Journal of Tropical Biodiversity and Biotechnology
Volume 08, Issue 02 (2023): jtbb77160
DOI: 10.22146/jtbb.77160

Review Article

Updated Species Check-list of the Indonesian Stingless Bees (Hymenoptera, Apidae, Apinae, Meliponini)

Manap Trianto[1,2], Tuty Arisuryanti[3], Hari Purwanto[4]*, Rosichon Ubaidillah[5]
1)Graduate Student of Doctor Biology, Faculty of Biology, Universitas Gadjah Mada. Jl. Teknika Selatan, Sekip Utara, Bulaksumur, Sleman 55281, Yogyakarta, Indonesia.
2)Departement of Biology Education, Faculty of Teacher Training and Education, Tadulako University. Jl. Soekarno Hatta No. KM. 9, Tondo, Mantikulore, Palu 94148, Central Sulawesi, Indonesia.
3)Laboratory of Genetics and Breeding, Faculty of Biology, Universitas Gadjah Mada. Jl. Teknika Selatan, Sekip Utara, Bulaksumur, Sleman 55281, Yogyakarta, Indonesia.
4)Laboratory of Entomology, Faculty of Biology, Universitas Gadjah Mada. Jl. Teknika Selatan, Sekip Utara, Bulaksumur, Sleman 55281, Yogyakarta, Indonesia.
5)Research Center for Biosystematics and Evolution, National Research and Innovation Agency (BRIN). Jl. Raya Jakarta-Bogor Km 46, Cibinong, West Java, Indonesia. email: rosichon.ubaidillah@brin.go.id.
* Corresponding author, email: hari.purwanto@ugm.ac.id.

Keywords:
Annotated catalog
bibliography
Indonesian
meliponini
stingless bees
Submitted:
19 August 2022
Accepted:
10 April 2023
Published:
17 July 2023
Editor:
Miftahul Ilmi

ABSTRACT
A catalog provides an index to previous studies in taxonomy, behavioral research, and pollination ecology, thus consolidating the existing knowledge in an accessible format. In this study, we explore the annotated catalog and bibliography of the Indonesian meliponini stingless bees (Hymenoptera, Apidae, Apinae, Meliponini). The catalog format is arranged based on Rasmussen (2008). All available literature was reviewed for compiling this catalog and bibliography. References to a Meliponini genus only were not included in the list of references. Cited references must have used a trackable specific epithet to have been included. In total, Indonesia has 52 recorded stingless bee species across the Indonesian archipelagoes of Sumatera (27 species), Java (13 species), Nusa Tenggara (1 species), Kalimantan (34 species), Sulawesi (8 species), Bali (1 species), Maluku (4 species), and Papua (12 species). After the data was updated, there was an increase in the number of stingless bee species in Indonesia, namely 46 species (before update) to 52 species (after update). An up-to-date, comprehensive taxonomic and biological catalog is fundamental to any comparative evolutionary, ecological, and behavioral research on any group of organisms.

INTRODUCTION
Stingless bees (Hymenoptera, Apidae, Apinae, Meliponini) are by far the largest group of eusocial bees on Earth, with more than 500 described (Rasmussen & Cameron 2010) and possibly 100 more undescribed species (Michener 2013). They outnumber honeybees in Indonesia by a factor of 50 (Apidae, Apini: 11 species) and make up twice as many species as the known bumble bees (Apidae, Bombini: about 250 species) (Michener 2007). Meliponini tribe is believed to have originated from the ancient Gondwana continent, which included tropical America, Africa, Southeast Asia, and Australia, more than 100 million years ago based on their pantropical range, (Sakagami 1982; Camargo & Pedro 1992). To date, most stingless bee species are found in the Neotropics, where they

exhibit remarkable diversity in their life cycles and taxonomic composition (more than 400 nominate taxa in 32 extant genera) (Camargo 2013).

The shortened wing venation, penicillum (a brush of long setae on the outer, apical side of the hind tibia), and vestige of a sting are several of the characteristics that immediately distinguish Meliponini from other tribes of the subfamily Apinae (Wille 1979, 1983; Michener 1990, 2000). The lack of an auricle on the hind basitarsus distinguishes Meliponini from other corbiculate tribes. The tribe's species exhibit considerable variation in could be omitted size, nesting location, and nest design (Michener 1974; Sakagami 1982). The morphologies of the two female castes, namely, the queen and laborer, differ drastically (Michener 1974; Wille 1979).

Stingless bees are important native plant pollinators in tropical and subtropical regions of the world (Heard 1999). They have a wide range of nesting biology ranging from exposed to underground colonies (Camargo & Pedro 2003; Roubik 2006; Rasmussen & Camargo 2008), create sizable perennial colonies with a sophisticated social organization (Michener 2007), and are frequently observed in their natural habitat (Roubik 2006). A current and thorough taxonomic and biological catalog is essential to any comparative evolutionary, ecological, and behavioral investigation of any group of organisms, in addition to a well-corroborated phylogeny. A catalog offers an index to early research on taxonomy, behavioral science, and pollination ecology, thus condensing the available knowledge to become accessible. Camargo and Pedro recently cataloged the diverse Neotropical fauna (2007: 391 spp.), and a systematic study of the Afrotropical stingless bees involved a fairly exhaustive bibliography (Eardley 2004: 26 spp. incl. Madagascar). Rasmussen (2008) catalog attempts to list the world's stingless bee fauna by treating the remaining Indo-Malayan/Australasian stingless bees (129 proposed species-group names, 89 currently accepted valid species). These methods are anticipated to rekindle scientific interest in this diverse group of bees, together with the recent molecular phylogenies of stingless bees (Rasmussen & Cameron 2007; Rasmussen 2008).

The distribution of stingless bees in the Indo-Malay/Australasian region stretches from India to the Solomon Island and from China (Yunnan, Hainan, Taiwan) (Wu 2000) to Australia (New South Wales). Schwarz (1937) suggested that the greater abundance of stingless bees in Thailand and Malaysia, including all of Borneo, is due to the abundance of resin-secreting trees (Dipterocarpaceae) and humid tropical climate, although most likely an array of factors are responsible for this concentration of species. Meliponini research in Indonesia has experienced an ever-diversifying range of interests and methods since the post-Sakagami era (1978) (Grüter 2020). Possible migration of stingless bees since the Paleocene is studied. Papers on Meliponini now span all modern apidology disciplines from taxonomy, evolutionary biology, ecology, ethology, agronomics, and physiology. In this study, we provide the annotated catalog and bibliography of the Indonesian Meliponini stingless bees (Hymenoptera, Apidae, Apinae, Meliponini) to elaborate on the current progress in meliponinie studies in Indonesia.

MATERIALS AND METHODS

The catalog format is arranged based on Rasmussen (2008) with modification. Subspecies are not recognized in the catalog; instead, genus-group and currently accepted species-group names are arranged alphabetically. Headings for genera-groups are in capital letters, bold, and italic. The list of distributional records is restricted to records could be omitted cited in

either taxonomic publications or faunal inventories. The literature has been updated until mid-2022. References are cited within these records, with a total of 109 papers. Most biological data pertaining to Meliponini are listed in the nearly complete stingless bee bibliography by Rasmussen (2008).

All available literature was reviewed for compiling this catalog and bibliography. References to a Meliponini genus only were not included in the list of references. Cited references must have used a trackable specific epithet to have been included. The institutional and collection acronyms used throughout the catalog follow Rasmussen (2008) when possible. For museum acronyms, curators and sources of information concerning the collection are listed in Table 1.

RESULTS AND DISCUSSION

Distribution of Stingless Bee Species Across the Indonesian Archipelagos

In total, Indonesia has 52 recorded stingless bee species across the Indonesian archipelagos of Sumatera, Java, Bali, Kalimantan, Sulawesi, Nusa Tenggara, Maluku, and Papua (Figure 1). Scattered records and undescribed species are found in collections for the remaining islands of Indonesia (Table 2).

Table 1. Museum acronyms, curators and sources of information concerning the collection are listed in parenthesis.

Museum acronyms	Curators and sources of information
AMNH	USA, New York, New York, American Museum of Natural History (Jerome G. Rozen, John S. Ascher)
AMS	Australia, New South Wales, Sydney, Australian Museum (David Britton, Max Beatson)
ANIC	Australia, Australian Capital Territory, Canberra City, CSIRO, Australian National Insect Collection (John La Salle, Nicole Fisher)
BMNH	United Kingdom, London, The Natural History Museum (David Notton)
BPBM	USA, Hawaii, Honolulu, Bernice P. Bishop Museum (Shepherd P. Myers) Calicut India, Kerala, Calicut University, Zoology Department
DEI	Germany, Müncheberg, Deutsches Entomologisches Institut im ZALF (Holger H. Dathe, Stephan Blank)
HNHM	Hungary, Budapest, Hungarian Natural History Museum (Sándor Csõsz)
MNHN	France, Paris, Muséum National d'Histoire Naturelle (Claire Villemant)
MSNG	(Collezione Gribodo) Italy, Genova, Museo Civico di Storia Naturale "Giacomo Doria" (Fabio Penati)
MZB	Indonesia, Bogor, Museum Zoologicum Bogoriense (Yayuk R. Suhardjono)
OUMNH	(=Wilson Saunders collection) United Kingdom, Oxford, University Museum of Natural History (James Hogan)
QM	Australia, Queensland, South Brisbane, Queensland Museum
RMNH	Netherlands, Leiden, Nationaal Natuurhistorische Museum (“Naturalis”) (Cornelius van Achterberg)
SEHU	Japan, Sapporo, Hokkaido University Museum, Systematic entomology (Masahiro Ohara)
SFS	Shôichi F. Sakagami’s collection (see SEHU)
USNM	USA, Washington D.C., National Museum of Natural History, (formerly, United States National Museum) (David Furth, Brian Harris)
ZMHB	Germany, Berlin, Museum für Naturkunde der Humboldt-Universität (Frank Koch)
ZRC	Singapore, National University of Singapore, Raffles Museum of Biodiversity Research, Zoological Reference Collection (Lua Hui Kheng)

Table 2. List of stingless bee species described in Indonesia based on geographical region.

