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CICADA FAUNA (HOMOPTERA: CICADOIDEA) OF SABAH: WITH SPECIAL REFERENCE TO SIX SELECTED PROTECTED AREAS

Zaidi, M.I. & Azman, S.
Centre for insect Systematics
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor, MALAYSIA

ABSTRACT

To date, published works have indicated that cicada fauna of Sabah is represented by a total of 73 species in 23 genera under 2 families (Cicadidae: 66 species; Tibicinidae: 7 species). In 6 selected protected areas combined, namely Kinabalu Park, Crocker Range Park, Tambunan Virgin Jungle Reserve, Tawau Hills Park, conservation areas of Danum Valley and Maliau Basin, the fauna is very well represented, i.e. 63 (or 86% of the total) species in 21 (or 91% of the total) genera. It is even better compared to all recorded localities in Sabah outside these 6 protected areas combined (46 (or 63% of the total) species in 20 (or 87% of the total) genera). Discretely, the fauna is best represented in Kinabalu Park, i.e. 45 (or 62% of the total) species in 18 (or 78% of the total) genera, which is almost as good as all recorded localities in Sabah outside these 6 selected areas combined. Next best is Crocker Range Park (i.e. 23 (or 32% of the total) species in 11 (or 48% of the total) genera), followed by Tawau Hills Park (i.e. 22 (or 30% of the total)

species in 9 (or 39% of the total) genera). Danum Valley and Maliau Basin (each 16 (or 22% of the total) species in 6 (or 26% of the total) genera) and Tambunan Virgin Jungle Reserve (15 (or 21% of the total) species in 10 (or 43% of the total) genera) appear not as good, mainly because their cicadas have not been much sampled and/or published. Of the total 73 species, 10 (or 14 %) are endemic species to Sabah, i.e. *Chremistica tridentigera* (Breddin), *Ternopsia pumila* (Distant), *Tanna pallida* Distant, *Nabalua neglecta* Moulton (confined to Kinabalu Park), *Orientopsaltria kinabaluana* Duffels & Zaidi, *Platylomia bangueyensis* Distant, *Pomponia bulu* Zaidi & Azman (confined to Kinabalu Park), *Ayesha operculissima* (Distant), *Mogannia binotata* Distant (confined to Kinabalu Park) and *Huechys lutulenta* Distant (confined to Kinabalu Park). After 1923, no recent specimens have been obtained from Sabah for 7 (thus rare) species, i.e. *Ternopsia psecas* (Walker), *T. pumila, T. pallida* Distant, *P. bangueyensis*, *A. operculissima*, *M. binotata* and *H. lutulenta*. Of these, 3 had been in Kinabalu Park (*T. psecas, M. binotata, H. lutulenta*) and the rest outside the 6 selected areas. *Dundubia vaginata* (Fabricius) and *Orientopsalria montivaga* (Distant), appear to be the most common species in Sabah (in all recorded localities, within and outside the 6 protected areas).

Keywords: Homoptera, Cicadoidea, fauna, list, new records, endemic, common species, protected areas, Sabah.

ABSTRAK

Setakat ini, penerbitan menunjukkan bahawa fauna riang-riang Sabah diwakili oleh sejumlah 73 spesies dalam 23 genus di bawah 2 famili (Cicadidae: 66 spesies; Tibicinidae: 7 spesies). Secara gabungan, dalam 6 kawasan dilindungi yang terpilih, iaitu Taman Kinabalu Park, Taman Banjaran Crocker, Rezab Hutan Dara Tambunan, Taman Bukit Tawau, kawasan konservasi Lembah Danum dan Lembangan Maliau, fauna ini sangat baik diwakili, i.e. 63 (atau 86% daripada jumlah) spesies dalam 21 (atau 91% daripada jumlah) genus. Ianya malah lebih baik berbanding

