

An updated checklist of Vespidae (Insecta: Hymenoptera) from Arunachal Pradesh, India with new distributional records from the State

*Dibyajyoti Ghosh¹, P. Girish Kumar², Basudev Tripathy¹ and Kailash Chandra¹

¹Zoological Survey of India, M-Block, New Alipore, Kolkata, West Bengal-700053, India.

²Western Ghats Regional Centre, Zoological Survey of India, Eraniel, Kozhikode, Kerala-673006, India.

(Email: ghoshd774@gmail.com)

Abstract

An updated checklist of 69 species from 26 genera and 4 subfamilies of Vespidae from Arunachal Pradesh is provided in this study. Four species, viz. *Eumenes macrops* de Saussure, *Polistes (Polistella) adustus* Bingham, *Polistes (Polistella) rubellus* Gusenleitner, and *Vespula germanica* (Fabricius), are documented for the first time from Arunachal Pradesh.

Keywords: *Hymenoptera, New records, Arunachal Pradesh, Checklist.*

Received: 20 January 2020; Revised: 24 September 2020; Online: 28 September 2020

Introduction

Arunachal Pradesh is the eastern most state of India and among the biodiversity hotspots at India (Myers *et al.*, 2000). The location of the state with topographical and climatological uniqueness made the state as one of the most species rich regions of the country.

Family Vespidae belongs to the order Hymenoptera with 5000 species recorded globally, with six subfamilies, viz. Eumeninae, Vespinae, Polistinae, Masarinae, Stenogastrinae and Euparagiinae (Goulet & Huber, 1993) and is represented by 150 species under 40 genera from the Indian Himalayan region (Chandra *et al.*, 2018). Reports of Vespidae from Arunachal Pradesh is however scattered and scanty. The earlier work done by Bingham (1897), Roy & Kundu (1985), Das & Gupta (1989), Kundu *et al.* (2006), Singh *et al.* (2010), Srinivasan & Girish Kumar (2010), Kenny *et al.* (2019) and Gawas *et al.* (2020) reflected documentation of few species for the state, altogether 65 species of Vespidae have been reported from Arunachal Pradesh. Present study reports new distributional records of four species from the state taking the tally to 69 species belonging to 26 genera from 4 subfamilies. Along with brief description of the new records from the

state, an updated checklist of Vespidae from Arunachal Pradesh is provided through the present work.

Materials and Methods

Surveys were undertaken in different parts of Indian Himalayan region, as part of the NMHS- Biodiversity assessment project. However, in this study, specimens collected from Arunachal Pradesh are only taken into account. Wasps were collected, narcotised with ethyl acetate and subsequently stored in 70% ethyl alcohol. Specimens were then taken to the laboratory, properly stretched, pinned and identification was done following Bingham (1897), Das & Gupta (1989), Gusenleitner (2006), Fabricius (1793), Girish Kumar *et al.* (2017) and then compared with reference collections from Zoological Survey of India, Western Ghats Regional Centre, Kozhikode (ZSIK). All the specimens were examined and photographed under Leica stereo zoom microscope and labelled with Adobe Photoshop v7.0.

Taxonomic classification is followed as in Carpenter (1982). The different morphological terms that are used for describing the specimen followed Das & Gupta (1989) and Girish Kumar *et al.* (2017).

