| Ann. Naturhist. Mus. Wien, B | 114 | 27–35 | Wien, Oktober 2012 |
|---|---|---|---|

# Notes on the genus *Provespa* Ashmead, 1903 (Insecta: Hymenoptera: Vespidae: Vespinae) based on the material of the Naturhistorisches Museum Wien (Austria)

M. Madl*

**Abstract**

An annotated catalogue of the genus *Provespa* Ashmead, 1903 is provided. New records are dealt with from Brunei, China, Indonesia, Malaysia, Myanmar and Thailand.

**Key words:** Vespidae, Vespinae, *Provespa*, catalogue, new records, Brunei, China, Indonesia, Malaysia, Myanmar, Thailand, Oriental Region.

**Zusammenfassung**

Eine kommentierte Artenliste der Gattung *Provespa* Ashmead, 1903 wird vorgelegt. Neue Funddaten von Brunei, China, Indonesien, Malaysia, Myanmar und Thailand werden mitgeteilt.

## Introduction

Currently the small subfamily Vespinae consists of four extant genera: *Dolichovespula* Rohwer, 1916, *Provespa* Ashmead, 1903, *Vespa* Linnaeus, 1758, and *Vespula* Thomson, 1869 (Carpenter & Kojima 1997). The genus *Provespa*, which contains only three species, is restricted to the Oriental Region and occurs from India (East Himalayas) via southern China to Vietnam and via the Malaysian Peninsula to Sumatra, West-Java and Borneo including nearby smaller islands. There are occasional records from Sulawesi, but an established occurrence is still doubtful.

Species of the genus *Provespa* can be easily recognized by their yellow-brown body colour and the enlarged ocelli. They are nocturnal in their habits and new colonies are founded by swarming. The larvae and pupae of *Provespa* species are consumed by people in China and Indonesia. In Indonesia *Provespa anomala* (de Saussure, 1854) is known as edible insect from Sumatra (van der Meer Mohr 1941) and Kalimantan (Chung 2010) and *Provespa nocturna* van der Vecht, 1935 from Sumatra (van der Meer Mohr 1941). In China *Provespa barthelemyi* du Buysson, 1905 is a common insect food in Yunnan (Yi & al. 2010, Ying & al. 2010).

A curious fact is the overlap of the distribution areas of all three species in the area of Jitra (Malaysia: Province Kedah), which is currently the southern limit for *Provespa barthelemyi* and the northern limit for *Provespa anomala* and *Provespa nocturna*.

* Michael Madl, Internationales Institut für Entomologie, Naturhistorisches Museum Wien, Burgring 7, 1010 Wien, Austria. E-mail: michael.madl@nhm-wien.ac.at

The small amount of material housed in the Hymenoptera Collection of the Naturhistorisches Museum in Vienna contains all known species. Most of the material has been identified or checked by J. van der Vecht or J. Gusenleitner. *Provespa anomala* is here recorded from Malaysia, Singapore, Brunei and Indonesia, *Provespa barthelemyi* from China, Myanmar, and Thailand and *Provespa nocturna* from Indonesia.

The papers dealing with the genus *Provespa* are scattered in various scientific journals. As some of them are often not available for researchers, I have prepared a catalogue. Papers, which I could not consult, are indicated "not seen" in the chapter references.

## Abbreviations

biol. ..... biology
cat. ..... catalogue
descr. ..... description
fig. (s) ..... figure (s)
syn. ..... synonym
tab. ..... table
tax. ..... taxonomy
typ. gen. ..... typus generis

## Annotated catalogue

### Genus *Provespa* Ashmead, 1903

Description: Ashmead 1903: 182.
Typus generis: *Vespa dorylloides* de Saussure, 1854 (= *Provespa anomala* (de Saussure, 1854)).
Distribution: Oriental Region.
Valid species: 3.

### *Provespa anomala* (de Saussure, 1854)

*Vespa anomala* de Saussure, 1854: 112 (descr. ♀, Indonesia (Java)); de Dalla Torre 1894: 137 (cat. partim); von Dalla Torre 1904: 68 (syn. of *Vespa doryloides* (!) de Saussure). Casolari & Casolari Moreno 1980: 126 (Indonesia (Java), cat.).

