

Short Notes

Dragonflies and Damselflies (Odonata) of Kadamaian, Kinabalu Park, Sabah

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Abstract

The Odonata fauna of Kadamaian was surveyed from 15th to 19th October, 2019 during the Borneo Geographic Expedition 2019 Kadamaian. The altitude of the survey area ranged from 400 m to 850 m above sea level, representing the lower part of Kinabalu Park. A total of 23 species in nine families were recorded - 10 species in Libellulidae, three species in Platycnemididae, two species each in Platystictidae, Calopterygidae and Coenagrionidae, and one species each in Chlorocyphidae, Devadattidae, Euphaeidae and Synthemistidae. Of these, only one species is a new record for Kinabalu Park - *Pericnemis dowi*. The published Odonata records were compiled to produce a species list known from Kinabalu Park. The total number of species known to Kinabalu Park is now 71. Many more parts in Kinabalu Park need to be explored for a more comprehensive Odonata fauna of the park.

Keywords: Biodiversity, Borneo, expedition, new records, species list

Introduction

Dragonflies and damselflies are conspicuous insects in the order Odonata. They are well distributed in the tropical and subtropical regions. The nymphs are aquatic but the adult insects are terrestrial. They are an important biological component of freshwater ecosystems. According to the IUCN, Odonata are one of the four major taxonomic groups (fish, aquatic plants, molluscs and Odonata) for biodiversity assessment of wetlands (Springate-Baginski et al. 2009). Odonata are a good indicator for water quality and aquatic ecosystem health. Close to 6,000 Odonata species are distributed throughout the world (Dijkstra et al., 2013). In Malaysia, more than 400 species have been recorded (Choong et al., 2017), and Borneo has at least 300 species (Orr, 2003).

Kinabalu Park is located at the northern tip of Borneo Island in the state of Sabah, Malaysia. It is Malaysia's first UNESCO World Heritage Site for its significant biota. The park covers an area 754 square kilometres (Hämäläinen, 1994). Much of Mount Kinabalu is located inside the park with its highest peak at 4,095 m - the highest mountain in Southeast Asia. The Odonata of Kinabalu Park have been well studied. Hämäläinen (1994) compiled most Odonata records of Kinabalu Park from literature, and he listed 38 species. However, Hämäläinen (1994) missed a few published records (Laidlaw, 1931; Asahina & Kitagawa, 1992; Tsuda & Kitagawa, 1989). Later on, Odonata records for Kinabalu Park are found in various publications (Orr, 2003; Malkmus, 2005; Dow, 2010, 2017; Dow et al., 2015, 2016, 2017, 2020; Dow & Orr, 2010; Orr & Hämäläinen, 2013). Apart from all these published records, a few additional Odonata species were recorded by Rory Dow at Poring Hot Springs and Sayap during the 2012 Dutch/Malaysian Expedition to Kinabalu Park and Crocker Range National Park - *Drepanosticta cf crenitis* Lieftinck, 1933, *Vestalis amaryllis* Lieftinck, 1965 and *Coelliccia borneensis* (Selys, 1886) (Dow personal communication, 2021). Rory Dow and Graham Reels spotted and photographed *Orolestes wallacei* (Kirby, 1889) at Poring Hot Springs during their visit to the Kinabalu Park headquarters in 2005 (Dow personal communication, 2021). These records have not been published, but are added to the Kinabalu Park list with permission. Kadamaian is located at the northwest of the park (N6° 12'14.2" E116° 30' 34.6"). To our knowledge, no Odonata record has been available from this part of Kinabalu Park. In this paper we report the Odonata species found at Kadamaian. At the same time, we produce an updated Odonata list for Kinabalu Park.

