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Previously unpublished Odonata records from Sarawak, Borneo, part V: Odonata from the southwest of Sarawak, including the first records from the Bungo Range National Park

Rory A. Dow[1, 2], Stephen *G.* Butler[3], Robin W.J. Ngiam[4] & Graham T. Reels[5]

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

[2]Sarawak Museum Campus Project, Jabatan Muzium Sarawak, Jalan Barrack, 9300 Kuching, Sarawak, Malaysia

[3]Red Willow, All Stretton, SY6 6HN Shropshire, UK. Email: sgbutler15@btopenworld.com

[4]Block 539, Ang Mo Kio. Avenue 10. Unit 13-2577., Singapore 560539, Republic of Singapore. Email: yanrobin@hotmail.com

[5]31 St Anne's Close, Winchester SO22 4LQ, Hants., United Kingdom. Email: gtreels@gmail.com

Abstract

Records of Odonata from three administrative divisions in the southwest of Sarawak (Kuching, Samarahan and Serian), mostly made during field work funded by the International Dragonfly Fund and the Sarawak Museum Campus Project, are presented. In the first part of the paper 176 species are listed, of which *Burmagomphus plagiatus* Lieftinck, 1964 was recorded from Sarawak for the first time during this study and one or possibly two unnamed *Onychogomphus* sensu latu species were recorded from Borneo for the first time (one from a single female, the other from an exuvia). *Gynacantha maclachlani* Krüger, 1899 is also recorded from Sarawak for the first time. The first records of Odonata from the Bungo Range National Park are included here. Other notable records include *Drepanosticta drusilla* Lieftinck, 1934, *Drepanosticta kosterini* Dow, 2017, *Podolestes chrysopus* Selys, 1889, *Libellago stigmatizans* (Selys, 1859), *Rhinocypha aurofulgens* Laidlaw, 1931 (recorded from southwest Sarawak for the first time), *Bornargiolestes reelsi* Dow, 2014, *Amphicnemis madelenae* Laidlaw, 1913, *Amphicnemis rigiketit* Dow, 2019, *Burmagomphus insularis* Laidlaw, 1914, *Gomphidia abbotti* Williamson, 1907, *Macrogomphus albardae* Selys, 1878, *Macromia arachnomima* Lieftinck, 1953, *Macromia callisto* Laidlaw, 1922 and *Nannophyopsis chalcosoma* Lieftinck, 1935. The importance of kampung (village) lands, still mostly farmed by traditional methods and presenting a mosaic of different habitat types in close proximity to each other, for conservation is discussed briefly, taking the Gomphidae as an example. In the second part of the paper some taxonomic issues are discussed and some molecular data is included. Bornean *Libellago stigmatizans* are shown to be indistinguishable from *L. stictica* (Selys, 1859) using COI based DNA barcoding, but the two are clearly separated in ITS. *Gomphidia caesarea* Lieftinck, 1929 is considered to be a junior synonym of *Gomphidia abbotti*, variation in *G. abbotti* is discussed and DNA barcoding data for *G. abbotti* and *G. maclachlani* Selys, 1873 is presented. The status of *Macrogom-*

phus abnormis Selys, 1884 is discussed and some COI data is presented to support the view that two species have been treated as *M. parallelogramma* in Borneo until now (an issue that will be dealt with in much more detail in a future paper). One of the *Onychogomphus* sensu latu species is discussed and illustrated from a female and illustrations of the female of "Phaenandrogomphus" *safei* Dow & Luke, 2015 are presented for the first time. A detailed list of previously unpublished specimens from the locations covered is given in an appendix and details of specimens used in the molecular analyses are given in a second appendix.

Key words: Malaysia, Kuching Division, Samarahan Division, Serian Division, *Libellago stictica* (Selys, 1859), *Libellago stigmatizans* (Selys, 1859), *Gomphidia abbotti* Williamson, 1907 - *Gomphidia caesarea* Lieftinck, 1929 syn. nov., *Gomphidia maclachlani* Selys, 1873, *Macrogomphus abnormis* Selys, 1884, The *Macrogomphus parallelogramma*–group, *Onychogomphus*, COI, ITS.

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 fifth in a series of publications in which we hope to list all of the Odonata records we have made in Sarawak since 2005 which have not previously been published and which are not scheduled to be published elsewhere. In this paper we present records from three Divisions in the southwest of Sarawak - Kuching, Samarahan and Serian - made up to November 2020. Here we follow the definition of southwest Sarawak used in Dow (2019a), as the part south and west of the Lupar Line, so that some parts of Sri Aman Division (not covered here) are also part of southwest Sarawak. The first paper in the series (Dow & Reels 2013) also covered Kuching and Samarahan Divisions but considerable amounts of work have been done in the southwest since then. Additional records from protected areas in the southwest, with the exception of the Bungo Range National Park, will be published separately, as will additional records from Gunung Penrissen (an area covered in two previous IDF reports: Dow (2012a) and Dow, Butler & Reels (2016)).

The three southwestern administrative divisions of Sarawak with which this report is concerned are relatively small. Kuching has an area of ca. 4,560km^2, Samarahan ca. 4,967km^2 and Serian ca. 2,040 km^2. Serian Division was only separated from Samarahan Division in April 2015, and one of the locations reported on in Dow & Reels (2013) as being in Samarahan Division (Ranchan Recreational Park) is now in Serian Division. Dow & Reels (2013) summarised the literature containing records from the three Divisions, however Donnelly (1997) also includes some records from Serian Division in the present sense (see the discussion in the introduction to Dow 2019a) but was overlooked in Dow & Reels (2013). Since the publication of Dow & Reels (2013), records from these divisions have been included in Butler et al. (2016), Dow (2013, 2014, 2016a, 2016b, 2017, 2019b, 2019c, 2021), Dow, Butler & Reels (2016), Dow & Morris (2021), Dow & Ngiam (2019), Dow & Price (2020), Dow et al. (2013, 2015, 2017), Hämäläinen et al (2015), Orr & Dow (2015, 2016) and Seehausen & Dow (2016). Additionally Dow (2019a) includes some records from the extreme east of Serian Division. The primary types of *Drepanosticta burbachi* Dow, 2013, *Drepanosticta kosterini* Dow, 2017, *Telosticta bidayuh* Dow & Orr, 2012, *Telosticta gading* Dow & Orr, 2012, *Telosticta santubong* Dow & Orr, 2012, *Telosticta serapi* Dow &

Orr, 2012, *Podolestes harrissoni* Lieftinck, 1953, *Vestalis amaryllis* Lieftinck, 1965, *Vestalis beryllae* Laidlaw, 1915, *Bornargiolestes reelsi* Dow, 2014, *Coeliccia flavostriata* Laidlaw, 1918, *Coeliccia matok* Dow, 2016, *Coeliccia nigrohamata* Laidlaw, 1918, *Amphicnemis rigiketit* Dow 2019, *Ceriagrion bellona* Laidlaw, 1915, *Teinobasis cryptica* Dow, 2010, *Acrogomphus jubilaris* Lieftinck, 1964, *Leptogomphus schieli* Dow, Stokvis & Ngiam, 2017 and *Megalogomphus borneensis* (Laidlaw, 1914) are from locations in Kuching, Samarahan or Serian Divisions.

From 2005 onwards the first author of this report (hereafter referred to as RD) in particular has spent a considerable amount of time conducting fieldwork in the state. Despite the time spent, and the fact that Kuching, the state capital in the Division of the same name, has always been our base of operations, until 2017 our work in the southwest had been concentrated on relatively few areas. In June 2017 RD moved to Kuching to take up a one year position with the Sarawak Museum Campus Project, and has been in Sarawak most of the time since then. Over this period, among other projects, RD has been engaged in a survey of the Odonata to be found in non-protected areas in the southwest of Sarawak, funded by the International Dragonfly Fund and also (from June 2017–May 2018) by the Sarawak Museum Campus Project. The second and third authors have also taken part in this project while the fourth author took part in some earlier work in the same area that is included here because the results had not been published elsewhere. As part of this survey trips have been made into the Bungo Range, the upper parts of which have been protected as the Bungo Range National Park, and the few results obtained from within the National Park boundary to date are also included here. The results presented here are the result of 103 days of fieldwork (this figure does not include days on which specimens were collected in and around buildings during other activities). Unfortunately little progress was made in the southwest of Sarawak during 2020 or so far in 2021 because of the Covid 19 pandemic, which has resulted in many local communities closing their lands to outsiders even when movement restrictions were not in place.

Many of the locations reported on here are streams and other habitats in kampung (village) lands belonging to Bidayuh and in some cases mixed Bidayuh and Hakka Chinese communities. The streams at these locations typically flow through a complex mosaic of farms (traditional shifting agriculture and often with trees remaining at the river bank), second growth forest of various ages, often clumps of large bamboo, and patches of older growth forest (often altered so that it mostly consists of large fruit trees). Such habitats are referred to as the typical habitat mosaic in the location descriptions below, but it should be noted that no two of these locations are completely alike. Although these habitats are still at least partly forested they are highly disturbed and human altered, but few or none of them have undergone commercial logging operations and large scale, homogenous plantations or other agro-industry farming are also still largely absent from the parts surveyed. Many of the streams run either entirely clear or only slightly turbid except after heavy rain (when even streams entirely in primary forest can become turbid). Although disturbed, the history of disturbance at these locations has been gradual and, for instance, land clearance has generally proceeded at a relatively slow piecemeal fashion so that there has always been habitat nearby providing refugia that promote recolonisation. The results presented here show that many of these locations still harbour a rich, interesting and important odonate fauna.

Other sampled habitats include remnants of tropical peat swamp forest, which harbours some of the most threatened of the Bornean Odonata. In the Bungo Range logged forest on steep slopes has been sampled and at higher altitudes on one side a form of undisturbed montane kerangas forest has been reached. Some of the sampled parts of Mount Matang are in relatively undisturbed mixed dipterocarp and kerangas forest. The upper parts of Sungai Segong reached run through a relatively undisturbed kerangas formation at the base of the Matang Range. Some sampling was also conducted at open and largely open pond habitats.

Additional records from locations not far outside of Ulu Sebuyau National Park in Samarahan Division (locations SA3 and SA4 below) made during surveys primarily inside the National Park in 2015 are also reported here. Records from within Ulu Sebuyau National Park will be published separately. Also some records from 2013 from the environs of Kampung Sebako (location K17) at the foot of the Pueh Range in Kuching Division are included here along with more recent records from the same location. Surveys at Mount Matang (location K14) began in 2014 and continued during the present survey.

These are the first published records of Odonata for most of the locations reported on here but there are some exceptions. Annah Rais (location K1 below) was one of the first locations in Sarawak where RD collected and older records from there are included in an appendix to Dow (2012a). RD made a survey on Gunung Pueh and around Kampung Sebako (location K17) in 2012 which was reported on in Dow (2012b). Surveys at Sungai Merah (location K27 here) and the UNIMAS Peat Swamp Forest (location SA5 here) were reported in Dow & Reels (2013). Material from all of these locations has also appeared in taxonomic publications involving one or more of the authors of this report. Going back further, Mount Matang (K14) is a historical collecting location for Odonata in Sarawak and material from there is included in many old publications (for instance Hincks 1930, Laidlaw 1911, 1915, 1918, 1920, 1934; also Kitagawa 1997 includes records from “Hindu Temple”, which can only be the area on Mount Matang, see the notes on location K14 below). The holotype of *Ceriagrion bellona* Laidlaw, 1915 is from Mount Matang. Material collected by us from this location has also been recorded in various taxonomic publications. Similarly there are records from the Bidi area (location K4) in Hincks (1930) and Laidlaw (1920), and some of the locations reported on in Grinang (2004) will be in this area. There are old specimens from a location called Tebang (for instance the holotype of *Acrogomphus jubilaris*) that have been used in a number of taxonomic publications (Dow et al. 2017, Lieftinck 1964, Lieftinck 1965, van Tol & Norma-Rashid 1995). Lieftinck (1965, in the type series of *Vestalis amaryllis*) states that Tebang is on the NE slope of Gunung Penrissen but it is not clear where his information came from, possibly from the labels of the specimens concerned (however the holotype of *Acrogomphus jubilaris* was collected two days earlier than the material of *Vestalis amaryllis*, and the labels of the *Acrogomphus* do not mention Penrissen). Location K6 here, Pangkalan Tebang (Tebang Jetty, there is no jetty there now but it might once have been the last point for boat travel up river) is near to the Bungo Range and maybe the material from Tebang is from somewhere in this area, certainly we know no location called Tebang on Gunung Penrissen or at its foot. Part of the type series of *Podolestes harrissoni* is from near Batu Kawa (Lieftinck 1953a), one of the last remnants of peat swamp forest in this area is reported on here (K12). Some specimens attributed to J.C. Moulton on an expedition that he led in 1914 (Moulton 1914) are almost certainly from Sungai Kayan upstream of Tebekang.

In 2018 an annotated checklist of the Odonata of Sarawak (Dow 2021), with records to district level, by RD was accepted for a special edition of the Sarawak Museum Journal, and (after hasty updating in early April 2019) was supposed to appear in 2019. A paper on the Odonata collection of the Sarawak Museum by RD and the historian Jennifer Morris is also included in the same special issue. Unfortunately the appearance of the special issue was severely delayed and it was finally (and rather suddenly) published in February 2021. Because of the delays the checklist is already be out-of-date in a number of respects. Moreover proofs were not provided to RD and no option of making any corrections at the proof stage was offered. The checklist is referred to in the present paper at various points and some discrepancies from the checklist are pointed out. The checklist itself will be made available by RD on ResearchGate once he has finished compiling a list of corrections (many of which could/should have been dealt with at the proof stage) and updates related to taxonomic progress since April 2019.

This paper is split into two parts and there are two appendices. In Part 1 we list the collecting locations and the 176 species recorded during the fieldwork reported on, with annotations where appropriate, followed by a short discussion. A detailed list of material not published previously (and some that has been published previously) is given in Appendix 1, along with a few additional records (mostly of larvae) that cannot be definitely assigned to any of the taxa in the main list. In the second part some taxonomic issues are touched upon and some simple molecular analyses are included. Appendix 2 contains details of the specimens used in the molecular analyses.

The final draft of this paper was already prepared when the revised classification of Odonata in Bybee et al. (2021) was published. The order in which families are listed here has not been changed to reflect Bybee et al. (2021) merely because of the effort required to renumber the list of species recorded here. For consistency with the taxonomic order used here we have retained *Bornargiolestes* as incertae sedis rather than including it in the Rhipidolestidae as done by Bybee et al. (2021). However, regarding the Rhipidolestidae Bybee et al. (2021: 9) note that “Further work might therefore show that the family should better be divided into two separate subfamilies or even families” and we certainly wonder if *Bornargiolestes* really belongs in the same family as *Rhipidolestes* Ris, 1912.

Part 1: species recorded

Locations

Fig. 1 gives an overview of the locations covered in this report, Fig. 2 shows more detail of most of the locations closest to (and in) Kuching city and Fig. 3 shows more detail of the most southern locations. It should be noted that although Serian is a separate administrative division of Sarawak, the divisional boundary is not available on Google Earth at the time of writing and is not shown in Fig. 1 or Fig. 3.

Kuching Division

K1: Annah Rais area:

a: Sungai Semadang (coordinates at kampung 1.1569N, 110.2649E, ca. 67m a.s.l.) and tributaries downstream of kampung. Relatively large stream, substrate sandy in some parts (especially downstream), rocks and gravel in others, some deep sections,

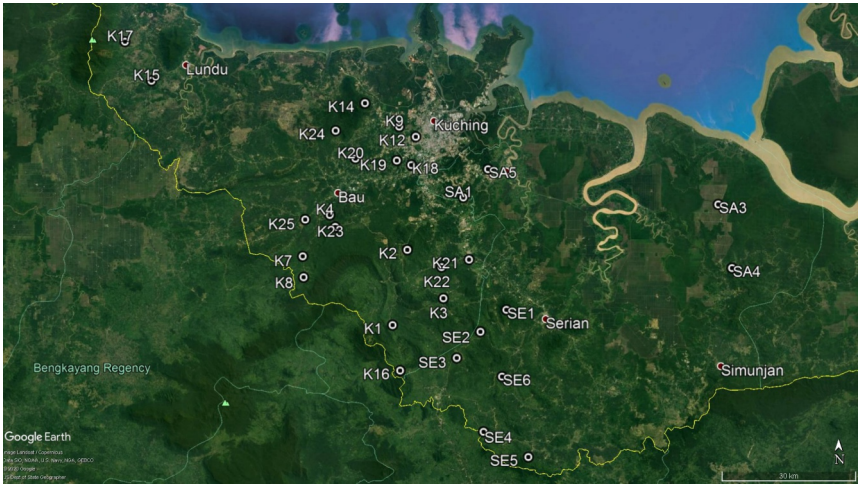


Figure 1. Overview of collecting locations in Kuching, Samarahan and Serian Divisions. Image made using Google Earth. Note that the boundary between Samarahan and Serian Divisions does not yet appear in Google Earth.

Figure 2. Collecting locations closest to Kuching City. Image made using Google Earth.

low gradient, flowing through a typical habitat mosaic with some large open areas. Fig. 4 shows a section of the stream (with RD mid-stream).

b: Tributary of Sungai Semadang at the hot springs and above (coordinates slightly upstream of hot springs 1.1316N, 110.2677E, ca. 71m a.s.l.). Similar characteristics to K1a but stream bed with many large rocks and a higher gradient upstream, and few trees in the same part.

Figure 3. The most southern collecting locations covered in this report. Image made using Google Earth.

Figure 4. Sungai Semadang downstream of Annah Rais, RD midstream. Photo by R. Orenstein.

c: A small stream in disturbed and old second growth forest near Annah Rais, on the road leading to Teng Bukap (coordinates upstream 1.1716N, 110.2744E, 73-95m a.s.l.).

K2: Kampung Benuk.

a: Main stream (coordinates in kampung 1.3059N, 110.2938E, ca. 37-44m a.s.l.). Sand and gravel bed, mostly fairly shallow, low gradient, flowing through a typical habitat mosaic.

b: Shady muddy backwaters to main stream.

c: Major tributary/branch to main stream on right far upstream (coordinates someway upstream of mouth: 1.298N, 110.3063E, ca. 44m a.s.l.) and its tributaries.

d: Along a trail running near to the stream in places.

e: A shady pool near to but not connected to main stream.

K3: Teng Bukap:

a: Main stream (coordinates near entry point: 1.2095N, 110.365E, ca 40m a.s.l.). Sand and gravel bed with limestone blocks in parts, some deep sections, flowing through typical habitat mosaic. A promising site in parts, so far only visited once.

b: Tributary.

K4: Bidi area:

a: Tasik Kunyit (1.3783N, 110.1326E, ca. 45m a.s.l.), a large pond or small lake, with houses and gardens around parts of its perimeter.

b: Streams crossed by and near to trail from Tasik Kunyit, this trail passes through some small farms between limestone hills and eventually reaches a gate with a no entry sign (in three languages). Streams sampled at ca. 60-100m a.s.l.

c: A slightly larger stream reached by following a side track (coordinates near entry point on stream 1.3789N, 110.1409E, ca. 65m a.s.l., Fig. 5). Stream bed mostly rocks and gravel, shallow, surrounded by second growth forest becoming disturbed old growth upstream. Eventually emerging from limestone hill, sampled over ca. 65-85m a.s.l.

d: Small tributaries to K4c.

e: Trailside, small shady pools at base of limestone and ponds.

Figure 5. A stream at Tasik Kunyit. Photo by R.W.J. Ngiam.

f: A pond nearby (1.3848N, 110.137E, ca. 33m a.s.l.). Possibly an old quarry site, quarries are still active in this area.

K5: Stream at Kampung Blimbin (representative coordinates upstream 1.3521N, 110.1216E, sampled from ca. 44–135m a.s.l.). Low gradient at first, but running in a valley on a hillside upstream, rocky with gravel sections, generally shallow, surrounded by typical habitat mosaic.

K6: Kampung Pangkalan Tebang:

a: Main stream (Sungai Pedid, also sometimes known as Sungai Spora, coordinates at entry point: 1.2872N, 110.0923E, ca. 59m a.s.l.), large stream with mostly sand and gravel substrates, some deep sections, running through a typical habitat mosaic. Sampled between ca. 59-70m a.s.l.

b: Tributary stream (coordinates near mouth: 1.2816N, 110.095E, ca. 70m a.s.l.).

c: Pool by side of K6b.

d: Trailside.

K7: Ponds and small stream near to Kampung Pangkalan Tebang:

a: Large pond (1.2929N, 110.0862E, ca. 53m a.s.l.).

b: Muddy mostly open small stream and shady backwater very close to the above.

K8: Kampung Tringgus Bung:

a: Main stream (Sungai Pedid, also sometimes referred to as Sungai Spora, coordinates at kampung: 1.2605N, 110.0925E, ca. 76m a.s.l.), sand, gravel and rock substrate, becoming increasingly rocky upstream, some deep sections, prone to violent spates and flooding around the kampung, running through a typical habitat mosaic, Fig. 6. Sampled between ca. 76-115m a.s.l.

Figure 6. Sungai Pedid upstream of Kampung Tringgus Bung. Photo by R.W.J. Ngiam.

b: Smaller streams in a typical habitat mosaic at the bottom of and in the foothills of the Bungo Range, and trailside in these areas.

c: Along an old logging road in the Bungo Range.

d: Streams in the Bungo Range, below the National Park boundary, reached by following the old logging road, in old growth forest disturbed by logging (Fig. 7 shows part of one of these streams), mostly high gradient and rocky:

i: (1.2458N, 110.1087E, ca. 436-502m a.s.l.).

ii: (1.2416N, 110.1067E, ca. 465m a.s.l. at entry point).

iii: (1.2344N, 110.105E, ca. 461m a.s.l. at entry point).

iv: (1.2379N, 110.1055E, ca. 437m a.s.l. at entry point).

v: (1.2349N, 110.1048E, ca. 447m a.s.l. at entry point).

vi: (1.2326N, 110.1041E, ca. 458m a.s.l. at entry point).

e: Sungai Daan (tributary of Sungai Pedid) and tributaries, rocky stream bed, disturbed old growth and second growth forest:

i: Main stream below confluence of Sungai Daan Kiri and Sungai Daan Kanan (coordinates at mouth of Sungai Daan: 1.2473N, 110.0874E, ca. 115-154m a.s.l.).

ii Tributary below confluence of Sungai Daan Kiri and Sungai Daan Kanan.

iii. Sungai Daan Kanan and tributaries (coordinates at confluence: 1.2454N, 110.093E, ca. 154-208m a.s.l.).

Figure 7. A stream in the Bungo Range, below the National Park boundary. Photo by R. W.J. Ngiam.

f: Pond on hill near kampung (1.2594N, 110.0959E, ca. 100m a.s.l.), small and partly shaded.

g: Pond (probably intermittent) beside Sungai Pedid at kampung.

h: Ulu Pedawan, a stream and tributaries, below the Bungo Range National Park boundary (representative coordinates 1.2573N, 110.1183E, ca. 330-420m a.s.l.), rocky bed. Old growth forest disturbed by logging.

K9: Remnant peat swamp forest near to kampung Paroh (A Malay village beside a branch of the Sarawak River) with a small farm (1.5499N, 110.2769E, ca. 6-17m a.s.l.). This is a part of the same patch of remnant peat swamp forest accessed from the Matang Road reported on in Dow & Reels (2011) and is situated approximately 2.7 km from that site:

a: In forest, including tiny streams.

b: Along a path and small ponds beside the path.

K10: One of the source streams of Sungai Moyan (Sungai Moyan 3), in swampy second growth forest (1.4914N, 110.2493E, ca. 17m a.s.l.), mostly deep water in a deep channel, mud substrate, turbid.

K11: In and around buildings in the E-Mart area, Batu Kawa (coordinates at E-Mart: 1.5065N, 110.2992E, ca. 8-11m a.s.l.).

K12: MJC peat swamp forest (1.5287N, 110.3091E, ca. 6-9m a.s.l.), a small area of disturbed peat swamp forest close to the Sarawak River in the Batu Kawa area, apparently owned by the Mudajaya Corporation (MJC), major developers in the Batu Kawa area:

a: In swamp.

b: Drains along road through swamp and flooded sections of road.

c: Along road by small farms.

K13: At lights at a building (the Segu Bungalow) owned by the Sarawak Museum in a leafy area of central Kuching (1.549N, 110.3483E, ca. 15m a.s.l.).

K14: Mount Matang:

a: Small forest streams crossed by road to the Sri Maha Mariamman Temple (the oldest Hindu temple in Sarawak, often just referred to as Hindu Temple, situated on the slopes of Mount Matang) and trickles beside road (coordinates at carpark 1.591N, 110.2211E, altitude range ca. 60-340m a.s.l.).

b: Slightly larger forest stream crossed by road to Hindu Temple just after junction (with shrine at junction) with trail to and past the site of Vallombrosa, a colonial era bungalow, apparently used by the botanist Beccari for his research. The road up the mountain has now been renamed as the Beccari Discovery Trail. The stream (approximate coordinates 1.5935N, 110.212E, ca. 323m a.s.l. at entry point, sampled downstream from there) is mostly rocky, some sand substrate sections downstream.

c: Trailside on forest trail past site of Vallombrosa (ca. 300-350m).

d: Mostly rocky streams in steep terrain accessed by trail past site of Vallombrosa (coordinates above waterfall on first such stream: 1.5963N, 110.2095E, sampled at ca. 347-400m a.s.l.).

e: By road to Hindu Temple.

f: At bottom of range on a path through highly disturbed kerangas behind kampung Matang.

Figure 8. A pond near the road to Kampung Biawak. Photo by R.W.J. Ngiam.

K15: Pond near the road to Kampung Biawak (1.6418N, 109.7843E, ca. 14m a.s.l.), Fig. 8.

K16: Sungai Kayan upstream of Kampung Tepoi (note that we are unclear about exactly where the divisional boundary between Kuching and Serian is at this location, it is not clear if that shown on Google Earth is completely accurate, but although Kampung Tepoi appears to be treated under Serian for administrative purposes, the stream upstream of the kampung appears to be within Kuching Division):

a: Main stream upstream of kampung (representative coordinates 1.0648N, 110.2837E, sampled between ca. 88-137m a.s.l.), fine gravel and sand, becoming rocky upstream, mostly shallow, flowing through a typical habitat mosaic. Fig. 9.

b: A low gradient tributary upstream of the kampung.

c: A small steep tributary in disturbed old growth forest.

d: An artificial, concrete pond, deserted, mud and leaf litter bottomed, overhung by second growth trees and well vegetated in parts, close to K16a.

e: Trailside.

K17: Kampung Sebako:

a: Sungai Sebako (representative coordinates 1.7268N, 109.7243E, ca. 27m a.s.l.) and tributaries, in a typical habitat mosaic.

b: Small peaty streams in rubber, old second growth, highly degraded forest and oil palm (1.7197N, 109.7313E, ca. 25m a.s.l.).

c: A section of low pH swamp with a stream in shallow valley surrounded by oil palm (1.7193N, 109.7343E, ca. 24m a.s.l.). Unfortunately this site was completely cleared of forest after RD visited it in early 2018.

d: Trailside.

K18: Pond at Kampung Semeba, Batu Kitang area (1.4738N, 110.3013E, ca. 15m a.s.l.).

Figure 9. Sungai Kayan upstream of Kampung Tepoi. Photo by S.G. Butler.

K19: Rantau Panjang area.

a: Drain at edge of disturbed and second growth forest and two pools inside the forest (1.4829N, 110.2773E, ca. 17m a.s.l.). This site was first visited in January 2019, on a second visit in June 2020 (which was not a particularly dry month) both the drain and the pools were completely dry, so clearly water is only present at this location during the wettest parts of the year.

b: Open section of turbid stream running into and out of tangled second growth forest and scrub (1.4825N, 110.2759E, ca. 9m a.s.l.).

c: Pond by quiet road, water from 0.7-1.5m deep, steep sided with much vegetation on the banks, shaded in one corner (1.4829N, 110.2726E, ca. 12m a.s.l.).

d. Semi-shaded section of turbid stream running from tangled second growth forest and scrub (1.4703N, 110.2646E, ca. 10m a.s.l.).

K20: Gunung Singgai area.

a: A large but apparently recently created or expanded pond (1.5055N, 110.1953E, ca. 27m a.s.l.).

b: A pond with a wide margin of thick floating grass (1.4866N, 110.1904E, ca. 23m a.s.l.).

c: Very steep sided and deep, muddy pond, only sampled very briefly, only one specimen collected (1.5028N, 110.1817N, ca. 40m a.s.l.).

K21: Ponds and shallow marshy areas near start of turning from highway just after Tapah, eventually leading to Kampung Panchor Dayak, sampled briefly and in poor weather conditions (1.2863N, 110.416E, ca. 23m a.s.l.).

a: Deep pond at edge of second growth forest.

b: Shallow marshy pools (presumably intermittent) in cleared area near (a).

K22: Sungai Sirin at kampung Simpok (a large and rather spread out kampung) area.

A stream flowing through a typical habitat mosaic.

a: Sungai Sirin downstream of kampung, mostly soft substrates, much deep water, sampled as far as 1.2704N, 110.3686E, ca. 20-21m a.s.l.

b: Sungai Sirin upstream of main part of kampung, soft substrates with pebbly stretches, some deep areas, sampled as far as 1.2664N, 110.3407E, ca. 22-42m a.s.l.

c: Sungai Sirin inside main part of kampung, long shallow pebble bottomed stretch, upstream of that mostly soft substrates and a number of deep sections, (1.2714N, 110.3614E, ca. 22m a.s.l.).

d: A small tributary to b.