*Provespa anomala* (de Saussure, 1854): Bequaert 1930: 63 (tax., Myanmar partim, Thailand, Malaysia (West Malaysia, Borneo partim), Indonesia (Sumatra, Java, Borneo partim), Philippines (?)); van der Vecht 1935: 42 (figs. 2A-C); van der Vecht 1936: 160 (tax.), 161 (tax., descr. ♀, Indonesia (Sumatra), 162 (key), 163 (key, tax., Thailand, Malaysia (West Malaysia, Langkawi, Sarawak, Sabah), Indonesia (Sumatra, Bangka, Durian)); van der Vecht 1957: 4 (key ♀ ♂), 7 (tax., Indonesia (Sumatra, Bangka, Durian, Kalimantan), 8 (fig. 2: map), 51 (as probably *anomala*, descr. nest, Malaysia (West Malaysia)); van der Vecht 1959: 208 (tax., Myanmar, Malaysia (Sarawak, Sabah), Singapore, Indonesia (Batu, Karimun, Kalimantan)); van der Vecht 1968: 421 (fig. 5d); Matsuura 1983: 27 (biol., Indonesia (Sumatra), tab. 2-3: biol.), 29 (tab. 2-5: biol.); Matsuura 1985: 27 (biol., Indonesia (Sumatra), 28 (tab. 1: biol., Sumatra), 29 (tab. 2: biol.), 31 (tab. 3: biol.), 32 (figs. 1, 2: both nest), 33 (fig. 3: nest), 34 (fig. 4: nest)); Kifune 1986: 86 (biol., Indonesia (Sumatra)), 87 (tab. 1: biol.); Carpenter 1987: 417 (tax.), 430 (without locality); Archer 1989: 6 (key), 31 (cat.), fig. 19A; Matsuura & Yamane 1990: 187 (biol., tab.7.2: biol.), 190 (biol., Indonesia (Sumatra)), 191 (fig. 7.2), 192 (fig. 7.3 below), 193 (fig. 7.4C), 233 (cat.), 267 (as food); Kojima & Yamane 1990: 32 (key, Indonesia (Sumatra)); Matsuura 1991: 257 (biol., Indonesia (Sumatra), 259 (fig. 7.10), 261 (fig. 7.11); Carpenter & Kojima 1997: 63 (cat.); Kojima & van Achterberg 1997b: 4 (Malaysia (Sabah), Indonesia (Sumatra)), 6 (biol.); Kifune & Yamane 1998: 213 (biol., Thailand); Wenzel 1998: 25 (cat. nest), 28 (fig. 15B: nest); Matsuura 1999: 219 (biol., Indonesia (Sumatra)), 220 (fig. 1: biol.), 221 (figs 2: biol., 3: biol.); Archer 2000: 127 (tax., fig. 1B),

128 (Thailand, Malaysia (West Malaysia, Sarawak, Sabah), Singapore, Brunei, Indonesia (Sumatra, Bangka, Batu, Java, Kalimantan, Laut), 129 (fig. 2A)); FOSTER & RATNICKS 2001: 2 (fig. 1: tax., biol.); SMITH, O'DONNELL & JEANNE 2001: 336 (tab. 1: biol., cat.); SONTICHAI, PROMKUTKAEW & NAKAMURA 2004: (Thailand); ARCHER 2008: 68 (tax., distr.), 70 (tab. 1: cat.), 71 (biol.), 73 (biol.), 84 (biol.), 86 (biol., tab. 3: biol.), 90 (biol., tab. 7: biol.), 93 (tab. 10: biol.); CHUNG 2010: 148 (biol., as food, Indonesia (Kalimantan); SAITO & KOJIMA 2011: 66 (tax.), 67 (tab. 1: tax., Indonesia (Kalimantan)), 68 (fig. 2), 70 (figs. 3-5), 71 (Indonesia (Java), 72 (map); KOJIMA, SAITO & NGUYEN 2011: 57 (Malaysia (West Malaysia)); HYODO et al. 2011: 419 (biol.), 420 (tab. 1: biol., Malaysia (Sarawak)), 423 (biol.), 424 (app.: biol.); NUGROHO, KOJIMA & CARPENTER 2011: 171 (cat. Indonesia).

*Vespa dorylloides* DE SAUSSURE, 1854: 256 (unnecessary replacement name for *Vespa anomala*), pl. 14 (figs. 2, 2a); SMITH 1857: 120 (Myanmar, East India, Indonesia (Sumatra, Java)); SMITH 1858: 116 (Malaysia (Sarawak)); WALLACE 1871 (In: Smith): 297 (biol.); SMITH 1871: 383 (cat.); CAMERON 1905: 19 (Indonesia (Lingga)); CAMERON 1910: 86 (biol.); DOVER & RAO 1923: 248 (Myanmar partim, Malaysia (Sarawak, Sabah), Indonesia (Kalimantan); DOVER 1929: 48 (Malaysia (West Malaysia, Sarawak); BEQUAERT 1930: 63 (syn.); DOVER 1931: 259 (no data); DE SCHULTHESS 1932: 39 (Indonesia: Sumatra).

*Vespa doryloides* (!) DE SAUSSURE, 1854: DE SAUSSURE 1855: pl. 1 (tax.); ANONYMOUS 1859: 2 (biol., Malaysia (Borneo – in fact Sarawak)); ASHMEAD 1903 (In: ANONYMOUS): 284 (Thailand); DU BUYSSON 1905: 492 (key), 497 (key), 616 (tax., descr. ♂ ♀, biol., Myanmar partim, Malaysia (West Malaysia, Sarawak, Sabah), Singapore, Indonesia ( Sumatra partim, Padang (Bengkalis), Kalimantan), pl. 5 (figs. 1, 2); VON SCHULTHESS 1914: 261 (Malaysia (West Malaysia), Indonesia (Sumatra).

