



Faunistic Studies in South-East Asian and Pacific Island Odonata

**Journal of the
International Dragonfly Fund**

ISSN 2195-4534

Content

Dow, Rory, Graham Reels & Robin Ngiam

Previously unpublished Odonata records from Sarawak, Borneo,

Part III. Sri Aman, Sibuan and Kapit Divisions

1-34

Volume 9 2015

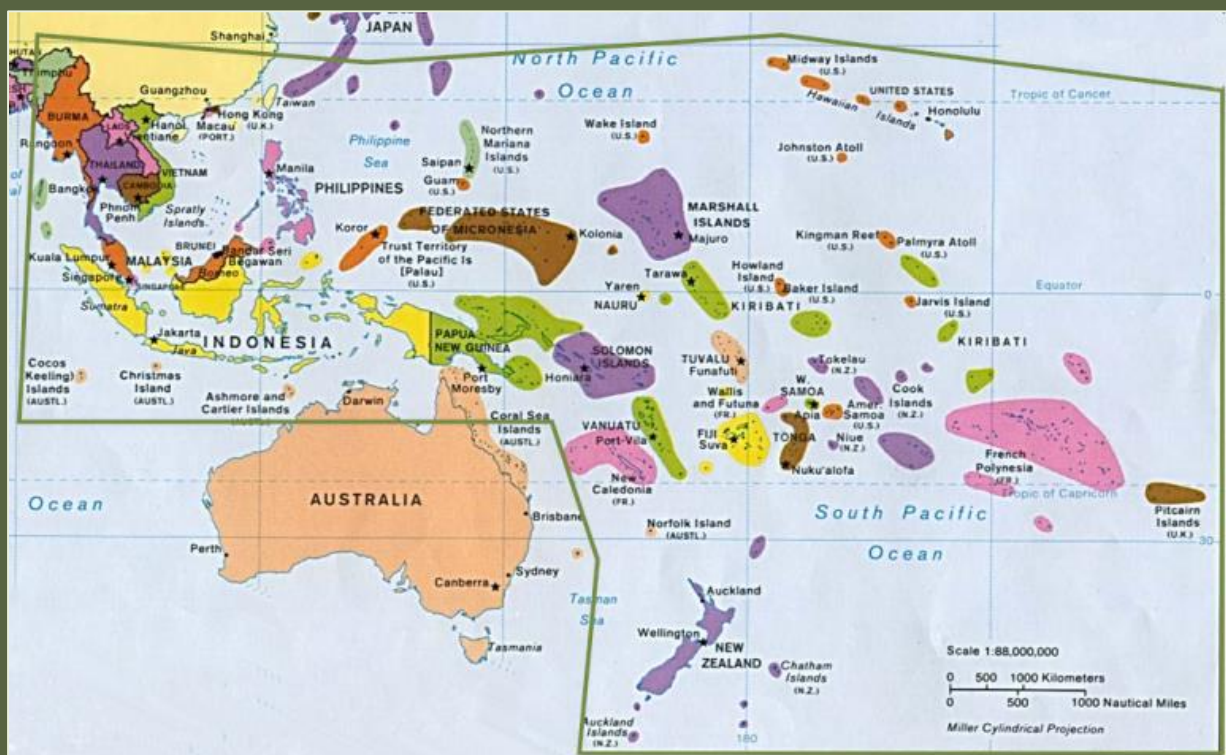
The International Dragonfly Fund (IDF) is a scientific society founded in 1996 for the improvement of odonatological knowledge and the protection of species.

Internet: <http://www.dragonflyfund.org/>

This series intends to contribute to the knowledge of the regional Odonata fauna of the Southeastern Asian and Pacific regions to facilitate cost-efficient and rapid dissemination of faunistic data.

Southeast Asia or Southeastern Asia is a subregion of Asia, consisting of the countries that are geographically south of China, east of India, west of New Guinea and north of Australia. Southeast Asia consists of two geographic regions: Mainland Southeast Asia (Indochina) and Maritime Southeast Asia.

Pacific Islands comprise of Micronesian, Melanesian and Polynesian Islands.



http://www.lib.utexas.edu/maps/middle_east_and_asia/easia_oceania_92.jpg; modified

Editorial Work: Rory Dow, Milen Marinov, and Martin Schorr

Layout: Martin Schorr

Indexed by Zoological Record, Thomson Reuters, UK

Printing: ikt Trier, Germany

Impressum: Faunistic Studies in South-East Asian and Pacific Island Odonata - Volume 09

- Date of publication: 13.02.2015
- Publisher: International Dragonfly Fund e.V., Schulstr. 7B, 54314 Zerf, Germany. E-mail: oestlap@online.de
- Responsible editor: Martin Schorr

Previously unpublished Odonata records from Sarawak, Borneo, Part III. Sri Aman, Sibuan and Kapit Divisions

Rory A. Dow¹ & Graham T. Reels² & Robin W.J. Ngiam³

¹Naturalis Biodiversity Center, P.O. Box 9517, 2300 RA Leiden, The Netherlands
Email: rory.dow230@yahoo.co.uk

²31 St Anne's Close, Winchester SO22 4LQ, Hants., United Kingdom
Email: gtreels@gmail.com

³National Biodiversity Centre, National Parks Board, Singapore
Email: ngiam_wen_jiang@nparks.gov.sg

Abstract

New records of Odonata from three of Sarawak's administrative divisions are presented: Sri Aman, Sibuan and Kapit. *Idionyx montana* is recorded from Borneo for the first time, from Batang Ai National Park in Sri Aman Division. Other notable records include: *Podolestes* species, *Matronoides cyaneipennis*, *Rhinoneura caerulea*, *Dysphaea* species, *Coeliccia campioni*, *Acrogomphus jubilaris*, *Procordulia fusiformis* and *Orthetrum borneense*.

Key words: Odonata, Kapit, Sibuan, Sri Aman, Batang Ai, Sarawak, Borneo, Malaysia

Introduction

Since 2005 the authors have been engaged in an ongoing survey of the Odonata of Sarawak in Malaysian Borneo. The present paper is the third of a series of publications in which we hope to list all the Odonata records we have made in Sarawak in 2005-2014 which have not previously been published and which are not scheduled to be published elsewhere. In this third paper of the series we present records from some of the central administrative divisions of Sarawak. Map 1 gives an overview of the locations covered.

Sri Aman division is the most western and southern of the divisions dealt with here. It is believed that the Iban people, the largest Dayak group in Sarawak, first entered Sarawak from Kalimantan in this division, in the area of the present-day Batang Ai National Park. It is very poorly known odonatologically, with published records in Laidlaw (1920a), Kalkman & Villanueva (2011), Dow (2010b, 2010c), Dow & Orr (2012) and Donnelly (1999); most records in the latter are from Batang Ai National Park, with isolated records from the Skrang River area and Selindong near Engkilili. Many records in Donnelly (1997) are also probably from Sri Aman, but are presented without detailed locality information and could also be from some location(s) in Samarahan division.



Sibu division is located to the north and east of Sri Aman division. It is even more poorly known for Odonata than Sri Aman, with definite published records from the division of only 10 species in Hincks (1930), Hisamatsu & Sasamoto (2003) and Lieftinck (1953) prior to this publication. The city of Sibu, located on the Rajang River, is the gateway to Kapit division; our few records from Sibu division are all from locations near the city, sampled on odd days before or after trips to Kapit.



Map 1. Satellite image of Sarawak showing the locations of some of the sampling sites covered in this report. B – Batang Ai National Park, Sri Aman division; S – sites in Sibu Division; K – sites in Kapit division.

Land-locked Kapit division is the largest administrative division in Sarawak with an area of 38,934 km², not much smaller than the Netherlands (41,543 km²). Much of the division is lacking in infrastructure and difficult to access; most of the few towns are best reached by express boat, and smaller communities by boat or the network of logging roads. Kapit is also poorly known for Odonata, but records can be found in Asahina (1966), Dow (2010a, 2010c, 2013), Dow, Choong & Ng (2010), Dow & Ngiam (2011, 2012, 2014), Dow & Orr (2012), Dow & Reels (2010, 2011), Dow, Reels & Butler (2013a), Kimmins (1936), Lieftinck (1950, 1954, 1965), Matsuki & Kitagawa (1993), Norma-Rashid *et al.* (2010), Reels & Wilson (2009) and van Tol & Norma-Rashid (1995). The holotypes of *Drepanosticta sbong* Dow, 2010, *Telosticta iban* Dow, 2014, *Telosticta kajang* Dow & Orr, 2012, *Coeliccia cyaneothorax* Kimmins, 1936, *Coeliccia southwelli* Dow & Reels, 2011, *Elattonaura mauros* Dow, Choong & Ng, 2010 and *Chlorogomphus manau* Dow & Ngiam, 2011 are from locations in Kapit division.

Classification used here follows Dijkstra, Bechly *et al.* (2013) for Anisoptera and Dijkstra, Kalkman *et al.* (2014) for Zygoptera, including the treatment of some genera formerly placed in Megapodagrionidae and Corduliidae as *incertae sedis*.

As-yet-undescribed species of *Devadatta* are referred to as species A, B and C; this notation is consistent with Parts I and II of this series and Dow & Ngiam (2014), e.g. *Devadatta* species 'A' here is the same as species 'A' in Dow & Reels (2013) and in Dow, Reels & Butler (2013b). A combined morphological and molecular analysis of the Bornean Devadattidae will be published in the near future (Dow, Hämäläinen & Stokvis in preparation); material will be listed there so is not listed here.

Names of collectors (where they appear more than once) are abbreviated as follows in the lists below: Manau anak Budi – MB, Rory Dow – RD, Yohanes anak Jenok – YJ, Mi-bang (Mathias) Kibi – MK, Robin Ngiam – RN, Graham Reels – GR, Luke Southwell – LS, Joanes Unggang – JU.

Sri Aman Division – Batang Ai National Park

All of our records from Sri Aman are from one trip made to Batang Ai National Park (Map 2) by the first two authors in December 2007. The national park has an area of ca 270 km² and is contiguous with the Lanjak Entimau Wildlife Sanctuary, and with Bentuang-Karimun National Park in Kalimantan. The park includes the headwaters of the Batang Ai River, which feeds the Batang Ai hydroelectric dam. More information on the national park can be found in Hazebroek & Morshidi (2001). Our sampling was mostly confined to a small area easily accessed from the Nanga Delok Ranger Station.



Map 2. Satellite image showing Sri Aman division and parts of Sibul and Kapit divisions in more detail.

Locations:

- B1. Sungai Bebiang Besar and tributaries.
- B2. Sungai Bebiang Mit and tributaries.
- B3. Sungai Nanga Beredik (Fig. 1).





Figure 1. Sungai Nanga Beredik. Photo by G.T. Reels.

