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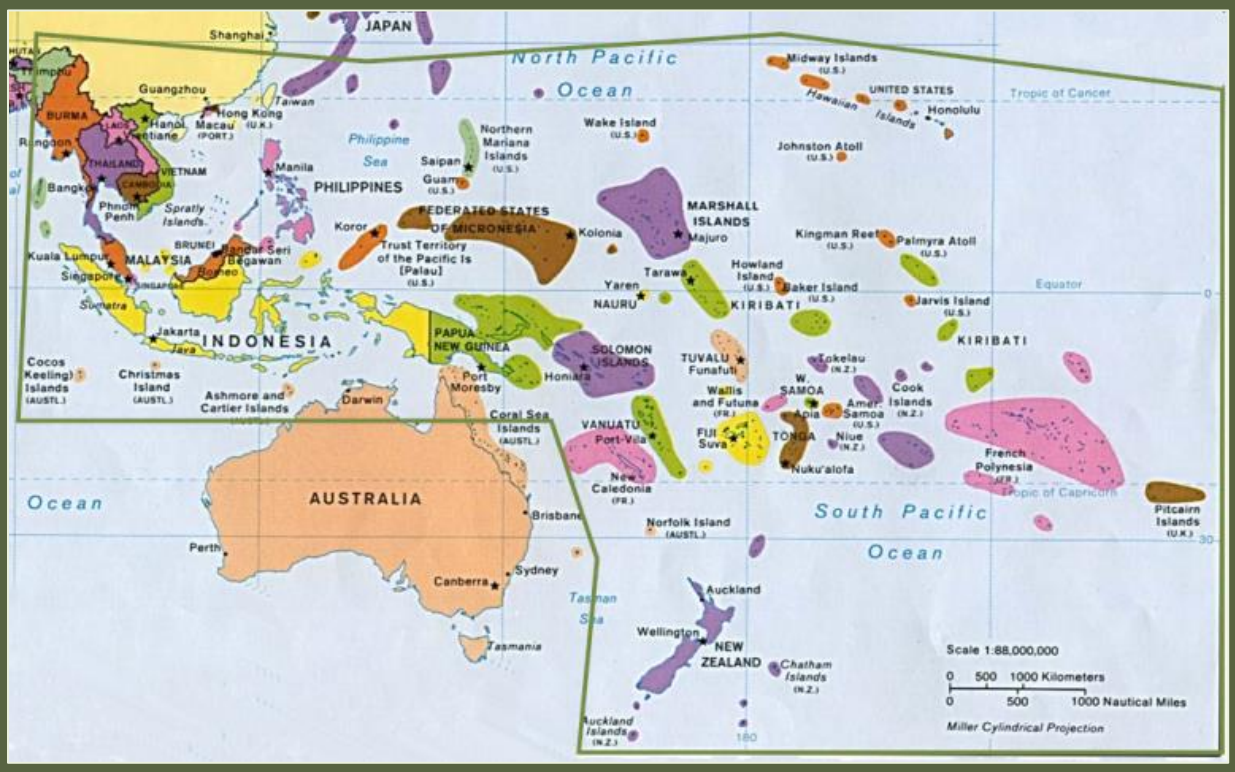

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Previously unpublished Odonata records from Sarawak, Borneo. Part II. Kubah National Park

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Abstract

Records of Odonata from Kubah National Park, near Kuching in west Sarawak, are presented. Eighty-five species are known from the national park. Notable records include *Drepanosticta drusilla*, *Rhinocypha* species cf *spinifer*, *Bornagriolestes* species, *Anaciaeschna* species and *Macromidia genialis erratica*.

Abstrak Bahasa Melayu

Rekod Odonata dari Taman Negara Kubah, dekat Kuching di bahagian barat Sarawak, dilaporkan di sini. Sebanyak 85 spesies pepatung diketahui berada di Taman Negara Kubah. Rekod yang penting termasuk *Drepanosticta drusilla*, *Rhinocypha* spesies cf *spinifer*, *Bornagriolestes* spesies, *Anaciaeschna* spesies dan *Macromidia genialis erratica*.

Key words: Odonata, Kubah, Kuching, Sarawak, Borneo

Introduction

Since 2005 the authors have been engaged in an on-going survey of the Odonata of Sarawak in Malaysian Borneo. The present paper is the second of a series of publications in which we hope to list all the as-yet unpublished Odonata records we have made in Sarawak in 2005-2013 which are not otherwise expected to appear in other papers. In this second paper of the series we present records from Kubah National Park in western Sarawak.

Kubah National Park is situated close to the state capital Kuching in the administrative division of the same name (Fig. 1). The park was opened to the public in 1995. It is situated in the Matang Range of mountains (Fig. 2) and occupies ca 22 km^2 of forested, mostly hilly and mountainous landscape. Parts of Gunung Serapi, the highest peak in the Matang Range, lie within the park, but the summit is outside of the park. The park includes, on its western side, the Matang Wildlife Centre (MWC), whose activities include Orang-utan rehabilitation. Much of the park is covered by lowland mixed dipterocarp forest, with hill dipterocarp forest and kerangas at higher elevations, and some lower montane forest above 700 m. There are small areas of alluvial forest in the valley of the Sungai Rayu, a large stream with its sources on Gunung Serapi, which flows out of the park at the MWC. Figs. 3-5 show some of the habitats present in the national park. More information on the national park can be found in Hazebroek & Morshidi (2001).