*Provespa doryloides* (!) (DE SAUSSURE, 1854): ASHMEAD 1903: 182 (typ. gen., Thailand); VON DALLA TORRE 1904: 68 (cat. partim);

**Parasites:** *Xenos provesparum* KIFUNE, 1986, *Xenos* sp. (Strepsiptera: Xenidae).

**Material examined:** Malaysia: West Malaysia (Perak: Kuala Kangsar 4 ♀♀ 1902 leg. Grubauer) – Sarawak (Batang Ai National Park, Enkari river 3 ♀♀ 19.-20. 2. 1993 leg. H. Zettel) – Singapore: Bukit Tamah 2 ♀♀ 1888 leg. Ranson. – Brunei: 3 ♀♀ 1968 leg. Birkenmeier – Indonesia: Sumatra (1 ♀ Coll. Paganetti – Medan, am Licht 1 ♀ 29. 4. 1922 leg. L. Fulmek – Padang 1 ♀ 16. 1. 1901 leg. Schild – Montes Battak 2 ♀♀ Coll. Frustorfer – Pantai Bungus bei Padang 1 ♀ 23. 2. 1991 leg. H. Schillhammer – Permatangsiantar, Holzweg 2 33 ♀♀ 23. 2. 1996, 1 ♂, 26 ♀♀ 26. 2. 1996; Holzweg 3 15 ♀♀ 24. 2. 1996 leg. M. Lödl – Padang Sidempoean 1 ♀ 12. 7. 1925 leg. SWK – Sipirok 2 ♀♀ 20. 2. 1996, 1 ♂ 2 ♀♀ 21. 2. 1996 leg. M. Lödl) – Bengkalis (1 ♀ 1885 leg. Maindron) – Borneo (4 ♀♀ 1852 leg. I. Pfeiffer; 5 ♀♀ 1880; 1 ♀ 1882; 2 ♀♀ 1886 leg. Baczes) – Sulawesi (1 ♀ 1860 leg. Stevens) – India Orientalis: 2 ♀♀ 1866.

**Distribution:** Myanmar, Thailand, Malaysia (West Malaysia, Pulau Langkawi, Sarawak, Sabah), Singapore, Brunei, Indonesia (Sumatra, Bangka, Batu, Durian, Karimun Lingga, Padang, Java, Kalimantan, Laut).

The record from Taiwan (SONAN 1929: 138) is caused by mislabelling (KOJIMA, SAITO & NGUYEN 2011: 57). The record from Sulawesi (Indonesia) is probably caused by mislabelling or by a dead specimen on board ship. The record from North Thailand (Province Chiang Mai) by SONTICHAI, PROMKUTKAEW & NAKAMURA (2004) should be checked.

## *Provespa barthelemyi* (DU BUYSSON, 1905)

*Vespa barthelemyi* DU BUYSSON, 1905: 492 (key), 497 (key), 618 (descr. ♂ ♀, India (West Bengal (not Bhutan), Myanmar, Cambodia, Vietnam), pl. 5 (figs. 3, 4); BEQUAERT 1930: 63 (tax., India (West Bengal (not Bhutan), Cambodia, Myanmar, Thailand, Vietnam); VAN DER VECHT 1936: 162 (key), 163 (key), 165 (tax., Laos, Thailand, Malaysia (West Malaysia)); VAN DER VECHT 1957: 4 (key ♀ ♂), 8 (fig. 2 (map)), 10 (tax., India (Sikkim, West Bengal (not Bhutan)), Cambodia, Thailand, Vietnam); VAN DER VECHT 1959: 209 (tax., Myanmar, Thailand); DAS & GUPTA 1984: 434 (cat. India); CARPENTER 1987: 430 (without locality); DAS & GUPTA 1989: 227 (key), 228 (tax., India (Sikkim, West Bengal (not Bhutan)), 253 (figs. 39f, g), 265 (map 41); ARCHER 1989: 6 (key), 31 (cat.), figs. 2A, figs. 18B,C, 19B; MATSUURA & YAMANE 1990: 233 (cat.); MADL 1995: 397 (Thailand); DONG & WANG 1992: 344 (tab. 1: biol. China); CARPENTER & KOJIMA 1997: 64 (cat.); ARCHER 2000: 127 (tax., fig. 1A), 128 (India (Sikkim, West Bengal

(not Bhutan), Assam, Arunchal Pradesh, Manipur), Myanmar, Thailand, Cambodia, Vietnam, Malaysia (West Malaysia)), 129 (fig. 2B (map)); Tano & Kurokawa 2001: (Myanmar); Nguyen & Carpenter 2002: 201 (key, Vietnam); Carpenter & Nguyen 2003: 190 (fig. 40); Tangmitcharoen & al. 2005: 102 (tab. 2: biol., Thailand); Gusenleitner 2006: 679 (India (Meghalaya)); Nguyen et al. 2006: 96 (key), 98 (Vietnam); Archer 2008: 68 (tax., distr.), 70 (tab. 1: cat.), 71 (biol.); Kumar & Nguyen 2010: 379 (tax., descr. ♂ ♀, India (Sikkim, West Bengal, Assam, Meghalaya, Arunachal Pradesh, Nagaland, Manipur, Tripura, Mizoram)), 381 (figs. 1-6); Saito & Kojima 2011: 66 (tax.), 67 (tab. 1: tax., Vietnam), 70 (figs. 3-5), 71 (Vietnam, Laos), 72 (map).

*Provespa berthelemyi* (!) (du Buysson, 1905): Dey 2007: 340 (tax., biol., India (Sikkim)), 341 (tab. 1: tax., fig. 2), 342 (tab. 2: tax., fig. 3).

*Provespa berthelmyi* (!) (du Buysson, 1905): Carpenter 1982: 34 (without data).

*Provespa anomala* (de Saussure, 1854): Bequaert 1930: 63 (India (Sikkim), Myanmar partim); Das & Gupta 1984: 433 (cat. India). Roy & Kundu 1985. (India (Arunachal Pradesh)); Das & Gupta 1989: 227 (key, tax., descr. ♂ ♀, India (Sikkim)), 253 (figs. 39d, e), 265 (map 41). Jonathan, Roy & Kundu 1999: (India (West Bengal)); Jonathan, Roy & Kundu 2000a: (India (Tripura)). Jonathan, Roy & Kundu 2000b: (India (Meghalaya)); Jonathan & Kundu 2003: (India (Sikkim)); Kundu, Gosh & Roychowdhury 2006: (India (Arunachal Pradesh)).

