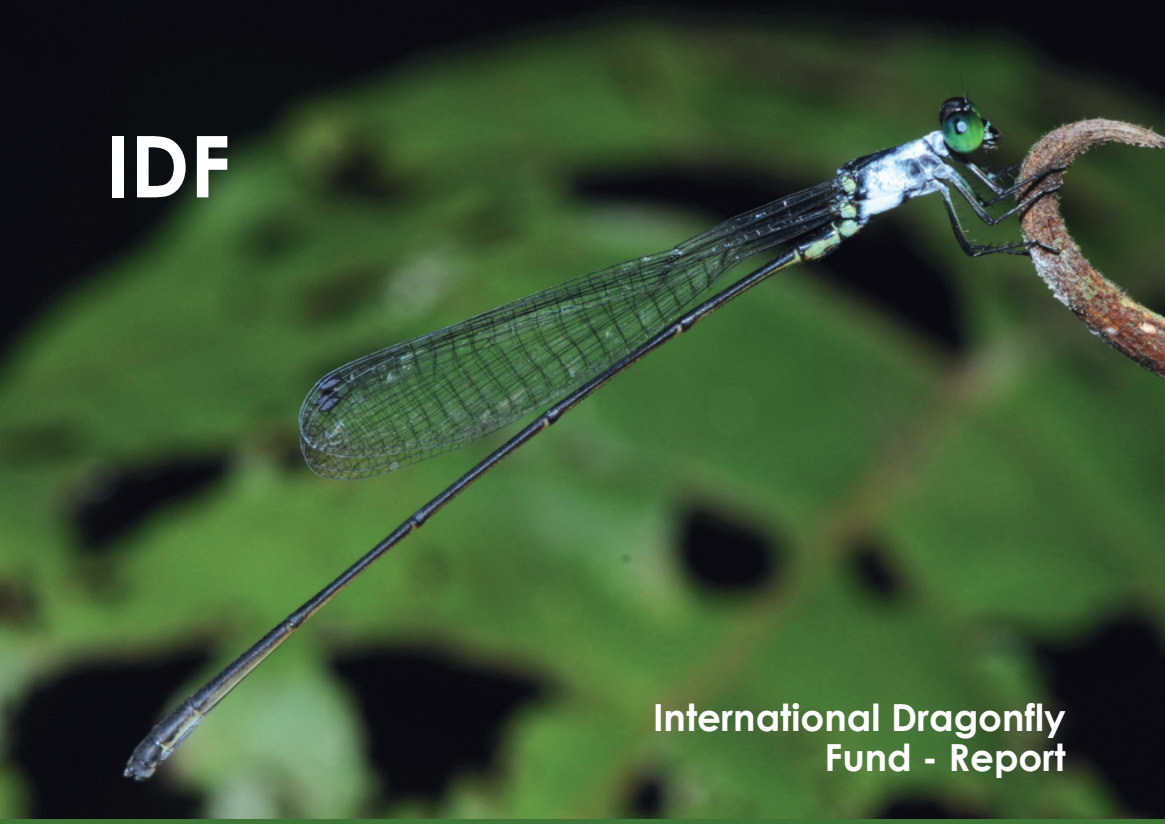

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Plagulibasis richardsi sp. nov., a new damselfly from Papua New Guinea (Zygoptera: Coenagrionidae)

Günther Theischinger[1]* & Albert G. Orr[2]
[1]Australian Museum, Entomology, 6 College Street, Sydney, NSW, 2010, Australia
[2]Environmental Futures Research Institute, Griffith University, Nathan, Australia.
*Email: theischingergunther@gmail.com

Abstract

Plagulibasis richardsi sp. nov. (Holotype ♂: P'nyang Camp 4, 1-viii-2013), a new damselfly from southern Papua New Guinea, is described. Diagnostic characters of both sexes are illustrated. Similarities with *Plagulibasis ciliata* (Ris, 1913), the hitherto only other known species of *Plagulibasis* Lieftinck, 1949, and with two similar species of *Teinobasis* Kirby, 1890 are discussed, with all being compared in detail.

