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# Biodiversity Record: Observations of the damselfly, *Ceriagrion chaoi*, at Woodlands

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**Subjects:** Fiery coraltail, *Ceriagrion chaoi* (Insecta: Odonata: Coenagrionidae).

**Subjects identified by:** Hung Bun Tang, Robin W. J. Ngiam and Lumin Ong Jun Xiang.

**Location, dates and times:** Singapore Island, Woodlands Botanical Garden; 17 February 2024 at around 0900, 15 March to 6 July 2024, and 7 October 2024; morning.

**Habitat:** Urban parkland. Man-made pond of about 4 $m^2$ (Fig. 1) and a smaller pond of about 60 × 60 cm (Fig. 2), both filled with freshwater and densely stocked with submerged, emergent, and floating plants. The ponds, bordered by trees and shrubs, are located at the bottom of a wildlife-oriented community garden at the base of a hill which is covered on top by a small patch of secondary forest.

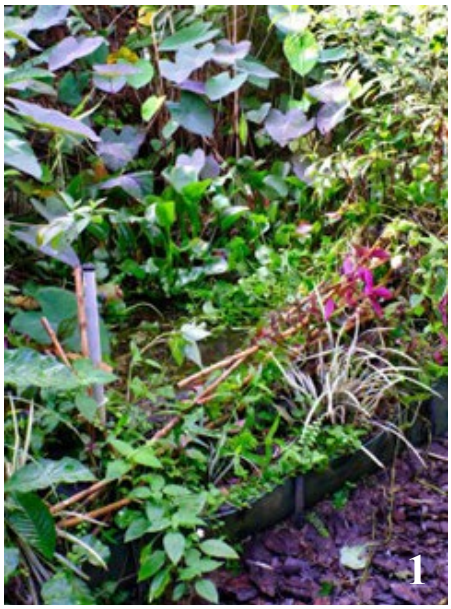


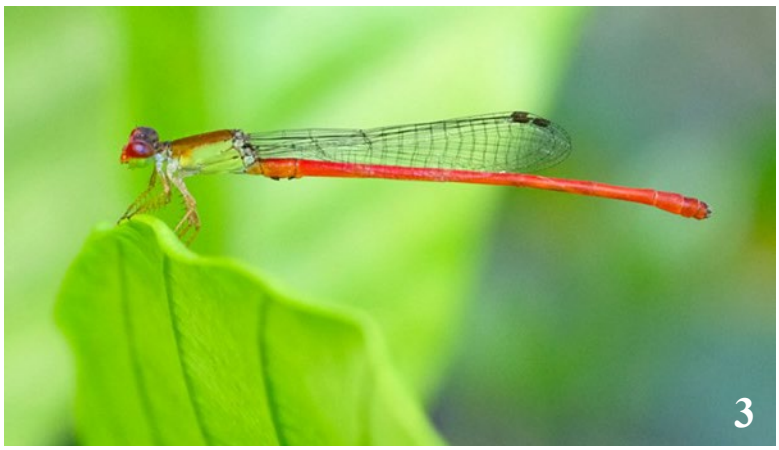


Fig. 1. Man-made pond of about 4 $m^2$, filled with submersed and immersed plants, bordered by larger shrubs and trees. Fig. 2. Isolated smaller pond of about 60x60 cm, also densely planted (Photographs by: Hung Bun Tang).

**Observers:** Hung Bun Tang, Ganesh Kumar Devakumar, Robin W. J. Ngiam, Lumin Ong Jun Xiang, Tay Jing Xuan, Henrietta Woo, Elliott James Ong, Lena Chow, Pei Shuan Goh, Nicole Li Ying Lee, and Elliott James Ong.