B4. Forest pools away from streams.

B5. Trailside.

B6. At the Ranger Station.

B7. Outside the park, at edges of the Batang Ai reservoir.

List of species collected

Zygoptera

Platystictidae

1. *Drepanosticta attala* Lieftinck, 1934

A very local species.

Loc B2 – ♂, 6.xii.2007, RD.

2. *Drepanosticta* species cf *crenitis* Lieftinck, 1933

Loc B1 – ♀, 4.xii.2007, RD. Loc B2 – ♂, ♀, 5.xii.2007, RD.

3. *Drepanosticta rufostigma* (Selys, 1886)

Loc B1 – ♂, 4.xii.2007, RD. Loc B2 – 2 ♂♂, 5.xii.2007, RD; 3 ♂♂, 5.xii.2007, GR.

Loc B3 – ♂, 8.xii.2007, RD.

4. *Drepanosticta versicolor* (Laidlaw, 1913)

Loc B2 – ♂, 5.xii.2007, RD.

5. *Telosticta longigaster* Dow & Orr, 2012 (Fig. 2)
See Dow & Orr (2012).



Figure 2. *Telosticta longigaster* male. Photo by G.T. Reels.

Argiolestidae

6. *Podolestes* species (Fig. 3)

This large sized species is closely allied to *P. orientalis*, but differs from that species in size, markings and details of the anal appendages. At Batang Ai it was found at one large forest pond in a saddle on a ridge; the pool had probably originally been created by the digging activities of Bearded Pigs. Subsequently this species has been found at several other locations in Sarawak.

Loc B4 – 2 ♂♂, 4.xii.2007, RD; ♂, 4.xii.2007, GR; ♂+♀, 7.xii.2007, RD.





Figure 3. *Podolestes* species male. Photo by G.T. Reels.

Calopterygidae

7. *Neurobasis longipes* Hagen, 1887

Loc B2 – ♀, 5.xii.2007, RD; 2 ♂♂, 2 ♀♀, 5.xii.2007, GR. Loc B3 – ♂, 8.xii.2007, GR.

8. *Vestalis amaryllis* Lieftinck, 1965

Loc B2 – 2 ♂♂, 5.xii.2007, RD; 6 ♂♂, 5.xii.2007, GR; 2 ♂♂, 6.xii.2007, RD; ♂, 6.xii.2007, GR. Loc B5 – 2 ♂♂, 4.xii.2007, RD.

9. *Vestalis amnicola* Lieftinck, 1965

Loc B2 – 2 ♂♂, 5.xii.2007, RD.

10. *Vestalis atropa* Lieftinck, 1965

Loc B1 – ♂, 4.xii.2007, GR. Loc B2 – 3 ♂♂, 5.xii.2007, RD; ♂, 5.xii.2007, GR; ♂, 6.xii.2007, RD. Loc B3 – 3 ♂♂, 8.xii.2007, RD; 5 ♂♂, 8.xii.2007, GR. Loc B5 – ♂, 4.xii.2007, GR.

11. *Vestalis beryllae* Laidlaw, 1915 (Fig. 4)

Loc B5 – ♂, 4.xii.2007, GR.



Figure 4. *Vestalis beryllae* male. Photo by G.T. Reels.

Chlorocyphidae

12. *Heliocypha biseriata* (Selys, 1859)

Loc B1 – ♂, 4.xii.2007, RD.

13. *Libellago stictica* Selys, 1859

Loc B1 – ♂, 4.xii.2007, GR.

14. *Rhinocypha aurofulgens* Laidlaw, 1931 (Fig. 5)

Loc B1 – ♂, 4.xii.2007, RD; ♂, 4.xii.2007, GR. Loc B2 – 2 ♂♂, 5.xii.2007, RD.



Figure 5. *Rhinocypha aurofulgens* male. Photo by G.T. Reels.



Devadattidae15. *Devadatta* species B

Specimens will be listed in Dow, Hämäläinen & Stokvis (in preparation). Loc B1, B2.

Euphaeidae16. *Dysphaea* species

This unnamed species, similar in appearance to *D. dimidiata* Selys, (Selys, 1853) is being described as part of a combined morphological and molecular revision of the genus in Sundaland (Hämäläinen, Dow & Stokvis in preparation); specimens will be listed in that publication.

Loc B1, Loc B2.

17. *Euphaea impar* Selys, 1859

Loc B1 – ♂, 4.xii.2007, RD. Loc B2 – ♂, 5.xii.2007, RD.

18. *Euphaea subcostalis* Selys, 1873 Fig. 6

Loc B1 – 4 ♂♂, 4.xii.2007, RD; ♂, 4.xii.2007, GR. Loc B2 – ♂, 5.xii.2007, RD; ♂, 5.xii.2007, GR. Loc B3 – ♂, 8.xii.2007, RD; 2 ♂♂, 8.xii.2007, GR.



Figure 6. *Euphaea subcostalis* male. Photo by G.T. Reels.

19. *Euphaea tricolor* Selys, 1859

Loc B2 – ♂, 5.xii.2007, RD; ♂, 5.xii.2007, GR.

Platycnemididae20. *Coeliccia* species cf *borneensis* (Selys, 1866)

Specimens from Batang Ai were included under the “western form” of *Coeliccia borneensis* in Dow 2010b; molecular results (unpublished) suggest that *C. borneensis* might belong to a complex of extremely similar taxa, requiring further study.

21. *Coeliccia cyaneothorax* Kimmins, 1936

Loc B1 – ♂, ♂+♀, 4.xii.2007, GR. Loc B2 – ♂, 5.xii.2007, RD; ♀, 5.xii.2007, GR. Loc B3 – ♂, 8.xii.2007, RD; ♂, 8.xii.2007, GR.

22. *Coeliccia nigrohamata* Laidlaw, 1918

Loc B1 – 3 ♂♂, ♂+♀, 4.xii.2007, RD; 2 ♂♂, 4.xii.2007, GR. Loc B2 – 2 ♂♂, 5.xii.2007, RD; 2 ♂♂, 5.xii.2007, GR; 2 ♂♂, 6.xii.2007, RD; ♂, 6.xii.2007, GR. Loc B3 – ♂+♀, 8.xii.2007, RD; 3 ♂♂, 8.xii.2007, GR.

23. *Prodasineura dorsalis* (Selys, 1860)

Loc B2 – 2 ♂♂, 5.xii.2007, RD; ♂, 6.xii.2007, RD.

Coenagrionidae

24. *Ceriagrion bellona* Laidlaw, 1915

Loc B2 – ♂, 6.xii.2007, RD.

25. *Pseudagrion microcephalum* (Rambur, 1842)

Loc B7 – ♂, 9.xii.2007, RD.

26. *Stenagrion dubium* (Laidlaw, 1912)

Loc B1 – 4 ♂♂, ♂+♀, 4.xii.2007, RD; ♂, 4.xii.2007, GR. Loc B2 – ♀, 5.xii.2007, RD; 3 ♂♂, 5.xii.2007, GR.

27. *Teinobasis laidlawi* Kimmins, 1936 (Fig. 7)

See Dow 2010a.



Figure 7. *Teinobasis laidlawi* male. Photo by G.T. Reels.



Anisoptera**Aeshnidae**

28. *Gynacantha dohrni* Krüger, 1899

Loc B4 – ♂, 7.xii.2007, RD.

29. *Indaeschna grubaueri* (Förster, 1904)

Loc B3 – ♂, 8.xii.2007, GR. Loc B4 – ♂, 7.xii.2007, GR.

Gomphidae

30. *Ictinogomphus decoratus melaenops* (Selys, 1858)

Loc B7 – ♂, 9.xii.2007, GR.

31. *Leptogomphus coomansi* Laidlaw, 1936

Loc B2 – ♂, 5.xii.2007, RD; ♂, 5.xii.2007, GR.



Figure 8. Habitat of *Hylaeothemis clementia* at Batang Ai National Park. Photo by G.T. Reels.

Libellulidae32. *Cratilla lineata* (Brauer, 1878)

Loc B4 – ♂, 4.xii.2007, GR.

33. *Cratilla metallica* (Brauer, 1878)

Loc B4 – ♂, 4.xii.2007, GR; ♂, 7.xii.2007, RD.

34. *Hylaeothemis clementia* Ris, 1909 (Fig. 9)

This is a species of hilly and mountainous terrain, favouring small but sunlit seeps and stream heads. At Batang Ai it was found at the marshy head of a tributary in a saddle point on a ridge, where past disturbance had opened up the canopy to a considerable extent (Fig. 8). Fig. 9 shows a mature male at this location.

Loc B2 – 2 ♂♂, 5.xii.2007, RD.



Figure 9. *Hylaeothemis clementia* male. Photo by G.T. Reels.

35. *Lyriothemis biappendiculata* (Selys, 1878)

Loc B2 – ♂, 5.xii.2007, RD. Loc B3 – ♂, 8.xii.2007, RD.

36. *Neurothemis fluctuans* (Fabricius, 1793)

Loc B6 – ♀, 3.xii.2007, RD.

37. *Onychothemis coccinea* Lieftinck, 1953

Loc B1 – ♂, 4.xii.2007, RD; ♂, 4.xii.2007, GR.

38. *Orchithemis pulcherrima* Brauer, 1878

Loc B2 – 2 ♂♂, 5.xii.2007, GR.



39. *Orthetrum chrysis* (Selys, 1891)
Loc B2 – ♂, 5.xii.2007, GR.
40. *Orthetrum glaucum* (Brauer, 1865)
Loc B5 – ♀, 4.xii.2007, RD.
41. *Orthetrum pruinosum schneideri* Förster, 1903
Loc B2 – ♂, 5.xii.2007, GR.
42. *Trithemis aurora* (Burmeister, 1839)
Loc B7 – ♂, 3.xii.2007, RD.
43. *Tyriobapta torrida* Kirby, 1889
Loc B3 – ♂, 8.xii.2007, RD.

Incertae sedis

44. *Idionyx montana* Karsch, 1891
This species has not previously been recorded from Borneo. A single male was collected whilst perched by a rocky, low gradient, forest stream (Fig. 1) at the onset of late afternoon rain.
Loc B3 – ♂, 8.xii.2007, RD.
45. *Idionyx* species cf *selysi* Fraser, 1926
Loc B5 – ♂, 7.xii.2007, GR.



Figure 10. Black water channel in highly disturbed forest, Sungai Teku. Photo by R.A. Dow.

Sibu

As noted in the introduction, Sibu has been very poorly sampled for Odonata historically, and little has changed in the past decade. Our sampling in the division to date has been confined to two disturbed sites close to Sibu town (Map 2).

S1. Bukit Lima Nature Reserve in Sibu division, outskirts of Sibu town.

S2. Sungai Teku area in Sibu division, outskirts of Sibu town. Fig. 10.