Genus	Species	Sumatera	Jawa	Nusa Tenggara	Kalimantan	Sulawesi	Bali	Maluku	Papua
Austroplebeia Moure	*cincta* (Mocsáry in Friese)								+
Geniotrigona Moure	*lacteifasciata* (Cameron)				+				
	thoracica (Smith)	+			+				
Heterotrigona Schwarz	*erythrogastra* (Cameron)				+				
	itama (Cockerell)	+	+		+				
	flaviventris (Friese)								+
	hobbyi (Schwarz)				+				
	keyensis (Friese)								+
	lamingtonia (Cockerell)								+
	planifrons (Smith)								+
	lieftincki (Sakagami and Inoue)	+							
	moorei (Schwarz)	+			+				
	bakeri (Cockerell)				+				
	paradisaea (Engel & Rasmussen)								+
	taraxis (Engel & Rasmussen)								+
	tricholoma (Engel & Rasmussen)								+
Homotrigona Moure	*aliceae* (Cockerell)	+							
	anamitica (Friese)				+				
	fimbriata (Smith)	+			+				
	canifrons (Smith)	+			+				
	haematoptera (Cockerell)				+				
	apicalis (Smith)	+	+		+				
	binghami (Schwarz)	+			+				
	vidua (Lepeletier)	+	+	+					
Lepidotrigona Schwarz	*javanica* (Gribodo)		+						
	latebalteata (Cameron)				+				

Table 2. Contd.

Genus	Species	Sumatera	Jawa	Nusa Tenggara	Kalimantan	Sulawesi	Bali	Maluku	Papua
	nitidiventris (Smith)	+	+		+				
	terminata (Smith)	+	+		+	+			
	trochanterica (Cockerell)	+			+				
	ventralis (Smith)	+	+		+				
Lisotrigona Moure	*cacciae* (Nurse)	+			+				
Papuatrigona Michener and Sakagami	*atricornis* (Smith)								+
Pariotrigona Moure	*pendleburyi* (Schwarz)	+							
Tetragonula Moure	*atripes* (Smith)	+			+				
	collina (Smith)	+			+				
	fuscibasis (Cockerell)	+			+				
	biroi (Friese)		+		+	+			+
	clypearis (Friese)					+		+	+
	drescheri (Schwarz)	+	+		+				
	fuscobalteata (Cameron)	+			+	+		+	
	geissleri (Cockerell)	+			+				
	iridipennis (Smith)		+		+				
	laeviceps (Smith)	+	+		+	+	+	+	
	melanocephala (Gribodo)				+				
	melina (Gribodo)	+			+				
	minangkabau (Sakagami and Inoue)	+							
	pagdeni (Schwarz)					+			
	reepeni (Friese)	+			+				
	sapiens (Cockerell)		+			+		+	+
	sarawakensis (Schwarz)		+		+				
	testaceitarsis (Cameron)	+			+				
Wallacetrigona Engel and Rasmussen	*incisa* (Sakagami and Inoue)				+	+			
Total		27	13	1	34	8	1	4	12

***AUSTROPLEBEIA* Moure, 1961**

***Austroplebeia cincta* (Mocsáry in Friese, 1898)**

Trigona cincta Friese, 1898: 431: **Holotype** (HNHM, worker): examined, "Friedrich- / Wilh.-hafen", "N. Guinea / Biró 96"; **Type locality: PAPUA NEW GUINEA** "Neu-Guinea".

Distribution: INDONESIA (Papua); AUSTRALIA; PAPUA NEW GUINEA.

References: Friese 1898; Kahono 2018.

***GENIOTRIGONA* Moure, 1961**

***Geniotrigona lacteifasciata* (Cameron, 1902)**

Trigona lacteifasciata Cameron, 1902: 131: **Holotype** (BMNH 17b.1132); **Type locality MALAYSIA** "Borneo" (unknown).

Trigona borneënsis Friese, 1933a: 46. Synonymy vide Schwarz (1939): **Lectotype** (ZMHB, worker); **Type locality: INDONESIA** "Sanggau (Borneo)".

Trigona thoracica variety *lacteifasciata* Cameron; Schwarz, 1937: 317: examination of types of *T. thoracica* Smith and *T. lacteifasciata* Cameron.

Trigona thoracica variety *borneënsis* Friese; Schwarz, 1937: 328.

Geniotrigona lacteifasciata (Cameron); Moure, 1961: 213.

Distribution: INDONESIA (Kalimantan); MALAYSIA; SINGAPORE; THAILAND.

References: Cameron 1902; Friese 1933a; Schwarz 1937; Moure 1961; Smith 2012; Zubaidah et al. 2017; Kahono et al. 2018; Kerisna et al. 2019.

***Geniotrigona thoracica* (Smith, 1857)**

Trigona ambusta Cockerell, 1918: 387. Synonymy vide Schwarz (1939): **Holotype** (BMNH 17b.1131); **Type locality: MALAYSIA/ SINGAPORE** "Sandakan and Singapore".

Trigona thoracica Smith, 1857: 50: **Type** (BMNH 17b.1181) (taxonomy); **Type locality: SINGAPORE** "Singapore".

Distribution: INDONESIA (Kalimantan, Sumatera); BRUNEI; CAMBODIA; MALAYSIA; MYANMAR; SINGAPORE; THAILAND.

References: Smith 1857; Dalla Torre 1896; Cockerell 1918; Schwarz 1937; Schwarz 1939; Moure 1961; Sakagami 1975; Michener 1990; Smith 2012; Jaapar et al. 2016; Kahono et al. 2018; Samsudin et al. 2018; Tuksitha et al. 2018; Ascher et al. 2019; Sanjaya et al. 2019; Priawandiputra et al. 2020; Rosli et al. 2020; Syafrizal et al. 2020; Herwina et al. 2021; Rahmad et al. 2021; Ramly et al. 2021; Purwanto et al. 2022.

***HETEROTRIGONA* Schwarz, 1939**

***Heterotrigona erythrogastra* (Cameron, 1902)**

Trigona erythrogastra Cameron 1902: 129-130: **Holotype** (BMNH 17b.1130); **Type locality: MALAYSIA** "Sarawak (R. Shelford)".

Trigona luteiventris Friese 1909("1908"): 354, 358: **Lectotype** (ZMHB, worker); **Type locality: MALAYSIA/PHILIPPINES** "Perak (Malaka)"; Palawan" (s).

Trigona sandacana Cockerell 1919: 242-243: **Holotype** (BMNH 17b.1129); **Type locality: MALAYSIA** "Sandakan, Borneo".

Distribution: INDONESIA (Kalimantan); BRUNEI; MALAYSIA; PHILIPPINES.

References: Cameron 1902; Friese 1909; Cockerell 1919; Smith 2012; Kahono et al. 2018; Samsudin et al. 2018; Tuksitha et al. 2018; Rosli et al. 2020; Ramly et al. 2021.

Heterotrigona itama **(Cockerell, 1918)**

Trigona itama Cockerell 1918: 387: **Holotype** (USNM 29471, worker); **Type locality: SINGAPORE** "Singapore" (unknown).

Trigona breviceps Cockerell 1919b: 244: **Holotype** (BMNH 17b.1123, worker); **Type locality: MALAYSIA** "Sandakan, Borneo".

Distribution: INDONESIA (Java, Sumatera, Kalimantan, Sulawesi); MALAYSIA; SINGAPORE; THAILAND.

References: Cockerell 1918; Cockerell 1919b; Smith 2012; Syafrizal et al. 2014; Jaapar et al. 2016; Basari et al. 2018; Kahono et al. 2018; Samsudin et al. 2018; Tuksitha et al. 2018; Sanjaya et al. 2019; Febrianti et al. 2020; Priawandiputra et al. 2020; Rosli et al. 2020; Syafrizal et al. 2020; Kerisna et al. 2019; Trianto & Purwanto 2020a; Trianto & Purwanto 2020b; Arung et al. 2021; Herwina et al. 2021; Purwanto & Trianto 2021; Rahmad et al. 2021; Ramly et al. 2021; Purwanto et al. 2022; Suderajat et al. 2021; Trianto & Purwanto 2022; Saputra & Nurlina 2022.

Heterotrigona flaviventris **(Friese, 1909)**

Trigona flaviventris Friese 1909("1908"): 354, 356, 357-358: **Lectotype** (ZMHB, worker); **Type locality: INDONESIA (PAPUA)** "Cyclopen-Gebirge".

Distribution: INDONESIA (Papua).

References: Friese 1909; Kahono et al. 2018; Engel 2019.

Heterotrigona hobbyi **(Schwarz, 1937)**

Trigona hobbyi Schwarz 1937: 283, 288, 298-300*, 328: **Holotype** (BMNH 17b.1118); **Type locality: MALAYSIA** "Sarawak: Mt. Dulit, 4000 feet, moss forest".

Distribution: INDONESIA (Kalimantan); BRUNEI; MALAYSIA.

References: Schwarz 1937; Kahono et al. 2018; Engel 2019.

Heterotrigona keyensis **(Friese, 1901)**

Trigona keyensis Friese 1901: 271: **Lectotype** (ZMHB, worker); **Type locality: INDONESIA** "Key-Eilanden (Amboina, Nederland India) durch H. Kuhn".

Distribution: INDONESIA (Papua).

References: Friese 1901; Kahono et al. 2018; Engel 2019.

Heterotrigona lamingtonia **(Cockerell, 1929)**

Trigona lamingtonia Cockerell 1929: 243: **Holotype** (AMS, worker); **Type locality: PAPUA NEW GUINEA** "Mt. Lamington".

Distribution: INDONESIA (Papua); PAPUA NEW GUINEA.

References: Cockerell 1929; Kahono et al. 2018; Engel 2019.

Heterotrigona planifrons **(Smith, 1865)**

Trigona planifrons Smith 1865: 93-94: **Holotype** (OUMNH, worker); **Type locality: INDONESIA** "New Guinea".

Distribution: INDONESIA (Papua); MALAYSIA.

References: Smith 1865; Kahono et al. 2018; Engel 2019.

***Heterotrigona lieftincki* (Sakagami & Inoue, 1987)**

Trigona (Trigonella) lieftincki Sakagami & Inoue 1987: 610, 611, 613-615, 617-624: **Holotype** (RMNH, not located, nor in SEHU); Paratypes (RMNH, 3 workers, 2 males); **Type locality: INDONESIA** "N.E. Sumatra, Tongkoh, probably Mt. Talamau (Pasaman)".

Distribution: INDONESIA (Sumatera).

References: Sakagami & Inoue 1987; Kahono et al. 2018; Priawandiputra et al. 2020.

