ON THE IDENTITY OF ATERGATIS FLORIDUS (LINNAEUS, 1767) AND RECOGNITION OF ATERGATIS OCYROE (HERBST, 1901) AS A VALID SPECIES FROM THE INDIAN OCEAN (CRUSTACEA: BRACHYURA: XANTHIDAE)

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ABSTRACT. – *Atergatis ocyroe* (Herbst, 1801) is separated from *Atergatis floridus* (Linnaeus, 1767), with which it has been considered a junior synonym for many years. *Atergatis ocyroe* is the common species of the northern and Western Indian Ocean whereas *A. floridus* occurs in Southeast Asia, Australia and the western Pacific. *Atergatis ocyroe* can be separated from *A. floridus* by marked differences in the carapace colour and patterns, by the degree of swelling of the branchial carapace regions, and by the relative proportions the ischium of the third maxillipeds. In order to stabilise the taxonomy of these two species, a neotype is designated for *A. floridus* (Linnaeus, 1767) and a lectotype for *A. ocyroe* (Herbst, 1801).


INTRODUCTION

The identity of the well-known toxic Indo-West Pacific reef xanthid crab, *Atergatis floridus* (Linnaeus, 1767), has not been questioned for many decades, with both *Cancer ocyroe* Herbst, 1801, and *Atergatis compressipes* MacLeay, 1838, long regarded as junior synonyms. Possible nomenclatural problems of *Cancer floridus* with the Atlantic aethrid *Hepatus epheliticus* (Linnaeus, 1763) have been discussed and resolved by Ng & Holthuis (1993) with the selection of a neotype for the latter species. Ng & Ahyong (2001: 90), however, commented that “We have examined specimens from the eastern Indian Ocean which have a different colour pattern to those in Southeast Asia and Pacific, which suggests that *Atergatis floridus*, as currently recognised, may be more than one species.” To this effect, a good series of specimens from Phuket (Thailand) in the Indian Ocean and from many parts of Southeast Asia and Western Pacific were examined.

The present note serves to formally recognise two separate species previously synonymised under *Atergatis floridus*. The Southeast Asian and Pacific populations are now regarded as *Atergatis floridus* (Linnaeus, 1767) sensu stricte with the selection of an appropriate neotype. The northern and western Indian Ocean populations are here referred to *Atergatis ocyroe* (Herbst, 1801) with the selection of a lectotype. Specimens examined are deposited in the Zoological Reference Collection of the Raffles Museum, National University of Singapore (ZRC); Queensland Museum, Brisbane (QM); Phuket Marine Biological Centre (PMBC), Phuket, Thailand; and the Humbolt Museum, Berlin (ZMB).

TAXONOMY

XANTHIDAE MacLeay, 1838

*Atergatis floridus* (Linnaeus, 1767) (Figs. 2A–C, 3A, 4A, C)

*Cancer floridus* Linnaeus, 1767: 1041. (see discussion on synonymy)


Ng & Davie: Identity of *Atergatis floridus* and *Atergatis ocyroe*
Fig. 2. Living colours of *Atergatis floridus* and *A. ocyroe*. A–C, *A. floridus*; D–H, *A. ocyroe*. A, B, female, ca. 35 mm carapace width, from reef on Pulau Tioman, Peninsular, Malaysia, not preserved; C, juvenile, ca. 10 mm carapace width, from reef on Pulau Tioman, Peninsular, Malaysia, not preserved; D, male (41.8 × 29.1 mm) (ZRC 1999.0317), Phuket, Thailand; E, female (39.5 × 27.2 mm) (ZRC 1999.0317), Phuket, Thailand; F, female (41.0 × 28.4 mm) (ZRC 1999.0317), Phuket, Thailand; G, H, specimens from Sri Lanka, not preserved (courtesy of R. Pethiyagoda).

Remarks. – Since the Southeast Asian, Australian, and Western Pacific species has been better studied, especially with regards to its toxicology, it should be this species for which the name *Atergatis floridus* is fixed. *Cancer floridus* was briefly described by Linnaeus (1767: 1041), but without any colour notes or figures to help ascertain its identity. Also Linnaeus’ type(s) is/are no longer extant, and the exact type locality is not known. Linnaeus listed “Carolina [Islands?]” and East Indian Seas”, but the former locality (in the Americas) is incorrect with specimens from there actually being *Hepatus epheliticus* (Linnaeus, 1763) (Ng & Holthuis, 1993). And “East Indian Seas” could refer to either Indian or Pacific Oceans as during that time, it typically included the broader Indo-Malaysian Archipelago. In any case, Western Australia has the typical green form, not the cream one (see Jones & Morgan, 2002: 168). To stabilise the taxonomy of this species, a male specimen (42.4 × 29.0 mm, ZRC 1999.0332) from Pulau Seringat, Singapore, has been designated as the neotype of *Cancer floridus* Linnaeus, 1767. This will keep the use of the name *Atergatis floridus* for the better known and more widely-studied species.

