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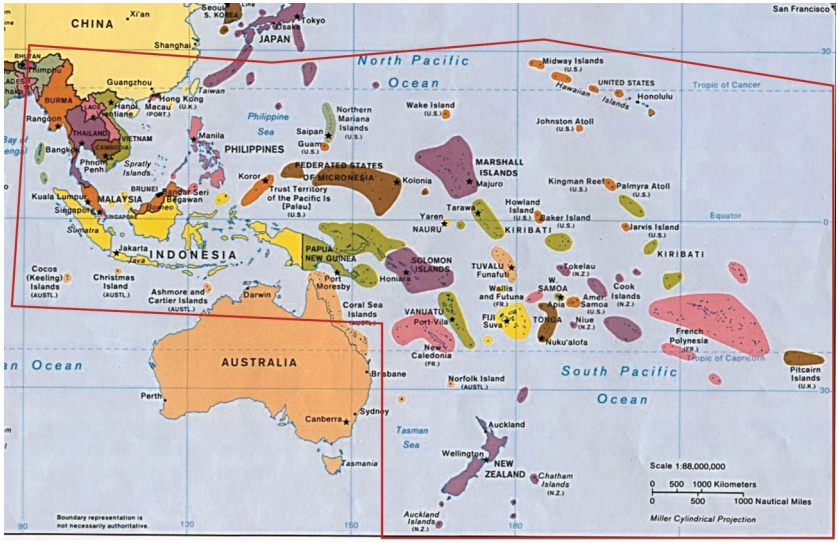

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New records of Odonata from Kelantan, Malaysia, with a checklist of species recorded from the state

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Abstract

We report here the results from field trips to collect Odonata in the central and north-eastern parts of Kelantan state, Peninsular Malaysia. Sixty eight species were collected, and 15 of these are new records for the state. Interesting species collected include *Euphaea masoni* Selys, 1879 and *Leptogomphus tioman* Choong, 2016. A checklist of the Odonata recorded from Kelantan with a total 131 confirmed species is given in an appendix.

Bahasa Melayu Abstract

Kita melaporkan di sini hasil pengutipan Odonata daripada kerja lapangan di bahagian tengah dan timur laut negeri Kelantan, Semenanjung Malaysia. Enam puluh lapan spesies telah dikutip, dan 15 spesies daripadanya adalah rekod baharu untuk negeri Kelantan. Spesies menarik yang berjaya dikutip daripada kerja lapangan adalah *Euphaea masoni* Selys, 1879 dan *Leptogomphus tioman* Choong 2016. Satu senarai semak Odonata untuk negeri Kelantan dengan 131 spesies disediakan dalam lampiran.

Key words: Odonata checklist, Gunung Stong, Kelantan state, Malaysia, new records

Introduction

Kelantan state is located in the northeast of Peninsular Malaysia, bordered by Perak state to the west, Terengganu state to the east, Pahang state to the south and the Thai Peninsula to the north (Fig. 1). With a total of land area of just over 15,000 km^2, Kelantan is the fourth largest state in Peninsular Malaysia after Pahang, Perak and Johor. Taman Negara National Park Kelantan is in the southeast of Kelantan, and Gunung Stong State Park is in the central part.

Odonata records from Kelantan have appeared in publications since the colonial period, the first appearing as early as 1902. Since then scattered records have appeared in the odonatological literature. We are aware of records from Kelantan in the following publications: Asahina (1966), Choong (2007, 2013, 2017), Furtado (1975),

Hämäläinen, Dow & Stokvis (2015), Hämäläinen, Norma-Rashid & Zakaria-Ismail (1996), Kalkman & Villanueva (2011), Laidlaw (1902a, 1902b, 1903, 1922), Laidlaw & Förster 1907, Lieftinck (1937, 1941, 1953, 1954, 1964, 1965), Norma-Rashid (2010), Norma-Rashid & van Tol (1995), Norma-Rashid, Zakaria-Ismail & Hämäläinen (1996), Novelo-Gutierrez & Salmah (2013), Ris (1909, 1910, 1911, 1912, 1913).

We conducted a short field trip to the central part of Kelantan to collect Odonata on 27 June – 4 July, 2016. The collecting was carried out at Gunung Stong State Park, and the adjacent Gunung Stong Forest Reserves and also at Hutan Lipur Bukit Bakar in the north-east of the state, close to Terengganu. Additionally the second author conducted some limited sampling in Hutan Lipur Jeram Linang, in the same area as Bukit Bakar, on 3 – 4 December 2016; however adverse weather conditions severely limited what could be accomplished. The results from these collecting trips are reported here; the general areas of the state where the sampling was conducted are indicated in Fig. 1. We also compile the published records from Kelantan to produce a checklist of Odonata known from Kelantan.