Methodology

The Odonata of Kadamaian was surveyed from 15th to 19th October, 2019 during the Borneo Geographic Expedition 2019 Kadamaian. The altitude of the survey locations ranged from 400 m to 850 m above sea level (Table 1), and this represents the lower part of Kinabalu Park. The survey was carried out at various aquatic habitats found at the locations - streams, rivers, waterfalls and water pools. Adult insects were caught using an aerial net. The collected specimens were treated with acetone and then dried in silica gel for preservation. Identification to species level was done based on references and comparison with other specimens in collection. The specimens are kept in BORNEENSIS (Universiti Malaysia Sabah).

Table 1. Sampling locations in Kadamaian

Location	Description of aquatic habitat
A	Kadamaian campsite; rivers and small streams; N6° 12'14.2" E116° 30' 34.6"
B	waterfall, rivers and small streams; N6° 10'47.1" E116° 29' 11.1"
C	waterfalls, rivers and small streams; N6° 15'19.5" E116° 29' 38.6"
D	Wasai Waterfall; waterfall and river; N6° 13'24.2" E116° 30' 18.2"

Results

For a period of five days of survey (15th to 19th October, 2019), a total of 23 Odonata species in nine families were recorded (Table 2; columns A-D). Family Libellulidae dominated the list with 10 species, and this was followed by family Platycnemididae with three species. Families Platystictidae, Calopterygidae and Coenagrionidae had two species each while one species each was recorded for families Chlorocyphidae, Devadattidae, Euphaeidae and Synthemitidae. Of these, only one species is a new record for Kinabalu Park, i.e. *Pericnemis dowi* Orr & Hämäläinen, 2013. The previously known records (70 species) are listed in Table 2 (column E). The total number of species known from Kinabalu Park is now 71. Some of the species photographed at Kadamaian are shown in Figure 1.

Table 2. Odonata species recorded at Kinabalu Park. Columns A–D: sampling locations in Kadamaian (see Table 1), and column E: previously known records for Kinabalu Park. * indicates new record for Kinabalu Park.

No.	Family/Species	A	B	C	D	E	IUCN status
	Family Lestidae						
1	<i>Orolestes wallacei</i> (Kirby, 1889)					/	LC
	Family Platystictidae						
2	<i>Drepanosticta actaeon</i> Laidlaw, 1934					/	LC
3	<i>Drepanosticta barbatula</i> Lieftinck, 1940					/	DD
4	<i>Drepanosticta cf crenitis</i> Lieftinck, 1933					/	-
5	<i>Drepanosticta rufostigma</i> (Selys, 1886)	/				/	LC
6	<i>Protosticta joepani</i> Dow, Phan & Choong, 2020	/				/	NA
7	<i>Protosticta kinabaluensis</i> Laidlaw, 1915					/	VU
8	<i>Telosticta fugispinosa</i> Dow, Afendy & Rahman, 2016					/	NT

