

Biodiversity Record: Ex-situ observation of mating swamp forest crabs, *Parathelphusa reticulata*

Chin Yu Xun, Wayne Z. H. Tan & Daniel J. J. Ng^{1*}

¹National Parks Board, Singapore Botanic Gardens, 1 Cluny Road, Singapore 259569; Email: yuxun.sg@gmail.com (Chin), waynetanzh63@gmail.com (Tan), Daniel_NG@nparks.gov.sg (*corresponding author)

Recommended citation. Chin YX, Tan ZHW & Ng DJJ (2024) Biodiversity Record: Ex-situ observation of mating swamp forest crabs, *Parathelphusa reticulata*. Nature in Singapore, 17: e2024049. DOI: 10.26107/NIS-2024-0049

Subjects: Reticulated swamp forest crab, *Parathelphusa reticulata* (Crustacea: Decapoda: Gecarcinucidae).

Subjects identified by: Daniel J. J. Ng.

Location, date and time: Singapore Island, Singapore Botanic Gardens; 19 March 2024 at 1615 hrs, 25 March 2024 at 1642 hrs, 1 April 2024 at 1407 hrs and 3 April 2024 at 1547 hrs.

Habitat: Plastic aquariums measuring 29 × 17.5 × 18 cm maintained at around 25°C in a room within a low concrete building, devoid of substrate and décor, filled with about 5 cm (depth) of freshwater. The water was reconstituted by adding dechlorinator to tap water before filtering it through mixed bed resin to reduce water hardness (Fig. 1).

Observers: Chin Yu Xun, Wayne Z. H. Tan and Daniel J. J. Ng.



Fig. 1. Top-down view of plastic tank set-up for paired crabs (Photograph by: Chin Yu Xun).

Observations: Four mixed sex pairs of captive bred *Parathelphusa reticulata* were set up in four separate vivariums. Each pair was assigned the letters A, B, C and D. The carapace width (CW) of males ranged between 26.46–29.27 mm, while the CW of females ranged between 26.64–28.90 mm.

On 19 March, pair A was observed mating approximately 2 hours after the male and female crabs were introduced. Pair B was observed mating on 25 March approximately 1 hour and 40 minutes after the individuals were placed together. Pair C was observed mating on 1 April approximately 6 minutes after they were introduced to each other. Pair D was observed mating on 3 April approximately 2 hours 46 minutes after introduction.

No obvious courtship behaviour was observed in all the pairings, with the males practising forced copulation instead. In all pairings, the males displayed aggressive behaviour, grasping the females by the chelae. For pair A, the male first flipped the female using his pereopods, before rotating her such that their ventral surfaces come into contact. Whereas for pair B, C and D, the males used their chelae to pull the females over such that their ventral surfaces immediately came into contact.

In this sternum-to-sternum position, the male inserted their gonopods into the female genitalia (Fig. 2). The female was on top while the male lay on the bottom of the tank on the dorsal surface of his cephalothorax (Fig. 3). Mating lasted approximately 1 hour, 33 minutes, 29 minutes and 23 minutes for pairs A, B, C and D respectively. The crabs remained motionless during copulation and separated after the male released the female, with no mate guarding behaviour exhibited by the males.



Fig. 2. Rear view of pair B with the male gonopods inserted into the female genitalia (Photograph by: Chin Yu Xun).



Fig. 3. Dorsal view of mating pair B in sternum-to-sternum position, with the female on top (Photograph by: Chin Yu Xun).

All the crabs had not moulted recently and had hard integuments, indicating that they were in the inter-moult phase. These captive bred animals are being paired as part of an ongoing ex-situ conservation effort by the National Parks Board to establish a self-sustaining assurance population. Only 15% of pairings resulted in successful copulation, with no interactions between the male and female observed in majority of the pairings.

Remarks: The featured observation is a deviation from the usual contents of Biodiversity Records. Although it involves captive animals, it has direct implications to the survival of a locally endemic species that is listed in the International Union for Conservation of Nature (IUCN) Red List as Critically Endangered. To our knowledge, *Parathelphusa reticulata* mating has not been observed in the wild as the species is cryptic in nature and tends to hide within thick leaf litter (Ng, 1990). The observed mating is similar to *Johora singaporensis*, another endemic freshwater crab in Singapore, where the female is positioned above the male (Chua et al., 2014). Male aggression during copulation is also observed in other primary freshwater crabs such as *Zilchiopsis collastinensis*, *Dilocarcinus pagei* and *Trichodactylus borellianus* (Senkman et al., 2015). This record serves as a more detailed supplement to the mating observations mentioned in Ng et al. (2023).

Note: This observation was made during research conducted under the permit: NP/RP17-021 and funded by the Species Recovery Programme, National Parks Board.

Literature cited:

- Chua KWJ, Ng DJJ & Yeo DCJ (2014) In situ observations of mating behaviour of the Singapore freshwater crab *Johora singaporensis* (Crustacea: Brachyura: Potamidae). *Nature in Singapore*, 7: 117–120.
- Ng DJJ, Tianjiao L, Misba DAB, Ong B, Cai Y & Er KBH (2023) Ex-situ conservation of the critically endangered swamp forest crab *Parathelphusa reticulata* Ng, 1990 (Decapoda: Brachyura: Gecarcinucidae): observations on its reproduction and biology in captivity. *Raffles Bulletin of Zoology*, 71: 366–376.
- Ng PKL (1990) *Parathelphusa reticulata* spec. nov., a new species of freshwater crab from blackwater swamps in Singapore (Crustacea: Decapoda: Brachyura: Gecarcinucoidea). *Zoologische Mededelingen*, 63: 241–254.
- Senkman LE, Negro CL, Lopretto EC & Collins PA (2015) Reproductive behaviour of three species of freshwater crabs of the family Trichodactylidae (Crustacea: Decapoda) including forced copulation by males. *Marine and Freshwater Behaviour and Physiology*, 48: 77–88.