



Uca cryptica Naderloo, Türkay & Chen, 2010 (Crustacea: Brachyura: Ocypodidae) is no longer cryptic

LAURA A. MICHIE^{1,4}, SIMON M. CRAGG¹, R. S. K. BARNES² & WAYNE A. BENNETT³

¹Institute of Marine Sciences, University of Portsmouth, Ferry Road, Portsmouth, PO4 9LY, UK

²Biodiversity Program, Queensland Museum, Brisbane, Australia

³University of West Florida, 11000 University Parkway, Pensacola, US

⁴Corresponding author. E-mail: laura.michie@port.ac.uk

Abstract

Uca cryptica Naderloo, Türkay & Chen, 2010, was originally described from four male specimens found in museum collections without any information regarding the site of collection. We present the first recorded field observations of this species and new morphological features. Specimens were observed and collected in the Wakatobi National Park, on the island of Kaledupa, Sulawesi Tenggara, Indonesia. Colouration of both males and females is described and ecology and distribution are noted. *Uca cryptica* has been seen coexisting with nine other species; one of the highest recorded numbers of *Uca* species living in sympatry.

Key words: Fiddler crabs, ecology, habitat, colouration, Sulawesi, Indonesia

Introduction

Fiddler crabs (*Uca* Leach, 1814) are one of the most characteristic animals associated with warm-temperate to tropical intertidal shores, particularly mudflats within and adjacent to mangrove forests or temperate salt marshes (Crane 1975). To date, 102 species of *Uca* have been described worldwide (Rosenberg 2014), 38 of which have been reported in the Indo-West Pacific, with 19 from the Wallacea region (Barnes 2010).

The initial description of *Uca cryptica* Naderloo, Türkay & Chen, 2010, was obtained from museum specimens that had lost their pigmentation, with only males being available (Naderloo *et al.* 2010). These specimens were obtained from West Flores, Sulawesi and Naawan. It was noted that ‘nothing is known about the biology and ecology of the new species, and very few specimens are known’, with no additional information published in the interim. It was named *Uca cryptica* to highlight the fact that it was hidden amongst many other museum specimens and remained undiscovered. A living population of this species has been found at Ambeua on the Island of Kaledupa, Sulawesi Tenggara (05° 30’ 14” S; 123° 45’ 36” E). This site is not only notable for the presence of *Uca cryptica* but also for the occurrence of a remarkably high level of fiddler crab alpha diversity. This contribution describes the ecology of *Uca cryptica* and adds to its morphological description; giving details of colouration for the first time.

The Wakatobi National Park is located in South East Sulawesi, with the Banda Sea to the north-east and the Flores Sea to the south-west. It consists of four larger islands: Wangi-Wangi, Kaledupa, Tomia, and Binongko and many smaller ones.

Material and methods

Specimens were collected from the intertidal at Ambeua mudflat, Kaledupa Island (see Fig. 1), during July and August 2012. The specimens were collected by hand during low tide, preserved in 70–80% ethanol, and deposited in the collections of the Natural History Museum (NHM), London. Quadrats of 1 x 1m² were used to calculate the density of crabs.

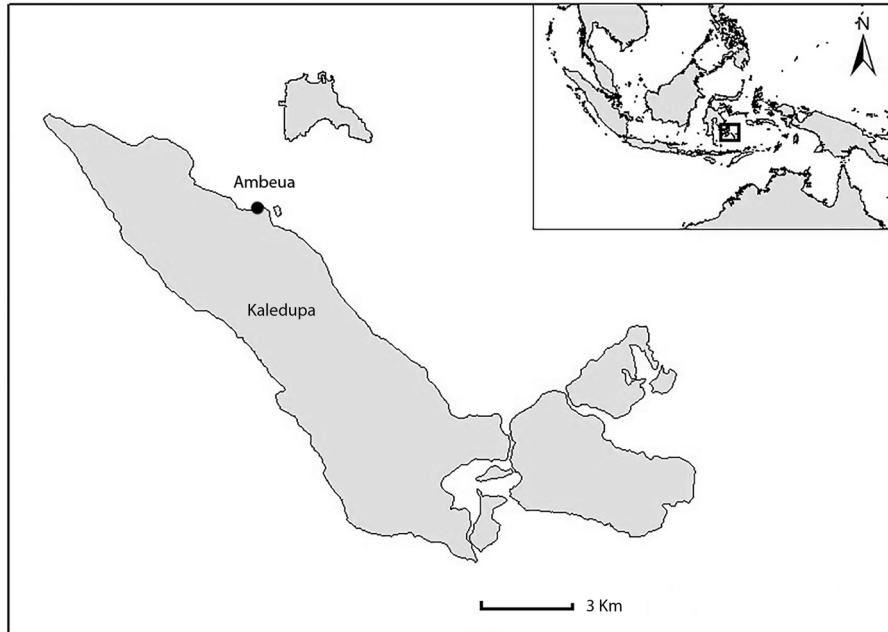


FIGURE 1. Ambeua, Kaledupa Island, with inset of Indonesia.