K23: Kampung Pauk area.

a: Sungai Pauk upstream of kampung (representative coordinates 1.3483N, 110.1454E, ca. 51-65m a.s.l), mixed substrates. Typical habitat mosaic.

b: Small seepage at K23a, entirely in second growth forest.

c: Sungai Pauk far upstream from Kampung, upstream of water pipe (representative coordinates at mouths of K23d tributaries 1.3506N, 110.1373E, ca. 93m a.s.l.). In this area the stream is surrounded by rather homogenous, fairly old, second growth forest.

d: Small high gradient tributaries at K23c.

e: Path near Sungai Pauk.

K24: Sungai Segong at and upstream of Adis Buan Resort, Fig. 10.

a: Main stream, sampled from the resort (1.5427N, 110.1513E, ca. 58m a.s.l.) to (1.559N, 110.1665E, ca. 104m a.s.l.), deep in parts, mostly rocks and gravel with some sandy sections. Surrounded by kerangas forest, a typical habitat mosaic in the lower part but the forest gradually changes until it is all old growth, albeit disturbed, with the degree of disturbance reducing as one proceeds upstream.

Figure 10. Sungai Segong upstream of the Adis Buan Resort. Photo by S.G. Butler.

b: Small peaty tributaries in disturbed kerangas forest, in some cases reduced to a series of pools at the time of sampling.

c: Slightly larger tributary (1.5491N, 110.1573E, ca. 63m a.s.l. at mouth), sampling abandoned after RD was attacked by large and very aggressive wasps.

d: A tributary system far upstream on right hand side.

e: A tributary system far upstream (possibly within Kubah National Park) on the left hand side, disturbed old growth forest (coordinates upstream 1.5611N, 110.1644E, ca. 115m a.s.l.).

f: Trailside near Sungai Segong.

g: In forest between trail and stream.

K25: Sungai Noren:

a: Main stream (sampled from slightly downstream of 1.3668N, 110.0906E to 1.3647 N, 110.08012E, ca. 31–41m a.s.l.), mostly sand substrates with some limestone blocks in places and gravel sections, deep in places, typical habitat mosaic.

b: Trail through oil palm and second growth forest.

K26: Paku Hot Springs near to Siniawan, a potentially interesting location, to date sampled only briefly in the late afternoon (1.4185N, 110.1986E, ca. 28m a.s.l.):

a: In degraded/secondary freshwater swamp forest between small limestone outcrops.

b: Small stream running along edge of freshwater swamp forest.

c: Marshy open areas.

K27: Sungai Merah (we have also seen this stream referred to as Sungai Cina), a stream originating in the Matang Rang and crossed by Matang Road not far before the turning to Kubah National Park, with a small recreational park by the road. Results reported here are from downstream of the bridge, the stream runs through disturbed and second growth forest, with rock and pebble substrates, becoming increasingly sedimentary downstream, eventually under tidal influence (no Odonata found in the tidally influenced part to-date). (Representative coordinates for section sampled in 2020: 1.6066N, 110.2274E, ca, 21m a.s.l.).

Bungo Range National Park (within Kuching Division)

BR1: A stream accessed by an old logging road from the Kampung Tringgus area, just inside the NP boundary, disturbed old growth forest (coordinates at boundary 1.2428N, 110.1101E, ca. 565m a.s.l.).

BR2: Two small, shallow, mostly rocky streams at ca. 730–780m a.s.l. on the far side of the range from Kampung Tringgus, coordinates on first stream 1.2398N, 110.1142E. The forest here is a pristine kerangas formation of a type more often seen at higher altitudes.

BR3: In forest in the BR2 area.

BR4: Small stream at the National Park boundary in the Sungai Pedaun area (coordinates at boundary 1.2558N, 110.1183E, ca. 435m a.s.l.).

Samarahan Division

SA1: A patch of old second growth forest with some original forest (on private land) near an air force base (1.4096N, 110.4046E, ca. 13m a.s.l.):

a: Deep stream with mostly mud substrate, turbid.

b: Trailside, in forest and at small pools.

SA2: Ponds and marshy areas on the other side of the road from SA1 (1.4104N, 110.4038E, ca. 13m a.s.l.):

a: Ponds.

b: Shallow marshy pools.

SA3: Oil palm plantation adjacent to Ulu Sebuyau National Park:

a: Ditches, drains and ponds in and beside oil palm, and along roads through oil palm (representative coordinates 1.3958N, 110.9115E, ca. 19m a.s.l.).

b: Path through degraded forest just outside Ulu Sebuyau National Park (1.3579N, 110.9391E, ca. 18m a.s.l.).

c: At buildings (1.2791N, 110.9118E, ca. 40m a.s.l.).

SA4: Hills in Ulu Sebuyau area:

a: Stream, name not known, mostly rocky, in typical habitat mosaic, then disturbed (by old logging activities) old growth forest upstream, sampled from 1.2693N, 110.9382E to 1.2608N, 110.9402E, ca. 73–175m a.s.l.

b: Sungai Kepayang (coordinates near road 1.2771N, 110.9481E, ca. 45m a.s.l.), similar habitat to SA4a.

c: Trailside and small ponds at SA4a.

SA5: Disturbed peat swamp forest at the old Universti Malaysia Sarawak (UNIMAS) campus (1.4657N, 110.4536E, ca. 19m a.s.l.).

Serian Division

SE1: Streams on Gunung Sadong accessed from Kampung Tarat Mawang:

a: Stream system below waterfall very near kampung, and a tributary (representative coordinates 1.1954N, 110.5129E, ca. 137m a.s.l.), typical habitat mosaic.

b: Streams higher up on mountain (representative coordinates 1.1884N, 110.4901E, ca. 425m a.s.l.), disturbed old growth and old second growth forest.

c: Trailside.

SE2: An agricultural area at foot of limestone hills, between Tebedu and Serian (representative coordinates 1.1418N, 110.4384E, ca. 63m a.s.l.):

a: Ponds (Fig. 11) and ditches.

b: Clear running streams, sand and gravel substrates, with some trees on the banks.

c: A swampy stream head at the base of limestone.

d: A small pond in second growth forest.

e: Trailside.

SE3: Sungai Kayan (many deep sections in this part, sand and gravel substrates with some rocky sections, typical habitat mosaic):

a: Upstream of Tebedu-Serian road, far downstream of Kampung Sungan (representative coordinates 1.0766N, 110.3701E, ca. 47m a.s.l.).

b: At and upstream of Kampung Sungan (representative coordinates 1.0761N, 110.3655E, ca. 60m a.s.l.).

Figure 11. A large pond at the bottom of limestone hills between Tebedu and Serian. Photo by R.W.J. Ngiam.

c: A tributary upstream of Kampung Sungan.

d: Downstream of Kampung Tepoi (representative coordinates 1.0588N, 110.3111E, ca. 84m a.s.l.).

SE4: Sungai Ruben (shown as Sungai Robin in some sources).

a: Main stream upstream of kampung, mostly rocks and gravel substrate, sampled between 0.9448N, 110.4447E and ca 0.9404N, 110.4423E, ca. 89–110m a.s.l.

b: Trailside.

SE5: Sungai Ahi upstream of Kampung Bunan Gega.

a: Main stream, fast flowing and clear, rocky substrate, typical habitat mosaic with lower part open for large stretches, some oil palm in places even in the upper part (sampled between 0.9054N, 110.5389E and 0.8927N, 110.5341E, ca. 67–126m a.s.l.).

b: Right hand (going upstream) branch, running from mountain, much old growth forest after first few hundred metres (representative coordinates 0.8812N, 110.5301E, ca. 252m a.s.l.).

c: Small tributaries to SE5a.

d: Muddy pools along a 4WD track running approximately parallel to Sungai Ahi for most of its length.

e: Small pond near track.

SE6: Sungai Bingara, a tributary of Sungai Kayan in the Tabekang area, entering Sungai Kayan well downstream of the sampled points but upstream from Tabekang), typical habitat mosaic, sand and rocks, many deep sections even during drought:

a: Main stream (coordinates near bridge 1.0542N, 110.4812E, ca. 32m a.s.l.).

b: Tributaries.

List of species recorded

See Appendix 1 for detailed specimen records.

Zygoptera

Lestidae

1. *Orolestes wallacei* (Kirby, 1889)

K19a.

Platystictidae

2. *Drepanosticta attala* Lieftinck, 1934

Once poorly known, this now appears to be a relatively common species, occurring at low densities on larger, lower gradient streams than most of the Bornean Platystictidae, and clearly tolerant of disturbance to the forest surrounding these streams.

K1a, K1b, K2a, K8a, K24f, K24g, SE3b, SE3d, SE5a.

3. *Drepanosticta* sp. cf *crenitis* Lieftinck, 1933

K4c, K8div, K8h, K14d, K23d, SE1a, SE1c.

4. *Drepanosticta drusilla* Lieftinck, 1934

This is probably the scarcest member of the Platystictidae known from southwestern Sarawak. To our knowledge five specimens (Lieftinck 1934, Dow 2012b, Dow & Orr 2012) had been reported prior to this (plus one photographic record). Its habitat requirements have not been well understood, but observations made during this study go some way to rectifying this. At location 16a, far upstream, two males were collected. At this section of the stream the gradient increases and large boulders are present in the stream bed and the stream runs in a steep valley with much original (albeit disturbed) forest on the slopes. The males were found perched 1-2 m above the ground, sitting back 2-4m from the stream near a rough trail adjacent to a relatively low gradient section of the stream. At Sungai Segong on 16.iv.2019 RD's attention was caught by long-bodied teneral platystictids at two shaded sections of the stream. These flew from shallow fast flowing sections with rocks and gravel, over several metres, through the shade over a flat, rocky "beach" to perch at 1.5–2.5m above the stream on vegetation on the bank. One was netted and revealed to be *Drepanosticta drusilla*. These individuals were conspicuous because of their long flight from the water's edge over the beach, so it may be that individuals emerging from sections where the water's edge was right at the stream bank were overlooked. Two days later mature males were found perched in two places on trails running close to the stream bank, and again on 3.v.2019 (when only one was collected but several were seen). It appears likely that this species breeds in fast flowing water in shady, low gradient sections of clear streams in lowland forest but once emerged spends most of its time hanging back several metres or more from the stream where it is only likely to be found if a path passes through the spot. The mature female from 16e was above a section of the main stream without many rocks (gravel and sand substrates). This might indicate that the species can use a broader range of substrates but the individual may have simply come from further upstream to forage. The tiny, shady tributary over which this female was perched was grossly polluted (fed by drains running directly from a

Figure 12. Male of *Drepanosticta drusilla* in hand at Sungai Segong. Photo by R. Orenstein.

settlement a very short distance away) and its presence at that tributary is not likely to have been anything but coincidental. Fig. 12 shows a male collected at Sungai Segong.

K16a, K16e, K24a, K24f, SE5b.

5. *Drepanosticta* cf *forficula* Kimmins, 1936

K4d, BR2, BR3.

6. *Drepanosticta kosterini* Dow, 2017

This species was described from Gunung Penrissen (Dow 2017) and it is not surprising to find it in the Bungo Range. What is interesting is that on Gunung Penrissen the species has not yet been found below ca. 750m a.s.l. but in the Bungo Range it has been found as low as ca. 180m a.s.l. at Sungai Daan.

K8di, K8dii, K8dv, K8dvi, K8eiii, K8h.

7. *Drepanosticta rufostigma* (Selys, 1886)

K1a, K1c, K3b, K4b, K4c, K5, K6, K8b, K8dii, K8diii, K8dv, K8dvi, K8eiii, K8h, K14a, K14b, K14d, K16b, K16c, K16e, K22b, K22d, K23a, K23c, K24d, SA4a, SE1a, SE1b, SE2c, SE3c, SE4a, SE5a, SE5b, SE5c.

8. *Drepanosticta versicolor* (Laidlaw, 1913)

K8b, K8div, K8eii, K14d.

9. *Telosticta bidayuh* Dow & Orr, 2012

This species now appears to be locally common in a large part of southwest Sarawak. At most locations it occurs at fairly high to high gradient streams but in the Tasik Kunyit area it occurs on small very low gradient streams as well.

K4b, K4d, K5, K8b, K8di, K8dii, K8div, K8dv, K8dvi, K8eii, K8h, K14a, K14d, K16a, K16c, BR1, SA4a, SE1a, SE1b.

10. *Telosticta dupophila* (Lieftinck, 1933)
K8b, K24b.

11. *Telosticta serapi* Dow & Orr, 2012
K14a, K14b, K14d.

12. *Telosticta* new species

This is the same *Telosticta* species reported from Gunung Penrissen in Dow, Butler & Reels (2016). In the Bungo Range it has so far only been found around two small streams above 700m a.s.l. in a montane kerangas forest formation on the far side of the range from Kampung Tringgus. A description is in preparation.

BR2, BR3.

Argiolestidae

13. *Podolestes chrysopus* Selys, 1889

The scarcest *Podolestes* species reported here, now listed as Endangered on the IUCN Red List. Unfortunately the location reported here has already been drained and converted to oil palm plantation.

K17c.

14. *Podolestes harrissoni* Lieftinck, 1953

Although this is the most common of the peat swamp forest specialist *Podolestes* species in Sarawak, suitable habitat for it is still clearly declining and none of the locations reported here is protected or likely to survive in the long term.

K9a, K12a, SA5.

15. *Podolestes orientalis* Selys, 1862

This species was present at location K19a both when the site was wet and when it was completely dry.

K4c, K4e, K9a, K12a, K16a, K17b, K19a, K23a, K24a, K24b, SA1b.

Calopterygidae

16. *Neurobasis longipes* Hagen, 1887

For many years the only location in Kuching Division where we had found this species was at Annah Rais (K1) but during this study it was found at numerous other locations in the division. Interestingly it is a common species at Sungai Segong but has never been found at the Sungai Rayu at the Matang Wildlife Centre, a similar stream in some respects, running from the same hill range as Sungai Segong.

K1b, K2a, K2c, K3a, K6a, K8a, K16a, K16b, K22b, K23a, K24a, K25a, SA4b, SE3a, SE3b, SE3d, SE4a, SE5a.

17. *Vestalis amaryllis* Lieftinck, 1965
K1b, K1c, K2c, K4b, K4c, K5, K14a, K14b, K14d, K17b, K22d, K24b, K24d, K24e.

18. *Vestalis* sp. cf *amnicola* Lieftinck, 1965
K4c, K8b, K8dii, K8diii, BR4, SE1a, SE1b, SE5b.

19. *Vestalis amoena* Hagen in Selys, 1853

A very common species on low gradient streams in the typical habitat mosaic in southwestern Sarawak.

K1a, K2a, K2c, K3a, K3b, K4b, K4e, K5, K6a, K6b, K8a, K8eiii, K16a, K17a, K22a, K22b, K23a, K23c, K24a, K24e, K25a, SA4b, SE3a, SE3b, SE3c, SE3d, SE4a, SE5a, SE5c, SE6a, SE6b.

20. *Vestalis atropha* Lieftinck, 1965

K1a, K1b, K1c, K2a, K2c, K6a, K8ei, K8h, K16a, K16b, K24a, SA4a, SA4b, SE1a, SE4a, SE5a.

21. *Vestalis beryllae* Laidlaw, 1915

To date the only locations known for this species in the southwest are on Gunung Penrissen and now the Bungo Range. However it is moderately common in the deep interior of Sarawak.

K8c, K8di.

Chlorocyphidae

22. *Heliocypha biseriata* (Selys, 1859)

This is by far the most common chlorocyphid outside of swamp forest in the lowlands of Sarawak.

K1a, K1b, K1c, K2a, K2c, K3a, K4b, K4c, K5, K6a, K8a, K8ei, K16a, K16b, K17a, K22a, K22b, K23a, K23c, K24a, K25a, K27, SA1a, SA4a, SA4b, SE1a, SE2b, SE3a, SE3b, SE3d, SE4a, SE5a, SE5b, SE6a, SE6b.

23. *Libellago aurantiaca* (Selys, 1859)

K24a.

24. *Libellago hyalina* (Selys, 1859)

K9a, K10, K17b, K17c, K19d, K26b, SA1a, SA3a.

25. *Libellago semiopaca* (Selys, 1873)

We typically found this species perched on logs and larger pieces of dead wood where the females oviposit. At Sungai Pedid upstream of Kampung Pangkalan Tebang (location K6a), although many logs and large pieces of dead wood are present in the stream, RD also observed males perching on shallow, flat sand banks and females apparently ovipositing into small twigs in shallow water adjacent to such sandbanks.

K1a, K1b, K2a, K6a, K8a, K16a, K22a, K25a, SE3a, SE3b, SE6a.

26. *Libellago stictica* (Selys, 1859)

K1a, K2a, K3a, K6a, K22b, K25a, SE2b, SE3a, SE3b.

27. *Libellago stigmatizans* (Selys, 1859)

This species was previously reported from the same location as listed here (Dow 2012b), which remains the only known site for this species in Borneo to our knowledge. Also see the section on this and the previous species in Part 2 below.

K17a.

28. *Rhinocypha aurofulgens* Laidlaw, 1931

To the authors' knowledge this species has never been recorded west of Batang Ai National Park in Sri Aman Division until now, and is clearly very uncommon in southwest Sarawak. It occurs at very low densities on Sungai Daan at the foot of the Bungo Range.

K8ei.

29. *Rhinocypha cucullata* Selys, 1873

Also uncommon in southwest Sarawak, where it is so far only known from two stream systems descending from the Matang Range (Sungai Rayu and its major tributary Sungai Sendok at the Matang Wildlife Centre and Sungai Segong), and also Sungai Pedid upstream of Pangkalan Tebang, where it appears to be scarce.

K6a, K24a, K24b.

30. *Rhinocypha* cf *spinifer* Laidlaw, 1931
K8c, K8dii.

31. *Sundacypha petiolata* (Selys, 1859)
K14b, K22d, K24c, K24d, K24e.

Devadattidae

32. *Devadatta clavicauda* Dow, Hämäläinen & Stokvis, 2015

A tandem pair collected at SE5c on 22.v.2019 was hanging on a plant stem and was repeatedly approached and almost struck by a male of *Drepanosticta rufostigma* (also collected).

K2c, K8b, K14a, K14b, K14d, K23b, K23c, K24b, K24d, K24e, BR2, SA4a, SE3c, SE5c.

33. *Devadatta podolestoides* Laidlaw, 1934
K1b, K1c, K2c, K4b, K4c, K5, K8di, K8dii, K8diii, K8dv, K8dvi, K8ei, K8eiii, K8h, K14a, K14d, K16c, K23d, SE1a, SE1b, SE5b.

Euphaeidae

34. *Dysphaea dimidiata* Selys, 1853
K1a, K1b, K2a, K2c, K6a, K6b, K8a, K16a, K17a, K22a, K22b, K23a, K24a, K25a, SE3a, SE3d, SE3b, SE6a.

35. *Dysphaea ulu* Hämäläinen, Dow & Stokvis, 2015

Scarce in southwest Sarawak but regularly recorded at larger streams at the foot of the Matang Range (Sungai Segong and Sungai Rayu at the Matang Wildlife Centre).

K8a, K24a.

36. *Euphaea impar* Selys, 1859
K1a, K1b, K1c, K2c, K3a, K4b, K4c, K5, K6a, K6b, K8b, K14b, K14d, K16a, K17a, K17b, K22b, K23a, K23c, K24a, K24c, K24d, K24e, K25a, K27, SA4a, SA4b, SE1a, SE1b, SE3b, SE3c, SE4a, SE5a, SE5b, SE5c, SE6a, SE6b.

37. *Euphaea subcostalis* Selys, 1873
K1b, K4b, K4c, K8c, K8di, K8diii, K8dvi, K8ei, K8h, K14d, K16b, K23c, K24a, SA4a, SE1a, SE1b, SE5a, SE5b.

38. *Euphaea tricolor* Selys, 1859
K1a, K2a, K2c, K3a, K6a, K8a, K8ei, K16a, K22a, K22b, K23a, K24a, K24e, K27, SE3a, SE3b, SE3c, SE4a, SE5a, SE6a.

Philosinidae

39. *Rhinagrion borneense* (Selys, 1886)

The blue markings on the terminal abdominal segments of this species are typically very pale. However in a number of the populations recorded here, including but not confined to those close to the border with Indonesia, these markings are a deeper blue. At some locations both types occur. We do not think that the different intensities of blue present are evidence of a second species, but they are an interesting form of variation.

K1a, K2c, K3a, K4b, K4c, K6b, K17a, K17b, K23a, K23c, K24a, K24e, K27, SA4a, SA4b, SE2, SE3b, SE4a, SE6a, SE6b.

Incertae sedis

40. *Bornargiolestes reelsi* Dow, 2014

K8div, K8h, K14c, K14d.

Platycnemididae

41. *Coeliccia cyaneothorax* Kimmins, 1936

Not common in southwest Sarawak.

K8a, K16a.

42. *Coeliccia flavostriata* Laidlaw, 1918

Once considered to be a scarce species, but actually common in southwest Sarawak.
K1c, K4b, K4c, K5, K8b, K8c, K8di, K8dii, K8diii, K8div, K8dv, K8dvi, K8eii, K8eiii, K8h, K14a, K14d, K16c, K23d, BR1, SA4a, SE1a, SE1b.

43. *Coeliccia matok* Dow, 2016

In contrast to the last, this species is only known from a few locations, although it can be common where it does occur.

SA5.

44. *Coeliccia* sp. cf *nemoricola* Laidlaw, 1912
K8b, K14a, K14d, K14e, BR2.

45. *Coeliccia* nigrohamata Laidlaw, 1918
K1c, K4b, K4d, K4e, K5, K8b, K8c, K8ei, K8eiii, K14a, K14b, K14d, K22d, K23a, K23c, K24b, K24d, K26a, SA4a, SE5a, SE5b, SE5c.

46. *Copera vittata* (Selys, 1863)
K2e, K4e, K8ei, K9a, K10, K12a, K17a, K17b, K19a, K23a, K24a, K24b, K26a, K27, SA1b, SE2c, SE4a.

47. *Elattoneura analis* (Selys, 1860)
K2a, K2c, K4b, K4c, K4e, K5, K6a, K6b, K22b, K23a, K23c, K24e, SA4a, SA4b, SE2b, SE3c, SE5a, SE5c, SE6a, SE6b.

48. *Elattoneura aurantiaca* (Selys, 1886)
K17b, K17c.

49. *Onychargia atrocyana* Selys, 1865
K11, K12a, K19b, SA3b.

50. *Prodasineura collaris* (Selys, 1860)

Although widespread, this is not a common species in Sarawak.

K17a, K17b.

51. *Prodasineura dorsalis* (Selys, 1860)
K4b, K4d, K8b, K9a, K14a, K14b, K17b, K22d, K23a, K24b, K24d, K24f, SA4a, SA4b, SE1a, SE5a, SE5c.

52. *Prodasineura haematosoma* Lieftinck, 1937
K4b, K8b, K8c, K8eii, K8eiii, K23a, SE2c, SE3c, SE5a, SE5b, SE5c.

53. *Prodasineura hosei* (Laidlaw, 1913)
K23a, K23c, K24a, K24d, K24e.

54. *Prodasineura* sp. cf *interrupta* (Selys, 1860)

This is the species that has been recorded as *Prodasineura interrupta* from Borneo, but it has anal appendages clearly distinct from the true *interrupta* which occurs in Belitung, southern Peninsular Malaysia, Singapore and Sumatra.

K17b, K17c.

55. *Prodasineura notostigma* (Selys, 1860)
K14b, K17b, K24b, K24d, SA4b.

56. *Prodasineura tenebricosa* Lieftinck, 1937

This species, first described from West Kalimantan (Lieftinck 1937) and later reported from Central Kalimantan (Lieftinck 1953b) and East Kalimantan (Dolný et al. 2011), has only been found in Sarawak comparatively recently; it was first found at Gunung Mulu National Park in the northeast in 2007 (Steinhoff et al. 2019) and at a location in Bintulu Division in 2013 (Dow et al. 2019). It had appeared to be a very scarce and local species in Sarawak but over the last few years it has been found at a number of sites in the south-west. In Sarawak it perches in trees high above the water and males, when they do descend, are most often found flying over deep water and are typically extremely wary, however RD has seen very different behaviour from the species in East Kalimantan. At most sites in Sarawak it appears to occur at fairly low densities but it is abundant on the sampled part of Sungai Bingara (Location SE6) where it frequently clashes with *Prodasineura verticalis* which is also common at the site.

K3, K6a, K22a, SE3a, SE3b, SE6a, SE6b.

57. *Prodasineura verticalis* (Selys, 1860)
K1a, K1b, K2a, K2b, K2c, K3a, K3b, K4b, K4f, K6a, K6b, K8a, K10, K16a, K16b, K17a, K19d, K22a, K22b, K23a, K24a, K25a, K26b, K27, SA1a, SA1b, SA4b, SE2b, SE3a, SE3b, SE3c, SE4a, SE5a, SE6a.

58. *Pseudocopera ciliata* (Selys, 1863)

As with *Libellago stigmatizans*, the Kampung Sebako area remains the only known location (to the authors' knowledge) in Borneo for this species.

K17b.

Coenagrionidae

59. *Aciagrion borneense* Ris, 1911
K4e, K7a, K15, K18, K19c, K20b, K21a, SA2b, SA3a, SA4c.

60. *Agriocnemis femina* (Brauer, 1868)
K7a, K11, K12b, K19b, K19d, SA3a.

61. *Agriocnemis minima* Selys, 1877
K15, K17b, SA3a.

62. *Agriocnemis pygmaea* (Rambur, 1842)

This species has seldom been recorded in Borneo, but is likely to be over-looked.

SE2a.

63. *Amphicnemis annae* Lieftinck, 1940
SA5.

64. *Amphicnemis madelenae* Laidlaw, 1913

One of the scarcest *Amphicnemis* (now with a Critically Endangered IUCN Red List assessment), the location reported here is approximately 2.7 km from that reported in Dow & Reels (2011), on the other side of the same chunk of remnant, unprotected peat swamp forest. Unfortunately it is unlikely that the forest in this area will survive in the long-term and no other location is currently known for this species.

K9a.

65. *Amphicnemis martini*-group
K9a, K17b, K17c, SA5.

66. *Amphicnemis rigiketit* Dow, 2019

This species was discovered at one location in Samarahan Division in early 2018 (see Dow 2019b) and has yet to be found anywhere else. It is listed as *Amphicnemis* new sp. cf *remiger* Laidlaw, 1912 in Dow (2021). This may already be a highly threatened species.

SA1b.

67. *Amphicnemis wallacii* Selys, 1863
K9a, K10, K11, K12a, K17b, SA3c, SA5.

68. *Archibasis melanocyana* (Selys, 1877)
SA5.

69. *Archibasis tenella* Lieftinck, 1949
K4c, K6b, K17b, K23a, K24a, K24c, K24d, SA4b, SE3a, SE6b.

70. *Archibasis viola* Lieftinck, 1949
K9a, K17b, K17c, K19a, SA5, SE2a.

71. *Argiocnemis* sp.
K2e, K4e, K6c, K8c, K8ei, K16d, K17a, K24b, SE5a, SE6b.

72. *Ceriagrion bellona* Laidlaw, 1915

Although the holotype is from Mount Matang (K14), this species has not been found there again and is not common in southwest Sarawak.

K8c, K16d.

73. *Ceriagrion cerinorubellum* (Brauer, 1865)
K4c, K4f, K7a, K8f, K9b, K11, K12b, K14f, K15, K16d, K17b, K17c, K18, K19c, K19d, K20a, K20b, K23a, K27, SA1b, SA2a, SA3a, SE2a, SE2d, SE3a.

74. *Ischnura senegalensis* (Rambur, 1842)
K7a, K11, K15, K19c, K20a, K21b.

75. *Mortonagrion indraneil* Dow, 2011
K9a, K12a, SA5.

76. *Pericnemis dowi* Orr & Hämäläinen, 2013
SA4a.

77. *Pericnemis stictica* Hagen in Selys, 1863

Fig. 13 shows a male collected at Annah Rais.
K1a, SA1b.

78. *Pseudagrion coomansi* Lieftinck, 1937
K17b.

79. *Pseudagrion lalakense* Orr & van Tol, 2001
K8g, K16d, SE2a, SE6a.

80. *Pseudagrion microcephalum* (Rambur, 1842)
K4a, K4e, K4f, K7a, K10, K11, K12b, K15, K19c, K19d, K20a, K23a, K26b, K27, SA2a, SA3a, SE2a, SE2b, SE3a.

81. *Pseudagrion perfuscatum* Lieftinck, 1937

This species is normally found at the grassy banks of open sections of streams where it perches on grasses. However, a male collected at location K6a in August 2019 was found in atypical habitat, in a section of the stream which although sunlit had no grassy bank. It was observed flying low and very actively before perching on a leaf balanced on a submerged rock.

Figure 13. Male of *Pericnemis stictica* in hand at Sungai Semadang, Annah Rais. Photo by R. Orenstein.

K1a, K1b, K2a, K6a, K7b, K8a, K10, K16a, K16b, K19d, K22a, K22b, K23a, K27, SA1a, SA4b, SE2b, SE3a, SE3b, SE3d, SE4a, SE5a.