Family Calopterygidae				
9	<i>Matronoides cyaneipennis</i> (Förster, 1897)		/	LC
10	<i>Neurobasis longipes</i> Hagen, 1887		/	LC
11	<i>Vestalis amaryllis</i> Lieftinck, 1965		/	LC
12	<i>Vestalis amnicola</i> Lieftinck, 1965	/	/	LC
13	<i>Vestalis anacolosa</i> Lieftinck, 1965		/	LC
14	<i>Vestalis beryllae</i> Laidlaw, 1915	/	/	LC
Family Chlorocyphidae				
15	<i>Heliocypha biseriata</i> (Selys, 1859)	/	/	LC
16	<i>Rhinocypha aurofulgens</i> Laidlaw, 1931		/	LC
17	<i>Rhinocypha humeralis</i> Selys, 1873		/	LC
18	<i>Rhinocypha moultoni</i> Laidlaw, 1915		/	DD
19	<i>Rhinocypha stygia</i> Förster, 1897		/	NT
20	<i>Rhinoneura villosipes</i> Laidlaw, 1915		/	VU
Family Devadattidae				
21	<i>Devadatta aran</i> Dow, Hämäläinen & Stokvis, 2015		/	LC
22	<i>Devadatta tanduk</i> Dow, Hämäläinen & Stokvis, 2015	/	/	DD
Family Euphaeidae				
23	<i>Euphaea basalis</i> (Laidlaw, 1915)		/	NT
24	<i>Euphaea subcostalis</i> Selys, 1873	/ / / /	/	LC
25	<i>Euphaea subnodalis</i> (Laidlaw, 1915)		/	LC
Family Platycnemididae				
26	<i>Coelliccia arcuata</i> Lieftinck, 1940	/	/	LC
27	<i>Coelliccia borneensis</i> (Selys, 1886)		/	LC
28	<i>Coelliccia cyaneothorax</i> Kimmins, 1936		/	LC
29	<i>Coelliccia cf nemoricola</i> Laidlaw, 1912	/ /	/	-
#30	<i>Copera vittata</i> (Selys, 1863)		/	LC
31	<i>Prodasineura hyperythra</i> (Selys, 1886)	/	/	LC
Family Coenagrionidae				
32	<i>Agriocnemis femina</i> (Brauer, 1868)		/	LC
33	<i>Ceriagrion bellona</i> Laidlaw, 1915		/	LC
34	<i>Ceriagrion cerinorubellum</i> (Brauer, 1865)		/	LC
35	<i>Ischnura senegalensis</i> (Rambur, 1842)		/	LC
*36	<i>Pericnemis dowi</i> Orr & Hämäläinen, 2013	/	/	NT
37	<i>Pericnemis kiautarum</i> Orr & Hämäläinen, 2013		/	VU
38	<i>Pseudagrion perfucatum</i> Lieftinck, 1937		/	NA
39	<i>Stenagrion dubium</i> (Laidlaw, 1912)	/	/	LC
Family Aeshnidae				
40	<i>Gynacantha basiguttata</i> Selys, 1882		/	LC
41	<i>Indaeschna grubaueri</i> (Förster, 1904)		/	LC

42	<i>Tetracanthagyna degorsi</i> Martin, 1895		/		NA	
Family Gomphidae						
43	<i>Leptogomphus coomansi</i> Laidlaw, 1936		/		LC	
44	<i>Leptogomphus pasia</i> van Tol, 1990		/		DD	
45	<i>Leptogomphus pendleburyi</i> Laidlaw, 1934		/		LC	
46	<i>Leptogomphus williamsoni</i> Laidlaw, 1912		/		LC	
47	<i>Megalogomphus buddi</i> Dow & Price, 2020		/		NA	
48	<i>Sieboldius japonicus</i> Selys, 1854		/		LC	
Family Chlorogomphus						
49	<i>Chlorogomphus dyak</i> (Laidlaw, 1911)		/		DD	
Family Macromiidae						
50	<i>Macromia euterpe</i> Laidlaw, 1915		/		DD	
Family Synthemistidae						
51	<i>Macromidia fulva</i> Laidlaw, 1915	/	/	/	LC	
Family Corduliidae						
52	<i>Procordulia fusiformis</i> Lieftinck, 1977		/		LC	
Family Libellulidae						
53	<i>Agrionoptera insignis</i> (Rambur, 1842)		/		LC	
54	<i>Cratilla lineata</i> (Brauer, 1878)		/		LC	
55	<i>Cratilla metallica</i> (Brauer, 1878)	/	/	/	LC	
56	<i>Diplacodes trivialis</i> (Rambur, 1842)	/	/	/	LC	
57	<i>Hylaeothemis clementia</i> Ris, 1909	/	/	/	LC	
58	<i>Lyriothemis cleis</i> Brauer, 1868		/		LC	
59	<i>Lyriothemis magnificata</i> (Selys, 1878)		/		LC	
60	<i>Neurothemis ramburii</i> (Brauer, 1866)		/		LC	
61	<i>Neurothemis terminata</i> Ris, 1911		/	/	LC	
62	<i>Orthetrum chrysis</i> (Selys, 1891)	/	/	/	LC	
63	<i>Orthetrum glaucum</i> (Brauer, 1865)	/	/	/	LC	
64	<i>Orthetrum pruinatum schneideri</i> Förster, 1903		/		LC	
65	<i>Orthetrum sabina</i> (Drury, 1770)	/	/	/	LC	
66	<i>Orthetrum testaceum</i> (Burmeister, 1839)	/	/	/	LC	
67	<i>Pantala flavescens</i> (Fabricius, 1798)	/	/	/	LC	
68	<i>Trithemis aurora</i> (Burmeister, 1839)		/		LC	
69	<i>Trithemis festiva</i> (Rambur, 1842)	/	/	/	LC	
70	<i>Zygonyx iris errans</i> Lieftinck, 1953		/		LC	
71	<i>Zyxomma obtustum</i> (Albarda, 1881)		/		LC	
Total number		12	10	4	3	70