*Vespa doryloides* (!) de Saussure, 1854: Gribodo 1884: 354 (Myanmar).

*Vespa dorylloides* de Saussure, 1854: Bingham 1897: 400 (key, tax., descr. ♀, India (Uttara Pradesh, Uttarakhand (Dehradun), Sikkim, Myanmar), pl. 3 (fig. 5); du Buysson 1905: 618 (India (Himalaya), Myanmar partim); Dover & Rao 1923: 248 (biol., India (East Himalayas, Assam), Myanmar partim);

**Material examined:** China: Province Yunnan (Xishuangbanna, N Jinghong, Guangping env., 1000 m 1 ♀ leg. S. Murzin) – Myanmar: Chin State (Natmataung National Park, WNW Kanpetlet township, Oasis Mountain Resort, ca. 1700 m 1 ♂ 1 ♀ 31. 5. 2010, 1 ♂ 6. 6. 2010; WNW Kanpetlet township, pine tree forest, 2340 m 4 ♀♀ 1. 6. 2010, WNW Kanpetlet township, 1930 m 1 ♀ 4. 6. 2010 leg. D. Zimmermann) – Thailand: Provinz Mae Hong Son (WNW Pai, SW Ban Mo Paeng, am Mo Paeng Wasserfall (19°22'41''N/98°22'34''E), 900m 3 ♀♀ 11. 04. 2000 leg. H. & R. Rausch – Province Mae Hong Son, WNW Pai, SW Ban Mo Paeng, in der Nähe des Ortes (19°22'51''N/98°23'52''E), 700m 3 ♀♀ leg. H. & R. Rausch – Provinz Mae Hong Son, NNW Soppong, N Mae Lana, Umgebung Ban Papuek, Weg zur Grenzregion Myanmar (19°39'24''N/98°14'22''E), 1115m 3 ♀♀ leg. H. & R. Rausch) – Province Kanchanaburi (Sai Yok National Park 1 ♀ 3. 12. 1990 leg. M.A. Jäch).

**Distribution:** India: (Sikkim, West Bengal, Assam, Meghalaya, Arunachal Pradesh, Nagaland, Manipur, Tripura, Mizoram), China (Yunnan, Guangxi), Myanmar, Laos, Cambodia, Vietnam, Thailand, Malaysia (West Malaysia).

Actually the locality Maria Basti is situated in West Bengal (India). Therefore Bhutan (du Buysson 1905: 619) is deleted from the distribution list. The record from Uttar Pradesh has never been confirmed (Das & Gupta 1989: 228).

### *Provespa nocturna* van der Vecht, 1935

*Provespa nocturna* van der Vecht, 1935: 41 (descr. ♂ ♀, biol., Indonesia (Sumatra, Kalimantan), 42 (figs. 1A-C); van der Vecht 1936: 159 (tax., descr. ♂ ♀, Malaysia (West Malaysia, Sarawak), Indonesia (Sumatra)), 161 (figs. 1-3), 162 (key ♀, ♂), 163 (tax., Malaysia (West Malaysia, Sarawak, Sabah), Indonesia (Sumatra)); van der Vecht 1957: 3 (key ♀), 4 (key ♂), 8 (fig. 2 (map), 9 (tax.,biol., Indonesia (Sumatra, Bangka, Kalimantan),Vietnam); van der Vecht 1959: 210 (Malaysia (Sarawak), Indonesia (Sumatra)); Matsuura 1983: 27 (biol., Indonesia (Sumatra)), 28 (tab. 2-4: biol.); Kifune 1986: 86 (biol., Indonesia (Sumatra)), 87 (tab. 1: biol.); Das & Gupta 1989: 227 (key), 253 (figs. 39a-c), 265 (map 41); Archer 1989: 6 (keys ♂ ♀), 31 (cat.), figs 18A, 19A; Matsuura & Yamane 1990: 187 (as *Provespa*, biol.), 190 (biol., Indonesia (Sumatra)), 192 (fig. 7.3 above), 193 (figs. 7.4A, B), 209 (tab. 9.1: biol.), 233 (cat.), 267 (used as food); Kojima & Yamane 1990: 32 (key), 33 (Indonesia (Sumatra)); Matsuura 1991: 257 (biol., Indonesia (Sumatra)); Carpenter & Kojima 1997: 64 (cat.); Kojima & van Achterberg 1997b: 158 (type cat.); Schmitz & Moritz 1998: 184 (Malaysia without locality), 185 (figs. 1a, b: tax.), 186 (tax.), 187 (tab. 1: tax.), 188 (fig. 2: tax.), 190 (fig. 3: tax.); Archer 1999: 90 (Australia