Key words: Melanesia, new species, Odonata, *Plagulibasis richardsi* sp. nov., taxonomy

Introduction

Over the last 30 years Stephen Richards, an honorary researcher at the South Australian Museum who is based in the tropics of north Queensland, has collected a large number of previously unknown odonate species from across Melanesia. He has kept a small army of dragonfly taxonomists busy, publishing on his material in co-authored contributions (e.g. Theischinger & Richards 2013, 2015, 2017) resulting in the descriptions of two new genera and 109 new species of damselflies and dragonflies in 55 peer reviewed publications. He has also supplied numerous photographs in life of new and poorly known odonate species for use in regional field guides (e.g. Kalkman & Orr 2013, Orr & Kalkman 2015) and his extensive field knowledge of the Papuan fauna has been incorporated into important biodiversity and conservation work including a series of comprehensive conservation assessments for the IUCN's Red List of Threatened Species.

Despite these efforts, taxonomic progress on material of the genus *Teinobasis* and close relatives obtained by Richards has been hindered due to constraints imposed by the preponderance of immature specimens collected. This has been particularly problematic in a group where normally reliable morphological structures tend to be obscured, may be variable within and between species, or are difficult or impossible to examine (e.g. Theischinger & Kalkman 2014). However, the accumulation of extensive *Teinobasis* material by Richards in recent years, accompanied by colour images of most species in life, is providing new insights into the true diversity of this difficult group of damselflies (Theischinger & Kalkman 2014, Theischinger et al. 2024). In contrast *Plagulibasis*, a genus very close to *Teinobasis*, has remained monotypic since it was described 75 years ago (Lieftinck 1949). Thus it seems appropriate now to dedicate to Richards the second known species of *Plagulibasis*, which he collected more than a decade ago.

Material and methods

Descriptive terminology largely follows Chao (1953) and Watson & O'Farrell (1991). Coloration is given as detectable from live photographs and from the preserved material. In order to detect and display some details of appendages, including size, proportions and shape of different elements, the damaged terminalia of the paratype were treated with potassium hydroxide (KOH) and placed in glycerol. All illustrations were done with the aid of a camera lucida and are not to scale. Coordinates are presented using the GPS datum WGS 84. Material is lodged in the collection of the South Australian Museum, Adelaide, Australia (SAMA).

***Plagulibasis richardsi* sp. nov.**

Figures 1, 2, 4, 5, 15.

Material

Holotype (SAMA 7-1695): ♂, Papua New Guinea, Western Province, P'nyang Camp 4 (5.9079°S, 141.8462°E, 125 m a.s.l), 25-vii-2013, C. Muller; deposited in SAMA.

Paratypes – Papua New Guinea, details as for holotype except 2 ♀ (SAMA 7-1696–97) collected 31-vii-2013; 1 ♂, 2 ♀ (SAMA 7-1698–1700), collected 30-vii-2013; and 1 ♀ (SAMA 7-1701) collected 2-viii-2013, all S.J. Richards; all deposited in SAMA.

Etymology

The species is dedicated to Stephen J. Richards in friendship and recognition of his tremendous contributions towards a better understanding of the Odonata fauna of the New Guinea region.

Diagnosis

The new species is assigned to *Plagulibasis* on the basis of the following combination of characters: posterior margin of abdominal segment 10 of male deeply emarginate, so as to form a broad U-shaped excavation; broad tufts of long setae at dorsal posterior margin of abdominal segment 10 of male.

A small species, black with pale yellowish to blue markings, male with three terminal segments of abdomen largely black. Paraprocts (inferior anal appendages) rather slender, acuminate and in lateral view longer than cerci (superior anal appendages) that are not produced into a spine.