82. *Stenagrion dubium* (Laidlaw, 1912)
K4b, K4d, K5, K8a, K8c, K8di, K8dii, K8dv, K8eiii, K14a, K14b, K14d, K16a, K23a. K24e, BR1, SA4a, SE1a.

83. *Teinobasis ruficollis* (Selys, 1877)
K12a.

84. *Xiphiagrion cyanomelas* Selys, 1876
K15, K16d.

Anisoptera

Aeshnidae

85. *Anax ?guttatus* (Burmeister, 1839)

A single female, identification uncertain.

K1b.

86. *Gynacantha maclachlani* Krüger, 1899

Several female *Gynacantha* from two locations that had remained unidentified until very recently are identical to females from a series of both sexes of the poorly known *G. maclachlani* collected together at a protected area in Kuching Division in March 2021. This is the first record of *G. maclachlani* published from Sarawak, however it may well be that other unidentified female *Gynacantha* specimens collected in the state include *G. maclachlani*, unfortunately such material in collection RD is currently inaccessible to RD (because in storage in England) so cannot be checked at present. More generally there is a need for a critical review of all records of this species and its close allies such as *G. dohrni* Krüger, 1899.

K11, K14c.

87. *Heliaeschna idae* (Brauer, 1865)
SA3c.

88. *Heliaeschna simplicia* (Karsch, 1891)
K11.

89. *Indaeschna grubaueri* (Förster, 1904)
K4c, K8c, K16a.

90. *Oligoaeschna foliacea* Lieftinck, 1968

This appears to be the most common *Oligoaeschna* species in Sarawak but is still only occasionally recorded. It is most often found in or in the vicinity of peat swamp forest but certainly occurs in a wider variety of swampy forest habitats. The single male reported here was found at lights in the early evening on the veranda of a building belonging to the Sarawak Museum, situated in a leafy part of central Kuching. It is not known if the breeding habitat was nearby or if the specimen originated from one of the remnants of swamp forest in the immediate surrounds of Kuching.

K13.

91. *Tetracanthagyna* cf *degorsi* Martin, 1895
K16a, K22b, K23a, K24a/b.

Gomphidae

92. *Acrogomphus* sp.

K4b, K16a, K22b, K23a, K24a/b.

93. *Burmagomphus arthuri* Lieftinck, 1953

A female collected at Sungai Pedid (location K6a) was found flying in shade under hanging branches in a sunny part of the stream. The water was shallow where it was flying and the substrate was sandy at the spot but generally rocky in the same section of the stream. A number of teneral individuals have been collected from relatively deep, steep-banked sections of Sungai Sirin, with mostly soft substrates.

K6a, K22b, SE3b.

94. *Burmagomphus insularis* Laidlaw, 1914

This species has seldom been recorded, but was originally described from a male from an unspecified location in Sarawak (Laidlaw 1914) and in Sarawak the only other records until now were from the Lanjak Entimau Wildlife Sanctuary (see Dow et al. 2018 and Norma-Rashid et al. 2010). Found perching low on rocks or on sandbanks near the water's edge in or at the edge of sunspots. Fig. 14 shows a male collected at Annah Rais.

K1a, K6a, K16a.

Figure 14. Male of *Burmagomphus insularis* in hand at Sungai Semadang, Annah Rais. Photo by R. Orenstein.

95. *Burmagomphus plagiatus* Lieftinck, 1964

The first record of this species from Sarawak was made during this study. It is otherwise known from a relatively small number of locations scattered across Kalimantan, Sumatra and Peninsular Malaysia and also possibly Singapore. A single teneral male was found perched on grasses on a mud/sand bank in a soft substrate section of Sungai Sirin.

K22b.

96. *Gomphidia abbotti* Williamson, 1907

Not recorded from Borneo under this name before (listed as *Gomphidia caesarea* Lieftinck, 1929 in Dow (2021)) but see the section on *Gomphidia* in Part 2 below. Possibly seen at K2a in addition to the locations listed below.

K1a, K16a, SE3b, SE3d.

97. *Gomphidia maclachlani* Selys, 1873

Although this is generally the commonest *Gomphidia* species in Sarawak it was not found often during these surveys. However at Sungai Segong (K24) at least two males were seen on 2.iii.2019 at a very slow and relatively deep part of the stream, probable females were seen at fast flowing sections far upstream on two subsequent visits and on 3.v.2019 males were seen at multiple locations on the stream. Also see the section on *Gomphidia* in Part 2 below.

K2a, K22b, K24a, SE5a.

98. *Heliogomphus* sp. cf *blandulus* Lieftinck, 1929

K6a, K14d, K24e.

99. *Heliogomphus* borneensis Lieftinck, 1964

K14e.

100. *Heliogomphus* sp. cf olivaceus Lieftinck, 1961

K22b.

101. Ictinogomphus decoratus melaenops (Selys, 1858)

K1a, K4e, K7a, K14e, K15, K16d, K19b, K19c, K20b, K22b, K23a, K24a, K26b, K27, SA3a, SA3b, SA4b, SE2a, SE3b, SE3d, SE5a.

102. *Leptogomphus* coomansi Laidlaw, 1936

A female of this species from location 24a was collected while ovipositing (eggs were still emerging from its body when removed from the net) between rocks into shallow, fast-flowing water in a broad, sunlit and at the time very hot section of the stream. A few passes were made at each spot before moving rapidly to the next. The (mature) male caught at location SE5a on 9.xi.2018 was perched on low vegetation several metres back from the stream in the afternoon and would not have been seen if RD had not been cutting off a loop of the stream by walking through the forest. Similarly the (mature) male collected at K24f on 16.iv.2019 was perched on waist high vegetation in the afternoon, beside the trail in a section where the trail was only a few metres from the stream.

K1a, K8c, K14c, K14e, K23a, K24a, K24f, SA4b, SE5.

103. *Leptogomphus sii* Dow, Stokvis & Ngiam, 2017

K1a, SE5a.

104. *Leptogomphus* sp. cf *williamsoni* Laidlaw, 1912

K14d, K16a, SE1b.

105. *Macrogomphus decemlineatus* Selys, 1878

K17c.

106. *Macrogomphus albardae* Selys, 1878

Not uncommon on some of the streams surveyed, and at times almost abundant on Sungai

Sirin. Most often seen before 11am, males typically fly low and fast but hover over or just upstream or downstream of riffle sections. Also see the section on *Macrogomphus* in Part 2 below. This species was listed under *M. parallelogramma* (Burmeister, 1839) in Dow (2021). The cover photo to this report shows a male collected at Annah Rais.

K1a, K22b, K25a, SE3b, SE6a.

107. *Macrogomphus* quadratus Selys, 1878

K4e, K8c, K16a, K23a, K24a/b, SE2e.

108. *Megalogomphus borneensis* (Laidlaw, 1914)

The status of this species was revised in Dow & Price (2020), it is listed as *Megalogomphus* sp. A in Dow (2021).

K22b, SE3d.

109. *Megalogomphus buddi* Dow & Price, 2020

Listed as *Megalogomphus* sp. B in Dow (2021).

K1a, K6a, K22b, SE3d.

110. *Microgomphus* chelifer Selys, 1858

K2a, K4c, K22b, SE3b.

111. *Microgomphus* species

K8a, K16a, SE3a, SE6a.

112. *Onychogomphus* sensu latu sp. A

An exuvia found at the side of Sungai Sirin belongs to an *Onychogomphus* sensu latu species and is thought to be from a species group distinct from the next. The exuvia is very similar to the larva of the recently described *Onychogomphus* (*Siriusonychogomphus*) *louissiriusi* Fleck, 2020, known from Thailand and considered by Fleck (2020) to be possibly allied to *Onychogomphus marijanmatoki* Dow, 2014, at present known with certainty only from Gunong Mulu National Park in Sarawak. In the absence of adult specimens it is not possible to be sure if the species at Sungai Sirin is *O. marijanmatoki* or something else.

K22b.

113. *Onychogomphus* sensu latu sp. B

A single female collected at Sungai Kayan upstream of Kampung Tepoi, this specimen is discussed further in Part 2 of this report and was listed under *Phaenandrogomphus safei* Dow & Luke, 2015 in Dow (2021, see also note 68 in that publication) prior to a thorough examination of the specimen. The individual was perched high and inconspicuously on a twig in the afternoon.

K16a.

Chlorogomphidae

114. *Chlorogomphus* sp. or spp.

Larvae from the Chlorogomphidae have been found at two of the locations covered here, but adults remain elusive.

K16a, K23a.

Macromiidae

115. *Epophthalmia vittigera* (Rambur, 1842)

K4f, K7a, K12b, K23a, SA3b, SE2a.

116. *Macromia arachnomima* Lieftinck, 1953

Seemingly a scarce species in Sarawak, where all records that might refer to it have been of larvae until now, it was treated as *Macromia* sp. cf *arachnomima* in Dow (2021) for this reason. A mature female was collected at Sungai Bingara in May 2019 while apparently ovipositing into a mass of semi-submerged roots besides deep water in heavy shade; this record confirms the presence of the species in Sarawak. A teneral male likely to be of this species was seen at the same location in early September 2019 but flew away before it could be collected. Fig. 15.

K23a, SE6a.

Figure 15. Female of *Macromia arachnomima* in hand at Sungai Bingara. Photo by Smigeo Stephen.

117. *Macromia callisto* Laidlaw, 1922

There are few records of this species from Sarawak but this scarcity may be more apparent than real; the species flies early, is fast-flying and difficult to net and is likely to be under-recorded. A single male has been collected upstream from Kampung Tepoi but other small Macromia, probably also this species, have been seen in the morning at this location on most visits there.

K16a.

118. *Macromia cincta* Rambur, 1842

Caught twice at Sungai Segong (K24), that on 3.v.2019 far upstream in a rocky and fast flowing section, not typical habitat for this species in Borneo. However the individual

collected was caught while flying high over the stream and its behaviour suggested feeding rather than patrolling a territory or searching for females, so perhaps it was only coincidentally at that part of the stream. It was also unusually brightly coloured in life and probably immature.

K7b, K24a.

119. *Macromia cydippe* Laidlaw, 1922

K22b, K23a, K24a, K25a.

120. *Macromia westwoodii* Selys, 1874

K8h, K14d, K14e.

Synthemistidae

121. *Idionyx* sp. cf *yolanda* Selys, 1871

K8diii, K14b, K14e, K14d, K16e.

122. *Macromidia fulva* Laidlaw, 1915

This species was rather common in forest around Sungai Segong (K24) with multiple individuals seen on every visit.

K3a, K8b, K8di, K22b, K24f, SE3b, SE5a.

Libellulidae

123. *Acisoma panorpoides* Rambur, 1842

K4f, K15, K19c, K20a, K26c.

124. *Aethriamanta gracilis* (Brauer, 1878)

K4a, K4f, K7b, K15, K18, K19a, K19c, K20b, SE2a.

125. *Agrionoptera insignis* (Rambur, 1842)

K2e, K12a, K12b, K16a, K19a, K22a, SE3b, SA1b, SA2a, SE2d.

126. *Agrionoptera sexlineata* Selys, 1879

Seen trailside and in forest on every visit to Sungai Segong (K24). Fig. 16 shows a female.

K17b, K24f.

Figure 16. Female of *Agrionoptera sexlineata* Sungai Segong, Annah Rais. Photo by R. Orenstein.

127. *Brachydiplax* chalybea Brauer, 1868

K1a, K2a, K2b, K4f, K7b, K12b, K17b, K18, K19b, K19c, K20a, K20b, K22b, K26b, SA2a, SA3a, SE2a.

128. *Brachydiplax* cf *farinosa* Krüger, 1902

This is *Brachydiplax farinosa* B as defined in Dow, Choong & Ng (2016).

K16d.

129. *Brachygonia oculata* (Brauer, 1878)

K9a, K12a, K12b, K17b, K17c, K24b, SA2a.

130. *Camacinia gigantea* (Brauer, 1867)

This species occurs locally in Sarawak, but can be very abundant where it does occur. The colony at location K16d is a good example: adults of *Camacinia gigantea* far outnumbered those of any other species, including the very common ones, found at this not particularly large pond on each visit by RD.

K16d.

131. *Chalybeothemis fluviatilis* Lieftinck, 1933

K17b.

132. *Cratilla lineata* (Brauer, 1878)

K4e, K25a, K25b, SE5d.

133. *Cratilla metallica* (Brauer, 1878)

K1a, K3a, K4e, K6d, K8c, K8ei, K14a, K14c, K14e, K16a, K24f, K27, SA4a, SE3b, SE4b, SE5d.

134. *Diplacodes trivialis* (Rambur, 1842)

K7a, K11, K14e, K21b, SA2b.

135. *Hydrobasileus croceus* (Brauer, 1867)

Normally considered to be a pond species but frequently seen flying over open sections of streams (at far more locations than at which it was collected), sometimes in tandem.

K24a, SE2a, SE2b.

136. *Lyriothemis biappendiculata* (Selys, 1878)

K8c, K8eii, K22d.

137. *Lyriothemis cleis* Brauer, 1868

K2d, K8c, K8di, K23a, BR1, SE3b.

138. *Lyriothemis magnificata* (Selys, 1878)

One of the scarcest, or at least hardest to find, libellulids occurring in Borneo.

K8c.

139. *Nannophya pygmaea* Rambur, 1842

K7a, K8f, K9b, K12b, K14f, K15, K17b, K17c, K18, K19c, K20a, K20b, K21b, K24a, SA1b, SA2b, SA3a, SE5e.

140. *Nannophyopsis chalcosoma* Lieftinck, 1935

Another very scarce libellulid, a single female was caught at a small pool inside heavily disturbed Peat Swamp Forest.

K9a.

141. *Nesoxenia lineata* (Selys, 1879)

K12a, K12b, K14e, K19a, K27, SA1b.

142. *Neurothemis fluctuans* (Fabricius, 1793)

K2d, K4e, K4f, K7a, K8c, K11, K12b, K14f, K14e, K15, K17a, K17b, K18, K19a, K19c, K20a, K20b, K21a, K24a, K24f, K25b, K27, SA1b, SA2a, SA3a, SE5d, SE5e.

143. *Neurothemis ramburii* (Brauer, 1866)

K2a, K4e, K4f, K8g, K12b, K14e, K16a, K16d, K19d, K26b, K27, SA2b, SE2b, SE5d.

144. *Neurothemis terminata* Ris, 1911

K4e, K8c, K8g, K11, K12b, K14d, K17b, K18, K20a, K22b, K23e, K24f, SE2a, SE2b, SE5a, SE5d.

145. *Onychothemis coccinea* Lieftinck, 1953

This species and the next occur together at many locations, but their abundances relative to one-another are not constant at these locations. For instance at Sungai Kayan upstream of Kampung Tepoi (K16a) only *Onychothemis coccinea* was seen until late March 2019 but then *O. culminicola* was the more common of the two over much of the surveyed portion of the stream.

K1a, K1b, K6a, K8a, K8ei, K16a, K22b, K23a, K24a, SA4b, SE3b, SE3d.

146. *Onychothemis culminicola* Förster, 1904

Fig. 17 shows a male collected at Annah Rais.

K1a, K2a, K16a, K17a, K22a, K22b, K25a, SE3a, SE3b, SE6A.

Figure 17. Male of *Onychothemis culminicola* in hand at Sungai Semadang, Annah Rais. Photo by R. Orenstein.

147. *Orchithemis pruinans* (Selys, 1878)
K9a, K17b, K17c.

148. *Orchithemis pulcherrima* Brauer, 1878
K9a, K8f, K12a, K12b, K17b, SA1b.

149. *Orchithemis xanthosoma* Laidlaw, 1911
K9a, K12a.

150. *Orthetrum chrysis* (Selys, 1891)
K1b, K2b, K4c, K4f, K7a, K12a, K17a, K19a, K19b, K22b, K23a, K24a, K26b, K27, SA4.

151. *Orthetrum glaucum* (Brauer, 1865)
K1b, K2b, K8c, K14e, K21b, SE3d, SE5a.

152. *Orthetrum pruinosum schneideri* Förster, 1903
K2a, K8c, K16a, K16b, K16d, K22b, SA4b.

153. *Orthetrum sabina* (Drury, 1773)
K4e, K7a, K11, K12b, K15, K17d, K18, K19b, K19c, K20a, K22c, K23e, K24a, K27, SA3a, SA4b, SE2b, SE5a.

154. *Orthetrum testaceum* (Burmeister, 1839)
K2a, K2b, K4e, K6a, K11, K14d, K20a, K22b, K23a, K25a, K25b, SA1b, SA3a, SA4b, SE3b, SE3d, SE5d.

155. *Pantala flavescens* (Fabricius, 1798)

This species is far more common in southwest Sarawak than the single record here suggests. It is frequently seen flying over open areas, often far from water, and for instance it is often seen at location K11 or flying over roads in Kuching, and has been seen at location SE5a. However little or no effort is typically made to collect it.

K8c.

156. *Pornothemis serrata* complex Krüger, 1902

It has previously been stated that there are two or even three species currently being treated under the name *Pornothemis serrata* (see for instance the discussion in Dow et al. (2019: 24–25) and Note 81 in Dow (2021)). It now appears that there are indeed three species and the identity of the material reported here is best left open until a revision is completed.

K12a, SA5.

157. *Rhodothemis rufa* (Rambur, 1842)
K4f, K12b, K15, K19c, K20a, K22b, SA3a.

158. *Rhyothemis fulgens* Kirby, 1889
K9a.

159. *Rhyothemis obsolescens* Kirby, 1889
K7b, K9b, K12b, K17b, K19c, K27.

160. *Rhyothemis phyllis* (Sulzer, 1776)
K4e, K12b, K12c, K14e, K17b, K18, K19c, K20a, K20b, SE2a, SA1b, SA3a.

161. *Rhyothemis triangularis* Kirby, 1889
K4f, K7b, K12b, K16a, K16d, K19c, K20b, SA2a, SE2a, SE3b, SE5e.

162. *Risiophlebia dohrni* (Krüger, 1902)
K12a, K17b, SA5.

163. *Tetrathemis flavescens* Kirby, 1889
K12a.

164. *Tetrathemis hyalina* Kirby, 1889
K2b, K2e, K6c, K19a, K19c, K23a, SA1b, SE2a, SE2d, SE5a.

165. *Tholymis tillarga* (Fabricius, 1798)
K11, K19c, K20a, SE2b.

166. *Tramea phaeoneura* Lieftinck, 1953
SA3a.

167. *Tramea transmarina euryale* (Selys, 1878)

A male collected on Sungai Segong on 23.iii.2019 had a dense coating of red mites attached to the sides of its thorax and basal abdominal segments.

K7a, K19c, K24a, SA2a.

168. *Trithemis aurora* (Burmeister, 1839)
K1b, K4b, K4f, K6a, K8a, K21b, SE2a, SE3b.

169. *Trithemis festiva* (Rambur, 1842)
K1a, K1b, K2a, K8a, K8b, K23a, K24a, K27, SE1c, SE3d, SE5a.

170. *Tyriobapta kuekenthali* (Karsch, 1900)
K9b, K12a, K17b, K17c, SA5.

171. *Tyriobapta laidlawi* Ris, 1919

Moderately common on parts of Sungai Segong (K24) and in some of its tributaries.

K24a, K24d.

172. *Tyriobapta torrida* Kirby, 1889
K1c, K2b, K4e, K6c, K8eii, K7b, K17b, K19a, K23a, K24a, K24b, SE2c, SE4a, SE5c.

173. *Urothemis signata* (Rambur, 1842)
K4e, K4f, K7a, K7b, K15, K18, K19c, K20a, K20b, K20c, SA2a, SE2b.

174. *Zygonyx ida errans* Lieftinck, 1953

Males of this species are usually found patrolling fast-flowing sections of rocky streams, however that taken on 3.v.2019 at Sungai Segong (where many males were seen behaving typically) was seemingly patrolling an almost motionless pool section some way upstream from a rapid.

K8a, K24a, SE5a.

175. *Zyxomma obtusum* Albarda, 1881
K11.

176. *Zyxomma petiolatum* Rambur, 1842
K11, K16d, K26b, SA3a.

Discussion

With the records included here, 211 species of Odonata have been recorded from Kuching Division, 90 species from Samarahan Division and 93 species from Serian Division. The figure for Serian Division is higher than that given in Dow (2021) because additional records were made in the division after the last update to the paper was made. The figure for Kuching Division is one higher than that in Dow (2021) because *Gynacantha maclachlani* is recorded for the first time here. From Sarawak's 12 administrative divisions only Miri Division has more species of Odonata recorded than Kuching Division, with at least 216 species recorded at the time Dow (2021) was last updated (more now; Miri Division will be the subject of the next report in this series).

As noted in the introduction, the results presented here demonstrate clearly that kampung lands in southwest Sarawak, still farmed by largely traditional methods, can and often do harbour rich and important odonate faunas. Sungai Kayan (note that there is another Sungai Kayan in southwest Sarawak, west of Bau in Kuching Division, that has not been sampled for Odonata), sampled in several different parts, which has received the most sampling effort of any of the stream systems sampled to date, provides the clearest illustration of this, with 68 species already recorded, including 14 from the Gomphidae. This is more species from the Gomphidae than are known from most protected areas that have been surveyed for Odonata in Sarawak (only Gunong Mulu National Park and the Lanjak Entimau Wildlife Sanctuary have more, with 18 and 19 species respectively; note that one species from the Gomphidae, *Leptogomphus* sp. cf *coomansi* that has been recorded at Gunong Mulu National Park (see Dow et al. 2017) was accidently omitted from Steinhoff et al. 2019) and more species in total than are known from some protected areas (for instance Bako National Park). For instance Kubah National Park and the Matang Wildlife Centre combined have only 9 species from the Gomphidae recorded, while they have 65 and 79 species of Odonata recorded in total respectively to date (101 species combined); each of these locations has received far more collecting effort than Sungai Kayan (updated checklists for both these areas will be published in a future report in this series). Most protected areas in southwest Sarawak consist largely or entirely of hills and mountains, with predominantly steep terrain, and many of the Gomphidae occurring in Sarawak are not found in such landscapes. In contrast, locations such as the sampled parts of Sungai Kayan provide predominantly low gradient habitats. However there are extensive low gradient areas at the Matang Wildlife Centre and also the Samunsam Wildlife Sanctuary (68 species, six Gomphidae). In fact no fewer than 10 members of the Gomphidae reported from streams in kampung lands here have no definite record from any protected area in southwest Sarawak at the time of writing (in some cases larval records only identified to genus from protected areas might actually be one or more of these species): *Burmagomphus insularis*, *Burmagomphus plagiatus*, *Gomphidia abbotti*, *Heliogomphus* sp. cf *blandulus*, *Macrogomphus decemlineatus*, *Macrogomphus albardae*, *Megalogomphus buddi*, *Microgomphus* sp., *Onychogomphus* sensu latu A, *Onychogomphus* sensu latu B.

Of course interesting and/or significant records reported here are not confined to the Gomphidae. In this regard *Drepanosticta drusilla*, *Drepanosticta kosterini* (not previously recorded from anywhere except Gunung Penrissen), *Podolestes chrysopus*, *Libellago stigmatizans*, *Rhinocypha aurofulgens* (recorded from southwest Sarawak for the first time), *Bornargiolestes reelsi*, *Amphicnemis madelenae*, *Amphicnemis rigiketit*, *Gynacantha maclachlani*,

Macromia arachnomima, *Macromia callisto*, *Nannophyopsis chalcosoma* and *Lyriothemis magnificata* stand out in particular.

It has been a source of frustration that very little could be accomplished in southwest Sarawak during 2020 (and so far in 2021) due to the global pandemic, especially since relatively little was accomplished in the latter half of 2019 when RD's time was otherwise engaged. Another source of frustration to-date has been the difficulty of finding usable and affordable boats and boat drivers for sampling on deeper sections of streams in the southwest. In fact, so far RD has only once managed to find a boat plus driver at a price he felt was not extortionate, at Tebakang in Serian Division, however the attempt to sample on Sungai Kayan using this boat was aborted before any results could be obtained when the engine caught fire. There is no doubt that many more interesting discoveries can still be made in the part of Sarawak covered here and it is to be hoped that it will again become feasible to conduct intensive fieldwork in the southwest later in 2021.

Part 2: Taxonomic and molecular part

Materials and methods for the molecular analyses

Specimens

The dataset used for *Libellago* includes 14 specimens, plus outgroup, from Borneo and Peninsular Malaysia (see Table 1 in Appendix 2). The dataset for *Gomphidia* includes 18 specimens (adult and larval), plus two outgroup specimens, from Borneo, China and Peninsular Malaysia (see Table 2 in Appendix 2). The dataset for *Macrogomphus* includes five specimens, plus outgroup, from Borneo, Peninsular Malaysia and China (see Table 3 in Appendix 2). All of these specimens are housed in the collections of the Naturalis Biodiversity Center, Leiden (RMNH). The mitochondrial marker COI was amplified from all of these specimens and the nuclear marker ITS from a subset of the *Libellago* specimens plus outgroup.

The gene trees resulting from Neighbour Joining (NJ) of these sequences, are shown in Figs. 18, 19 (*Libellago*), Fig. 20 (*Gomphidia*) and Fig. 23 (*Macrogomphus*). All sequences (except one, see Table 3 in Appendix 2) have already been uploaded to the BOLD website and can be found there, once they are made public, using the collection codes or BOLD Process IDs listed in Tables 1, 2 and 3 in Appendix 2.

Methods

DNA extraction and amplification. This was carried out as detailed in Dow & Stokvis (2018) and the reader is referred to the relevant section in that publication for details.

Analysis. All the analyses included here are NJ performed as described in Dow & Stokvis (2018) and (for ITS) Dow et al. (2017) and the reader is referred to the relevant sections in those publications for details.

Libellago stictica (Selys, 1859) and *Libellago stigmatizans* (Selys, 1859)

Libellago stictica is endemic to Borneo, *L. stigmatizans* is more widely distributed but in Borneo is (to our knowledge) only known from the surrounds of Kampung Sebako near Sematan in southwest Sarawak. The two species are clearly closely allied but separated by consistent differences in markings. Interestingly, DNA barcoding does not distinguish the

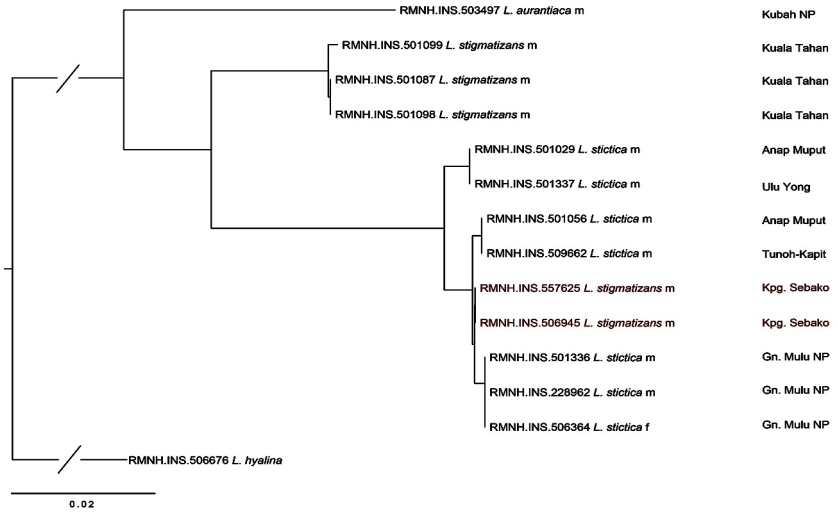


Figure 18. Neighbour joining COI gene tree for *Libellago* species. RMNH collection codes are shown for each specimen, as well as the sex (male is indicated by m and female by f) of the specimen and an indication of where it was collected; the reader is also referred to Table 1 in Appendix 2. The tree is rooted with *Libellago hyalina* as outgroup. Abbreviations: Gn. – Gunong; Kpg. – Kampung; NP – National Park.

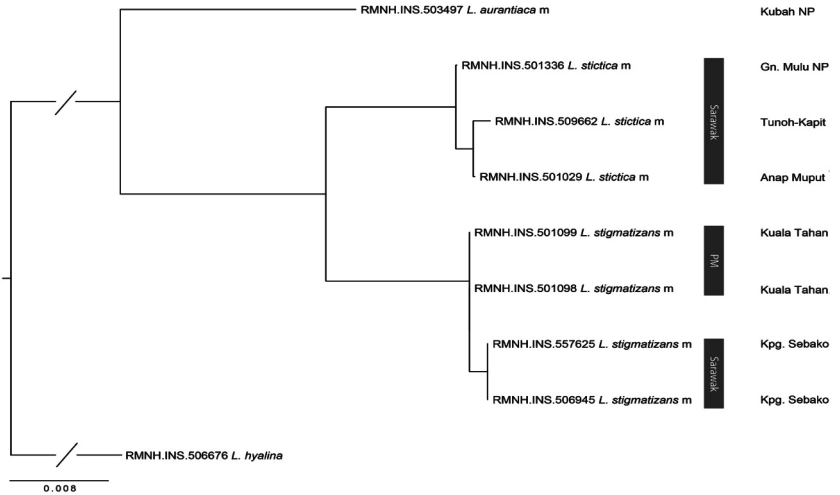


Figure 19. Neighbour joining ITS gene tree for *Libellago* species. RMNH collection codes are shown for each specimen, as well as the sex (male is indicated by m and female by f) of the specimen and an indication of where it was collected; the reader is also referred to Table 1 in Appendix 2. The tree is rooted with *Libellago hyalina* as outgroup. Abbreviations: Gn. – Gunong; Kpg. – Kampung; NP – National Park.

