

NOTES ON SOME FRESHWATER CARIDEAN PRAWNS  
(PALAEMONIDAE AND ATYIDAE)  
FROM THE ENDAU-ROMPIN AREA,  
JOHORE-PAHANG, PENINSULAR MALAYSIA

Peter K. L. Ng and Satish C. Choy

**ABSTRACT.** - The taxonomy and biology of three genera and ten species of freshwater caridean prawns (Palaemonidae and Atyidae) from the Endau-Rompin State Park area in northern Johore and southern Pahang, Peninsular Malaysia, are discussed. Lists of the species known thus far from Peninsular Malaysia and Singapore are also presented, and taxonomic problems highlighted.

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INTRODUCTION

During the Malayan Nature Society Scientific and Heritage Expedition: Rompin-Endau 1989 to the Sungai Kinchin area in southern Pahang and northern Johore, Peninsular Malaysia, numerous freshwater caridean prawns were collected. These collections were collated with others from Johore in the earlier phase of the expedition (Endau-Rompin 1985-1986) to complete the study.

A preliminary report on the species, including notes on their ecology, keys and figures, known thus far from Endau-Rompin State Park has been published (Ng & Choy, 1990). That publication however, being a survey report, precluded details of their systematics.

In this paper, the taxonomy and biology of these prawns are discussed, and serves to supplement the earlier one (Ng & Choy, 1990). Two families of carideans are considered here; Palaemonidae (with one genus and six species) and Atyidae (with two genera and four species).

The taxonomy of freshwater prawns is difficult. This is in spite of the many studies which have been conducted. The revision by Holthuis (1950) of the world species of *Macrobrachium* is still the most comprehensive and useful work for the Southeast Asian fauna. The same is true of Bouvier's (1925) work on the atyids. Johnson (1960, 1961a, b, 1962, 1963, 1966a, b, 1968, 1969, 1973a, b) made many studies on the Malayan caridean fauna, but many aspects remained unresolved. Chong & Khoo (1987b, c, d, 1988) clarified the taxonomy of *M. lanchesteri* and *M. malayanum*, describing a new species, *M.*

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Peter K. L. Ng - Department of Zoology, National University of Singapore, Kent Ridge, Singapore 0511, Republic of Singapore. Satish C. Choy - Department of Biology, Universiti Brunei Darussalam, Gadong, Bandar Seri Begawan 3186, Negara Brunei Darussalam, Brunei.

*ahkowi* from Malaysia (Chong & Khoo, 1987c, d) and another from Sabah, *M. gua* (see Chong, 1989). Chong *et al.* (1987) also provided a new Singapore record for *M. nipponense* (De Haan, 1849). The Pulau Tioman fauna was reported on by Ng (1985) and Ng & Chong (1986). The thesis by Chong (1985) which partially revises the Malayan species of *Macrobrachium* is particularly useful for the species which have large eggs and semi- or fully abbreviated development. Several important sections unfortunately, remain unpublished.

## METHODS AND MATERIALS

The areas which were sampled in the present Sungai Kinchin phase fall under two habitat categories. The first category includes the main river, with clear, fast flowing waters in most places, the substrate being rocky and the area generally exposed. The second category includes slower waters with mud and leaf-litter substrates. This category is often well shaded, with shallow water, the water sometimes turbid. The acidity of the waters in both categories varied between 4.0 and 5.5.

Most of the specimens were collected using two types of nets. Hand nets (mesh size 0.5 mm) were used in narrow streams. Large rectangular nets measuring 72.0 by 40.0 cm of two mesh sizes (0.2 and 0.5 mm) were used to sample the fauna near the banks, leaf-litter and under rocks. All specimens were preserved in 70% alcohol. Specimens are deposited in the Invertebrate Collection, Department of Zoology, University of Malaya, Kuala Lumpur (UMKL); and the Zoological Reference Collection, Department of Zoology, National University of Singapore (ZRC).