***Heterotrigona moorei* (Schwarz, 1937)**

Trigona moorei Schwarz 1937: 283, 292, 321-322*, 328, plate 3, 4: **Holotype** (BMNH 17b.1124); 1 paratype (AMNH); **Type locality: MALAYSIA** "Sarawak: Mt. Dulit, R. Lejok, near sweat and water".

Trigona (Tetragona) matsumurai Sakagami 1959: 120-121: **Holotype** (SEHU, worker); 1 paratype (SEHU); **Type locality: SINGAPORE** "Singapore".

Distribution: INDONESIA (Sumatera, Kalimantan); MALAYSIA; SINGAPORE.

References: Schwarz 1937; Sakagami 1959; Herwina et al. 2021; Kahono et al. 2018; Priawandiputra et al. 2020.

***Heterotrigona bakeri* (Cockerell, 1919)**

Trigona bakeri Cockerell 1919c: 78, 79: **Holotype** (USNM 29468, worker); **Type locality: MALAYSIA** "Penang Island".

Distribution: INDONESIA (Kalimantan); CAMBODIA; MALAYSIA.

References: Cockerell 1919c; Smith 2012; Syafrizal et al. 2020; Arung et al. 2021.

***Heterotrigona taraxis* (Engel & Rasmussen, 2017)**

Heterotrigona taraxis Engel & Rasmussen 2017: 1-25: **Holotype** (AMNH); **Type locality: INDONESIA** "Papua".

Distribution: INDONESIA (Papua); PAPUA NEW GUINEA.

References: Engel & Rasmussen 2017; Engel 2019.

***Heterotrigona tricholoma* (Engel & Rasmussen, 2017)**

Heterotrigona tricholoma Engel & Rasmussen 2017: 1-25: **Holotype** (AMNH); **Type locality: INDONESIA** "Papua".

Distribution: INDONESIA; PAPUA NEW GUINEA.

References: Engel & Rasmussen 2017; Engel 2019.

***Heterotrigona paradisaea* (Engel & Rasmussen, 2017)**

Heterotrigona paradisaea Engel & Rasmussen 2017: 1-25: **Holotype** (AMNH); **Type locality: INDONESIA** "Papua".

Distribution: INDONESIA (Papua); PAPUA NEW GUINEA.

References: Engel & Rasmussen 2017.

***HOMOTRIGONA* Moure, 1961**

***Homotrigona aliceae* (Cockerell, 1929)**

Trigona aliceæ Cockerell 1929b: 139, 140: **Holotype** (BMNH 17b.1116) (comparative note, taxonomy); **Type locality: THAILAND** "Siam: On trail in jungle between Pahtoop mountain and Nan".

Distribution: INDONESIA (Sumatera, Kalimantan); CAMBODIA; MALAYSIA; THAILAND; VIETNAM.

References: Cockerell 1929b; Smith 2012; Awang et al. 2018; Kahono et al. 2018.

***Homotrigona anamitica* (Friese, 1909)**

Trigona anamitica Friese 1909("1908"): 358-359, fig 15-4: **Lectotype** (ZMHB, worker): here designated, "Süd-Annam / Xom-Gom / Februar / H. Fruhstorfer", "Trigona / anamitica / 1904 Friese det. / Fr."; paralectotype (ZMHB (1)); **Type locality: VIETNAM** "Xom-Gom, SüdAnnam"

Trigona melanotricha Cockerell 1918: 386, 387: **Holotype** (BMNH 17b.1095); **Type locality: MALAYSIA** "Sandakan, Borneo".

Distribution: INDONESIA (Kalimantan); MALAYSIA; VIETNAM.

References: Friese 1909; Cockerell 1918; Smith 2012; Kahono et al. 2018.

***Homotrigona fimbriata* (Smith, 1857)**

Trigona fimbriata Smith 1857: 52: **Type** (BMNH 17b.1182); **Type locality: SINGAPORE** "Singapore".

Trigona flavistigma Cameron 1902: 130: **Holotype** (BMNH 17b.1097); **Type locality: MALAYSIA** "Kuching, Sarawak".

Melipona castanea Bingham 1903: vi: **Type** (BMNH 17b.1128); **Type locality: THAILAND** "Bukit Besar, Nawngchik. 1500 to 2500 feet".

Trigona versicolor Friese 1909("1908"): 358, 359, fig. 15-1: **Lectotype** (ZMHB, worker): here designated, "Tandjong / SO.-Kalimantan / coll.Speyer", "Trigona / versicolor / 1904 Friese det. / n. Fr.", "Type" (red label); **Type locality: MALAYSIA** "Malaka (Perak); "SO-Borneo (Tandjong)".

Distribution: INDONESIA (Kalimantan; Java, Sumatera); CAMBODIA; LAOS; MALAYSIA.

References: Smith 1857; Cameron 1902; Bingham 1903; Friese 1909; Smith 2012; Kahono et al. 2018; Samsudin et al. 2018; Awang et al. 2018; Ascher et al. 2019; Priawandiputra et al. 2020; Rosli et al. 2020; Syafrizal et al. 2020; Arung et al. 2021; Herwina et al. 2021.

***Homotrigona canifrons* (Smith, 1857)**

Trigona canifrons Smith 1857: 51: **Syntype** (OUMNH, 1 worker); additional putative type (BMNH 17b.1183); **Type locality: MALAYSIA** "Borneo (Sarawak)".

Trigona busara Cockerell 1918: 387: **Holotype** (USNM 29496, worker): examined, "Singapore / Coll. Baker", "9072", Type No. / 29496 / U.S.N.M.", "Trigona / busara / Ckll TYPE"; **Type locality: MALAYSIA** "Sandakan".

Distribution: INDONESIA (Kalimantan, Sumatera); AUSTRALIA; MALAYSIA; MYANMAR; SINGAPORE; SRI LANKA; THAILAND.

References: Smith 1857; Cockerell 1918; Samsudin et al. 2018; Awang et al. 2018; Priawandiputra et al. 2020; Herwina et al. 2021; Kahono et al. 2018; Ascher et al. 2019; Purwanto et al. 2022.

***Homotrigona haematoptera* (Cockerell, 1919)**

Trigona hæmatoptera Cockerell 1919b: 243: **Holotype** (BMNH 17b.1126); **Type locality: MALAYSIA** "Sandakan, Borneo".

Trigona haematoptera variety *dulitae* Schwarz 1937: 282, 283, 286, 291, 320-321*, 328, plate 2, 6: **Holotype** (BMNH 17b.1125); **Paratypes**

(AMNH, BMNH (8)); **Type locality: MALAYSIA** "Sarawak: Foot of Mt. Dulit, junction of rivers Tinjar and Lejok".

Distribution: INDONESIA (Kalimantan); **MALAYSIA.**

References: Cockerell 1919b; Schwarz 1937; Kahono et al. 2018.

***Homotrigona apicalis* (Smith, 1857)**

Trigona apicalis Smith 1857: 51: **Holotype** (OUMNH); additional putative type (BMNH 17b.1188) (taxonomy); **Type locality: MALAYSIA** "Borneo (Sarawak)".

Trigona hemileuca Cockerell 1929b: 140: **Holotype** (BMNH 17b.1098) (comparative note, taxonomy); **Type locality: THAILAND** "Siam: Nan".

Trigona sericea Friese 1933a: 45-46: **Lectotype** (ZMHB, worker): here designated, "Kalimantan / Sanggau / 24- 7-32", "Trigona / sericea / 1925 Friese det. / Fr."; paralectotypes (ZMHB (5), DEI (4)) (taxonomy); **Type locality: MALAYSIA/INDONESIA** "Meliau (Borneo); Sanggau (Borneo)".

Distribution: INDONESIA (Java, Sumatera, Kalimantan); CAMBODIA; LAOS; MALAYSIA; MYANMAR; SINGAPORE; THAILAND; VIETNAM.

References: Smith 1857; Cockerell 1929b; Friese 1933a; Jaapar et al. 2016; Samsudin et al. 2018; Awang et al. 2018; Priawandiputra et al. 2020; Herwina et al. 2021; Kahono et al. 2018; Purwanto et al. 2022.

***Homotrigona binghami* (Schwarz, 1937)**

Trigona apicalis variety *binghami* Schwarz 1937: 288, 300, 301, 303-304*, 328, plate 2, 5, 7: **Holotype** (BMNH 17b.1142); paratypes (AMNH, BMNH, USNM); **Type locality: MYANMAR** "Tenasserim: Dawnat Range".

Distribution: INDONESIA (Java, Kalimantan); MALAYSIA; MYANMAR.

References: Schwarz 1937; Samsudin et al. 2018; Awang et al. 2018; Kerisna et al. 2019; Rosli et al. 2020; Herwina et al. 2021; Kahono et al. 2018.

***Homotrigona vidua* (Lepeletier de Saint Fargeau, 1836)**

Melipona vidua Lepeletier de Saint Fargeau 1836: 429: **Syntype** (MNHN, 1 worker): putative syntype examined, "Museum Paris / Bengale / Diard & Duvaucel 1815", "vidua", "Diard et Duvaucel", "type", "TYPE", "M. Vidua / Lep. S. Farg / Bengale". I consider this a true type: Alfred Duvaucel (1793-1825) and Pierre-Médard Diard (1794-1863) arrived on their first expedition to Kolkata, India, in January 1818 and spent years collecting in the Indo-Malayan region; **Type locality: INDONESIA/E TIMOR** "Ile de Timor".

Distribution: INDONESIA (Java, Sumatera, Kalimantan); INDIA; MALAYSIA; MYANMAR.

References: Lepeletier de Saint Fargeau 1836; Awang et al. 2018; Kahono et al. 2018.

***LEPIDOTRIGONA* Schwarz, 1939**

***Lepidotrigona javanica* (Gribodo, 1891)**

Trigona javanica Gribodo 1891: 109: **Holotype** (MSNG, worker); **Type locality: INDONESIA** "Giava" (=Java)".

Distribution: INDONESIA (Java).

References: Gribodo 1891; Smith 2012; Kahono et al. 2018.

***Lepidotrigona latebalteata* (Cameron, 1902)**

Trigona latebalteata Cameron 1902: 130-131: **Syntypes** (BMNH 17b.1084, 2 workers). The *terminata* species group; **Type locality: MALAYSIA** "Kuching, Sarawak".

