



Research Article

Checklist of vespid wasps (Hymenoptera: Vespidae) of Arunachal Pradesh, India, with a new distribution record of *Vespula flaviceps* (Smith)

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ABSTRACT: The species *Vespula flaviceps* (Smith) belonging to subfamily Vespinae is a new record for the state Arunachal Pradesh. A total of 26 genera and 62 species of vespid wasps have been reported from the state. A distributional checklist along with brief diagnosis of *V. flaviceps* is provided.

KEY WORDS: Arunachal Pradesh, checklist, new record, Vespidae, *Vespula flaviceps*

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INTRODUCTION

The subfamily Vespinae is composed of four genera: *Dolichovespula* Rohwer, 1916, *Provespa* Ashmead, 1903, *Vespa* Linnaeus, 1758 and *Vespula* Thomson, 1869. Genus *Vespula* can be distinguished from the other Vespinae genera by the absence of pronotal carina and malar space shorter than the last antennal article. Members of genus *Vespula* are commonly called yellow jackets. They are eusocial in nature and build underground nests. A total of 25 species of the genus *Vespula* are recorded worldwide, of which 8 species are reported from India. In Arunachal Pradesh, two species of the genus *Vespula* (*V. orbata* and *V. structor*) are reported till date (Girish Kumar and Carpenter, 2018). A new record of *Vespula flaviceps* (Smith) for the state along with a distributional checklist is presented in this paper.

MATERIALS AND METHODS

The specimen was collected from the Lower Subansiri district (Fig. 1) of Arunachal Pradesh by placing yellow pan traps in the pine tree orchard. Identification was made using Carpenter and Nguyen (2003) and Girish Kumar and

Carpenter (2018). The distributional checklist was prepared consulting Carpenter and Kojima (1997), Das and Gupta (1984, 1989), Gawas and Gupta (2017), Gawas *et al.* (2019), Girish Kumar and Sharma (2012, 2013, 2014, 2015a, 2015b), Girish Kumar *et al.* (2013a, 2013b, 2013c, 2014a, 2014b, 2016a, 2016b, 2016c, 2017a, 2017b), Girish Kumar and Carpenter (2013, 2018), Girish Kumar and Mazumdar (2015), Girish Kumar and Srinivasan (2010), Girish Kumar and Sureshan (2018, 2019), Jonathan and Kundu (2003), Kojima *et al.* (2007), Kundu *et al.* (2006, 2010), Pannure *et al.* (2016), Rafi *et al.* (2017), and Srinivasan and Girish Kumar (2009, 2010, 2013).

The specimen examined for the study has been deposited in the ICAR-National Bureau of Agricultural Insect Resources (NBAIR) Bengaluru, India. The abbreviations for the type repositories are as follows:

ASIZB: Academia Sinica Institute of Zoology, Beijing, China.

NHM: Natural History Museum, London, United Kingdom.



Fig. 1. Species distribution map (red area denotes collection site of the new distribution record- *Vespa flaviceps* (Smith)).

KIZ: Kunming Institute of Zoology, Yunnan, China.

MHN: Museum d'Histoire Naturelle, Genève.

TARI: Taiwan Agricultural Research Institute, Wufeng, Taichung, Taiwan.

RESULTS AND DISCUSSION

Vespa flaviceps (Smith, 1870)

Vespa japonica de Saussure, 1858, *Rev Mag Zool.* 10(2): 261, female - "Japon" (MHN). Junior primary homonym of *Vespa japonica* Radoszkowski, 1857.

Vespa flaviceps Smith, 1870, in Horne and Smith, *Trans Zool Soc Lond.* 7(3): 174, 191, pl. XXI figs. 10, 11, female - "Binsur, Kumaon, North-west Provinces of India" (NHM).

"*Vespa Lewisii*, Sauss. Guêpes Soc. (MS.)" Smith, 1873, *Trans Ent Soc Lond.* 1873 (2): 198. Nomen nudum.

Vespa "lewisii, Sauss. MS." Cameron, 1903, *Entomologist* 36: 280, as a synonym of *Vespa japonica* de Saussure, 1858.

Vespa Saussurei Schulz, 1906, *Spolia Hym.*: 231. Replacement name for *Vespa japonica* de Saussure.

Vespa karenkona Sonan, 1929, *Trans Nat Hist Soc Formosa* 19(101): 137 (key), 148, female - "Karenkô, Taiwan" (TARI).

Vespa quadrimaculata Sonan, 1929, *Trans Nat Hist Soc*

Formosa 19 (101): 137(key), 148, female "Arisan, Taiwan" (TARI).

Vespa vulgaris var. *flavior* Stolfa, 1934, *Bull Soc Venez Stor Nat.* 1: 49, female - "India" (type depository unknown).

Vespa japonica pionganensis Giordani Soika, 1976, *Ann Hist- Nat Mus Natl Hung.* 68: 287, 290, female (in subgenus *Vespa*) - "Za-mo san, Korea" (NHM).

Vespa vulgaris var. *flavior*; Das and Gupta, 1984, *Orient Ins.* 17: 449. Incorrect spelling of *Vespa vulgaris* var. *flavior* Stolfa.