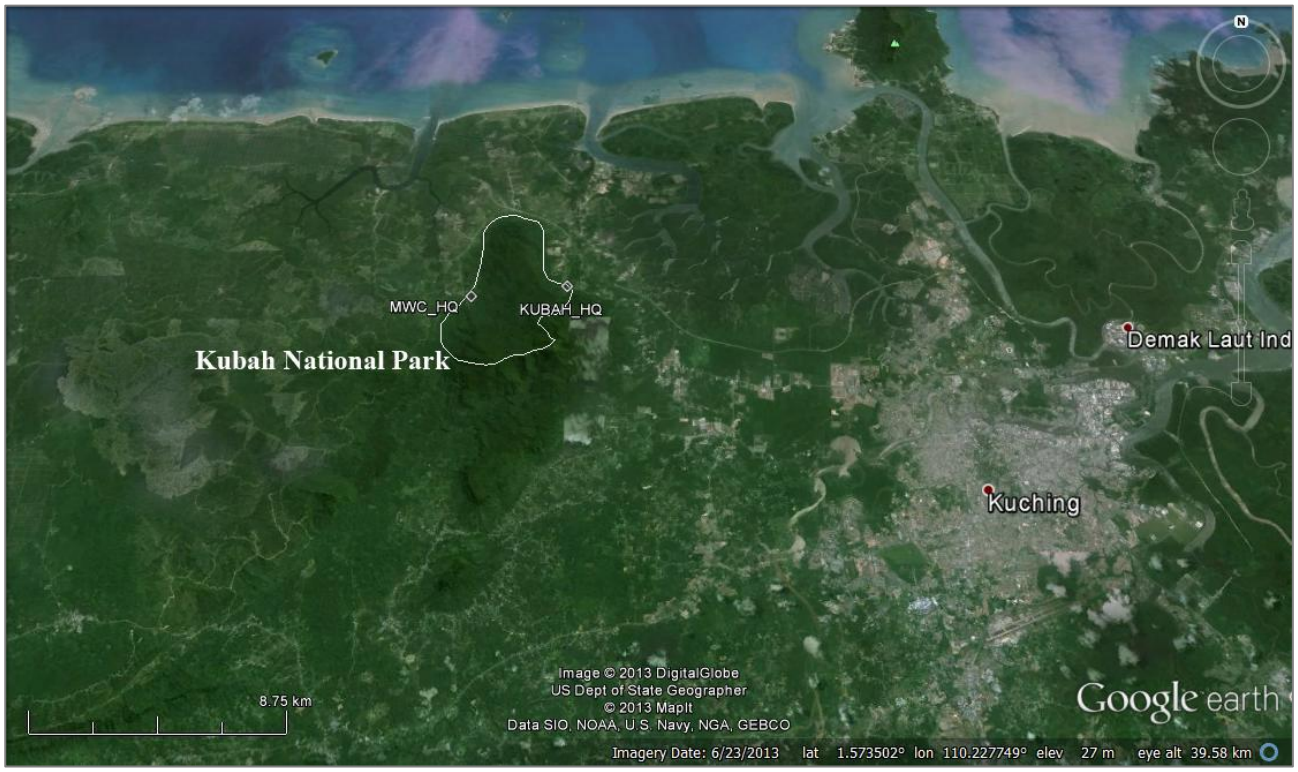

Figure 1. Kubah National Park. Image made using Google earth.

A list of species known from Kubah up until 2009 was included in Dow & Reels (2010); other publications containing records from the western divisions (Kuching and Samarahan) of Sarawak are summarised in the first part of this series (Dow & Reels 2013). Here we present an up-to-date (as of October 2013) list including all adult odonate material collected in the national park, as well as the most significant larval records. A field guide to Kubah's Odonata has been prepared by the first two authors in cooperation with the Sarawak Forestry Corporation and will hopefully be published in 2014.

Figure 2. View over the Matang Range from Gunung Serapi. Photo by G.T. Reels.

Figure 3. Waterfall on waterfall Trail, Kubah trail system. Photo by G.T. Reels.

Figure 4. Small stream on Main Trail, Kubah trail system. Photo by R.A. Dow.

Figure 5. The Sungai Rayu upstream from the Matang Wildlife Centre. Photo by R.A. Dow.

List of species collected – Kubah National Park

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

The following abbreviations for names of collectors are used below: RD – Rory A. Dow, GR – Graham Reels, SB – Stephen G. Butler. ♂+♀ denotes a pair taken in tandem.

Localities (for more details see Fig. 25 and 26 in appendix): 'K': Kubah trail system; 'M': Matang Wildlife Centre trail system.

Zygoptera
Platystictidae

1. *Drepanosticta* species cf *crenitis* Lieftinck, 1933
   See Dow (2012) for a discussion of this taxon; however it appears likely that several species of very similar appearance are being lumped together under this name. Loc. K – ♂, 2 ♀♀, 14.iv.2006, RD; ♂, 23.ii.2008, RD; ♂, 21.viii.2008, RD; ♀, 13.viii.2009, RD; 2 ♀♀, 7.ix.2009, RD; ♀, 25.iv.2010, RD; ♀, 6.vi.2010, RD; ♀, 28.vii.2010, RD; ♀, 30.iii.2012, RD; 2 ♀♀, 30.ix.2012, RD; ♀, 1.vii.2013, RD.

2. *Drepanosticta drusilla* Lieftinck, 1934 (Fig. 6)
   Loc. M – See Dow & Orr (2012b).

Figure 6. *Drepanosticta drusilla* male. Photo by R.A. Dow.

3. *Drepanosticta* species cf *forficula* Kimmins, 1936
   See Dow & Reels (2013) for a discussion of this species. Loc. M – ♂, 9.ix.2009, RD.
4. *Drepanosticta rufostigma* (Selys, 1886) (Fig. 7)
   Loc. K – 12 ♂♂, 18.iii.2005, RD; ♂, 14.iv.2005, RD; 3 ♂♂, ♀, 1.vi.2005, RD; 8 ♂♂, ♀, 21.i.2006, RD; ♀, 22.i.2006, RD; 2 ♂♂, 22.i.2006, GR; 4 ♂♂, 13.iv.2006, RD; 2 ♂♂, ♀, 14.iv.2006, RD; ♂, 29.xi.2007, RD; 5 ♂♂, 23.ii.2008, RD; 4 ♂♂, 15.ix.2008, RD; ♂, 13.viii.2009, RD; 3 ♂♂, ♀, 6.ix.2009, RD; 4 ♂♂, 7.ix.2009, RD; 2 ♂♂, 7.ix.2009, SB; ♂, 8.ix.2009, RD; ♀, 15.ix.2009, RD; 5 ♂♂, 16.ix.2009, RD; 4 ♂♂, 28.x.2009, RD; 7 ♂♂, 3.vi.2010, RD; ♂, 27.vii.2010, RD; ♂, 28.vii.2010, RD; 3 ♂♂, ♀, 2.x.2011, RD; ♂, 3.x.2011, RD; 2 ♂♂, 30.iii.2012, RD; ♂, 3.ix.2012, RD; 2 ♂♂, 29.ix.2012, RD; 2 ♂♂, 30.ix.2012, RD. Loc. M – 3 ♂♂, 10.iv.2005, RD; 3 ♂♂, 20.i.2006, RD; ♂, ♀, 25.i.2006, RD; 3 ♂♂, 9.ix.2009, RD; ♂, ♀, 2.ix.2011, RD; ♂, 1.vii.2013, RD.

Figure 7. *Drepanosticta rufostigma* female. Photo by G.T. Reels.

5. *Drepanosticta versicolor* (Laidlaw, 1913)
   Loc. K – 2 ♂♂, 15.ix.2008, RD; ♂, 30.ix.2012, RD.
6. *Telosticta bidayuh* Dow & Orr, 2012
   See Dow & Orr (2012a). Additional records: Loc. K – ♂, 30.iii.2012, RD; 2 ♂♂, 29.ix.2012, RD; 3 ♂♂, 30.ix.2012, RD; ♂, ♀, 1.vii.2013, RD.