Distribution: INDONESIA (Kalimantan); MALAYSIA.

References: Cameron 1902; Smith 2012; Kahono et al. 2018.

***Lepidotrigona nitidiventris* (Smith, 1857)**

Trigona nitidiventris Smith 1857: 50-51: **Type** (OUMNH (=Wilson Saunders collection)): Type locality: **MALAYSIA** "Malacca (Mount Ophir).

Trigona fulvopilosella Cameron 1908: 193, 194: **Syntypes** (BMNH 17b.1101, 2 workers): Type locality: **MALAYSIA** "Kuching, May and October (John Hewitt)".

Distribution: INDONESIA (Kalimantan, Java, Sumatera); BRUNEI; MALAYSIA; PHILIPPINES; THAILAND.

References: Smith 1857; Cameron 1908; Smith 2012; Kahono et al. 2018; Samsudin et al. 2018; Priawandiputra et al. 2020; Herwina et al. 2021.

***Lepidotrigona terminata* (Smith, 1878)**

Trigona terminata Smith 1878: 169: **Type** (BMNH 17b.1100); **Type locality: MYANMAR** no precise locality, presumably "Maulmain, Tenasserim Provinces".

Trigona fulvomarginata Cockerell 1919c: 78: **Holotype** (BMNH 17b.1083); **Type locality: MALAYSIA** "Penang".

Distribution: INDONESIA (Sulawesi, Kalimantan, Java); BRUNEI; CAMBODIA; LAOS; MALAYSIA; MYANMAR; THAILAND; VIETNAM.

References: Smith 1878; Cockerell 1919c; Smith 2012; Syafrizal et al. 2014; Azlan et al. 2016; Rasmussen & Cameron 2010; Jaapar et al. 2016; Kahono et al. 2018; Samsudin et al. 2018; Kerisna et al. 2019; Priawandiputra et al. 2020; Rosli et al. 2020; Suprianto et al. 2020; Syafrizal et al. 2020; Trianto & Purwanto 2020a; Trianto & Purwanto 2020b; Wicaksono et al. 2020; Herwina et al. 2021; Purwanto & Trianto 2021; Rahmad et al. 2021; Ramly et al. 2021; Sayusti et al. 2021; Purwanto et al. 2022; Suderajat et al. 2021; Trianto & Purwanto 2022.

***Lepidotrigona trochanterica* (Cockerell, 1920)**

Trigona trochanterica Cockerell 1920a: 115: **Holotype** (BMNH 17b.1102); **Type locality: MALAYSIA** "Sandakan, Borneo".

Distribution: INDONESIA (Sumatera, Kalimantan); MALAYSIA.

References: Cockerell 1920a; Smith 2012; Jaapar et al. 2016; Kahono et al. 2018; Priawandiputra et al. 2020.

***Lepidotrigona ventralis* (Smith, 1857)**

Trigona ventralis Smith 1857: 50: **Type** (BMNH 17b.1186); Mt. Ophir specimen is *latebalteata*; **Type locality: MALAYSIA** "Borneo (Sarawak)".

Distribution: INDONESIA (Sumatera, Kalimantan, Java); BRUNEI; CAMBODIA; INDIA; LAOS; VIETNAM; MALAYSIA; MYANMAR; THAILAND; VIETNAM.

References: Smith 1857; Smith 2012; Kahono et al. 2018; Priawandiputra et al. 2020; Herwina et al. 2021.

***LISOTRIGONA* Moure, 1961**

***Lisotrigona cacciae* (Nurse, 1907)**

Melipona cacciae Nurse 1907: 619: Lectotype (BMNH 17b.1103, worker); **Type locality: INDIA** "Hoshangabad, Central Provinces".

Trigona scintillans Cockerell 1920a: 116: **Holotype** (BMNH 17b.1115); **Type locality: MALAYSIA** "Sandakan, Borneo".

Distribution: INDONESIA (Sumatera, Kalimantan); CAMBODIA; LAOS; MALAYSIA; THAILAND; VIETNAM.

References: Nurse 1907; Smith 2012; Kahono et al. 2018; Priawandiputra et al. 2020.

***PAPUATRIGONA* Michener and Sakagami, 1990**

***Papuatrigona atricornis* (Smith, 1865)**

Trigona atricornis Smith 1865: 94: **Holotype** (OUMNH, worker): According to Baker (1993) the specimen is labeled " 'N' [New Guinea (Allen); white disc] and 'Trigona atricornis' 'Smith'; **Type locality: INDONESIA (PAPUA)** "New Guinea".

Distribution: INDONESIA (Papua).

References: Smith 1865; Friese 1909; Kahono et al. 2018; Engel 2019.

***PARIOTRIGONA* Moure, 1961**

***Pariotrigona pendleburyi* (Schwarz, 1939)**

Trigona (Hypotrigona) pendleburyi variety *klossi* Schwarz 1939a: 85, 94, 132*: **Holotype** (BMNH, no number); **Type locality: MALAYSIA** "MALAYA. State of Selangor: Bukit Kutu, 200 feet".

Trigona (Hypotrigona) pendleburyi Schwarz 1939a: 85, 86, 94, 130-132*: **Holotype** (BMNH, no number); paratypes (BMNH (5)); **Type locality: MALAYSIA** "Cameron Highlands, Rhododendron Hill, 5000 feet".

Distribution: INDONESIA (Sumatera); MALAYSIA; THAILAND.

References: Schwarz 1939a; Smith 2012; Kahono et al. 2018; Priawandiputra et al. 2020.

***TETRAGONULA* Moure, 1961**

***Tetragonula atripes* (Smith, 1857)**

Trigona atripes Smith 1857: 50: **Type** (OUMNH (=Wilson Saunders collection)); **Type locality: MALAYSIA** "Malacca (Mt. Ophir)".

Distribution: INDONESIA (Sumatera, Kalimantan); MALAYSIA; MYANMAR; SINGAPORE; THAILAND.

References: Smith 1857; Smith 2012; Kahono et al. 2018; Ascher et al. 2019; Priawandiputra et al. 2020.

***Tetragonula collina* (Smith, 1857)**

Trigona collina Smith 1857: 51-52: **Type** (OUMNH (=Wilson Saunders collection)): Type locality: **MALAYSIA** "Malacca (Mount Ophir).

Trigona cambodiensis Cockerell 1926a: 224: **Holotype** (USNM 29470, worker); **Type locality: CAMBODIA** "Angkov (=Angkor) Wat, Cambodia".

Distribution: INDONESIA (Sumatera, Kalimantan); BRUNEI; CAMBODIA; LAOS; MALAYSIA; MYANMAR; THAILAND; VIETNAM.

References: Smith 1857; Cockerell 1926a; Smith 2012; Azlan et al. 2016; Kahono et al. 2018; Samsudin et al. 2018; Kerisna et al. 2019; Priawandiputra et al. 2020; Herwina et al. 2021.

***Tetragonula fuscibasis* (Cockerell, 1920)**

Trigona fuscibasis Cockerell 1920a: 115-116: **Holotype** (BMNH 17b.1082); **Type locality: MALAYSIA** "Sandakan, Borneo".

Distribution: INDONESIA (Sumatera, Kalimantan); BRUNEI; MALAYSIA.

References: Cockerell 1920a; Smith 2012; Kustiawan et al. 2014; Syafrizal et al. 2014; Kahono et al. 2018; Samsudin et al. 2018; Priawandiputra et al. 2020.

***Tetragonula biroi* (Friese, 1898)**

Trigona birói Friese 1898: 428, 429: **Syntypes** (ZMHB, 2 workers): examined, "N. Guinea / Biró 96", "Friedrich- / Wilh.-hafen", "Trigona / biroi / det. Friese 1897" (1 worker); "Philippinen / Schadenberg", "Trigona / biroi / det. Friese 1897 / n.sp.", "Coll. / Friese" (1 worker); **Type locality: PHILIPPINES** "Philippinen (Schadenburg)".

Distribution: INDONESIA (Sulawesi, Papua, Moluccas, Kalimantan, Java, Sumatera); CAMBODIA; PAPUA NEW GUINEA; PHILIPPINES.

References: Friese 1898; Smith 2012; Suriawanto et al. 2017; Kahono et al. 2018; Hasan et al. 2020; Syafrizal et al. 2020; Trianto & Purwanto 2020a; Trianto & Purwanto 2020b; Octaviani et al. 2020; Herwina et al. 2021; Purwanto & Trianto 2021; Salatnaya et al. 2021; Purwanto et al. 2022; Trianto & Purwanto 2022.

***Tetragonula clypearis* (Friese, 1909)**

Trigona laeviceps variety clypearis Friese 1909("1908"): 356, 358, fig. 15-3: Unknown; **paralectotype** (ZMHB (1)): Type locality: **INDONESIA (PAPUA)** "Manikion".

Trigona wybenica Cockerell 1929d: 300: **Holotype** (USNM 54960, worker): examined; paratypes (BMNH (1), QM (3), ZMHB (1)) (common name (wyben), nest, taxonomy); **Type locality: AUSTRALIA** "Thursday island".

Distribution: INDONESIA (Papua, Sulawesi); AUSTRALIA; PHILIPPINES.

References: Friese 1909; Cockerell 1929c; Smith 2012; Kahono et al. 2018; Salatnaya et al. 2021; Sayusti et al. 2021.

***Tetragonula drescheri* (Schwarz, 1939)**

Trigona (Tetragona) sarawakensis variety *drescheri* Schwarz 1939a: 85, 93, 106-107*: **Holotype** (AMNH); paratype (AMNH (1) (distribution, key to species, taxonomy); **Type locality: INDONESIA** "M. Java. South Banjoemas, Koebangkangkoeng".

Distribution: INDONESIA (Kalimantan, Java, Sumatera); BRUNEI; MALAYSIA.

References: Schwarz 1939a; Smith 2012; Syafrizal et al. 2014; Kahono et al. 2018; Priawandiputra et al. 2020; Purwanto & Trianto 2021; Purwanto et al. 2022.

Tetragonula fuscobalteata **(Cameron, 1908)**

Trigona atomella Cockerell 1919b: 243-244: **Holotype** (USNM 29467, worker): examined, "Island of / Penang / Baker", "Type No. / 29467 / U.S.N.M.", "Trigona / atomella / Ckll TYPE"); 2 paratypes (USNM); **Type locality: MALAYSIA** "Island of Penang".