Vespa gracilia Lee, 1986, *Sinozool* 10 (4): 201, 203, 206, fig. 2 – female "Zhoushan, China" (ASIZB).

Vespa yulongensis Dong and Wang, 2002, *J S W Agric Univ.* 24: 392 – female "Yunnan China" (KIZ).

Brief diagnosis: Female: Head wider than high (Fig. 2A), with long black hairs. Antennae with 12 articles, closer to eyes than to each other. Clypeus wider than high, apically truncate. Mandibles with 3 teeth. Posterior ocelli closer to each other than to eyes. Occipital carina not extending to the base of mandible. Clypeus and frons with fine shallow punctures, distance between punctures wider than diameter of punctures. Mesosoma with long black hairs dorsally and pale hairs laterally. Mesoscutum, scutellum and metanotum with shallow fine punctures. Metasoma without punctures. T1 with long pale hairs. Rest of the metasoma with short pale hairs.

Colour: Body black with yellow markings (Figs 2B, C).

Clypeus, ocular sinus, gena, frons, and mandibles yellow. Vertex black. Antennae black with scape yellow ventrally. Pronotum black with posterior yellow band. Mesoscutum entirely black. Scutellum and metanotum black with anterior yellow band. Propodeum with a pair of yellow spots. Mesosoma black laterally except a yellow spot under wing base. Gaster black with apical yellow bands which are darker than mesosoma. Dorsal surface of T1 with a pair of orange horizontal short bands. Legs yellowish. Wings yellowish hyaline with brownish pterostigma.

Material examined: 1♀, INDIA: Arunachal Pradesh, Lower Subansiri district, Old Ziro, 27°35'42.69" N & 93°50'53.45" E, 31.i.2019, coll. Kenny Sora.

Distribution: INDIA: Arunachal Pradesh (new record), Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Punjab, Sikkim, Uttarakhand, and West Bengal. *Elsewhere:* Bhutan, China, Japan, Laos, Myanmar, Nepal, North Korea, Pakistan, Russia, South Korea, Taiwan, Thailand, Vietnam (Das and Gupta, 1984, 1989; Archer, 1989; Carpenter and Kojima, 1997; Jonathan and Kundu, 2003; Kundu *et al.*, 2010; Barthélémy *et al.*, 2014; Choi and Kwon, 2015; Dorji *et al.*, 2017; Rafi *et al.*, 2017; Girish Kumar and Carpenter, 2018).

Checklist of vespid wasps of Arunachal Pradesh

Subfamily: Eumeninae

Tribe: Eumenini

1. *Delta campaniforme campaniforme* (Fabricius, 1775)
2. *Delta conoideum* (Gmelin, 1790)
3. *Delta dimidiatipenne* (de Saussure, 1852)
4. *Delta esuriens* (Fabricius, 1787)
5. *Delta pyriforme pyriforme* (Fabricius, 1775)
6. *Eumenes architectus* Smith, 1859
7. *Eumenes assamensis* Meade-Waldo, 1910
8. *Eumenes atrophicus* (Fabricius, 1798)
9. *Eumenes punctatus* de Saussure, 1852
10. *Phimenes flavopictus* (Blanchard, 1845)

Tribe: Odynerini

11. *Allorhynchium argentatum* (Fabricius, 1804)
12. *Antepipona biguttata* (Fabricius, 1787)
13. *Antepipona bipustulata* (de Saussure, 1855)
14. *Anterhynchium (Dirhynchium) flavolineatum* (Smith, 1857)
15. *Antodynerus limbatus* (de Saussure, 1852)
16. *Apodynerus formosensis indicus* Giordani Soika, 1994



A



B



C

Fig 2. *Vespula flaviceps*: A. Head in frontal view; B. Female in habitus, dorsal view; C. Female in habitus, lateral view

17. *Apodynerus troglodytes troglodytes* (de Saussure, 1856)
18. *Labus humberianus* de Saussure, 1867
19. *Orancistrocerus aterrimus khasianus* (Cameron, 1900)
20. *Paraleptomenes darugiriensis* Girish Kumar *et al.*,

2014

21. *Paraleptomenes rufoniger* Giordani Soika, 1994
22. *Parancistrocerus holzschuhi* Gutsenlechner, 1987
23. *Pararrhynchium venkataramani* Girish Kumar and Carpenter, 2017
24. *Pareumenes quadrispinosus acutus* Liu, 1941
25. *Pareumenes quadrispinosus quadrispinosus* (de Saussure, 1855)
26. *Rhynchium brunneum brunneum* (Fabricius, 1793)
27. *Subancistrocerus sichelii* (de Saussure, 1856)
28. *Tropidodynerus (Tropidepipona) fraternus* (Bingham, 1897)

Subfamily: Polistinae

Tribe: Polistini

29. *Polistes (Gyrostoma) olivaceus* (De Geer, 1773)
30. *Polistes (Gyrostoma) tenebricosus* Lepeletier, 1836
31. *Polistes (Polistella) dawnae* Dover and Rao, 1922
32. *Polistes (Polistella) nigritarsis* Cameron, 1900
33. *Polistes (Polistella) sagittarius* de Saussure, 1854

