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A PRELIMINARY CHECKLIST OF HARVESTMEN (ARACHNIDA: OPILIONES) IN MALAYSIA

Fatin-Elina Kamarulzaman[1], Dzulhelmi Muhammad Nasir[2], Nur-Syahirah Mamat[1], Faszly Rahim[3] And Izfa Riza Hazmi[1]

[1]Centre for Insects Systematic, School of Environmental and Natural Resource Sciences, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.

[2]Applied Entomology & Microbiology Unit, Biological Research Division, Malaysian Palm Oil Board, No.6 Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor.

[3]Pusat PERMATA Insan Universiti Sains Islam Malaysia, Kompleks PERMATA Insan, Bandar Baru Nilai, 71800, Nilai, Negeri Sembilan, Malaysia.

**Corresponding author: izfahazmi@ukm.edu.my*

ABSTRACT

This is the first series on harvestmen species representing a total of 67 species from 25 genera and 9 families of harvestmen (Opiliones) from Malaysia compiled from available literatures between 1900s till date. In addition, the preliminary field survey identified six harvestmen species which are *Dentobunus luteus, Gagrella longipalpis, Koyamaia curvipes, Marthana ferruginea, Zaleptus quadrimaculata* and *Hoplodino gapensis* collected at Bukit Sawak, Langkawi Island (Kedah) and Hutan Lipur Lata Jarum (Pahang) which are considered as new locality record for

this country. This information could serve as basic guideline and reference for future studies on harvestmen in Malaysia.

Keywords: Arachnida, Opiliones, distribution

ABSTRAK

Senarai semak ini merupakan senarai spesies harvestmen yang pertama mewakili 67 spesies daripada 25 genus dan sembilan famili dari Malaysia yang dikumpulkan daripada jurnal yang telah diterbitkan dari tahun 1990-an sehingga terkini. Sebanyak enam spesies harvestmen iaitu *Dentobunus luteus, Gagrella longipalpis, Koyamaia curvipes, Marthana ferruginea, Zaleptus quadrimaculata* dan *Hoplodino gapensis* telah berjaya direkodkan sepanjang kajian lapangan awal di Bukit Sawak, Pulau Langkawi (Kedah) dan Hutan Lipur Lata Jarum (Pahang) sebagai rekod lokaliti baru di negara ini. Maklumat ini boleh dijadikan garis panduan sebagai asas dan rujukan untuk kajian masa depan pada harvestmen di Malaysia.

Kata kunci: Araknida, Opiliones, sebaran

INTRODUCTION

The commonly known Harvestmen, Harvest Spider or Daddy-Longlegs, is a spider-like invertebrate that belongs to the Arachnida group. It is closely related to Scorpions, Pseudoscorpions, camel spiders, wind scorpions and sun spiders (Lecointre and Guyader 2006). Harvestmen are a diverse group comprising of at least 6500 described species worldwide, making it the third largest arachnid order after acarines and spiders (Beccaloni 2009). Harvestmen are divided into four suborders namely Cyphophthalmi (130 species from 6 families), Laniatores (3748 species from 26 families), Dyspnoi (290

species from 7 families) and Eupnoi (1780 species from 6 families) (Huang et al. 2009). Cyphophthalmi is characterized by small-size Harvestmen measuring between 1-3 mm in length. The suborder Laniatores which has the most diverse taxa can be found in tropical and temperate regions of the Southern Hemisphere. Eupnoi on the other hand is recognized by the soft-bodied and long-legged individuals. Dyspnoi can be categorized in variety of size and restricted to the Northern Hemisphere (Pinto-Da-Rocha et al 2007).

Harvestmen are mostly active during the night although some species can be found in daytime. They occurred in various microhabitat types ranging from soils, leaf litters, in-between shrubs, under rocks and stones and at rotten woods with many species preferring damp and shaded microhabitats. Many harvestmen species are omnivorous that feed on small insects, plant materials and fungi, while some species are considered scavengers, feeding on dung, feces and decayed materials (Pinto-Da-Rocha et al 2007)

Harvestmen are a poorly a studied group of invertebrates that had been neglected till today for Malaysia. The most comprehensive studies of harvestmen group were made dated back in the 1970's documenting the species diversity in several localities in peninsular Malaysia (i.e. Suzuki 1969; 1972; Silhavy 1974; Suzuki 1982; 1983; 1985). Later, few studies recorded the harvestmen found in the state of Sarawak (i.e. Rambla 1991; Shear 1993) and Sabah (i.e Fatin-Elina and Faszly 2011). However, these studies were very limited to a certain locality with very limited sampling effort while comprehensive studies had been neglected. This is the first series on compilation of harvestmen species recorded in Malaysia retrieval from published materials.