## SYSTEMATICS

### Family Palaemonidae

*Remarks.* - On the basis of the existing literature, 15 species are recognised at present from Peninsular Malaysia and Singapore (most recent and/or useful reference(s) stated in parenthesis):

- Macrobrachium ahkowi* Chong & Khoo, 1987 (see Chong & Khoo, 1987d)
- Macrobrachium equidens* (Dana, 1852) (see Johnson, 1961b)
- Macrobrachium idae* (Heller, 1862) (see Johnson, 1961b, 1963)
- Macrobrachium lanchesteri* (De Man, 1911) (see Chong & Khoo, 1988)
- Macrobrachium lar* (Fabricius, 1798) (see Johnson, 1961b)
- Macrobrachium latidactylus* (Thallwitz, 1891) (see Johnson, 1963)
- Macrobrachium malayanum* (Roux, 1934) (see Chong & Khoo, 1987b)
- Macrobrachium neglectum* (De Man, 1905) (see Johnson, 1960)
- Macrobrachium nipponense* (De Haan, 1849) (see Chong *et al.*, 1987)
- Macrobrachium palawanense* Johnson, 1962 (see Johnson, 1962, 1973a)
- Macrobrachium pilimanus* (De Man, 1879) (see Ng, 1985; Chong & Khoo, 1987a)
- Macrobrachium rosenbergii* (De Man, 1879) (see Johnson, 1973)
- Macrobrachium scabriculum* (Heller, 1862) (see Johnson, 1963)
- Macrobrachium sintangense* (De Man, 1898) (see Johnson, 1963)
- Macrobrachium trompii* (De Man, 1898) (see Johnson, 1961b, 1963)

GENUS *MACROBRACHIUM* BATE, 1868*Macrobrachium malayanum* (Roux, 1936)

Synonym: *Macrobrachium geron* Holthuis, 1950

*Material examined.* - 1 large ♂ (ZRC 1989.2353), Lubok Udang, Ulu Endau, Johore, leg. R. P. Lim, 7.viii.1985. — 10 spec. (ZRC 1989.3001-3010), Sungai Zain, Ulu Endau, Johore, leg. R. P. Lim, 17.vi.1985. — 8 spec. (2 ovigerous ♀♀) (ZRC 1989.2462-2469), tributary of Sungai Kinchin between base camp and Sungai Seladang, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 1 spec. (ZRC 1989.2515), base camp, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 14.vi.1989. — 1 spec. (ZRC 1989.2354), base camp, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 15.vi.1989. — 3 spec. (ZRC 1989.2681-2683), among leaf litter, tributary of Sungai Kinchin, at Sungai Seladang, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 24 spec. (including 3 ovigerous ♀♀) (ZRC 1989.2517-2540), Sungai Batu Labi, tributary of Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 5 spec. (ZRC 1989.2436-2440), Sungai Seladang tributary, Sungai Kinchin, Pahang, leg. E. Koh & K. L. Yeo, 19.vii.1989. — 2 spec. (1 ovigerous ♀) (ZRC 1989.2512-2513), among leaf litter, Sungai Kernam, tributary of Sungai Kinchin, Pahang, leg. E. Koh & K. L. Yeo, 19.vii.1989. — 4 spec. (ZRC 1989.2451-2454), first stream south of base camp, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 30 spec. (3 ovigerous ♀♀) (ZRC 1989.2476-2505), first stream south of base camp, along Sungai Kinchin, Pahang, leg. 20.vii.1989. — 6 spec. (ZRC 1989.2356-2361), first stream south of base camp, tributary of Sungai Kinchin, Pahang, leg. Y. H. Koo & H. K. Lua, 20.vii.1989. — 61 spec. (2 ovigerous ♀♀) (ZRC 1989.2364-2424), second stream south of base camp, tributary of Sungai Kinchin, Pahang, leg. Y. H. Koo & H. K. Lua, 20.vii.1989. — 1 spec. (ZRC 1989.2450), second stream south of base camp, tributary of Sungai Kinchin, Pahang, leg. Y. H. Koo & H. K. Lua, 20.vii.1989.

*Remarks.* - This is one of the most common prawns in Malaysia. A large male collected from the first stream south of base camp on 20 July 1989 (ZRC 1989.2356) had the fingers and lower part of the chelae showing the pubescence. Specimens (including one large male) collected during the earlier Ulu Endau phase of the expedition in Johore however, had the typical chelae.

The taxonomy of this prawn was resolved by Chong & Khoo (1987b), who showed that *M. geron* Holthuis, 1950, is a junior synonym of *Palaemon malayanum* Roux, 1936 s. str. Prior to their paper, *M. geron* was the name used by local carcinologists (see Johnson, 1960, 1961b, 1963, 1973b). What Johnson (1960, 1963) regards as "*M. malayanum*" does not belong to that species, but to an as yet undescribed form of *M. pilimanus* (fide Chong, 1985).

