

## Odonata from Batanta (Indonesia, West Papua) with description of three new species

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**ABSTRACT:** Thirty-eight taxa of Odonata are reported from Batanta Island (including Arefi and Birie Islands). Three new species are described: *Drepanosticta batanta* sp. n., *Palaiargia susannae* sp. n. and *Diplacina olahi* sp. n. *Hydrobasileus vittatus* Kirby, 1889 is new to New Guinea. The following 15 species are new to the Raja Ampat Islands: *Drepanosticta auriculata* (Selys, 1878), *Metagrion postnodale* (Selys, 1878), *Selysioneura* cf. *cervicornu* Förster, 1900, *Nososticta* cf. *finisterrae* (Förster, 1897), *Idiocnemis bidentata* Selys, 1878, *I. inornata* Selys, 1878, *Agriocnemis femina* (Brauer, 1869), *Ceragrion aeruginosum* Brauer, 1869, *Ischnura senegalensis* (Rambur, 1842), *Pseudagrion* cf. *civicum* Lieftinck, 1932, *Xiphiagrion cyanomelas* Selys, 1876, *Diplacodes trivialis* (Rambur, 1842), *Huonia epinephela* Förster, 1903, *Neurothemis ramburii* (Brauer, 1866), *Orthetrum serapia* Watson, 1984, *Rhyothemis phyllis* (Sulzer, 1776).

### Introduction

The regular research of aquatic insects on Batanta Island started in 2010, organised by Róbert Horváth and János Oláh. Of the material collected by Róbert Horváth with UV light traps the Trichoptera were studied by János Oláh. The fauna of the island proved to be very rich and most of the species were undescribed (OLÁH 2012, 2013, 2014). In 2014, Péter Juhász and Tibor Kovács joined in the team, and the work was continued with new methods and inclusion of further groups (Ephemeroptera, Odonata). The present paper provides the results of Odonata collectings in 2014 and 2015.

The only odonate known so far from Batanta is *Idiocnemis bidentata* Selys, 1878, which was collected during the 1996 trip of the Zoölogisch Museum, Amsterdam on the southern part of the island (GASSMANN 2000). The record below of *Hydrobasileus vittatus* for New Guinea is mentioned in ORR & KALKMAN (2015).

### Material and methods

The material was collected during two trips (16.01.-02.02.2014 and 01.02.-19.02.2015) in 23 sites. For collecting methods of larvae see KOVÁCS *et al.* (1998). Exuviae were hand-collected while adults were captured with sweeping net. All material is preserved in 70% ethanol and deposited in the Mátra Museum of the Hungarian Natural History Museum, Gyöngyös. The larvae and the exuviae are still unidentified, except for three species.

**Abbreviations:** HR = Róbert Horváth, JP = Péter Juhász, KT = Tibor Kovács; PPER = Papua Paradise Eco Resort; MM = Mátra Museum of the Hungarian Natural History Museum (Gyöngyös).

## Results

### ZYGOPTERA

#### PLATYSTICTIDAE Kennedy, 1920

*Drepanosticta auriculata* (Selys, 1878) – Batanta Island, right side stream of Forum River, 00°52'11.32", 130°27'41.69", 13.02.2015, 2 males, KT-HR-JP (MM: 2015-14).

#### *Drepanosticta batanta* sp. n. Kovács et Theischinger (Figs 1–5)

*Type material* – Holotype. **Indonesia**, Batanta Island, right side stream of Forum River, 00°52'11.32", 130°27'41.69", 215 m, 13.02.2015, 1 male, KT-HR-JP (MM: 2015-14). Paratype. Batanta Island, valley of Weras stream, 00°49'51.2", 130°38'00.0", 250 m, 08.02.2015, 1 male, KT-JP (MM: 2015-9).

*Diagnosis* – Male: Small, predominantly brown *Drepanosticta* species. Head shiny bronze, prothorax and legs yellowish brown, synthorax dark brown with 5 or 6 yellowish brown spots. Abdomen brown with yellowish basal rings in segments 3 to 6, segments 9 and 10 dark brown with greenish sheen, appendages yellowish brown. Occiput with distinct transverse occipital carina. Posterior margin of posterior lobe of pronotum with a pair of processes. Superior anal appendage with denticle in basal half.

#### *Description* – Male.

Head. Labium yellowish brown to brown; base of mandibles yellowish, remainder brown; whole labrum yellowish, whole anteclypeus ivory white, rest of head shiny bronze. Transverse occipital carina distinct. Antennae with scape and flagellum brown, pedicel yellowish.

