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Papuagrion carcharodon sp. nov. from southern New Guinea (Odonata: Coenagrionidae)

John Michalski [1] **& Steffen Oppel** [2]

[1] 223 Mount Kemble Avenue, Morristown New Jersey 07960, USA.
<jmichalski@easthanoverschools.org>
[2] Department of Biology and Wildlife, 211 Irving 1, University of Alaska, Fairbanks, AK 99775, USA. <steffen.oppel@gmail.com>

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Abstract

Papuagrion carcharodon, a new coenagrionid from the rainforest of Papua New Guinea's Simbu Province, is described (holotype: 06°43'S, 145°05'E; 900 m a.s.l., 27 March 2004, to be deposited at Naturalis, Leiden). This new species is similar to *P. ekari* and *P. pesechem* but may be distinguished from both by the tooth-shaped lower branch of the male cerci, and the position of the tubercles on the female pronotum.

Introduction

Papuagrion species are medium- to large-sized, elongate Zygoptera, all endemic to New Guinea and the nearby islands of Aru, Biak, and Japen (Lieftinck 1937, 1949; Tsuda 1991). Of the 23 published taxa, 18 were described by Lieftinck (1935, 1937, 1938, 1949). Lieftinck (1937) provided a key to the genus, but he introduced additional species in subsequent publications (Lieftinck 1938, 1949) without producing a revised key. The habitat, ecology, and behavior of most species are very poorly known and, apart from a passing reference to one species being found in lakeside and forest swamps (Lieftinck 1935), no information of this kind has been published. Since 1949 no new taxa have been described.

Lieftinck (1937) considered *Papuagrion* a close relative of *Teinobasis*, another speciose genus whose center of diversity apparently lies in New Guinea. The two share a number of apparent apomorphies, including the form of the female prothorax, the complex structure of the male terminalia, and the presence of a definite transverse ridge across the frons, which divides the frons into a vertical anterior portion and horizontal upper portion. Lieftinck (1935) distinguished *Papuagrion* from *Teinobasis* as follows:

Papuagrion: R_{4+5} strongly curved basally and arising very distinctly before the subnodus, while IR_3 coincides with the subnodus, both veins hence not fused nor approximated at origin. Ab arises from the posterior border of the wing at the point where Ac meets it, rarely slightly distad to Ac. Course of MA and 1A broken for a long distance: i.e., MA zig-zagged at, before, or slightly after the middle of its length, 1A broken up at or slightly beyond the level of subnodus. Tarsal claws with an inferior tooth (obsolete in *occipitale*). Stature rather robust.

Teinobasis: R_{4+5} straight or but slightly curved basally and arising at or very near to the subnodus, IR_3 at or a trace beyond it, both veins hence very closely approximated at origin, or fused for one cell-length. Ab fusing with the posterior border of the wing distad to Ac, for a distance at least as long as the length of Ac itself. Course of MA and 1A normal, i.e., only the extreme apical (marginal) portion of MA zigzagged and 1A straight for a long distance (3-4 cells) beyond level of subnodus. Tarsal claws without inferior tooth. Stature slender.

The new species described below complies with all aspects of Lieftinck's diagnosis of *Papuagrion*.

Papuagrion carcharodon sp. nov.

(Figs 1a-e, 2a, 3a, 4a)

Specimens studied

Holotype ♂: Papua New Guinea, Simbu Province, Crater Mountain Biological Research Station (06°43'S, 145°05'E; 900 m a.s.l.), muddy forest trail, 27 March 2004, S. Oppel leg. — Paratype ♀: same location, forested ridge with ephemeral streams nearby, 26 July 2004, J. Jomae and A. Martin leg. Both specimens shall be deposited at the National Natural History Museum Naturalis, Leiden, The Netherlands.

Diagnosis

A drab, dusky-greenish zygopteran typical of the genus. Male may be distinguished from similar species by the triangular median ridge of the hind lobe of the prothorax and by the outer lobe of the lower branch of the cerci, which is triangular and tooth-shaped. Female may be distinguished from similar species by the wider space between the lateral lobes and the inner prongs of the hind lobe of the prothorax.