Zygoptera

Chlorocyphidae

1. *Libellago hyalina* (Selys, 1859)

Loc S2 – ♂, 10.v.2010, RD.

Platycnemididae

2. *Copera vittata* (Selys, 1863)

Loc S2 – ♂, 10.v.2010, RD.

Coenagrionidae

3. *Agriocnemis femina* (Brauer, 1868)

Loc S1 – 2 ♂♂, ♀, 23.x.2009, RD. Loc S2 – ♂, ♀, 10.v.2010, RD; ♂, ♀, 10.v.2010, LS.

4. *Agriocnemis minima* (Selys, 1877)

Loc S2 – 2 ♀♀, 10.v.2010, GR.

5. *Amphicnemis wallacii* Selys, 1863

Loc S2 – 7 ♂♂, 3 ♀♀, 10.v.2010, RD; 3 ♂♂, 3 ♀♀, 10.v.2010, GR; ♂, 2 ♀♀, 10.v.2010, LS.

6. *Archibasis viola* Lieftinck, 1949

Loc S2 – ♂, 10.v.2010, RD.

7. *Ceriagrion cerinorubellum* (Brauer, 1865) (Fig. 11)

Loc S2 – ♂, 10.v.2010, RD; ♂, 10.v.2010, GR; ♂, 10.v.2010, LS.



Figure 11. *Ceriagrion cerinorubellum* male. Photo by G.T. Reels.



8. *Ischnura senegalensis* (Rambur, 1842)
Loc S2 – 2 ♂♂, 10.v.2010, RD.
9. *Pseudagrion coomansi* Lieftinck, 1937
Only a single male of this species was collected, flying with *P. microcephalum*.
In Borneo this species appears to be a low pH specialist.
Loc S2 – ♂, 10.v.2010, RD.
10. *Pseudagrion microcephalum* (Rambur, 1842)
Loc S2 – 4 ♂♂, 10.v.2010, RD; 2 ♂♂, ♂+♀, 10.v.2010, GR.

Anisoptera

Gomphidae

11. *Ictinogomphus decoratus melaenops* (Selys, 1858)
Loc S2 – ♂, 10.v.2010, GR.

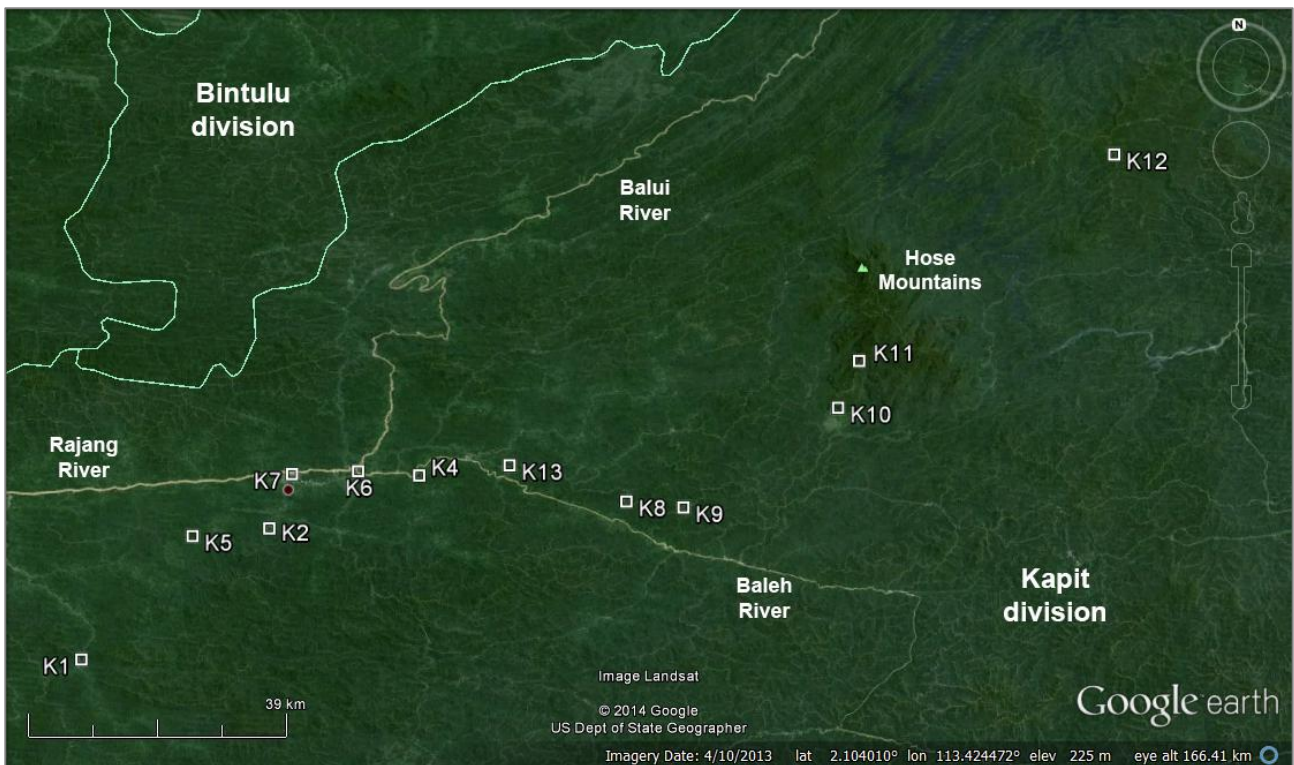
Macromiidae

12. *Epophthalmia vittigera* (Rambur, 1842)
Loc S2 – ♀, 10.v.2010, GR.

Libellulidae

13. *Agrionoptera sexlineata* Selys, 1879
Loc S1 – 2 ♂♂, ♀, 23.x.2009, RD.
14. *Brachydiplax chalybea* Brauer, 1868
Loc S1 – ♂, 23.x.2009, RD. Loc S2 – 2 ♂♂, 10.v.2010, RD.
15. *Brachygonia oculata* (Brauer, 1878)
Loc S2 – ♂, 10.v.2010, RD.
16. *Hydrobasileus croceus* (Brauer, 1867)
Loc S2 – ♀, 10.v.2010, GR.
17. *Nannophya pygmaea* Rambur, 1842
Loc S2 – ♂, 10.v.2010, GR.
18. *Neurothemis fluctuans* (Fabricius, 1793)
Loc S2 – ♂, 10.v.2010, GR.
19. *Orchithemis pulcherrima* Brauer, 1878
Loc S2 – ♂, 10.v.2010, RD.
20. *Orthetrum chrysis* (Selys, 1891)
Loc S2 – ♂, 10.v.2010, GR.
21. *Orthetrum sabina* (Drury, 1773)
Loc S2 – ♀, 10.v.2010, RD; ♀, 10.v.2010, GR.
22. *Orthetrum testaceum* (Burmeister, 1839)
Loc S2 – ♀, 10.v.2010, LS.
23. *Rhodothemis rufa* (Rambur, 1842)
Loc S1 – 2 ♂♂, 23.x.2009, RD. Loc S2 – ♂, 10.v.2010, GR.

24. *Rhyothemis obsolescens* Kirby, 1889
 Loc S2 – ♂, 10.v.2010, RD; ♀, 10.v.2010, GR.
25. *Rhyothemis phyllis* (Sulzer, 1776)
 Loc S1 – ♀, 23.x.2009, RD. Loc S2 – ♀, 10.v.2010, GR.
26. *Urothemis signata insignata* (Selys, 1872)
 Loc S2 – ♂, 10.v.2010, RD; ♂, 10.v.2010, GR.
27. *Zygomma petiolatum* (Albarda, 1881)
 Loc S2 – ♀, 10.v.2010, GR.



Map 3. Satellite image showing part of Kapit division in more detail. All sampling locations are marked except K3, which is too close to K2 to display separately at this scale.

Kapit

We have been visiting Kapit since 2008, but our early efforts in the division were hampered by lack of information and poor local contacts. Before 2010 our efforts were confined to the area around Kapit town, but in 2010 we were able to mount a small expedition to the fascinating Hose Mountains (Dow & Reels 2010). In 2011 RD and RN visited another part of the Hose Mountains (Dow & Ngiem 2012) and later in the year RD embarked on an ill-fated trip to the Batu Laga plateau on the far side of the Balui river to the east of the Hose Mountains; a combination of vehicle breakdown and washed-out bridges meant that RD managed only one day in the field out of a planned seven (fortunately LS and MB were able to do a few days of sampling at the foot of the Hose Mountains during this period). 2013 saw trips to areas near the Indonesian border (Dow & Ngiem 2014) and to the Lanjak Entimau Wildlife Sanctuary; the results of the



latter will be reported elsewhere. A few records from the vicinity of a long house on the Sungai Katibas are also available. Despite our efforts this largest division remains poorly sampled for Odonata; a situation we hope to rectify in coming years, insofar as time and funding allow. The sampling locations listed below are shown in Map 3.

K1. Sungai Katibas area, on tributaries to Sungai Katibas.

K2. Sebabei Recreational Park, near Kapit Town: Sungai Sebabei and tributaries. Fig. 12.



Figure 12. Sungai Sebabei. Photo by G.T. Reels.

K3. The Sungai Kapit and tributaries above Rumah Bundong (Fig. 13), the last longhouse on the stream.



Figure 13. Rumah Bundong. Photo by G.T. Reels.



Figure 14. A rocky stream at the foot of the Hose Mountains. Photo by R.A. Dow.