Figure 1. Location of Kelantan state in Peninsular Malaysia. Red dots indicate the general areas of Kelantan where the sampling trips were conducted.

Odonata recorded in June – July and December 2016

Locations

Some of the sampling locations are indicated in Fig. 2. Some of the aquatic habitats at the locations are shown in Fig. 3.

1. Stream and tributaries at Gunung Stong State Park, below waterfall [5.3392N, 101.9733E].

2. Stream and tributaries at Gunung Stong State Park, above waterfall [5.3399N, 101.965E].

3. Along roads and around accommodation at Gunung Stong State Park.

4. Stream and tributaries running from Gunung Stong Utara Forest Reserve [5.3888N, 101.9455E].

5. Pond and tiny outflow stream by road near Gunung Stong Utara Forest Reserve [5.3981N, 101.9509E].

6. Large stream and tributaries, near hydroelectric station, Gunung Stong Tengah Forest Reserve [5.3011N, 101.9319E].

Figure 2. Some of the sampling locations in Kelantan.

Figure 3. Various sampling habitats. A: location 2, B: location 4, C: location 5, D: location 6, E: location 7, F: location 9, G: location 10 and H: location 11.

7. Smaller stream in rubber and bamboo on road to hydroelectric station, Gunung Stong Tengah Forest Reserve [5.2962N, 101.9765E].

8. Pools on dirt tracks near to 7.

9. Forest stream and tributaries in Gunung Stong Selantan Forest Reserve [5.1505N, 101.9107E].

10. Stream and tributaries at Hutan Lipur Bukit Bakar [5.7182N, 102.2644E].

11. Ponds by road near Bukit Bakar [5.7263N, 102.2569E].

12. Stream, tributaries and rock pools at Hutan Lipur Jeram Linang, above waterfall [5.73952N, 102.37645E].

13. Stream at Hutan Lipur Jeram Linang, below waterfall [5.74209N, 102.37368E].

14. Tributary to main stream at Hutan Lipur Jeram Linang entering below waterfall [5.73992N, 102.3703E].

Species collected

First records from Kelantan are indicated by a *. The authors' names are abbreviated as CYC, RAD and YFN respectively. ♂+♀ indicates a pair in tandem.

Zygoptera

PLATYSTICTIDAE

Drepanosticta species

Only one female was collected, and species identification of *Drepanosticta* females in peninsular Malaysia is difficult. Three *Drepanosticta* species have been recorded from Kelantan (see appendix); this taxon could be one of those species, or some other species.

10 – ♀, 1.vii, CYC.

Protosticta curiosa Fraser, 1934*

6 – ♂, 29.vi, CYC.

ARGIOLESTIDAE

Podolestes orientalis Selys, 1862*

5 – ♂, 27.vi, YFN.

12 – ♂, 3.xii, RAD.

CALOPTERYGIDAE

Echo modesta Laidlaw, 1902

9 – 2 ♂♂, 30.vi, RAD.

Neurobasis chinensis (Linnaeus, 1758)

4 – ♂, 27.vi, CYC

6 – 2 ♂♂, 29.vi, CYC; ♂, 29.vi, RAD.

13 – ♂, 4.vii, RAD.

Vestalis amethystina Lieftinck, 1965
1 – ♂, 28.vi, CYC; ♂, 28.vi, RAD.
9 – ♂, 30.vi, CYC; ♂, 30.vi, RAD.
10 – ♂, 1.vii, CYC; ♂, 1.vii, RAD.
Vestalis amoena Hagen in Selys, 1853
4 – 2 ♂♂, 27.vi, RAD.
6 – ♂, 29.vi, CYC.
7 – ♂, 29.vi, CYC; ♂, 29.vi, RAD.
14 – ♂, 3.vii, RAD.

CHLOROCYPHIDAE
Aristocypha fenestrella (Rambur, 1842)
2 – 2 ♂♂, 28.vi, RAD.
3 – ♂, 28.vi, CYC.
4 – ♂, 27.vi, CYC; ♂, 27.vi, RAD.
6 – 4 ♂♂, 29.vi, CYC; 4 ♂♂, 29.vi, RAD.
9 – ♂, 30.vi, CYC; ♂, 30.vi, RAD.
Heliocypha biforata (Selys, 1859)
4 – ♂, 27.vi, CYC; ♂, 27.vi, RAD; ♂, 27.vi, YFN
7 – ♂, 29.vi, CYC; ♂, 29.vi, RAD.
9 – ♂, 30.vi, CYC.
10 – ♂, 1.vii, CYC; ♂, 1.vii, RAD.

Heliocypha perforata (Percheron, 1835)
4 – 2 ♂♂, 27.vi, YFN.
7 – ♂, 29.vi, CYC; 2 ♂♂, 29.vi, RAD.
Libellago lineata (Burmeister, 1839)
10 – 2 ♂♂, 1.vii, CYC; ♂, ♀, 1.vii, RAD; ♂, 1.vii, YFN.
Sundacypha petiolata (Selys, 1859)
10 – ♂, 1.vii, RAD.