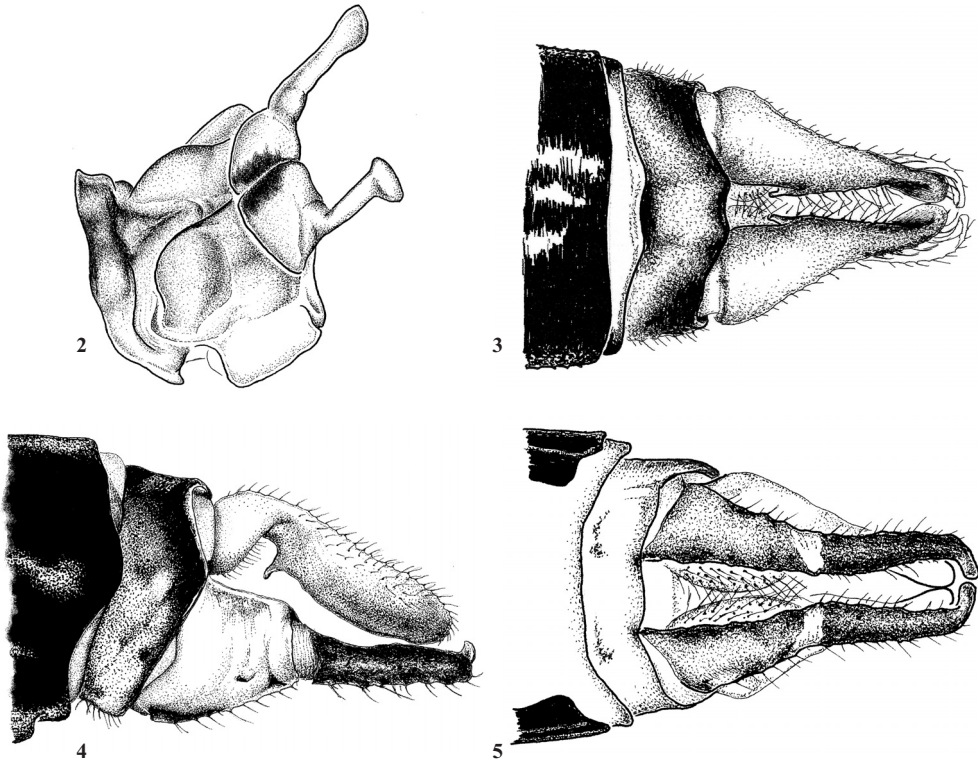
Prothorax (Fig. 1). Pronotum dorsally largely light to darker brown, sides yellowish, lower portion yellowish; other prothoracic and cervical sclerites yellowish. Posterior margin of posterior lobe of pronotum with a pair of conspicuous processes. Processes nearly equal in length to rest of pronotum (Fig. 2), largely parallel-sided, with broadened and rounded apex. Coxa and trochanter yellowish; femur yellowish with one spot at posterior third and apex greyish brown, remainder of leg yellowish, posterior quarter of third tarsomere brown.

Synthorax (Fig. 1). Pleura largely shiny dark brown with 5–6 yellowish and yellowish brown patches: one or two, ill-defined, in lateral portion of mesanepisternum; one, 2/3 length, in anterodorsal corner of mesepimeron; one along almost whole metapleural suture in metepisternum, this patch narrowly subdivided at level metastigma; one, squarish, in posterodorsal portion of metepimeron. Poststernum largely shiny dark brown. Coxae yellowish to brown, rest of legs as given above for foreleg. Wings with venation black and membrane hyaline; 14–16 postnodals in Fw, 13–15 in Hw; pterostigma light brown, 1.8–2.1 times as long as wide, overlying 2 crossveins, posterior border slightly longer than anterior border, proximal and distal borders subequal in length, proximal angle at R approximately 60°.

Abdomen. Segments 1–8 brown, segments 2–6 with ill-defined narrow brownish yellow basal ring; segments 9–10 dark brown with greenish sheen. Anal appendages (Figs 3–5) yellowish



Fig. 1. *Drepanosticta batanta* sp. n., holotype male thorax, lateral view



Figs 2-5. *Drepanosticta batanta* sp. n., holotype male: 2 = pronotum, oblique dorso-lateral view; 3 = anal appendages, dorsal view; 4 = anal appendages, lateral view; 5 = anal appendages, ventral view

brown to brown, superiors with strong subbasal bend and remainder somewhat bulbous (as seen only in lateral view), moderately thick, abruptly narrowing and slightly incurved toward apex, with denticle well visible in dorsal and lateral view in anterior ¼, inferiors slightly longer than superiors, narrow, with short membranous portion at half length, almost straight, gradually narrowing toward incurved and dorsally directed apex.

Measurements. Hind wing 18.6–19.1 mm, abdomen (including appendages) 28.7–31.9 mm.

Female and larva unknown.

*Etymology* – *Batanta*, after the type locality.

*Habitat* – The specimens were collected in tropical rainforest, at 215–250 m above sea level, in shade, at outfall of a slow-running, clear spring. They occurred there together with *Drepanosticta auriculata*.

Comparison with other species. *Drepanosticta batanta* sp. n. belongs to the *Drepanosticta megametta* species group, that includes the following species: *D. centrosaurus*, *D. megametta* (Mindanao), *D. halmahera*, *D. rudicula* (Halmahera), *D. misoolensis* (Misool) (VAN TOL 2005, 2007) and *D. pararudicula* (Halmahera) according to THEISCHINGER et al. (2015). *D. batanta* significantly differs from the Philippine *D. centrosaurus* and *D. megametta* by long (set widely apart) vs short (set close together) processes on the posterior lobe of pronotum (VAN TOL 2005: 163, Fig. 47 and 165, Fig. 50), from *D. rudicula* and *D. pararudicula* by the denticle of the superior anal appendage being visible vs not visible in lateral view (cf. VAN TOL 2007: 12, Fig. 17; THEISCHINGER et al. 2015: 4, Fig. 9); and from *D. halmahera* (VAN TOL 2007: 9, Fig. 7), *D. misoolensis* (VAN TOL 2007: 9, Fig. 19) and *D. pararudicula* (THEISCHINGER et al. 2015: 4, Fig. 8) by most of the apical quarter/half of the inferior anal appendages being almost perfectly straight and only slightly tapered vs strongly constricted or arched. From this it appears that *D. misoolensis* is the species most similar to *D. batanta*.