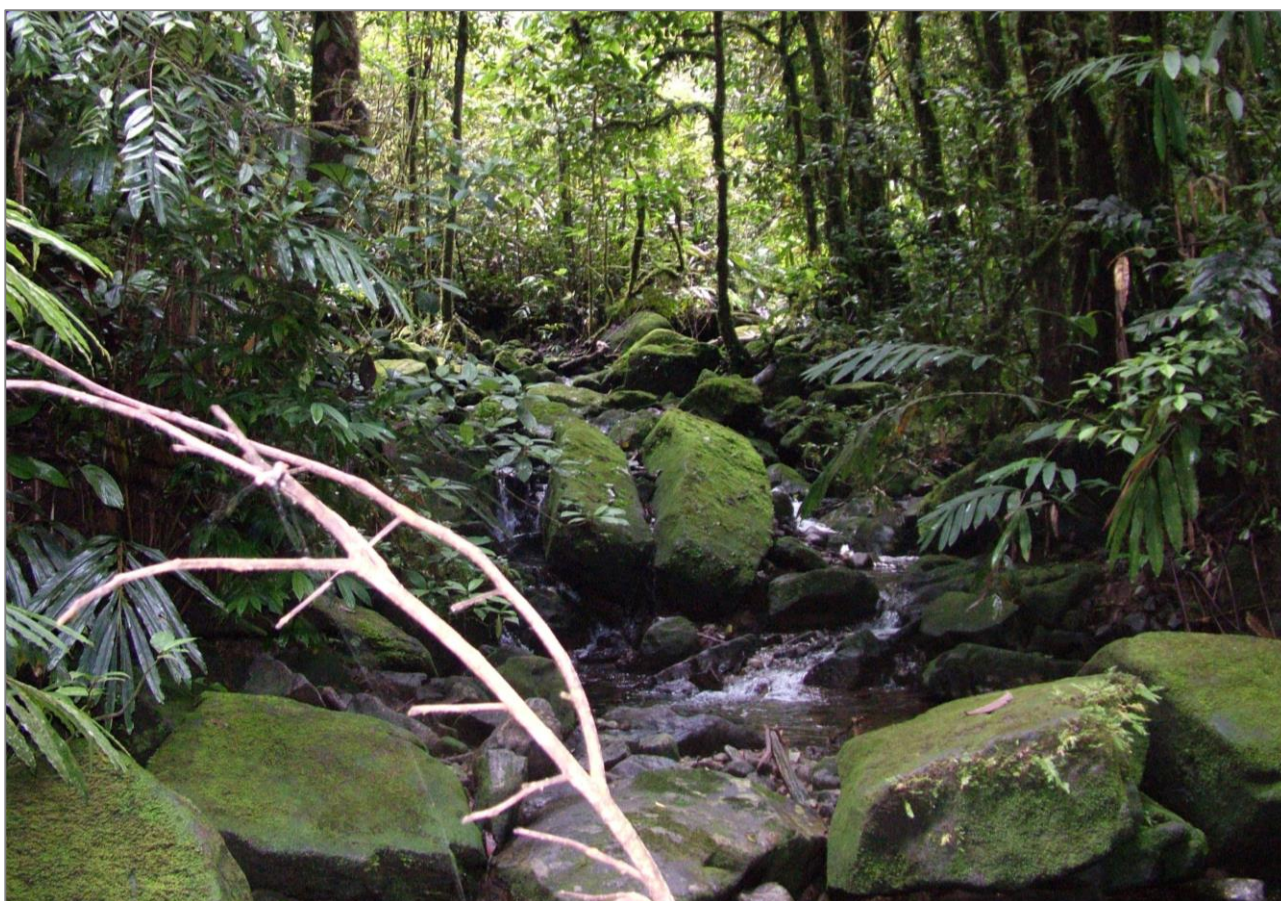


Figure 15. A stream at 1300-1400m in the Hose Mountains. Photo by R.A. Dow.

- K4. The Sungai Sjong, a tributary of the Baleh River, and tributaries and adjacent marshy open area.
- K5. The Sungai Ulu Yong and tributaries near Kapit town.
- K6. Open and disturbed habitats by Baleh river near Kapit town.
- K7. In Kapit town.
- K8. A small shady pool at the edge of disturbed forest, between Kapit town and the Hose Mountains.
- K9. A low gradient stream in disturbed forest between Kapit and the Hose Mountains.
- K10. At foot of the Hose Mountains and on the lower slopes up to ca 900m. Fig. 14.
- K11. Above ca 900m in the Gunung Lumut area of the Hose Mountains. Fig. 15.
- K12. The "Stone Park", Belaga area.
- K13. A shallow forest stream about one hour's drive from the Baleh river at Kapit town. Fig. 16.

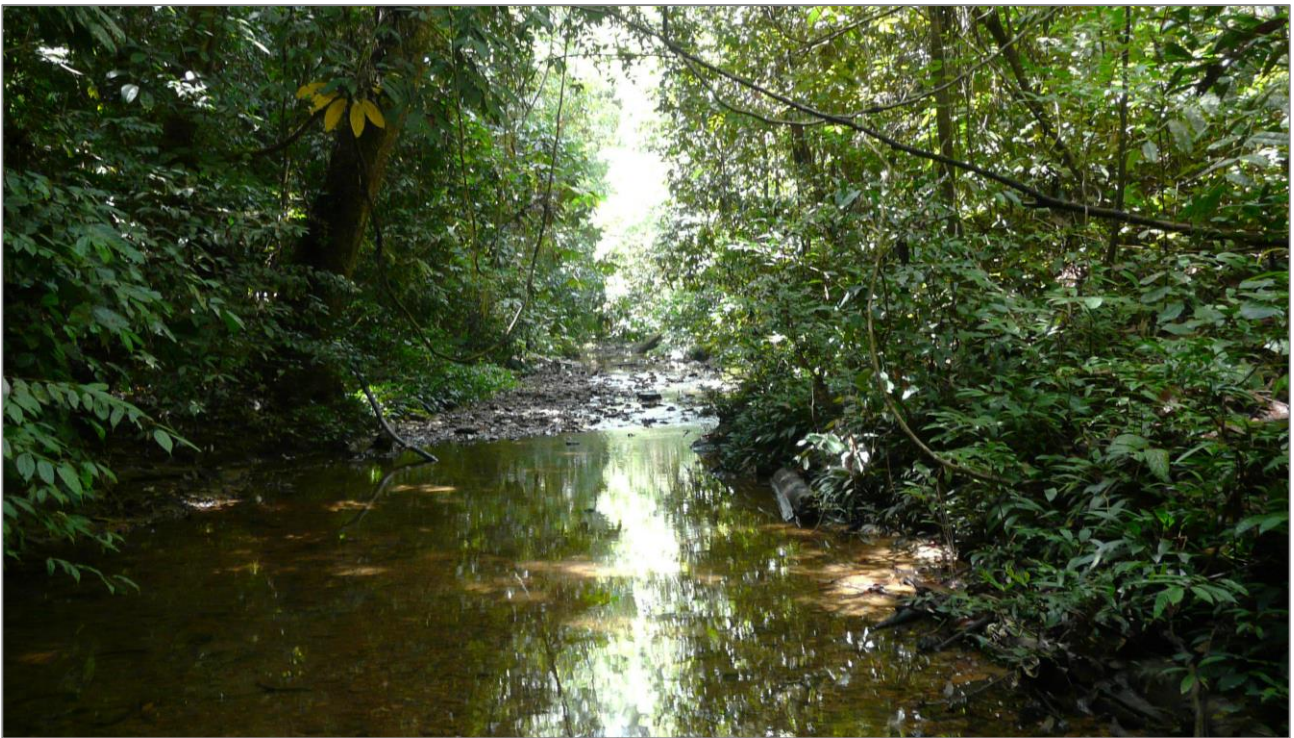


Figure 16. A shallow forest stream in Kapit. Photo by R.W.J. Ngiam.

List of species collected

Zygoptera

Platystictidae

1. *Drepanosticta actaeon* Laidlaw, 1934

This species was recorded as *Drepanosticta* species cf *actaeon* in Dow & Ngiam (2012), but subsequent examination of a large amount of material from Sabah and Sarawak east of the Lupar river has shown that differences in the inferior anal appendages were more apparent than real and that differences in colour between some populations may merely represent geographical variation. Although further

study is needed, we feel that all populations from east of the Lupar river are best treated as *D. actaeon* for the time-being.

Loc K2 – 2 ♂♂, 7.ii.2008, RD; ♂, 7.ii.2008, GR; ♂, 2.iv.2011, RD; ♂, 2.iv.2011, MK.

2. *Drepanosticta* species cf *crenitis* Lieftinck, 1933

Loc K2 – ♀, 2.iv.2011, RD. Loc K10 – 3 ♀♀, 21.v.2010, RD.

3. *Drepanosticta* species cf *dentifera* Kimmins, 1936

Loc K5 – ♂, 12.v.2010, GR. Loc K11 – ♂, 23.v.2010, RD.

4. *Drepanosticta dulitensis* Kimmins, 1936

Loc K10, Loc K11 – See Dow (2013).

5. *Drepanosticta rufostigma* (Selys, 1886)

Loc K2 – 5 ♂♂, 7.ii.2008, RD; 2 ♂♂, 7.ii.2008, GR; 3 ♂♂, ♀, 20.x.2009, RD; ♂, 20.x.2009, LS; 4 ♂♂, ♀, 2.iv.2011, RD; ♂, 2.iv.2011, RN. Loc K3 – 2 ♂♂, 9.ii.2008, RD; ♂, 9.ii.2008, GR. Loc K4 – 2 ♂♂, 10.ii.2008, RD; ♂, 11.ii.2008, RD; ♂, 11.ii.2008, GR; 2 ♂♂, 18.x.2009, RD; ♂, 18.x.2009, LS.; Loc K5 – 3 ♂♂, 21.x.2009, RD; 2 ♂♂, 12.v.2010, RD; ♂, 12.v.2010, GR; Loc K10 – 5 ♂♂, 2 ♀♀, 21.v.2010, MB & RD; 8 ♂♂, ♀, 21.v.2010, GR; ♂, 24.v.2010, RD; 4 ♂♂, 26.ix.2011, MB; 2 ♂♂, 26.ix.2011, LS. Loc K12 – 4 ♂♂, ♀, 29.ix.2011, RD.

6. *Drepanosticta sbong* Dow, 2010

Loc K4 – See Dow (2010a).

7. *Drepanosticta versicolor* (Laidlaw, 1913)

Loc K1 – 2 ♂♂, 1.v.2011, RD. Loc K2 – 3 ♂♂, 20.x.2009, RD. Loc K4 – ♀, 11.ii.2008, RD; ♂, 11.ii.2008, GR. Loc K5 – ♂, ♀, 21.x.2009, RD; 4 ♂♂, 12.v.2010, RD. Loc K10 – ♂, 16.v.2010, RD; 2 ♂♂, 21.v.2010, MB & RD.

8. *Protosticta* species

Since only teneral females have been collected at the locations discussed here, little can be said about this taxon.

Loc K11 – ♀ (teneral), 23.v.2010, YJ. Loc K12 – ♀ (teneral), 29.ix.2011, MB.

9. *Telosticta longigaster* Dow & Orr, 2012

See Dow & Orr (2012).

Argiolestidae

10. *Podolestes orientalis* Selys, 1862

Loc K2 – ♂, 20.x.2009, RD. Loc K4 – ♂, 11.ii.2008, GR.

Calopterygidae

11. *Matronoides cyaneipennis* Förster, 1897

The Hose mountains are the western limit of the known range of this beautiful species.

Loc K11 – ♀, 18.v.2010, RD; 3 ♂♂, 19.v.2010, LS; ♂, ♀, 22.v.2010, MB; 3 ♂♂, 22.v.2010, RD; 2 ♂♂, ♀, 22.v.2010, GR; ♂, 2 ♀♀, 22.v.2010, LS; ♂, 23.v.2010,



RD; ♀, 23.v.2010, GR.