7. *Telosticta dupophila* (Lieftinck, 1933)
   Loc. M – see Dow & Orr (2012a).
8. *Telosticta serapi* Dow & Orr, 2012 (Fig. 8)
   See Dow & Orr (2012a). Additional records: Loc. K – 2 ♂♂, 30.iii.2012, RD; 3 ♂♂, 29.ix.2012, RD; ♂, 30.ix.2012, RD; ♂, ♀, 21.vi.2013, RD; ♂, 1.vii.2013, RD. Loc. M – 2 ♂♂, 29.vii.2012, RD.

Figure 8. *Telosticta serapi* male. Photo by G.T. Reels.

Argiolestidae

9. *Podolestes orientalis* Selys, 1862 (Fig. 9)
   The most common and widespread species of *Podolestes*. Loc. M – ♂, 17.iii.2005, RD; ♀, 10.iv.2005, RD; ♂, 20.i.2006, RD; ♂, 2.ix.2011, RD.

Figure 9. *Podolestes orientalis* male. Photo by G.T. Reels.

Calopterygidae

10. *Vestalis amaryllis* Lieftinck, 1965
    Loc. K – ♂, 21.i.2006, RD; 3 ♂♂, 13.iv.2006, RD; ♂, 14.iv.2006, RD; ♂, 13.ii.2008, GR; ♂, 23.ii.2008, RD; 5 ♂♂, ?♀, 15.ix.2008, RD; ♂, 3.x.2008, RD; ♂, 25.iv.2010, RD. Loc. M – 8 ♂♂, 17.iii.2005, RD; ♂, 20.i.2006, RD; 2 ♂♂, 20.viii.2008, RD; ♂, 9.ix.2009, RD; ♂, 2.ix.2011, RD; 4 ♂♂, 1.iv.2012, RD; ♂+♀, 3.ix.2012, RD; 2 ♂♂, 29.ix.2012; RD.
11. *Vestalis* species cf *amnicola* Lieftinck, 1965
    See Dow (2012) for a discussion of this taxon. Loc. K – 3 ♂♂, 21.i.2006, RD; ♂, 13.ii.2008, RD; ♂, 3.x.2008, RD; 2 ♂♂, 13.viii.2009, RD; ♂, 6.ix.2009, RD; ♂, 7.ix.2009, RD; ♂, 8.ix.2009, RD; ♂, 3.vi.2010, RD; ♂, 2.x.2011, RD; ♂, 3.x.2011, RD; 3 ♂♂, 30.iii.2012, RD; 2 ♂♂, 30.ix.2012, RD.
12. *Vestalis amoena* Hagen in Selys, 1853
    Loc. K – 3 ♂♂, 14.ix.2009, RD. Loc. M – ♂, 16.iii.2005, RD; ♂, 25.i.2006, RD; ♂, 4.vi.2010, RD.

13. *Vestalis atropha* Lieftinck, 1965
    Loc. M – 2 ♂♂, ?♀, 10.iv.2005, RD; ♂, 25.i.2006, RD; ♂, 8.ix.2009, RD; 4 ♂♂, 1.iv.2012, RD.

Chlorocyphidae

14. *Heliocypha biseriata* (Selys, 1859) (Fig. 10)
    A common species in parts of Kubah National Park. Loc. K – ♂, 14.iv.2005, RD; ♂, 1.vi.2005, RD; ♂, 29.ix.2012, RD. Loc. M – ♂, 16.iii.2005, RD; ♀, 17.iii.2005, RD; ♂, 10.iv.2005, RD; ♂, 25.i.2006, RD; ♂, ♀, 3.ix.2009, RD; 2 ♂♂, 13.ix.2009, RD; ♂, 1.iv.2012, RD; ♂, 29.vii.2012, RD.

Figure 10. *Heliocypha biseriata* male. Photo by G.T. Reels.

15. *Libellago aurantiaca* Selys, 1859
    Loc. K – ♂, 14.ix.2009, RD. Loc. M – ♂, 25.i.2006, GR.
16. *Rhinocypha cucullata* (Selys, 1873)
    Loc. M – ♂, 13.ix.2009, RD; ♂, 1.iv.2012, RD.

17. *Rhinocypha* species cf *spinifer* Laidlaw, 1931 (Fig. 11)
This is a problematic taxon; until 2012 it was known only from a few female specimens; the male, which exhibits exceptionally cryptic behaviour for a chlorocyphid, had been glimpsed but had evaded capture. Finally, in October 2010, one male was collected. It is clearly closely related to the upland species *R. spinifer*, which is known from Bintulu Division and eastwards, but differs from it in having the dorsum of the abdomen completely black (extensive red markings in *R. spinifer*) and in behaviour. What may be the same species also occurs on Gunung Penrissen (Dow 2012). Loc. K – 2 ♀♀, 8.ix.2009, RD; 2 ♀♀, 6.vi.2010, RD; ♂, ♀, 3.ix.2012, RD.

Figure 11. *Rhinocypha* species cf *spinifer* male. Photo by R.A. Dow.

18. *Sundacypha petiolata* (Selys, 1859)
A locally common species in the lowlands of Sarawak, typically found on small closed canopy streams. Loc. K – ♂, 14.iv.2005, RD; ♂, 1.vi.2005, RD; ♂,

13.iv.2006, RD; ♂, 15.ix.2008, RD; ♂, 3.x.2008, RD; ♂, 2.x.2011, RD. Loc. M – 3 ♂♂, 17.iii.2005, RD; ♂, 20.i.2006, RD; ♂, 20.viii.2008, RD; ♂, 9.ix.2009, RD; ♂, 2.ix.2011, RD.

Devadattidae

19. *Devadatta podolestoides* Laidlaw, 1934
    See the comments in Dow (2012) and Dow & Reels (2013) on this species and the next. At Kubah National Park it is known from a few locations on Gunung Serapi. Loc. K – ♂+♀, 13.iv.2005, RD; ♂, 13.ii.2008, GR; 2 ♂♂, 7.ix.2009, RD; ♂, 16.ix.2009, RD; ♂, 30.iii.2012, RD; 3 ♂♂, ♀, 30.ix.2012, RD; ♂, 1.vii.2013, RD.
20. *Devadatta* species A
    Loc. K – 2 ♂♂, 3 ♀♀, 18.iii.2005, RD; ♂, 14.iv.2005, RD; ♂, 1.vi.2005, RD; ♂, 21.i.2006, RD; 2 ♂♂, 22.i.2006, GR; ♂, 23.ii.2008, RD; ♂, ♀, 15.ix.2008, RD; ♂+♀, 3.x.2008, RD; ♂, ♀, 3.vi.2010, RD; ♂, 28.vii.2010, RD; ♀, 2.ix.2011, RD; ♂, 2.x.2011, RD; ♀, 3.x.2011, RD; 7 ♂♂, 30.iii.2012, RD; ♂, 1.iv.2012, RD; 2 ♂♂, 3.ix.2012, RD; ♂, ♀, ♂+♀, 29.ix.2012, RD; ♂, 30.ix.2012, RD. Loc. M – ♂, 17.iii.2005, RD; ♂, 20.i.2006, RD; ♂, 25.i.2006, GR; ♂, 13.ix.2009, RD; ♂, ♀, 29.vii.2012, RD; ♂, 1.vii.2013, RD.