An updated checklist of Vespidae from Arunachal Pradesh, India

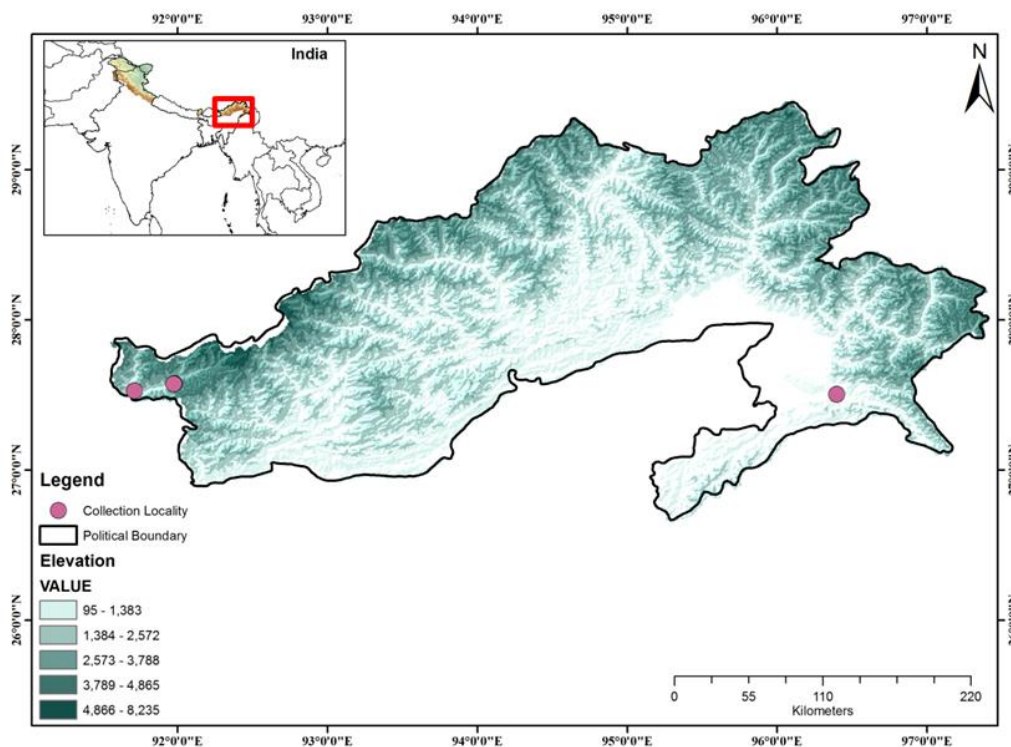


Figure 1. Collection localities of Family Vespidae from Arunachal Pradesh, India.

Abbreviations used

BL: Body Length; BMNH: The Natural History Museum, formerly British Museum (Natural History), London, Great Britain; FWL: Fore Wing Length; OLM: Oberösterreichischen Landesmuseum, Linz, Austria; ZSIK: Zoological Survey of India, Western Ghats Regional Centre, Kozhikode, Kerala, India.

Results

Taxonomic Account

Order Hymenoptera

Family Vespidae

Subfamily Eumeninae

Genus *Eumenes* Latreille, 1802

Eumenes macrops de Saussure (Fig. 2A-D)

Eumenes macrops de Saussure, 1852: 41, ♂—
“La Caroline du nord” (BMNH).

Material examined: Registration No.22424/H3 and 22425/H3, 1 Male and 1 Female, 13.iii.2017, 27.506 N, 96.396 E, Alt. 345.4 metres, Deban, Namdapha National Park, Changlang, Arunachal Pradesh, India, coll. J. Saini & Party.

Male: **BL** 14.8mm; **FWL** 9.1 mm.

Female: **BL** 11.7 mm; **FWL** 8.2 mm.

Diagnosis: Legs almost entirely ferruginous (coxae and trochanter black), rarely with few yellow markings on fore and mid leg; punctuation of second tergum relatively coarse and not very dense; second tergum, in profile, little swollen in middle, weakly impressed preapically, and apical margin slightly reflected; in male, apical antennal article hooked, its apex reaching middle of 10th segment in curved position.

Distribution: India: Arunachal Pradesh (present record), Assam, Karnataka, Kerala, Maharashtra, Nagaland, Pondicherry, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, West Bengal. *Elsewhere:* Indonesia; Malaysia; Myanmar. (Girish Kumar *et al.*, 2017).

Remarks: This is one of the widely distributed potter wasp in India. First time reported from Arunachal Pradesh.

Subfamily Polistinae

Tribe Polistini

Genus *Polistes* Latreille, 1802

Subgenus *Polistella* Ashmead, 1904

Polistes (Polistella) adustus Bingham, 1897
(Fig. 3A-D)

Polistes adustus Bingham, 1897: 397, ♀, holotype, "Sikkim, up to 6000 feet" (BMNH).

Material examined: Registration No.22426/H3, 1 Male, 21.ix.2018, 27.578 N, 91.976 E, Alt. 2274 metres, Jung, Tawang, Arunachal Pradesh, India, coll. S. Ahmed & Party.

BL 14.9mm; **FWL** 11.3 mm.

Diagnosis: Metasoma black with broad red band on apical margin of first to fifth tergum; scutellum more or less raised, elevated from the level of mesoscutum; second sternum angular at base, propodeum with sharp lateral edges; legs not completely black. In males, sub genital plate with central tubercle.

Distribution: India: Arunachal Pradesh (present record), Delhi, Himachal Pradesh, Jammu & Kashmir, Meghalaya, Sikkim, Uttarakhand, West Bengal. *Elsewhere:* Bhutan; China; Nepal (Das & Gupta, 1989).