12. *Neurobasis longipes* Hagen, 1887

Loc K1 – ♂, 1.v.2011, JU; ♂, ♀, 20.viii.2011, JU. Loc K2 – ♂, 7.ii.2008, GR; ♀, 20.x.2009, RD; ♂+♀, 2.iv.2011, RD. Loc K3 – ♂, 9.ii.2008, RD; ♂, ♀, 9.ii.2008, GR. Loc K4 – ♂, 10.ii.2008, RD; ♂, 18.x.2009, RD; ♀, 18.x.2009, LS. Loc K5 – ♂, 21.x.2009, RD; ♂, 12.v.2010, GR. Loc K9 – ♂, 14.v.2010, RD. Loc K10 – ♀, 15.v.2010, RD; ♂, 16.v.2010, RD, ♂, ♀, 16.v.2010, LS. Loc K13 – 2 ♂♂, 18.vi.2013, RD; ♂, 18.vi.2013, RN; ♀, 18.vi.2013, LS.

13. *Vestalis amaryllis* Lieftinck, 1965

Loc K3 – ♂, 9.ii.2008, RD. Loc K5 – ♂, 12.v.2010, RD. Loc K10 – 2 ♂♂, 21.v.2010, RD; ♂, 21.v.2010, GR; 2 ♂♂, 24.v.2010, RD; 2 ♂♂, 24.v.2010, LS; ♂, 26.ix.2011, LS. Loc K12 – ♂, 29.ix.2011, RD.

14. *Vestalis amnicola* Lieftinck, 1965

Loc K1 – ♂, 20.viii.2011, JU. Loc K11 – 2 ♂♂, 19.v.2010, LS; 4 ♂♂, 22.v.2010, RD; 2 ♂♂, ♂+♀, 22.v.2010, GR. Loc K12 – 7 ♂♂, 29.ix.2011, RD; 2 ♂♂, 29.ix.2011, LS.

15. *Vestalis amoena* Hagen in Selys, 1853

Loc K2 – 6 ♂♂, ♂+♀, 7.ii.2008, RD; 10 ♂♂, 7.ii.2008, GR; 4 ♂♂, 20.x.2009, RD; 2 ♂♂, 20.x.2009, LS; 2 ♂♂, 2.iv.2011, MK; ♂, 2.iv.2011, RN. Loc K3 – 3 ♂♂, 9.ii.2008, RD; 4 ♂♂, 9.ii.2008, GR. Loc K4 – 2 ♂♂, 10.ii.2008, RD; 2 ♂♂, 10.ii.2008, GR; ♂, 11.ii.2008, RD; 2 ♂♂, 18.x.2009, RD; 2 ♂♂, 18.x.2009, LS. Loc K6 – 6 ♂♂, 21.x.2009, RD; ♂, 21.x.2009, LS; ♂, 12.v.2010, RD. Loc K9 – ♂, 14.v.2010, RD. Loc K10 – 5 ♂♂, 16.v.2010, RD. Loc K13 – 4 ♂♂, 18.vi.2013, RD; 3 ♂♂, 18.vi.2013, RN; 3 ♂♂, ♀, 18.vi.2013, LS.

16. *Vestalis atroptha* Lieftinck, 1965

Loc K1 – ♂, 1.v.2011, JU. Loc K2 – ♂, 7.ii.2008, RD; 2 ♂♂, 20.x.2009, RD; ♂, 20.x.2009, LS. Loc K5 – ♂, 12.v.2010, GR. Loc K10 – 3 ♂♂, 15.v.2010, RD; 2 ♂♂, 15.v.2010, GR; ♂, 16.v.2010, LS; ♂, 21.v.2010, RD; 3 ♂♂, 24.v.2010, RD; 4 ♂♂, 24.v.2010, GR; 2 ♂♂, 24.v.2010, LS; ♂, 25.ix.2011, LS; ♂, 26.ix.2011, LS.

17. *Vestalis beryllae* Laidlaw, 1915

Loc K10 – ♂+♀, 21.v.2010, MB. Loc K11 – ♂, 17.v.2010, RD; ♀, 17.v.2010, GR; 2 ♂♂, 19.v.2010, GR.

Chlorocyphidae

18. *Heliocypha biseriata* (Selys, 1859)

Loc K1 – 3 ♂♂, 1.v.2011, RD. Loc K2 – ♂, 7.ii.2008, GR; ♂, 20.x.2009, RD; ♂, ♀, 20.x.2009, LS; 2 ♂♂, 2.iv.2011, MK. Loc K3 – ♂, 9.ii.2008, RD; ♂, 9.ii.2008, GR. Loc K4 – ♂, 10.ii.2008, GR; ♂, 18.x.2009, RD; 4 ♂♂, ♀, 18.x.2009, LS. Loc K5 – 2 ♂♂, 21.x.2009, RD, ♀, 21.x.2009, LS; ♂, 12.v.2010, RD; ♂, 12.v.2010, GR. Loc K9 – ♂, 14.v.2010, RD. Loc K10 – ♂, 15.v.2010, RD; ♂, ♂+♀, 16.v.2010, RD; ♂, 16.v.2010, GR; 2 ♂♂, 24.v.2010, RD. Loc K12 – ♀, 29.ix.2011, RD. Loc K13 – ♂, 18.vi.2013, RD; ♂, 3 ♀♀, 18.vi.2013, LS; ♂, 18.vi.2013, RN.

19. *Libellago semiopaca* (Selys, 1873)

Loc K5 – ♂, 12.v.2010, RD; ♂, 12.v.2010, GR; ♀, 12.v.2010, LS. Loc K9 – ♂, 14.v.2010, RD; ♂, 14.v.2010, GR; ♂+♀, 14.v.2010, LS.

20. *Libellago stictica* Selys, 1859

Loc K5 – ♂, 12.v.2010, LS. Loc K13 – ♂, 18.vi.2013, RD; ♂, 18.vi.2013, LS.

21. *Rhinocypha aurofulgens* Laidlaw, 1931

Loc K1 – ♂, 1.v.2011, RD. Loc K10 – 2 ♂♂, 15.v.2010, RD; 4 ♂♂, 21.v.2010, GR; ♂, 26.ix.2011, MB; 3 ♂♂, 27.ix.2011, MB.

22. *Rhinocypha cucullata* (Selys, 1873)

Loc K5 – ♂, 21.x.2009, RD; ♀, 21.x.2009, LS.

23. *Rhinocypha spinifer* Laidlaw, 1931 (Fig. 17)

Loc K10 – 3 ♂♂, 17.v.2010, LS; 2 ♂♂, 24.v.2010, LS. Loc K11 – 2 ♂♂, ♀, 17.v.2010, RD; 2 ♂♂, 19.v.2010, RD; 4 ♂♂, 19.v.2010, GR; ♂, 22.v.2010, GR. Loc K12 – 4 ♂♂, 29.ix.2011, MB; 3 ♂♂, 2 ♀♀, 29.ix.2011, LS.



Figure 17. *Rhinocypha spinifer* male. Photo by G.T. Reels.

24. *Rhinoneura caerulea* Kimmins, 1936

See Dow & Reels (2010) for the story of the rediscovery of this species, originally described from Mount Dulit on the Miri/Kapit border (Kimmins 1936), in the Hose Mountains in 2010. It has now also been found on Gunung Mulu in Miri division (Dow unpublished).

Loc K10 – ♀, 24.v.2010, LS. Loc K11 – ♂, 18.v.2010, RD; 3 ♂♂, 22.v.2010, RD; 2 ♂♂, 22.v.2010, LS; 2 ♂♂, 22.v.2010, GR; ♀, 23.v.2010, RD.

25. *Sundacypha petiolata* (Selys, 1859)

Loc K10 – 4 ♂♂, 24.v.2010, RD; 2 ♂♂, 24.v.2010, LS.

Devadattidae

Specimens will be listed in Dow, Hämäläinen & Stokvis (in preparation).

26. *Devadatta* species A

Loc K3, K5, K11, K12.

27. *Devadatta* species B

Loc K2, K3, K4, K5, K10.

28. *Devadatta* species C

Loc K11, K12.

Euphaeidae

29. *Dysphaea dimidiata* (Selys, 1853)

Specimens will be listed in Hämäläinen, Dow & Stokvis (in preparation).

Loc K9, K10.

30. *Euphaea basalis* (Laidlaw, 1915) (Fig. 18)

Loc K11 – 2 ♂♂, 19.v.2010, LS; 4 ♂♂, ♀, 22.v.2010, GR; ♂, 22.v.2010, LS; ♂+♀, 23.v.2010, GR; 2 ♀♀, 23.v.2012, LS.



Figure 18. *Euphaea basalis* male. Photo by R.A. Dow.

31. *Euphaea impar* Selys, 1859

Loc K2 – ♂, 7.ii.2008, RD; ♂, 7.ii.2008, GR; ♂, 20.x.2009, RD; ♂, 2.iv.2011, MK.

Loc K3 – ♂, 9.ii.2008, RD. Loc K4 – 2 ♂♂, 10.ii.2008, RD; 2 ♂♂, 18.x.2009, LS.

Loc K5 – ♂, 21.x.2009, RD; ♂, 12.v.2010, GR. Loc K9 – ♂, 14.v.2010, RD. Loc K10

– ♂, 16.v.2010, RD; 2 ♂♂, 21.v.2010, RD; 2 ♂♂, 21.v.2010, GR; ♂, 24.v.2010, RD;

♂, ♀, 24.v.2010, LS; ♂, 25.ix.2011, LS; ♂, 26.ix.2011, MB. Loc K12 – ♂,

29.ix.2009, RD. Loc K13 – ♂, 18.vi.2013, RD; ♂, 18.vi.2013, RN.

32. *Euphaea subcostalis* Selys, 1873

Loc K1 – ♂, 1.v.2011, RD; ♂, 20.viii.2011, JU. Loc K2 – 3 ♂♂, 7.ii.2008, RD; 3 ♂♂,

7.ii.2008, GR; ♂, ♂+♀, 20.x.2009, RD; ♂, 20.x.2009, LS. Loc K3 – ♂, 9.ii.2008, RD. Loc K4 – 2 ♂♂, 10.ii.2008, RD; 4 ♂♂, 10.ii.2008, GR; ♂, 18.x.2009, RD. Loc K9 – 2 ♂♂, 21.x.2009, RD; 2 ♂♂, 21.x.2009, LS; ♂, 12.v.2010, GR. Loc K10 – 2 ♂♂, 15.v.2010, RD; ♂, 15.v.2010, GR; ♂, 16.v.2010, RD; 2 ♂♂, ♀, 16.v.2010, GR; 2 ♂♂, 21.v.2010, GR; 2 ♂♂, 24.v.2010, RD; ♂, 24.v.2010, LS; ♂, 25.ix.2011, MB; ♂, 25.ix.2011, LS; 2 ♂♂, 26.ix.2011, MB; 2 ♂♂, 26.ix.2011, LS. Loc K13 – 2 ♂♂, 18.vi.2013, RD; ♂, 18.vi.2013, RN; 2 ♀♀, 18.vi.2013, LS.