#### CALOPTERYGIDAE Selys, 1850

*Neurobasis australis* Selys, 1897 – Batanta Island, valley of Waridor River, between 00°50'30.55", 130°31'30.54" and 00°52'09.66", 130°32'11.54", 18.01.2014, 2 males, KT-HR-JP (MM: 2014-5); 03.02.2015, 1 female, KT-HR-JP (MM: 2015-4).

#### CHLOROCYPHIDAE Cowley, 1937

*Rhinocypha tincta* cf. *sagitta* Lieftinck, 1938 – Batanta Island, Teluk Warai, stream, 00°50'51.0", 130°35'14.0", 11.02.2015, 1 male, KT-JP (MM: 2015-13). – Batanta Island, valley of Waridor River, between 00°50'30.55", 130°31'30.54" and 00°52'09.66", 130°32'11.54", 18.01.2014, 6 males, 2 females, KT-HR-JP (MM: 2014-5); 03.02.2015, 2 males, 3 females, KT-HR-JP (MM: 2015-4). – Batanta Island, valley of Waridor River, between 00°52'09.66", 130°32'11.54" and 00°51'51", 130°33'41", 04.02.2015, 2 females, KT-HR-JP (MM: 2015-6). – Batanta Island, valley of Weras stream, 00°49'42.05", 130°38'12.23", 27.01.2014, 1 male, KT-JP (MM: 2014-22); 00°49'51.2", 130°38'00.0", 08.02.2015, 1 male, KT-JP (MM: 2015-9). – Batanta Island, Welebed, valley of Kalijakut River, 00°52'52.0", 130°38'08.0", 16.02.2015, 1 male, KT-JP-Kris (MM: 2015-16). – Batanta Island, Welebed, valley of Kalijakut River, between 00°54'20.59", 130°38'31.70" and 00°53'12.88", 130°38'16.40", 23.01.2014, 1 male, KT-HR-JP (MM: 2014-17).

#### ARGIOLESTIDAE Fraser, 1957

*Metagrion postnodale* (Selys, 1878) – Batanta Island, right side stream of Forum River, 00°52'09.6", 130°27'42.3", 13.02.2015, 1 male, 1 female, KT-HR-JP (MM: 2015-14). – Batanta Island, Teluk Warai, stream, 00°50'51.0",

130°35'14.0", 11.02.2015, 1 male, KT-JP (MM: 2015-13). – Batanta Island, valley of Warmon stream, between the lower and upper waterfall (00°50'04.50", 130°42'54.01" and 00°50'23.25", 130°42'35.18"), 21.01.2014, 1 male, 1 female, KT-HR-JP (MM: 2014-12). – Batanta Island, valley of Weras stream, 00°49'51.2", 130°38'00.0", 08.02.2015, 2 males, KT-JP (MM: 2015-9). – Batanta Island, Welebed, valley of Kalijakut River, 00°52'52.0", 130°38'08.0", 16.02.2015, 1 male, 1 female, KT-JP-Kris (MM: 2015-16).

ISOSTICTIDAE Fraser, 1955

*Selysioneura cf. cervicornu* Förster, 1900 – Batanta Island, valley of Warmon stream, between the lower and upper waterfall (00°50'04.50", 130°42'54.01" and 00°50'23.25", 130°42'35.18"), 21.01.2014, 2 females, KT-HR-JP (MM: 2014-12).

PLATYCNEMIDIDAE Yacobson & Bianchi, 1905

Disparoneurinae Fraser, 1957

*Nososticta aurantiaca* (Liefinck, 1938) – Batanta Island, left side stream of Waridor River, 00°52'10.7", 130°32'11.6", 04.02.2015, 4 males, 1 female, KT-HR-JP (MM: 2015-5). – Batanta Island, right side stream of Forum River, 00°52'09.6", 130°27'42.3", 13.02.2015, 3 males, KT-HR-JP (MM: 2015-14). – Batanta Island, Teluk Warai, stream, 00°50'51.0", 130°35'14.0", 11.02.2015, 4 males, KT-JP (MM: 2015-13). – Batanta Island, Welebed, valley of Kalijakut River, between 00°54'20.59", 130°38'31.70" and 00°53'12.88", 130°38'16.40", 23.01.2014, 2 males, 1 female, KT-HR-JP (MM: 2014-17). – Batanta Island, valley of Waridor River, between 00°50'30.55", 130°31'30.54" and 00°52'09.66", 130°32'11.54", 18.01.2014, 2 males, KT-HR-JP (MM: 2014-5). – Batanta Island, valley of Warmon stream, between the lower and upper waterfall (00°50'04.50", 130°42'54.01" and 00°50'23.25", 130°42'35.18"), 21.01.2014, 1 male, KT-HR-JP (MM: 2014-12).

*Nososticta cf. finisterrae* (Förster, 1897) – Batanta Island, right side stream of Forum River, 00°52'09.6", 130°27'42.3", 13.02.2015, 1 male, KT-HR-JP (MM: 2015-14). – Batanta Island, valley of Warmon stream, between the lower and upper waterfall (00°50'04.50", 130°42'54.01" and 00°50'23.25", 130°42'35.18"), 21.01.2014, 2 males, 2 females, KT-HR-JP (MM: 2014-12). – Batanta Island, valley of Weras stream, 00°49'51.2", 130°38'00.0", 08.02.2015, 1 male, 1 female, KT-JP (MM: 2015-9).