Härmäläinen (1994) states “teneral whitish specimen of *Copera*, most likely *C. marginipes*”, but he failed to collect the specimen. The description of the teneral matches teneral *Copera vittata*. Therefore, it is listed here as *Copera vittata*.



Figure 1. Some of the Odonata species photographed at Kadamaian. A. *Hylaeothemis clementia*, B. *Trithemis festiva*, C. *Pantala flavescens*, D. *Vestalis amnicola*, E. *Euphaea subcostalis*, F. *Coeliccia arcuata*, G. *Protosticta joepani* and F. *Pericnemis dowi*.

Discussion

The number of species recorded from the expedition was not high. This was mainly due to the limited type of aquatic habitat in the survey locations - rivers, streams and waterfalls. Of course, another contributing factor to the low number of species is the short period of survey (only five days). However, we still managed to add one species to the species list of Kinabalu Park (Table 2, marked with *). This might have indicated that the species list of Kinabalu Park (Table 2) is far from complete. We believe that many more common species have yet to be recorded for Kinabalu Park. It is also worthwhile to note that Kinabalu Park is a refuge for a good number of uncommon species, and quite a few species were described from there. Hämäläinen (1994) provided information on 13 species with type locality from Kinabalu Park. Later on, a few more species were described from the park - Orr & Hämäläinen (2013) described *Pericnemis kiautarum* from Poring Hot Springs, and Dow et al. (2015) described *Devadatta tanduk* from Poring Hot Springs.

The most interesting species recorded from Kadamaian were *Pericnemis dowi* and *Protosticta joepani* Dow, Phan & Choong, 2020. A male of *P. dowi* was spotted on vegetation next to a forest stream at location A, and it was photographed (Figure 1H). This species was described from Brunei, and it is also found in various parts of Sarawak such as Gunung Mulu National Park, Lanjak Entimau Wildlife Sanctuary, the Kelilngklang Range etc. (Orr & Hämäläinen, 2013; Dow et al., 2018). Kadamaian is the first location of this species in Sabah, and therefore it is a new record for Sabah. Sabah now has three *Pericnemis* species - *P. dowi*, *P. kiautarum* and *Pericnemis triangularis* (Laidlaw, 1931), and the first two species are found in Kinabalu Park. *Protosticta joepani* was recorded at forest path by a stream in location A. It is a recently described species from Borneo (Dow et al., 2020). In Sabah, this species has been recorded in the Crocker Ranger (Afendy et al., 2017), the Imbak Canyon (Choong & Chung, 2019), as well as other parts of Kinabalu Park - Poring Hot Springs and Sayap (Dow et al., 2020).

As it is now, 71 species in 15 families are known from Kinabalu Park. This number of species is not high for an area claimed to have high level of biota. Therefore, more effort is needed to explore many other parts of the park.

Conclusion

Kinabalu Park is a refuge for some rare and uncommon Odonata species endemic to Borneo. At present the Odonata list of Kinabalu Park has 71

species. It must be noted that this species list is far from complete as many parts of the park have yet to be explored for Odonata. Nevertheless, the species list may provide a reference for the study of Odonata diversity in Sabah and Borneo.

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