(Queensland)); ARCHER 2000: 127 (tax., fig. 1B), 128 (Thailand, Vietnam, Malaysia (West Malaysia, Sarawak, Sabah), Indonesia (Sumatra, Bangka, Kalimantan), Australia (Queensland)), 129 (fig. 2C); SMITH, O'DONNELL & JEANNE 2001: 336 (tab. 1: biol., tax.); NGUYEN & CARPENTER 2002: 201 (key), 202 (cat.); CARPENTER 2003: 3 (fig. 1: tax.), 4 (fig. 2: tax.), 6 (fig. 3: tax.), 7 (fig. 4: tax.), 8 (fig. 5: tax.), 9 (fig. 6: tax., fig. 7 (tax.), 10 (fig. 8: tax.), 11 (fig. 9: tax.), 16 (app. 1: tax.), 17-20 (app. 2: tax.); ARCHER 2008: 68 (tax., distr.), 70 (tab. 1: cat.), 71 (biol.), 86 (biol.); SAITO & KOJIMA 2011: 66 (tax.), 67 (tab. 1: tax., Malaysia (West Malaysia)), 68 (fig. 1), 70 (figs. 3-5), 72 (map); KOJIMA, SAITO & NGUYEN 2011: 57 (Malaysia (West Malaysia)); NUGROHO, KOJIMA & CARPENTER 2011: 171 (Sumatra, cat. Indonesia).

*Provespa anomala* (DE SAUSSURE, 1853): DU BUYSSON 1905: 616 (Sumatra partim).

**Parasites:** *Bareogonalos* sp. (Hymenoptera: Trigonalidae) – *Xenos provesparum* KIFUNE, 1986 (Strepsiptera: Xenidae).

**Material examined:** Indonesia: Sumatra (without locality 1 ♂ 1893 – Padang 1 ♂ 16.1.1901 leg. Schild – Permatangsiantar, Holzweg 2 1 ♂ 4 ♀♀ 23.2.1996, 2 ♀♀ 24.2.1996; Holzweg 3 3 ♀♀ 24.2.1996 leg. M. Lödl – Sipirok 1 ♂ 15 ♀♀ 21.2.1996 leg. M. Lödl).

**Distribution:** Malaysia (West Malaysia, Sarawak, Sabah), Indonesia (Sumatra, Bangka, Kalimantan).

The record from Sulawesi (VAN DER VECHT 1935: 43) was caused by mislabelling (VAN DER VECHT 1957: 9). The records from Vietnam and Australia (Queensland), which are far away from the core range of *Provespa nocturna*, are probably caused by dead specimens on board ships. NGUYEN & CARPENTER (2002) have not seen any material from Vietnam.

**Acknowledgements**

I thank Manuela Vizek and Dominique Zimmermann (both Naturhistorisches Museum Wien, Austria) for making unidentified material available for study. I am grateful to C. van Achterberg (Netherlands Centre for Biodiversity Naturalis in Leiden, Netherlands), J.M. Carpenter (American Museum of Natural History in New York, U.S.A.), P.D. Durst (FAO Regional Office for Asia and the Pacific in Bangkok, Thailand), J. Gusenleitner (Linz, Austria), J. Kojima (Ibaraki University in Mito, Japan), L.T.P. Nguyen (Vietnamese Academy of Science and Technology in Hanoi, Vietnam) and F. Saito (Japan) for providing copies of papers. I also thank J.M. Carpenter for his comments on an earlier draft of the manuscript.

## References

Papers, in which wasps are identified only to generic level, are marked with an asterisk (*). I have only seen an unpaginated pdf-file of Sontichai, Promkutkaew & Nakamura (2004), which has been submitted for publication to the 30th Congress on Science and Technology of Thailand.

ANONYMOUS, 1859: February 11, 1858. – Proceedings of the Entomological Society of London 1858: 1–18.

ANONYMOUS, 1903: March 12, 1903. – Proceedings of the Entomological Society of Washington 5/4: 284–285.

ARCHER M.E., 1989: A key to the world species of the Vespinae (Hymenoptera) Part 1. Keys, checklist and distribution. – Research Monograph of the College of Ripon & York St. John 2: 41 pp.

ARCHER M.E., 1999: *Provespa nocturna* v.d. VECHT recorded from Australia and *Paravespula shidai* from Korea (Hym., Vespinae). – Entomologist's Monthly Magazine 135/1616–19: 90.

ARCHER M.E., 2000: Taxonomy and distribution of the nocturnal hornets, *Provespa* (Hym., Vespinae). – Entomologist's Monthly Magazine 136/1632–35: 127–130.

Archer M.E., 2008: Taxonomy, distribution and nesting biology of species of the genera *Provespa* Ashmead and *Vespa* Linnaeus (Hymenoptera, Vespidae). – Entomologist's Monthly Magazine 144/1727–29: 69–101.

Ashmead W.H., 1903: *Provespa* a New Genus in the Vespidae. – Entomological News 14(6): 182.

*Beck J., 2005: Wasp-mimicking Mantispidae (Insecta: Neuroptera) from Sabah, Malaysia. – Sepilok Bulletin 3: 37–40.

Bequaert J., 1930: On the generic and subgeneric divisions of the Vespinae (Hymenoptera). – Bulletin of the Brooklyn Entomological Society 25(2): 59–70.

Bingham C.T., 1897: Fauna of British India, including Ceylon and Burma. Hymenoptera I. – Vol. I. Wasps and Bees. – Taylor & Francis, London: III-XXIX, 579 pp., 4 pls.

Buysson R. du, 1903-1905: Monographie des guêpes ou *Vespa*. – Annales de la Société Entomologique de France 72(2) (1903): 260–288; 73(3) (1905): 485–556; 73(4) (1905): 565–634, pls. 5–15.