Idiocnemidinae Dijkstra, Kalkman, Dow, Stokvis & van Tol, 2014

*Idiocnemis bidentata* Selys, 1878 – Batanta Island, left side stream of Waridor River, between 00°52'09.66", 130°32'11.54" and 00°51'51", 130°33'41", 04.02.2015, 3 males, 1 female, KT-HR-JP (MM: 2015-6b).

*Idiocnemis inornata* Selys, 1878 – Batanta Island, valley of Weras stream, 00°49'51.2", 130°38'00.0", 08.02.2015, 3 males, KT-JP (MM: 2015-9).

***Palaiargia susannae* sp. n. Kovács et Theischinger (Figs 6–14)**

*Type material* – Holotype. **Indonesia**, Batanta Island, right side stream of Forum River, 00°52'09.6", 130°27'42.3", 225 m, 13.02.2015, 1 male, KT-HR-JP (MM: 2015-14). Paratypes. Same as holotype, 2 males, KT-HR-JP (MM: 2015-14).

*Diagnosis* – Male: Small *Palaiargia* species (Fig. 6). Head black with rich bright red pattern, prothorax brown, legs largely black, synthorax dark brown to black, with one bright red and two light blue markings. Wings with yellowish brown lustre. Abdomen black with light blue pattern on segments 1–6 and 8–10, appendages black.

*Description* – Male.

Head (Fig. 7). Labium brown to dark brown; base of mandibles brown, remainder dark brown; labrum brown with narrow darker spot on upper part, anteclypeus ivory white with two narrow dark brown spots on lower part, postclypeus largely red, margined with brown, within the red patch 1 small brown spot each side at about one-fourth of width of postclypeus.



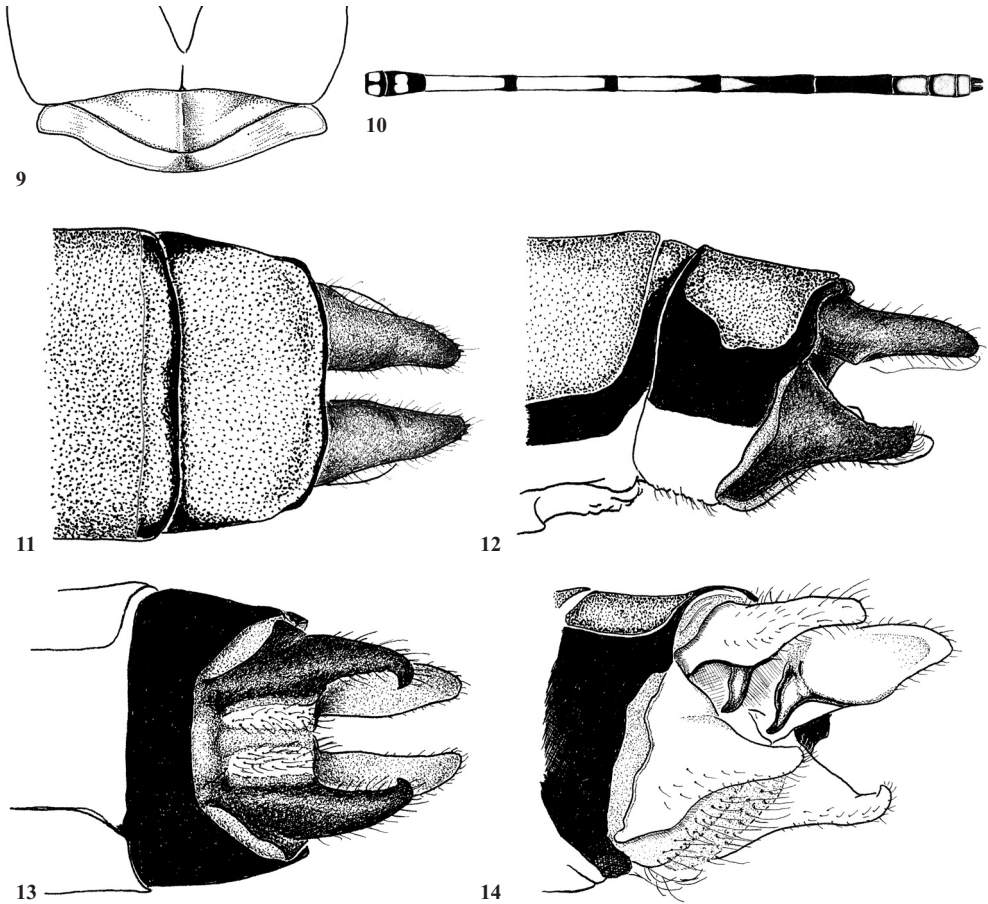
**Figs 6–8.** *Palaiargia susannae* sp. n., male: 6 = paratype, lateral view; 7 = holotype, head and part of thorax, dorsal view; 8 = habitat at locus typicus

Lower part of frons bright red, upper part black, the bar with three triangular prominences on upper edge: 1-1 small on each side between antenna and eye, one large between antennae, with edge surrounding median ocellus. Top of head between eyes and anterior part of occiput bright red, area around two ocelli black, rest of head brown to black. Antennae black.