Carapace measurements are carapace length x carapace width respectively. Five males (9.0 x 15.1 mm, 8.9 x 15.0 mm, 7.5 x 14.5 mm, 7.9 x 14.8 mm, 8.2 x 15.6 mm) and five females (8.2 x 12.1 mm, 8.9 x 13.2 mm, 8.8 x 13.3 mm, 6.8 x 9.1 mm, 6.8 x 9.1 mm) were measured.

Figure 2 was produced using confocal laser scanning microscopy (CLSM), which generates improved imaging due to the removal of out-of-focus light and gives greater resolution than conventional imaging. CLSM offers considerably enhanced imaging of biological structures, mainly due to the ability to collect optical slices of the object for use in creating a three dimensional representation of the sample. Enhancements are such that it is possible to visualise interior sections (Michels 2007). This technique offers an accurate representation of the form of the first pleopod (G1) and offers greater detail than could be gained from using scientific drawing techniques. Four wavelengths were used for imaging; 403, 487, 561 and 638 nm.

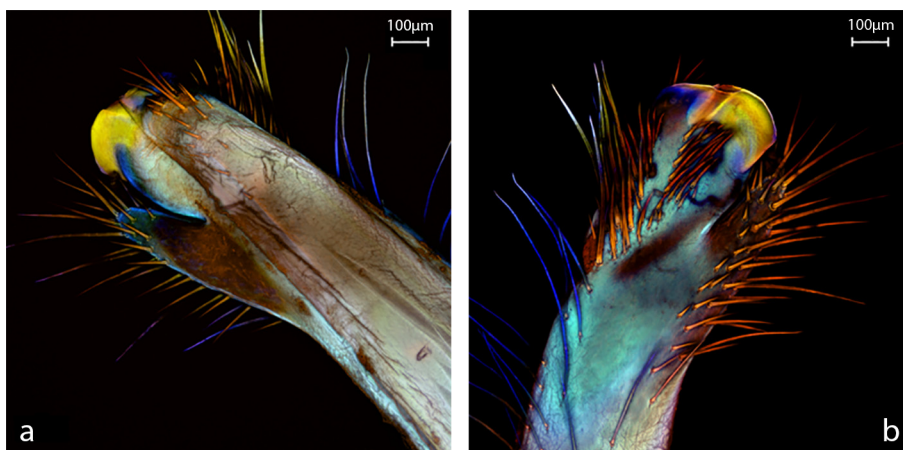


FIGURE 2. *Uca cryptica*: a, apical part of G1 mesial surface; b, apical part of G1, lateral surface. CLSM image formed via autofluorescence.

Remarks

The specimens examined fit the description given by Naderloo *et al.* (2010), specifically the distinct inclination of the apical part of the (G1) of the male (Fig. 2). Other distinguishing features, which set *U. cryptica* apart from other closely

related species, namely *U. annulipes* and *U. perplexa*, are the gastric mill and the lack of a tuft of setae on the lower anterior corner of the merus of the major chela.

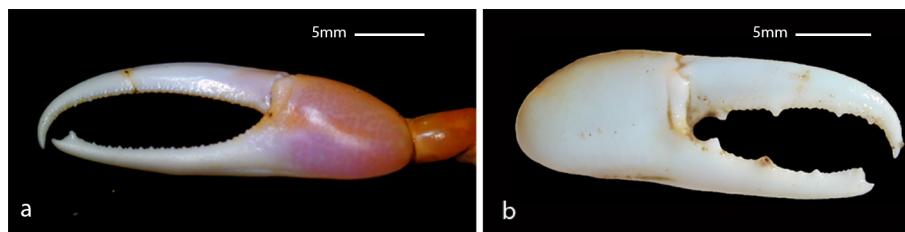


FIGURE 3. Variation in male chela of *Uca cryptica*: a, b, major chela, outer surface.

Uca cryptica inhabits the seaward fringe of a mangrove forest and intertidal mudflat. Only one small population of *U. cryptica* (32 individuals) has been recorded to date, living mainly under the shelter of *Avicennia* and *Rhizophora* trees. They live in a substratum of medium-to-fine sand, tend to burrow in the shade and are active during the complete low tide period. They feed around individual burrows venturing no more than 45 cm from the burrow opening during feeding. Males made up almost 75% of the population and 70% of the females were ovigerous when recorded during the months of June to August 2013. Up to 12 individuals per m² were observed.