Trigona erythrostoma Cameron 1908: 193-194: **Syntypes** (BMNH 17b.1113, 2 workers); **Type locality: MALAYSIA** "Kuching, Borneo".

Trigona fuscobalteata Cameron 1908: 193, 194: **Lectotype** (BMNH 17b.1112): Designated Moure 1961 (key to species, taxonomy); **Type locality: MALAYSIA** "Medang, Sarawak (Hewitt)".

Trigona pallidistigma Cameron 1908: 193, 195: **Syntypes** (BMNH 17b.1133, 2? workers); **Type locality: MALAYSIA** "Sarawak, Borneo".

Trigona pfeifferi Friese 1925: 41: **Lectotype** (AMNH, worker): here designated, "Brasil / Campinas", "Trigona / pfeifferi / Friese det. 25 / Fr.", "Typus" (orange label), "Heterotrigona / cf. fuscobalteata / (erroneous locality) / det. J.S.Ascher"; paralectotypes (DEI (3)); **Type locality: UNCERTAIN** "Campinas (Sao Paulo), S.-Brasil".

Trigona pygmaea Friese 1933b: 147: **Lectotype** (ZMHB, worker): here designated "O-Sumatra / Mandau / 7.1933", "Trigona / pygmaea / Fr. / 1933 Friese det. / n."; paralectotype (DEI (1), ZMHB (1)) (common name (kloeloet itam ketjid)); **Type locality: INDONESIA** "Beringin, in der Waldern oberhalb Mandau (Sumatra), v. Bengkalis".

Distribution: INDONESIA (Sulawesi, Kalimantan, Sumatera); AUSTRALIA; BRUNEI; CAMBODIA; MALAYSIA; PALAU ISLANDS; PHILIPPINES; THAILAND; UNCERTAIN.

References: Cockerell 1919b; Cameron 1908; Friese 1925; Friese 1933b; Rasmussen & Cameron 2010; Smith 2012; Suriawanto et al. 2017; Kahono et al. 2018; Samsudin et al. 2018; Kerisna et al. 2019; Syafrizal et al. 2020; Anaktototy et al. 2021; Arung et al. 2021; Herwina et al. 2021; Sayusti et al. 2021; Purwanto et al. 2022.

Tetragonula geissleri **(Cockerell, 1918)**

Trigona geissleri Cockerell 1918: 385-386, 387: **Unknown**: Cockerell used a Friese manuscript name for his description (key to species, distribution, manuscript name of Friese, taxonomy, variation); **Type locality: MALAYSIA** "Sintang, North Borneo".

Trigona confusella Cockerell 1919b: 242: **Holotype** (USNM 40248) (taxonomy, previously identified as *T. geissleri* (in Cockerell 1918)); **Type locality: SINGAPORE** "Singapore".

Distribution: INDONESIA (Kalimantan, Sumatera); BRUNEI; LAOS; MALAYSIA; SINGAPORE; THAILAND.

References: Cockerell 1918; Cockerell 1919b; Smith 2012; Kahono et al. 2018; Samsudin et al. 2018; Herwina et al. 2021.

Tetragonula iridipennis **(Smith, 1854)**

Trigona iridipennis Smith 1854: 413-414: **Holotype** (BMNH 17b.1114, worker): examined, "Type" (orange border), "iridipennis / Type Sm.", "B.M.TYPE / HYM. / 17B.1114", "Trigona / iridipennis / TYPE. Smith.", "Ceylon" (reverse side "53 / 23"). Citations for *iridipennis* are included in a broad sense, as species limits for this taxon is uncertain. To the same group belongs also *T. bengalensis*, *T. praeterita*, and *T. ruficornis*, as well as several undescribed species

(see Rasmussen & Cameron (2007)) (taxonomy); **Type locality: SRI LANKA** "Ceylon".

Distribution: INDONESIA (Kalimantan, Java); CAMBODIA; INDIA; MYANMAR; PHILIPPINES; SRI LANKA; SRI LANKA; THAILAND.

References: Smith 1854; Smith 2012; Trianto & Purwanto 2020a; Trianto & Purwanto 2020b; Syafrizal et al. 2020; Trianto & Purwanto 2022.

***Tetragonula laeviceps* (Smith, 1857)**

Trigona læviceps Smith 1857: 51: **Holotype** (OUMNH); **Type locality: SINGAPORE** "Singapore".

Distribution: INDONESIA (Bali, Kalimantan, Sumatera, Java, Papua); AUSTRALIA; BRUNEI; CAMBODIA; INDIA; LAOS; MALAYSIA; MYANMAR; SINGAPORE; PAPUA NEW GUINEA; PHILIPPINES; SRI LANKA; THAILAND; VIETNAM.

References: Smith 1857; Thummajitsakul et al. 2008; Smith 2012; Syafrizal et al. 2014; Hasan et al. 2020; Jaapar et al. 2016; Putra et al. 2016; Suriawanto et al. 2017; Kahono et al. 2018; Kerisna et al. 2019; Sanjaya et al. 2019; Samsudin et al. 2018; Efin et al. 2019; Febrianti et al. 2020; Priawandiputra et al. 2020; Syafrizal et al. 2020; Trianto & Purwanto 2020a; Trianto & Purwanto 2020b; Arung et al. 2021; Atmowidi et al. 2021; Herwina et al. 2021; Purwanto & Trianto 2021; Rahmad et al. 2021; Suderajat et al. 2021; Purwanto et al. 2022; Trianto & Purwanto 2022.

***Tetragonula melanocephala* (Gribodo, 1893)**

Trigona melanocephala Gribodo 1893: 264: **Holotype** (MSNG, worker): The authentic holotype of this taxon is labeled "Bandjarmas" (?=Bandjarmasin, near Liangtelan) (F. Penati, pers. com.); **Type locality: MALAYSIA** "Liangtelan (Borneo)".

Trigona testaceinerva Cameron 1908: 193, 195: **Type** (BMNH 17b.1109) (key to species, taxonomy); **Type locality: MALAYSIA** "Kuching, Borneo".

Distribution: INDONESIA (Kalimantan); BRUNEI; MALAYSIA.

References: Gribodo 1893; Cameron 1908; Smith 2012; Zubaidah et al. 2017; Kahono et al. 2018; Purwanto et al. 2022.

***Tetragonula melina* (Gribodo, 1893)**

Trigona melina Gribodo 1893: 262-263, 264: **Syntypes** (MSNG, 3 workers; unknown depository, 2 workers): Two syntypes are labeled "Bandjarmas" (?=Bandjarmasin, near Liangtelan), while the third syntype carry no locality label (F. Penati, pers. com.); **Type locality: MALAYSIA** "Liangtelan (Borneo)".

Distribution: INDONESIA (Sumatera, Kalimantan); BRUNEI; MALAYSIA; THAILAND.

References: Gribodo 1893; Smith 2012; Syafrizal et al. 2014; Priawandiputra et al. 2020; Jaapar et al. 2016.

***Tetragonula minangkabau* (Sakagami & Inoue, 1985)**

Trigona (Tetragonula) minangkabau Sakagami & Inoue 1985: 175, 176, 177, 178, 179, 180, 181, 184-186*, 187-188: **Holotype** (MZB, Hymn.0198, worker); paratypes (MZB (Hymn.0195-0197)); **Type locality: INDONESIA** "Lubuk Mintrun nr. Padang, Sumatera Barat".

Distribution: INDONESIA (Sumatera); MALAYSIA. *Trigona (Tetragona) fuscobalteata* variety *pagdeni* Schwarz, 1939, by original designation.

References: Sakagami & Inoue 1985; Smith 2012; Kahono et al. 2018; Samsudin et al. 2018; Priawandiputra et al. 2020; Herwina et al. 2021.

***Tetragonula pagdeni* (Schwarz, 1939)**

Trigona (Tetragona) fuscobalteata variety *pagdeni* Schwarz 1939a: 85, 93, 96, 110-111*, 113: **Holotype** (USNM 53564, male): examined, "Nakon / SriTamarat / Siam 7/5/28", "HughSmith / coll", Type No. / 53564 / U.S.N.M.", "Holotype", "Trigona / fusco-balteata / var. pagdeni / H.F. Schwarz"; paratype (AMNH (1)); **Type locality: THAILAND** "SIAM.-Nakon Sri Tamarat".

Distribution: INDONESIA (Sulawesi); CAMBODIA; MALAYSIA; THAILAND.

References: Schwarz 1939a; Thummajitsakul et al. 2008; Rasmussen & Cameron 2010; Smith 2012.

***Tetragonula reepeni* (Friese, 1918)**

Trigona reepeni Friese 1918: 519-520: **Lectotype** (ZMHB, worker): here designated, "Malacca / Taip. Hills/ 2.1912 / Butt.-Reep.", "Trigona / reepeni / 1914 Friese det. / Fr.", "Type" (red label), "Coll. / Friese"; para- lectotypes (DEI (1), USNM (1), ZMHB (7)); **Type locality:** MALAYSIA "Taiping Hills (Upp. Perak) auf Malakka".

Trigona (Tetragonula) latigenalis Sakagami 1978: 166-194, 194-195*, 196, 227, 236, 237, 238, 247, plate 5: **Holotype** (SEHU); **Type locality: MALAYSIA** "Frasers Hill-b, Malaya".

Distribution: INDONESIA (Sumatera); MALAYSIA; THAILAND.

References: Friese 1918; Sakagami 1978; Smith 2012; Kahono et al. 2018; Priawandiputra et al. 2020; Syafrizal et al. 2020; Herwina et al. 2021.

***Tetragonula sapiens* (Cockerell, 1911)**

Trigona sapiens Cockerell 1911: 176: **Holotype** (ANIC, worker); **Type locality: SOLOMON ISLANDS** "Solomon Islands".

Distribution: INDONESIA (Sulawesi, Maluku, Papua, Java); AUSTRALIA; PHILIPPINES; SOLOMON ISLANDS.

References: Cockerell 1911; Wallace et al. 2008; Smith 2012; Suriawanto et al. 2017; Kahono et al. 2018; Salatnaya et al. 2021; Djakaria et al. 2020; Suhri et al. 2020; Trianto & Purwanto 2020a; Trianto & Purwanto 2020b; Anaktototy et al. 2021; Sayusti et al. 2021; Trianto & Purwanto 2022.

