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# Description of a new species of the genus *Sarasaeschna* Karube & Yeh, with a key to the species of Taiwan (Odonata: Anisoptera: Aeshnidae)

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## Abstract

*Sarasaeschna chiangchinlii* **sp. nov.** collected from Daxi, Taoyuan County in northern Taiwan is described and diagnosed. Judging from male penile structure, this species is considered to belong to the *pryeri*-group of its genus. It is easily distinguished from all known congeners in having peculiar sickle-shaped cerci in male. The habitats of *S. chiangchinlii* are mainly shaded brooks in lowland areas, which are exceptional for its Taiwanese relatives. Distributional maps and a key are also provided for the four species of Taiwanese *Sarasaeschna*.

**Key words**: new species, *Sarasaeschna*, distribution, key, Taiwan

## Introduction

*Sarasaeschna* was established recently (Karube & Yeh 2001) to include a group of aeshnid species traditionally put in the genus *Oligoaeschna* Selys yet have similar configurations of male penes to those of the Nearctic *Gomphaeschna* Selys (Yeh & Chen 2000). The close relationship between *Sarasaeschna* and *Gomphaeschna* has been supported subsequently by phylogenetic analysis based on external morphological characters (von Ellenrieder 2002). So far, *Sarasaeschna* includes 14 species (Schorr & Paulson 2013), which are mainly distributed in a transverse and narrow belt extending from eastern Himalaya eastward through Laos, Thailand and Vietnam to southern China, Taiwan and Japan (Karube & Yeh 2001; Wilson & Reels 2001; Wilson *et al.* 2008; Xu 2008). Karube & Yeh (2001) recognized three groups in this genus, viz., *pyanan*-, *pryeri*- and *niisatoii*-groups, based mainly on the male penile structures. The above authors defined the genus chiefly with the following characters: body black to dark reddish-brown marked with yellow or apple-green maculation; antefrons wrinkled at least at upper 1/3 with upper margin straight and weakly ridged, postfrons shallowly depressed with a thick black T-mark; pterothorax with a pair of stick- or cigar-shaped dorsal stripes; venation simple and similar to that of *Oligoaeschna*; abdomen spindle-shaped after S3, male epiproct deeply bifurcate apically as in *Gomphaeschna*; female cerci short and as long as S10, or longer, slim and blade-shaped; male penis with 1st segment (sperm vesicle) broadly hollow ventrally and cup-shaped, 3rd segment squarish and tumid, apico-lateral sides with striate micro-sculptures, 4th (apical) segment deeply notched laterally with well-developed ventrobasal sclerotized plates (cf. Yeh & Chen 2000) and long, flat and strongly curved flagella.

In Taiwan, three species of the genus *Sarasaeschna* have been recorded, i.e., *S. lieni* (Yeh & Chen 2000), *S. tsaopiensis* (Yeh & Chen 2000) and *S. pyanan* (Asahina 1951). These species usually live in sphagnum bogs or grassy swamps in remote mountain areas with well-developed forest vegetation and free from human disturbance (pers. obs.). However, an unknown species of this genus has been discovered recently in several localities mainly in the lowland areas of northern Taiwan. This species inhabits small and heavily shaded slow flowing waters, which is exceptional for the other Taiwanese *Sarasaeschna*. In this article, we describe this species as new and give its diagnosis and general habit. The known localities of the four *Sarasaeschna* species of Taiwan are plotted on maps to show their known distribution in the island. A key to both males and females is also provided for easy identification of the Taiwanese *Sarasaeschna*.

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Further investigations to monitor the population status of *S. chiangchinlii* in the known localities and to search for more populations in different areas of the island are highly recommended.

## Distribution of *Sarasaeschna* in Taiwan

The known localities of the four *Sarasaeschna* species in Taiwan were shown in Fig. 36. They are generally widespread through the island and overlap each other in altitudinal distribution; coexistence of two species in the same locality is also common. As mentioned earlier, *S. chiangchinlii* is a lowland species with altitudinal range not reaching above 700 m. *S. tsaopiensis* has an altitudinal range from 350–1000 m, with only three known discrete localities in Yilan County in the north, Hualien County in the east and Pingtung County in the south; it coexisted with *S. chiangchinlii* in Gangzaishan Swamp, Pingtung at lower elevation and with *S. lieni* in Tsaopi, Yilan and Matailin Swamp, Hualien at higher elevation; *S. tsaopiensis* also exhibits geographic variation in body maculation, individuals of the southern population in Gangzaishan Swamp with reduced yellow markings on body, especially on S2 (Fig. 14). *S. lieni* occurs at a wider elevation range, overlapping in lower mountain areas with *S. tsaopiensis* between 800–1000 m and with *S. pyanan* in higher mountain areas between 1700–2200 m. *S. pyanan* is mainly a high mountain species, which can only be found from 1700 m to a little above 2200 m.

## Key to the species of *Sarasaeschna* in Taiwan

1 Upper spot on dorsal side of pterothorax triangular and transverse (Fig. 18); flagella of male penis protrude vertically and perpendicular to 4th segment (cf. Karube & Yeh 2001, Fig. 11; Yeh & Chen 2000, Fig. 19b); male with posteroventral corner of S2 smoothly curved (Fig. 31); male cercus shorter than 2X length of S10 (Figs. 22, 26); maculation of S2 as shown in Figs. 8–9 . *S. pyanan*

- Upper spot on dorsal side of pterothorax round or oval (Figs. 19–21); flagella of male penis not protruding vertically; male cercus as long as or longer than 2X length of S10; male with posteroventral corner of S2 obtusely angulate (Fig. 32) . . . . . 2

2 PD spots of S2 distinctly separated from each other (Figs. 10–11); flagella of male penis protruding obliquely and laterally crossed over 4th segment (cf. Karube & Yeh 2001, Fig. 14; Yeh & Chen 2000, Fig. 19c), male cercus slender (Figs. 23, 27) . . . . . *S. lieni*

- PD spots of S2 close or connected to each other (Figs. 12–13, 15–17); flagella of male penis protruding horizontally, male cercus stalked with apical part abruptly broadened . . . . . 3

3 PD spots of S2 transverse (Figs. 12–13); male cercus razor-like, epiproct elongate with shallow apical notch (Figs. 24, 28); female with abdomen spindle-shaped, female cercus more than 2X as long as S10 (Fig 30) . . . . . *S. tsaopiensis*

- PD spots of S2 round (Figs. 15–17); male cercus sickle-like, epiproct rectangular with deep apical notch (Figs. 6, 25, 29); female with abdomen nearly straight, female cercus short, as long as S10 (Fig. 7). . . . . *S. chiangchinlii*

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