

**ENCOUNTERS WITH *TETRACANTHAGYNA PLAGIATA* (WATERHOUSE)  
IN SINGAPORE, WITH AN OBSERVATION OF OVIPOSITION  
(ODONATA: ANISOPTERA: AESHNIDAE)**

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**INTRODUCTION**

Members of the dragonfly genus, *Tetracanthagyna* Selys, 1883 are among the largest representatives of the extant Odonata. The genus is currently represented by five species, namely: (i) *Tetracanthagyna bakeri* Campion & Laidlaw, 1928 (Philippine Islands); (ii) *Tetracanthagyna brunnea* McLahlan, 1898 (Thailand to Borneo); (iii) *Tetracanthagyna degorsi* Martin, 1895 (Sumatra, Java, Borneo); (iv) *Tetracanthagyna plagiata* (Waterhouse, 1877) (Oriental region); and (v) *Tetracanthagyna waterhousei* McLahlan, 1898 (Oriental region) (Steinmann, 1997). In Singapore, there have been occasional and isolated records of *Tetracanthagyna plagiata*, which is also the type species of the genus. Locally, it may also be referred to by its vernacular name, the ‘giant hawker’ (Norma-Rashid et al., 2008).

Using the wingspan as a benchmark, the largest living odonate would be the South American damselfly, *Megaloprepus caerulatus* (Drury, 1782) (suborder Zygoptera: family Pseudostigmatidae), and taking second place are the females of *Tetracanthagyna plagiata* (Wilson, 2009). However, female *Tetracanthagyna plagiata* is reckoned to be the heaviest of all living Odonata (Tillyard, 1917).



Fig. 1. Female *Tetracanthagyna plagiata* individual found in Bukit Kallang on the morning of 31 Jul.2008 by Tay Soon Lian. It was already weak and unable to fly, possibly near the end of its life. It was preserved as a voucher specimen (ZRC.ODO.18, hind-wing span = 143 mm). (Photograph by: Leong Tzi Ming).

The earliest published record of *Tetracanthagyna plagiata* in Singapore appears to be by René Martin, who also reported the species to occur in Borneo, Sumatra and Malacca (Martin, 1909). Lieftinck (1954) also included Singapore within the distributional range for the species. In his monumental work on odonate behaviour and ecology, Philip S. Corbet featured a photograph (taken by M. A. Lieftinck) of a male specimen of this species which was “caught at light on Singapore Island in June 1950” (Corbet, 1999: 353, Fig. 9.8). Corbet (1999) also stated its hind-wing span to be 144 mm and pointed out the clearly visible pair of oreillets (ventro-lateral protruberances on the second abdominal segment of the male). This very specimen resides in the entomology section of the Zoological Reference Collection (ZRC), Raffles Museum of Biodiversity Research (RMBR), Department of Biological Sciences, National University of Singapore, and bears the catalogue number ZRC.6.06. In addition to being the earliest specimen for the species in the museum, it is also the only representative male specimen at the moment. The original specimen label that accompanies the specimen (ZRC.6.06) did not indicate a collector’s name, but bears the characteristic handwriting of Michael W. F. Tweedie (Lua Hui Kheng, pers. comm.), who was the former director of the Raffles Museum, Singapore between 1946 and 1971. It is possible that he collected this male specimen.

Since the initial museum acquisition of this local *Tetracanthagyna plagiata* specimen, subsequent sightings, and vouchers for the species have been few and far between in Singapore. During the 1990s faunal inventory of the Central Catchment Nature Reserve, D. H. Murphy (Department of Biological Sciences, National University of Singapore) recorded a female specimen collected at the Nee Soon Swamp Forest (Murphy, 1997). He considered this, plus seven other odonate species, as being confined to the Nee Soon Swamp Forest. In recent years, we and our colleagues have encountered adults outside of the Nee Soon Swamp Forest and can therefore announce the encouraging news that the species evidently has a wider range within the Central Catchment Nature Reserve.

### OBSERVATIONS

On the morning of 11 Aug.2004, an adult female *Tetracanthagyna plagiata* was sighted at the Central Nature Reserve (CNR) office at Bukit Kalang by Aminurashid (CNR, National Parks Board). It may have been attracted to the lights the night before, but was found to be weak and unable to fly when encountered. The dragonfly had most probably reached the end of its natural life span and was subsequently preserved as a voucher specimen at the ZRC (ZRC.ODO.17, hind-wing span: 143 mm, body length: 87 mm). On 31 Jul.2008, another female dragonfly of the same species was found by SLT at the same locality. It was also weak and made no effort to fly away. This specimen was then photographed (Fig. 1) and preserved soon after (ZRC.ODO.18, hind-wing span: 143 mm, body length: 85 mm). Both specimens (ZRC.ODO.17, 18) lacked the distal, transverse dark banding patterns (variable character) on the fore- and hindwings, unlike the individual female previously collected by Murphy (1997: 350, Plate 1–dragonfly #1). This colouration occurs in a minority of specimens throughout its range (A. G. Orr, in litt.).