MATERIALS AND METHODS

Preliminary survey was conducted at two sites namely Bukit Sawak in Langkawi (Kedah) (6º23'17.5"N, 99º44'58.1"E) on 16th to 19th January 2011 and Hutan Lipur Lata Jarum (Pahang) (3°59'53.1"N, 103°37'26.8"E) on 3rd to 6th March 2011. Harvestmen specimens were collected by active sampling during the night time at 2000h-2200h. Specimens collected were stored in a 70% ethanol and deposited at the Terrestrial Ecology Lab, Centre for Insects Systematics, Faculty of Science and Technology, Universiti Kebangsaan Malaysia. Identification was done to the lowest taxonomy level using the available literature notably by Suzuki (1969; 1972; 1982; 1983; 1985) and Pinto-Da-Rocha et al. (2007). The collected specimens' that was considered as new locality record is marked with (*). Additionally, harvestmen that had previously been recorded in Malaysia including the two states located on Borneo Island were compiled from available published literatures and listed in alphabetical order following the sequence: Family, species name, page numbers of the mentioned species and references.

RESULTS AND DISCUSSIONS

The harvestmen fauna of Malaysia including Sabah and Sarawak in Borneo were successfully compiled. An overall of 67 harvestmen species comprising three suborders, 9 families and 25 genera were recorded in Malaysia via current sampling and published materials. 39 species were recorded from Peninsular Malaysia, six from Sabah, 16 from Sarawak and six undefined localities (peninsular, Sabah or Sarawak), with some redundancy records on their occurrence. The list from collected specimens inclusive of five species from two suborders (Eupnoi and Laniatores), two family (Sclerosomatidae and Podoctidae) and five genera from the two localities sampled. The most diverse family is Sandokanidae (40.30%), followed by Sclerosomatidae

(19.40%), Stylocellidae (19.40%) and Phalangodidae (7.46%) (Figure 1). Note on the new record for three localities (Hutan Lipur Lata Jarum, Fraser Hill and Langkawi) are six species which are *Dentobunus luteus*, *Gagrella longipalpis*, *Koyamaia curvipes*, *Marthana ferruginea*, *Zaleptus quadrimaculata* and *Hoplodino gapensis.*

There are four suborders occurring worldwide which are Cyphophthalmi, Laniatores, Eupnoi and Dsypnoi (Baccaloni 2009). The suborder Dsypnoi never been recorded in Malaysia. This suborder is more widely distributed in the temperate countries (Pinto-Da-Rocha et al. 2007) but Schwendinger and Gruber (1992) has reported that *Dendrolasma angka* occurs in tropical Thailand, indicated that some species from the suborder Dyspnoi are also cosmopolites.

The family Sandokanidae and Stylocellidae are considered endemic to Southeast Asia (Sharma and Giribet 2009; Pinto-Da-Rocha et al. 2007). In our current checklist, there are 29 species of Sandokanidae and 13 species of Stylocellidae was recorded. These two families share the same ecological characteristics such as cryptic lifestyle, leaf-litter habitats and limited dispersal ability (Sharma and Giribet 2009). The genus *Stylocellus* from family Stylocellidae is highly diversified due to the numerous cavern systems in the tropical regions, therefore more cave species can be expected to be discovered as well (Schwendinger et al 2004).

Meanwhile, there are at least 85 species of harvestman that had been recorded in Thailand, with some genera such as *Metahehoa* (1 species), *Pseudosystenocentrus* (1 species), *Systenocentrus* (2 species) (Suzuki 1985) that is currently not recorded in Malaysia. In addition, species such as *Oncopus kaltim* (Schwendinger 2007), *Parabupaves robustus* and *Sotekia minima* (Suzuki 1982) recorded in Indonesia as well as *Zalmoxis*

lavongaiensis and *Anacrobunus palawanensis* (Suzuki 1985) from the Philippines were not recorded in the current listing. This suggests that more studies are needed in Malaysia in order to reveal the actual concurrent species among countries that share the same topology, climate and habitat types.

There are six and 24 harvestmen species recorded in Sabah and Sarawak respectively. Some genera such as *Pelitnus* (Schwendinger 1992), *Baramia* and *Metahyamus* (Suzuki 1969) had also been recorded in Brunei, indicating its wide distribution in the Borneo island. Nonetheless, some species such as *Arulla parvula* and *Metatithaeus rubidus* that are found in Brunei (Suzuki 1969) were not recorded in Malaysia. The relatively small number of harvestmen species recorded in comparison with the large land mass of Malaysian Borneo suggests that most harvestmen species is still currently unknown.

