Zootaxa 3905 (1): 145–150
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3905.1.10
http://zoobank.org/urn:lsid:zoobank.org:pub:1E6F3CE8-FAF9-443A-97A2-50388447AA06

Phaenandrogomphus safei, a new species from Sabah, northern Borneo (Odonata: Anisoptera: Gomphidae)

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Abstract

Phaenandrogomphus safei is described from a male from the Kalabakan Forest Reserve, Sabah, Malaysian Borneo. It is the first species of *Phaenandrogomphus* to be recorded from Borneo. *Onychogomphus treadawayi*, known from Busuanga Island in the Palawan region of the Philippines, is transferred to *Phaenandrogomphus*.

Key words: Odonata, Anisoptera, Gomphidae, Onychogomphinae, *Phaenandrogomphus*, *safei*, *treadawayi*, new species, new combination, Borneo, Palawan, Malaysia, Philippines, Sabah

Introduction

The genus *Phaenandrogomphus* Lieftinck, 1964 has representatives from India and China to peninsular Malaysia, but no species included in the genus had been recorded from outside of mainland Asia until now. In 2013 the second author collected a small and distinctive gomphid species from a lowland dipterocarp forest stream that forms part of the Stability of Altered Forest Ecosystems (SAFE) Project research site within the Kalabakan Forest Reserve, Sabah. See Ewers *et al*. (2011) for details of the site. Although this species differs in some regards from mainland *Phaenandrogomphus* species, it shares with them an unusual penis structure and form of epiproct and is described here as *Phaenandrogomphus safei*. The species most closely allied to *P. safei* is none of the mainland *Phaenandrogomphus*, but rather *Onychogomphus treadawayi* Müller & Hämäläinen, 1993, known from a single male from Busuanga Island near Palawan in the Philippines (Müller & Hämäläinen 1993). *Onychogomphus treadawayi* shares a similar penis structure, structure of anterior hamules and penis vesicle, colouration and wing venation with *P. safei* and is therefore here transferred to *Phaenandrogomphus*.

Terminology used below mostly follows Watson & O'Farrell (1991) except that the terms cerci and epiproct are preferred over superior and inferior anal appendages. The acronym RMNH is used below for the Naturalis Biodiversity Center (Leiden). As well as the type specimens of *P. safei* and *P. treadawayi* listed below, the following *Phaenandrogomphus* specimens were examined:

Phaenandrogomphus asthenes Lieftinck, 1964—holotype ♂, Malaysia, Selangor, Templer Park, Kuala Lumpur 12–13 mile, 26 iii 1963, leg. M. A. Lieftinck, in RMNH. ♂, Thailand, Chiang Mai, boundary of Doi Suthep National Park, Mae Tachang Stream, 12 viii 2006, leg. R. A. Dow, in coll. R. A. Dow.

Phaenandrogomphus tonkinicus (Fraser, 1926)—♂, Thailand, Chiang mai, Doi Inthanon, Siribhum waterfall, 1250m, 12 vi 1991, leg. M. Hämäläinen, in RMNH.

Phaenandrogomphus safei sp. nov.

(Figs. 1, 3, 4, 5, 6, 7, 8, 11, 12, 13, 14, 15, 16)

Material. Holotype: ♂, Malaysia, Sabah, Kalabakan Forest Reserve, 4˚43'N, 117˚37'E, 29 iv 2013, leg. S. H. Luke. To be deposited at the Forest Research Centre, Sepilok, Sabah.

Accepted by D. Paulson: 25 Aug. 2014; published: 9 Jan. 2015

Hämäläinen (1993) regarding the generic placement of southeast Asian Onychogomphinae, *Phaenandrogomphus* is sufficiently distinctive in its penis structure for its generic status to remain secure. *Phaenandrogomphus safei* and *P. treadawayi* differ in some respects from mainland species: less extensive pale colouration, denser wing venation (see holotype of *P. asthenes* in Figs. 9–10 for comparison), anterior hamule without a posteriad turn, and smaller penis vesicle. Possibly the differences in structure of the anterior hamule, size of penis vesicle and general colouration between mainland and insular representatives of *Phaenandrogomphus* might warrant further division into subgenera or even placement of the insular species into a separate genus, but we prefer to wait until more material and molecular data become available.

Lieftinck (1964) drew attention in *P. asthenes* to the tubercles on the rear of the occiput at the end of the ridges that run on either side of the point of attachment with the prothorax, more developed in the female but also present in the male. Such tubercles are absent in *P. safei*, absent in a male of *P. tonkinicus* from Thailand examined, and barely present in a male of *P. asthenes* from Thailand. The presence of these tubercles, at least in males, cannot be considered a defining character for *Phaenandrogomphus* nor can their absence be used to separate the mainland and island branches of the genus.

Although the Onychogomphinae have formerly been regarded as absent from Borneo (e.g. Orr 2003), *P. safei* is the third member of the subfamily now known to occur on the island (Karube & Sasamoto 2014, Dow 2014). It seems probable that other species from the subfamily will be found to occur in Borneo with further fieldwork.

Acknowledgements

We thank the Sabah Biodiversity Centre, Maliau Basin and Danum Valley Management Committees, the Royal Society Southeast Asia Rainforest Research Programme, the SAFE Project (including funding from the Sime Darby Foundation, permission from Robert Ewers and help in the field from all staff and research assistants), Benta Wawasan, Glen Reynolds, Rory Walsh, Chey Vun Khen (local collaborator) and the Forest Research Centre, Sabah Forestry Department, for research permission and their support of this work. During this work SHL was funded by the Natural Environment Research Council (NERC), Proforest (Oxford), the University of Oxford (Varley Gradwell Travelling Fellowship) and the University of Cambridge (Commonwealth Travel Fund, Tim Whitmore Fund, Panton Trust). Albert Orr made a valuable review of the manuscript that has greatly improved it.

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