DEVADATTIDAE
Devadatta argyoides (Selys, 1859)
2 – ♂, 28.vi, RAD.
3 – 2 ♂♂, 28.vi, CYC.
6 – ♂, 29.vi, RAD.
9 – ♂, ♀, 27.vi, CYC; ♂, 30.vi, RAD.
10 – ♂, 1.vii, CYC; 3 ♂♂, 1.vii, RAD.

EUPHAEIDAE

Dysphaea dimidiata Selys, 1853

7 – ♂, 29.vi, RAD.

Euphaea impar Selys, 1859

7 – ♂, 29.vi, RAD.

10 – 2 ♂♂, 1.vii, CYC; ♂, 1.vii, RAD.

Euphaea masoni Selys, 1879*

This species was only recently recorded from Malaysia (see Dow et al. 2016). Fig. 4 shows a male at location 6.

6 – ♂, 29.vi, CYC.

7 – 4 ♂♂, 29.vi, CYC; 3 ♂♂, 29.vi, RAD.

9 – ♂, 30.vi, CYC; ♂, 30.vi, RAD.

Figure 4. *Euphaea masoni* male, photography by C.Y. Choong.

Euphaea ochracea Selys, 1859

2 – ♂, 28.vi, CYC; ♂, 28.vi, RAD.

4 – ♂, 27.vi, CYC; 3 ♂♂, 27.vi, RAD; ♂, 27.vi, YFN.

6 – ♂, 29.vi, CYC; 2 ♂♂, 29.vi, RAD.

7 – ♂, ♀, 27.vi, RAD.

9 – ♂, 30.vi, CYC; ♂, 30.vi, RAD.

10 – ♂, 1.vii, CYC; ♂, ♂+♀, 1.vii, RAD.

PHILOSINIDAE

Rhinagrion viridatuma Fraser, 1938

6 – ♂, 29.vi, CYC.
7 – ♂, 29.vi, CYC; 4 ♂♂, 29.vi, RAD.
10 – ♂, 1.vii, CYC; ♂, 1.vii, RAD.

PLATYCNEMIDIDAE
Calicnemia chaseni (Laidlaw, 1928)
Fig. 5 shows a tandem pair at location 9.
6 – 4 ♂♂, 29.vi, CYC; ♂, 29.vi, RAD.
9 – 3 ♂♂, 2 ♂+♀, 30.vi, CYC.

Figure 5. *Calicnemia chaseni* in tandem pair, photography by C.Y. Choong.

Coeliccia albicauda (Förster in Laidlaw, 1907)
2 – ♂, 28.vi, CYC.
4 – ♂, 27.vii, RAD; 3 ♂♂, 27.vi, YFN.
6 – ♂, 29.vi, RAD.
9 – ♂, 30.vi, CYC; ♂, 30.vi, RAD.
10 – ♂, 1.vii, CYC; ♂, 1.vii, RAD; 2 ♂♂, 1.vii, YFN.
12 – ♂, 3.xii, RAD.
14 – 2 ♂♂, 2 ♀♀, 3.xii, RAD.
Coeliccia didyma (Selys, 1863)
2 – 2 ♂♂, 28.vi, RAD.
6 – 2 ♂♂, 29.vi, CYC; 2 ♂♂, 29.vi, RAD.

Coeliccia cf erici Laidlaw, 1917

This taxon and the true *C. erici* will be discussed elsewhere (Dow, Choong & Ng in preparation).

12 – ♂, 3.xii, RAD; 2 ♂♂, 4.xii, RAD.

14 – ♂, 3.xii, RAD.

Copera marginipes (Rambur, 1842)

5 – ♂, 27.vi, CYC; ♂, 27.vi, RAD; ♂, 27.vi, YFN.

10 – ♂, 1.vii, CYC.

13 – ♂+ ♀, 4.xii, RAD.

Copera vittata (Selys, 1863)

5 – 6 ♂♂, 27.vi, CYC; ♂, ♂+♀, 27.vi, RAD; 2 ♂♂, 27.vi, YFN.

9 – ♂, 30.vi, CYC; ♂, 30.vi, RAD.

10 – ♂, 1.vii, CYC.

Indocnemis orang (Förster in Laidlaw, 1907)

2 – 2 ♂♂, 28.vi, CYC; ♂, 28.vi, RAD.

6 – ♂, 29.vi, CYC; 5 ♂♂, ♀, 29.vi, RAD; 3 ♂♂, ♀, 29.vi, YFN.

9 – ♂, 30.vi, CYC.

10 – ♂, 1.vii, RAD.

12 – 2 ♂♂, 4.xii, RAD.