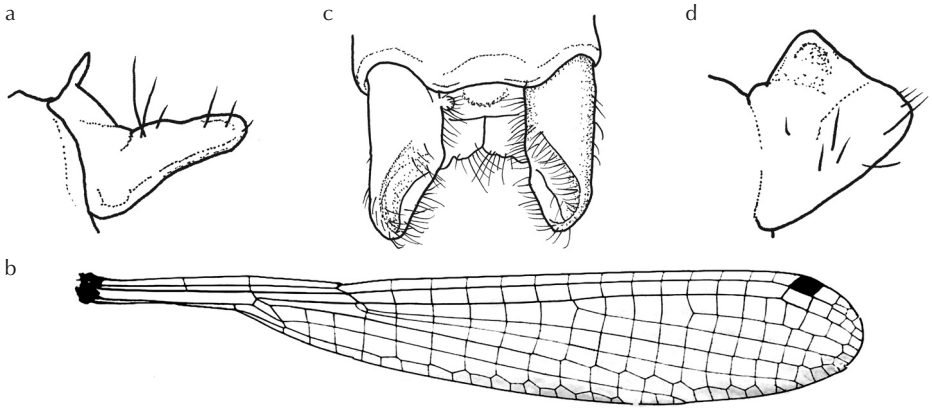

Figure 1: *Papuagrion carcharodon* sp. nov. — (a) male prothoracic lobe, left lateral view; (b) hindwing of male holotype; (c) male terminalia, dorsal view; (d) female prothoracic lobe, left lateral view.

Etymology

The species is named after the genus of so-called Great White sharks, and refers in this case to the shape of the outer lobe of the lower branch of the male cerci, which resemble the sharks' large triangular teeth. The name is a noun in apposition.

Description of male

Head: Labium brown. Labrum blackish basally, brown anteriorly. Genae brown; anterior surface of head, including clypeus and frons, dark brown, vertical surface of frons a little lighter; space between compound eyes, from just before median ocellus, black; an isolated brown barbell-shaped bar across rear margin of head.
Thorax: Prothorax brown, unmarked. Posterior lobe of male (Figs 1a, 2a), seen in dorsal view, divided into a pair of broadly-rounded side-lobes, the cleft between them sharply raised up forming a triangular prominence when viewed in profile. Synthorax brownish with a dusky-greenish cast, mostly unmarked, with a broad black stripe along the entire length of the median carina.
Legs: Mostly brown, blackish at femero-tibial joints, spurs also blackish.
Wings: Venation as depicted (Fig. 1b), membrane hyaline, pterostigma black.
Abdomen: Brown on sides, black dorsally, black dorsal area much constricted basally. Male terminalia (Figs 1c, 3a) with upper branch of cerci long and finger-like in profile view, gently curving over their entire length, apices slightly downturned. Lower branch of cerci slightly more than half the length of upper branch; comprising a pale, wedge-shaped inner lobe, and a blackish, triangular, tooth-shaped outer lobe; outer lobe pointed upward to overlap slightly with upper branch of cerci.
Measurements [mm]: Length of abdomen (excl. appendages) 39.5; length of Hw 25.0.

Description of female

Head: Anterior surface (including labrum, clypeus, and frons) medium-brown, dorsal surface of head colored as in male.

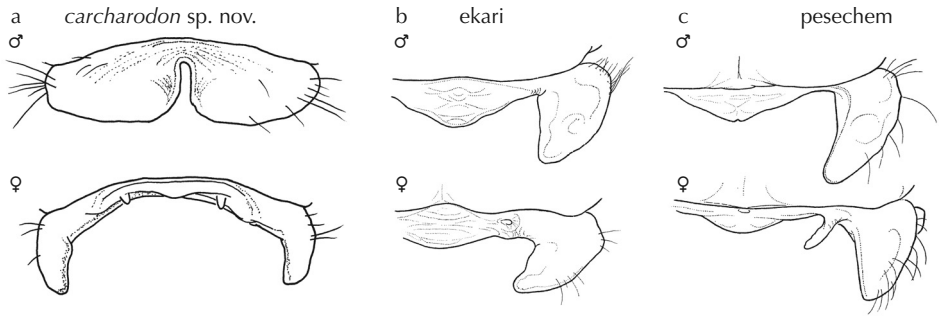

Figure 2: Prothorax hind lobe of three *Papuagrion* species, dorsal view — (a) *P. carcharodon* sp. nov.; (b) *P. ekari*; (c) *P. pesechem*; (b, c) from Lieftinck (1949).

Thorax: Colored as in male. Hind lobe of prothorax (Figs 1d, 2a) armed with two small, upright fingerlike prongs, separated by a distance much greater than the length of either; side-lobes ear-like, somewhat triangular and longer than wide, inner margins straight, outer margins curved, with acute but rounded apices; these side-lobes each separated from inner prongs by a distance almost as great as median space between the two prongs.
Abdomen: Colored as in male. Epiproct broadly heart-shaped, the two apical lobes greatly rounded, flaring wide to either side, each lobe deeply concave, and separated by a deep, U-shaped cleft (Fig. 4a).
Measurements [mm]: length of abdomen (excl. appendages) 35.5; length of Hw 25.0.