Prothorax. Pronotum largely brown dorsally (Fig. 7), sides brown or with small blue spot in posterior upper corner, lower portion brown; other prothoracic and cervical sclerites also brown. Posterior margin of posterior lobe of pronotum arcuately convex, corners slightly upright (Fig. 9). Coxa and trochanter brown, lower third of femur brownish, rest of leg black.

Synthorax (Figs 6–7). Pleura dark brown to black with one bright red and two light blue patches: the red patch in antero-lateral portion, two-fifths to one-half as long and nearly half as wide as mesanepisternum; one light blue patch across approximately dorsal three-quarters of metepisternum and one light blue patch across most of posterodorsal two-thirds of metepimeron. Poststernum largely dark brown. Coxae and trochanters brown, lower two-thirds of femora brownish, rest of legs black. Wing venation black, membrane with yellowish brown lustre; 13–14 postnodals in Fw, 12–13 in Hw; pterostigma black.

Abdomen (Fig. 10). Segments 1–10 black, segments 1–6 and 8–10 with light blue dorsal pattern. Anal appendages (Figs 11–14) black, superiors narrowing posteriorly in posterior and lateral view, with apex rounded, with small widening at anterior third in lateral view, interior side at base with large tooth curved forward, visible in posterior-lateral view only.



**Figs 9–14.** *Palaiargia susannae* sp. n., holotype male: 9 = posterior lobe of prothorax, dorsal view; 10 = abdomen, dorsal view; 11 = anal appendages, dorsal view; 12 = anal appendages, lateral view; 13 = anal appendages, ventral view; 14 = anal appendages, oblique ventro-caudal view

Inferiors shorter than superiors, abruptly widening from base in lateral view, with apex slightly upturned; in ventral view narrower, gradually narrowing toward incurved and acute apex.

Measurements. Hind wing 18–20.1 mm, abdomen (including appendages) 26.8–30.6 mm.

Female and larva unknown.

*Etymology* – The species is dedicated to Zsuzsanna Benkó, the beloved wife of the senior author.

*Habitat* – The specimens were collected in tropical rainforest, at 225 m above sea level, along the upper stretches of a small tributary of Forum River. The 60 cm wide, stone-bedded stream was mostly shaded, but the individuals flew in the sunny parts (Fig. 8). There was a spring 15 m from this part of the stream. They occurred there together with *Metagrion postnodale*. The site is 200 m from the type locality of *Drepanosticta batanta*.

Comparison with other species. The male of *Palaiargia susannae* sp. n. is most similar to *P. charmosyna* (see KALKMAN & ORR 2013, ORR & RICHARDS 2014, ORR et al. 2014). It can be distinguished from this species by the presence of a red antehumeral patch and of a light blue dorsal patch on abdominal tergite 6. In male *P. charmosyna* the frons of synthorax and abdominal tergite 6 are black without any markings (KALKMAN & ORR 2013: 54, plate 23; 57, plate 26).

#### COENAGRIONIDAE Kirby, 1890

*Agriocnemis femina* (Brauer, 1869) – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 10.02.2015, 8 males, 2 females, KT (MM: 2015-11); 18.02.2015, 1 male, KT (MM: 2015-18). – Birie Island, PPER, marsh, 00°46'14", 130°44'51", 02.02.2015, 6 males, 1 female KT (MM: 2015-3); 15.02.2015, 2 females, KT (MM: 2015-15).

*Ceriagrion aeruginosum* Brauer, 1869 – Birie Island, PPER, marsh, 00°46'14", 130°44'51", 17.01.2014, 1 larva, KT-JP (MM: 2014-3); Birie Island, PPER, marsh, 00°46'14", 130°44'51", 02.02.2015, 1 male, KT (MM: 2015-3).

*Ischnura senegalensis* (Rambur, 1842) – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 10.02.2015, 2 males, KT (MM: 2015-11); 18.02.2015, 2 females, KT (MM: 2015-18).

*Pseudagrion* cf. *civicum* Lieftinck, 1932 – Batanta Island, left side stream of Waridor River, 00°52'10.7", 130°32'11.6", 04.02.2015, 5 males, KT-HR-JP (MM: 2015-5).

*Pseudagrion starreanum* Lieftinck, 1949 – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 09.02.2015, 1 male, 1 female, KT-HR-JP (MM: 2015-10); 10.02.2015, 1 female, KT (MM: 2015-11). – Batanta Island, Forum River, 00°52'45.78", 130°27'28.04", 14.02.2015, 3 males, KT-HR-JP (MM: 2015-14b). – Batanta Island, Welebed, 00°53'55.5", 130°39'50.0", 17.02.2015, 4 males, KT-JP-Kris (MM: 2015-17).

*Teinobasis rufithorax* (Selys, 1877) – Birie Island, PPER, moor, 00°46'21", 130°44'43", 17.01.2014, 6 males, KT-JP (MM: 2014-3); 20.01.2014, 2 males, 1 female, KT-JP (MM: 2014-10). – Birie Island, PPER, marsh, 00°46'14", 130°44'51", 02.02.2015, 1 male, KT (MM: 2015-3).

*Xiphiagrion cyanomelas* Selys, 1876 – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 10.02.2015, 2 males, 1 female, KT (MM: 2015-11).