Sarawak population of *L. stigmatizans* from *L. stictica* (see Fig. 18 which shows a neighbour joining COI gene tree for the two species). However this is a case where the ITS marker successfully distinguishes species not distinguished using COI; Fig. 19 shows the ITS gene tree for a smaller (for budgetary reasons) subset of the same sample set of the same two species. Here *L. stigmatizans* from Sarawak and Peninsular Malaysia cluster together separately from *L. stictica*. Although Fig. 19 is the result of a neighbour joining analysis, phylogenetic methods give the same result. A likely explanation of the COI results in this case is hybrid introgression between *L. stictica* and the Sarawak population of *L. stigmatizans*.

Gomphidia Selys, 1854

Gomphidia abbotti Williamson, 1907

Gomphidia caesarea Lieftinck, 1929 Syn. Nov.

Gomphidia caesarea was described from a single male from Lebang Hara in West Kalimantan (Lieftinck 1929). It was not recorded again until another single male was found in the Lanjak Entimau Wildlife Sanctuary in Sarawak (Norma-Rashid et al. 2010, Dow et al. 2018). However Lieftinck (1948: 258) noted that "there is reason to suspect that the conspicuously coloured and large sized *G. caesarea* LIEFT., from W. Borneo … will prove to be the Bornean representative of *abbotti*. Unfortunately, the type of *caesarea* is (or was) in the Hamburg Museum and hence cannot be re-studied." *Gomphidia abbotti* was described from Trang in Thailand (Williamson 1907). A number of male *Gomphidia* from location K16a reported here differ only in trivial details of markings from both the description of *G. caesarea* and from specimens of *G. abbotti* from Peninsular Malaysia. Bornean examples of the latter measured by RD lie at the upper end of the size spectrum (abdomen plus appendages 53–56mm, Hw 41–42.5mm, said to be 45mm in the type), and overlap broadly with mainland abbotti measured by RD (abdomen plus appendages 51–55mm, Hw 39–41mm). Other differences mentioned by Lieftinck (1929) are: legs largely black (but this appears to be a variable character—even the first male from a short series from northwest Thailand examined by RD had legs more extensively black than described for *caesarea* or in any of the specimens from K16a); sides of segment 2 yellow (in examples from K16 only bright yellow on and around the auricles but sometimes with a larger pale surrounding area; non-Bornean examples similar); lack of abdominal rings on S3-S6, merely spots and S9-S10 without pale markings (the colouration of S3-S6 agrees with *abbotti* from Peninsular Malaysia examined by RD but not with examples from northern Thailand, but two males from Peninsular Malaysia in collection RD have a small yellow lateral, basal mark on S9); some rather subtle details of the anal appendages but which are variable even in our series from Sarawak and overlap with *abbotti* from the mainland. Two females (one from Sungai Kayan, the other from Annah Rais) have vulvar scales (see Fig. 21) agreeing in shape with those of *G. abbotti* as illustrated by Asahina (1986: Figs 152, 153). There appears to be some variation in the length of the vulvar scale in this species.

There appears to be insufficient evidence, even in the absence of the holotype of *Gomphidia caesarea*, to maintain the two as separate species or even subspecies (but see below) and we consider *G. caesarea* to be a junior synonym of *G. abbotti* here. However it should be noted that there is a small chance that although the populations in Sarawak are *G. ab-*

botti the type of *G. caesarea* differed in some way not described by Lieftinck, but since that specimen no longer exists, maintaining *G. caesarea* as separate is not justified with the available information. A COI gene tree for some species of *Gomphidia* including *G. abbotti* from Borneo, Peninsular Malaysia and Hainan (the last strongly resembling specimens from Thailand in its markings) is shown in Fig. 20 (also see Table 3 in Appendix 2). The four *G. abbotti* samples differ from each other by 4–13 base pairs (bp) (0.61–1.98%), the sample from Sarawak differs from those from outside of Borneo by 9–13 bp (1.34–1.98%); these are not large differences. Although the possibility of separate but cryptic species cannot be entirely ruled out, the COI marker gives no support to this and since consistent morphological differences are lacking there is no strong reason to suspect that introgression, or any other mechanism, is obscuring species boundaries in this marker in this case.

Gomphidia abbotti appears to be variable in its markings across its range, and most northern specimens (and even the type from Trang) appear to generally have more extensive pale markings than those from Sundaland. Asahina (1986) divided specimens from Thailand into two groups, group A consisting of "very dark" specimens (perhaps an exaggeration) and group B consisting of "more yellowish marked ones" agreeing with the type from Trang. Among Asahina's material were two males from Khao Chong, near Trang, which fall into his group A, while he also reported specimens from his group B from further south in Thailand, so there is an overlap in the ranges of the two apparent forms. This could be considered as an argument for separate subspecies or even species, and this issue has also been discussed by Kosterin (2014). However, it may be that collection of more material will reveal that there is simply a continuum between the two extremes in Peninsular Thailand, (which in our view is likely); there are a number of photographs of the species from peninsular Thailand on the iNaturalist website, and these do appear to show some variation in the abdominal markings, although not a full continuum of variation and none of them have complete pale rings on abdominal segments S3-S6.

Lieftinck (1948) described the subspecies *G. a. audax* Lieftinck, 1948 from three males from one location in south Sumatra based on differences in colouration and subtle differences in the accessory genitalia and anal appendages, and (slightly) smaller size. Of the stated differences the one that at first appeared most convincing to us is in the anterior lamina. Lieftinck (1948: Fig. 13) illustrated the anterior lamina of *G.* a. *abbotti* (specimen from Thailand) and *G. a. audax* (specimen from south Sumatra) in ventral view. These illustrations show seemingly clear differences in this structure. Interestingly, males from K16a in Sarawak generally conform more to *G. a. audax* in this character, but are somewhat variable. However examination of specimens of *G. abbotti* from Peninsular Malaysia in collection RD reveals a range of states between the two extremes figured, hence this character is unreliable. Nevertheless, a more detailed treatment of Sumatran *G. abbotti* and a detailed examination of the type material of *G. a. audax* is needed (see also the remarks in Lieftinck (1948) on specimens from other parts of Sumatra) so we refrain from declaring *G. a. audax* a junior synonym of *G. abbotti* here, although, at least in our opinion, it is likely to be one.

If it does transpire that two discrete forms occur in peninsular Thailand thus supporting a case for a separate subspecies (or even species) for the typical form from Borneo and Peninsular Malaysia with reduced pale markings, then the name *caesarea* should be resurrected. We note that although there is some risk in synonymising *G. caesarea* be-

fore the situation in Peninsular Thailand and Sumatra is fully understood, it is clear that populations from Sarawak are the same as *G. abbotti* from Peninsular Malaysia. The current situation with two separate names used for the same taxon according to their geographic distribution is unacceptable and the choices are to either call the Peninsular Malaysian populations *G. a. caesarea* (or *G. caesarea*) or to treat all as *G. abbotti*. Given current knowledge the latter seems the prudent course.

One should consider the conservation implications of making taxonomic changes where certainty is not possible, the changes made here have little effect on the threat status of *G. abbotti* which is a Least Concern species with or without the inclusion of the Bornean populations. If the alternative course was taken and the name *caesarea* was adopted for all populations in Borneo, Peninsular Malaysia, whether as a subspecies of *G. abbotti* or as a full species, this taxon would still be Least Concern globally because it is relatively common throughout Peninsular Malaysia and capable of surviving (even thriving) in disturbed and human altered landscapes. In either case there is some cause for concern for the population in Borneo, where the species is less common.

It is worth remarking that there is variation in the exact shade of the pale markings on the thorax in *Gomphidia abbotti* from Sundaland. Males from K16a have the pale markings consistently a rather pale yellow; males from different populations in Peninsular Malaysia seen by RD sometimes have this same pale shade in their thoracic markings, but sometimes these are pale greenish in life. These differences do not seem to be related to age.

Gomphidia maclachlani Selys, 1873

Gomphidia maclachlani was described from specimens stated to be from Labuan off the coast of northern Borneo (Selys 1873), however it is likely that Labuan was just the port from which the specimens were shipped and that they actually originated from somewhere on the mainland of Borneo. Most records of the species have been from Borneo but it has also been recorded from Belitung (e.g. Lieftinck 1954), Peninsular Malaysia (Norma-Rashid & van Tol 1995) and Thailand (e.g. Asahina 1986). Martin (1904) listed the species from Vietnam (Tonkin and Annam) without any details but there is no good support for these records. The species was also recorded from the Sumatran mainland by Krüger (1899) and Ris (1927) but Lieftinck (1948) considered these records uncertain and listed them as *G. abbotti* with a '?' in Lieftinck (1954); however its presence in Sumatra is likely. Although present in Peninsular Malaysia and Thailand *G. maclachlani* appears to be very scarce in these areas, but in Sarawak it is moderately common.

In the COI gene tree (Fig. 20) *G. maclachlani* (represented by samples from five separate locations spread across a wide part of Sarawak) is clearly separated from the samples of other *Gomphidia* species included. However, examination of the COI from this species (each sequence is identical) reveals a nine base pair deletion, a possible indication that rather than the true mitochondrial COI this is a COI-like sequence, presumably nuclear mitochondrial DNA (a NUMT). In this case it is not clear whether the sequences obtained are the true COI or a NUMT because despite the deletion (which does not produce a frameshift) the sequence still translates to a protein that, apart from the three missing amino acids corresponding to the deletion, is identical to that for *G. abbotti* (the protein coded for by COI is more conserved than the COI itself, in the marker the third codon position

can vary without changing the amino acid coded for by the codon; this accounts for much of the variation seen in COI); this could still be a functional enzyme. Moreover if these sequences do represent non-coding (and therefore freely mutating) copies then it is perhaps surprising that all of the available sequences are identical.

Gomphidia maclachlani differs consistently from *G. abbotti* in, for instance, having a much darker abdomen, labrum and clypeus without any distinct yellow marks and in the shape of

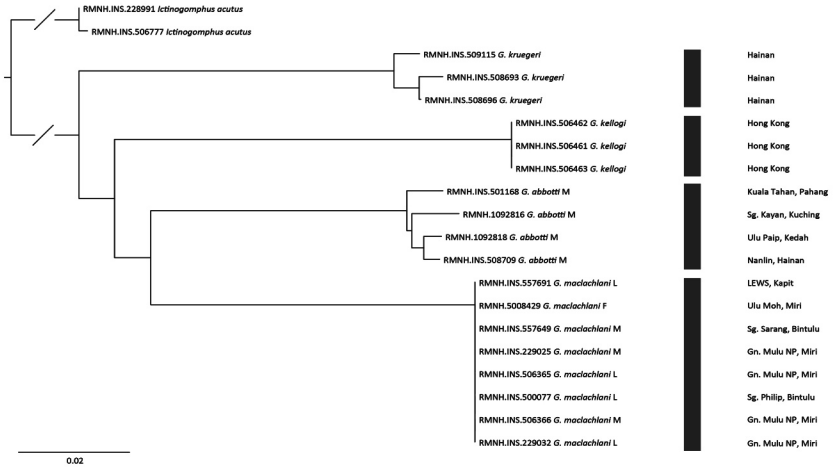
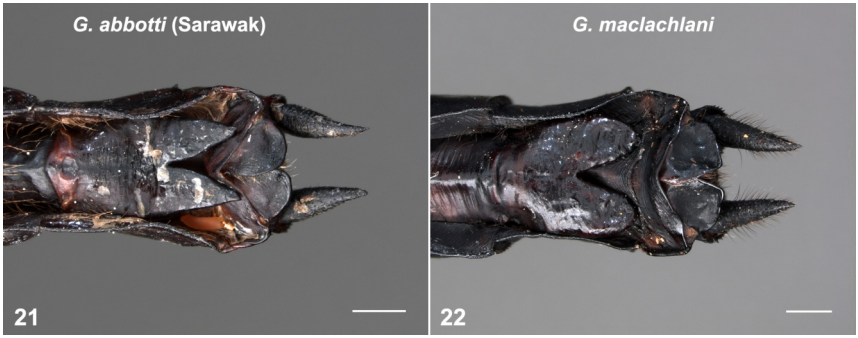


Figure 20. Neighbour joining COI gene tree for *Gomphidia* species. RMNH collection codes are shown for each specimen, as well as the sex (male is indicated by m and female by f) of the specimen and an indication of where it was collected; the reader is also referred to Table 2 in Appendix 2. The tree is rooted with *Ictinogomphus acutus* as outgroup. Abbreviations: Gn. – Gunong; NP – National Park; Sg. – Sungai.



Figures 21–22. Ventral view of terminal abdominal segments, showing the vulvar scale, of females of *Gomphidia* species. (21) *G. abbotti*, Sungai Kayan upstream of kampung Sungan, Serian Division, Sarawak, 19.vii.2018. (22) *G. maclachlani,* Ulu Moh area, upper Baram, Miri Division, Sarawak, 23.viii.2014. All scale bars 1mm.

the anterior lamina, which agrees with only minor variation with the illustrations in Fig. 13 in Lieftinck (1948) and Fig. 160 in Asahina (1986). Fig. 15 in Lieftinck (1948) appears to show differences in details of the anal appendages of *G. maclachlani* compared with *G. abbotti* but in reality there is some variation in these characters in both species and they might not be of any real diagnostic value, (this is an area where further work is needed). The measurements of 20 males of *G. maclachlani* in collection RD from locations across Sarawak are abdomen plus appendages 48–55mm, Hw 37–44mm. Half of the measured specimens are from deep streams that can only be sampled using a boat. These deep-water specimens are smaller on average than those from shallow streams.

As noted by Lieftinck (1948: 261) females of *Gomphidia* species from Sundaland are rare in collections and that of *G. maclachlani* does not appear to have been illustrated. However the female of *G. maclachlani* is a similar to the male in its dark coloration and so is easily differentiated from that of *G. abbotti*. Additionally, the vulvar scale, although divided as in *G. abbotti*, has rounded rather than pointed apices (see Fig. 22). This is in general agreement with the description given by Selys (1873) “Écaille vulvaire presque entirèment divisée en deux feuilles aplaties ovales au bout, attaignant presque l'extrémite du 9c segment [Vulvar scale almost entirely divided into two flattened leaves oval at the end, almost touching the end of the 9th segment].”

***Macrogomphus* Selys, 1858**

Macrogomphus abnormis Selys, 1884

Orr (2003) lists five species of *Macrogomphus* from Borneo: *M.* ?*abnormis* Selys, 1884, *M. decemlineatus* (Selys, 1876), *M. parallelogramma albardae* Selys, 1878, *M. phalantus* Lieftinck, 1935 and *M. quadratus* (Selys, 1878). Of these *M. abnormis* was described by Selys (1884) from two (not one as stated by Kosterin (2019)) females attributed to Lansberge; these specimens are in RBINS and have “Borneo ?” on their labels. Selys (1884) states “Probablement Bornéo [Probably Borneo]” for the origin of the specimens. *Macrogomphus abnormis* has not been recorded since it was described and doubts over its status have been raised repeatedly, e.g. Orr (2003: 95) states “most probably a form of ***M. quadratus***” and Lieftinck (1954: footnote on page 86) remarks “It seems likely that the name will eventually have to be reduced to a synonym of *quadratus*.” However Lieftinck (1954: footnote on page 86) also remarks on the “strongly aberrant colour-scheme of the thorax of *abnormis*” that he had “never seen anything approaching” in related species. RD has examined the two syntypes in the Selys collection, which have labels added by Lieftinck stating “Type I” and “Type II” and has also seen nothing approaching the markings of the synthorax in many examples of both sexes of *M. quadratus*. In our view it would be unwise to synonymise *M. abnormis* with *M. quadratus* and we suspect that *M. abnormis* is actually a distinct species, but it is certainly unclear whether it really comes from Borneo.

The *Macrogomphus parallelogramma*–group

Nothing more can be added here on the other Bornean *Macrogomphus* except for *M. parallelogramma* (Burmeister, 1839) and its allies, the *parallelogramma*–group as defined and discussed in detail in Kosterin (2019). The named taxa from this group occurring in Sundaland are *M. albardae* Selys, 1878, *M. parallelogramma* and *M. phalantus* Lieftinck,

1935. Until recently, the most complete single account of *M. parallelogramma* and of *M. albardae* (which he considered to be a subspecies of *M. parallelogramma*) was provided by Lieftinck (1935a). Kosterin (2019) contributed a useful review that represents an advance on that provided by Lieftinck, but this does not resolve all issues. Originally RD had intended to a include a detailed discussion of this group in Sundaland here, but this discussion grew in length to the point where it is better published as a separate paper, after further work to clarify some issues. Here we just note that material previously reported from Borneo as either *M. parallelogramma* or *M. p. albardae* appears to actually be two species, with specimens from West Kalimantan (Lieftinck 1935a) and those from southwestern Sarawak reported here agreeing with *M. albardae* following Kosterin (2019) and those from Brunei (Orr 2001) and Sarawak east of the Lupar River representing a distinct species which we will refer to as *M.* sp. here. It became apparent to us that these forms were likely distinct species some years ago but because of the uncertainty involved Dow (2021) and Dow et al. (2019) provisionally lumped all Bornean material under *M. parallelogramma*, although Dow (2021: Note 65, written before the publication of Kosterin (2019)) points out that two forms exist in Sarawak. However, rather than leaving the statement that two species (plus *M. phalantus*) occur in Borneo completely unsupported, we present a simple molecular analysis below, the results of which correlate with morphology. It is also worth remarking here that specimens of *M. albardae* examined by RD show no evidence of the polymorphism in the abdominal markings mentioned by Kosterin (2019).

COI sequences of both *Macrogomphus* sp. and Bornean *M. albardae* are available (as is a sample from Peninsular Malaysia of *M. albardae*). A neighbour joining gene tree for these sam-

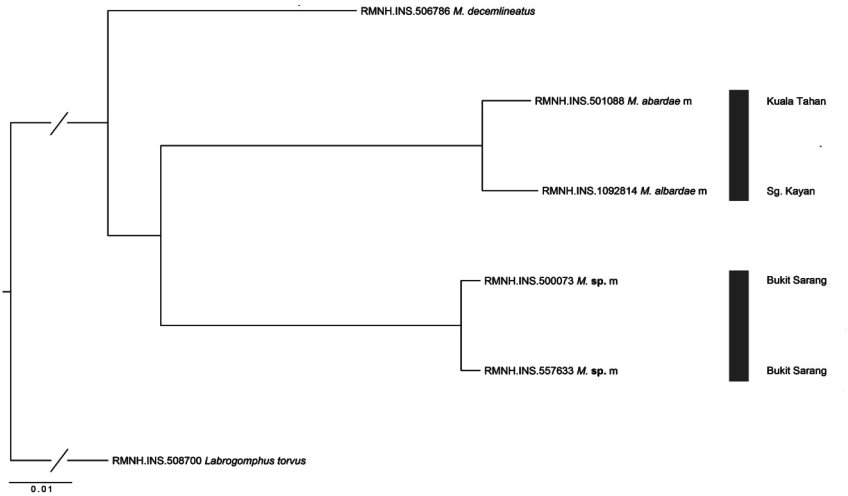
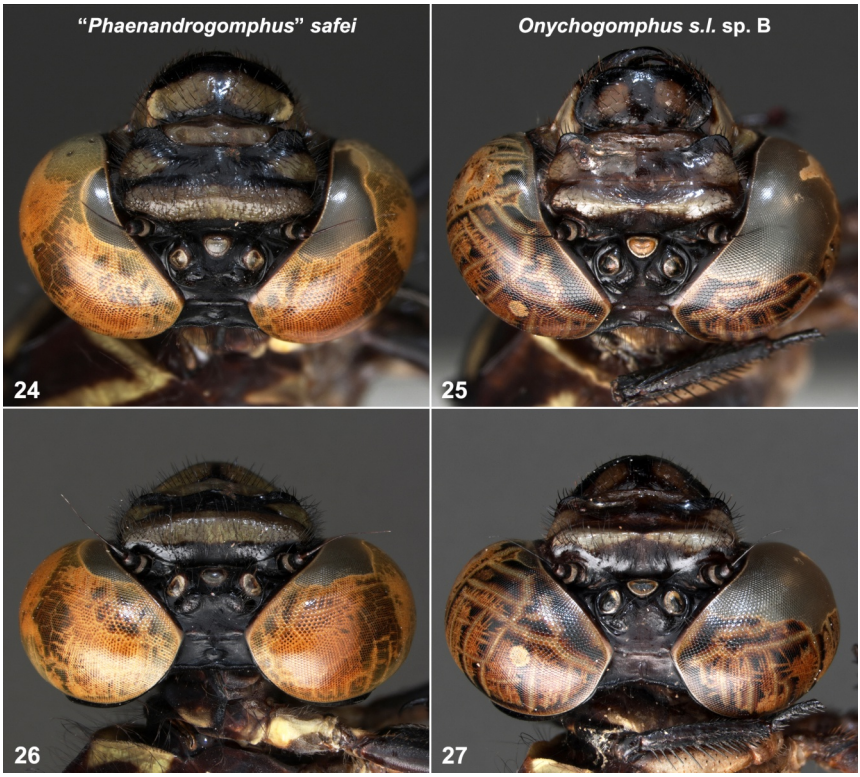


Figure 23. Neighbour joining COI gene tree for *Macrogomphus* species. RMNH collection codes are shown for each specimen, as well as the sex (male is indicated by m and female by f) of the specimen and an indication of where it was collected; the reader is also referred to Table 3 in Appendix 2. The tree is rooted with *Labrogomphus torvus* as outgroup. Sungai is abbreviated as Sg.

ples plus *M. decemlineatus* and *Labrogomphus torvus* Needham, 1931 as outgroup is shown in Fig. 23. In Fig. 23 the two *M. albardae* samples cluster together, well separated from the two *M.* sp. samples, which also cluster together. The two *M. albardae* samples differ in only 11 bp (1.671733%), the two *M.* sp. samples in only 4 bp (0.607903%) but the two clusters differ from each other by 72-76 bp (10.94225-11.55015%). The difference between the two clusters is large (larger than would normally be expected in a single biological species), and give support to the notion that two separate species are represented. However at least some caution is needed with regards to the COI results. The sample sets are small and both *M.* sp. samples are from the same location (Bukit Sarang); an expanded analysis with more samples from more locations is highly desirable.

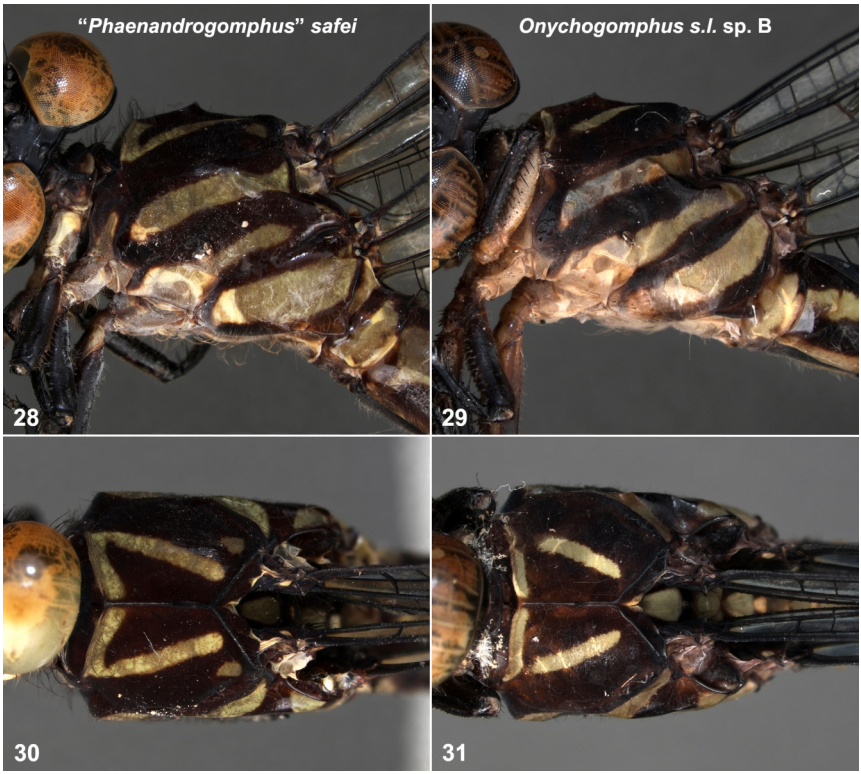
Onychogomphus sensu latu sp. B

The single female collected at Sungai Kayan upstream of kampung Tepoi is similar to the (undescribed) female of "*Phaenandrogomphus*" *safei* Dow & Luke, 2015 but differs in a number of respects including markings of the synthorax, shape of the abdomen and

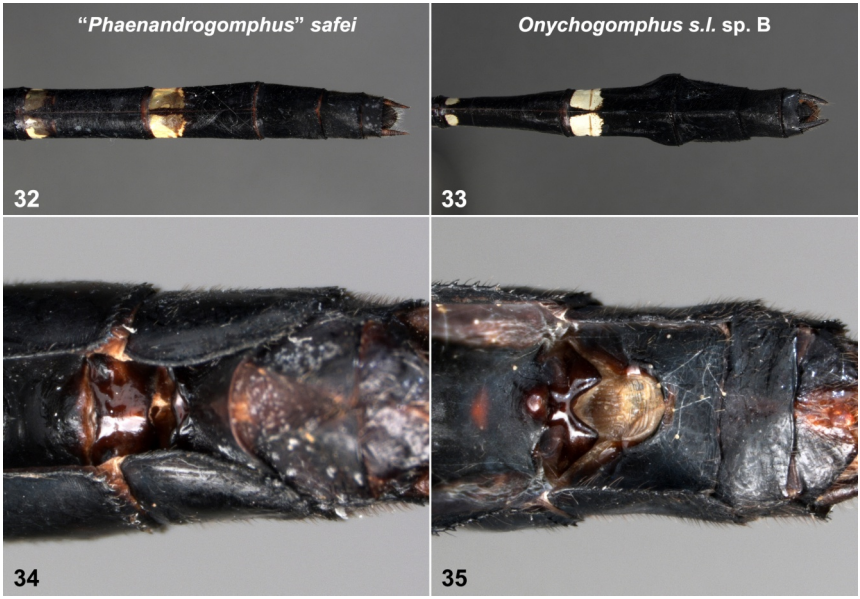


Figures 24–27. *Onychogomphus* sensu latu female heads. "*Phaenandrogomphus*" *safei* Dow & Luke, 2015 (24) dorso-frontal; (25) dorsal. *Onychogomphus* sensu latu sp. B (26) dorso-frontal; (27) dorsal.

the vulvar scale. As noted in Dow et al. (2018) *safei* is unlikely to belong in *Phaenandrogomphus* and appears to be closely allied to *Onychogomphus duaricus* Fraser, 1924, often placed in *Nychogomphus* Carle, 1986 (originally described as a subgenus of *Onychogomphus*, type species *Onychogomphus geometricus* Selys, 1854). However the female from Sungai Kayan also differs from *duaricus* in its markings and is unlikely to be that species. *Onychogomphus rappardi* Lieftinck, 1937, known with certainty only from the holotype male from southwest Sumatra, is another closely allied species (but curiously not placed in *Nychogomphus* by any authority as far as we are aware, despite statements in Lieftinck (1937, 1954) on its close relationship with *O. geometricus*). The male of *O. rappardi* (which differs from *P. safei* in markings and details of the accessory genitalia and anal appendages) has different thoracic markings from the female from Sungai Kayan, but not so far removed as to be able to exclude it from consideration. The male of the Sungai Kayan species must be found before its identity can be resolved. Unfortunately the location has recently been off-limits to outsiders due to Covid-19 restrictions.



Figures 28–31. Synthorax of *Onychogomphus* sensu latu females. "*Phaenandrogomphus*" *safei* Dow & Luke, 2015 (28) lateral; (29) dorsal. *Onychogomphus* sensu latu sp. B (30) lateral; (31) dorsal.



Figures 32–35. Terminal abdominal segments and vulvar scale of *Onychogomphus* sensu latu females. "*Phaenandrogomphus*" *safei* Dow & Luke, 2015: (32) terminal abdominal segments in dorsal view; (33) vulvar scale. *Onychogomphus* sensu latu sp. B: (34) terminal abdominal segments in dorsal view; (35) vulvar scale.

Since the female of *Phaenandrogomphus safei* has not been described or illustrated, we provide a set of images of the females of both *P. safei* and the species from Sungai Kayan. Figs 24–27 show the heads, Figs 28–31 the synthorax, Figs 32–35 the terminal abdominal segments and the vulvar scale.

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Stokvis provided insight into the deletion in the COI of *G. maclachlani*. Ron Orenstein allowed us to use some photographs that he took when he accompanied RD on field trips. Last but not least Albert Orr provided a valuable review of the manuscript.

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Appendix 1: Detailed specimen records

Collectors: the author's names are abbreviated as SB, RD, RN and GR. The names of other collectors who appear many times are abbreviated as: CD – Clyteus Ding, LS – Luke Southwell, JS – Jeffery Sujang, RS – Romina Sujang.

Note that not all larvae caught by SB in March/April 2019 and listed below were actually collected, many were placed back in the stream where they were found.

