On a new species of blackwater prawn, *Macrobrachium oxyphilus* (Crustacea: Decapoda: Caridea: Palaemonidae), from peat swamps in Peninsular Malaysia

P.K.L. Ng

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A new species of freshwater palaemonid prawn, *Macrobrachium oxyphilus* spec. nov., is described from highly acidic blackwaters in a peat swamp forest in Selangor, Peninsular Malaysia. The species differs from its nearest congener, *M. trompii* (de Man, 1898), in having proportionately smaller eyes, shorter scaphocerites, a lesser number of ventral rostral teeth, a more inflated carapace, and less pubescent and more spiniferous chelipeds.

Peter K.L. Ng, Department of Zoology, National University of Singapore, Kent Ridge, Singapore 0511, Republic of Singapore.

Introduction

One of the most extreme biotopes for decapod crustaceans are the highly acidic blackwaters (sensu Johnson, 1968: 305) of peat swamp forests in Southeast Asia (see Whitmore, 1988: 24, 29), and very little is known about the prawn fauna in these areas. In a survey of an extensive stretch of blackwater swamps in northern Selangor, numerous specimens of a relatively large, dark-coloured palaemonid freshwater prawn were collected which resembles *M. trompii* (de Man, 1898). Comparison of this blackwater prawn material with a good series of specimens of *M. trompii* from Peninsular Malaysia and Singapore showed that the blackwater specimens belong to an undescribed species, here named *Macrobrachium oxyphilus*.

The description of this species and comparison with *M. trompii* form the text of the present paper. Some notes on the biology of the new species are also presented.

The abbreviations cl, rl and bl are for the carapace, rostral and body lengths, respectively. Carapace length is measured from the postorbital margin to the posterior margin of the carapace; rostral length from the tip of the rostrum to the postorbital margin; and total length from the tip of the rostrum to the posterior margin of the telson. All measurements are in millimetres. The terminology and notation for the rostral formula follow that used by Holthuis (1984: 141). Specimens are deposited in the Nationaal Natuurhistorisch Museum [previously Rijksmuseum van Natuurlijke Historie (RMNH)], Leiden, Netherlands; and Zoological Reference Collection (ZRC), Department of Zoology, National University of Singapore.

Descriptive part

Family Palaemonidae Rafinesque, 1815
Genus **Macrobrachium** Bate, 1868
Macrobrachium oxyphilus spec. nov.
(figs. 1A, C, E, G; 2A, C; 3A, C)

Material.— Holotype, ♂, (RMNH D 42022), blackwater stream, 39 km road marker, Sungai Besar to Tanjong Malim trunk road, north Selangor peat swamp forest, Peninsular Malaysia, leg. P.K.L. Ng et al., viii.1991 (bl 74.4 mm, cl 22.8 mm, rl 11.4 mm). Paratypes – 6 ♂♂ (ZRC) (cls 19.4-21.1 mm); 1 ♀ (ovigerous) (RMNH D 42023) (cl 15.2 mm); 2 ♀♀ (ZRC) (both ovigerous) (cls 16.7 mm, 14.4 mm); all same data as holotype.

Diagnosis.— *Macrobrachium oxyphilus* differs from its nearest congener, *M. trompii*, in the following characters: i) a more inflated carapace, with the lateral margins distinctly convex when viewed dorsally (versus almost straight, the two margins being subparallel) (figs. 1C, D; 2C, D); ii) a shorter rostrum which is more blade-like, the tip usually not over-reaching the edge of the scaphocerite (never distinctly beyond) (versus longer, slightly more sinuous, with the tip usually distinctly over-reaching the edge of the scaphocerite) (figs. 1A-D; 2A-D); iii) fewer ventral teeth (mode 4) (versus 5-6); iv) a distinctly smaller eye (ratio of eye diameter and carapace height ca. 0.16-0.25) (versus 0.26-0.32); v) a shorter scaphocerite (ratio of scaphocerite and carapace length 0.76-0.85) (versus 0.68-0.73); vi) the chelae of large males are more strongly spiniferous (fig. 3A, B) and distinctly less pubescent; and vii) the telson is slightly shorter and more slender (fig. 1G, H).