The major chela form of adult males varies considerably. Figure 3 shows the claws of two male adults of similar size from the same site. Crane (1975) noted intraspecific dimorphism of the major chela in multiple species. Females are generally smaller, but similar in morphology to the described males. It should be noted that females appear to have two rows of suborbital crenellations, one above the other, with the top row not extending the full width of the lower.

The species has been seen living in sympatry amongst nine other species within a 20 m² area: *Uca jocelynae* Shih, Naruse & Ng 2010 (= *U. vocans* Linnaeus, 1758), *U. perplexa* H. Milne-Edwards, 1852, *U. dussumieri* H. Milne-Edwards, 1852, *U. triangularis* A. Milne-Edwards, 1873, *U. crassipes* Adams & White, 1848, *U. demani* Ortmann, 1897, *U. mjoebergi* Rathbun, 1924, *U. tetragonon* Herbst, 1790 and *Uca coarctata* H. Milne-Edwards, 1852.

Uca cryptica is a member of the *Uca lactea* complex (De Haan 1835). Fiddler crab species have been grouped into a number of subgeneric taxa (see Crane 1975; Bott 1973; Rosenberg 2001; Beinlich & von Hagen 2006), yet for the purpose of this study, we have grouped *U. cryptica* according to Shih *et al.* (2013), who placed the *Uca lactea* complex within the *Austruca* Bott, 1973 subgenus, which also contains *U. perplexa*, *U. annulipes* H. Milne Edwards, 1837, *U. albimana* Kossmann, 1877, *U. iranica* Pretzmann, 1971, *U. lactea* De Haan, 1835, *U. mjoebergi*, *U. triangularis*, *U. bengali* Crane, 1975, and *U. sindensis* Alcock, 1900, three of which are present at this site.

Colouration. The male carapace is largely black, with white transverse markings (Fig. 4). Transverse bands vary in size and number (Figs. 4c, d). There are some individuals where there is as much white as black, and occasionally the pale region is turquoise rather than white. The dactyl and pollex of the major chela generally have white tips, with the base having orange or pink colouration (Figs. 4a, b) which extends to the manus and carpus. The dactyl and pollex can nevertheless be all white or in equal parts white and orange or pink. The merus is usually the same colour as the adjacent manus and carpus, but a darker shade (Figs. 4a, c, d). In younger males the carapace is usually a mottled light brown/russet, with the patterns and darker colours developing with maturity. The major chela likewise tends to be light brown and pink at the juvenile stage but becomes darker with maturation. The walking legs and the minor chela are black, dark brown or grey (Fig. 4b). The anterior ventral surface of the carapace and the merus of the third maxilliped are generally black. The ventral surface of the ischium of the third maxilliped is almost always white or pink. The colouration of adult females varies greatly. The carapace is most often a pale shade of pink or orange and can occasionally be grey (Figs. 4e, f). There is frequently a white band across the lower posterior region (Fig. 4f). The walking legs in females are similar to those in males (Fig. 4e). Juvenile females have the same colour pattern as juvenile males.

As the colouration of *U. cryptica* has been described from this site only, it is not known whether this will be the case elsewhere. Some species of fiddler crab have been known to differ in colouration depending on geographical location and sympatric associates (Crane 1975). In Australia, specifically the coast of Queensland, *U. perplexa* has a yellow major chela and generally a mottled brown carapace, yet, *U. perplexa* at this site has a white major chela with yellow carpus, merus and ischium and a carapace that has white and black transverse pattern. This colouration could be due to the presence of *U. mjoebergi* at this site, which has very similar colouration to the Australian *U. perplexa*. Crane (1975) noted that one species can, in some regions, have the same colouration as another elsewhere. Females are known to use colour vision when choosing a mate (Detto 2007), so being a distinguishable colour can be vital for successful reproduction. At this site it is possible to distinguish most species using colour and size only, especially in the case of

adult males. Here, *U. cryptica* resembles *U. annulipes* elsewhere, which could make distinguishing by colour alone difficult if found together, yet as noted by Naderloo (2010) they are still discernible by the shape of the G1 and the median tooth of the gastric mill.



FIGURE 4. *Uca cryptica*; Kaledupa, Sulawesi Tenggara, Indonesia; a,b, male adults, anterior view; c,d, male adults, posterior view; e,f, female adults, posterior view. Photos a, d, e, f, by L. Michie; b, c, by R.S.K. Barnes.

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