Lestidae

Orolestes wallacei (Kirby, 1889)

K19a – ♂, 25.i.2019, RD.

Platystictidae

Drepanosticta attala Lieftinck, 1934

K1a – ♂, 8.iii.2018, RD. **K1b** – ♂, 8.vi.2017, RD. **K2a** – ♀ (teneral), 12.i.2018, CD. **K8a** – ♂, 22.ix.2017, RN. **K24f** – ♂, 16.iv.2019, RD. **K24g** – ♀, 3.vii.2019, RD. **SE3b** – ♂, 3.x.2018, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE5a** – ♂ (teneral), 22.v.2019, RD.

Drepanosticta sp. cf *crenitis* Lieftinck, 1933

K4c – ♀, 29.v.2018, RN; 2 ♀♀, 15.vi.2020, RD. **K8div** – ♀, 30.v.2018, RD. **K8h** – ♀, 17.vii.2018, RD. **K14d** – ♂, 5.vii.2015, RD; ♀, 2.vii.2017, RD. **K23d** – ♂, ♀, 22.iii.2019, RD. **SE1a** – ♀, 22.x.2017, RD. **SE1c** – 2 ♂♂ (one teneral), 2.iv.2018, RD.

Drepanosticta drusilla Lieftinck, 1934

K16a – 2 ♂♂, 25.iii.2019, RD. **K16e** – ♀ (hanging over plank bridge over a tiny tributary of Sungai Kayan, ca 2m above mouth of tributary), 8.xi.2018, RD. **K24a** – ♀ (teneral), 16.iv.2019, RD. **K24f** – 2 ♂♂, 18.iv.2019, RD; ♂, 3.vii.2019, RD. **SE5b** – ?♂ (teneral), 23.v.2019, RD.

Drepanosticta cf *forficula* Kimmins, 1936

K4d – ♂, 1.iv.2018, RD. **BR2** – ♂, 2 ♀♀, 5.iv.2018, RD. **BR3** – ♂, 8.v.2018, RD.

Drepanosticta kosterini Dow, 2017

K8di – ♂, 16.xi.2018, RD. **K8dii** – ♀, 30.v.2018, RD. **K8dv** – ♂, 30.v.2018, RD; 3 ♂♂, ♀, 29.vi.2018, RD. **K8dvi** – ♂, 10.x.2018, RD. **K8eiii** – 2 ♂♂, ♀, 20.xi.2018, RD. **K8h** – ♂, 17.vii.2018, RD.

Drepanosticta rufostigma (Selys, 1886)

K1a – ♂, 20.ix.2017, RN. **K1c** – ♂, 11.iii.2019, RD. **K3b** – ♂, 26.ii.2018, RD. **K4b** – 4 ♂♂, 9.vii.2017, RD. **K4c** – ♂, 12.vii.2017, RD; 3 ♂♂, 1.iv.2018, RD; ♀, 29.v.2018, RN; ♂, ♀, 15.vi.2020, RD. **K5** – 4 ♂♂, 11.iii.2018, RD. K6 – ♀, 20.x.2017, RD. **K8b** – 4 ♂♂, 25.x.2017, RD. **K8dii** – 2 ♂♂, 30.v.2018, RD. **K8diii** – 2 ♂♂, 30.v.2018, RN. **K8dv** – ♂, ♀, 30.v.2018, RD; ♂, 29.vi.2018, RD. **K8dvi** – ♂, 10.x.2018, RD. **K8eiii** – ♀, 20.xi.2018, RD. **K8h** – 2 ♂♂, ♀, 17.vii.2018, RD. **K14a** – See Dow (2017). **K14b** – ♂, 14.iii.2018, RD; ♂, 8.v.2019, RD. **K14d** – See Dow (2017); 2 ♂♂, 3.vii.2018, RD. **K16b** – ♂, 8.x.2018, RD; ♂, 25.iii.2019, S. Butler. **K16c** – 2 ♂♂, 5.xi.2018, RD. **K16e** – ♀, 5.xi.2018, RD. **K22b** – ♂, ♀, 15.iii.2019, RD. **K22d** – ♂, 23.iv.2019, RD. **K23a** – 3 ♂♂, 14.iii.2019, RD. **K23c** – ♂, 22.iii.2019, RD.

K24d – ♂, 18.iv.2019, RD; ♂, 3.vii.2019, RD. **SA4a** – See Dow (2017). **SE1a** – 2 ♂♂, 17.ix.2017, RD; ♂, 17.ix.2017, RN; 3 ♂♂, 22.x.2017, RD. **SE1b** – ♂, 2.iv.2018, RD. **SE2c** – ♂, 16.ix.2017, RD. **SE3c** – ♂, 19.ix.2017, RD. **SE4a** – 4 ♂♂, 11.x.2018, RD. **SE5a** – ♂, 9.xi.2018, RD. **SE5b** – 5 ♂♂, 23.v.2019, RD. **SE5c** – 4 ♂♂, 22.v.2019, RD.

Drepanosticta versicolor (Laidlaw, 1913)

K8b – ♂, 25.x.2017, RD. **K8div** – ♀, 30.v.2018, RD. **K8eii** – ♂ (on steep slope above stream), 5.vii.2018, RD. **K14d** – ♂, 5.vii.2015, RD; ♂, 2.vii.2017, RD; ♂, ♀, 3.vii.2018, RD.

Telosticta bidayuh Dow & Orr, 2012

K4b – ♂, 9.vii.2017, RD; 2 ♂♂, 15.vi.2020, RD. **K4d** – 2 ♂♂, ♀, 1.iv.2018, RD. **K5** – ♂, 11.iii.2018, RD. **K8b** – ♂, 20.xi.2018, RD. **K8di** – 3 ♂♂, 25.x.2017, RD; ♂+♀, 16.xi.2018, RD. **K8dii** – 2 ♂♂, 30.v.2018, RD. **K8div** – ♂, 30.v.2018, RD. **K8dv** – ♂, 30.v.2018, RD. **K8dvi** – ♂, 10.x.2018, RD. **K8eii** – ♂, 5.vii.2018, RD. **K8h** – 2 ♂♂, 17.vii.2018, RD. **K14a** – ♂, 31.iii.2014, RD. **K14d** – ♂, 5.vii.2015, RD; ♀, 5.vii.2015, GR; 2 ♂♂, 2.vii.2017, RD. **K16a** – ♂ (in forest by stream), 25.iii.2019, RD. **K16c** – ♂, 5.xi.2018, RD. **BR1** – ♂, 8.v.2018, RD. **SA4a** – ♂, 7.vii.2015, RD; ♂, ♀, 9.vii.2015, GR. **SE1a** – ♂, 17.ix.2017, RD; 2 ♂♂, 22.x.2017, RD. **SE1b** – ♂, 2.iv.2018, RD.

Telosticta dupophila (Lieftinck, 1933)

K8b – ♂, 25.x.2017, RD. **K24b** – 3 ♂♂, 23.iii.2019, RD.

Telosticta serapi Dow & Orr, 2012

K14a – 3 ♂♂, 31.iii.2014, RD. **K14b** – 4 ♂♂, 14.iii.2018, RD; 3 ♂♂, 8.v.2019, RD. **K14d** – 2 ♂♂, 8.ix.2014, RD; 3 ♂♂, 5.vii.2015, RD; 2 ♂♂, 5.vii.2015, GR; ♂, ♀, 23.ii.2016, RD; ♂, 2.vii.2017, RD; 2 ♂♂, 3.vii.2018, RD.

Telosticta new species

Material to be listed elsewhere.

Argiolestidae

Podolestes chrysopus Selys, 1889

K17c – ♀, 4.i.2018, RD; ♂, 4.i.2018, JS.

Podolestes harrissoni Lieftinck, 1953

K9a – 3 ♂♂, 30.vii.2017, RD; 2 ♂♂, 26.xi.2017, RD. **K12a** – 2 ♂♂, 22.vii.2017, RD; ♂, 5.viii.2017, RD; ♂, 10.vi.2020, RD. **SA5** – 2 ♀♀, 19.xii.2018, RD.

Podolestes orientalis Selys, 1862

K4c – ♂, 29.v.2018, RD. **K4e** – 2 ♂♂ (forest pools at base of limestone hill), 15.vi.2020, RD. **K9a** – ♀, 30.vii.2017, RD; ♂, 26.xi.2017, RD. **K12a** – ♂, 5.viii.2017, RD; ♂, 2.xii.2017, RD; ♂, 10.vi.2020, RD. **K16a** – ♂ (pool set back from edge of stream), 25.iii.2018, RD. **K17b** – 2 ♂♂, 2.viii.2013, RD; 2 ♀♀, 2.viii.2013, JS; 4 ♂♂, 4.i.2018, RD. **K19a** – 2 ♂♂, 25.i.2019, RD; ♂, 10.vi.2020, RD. **K23a** – larva (in backwater), 22.iii.2019, SB; ♂ (in backwater), 22.iii.2019, RD. **K24a** – ♀ (at small pool at side of stream), 18.iv.2019, RD. **K24b** – larva, 23.iii.2019, SB; ♂, 3.vii.2019, RD. **SA1b** – ♂, 21.ii.2018, RD.

Calopterygidae

Neurobasis longipes Hagen, 1887

K1b – ♂, 8.vi.2017, RD. **K2a** – 2 ♂♂, 12.i.2018, RD; 2 ♂♂, ♀, 6.vii.2018, CD. **K2c** – ♂,

30.iv.2019, RD. **K3a** – ♂, 26.ii.2018, RD. **K6a** – ♂, 20.x.2017, RD; 2 ♂♂, 2.viii.2019, RD. **K8a** – ♀, 22.ix.2017, RD; ♂, 22.ix.2017, RN. **K16a** – ♂, 8.x.2018, RD; ♂, 5.xi.2018, RD. **K16b** – ♂, 8.x.2018, RD. **K22b** – 2 ♂♂, 15.iii.2019, RD; ♂, 19.iii.2019, RD; 10 larvae, 8.iv.2019, SB; ♂, 23.iv.2019, RD; ♂, 5.ix.2019, RD. **K23a** – ♂+♀, 14.iii.2019, RD; ♂, 22.iii.2019, RD. **K24a** – 2 ♂♂, ♀, 23.iii.2019, RD; 4 ♂♂, 2 ♀♀, 3.vii.2019, CD. **K25a** – ♂, 16.v.2019, RD. **SA4b** – 2 ♂♂, 10.vii.2015, GR. **SE3a** – ♀, 18.ix.2017, RD. **SE3b** – ♂, ♀, 18.ix.2017, RD; ♂, 19.ix.2017, RN; ♂, 19.vii.2018, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE4a** – ♂, 11.x.2018, RD. **SE5a** – ♂, 9.xi.2018, RD; ♂, 22.v.2019, RD.

Vestalis amaryllis Lieftinck, 1965

K1b – ♂, 8.vi.2017, RD. **K1c** – 3 ♂♂, 11.iii.2019, RD. **K2c** – ♂, 30.iv.2019, RD. **K4b** – ♂, 9.vii.2017, RD. **K4c** – ♂, 28.vii.2017, RD. **K5** – ♂, 11.iii.2018, RD. **K14a** – ♂, 31.iii.2014, RD. **K14b** – 2 ♂♂, 14.iii.2018, RD; ♂, 8.v.2019, RD. **K14d** – ♂, 8.v.2019, RD. **K17b** – 2 ♂♂, 2.viii.2013, RD; ♂, 4.i.2018, RD. **K22d** – ♂, 19.iii.2019, RD; ♂, 23.iv.2019, RD. **K24b** – ♂, 23.iii.2019, RD. **K24d** – 2 ♂♂, 3.vii.2019, RD. **K24e** – ♂, 18.iv.2019, RD.

Vestalis sp. cf *amnicola* Lieftinck, 1965

K4c –3♂♂, 1.iv.2018, RD; ♂, 29.v.2018, RN; ♂, 15.vi.2020, RD. **K8b** – ♂, 17.vii.2018, RD. **K8dii** –2♂♂, 30.v.2018, RD. **K8diii** –2♂♂, 30.v.2018, RN. **BR4** – ♂, 17.vii.2018, RD. **SE1a** – ♂, 17.ix.2017, RD; 2♂♂, 22.x.2017, RD. **SE1b** – ♂, 2.iv.2018, RD. **SE5b** –2♂♂, 23.v.2019, RD.

Vestalis amoena Hagen in Selys, 1853

K1a – ♂, 13.ix.2017, RD; ♂, 20.ix.2017, RN. **K2a** – ♀, 12.i.2018, RD; ♂, ♂+♀, 6.vii.2018, RD. **K2c** – ♂, 30.iv.2019, RD. **K3a** – ♂, 26.ii.2018, RD. **K3b** – ♂, 26.ii.2018, RD. **K4b** – ♂, 28.vii.2017, RD. **K4e** – ♂, 1.iv.2018, RD. **K5** – ♂, 11.iii.2018, RD. **K6a** – 2 ♂♂, 20.x.2017, RD; 2 ♂♂, 2.viii.2019, RD. **K6b** – ♂, 20.x.2017, RD. **K8a** – 2 ♂♂, 22.ix.2017, RD. **K8eiii** – ♂, 20.xi.2018, RD. **K16a** – ♂, 8.x.2018, RD. **K17a** – 2 ♂♂, 28.vii.2013, RD; 3 ♂♂, 28.vii.2013, RN. **K22a** – 2 ♂♂, 15.iii.2019, RD; ♂, 23.iv.2019, RD. **K22b** – 2 ♂♂, 15.iii.2019, RD; ♂, 19.iii.2019, RD; larva (supposition, no other species of *Vestalis* found as an adult at this location), 8.iv.2019, SB; 3 ♂♂, 5.ix.2019, RD. **K23a** – 6 ♂♂, ♀, 14.iii.2019, RD; 3♂♂, 22.iii.2019, RD. **K23c** – 3 ♂♂, 22.iii.2019, RD. **K24a** – ♂ (in backwater), 23.iii.2019, RD; ♂, 16.iv.2019, RD. **K24e** – ♂, 18.iv.2019, RD. **K25a** – 3 ♂♂, 16.v.2019, RD; 2 ♂♂, 31.vii.2019, RD. **SA4b** – 5 ♂♂, ♀, 10.vii.2015, GR; 4 ♂♂, 2 ♀♀, 10.vii.2015, LS. **SE3a** – 2 ♂♂, 18.ix.2017, RD. **SE3b** – 2 ♂♂, 19.vii.2018, RD; ♂, 3.x.2018, RD. **SE3c** – 3 ♂♂, 19.ix.2017, RD; ♂, 28.ix.2017, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE4a** – 3 ♂♂, 11.x.2018, RD. **SE5a** – ♂+♀, 9.xi.2018, RD. **SE5c** – 2 ♂♂, 22.v.2019, RD. **SE6a** – ♂, 14.v.2019, RD; 2♂♂, 13.viii.2019, RD. **SE6b** –2♂♂, 13.viii.2019, RD.

Vestalis atropha Lieftinck, 1965

K1a – ♂, 13.ix.2017, RD; ♂, 20.ix.2017, RN. **K1b** – ♂, 8.vi.2017, RD. **K1c** – ♂, 11.iii.2019, RD. **K2a** – ♂ (far upstream), 30.iv.2019, RD. **K2c** – 3 ♂♂, 30.iv.2019, RD. **K6a** – 2 ♂♂, 2.viii.2019, RD. **K8ei** – 2 ♂♂, 5.vii.2018, RD. **K8h** – ♂, 17.vii.2018, RD. **K16a** – ♂, 5.xi.2018, RD; ♂, 8.xi.2018, RD. **K16b** – 3 ♂♂, 8.x.2018, RD. **K24a** – ♂+♀, 3.vii.2019, RD. **SA4a** – ♂, 7.vii.2015, RD; 3 ♂♂, 9.vii.2015, GR; 2 ♂♂, 9.vii.2015, LS. **SA4b** – ♂, 10.vii.2015, GR. **SE1a** – ♂, 17.ix.2017, RD; ♂, 22.x.2017, RD. **SE4a** – ♂, 11.x.2018, RD. **SE5a** – 3 ♂♂, 9.xi.2018, RD; 4 ♂♂, 22.v.2019, RD; 3 ♂♂, 22.v.2019, Michael & Kak.

Vestalis beryllae Laidlaw, 1915

K8c – ♂, 10.x.2018, RD. **K8di** – ♂, 25.x.2017, RD.

Chlorocyphidae

Heliocypha biseriata (Selys, 1859)

K1a – 2 ♂♂, 13.ix.2017, RD; ♂, 20.ix.2017, RD; ♂, 20.ix.2017, RN. **K1b** – 2 ♂♂, 8.vi.2017, RD. **K1c** – ♂, 11.iii.2019, RD. **K2a** – ♂, 12.i.2018, CD; 2 ♂♂, ♀, 12.i.2018, RD; 5 ♂♂, ♀, 6.vii.2018, CD; ♂, 6.vii.2018, RD; ♂, 30.iv.2019, RD. **K2c** – ♂, 30.iv.2019, RD. **K3a** – 2 ♂♂, 26.ii.2018, RD. **K4b** – 2 ♂♂, 9.vii.2017, RD. **K4c** – ♂, 12.vii.2017, RD; ♂, 1.iv.2018, RD; ♂, 29.v.2018, RN; ♂, 15.vi.2020, RD. **K5** – ♂, 11.iii.2018, RD. **K6a** – 3 ♂♂, 20.x.2017, RD; 3 ♂♂, 2.viii.2019, RD. **K8a** – ♂, ♂+♀, 22.ix.2017, RD; ♂, 5.vii.2018, RD. **K8ei** – ♂, 5.vii.2018, RD; ♂, 20.xi.2018, RD. **K16a** – ♂, 8.x.2018, RD. **K16b** – ♂, 8.x.2018, RD. **K17a** – 2 ♂♂, 28.vii.2013, RD; 2 ♂♂, ♀, 28.vii.2013, RN. **K22a** – 2 ♂♂, 15.iii.2019, RD. **K22b** – 2 ♂♂, 15.iii.2019, RD; ♂, 19.iii.2019, RD; larva, 8.iv.2019, SB; ♂+♀, 8.iv.2019, RD; ♂, 23.iv.2019, RD; 2 ♂♂, 5.ix.2019, RD. **K23a** – 2 ♂♂, 14.iii.2019, RD; ♂, 22.iii.2019, RD. **K23c** – ♂, 22.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD; 4 ♂♂, 3.v.2019, CD. **K25a** – 2 ♂♂, 16.v.2019, RD; 2 ♂♂, 31.vii.2019, RAD. **K27** – ♂, 11.viii.2020, RD. **SA1**a – ♂, ♀, 21.ii.2018, RD. **SA4a** – ♂, 7.vii.2015, RD. **SA4b** – 3 ♂♂, 2 ♀♀, 10.vii.2015, GR; ♂, 3 ♀♀, 10.vii.2013, LS. **SE1a** – ♂, ♀, 22.x.2017, RD. **SE2b** – ♂, 16.ix.2017, RD; ♂, 16.ix.2017, RN. **SE3a** – ♂, 18.ix.2017, RD; ♂, 18.ix.2017, RN. **SE3b** – ♂, 18.ix.2017, RD; 2 ♂♂, 19.vii.2018, RD; ♂, 3.x.2018, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE4a** – ♂, 11.x.2018, RD. **SE5a** – ♂, 9.xi.2018, RD; ♂, ♀, 22.v.2019, RD. **SE5b** – ♂, 23.v.2019, RD. **SE6a** – ♂, 14.v.2019, RD; 2 ♂♂, 13.viii.2019, RD. **SE6b** – ♂, 13.viii.2019, RD.

Libellago aurantiaca (Selys, 1859)

K24a – 2 ♂♂, 23.iii.2019, RD.

Libellago hyalina (Selys, 1859)

K9a – ♀, 30.vii.2017, RD; ♂, 26.xi.2017, RD. **K10** – 4 ♂♂, 2 ♀♀, 7.i.2018, RD. **K17b** – ♂, ♀, 2.viii.2013, RD; 2 ♂♂, 2.viii.2013, RN; 3 ♂♂, 2.viii.2013, JS; 3 ♂♂, ♀, 2.viii.2013, RS. **K17c** – ♂, 4.i.2018, RD; 2 ♂♂, ♀, 4.i.2018, JS. **K19d** – 2 ♂♂, 25.i.2019, RD. **K26b** – 2 ♂♂, 15.vi.2020, RD. **SA1a** – 9 ♂♂, 21.ii.2018, CD; 2 ♂♂, 21.ii.2018, RD. **SA3a** – ♂, ♀, 7.vii.2015, GR.

Libellago semiopaca (Selys, 1873)

K1a – 2 ♂♂, 13.ix.2017, RD; ♂, 20.ix.2017, RD. **K1b** – 3 ♂♂, ♂+♀, 8.vi.2017, RD. **K2a** – ♂, 6.vii.2018, RD; ♂, 30.iv.2019, RD. **K6a** – 4 ♂♂, ♀, 20.x.2017, RD; 2 ♂♂, 2.viii.2019, RD. **K8a** – ♂, ♂+♀, 22.ix.2017, RD. **K16a** – 3 ♂♂, ♀, 8.x.2018, RD. **K22a** – 2 ♂♂, 15.iii.2019, RD. **K25a** – ♂, 16.v.2019, RD; ♂, 31.vii.2019, RD. **SE3a** – 4 ♂♂, 18.ix.2017, RD; ♂, 18.ix.2017, RN. **SE3b** – ♂, 18.ic.2017, RD; 2 ♂♂, 28.ix.2017, RD; ♂, 3.x.2018, RD. **SE6a** – ♂, 14.v.2019, RD; ♂, 13.viii.2019, RD.

Libellago stictica (Selys, 1859)

K1a – 2 ♂♂, 8.iii.2018, RD. **K2a** – ♂, 6.vii.2018, RD; ♂, 30.iv.2019, RD. **K3a** – ♂, 26.ii.2018, RD. **K6a** – 2 ♂♂, 2.viii.2019, RD. **K22b** – 2 ♂♂, 15.iii.2019, RD; ♂, 19.iii.2019, RD; 2 ♂♂, 8.iv.2019, RD; ♂, 5.ix.2019, RD. **K25a** – ♂, 16.v.2019, RD; 2 ♂♂, 31.vii.2019, RD. **SA4b** – ♂, 10.vii.2015, GR. **SE2b** – ♀, 4.iv.2018, RD. **SE3a** – 2 ♂♂, 18.ix.2017, RD. **SE3b** – 2 ♂♂, 18.ix.2017, RD; 2 ♂♂, 18.ix.2017, RN; 2 ♂♂, 19.vii.2018, RD; ♂, 3.x.2018, RD.

Libellago stigmatizans (Selys, 1859)

K17a – 3 ♂♂, ♀, 28.vii.2013, RD; ♂, 4.i.2018, RD.

Rhinocypha aurofulgens Laidlaw, 1931

K8ei – ♂, 5.vii.2018, RD; ♂, 20.xi.2018, RD.

Rhinocypha cucullata Selys, 1873

K6a – 2 ♂♂, 20.x.2017, RD. **K24a** – 2 ♂♂, 23.iii.2019, RD; 2 ♂♂, 16.iv.2019, RD. **K24b** – ♂ (immature), 23.iii.2019, RD.

Rhinocypha cf *spinifer* Laidlaw, 1931

K8c – ♂ (perched high at an overgrown part of the road in the afternoon), 10.x.2018, RD. **K8dii** – ♀, 30.v.2018, RD.

Sundacypha petiolata (Selys, 1859)

K14b – ♂, 8.v.2019, RD. **K22d** – ♂, 19.iii.2019, RD; ♂, 5.ix.2019. **K24c** – ♂, 23.iii.2019, RD. **K24d** – ♂, 3.v.2019, RD. **K24e** – ♂, 18.iv.2019, RD.

Devadattidae

Devadatta clavicauda Dow, Hämäläinen & Stokvis, 2015

K2c – ♂, 30.iv.2019, RD. **K8b** – 5 ♂♂, ♀, 25.x.2017, RD. **K14a** – material listed in Dow et al. 2015. **K14b** – 3 ♂♂, 14.iii.2018, RD; 2 ♂♂, 8.v.2019, RD. **K14d** – 3 ♂♂, 5.vii.2015, RD; 2 ♂♂, 23.ii.2016, RD; ♂, 2.vii.2017, RD; 4 ♂♂, 3.vii.2018, RD. **K23b** – ♂, 22.iii.2019, RD. **K23c** – ♂, 22.iii.2019, RD. **K24b** – ♂, 16.iv.2019, RD. **K24d** – ♂, 18.iv.2019, RD; 2 ♂♂, 3.v.2019, RD. **K24e** – ♀, 18.iv.2019, RD. **BR2** – 3 ♂♂, 5.iv.2018, RD; 2 ♂♂, 8.v.2018, RD. **SA4a** – 4 ♂♂, ♀, 7.vii.2015, RD; 3 ♂♂, ♂+♀, 9.vii.2015, GR; 3 ♂♂, 9.vii.2015, LS. **SE3c** – 2 ♂♂, 28.ix.2017, RD. **SE5c** – ♂, 9.xi.2018, RD; ♂+♀, 22.v.2019, RD; 2 ♂♂, 23.v.2019, RD.

Devadatta podolestoides Laidlaw, 1934

K1b – ♂, 8.vi.2017, RD. **K1c** – 3 ♂♂, 11.iii.2019, RD. **K2c** – ♂, 30.iv.2019, RD. **K4b** – 2 ♂♂, 9.vii.2017, RD; 2 ♂♂, 15.vi.2020, RD. **K4c** – 2 ♂♂, 12.vii.2017, RD; 2 ♂♂, 1.iv.2018, RD; ♂, 29.v.2018, RN; 2 ♂♂, 15.vi.2020, RD. **K5** – ♂, 11.iii.2018, RD. **K8di** – 2 ♂♂, 25.x.2017, RD. **K8dii** – 2 ♂♂, 30.v.2018, RD. **K8diii** – ♂, 30.v.2018, RN. **K8dv** – 2 ♂♂, 29.vi.2018, RD. **K8dvi** – ♂, 10.x.2018, RD. **K8ei** – ♂, 5.vii.2018, RD. **K8eiii** – ♂, 20.xi.2018, RD. **K8h** – 2 ♂♂, 17.vii.2018, RD. **K14a** – material listed in Dow et al. 2015. **K14d** – material listed in Dow et al. 2015. **K16c** – ♂, 5.xi.2018, RD. **K23d** – ♂, 22.iii.2019, RD. **SE1a** – 2 ♂♂, 17.ix.2017, RD; 2 ♂♂, 22.x.2017. **SE1b** – 3 ♂♂, ♂+♀, 2.iv.2018, RD. **SE5b** – 2 ♂♂, ♀, 23.v.2019, RD.

Euphaeidae

Dysphaea dimidiata Selys, 1853

K1a – 3 ♂♂, 13.ix.2017, RD; ♂, 20.ix.2017, RD; ♂, ♀, 28.ix.2017, RD. **K1b** – ♂, 8.vi.2017, RD. **K2a** – ♂, 26.ii.2018, RD; ♂, 6.vii.2018, RD; 2 ♂♂, 30.iv.2019, RD. **K2c** – ♂, ♂+♀, 30.iv.2019, RD. **K6a** – 2 ♂♂, 20.x.2017, RD; 2 ♂♂, ♂+♀, 2.viii.2019, RD. **K6b** – ♂, 20.x.2017, RD. **K8a** – 3 ♂♂, 22.ix.2017, RD; 3 ♂♂, 5.vii.2018, RD. **K16a** – 2 ♂♂, 8.x.2018, RD; ♂, 5.xi.2018, RD; ♂, 8.xi.2018, RD; 2 ♂♂, 25.iii.2019, RD. **K17a** – material listed in Hämäläinen, Dow & Stokvis (2015). **K22a** – 2 ♂♂, ♂+♀, 15.iii.2019,

RD. **K22b** – ♂, 15.iii.2019. RD; ♂, 19.iii.2019, RD; ♂, 8.iv.2019, RD; ♂, 23.iv.2019, RD; ♂, 5.ix.2019, RD. **K23a** – ♂, 22.iii.2019, RD. **K24a** – 3 ♂♂, 23.iii.2019, RD; ♂, 3.v.2019, CD. **K25a** – ♂, 16.v.2019, RD; 2 ♂♂, 31.vii.2019, RD. **SE3a** – 4 ♂♂, 18.ix.2017, RD; 2 ♂♂, 18.ix.2017, RN. **SE3d** – ♂, 25.iv.2019, RD. **SE3b** – ♂, ♂+♀, 18.ix.2017, RD; ♂, 19.ix.2017, RD; 3 ♂♂, ♂+♀, 19.vii.2018, RD; 2 ♂♂, 3.x.2018, RD. **SE6a** – ♂, 14.v.2019, RD; ♂, 13.viii.2019, RD.

Dysphaea ulu Hämäläinen, Dow & Stokvis, 2015

K8a – ♂, 22.ix.2017, RN. **K24a** – ♂, 23.iii.2019, RD; ♂, 16.iv.2019, RD; ♂, 18.iv.2019, RD.