Ecological data

The Crater Mountain Biological Research Station is situated on the southern scarp of the central mountain range of Papua New Guinea. The study site lay within a large continuous tract of aseasonal, lower montane rainforest, and featured a large number of clear rocky mountain streams. The terrain was very rugged and creek drainages were usually separated by steep, forested ridgelines. Two larger rivers run through the study area, and were fed by numerous smaller tributaries. Due to the rugged terrain the tributaries were generally less than 2,000 m long. The study site included innumerable streams and rivers with a high variability of flow rate, depending on rainfall. Small depressions on the forest floor filled with water during heavy rains and formed temporary puddles that dried up within three days of no rain. Annual rainfall at the site averages 6,400 mm (Wright et al. 1997). A moratorium on hunting and tree cutting over the entire study area had been in place since 1989, and the study area could be regarded as pristine tropical rainforest.

The male of the new species was taken on a forest track in a sunny clearing surrounded by *Pandanus* trees, and with no water in the immediate area. No information on reproductive habitat or on the behavior of this species was available.

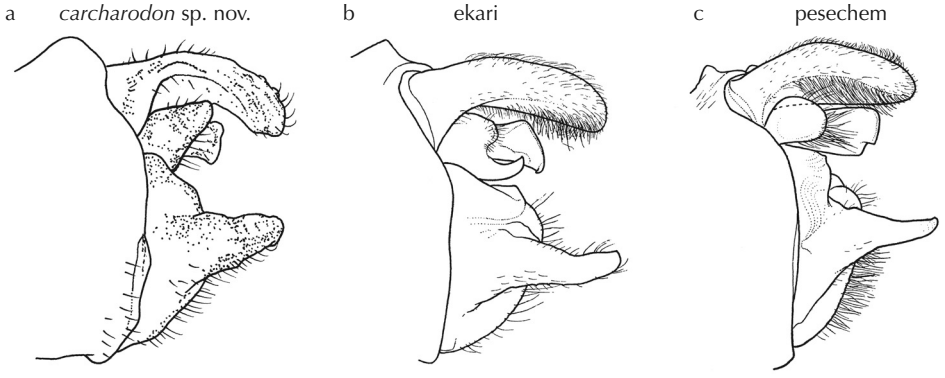

Figure 3: Male terminalia of three *Papuagrion* species, left lateral view — (a) *P. carcharodon* sp. nov.; (b) *P. ekari*; (c) *P. pesechem*; (b, c) from Lieftinck (1949).

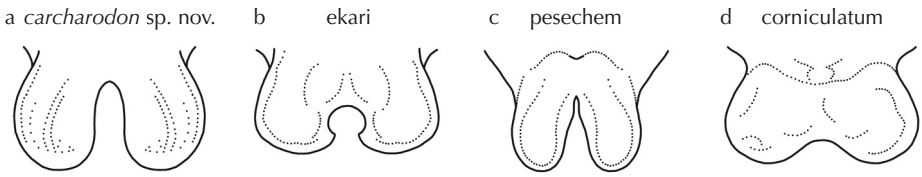

Figure 4: Female epiproct of four *Papuagrion* taxa — (a) *P. carcharodon* sp. nov.; (b) *P. ekari*; (c) *P. pesechem pesechem*; (d) *P. pesechem corniculatum*; (b-d) from Lieftinck (1949).

Discussion

This rather small, dusky-greenish zygopteran has been reported previously as *Papuagrion* sp. nov. A in Oppel (2005, 2006). It is very likely a close relative of *P. ekari* Lieftinck, 1949 and *P. pesechem* Lieftinck, 1949, since the male terminalia and female prothoracic lobes are very similar in all three species. The male of the new species may be distinguished by the hind margin of the male pronotum of *P. carcharodon*, which lacks the large side-lobes found in the other two species (Figs 2b, c), and which bears a thin, triangular median projection (Fig. 1a). A further distinct characteristic is the outer lobe of the lower branch of the cerci, which is triangularly tooth-shaped and pointed upward to overlap slightly with the upper branch of the cerci (Fig. 3a). In *P. ekari* this structure is broad basally, narrowing sharply at mid-length and ending in a small acute hook (Fig. 3b); in *P. pesechem* this structure is simply round (Fig. 3c).

The female may be distinguished by the hind lobe of the pronotum (Fig. 2) and the shape of the epiproct (Fig. 4). The pronotum hind lobe in *P. carcharodon* has the side lobes separated from the inner prongs by a distance equal to the space between the two prongs themselves (Fig. 2a). In *P. ekari*, the inner prongs are reduced to short tubercles, barely longer than wide, and also very close to the lateral lobes (Fig. 2b), and in *P. pesechem*, the lateral lobes are located immediately next to the inner prongs (Fig. 2c). In the epiproct of *P. ekari* there is no median cleft (Fig. 4b), while in *P. p. pesechem* this cleft is round (Fig. 4c), and in *P. p. corniculatum* Lieftinck, 1949 this cleft is narrower and the two apical lobes are much narrower, oblong, and not distinctly flared to either side (Fig. 4d).

Acknowledgements

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