Prodasineura collaris (Selys, 1860)

5 – ♂, 27.vi, YFN.

10 – ♂, 1.vii, CYC.

Prodasineura humeralis (Selys, 1860)

4 – ♂, 27.vi, RAD; 2 ♂♂, 27.vi, YFN.

5 – ♂, 27.vi, CYC.

6 – ♂, 29.vi, RAD; ♂, ♂+♀, 29.vi, CYC.

7 – ♂, 29.vi, CYC; ♂, ♀, ♂+♀, 29.vi, RAD.

10 – ♂, 1.vii, CYC; ♂, 1.vii, RAD.

13 – ♂, 4.xii, RAD.

Prodasineura laidlawi (Förster in Laidlaw, 1907)

1 – ♂, 28.vi, CYC; ♂, ♂+♀, 28.vi, RAD.

4 – 2 ♂♂, 27.vi, CYC; 2 ♂♂, 27.vi, RAD.

6 – ♂, 29.vi, RAD.

7 – ♂, ♀, 29.vi, RAD.

9 – ♂, 30.vi, CYC.

10 – ♂, 1.vii, CYC; 2 ♂♂, ♀, 1.vii, RAD.

12 – ♂, 4.xii, RAD.

Prodasineura notostigma (Selys, 1860)*

10 – 2 ♂♂, 1.vii, RAD.

Pseudocopera ciliata (Selys, 1863)*

Fig. 6 shows a male taken at location 11.

5 – 2 ♂♂, 27.vi, CYC.

11 – ♂, 1.vii, CYC; ♀, 1.vii, RAD.

COENAGRIONIDAE

Argiocnemis species

5 – 2 ♂♂, 27.vi, CYC; ♂, 27.vi, RAD; ♂, 27.vi, YFN.

9 – ♂, 30.vi, CYC.

10 – ♂+♀, 1.vii, CYC.

12 – ♂, 3.xii, RAD.

Ceriagrion auranticum Fraser, 1922

11 – ♂, 1.vii, RAD.

Mortonagrion aborense (Laidlaw, 1914)*

5 – ♂, 27.vi, CYC; 2 ♂♂, 27.vi, RAD; 2 ♂♂, 27.vi, YFN.

Pseudagrion pruinosum (Burmeister, 1839)

5 – ♂, 27.vi, RAD.

Figure 6. *Pseudocopera ciliata* male, photography by C.Y. Choong.

Pseudagrion rubriceps Selys, 1876

5 – ♂, 27.vi, RAD.

Anisoptera

AESHNIDAE

Indaeschna grubaueri (Förster, 1904)

6 – ♂, 29.vi, YFN.

8 – ♂, 29.vi, RAD.

GOMPHIDAE

*Burmagomphus divaricatus*Lieftinck, 1964

9 – 2 ♂♂, 30.vi, CYC; ♂, 30.vi, RAD.

Ictinogomphus decoratus melaenops (Selys, 1858)

5 – ♂, 27.vi, CYC.

Leptogomphus tioman Choong, 2016*

This is the first record of this recently described (Choong 2016) species outside of Tioman Island.

10 – ♂, 1.vii, RAD.

*Microgomphus chelifer*Selys, 1858*

1 – ♂ (teneral), 28.vi, RAD.

Nepogomphus walli (Fraser, 1924)

6 – ♂, ?♀, 29.vi, RAD.

Paragomphus capricornis (Förster, 1914)

4 – ♂, 27.vi, CYC; 2 ♂♂, 27.vi, RAD.

6 – ♀, 29.vi, RAD.

9 – ♀, 30.vi, RAD.

10 – ♂, 1.vii, RAD.

Phaenandrogomphus asthenes Lieftinck, 1964*

4 – ♀, 27.vi, RAD.

6 – 2 ♀♀, 29.vi, CYC; ♂, 29.vi, RAD.

Stylogomphus ?malayanus Sasamoto, 2001*

9 – ♀ (teneral), 30.vi, RAD.

MACROMIIDAE

Macromia callisto Laidlaw, 1902

7 – ♀, 29.vi, RAD.

SYNTHEMISTIDAE

Idionyx species

4 – ♀, 27.vi, RAD.

9 – ♀, 30.vi, CYC.

Macromidia genialis Laidlaw, 1923*

6 – ♀, 29.vi, RAD.

LIBELLULIDAE

Aethriamanta gracilis (Brauer, 1878)*

11 – ♂, 1.vii, RAD.

Chalybeothemis chini Dow, Choong & Orr, 2007*

11 – 2 ♂♂, 1.vii, RAD.

Cratilla lineata (Brauer, 1878)

6 – ♂, 29.vi, YFN.

7 – ♂, 29.vi, CYC.

Cratilla metallica (Brauer, 1878)

6 – ♂, 29.vi, CYC; ♂, 29.vi, YFN.