Remarks.— The differences between *M. oxyphilus* spec. nov. and *M. trompii* are quite consistent for the series of specimens examined. In the ZRC, there are some 300 specimens of *M. trompii* from various parts of Peninsular Malaysia, Singapore and the Riau Archipelago (Indonesia). The types of *Palaemon trompii armatus* Roux, 1936 (a junior synonym of *M. trompii*, see Holthuis, 1950: 211), in the Naturhistorisches Museum Basel (Switzerland) have also been examined. *Macrobrachium oxyphilus* seems to grow generally to a larger size than *M. trompii*. The largest specimen of *M. trompii* in the ZRC from Malaysia is a male of cl 19 mm from Johor (ZRC 1985.3723), the largest from Singapore is a male of cl 22 mm (ZRC) and the largest from Batam island (Riau) is a male of cl 22.5 mm (ZRC). Almost all the other mature males of *M. trompii* are much smaller in size. The largest male of *M. oxyphilus* (the holotype) has a cl of 22.8 mm.

In larger specimens, the cheliped carpus, merus, palm and fingers are proportionately shorter and distinctly more spiniferous in *M. oxyphilus* (fig. 3A). The spines on *M. oxyphilus* are also stronger. In smaller males (cls 15-17 mm), the chelipeds of the two species do not differ significantly in the degree of spinulation (fig. 1E, F). The degree of pubescence is also a useful secondary character in adult males of all sizes. In *M. trompii* the distal part of the larger male chela and both fingers are covered with a dense short pubescence which obscures the margins of these structures (see Ng & Choy, 1990: 304, fig. 1E-H). In *M. oxyphilus*, the pubescence is very sparse and scattered, and does not obscure the margins of the chela and fingers at all. The colour of the male chelipeds in live specimens differs markedly. All specimens of *M. trompii* which I have collected over the years have reddish-brown chelae, usually with a distinct, dull, yellow longitudinal median band on the outer surface. In *M. oxyphilus* the

Table 1. Meristic characters of *Macrobrachium oxyphilus* spec. nov. and large specimens of *M. trompii* (de Man, 1898).

Specimen	Rostral formula	bl	cl	rl
Macrobrachium oxyphilus				
Holotype ♂ (RMNH D 42022)	4/7 / 4	74.4	22.8	11.4
Paratype ♂ (ZRC)	3/8 / 4	69.4	21.1	11.9
Paratype ♂ (ZRC)	4/6 / 4	66.5	18.7	9.7
Paratype ♂ (ZRC)	3/8 / 5	59.8	16.4	10.5
Paratype ♂ (ZRC)	3/6 / 4	57.0	16.2	9.7
Paratype ♂ (ZRC)	3/8 / 4	42.5	12.5	7.5
Paratype ♂ (ZRC)	3/7 / 5	67.0	19.4	11.3
Paratype ♀ (ZRC)	3/6 / 4	58.8	16.7	11.0
Paratype ♀ (RMNH D 42023)	4/8 / 6	55.6	15.2	9.1
Paratype ♀ (ZRC)	3/6 / 4	51.3	14.4	9.0
Macrobrachium trompii				
♂ (ZRC 1990.9236) (Nee Soon, Singapore)	4/6 / 5	59.5	15.1	11.8
♂ (ZRC) (Nee Soon, Singapore)	3/7 / 6	84.3	22.0	14.4
♂ (ZRC 1985.3723) (Jemaluang, Johor)	3/7 / 6	69.0	19.0	13.5
♂ (ZRC) (Batam, Riau Archipelago)	4/6 / 5	76.7	22.5	12.8

chelae are purplish-blue in colour, the longitudinal median band being brownish and less distinct. Even in specimens preserved in alcohol, the differences in coloration are still pronounced, that of *M. trompii* being reddish-brown, that of *M. oxyphilus* purplish-black.

The size of the eye is distinctive, especially when specimens of equal size are compared. For males between cls 15-17 mm, the ratios of eye diameter and carapace height for *M. oxyphilus* and *M. trompii* are 0.24-0.25 and 0.31-0.32, respectively; for large males between cls 22-23 mm, these ratios are 0.16 and 0.26. The length of the scaphocerites in adult specimens is also distinctly shorter in *M. oxyphilus* (figs. 1C, D; 2C, D). In *M. oxyphilus*, the ratio of the length of the scaphocerite and carapace length

is ca. 0.73 in smaller specimens and ca. 0.68 in larger ones. In *M. trompii*, this ratio is ca. 0.85 for smaller specimens and ca. 0.76 for larger ones (based on material from Malaysia, Singapore and Indonesia).

Etymology.— The species name "oxyphilus" refers to the apparent preference of this prawn for the highly acidic blackwaters of peat swamp forests.