**Observations:** A male *Ceriagrion chaoi*, perched on some plants bordering the main pond, was first spotted on 17 February 2024 at around 0900 hrs by Ganesh Kumar Devakumar. A population of this species has since been noted at the site and Hung Bun Tang made observations on this population about three times a week for four months from 15 March 2024 to 6 July 2024. Alongside sporadic sightings by the other observers, the following behaviours were noted:

1) *Ceriagrion chaoi* forages in the main pond by 'hawking', i.e., perching on a tip or edge of a leaf (Fig. 3) and waiting for a prey item to fly by before intercepting it, and then returning to its perch to feed. These damselflies have been observed to only take tiny prey of no more than a few mm in size, such as small flies (Fig. 4; video clip at https://www.youtube.com/watch?v=KT5HuMAeM8I&t=9s).



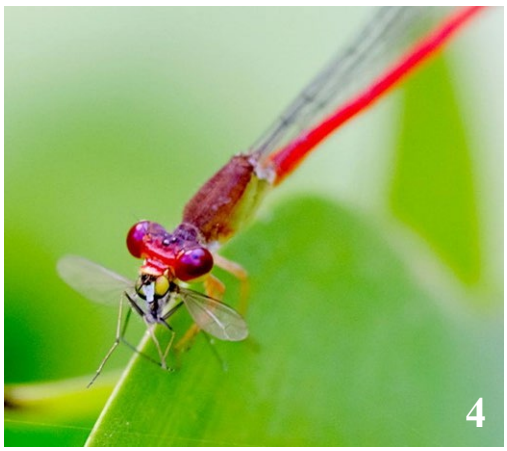
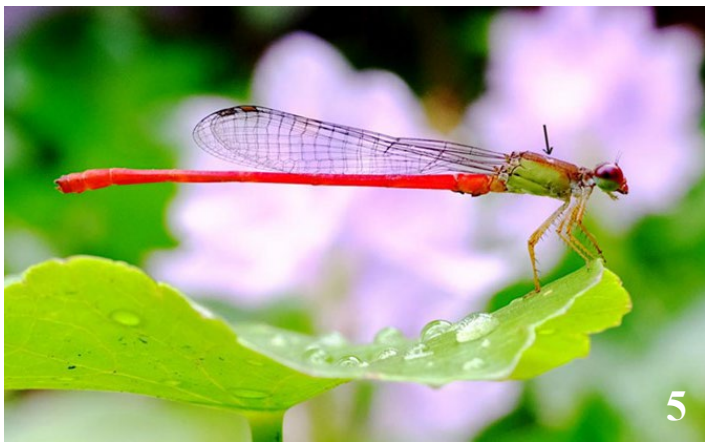


Fig. 3. Lateral view of a male *Ceriagrion chaoi*, about 3cm total body length, perching on a leaf of a *Odontadenia macrantha* plant. Fig. 4. Fronto-lateral view of a male *Ceriagrion chaoi* consuming a small fly (Photographs by: Tang Hung Bun).

2) On warm and sunny days, the males were observed to arrive in the main pond at around 1000 hrs or earlier and perched on the tips or edges of leaves, such as that of water hyacinth (*Pontederia crassipes*). Similar to its foraging behaviour, they would attempt to chase or flee conspecifics and other odonates such as common parasols (*Neurothemis fluctuans*) (see Corbet, 1999). They seemed much more responsive and aggressive to conspecifics than to other species (video clip at https://www.youtube.com/watch?v=KT5HuMAeM8I&t=60s). An individual identifiable by a distinctive mark on its back (Fig. 5) dominated the pond from 25 April 2024 until 31 May 2024 for at least 36 days, where he frequently chased off other males and mated with females. On cloudy and gloomy days, the males arrived in the pond usually later. It was also noted that due to the space limitations, usually only one to three males occupied the pond (video clip at https://www.youtube.com/watch?v=KT5HuMAeM8I&t=100s).

3) Male *Ceriagrion chaoi* would descend to the pond from tall trees and shrubs such as two *Syzygium polyanthum* trees with dense foliage, over 20 m in height, and about 25 m away from the pond. The species was observed perching on plants of varying height throughout the garden when not occupying any of the ponds (Fig. 6).