***Tetragonula sarawakensis* (Schwarz, 1937)**

Trigona sarawakensis Schwarz 1937: 283, 290, 313-315*, 316, 328, plate 2, 4: **Holotype** (BMNH 17b.1110); paratypes (AMNH, BMNH?); **Type locality: MALAYSIA** "Sarawak: Mt. Dulit, 4000 ft.".

Distribution: INDONESIA (Kalimantan, Java); MALAYSIA; SINGAPORE; THAILAND.

References: Schwarz 1937; Smith 2012; Kahono et al. 2018; Syafrizal et al. 2020b; Trianto & Purwanto 2020a; Trianto & Purwanto 2020b; Arung et al. 2021; Sari et al. 2021; Purwanto & Trianto 2021; Trianto & Purwanto 2022.

***Tetragonula testaceitarsis* (Cameron, 1901)**

Trigona testaceitarsis Cameron 1901: 36: **Type** (BMNH 17b.1121); **Type locality: MALAYSIA** "Patani, Malay Peninsula".

Distribution: INDONESIA (Kalimantan, Sumatera); MALAYSIA.

References: Cameron 1901; Syafrizal et al. 2020; Arung et al. 2021; Herwina et al. 2021; Sari et al. 2021.

***WALLACETRIGONA* Engel and Rasmussen, 2017**

***Wallacetrigona incisa* (Sakagami & Inoue, 1989)**

Trigona incisa Sakagami & Inoue 1989: 605-610*, 614, 615, 617, 618, 619: **Holotype** (RMNH); paratypes (RMNH, 6 workers; MBBJ, 1 worker; SFS, remaining); **Type locality: INDONESIA** "Modoinding Minahasa, N. Celebes, vi. 26-27, 1941, native collector, ded. F. Dupont" (3 workers, holotype, paratypes); "Todyamboe, 900m, C. Celebes" (3 workers); "Wuasa, Kab. Poso, Sulteng, Sulawesi" (9 workers); "Lorei Lindu Nat. Park, C. Sulawesi".

Distribution: INDONESIA (Sulawesi, Kalimantan).

References: Sakagami & Inoue 1989; Smith 2012; Kustiawan et al. 2014; Syafrizal et al. 2014; Azlan et al. 2016; Saleng et al. 2016; Hasan et al. 2020; Kustiawan et al. 2021; Rasmussen et al. 2017; Kahono et al. 2018; Djakaria et al. 2020; Octaviani et al. 2020; Sayusti et al. 2021.

DISCUSSION

Indonesia has the highest diversity of stingless bee species in Asia (Kahono et al. 2018), but more thorough research on these insects are needed, particularly in terms of the adoption of sustainable meliponiculture systems. The literature has been updated up to mid-2022. References are cited within these records, with a total of 109 papers. Most biological data pertaining to Meliponini are listed in the nearly complete stingless bee bibliography by Rasmussen (2008). This publication provides updated data regarding the annotated catalog and bibliography of the Indonesian Meliponini stingless bees (Hymenoptera, Apidae, Apinae, Meliponini). First, our study showed 52 recorded stingless bee species across the Indonesian archipelagos. This information adds to the data on the number of stingless bees from a previous publication by Kahono et al. (2018) which recorded 46 species and Rasmussen (2008) which recorded 49 species of stingless bees in Indonesia. Second, this catalog provides up-to-date data regarding the distribution of Indonesian stingless bees. For example, Sulawesi Island is inhabited by three species of stingless bees (Kahono et al. 2018), but by mid-2022 eight stingless bee species had been recorded on the island. Third, there is the addition of data on new species of Indonesian stingless bee that have never been reported in the catalog Rasmussen (2008), namely *Heterotrigona paradisaea* (Engel & Rasmussen), *H. taraxis* (Engel & Rasmussen), and *H. tricholoma* (Engel & Rasmussen). Fourth, in addition to presenting data on the distribution of the Indonesian stingless bees, this catalog provides the type of specimen holding institutions, which would be of value to the reader.

AUTHOR CONTRIBUTION

M.T., searched the literatures and wrote the manuscript, T.A., H.P., and R.U. supervised the processes.

ACKNOWLEDGEMENTS

The first author was supported by LPDP (Indonesia Endowment Fund

for Education) for Doctoral Scholarship [KEP-308/LPDP/LPDP.3/2022].

CONFLICT OF INTEREST

The authors state that they do not have any conflicts of interest. However, the authors are responsible for the article's content and writing.

REFERENCES

Anaktototy et al., 2021. Morfologi dan variasi morfometrik stingless bees di Kepulauan Maluku, Indonesia. *Jurnal Entomologi Indonesia*, 18(1), pp.10-22. doi: 10.5994/jei.18.1.10.

Arung et al., 2021. Cytotoxicity effect of honey, bee pollen, and propolis from even stingless bees in some cancer cell lines. *Saudi Journal of Biological Science*, 28(12), pp.1-8. doi: 10.1016/j.sjbs.2021.08.017.

Ascher et al., 2019. Bees of the Bukit Timah nature reserve and vicinity. *Gard. Bull. Singapore*, 71(Suppl 1), pp.245-271. doi: 10.26492/GBS71(SUPPL.1).2019-09.

Atmowidi et al., 2021. Stingless Bees Pollination Increases Fruit Formation of Strawberry (*Fragaria x annanassa* Duch) and Melon (*Cucumis melo* L.). *Tropical Life Sciences Research*, 33(1), pp.43. doi: 10.21315/tlsr2022.33.1.3.

Awang et al., 2018. Total flavonoids and phenolic contents of sticky and hard propolis from 10 species of Indo-Malayan stingless bees. *Malaysia Journal of Analytical Science*, 22(5), pp. 877-884. doi: 10.17576/mjas-2018-2205-15.

Azlan et al., 2016. The successfull of affectiveness in the movement of *Trigona* spp. Colonies on the artificial nests at the prohibition forest of indigenous village of rumbio kampar regency. *Jom Faperta UR*, 3, pp.1-7.

Basari et al., 2018. Food reward and distance influence the foraging pattern of stingless bee, *Heterotrigona itama*. *Insects*, 9(4), pp.1-10. doi: 10.3390/insects9040138.

Bingham, C.T., 1903. Diagnoses of aceuleate Hymenoptera. In *Fasciculi Malayenses, Anthropological and Zoological Results of an Expedition to Perak and the Siamese Malay States, 1901–1902.* Zoology Vol. I (appendix). London: University Press of Liverpool.

Camargo, J.M.F. & Pedro, S.R.M., 1992. Systematics, phylogeny and biogeography of the Meliponinae (Hymenoptera, Apidae): a mini-review. *Apidologie*, 23, pp.509-–522. doi: 10.1051/apido:19920603.

Camargo, J.M.F. & Pedro, S.R.M., 2003. *Sobre as relações filogenéticas de Trichotrigona Camargo & Moure (Hymenoptera, Apidae, Meliponini).* In *Apoidea neotropica: Homenagem aos 90 anos de Jesus Santiago Moure*. Criciúma: Editora UNESC, pp.109-–122.

Camargo, J.M.F. & Pedro, S.R.M., 2007. Meliponini. In *Catalogue of bees (Hymenoptera, Apoidea) in the Neotropical region*. Curitiba (Paraná): Sociedade Brasileira de Entomologia, pp.272–578.

Camargo, J.M.F., 2013. Historical biogeography of the Meliponini (Hymenoptera, Apidae, Apinae) of the Neotropical region. In *Pot-honey: a legacy of stingless bees*. Springer New York, pp.19-–34.

Cameron, P., 1901. On the Hymenoptera collected during the "Skeat Expedition" to the Malay Peninsula, 1899–1900. *Proceedings of the Zoological Society of London*, pp.16-44.

Cameron, P., 1902. On the Hymenoptera collected by Mr. Robert Shelford at Sarawak, and on the Hymenoptera of the Sarawak museum. *Journal of the Straits Branch of the Royal Asiatic Society*, 37, pp.29-131.

Cameron, P., 1908. On some bornean species of *Trigona* (Apidae). *The Entomologist*, 41, pp.192-195.

Cockerell, T.D.A., 1911. The bees of the Solomon Islands. *Proceedings of the Linnean Society of New South Wales*, 36, pp.160-178.

Cockerell, T.D.A., 1918. Descriptions and records of bees. —LXXX. *Annals and Magazine of Natural History*, 9(2), pp.384-390. doi: 10.1080/00222931808562381.

Cockerell, T.D.A., 1919a. Descriptions and records of bees. —LXXXIII. *Annals and Magazine of Natural History*, 3, pp.118-125. doi: 10.1080/00222931908673805.

Cockerell, T.D.A., 1919b. Descriptions and records of bees. —LXXXV. *Annals and Magazine of Natural History*, 3, pp.240-250. doi: 10.1080/00222931908673818.

Cockerell, T.D.A., 1919c. The social bees of the Philippine Islands. *Philippine Journal of Science*, 14, pp.77-81. https://digitalcommons.usu.edu/bee_lab_co/609.

Cockerell, T.D.A., 1920. Descriptions and records of bees. —LXXXVIII. *Annals and Magazine of Natural History*, 5, pp.113-119. doi: 10.1080/00222932008632346.

Cockerell, T.D.A., 1926a. Descriptions and records of bees. —CXII. *Annals and Magazine of Natural History*, 18, 216-227. doi: 10.1080/00222932608633504.

Cockerell, T.D.A., 1929a. Bees from the Australian region. *American Museum Novitates*, 346, pp.1-18. https://digitalcommons.usu.edu/bee_lab_co/761.

Cockerell, T.D.A., 1929b. Descriptions and records of bees. —CXVII. *Annals and Magazine of Natural History*, 4, pp.132-141. https://digitalcommons.usu.edu/bee_lab_co/767.

Cockerell, T.D.A., 1929c. Bees in the Queensland Museum. Memoirs of the Queensland Museum, 9, pp. 298–323. https://digitalcommons.usu.edu/bee_lab_co/648

Dalla Torre, K.W.V., 1896. Catalogus hymenopterorum hucusque descriptorum systematicus et synonymicus. Vol. 10, Apidae (Anthophila). *G. Engelmann, Leipzig*, pp.643. doi: 10.5962/bhl.title.10348.

Djakaria et al., 2020. Antioxidant and antibacterial activity of selected Indonesian honey against bacteria of acne. *Jurnal Kimia Sains dan Aplikasi*, 23(8), pp.267-275. doi: 10.14710/jksa.23.8.267-275.