Cameron P., 1905: On the Malay Fossorial Hymenoptera and Vespidae of the Museum of the R. Zool. Soc. "Natura Artis Magistra" at Amsterdam. – Tijdschrift voor Entomologie 48(1-3): 48–78.

Cameron P., 1910: Some further Notes on Nocturnal Hymenoptera. – Annals of Scottish Natural History 1910(74): 86–87.

Carpenter J.M., 1982: The phylogenetic relationships and natural classification of the Vespoidea (Hymenoptera). – Systematic Entomology 7(1): 11–38.

Carpenter J.M., 1987: Phylogenetic relationships and classification of the Vespinae (Hymenoptera: Vespidae). – Systematic Entomology 12(4): 413–431.

Carpenter J.M., 2003: On "Molecular Phylogeny of Vespidae (Hymenoptera) and the Evolution of Sociality in Wasps". – American Museum Novitates 3389: 17 pp.

Carpenter J.M. & Kojima J.-I., 1997: Checklist of the species in the subfamily Vespinae (Insecta: Hymenoptera: Vespidae). – Natural History Bulletin of Ibaraki University 1: 51–92.

Carpenter J.M. & Nguyen L.P.T., 2003: Keys to the genera of social wasps of South-East Asia (Hymenoptera: Vespidae). – Entomological Science 6(3): 183–192.

Casolari C. & Casolari Moreno R., 1980: Cataloghi I – Collezione Imenoterologica di Massimo Spinola. – Torino (Museo Regionale di Scienze Naturali): 165 pp.

Chung A.Y.C., 2010: Edible insects and entomophagy in Borneo. – In: Durst P.B., Johnson D.V., Leslie R.N. & Shono K. (eds.): Forest insects as food: humans bite back: 141–150.

Dalla Torre C.G. de, 1894: Catalogus hymenopterorum hucusque descriptorum et systematicus et synonymicus. Volumen 9: Vespidae (Diploptera). — Leipzig (Wilhelm Engelmann): I-VIII, 181 pp.

Dalla Torre K.W. von, 1904: Hymenoptera Fam. Vespidae. — In: Wytsman P. (ed.): Genera Insectorum 19: 108 pp.

Das B.P. & Gupta V., 1984: A catalogue of the families Stenogastridae and Vespidae from the Indian Subregion. – Oriental Insects 17: 395–464.

Das B.P. & Gupta V., 1989: The Social Wasps of India and the Adjacent Countries (An illustrated account of the vespid fauna of the Indian Subregion. – Oriental Insects Monograph 11: 292 pp.

Dey S., 2007: Role of Scanning Electron Microscopy in Understanding Insect Corneal Nipple and Other Structures. – In: Méndez-Vilas A. & Díaz J. (eds.): Modern Research and Educational Topics in Microscopy: 336–344.

Dong D. & Wang Y., 1992: Studies on the vertical distribution of Vespoidea and analysis of the fauna in Yunnan Province, China. – Zoological Research 13(4): 343–352.

DOVER C., 1929: Wasps and Bees in the Raffles Museum, Singapore. – Bulletin of the Raffles Museum Singapore, Straits Settlements, 2: 43–70.

DOVER C., 1931: The Vespidae in the Federated Malay States Museums. – Journal of the Federated Malayan States Museum 16(3-4): 251–260.

DOVER C. & RAO H.S., 1923: A Note on the Diplopterous Wasps in the Collection of the Indian Museum. – Journal & Proceedings of the Asiatic Society, Bengal, New Series, 18(4): 235–249.

DURST P.B., JOHNSON D.V., LESLIE R.N. & SHONO K. (eds.), 2010: Forest insects as food: humans bite back. – Food and Agriculture Organization of the United Nations, Bangkok: III-VIII, 231 pp.

FOSTER K.R. & RATNIEKS F.L.W., 2001: Paternity, Reproduction and Conflict in Vespine Wasps: A Model System for Testing Kin Selection Predictions. – Behavioral Ecology and Sociobiology 50(1): 1–8.

GRIBODO G., 1884: Sopra alcuni imenotteri raccolti a Minhla nel regno di Birmania dal Cap. G.B. COMOTTO. – Annali del Museo Civico di Storia Naturale di Genova 21: 349–368.

GUSENLEITNER J., 2006: Über Aufsammlungen von Faltenwespen in Indien (Hymenoptera: Vespidae). – Linzer biologische Beiträge 38(1): 677–695.

HYODO F., TAKEMATSU Y., MATSUMOTO T., INUI Y. & ITIOKA T., 2011: Feeding habits of Hymenoptera and Isoptera in a tropical rain forest as revealed by nitrogen and carbon isotope ratios. – Insectes Sociaux 58(3): 417–426.

*JACOBSON E., 1935: Some remarks on *Provespa* ASHM. – Entomologische Mededeelingen van Nederlandsch-Indië 1(3): 56–58.