The six species that are recorded as the new locality records, namely *Dentobunus luteus, Gagrella longipalpis, Koyamaia curvipes, Marthana ferruginea* and *Zaleptus quadrimaculata* are from suborder Eupnoi, and *Hoplodino gapensis* are from suborder Laniatores. The suborder Eupnoi can be found in many types of habitats (Pinto-da-Rocha et al 2007). Based on the observation during the field survey, these five species are usually found resting on the leaves or tree trunk and running on the leaf litter on the forest floor. As for the Laniatores, the habitats for this suborder are more limited (Pinto-da-Rocha et al 2007). *Hoplodino gapensis* were found at Semangkok Forest Reserve, Selangor, and Fraser Hill, Pahang as the new locality record. Semangkok Forest Reserve and Fraser Hill are located nearby and sharing the same forest structure. Therefore, *Hoplodino gapensis* can be found at both localities based on the same habitats structure.

It is indeed very difficult to determine the actual number of species that occurring in the Southeast Asian countries pertaining from the lack of comprehensive information. Kury (2012) had documented the catalogs and checklists of harvestmen in the worldwide region but for the Indo-Malaya region, there are no list for Bangladesh, Bhutan, Cambodia, India, Indonesia, Laos, Malaysia, Nepal, Philippines, Singapore, Sri Lanka or Vietnam. As Southeast Asia is considered rich in biodiversity, extensive samplings and collaboration with taxonomist are crucial in order to discover the great number of Harvestmen species nationwide.

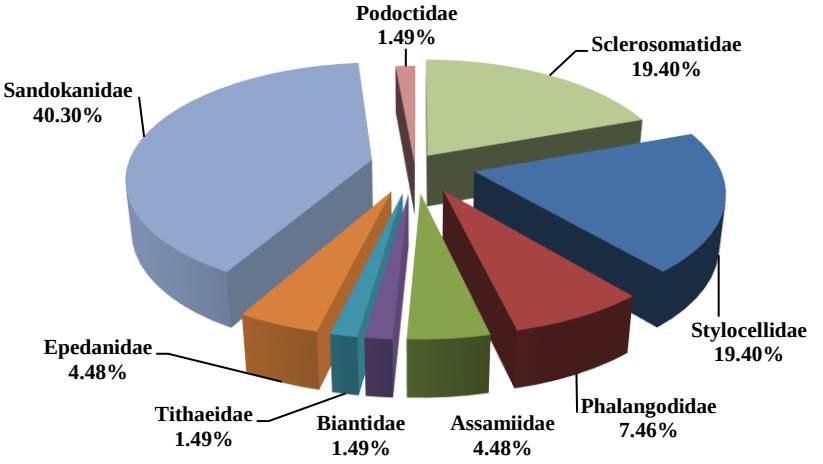

Figure 1 Relative species diversity of different harvestmen families recorded in Malaysia

Table 1 A checklist of harvestmen species in Malaysia

No.	Species	Localities	References
	Suborder Cyphophthalmi Famili Stylocellidae		
1.	*Stylocellus collinsi* Shear 1993	SARAWAK, Gunung Mulu; Baram District.	Shear (1993)
2.	*Stylocellus globosus* Schwendinger 2004	PERAK, Ipoh	Schwendinger et al (2004)
3.	*Stylocellus gryllospecus* Shear 1993	SARAWAK, Mulu National Park	Shear (1993)
4.	*Stylocellus kinabalu* Shear 1993	SABAH, Kinabalu National Park (1500m)	Shear (1993)
5.	*Stylocellus laevichelis* Roewer 1946	MELAKA, Undefined location.	Shear (1979)
6.	*Stylocellus leakeyi* Shear 1993	SABAH, Gunung Silum (440m)	Shear (1993)
7.	*Stylocellus lionotus* Pocock 1897	SABAH, Sandakan	Shear (1979)
8.	*Stylocellus mulu* Shear 1993	SARAWAK, Gunung Mulu; Baram District.	Shear (1993)
9.	*Stylocellus pococki* Hansen and SA Ransen 1904	SABAH, British North Borneo	Shear (1979)
10.	*Stylocellus sabah* Shear 1993	SABAH, Gunung Silum (440m);	Shear (1993)
11.	*Stylocellus sedgwicki* Shear 1979	PULAU PINANG, Penang Island	Shear (1979)

