

New record of the dragonfly, *Anax panybeus*, in Singapore

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Subject(s): Arrow emperor, *Anax panybeus* (Insecta: Odonata: Aeshnidae).

Subject(s) identified by: Robin Ngiam, Rory Dow & Albert G. Orr.

Location, date and time: Pulau Ubin, NParks office at Pulau Ubin Volunteer Hub; 10 October 2017; 0700 and 1000 hrs.

Habitat: Low concrete building among gardens in an open rural environment.

Observers: Jacky Soh, Germaine Leng, Siti Khadijah & Noel Thomas.

Observation: A large dragonfly of about 11 cm body length flew into the office at 0700 hrs and was captured by Jacky Soh, Germaine Leng and Siti Khadijah. It was released unharmed after pictures of it (Fig. 1 & 2) were taken. Later in the same day, at around 1000 hrs, an identical dragonfly was found by an NParks volunteer near the toilet. It was handed over to Noel Thomas who released it unharmed after photography (Fig 3, 4 & 5). It cannot be verified if the two dragonflies were the same individual.

Based on the photographs (Fig. 1-5), this dragonfly species is described as follows with morphological terminology mainly following Watson & O'Farrell (1991): frons, postclypeus, anteclypeus and labrum mostly light greenish-yellow; mandibles black; dorsally, frons greenish with a distinctive broad horizontal black stripe extending anteriorly from center to form narrow T-shaped mark; two very light bluish spots present on both sides of the T-mark; antennae black; eyes dark green; thorax entirely green; bluish spots present on the humeral sclerites of all wings; fore wings hyaline; hind wings with patch of amber yellow in discoidal field to slightly beyond nodus; all legs black; first abdominal segment (S1) green; S2 green anteriorly with four distinct blue markings on posterior of dorsum, extending downwards to mid-dorsum; S3 to S10 blackish-brown with S3 to S9 having two small greenish spots on both ends of each abdominal segment; S3 distinctively constricted and elongated, with a blue-white marking anteriorly in latero-ventral view; anal appendages reddish-brown.

Remarks: The genus *Anax* contains 31 recognised species of dragonflies (Schorr & Paulson, 2017). At least five species are known to occur within the Sunda biogeographical region (Seehausen, 2017). They inhabit diverse open wetland habitats such as urban ponds, lakes, rural marshes, rivers and streams.

In Singapore only the widespread *Anax guttatus* was previously known (Ngiam & Cheong, 2016). Locally collected specimens or photographs of *Anax* species that we have seen had all been *Anax guttatus*. These fast fliers are mostly observed during their non-stop territorial patrols over water bodies (Tang et al., 2010). Occasionally an individual or a mating pair may be seen perched vertically on a plant, or ovipositing females may appear at weedy ponds (Robin Ngiam, personal observations). There are also anecdotal reports of individuals flying into buildings, apparently attracted by artificial lights (Annabelle Ng, personal communication, 2012).

Due to the superficial similarity among congeners, *Anax* species can only be identified confidently from either good quality photographs of individuals at rest or from specimens in the hand. It has been acknowledged among local odonatologists that other *Anax* species can also be present in Singapore, with the most likely candidate being *Anax panybeus*. This species is also widespread, and known to be sympatric with *Anax guttatus* (Seehausen, 2017). The present sightings appear to be the first record of *Anax panybeus* in Singapore.

Without inspecting the anal appendages, mature adult *Anax panybeus* can reliably be distinguished from *Anax guttatus* by the presence of a T-mark on the frons (Seehausen, 2017; Kennedy, 1934) and a comparatively more elongated third abdominal segment (Rory Dow, personal communication, 2017). Given the similarity in

appearance and sympatric occurrence with *Anax guttatus*, it is possible that *Anax panybeus* had been overlooked in Singapore. Moreover, adults of *Anax* species are mostly encountered in flight rendering its identification in the field all the more difficult. Indeed, *Anax panybeus* was similarly discovered only recently in Peninsular Malaysia (Choong, 2010) and India (Mitra et al., 2013). *Anax panybeus* appears to be the less widespread and rarer of the two species in Singapore. Adult *Anax* dragonflies are powerful flyers capable of covering up to 100 km in a day during seasonal migration (Wikelski et al., 2006). Hence it is likely for *Anax panybeus* to disperse across the Johor Strait onto Pulau Ubin.