JONATHAN J.K. & KUNDU B.G., 2003: Insecta: Hymenoptera: Vespidae. – In: ALFRED J.R.B. (ed.): Fauna of Sikkim 4: 369–392. **not seen**

JONATHAN J.K., ROY S.B. & KUNDU B.G., 1999: Insecta: Hymenoptera: Vespidae. – Zoological Survey of India, Fauna of West Bengal, Part 8, Insecta (Trichoptera, Thysanoptera, Neuroptera, Hymenoptera and Anoplura): 149–184. **not seen**

JONATHAN J.K., ROY S.B. & KUNDU B.G., 2000a: Insecta: Hymenoptera: Vespidae. – Zoological Survey of India, Fauna of Tripura, State Fauna Series 7: 377–390. **not seen**

JONATHAN J.K., ROY S.B. & KUNDU B.G., 2000b: Insecta: Hymenoptera: Vespidae. – Zoological Survey of India, Fauna of Meghalaya, State Fauna Series 4: 117–160. **not seen**

KIFUNE T., 1986: A New Species of the Genus *Xenos* (Strepsiptera, Stylopidae) Parasitic on the Genus *Provespa* (Hymenoptera, Vespidae) from West Sumatra, Indonesia (Notulae Strepsipterologicae-XVI). – Kontyû 54(1): 84–88.

KIFUNE T. & YAMANE S., 1998: Discovery of the genus *Xenos* (Strepsiptera: Stylopidae) from Thailand (Notulae Strepsipterologicae-XXV). – Entomological Science 1(2): 213.

KOJIMA J. & ACHTERBERG C. VAN, 1997a: List of the primary types of social wasps (Hymenoptera: Vespidae) deposited in the Nationaal Natuurhistorisch Museum, Leiden, and the Zoölogisch Museum, Amsterdam. – Zoologische Mededelingen 71(1-18): 157–169.

KOJIMA J. & ACHTERBERG K. VAN, 1997b: Social wasps collected by Malaise trapping in Southeast Asia, with a note on relative abundance of swarm-founding species (Insecta: Hymenoptera: Vespidae). – Natural History Bulletin of Ibaraki University 1: 1–13.

KOJIMA J., SAITO F. & NGUYEN L.T.P., 2011: On the species group taxa of Taiwanese social wasps (Hymenoptera: Vespidae) described and/or treated by J. Sonan. – Zootaxa 2920: 42–64.

KOJIMA J. & YAMANE S., 1990: List of the Subfamily Vespinae and Polistinae Collected in Central Sumatra, with Keys to the Sumatran Species (Hymenoptera, Vespinae. – In: SAKAGAMI S.F., OHGUSHI R. & ROUBIK D.W. (eds.): Natural History of Social Wasps and Bees in Equatorial Sumatra: 31–39.

Kumar P.G. & Nguyen L.T.P., 2010: New distributional records of the nocturnal wasp *Provespa barthelemyi* (du Buysson) (Hymenoptera: Vespidae; Vespinae) from various states of India. – Journal of Experimental Zoology India 13(2): 379–382.

Kundu B.G., Ghosh S.N. & Roychowdhury S., 2006: Insecta: Hymenoptera: Vespidae. – Zoological Survey of India, Fauna of Arunachal Pradesh, State Fauna Series 13: 427–448. **not seen**

Li T.-S., 1985: Hymenoptera :Vespoidea. – Economic Insect Fauna of China 30: I-VII, 159 pp. **not seen**

Madl M., 1995: Contribution to the Hymenoptera-Fauna of Thale Ban National Park (Thailand). – Linzer biologische Beiträge 27(1): 397–399.

Martin S.J., 1995: Hornets (Hymenoptera: Vespinae) of Malaysia. – Malaysian Nature Journal 49: 71–82.

Maschwitz U. & Hänel H., 1988: Biology of the southeast Asian nocturnal wasp, *Provespa anomala* (Hymenoptera, Vespidae). – Entomologica Generalis 14(1): 47–52.

Matsuura M., 1983: Some Biological Aspects of the Nocturnal Vespine Genus *Provespa*. – In: Ecological Study on Social Insects in Central Sumatra with Special Reference to Wasps and Bees. – Sumatra Nature Study (Entomology): 27–29.

Matsuura M., 1985: Life history of the nocturnal vespine *Provespa anomalla*. – In: Evolutionary Ecology of Insects in Humid Tropics, Especially in Central Sumatra. – Sumatra Nature Study (Entomology): 27–36.

Matsuura M., 1991: *Vespa* and *Provespa*. – In: Ross K.G. & Matthews R.W. (eds): The Social Biology of Wasps. – Cornell University Press, Ithaca: 232–262.

Matsuura M., 1991: Life history patterns of vespine wasps (Hymenoptera, Vespidae). – In: Inoue Y. & Yamane S. (eds): Evolution of Insect Societies. –Hakuhin-sha, Tokyo: 329–372 (In Japanese). **not seen**

Matsuura M., 1999: Size and composition of swarming colonies in *Provespa anomala* (Hymenoptera, Vespidae), a nocturnal social wasp. – Insectes Sociaux 46(3): 219–223.

Matsuura M. & Yamane S., 1990: Biology of the Vespine Wasps. – Springer, Berlin: 323 pp.

Meer Mohr J.C. van der, 1941: Insecten di door de Karo-Bataks gegeten worden. – De tropische Natuur 30: 41-47.

Nguyen L.T.P. & Carpenter J.M., 2002: Vespidae of Vietnam (Insecta: Hymenoptera) 1: Vespinae. – Journal of the New York Entomological Society 110(2): 199–211.

Nguyen L.T.P., Saito F., Kojima J.-I. & Carpenter J.M., 2006: Vespidae of Vietnam (Insecta: Hymenoptera) 2. Taxonomic Notes on Vespinae. – Zoological Science 23(1): 95–104.

Nugroho H., Kojima J.-I. & Carpenter J.M., 2011: Checklist of Vespid Species (Insecta: Hymenoptera: Vespidae) Occurring in Indonesian Archipelago. – Treubia 38: 71–186.