Euphaea impar Selys, 1859

K1a – ♂, 20.ix.2017, RN. **K1b** – ♂, 8.vi.2017, RD. **K1c** – ♂, 11.iii.2019, RD. **K2c** – ♂, 30.iv.2019, RD. **K3a** – ♂, 26.ii.2018, RD. **K4b** – ♂, 9.vii.2017, RD. **K4c** – ♂, 12.vii.2017, RD; ♂, 1.iv.2018, RD; ♀, 29.v.2018, RN; ♂, 15.vi.2020, RD. **K5** – ♂, 11.iii.2018, RD. **K6a** – ♂ (immature without dark wing tip marks), 2.viii.2019, RD. **K6b** – ♂, 20.x.2017, RD. **K8b** – ♂, 25.x.2017, RD. **K14b** – ♂, 14.iii.2018, RD; ♂, 8.v.2019, RD. **K14d** – ♂, 5.vii.2015, RD; 2 ♂♂, 3.vii.2018, RD. **K16a** – ♂, 8.x.2018, RD; ♂, 25.iii.2019, RD. **K17a** – ♀, 28.vii.2013, RN. **K17b** – 2 ♂♂, ♀, 2.viii.2013, JS; 2 ♂♂, 4.i.2018, JS. **K22b** – ♂, 15.iii.2019, RD; ♂, 19.iii.2019, RD. **K23a** – 2 ♂♂, 14.iii.2019, RD; ♂, 22.iii.2019, RD. **K23c** – 2 ♂♂, 22.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD; ♂, 16.iv.2019, RD; 2 ♂♂ (one teneral), 3.vii.2019, CD. **K24c** – ♂, 23.iii.2019, RD. **K24d** – ♂, 3.vii.2019, RD **K24e** – ♂, 18.iv.2019, RD. **K25a** – ♂, 16.v.2019, RD; ♂, 31.vii.2019, RD. **K27** – ♂, 11.viii.2020, RD. **SA4a** – ♂, 7.vii.2015, RD; 2 ♂♂, 9.vii.2015, GR; 2 ♂♂, 9.vii.2015, LS. **SA4b** – ♂, 10.vii.2015, GR. **SE1a** – ♂, 17.ix.2017, RD; ♂, 22.x.2017, RD. **SE1b** – ♂, ♀, 2.iv.2018, RD. **SE3b** – ♂, 19.vii.2018, RD. **SE3c** – ♂, 19.ix.2017, RD. **SE4a** – ♂, ♂+♀, 11.x.2018, RD. **SE5a** – ♂, 9.xi.2018, RD; ♂, 22.v.2019, RD. **SE5b** – ♂, 22.v.2019, RD. **SE5c** – ♂, 22.v.2019, RD. **SE6a** – ♂, 14.v.2019, RD; ♂, 13.viii.2019, RD. **SE6b** – ♂, 13.viii.2019, RD.

Euphaea subcostalis Selys, 1873

K1b – ♂, 8.vi.2017, RD. **K4b** – ♂, 9.vii.2017, RD. **K4c** – ♂, 12.vii.2017, RD; ♂+♀, 28.vii.2017, RD; ♂, 1.iv.2018, RD; ♂, 29.v.2018, RN. **K8c** – ♀, 8.v.2018, RD. **K8di** – ♂, 16.xi.2018, RD. **K8diii** – ♂, 30.v.2018, RN. **K8dvi** – ♂, 10.x.2018, RD. **K8ei** – ♂, 5.vii.2018, RD; ♀, 20.xi.2018, RD. **K8h** – ♂, ♀, 17.vii.2018, RD. **K14d** – ♂, 3.vii.2018, RD. **K16b** – ♂, 8.x.2018, RD. **K23c** – ♂, 22.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD. **SA4a** – 2 ♂♂, 9.vii.2015, GR. **SE1a** – ♂, 17.ix.2017, RD; ♂, 17.ix.2017, RN. **SE1b** – ♂, 2.iv.2018, RD. **SE5a** – ♂, 23.v.2019, Michael & Kak. **SE5b** – ♂, 22.v.2019, RD; ♂, 23.v.2019, RD.

Euphaea tricolor Selys, 1859

K1a – ♂, 20.ix.2017, RD; ♂, 4.x.2018, RD. **K2a** –3 ♂♂, 12.i.2018, RD; ♂, 6.vii.2018, RD; ♂, 30.iv.2019, RD. **K2c** –2 ♂♂, 30.iv.2019, RD. **K3a** –2 ♂♂, 26.ii.2018, RD. **K6a** –2 ♂♂, 20.x.2017, RD; 3 ♂♂, 2.viii.2019, RD. **K8a** –3 ♂♂, 22.ix.2017, RD; 3 ♂♂ (2 teneral), 22.ix.2017, RN; 2 ♂♂, 5.vii.2018, RD. **K8ei** – ♂, 5.vii.2018, RD. **K16b** – ♂, 8.x.2018, RD. **K22a** – ♂, 15.iii.2019, RD. **K22b** – ♂, 19.iii.2019, RD; ♂, 23.iv.2019, RD; ♂, 5.ix.2019, RD. **K23a** – 3 ♂♂, 14.iii.2019, RD; ♂, 22.iii.2019, RD. **K24a** – 3 ♂♂, 23.iii.2019, RD; ♂+♀, 16.iv.2019, RD; 5 ♂♂, 3.vii.2019, CD. **K24e** – ♂, 18.iv.2019, RD. **K27** – 2 ♂♂, 11.viii.2020, RD. **SE3a** – 2 ♂♂, 18.ix.2017, RD. **SE3b** – ♂, 18.ix.2017, RN; ♂, 28.ix.2017, RD; ♂, 19.vii.2018, RD; ♂, 3.x.2018, RD. **SE3c** – ♂, 19.ix.2017, RD. **SE4a** –2 ♂♂, 11.x.2018, RD. **SE5a** –3 ♂♂, 9.xi.2018, RD; ♂, 22.v.2019, RD. **SE6a** – ♂, 13.viii.2019, RD.

Philosinidae

Rhinagrion borneense (Selys, 1886)

K1a – ♂, 13.ix.2017, RD; ♂, ♀, 20.ix.2017, RN. **K2c** – 2 ♂♂, 30.iv.2019, RD. **K3a** – ♂, 26.ii.2018, RD. **K4b** – ♂, 9.vii.2017, RD; ♂, 15.vi.2020, RD. **K4c** – ♂, 1.iv.2018, RD; ♂, 29.v.2018, RD. **K6b** – ♂, 20.x.2017, RD. **K17a** – ♂, 28.vii.2013, RD. **K17b** – 2 ♂♂, 2.viii.2013, RD; ♂, 4.i.2018, RD; 2 ♂♂ 4.i.2018, JS. **K23a** – 3 ♂♂, 14.iii.2019, RD; 2 ♂♂, ♀, 22.iii.2019, RD. **K23c** – ♂, 22.iii.2019, RD. **K24a** – 3 ♂♂, 23.iii.2019, RD; ♂, 16.iv.2019, RD; ♂, 3.vii.2019, P. Dow. **K24e** – ♂, 18.iv.2019, RD. **K27** – ♂, ♀ (in bamboo away from stream), 11.viii.2020, RD. **SA4a** – ♂, 7.vii.2015, RD. **SA4b** – ♂, 10.vii.2015, GR. **SE2b** – ♂, 16.ix.2017, RD; ♂, 16.ix.2017, RN. **SE3b** – ♂, 19.ix.2017, RD. **SE4a** – 4 ♂♂ (one abnormal), 11.x.2018, RD. **SE6a** – ♂, 13.viii.2019, RD. **SE6b** – ♂, 13.viii.2019, RD.

Incertae sedis

Bornargiolestes reelsi Dow, 2014

K8div – ♀, 30.v.2018, RD. **K8h** – ♀, 17.vii.2018, RD. **K14c** – ♂, 5.vii.2015, RD; ♀, 5.vii.2015, GR. **K14d** – ♀, 8.ix.2014, RD; ♂, ♀ (both at tiny, very steep, seepage area with water only above ground for ca 1-2 m, in forest remote from other streams), 2.vii.2017, RD.

Platycnemididae

Coeliccia cyaneothorax Kimmins, 1936

K8a – 2 ♂♂ (at small rock pools at side of stream), 22.ix.2017, RD. **K16a** – ♂, 5.xi.2018, RD; ♀, 25.iii.2019, RD.

Coeliccia flavostriata Laidlaw, 1918

K1c – ♂, 11.iii.2019, RD. **K4b** – 2 ♂♂, ♀, 15.vi.2020, RD. **K4c** – 3 ♂♂, 12.vii.2017, RD; 2 ♂♂, 2 ♀♀, 1.iv.2018, RD; 2 ♂♂, 29.v.2018, RN; ♂, 15.vi.2020, RD. **K5** – 3 ♂♂, 11.iii.2018, RD. **K8b** – ♂, 20.xi.2018, RD. **K8c** – ♂, ♀, 10.x.2018, RD. **K8di** – ♂, 25.x.2017, RD. **K8dii** – 2 ♂♂, 30.v.2018, RD. **K8diii** – ♂, 30.v.2018, RN. **K8div** – ♂, 30.v.2018, RD. **K8dv** – 2 ♂♂, ♀, 29.vi.2018, RD. **K8dvi** – 2 ♂♂, 10.x.2018, RD. **K8eii** – ♂, 5.vii.2018, RD. **K8eiii** – ♂, ♀, 20.xi.2018, RD. **K8h** – 2 ♂♂, 17.vii.2018, RD. **K14a** – ♂, ♀, 31.iii.2014, RD; ♂, 3.vii.2018, RD **K14d** – ♂, 5.vii.2015, RD; 2 ♂♂, 5.vii.2015, GR; ♀, 23.ii.2016, RD; 2 ♂♂, ♀, 2.vii.2017, RD; ♂, 19.vii.2017, RD. **K16c** – ♂, 5.xi.2018, RD. **K23d** – ♂, ♀, 22.iii.2019, RD. **BR1** – 2 ♂♂, 2 ♀♀, 8.v.2018, RD. **SA4a** – ♂, ♀, 7.vii.2015, RD. **SE1a** – 5 ♂♂, 17.ix.2017, RD; 2 ♂♂, ♀, 22.x.2017, RD. **SE1b** – 4 ♂♂, 2.iv.2018, RD.

Coeliccia matok Dow, 2016

SA5 – ♂, 19.xii.2018, RD.

Coeliccia sp. cf *nemoricola* Laidlaw, 1912

K8b – 2 ♂♂, 25.x.2017, RD; ♂, 17.vii.2018, RD. **K14a** – ♂, 31.iii.2014, RD; 2 ♂♂, 9.viii.2017, RD; ♂, 3.vii.2018, RD. **K14d** – ♂, 8.ix.2014, RD; ♂, 5.vii.2015, RD; ♀, 5.vii.2015, GR; 2 ♂♂, 23.ii.2016, RD; ♂, 8.v.2019, RD. **K14e** – ♂, 14.iii.2018, RD. **BR2** – 3 ♂♂, 5.iv.2018, RD; ♂, ♂+♀, 8.v.2018, RD.

Coeliccia nigrohamata Laidlaw, 1918

K1c – ♂, 11.iii.2019, RD. **K4b** – ♂, 15.vi.2020, RD. **K4d** – 3 ♂♂, 1.iv.2018, RD. **K4e** – 2 ♂♂ (small forest pool), 9.vii.2017, RD; ♂ (small pool beside track), 12.vii.2017, RD. **K5** – ♂,

11.iii.2018, RD. **K8b** – ♀, 5.vii.2018, RD; ♀, 20.xi.2018, RD. **K8c** – ♂, 8.v.2018, RD; ♂+♀, 30.v.2018, RD. **K8ei** – ♂, 5.vii.2018, RD. **K8eiii** – ♂, 20.xi.2018, RD. **K14a** – ♂, 31.iii.2014, RD; ♂, 3.vii.2018, RD. **K14b** – ♂, 8.v.2019, RD. **K14d** – ♂, 23.ii.2016, RD. **K22d** – ♂, 19.iii.2019, RD. **K23a** – ♂, 14.iii.2019, RD. **K23c** – ♂, 22.iii.2019, RD. **K24b** – ♂, 23.iii.2019, RD. **K24d** – ♂, 18.iv.2019, RD; ♂, 3.vii.2019, RD. **K26a** – ♂, 15.vi.2020, RD. **SA4a** – 2 ♂♂, 7.vii.2015, RD; 8 ♂♂, 9.vii.2015, GR; ♂, 9.vii.2015, LS. **SE5a** – ♂ (small pool at side), 22.v.2019, RD. **SE5b** – 3 ♂♂, 23.v.2019, RD. **SE5c** – ♂, 22.v.2019, RD; ♂, 23.v.2019, RD.

Copera vittata (Selys, 1863)

K2e – ♂, 6.vii.2018, RD. **K4e** – ♂ (small forest pool at base of limestone hill), 9.vii.2017, RD; ♂ (same habitat), 15.vi.2020, RD. **K8e**i – ♂ (at pool beside stream), 5.vii.2018, RD. **K9a** – ♂, 30.vii.2017, RD. **K10** – ♀, 7.i.2018, RD. **K12a** – ♂, ♂+♀, 22.vii.2017, RD; ♂+♀, 5.viii.2017, RD; ♂, 10.vi.2020, RD. **K17a** – ♂, ♂+♀, 28.vii.2013, RD. **K17b** – 2 ♂♂, 2.viii.2013, RD; ♂, ♀, ♂+♀, 2.viii.2013, RN; 5 ♂♂, 2.viii.2013, JS; ♂, 4.i.2018, RD; ♂, 4.i.2018, JS. **K19a** – 3 ♂♂, 25.i.2019, RD. **K23a** – ♂, 14.iii.2019, RD; ♂, 22.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD, ♂+ ♀, 16.iv.2019, RD. **K24b** – ♂, 23.iii.2019, RD. **K26a** – ♀, 15.vi.2020, RD. **K27** – ♂, 11.viii.2020, RD. **SA1**b – ♂, 21.ii.2018, CD; ♂+♀, 21.ii.2018, RD. **SE2c** – 2 ♂♂, ♂+♀, 16.ix.2017, RD. **SE4a** – ♂+♀ (at backwater), 11.x.2018, RD.

"*Elattoneura*" analis (Selys, 1860)

K2a – ♂, ♀, 6.vii.2018, RD. **K2c** – 2 ♂♂, 30.iv.2019, RD. **K4b** – 4 ♂♂, 9.vii.2017, RD. **K4c** – ♂, ♀, 12.vii.2017, RD; 2 ♂♂, 1.iv.2018, RD; ♂, 29.v.2018, RD; 3 ♂♂ (one with pale marks blue), 29.v.2018. RN; ♂, 15.vi.2020, RD. **K4e** – ♂, 1.iv.2018, RD; ♂ (forest pool at base of limestone hill), 15.vi.2020, RD. **K5** – ♂, 11.iii.2018, RD. **K6a** – ♂, 20.x.2017, RD. **K6b** – ♂, 20.x.2017, RD. **K22b** – ♂, 8.iv.2019, RD. **K23a** – ♂ (seemingly mature but pale marks blue), 22.iii.2019, RD. **K23c** – 2 ♂♂, 22.iii.2019, RD. **K24e** – ♂, 18.iv.2019, RD. **SA4a** – 3 ♂♂, ♀, 7.vii.2015, RD; ♂, 9.vii.2015, GR. **SA4b** –4 ♂♂, ♂+♀, 10.vii.2015, GR; 3 ♂♂, 10.vii.2015, LS. **SE2b** – 6 ♂♂, 4.iv.2018, RD. **SE3c** – ♂, 28.ix.2017, RD. **SE5a** – 2 ♂♂, 9.xi.2018, RD; ♂, ♀ (with pale marks blue), 22.v.2019, RD. **SE5c** – ♂, 22.v.2019, RD. **SE6a** – ♂, 14.v.2019, RD. E6b – ♂, 13.viii.2019, RD.

"*Elattoneura*" *aurantiaca* (Selys, 1886)

K17b – 3 ♂♂, ♂+♀, 2.viii.2013, RD; 3 ♂♂, 2.viii.2013, RN; ♂, ♀, 2.viii.2013, JS; 2 ♂♂, 2.viii.2013, RS. **K17c** – 2 ♂♂, 4.i.2018, RD.

Onychargia atrocyana Selys, 1865

K11 – ♂ (at lights in apartment at dusk), 4.viii.2017, RD. **K12a** – ♂+♀, 22.vii.2017, RD. **K19b** – ♀ (teneral, in long grass near stream), 25.i.2019, RD. **SA3b** – ♂+♀, 29.i.2015, RD.

Prodasineura collaris (Selys, 1860)

K17a – ♂, 28.vii.2013, RN. **K17b** – 3 ♂♂, 2.viii.2013, RD; ♂, 2.viii.2013, JS.

Prodasineura dorsalis (Selys, 1860)

K4b – ♂, 9.vii.2017, RD; ♂, 12.vii.2017, RD; ♂, 15.vi.2020, RD. **K4d** – ♂, 1.iv.2018, RD. **K8b** – ♂, 29.vi.2018, RD; ♂, 5.vii.2018, RD; ♂, 20.xi.2018, RD. **K9a** – 3 ♂♂, ♀, 30.vii.2017, RD. **K14a** – ♂, 31.iii.2014, RD. **K14b** – ♂, 14.iii.2018, RD; ♂, 8.v.2019, RD. **K17b** – 2 ♂♂, ♂+♀, 2.viii.2013, RD; 2 ♂♂, 2 ♀♀, 2.viii.2013, JS; ♂, 2.viii.2013, RS; 2 ♂♂, 4.i.2018, RD; 2 ♂♂, 4.i.2018, JS. **K22d** – 2 ♂♂, 19.iii.2019, RD; ♂+♀, 23.iv.2019, RD.

K23a – ♂, 14.iii.2019, RD. **K24b** – ♂, 23.iii.2019, RD. **K24d** – ♂, ♂+♀, 18.iv.2019, RD; ♂, 3.vii.2019, RD. **K24f** – ♀, 23.iii.2019, RD. **SA4a** – 3 ♂♂, ♀, 7.vii.2015, RD; ♂, 9.vii.2015, GR. **SA4b** – ♂, 10.vii.2015, LS. **SE1a** – 2 ♂♂, 22.x.2017, RD. **SE5a** – ♂+♀, 9.xi.2018, RD. **SE5c** – ♂, 22.v.2019, RD; ♂, 23.v.2019, RD.

Prodasineura haematosoma Lieftinck, 1937

K4b – 2 ♂♂, 9.vii.2017, RD. **K8b** – ♂, 25.x.2017, RD. **K8c** – ♂, ♀ (small pool besides logging road), 25.x.2017, RD. **K8eii** – ♂, 5.vii.2018, RD. **K8eiii** – ♂, 20.xi.2018, RD. **K23a** – ♂ (in mouth of small tributary), 22.iii.2019, RD. **SE2c** – 6 ♂♂, ♂+♀, 16.ix.2017, RD. **SE3c** – 2 ♂♂, ♀, 28.ix.2017, RD. **SE5a** – ♂, ♀, 9.xi.2018, RD. **SE5b** – ♂, ♂+♀, 23.v.2019, RD. **SE5c** – 2 ♂♂, 22.v.2019, RD.

Prodasineura hosei (Laidlaw, 1913)

K23a – 2 ♂♂, 14.iii.2019, RD. **K23c** – ♂, 22.iii.2019, RD. **K24a** – ♂, 18.iv.2019, RD. **K24d** – ♂, 3.vii.2019, RD. **K24e** – ♂, 18.iv.2019, RD.

Prodasineura sp. cf *interrupta* (Selys, 1860)

K17b – Material to be listed elsewhere. **K17c** – Material to be listed elsewhere.

Prodasineura notostigma (Selys, 1860)

K14b – ♂+♀, 8.v.2019, RD. **K17b** – 4 ♂♂, 2 ♀♀, 2.viii.2013, RD; ♂, ♀, 2.viii.2013, RN; 9 ♂♂, 2.viii.2013, JS; 6 ♂♂, 2.viii.2013, RS; 2 ♂♂, ♀, 4.i.2018, RD; 4 ♂♂, ♀, 4.i.2018, JS. **K24b** – ♂, 23.iii.2019, S. Butler. **K24d** – ♂, 18.iv.2019, RD. **SA4b** – ♂, 10.vii.2015, GR.

Prodasineura tenebricosa Lieftinck, 1937

K3a – ♂, ♀, 26.ii.2018, RD. **K6a** – ♂, ♀, 20.x.2017, RD. **K22a** – ♂, 14.iii.2019, RD. **SE3a** – ♂, 18.ix.2017, RD. **SE3b** – ♀, 19.ix.2017, RN; 2 ♂♂, ♀, 19.vii.2018, RD. **SE6a** – 3 ♂♂, ♂+♀, 14.v.2019, RD; 5 ♂♂, ♂+♀, 13.viii.2019, RD. **SE6b** – ♀ (near mouth), 13.viii.2019, RD.

Prodasineura verticalis (Selys, 1860)

K1a – ♂, 13.ix.2017, RD; ♂, 20.ix.2017, RN. **K1b** – ♂, 8.vi.2017, RD. **K2a** – ♂, 6.vii.2018, CD; 2 ♂♂, 6.vii.2018, RD; ♂, 30.iv.2019, RD. **K2b** – ♂+♀ (at shady backwater), 6.vii.2018, RD. **K2c** – 2 ♂♂, 30.iv.2019, RD. **K3a** – ♂+♀, 26.ii.2018, RD. **K3b** – ♂, 26.ii.2018, RD. **K4b** – 2 ♂♂, 9.vii.2017, RD. **K4f** – ♂ (at outflow trickle from pond), 28.vii.2017, RD. **K6a** – ♂, 20.x.2017, RD. **K6b** – ♂, 20.x.2017, RD; 3 ♂♂, 2.viii.2019, RD. **K8a** – ♂, 2(♂+♀), 22.ix.2017, RD; ♂, 22.ix.2017, RN; ♂, 5.vii.2018, RD. **K10** – 7 ♂♂, ♀, 7.i.2018, RD. **K16a** – ♂, 8.x.2018, RD; ♂, 5.xi.2018, RD. **K16b** – ♂+♀, 8.x.2018, RD. **K17a** – ♂, ♀, ♂+♀, 28.vii.2013, RD; ♂, 28.vii.2013, RN. **K19d** – 2 ♂♂, 25.i.2019, RD. **K22a** – ♂, 15.iii.2019, RD. **K22b** – 2 ♂♂, ♂+♀, 15.iii.2019, RD; ♂, 19.iii.2019, RD. **K23a** – ♂, 14.iii.2019, RD. **K24a** – 2 ♂♂, ♀, 23.iii.2019, RD; ♂, 3.vii.2019, P. Dow. **K25a** – ♂, 16.v.2019, RD; ♂, 31.vii.2019, RD. **K26b** – ♂, 15.vi.2020, RD. **K27** – 2 ♂♂, ♂+♀, 11.viii.2020, RD. **SA1**a – ♂, ♀ (teneral), 21.ii.2018, CD. **SA1**b – 2 ♀♀, 21.ii.2018, RD. **SA4b** – 6 ♂♂, 10.vii.2015, GR; ♀, 10.vii.2015, LS. **SE2b** – 2 ♂♂, 16.ix.2017, RD; ♂, 16.ix.2017, RN; ♂, 4.iv.2018, RD. **SE3a** – 2 ♂♂, 18.ix.2017, RD; ♂, 18.ix.2017, RN. **SE3b** – ♂+♀, 28.ix.2017, RD; ♂, 19.vii.2018, RD; ♂, 3.x.2018, RD. **SE3c** – ♂, 19.ix.2017, RD. **SE4a** – ♂, 11.x.2018, RD. **SE5a** – ♂, 9.xi.2018, RD; ♂, 22.v.2019, RD. **SE6a** – ♂, 14.v.2019, RD.

Pseudocopera ciliata (Selys, 1863)

K17b – ♀, 2.viii.2013, RD.

Coenagrionidae

Aciagrion borneense Ris, 1911

K4e – ♂+♀, 12.vii.2017, RD. **K7a** – 4 ♂♂, 22.ix.2017, RD; ♂, ♀, 14.xii.2017, RD. **K15** – 2 ♂♂, 28.v.2018, RD; ♂, ♀, 28.v.2018, RN. **K18** – ♀, 18.i.2019, RD. **K19c** – ♂, 25.i.2019, RD. **K20b** – ♂, 28.i.2019, RD. **K21a** – ♂, 11.iii.2019, RD. **SA2**b – ♀, 21.ii.2018, RD. **SA3a** – 2 ♂♂, 31.i.2015, RD; ♂, 31.i.2015, LS. SA4c – ♂, 7.vii.2015, RD.

Agriocnemis femina (Brauer, 1868)

K7a – ♂, 2 ♀♀, 22.ix.2017, RD; 2 ♂♂, ♀, 14.xii.2017, RD. **K11** – ♂, 18.vi.2017, P. Dow. **K12b** – ♂, 22.vii.2017, RD. **K19b** – ♂, 25.i.2019, RD. **K19d** – ♀ (in grass in shade by stream), 25.i.2019, RD. **SA3a** – ♀, 27.i.2015, RD.

Agriocnemis minima Selys, 1877

K15 – ♀, 28.v.2018, RD. **K17b** – 2 ♂♂, 2 ♀♀, 2.viii.2013, RD; ♂, 2 ♀♀, 2.viii.2013, JS. **SA3a** – 2 ♀♀, 27.i.2015, LS; ♀, 31.i.2015, RD.

Agriocnemis pygmaea (Rambur, 1842)

SE2a – ♀, 16.ix.2017, RN.

Amphicnemis annae Lieftinck, 1940

SA5 – 7 ♂♂, 4 ♀♀, 19.xii.2018, RD.

Amphicnemis madelenae Laidlaw, 1913

K9a – ♀, 30.vii.2017, RD.

Amphicnemis martini-group

K9a – ♂, ♀, 30.vii.2017, RD; 5 ♂♂, 2 ♀♀, 26.xi.2017, RD. **K17b** – 3 ♂♂, 2 ♀♀, 4.i.2018, RD. **K17c** – 3 ♂♂, 4.i.2018, RD. **SA5** – 6 ♂♂, 3 ♀♀, 19.xii.2018, RD.

Amphicnemis rigiketit Dow, 2019

Material listed in Dow (2019b).

Amphicnemis wallac**ii** Selys, 1863

K9a – 7 ♂♂, ♀, 30.vii.2017, RD; 3 ♂♂, 26.xi.2017, RD. **K10** – ♂ (in forest), 7.i.2018, RD. **K11** – ♀ (in apartment during day), 5.iii.2018, P. Dow. **K12a** – 5 ♂♂, ♀, 22.vii.2017, RD; 6 ♂♂, 5.viii.2017, RD; 2 ♂♂, ♀, 2.xii.2017, RD; 2 ♂♂, ♀, 10.vi.2020, RD. **K17b** – ♂, 2.viii.2013, JS; ♀, 4.i.2018, RD. **SA3c** – ♀ (at lights at 8 P.M.), 31.i.2015, LS. **SA5** – 4 ♀♀, 19.xii.2018, RD.

Archibasis melanocyana (Selys, 1877)

SA5 – ♂, 19.xii.2018, RD.

Archibasis tenella Lieftinck, 1949

K4c – ♂, 4.iv.2018, RD. **K6b** – ♂, 20.x.2017, RD. **K17b** – 4 ♂♂, 2 ♀♀, 2.viii.2013, RD. ♂, 2.viii.2013, RN; ♂, 2.viii.2013, JS; 2 ♂♂, 2.viii.2013, RS; ♂, 4.i.2018, JS. **K23a** – 3 ♂♂, ♀, 14.iii.2019, RD; ♂, 22.iii.2019, RD. **K24a** – 2 ♂♂, 23.iii.2019, RD; ♂, 3.vii.2019, RD. **K24c** – ♂, 23.iii.2019, RD. **K24d** – ♂, 3.vii.2019, RD. **SA4b** – ♂, 10.vii.2015, LS. **SE3a** – ♂, 19.ix.2017, RD. **SE6b** – ♂, 13.viii.2019, RD.

Archibasis viola Lieftinck, 1949

K9a – 2 ♂♂, 26.xi.2017, RD. **K17b** – 3 ♂♂, 2.viii.2013, RD; ♂, 2.viii.2013, RN; 3 ♂♂, 2.viii.2013, JS; 2 ♂♂, 2.viii.2013, RS. **K17c** – ♂, 4.i.2018, RD. **K19a** – 2 ♂♂, 25.i.2019, RD. **SA5** – ♂, 19.xii.2018, RD. **SE2a** – ♂, 4.iv.2018, RD.

Argiocnemis sp.

K2e – ♂, 6.vii.2018, RD. **K4e** – 2 ♂♂, 28.vii.2017, RD. **K6c** – ♂, 20.x.2017, RD. **K8c** – ♂ (at small pool), 29.vi.2018, RD. **K8ei** – ♂ (at pool beside stream), 5.vii.2018, RD. **K16d** – ♂, 5.xi.2018, RD. **K17a** – ♂, ♀, 28.vii.2013, RD. **K24b** – ♂, 18.iv.2019, RD. **SE5a** – ♂ (near backwater), 9.xi.2018, RD. **SE6b** – ♀, 13.viii.2019, RD.

Ceriagrion bellona Laidlaw, 1915

K8c – ♂ (at small pool), 29.vi.2018, RD; ♂+ ♀ (at long pool), 10.x.2018, RD. **K16d** – ♂, ♂+♀, 8.xi.2018, RD; ♂+♀, 25.iii.2019, RD.