*Macrobrachium trompii* (De Man, 1898)

Synonym: *Palaemon* (*Parapalaemon*) *trompi armatus* Roux, 1936

*Material examined.* - 3 ♂♂ (ZRC 1989.2445-2447), Sungai Taku, Johore, leg. P. K. L. Ng, 15.vi.1989. — 1 ♂ (ZRC 1989.2363), Sungai Taku, Johore, leg. P. K. L. Ng, 15.vi.1989. — 1 ♂, 1 ♀, 1 juv. (ZRC 1989.2459-2461), Sungai Taku, Johore, leg. H.

P. Ng & P. K. L. Ng, 15.vi.1989. — 1 spec. (ZRC 1989.2684), third stream south of base camp, tributary of Sungai Kinchin, Pahang, leg. P. K. L. Ng, 14.vi.1989. — 1 spec. (ZRC 1989.2470), tributary of Sungai Kinchin between base camp and Sungai Seladang, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 1 spec. (ZRC 1989.2516), Sungai Kernam, in shallow water, Pahang, leg. E. Koh & K. L. Yeo, 19.vii.1989. — 4 spec. (ZRC 1989.2441-2444), mouth of Sungai Seladang, tributary of Sungai Kinchin, Pahang, leg. E. Koh & K. L. Yeo, 19.vii.1989. — 1 spec. (ZRC 1989.2471), first stream south of base camp, tributary of Sungai Kinchin, Pahang, leg. Y. H. Koo & H. K. Lua, 20.vii.1989. — 1 spec. (ZRC 1989.2362), first stream, south of base camp, along Sungai Kinchin, Pahang, leg. Y. H. Koo & H. K. Lua, 20.vii.1989.

*Remarks.* - The larvae of this species has been reared through by Chong (1985), and they are typically of the abbreviated form. The specific name is sometimes spelled “*trompi*” (eg. Johnson, 1961b, 1966a), but the spelling used by De Man (1898), “*trompii*” must be used instead.

#### *Macrobrachium pilimanus* De Man, 1879

*Material examined.* - 5 spec. (including one large ♂ and 2 ovigerous ♀♀) (ZRC 1989.2541-2545), stream near base camp, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 1 spec. (ZRC 1989.2428), shallow water of Sungai Kernam, Pahang, leg. E. Koh & K. L. Yeo, 19.vii.1989.

*Remarks.* - The taxonomy of this species and its allies is one of the outstanding problems of *Macrobrachium* systematics. While the typical form, with the cup-like second pereopod carpus and short rostrum appears to be the most common, being found throughout Peninsular Malaysia, other forms exist which have more intermediate conditions. Several species, subspecies or forms allied to *M. pilimanus* have been recognised by other authors (see Johnson, 1960, 1963) from Thailand, Sumatra, Java and Borneo. Some other authors (see Holthuis, 1950, 1979) however, prefer to regard all as belonging to one broad species, *M. pilimanus* until a complete study can be made. All these “taxa” are identified with the *M. pilimanus* complex of species on the basis of the chelae of their male second pereopod having long dense hairs. Of these, one of the most easily recognisable is the newly described *M. ahkowi* (see next species). The taxonomy of the others is still unresolved.

Johnson (1960, 1963) recognised at least two other “sibling” species - *M. malayanum* (Roux, 1934) and *M. leptodactylus* (De Man, 1892) from Malaya and Java respectively. The author has collected specimens clearly referable to *M. leptodactylus* from Java, and *M. pilimanus* s. str. as well. *Macrobrachium leptodactylus* appears to be a good species. *Macrobrachium malayanum* s. str. was shown to be a senior synonym of *M. geron* Holthuis, 1950 (Chong & Khoo, 1987b), and specimens identified to this species by Johnson (1960, 1963, 1973b) do not belong to that species. The identity of Johnson’s “*M. malayanum*” remain unresolved, although Chong (1985) regarded it as a new form of *M. pilimanus*. This information however, is unpublished. These “sibling” species and forms of *M. pilimanus* have not yet been found in the Endau-Rompin area.

***Macrobrachium ahkowi* Chong & Khoo, 1987**

Synonym: *Macrobrachium johnsoni* Chong & Khoo, 1987c  
(not *Macrobrachium johnsoni* Ravindranath, 1979)

*Material examined.* - 1 large ♂ (ZRC 1989.2355), base camp, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989. 1 juv. (?) (ZRC 1989.2427), Sungai Seladang, tributary of Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989.

*Remarks.* - This species is part of the *M. pilimanus* complex of species, but easily separated by the characters stipulated by Chong & Khoo (1987). The species was originally named *M. johnsoni* by Chong & Khoo (1987c) but this name was preoccupied by *M. johnsoni* Ravindranath, 1979. They (1987d) subsequently proposed a replacement name, *M. ahkowi* for the species.