Remarks: This species is distributed in Himalaya and adjacent regions. First time reported from Arunachal Pradesh.

***Polistes (Polistella) rubellus* Gusenleitner, 2006 (Fig. 4A-D)**

Polistes rubellus Gusenleitner 2006: 684, ♀, holotype, Yuksam 8 km S, W-Sikkim, India [OLM].

Material examined: Registration No.22427/H3, 1 Female, 21.ix.2018, 27.575 N, 91.973 E, Alt. 2271 metres, Jung, Tawang, Arunachal Pradesh, India, coll. S. Ahmed & Party.

BL 15.2 mm; **FWL** 11.9 mm.

Diagnosis: Second sternum behind the basal furrow, in side view, not angular, only strongly curved; propodeum with strong transverse striations; base of metanotum with distinct transverse carina; metasoma bicoloured: black and ferruginous.

Distribution: **India:** Arunachal Pradesh (present record), Sikkim. *Elsewhere:* Nepal (Gusenleitner, 2006; Nguyen *et al.*, 2011).

Remarks: This is a Himalayan species with a limited distributional record. First time reported from Arunachal Pradesh.

Subfamily Vespinae
Genus *Vespula* Thomson, 1869
***Vespula germanica* (Fabricius, 1793)**
(Fig. 5A-D)

Vespa germanica Fabricius, 1793: 256 - [Germany] "Kiliae" (type depository unknown).

Material examined: Registration No. 22429/H3, 1 Female, 21.iv.2018, 27.578 N, 91.976 E, Alt. 2274 metres, Jung, Tawang, Arunachal Pradesh, India, coll. J. Saini & Party.

BL 22.4 mm; **FWL** 14.1 mm.

Diagnosis: Margin behind third mandibular tooth distinctly concave; outer basal flange of mandible strongly curved; occipital carina reaching mandibular base; apical margin of clypeus concave and depressed medially; mesosomal punctures indistinct; propodeum not rugose.

Distribution: India: Arunachal Pradesh (present record), Himachal Pradesh, Jammu & Kashmir. *Elsewhere:* Afghanistan; Albania; Algeria; Armenia; Argentina (Introduced); Ascension Island (Introduced); Australia (Introduced); Austria; Azerbaijan; Belarus; Belgium; Bosnia & Herzegovina; Bulgaria; Canada (Introduced); Chile (Introduced); China; Croatia; Czech Republic; Denmark; Estonia; Finland; France; Georgia; Germany; Greece; Hungary; Iceland (Introduced); Iran; Iraq; Ireland; Israel; Italy; Jordan; Kazakhstan; Korea; Kyrgyzstan; Lebanon; Liechtenstein; Lithuania; Luxembourg; Macedonia; Malta; Mayotte; Moldova; Mongolia; Morocco; Nepal; Netherlands; New Zealand (Introduced); Norway; Pakistan; Poland; Portugal; Romania; Russia; Sakhalin Island; Scotland; Serbia; Slovakia; Slovenia; South Africa (Introduced); Spain (including Canary Islands); Sweden; Switzerland; Syria; Taiwan; Tajikistan; Tunisia; Turkey; Turkmenistan; U.K.; Ukraine; U.S.A. (Introduced); Uzbekistan (Girish Kumar and Carpenter, 2018).



Figure 2. *Eumenes macrops* de Saussure: **A.** Habitus; **B.** Head, Frontal View; **C.** Head and Mesosoma, Dorsal View; **D.** Metasoma, Lateral View.



Figure 3. *Polistes (Polistella) adustus* Bingham 1897: **A.** Habitus; **B.** Head, Frontal View; **C.** Head and Mesosoma, Dorsal View; **D.** Metasoma, Lateral View.