33. *Euphaea tricolor* Selys, 1859

Loc K2 – 2 ♂♂, 20.x.2009, RD; ♂, 2.iv.2011, RD. Loc K3 – 2 ♂♂, 9.ii.2008, RD. Loc K5 – 2 ♂♂, 21.x.2009, RD; ♂, 21.x.2009, LS; ♂, 12.v.2010, RD; ♂, 12.v.2010, GR. Loc K9 – 2 ♂♂, 14.v.2010, GR. Loc K10 – ♂, 16.v.2010, RD; 2 ♂♂, 16.v.2010, LS.

Philosinidae

34. *Rhinagrion borneense* (Selys, 1886)

Loc K1 – ♂, 1.v.2011, RD. Loc K2 – 3 ♂♂, 7.ii.2008, RD; ♂, 7.ii.2008, GR; ♂, 20.x.2009, RD; 2 ♂♂, 20.x.2009, LS; ♂, 2.iv.2011, RD. Loc K3 – ♂, 9.ii.2008, RD. Loc K4 – ♂, 10.ii.2008, RD; ♂, 10.ii.2008, GR; ♂, 18.x.2009, RD; 2 ♂♂, 18.x.2009, LS. Loc K5 – 2 ♂♂, 21.x.2009, RD; ♂, 21.x.2009, LS. Loc K10 – ♂, 15.v.2010, RD; ♂, 15.v.2010, GR; ♂, 16.v.2010, RD; 2 ♂♂, 16.v.2010, GR; 2 ♂♂, 16.v.2010, LS; ♂, 24.v.2010, GR. Loc K13 – 2 ♂♂, 18.vi.2013, RD; ♂, 18.vi.2013, RN; ♂, 18.vi.2013, LS.

Platycnemididae

35. *Coellicia* species cf *borneensis* (Selys, 1866)

See Dow (2010c) and Dow & Reels (2011) and the comments above in the Sri Aman section.

Loc K2 – ♂, 2.iv.2011, RD. Loc K10 – ♂, 26.ix.2011, LS; ♂, 27.ix.2011, LS. Loc K13 – ♀, 18.vi.2013, RD.

36. *Coellicia campioni* Laidlaw, 1918

See Dow & Reels (2011). This species appears to have a rather limited range in Sarawak's Miri and Kapit divisions, although it is to be expected across the border in Kalimantan.

37. *Coellicia cyaneothorax* Kimmins, 1936

Loc K1 – 4 ♂♂, 2 ♀♀, 1.v.2011, RD. Loc K2 – 2 ♂♂, 7.ii.2008, RD; 4 ♂♂, 7.ii.2008, GR; 2 ♂♂, 20.x.2009, RD; ♂, 2.iv.2011, RD. Loc K4 – ♂, 10.ii.2008, RD; ♂, 11.ii.2008, RD. Loc K5 – ♂, 21.x.2009, RD. Loc K10 – ♂, 25.ix.2011, MB. Loc K11 – ♂, 22.v.2010, RD; ♂, 22.v.2010, GR.

38. *Coellicia* species cf *nemoricola* Laidlaw, 1912

Loc K11 – 11 ♂♂, 2 ♀♀, ♂+♀, 18.v.2010, RD; 14 ♂♂, 18.v.2010, GR; 2 ♂♂, 18.v.2010, LS; 3 ♂♂, ♀, 19.v.2010, RD; ♂, 19.v.2010, GR; 2 ♂♂, 19.v.2010, LS; 2 ♂♂, ♂+♀, 22.v.2010, RD; ♂, 22.v.2010, GR. Loc K12 – 7 ♂♂, ♀, 29.ix.2011, RD.



39. *Coeliccia nigrohamata* Laidlaw, 1918

Loc K1 – ♂, 1.v.2011, RD. Loc K2 – 6 ♂♂, ♂+♀, 7.ii.2008, RD; 2 ♂♂, 7.ii.2008, GR; 2 ♂♂, 20.x.2009, RD; 2 ♂♂, 2.iv.2011, RD; ♂, 2.iv.2011, RN. Loc K3 – 2 ♂♂, ♂+♀, 9.ii.2008, RD. Loc K4 – ♂, 10.ii.2008, RD; 2 ♂♂, 11.ii.2008, RD; 4 ♂♂, 11.ii.2008, GR. Loc K5 – ♂, 21.x.2009, RD; ♂, 12.v.2010, RD. Loc K10 – 5 ♂♂, 15.v.2010, RD; 2 ♂♂, 16.v.2010, RD; ♂, ♂+♀, 16.v.2010, GR; 3 ♂♂, ♀, 21.v.2010, RD; ♂+♀, 21.v.2010, GR; 3 ♂♂, ♂+♀, 24.v.2010, RD; 4 ♂♂, 24.v.2010, LS; ♂, 25.ix.2011, LS; 2 ♂♂, 26.ix.2011, MB; 2 ♂♂, 26.ix.2011, LS. Loc K11 – 2 ♂♂, ♀, 19.v.2010, RD; ♀, 19.v.2010, GR. Loc K12 – 2 ♂♂, ♀, 29.ix.2011, RD. Loc K13 – ♂, 18.vi.2013, RN.

40. *Copera vittata* (Selys, 1863)

Loc K2 – ♂, 2.iv.2011, RD. Loc K4 – ♂, 11.ii.2008, RD; ♂, 11.ii.2008, GR. Loc K10 – 2 ♂♂, 16.v.2010, RD.

41. *Elattoneura analis* (Selys, 1860) (Fig. 19)

Loc K2 – ♂, 20.x.2009, RD; 2 ♂♂, 20.x.2009, LS; 2 ♂♂, 2.iv.2011, RD. Loc K4 – 2 ♂♂, 10.ii.2008, RD. Loc K5 – ♂, 21.x.2009, RD. Loc K10 – ♂, 16.v.2010, RD; ♂, 16.v.2010, GR; 3 ♂♂, ♂+♀, 16.v.2010, LS; 3 ♂♂, 24.v.2010, RD.



Figure 19. *Elattonneura analis* male. Photo by R.A. Dow.

42. *Prodasineura dorsalis* (Selys, 1860)

Loc K3 – ♂, 9.ii.2008, RD. Loc K10 – 2 ♂♂, 21.v.2010, RD; 4 ♂♂, 21.v.2010, GR; ♂, ♂+♀, 24.v.2010, RD; ♂, ♀, 24.v.2010, LS. Loc K13 – ♂, 18.vi.2013, RN.

43. *Prodasineura hosei* (Laidlaw, 1913)

Loc K1 – ♂, 1.v.2011, RD. Loc K2 – ♀, 2.iv.2011, RD; ♂, 2.iv.2011, RN. Loc K3 – 2 ♂♂, 9.ii.2008, RD. Loc K4 – ♂, 10.ii.2008, GR; 3 ♂♂, ♂+♀, 18.x.2009, RD; 2 ♂♂, 18.x.2009, LS. Loc K5 – 3 ♂♂, ♂+♀, 21.x.2009, RD; 3 ♂♂, ♀, 21.x.2009, LS. Loc

- K10 – ♂+♀, 15.v.2010, RD; 2 ♂♂, 24.v.2010, RD. Loc K13 – 2 ♂♂, 18.vi.2013, RD.
44. *Prodasineura hyperythra* (Selys, 1886)
Loc K10 – ♂, ♂+♀, 15.v.2010, RD; 2 ♂♂, 16.v.2010, RD; ♂, 24.v.2010, RD.
45. *Prodasineura* species
A single female from disturbed forest that might be the true *P. peramoena* (Laidlaw, 1913).
Loc K12 – ♀, 29.ix.2011, RD.
46. *Prodasineura verticalis* (Selys, 1860)
Loc K4 – 4 ♂♂, ♀, 18.x.2009, LS. Loc K5 – ♂, 21.x.2009, RD; ♂, 12.v.2010, GR; 2 ♂♂, ♀, 12.v.2010, LS. Loc K9 – ♂, 14.v.2010, RD. Loc K10 – ♂, 16.v.2010, RD; ♂, 16.v.2010, LS.

Coenagrionidae

47. *Aciagrion borneense* Ris, 1911
Loc K10 – ♂, 16.v.2010, RD; ♂+♀, 16.v.2010, GR.
48. *Argiocnemis femina* (Brauer, 1868)
Loc K6 – ♂, 4.iv.2011, RD.
49. *Argiocnemis* species
Loc K10 – ♂, 16.v.2010, RD; ♂, 16.v.2010, GR.
50. *Ceriagrion bellona* Laidlaw, 1915
Loc K8 – ♂+♀, 14.v.2010, GR; ♂+♀, 4.iv.2011, RD. Loc K10 – ♀, 24.v.2010, GR; ♂, 24.v.2010, LS. Loc K11 – ♂, 17.v.2010, RD; ♂, ♂+♀, 17.v.2010, LS.
51. *Ceriagrion cerinorubellum* (Brauer, 1865)
Loc K5 – ♂, 21.x.2009, RD. Loc K10 – ♂, 16.v.2010, RD.
52. *Pseudagrion microcephalum* (Rambur, 1842)
Loc K7 – ♀, 8.ii.2008, GR.



Figure 20. *Pseudagrion perfuscatum* male. Photo by R.A. Dow.

53. *Pseudagrion perfuscatum* Lieftinck, 1937 (Fig. 20)
 Loc K4 – ♂, 10.ii.2008, GR; ♂, 11.ii.2008, RD. Loc K5 – 3 ♂♂, 21.x.2009, RD; 3 ♂♂, 21.x.2009, LS; ♀, 12.v.2010, LS. Loc K10 – ♂, 16.v.2010, LS.
54. *Stenagrion dubium* (Laidlaw, 1912)
 Loc K2 – 2 ♂♂, 7.ii.2008, RD; ♂, ♀, 7.ii.2008, GR; 2 ♂♂, 20.x.2009, RD; 2 ♂♂, 2.iv.2011, RD. Loc K3 – ♂, 9.ii.2008, RD. Loc K4 – 3 ♂♂, 2 ♀♀, 11.ii.2008, RD. Loc K5 – ♂, 21.x.2009, RD. Loc K10 – 6 ♂♂, 21.v.2010, MB & RD; ♂, 26.ix.2011, LS; ♂, 27.ix.2011, MB; 2 ♂♂, 27.ix.2011, LS. Loc K11 – 4 ♂♂, 17.v.2010, RD; 3 ♂♂, 17.v.2010, GR; 2 ♂♂, 19.v.2010, GR. Loc K12 – ♂, 29.ix.2011, RD; ♂, 29.ix.2011, LS. Loc K13 – ♂, 18.vi.2013, RD.
55. *Xiphiagrion cyanomelas* (Selys, 1876)
 Loc K10 – 2 ♂♂, 16.v.2010, RD; 2 ♂♂, ♂+♀, 24.v.2010, GR.