***Macrobrachium neglectum* (De Man, 1905)**

*Material examined.* - 1 ♂, 1 ♀ (ZRC 1989.2455-2456), base camp, shallow water under large tree trunk, along Sungai Kinchin, Pahang, leg. Ghani, 15.vi.1989. — 1 ♀ (ZRC 1989.2429), tributary between Sungai Seladang and base camp, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 4 spec. (ZRC 1989.2349-2353), tributary between base camp and Sungai Seladang, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989.

*Remarks.* - The taxonomy of this species was reviewed by Johnson (1960, 1963) who recognised three "races" (subspecies) of *M. javanicum* (Heller, 1862) - *M. javanicum javanicum* (Heller, 1862), *M. javanicum neglectum* (De Man, 1905) and an as yet unnamed taxon from Sulawesi. According to Johnson (1960), the nominate subspecies is restricted to southern Sumatra and Java, whilst *M. javanicum neglectum* occurs in southern Thailand, Peninsular Malaysia and Borneo. He cited the presence of intermediates in northern Sumatra after studying specimens from numerous localities.

The rostral, scaphocerite and second pereopod characters cited by Johnson (1960) to separate *javanicum* and *neglectum* however, are very distinct, and easily allow for their separation. Until these intermediate specimens from northern Sumatra can be re-examined and directly compared with the specimens from the other localities, the present authors prefer to regard *M. javanicum* and *M. neglectum* as distinct species. Naiyanetr (pers. comm. with first author), in his studies of the Thai material of *M. neglectum*, also regards both as distinct species. The first author has collected specimens from southern Thailand, and studies of these concur with Naiyanetr's conclusions.

***Macrobrachium rosenbergii* De Man, 1879**

*Remarks.* - This large and commercially important prawn was collected from Sungai Endau by nets but none were obtained from Sungai Kinchin and its associated tributaries. The characteristic velvet-like pubescence on the dactylus of the large male second pereopods is absent or indistinctive in smaller specimens. The very sinuous rostrum however, appears to be a reliable specific character even for juveniles.

Family Atyidae

*Remarks.* - This family faces as many taxonomic problems as the Palaemonidae, mainly with the genus *Caridina*. Johnson (1961a, b, 1963) reviewed the problems involved, and partially revised the Malayan species. He recognised nine *Caridina* and one *Atya* (present *Atyopsis*) species from Peninsular Malaysia and Singapore (see also Ng, 1985). The identities of several species however, could not be ascertained with certainty. Three species of *Caridina*, one not previously known from mainland Malaysia were obtained at Ulu Kinchin.

Summarising the literature, the 10 species of atyids known at present from Peninsular Malaysia and Singapore are (most recent or useful reference(s) stated in parenthesis):

- Atyopsis moluccensis* (De Haan, 1849) (see present paper)
- Caridina* cf. *babaulti* Bouvier, 1918 (see Johnson, 1961a)
- Caridina excavatooides* Johnson, 1961 (see Johnson, 1961a)
- Caridina gracilirostris gracilirostris* De Man, 1892 (see Johnson, 1963)
- Caridina propinqua* De Man, 1908 (see present paper)
- Caridina simoni peninsularis* Kemp, 1918 (see Johnson, 1963, 1966a, 1969)
- Caridina thambipillai* Johnson, 1961 (see Johnson, 1961a)
- Caridina tonkinensis* Bouvier, 1919 (see present paper)
- Caridina typus* H. Milne-Edwards, 1837 (see Johnson, 1966a, 1969; Ng, 1985)
- Caridina weberi sumatrensis* De Man, 1892 (see Johnson, 1961a, 1963)

Genus *Caridina* H. Milne-Edwards, 1837

*Caridina thambipillai* Johnson, 1961

*Material examined.* - 1 gravid ♀ (postorbital carapace length 5.6 mm) (egg size 0.36 by 0.20 mm) (ZRC 1989.2685), among leaf litter, tributary of Sungai Kinchin, at Sungai Seladang, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 2 ♀♀ (ZRC 1989.2686-2687), Sungai Seladang, Pahang, leg. E. Koh & K. L. Yeo, 19.vii.1989.

*Remarks.* - This is a common species, and has been reported from the Tasek Bera area before (Mizuno, 1982; Cranbrook & Furtado, 1988). Johnson (1961a) described this species from specimens in Malacca and southern Johore.