General biology.— The habitat in which *M. oxyphilus* was collected is part of a large peat swamp forest. The streams in the forest where the species occurs are well shaded, with a detritus and peat substrate, shallow (depth less than a metre), without submerged macrophytes. The waters flowing from and through the swamp appear black when viewed under reflected light and is dark tea-coloured under transmitted light. The pH was between 3.3 and 3.8 (average 3.5) (see also Ng et al., in press).

The presence of a *Macrobrachium* species in waters as acid as those in the peat swamp forest of north Selangor is rather surprising, especially since the taxon is obviously breeding in the waters there (three ovigerous females were obtained). The eggs of *M. oxyphilus* are ovoid and large (ca. 1.6-2.0 by 1.1-1.2 mm), and the brood is relatively small (one of the females (RMNH D 42023) had 104 eggs). Johnson (1967: 429, 1968: 308) had reported that *M. trompii* occurs in Malaysian blackwaters and sometimes flourishes in waters of pH <4.5 and in the absence of detectable calcium in the water. I have seen some of Johnson's specimens in the ZRC from blackwater areas (mostly from Johor), and they are typical *M. trompii*, not *M. oxyphilus*.

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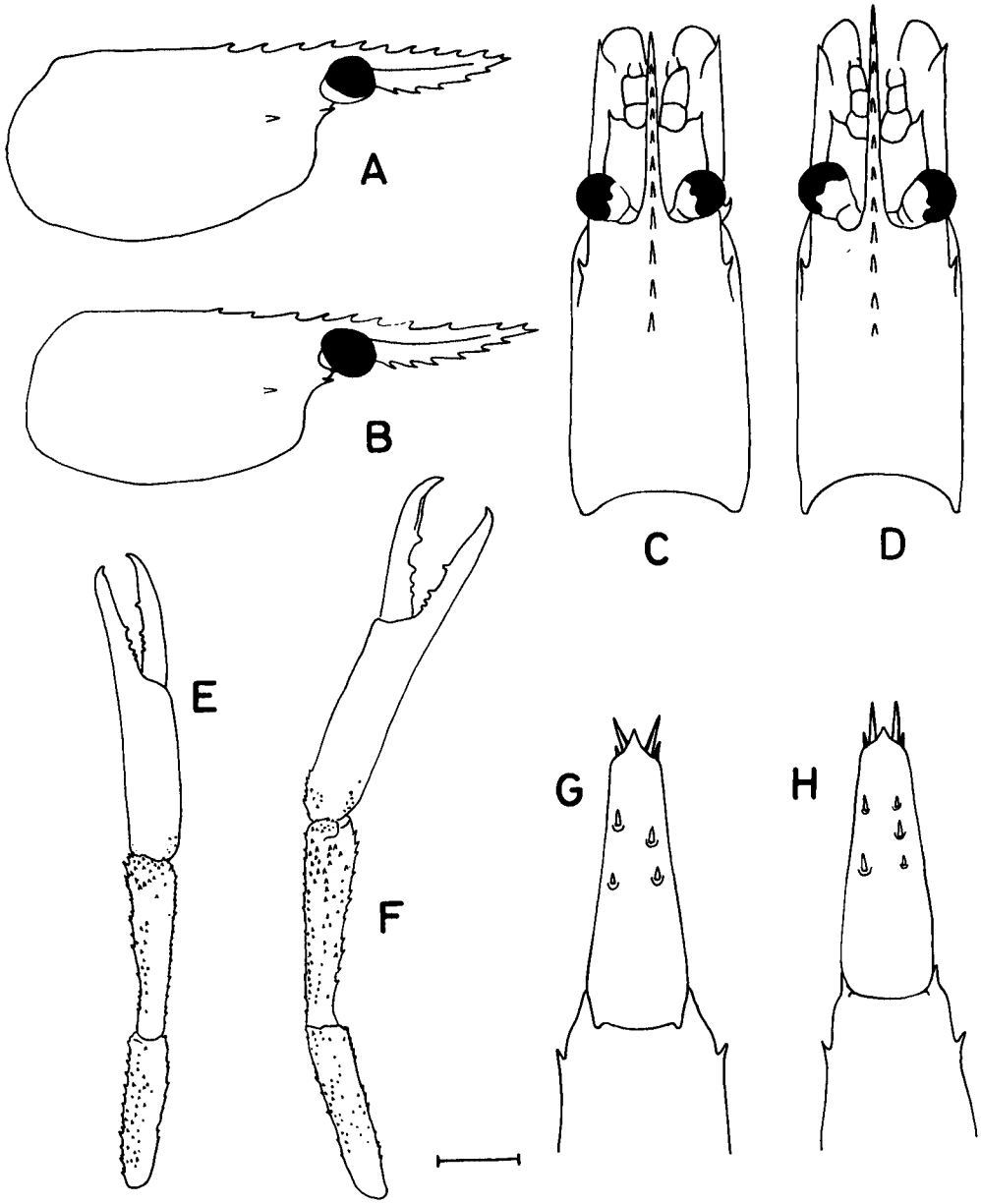