*Atergatis ocyroe* (Herbst, 1801)  
(Figs. 1, 2D–H, 3B, 4B, D)

*Cancer ocyroe* Herbst, 1801: 20, Pl. 54 fig. 2.  
*Atergatis compressipes* MacLeay, 1838: 59.  
*Atergatis floridus* Sakai, 1999: 32, Pl. 17C.

Material. – 1 male (41.8 × 29.1 mm), 2 females (39.5 × 27.2 mm) (ZRC 1999.0317), 2 males, 2 females (PMBC), Cape Panwa, coral reefs, southern Phuket, Thailand, coll. P. K. L. Ng, Dec. 1998.

Remarks. – Herbst (1801: 21) described *Cancer ocyroe* from “Das Vaterland ift Oftindien”. This vague locality is now generally regarded as probably the east coast of India, although extending as far east as the Indo-Malayan Archipelago. The figure in Herbst (1801: 20, Pl. 54 fig. 2; present Fig. 1) matches well with the Phuket specimens examined (Figs. 2D–H, 3B). In addition, Sakai (1999: 17C) pictured the dried types in the Berlin Museum, showing the relatively flatter carapace characteristic of this species. The female specimen figured by Sakai (1999: Fig. 17C, ZMB 2273-ex) is here designated as the lectotype.

*Atergatis compressipes* MacLeay, 1838, was described from South Africa, and no colour notes are available, although the type in the University of Sydney has a relatively flat carapace (Ng & Ahyong, 2001: fig. 3D). However, Barnard (1950: 207) described the colour of the South African specimens as “yellowish”, orange, or greenish, more or less symmetrically marbled or spotted with darker red or brown, the blotches often surrounded by a fine white line; chelipeds, legs, external maxillipeds, sternum and abdomen also more or less spotted; finger and thumb of cheliped black with white tips”. This agrees with the colours observed on the specimens examined from Thailand.

In their study of the Pakistani xanthid fauna, Tirmizi & Ghani (1996: 21) reported the species as being “Reddish with light yellow blotches” and it is apparent from their figure (Tirmizi & Ghani, 1996: fig. 6B) that the ischium of the third maxilliped is of the more slender type. Jayabaskaram et al. (1999: pl. 52) depict a specimen from southern India that agrees very well with the Phuket form. Serène (1984: pl. 21D) also shows a specimen from Madagascar with a similar colour pattern; even though it is a preserved specimen and the figure is in monochrome, the colour patterns are unmistakably that of *A. ocyroe*.

Rohan Pethiyagoda (Wildlife Heritage Trust of Sri Lanka) supplied several colour photographs of an *Atergatis* from Sri Lankan reefs for the present study which were being exported by aquarium dealers, and these too are referable to what is identified as *A. ocyroe* here. Their colour patterns (Fig. 2G, H) are diagnostic for this species.

**DISCUSSION**

The typical and better studied species, *Atergatis floridus*, from Southeast Asia and the Western Pacific has a characteristic green colouration with flower-like-yellowish to yellowish-white markings on the carapace (Figs. 2A, 3A), the branchial regions of the carapace are relatively more swollen (Fig. 4A).
and the ischium of the third maxilliped is relatively more quadrate (Fig. 4C). By contrast, the carapace of the Phuket material has a cream-coloured background with reddish-brown to brown (sometimes greenish-brown) patches and blotches (Figs. 2D–F, 3B), the branchial regions are relatively lower (Fig. 4B) and the ischium of the third maxilliped distinctly more longitudinally rectangular (Fig. 4D). These two morphological features are quite consistent for the series of specimens examined. While the colour pattern of each population does vary, they do not overlap, and it can often be determined in preserved specimens.