Euphaeidae

21. *Dysphaea dimidiata* (Selys, 1853)
    Loc. M – ♂, 20.i.2006, RD; 2 ♂♂, 25.i.2006, GR.

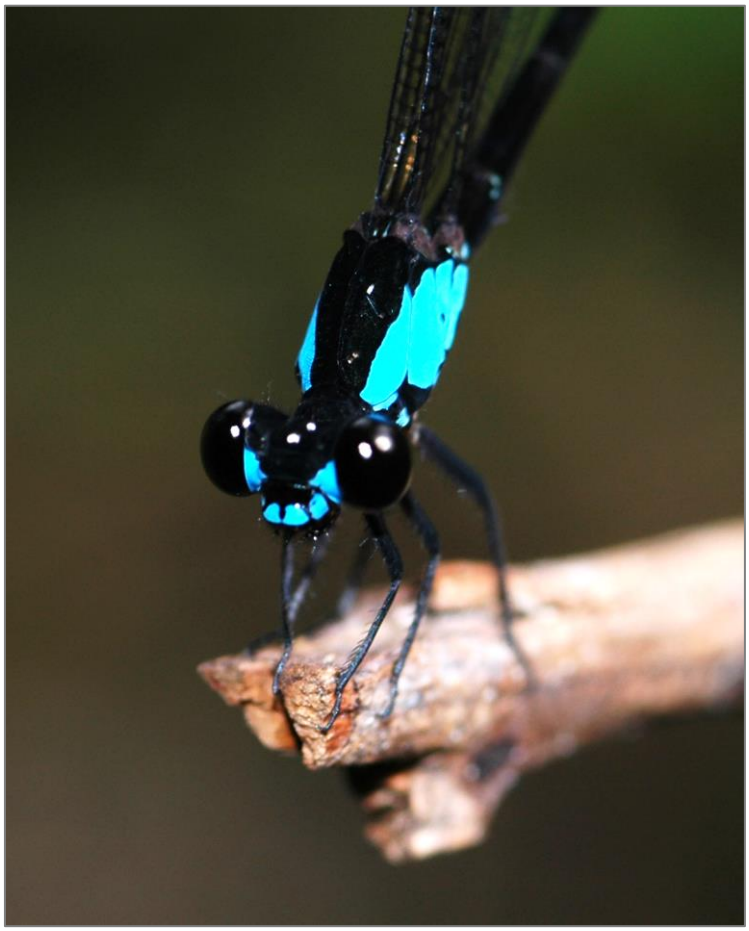

Figure 12. *Euphaea impar* male. Photo by G.T. Reels.

22. *Euphaea impar* Selys, 1859 (Fig. 12)
    Loc. K – ♂, 18.iii.2005, RD; ♂, 14.iv.2005, RD; ♂, 22.i.2006, GR; ♂, 15.ix.2008, RD; ♂, 6.ix.2009, SB; ♂, 7.ix.2009, RD; ♂, 7.ix.2009, SB; ♂, 14.ix.2009, RD; ♂, 27.vii.2010, RD; ♂, 2.ix.2011, RD; ♂, 29.ix.2012, RD; ♂, 30.ix.2012, RD. Loc. M – ♂, 16.iii.2005, RD; ♂, 17.iii.2005, RD; ♀, 10.iv.2005, RD; ♂, 20.i.2006, RD; ♂, 25.i.2006, GR; ♂, 20.viii.2008, RD; ♂, 13.ix.2009, RD; ♂, 29.vii.2012, RD.
23. *Euphaea subcostalis* Selys, 1873
    A common species in mixed dipterocarp forest in Sarawak. At Kubah it can be found together with *E. tricolor* on parts of the Sungai Rayu at the Matang Wildlife Centre. Loc. K – ♂, 14.iv.2005, RD; ♂, 14.iv.2006, RD; ♂, 13.viii.2009, RD; ♂, 7.ix.2009, RD; 2 ♂♂, 8.ix.2009, RD; 2 ♂♂, ♀, 3.vi.2010, RD; ♂, 27.vii.2010, RD; 2 ♂♂, 3.ix.2012, RD. Loc. M – ♂, 17.iii.2005, RD; 4 ♂♂, 10.iv.2005, RD; ♂, 25.i.2006, RD; 2 ♂♂, 9.ix.2009, RD; ♂, 13.ix.2009, RD; ♂, 1.iv.2012, RD; ♂, 29.vii.2012, RD.
24. *Euphaea tricolor* Selys, 1859
    Loc. M – ?♀, 16.iii.2005, RD; ♂, 17.iii.2005, RD; 2 ♂♂, 25.i.2006, RD; 2 ♂♂, 25.i.2006, GR; ♂, 20.viii.2008, RD; 2 ♂♂, 9.ix.2009, RD; ♂, 2.ix.2011, RD; ♂, 1.iv.2012, RD.

Figure 13. *Coeliccia flavostriata* male. Photo by G.T. Reels.

Philosinidae

25. *Rhinagrion borneense* (Selys, 1886)
    Loc. K – ♂, ♀, 14.iv.2005, RD; ♂, ♀, 15.ix.2008, RD; ♂, 14.ix.2009, RD; ♂, 2.x.2011, RD; ♂, 29.ix.2012, RD. Loc. M – ♂, 16.iii.2005, RD; ♂, 17.iii.2005, RD; ♂, 20.i.2006, RD; 3 ♂♂, 25.iii.2006, RD; larva, 5.iii.2008, RD; ♂, 20.viii.2008, RD; ♂, ♀, 9.ix.2009, RD; ♂, 9.ix.2009, SB; ♂, 13.ix.2009, RD; ♂, 29.vii.2012, RD.

Platycnemididae

26. *Coeliccia cyaneothorax* Kimmins, 1936
    Loc. K – 2 ♂♂, 14.iv.2006, RD; ♂, 28.vii.2010, RD.
27. *Coeliccia flavostriata* Laidlaw, 1918 (Fig. 13)
    Loc. K – See Dow (2010), additional records: 3 ♂♂, 3.x.2011, RD; ♂, ♂+♀, 30.iii.2012, RD; ♀, 29.ix.2012, RD; ♀, 30.ix.2012, RD; 4 ♂♂, 1.vii.2013, RD.
28. *Coeliccia* species cf *nemoricola* Laidlaw, 1912
    Loc. K – 3 ♂♂, 13.iv.2005, RD; 9 ♂♂, ♀, 1.vi.2005, RD; 3 ♂♂, 21.i.2006, RD; 2 ♂♂, 23.ii.2008, RD; ♂, 7.ix.2009, RD; ♂, ♀, 14.ix.2009, RD; ♂, 6.vi.2010, RD; ♀, 3.x.2011, RD; ♂, 30.iii.2012, RD.