Holotype – Male (Figs 1, 4, 5)

Head (Fig. 1) – Labium whitish yellow; base of mandibles, genae up to antennal base, anteclypeus, median tip of postclypeus and much of antefrons pale greyish blue; anterior face of scape very pale bluish, pedicel largely greyish black; labrum, almost all of postclypeus, remainder of antefrons and all of top of frons black. Top of head black except for tiny yellowish spot halfway between antennal base and lateral ocellus; postgenae black; postoccipital area whitish to pale greyish yellow.

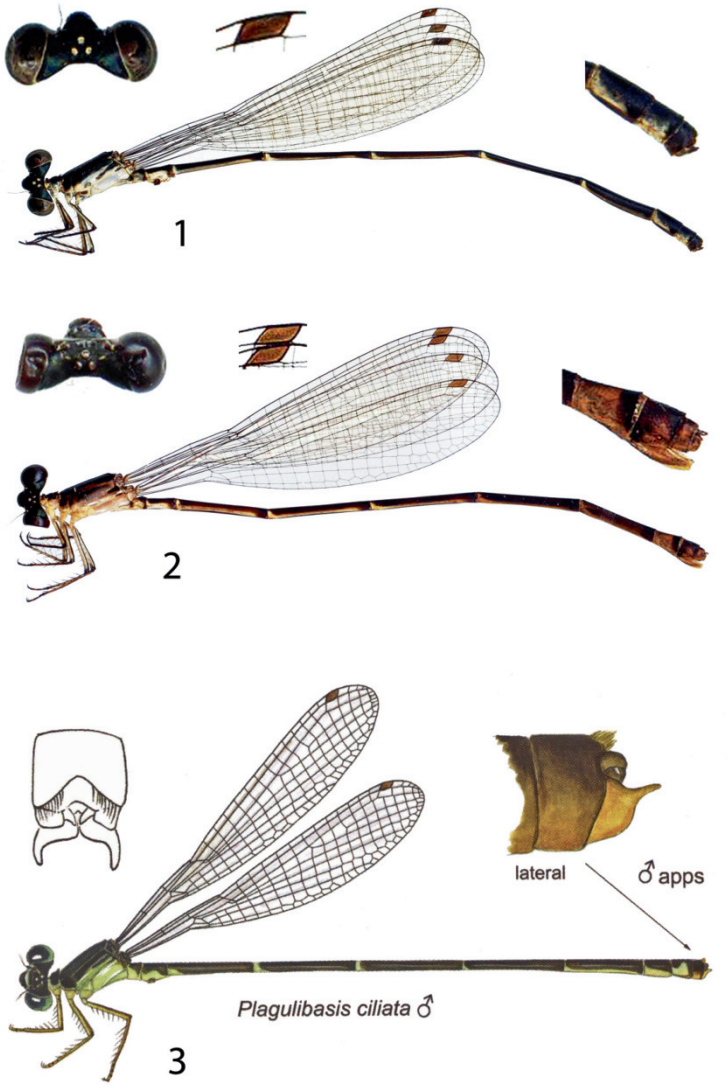


Fig. 1. *Plagulibasis richardsi* sp. nov., holotype male, habitus; with head and pterostigma and terminalia inset.

Fig. 2. *Plagulibasis richardsi* sp. nov., female, habitus; with head and pterostigmata and terminalia inset.

Fig. 3. *Plagulibasis ciliata* Ris, male, habitus; with head posterior lobe of pronotum, abdominal details and terminalia inset (modified from Kalkman & Orr, 2013).