The variations in morphometry and meristic characteristics of the present specimens from Endau-Rompin are much greater than those indicated by Johnson (1961a). The differences are as follows (Johnson's characters in parenthesis): 1. the rostrum can reach the middle of the last antennular peduncle (not reaching); 2. rostral formula of 6) 9/7 (3-4) 14-21/1-4); 3. antennules can be longer, greater than or equal to the carapace length, even in females (antennules only 0.61-0.75 carapace length); 4. peduncle of antennae can be much longer than the first segment of the antennule, reaching middle of the second antennular segment; 5. length to width ratio of the carpus of the first pereopod may be less than 2.2 (greater range of variation than in the types); 6. length to width ratio of the carpus of the second pereopod may be as low as 7.5 (vs. 11) and chela about 0.65 times length of carpus (vs. 0.82-0.86); 7. the number of spines on the dactylus of the pereopods is more variable; and 7. the armature of the propodus, carpus, merus and ischium the third

to fifth pereopods are more variable. These variations may warrant the separation of the Ulu Kinchin specimens into a new subspecies but the paucity of specimens (and the absence of males) precludes this for the time being.

***Caridina tonkinensis* Bouvier, 1919**

*Material examined.* - 1 gravid ♀ (postorbital carapace length 3.2 mm) (egg size 0.65 by 0.40 mm) (ZRC 1989.2688), base camp, along Sungai Kinchin, Pahang, leg. P. K. L. Ng, 13.vi.1989. — 1 ♀ (ZRC 1989.2689), Sungai Seladang, Pahang, leg. E. Koh & K. L. Yeo, 19.vii.1989.

*Remarks.* - The rostrum of this species resembles that of *C. thambipillai*, but the larger size of the eggs of *C. tonkinensis* easily distinguishes it from *C. thambipillai*. In *C. thambipillai*, the carpus of the first pereopod is also deeply excavated anteriorly.

Johnson (1961a) first recorded this species from Southeast Asia from specimens he collected in Singapore. They not been previously reported from Peninsular Malaysia (see Ng & Choy, 1990). It is otherwise known from Tonkin. Johnson (1961a) records only females, and males are not yet known from this part of the world.

***Caridina propinqua* De Man, 1908**

*Material examined.* - 1 ♂ (ZRC 1989.2690), Sungai Seladang, Pahang, leg. E. Koh & K. L. Yeo, 19.vii.1989.

*Remarks.* - The form of the rostrum in this species is rather distinctive, being curved gradually downwards. According to Johnson (1961a), this species seems to prefer alkaline or brackish waters. The waters where the present specimen was collected however, was acidic (pH 4 to 5).

**Genus *Atyopsis* Chace, 1983**

***Atyopsis moluccensis* (De Haan, 1849)**

*Material examined.* - 2 ♂♂, 3 ♀♀ (ZRC 1989.3011-3015), 1 spec. (UMKL), Sungai Sempanong, Ulu Endau, Johore, leg. R. P. Lim, 1985.

*Remarks.* - The taxonomy of the genus *Atya* was revised by Chace (1983), who showed that Asiatic species formerly referred to *Atya* belong to the genera *Atyopsis* Chace, 1983 and *Atyoida* Randall, 1840 instead. *Atyopsis* contained two closely related species, *A. moluccensis* De Haan, 1849 and *A. spinipes* Newport, 1847. The only species of “*Atya*” reported from Peninsular Malaysia, “*A. spinipes*”, was shown by Chace (1983) to belong to *A. moluccensis*. The specimens referred to as “*Atyinopsis moluccensis*” from the base of Gunong Janing (Ulu Endau) in Davison (1988: 134) refer to *Atyopsis moluccensis*. This species was not collected in the present survey, although suitable habitats in Sungei Taku

were found. The first author has collected specimens of this species from southern Thailand from fast flowing waters with gravel and rock substrate.

The most obvious distinction between the two species was the form of the rostrum (gradually tapering to a slender apex in *A. moluccensis* but tapering more abruptly to a broader apex in *A. spinipes*) and the number of teeth on the ventral rostral margin (seven to 16 in *A. moluccensis* but two to six in *A. spinipes*). In these two aspects, the specimens from Ulu Endau the first author has examined agree with *A. moluccensis*. In the largest male specimen, the rostrum is more slender and longer, but agree with *A. moluccensis* in all other respects. The photograph purportedly showing a specimen of "*Atyinopsis moluccensis*" (sic) being measured in Davison (1988) is rather doubtful. The prawn (not completely shown) appears to be more like a *Macrobrachium* than an *Atyopsis*.

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