Figure 14. *Coeliccia nigrohamata* male. Photo by G.T. Reels.

29. *Coeliccia nigrohamata* Laidlaw, 1918 (Fig. 14)
Loc. K – ♂, 3 ♀♀, 18.iii.2005, RD; ♂, 13.iv.2005, RD; 2 ♂♂, 14.iv.2005, RD; ♂, 15.iv.2005, RD; ♂, ♀, 1.vi.2005, RD; 3 ♂♂, ♀, 21.i.2006, RD; 2 ♂♂, ♂+♀, 13.iv.2006, RD; 2 ♂♂, 29.xi.2007, RD; 3 ♂♂,13.ii.2008, GR; 5 ♂♂, 23.ii.2008, RD; 4 ♂♂, 3 ♀♀, 15.ix.2008, RD; ♂, 3.x.2008, RD; 2 ♂♂, 13.viii.2009, RD; ♂, 6.ix.2009, RD; 2 ♂♂, 8.ix.2009, RD; ♂, 14.ix.2009, RD; ♂, 15.ix.2009, RD; ♂, ♀, 25.iv.2010; ♂, 2.x.2011, RD; ♂, 30.iii.2012, RD; ♂, ♀, 29.ix.2012, RD. Loc. M – 4 ♂♂, ♀, 17.iii.2005, RD; ♂, 25.i.2006, GR; ♂, 20.viii.2008, RD; ♂, ♀, 13.ix.2009, RD; ♂, 4.vi.2010, RD; ♂, 1.iv.2012, RD; ♂, 29.vii.2012, RD.

30. *Copera vittata* (Selys, 1863)
Loc. M – ♀, 16.iii.2005, RD; ♂, 20.i.2006, RD; ♂, 9.ix.2009, RD; 2 ♂♂, 2.ix.2011, RD.

31. *Elattoneura analis* (Selys, 1860)
Loc. K – ♂, 18.iii.2005, RD; ♂, 14.iv.2005, RD; ♂+♀, 13.iv.2006, RD; ♂, 29.xi.2007, RD; 2 ♂♂, 15.ix.2008; 2 ♂♂, 3.x.2008, RD; ♂, 13.viii.2009, RD; 3 ♂♂, 14.ix.2009, RD; ♂, 25.iv.2010, RD; ♂, 2.x.2011, RD; ♂, ♀, 3.ix.2012, RD; ♂, 29.ix.2012, RD. Loc. M – 2 ♂♂, 17.iii.2005, RD; ♂, 20.iii.2006, RD; 2 ♂♂, 25.i.2006, RD; ♂, 9.ix.2009, RD; ♂, 13.ix.2009, RD; ♂, ♀, 29.vii.2012, RD.

32. *Prodasineura dorsalis* (Selys, 1860) (Fig. 15)
The western form of this species differs from those found east of the Lupar river in having no yellow band between the eyes. Loc. K – ♂, 13.iv.2006, RD; ♂, 23.ii.2008, RD; ♂+♀, 28.x.2009, RD; ♂, 25.iv.2010, RD; ♂, 2.x.2011, RD; ♂, 3.ix.2012, RD; 2 ♂♂, ♀, ♂+♀, 29.ix.2012, RD. Loc. M – 2 ♂♂, 17.iii.2005, RD; ♂, 20.i.2006, RD; ♂, 9.ix.2009, RD.

Figure 15. *Prodasineura dorsalis* male. Photo by R.A. Dow.

33. *Prodasineura haematosoma* Lieftinck, 1937
    Loc. K – ♂, 13.iv.2006, RD; ♂, 23.ii.2008, RD; ♂, 15.ix.2008; ♂, 6.ix.2009, RD; ♂, ♂+♀, 3.ix.2012, RD. Loc. M – ♂, 9.ix.2009, RD; ♂, 9.ix.2009, SB; ♂, 13.ix.2009, RD; 2 ♂♂, ♀, 29.vii.2012, RD.
34. *Prodasineura hosei* (Laidlaw, 1913) (Fig. 16)
    A local species in mixed dipterocarp forest. Loc. K – 2 ♂♂, 15.ix.2008, RD; 2 ♂♂, 3.x.2008, RD; ♂, 13.viii.2009, RD; ♂, 14.ix.2009, RD. Loc. M – ♂, 17.iii.2005, RD; ♂, 20.viii.2008, RD; 2(♂+♀), 9.ix.2009, RD; ♂, 13.ix.2009, RD; ♂, 4.vi.2010, RD; ♂, 2.ix.2011, RD.
35. *Prodasineura notostigma* (Selys, 1860)
    Loc. K – 3 ♂♂, 15.ix.2008, RD; 2 ♂♂, 2.x.2011, RD. Loc. M – ♂, 17.iii.2005, RD; ♂, ♂+♀, 20.i.2006, RD.
36. *Prodasineura verticalis* (Selys, 1860)
    Loc. K – ♂+♀, 14.ix.2009, RD. Loc. M – 2 ♂♂, 16.iii.2005, RD; ♂, 20.i.2006, RD; ♂, 20.viii.2008, RD; ♂, 13.ix.2009, RD.

Figure 16. *Prodasineura hosei* male. Photo by R.A. Dow.

Coenagrionidae

37. *Agriocnemis femina* (Brauer, 1868)
    Loc. M – 2 ♂♂, ♀, 16.iii.2005, RD; ♀, 20.i.2006, RD.
38. *Amphicnemis* species cf *dactylostyla* Lieftinck, 1953
    Loc. M – ♂, 20.i.2006, RD; ♂, 25.i.2006, RD.
39. *Archibasis tenella* Lieftinck, 1949
    Loc. K – 3 ♂♂, 14.ix.2009, RD. Loc. M – 5 ♂♂, 25.i.2006, RD; ♂, 25.i.2006, GR; 2 ♂♂, 20.viii.2008, RD; ♂, 9.ix.2009, RD; ♂, 4.vi.2010, RD.
40. *Argiocnemis* species
    Loc. M – ♂, 13.ix.2009, RD.
41. *Ceriagrion cerinorubellum* (Brauer, 1865)
    Loc. M – ♂, 16.iii.2005, RD.
42. *Pericnemis stictica* (Hagen in Selys, 1863) (Fig. 17)
    Loc. K – ♂, 15.ix.2008, RD; ♀, 1.vii.2013, RD.

Figure 17. *Pericnemis stictica* male. Photo by R.A. Dow.