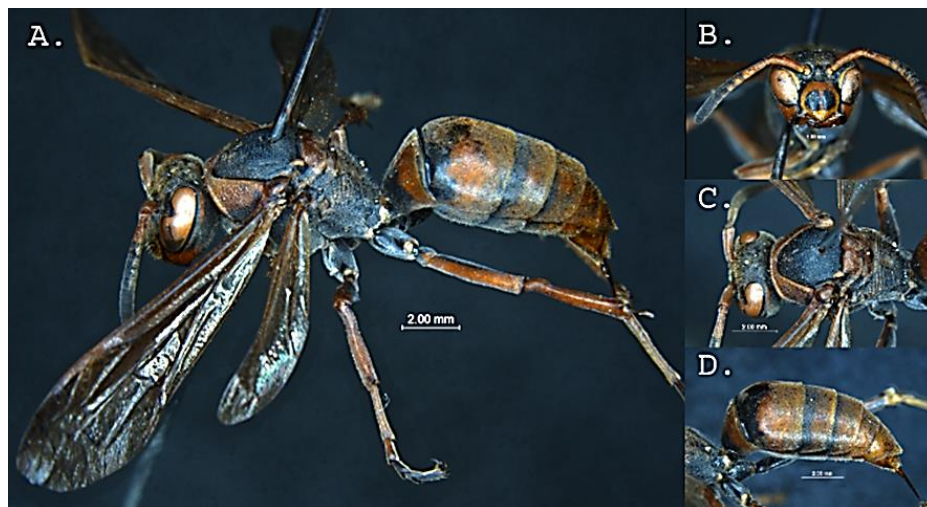


Figure 4. *Polistes (Polistella) rubellus* Gusenleitner, 2006: **A.** Habitus; **B.** Head, Frontal View; **C.** Head and Mesosoma, Dorsal View; **D.** Metasoma, Lateral View.

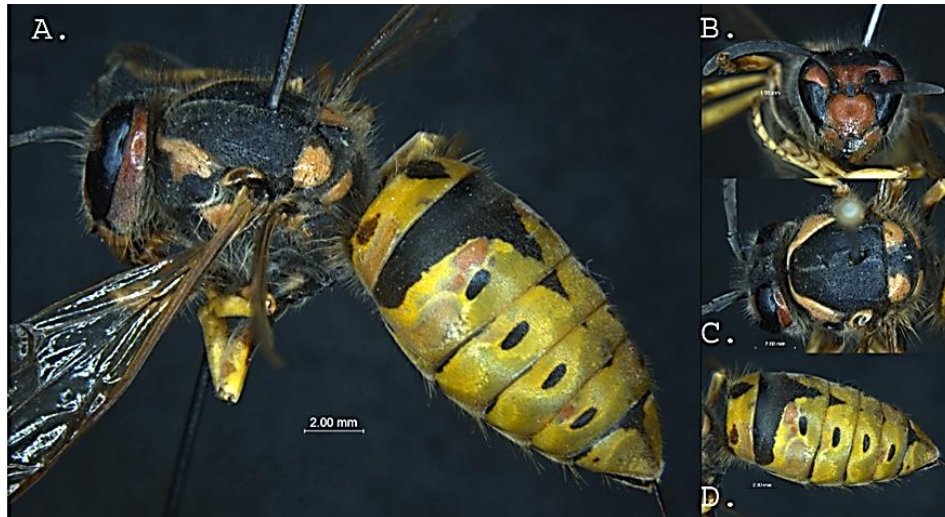


Figure 5. *Vespa germanica* (Fabricius, 1793): **A.** Habitus; **B.** Head, Frontal View; **C.** Head and Mesosoma, Dorsal View; **D.** Metasoma, Lateral View.

Remarks: *V. garmanica* is a common European (Palearctic) species. Being invasive, except Antarctica, widely introduced to all of the continents. Previously reported from Kashmir, India (Lester & Beggs, 2019). First time recorded from Arunachal Pradesh.

Discussion

According to the generic and species diversity of family Vespidae from Arunachal Pradesh, the most speciose subfamily

Eumeninae has 30 species belonging to 17genera, followed by Polistinae with 20 species under 3 genera, Vespinae with 16 species from 3 genera and Stenogastrinae with 3 species belonging to 3 genera (Fig.6). Being a biodiversity hotspot, Arunachal Pradesh harbours a vast range of faunal diversity which is yet to be discovered. So, it is imperative that further intensive sampling effort is needed in order to discover all the faunal resources from the region.