Fig. 1. A, C, E, G, *Macrobrachium oxyphilus* spec. nov., paratype male, cl 16.4 mm, north Selangor (ZRC). B, D, F, H, *Macrobrachium trompii* (de Man, 1898), male, cl 15.1 mm, Nee Soon, Singapore (ZRC 1990.9236). A, B, lateral views of carapace; C, D, dorsal views of carapace; E, F, major chelae (pubescence denuded); G, H, telsons. Scale: 5.0 mm.

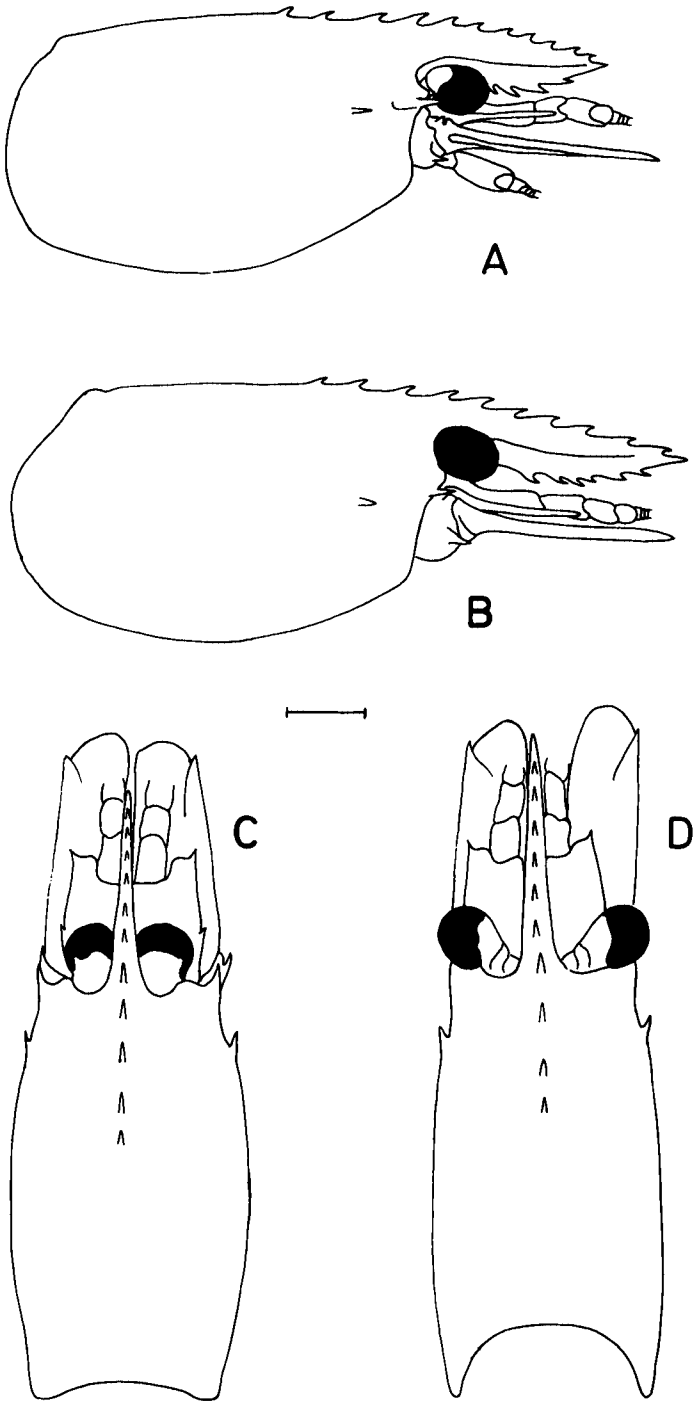

Fig. 2. A, C, *Macrobrachium oxyphilus* spec. nov., holotype male, cl 22.8 mm, north Selangor (RMNH D 42022). B, D, *Macrobrachium trompii* (de Man, 1898), male, cl 22.0 mm, Singapore (ZRC). A, B, lateral views of carapace; C, D, dorsal views of carapace. Scale: 5.0 mm.