dengan semua lokaliti yang direkodkan di Sabah di luar 6 kawasan terpilih ini secara gabungan (46 (atau 63% daripada jumlah) spesies dalam 20 (atau 87% daripada jumlah) genus). Secara diskret, fauna ini diwakili terbaik di Taman Kinabalu, i.e. 45 (atau 62% daripada jumlah) spesies dalam 18 (atau 78% daripada jumlah) genus, yang mana hampir sebaik seperti semua lokaliti yang direkodkan di Sabah di luar 6 kawasan terpilih ini secara gabungan. Kedua terbaik adalah Taman Banjaran Crocker (i.e. 23 (atau 32% daripada jumlah) spesies dalam 11 (atau 48% daripada jumlah) genus), diikuti oleh Taman Bukit Tawau (i.e. 22 (atau 30% daripada jumlah) spesies dalam 9 (atau 39% daripada jumlah) genus). Lembah Danum dan Lembangan Maliau (masing-masing 16 (atau 22% daripada jumlah) spesies dalam 6 (atau 26% daripada jumlah) genus) dan Rezab Hutan DaraTambunan (15 (atau 21% daripada jumlah) spesies dalam10 (atau 43% daripada jumlah) genus) kelihatan tidak sebaik, dasarnya kerana riang-riang di sini tidak banyak disampel dan/ atau diterbitkan. Daripada 73 spesies ini, 10 (atau 14 %) adalah spesies endemik di Sabah, i.e. *Chremistica tridentigera* (Breddin), *Ternopsia pumila* (Distant), *Tanna pallida* Distant, *Nabalua neglecta* Moulton (terhad kepada Taman Kinabalu), *Orientopsaltria kinabaluana* Duffels & Zaidi, *Platylomia bangueyensis* Distant, *Pomponia bulu* Zaidi & Azman (terhad kepada Taman Kinabalu), *Ayesha operculissima* (Distant), *Mogannia binotata* Distant (terhad kepada Taman Kinabalu) dan *Huechys lutulenta* Distant (terhad kepada Taman Kinabalu). Selepas 1923, tiada spesimen terbaru diperolehi dari Sabah bagi 7 spesies (justeru langka), i.e. *Ternopsia psecas* (Walker), *T. pumila, T. pallida* Distant, *P. bangueyensis*, *A. operculissima*, *M. binotata* dan *H. lutulenta*. Daripadanya, 3 pernah berada di Taman Kinabalu (*T. psecas, M. binotata, H. lutulenta*) dan selebihnya di luar 6 kawasan terpilih ini. *Dundubia vaginata* (Fabricius) dan *Orientopsalria montivaga* (Distant), kelihatan sebagai paling umum di Sabah (di lokaliti yang terekod, di dalam dan di luar 6 kawasan dilindungi ini).

Kata kunci: Homoptera, Cicadoidea, fauna, senarai, rekod baru, spesies endemik, langka umum, kawasan dilindungi, Sabah.

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INTRODUCTION

Cicadas, in terms of eco-tourism, are insects of aesthetic values for their species-specific songs (mating calls), in a way like birds. Unlike birds, there has been no one recent publication that provides a quick holistic grasp of cicada fauna of Sabah or Borneo. Thus, with regard to this, Moulton (1923) is still considered the one publication to be referred to. Moulton (1923) provides an excellent systematic review of cicadas of Sundalands that includes Borneo. Nonetheless, thereafter, there have been publications on systematic revisions of selected cicada genera of which the examined materials include those from Sabah, and also surveys of cicada fauna of or inventories of cicada specimens from selected areas in Sabah (Bregman 1985; Hayashi 1987; Zaidi & Ruslan 1995a, 1995b, 1997; Beuk 1996, 1999; Duffels & Zaidi 1999; Zaidi et al. 1999, 2000a, 2000b, 2001a, 2001b; Kos & Gogala 2000; Zaidi & Azman 2000; Zaidi & Nordin 2001; Schouten & Duffels 2002).

In view of the above, a review of cicada fauna of Sabah with special reference to six selected protected areas, namely Kinabalu Park, Crocker Range Park, Tambunan Virgin Jungle Reserve, Tawau Hills Park and the conservation areas of Danum Valley and Maliau Basin, is made based on the above-mentioned publications, and this presented herewith.

CICADA FAUNA OF SABAH

To date, published works (Moulton 1923; Bregman 1985; Hayashi 1987; Zaidi & Ruslan 1995a, 1995b, 1997; Beuk 1996, 1999; Duffels & Zaidi 1999; Zaidi et al. 1999, 2000a, 2000b, 2001a, 2001b; Kos & Gogala 2000; Zaidi & Azman 2000; Zaidi & Nordin 2001; Schouten & Duffels 2002) have indicated that cicada fauna of Sabah is represented by a total of 73 species in 23 genera under 2 families (Cicadidae: 66 species; Tibicinidae: 7 species) (Table 1).