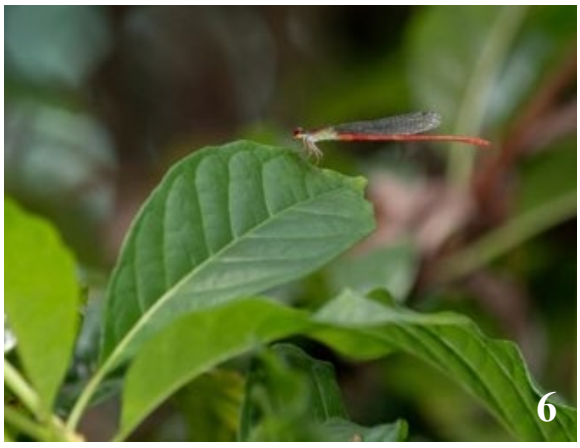
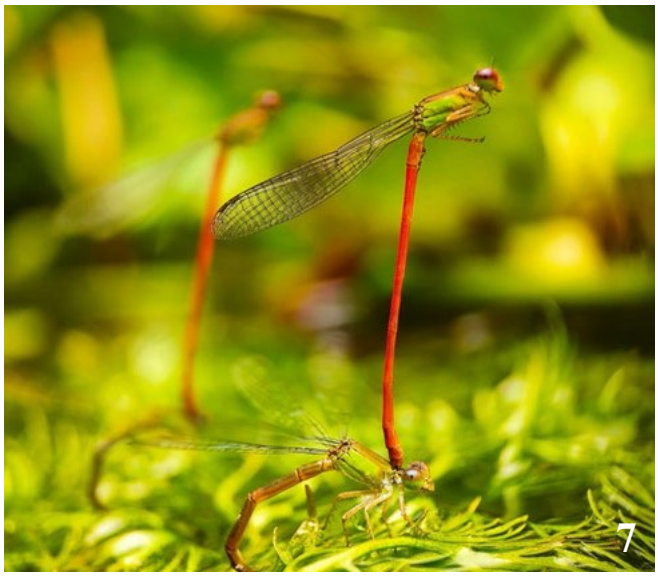


Fig. 5. Lateral view of a male with a distinctive mark on the dorsal surface of his thorax (nicknamed 'Scarred Back'), was the dominant male in the pond for at least 36 days (Photograph by: Tang Hung Bun). Fig. 6. Lateral view of a male *Ceriagrion chaoi* perching at eye-level a few metres away from the main pond (Photograph by: Lumin Ong Jun Xiang).

4) Later in the day, at around 1000 to 1200 hrs, there would usually be a lone female occupying the pond alongside the males that were present earlier. Upon sighting her, a male would fly to her and seize her, falling to the ground before assuming tandem formation (see Nilesh et al., 2018). If successful, copulation occurred (video clip at https://www.youtube.com/watch?v=KT5HuMAeM8I&t=192s) and the pair would fly to look for suitable oviposition sites. The females seemed to only oviposit in aquatic plant masses such as the roots of floating plants, all while the male stood guard attached to her prothorax (video clip at https://www.youtube.com/watch?v=KT5HuMAeM8I&t=222s). On 7 October 2024, three pairs in tandem were observed ovipositing at the smaller pond by Lumin Ong Jun Xiang and Tay Jing Xuan (Fig. 7). It was noted by this time, the population of *Ceriagrion chaoi* at the Woodlands Botanic Garden has reached at least three times the size than during Tang Hung Bun's observation period, with at least 10 individuals counted.

5) On 6 July 2024 at 1015 hrs, a final instar larva of *Ceriagrion chaoi* was photographed by Elliott James Ong slowly crawling out of the water and climbing up a water hyacinth plant (Fig. 8). After a series of slow movements and changes in colour, it began ecdysis at 1047 hrs. By 1200 hrs, the insect had become a teneral with glittering wings and a pale coloured body, walking about on the leaf occasionally. Observation ended thereafter, and the teneral was missing upon

the observer's return an hour later, possibly having taken its maiden flight (video clip at https://www.youtube.com/watch?v=KT5HuMAeM8I&t=234s).