Anisoptera

Aeshnidae

56. *Indaeschna grubaueri* (Förster, 1904)
 Loc K7 – ♀, x.2009, J. Muda.
57. *Tetracanthagyna degorsi* Martin, 1896
 Loc K3 – ?exuvia, 10.ii.2008, RD. Loc K5 – ♀, 21.x.2009, RD. Loc K11 – ♀, 19.v.2010, GR.

Gomphidae

58. *Acrogomphus jubilaris* Lieftinck, 1964 (Fig. 21)
 This genus is common in larval samples in sandy forest streams in Sarawak, but the adults are exceptionally elusive; two male *A. jubilaris* collected in the Hose



Figure 21. *Acrogomphus jubilaris* male. Photo by G.T. Reels.

Mountains in 2010 are the only non-reared examples of their sex that we have collected. Females are encountered more often, but still relatively rarely. The males from the Hose Mountains were caught while basking at the side of a logging road in the morning, rather than at a stream.

Loc K10 – 2 ♂♂, 24.v.2010, RD.

59. *Heliogomphus* species

More than one species may be included here.

Loc K5 – ♀, 21.x.2009, RD. Loc K10 – ♀ (teneral), 24.v.2010, RD. Loc K13 – ♀ (teneral), 18.vi.2013, RD.

60. *Leptogomphus coomansi* Laidlaw, 1936

Loc K4 – ♂, 11.ii.2008, GR. Loc K10 – ♂, 16.v.2010, RD. Loc K13 – ♀ reared from larva collected 18.vi.2013, RN.

61. *Leptogomphus* species cf *pasia* van Tol, 1990

Loc K2 – ♂, 20.x.2009, RD.

62. *Leptogomphus williamsoni* Laidlaw, 1912

Loc K5 – ♂, 21.x.2009, RD. Loc K10 – ♂, 25.ix.2011, MB. Loc K12 – ♂, 29.ix.2011, LS.

63. *Macrogomphus quadratus* (Selys, 1878) (Fig. 22)

Loc K10 – ♂, 21.v.2010, RD; ♀, 24.v.2010, RD.



Figure 22. *Macrogomphus quadratus* female. Photo by G.T. Reels.

64. *Macrogomphus* species

Loc K5 – exuvia, 21.x.2009, RD.



65. *Megalogomphus* species cf *sumatranus* (Krüger, 1899)

The species from Sarawak differs considerably in the male accessory genitalia from specimens from Sumatra and Peninsular Malaysia in the RMNH collection and a male from Peninsular Malaysia in the collection of the first author; the species from Borneo is certainly a distinct species.

Loc K5 – ♂, 12.v.2010, RD.

Macromiidae66. *Epophthalmia vittigera* (Rambur, 1842)

Loc K1 – ♂, 1.v.2011, JU.

67. *Macromia cydippe* Laidlaw, 1922

Probably a fairly common species in lowland forest in Sarawak, but most records are of females and larvae.

Loc K4 – ♀, 10.ii.2008, GR. Loc K5 – ♀, 21.x.2009, RD.

68. *Macromia euterpe* Laidlaw, 1915

This and the next species are extremely similar and may eventually prove to be the same species.

Loc K11 – 2 ♀♀, 22.v.2010, RD; ♂, ♀, 23.v.2010, RD; ♂, 23.v.2010, GR; ♀, 23.v.2010, LS.

69. *Macromia westwoodi* Selys, 1874

Loc K10 – ♂, 17.v.2010, GR; ♂, 24.v.2010, GR. Loc K11 – ♀, 18.v.2010, RD; ♀, 19.v.2010, GR; 2 ♀♀, 19.v.2010, LS.

Corduliidae70. *Procordulia fusiformis* Lieftinck, 1977

Once a very poorly known species, there have been a number of records in recent years. All records definitely of this species are from above 900m, where it can be found at forest pools, but it is quite commonly encountered at man-made forest edge ponds (created by partial damming of streams or excavation for road building materials) beside logging roads.

Loc K11 – ♀, 17.v.2010, RD; ♂, 17.v.2010, GR.

Libellulidae71. *Aethriamanta gracilis* (Brauer, 1878) (Fig. 23)

Loc K5 – ♂, 21.x.2009, RD.

72. *Agrionoptera sexlineata* Selys, 1879

Loc K8 – ♂, 14.v.2010, GR.

73. *Camacina gigantea* (Brauer, 1867)

Loc K10 – ♂, 20.v.2010, RD.

74. *Cratilla metallica* (Brauer, 1878)

Loc K2 – ♂, 2.iv.2011, RD. Loc K8 – ♂, 14.v.2010, GR.



Figure 23. *Aethriamanta gracilis* male. Photo by G.T. Reels.

75. *Diplacodes trivialis* (Rambur, 1842)

Loc K6 – ♂, 4.iv.2011, RD. Loc K10 – ♂, 16.v.2010, RD; ♂, 16.v.2010, GR.

76. *Lyriothemis biappendiculata* (Selys, 1878)

Loc K2 – ♂, 7.ii.2008, RD. Loc K3 – ♂, 9.ii.2008, RD. Loc K10 – ♂, 15.v.2010, RD; ♂, 21.v.2010, RD; ♂, 24.v.2010, RD. Loc K13 – ♂, 18.vi.2013, RN.

77. *Lyriothemis cleis* Brauer, 1868

Loc K2 – ♂, 7.ii.2008, GR. Loc K4 – ♂, 10.ii.2008, GR.

78. *Nannophya pygmaea* Rambur, 1842

Loc K10 – ♂, 16.v.2010, RD.

79. *Neurothemis terminata* Ris, 1911

Loc K6 – ♂, 4.iv.2011, RD.

80. *Onychothemis coccinea* Lieftinck, 1953

Loc K2 – ♂, 20.x.2009, LS. Loc K5 – ♂, 12.v.2010, RD; ♂, 12.v.2010, GR.

81. *Orchithemis pulcherrima* Brauer, 1878

Loc K10 – ♂, 16.v.2010, RD.

82. *Orthetrum borneense* Kimmins, 1936

This montane species was described from Mount Dulit on the Miri/Kapit border and has been found on Gunung Mulu in Miri division and in the Hose Mountains in recent years.

Loc K11 – 2 ♀♀, 19.v.2010, RD.



83. *Orthetrum chrysis* (Selys, 1891)

Loc K10 – ♂, 16.v.2010, RD; ♂, 16.v.2010, GR; ♂, 16.v.2010, LS; ♂, 24.v.2010, GR.

84. *Orthetrum glaucum* (Brauer, 1865)

Loc K4 – ♂, 11.ii.2008, RD. Loc K10 – ♀, 15.v.2010, RD; ♂, 16.v.2010, RD. Loc K11 – ♂, 17.v.2010, GR; ♀, 17.v.2010, LS. Loc K12 – ♂, 29.ix.2011, RD; ♀, 29.ix.2011, LS.

85. *Orthetrum pruinosum schneideri* Förster, 1903 (Fig. 24)

Loc K10 – ♂, 16.v.2010, GR. Loc K11 – 2 ♂♂, 17.v.2010, RD. Loc K12 – ♂, 29.ix.2011, RD; ♂+♀, 29.ix.2011, LS.



Figure 24. *Orthetrum pruinosum schneideri* male. Photo by G.T. Reels.

86. *Orthetrum sabina* (Drury, 1773)

Loc K4 – ♂, 11.ii.2008, RD.

87. *Orthetrum testaceum* (Burmeister, 1839)

Loc K4 – ♂, 11.ii.2008, RD. Loc K5 – ♂, 12.v.2010, GR; ♂, 12.v.2010, LS.

88. *Pantala flavescens* (Fabricius, 1798)

Loc K10 – ♂, 17.v.2010, RD.

89. *Rhyothemis phyllis* (Sulzer, 1776)

Loc K7 – ♀, 20.v.2010, J. Muda. Loc K10 – ♀, 15.v.2010, RD.

90. *Rhyothemis triangularis* Kirby, 1889
 Loc K10 – ♂, 16.v.2010, RD; ♂, 16.v.2010, GR; ♂, 16.v.2010, LS.
91. *Tetrathemis* new species
 See Dow & Ngiam (2012) for remarks on this species.
 Loc K11 – ♂, 17.v.2010, RD; ♂, 17.v.2010, GR; ♂, 17.v.2010, LS.
92. *Tramea transmarina euryale* Selys, 1878
 Loc K6 - ♂, 13.ix.2013, RD. Loc K10 – ♂, 16.v.2010, GR; 2 ♂♂, 17.v.2010, RD.
93. *Trithemis aurora* (Burmeister, 1839)
 Loc K4 – ♂, 10.ii.2008, RD; ♂, 10.ii.2008, GR; 2 ♂♂, 18.x.2009, LS. Loc K5 – ♂, 21.x.2009, RD; 2 ♂♂, 21.x.2009, LS; ♂, 12.v.2010, GR. Loc K10 – ♂, 16.v.2010, RD; 2 ♂♂, ♀, 16.v.2010, LS.
94. *Trithemis festiva* (Rambur, 1842)
 Loc K4 – ♂, 18.x.2009, LS. Loc K5 – ♂, 21.x.2009, RD; ♂, 12.v.2010, RD. Loc K10 – ♂, 15.v.2010, RD; ♀, 15.v.2010, GR; ♂, 2 ♀♀, 16.v.2010, LS; ♀, 17.v.2010, YJ.
95. *Tyriobapta torrida* Kirby, 1889
 Loc K4 – ♂, 10.ii.2008, GR. Loc K8 – ♂, 14.v.2010, GR. Loc K10 – ♂, 16.v.2010, RD.
96. *Zygonyx iris errans* Lieftinck, 1953
 Loc K5 – ♂, 21.x.2009, RD. Loc K10 – ♂, 16.v.2010, LS. Loc K11 – ♂, 17.v.2010, RD.
97. *Zygomma obtustum* (Albarda, 1881)
 Loc K7 – ♂, 7.ii.2008, RD.
- Incertae sedis**
98. *Macromidia fulva* Laidlaw, 1915
 Loc K4 – ♀, 11.ii.2008, RD. Loc K10 – ♂, 18.v.2010, RD.
99. *Macromidia genialis erratica* Lieftinck, 1948
 Loc K4 – 2 ♂♂, 2 ♀♀, 11.ii.2008, GR.