Representation of the cicada fauna of Sabah in six selected protected areas

In 6 selected protected areas combined, namely Kinabalu Park, Crocker Range Park, Tambunan Virgin Jungle Reserve, Tawau Hills Park, the conservation areas of Danum Valley and Maliau Basin, the fauna is very well represented, i.e. 63 (or 86% of the total) species in 21 (or 91% of the total) genera. It is even better compared to all recorded localities in Sabah outside these 6 protected areas combined (46 (or 63% of the total) species in 20 (or 87% of the total) genera) (Table 1).

Discretely, the fauna is best represented in Kinabalu Park, i.e. 45 (or 62% of the total) species in 18 (or 78% of the total) genera (Table 1). This is almost that of all recorded localities in Sabah outside these 6 selected protected areas combined. (46 (or 63% of the total) species in 20 (or 87% of the total) genera) (Table 1).

Next best (after Kinabalu Park) is Crocker Range Park (i.e. 23 (or 32% of the total) species in 11 (or 48% of the total) genera), followed by Tawau Hills Park (i.e. 22 (or 30% of the total) species in 9 (or 39% of the total) genera) (Table 1). .

Danum Valley and Maliau Basin, each represented by 16 species (22% of the total) in 6 genera (26% of the total) and Tambunan Virgin Jungle Reserve, represented by 15 species (21% of the total) in 10 genera (43% of the total) appear not as good (Table 1). Such are mainly because their cicadas have not been much sampled and/or published.

Endemic species

Of the total 73 species, 10 (or 14 %) are thus-far endemic species to Sabah. The 10 species are *Chremistica tridentigera* (Breddin), *Ternopsia pumila* (Distant), *Tanna pallida* Distant, *Nabalua neglecta* Moulton, *Orientopsaltria kinabaluana* Duffels & Zaidi, *Platylomia bangueyensis* Distant, *Pomponia bulu* Zaidi & Azman, *Ayesha operculissima* (Distant), *Mogannia binotata* Distant and *Huechys lutulenta* Distant (Table 1).

Of these 10 endemic species to Sabah, 4 (*N. neglecta*, *P. bulu*, *Mogannia binotata* and *H. lutulenta*) are thus-far known to be confined to Kinabalu Park (Table 1).

Rare species

After Moulton (1923), no recent specimens have been obtained from Sabah (or anywhere else of the previous recorded localities) for 7 (thus rare) species, i.e. *Ternopsia psecas* (Walker), *T. pumila, T. pallida, P. bangueyensis, A. operculissima, M. binotata* and *H. lutulenta*. Of these, in Sabah, Moulton recorded 3 to be in Kinabalu Park (*T. psecas, M. binotata, H. lutulenta*) and the rest outside the 6 protected areas (Table 1).

Thus, *M. binotata* and *H. lutulenta* seem to be not only endemic to and rare in Sabah but also only known in Kinabalu Park and yet to be rediscovered. In this respect, the other 5 species (*T. psecas, T. pumila, T. pallida*, *P. bangueyensis*, *A. operculissima*) have also yet to be rediscovered in Sabah.

Common species

Two species, *Dundubia vaginata* (Fabricius) and *Orientopsalria montivaga* (Distant), appear to be the most common species in Sabah. Both have been widely recorded in Sabah, in all the 6 protected areas as well as localities outside these protected areas (Table 1).

CONCLUDING REMARKS

It is pertinent to point out that the above-mentioned 'all localities in Sabah outside the 6 selected protected areas' also include areas protected by Sabah State Government in some form or other, e.g. as other parks under Sabah Parks or reserves under Sabah Wildlife Department or Sabah Forestry Department. In view of this and the above presentation, it can be concluded that protected areas in Sabah are excellent in harbouring a great diversity of cicada species, of which some of the cicada species are endemic to and rare in Sabah and confined to certain particular protected

areas (e.g. Kinabalu Park) but not rediscovered in recent years. More studies of cicadas need to be carried out within protected areas in Sabah and documented. Thus, In Sabah, future uses of protected areas would obviously include, among others, continual generation of their biodiversity information, the very essence of them being designated as protected areas. This would of course include aesthetic insects like cicadas. The information provided in this paper especially for Kinabalu Park, is one aspect that supports Kinabalu Park being a World Heritage area.