Ceriagrion cerinorubellum (Brauer, 1865)

K4c – ♂+♀, 28.vii.2017, RD. **K4f** – ♂, 28.vii.2017, RD. **K7a** – ♂, 22.ix.2017, RD; 2 ♂♂, 14.xii.2017, RD. **K8f** – ♂, 29.vi.2018, RD. **K9b** – ♂, 30.vii.2017, RD. **K11** – ♀ (found in apartment at ca 8 A.M.), 20.vii.2017, RD; ♀ (outside apartment block), 13.xii.2017, RD; ♀ (in apartment in evening), 14.i.2019, RD; ♀ (in apartment in evening), 5.iii.2020, RD; ♀ (in apartment in evening), 5.v.2020, RD; ♀ (found dead on apartment floor in mid-afternoon), 25.v.2020, RD; ♀ (in apartment in evening), 2.vi.2020, RD; ♀ (in apartment in early afternoon), 11.vi.2020, RD. **K12b** – ♂, 22.vii.2017, RD. **K14f** – ♂+♀, 8.v.2019, RD. **K15** – ♂, 28.v.2018, RD. **K16d** – ♂, 8.xi.2018, RD. **K17b** – ♂, 2.viii.2013, RD; ♂, 2.viii.2013, RN; ♂, 2.viii.2013, JS; 2 ♂♂, 2.viii.2013, RS. **K17c** – ♂, 4.i.2018, RD; 3 ♂♂, 4.i.2018, JS. **K18** – ♂, 18.i.2019, RD. **K19c** – ♂, 25.i.2019, RD; 2 ♂♂, 10.vi.2020, RD. **K19d** – ♂, 25.i.2019, RD. **K20a** – ♂, 28.i.2019, RD. **K20b** – ♂, 28.i.2019, RD. **K23a** – ♂+♀, 14.iii.2019, RD. **K27** – ♀, 11.viii.2020, RD. **SA1**b – ♀, 21.ii.2018, RD. **SA2**a – ♂, 21.ii.2018, RD. **SA3a** – ♂, 7.vii.2015, GR. **SE2a** – ♀, 16.ix.2017, RD. **SE2d** – ♂+♀, 4.iv.2018, RD. **SE3a** – ♂, 18.ix.2017, RD.

Ischnura senegalensis (Rambur, 1842)

K7a – ♂, 22.ix.2017, RD. **K11** – ♀ (flying among plants on apartment balcony in early morning), 9.iv.2020, RD; ♂ (in parking space below apartments), 14.vi.2020, RD; 2 ♂♂, ♀ (all semi-teneral, all around plants outside buildings at apartment complex), 20.vi.2020, P. Dow; ♂ (in parking space below apartments at ca 12:10 PM), 20.ix.2020, RD. **K15** – ♂, ♂+♀, 28.v.2018, RD. **K19c** – ♂, 25.i.2019, RD. **K20a** – ♂, ♀, 28.i.2019, RD. **K21b** – ♂, 11.iii.2019, RD.

Mortonagrion indraneil Dow, 2011

K9a – ♂, 30.vii.2017, RD. **K12a** – ♂, 22.vii.2017, RD; ♂, 5.viii.2017, RD. **SA5** – ♂, 19.xii.2018, RD.

Pericnemis dowi Orr & Hämäläinen, 2013

SA4a – ♀, 9.vii.2015, GR.

Pericnemis stictica Hagen in Selys, 1863

K1a – ♂ (at edge of stream near tree with water containing hole), 8.iii.2018, RD. **SA1b** – ♀ (perched by clump of very large bamboo), 21.ii.2018, RD.

Pseudagrion coomansi Lieftinck, 1937

K17b – 3 ♂♂, 2.viii.2013, RD; ♂, 2.viii.2013, JS.

Pseudagrion lalakense Orr & van Tol, 2001

K8g – ♂, 29.vi.2018, RD. **K16d** – ♂, 8.xi.2018, RD. **SE2a** – ♂, 16.ix.2017, RD. **SE6a** – ♂ (in open section near bridge), 13.viii.2019, RD.

Pseudagrion microcephalum (Rambur, 1842)

K4a – ♂, 9.vii.2017, RD; ♂+♀, 1.iv.2018, RD. **K4e** – ♂, 28.vii.2017, RD. **K4f** – 4 ♂♂, ♂+♀, 28.vii.2017, RD. **K7a** – 9 ♂♂, ♀, 2(♂+♀), 22.ix.2017, RD; 16 ♂♂, 14.xii.2017, RD. **K10** – 4 ♂♂, 7.i.2018, RD. **K11** – ♂, in apartment at noon, 26.xii.2018, RD; ♂ (semi-teneral), in apartment in middle of day, 5.i.2019, RD; ♂, (semi-teneral), in apartment in morning, 25.i.2019, RD. **K12b** – ♂, 22.vii.2017, RD. **K15** – 4 ♂♂, 28.v.2018, RD; ♂, 28.v.2018, RN. **K19c** – 3 ♂♂, ♂+♀, 25.i.2019, RD; 4 ♂♂, 10.vi.2020, RD. **K19d** – 2 ♂♂, 25.i.2019, RD. **K20a** – ♂, ♂+♀, 28.i.2019, RD. **K23a** – ♂, 22.iii.2019, RD. **K26b** – 3 ♂♂, 15.vi.2020, RD. **K27** – 2 ♂♂, 11.viii.2020, RD. **SA2**a – ♂, 21.ii.2018, RD. **SA3a** – ♂, 7.vii.2015, GR. **SE2a** – 2 ♂♂, 16.ix.2017, RD; ♂, 4.iv.2018, RD. **SE2b** – ♂+♀ (late afternoon), 5.xi.2018, RD. **SE3a** – ♂, 18.ix.2017, RN.

Pseudagrion perfuscatum Lieftinck, 1937

K1a – ♂, 13.ix.2017, RD; ♀, 20.ix.2017, RD. **K1b** – ♂+♀, 8.vi.2017, RD. **K2a** – ♂, 12.i.2018, CD; 2 ♂♂, 12.i.2018, RD; ♂, ♀, 6.vii.2018, CD. **K6a** – ♂, ♂+♀, 22.x.2017, RD; ♂, 2.viii.2019, RD. **K7b** – ♂, ♀, 14.xii.2017, RD. **K8a** – ♂, 22.ix.2017, RD; 2 ♂♂, 5.vii.2018, RD. **K10** – 3 ♂♂, 7.i.2018, RD. **K16a** – ♂+ ♀, 8.x.2018, RD; ♂, 5.xi.2018, RD. **K16b** – ♂, 8.x.2018, RD. **K19d** – ♂, 25.i.2019, RD. **K22a** – 3 ♂♂, 15.iii.2019, RD. **K22b** – ♂, ♂+♀, 15.iii.2019, RD; ♂, 19.iii.2019, RD; ♂, 23.iv.2019, RD; ♂, 5.ix.2019, RD. **K23a** – ♂, 14.iii.2019, RD; ♂, 22.iii.2019, RD. **K27** – ♂, 11.viii.2020, RD. **SA1a** – 3 ♂♂, 21.ii.2018, CD; ♂, 21.ii.2018, RD. **SA4b** – ♂, 10.vii.2015, GR. **SE2b** – ♂, 16.ix.2017, RD; ♂, 4.iv.2018, RD. **SE3a** – 2 ♂♂, ♂+♀, 18.ix.2017, RD. **SE3b** – ♂, 19.ix.2017, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE4a** – ♂, 11.x.2018, RD. **SE5a** – ♂, 9.xi.2018, RD.

Stenagrion dubium (Laidlaw, 1912)

K4b – ♂, 9.vii.2017, RD; ♂, 15.vi.2020, RD. **K4d** – ♂, 1.iv.2018, RD. **K5** – ♂, 11.iii.2018, RD. **K8a** – 2 ♂♂ (at shaded rocky trickles at side of stream), 22.ix.2017, RD. **K8c** – ♂, 30.v.2018, RD. **K8di** – 2 ♂♂, 25.x.2017, RD; ♂, 16.xi.2018, RD. **K8dii** – ♂, 30.v.2018, RD. **K8dv** – 3 ♂♂, 29.vi.2018, RD. **K8eiii** – ♂, 20.xi.2018, RD. **K14a** – ♂, 31.iii.2014, RD. **K14b** – ♂, 8.v.2019, RD. **K14d** – ♂, 8.ix.2014, RD; 2 ♂♂, 5.vii.2015, RD; 2 ♂♂, 3.vii.2018, RD. **K16a** – ♂, 5.xi.2018, RD. **K23a** – ♂, 22.iii.2019, RD. **K24e** – ♂, 18.iv.2019, RD. **BR1** – ♂+♀, 8.v.2018, RD. **SA4a** – ♂, 9.vii.2015, GR. **SE1a** – 2 ♂♂, 17.ix.2017, RD; 2 ♂♂, 22.x.2017, RD.

Teinobasis ruficollis (Selys, 1877)

K12a – ♂, 22.vii.2017, RD; ♂, ♀, 5.viii.2017, RD; ♂, 2.xii.2017, RD.

Xiphiagrion cyanomelas Selys, 1876

K15 – 3 ♂♂, 28.v.2018, RD; ♂, 28.v.2018, RN. **K16d** – ♂+♀, 8.xi.2018, RD.

Anisoptera

Aeshnidae

Anax ?guttatus (Burmeister, 1839)

K1b – ♀, 8.vi.2017, RD.

Gynacantha maclachlani Krüger, 1899

K11 – ♀ (at lights at dusk), 8.iv.2018, RD; ♀ (in apartment), 1.ii.2020, RD. **K14c** – ♀, 8.v.2019, RD.

Heliaeschna idae (Brauer, 1865)

SA3c – ♂ (found dead in a drain outside plantation guest house in early morning), 3.ii.2015, RD.

Heliaeschna simplicia (Karsch, 1891)

K11 – ♀, 19.vii.2018, P. Dow; ♀ (in apartment at ca 8 PM), 24.xii.2018, RD; ♀ (in apartment in morning), 29.iv.2019, P. Dow.

Indaeschna grubaueri (Förster, 1904)

K4c – ♀, 1.iv.2018, RD. **K8c** – ♂ (pool by logging road), 25.x.2017, RD; ♂, 30.v.2018, RD. **K16a** – ♂ (perched in short second growth forest a few metres back from stream), 25.iii.2019, RD.

Oligoaeschna foliacea Lieftinck, 1968

K13 – ♂, 19.vii.2018, RD.

Tetracanthagyna cf *degorsi* Martin, 1895

K16a – 3 larvae, 25.iii.2019, SB. **K22b** – larva, 8.iv.2019, SB. **K23a** – 2 larvae, 22.iii.2019, SB. **K24a/b** – 1 larva, 23.iii.2019, SB.

Gomphidae

Acrogomphus sp.

K4b – larva, 29.v.2018, RN. **K16a** – 10 larvae, 25.iii.2019, SB. **K22b** – 2 larvae, 8.iv.2019, SB. **K23a** – 3 larvae, 22.iii.2019, SB. **K24a/b** – 3 larvae, 23.iii.2019, SB.

Burmagomphus arthuri Lieftinck, 1953

K6a – ♀, 2.viii.2019, RD. **K22b** – ♂ (teneral), 15.iii.2019, RD; ♂ (teneral), 2 ♀♀ (teneral), 8.iv.2019, RD. **SE3b** – ♂ (teneral), 19.ix.2017, RD.

Burmagomphus insularis Laidlaw, 1914

K1a – 2 ♂♂, 13.ix.2017, RD; ♂, 20.ix.2017, RD; ♂, 8.iii.2018, RD. **K6a** – 2 ♂♂, 2.viii.2019, RD. **K16a** – 2 ♂♂, 5.xi.2018, RD.

Burmagomphus plagiatus Lieftinck, 1964

K22b – ♂ (teneral), 8.iv.2019, RD.

Gomphidia abbotti Williamson, 1907

K1a – ♀, 20.ix.2017, RN. **K16a** – ♂, 8.x.2018, RD; 2 ♂♂, 5.xi.2018, RD; ♂, 8.xi.2018, RD; 2 ♂♂, 25.iii.2019, RD. **SE3b** – ♀ (end of abdomen only), 19.vii.2018, RD. **SE3d** – ♂, 25.iv.2019, RD.

Gomphidia maclachlani Selys, 1873

K2a – ♂, 6.vii.2018, RD. **K22b** – larva, 8.iv.2019, SB. **K24a** – ♂, 23.iii.2019, RD; 2 ♂♂, 3.vii.2019, RD. **SE5a** – ♂, 22.v.2019, RD.

Heliogomphus sp. cf *blandulus* Lieftinck, 1929

K6a – ♀ (teneral), 2.viii.2019, RD. **K14d** – ♂ (teneral), 19.vii.2017, RD. **K24e** – ♀ (?), 18.iv.2019, RD.

Heliogomphus borneensis Lieftinck, 1964

K14e – ♂ (perched by road 3-4 P.M.), 5.vii.2015, RD.

Heliogomphus sp. cf olivaceus Lieftinck, 1961

K22b – ♂ (teneral), 23.iv.2019, RD.

Ictinogomphus decoratus melaenops (Selys, 1858)

K1a – ♂, 20.ix.2017, RD. **K4e** – ♂, 28.vii.2017, RD. **K7a** – ♂, 22.ix.2017, RN; ♂, 14.xii.2017, RD. **K14e** – ♂, 8.v.2019, RD. **K15** – ♂, 28.v.2018, RN. **K16d** – exuvia, 25.iii.2019, RD. **K19b** – ♂, 25.i.2019, RD. **K19c** – ♂, 10.vi.2020, RD. **K20b** – ♂, 28.i.2019, RD. **K22b** – 2 ♂♂, 19.iii.2019, RD; ♂, 5.ix.2019, RD. **K23a** – ♂, 22.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD. **K26b** – ♂, 15.vi.2020, RD. **K27** – ♀, 11.viii.2020, RD. **SA3a** – ♂, 31.i.2015, RD; ♀, 7.vii.2015, GR; ♂, 7.vii.2015, LS. **SA3b** – ♂, 29.i.2015, RD. **SA4b** – ♂, 10.vii.2015, GR. **SE2a** – ♂, 16.ix.2017, RD. **SE3b** – ♂, 19.vii.2018, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE5a** – ♂, 9.xi.2018, RD.

Leptogomphus coomansi Laidlaw, 1936

K1a – ♂ (teneral), ♀ (teneral), 20.ix.2017, RD. **K8c** – ♀, 8.v.2018, RD. **K14c** – ♂, 3.vii.2018, RD. **K14e** – See Dow, Stokvis & Ngiam (2017). **K23a** – ♀ (teneral), 14.iii.2019, RD. **K24a** – ♀, 23.iii.2019, RD; ♀, 16.iv.2019, RD; ♂, 18.iv.2019, RD **K24f** – ♂, 16.iv.2019, RD. **SA4b** – See Dow, Stokvis & Ngiam (2017). **SE5a** – ♂, 9.xi.2018, RD.

Leptogomphus sii Dow, Stokvis & Ngiam, 2017

K1a – ♂ reared from larva, 31.v.2018, RN. **SE5a** – ♀, 22.v.2019, RD.

Leptogomphus sp. cf *williamsoni* Laidlaw, 1912

K14d – ♀, 2.vii.2017, RD. **K16a** – 10 larvae, 25.iii.2019, SB. **SE1b** – ♂ (semi-teneral), 2.iv.2018, RD.

Macrogomphus decemlineatus Selys, 1878

K17c – ♂ (at edge of oil palm), 4.i.2018, RD.

Macrogomphus albardae Selys, 1878

K1a – ♂, 20.ix.2017, RD; ♂, ♀, 8.iii.2018, RD. **K22b** – 2 ♂♂, 19.iii.2019, RD; 2 ♂♂, 8.iv.2019, RD; 2 ♂♂, 5.ix.2019, RD. **K25a** – 2 ♂♂, 31.vii.2019, RD. **SE3b** – ♂, 19.ix.2017, RN; 3 ♂♂, 3.x.2018, RD. **SE6a** – ♂, 13.viii.2019, RD.

Macrogomphus quadratus Selys, 1878

K4e – ♂ (hawking along path), 28.vii.2017, RD. **K8c** – ♂, 25.x.2017, RD. **K16a** – 10 larvae, 25.iii.2019, SB; ♂ (sitting several metres back from stream in second growth forest), 25.iii.2016, RD. **K23a** – 4 larvae (?), 22.iii.2019, SB. **K24a/b** – 4 larvae (?), 23.iii.2019, SB. **SE2e** – ♀, 4.iv.2018, RD.

Megalogomphus borneensis (Laidlaw, 1914)

K22b – ♂, 23.iv.2019, RD; 2 ♂♂, 5.ix.2019, RD. **SE3d** – ♂, 25.iv.2019, RD.

Megalogomphus buddi Dow & Price, 2020

This material (all paratypes) is listed in Dow & Price (2020) but is re-listed here because the locations are given in greater detail in this publication.

K1a – ♂, 20.ix.2017, RD. **K6a** – ♂, 2.viii.2019, RD. **K22b** – ♂, 19.iii.2019, RD. **SE3d** – ♂, 25.iv.2019, RD.

Microgomphus chelifer Selys, 1858

K2a – ♂, 30.iv.2019, RD. **K4c** – ♂, 29.v.2018, RN. **K22b** – ♂ (teneral), 15.iii.2019, RD. **SE3b** – ♀ (teneral), 19.vii.2018, RD.

Microgomphus species

K8a – larvae (reared), 22.ix.2017, RN. **K16a** – ♀ (teneral), 8.x.2018, RD. **SE3a** – ♀ (teneral), 18.ix.2017, RN. **SE6a** – ♀ (teneral), 13.viii.2019, RD.

Onychogomphus sp.

K22b – exuvia, 8.iv.2019, SB.

"*Phaenandrogomphus*" sp. cf *safei* Dow & Luke, 2015

K16a – ♀ (perched on twig in shade ca 3m above stream), 5.xi.2018, RD.

Chlorogomphidae

Chlorogomphus sp. or spp.

K16a – larva (in small tributary near mouth), 25.iii.2019, SB. **K23a** – 2 larvae, 22.iii.2019, SB.

Macromiidae

Epophthalmia vittigera (Rambur, 1842)

K4f – ♀, 28.vii.2017, RD. **K7a** – 2 ♂♂, 22.ix.2017, RN; 2 ♂♂, 14.xii.2017, RD. **K12b** – ♂, 22.vii.2017, RD. **K23a** – ♂, 22.iii.2019, RD. **SA3b** – ♂, 29.i.2015, LS. **SE2a** – ♂, 16.ix.2017, RD.

Macromia arachnomima Lieftinck, 1953

K23a – larva, 22.iii.2019, SB. **SE6a** – ♀, 14.v.2019, RD.

Macromia callisto Laidlaw, 1922

K16a – ♂, 8.x.2018, RD.

Macromia cincta Rambur, 1842

K7b – ♂, 14.xii.2017, RD. **K24a** – ♂, 23.iii.2019, RD; ♂, 3.vii.2019, RD.

Macromia cydippe Laidlaw, 1922

K22b – ♂, 23.iv.2019, RD. **K23a** – 3 larvae, 22.iii.2019, SB. **K24a** – 2 larvae, 23.iii.2019, SB; ♂, ♀, 23.iii.2019, RD; ♂, 16.iv.2019, RD; ♀, 3.vii.2019, RD. **K25a** – ♀, 16.v.2019, RD.

Macromia westwoodii Selys, 1874

K8h – ♀, 17.vii.2018, RD. **K14d** – ♀, 3.vii.2018, RD. **K14e** – ♀ (hawking along road at ca 3:30 P.M.), 19.vii.2017, RD.

Synthemistidae

Idionyx sp. cf *yolanda* Selys, 1871

K8diii – ♀, 30.v.2018, RN. **K14b** – ♀, 8.v.2019, RD. **K14d** – ♀, 2.vii.2017, RD. **K14e** – ♂ (immature, hawking over road), 2.vii.2017, RD.

Macromidia fulva Laidlaw, 1915

K3a – ♀, 26.ii.2018, RD. **K8b** – ♂, 20.xi.2018, RD. **K8di** – ♂, 20.xi.2018, RD. **K22b** – ♂, 19.iii.2019, RD. **K24f** – 2 ♂♂, 23.iii.2019, RD; ♂, 18.iv.2019, RD. **SE3b** – ♂, 28.ix.2017, RD. **SE5a** – ♀, 9.xi.2018, RD.

Libellulidae

Acisoma panorpoides Rambur, 1842

K4f – ♂, 28.vii.2017, RD. **K15** – 3 ♂♂, 28.v.2018, RD; ♂, 28.v.2018, RN. **K20a** – 3 ♂♂, 28.i.2019, RD. **K19c** – ♂, 10.vi.2020, RD. **K26c** – ♂, 15.vi.2020, RD.

Aethriamanta gracilis (Brauer, 1878)

K4a – ♂, 12.vii.2017, RD; ♂, 15.vi.2020, RD. **K4f** – ♂, 28.vii.2017, RD. **K7b** – ♂, 14.xii.2017, RD. **K15** – ♂, 28.v.2018, RD. **K18** – ♂, 18.i.2019, RD. **K19a** – 2 ♂♂, 25.i.2019, RD. **K19c** – 2 ♂♂, 10.vi.2020, RD. **K20b** – 2 ♂♂, 28.i.2019, RD. **SE2a** – 2 ♂♂, 16.ix.2017, RD.

Agrionoptera insignis (Rambur, 1842)

K2e – ♂, 6.vii.2018, RD. **K12a** – ♀, 10.vi.2020, RD. **K12b** – 2 ♂♂, 10.vi.2020, RD. **K16a** – ♂ (in forest near stream), 25.iii.2019, RD. **K19a** – 2 ♂♂, 25.i.2019, RD. **K22a** – ♂, 15.iii.2019, RD. **SA1**b – ♂, 21.ii.2018, RD. **SA2**a – ♂, 21.ii.2018, RD. **SE2d** – ♂, 4.iv.2018, RD. **SE3b** – ♀ (above bank in area being cleared for a farm), 19.ix.2017, RN.

Agrionoptera sexlineata Selys, 1879

K17b – ♂, 2.viii.2013, RD. **K24f** – ♂, 23.iii.2019, RD; ♂, ♀, 16.iv.2019, RD.

Brachydiplax chalybea Brauer, 1868

K1a – ♀, 20.ix.2017, RD. **K2a** – ♂, 12.i.2018, RD. **K2b** – ♂, 30.iv.2019, RD. **K4f** – ♂, 28.vii.2017, RD. **K7b** – 2 ♂♂, 14.xii.2017, RD. **K12b** – ♂, 22.vii.2017, RD; 2 ♂♂, 2.xii.2017, RD; ♂, 10.vi.2020, RD. **K17b** – ♂, 2.viii.2013, RD; ♂, 2.viii.2013, JS. **K18** – ♂, 18.i.2019, RD. **K19b** – ♂, 25.i.2019, RD. **K19c** – ♂, 25.i.2019, RD; ♂, 10.vi.2020, RD. **K20a** – ♂, 28.i.2019, RD. **K20b** – ♂, 28.i.2019, RD. **K22b** – ♂ (small sized, immature), 5.ix.2019, RD. **K26b** – 2 ♂♂, 15.vi.2020, RD. **SA2**a – 3 ♂♂, 21.ii.2018, RD. **SA3a** – ♂, 7.vii.2015, GR. **SE2a** – ♂, 16.ix.2017, RD.

Brachydiplax cf *farinosa* Krüger, 1902

K16d – ♂, 5.xi.2018, RD.

Brachygonia oculata (Brauer, 1878)

K9a – ♂, 30.vii.2017, RD; ♂, 26.xi.2017, RD. **K12a** – ♂, 5.vii.2017, RD. **K12b** – ♂, 22.vii.2017, RD; 2 ♂♂, 10.vi.2020, RD. **K17b** – ♂, 2.viii.2013, RD; ♂, ♀, 2.viii.2013, RN; 3 ♂♂, 2.viii.2013,, JS; 6 ♂♂, ♀, 2.viii.2013, RS; 4 ♂♂, 4.i.2018, RD. **K17c** – 2 ♂♂, ♀, 4.i.2018, JS. **K24b** – ♂, 18.iv.2019, RD. **SA2a** – ♀ (small shady pond), 21.ii.2018, RD.

Camacinia gigantea (Brauer, 1867)

K16d – 2 ♂♂, 5.xi.2018, RD; ♂, 8.xi.2018, RD; ♂, 5 exuviae, 25.iii.2019, RD.

Chalybeothemis fluviatilis Lieftinck, 1933

K17b – ♂, 2.viii.2013, RD; ♀, 2.viii.2013, JS.

Cratilla lineata (Brauer, 1878)

K4e – ♂, 1.iv.2018, RD; ♀ (pool on path), 15.vi.2020, RD. **K25a** – 2 ♂♂, 31.vii.2019, RD. **K25b** – ♂, 16.v.2019, RD. **SE5d** – 2 ♂♂, 9.xi.2018, RD.

Cratilla metallica (Brauer, 1878)

K1a – ♀, 8.iii.2017, RD. **K3a** – ♀, 26.ii.2018, RD. **K4e** – ♂, ♀ (pools on and beside track), 12.vii.2017, RD; ♂ (pool on path), 15.vi.2020, RD. **K6d** – ♂, 20.x.2017, RD. **K8c** – ♂

(pool by logging road), 25.x.2017, RD; ♂, 8.v.2018, RD; ♂ (long pool), 10.x.2018, RD. **K8e**i – ♀, 5.vii.2018, RD. **K14a** – ♂, 31.iii.2014, RD. **K14c** – ♂, 19.vii.2017, RD. **K14e** – ♂, 8.ix.2014, RD. **K16a** – ♂ (rock pools at stream edge), 25.iii.2019, RD. **K24f** – ♂, 16.iv.2019, RD; ♂, 3.vii.2019, RD. **K27** – ♀, 11.viii.2020, RD. **SA4a** – ♂, 7.vii.2015, RD. **SE3b** – ♀, 18.ix.2017, RD; ♀, 19.ix.2017, RN. **SE4b** – ♂ (puddle by trail), 11.x.2018, RD. **SE5d** – ♂, 9.xi.2018, RD.

Diplacodes trivialis (Rambur, 1842)

K7a – ♀, 14.xii.2017, RD. **K11** – ♀ (immature, found perched on wall in parking space below apartments in morning), 13.iii.2020, RD; ♂ (found in same position as previous specimen but at ca 8:30 PM), 8.viii.2020. **K14e** – ♀, 5.vii.2015, RD. **K21b** – ♂, 11.iii.2019, RD. **SA2b** – ♂, 21.ii.2018, RD.

Hydrobasileus croceus (Brauer, 1867)

K24a – ♂, 23.iii.2019, RD; ♂, 3.vii.2019, RD. **SE2a** – ♂, 16.ix.2017, RD. **SE2b** – ♂, 16.ix.2017, RN.

Lyriothemis biappendiculata (Selys, 1878)

K8c – ♂, 8.v.2018, RD. **K8eii** – ♂, ♀, 5.vii.2018, RD. **K22d** – ♂, 5.ix.2019, RD.

Lyriothemis cleis Brauer, 1868

K2d – ♂, 30.iv.2019, RD. **K8c** – ♂, 25.x.2017, RD; ♂, 30.v.2018, RD. **K8d**i – ♂, 25.x.2017, RD. **K23a** – ♀, 22.iii.2019, RD. **BR1** – ♂+♀, 8.v.2018, RD. **SE3b** – ♂ (above bank of stream at small farm), 3.x.2018, RD.

Lyriothemis magnifcata (Selys, 1878)

K8c – ♀, 29.vi.2018, RD.

Nannophya pygmaea Rambur, 1842

K7a – ♂, 22.ix.2017, RD; 3 ♂♂, 14.xii.2017, RD. **K8f** – ♂, 29.vi.2018, RD. **K9b** – ♂, 30.vii.2017, RD; 2 ♂♂, 26.xi.2017, RD. **K12b** – ♂, 22.vii.2017, RD; ♂, 2.xii.2017, RD; ♂, 10.vi.2020, RD. **K14f** – ♂, 8.ix.2014, RD **K15** – ♂, ♀, 28.v.2018, RD; ♀, 28.v.2018, RN. **K17b** – ♂, 2.viii.2013, RD; ♂, 2.viii.2013, RN; ♂, 2.viii.2013, JS. **K17c** – ♂, 4.i.2018, RD; 2 ♂♂, 4.i.2018, JS. **K18** – ♂, 18.i.2019, RD. **K19c** – ♂, 25.i.2019, RD; ♂, 10.vi.2020, RD. **K20a** – ♂, 28.i.2019, RD. **K20b** – ♂, 28.i.2019, RD. **K21b** – ♂, 11.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD. **SA1b** – ♂, 21.ii.2018, RD. **SA2b** – ♂, 21.ii.2018, RD. **SA3a** – ♂, 31.i.2015, RD; 2 ♂♂, 31.vii.2015, LS. **SE5e** – ♂, 22.v.2019, RD.

Nannophyopsis chalcosoma Lieftinck, 1935

K9a – ♀, 26.xi.2017, RD.

Nesoxenia lineata (Selys, 1879)

K12a – ♂, 5.viii.2017, RD. **K12b** – ♂, 10.vi.2020, RD. **K14e** – ♀, 8.ix.2014, RD. **K19a** – ♂, 25.i.2019, RD. **K27** – ♀, 11.viii.2020, RD. **SA1b** – ♀, 21.ii.2018, RD.