Thorax (Fig. 1) – Pronotum black, a dark yellow medio-lateral and blue lateral spot each side in furrow between anterior and median lobe; posterior lobe short and wide, medially produced approximately semicircularly. Propleura largely pale greyish blue with some black adjacent to median pronotal lobe. Coxa pale greyish blue; trochanter and femur even paler greyish blue with most of posterior face black; spines, tibiae and tarsal segments black; claws dark brown with apex black. Synthoracic pleura including most of mesostigmatic lamina, dorsal carina, antealar ridge and sinus and humeral plates largely black, in places with green metallic reflections; the following sections pale to light blue: posteroventral corner of mesokatepisternum, a small triangular mark between mesopleural suture and subalar ridge, a large area covering posterior quarter of mesepimeron, much of metepisternum and almost all of metepimeron and metakatepisternum, with long black stripe/wedge along more than dorsal 1/2 of interpleural suture, short narrow wedge along approximately dorsal 1/5 of metapleural suture, on most of metapostepimeron and along ventral edge of metakatepisternum. Postcoxae and poststernum pale greyish blue. Legs much as in prothorax, coxae smudged with darker grey, and metatibia somewhat lighter on inner face. Wing membrane hyaline, venation black; pterostigma dark greyish brown, slightly sloping, almost twice as long as wide, overlying one cell; postnodals 13-14/13-14; ac distinctly proximal to ax2.

Abdomen (Fig. 1) – Slightly more than posterior half of S1 and all of S2 with black dorsal patch, laterally pale bluish; S3-7 dorsally and laterally largely shining black, latero-ventrally pale blue, this pale band distinctly widened at base of each segment. S8-9 black with hardly any indication of pale spot at base but with pale ventral margin; sterna whitish to bluish to yellowish and greyish brown, sternite 8 darkest (brownish grey), sternite 9 palest (whitish yellow). Terminalia (Figs 4, 5): S10 black, hind margin not raised but forming almost segment-wide low area covered laterally with dense fringing tuft of yellowish to whitish setae. Inferior anal appendages longer than superiors in lateral view. Superior anal appendages brown with dorsal branch very short and lower branch upturned and hooked; inferiors long and narrow, from basally brownish yellow over brown to black at tip. Anal tergite narrow, parallel sided with tip bilobed.

Measurements – Hindwing 18.6 mm; abdomen (including anal appendages) 30.0 mm.

Female (Fig. 2)

Head (Fig. 2) – Much as in male, but labrum with thin brown margin, from there greyish yellow merging into bluish grey or largely brown to largely black; base of mandibles, genae up to slightly beyond antennal base, anteclypeus, median tip of postclypeus, antefrons and anterior face of scape pale yellow to pale blue and pale grey or bluish grey; tiny spot halfway between antennal base and lateral ocellus barely detectable and dull yellow or somewhat larger than in male and bluish.

Thorax (Fig. 2) – Pronotum much as in male, but with paler and darker shades of greyish yellow and greyish brown merging into each other; posterior lobe (Fig. 5) short and wide, not medially produced, but posterior margin with broad concavity on either side of median cleft, and propleura largely pale brownish yellow with some black adjacent to median pronotal lobe. Synthoracic pleura much as in male but black sections without metallic reflections and sometimes medium brown, particularly in mesepimeron, and

pale sections without any blue; a more or less distinct brownish yellow to brown stripe along mesopleural suture and between mesanepisternum and mesokatepisternum, black stripe along interpleural suture may be more restricted than in male, often to dorsal 1/4. Legs with coxae and trochanters uniformly yellow and femora blackened at knees. Wings (Fig. 2) much as in male, but with 13-14/12-13 postnodals.

Abdomen (Fig. 2) – Much as in male, but generally lacking blue. S3-7 dorsally and laterally largely blackish brown or black, but with posterior 1/10-1/8 definitely black. S8 dorsally and laterally brownish yellow to brown with only posterior 1/4-1/3 black. Tergite 9 and S10 largely brownish yellow or black merging into brownish yellow latero-ventrally. Supra-anal plate, anal appendages and inferior anal lamina brown; sternites 3-7 yellowish- to brownish grey, sternite 8 and ovipositor valve dull yellow, terebra dark brown, reaching slightly beyond end of abdomen.