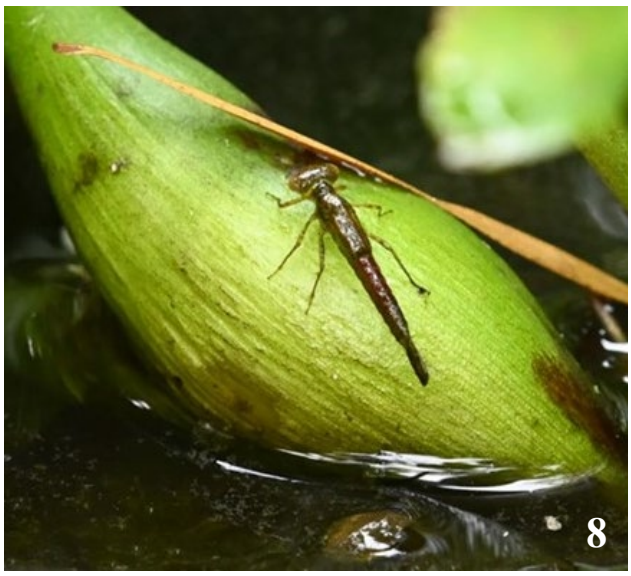




Fig. 7. Lateral view of two pairs of *Ceriagrion chaoi* side-by-side on the water surface at the smaller pond on 7 October 2024. Note the female laying eggs into the water with the male performing contact guarding over her (Photograph by: Tay Jing Xuan). Fig. 8. Dorsal view of a final instar larva crawling up a water hyacinth plant for emergence (Photograph by: Elliott James Ong).

**Remarks:** *Ceriagrion chaoi* is a nationally vulnerable damselfly that has a limited distribution in Singapore, with established populations known from Eng Neo forest and Ulu Sembawang (Ngiam & Ng, 2022). This is the first record of the species at Woodlands. It thrives on weedy ponds with rich aquatic vegetation. Where it occurs, it is usually dominant over the more widely distributed and common *Ceriagrion cerinorubellum*.

On a barren plot of land previously overgrown with lalang, Woodlands Botanical Garden was founded by Ganesh Kumar Devakumar as a collaboration with NParks in July 2020, with the aim to serve as a haven for biodiversity (see https://woodlandsbotanicalgarden.com/about-woodlands-botanical-garden/). The garden was immensely successful in attracting biodiversity, including various species of birds, butterflies and odonates. Noting a lack of a water source, a pond of about 4 $m^2$ was created. It is well vegetated, both inside and around it, with aquatic plants such as water hyacinth (*Pontederia crassipes*), blue water-hyssop (*Bacopa caroliniana*), mosaic plant (*Ludwigia sedioides*), horsetail (*Equisetum hyemale*), weeping tea trees (*Leptospermum madidum*), as well as a broad-leaved flowering vine, *Odontadenia macrantha*, growing on an adjacent structure (video clip at https://www.youtube.com/watch?v=KT5HuMAeM8I).

Alongside the smaller pond, the garden's water bodies are relatively small and susceptible to environmental factors, which can have an abrupt, adverse impact on the *Ceriagrion chaoi* population there. Hence, it is recommended that a larger pond, which replicates the habitat of the existing ponds, be constructed in the garden (see Córdoba-Aguilar, 2010). This should help towards the conservation of the nationally vulnerable *Ceriagrion chaoi* and other odonates, all while enhancing nature in urban areas.

**Acknowledgements:** Henrietta Woo, Elliott James Ong, Lena Chow, Pei Shuan Goh and Nicole Li Ying Lee graciously shared their observations, photographs and videos of the emergence of a final instar larva on 6 July 2024. Boo Chih Min helped with the identification of some plants in and around the Woodlands Botanical Garden.

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