#### ANISOPTERA

##### AESHNIDAE Leach, 1815

*Gynacantha mocsaryi* Förster, 1898 – Birie Island, PPER, moor, 00°46'21", 130°44'43", 17.01.2014, 1 larva, 1 exuvia, T. KT-JP (MM: 2014-3); 25.01.2014, 3 exuviae, KT (MM: 2014-21); 29.01.2014, 2 females, KT (MM: 2014-24); 15.02.2015, 1 exuvium, 1 male, KT (MM: 2015-15a). – Birie Island, PPER, marsh, 00°46'14", 130°44'51", 07.02.2015, 1 exuvium, KT (MM: 2015-8).

##### MACROMIIDAE Needham, 1903

*Macromia euphrosyne* Lieftinck, 1952 – Batanta Island, valley of Weras stream, 00°49'51.2", 130°38'00.0", 08.02.2015, 1 male, 1 female, KT-JP (MM: 2015-9).

##### LIBELLULIDAE Leach, 1815

*Agrionoptera insignis* (Rambur, 1842) – Birie Island, PPER, moor, 00°46'21", 130°44'43", 20.01.2014, 3 males, KT-JP (MM: 2014-10); 02.02.2015, 1 male, KT (MM: 2015-3a); 07.02.2015, 1 male, KT (MM: 2015-8a).

*Agrionoptera longitudinalis* Selys, 1878 – Arefi Island, Arefi, Mandur, east, water hole, 00°47'39.7", 130°42'28.4", 18.02.2015, 1 male, KT (MM: 2015-18b). – Batanta Island, valley of Waridor River, between 00°50'30.55", 130°31'30.54" and 00°52'09.66", 130°32'11.54", 18.01.2014, 1 male, KT-HR-JP (MM: 2014-5). – Batanta Island, valley of Waridor River, between 00°51'52.42", 130°32'26.34" and 00°51'48.7", 130°33'06.3", 01.02.2014, 1 female, KT-JP (MM: 2014-27a).

*Brachydiptax duivenbodei* (Brauer, 1866) – Birie Island, PPER, marsh, 00°46'14", 130°44'51", 20.01.2014, 2 males, KT-JP (MM: 2014-10); 29.01.2014, 1 male, KT (MM: 2014-24); 02.02.2014, 1 male, KT (MM: 2014-28);

02.02.2015, 1 male, KT (MM: 2015-3); 15.02.2015, 1 male, KT (MM: 2015-15); 07.02.2015, 1 male, KT (MM: 2015-8).

*Camacinia gigantea* (Brauer, 1867) – Birie Island, PPER, marsh, 00°46'14", 130°44'51", 29.01.2014, 1 exuvia, 2 males, 2 females, KT (MM: 2014-24); 07.02.2015, 1 male, KT (MM: 2015-8).

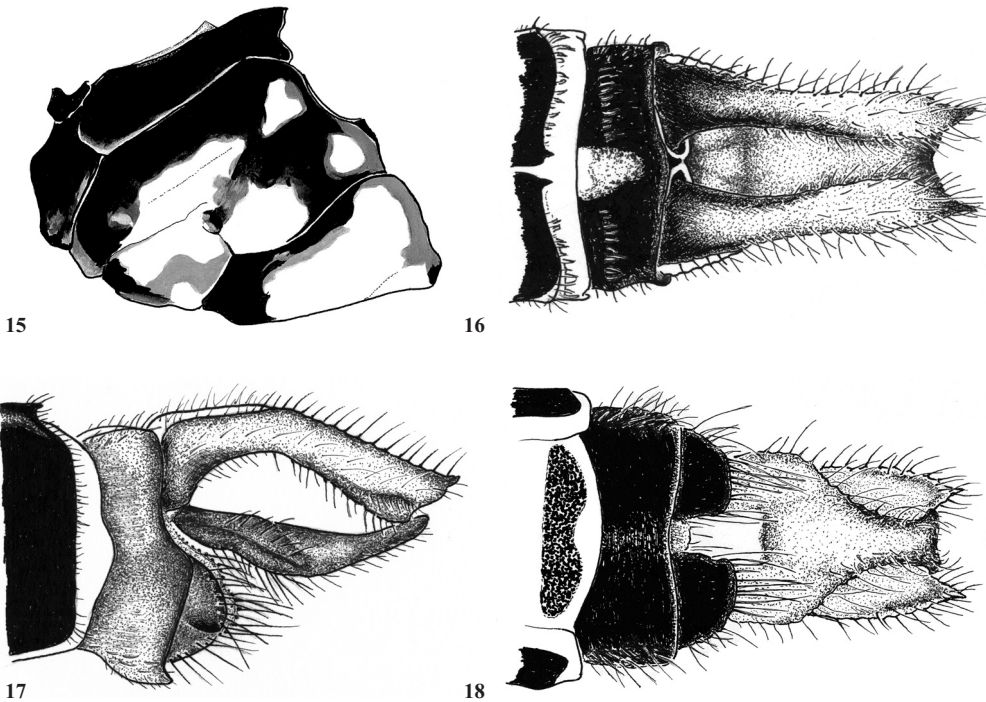
***Diplacina olahi* sp. n. Theischinger et Kovács (Figs 15–18)**

*Type material* – Holotype. **Indonesia**, Batanta Island, Welebed, valley of Kalijakut River, between 00°54'20.59", 130°38'31.70" and 00°53'12.88", 130°38'16.40", 23.01.2014, 1 male, KT-HR-JP (MM: 2014-17).