8 – ♂, 29.vi, RAD.

9 – ♂, 30.vi, CYC.

10 – ♂, 1.vii, YFN.

Lyriothemis biappendiculata (Selys, 1878)

5 – ♀, 27.vi, RAD.

9 – ♂, 30.vi, CYC; ♂, 30.vi, RAD.

11 – ♂, 1.vii, RAD.

Neurothemis fluctuans (Fabricius, 1793)

5 – ♂, 27.vi, CYC; ♀, 27.vi, RAD; ♂, 27.vi, YFN.

11 – ♂, 1.vii, RAD.

Orchithemis pulcherrima Brauer, 1878

5 – ♂, 27.vi, RAD.

Orthetrum glaucum (Brauer, 1865)

4 – ♂, 27.vi, CYC.

6 – ♂, 29.vi, RAD.

Orthetrum luzonicum (Brauer, 1868)

3 – ♂, 28.vi, RAD.

10 – ♂, 1.vii, CYC.

Orthetrum pruinosum schneideri Förster, 1903

9 – ♂, 30.vi, CYC.

Orthetrum testaceum (Burmeister, 1839)

5 – ♂, 27.vi, YFN.

6 – ♂, 29.vi, YFN.

Orthetrum triangulare malaccensis Förster, 1903

6 – 2 ♂♂, 29.vi, RAD.

9 - ♂, 30.vi, CYC.

Rhyothemis obsolescens Kirby, 1889*

10 – ♂, 1.vii, CYC.

Rhyothemis plutonia Selys, 1883*

5 – ♂, 27.vi, CYC.

Tetrathemis irregularis hyalina Kirby, 1889

5 – ♂, 27.vi, CYC; 2 ♂♂, 27.vi, RAD.

10 – ♂, 1.vii, CYC.

Tetrathemis platyptera Selys, 1878

Fig. 7 shows a male at location 5.

2 – 2 ♂♂, 28.vi, CYC; 2 ♂♂, 28.vi, RAD.

5 – 2 ♂♂, 27.vi, CYC; ♂, 27.vi, RAD.

6 – ♂, 29.vi, CYC; ♂, 29.vi, YFN.

9 – ♂, 30.vi, CYC.

10 – ♂, 1.vii, CYC; ♂, 1.vii, RAD.

Trithemis aurora (Burmeister, 1839)

5 – ♂, 27.vi, CYC; ♂, 27.vi, RAD; ♂, 27.vi, YFN.

6 – ♂, 29.vi, YFN.

Trithemis festiva (Rambur, 1842)

4 – ♂, 27.vi, CYC; ♂, 27.vi, YFN.

10 – ♂, 1.vii, CYC.

Figure 7. *Tetrathemis platyptera* male, photography by C.Y. Choong.

Tyriobapta torrida Kirby, 1889

5 – ♂, 27.vi, CYC; 2 ♂♂, 27.vi, RAD; ♂, 27.vi, YFN.

10 – ♂, 1.vii, YFN.

12 – ♂, 3.xii, RAD.

Zygonyx ida Hagen, 1867

2 – ♂, 28.vi, CYC; ♂, 28.vi, RAD.

6 – ♂, 29.vi, CYC; 3 ♂♂, 29.vi, RAD.

Zygonyx iris Selys, 1869

4 – ♂, ♀, 27.vi, RAD.

6 – 3 ♂♂, 29.vi, CYC.

11 – ♂, 1.vii, RAD.

12 – ♂, 4.xii, RAD.

Discussion

Within ten days of sampling (27 June – 4 July 2016, and 3 – 4 December 2016) in the central and north-eastern parts of Kelantan, we managed to collect 68 species. Fifteen of these are new records for the state. However, we did not record any new species for Peninsular Malaysia or Malaysia. The most notable species recorded may be *Euphaea masoni* and *Leptogomphus tioman*. We recorded *E. masoni* in Perlis (the most northern part of Peninsular Malaysia) for the first time in Malaysia in August 2015 (Dow et al. 2016). The discovery of this species in the central part of Kelantan indicates that it has a wider distribution in the northern part of Peninsular Malaysia. We predict that it will also be found in the northern parts of Kedah and Perak. *Leptogomphus tioman* was recently described from Tioman Island in Choong (2016), where it was speculated that this species could be endemic to the island. Our record from Hutan Lipur Bukit Bakar (location 5) has shown that this species is also found on the mainland, and given the northern location at which it was found, it may also occur in southern peninsular Thailand. The distance between Tioman Island and central part of Kelantan is great, so we are expecting a wider distribution of this species in peninsular Malaysia as well.