12.	*Stylocellus silhavyi* Rambla 1991	SARAWAK, Mulu National Park	Rambla (1991)
13.	*Stylocellus spinifrons* Roewer 1946	SARAWAK, Undefined location	Shear (1979)
		Suborder Eupnoi **Family Sclerosomatidae**	
14.	*Dentobunus luteus* Roewer 1910	SELANGOR, Semangkok Forest Reserve; Ulu Gombak. PAHANG, Fraser Hill; *Hutan Lipur Lata Jarum. KEDAH, *Langkawi ***New Locality Record**	Suzuki (1972; 1983). *present study (2016)
15.	*Dentobunus pulcer* Suzuki 1969a	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill	Suzuki (1972)
16.	*Eugagrella bimaculata* Suzuki 1972	SELANGOR, Semangkok Forest Reserve; Ulu Gombak. PAHANG, Fraser Hill. NEGERI SEMBILAN, Jeram Toi; Pasoh Forest Reserve	Suzuki (1972; 1983)
17.	*Gagrella atrorubra* Simon 1901	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill. Semangkok Forest Reserve. NEGERI SEMBILAN, Pasoh Forest Reserve	Suzuki (1972; 1983)
18.	*Gagrella granobunus* Roewer 1954a	PERAK, Undefined location	Taylor (2009)
19.	*Gagrella longipalpis* Thorell 1891	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill; *Hutan Lipur Lata Jarum ***New Locality Record**	Suzuki (1972). *present study (2016)

20.	*Gagrella semangkokensis* Suzuki 1972	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill	Suzuki (1972)
21.	*Hologagrella reticulata* Roewer 1910	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill	Suzuki (1972)
22.	*Koyamaia curvipes* Suzuki 1972	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill; *Hutan Lipur Lata Jarum ***New Locality Record**	Suzuki (1972). *present study (2016)
23.	*Marthana ferruginea* Roewer 1911	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill; *Hutan Lipur Lata Jarum ***New Locality Record**	Suzuki (1972; 1985). *present study (2016)
24.	*Strandia rubra* Roewer	MALAYSIA, Undefined location	Silhavy (1974)
25.	*Strandia strinatii* Silhavy 1974	MALAYSIA, Undefined location	Silhavy (1974)
26.	*Zaleptus quadrimaculatus* Suzuki 1972	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill; *Hutan Lipur Lata Jarum ***New Locality Record**	Suzuki (1972). *present study (2016)
		Suborder Laniatores Family Assamiidae	
27.	*Dulitellus sarawakensis* Suzuki 1969	SARAWAK, Undefined location	Suzuki (1969)
28.	*Metahyamus variedentatus* Suzuki 1976	NEGERI SEMBILAN, Pasoh Forest Reserve	Suzuki (1983)

29.	*Paramaracandus fuscus* Suzuki 1976	NEGERI SEMBILAN, Pasoh Forest Reserve	Suzuki (1983)
		Suborder Laniatores Family Biantidae	
30.	*Biantes aelleni* Silhavy	MALAYSIA, Undefined location	Silhavy (1974)
		Suborder Laniatores Family Epedanidae	
31.	*Euepedanus trispinosus* Roewer 1915	MALAYSIA, Undefined location	Kury (n.d). Ming-Sheng and Wei-Guang (2006)
32.	*Metacrobunus macrochelis* Roewer 1915	JOHOR, Gunung Pulai	Kury (n.d)
33.	*Toccolus chibai* Suzuki 1976	MALAYSIA, Undefined location	Kury (2008)
		Suborder Laniatores Family Phalangodidae	
34.	*Opelytus spinichelis* Roewer 1938	NEGERI SEMBILAN, Pasoh Forest Reserve	Suzuki (1983)
35.	*Tegestria coniata* Roewer 1938	NEGERI SEMBILAN, Pasoh Forest Reserve	Suzuki (1983)
36.	*Tegestria seriata* Roewer 1938	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill	Suzuki (1972)
37.	*Tithaeus fraseri* Suzuki 1972	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill	Suzuki (1972; 1983)
38.	*Tweedielus brevipes* Roewer 1949a	SELANGOR, Semangkok Forest Reserve. PAHANG, Fraser Hill	Suzuki (1972)