Eardley, C.D., 2004. Taxonomic revision of the African stingless bees (Apoidea: Apidae: Apinae: Meliponini). *African Plant Protection*, 10, pp.63–96. doi: 10.10520/EJC87785.

Efin et al., 2019. Morphological characteristics & morphometric of stingless bee (Apidae: Hymenoptera) from Banten Province, Indonesia. *Biodiversitas*, 20(6), pp.1693-1698. doi: 10.13057/biodiv/d200627.

Engel et al., 2019. A key to the genera and subgenera of stingless bees in Indonesia (Hymenoptera: Apidae). *Treubia*, 45, pp.65-84.

Engel, M.S. & Rasmussen, C., 2017. A new subgenus of Heterotrigona from New Guinea (Hymenoptera: Apidae). *Journal of Melittology*, 73, pp.1-6. doi: 10.17161/jom.v0i73.6673.

Engel, M.S., 2001. A monograph of the Baltic amber bees and evolution of the Apoidea (Hymenoptera). *Bulletin of the American Museum of Natural History*, 259, pp.1–192. http://hdl.handle.net/2246/1437.

Febrianti et al., 2020. Bentuk pintu masuk sarang *Trigona* spp. di kawasan hutan mangrove surya perdana mandiri kelurahan setapuk besar singkawang utara. *Jurnal Hutan Lestari*, 8(3), pp.620-627.

Friese, H., 1898. Die Trigona–Arten Australiens. *Természetrajzi Füzetek*, 21(1), pp.427-431.

Friese, H., 1901. Neue Arten der Bienengattung Trigona Jur. (Hym.). Zeitschrift für systematische Hymenopterologieund *Dipterologie*, 1, pp.265-271. https://biostor.org/reference/145407.

Friese, H., 1909. Die Bienenfauna von Neu–Guinea. Annales Historico–Naturales Musei Nationalis Hungarici. Budapest: Természettudományi Múzeum évkönyve.

Friese, H., 1918. Wissenschaftliche Ergebnisse einer Forschungsreise nach Ostindien, ausgeführt im Auftrage der Kgl.Preuß. Akademie der Wissenschaften zu Berlin von H. v. Buttel-Reepen. VII. Bienen aus Sumatra, Java, Malakkaund Ceylon. Gesammelt von Herrn Prof. Dr. v. Buttel-Reepen in den Jahren 1911–1912. *Zoologische Jahrbücher,Abteilung für Systematik, Geographie und Biologie der Tiere*, 41, pp.489-520.

Friese, H., 1925. Neue neotropischen Bienenarten, zugleich II. Nachtrag zur Bienenfauna von Costa Rica (Hym.). *Stettiner Entomologische Zeitung*, 86, pp. 1–41.

Friese, H., 1933a. Neue Trigona–Arten von Borneo (Hym.). *Natuurhistorisch Maandblad*, 22, pp.45-46.

Friese, H., 1933b. Eine neue Trigona von Sumatra (Hymenoptera, Apidae). *Natuurhistorisch Maandblad*, 22, pp.147

Gribodo, G. 1893. Note imenotterologische. Nota II. Nuovi generi e nuove specie di imenotteri antofili ed osservazionisopra alcune specie già conosciute. *Bollettino della Societá Entomologica Italiana, Genova*, 25, pp.248-287.

Gribodo, G., 1891. Contribuzioni imenotterologiche sopra alcune specie nuove o poco conosciute di imenotteri antofili (Generi Ctenoplectra, Xylocopa, Centris, Trigona e Bombus). *Bollettino della Societá Entomologica Italiana, Genova*, 23, pp.102-119.

Grüter, C., 2020. *Stingless Bees*, Cham, Switzerland: Springer International Publishing. doi: 10.1007/978-3-030-60090-7.

Hasan et al., 2020. Gambaran Umum *Trigona* spp. di Kabupaten Luwu Utara Provinsi Sulawesi Selatan. *Jurnal Matematika, Sains, dan Pembelajarannya*, 6(2), pp.121-124. doi: 10.31605/saintifik.v6i2.267.

Heard, T.A., 1999a. The role of stingless bees in crop pollination. *Annual Review of Entomology*, 44, pp.183-–206. doi: 10.1146/annurev.ento.44.1.183.

Herwina et al., 2021. West Sumatran Stingless Bees (Hymenoptera: Apidae: Meliponini): What can be told from its Local Distribution. *Conf. Series: Earth and Environmental Science*, 754(1), pp.012084. doi: 10.1088/1755-1315/757/1/012084.

Jaapar et al., 2016. The diversity and abundance of stingless bee (Hymenoptera: Meliponini) in Peninsular Malaysia. *Advences in Environmental Biology*, 10(9), pp.1-8.

Kahono, et al., 2018. Social bees and the current status of beekeeping in Indonesia. In *Asian Beekeeping in the 21st Century*. Springer Verlag. doi: 10.1007/978-981-10-8222-1_13.

Kerisna et al., 2019. Identification of *Trigona* spp. bee on Utilization Zone of Village Forest Menua Sadap Village, Embaloh Hulu District, Kapuas Hulu Regency. *Jurnal Tengkawang*, 9, pp.82-91. doi: 10.26418/jt.v9i2.36184.

Kustiawan et al., 2014. In vitro cytotoxicity of Indonesian stingless bee products against human cancer cell lines. *Asian Pasific Journal of Tropical Biomedicine*, 4(7), pp.549-556. doi: 10.12980/apjtb.4.2014apjtb-2013-0039.

Kustiawan et al., 2017. Protective Effects of Indonesian Propolis Against Light Induced Retinal Damage. *International Journal of Toxicological and Pharmacological Research*, 9, pp.163-170. doi: 10.25258/ijtpr.v9i02.9054.

Lepeletier de Saint Fargeau, A.L.M., 1836. Histoire naturelle des insectes. Hyménoptères. In. *Vol. 1*, *Librairie encyclopédique de Roret*. Paris. pp. 1–547. doi: 10.5962/bhl.title.9005.

Michener, C.D., 1974. The social behavior of the bees. Cambridge, MA: Harvard University Press, xii+404.

Michener, C.D., 1990. Classification of the Apidae (Hymenoptera). Appendix: *Trigona genalis* Friese, a hitherto unplaced New Guinea species. *University of Kansas Science Bulletin*, 54, pp.75–163.

Michener, C.D., 2000. *The bees of the world*, Baltimore: Johns Hopkins University Press, xiv+[1]+913.

Michener, C.D., 2007. *Lisotrigona* in Thailand, and the male of the genus (Hymenoptera: Apidae: Meliponini). *Journal of the Kansas Entomological Society*, 80, pp.130–135. https://www.jstor.org/stable/25086370.

Michener, C.D., 2013. The Meliponini. In *Pot-honey: a legacy of stingless bees*. New York: Springer, pp.3–17. doi: 10.1007/978-1-4614-4960-7.

Moure, J.S., 1961. A preliminary supra-specific classification of the old world meliponine bees (Hymenoptera, Apoidea). *Studia Entomologica*, 4, pp.181–242.

Nurse, C.G., 1907. A new species of Indian wax-producing bee. *Journal of the Bombay Natural History Society*, 17(3), pp.619.

Octaviani et al., 2020. Quality test comparison for Wallacetrigona incise and Tetragonula biroi honey in Mappedeceng District, North Luwu Regency, South Sulawesi Province. *Advances in Environmental Biology*, 14(10), pp.1-8. doi: 10.22587/aeb.2020.14.10.1.

Priawandiputra et al., 2020. Lebah tanpa sengat (stingless bee) di Desa Perbatasan Hutan (Sumatera Selatan; 1st ed.). *ZSL Indonesia*, pp. 1-82.

Purwanto et al., 2022. Stingless bees from meliponiculture in South Kalimantan, Indonesia. *Biodiversitas*, 23(3), pp.1254-1266. doi: 10.13057/biodiv/d230309.

Purwanto, H. & Trianto, M., 2021. Species description, morphometric measurement and molecular identification of stingless bees (Hymenoptera: Apidae: meliponini) in meliponiculture industry in West Java Province, Indonesia. *Serangga*, 26(1), pp.13-33.

Putra et al., 2016. Jenis Lebah *Trigona* (Apidae: Meliponinae) Pada Ketinggian Tempat Berbeda di Bali. *Jurnal Simbiosis*, 4(1), pp.6-9.

Rahmad et al., 2021. Jenis Lebah Madu Dan Tanaman Sumber Pakan Pada Budi Daya Lebah Madu Di Hutan Produksi Subanjeriji, Kabupaten Muara Enim, Sumatera Selatan. *Jurnal Penelitian Kehutanan Faloak*, 5(1), pp.47-61. doi: 10.20886/jpkf.2021.5.1.47-61.

Ramly et al., 2021. Physicochemical properties and mineral elements in honey from various species of Malaysian stingless bee. *Biosience Research*, 18, pp.34-44. doi: 10.1016/j.jfca.2018.06.002.

Rasmussen et al., 2017. A new genus of eastern hemisphere stingless bees (Hymenoptera: Apidae), with a key to the supraspecific groups of Indomalayan and Australasian Meliponini. *American Museum Novitates*, 2017(3888), pp.1-33. doi: 10.1206/3888.1.

Rasmussen, C., & Camargo, J.M.F., 2008. A molecular phylogeny and the evolution of nest architecture and behavior in *Trigona s.s.* (Hymenoptera: Apidae: Meliponini). *Apidologie*, 39, pp.102-–118. doi: 10.1051/apido:2007051.

Rasmussen, C., & Cameron SA., 2007. A molecular phylogeny of the Old World stingless bees (Hymenoptera: Apidae: Meliponini) and the non-monophyly of the large genus *Trigona*. *Systematic Entomology*, 32, pp.26-–39. doi: 10.1111/j.1095-8312.2009.01341.x.

Rasmussen, C., & Cameron, S.A., 2010. Global stingless bee phylogeny supports ancient divergence, vicariance, and long distance dispersal. *Biol. J. Linn. Soc*, 99, pp.206–232. doi: 10.1111/j.1095-8312.2009.01341.x.