Kelantan is one of the states in peninsular Malaysia that is known to be relatively well studied for its Odonata. Published records from Odonata specific surveys in the last two or so decades were from the north of the state at Bachok (Norma-Rashid 2010), from the south at Sungai Galas (Norma-Rashid, Zakaria-Ismail & Hämäläinen (1996), from the west at Gunung Chamah (Choong 2013) and southeast at Taman Negara National Park Kelantan (Choong 2007). With the 15 new records from our field trips, a total of 131 confirmed species are now known to occur in Kelantan. A checklist for Kelantan is provided in an appendix.

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Appendix: Checklist of Odonata recorded from Kelantan

Where the first record from Kelantan is not in this publication, a citation to the first record is made in square parenthesis after the species name.

Zygoptera

Lestidae

Lestes dorothea Fraser, 1924 [Choong 2013]

Lestes praemorsus decipiens Kirby, 1894 [Laidlaw 1902b]

Platystictidae

Drepanosticta fontinalis Lieftinck, 1937 [Lieftinck 1937]

Drepanosticta cf pan Laidlaw, 1931 [Choong 2013 as *D. pan*]

Drepanosticta sharpi (Laidlaw in Laidlaw & Förster, 1907) [Laidlaw & Förster 1907 as *Platysticta quadrata* Selys, 1860]

Protosticta curiosa Fraser, 1934

Argiolestidae

Podolestes orientalis Selys, 1862

Calopterygidae

Echo modesta Laidlaw, 1902 [Laidlaw 1902a]

Neurobasis chinensis (Linnaeus, 1758) [Laidlaw 1902a]

Neurobasis longipes Hagen, 1887 [Hämäläinen et al. 1996]

Vestalis amethystina Lieftinck, 1965 [Hämäläinen et al. 1996]

Vestalis amoena Hagen in Selys, 1853 [Hämäläinen et al. 1996]

Chlorocyphidae

Aristocypha fenestrella (Rambur, 1842) [Laidlaw 1902a]

Heliocypha biforata (Selys, 1859) [Laidlaw 1903]

Heliocypha perforata (Percheron, 1835) [Laidlaw 1903 as *Rhinocypha apicalis* Krüger, 1898]

Libellago lineata (Burmeister, 1839) [Choong 2007]

Libellago semiopaca (Selys, 1873) [Laidlaw 1902a as *Micromerus affinis* Laidlaw, 1902]

Libellago stigmatizans (Selys, 1869) [Lieftinck 1937]

Sundacypha petiolata (Selys, 1859) [Laidlaw 1902a as *Rhinocypha karschi* Krüger, 1898]

Devadattidae

Devadatta argyoides (Selys, 1859) [Hämäläinen et al. 1996]

Euphaeidae

Dysphaea dimidiata Selys, 1853 [Laidlaw 1902a as *Dysphaea limbata* Selys, 1859]

Euphaea impar Selys, 1859 [Laidlaw 1902a]

Euphaea masoni Selys, 1879

Euphaea ochracea Selys, 1859 [Laidlaw 1902a]

Philosinidae

*Rhinagrion viridatum*a Fraser, 1938 [Laidlaw 1902b as *Amphilestes mima* Karsch, 1891]

Platycnemididae

Calicnemia chaseni (Laidlaw, 1928) [Choong 2013]

Coeliccia albicauda (Förster in Laidlaw, 1907) [Laidlaw 1902b as *Trichocnemis borneensis* (Selys, 1886)]

Coeliccia didyma (Selys, 1863) [Choong 2013]

Coeliccia cf erici Laidlaw, 1917 [Choong 2013 as C. erici]

Copera marginipes¬ (Rambur, 1842) [Laidlaw 1902b]

Copera vittata (Selys, 1863) [Laidlaw 1902b as Copera atomaria (Selys, 1886)]

Elattoneura analis (Selys, 1860) [Hämäläinen et al. 1996]

Indocnemis orang (Förster in Laidlaw, 1907) [Hämäläinen et al. 1996]

Onychargia atrocyana Selys, 1865 [Choong 2017]

Prodasineura collaris (Selys, 1860) [Laidlaw 1902b]

Prodasineura humeralis (Selys, 1860) [Laidlaw 1902b]
Prodasineura laidlawi (Förster in Laidlaw, 1907) [Hämäläinen et al. 1996]
Prodasineura notostigma (Selys, 1860)
Pseudocopera ciliata (Selys, 1863)

