Material examined* : 1E (berried, 52.9 mm).

*Diagnostic characters* : Rostrum longer than the antennular peduncle but falls short of the antennalscale. The rostral formula is 7/3(2). Carapace is distinctly longer than the rostrum. The second cheliped is simple, in that finger is shorter than palm, the chela is shorter than the total length of the carpus but slightly longer than 3/4th of the carpus. Merus is shorter than carpus but longer than palm. Exopod of the uropod with accessory sub apical spine. The female carries 185 eggs the size of which ranges from 1.2–1.4 × 1.15–1.25.

*Distribution* : Karnataka.

*Remarks* : *Macrobrachium unikarnatakae* is considered as an endemic species to Karnataka. For the first time this species is reported outside Karnataka from Tamilnadu.

## DISCUSSION

So far prawns of the genus *Caridina* (Family : Atyidae) and *Macrobrachium* (Family : Palaemonidae) have been reported from freshwater bodies like river, pond, lake, stream etc., (Jalihal et al., 1988; Miriappan, 1997) and for the first time their occurrence and diversity is revealed in a paddy field. Among the *Macrobrachium* species collected, the following namely *M. lamarrei lamarrei*, *M. malcolmsonii* and *M. scabriculum* are culturable species. From Tamilnadu, *Macrobrachium peguense* (Tiwari) and *Macrobrachium unikarnatakae* Jalihal et al., are new records. The latter species is recorded out of Karnataka for the first time.

## ACKNOWLEDGEMENTS

The authors are thankful to the Director, Zoological Survey of India, Kolkata and to the Officer-in-Charge, Southern Regional Station, Zoological Survey of India, Chennai for encouragement

and facilities. Thanks are also due to Dr. Jasmine Richard, Retd. Professor, Bharathi Women's College for valuable help.

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