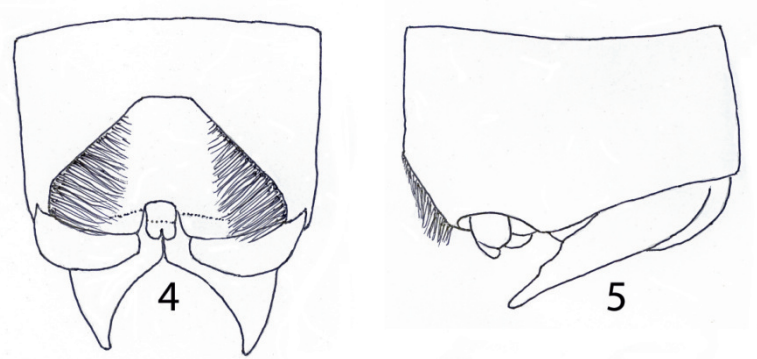
Measurements – Hindwing 20.8-21.3 mm, abdomen (including ovipositor) 30.9-33.0 mm.

Variability

The only male paratype is less well preserved than the holotype but generally matches it except the labrum is dark brown, and genae, mandible bases, anteclypeus and anterior frons are yellowish to greyish brown. Medio-lateral and lateral spots each side in furrow between anterior and median lobe of pronotum are slightly larger than in holotype and are brownish yellow. The triangular mark, confined in holotype between mesopleural suture and subalar ridge, continues ventrad along dorsal 1/2 of mesopleural suture as an ill-defined brownish line/stripe in paratype. Postnodals 12-13/12-13. All pale sections of abdomen are dull to brownish yellow and greyish brown. Hindwing 19.2 mm; abdomen (including anal appendages) 29.2 mm.