Coenagrionidae
Aciagrion borneense Ris, 1911 [Asahina 1966]
Agriocnemis femina (Brauer, 1868) [Laidlaw 1902b]
Agriocnemis minima Selys, 1877 [Asahina 1966 as *Agriocnemis d'abreui* Fraser, 1919; note 1]
Agriocnemis pygmaea (Rambur, 1842) [Asahina 1966]
Archibasis rebeccae Kemp, 1989 [Hämäläinen et al. 1996]
Argiocnemis rubescens rubeola Selys, 1877 Laidlaw 1902b]
Argiocnemis species [Choong 2013]
Ceriagrion auranticum Fraser, 1922 [Laidlaw 1902b as *Ceriagrion erubescens* Selys, 1891]
Ceriagrion cerinorubellum (Brauer, 1865) [Asahina 1966]
Ceriagrion fallax pendelburyi Laidlaw, 1931 [Hämäläinen et al. 1996]
Ischnura senegalensis (Rambur, 1842) [Asahina 1966]
Mortonagrion aborense (Laidlaw, 1914)
Pseudagrion microcephalum (Rambur, 1842) [Norma-Rashid 2010]
Pseudagrion pruinosum (Burmeister, 1839) [Hämäläinen et al. 1996]
Pseudagrion rubriceps Selys, 1876 [Choong 2017]

Anisoptera
Aeshnidae
Amphiaeschna ampla basitincta Lieftinck, 1940 [Choong 2013]
Anax guttatus (Burmeister, 1839) [Laidlaw 1902a]
Gynacantha basiguttata Selys, 1882 [Laidlaw 1902a as *G. rosenbergei* Brauer, 1867]
Gynacantha bayadera Selys, 1891 [Choong 2007]
Gynacantha limbalis Karsch, 1892 [Choong 2007]
Indaeschna grubaueri (Förster, 1904) [Choong 2013]
Periaeschna laidlawi (Förster, 1908) [Choong 2013]
Tetracanthagyna plagiata (Waterhouse, 1877) [Laidlaw 1902a]

Gomphidae
*Burmagomphus divaricatus*Lieftinck, 1964 [Lieftinck 1964]
Burmagomphus insularis Laidlaw, 1914 [Choong 2007]
Gomphidia abbotti Williamson, 1907 [Hämäläinen et al. 1996]

Gomphidictinus perakensis (Laidlaw, 1902) [Choong 2017]
Heliogomphus kelantanensis (Laidlaw, 1902) [Laidlaw 1902a as *Gomphus consobrinus*; note 2]
Ictinogomphus decoratus melaenops Selys, 1857 [Hämäläinen et al. 1996]
Leptogomphus tioman Choong, 2016
Macrogomphus parallelogramma albardae Selys, 1878 [Choong 2007]
Macrogomphus quadratus Selys, 1878 [Choong 2007]
Megalogomphus sumatranus (Krüger, 1899) [Hämäläinen et al. 1996]
Merogomphus parvus (Krüger, 1899) [Hämäläinen et al. 1996]
Microgomphus chelifer Selys, 1858
Nepogomphus walli (Fraser, 1924) [Norma-Rashid & van Tol 1995]
Onychogomphus castor Lieftinck, 1941 [Lieftinck 1941]
Onychogomphus thienemanni Schmidt, 1934 [Novelo-Gutierrez & Salmah 2013]
Paragomphus capricornis (Förster, 1914) [Choong 2007]
Phaenandrogomphus asthenes Lieftinck, 1964
Stylogomphus ?malayanus Sasamoto, 2001

Macromiidae

Macromia callisto Laidlaw, 1902 [Laidlaw 1902a as *Macromia gerstaeckeri* Krüger, 1899]
Macromia cydippe Laidlaw, 1922 [Hämäläinen et al. 1996]
Macromia gerstaeckeri Krüger, 1899 [Laidlaw 1902a]

Synthemistidae

Idionyx montana Karsch, 1891 [Choong 2013 as *Idionyx* sp.]
Idionyx yolanda Selys, 1871 [Laidlaw 1902a as *Idionyx dohrni* Krüger, 1899]
Macromidia genialis Laidlaw, 1923

Libellulidae

Acisoma panorpoides Rambur, 1842 [Laidlaw 1902a]
Aethriamanta gracilis (Brauer, 1878)
Brachydiplax chalybea Brauer, 1868 [Laidlaw 1902a as *Brachydiplax maria* Selys, 1878]
Brachydiplax farinosa Krüger, 1902 [Laidlaw 1902a as *Brachydiplax pruinosa* Laidlaw, 1902; note 3]
Brachythemis contaminata (Fabricius, 1793) [Laidlaw 1902a]
Camacinia gigantea (Brauer, 1867) [Laidlaw 1902a]
Chalybeothemis chini Dow, Choong & Orr, 2007
Cratilla lineata (Brauer, 1878) [Choong 2007]
Cratilla metallica (Brauer, 1878) [Laidlaw 1902a]