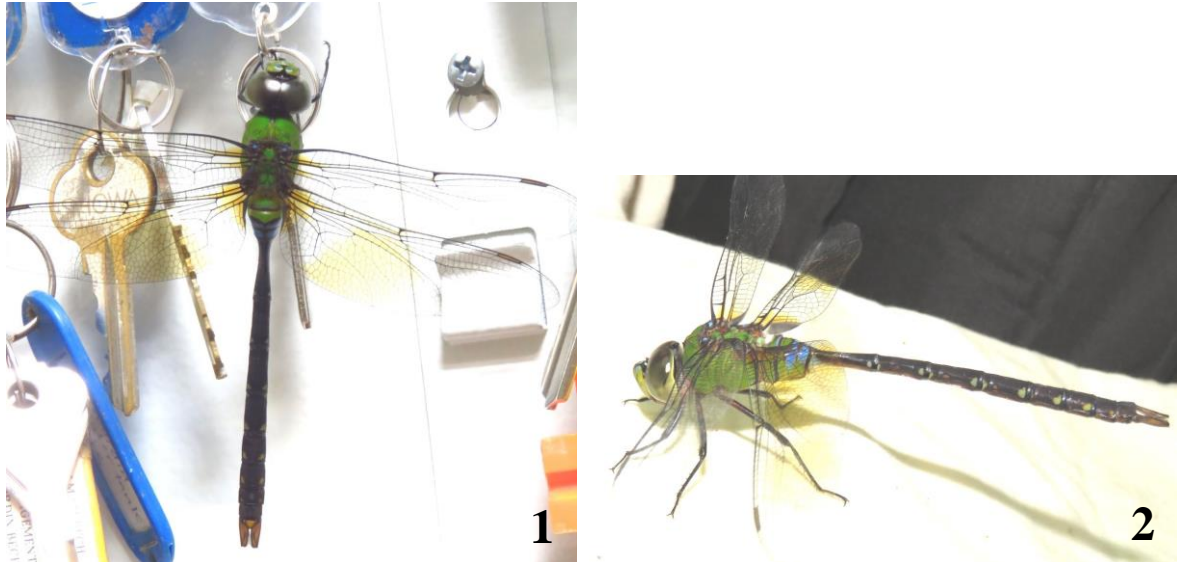


Fig. 1 & 2. *Anax panybeus* that flew into NParks office on Pulau Ubin on 10 October 2017 at around 0700 hrs. Fig. 1 shows the dorsal aspect (Photograph by Germaine Leng), Fig. 2, the lateral view (Photograph by Jacky Soh).



Fig. 3 & 4. *Anax panybeus* that was found near the toilet at NParks office on Pulau Ubin on 10 October 2017 at around 1000 hrs. Fig. 3 shows the lateral view, and Fig. 4 shows the dorsal view. Photographs by Noel Thomas

Based on the criteria set out by Ngiam & Cheong (2016), we provisionally confer *Anax panybeus* with a national conservation status of Critically Endangered (found in only one location), Restricted (found only on Pulau Ubin) and Very Rare (low encounter rate). We propose the English vernacular name 'Arrow Emperor' with reference to the frons T-mark. This new record increases the number of extant Odonata species in Singapore to 123. Including nine species which are nationally extinct, the overall total species recorded in Singapore is now 132.

This discovery highlights the possibility of more cryptic species among Singapore's Odonata. The burgeoning local dragonfly watching community is expected to contribute significantly to the discovery of more new Odonata records.

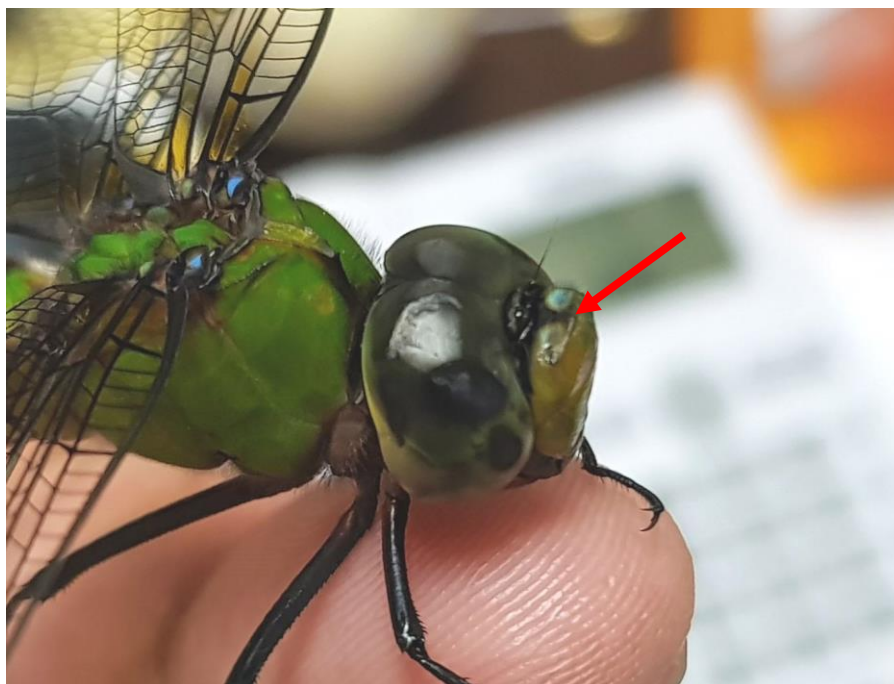


Fig. 5. Dorso-lateral view of the dragonfly's frons dorsum with the distinctive T-mark indicated by the red arrow. Photograph by Noel Thomas

Note: We thank Rory Dow and Albert G. Orr for their help in species identification.

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