From the large series of A. floridus specimens examined the degree of variation in form and more importantly in colour and patterns was ascertained. The colour pattern of A. floridus is consistent, regardless of sex – the green to greenish blue/brown background colour of the carapace is obvious in all fresh specimens (Figs. 2A, B, 3A). The flower-like pattern of the carapace varies considerably in extent and shape, but is always present. The only significant variation on colour patterning was reported by Nakatsubo & Yasuhara (2000) who found an interesting albinistic A. floridus. This specimen had white colouring on the posterior sternum, third maxillipeds, legs, and distal merus and carpus of the left cheliped; and as well, the characteristic “shawl” pattern was largely missing from right side of the carapace dorsal surface. While an obvious mutation, the remaining parts of the carapace showed normal colouring and patterning. Otherwise, only juvenile specimens of A. floridus (carapace width 1 cm or less) differ by having a purplish body with scattered white spots (Fig. 2C). A large number of general colour guides on seashore organisms, habitats and invertebrates (especially from Japan and Taiwan) (too many to list here), were consulted and all the photographs of A. floridus from the Western Pacific and Southeast Asia proper were referable to this species. With regards to subadults and adults, no intermediate forms between A. floridus and A. ocyroe were found during this study. While only a small series of A. ocyroe specimens were available for the present study, the reports by previous workers on the colour patterns of Indian Ocean material (e.g., Barnard, 1950; Tirmizi & Ghani, 1996; Serène, 1984), and other specimens we have seen over the years, leave no doubt that the northern and western Indian Ocean species is A. ocyroe and not A. floridus. In Phuket, A. ocyroe is relatively common in the reefs in the south, and while we observed numerous specimens, most were not collected. None of these Phuket specimens had either a colour or pattern like that of A. floridus. The material from Pakistan is consistent in the carapace coloration and pattern and never like those of A. floridus (Q. Kazmi, pers. comm.). The first author has also observed specimens from the reefs off Galle in southern Sri Lanka in the 1990s (not collected) and they are consistently of the A. ocyroe type (see also Fig. 2G, H) (see Ng & Davie, 2002, as A. floridus). The background colour of A. ocyroe varies from cream-coloured (Fig. 2D, E) to slightly pinkish (Fig. 2G, H) and one female specimen we

Fig. 4. Frontal views and third maxillipeds: A, C, Atergatis floridus, neotype male (42.4 × 29.0 mm) (ZRC 1999.0332), Singapore; B, D, Atergatis ocyroe, male (41.8 × 29.1 mm) (ZRC 1999.0317), Phuket, Thailand.
have on hand (Fig. 2F) is slightly more yellow (more or less matching Barnard’s, 1950, comments of what he thought was A. floridus), but is still distinct from the coloration seen for A. floridus. The dark brown to maroon blotches of A. ocyroe vary considerably in extent and pattern, but never come close to that seen in A. floridus.

The available data thus strongly support the concept of two distinct species – *Atergatis ocyroe* with large spots or blotches, and *A. floridus* with a fine reticulated “shawl-like” colour pattern (hence the often used common Australian name of “Shawl Crab”).

*Atergatis ocyroe* should thus become the available name for the common northern and western Indian Ocean species, at least those west from western Thailand (our material included Phuket, Indian, Pakistani and South African specimens). A complete synonymy for both species has not attempted as the literature is extensive. The compilation by Serène (1984) is excellent and should be consulted. All Southeast Asia (with the exception of the Andaman Sea and perhaps the west coast of Sumatra), West Pacific and Australia are *A. floridus*. Records from northern and western Indian Ocean are *A. ocyroe*. More work will need to be done to ascertain the precise geographical boundaries between the two species, especially in the area of the Andaman Sea and beginning of the Straits of Malacca, perhaps parts of Northern Australia and more isolated islands in the Indian Ocean. Fortunately, almost all toxicological work done on *A. floridus* over the years has been from Japan, Australia, Taiwan, Philippines, Singapore and various western Pacific islands, so the present study will not affect their work.

The present discovery that *A. floridus* and *A. ocyroe* are separate species with discrete geographic ranges is interesting. It fits into recent realisations that a number of supposedly widespread shallow water crabs from the Indo-West Pacific actually have distinct Indian Ocean and Pacific Ocean distributions (e.g. see Chiong & Ng, 1998; Ng et al., 2002; Lai et al., 2006). It may thus be a more widespread phenomenon and the taxonomy of many supposedly “widespread” species will need to be reappraised in the future.

**ACKNOWLEDGEMENTS**

The first author first saw the specimens of Herbst during a visit there in the early 1990s, and he is grateful to Hans Gruner, curator of crustacean at that time, for his kind help. The study was partially supported by a Raffles Museum fellowship to the second author. We are also grateful to Quddusi Kazmi (Pakistan) and Rohan Pethiyagoda (Sri Lanka) for their help. The late Yeo Keng Loo (ZRC) helped in the cataloguing of the ZRC crabs.

**LITERATURE CITED**