Crocothemis servilia (Drury, 1770) [Laidlaw 1902a]
Diplacodes nebulosa (Fabricius, 1793) [Laidlaw 1902a]
Diplacodes trivialis (Rambur, 1842) [Laidlaw 1902a]
Lathrecista asiatica (Fabricius, 1798) [Laidlaw 1902a as *Lathrecista terminalis* Kirby, 1889]
Lyriothemis biappendiculata (Selys, 1878) [Laidlaw 1902a]
Lyriothemis cleis Brauer, 1868 [Laidlaw 1902a as *Lyriothemis priapea* (Selys, 1878)]
Macrodiplax cora (Brauer, 1867) [Laidlaw 1902a as *Macrodiplax vittata* (Kirby, 1893)]
Neurothemis fluctuans (Fabricius, 1793) [Laidlaw 1902a]
Neurothemis fulvia (Drury, 1773) [Choong 2013]
Neurothemis tullia (Drury, 1773) [Laidlaw 1902a]
Onychothemis coccinea Lieftinck, 1953 [Lieftinck 1953]
Onychothemis testacea Laidlaw, 1902 [Laidlaw 1902a]
Orchithemis pulcherrima Brauer, 1878 [Choong 2013]
Orthetrum chrysis (Selys, 1891) [Hämäläinen et al. 1996]
Orthetrum glaucum (Brauer, 1865) [Laidlaw 1902a as *Orthetrum nicevillei* Kirby, 1894]
Orthetrum luzonicum (Brauer, 1868) [Hämäläinen et al. 1996]
Orthetrum pruinosum schneideri Förster, 1903 [Laidlaw 1902a as *Orthetrum pruinosum* (Burmeister, 1839)]
Orthetrum sabina (Drury, 1770) [Asahina 1966]
Orthetrum testaceum (Burmeister, 1839) [Laidlaw 1902a]
Orthetrum triangulare malaccensis Förster, 1903 [Hämäläinen et al. 1996]
Pantala flavescens (Fabricius, 1798) [Asahina 1966]
Phyllothemis raymondi Lieftinck, 1950 [Choong 2017; note 4]
Potamarcha congener (Rambur, 1842) [Laidlaw 1902a as *Potamarcha obscura* (Rambur, 1842)]
Rhodothemis rufa (Rambur, 1842) [Norma-Rashid 2010]
Rhyothemis obsolescens Kirby, 1889
Rhyothemis phyllis (Sulzer, 1776) [Ris 1913]
Rhyothemis plutonia Selys, 1883
Tetrathemis irregularis hyalina Kirby, 1889 [Hämäläinen et al. 1996]
Tetrathemis platyptera Selys, 1878 [Hämäläinen et al. 1996]
Tholymis tillarga (Fabricius, 1798) [Asahina 1966]
Tramea transmarina euryale Selys, 1878 [Choong 2017]
Trithemis aurora (Burmeister, 1839) [Laidlaw 1902a]
Trithemis festiva (Rambur, 1842) [Hämäläinen et al. 1996]
Tyriobapta torrida Kirby, 1889 [Laidlaw 1902a]
Zygonyx ida Hagen, 1867 [Ris 1912]
Zygonyx iris Selys, 1869 [Laidlaw 1902a as *Zygonidia malayana* Laidlaw, 1902]

Note 1: records of *A. dabreui* from peninsular Malaysia were considered to refer to *A. minima* in Orr (2005).

Note 2: as *Gomphus consobrinus* was a preoccupied name, changed in Laidlaw 1902b.

Note 3: two species are currently being treated as *B. farinosa* (see Dow, Choong & Ng 2016), it is not yet clear which one of these that *B. pruinosa* corresponds to.

Note 4: *Phyllothemis eltoni* Fraser, 1935 has been recorded from peninsular Malaysia (Donnelly 1998, Perak) but as noted by Orr (2005) who listed it as *Phyllothemis ?eltoni*, that record might really refer to *P. raymondi*. In our opinion the specimen collected in Kelantan is a better match with *P. raymondi*, however the two species may eventually prove to be synonymous.

Uncertain records

Gomphidae

Onychogomphus geometricus nigrescens Laidlaw, 1902 was described from a single female (Laidlaw 1902a) from Kelantan. Later Laidlaw (1931) listed this taxon under *O. saundersi* Selys, 1854 following Williamson (1907), an opinion followed by some later authors, e.g. van Tol (1992), but not all, e.g. Lieftinck (1954) and Orr (2005) both list it as a separate species *O. nigrescens*. Although it is likely that Laidlaw's female will prove to be that of some already known species (maybe one of those already known from Kelantan), there is no good evidence that it belongs to the Burmese *O. saundersi*. We do not consider that this matter has been satisfactorily resolved and prefer to list this taxon under the name originally used by Laidlaw rather than as *O. saundersi*. If the female to Kelantan eventually proves to be a distinct species, the African species *O. nigrescens* Pinhey, 1952 will need a new name.

Libellulidae

Neurothemis disparilis Kirby, 1889 was recorded from Kelantan in Laidlaw 1902a; Seehausen & Dow 2016 considered this record unconfirmed, as we do here. The Kelantan record may well be the result of misidentification of the variable *N. fluctuans*, or some other species, or mislabelling of material actually from Borneo.

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