Fig. 2. Oviposition by a female *Tetracanthagyna plagiata* beside a clear, shallow, sandy stream within the MacRitchie Reservoir forest on the afternoon (ca. 1515 hrs) of 30 Jan.2009. It repeatedly attempted to insert its ovipositor (arrowed) into the rotten log. (Photograph by: Tay Soon Lian).



Fig. 3. Dorsal view of resting female *Tetracanthagyna plagiata*, wing-span between 140–150 mm. (Photograph by: Tay Soon Lian).

On the afternoon of 30 Jan.2009, we were conducting a routine faunal survey within the MacRitchie Reservoir forest when an adult *Tetracanthagyna plagiata* was spotted flying low (waist level) over a sandy, forest stream. At ca. 1515 hrs, this dragonfly then perched on a moss-covered, decomposing log beside the stream and began to arch its abdomen in order to insert its ovipositor into the soft, moist wood (Fig. 2). The female deliberately scraped and dug into the branch for just over a minute, after which it flew off downstream. While SLT attempted to pursue the female downstream, TML continued upstream. At ca. 1530 hrs, TML witnessed a second dragonfly of the same species perched on a rattan leaf adjacent to the stream. When approached, it flew off and perched on a sapling ca. three metres away from the stream.

Shortly after, SLT also arrived at this location and cautiously approached the dragonfly for detailed photographic documentation (Figs. 3–5). Upon closer inspection, it was determined to be a female. Close examination of the posterior end of its abdomen allowed us to observe the ovipositor clearly (Fig. 5). Small specks of fresh wood debris on and around the ovipositor provided evidence that this female had also been recently engaged in ovipositing, as we had witnessed earlier. Despite our proximity to the female *Tetracanthagyna plagiata*, the specimen was not collected, as we were uncertain if it had completed its egg laying duties.

## DISCUSSION

There are few other published accounts of oviposition by *Tetracanthagyna plagiata* in the field. A succinct article by Watanabe (2003) summarised an observation of egg deposition by a female of this species beside a river in lowland forest, 20 km north of Kota Tinggi, Johore, Peninsular Malaysia, in May 2002 (with a photographic record). Consistent with the species, it inserted its ovipositor into decaying wood. Its reported oviposition site was ca. 150 cm above the water surface.

In Singapore, encounters or reports of the larvae of *Tetracanthagyna plagiata* have been scarce. Nevertheless, detailed illustrations of the nymphs of *Tetracanthagyna* species (e.g., Dudgeon, 1999; Orr, 2005) are available for comparative purposes and would serve as identification aids when similar looking larvae are found in future stream surveys. In Brunei (Borneo), the diagnostic larva of *Tetracanthagyna degorsi* has been described (Orr, 2001). Hopefully, our knowledge of the larval biology of *Tetracanthagyna plagiata* may eventually approach a level comparable to that attained for *Tetracanthagyna waterhousei* in Hong Kong (Wilson, 2004), where accounts of predation (on fish) and eclosion from exuvia have been documented.



Fig. 4. Ventrrolateral view of female *Tetracanthagyna plagiata* (as in Fig. 3). (Photograph by: Tay Soon Lian).



Fig. 5. Lateral closeup of posterior abdominal segments of female *Tetracanthagyna plagiata* (as in Figs. 3, 4) to illustrate ovipositor structure. Note the remnant fragments of soft wood debris (arrowed), clear indications of its recent attempts at oviposition. (Photograph by: Tay Soon Lian).

Our understanding of the ecology, behaviour, and morphology of odonate larvae are crucial to unlocking the mysteries of this amphibious insect order. When analysed in concert with adult characters, a more accurate picture may be obtained as to the phylogenetic relationships within various groups, such as the Aeshnidae (von Ellenrieder, 2002).

In the last few years, the local community of dragonfly enthusiasts and researchers has grown significantly, with encouraging reports of new records for Singapore's Odonata checklist (Cheong et al., 2009). We salute their continued dedication and devotion, as these will contribute to improving the appreciation and conservation of our native odonate diversity and their fragile habitats.

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