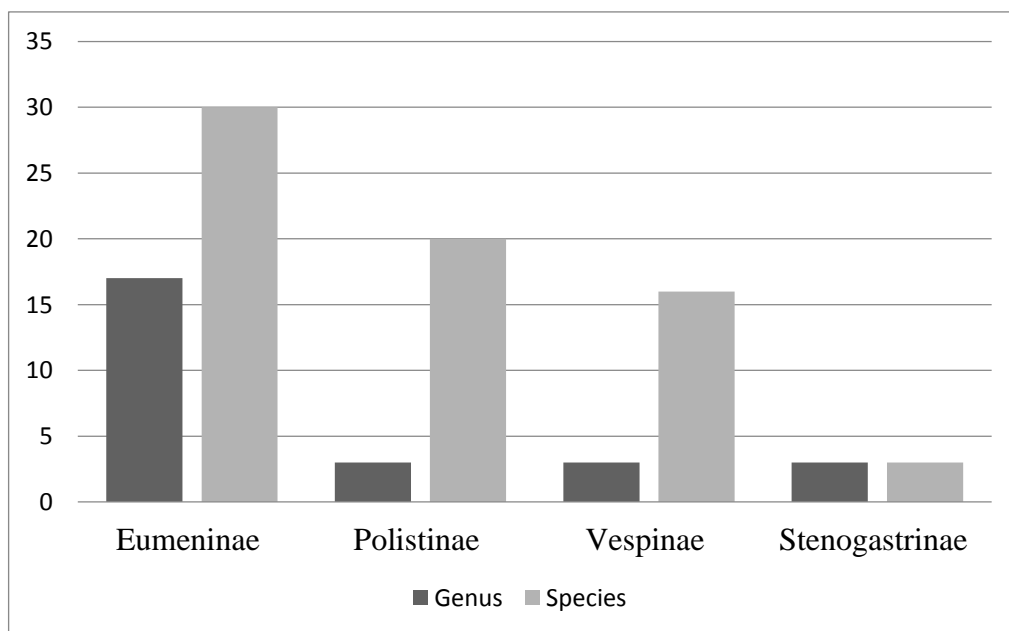


Figure 6. Generic and species diversity of Vespidae subfamilies in Arunachal Pradesh, India.

AN ANNOTATED DISTRIBUTIONAL
CHECKLIST OF VESPIDAE
(HYMENOPTERA: VESPOIDEA) OF
ARUNACHAL PRADESH

SUBFAMILY: EUMENINAE

TRIBE: EUMENINI

1. Genus *Delta* de Saussure, 1855

1. *Delta companiforme companiforme* (Fabricius, 1775)
2. *Delta conoideum* (Gmelin, 1790)
3. *Delta dimidiatipenne* (de Saussure, 1852)
4. *Delta esuriens* (Fabricius, 1787)
5. *Delta pyriforme pyriforme* (Fabricius, 1775)

2. Genus *Eumenes* Latreille, 1802

6. *Eumenes architectus* Smith, 1859 [kept as doubtful species from India; see Girish Kumar *et al.*, 2017]
7. *Eumenes assamensis* Meade-Waldo, 1910
8. *Eumenes atrophicus* (Fabricius, 1798)
9. *Eumenes punctatus* de Saussure, 1852
10. *Eumenes macrops* de Saussure, 1852 (**new record**)

3. Genus *Phimenes* Giordani Soika, 1992

11. *Phimenes flavopictus* (Blanchard, 1845)

TRIBE: ODYNERINI

4. Genus *Allorhynchium* van der Vecht, 1963

12. *Allorhynchium argentatum* (Fabricius, 1804)

5. Genus *Antepipona* de Saussure, 1855

13. *Antepipona biguttata* (Fabricius, 1787)
14. *Antepipona bipustulata* (de Saussure, 1855)

6. Genus *Anterhynchium* de Saussure, 1863

15. *Anterhynchium (Dirhynchium) flavolineatum* (Smith, 1857)

7. Genus *Antodynerus* de Saussure, 1855

16. *Antodynerus limbatus* (de Saussure, 1852)

8. Genus *Apodynerus* Giordani Soika, 1993

17. *Apodynerus formosensis indicus* Giordani Soika, 1994
18. *Apodynerus troglodytes troglodytes* (de Saussure, 1856)

9. Genus *Labus* de Saussure, 1867

19. *Labus humbertianus* de Saussure, 1867
20. *Labus pusillus* van der Vecht, 1963

10. Genus *Orancistrocerus* van der Vecht, 1963

21. *Orancistrocerus aterrimus khasianus* (Cameron, 1900)

11. Genus *Paraleptomenes* Giordani Soika, 1970

22. *Paraleptomenes darugiriensis* Girish Kumar *et al.*, 2014

23. *Paraleptomenes rufoniger* Giordani Soika, 1994

12. Genus *Parancistrocerus* Bequaert, 1925

24. *Parancistrocerus holzschuhi* Gutsenleitner, 1987

13. Genus *Pararrhynchium* de Saussure, 1855

25. *Pararrhynchium venkataramani* Girish Kumar and Carpenter, 2017

14. Genus *Pareumenes* de Saussure, 1855

26. *Pareumenes quadrispinosus acutus* Liu, 1941
27. *Pareumenes quadrispinosus quadrispinosus* (de Saussure, 1855)