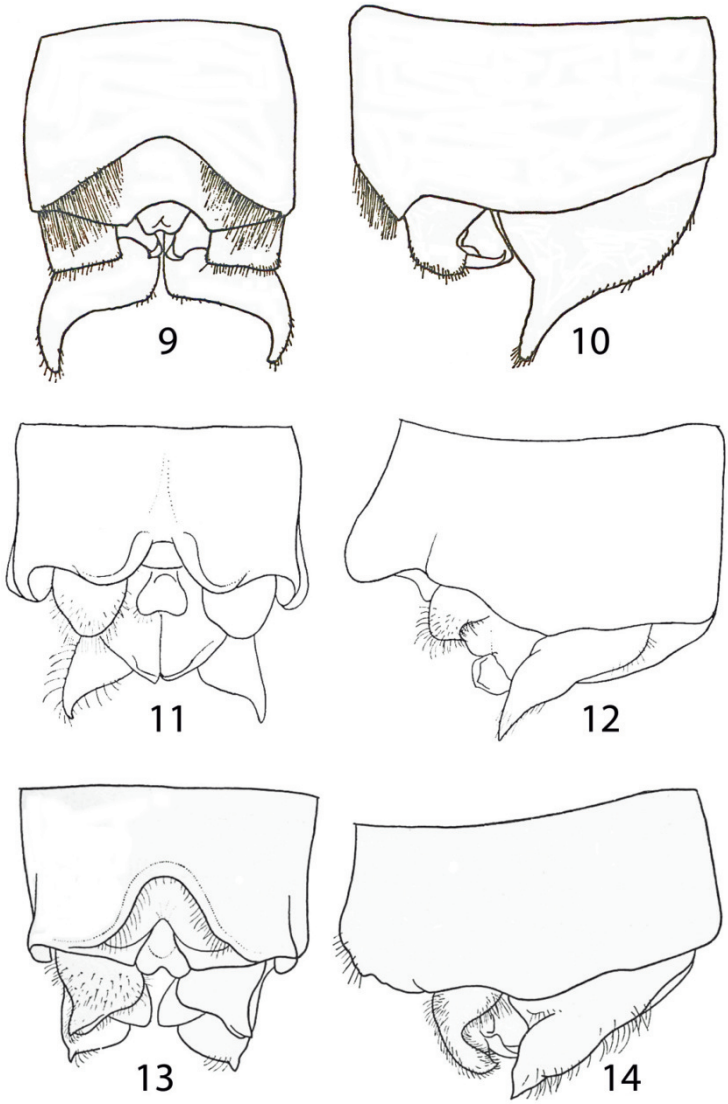
Differential diagnosis

Lieftinck (1949) proposed *Plagulibasis* for the reception of only *Nesobasis ciliata* Ris, 1913, on the basis of the male having the posterior margin of abdominal segment 10 deeply emarginate, so as to form a broad U-shaped excavation, and having long 'hair-fringes' along posterior margin of abdominal segment 10. *Plagulibasis richardsi* sp. nov. exhibits these characters but can be distinguished from *P. ciliata* by having the inferior anal appendages of the male appearing in lateral view rather slender and more or less uniformly tapered and in dorsal view subtriangular (Figs 4, 5) vs drawn out into a slender apical lobe from a massive base in *P. ciliata* (Figs 6-10). Lieftinck (1949) also noted that the general facies of *Plagulibasis* closely resembles that of small *Teinobasis* of the metallica group but differs from this group in being less slenderly built, wings relatively shorter and more distinctly petiolated and terminal abdominal segments slightly widened vs. not widened. The two *Teinobasis* species most similar to *Plagulibasis richardsi* sp. nov. are *T. alternans* Lieftinck, 1935 which has inferior anal appendages of a similar shape, but has S10 with a postero-dorsal elevation (Figs 11, 12) and *T. stigmatizans* Lieftinck, 1938 in which the hind margin of S10 is little raised, as in *Plagulibasis*, forming a low area covered laterally with some fringing of setae, but has plump inferior anal appendages (Figs 13, 14).



Figs 4-5. *Plagulibasis richardsi* sp. nov., Holotype male, terminalia: (4) dorsal; (5) lateral.

Figs 6-8. ***Plagulibasis ciliata*** Ris, holotype male: (6) habitus; (7, 8) terminalia: (7) dorsal; (8) lateral.



Figs 9-10. *Plagulibasis ciliata* Ris, male terminalia: (9) dorsal; (10) lateral (modified from Ris, 2013).

Figs 11-12. *Teinobasis alternans* Lieftinck, male terminalia: (11) dorsal; (12) lateral (modified from Lieftinck, 1935).

Figs 13-14. *Teinobasis stigmatizans* Lieftinck, male terminalia: (13) dorsal; (14) lateral (modified from Lieftinck 1938).

Fig. 15. *Plagulibasis richardsi* sp. nov., immature male, in life. Photo by S. Richards.

Distribution and habitat

Plagulibasis richardsi sp. nov. is known only from a single location in lowland rainforest on the Fly-Strickland plains of western Papua New Guinea. Most of the forest at the type locality is on well drained terrain, but this species was only encountered in a distinctive swampy peat forest habitat with an extremely wet substrate containing numerous shallow, interconnected pools and channels. Adults and immature specimens were found perching on low foliage over these exposed pools and channels that retained water throughout the time of the survey (Fig. 16). This species was not encountered at streams or other water bodies in nearby drier forest suggesting that it may be a peat swamp forest specialist.

Remark

Plagulibasis ciliata, the only other species of the genus, is known only from six locations in the Indonesian part of the lowlands of South New Guinea (Kaize & Kalkman 2011, Lieftinck 1949, Ris 1913). This area is very poorly explored for dragonflies and the available records suggest that it is relatively common and widespread. The genus *Plagulibasis* is the only genus of Odonata to be endemic to the southern lowland of New Guinea.

Fig. 16. Swampy peat forest at the type locality of *Plagulibasis richardsi* sp. nov. Adults were perched on low foliage over the exposed water.

Acknowledgements

Charlotte Hartong and Luc Willemse are thanked for help with photographs of the holotype of *Plagulibasis*/Nesobasis ciliata Ris, 1913. Vincent Kalkman provided helpful information on *Plagulibasis ciliata*. Chris Muller collected the holotype and provided many other specimens of interest during the survey. Field work was supported by ExxonMobil PNG Ltd (EMPNG), and the export permit was approved by the PNG Department of Environment and Conservation. Ben Parslow at the South Australian Museum kindly provided registration numbers for vouchers deposited in that institution.

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