43. *Pericnemis* species cf *triangularis* Laidlaw, 1931
    This is an unnamed species, known from Kubah and from the arboretum at Semenggoh (see Dow & Reels 2013). Loc. K – ♂, ♀, 13.iv.2006, RD; ♀, 8.ix.2009, RD. Loc. M – ♀, 1.iv.2012, RD.
44. *Pseudagrion microcephalum* (Rambur, 1842)
    Loc. M – ♂, 25.i.2006, RD.
45. *Pseudagrion perfuscatum* Lieftinck, 1937
    Loc. M – ♂, 16.iii.2005, RD; ♂, 25.i.2006, RD; ♂, 13.ix.2009, RD.
46. *Stenagrion dubium* (Laidlaw, 1912) (Fig. 18)
    Loc. K – ♂, 13.iv.2005, RD; 5 ♂♂, 25.i.2006, RD; 3 ♂♂, 13.iv.2006, RD; ♂, 14.iv.2006, RD; ♂, 13.ii.2008, RD; ♂, 13.ii.2008, GR; ♂, 15.ix.2008, RD; ♂, 3.x.2008, RD; ♂+♀, 13.viii.2009, RD; 4 ♂♂, 6.ix.2009, RD; ♂, 7.ix.2009, RD; 3

♂♂, 8.ix.2009, RD; ♂, 16.ix.2009, RD; ♂, 25.iv.2010, RD; ♂, 3.vi.2010, RD; ♂, 6.vi.2010, RD; ♂, 28.vii.2010, RD; 2 ♂♂, 2.x.2011, RD; ♂+♀, 30.iii.2012, RD; ♂, 29.ix.2012, RD; 2 ♂♂, 30.ix.2012, RD. Loc. M – 2 ♂♂, 10.iv.2005, RD; 3 ♂♂, 13.ix.2009, RD; ♂, 29.vii.2012, RD.

Figure 18. *Stenagrion dubium* male. Photo by G.T. Reels.

Incertae sedis

47. *Bornargiolestes* species

This species will be described in a paper in preparation by the first author; specimens collected will be listed there. Loc. K.

Anisoptera

Aeshnidae

48. *Anaciaeschna* species

A single female *Anaciaeschna* has been collected at a site at approximately 650m a.s.l. on Gunung Serapi. It was caught while flying up and down a low gradient section of a small forest stream, but might have been disturbed from an adjacent muddy seepage. It differs from other *Anaciaeschna* species known from South-East Asia in its total lack of pale markings on thorax and abdomen and is likely to be a new species, but male specimen material must be obtained before this can be confirmed. Loc. K – ♀, 28.vii.2010, RD.

Figure 19. *Indaeschna grubaueri* male. Photo by G.T. Reels.

49. *Indaeschna grubaueri* (Förster, 1904) (Fig. 19)
    This spectacular species can usually be seen at the easily accessible 'Frog Pond' on Gunung Serapi. Loc. K – ♂, 1.vi.2005, RD; ♂, 21.i.2006, RD; ♂, 30.ix.2012, RD.
50. *Tetracanthagyna degorsi* Martin, 1896
    Loc. K – ?larva, 7.ix.2009, SB; ♀, 8.ix.2009, RD. Loc. M – ?larva, 5.iii.2008, RD.

Gomphidae

51. *Acrogomphus* species
    At Kubah *Acrogomphus* is known only from larval records. Loc. K – 4 larvae, 7.ix.2009, SB. Loc. M – 5 larvae, 5.iii.2008, RD; larva, 9.ix.2009, SB.

52. *Burmagomphus* species
    Loc. M – larva, 5.iii.2008, RD.
53. *Heliogomphus* species
    Loc. K – ♀, 3.x.2008, RD; ♀, 13.viii.2009, RD; 2 larvae, 8.ix.2009, SB; ♀, 3.ix.2012, RD. Loc. M – larva, 5.iii.2008, RD.
54. *Leptogomphus coomansi* Laidlaw, 1936
    Loc. K – ♂, ♀, 15.ix.2008, RD; ?4 larvae, 7.ix.2009, SB; ?larva, 8.ix.2009, SB; ♂, 9.ix.2009, RD; ♀, 3.ix.2012, RD. Loc. M – ♂, 17.iii.2005, RD; ♂, 1.iv.2012, RD.
55. *Leptogomphus williamsoni* Laidlaw, 1912 (Fig. 20)
    Loc. K – larva, 7.ix.2009, SB. Loc. M – 2 larvae, 9.ix.2009, SB.
56. *Macrogomphus* species
    Only larvae have been collected in Kubah National Park to date, but adult *M. quadratus* has been seen in the park. Loc. K – 2 larvae, 8.ix.2009, SB. Loc. M – larva, 5.iii.2008, RD.

Figure 20. *Leptogomphus williamsoni* male. Photo by R.W.J. Ngiam.

57. *Microgomphus* species
    Loc. K – larva, 8.ix.2009, SB. Loc. M – 6 larvae, 5.iii.2008, RD; ♀, 4.vi.2010, RD.

Macromiidae

58. *Macromia arachnomima* Lieftinck, 1953
    Loc. M – larva, 9.ix.2009, SB.
59. *Macromia westwoodi* Selys, 1874
    Loc. K – ?larva, 7.ix.2009, SB; ♂, 3.vi.2010, RD; 2 ♀♀, 6.vi.2010, RD; 2 ♂♂, 27.vii.2010, RD; 2 ♂♂, 28.vii.2010, RD.

Figure 21. *Lyriothemis cleis* female. Photo by G.T. Reels.

Libellulidae

60. *Agrionoptera sexlineata* Selys, 1879
    Loc. M – ♂, ♀, 4.vi.2010, RD; ♂, 29.vii.2012, RD.
61. *Cratilla lineata* (Brauer, 1878)
    Loc. K – ♂, 18.iii.2005, RD; ♂, 14.iv.2005, RD; ♂, 7.ix.2009, RD.
62. *Cratilla metallica* (Brauer, 1878)
    Loc. K – ♂, 14.iv.2005, RD; ♂, 1.vi.2005, RD; ♂, 21.i.2006, RD; ♂, 6.ix.2009, RD; ♂, 8.ix.2009, RD; ♂, 30.iii.2012, RD; ♂, 30.ix.2012, RD.
63. *Lyriothemis biappendiculata* (Selys, 1878)
    Loc. K – ♂, 14.iv.2005, RD; ♂, 1.vi.2005, RD; ♂, 21.i.2006, RD, ♂, 14.iv.2006, RD; ♂, 23.ii.2008, RD; ♂, 15.ix.2008, RD; 2 ♂♂, 6.ix.2009, RD; ♂, 8.ix.2009, SB; ♂, 30.ix.2012, RD.
64. *Lyriothemis cleis* Brauer, 1868 (Fig. 21)
    Loc. K – ♀, 7.ix.2009, RD; ♂, 14.ix.2009, RD; ♂, 3.x.2011, RD; ♂, 3.ix.2012, RD; ♂, 30.ix.2012, RD. Loc. M – ♂, 2.ix.2011, RD; ♂, 1.iv.2012, RD.
65. *Neurothemis fluctuans* (Fabricius, 1793)
    Loc. K – ♂, 3.x.2008, RD. Loc. M – ♀, 17.iii.2005, RD; ♂, 2.ix.2011, RD.
66. *Neurothemis ramburii* (Brauer, 1866) (Fig. 22)
    Loc. M – ♂, 16.iii.2005, RD; ♂, 2.ix.2011, RD.