Roy S.B. & Kundu B.G., 1985: Fauna of Namdapha, Arunachal Pradesh, India (Insecta: Hymenoptera). – Records of the Zoological Survey of India 82: 221–229. **not seen**

Saito F. & Kojima J.-I., 2011: Phylogenetic Analysis and Biogeography of the Nocturnal Hornets, *Provespa* (Hymenoptera: Vespidae: Vespinae). – Species Diversity 16: 65–74.

Saussure H. de, 1853-58: Études sur la Famille des Vespides 2: Monographie des Guêpes Sociales, ou de la Tribu des Vespiens. – Masson, Paris, & Cherbuliez, Geneve: 1-2, I-CXCVI, 256 pp., 37 pls.

Schmitz J. & Moritz R.F.A., 1998: Molecular Phylogeny of Vespidae (Hymenoptera) and the Evolution of Sociality in Wasps. – Molecular Phylogenetics and Evolution 9(2): 183–191.

Schulthess A. von, 1914: Wissenschaftliche Ergebnisse einer Forschungsreise nach Ostindien, ausgeführt im Auftrage der Kgl. Preuß. Akademie der Wissenschaften zu Berlin von H.H.

v. Buttel-Reepen IV. Vespidae aus Ceylon, Malacca, Java und Sumatra. – Zoologische Jahrbücher für Systematik, Geographie und Biologie der Tiere 37(3): 253–266.

SCHULTHESS, A. DE, 1932: Aculeata. – In: VAN STRAELEN V. (ed.): Résultats Scientifiques du Voyage aux Indes Orientales Néderlandaises de LL. AA. RR. Le Prince et la Princesse Léopold de Belgique 4(5): 33–44.

SMITH A.R., O'DONNELL S. & JEANNE R.L., 2001: Correlated evolution of colony defence and social structure: A comparative analysis in eusocial wasps (Hymenoptera: Vespidae). – Evolutionary Ecology Research 3: 331–344.

SMITH F., 1857: Catalogue of the Hymenopterous Insects in the Collection of the British Museum. Part 5. Vespidae. – London (British Museum): 147 pp.

SMITH F., 1858: Catalogue of the Hymenopterous Insects Collected at Sarawak, Borneo; Mount Ophir, Malacca; and at Singapore, by A.R. Wallace. – Journal of the Proceedings of the Linnean Society, Zoology, 1: 42–129, pls. 1, 2.

SMITH F., 1871: A Catalogue of the Aculeate Hymenoptera and Ichneumonidae of India and the Eastern Archipelago with Introductionary Remarks by A.R. Wallace. – Journal of the Linnean Society, Zoology, 11: 285–415.

SONAN J., 1929: On *Vespa* from Formosa. – Transactions of the Natural History Society of Formosa 19: 136–149, pl. 6. **not seen**

SONTICHAI S., PROMKUTKAEW S. & NAKAMURA M., 2004: Some Hornet Species (Hymenoptera, Vespidae) in Thailand. – Proceedings of the 30th Congress on Science and Technology of Thailand, 19-21 October 2004, Bangkok, Thailand, October 2004. **see above**

TANGMITCHARON S., TAKASO S., SIRIPATANADILOX S., TASEN W. & OWENS J.N., 2005: Insect biodiversity in flowering teak (*Tectona grandis* L.f.) canopies: Comparison of wild and plantation stands. – Forest Ecology and Management 222/1-3: 99–107.

TANO T. & KUROKAWA H., 2001: Distributional and symptomatic notes on vespinae wasps collected at Dawei (= Tavoy), Union of Myanmar. – Entomological Journal of Fukui 28: 18–20 (In Japanese). **not seen**

VECHT J. VAN DER, 1935: On a new species of *Provespa* ASHM. (Hym. Vespidae). – Entomologische Mededeelingen van Nederlandsch-Indië 1(2): 41–44.

VECHT J. VAN DER, 1936: Some further notes on *Provespa* ASHM. – Journal of the Federated Malayan States Museum 18(1): 159–166.

VECHT J. VAN DER, 1957: The Vespinae of the Indo-Malayan and Papuan areas (Hymenoptera: Vespidae). – Zoologische Verhandelingen 34: 83 pp.

VECHT J. VAN DER, 1959: Notes on Oriental Vespinae, including some species from China and Japan (Hymenoptera, Vespidae). – Zoologische Mededelingen 36(13): 205–232.

VECHT J. VAN DER, 1968: The terminal gastral sternite of female and worker social wasps (Hymenoptera, Vespidae). – Proceedings der Koninklijke Nederlandse Akademie van Wetenschappen, Series C, 71: 411–422.

WENZEL J.W., 1998: A Generic Key to the Nests of Hornets, Yellowjackets, and Paper Wasps Worldwide (Vespidae: Vespinae, Polistinae). – American Museum Novitates 3224: 39 pp.

YI C., HE Q., WANG L. & KUANG R., 2010: The Utilization of Insect-resources in Chinese Rural Area. – Journal of Agricultural Science 2(3): 146–154.

YING F., XIAOMING C., LONG C. & ZHIAYANG C., 2010: Common edible wasps in Yunnan Province, China and their nutritional value. – In: DURST P.B., JOHNSON D.V., LESLIE R.N. & SHONO K. (eds.): Forest insects as food: humans bite back: 93–98.