*Diagnosis* – Male: Middle-sized species of *Diplacina*. Frons and vertex brilliant metallic green, prothorax brown, legs largely black, synthorax brilliant metallic green with yellow pattern. Abdomen dark brown to black, segments 1–7 with yellow pattern, appendages black. Superiors narrow, ending with acute point, apex of inferior appendix laterally expanded and with very shallow wide-angled median emargination making it appear bilobed.

*Description* – Male.

Head. Labium dark brown, on each side at base of lateral lobes with yellowish spot; these spots as large as dark median lobe, with three small emergences on upper edge. Mandibles brown; whole labrum black, whole anteclypeus ivory white, postclypeus ivory white with brownish middle third, frons and vertex brilliant metallic green, frons with ivory white spots in lower edges, occiput black. Antennae dark brown.



**Figs 15–18.** *Diplacina olahi* sp. n., holotype male: 15 = synthorax, lateral view; 16 = anal appendages, dorsal view; 17 = anal appendages, lateral view; 18 = anal appendages, ventral view

Prothorax. Pronotum brownish, other prothoracic and cervical sclerites also brownish. Posterior lobe of pronotum ivory white. Coxa and trochanter brown; inner surfaces of trochanter and femur with yellowish streak, other parts of legs black.

Synthorax (Fig. 15). Pleura largely brilliant metallic green with a few yellow patches: a small mark each on mesokatepisternum and metakatepisternum; two rather small triangular patches along subalar ridge, one in mesepimeron, the other in metepisternum; a large U-shaped patch covering approximately ventral 2/3 of mesepimeron and metepisternum; a large patch covering approximately posterior 3/4 of metepimeron. Poststernum largely brown. Coxa and trochanter brown; other parts of legs black. Wings with venation black, membrane hyaline; 8.11.11.8 nodals in Fw, 7.8.9.8 in Hw; pterostigma brown.

Abdomen. Segments 1–10 dark brown to black, with yellow pattern laterally and dorsally in segments 1–3, with yellow basal rings in segments 4–7, segments 4 and 7 with yellow pattern directing posteriorly from dorsal part of ring (similar to that of *D. merope*). Anal appendages (Figs 16–18) black, superiors narrow, straight in dorsal view, strongly curved downwards in lateral view, apex acute in both views. Ventrally in posterior four-fifths with longitudinal elevation with 4–6 minute teeth. Inferior appendage ventrally slightly shorter than superiors, moderately broadening to first third, then abruptly narrowing, divergent apically and with very shallow wide-angled median emargination making it appear bilobed.

Measurements. Hind wing 25.4 mm, abdomen (including appendages) 22.6 mm.

Female and larva unknown.

*Etymology* – The species is dedicated to János Oláh, a noted expert of world Trichoptera, supporter of research of Tibor Kovács in Batanta.

*Habitat* – The only known specimen was collected in tropical rainforest, in the valley of the Kalijakut River (0–105 m a.s.l.), along with *Rhinocypha tincta* cf. *sagitta*, *Metagrion postnodale* and *Nososticta aurantiaca*.

Comparison with other species. *Diplacina olahi* roughly fits the subgroup of *Diplacina* in ORR & KALKMAN (2015) defined by „Inferior appendage clearly bifid; superior apps in lateral view bent downwards, with shallow ventral subapical angle”. In this subgroup only *D. smaragdina* is included. With the „Inferior appendage widened at the tip and clearly bifid” it even better fits another group that is, however, further defined by „superior apps in lateral view bent downwards with a small subapical ventral tooth” and includes *D. arsinoe*, *D. callirrhoe*, *D. cyrene*, *D. dioxippe* and *D. merope* (all ORR & KALKMAN 2015, plates 21 and 22). Whereas the superior appendages of *D. olahi* are most similar to *D. smaragdina* (ORR & KALKMAN 2015, plate 22), its inferior appendix, very wide basally then very narrow and with apex widened, clearly bifid and with shallow median emargination, comes very close to *D. merope*. *D. olahi* and *D. merope* also share a yellowish spot at base of the lateral lobes of the labium. To sum it up the superior anal appendages of *D. olahi*, pointed, are clearly different from *D. merope* (blunt), the inferior appendage of *D. olahi* apically expanded and with shallow median emargination clearly differs from *D. smaragdina* (apically not expanded and with deep median emargination).

*Diplacodes trivialis* (Rambur, 1842) – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 09.02.2015, 1 female, KT-HR-JP (MM: 2015-10); 10.02.2015, 1 male, 1 female, KT (MM: 2015-11); 18.02.2015, 1 male, 3 females, KT (MM: 2015-18).

*Huonia epinephela* Förster, 1903 – Batanta Island, Teluk Warai, stream, 00°50'51.0", 130°35'14.0", 11.02.2015, 1 male, KT-JP (MM: 2015-13).

*Huonia thais* Lieftinck, 1953 – Batanta Island, valley of Waridor River, between 00°50'30.55", 130°31'30.54" and 00°52'09.66", 130°32'11.54", 18.01.2014, 3 males, 1 female, KT-HR-JP (MM: 2014-5); 03.02.2015, 1 female, KT-HR-JP (MM: 2015-4). – Batanta Island, valley of Waridor River, between 00°52'09.66", 130°32'11.54" and 00°51'51", 130°33'41", 04.02.2015, 1 male, KT-HR-JP (MM: 2015-6).