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TABLE 1. Checklist of cicada fauna of Sabah, based on thus-far published works

No	Taxa	Localities							References
		KP	DV	MB	CR	TH	VJR	Etc.	
	Cicadidae								
1	*Platypleura nobilis* (Germar)	♦		♦		♦		♦	10, 13, 14, 17
2	*Platypleura* sp.	♦	♦		♦		♦		10, 13, 15
3	*Tacua speciosa* (Illeger)	♦			♦			♦	1, 4, 7, 10, 13, 15, 16
4	*Chremistica bimaculata* (Olivier)					♦		♦	1, 10, 13, 14
5	*Chremistica germana* (Distant)					♦			1, 14
6	*Chremistica pontianaka* (Distant)							♦	1, 10, 13
7	*Chremistica tridentigera* (Breddin) *							♦	2
8	*Cryptotympana aquila* (Walker)	♦	♦		♦			♦	3, 10, 13, 15
9	*Cryptotympana praeclara* Hayashi	♦			♦				1, 3
10	*Terpnosia psecas* (Walker)	♦							1
11	*Terpnosia pumila* (Distant) *							♦	1
12	*Terpnosia* sp	♦					♦		10, 13
13	*Puranoides* sp						♦		13
14	*Purana capricornis* Kos & Gogala		♦	♦					11, 17
15	*Purana guttularis* (Walker)						♦	♦	1, 10, 13
16	*Purana hermes* Schouten & Duffels		♦	♦				♦	10, 13, 17, 18
17	*Purana nebulilinea* (Walker)		♦						11
18	*Purana obducta* Schouten & Duffels			♦					17, 18
19	*Purana pryeri* (Distant)			♦				♦	10, 11, 13, 17
20	*Purana sagittata* Schouten & Duffels		♦	♦					17, 18
21	*Purana tigrina* (Walker)					♦		♦	1, 13, 14
22	*Purana ubina* Moulton			♦					17
23	*Tanna bakeri* (Moulton)	♦			♦				1, 4, 10, 15
24	*Tanna insignis* Distant	♦							1, 4, 10
25	*Tanna pallida* Distant *							♦	1
26	*Nabalua mascula* (Distant)						♦		1, 10, 13
27	*Nabalua neglecta* Moulton *	♦							1, 10
28	*Nabalua* sp	♦							10
29	*Maua affinis* Distant	♦					♦	♦	1, 10, 13
30	*Maua albigutta* (Walker)							♦	16
31	*Maua quadrituberculata* (Signoret)					♦			1, 5
32	*Dundubia euterpe* (Bloem & Duffels)	♦						♦	10, 13