Figure 22. *Neurothemis ramburii* male. Photo by G.T. Reels.

67. *Neurothemis terminata* Ris, 1911
    Loc. K – ♂, 18.iii.2005, RD; ♂, 14.iv.2005, RD. Loc. M – ♂, 9.ix.2009, RD.

68. *Orchithemis pulcherrima* Brauer, 1878
Loc. M – ♂, 16.iii.2005, RD.

69. *Orthetrum chrysis* (Selys, 1891)
Loc. K – ♂, 14.iv.2005, RD. Loc. M – ♂, 16.iii.2005, RD.

70. *Orthetrum glaucum* (Brauer, 1865)
Loc. K – ♂, 14.iv.2005, RD; ♂, 6.ix.2009, SB. Loc. M – ♂, 16.iii.2005, RD.

71. *Orthetrum pruinosum schneideri* Förster, 1903
Loc. K – ♂, 14.iv.2005, RD; ♂, 1.vi.2005, RD; ♂, 21.i.2006, RD; ♂, 6.ix.2009, RD; ♂, 8.ix.2009, RD; ♂, 14.ix.2009, RD. Loc. M – ♂, 1.iv.2012, RD.

72. *Orthetrum sabina* (Drury, 1773)
Loc. M – ♀, 1.iv.2012, RD.

73. *Orthetrum testaceum* (Burmeister, 1839)
Loc. K – ♀, 18.iii.2005, RD. Loc. M – ♂, 16.iii.2005, RD.

74. *Rhyothemis phyllis* (Sulzer, 1776)
Loc. K – ♀, 22.i.2006, RD.

75. *Risiophlebia dohrni* (Krüger, 1902)
Loc. M – ♂, 17.iii.2005, RD.

76. *Trithemis aurora* (Burmeister, 1839)
Loc. M – ♂, 20.i.2006, RD.

77. *Trithemis festiva* (Rambur, 1842)
Loc. M – ♂, 25.i.2006, RD.

78. *Tyriobapta kuekenthali* (Karsch, 1900)
Loc. K – ♂, 1.vi.2005, RD; ♂, 13.iv.2006, RD; ♂, 14.ix.2009, RD; ♂, 28.x.2009, RD; ♂, 25.iv.2010, RD. Loc. M – 2 ♂♂, 17.iii.2005, RD; ♂, 20.viii.2008, RD; 2 ♂♂, 9.ix.2009, RD; ♂, 13.ix.2009, RD; ♂, 4.vi.2010, RD; ♂, 2.ix.2011, RD; 2 ♂♂, 1.iv.2012, RD; 2 ♂♂, 29.vii.2012, RD.

79. *Tyriobapta torrida* Kirby, 1889
Loc. K – ♂, 14.iv.2005, RD. Loc. M – ♂, 17.iii.2005, RD; ♂, 20.i.2006, RD; ♂, 2.ix.2011, RD.

80. *Urothemis signata insignata* (Selys, 1872)
Loc. M – ♂, 9.ix.2009, RD.

81. *Zygonyx iris errans* Lieftinck, 1953 (Fig. 23)
This species is generally scarce in Sarawak, but relatively common at Kubah National Park. Although it agrees with typical *Z. iris* from mainland Asia in its accessory genitalia, it differs substantially in size and general appearance (coming closer to *Z. ida* specimens from peninsular Malaysia in both) and is probably better treated as a distinct species. Loc. K – ♂, ♀, 13.iv.2006, RD; ♀, 14.iv.2006, RD; 2 ♂♂, 7.ix.2009, RD; ♂, 8.ix.2009, SB; ♂, 8.ix.2009, RD; ♂, 27.vii.2010, RD; 2 ♂♂, 28.vii.2010, RD; ♂, 3.x.2011, RD. Loc. M – 3 ♂♂, 1.iv.2012, RD.

Figure 23. *Zygonyx iris errans* male. Photo by R.A. Dow.

Incertae sedis

82. *Macromidia fulva* Laidlaw, 1915
    Loc. K – ♀, 23.ii.2008, RD.
83. *Macromidia genialis erratica* Lieftinck, 1948
    Loc. K – ♀, 3.x.2008, RD.
84. *Idionyx* species cf *selysi* Fraser, 1926 (Fig. 24)
    Loc. K – ♀, 1.vi.2005, RD; ♀, 21.i.2006, RD; ♂, 14.iv.2006, RD, ♀ larva, 6.ix.2009, emerged 16.ix.2009, SB; ?larva, 6.ix.2009, SB; ♀, 7.ix.2009, RD; ♂, 8.ix.2009, RD, ♀, 16.ix.2009, RD; ♂, 29.ix.2012, RD; ♀, 30.ix.2012, RD; ♀, 1.vii.2013, RD.
85. *Idionyx* ?*yolanda* Selys, 1871
    Loc. M – ♀, 2.ix.2011, RD.

Figure 24. *Idionyx* species cf *selysi* male. Photo by R.A. Dow.