		Suborder Laniatores **Family Podoctidae**	
39.	*Hoplodino gapensis* Suzuki 1972	SELANGOR, Semangkok Forest Reserve. PAHANG, *Fraser Hill ***New Locality Record**	Suzuki (1972). *present study (2016)
		Suborder Laniatores **Family Sandokanidae**	
40.	*Gnomulus annulipes* Pocock 1897	SARAWAK, Baram	Schwendinger (1992). Schwendinger and Martens (1999)
41.	*Gnomulus asli* Martens and Schwendinger 1998	PERAK, Undefined location	Schwendinger and Martens (1999). Martens and Schwendinger (1998)
42.	*Gnomulus conigerus* Schwendinger 1992	SABAH, Sandakan	Schwendinger and Martens (1999). Schwendinger (1992)
43.	*Gnomulus exsudans* Schwendinger and Martens 2002	SABAH, Sandakan Bay. SARAWAK, Gunung Mulu	Schwendinger and Martens (2002)
44.	*Gnomulus hirsutus* Martens and Schwendinger 1998	SELANGOR, Templer Park; Ulu Gombak	Martens and Schwendinger (1998). Schwendinger and Martens (1999)
45.	*Gnomulus hutan* Schwendinger and Martens 2002	SARAWAK, Oyan; Mujong rivers	Schwendinger and Martens (2002)
46.	*Gnomulus insularis* Roewer 1927	PULAU PINANG, Penang Island	Martens and Schwendinger (1998). Schwendinger and Martens (1999)
47.	*Gnomulus laevis* Roewer 1915	SARAWAK, Kuching; Matang	Schwendinger and Martens (1999)
48.	*Gnomulus laruticus* Martens and Schwendinger 1998	PERAK, Maxwell Hill	Schwendinger and Martens (1999; 2002). Martens and Schwendinger (1998)

49.	*Gnomulus monticola* Schwendinger and Martens 2002	PAHANG, Cameron Highlands	Schwendinger and Martens (2002)
50.	*Gnomulus obscurus* Schwendinger and Martens 2002	SARAWAK, Kuching	Schwendinger and Martens (2002)
51.	*Gnomulus piliger* Pocock 1903	MELAKA, Undefined location	Martens and Schwendinger (1998). Schwendinger and Martens (1999)
52.	*Gnomulus pilosus* Schwendinger and Martens 2002	PAHANG, Taman Negara	Schwendinger and Martens (2002)
53.	*Gnomulus pulvillatus* Pocock 1903	SELANGOR, Undefined location. MELAKA, Undefined location	Martens and Schwendinger (1998). Schwendinger and Martens (1999)
54.	*Gnomulus rostratoideus* Schwendinger and Martens 2002	JOHOR, Kota Tinggi	Schwendinger and Martens (2002)
55.	*Gnomulus rostratus* Thorell 1890	PULAU PINANG, Penang	Martens and Schwendinger (1998). Schwendinger and Martens (1999)
56.	*Gnomulus sundaicus* Schwendinger 1992	SARAWAK, Bau; Serian; Semengoh Forest Reserve	Schwendinger (1992). Schwendinger and Martens (1999)
57.	*Martensiellus tenuipalpus* Schwendinger 2006	SARAWAK, Baleh River	Schwendinger (2006)
58.	*Oncopus sp.* Suzuki 1976	SELANGOR, Templer Park	Suzuki (1983)
59.	*Oncopus alticeps* Pocock 1897	PULAU PINANG, Penang. PERAK, Maxwell's Hill	Silhavy (1974). Giribet et al (2002)
60.	*Oncopus doriae* Thorell 1876	SARAWAK, Undefined location	Schwendinger and Martens (2002; 2004)
61.	*Oncopus feai* Thorell	KUALA LUMPUR, Penchala	Silhavy (1974). Bristowe (1976). Schwendinger and Martens (2004)

62.	*Oncopus hosei* Pocock 1897	SARAWAK, Baram	Schwendinger (1992; 2007). Schwendinger and Martens (2004)
63.	*Oncopus malayanus*	MALAYSIA, Undefined location	Schwendinger and Martens (2004), Boyer et al (2007)
64.	*Oncopus tiomanensis*	PAHANG, Tioman Island	Schwendinger and Martens (2004)
65.	*Oncopus truncatus* Thorell 1891	PENINSULAR MALAYSIA, Undefined location	Schwendinger and Martens (2004)
66.	*Pelitnus drescoi* Silhavy, 1962	SELANGOR, Ulu Gombak	Suzuki (1983)
		Suborder Laniatores **Family Tithaeidae**	
67	*Tithaeus rotundus* Suzuki 1969	SARAWAK, Bukit Berdawan	Suzuki (1969)

CONCLUSION

A total of 67 species from 25 genera and 9 families of harvestmen (Opiliones) from Malaysia was compiled from available literatures between 1900s till date. Six harvestmen species was identified during the preliminary field survey collected at Bukit Sawak, Langkawi Island (Kedah) and Hutan Lipur Lata Jarum (Pahang) which are considered as new locality record for this country. This information could serve as basic guideline and reference for future studies on harvestmen

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