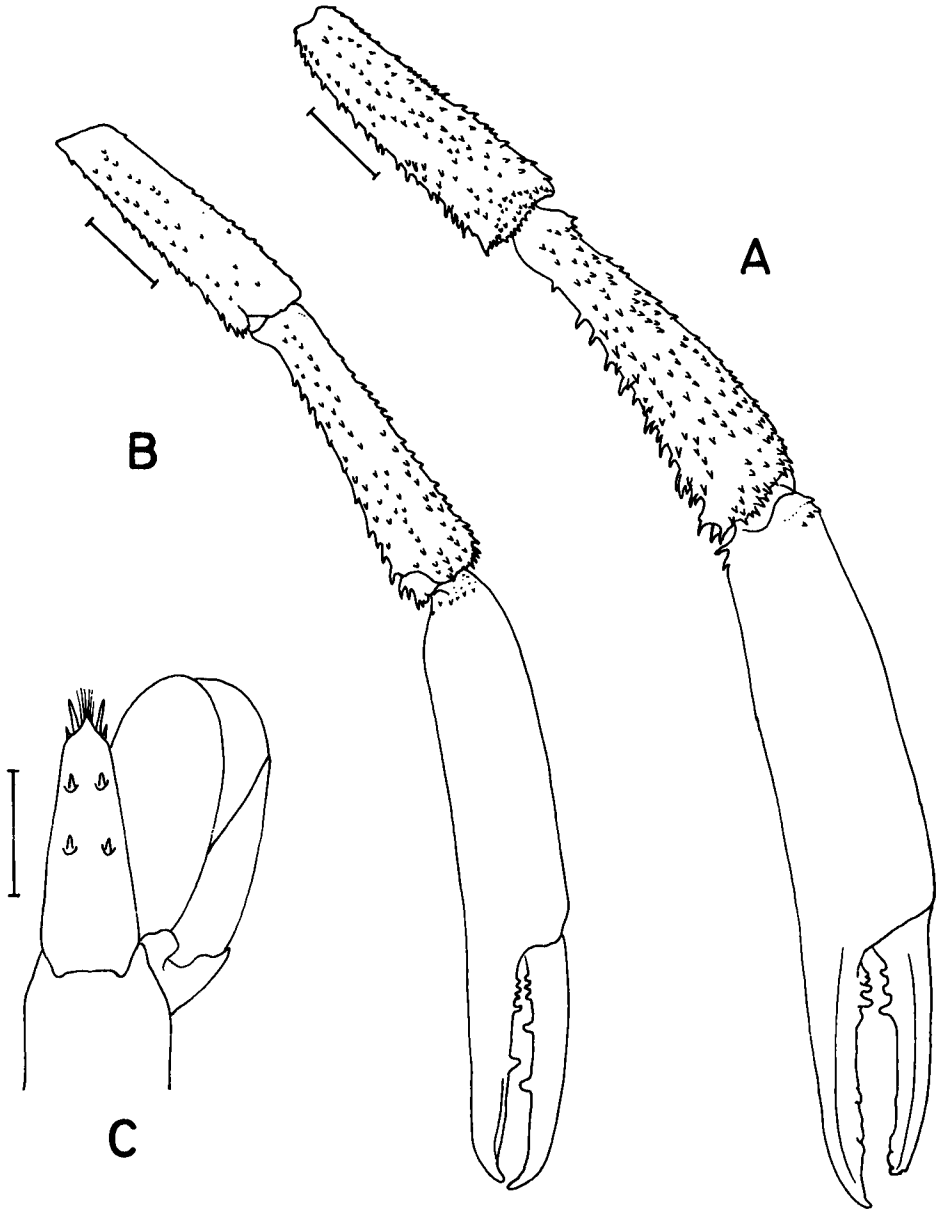

Fig. 3. A, C, *Macrobrachium oxyphilus* spec. nov., holotype male, cl 22.8 mm, north Selangor (RMNH D 42022). B, *Macrobrachium trompii* (de Man, 1898), male, cl 22.0 mm, Singapore (ZRC). A, B, major chelae (distal part of dactylus of A broken) (pubescence denuded); C, telson. Scales: 5.0 mm.