Neurothemis fluctuans (Fabricius, 1793)

Note that some of the material below (most of those that dating from 2015 or before) was listed in Seehausen & Dow (2016) but with less detail on the locations than is used in this report, and is therefore re-listed here.

K2d – ♂, 30.iv.2019, RD. **K4e** – ♂, 1.iv.2018, RD. **K4f** – ♀, 28.vii.2017, RD. **K7a** – 3 ♂♂, 22.ix.2017, RD. **K8c** – ♂, 8.v.2018, RD. **K11** – ♀ (at lights in evening), 5.i.2018, RD; ♀,

10.i.2018, P. Dow; ♂, 29.iii.2018, RD; ♂, 26.v.2018, RD; ♂, 17.ix.2018, P. Dow. **K12b** – 2 ♂♂, 22.vii.2017, RD; ♂, 10.vi.2020, RD. **K14f** – ♂, 8.ix.2014, RD. **K14e** – ♂, 2.vii.2017, RD. **K15** – ♂, 28.v.2018, RD. **K17a** – ♂, 28.vii.2013, RN. **K17b** – ♂, ♀, 2.viii.2013, JS; ♂, 2.viii.2013, RS. **K18** – ♂, 18.i.2019, RD. **K19a** – 2 ♂♂, 25.i.2019, RD. **K19c** – ♂, 10.vi.2020, RD. **K20a** – 2 ♂♂, 28.i.2019, RD. **K20b** – ♂, 28.i.2019, RD. **K21a** – ♂, 11.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD. **K24f** – ♂, 16.iv.2019, RD. **K25b** – ♂, 16.v.2019, RD. **K27** – ♂, 11.viii.2020, RD. **SA1b** – ♂, 21.ii.2018, RD. **SA2a** – ♂, 21.ii.2018, RD. **SA3a** – 2 ♂♂, 29.i.2015, RD; 2 ♂♂, ♀, 29.i.2015, LS; ♂, 30.i.2015, LS; ♀, 31.i.2015, LS; ♂, 7.vii.2015, GR. **SE5d** – ♂, 23.v.2019, RD. **SE5e** – ♂, 22.v.2019, RD.

Neurothemis ramburii (Brauer, 1866)

K2a – 2 ♂♂, 12.i.2018, RD. **K4e** – ♂, 12.vii.2017, RD; ♂, 29.v.2018, RD. **K4f** – ♂, 28.vii.2017, RD. **K8g** – ♂, 29.vi.2018, RD. **K12b** – ♂, 2.xii.2017, RD. **K14e** – 2.vii.2017, RD. **K16a** – ♂, 8.x.2018, RD. **K16d** – ♂, 8.xi.2018, RD. **K19d** – ♂, 25.i.2019, RD. **K26b** – ♂, 15.vi.2020, RD. **K27** – 2 ♂♂, 11.viii.2020, RD. **SA2b** – ♀, 21.ii.2018, RD. **SE2b** – 2 ♂♂, 4.iv.2018, RD. **SE5d** – ♂, 22.v.2019, RD.

Neurothemis terminata Ris, 1911

Note that some of the material below (most specimens that dating from 2015 or before) was listed in Seehausen & Dow (2016) but with less detail on the locations than is used in this report, and is therefore re-listed here.

K4e – ♂, 9.vii.2017, RD; ♂, 29.v.2018, RD; ♂, 15.vi.2020, RD. **K8c** – ♂, 30.v.2018, RD. **K8g** – 2 ♂♂, 29.vi.2018, RD. **K11** – ♂ (found, seemingly nearly dead, on ground outside apartments in morning), 7.vi.2020, RD. **K12b** – ♂, 22.vii.2017, RD. **K14d** – ♂, 5.vii.2015, GR. **K17b** – ♂, 2.viii.2013, RD. **K18** – ♂, 18.i.2019, RD. **K20a** – ♂, at a small well established pond behind the large pond, 28.i.2019, RD. **K22b** – 2 ♂♂, 5.ix.2019, RD. **K23e** – ♂, 14.iii.2019, RD. **K24f** – ♂ (immature), 23.iii.2019, RD; ♂, 16.iv.2019, RD. **SE2a** – 2 ♂♂, 4.iv.2018, RD. **SE2b** – ♂, 16.ix.2017, RD. **SE5a** – ♂, 9.xi.2018, RD; ♂, 22.v.2019, RD. **SE5d** – ♀, 22.v.2019, RD.

Onychothemis coccinea Lieftinck, 1953

K1a – ♂, 13.ix.2017, RD; ♂, 20.ix.2017, RD; ♂, 8.iii.2018, RD. **K1b** – ♂, 8.vi.2017, RD. **K6a** – ♂, 20.x.2017, RD; ♂, 2.viii.2019, RD. **K8a** – 2 ♂♂, 22.ix.2017, RD; ♂, 22.ix.2017, RN; ♂, 5.vii.2018, RD. **K8ei** – ♂, ♀, 5.vii.2018, RD. **K16a** – 2 ♂♂, 8.x.2018, RD. **K22b** – 2 ♂♂, 15.iii.2019, RD; ♂, 19.iii.2019, RD; ♂, 5.ix.2019, RD. **K23a** – ♂, 14.iii.2019, RD. **K24a** – ♂, 18.iv.2019, RD. **SA4b** – ♂, 10.vii.2015, LS. **SE3b** – ♂, 28.ix.2017, RD; ♂, 3.x.2018, RD. **SE3d** – ♂, 25.iv.2019, RD.

Onychothemis culminicola Förster, 1904

K1a – ♂, 8.iii.2018, RD. **K2a** – ♂, ♀, 12.i.2018, RD. **K16a** – ♂, 25.iii.2019, RD. **K17a** – 2 ♂♂, 28.vii.2013, RN. **K22a** – 2 ♂♂, 15.iii.2019, RD. **K22b** – ♂, 15.iii.2019, RD; 2 ♂♂, 19.iii.2019, RD; ♂, 23.iv.2019, RD. **K25a** – ♂, 16.v.2019, RD; 2 ♂♂, 2.viii.2019, RD. **SE3a** – ♂, 18.ix.2017, RD; 2 ♂♂, 18.ix.2017, RN. **SE3b** – 3 ♂♂, 18.ix.2017, RD; ♂, ♀, 19.ix.2017, RD; 2 ♂♂, 28.ix.2017, RD. **SE6a** – ♂, 14.v.2019, RD.

Orchithemis pruinans (Selys, 1878)

K9a – ♂, 30.vii.2017, RD. **K17b** – 2 ♂♂, 2.viii.2013, RN; 2 ♂♂, 2.viii.2013, JS; 3 ♂♂, 2.viii.2013, RS. **K17c** – 2 ♂♂, 4.i.2018, JS.

Orchithemis pulcherrima Brauer, 1878

K8f – ♂, 29.vi.2018, RD. **K9a** – ♂, ♀, 30.vii.2017, RD. **K12a** – 2 ♂♂, 22.vii.2017, RD. **K12b** – ♀, 22.vii.2017, RD. **K17b** – ♂, 2.viii.2013, RD; 2 ♂♂, 2.viii.2013, RN; ♂, 2.viii.2013, JS; ♀, 2.viii.2013, RS. **SA1**b – ♀, 21.ii.2018, RD.

Orchithemis xanthosoma Laidlaw, 1911

K9a – ♂, 30.vii.2017, RD; 2 ♂♂, 26.xi.2017, RD. **K12a** – ♂, 22.vii.2017, RD; ♂, 5.viii.2017, RD; ♂, 2.xii.2017, RD.

Orthetrum chrysis (Selys, 1891)

K1b – ♂, 8.vi.2017, RD. **K2b** – ♂, 6.vii.2018, RD. **K4c** – ♂, 12.vii.2017, RD. **K4f** – ♂, 28.vii.2017, RD. **K7a** – ♂, 22.ix.2017, RD; ♂, ♂+♀, 14.xii.2017, RD. **K12a** – ♂, 2.xii.2017, RD. **K17a** – ♂, 28.vii.2013, RD. **K19a** – ♂, 25.i.2019, RD. **K19b** – ♂, 25.i.2019, RD. **K22b** – ♂, 19.iii.2019, RD; ♂, ♀, 23.iv.2019, RD. **K23a** – ♂, 14.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD; 3 ♂♂, 3.vii.2019, CD. **K26b** – ♂, 15.vi.2020, RD. **K27** – ♂, 11.viii.2020, RD. **SA4b** – ♂, 10.vii.2015, GR; 3 ♂♂, 10.vii.2015, LS.

Orthetrum glaucum (Brauer, 1865)

K1b – ♂, 8.vi.2017, RD. **K2b** – ♂, 6.vii.2018, RD. **K8c** – ♂, 30.v.2018, RD; ♂, 29.vi.2018, RD. **K14e** – ♂, 31.iii.2014, RD; ♂, 2.vii.2017, RD; ♂, 14.iii.2018, RD. **K21b** – ♂, 11.iii.2019, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE5a** – ♂, 22.v.2019, RD.

Orthetrum pruinosum schneideri Förster, 1903

K2a – ♂, 6.vii.2018, RD; ♂, 30.iv.2019, RD. **K8c** – ♂, 8.v.2018, RD; ♂ (long pool), 10.x.2018, RD. **K16a** – ♂, 25.iii.2019, RD. **K16b** – ♂, 8.x.2018, RD. **K16d** – ♂, 5.xi.2018, RD. **K22b** – ♂, 5.ix.2019, RD. **SA4b** – ♂, 10.vii.2015, GR.

Orthetrum sabina (Drury, 1773)

K4e – ♂, 9.vii.2017, RD; ♂, 15.vi.2020, RD. **K7a** – ♀, 14.xii.2017, RD. **K11** – ♂ (in apartment), 26.xii.2019, RD. **K12b** – ♂, 2.xii.2017, RD. **K15** – ♂, 28.v.2018, RD. **K17d** – ♀, 4.i.2018, JS. **K18** – ♂, 18.i.2019, RD. **K19b** – ♂, 25.i.2019, RD. **K19c** – ♂, 25.i.2019, RD; ♂, 10.vi.2020, RD. **K20a** – ♂, 28.i.2019, RD. **K22c** – ♀, 15.iii.2019, RD. **K23e** – ♀, 22.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD; ♀, 3.vii.2019, RD. **K27** – ♂, 11.viii.2020, RD. **SA3a** – ♀, 7.vii.2015, GR. **SA4b** – ♀, 10.vii.2015, GR; 2 ♀♀, 10.vii.2015, LS. **SE2b** – ♂, 4.iv.2018, RD. **SE5a** – ♂, 9.xi.2018, RD.

Orthetrum testaceum (Burmeister, 1839)

K2a – 3 ♂♂, 12.i.2018, CD; ♂, 12.i.2018, RD; ♂, 6.vii.2018, CD; ♂, 30.iv.2019, RD. **K2b** – ♂+♀, 6.vii.2018, RD. **K4e** – ♂, 9.vii.2017, RD; ♂, 15.vi.2020, RD. **K6a** – ♂, 20.x.2017, RD. **K11** – ♂, landed on shoe in day time and caught by hand, 3.ii.2019, P. Dow. **K14d** – ♂, 31.iii.2014, RD. **K20a** – ♂, 28.i.2019, RD. **K22b** – ♂, 23.iv.2019, RD. **K23a** – ♀, 14.iii.2019, RD; ♂, 22.iii.2019, RD. **K25a** – ♂, 16.v.2019, RD; ♂, 31.vii.2019, RD. **K25b** – ♂, 16.v.2019, P. Dow. **SA1**b – ♂, 21.ii.2018, RD. **SA3a** – ♂, 31.i.2015, LS. **SA4b** – ♂, 10.vii.2015, GR. **SE3b** – ♂, 19.vii.2018, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE5d** – ♂, 9.xi.2018, RD.

Pantala flavescens (Fabricius, 1798)

K8c – ♀, 25.x.2017, RD.

Pornothemis serrata complex Krüger, 1902

K12a – ♂, 2 ♀♀, 5.viii.2017, RD. **SA5** – ♂, 19.xii.2018, RD.

Rhodothemis rufa (Rambur, 1842)

K4f – ♂, 28.vii.2017, RD. **K12b** – 2 ♂♂, 22.vii.2017, RD; ♂, 2.xii.2017, RD. **K15** – ♂, 28.v.2018, RD; ♂, 28.v.2018, RN. **K19c** – 2 ♂♂, 25.i.2019, RD; ♂, 10.vi.2020, RD. **K20a** – ♂, 28.i.2019, RD. **K22b** – ♂, 8.iv.2019, RD. **SA3a** – ♀, 7.vii.2015, GR; ♀, 7.vii.2015, LS.

Rhyothemis fulgens Kirby, 1889

K9a – ♀, 26.xi.2017, RD.

Rhyothemis obsolescens Kirby, 1889

K7b – ♂, 14.xii.2017, RD. **K9b** – ♂, 30.vii.2017, RD; 2 ♂♂, 26.xi.2017, RD. **K12b** – 2 ♂♂, ♀, 22.vii.2017, RD; 2 ♂♂, 10.vi.2020, RD. **K17b** – ♂, 2.viii.2013, RN; ♂, 2.viii.2013, JS; ♀, 2.viii.2013, RS. **K19c** – ♂, 25.i.2019, RD. **K27** – 2 ♂♂, 11.viii.2020, RD.

Rhyothemis phyllis (Sulzer, 1776)

K4e – ♀, 9.vii.2017, RD; ♂, 15.vi.2020, RD. **K12b** – ♂, 2.xii.2017, RD. K12c – ♀, 22.vii.2017, RD. **K14e** – ♀, 23.ii.2016, RD. **K17b** – ♀, 2.viii.2013, RN. **K18** – ♂, 18.i.2019, RD. **K19c** – ♂, 25.i.2019, RD; ♂, 10.vi.2020, RD. **K20a** – ♂, 28.i.2019, RD. **K20b** – ♂, 28.i.2019, RD. **SE2a** – ♂, 16.ix.2017, RD. **SA1**b – ♀, 21.ii.2018, RD. **SA3a** – ♀, 7.vii.2015, GR.

Rhyothemis triangularis Kirby, 1889

K4f – ♂, 28.vii.2017, RD. **K7b** – ♂, ♀, 14.xii.2017, RD. **K12b** – ♂, 22.vii.2017, RD; ♂, 2.xii.2017, RD. **K16a** – ♀, 25.iii.2019, RD. **K16d** – ♂, 5.xi.2018, RD. **K19c** – ♂, 25.i.2019, RD; ♂, 10.vi.2020, RD. **K20b** – ♂, 28.i.2019, RD. **SA2**a – ♂, 21.ii.2018, RD. **SE2a** – ♂, 16.ix.2017, RD; ♂, 16.ix.2017, RN. **SE3b** – ♂, 19.ix.2017, RD; ♂, 19.vii.2018, RD. **SE5e** – ♂, 22.v.2019, RD.

Risiophlebia dohrni (Krüger, 1902)

K12a – ♂, 2.xii.2017, RD; 2 ♂♂, 10.vi.2020, RD. **K17b** – 3 ♂♂, 4.i.2018, RD. **SA5** – ♂, ♀, 19.xii.2018, RD.

Tetrathemis flavescens Kirby, 1889

K12a – ♂, 5.viii.2017, RD.

Tetrathemis hyalina Kirby, 1889

K2b – ♂, 30.iv.2019, RD. **K2e** – ♂, ♀, 6.vii.2018, RD. **K6c** – ♂, 20.x.2017, RD. **K19a** – 2 ♂♂, 25.i.2019, RD. **K19c** – ♂, 10.vi.2020, RD. **K23a** – 2 ♂♂, 14.iii.2019, RD. **SA1b** – ♀, 21.ii.2018, RD. **SE2a** – ♂, 16.ix.2017, RD. **SE2d** – ♂, 4.iv.2018, RD. **SE5a** – 2 ♂♂ (at large pool beside), 22.v.2019, RD.

Tholymis tillarga (Fabricius, 1798)

K11 – ♂ (at lights outside apartment block, ca 9 P.M.), 1.viii.2018, RD; ♂ (at lights in parking space below apartments), 14.xii.2019, RD; ♀ (in apartment), 14.ii.2020, P. Dow. **K19c** – ♂, 25.i.2019, RD; ♀, 10.vi.2020, RD. **SE2b** – ♀, 4.iv.2018, RD.

Tramea phaeoneura Lieftinck, 1953

SA3a – ♀ (flying on road just outside Ulu Sebuyau National Park), 28.i.2015, RD.

Tramea transmarina euryale (Selys, 1878)

K7a – ♂, 14.xii.2017, RD. **K19c** – ♂, 25.i.2019, RD; ♂, 10.vi.2020, RD. **K24a** – ♂, 23.iii.2019, RD. **SA2a** – ♂, 21.ii.2018, RD.

Trithemis aurora (Burmeister, 1839)

K1b – ♂, 8.vi.2017, RD. **K4b** – ♂, 9.vii.2017, RD. **K4f** – ♂, 28.vii.2017, RD. **K6a** – ♂, 20.x.2017, RD. **K8a** – ♂, 22.ix.2017, RD. **K21b** – ♀, 11.iii.2019, RD. **SE2a** – ♂, 16.ix.2017, RD. **SE3b** – ♂, 19.vii.2018, RD.

Trithemis festiva (Rambur, 1842)

K1a – ♂, 20.ix.2017, RD. **K1b** – ♂, 8.vi.2017, RD. **K2a** – ♂, 12.i.2018, RD; ♂, 30.iv.2019, RD. **K8a** – ♂, 5.vii.2018, RD. **K8b** – ♀, 25.x.2017, RD. **K23a** – ♂, 22.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD. **K27** – ♂, 11.viii.2020, RD. **SE1c** – ♂, 22.x.2017, RD. **SE3d** – ♂, 25.iv.2019, RD. **SE5a** – ♂, 9.xi.2018, RD.

Tyriobapta kuekenthali (Karsch, 1903)

K9b – ♂, 30.vii.2017, RD; 2 ♂♂, 26.xi.2017, RD. **K12a** – 2 ♂♂, 22.vii.2017, RD; ♂, 5.viii.2017, RD; ♂, 10.vi.2020, RD. **K17b** – 3 ♂♂, 2.viii.2013, RD; ♂, 2.viii.2013, JS; ♂, 4.i.2018, RD; ♂, 4.i.2018, JS. **K17c** – ♂, 4.i.2018, RD. **SA5** – ♂, 19.xii.2018, RD.

Tyriobapta laidlawi Ris, 1919

K24a – 2 ♂♂, 23.iii.2019, RD; ♂, 16.iv.2019, RD. **K24d** – ♂+♀, 18.iv.2019, RD; ♂, 3.vii.2019, RD.

Tyriobapta torrida Kirby, 1889

K1c – ♂, 11.iii.2019, RD. **K2b** – ♂, 6.vii.2018, RD. **K4e** – ♂ (forest pool at base of limestone hill), 15.vi.2020, RD. **K6c** – ♂, 20.x.2017, RD. **K7b** – ♂, 14.xii.2017, RD. **K8eii** – ♂, 5.vii.2018, RD. **K17b** – 3 ♂♂, 2.viii.2013, JS. **K19a** – ♂, 25.i.2019, RD. **K23a** – ♂, 14.iii.2019, RD. **K24a** – ♂, 23.iii.2019, RD. **K24b** – ♂, 16.iv.2019, RD. **SE2c** – ♂, 16.ix.2017, RD. **SE4a** – ♂, 11.x.2018, RD. **SE5c** – ♂, 9.xi.2018, RD.

Urothemis signata (Rambur, 1842)

K4e – ♂, 1.iv.2018, RD. **K4f** – ♂, 28.vii.2017, RD. **K7a** – ♂, 22.ix.2017, RD. **K7b** – 2 ♂♂, 14.xii.2017, RD. **K15** – ♂, 28.v.2018, RD. **K18** – ♂, 18.i.2019, RD. **K19c** – ♂, 25.i.2019, RD; 2 ♂♂, 10.vi.2020, RD. **K20a** – ♂, 28.i.2019, RD. **K20b** – ♂, ♀, 28.i.2019, RD. **K20c** – ♂, 28.i.2019, RD. **SA2a** – ♂, 21.ii.2018, RD. **SE2b** – ♂, 16.ix.2017, RD.

Zygonyx ida errans Lieftinck, 1953

K8a – ♂, 5.vii.2018, RD. **K24a** – ♂, 16.iv.2019, RD; 2 ♂♂, 18.iv.2019, RD; ♂, 3.v.2019, RD. **SE5a** – ♀, 22.v.2019, RD.

Zyxomma obtusum Albarda, 1881

K11 – ♂ (immature; at lights in early evening), 30.iii.2018, RD.

Zyxomma petiolatum Rambur, 1842

K11 – ♀ (at lights in early evening), 30.ii.2018, RD; ♂ (at lights at night), 1.v.2019, RD; ♀ (found outside apartments), 20.vi.2020, P. Dow; ♀ (outside apartment block in early morning), 21.vi.2020, RD. **K16d** – 2 exuviae, 25.iii.2019, RD. **K26b** – 2 ♂♂, 15.vi.2020, RD. **SA3a** – ♀ (apparently ovipositing), 7.vii.2015, GR.

Additional Records

Gomphidae

Burmagomphus sp. or spp.

K16a – 3 larvae, 25.iii.2019, SB. **K22b** – 10 larvae, 8.iv.2019, SB.

Heliogomphus sp. or spp.

K2a – ♀ (teneral), 30.iv.2019, RD. **K16b** – larva, 25.iii.2019, SB. **K23a** – 2 larvae, 22.iii.2019, SB. **K24a/b** – larva, 23.iii.2019, SB. **K27** – ♀ (teneral), 11.viii.2020, RD.

Leptogomphus sp. or spp.

K23a – larva, 22.iii.2019, SB. **K24a/b** – 10 larvae, 23.iii.2019, SB.

Macrogomphus sp. or spp.

K22b – 10 larvae, 8.iv.2019, SB.

Megalogomphus sp. or spp.

K16a – 3 larvae, 25.iii.2019, SB. **K22b** – 10 larvae, 8.iv.2019, SB.

Microgomphus sp. or spp.

K16a – 2 larvae, 25.iii.2019, SB. **K22b** – 3 larvae, 8.iv.2019, SB. **K23a** – 2 larvae, 22.iii.2019, SB. **K24a/b** – 2 larvae, 23.iii.2019, SB.

Macromiidae

Macromia sp. or spp.

K16a – 10 larvae, 25.iii.2019, SB. **K22b** – 10 larvae, 8.iv.2019, SB. **K23a** – a number of early instar larvae, 22.iii.2019, SB. **K24a/b** – 3 larvae, 23.iii.2019, SB.

Appendix 2: Details of material used in the molecular analyses

Table 1: Collection codes and BOLD Process IDs for Libellago specimens in RMNH used for molecular analysis. Location information and collection data are listed for each specimen. Either the collection codes (which appear as BOLD Sample IDs on the BOLD website) or process IDs can be used to locate the COI sequences on the BOLD website. Gn. – Gunung; Kpg – Kampung; NP – National Park; Sg. – Sungai.

Species	RMNH number	Sex	Country/ Province	Location	COI	ITS	BOLD process ID
Libellago aurantiaca	RMNH.INS.503497	♂	Malaysia, Sarawak	Kubah NP	yes	yes	ODOPH064-13
Libellago hyalina	RMNH.INS.506676	♀	Indonesia, Kalimantan		yes	yes	ODOBP4073-16
Libellago stictica	RMNH.INS.228962	♂	Malaysia, Sarawak	Gunung Mulu NP, Bat Observatory stream	yes		ODOBP7455-16
	RMNH.INS.501029	♂	Malaysia, Sarawak	Anap Muput, Sg. Sawih	yes	yes	ODOBP8209-16
	RMNH.INS.501056	♂	Malaysia, Sarawak	Anap Muput, Sg. Sawih	yes		ODOBP8232-16
	RMNH.INS.501336	♂	Malaysia, Sarawak	Gunung Mulu NP, Bat Observatory stream	yes		ODOBP8466-16
	RMNH.INS.501337	♂	Malaysia, Sarawak	Kapit Town area, Ulu Yong	yes	yes	ODOBP8467-16
	RMNH.INS.506364	♀	Malaysia, Sarawak	Gunung Mulu NP, Sg. Paku	yes		ODOBP3780-16
	RMNH.INS.509662	♂	Malaysia, Sarawak	Stream between Hose Mountains and Kapit Town	yes	yes	ODOBP7116-16
Libellago stigmatizans	RMNH.INS.501087	♂	Malaysia, Pahang	Tributary to Sg. Tembeling	yes		ODOBP8257-16
	RMNH.INS.501098	♂	Malaysia, Pahang	Tributary to Sg. Tembeling	yes	yes	ODOBP8265-16
	RMNH.INS.501099	♂	Malaysia, Pahang	Tributary to Sg. Tembeling	yes	yes	ODOBP8266-16
	RMNH.INS.506945	♂	Malaysia, Sarawak	Kpg. Sebako	yes	yes	ODOBP5282-16
	RMNH.INS.557625	♂	Malaysia, Sarawak	Kpg. Sebako	yes	yes	ODOBP4654-16

Table 2: Collection codes and BOLD Process IDs for Gomphidia specimens and Ictinogomphus outgroup in RMNH used for molecular analysis. Location information and collection data are listed for each specimen. Either the collection codes (which appear as BOLD Sample IDs on the BOLD website) or process IDs can be used to locate the COI sequences on the BOLD website. Gn. – Gunung; Kpg – Kampung; NP – National Park; Sg. – Sungai.

Species	RMNH number	Sex / stage	Country/ Province	Location	BOLD process ID
Gomphidia abbotti	RMNH.INS.501168	♂	Malaysia, Pahang	Kuala Tahan, opposite side of river from Taman Negara	ODOBP8325-16
	RMNH.INS.508709	♂	China, Guangdong	Nanlin	ODOBP6419-16
	RMNH.INS.1092816	♂	Malaysia, Sarawak	Sg. Kayan upstream of Kpg. Tepoi	Not uploaded to BOLD at the time of writing
	RMNH.INS.1092818	♂	Malaysia, Kedah	Hutan Lipur Ulu Paip	Not uploaded to BOLD at the time of writing
Gomphidia kellogi	RMNH.INS.506461	♂	China, Hong Kong	Sha Lo Tung	ODOBP3873-16
	RMNH.INS.506462	♂	China, Hong Kong	Sha Lo Tung	ODOBP3874-16
	RMNH.INS.506463	♂	China, Hong Kong	Sha Lo Tung	ODOBP3875-16
Gomphidia kruegeri	RMNH.INS.508693	♂	China, Hainan	Nanling	ODOBP6406-16
	RMNH.INS.508696	♂	China, Hainan	Nanling	ODOBP6409-16
	RMNH.INS.509115	♂	China, Hainan	Nanling	ODOBP6591-16
Gomphidia maclachlani	RMNH.INS.229025	♂	Malaysia, Sarawak	Gn. Mulu NP	ODOBP7516-16
	RMNH.INS.229032	larva	Malaysia, Sarawak	Gn. Mulu NP	ODOBP7522-16
	RMNH.INS.500077	larva	Malaysia, Sarawak	Sg. Philip	ODOBP7726-16
	RMNH.INS.506365	♂	Malaysia, Sarawak	Gn. Mulu NP	ODOBP3781-16
	RMNH.INS.506366	♂	Malaysia, Sarawak	Gn. Mulu NP	ODOBP3782-16
	RMNH.INS.557649	♂	Malaysia, Sarawak	Bukit Sarang	ODOBP4678-16
	RMNH.INS.557691	larva	Malaysia, Sarawak	Lanjak Entimau Wildlife Sanctuary	ODOBP4719-16
	RMNH.5008429	♀	Malaysia, Sarawak	Upper Baram, Ulu Moh	ODOBP481-16
Ictinogomphus acutus	RMNH.INS.228991	♂	Malaysia, Sarawak	Binyo Penyilam	ODOBP7483-16
	RMNH.INS.506777	♂	Malaysia, Sarawak	Maludam NP	ODOBP4173-16

Table 3: Collection codes and BOLD Process IDs for Macrogomphus specimens and Labrogomphus outgroup in RMNH used for molecular analysis. Location information and collection data are listed for each specimen. Either the collection codes (which appear as BOLD Sample IDs on the BOLD website) or process IDs can be used to locate the COI sequences on the BOLD website. NP – National Park; Sg. – Sungai.

Species	RMNH number	Sex	Country/ Province	Location	BOLD process ID
Macrogomphus albardae	RMNH.INS.501088	♂	Malaysia, Pahang	Kuala Tahan, opposite side of river from Taman Negara	ODOBP8258-16
	RMNH.INS.1092814	♂	Malaysia, Sarawak	Sg. Kayan	Not uploaded to BOLD at the time of writing
Macrogomphus decemlineatus	RMNH.INS.506786	♂	Malaysia, Sarawak	Maludam NP	ODOBP4182-16
Macrogomphus sp.	RMNH.INS.500073	♂	Malaysia, Sarawak	Bukit Sarang	ODOBP7723-16
	RMNH.INS.557633	♂	Malaysia, Sarawak	Bukit Sarang	ODOBP4662-16
Labrogomphus torvus	RMNH.INS.508700	♂	China, Guangdong	Conghua City, Yadongxi	ODOBP6412-16

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