Rasmussen, C., 2008. *Molecular phylogeny of stingless bees: Insights into divergence times, biogeography, and nest architecture evolution (Hymenoptera: Apidae: Meliponini)*, University of Illinois at UrbanaChampaign,

Rosli et al., 2020. Stingless Bee Honey: Evaluating Its Antibacterial Activity and Bacterial Diversity. *Insects*, 11(8), pp.500. doi: 10.3390%2Finsects11080500.

Roubik, D.W., 2006. Stingless bee nesting biology. *Apidologie*, 37, pp.124-143. doi: 10.1051/apido:2006026.

Sakagami, S.F. & Inoue, T., 1985. Taxonomic notes on three bicolorous *Tetragonula* stingless bees in Southeast Asia. *Kontyû*, 53, pp.174-189.

Sakagami, S.F. & Inoue, T., 1987. Stinglee bees of the genus *Trigona* (subgenus *Trigonella*) with notes on the reduction of spatha in male genitalia of the subgenus *Tetragonula* (Hymenoptera, Apidae). *Kontyû*, 55, pp.610-627. http://dl.ndl.go.jp/info:ndljp/pid/10653539.

Sakagami, S.F. & Inoue, T., 1989. Stingless bees of the genus *Trigona* (subgen. *Geniotrigona*) (Hymenoptera, Apidae), with description of *T. (G.) incisa* sp.nov. from Sulawesi. *Japanese Journal of Entomology*, 57, pp.605-620. http://dl.ndl.go.jp/info:ndljp/pid/10653869.

Sakagami, S.F., 1959. Stingless bees collected by Prof. S. Matsumura from Singapore (Hymenoptera, Apidae). *Insecta Matsumurana*, 22, pp.119-121. http://hdl.handle.net/2115/9646.

Sakagami, S.F., 1975. Stingless bees (excl. *Tetragonula*) from the continental Southeast Asia in the collection of Bernice P. Bishop museum, Honolulu (Hymenoptera, Apidae). *Journal of the Faculty of Science, Hokkaido University, Series VI, Zoology*, 20, pp.49-76. http://hdl.handle.net/2115/27593.

Sakagami, S.F., 1978. *Tetragonula* stingless bees of the continental Asia and Sri Lanka (Hymenoptera, Apidae). *Journal of the Faculty of Science Hokkaido University Series VI Zoology*, 21, pp.165-247.

Sakagami, S.F., 1982. Stingless bees. In *Social insects*, Vol. 3. New York: Academic Press, pp.361-–423. doi: 10.1051/apido:2006026.

Salatnaya et al., 2021. Diversity, nest preferences, and forage plants of stingless bees (Hymenoptera: Apidae: Meliponini) from West Halmahera, North Moluccas, Indonesia. *Jurnal Ilmu Ternak dan Veteriner*, 26, pp.167-178. doi: 10.14334/jitv.v26i4.2896.

Saleng et al., 2016. Uji Aktivitas Antibakteri Ekstrak Propolis Lebah Trigona incisa Terhadap Bakteri klebsiella *Pneumonia* dan *Staphylococcus aureus*. *Bioprospek*, 11, pp.42-48. doi: 10.30872/bp.v11i1.126.

Samsudin et al., 2018. Taxonomic study on selected species of stingless bee (Hymenoptera: Apidae: Meliponini) in Peninsular Malaysia. *Serangga*, 23, pp.203-258. doi:

Sanjaya et al., 2019. Study of The Habitat and Food Sources Kelulut Bees in the Area of Gunung Nyiut Nature Reserve at Pisak Village Bengkayang District. *Jurnal Hutan Lestari*, 7, pp.786-798. doi: 10.26418/jhl.v7i2.34072.

Saputra, S.H. & Nurlina, S., 2022. Chemical Components, Pollen and Bioactivity of Stingless Honey Bee Kelulut (*Heterotrigona itama*) Meliponiculture from Samarinda East Kalimantan. *Conf. Series: Earth and Environmental Science*, pp.985. doi: 10.1088/1755-1315/985/1/012004.

Sari et al., 2021. Aktivitas Antioksidan dan Antibakteri dari Ekstrak Bee Pollen Lebah Kelulut (*Tetragonula sarawakensis*). *Jurnal Riset Industri Hasil Hutan*, 13, pp.123-132. doi: 10.24111/jrihh.v13i2.7050.

Sayusti et al., 2021. Stingless bees (Hymenoptera: Apidae) in South and West Sulawesi, Indonesia: Morphology, nest structure, and molecular characteristics. *Journal Apicultural Research*, 60(1), pp.143-156. doi: 10.1080/00218839.2020.1816272.

Schwarz, H.F., 1937. Results of the Oxford University Sarawak (Kalimantan) expedition: Bornean stingless bees of the genus *Trigona*. *Bulletin of the American Museum of Natural History*, 73, pp.281-328.

Schwarz, H.F., 1939. The Indo-Malayan species of Trigona. *Bulletin of the American Museum of Natural History*, 76, pp.83-141.

Smith, D.R., 2012. Key to workers of Indo-Malayan stingless bees. In: Smith DR (eds). For use in the stingless bees. *Proceeding of the 11th International Conference of the Asian Apiculture Association Malaysia.*

Smith, F., 1854. Catalogue of the Hymenopterous Insects in the Collection of the British Museum. Part II, Apidæ. *British Museum (Natural History) London*, pp. 197. doi: 10.5962/bhl.title.20858.

Smith, F., 1857. Catalogue of the hymenopterous insects collected at Sarawak, Kalimantan; Mount Ophir, Malacca; and at Singapore, by A. R. Wallace. *Journal of the Proceedings of the Linnean Society Zoology*, 2, pp.42-88. doi: 10.1111/j.1096-3642.1857.tb01759.x.

Smith, F., 1865. Descriptions of new species of Hymenopterous insects from the Islands of Sumatra, Sula, Gilolo, Salwatty, and New Guinea, collected by Mr. A.R. Wallace. *Journal of the Proceedings of the Linnean society Zoology*, 8, pp.61-94. doi: 10.1111/j.1096-3642.1865.tb02422.x.

Smith, F., 1878. List of Hymenoptera obtained by Mr. Ossian Limborg east of Maulmain, Tenasserim provinces, during the months december 1876, january, march and april 1877, with descriptions of new species. *Journal of the Asiatic Society of Bengal (Physical Science)*, 47, pp.167-169. doi: 10.1111/j.1469-7998.1878.tb08027.x.

Suderajat et al., 2021. The type of Trigona bee (Apidae: Meliponini) in three different habitat in South Sumatera. *Jurnal Biologi Tropis*, 21, pp.206-212. doi: 10.29303/jbt.v21i1.2461.

Suhri et al., 2020. Pollen Collected by Stingless Bee *Tetragonula sapiens* Cockerell (Apidae: Meliponini) in Organic Farm Land. *The 6th International Conference on Biological Science ICBS*, pp.1-6. doi: 10.1063/5.0016393.

Suprianto et al., 2020. Karakter morfologi dan analisis daerah conserved gen elongation factor 1a (EF1a) pada *Lepidotrigona terminata*. *Metamorfosa Journal of Biological Science*, 7, pp.30-39. doi: 10.24843/metamorfosa.2020.v07.i02.p05.

Suriawanto et al., 2017. Nesting Sites Characteristics of Stingless Bees (Hymenoptera: Apidae) in Central Sulawesi, Indonesia. *Journal of Insect Biodiversity*, 5(10), pp.1-9. doi: 10.12976/jib/2017.5.10.

Syafrizal et al., 2020. Diversity and honey properties of stingless bees from meliponiculture in East and North Kalimantan, Indonesia. *Biodiversitas*, 21(10), pp.4623-4630. doi: 10.13057/biodiv/d211021.

Syafrizal, et al., 2014. Keragaman dan habitat lebah Trigona pada hutan sekunder tropis basah di Hutan Pendidikan Lempake, Samarinda, Kalimantan Timur. *Jurnal Teknologi Pertanian*, 9(1), pp.34-38.

Thummajitsakul et al., 2008. Genetic diversity and population structure of Trigona pagdeni Schwarz in Thailand. *Apidologie*, 39(4), pp.446-455. doi: 10.1051/apido:2008026.

Trianto M, Purwanto H. 2020a. Morphological characteristics and morphometrics of stingless bees (Hymenoptera: Meliponini) in Yogyakarta, Indonesia. *Biodiversitas*, 21(6), pp.2619-2628. doi: 10.13057/biodiv/d210633.

Trianto, M. & Purwanto, H., 2020b. Molecular Phylogeny of Stingless Bees in the Special Region of Yogyakarta Revealed Using Partial 16S rRNA Mitochondrial Gene. *Buletin Peternakan*, 44(4), pp.186-93. doi: 10.21059/buletinpeternak.v44i4.55539.

Trianto, M. & Purwanto, H., 2022. Diversity, abundance, and distribution patterns of stingless bees (Hymenoptera: Meliponini) in Yogyakarta, Indonesia. *Biodiversitas Journal of Biological Diversity*, 23(2), pp. 695-702. doi: 10.13057/biodiv/d230214.

Tuksitha et al., 2018. Antioxidant and Antibactrial of Stingless Bees Honey from Kalimantan (Sarawak). *Journal of Asia Pasific Entomology*, 21(2), pp.563-570. doi: 10.13057/nusbiosci/n130213.

Wallace et al., 2008. Standard yet unusual mechanisms of long-distance dispersal: seed dispersal of Corymbia torelliana by bees. *Diversity and Distributions*, 14(1), pp.87-94. doi: 10.1111/j.1472-4642.2007.00427.x.

Wicaksono et al., 2020. Flight Activities and Pollen Load of *Lepidotrigona terminata* Smith (Apidae: Meliponinae). *HAYATI Journal of Biosciences*, 27, pp.97-106. doi: 10.4308/hjb.27.2.97.

Wille, A., 1979. A comparative study of the pollen press and nearby structures in the bees of the family Apidae. *Revista de Biología Tropical*, 27, pp.217-–222.

Wille, A., 1983. Biology of the stingless bees. *Annual Review of Entomology*, 28, pp.41-64. doi: 10.1146/annurev.en.28.010183.000353.

Wu, Y., 2000. [Original title in Chinese=Hymenoptera Melittidae Apidae]. In: Fauna Sinica, Insecta, 20, pp.1-442.

Zubaidah et al., 2017. Ultrastructural comparison of three stingless bees species of Borneo. *Malaysian Journal of Microscopy*, 13, pp.8-16.