*Hydrobasileus vittatus* Kirby, 1889 – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 10.02.2015, 1 female, KT (MM: 2015-11).

Localities – Indonesia: Menado [Manado], Celebes [Sulawesi] (KIRBY 1889), Buru, Celebes, Amboina [Ambon] (LIEFTINCK 1926), Flores (MONK et al. 1997). Philippines: Mindanao (VILLANUEVA 2011). Three ovipositing females were observed in Arefi, at the shallow lake of Mandur. New to the fauna of New Guinea.

*Nannophlebia amnosia* Lieftinck, 1955 – Batanta Island, valley of Waridor River, between 00°50'30.55", 130°31'30.54" and 00°52'09.66", 130°32'11.54", 18.01.2014, 1 female, KT-HR-JP (MM: 2014-5).

*Neurothemis ramburii* (Brauer, 1866) – Batanta Island, valley of Waridor River, 00°52'06", 130°31'30", 18.01.2014, 2 males, KT-HR-JP (MM: 2014-5a); 00°52'09.66", 130°32'11.54", 03.02.2015, 5 males, 1 female, KT-HR-JP (MM: 2015-4b).

*Neurothemis stigmatizans* (Fabricius, 1775) – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 10.02.2015, 3 males, 1 female, KT (MM: 2015-11). – Batanta Island, Welebed, 00°53'55.5", 130°39'50.0", 17.02.2015, 1 female, KT-JP-Kris (MM: 2015-17). – Batanta Island, valley of Waridor River, 00°52'06", 130°31'30", 03.02.2015, 1 female, KT-HR-JP (MM: 2015-4a). – Birie Island, PPER, marsh, 00°46'14", 130°44'51", 02.02.2014, 1 male, 2 females, KT (MM: 2014-28); 07.02.2015, 1 male, KT (MM: 2015-8).

*Orthetrum serapia* Watson, 1984 – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 09.02.2015, 1 male, KT-HR-JP (MM: 2015-10); 10.02.2015, 2 male, KT (MM: 2015-11).

*Orthetrum villosovittatum* (Brauer, 1868) – Batanta Island, valley of Waridor River, between 00°50'30.55", 130°31'30.54" and 00°52'09.66", 130°32'11.54", 18.01.2014, 2 males, KT-HR-JP (MM: 2014-5).

*Protorthemis coronata* (Brauer, 1866) – Batanta Island, valley of Warmon stream, lower waterfall, 00°50'04.50", 130°42'54.01", 21.01.2014, 1 male, 1 female (copula), KT-HR-JP (MM: 2014-13).

*Raphismia bispina* (Hagen, 1867) – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 09.02.2015, 1 male, KT-HR-JP (MM: 2015-10); 10.02.2015, 2 males, KT (MM: 2015-11); 18.02.2015, 3 males, KT (MM: 2015-18). – Batanta Island, Northwest Coast, 00°48'39.45", 130°27'10.41", 14.02.2015, 1 male, KT-HR-JP (MM: 2015-14c).

*Rhyothemis phyllis* (Sulzer, 1776) – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 09.02.2015, 1 male, KT-HR-JP (MM: 2015-10); 10.02.2015, 4 males, KT (MM: 2015-11); 18.02.2015, 1 male, KT (MM: 2015-18).

*Tramea eurybia* Selys 1878 – Arefi Island, Arefi, Mandur, 00°47'17.7", 130°42'20.0", 10.02.2015, 1 male, KT (MM: 2015-11).

## Discussion

Thirty-eight species were recorded from Batanta Island (including Arefi and Birie Islands). The following three new species were described: *Drepanosticta batanta* sp. n., *Palaiargia susannae* sp. n. and *Diplacina olahi* sp. n. *Hydrobasileus vittatus* is new to the fauna of New Guinea. Further 15 species were proved to be new to the fauna of the Raja Ampat Islands: *Drepanosticta auriculata*, *Metagrion postnodale*, *Selysioneura* cf. *cervicornu*, *Nososticta* cf. *finisterrae*, *Idiocnemis bidentata*, *I. inornata*, *Agriocnemis femina*, *Ceriagrion aeruginosum*, *Ischnura senegalensis*, *Pseudagrion* cf. *civicum*, *Xiphiagrion cyanomelas*, *Diplacodes trivialis*, *Huonia epinephela*, *Neurothemis ramburii*, *Orthetrum serapia*, *Rhyothemis phyllis*.

As a comparison, the species numbers of Odonata from the other three major islands of Raja Ampat are the following: Misool 29, Waigeo 30, Salawati 20 (KALKMAN & ORR 2013, ORR & KALKMAN 2015, V. Kalkman pers. comm.).

Owing to the diverse geomorphology of Batanta, a wealth of microhabitats can be seen on the island, from springs to large streams with waterfalls. Two of the three new Odonata species were found near springs (*Drepanosticta batanta* sp. n., *Palaiargia susannae* sp. n.), while the third (*Diplacina olahi* sp. n.) was collected at a stream. Two bodies of standing water deserve special mention: Lake Mandur at Arefi is the most species-rich with its eleven species; seven species were found exclusively here in Batanta, including *Hydrobasileus vittatus*, which is new to the fauna of New Guinea. The marshy area on Birie Island yielded eight species, including six that were not found elsewhere.

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