15. Genus *Rhynchium* Spinola, 1806

28. *Rhynchium brunneum* (Fabricius, 1793)

16. Genus *Subancistrocerus* de Saussure, 1855

29. *Subancistrocerus sichelii* (de Saussure, 1856)

17. Genus *Tropidodynerus* Blüthgen, 1939

30. *Tropidodynerus (Tropidepipona) fraternus* (Bingham, 1897)

SUBFAMILY: POLISTINAE

TRIBE: POLISTINI

18. Genus *Polistes* Latreille, 1802

Subgenus *Gyrostoma* Kirby, 1828

31. *Polistes (Gyrostoma) olivaceus* (De Geer, 1773)
32. *Polistes (Gyrostoma) tenebricosus* Lepeletier, 1836
33. *Polistes (Gyrostoma) rothneyi carletoni* van der Vecht, 1968

Subgenus *Polistella* Ashmead, 1904

34. *Polistes (Polistella) dawnae* Dover and Rao, 1922
35. *Polistes (Polistella) nigratarsis* Cameron, 1900
36. *Polistes (Polistella) sagittarius* de Saussure, 1854
37. *Polistes (Polistella) adustus* Bingham, 1897 (**new record**)
38. *Polistes (Polistella) rubellus* Gusenleitner, 2006 (**new record**)

TRIBE: POLYBIINI

19. Genus *Parapolybia* de Saussure, 1853

39. *Parapolybia indica* (de Saussure, 1854)
40. *Parapolybia varia* (Fabricius, 1787)
41. *Parapolybia tinctipennis* (Cameron, 1900)

TRIBE: ROPALIDIINI

20. Genus *Ropalidia* Guérin-Méneville, 1831

42. *Ropalidia cyathiformis* (Fabricius, 1804)
43. *Ropalidia brevita* Das & Gupta, 1989

44. *Ropalidia fasciata* (Fabricius, 1804)
45. *Ropalidia jacobsoni* (du Buysson, 1908)
46. *Ropalidia ornaticeps* (Cameron, 1900)
47. *Ropalidia rufocollaris* (Cameron, 1900)
48. *Ropalidia santoshae* (Das and Gupta, 1989)
49. *Ropalidia scitula* (Bingham, 1897)
50. *Ropalidia stigma* (Smith, 1858)

SUBFAMILY: STENOGASTRINAE

21. Genus *Cochlischnogaster* Dong & Otsuka, 1997

51. *Cochlischnogaster dadugangensis* Dong and Otsuka, 1997

22. Genus *Eustenogaster* van der Vecht, 1969

52. *Eustenogaster scitula* (Bingham, 1897)

23. Genus *Parischnogaster* von Schulthess, 1914

53. *Parischnogaster mellyi* (de Saussure, 1852)

SUBFAMILY: VESPINAE

24. Genus *Provespa* Ashmead, 1903

54. *Provespa barthelemyi* (du Buysson, 1905)

25. Genus *Vespa* Linnaeus, 1758

55. *Vespa affinis* (Linnaeus, 1764)
56. *Vespa analis* Fabricius, 1775
57. *Vespa auraria* Smith, 1852
58. *Vespa basalis* Smith, 1852
59. *Vespa bicolor* Fabricius, 1787
60. *Vespa binghami* du Buysson, 1905
61. *Vespa fumida* van der Vecht, 1905
62. *Vespa mandarinia* Smith, 1852
63. *Vespa soror* du Buysson, 1905
64. *Vespa tropica* (Linnaeus, 1758)
65. *Vespa velutina* Lepeletier, 1836

26. Genus *Vespula* Thomson, 1896

66. *Vespula flaviceps* (Smith, 1870)
67. *Vespula orbata* (du Buysson, 1902)
68. *Vespula structor* (Smith, 1870)
69. *Vespula germanica* (Fabricius, 1793) (new record)

Acknowledgements

The authors sincerely thank the Director, Zoological Survey of India, Kolkata, for providing facilities and encouragements. The study was funded by MoEF & CC under National Mission for Himalayan Studies (NMHS) programme entitled “Biodiversity Assessment through long term monitoring plots in Indian Himalayan Landscape” (Ref. No. NMHS/LG-2016/0011). We wish to convey our gratitude to the Forest Department

of Arunachal Pradesh for providing necessary permissions for field surveys. Authors are thankful to Gaurab Nandi Das for his inputs for image processing.

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