33	*Dundubia jacoona* (Distant)	♦		♦		♦		♦	1, 6, 13, 14, 16, 17
34	*Dundubia oopaga* (Distant)					♦			15
35	*Dundubirufivena* Walker	♦			♦	♦		♦	1, 4, 5, 10, 13, 14, 15
36	*Dundubia vaginata* (Fabricius)	♦	♦	♦	♦	♦	♦	♦	1, 4, 5, 10, 13, 14, 15, 17
37	*Orientopsaltria agatha* (Moulton)	♦	♦		♦			♦	9, 15
38	*Orientopsaltria alticola* (Distant)	♦	♦		♦	♦		♦	1, 5, 9, 10, 13, 14, 15, 16
39	*Orientopsaltria duarum* (Walker)	♦				♦			1, 4, 9, 10
40	*Orientopsaltria hollowayi* Duffels & Zaidi	♦			♦				9, 15
41	*Orientopsaltria ida* (Moulton)	♦			♦	♦	♦	♦	1, 4, 5, 9, 10, 13, 15, 16
42	*Orientopsaltria kinabaluana* Duffels & Zaidi *	♦			♦		♦	♦	9, 15
43	*Orientopsaltria maculosa* Duffels & Zaidi	♦	♦	♦		♦		♦	5, 9, 14, 17
44	*Orientopsaltria montivaga* (Distant)	♦	♦	♦	♦	♦	♦	♦	1, 5, 9, 10, 13, 15, 16, 17
45	*Orientopsaltria padda* (Distant)	♦	♦	♦		♦		♦	1, 4, 5, 9, 10, 13, 14, 16, 17
46	*Orientopsaltria phaeophila* (Walker)	♦	♦	♦	♦	♦		♦	4, 5, 9, 10, 13, 14, 15, 17
47	*Orientopsaltria saudarapadda* Duffels & Zaidi						♦	♦	13
48	*Platylomia abdulla* (Distant)							♦	8
49	*Platylomia aerata* (Distant)		♦			♦		♦	1, 5, 8, 13, 14
50	*Platylomia bagueyensis* Distant *							♦	1
51	*Platylomia spinosa* (Fabricius)	♦	♦		♦	♦		♦	4, 5, 8, 10, 13, 14, 15
52	*Platylomia viridimaculata* (Distant)	♦	♦		♦	♦		♦	1, 8, 10, 13, 14, 15
53	*Ayesha operculissima* (Distant) *							♦	1
54	*Ayesha spatulata* (Stal)	♦						♦	1, 10, 113, 16
55	*Tosena depicta* Distant	♦						♦	1, 10, 13
56	*Tosena faciata* Distant				♦	♦		♦	1, 10, 13, 15, 17
57	*Pomponia bulu* Zaidi & Azman *	♦							10, 12
58	*Pomponia decem* (Walker)	♦			♦	♦	♦	♦	♦	1, 4, 10, 13, 14, 15, 16, 17
59	*Pomponia graecina* Distant	♦			♦			♦	1, 4, 10, 13, 15
60	*Pomponia lactea* (Distant)	♦			♦		♦		1, 4, 10, 13, 15

61	*Pomponia merula* (Distant)	♦		♦	♦	♦	♦	1, 5, 10, 13, 14, 15, 16, 17
62	*Pomponia picta* (Walker)	♦					♦	4, 16
63	*Pomponia rajah* Mouton	♦				♦		10, 13
64	*Mogannia binotata* Distant *	♦						1
65	*Mogannia obliqua* Walker	♦						10
66	*Mogannia viridis* (Signoret)	♦						1, 10
	Tibicinidae							
67	*Heuchys fusca* Distant	♦					♦	1, 10, 13
68	*Heuchys lutulenta* Distant *	♦						1
69	*Lemuriana connexa* Distant						♦	13
70	*Scieroptera splendidula* (Fabricius)	♦		♦			♦	1, 10, 13, 15
71	*Nelcyndana tener* (Stal)						♦	1, 13
72	*Abroma maculicollis* (Guerin)	♦					♦	4, 10, 13
73	*Muda obtusa* (Walker)	♦		♦	♦	♦	♦	1, 4, 5, 10, 13, 15
	Total spp. (73 in Sabah)	45	16	16	23	22	15	46
		63						
	Total genera (23 in Sabah)	18	6	6	11	9	10	20
		21						20
	% presentation of (73)Sabah spp.	62	22	22	32	30	21	63
	% presentation of (73)Sabah spp.	86						63
	% presentation of (23)Sabah genera	78	26	26	48	39	43	87
	% presentation of (23)Sabah genera	91						87

* endemic species to Sabah.

KP=Kinabalu Park; **DV**=Danum Valley Conservation Area, **MB**=Maliau Basin Conservation Area; **CR**= Crocker Range Park; **TH**= Tawau Hills Park; **VJR**= Virgin Jungle Reserve, Tambunan; **Etc**.= all recorded localities in Sabah outside the former 6 selected protected areas.

1, Moulton (1923); **2**, Bregman (1985); **3**, Hayashi (1987); **4**, Zaidi & Ruslan (1995a); **5**, Zaidi & Ruslan (1995b); **6**, Beuk (1996); **7**, Zaidi & Ruslan (1997); **8**, Beuk (1999); **9**, Duffels & Zaidi (1999); **10**, Zaidi et al. (1999); **11**, Kos & Gogala (2000); **12**, Zaidi & Azman (2000); **13**, Zaidi et al. (2000a); **14**, Zaidi et al. (2000b); **15**, Zaidi & Nordin (2001); **16**, Zaidi et a. (2001a); **17**, Zaidi et a. (2001b); **18**, Schouten & Duffels (2002).