Acknowledgements

The Sarawak Forest Department and Sarawak Forestry Corporation are to be thanked for granting permits to collect Odonata in Sarawak. All those who have assisted us on our collecting trips in Sri Aman, Sibul and Kapit division are to be thanked, in particular Manau anak Budi, Lion anak Nyapong, Somoh anak Nyapong, Mibang Kibi, Luke Southwell and Joanes Unggang.



References

- Asahina, S., 1966. Sarawak Odonata taken by Mr. H. Hayashi. Tombo 9(1–4): 28–30.
- Dijkstra, K.-D.B., G. Bechly, S.M. Bybee, R.A. Dow, H.J. Dumont, G. Fleck, R.W. Garrison, M. Hämäläinen, V.J. Kalkman, H. Karube, M.L. May, A.G. Orr, D.R. Paulson, A.C. Rehn, G. Theischinger, J.W.H. Trueman, J. van Tol, N. von Ellenrieder, & J. Ware, 2013. The classification and diversity of dragonflies and damselflies (Odonata). In: Zhang, Z.-Q. (Ed.) Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness (Addenda 2013). Zootaxa 3703: 1–82.
- Dijkstra, K.-D.B., V.J. Kalkman, R.A. Dow, F.R. Stokvis & J. van Tol, 2014. Redefining the damselfly families: the first comprehensive molecular phylogeny of Zygoptera (Odonata). Systematic Entomology 39(1): 68–96. doi: 10.1111/syen.12035.
- Donnelly, T.W., 1997. Through darkest Borneo [and Malaysia] with net and camera. Malangpo 14: 123–128.
- Donnelly, T.W., 1999. Back to Borneo. Argia 11: 8–11.
- Dow, R.A., 2010a. Two new Platystictidae (Odonata: Zygoptera) from Sarawak, Malaysian Borneo. Zootaxa 2412: 63–68.
- Dow, R.A., 2010b. A review of the Teinobasis of Sundaland, with the description of *Teinobasis cryptica* sp. nov. from Malaysia (Odonata: Coenagrionidae). International Journal of Odonatology 13(2): 205–230, plate II.
- Dow, R.A., 2010c. Revision of the genus *Coeliccia* (Zygoptera: Platycnemididae) in Borneo. Part I: The borneensis-group of species. Zoologische Mededelingen Leiden 84(7): 117–157.
- Dow, R.A., 2013. *Drepanosticta burbachi* spec. nov. from Sarawak, Borneo, a new species allied to *D. dulitensis* Kimmins, with notes on related species (Zygoptera: Platystictidae). Odonatologica 42(3): 203–210.
- Dow, R.A., 2014. *Telosticta iban* sp. nov. from Sarawak (Odonata: Zygoptera: Platystictidae). Zootaxa 3784: 74–78.
- Dow, R.A., C.Y. Choong & Y.F. Ng, 2010. *Elattoneura mauros* sp. nov. (Odonata: Zygoptera: Protoneuridae) from Sarawak, Malaysian Borneo. Zootaxa 2502: 65–68.
- Dow, R.A. & R.W.J. Ngiam, 2011. *Chlorogomphus manau* sp. nov. from Sarawak, Malaysia (Odonata: Chlorogomphidae). International Journal of Odonatology 14(3): 269–274.
- Dow, R.A. & R.W.J. Ngiam, 2012. Odonata collected in the Hose Mountains, Kapit Division, Sarawak, Malaysia in April 2011. International Dragonfly Fund Report 44: 1–18.
- Dow, R.A. & R.W.J. Ngiam, 2014. Odonata from logged and unlogged forest in the Ulu Balui and Ulu Baleh, Kapit Division, Sarawak, in June and September 2013. International Dragonfly Fund Report 73: 1–48.

- Dow, R.A. & A.G. Orr, 2012. *Telosticta*, a new damselfly genus from Borneo and Palawan (Odonata: Zygoptera: Platystictidae). The Raffles Bulletin of Zoology 60(2): 361–397.
- Dow, R.A. & G.T. Reels, 2010. Finding the Holy Grail: the rediscovery of *Rhinoneura caerulea* in the Hose Mountains, Sarawak, Borneo. Agrion 14(2): 28–29.
- Dow, R.A. & G.T. Reels, 2011. *Coeliccia southwelli* sp. nov. (Odonata: Zygoptera: Platycnemididae) from Mount Dulit, Sarawak. Zootaxa 2832: 63–68.
- Dow, R.A. & G.T. Reels, 2013. Previously unpublished Odonata records from Sarawak, Borneo. Part I. Kuching Division excluding Kubah National Park, and Samarahan Division. Faunistic Studies in South-East Asian and Pacific Island Odonata 3: 1–25.
- Dow, R.A., G.T. Reels & S.G. Butler, 2013a. Odonata of the Dulit Range in Sarawak, Malaysian Borneo. Notulae odonatologicae 8(1): 1–16.
- Dow, R.A., G.T. Reels & S.G. Butler, 2013b. Previously unpublished Odonata records from Sarawak, Borneo. Part II. Kubah National Park. Faunistic Studies in South-East Asian and Pacific Island Odonata 6: 1–21.
- Hincks, W.D., 1930. Some notes on a collection of Sarawak Odonata. Sarawak Museum Journal 4: 49–56.
- Hisamatsu, S. & A. Sasamoto, 2003. A record of Odonata collected in Sarawak, Borneo (Kalimantan [sic]) Island, Malaysia. Aohada 2: 22–26.
- Kalkman, V.J. & R.J.T. Villanueva, 2011. A synopsis of the genus *Rhinagrion* with description of two new species from the Philippines (Odonata: Megapodagrionidae). International Journal of Odonatology 14(1): 11–31.
- Kimmins, D.E., 1936. The Odonata of the Oxford University Sarawak expedition. Journal of the Federated Malay States Museum 18: 65–108.
- Laidlaw, F.F., 1920. Contributions to the study of the dragonfly fauna of Borneo. Part IV. A list of species known to occur in the island. Proceedings of the Zoological Society of London 1920: 311–342.
- Lieftinck, M.A., 1950. Further studies on Southeast Asiatic species of *Macromia* Rambur, with notes on their ecology, habits and life history, and with descriptions of larvae and two new species (Odon., Epophthalmiinae). Treubia 20: 657–716.
- Lieftinck, M.A., 1953. Additions to the odonate fauna of the Indo–Australian archipelago. Treubia 22(1): 233–269.
- Lieftinck, M.A., 1954. Handlist of Malaysian Odonata. A catalogue of the dragonflies of the Malay Peninsula, Sumatra, Java and Borneo, including the adjacent small islands. Treubia (Suppl.) 22: i–xiii + 1–202.
- Lieftinck, M.A., 1965. The species–group of *Vestalis amoena* Selys, 1853, in Sundaland (Odonata, Calopterygidae). Tijdschrift voor Entomologie 108(11): 325–364.



- Matsuki, K. & K. Kitagawa, 1993. Bornean Odonata taken by Dr. T. Ueda. II. Zygoptera. *Aeschna* 27: 1–10.
- Norma–Rashid, Y., Y.C. Choong & Y.F. Ng, 2010. The Dragonfly fauna (adults) of the Lanjak Entimau Wildlife Sanctuary [sic]. In: Mohamed, H., I. Ipor, K. Meekiong, S. Ahmad & A. Ampeng, (Eds.) Lanjak Entimau Wildlife Sanctuary 'Hidden Jewel of Sarawak'. Proceedings of the seminar: Lanjak Entimau Scientific Expedition.
- Reels, G. & K.D.P. Wilson, 2009. Observations of the oviposition behaviour of four species of *Euphaea* Selys (Zygoptera: Euphaeidae). *Agrion* 13(2): 80–83.
- Van Tol, J. & Y. Norma Rashid, 1995. The genus *Euphaea* Rambur in Borneo (Odonata: Euphaeidae). *Tijdschrift voor Entomologie* 138: 131–142.

INSTRUCTION TO AUTHORS

Faunistic studies of South-East Asian and Pacific islands Odonata is a journal of the International Dragonfly Fund (IDF). It is referred to as *the journal* in the remainder of these instructions. Transfer of copyright to IDF is considered to have taken place implicitly once a paper has been published in the journal.

The journal publishes original papers only. By *original* is meant papers that: a) have not been published elsewhere before, and b) the scientific results of the paper have not been published in their entirety under a different title and/or with different wording elsewhere. The republishing of any part of a paper published in the journal must be negotiated with the Editorial Board and can only proceed after mutual agreement.

Papers reporting studies financially supported by the IDF will be reviewed with priority, however, authors working with *Odonata* from the focal area (as defined on the back page of the front cover) are encouraged to submit their manuscripts even if they have not received any funds from IDF.

Manuscripts submitted to the journal should preferably be in English; alternatively German or French will also be accepted. Every manuscript should be checked by a native speaker of the language in which it is written; if it is not possible for the authors to arrange this, they must inform the Editorial Board on submission of the paper. Authors are encouraged, if possible, to include a version of the abstract in the primary language of the country in which their study was made.

Authors can choose the best way for them to submit their manuscripts between these options: a) via e-mail to the publisher, or b) on a CD, DVD or any other IBM-compatible device. Manuscripts should be prepared in Microsoft Word for Windows.

While preparing the manuscript authors should consider that, although the journal gives some freedom in the style and arrangements of the sections, the editors would like to see the following clearly defined sections: Title (with authors names, physical and e-mail addresses), Abstract, Introduction, Material & Methods, Results, Discussion, Acknowledgments and References. This is a widely used scheme by scientists that everyone should be familiar with. No further instructions are given here, but every author should check the style of the journal.

Authors are advised to avoid any formatting of the text. The manuscripts will be stylised according to the font type and size adopted by the journal. However, check for: a) all species names must be given in *italic*, b) the authority and year of publication are required on the first appearance of a species name in the text, but not thereafter, and c) citations and reference list must be arranged following the format below.

Reference cited in the text should read as follows: Tillyard (1924), (Tillyard 1924), Swezey & Williams (1942). The reference list should be prepared according to the following standard:

Swezey, O. & F. Williams, 1942. Dragonflies of Guam. Bernice P. Bishop Museum Bulletin 172: 3-6.

Tillyard, R., 1924. The dragonflies (Order Odonata) of Fiji, with special reference to a collection made by Mr. H.W. Simmonds, F.E.S., on the Island of Viti Levu. Transactions of the Entomological Society London 1923 III-IV: 305-346.

Citations of internet sources should include the date of access.

The manuscript should end with a list of captions to the figures and tables. The later should be submitted separately from the text preferably as graphics made using one of the Microsoft Office products or as a high resolution picture saved as a .jpg or .tif file. Hand-made drawings should be scanned and submitted electronically. Printed figures sent by the post could be damaged, in which case authors will be asked to resubmit them.

Manuscripts not arranged according to these instructions may also be accepted, but in that case their publication will be delayed until the journal's standards are achieved.