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Appendix

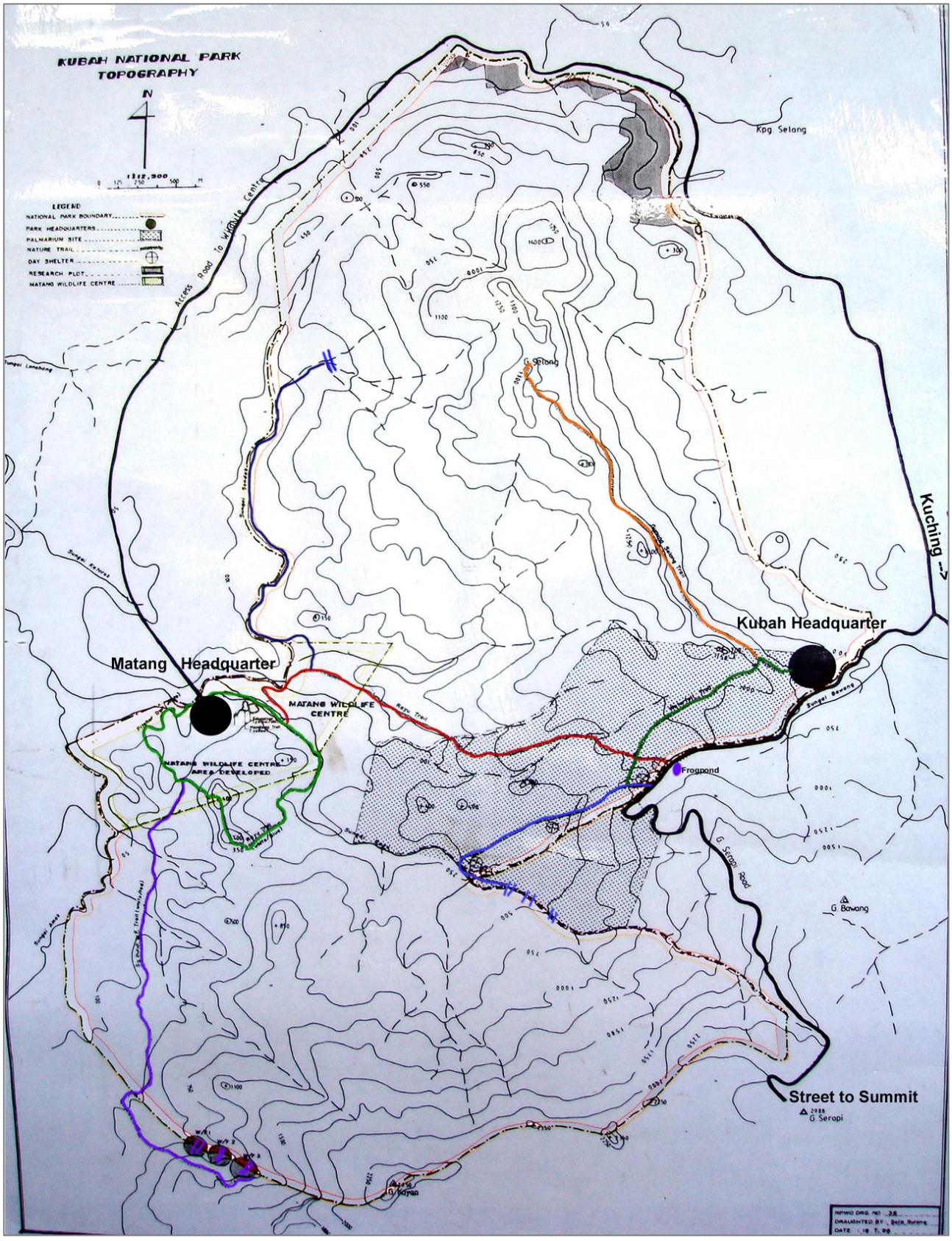

Figure 25: http://www.thefairview.com.my/images/trips/kubah-map.jpg

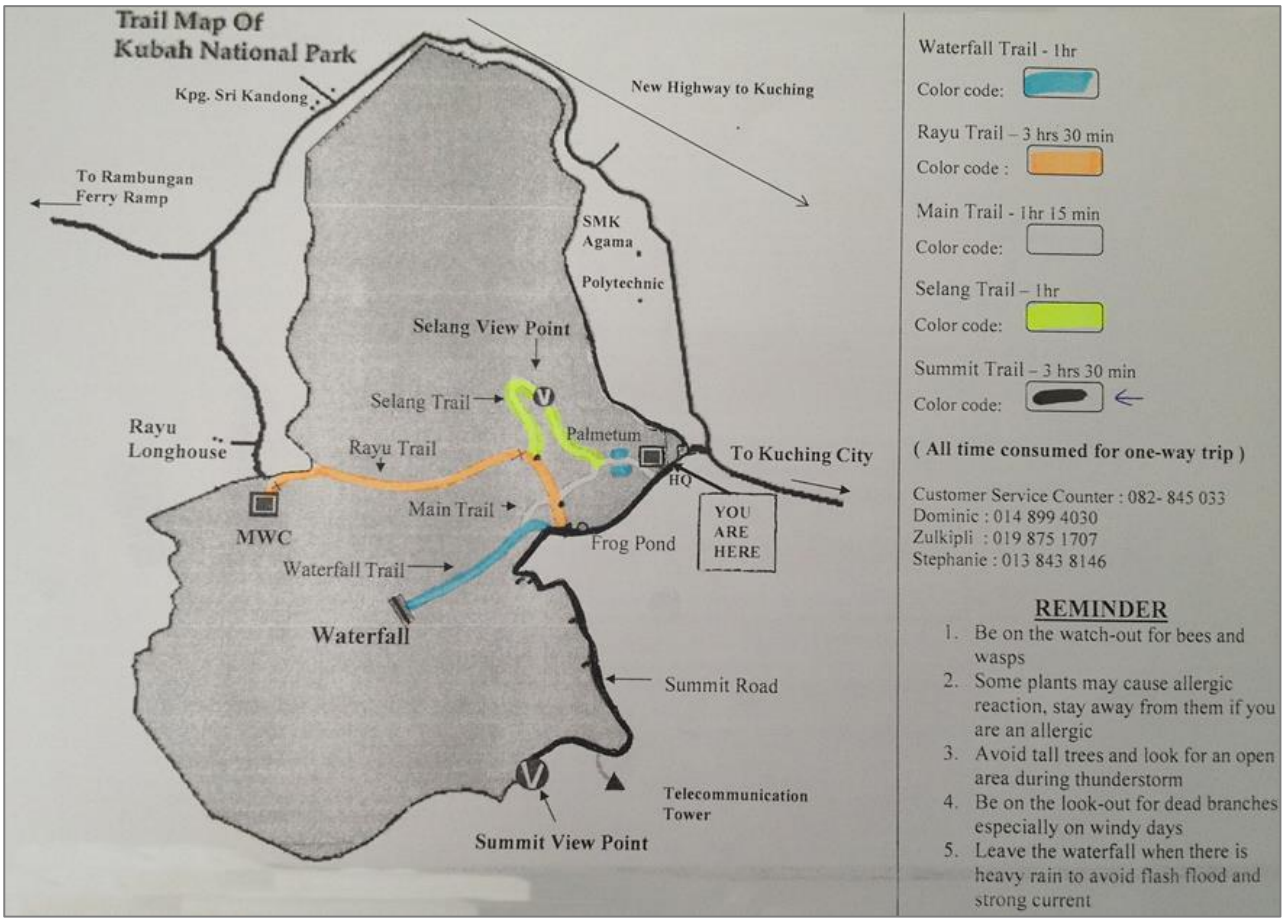

Fig. 26: Trail system within Kubah National Park (http://liewwkphoto.com/blog/wp-content/uploads/2012/10/Kubah-Map-fb.jpg)

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