Tribe: Polybiini

34. *Parapolybia indica* (de Saussure, 1854)
35. *Parapolybia varia* (Fabricius, 1787)
36. *Parapolybia tinctipennis* (Cameron, 1900)

Tribe: Ropalidiini

37. *Ropalidia cyathiformis* (Fabricius, 1804)
38. *Ropalidia fasciata* (Fabricius, 1804)
39. *Ropalidia jacobsoni* (du Buysson, 1908)
40. *Ropalidia ornateiceps* (Cameron, 1900)
41. *Ropalidia rufocollaris* (Cameron, 1900)
42. *Ropalidia santoshae* (Das and Gupta, 1989)
43. *Ropalidia scitula* (Bingham, 1897)
44. *Ropalidia stigma* (Smith, 1858)

Subfamily: Stenogastrinae

45. *Cochlischnogaster dadugangensis* Dong and Otsuka, 1997
46. *Eustenogaster scitula* (Bingham, 1897)
47. *Parischnogaster mellyi* (de Saussure, 1852)

Subfamily: Vespinae

48. *Provespa barthelemyi* (du Buysson, 1905)
49. *Vespa affinis* (Linnaeus, 1764)
50. *Vespa analis* Fabricius, 1775
51. *Vespa auraria* Smith, 1852

52. *Vespa basalis* Smith, 1852
53. *Vespa bicolor* Fabricius, 1787
54. *Vespa binghami* du Buysson, 1905
55. *Vespa fumida* van der Vecht, 1905
56. *Vespa mandarinia* Smith, 1852
57. *Vespa soror* du Buysson, 1905
58. *Vespa tropica* (Linnaeus, 1758)
59. *Vespa velutina* Lepeletier, 1836
60. *Vespula flaviceps* (Smith, 1870)
61. *Vespula orbata* (du Buysson, 1902)
62. *Vespula structor* (Smith, 1870)

This study resulted in a new record of *Vespula flaviceps* (Smith) from the state of Arunachal Pradesh. This species has already been reported from the neighboring northeastern states viz., Assam, Manipur, Meghalaya and Sikkim. Currently the vespid fauna of Arunachal Pradesh is represented with 62 species belonging to 26 genera. Among the four subfamilies of Vespidae present in Arunachal Pradesh, the subfamily Eumeninae shows highest diversity with 28 species belonging to 16 genera, followed by the subfamily Polistinae with 3 genera and 16 species, subfamily Vespinae with 3 genera and 15 species and Stenogastrinae with 3 genera and 3 species, respectively.

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REFERENCES

- Archer ME. 1989. A key to the world species of the Vespinae (Hymenoptera). *Res Monographs College Ripon York St John* **2**: 1-41.
- Barthélémy C, Lee JX, Kojima, JI. 2014. Provisional distributional checklist of Hong Kong social wasps (Hymenoptera: Vespidae: Vespinae, Polistinae, Stenogastrinae). *Hong Kong Entomol Bull.* **6**(1): 3-14.
- Bequaert J. 1931. A tentative synopsis of the hornets and yellow-jackets (Vespidae; Hymenoptera) of America. *Entomol Am.* **12**: 71-138.
- Cameron P. 1903. Descriptions of four species of *Vespa* from Japan. *Entomologist.* **36**: 278-281.

- Carpenter JM, Kojima JI. 1997. Checklist of the species in the subfamily Vespinae (Insecta: Hymenoptera: Vespidae). *Nat Hist Bull Ibaraki Univ.* **1**: 51-92.
- Carpenter JM, Nguyen LPT. 2003. Keys to the genera of social wasps of South-East Asia (Hymenoptera: Vespidae). *Entomol Sci.* **6**(3): 183-192. <https://doi.org/10.1046/j.1343-8786.2003.00016.x>
- Choi MB, Kwon O. 2015. Occurrence of Hymenoptera (wasps and bees) and their foraging in the southwestern part of Jirisan National Park, South Korea. *J Ecol Environ.* **38**(3): 367-374. <https://doi.org/10.5141/ecoenv.2015.038>
- Das BP, Gupta VK. 1984. A catalogue of the families Stenogastridae and Vespidae from the Indian Subregion (Hymenoptera: Vespoidea). *Orient Insects* **17**(1): 395-464. <https://doi.org/10.1080/00305316.1983.10433698>
- Das BP, Gupta VK. 1989. The social wasps of India and the adjacent countries. *Orient Insects Monograph* **11**: 1-292. <https://doi.org/10.1080/00305316.1989.11835532>
- de Saussure H. 1858. Note sur la famille des Vespides. *Revue Mag Zool.* **2**(10): 259-261.
- Dong DZ, Wang YZ, He YH, Wang RW. 2002. A new species of *Vespula* (Hymenoptera: Vespidae) from Yunnan China. *J Southwestern Agric Univ.* **24**(5): 396-397.
- Dorji P, Klein W, Nidup T. 2017. Taxonomic study of social vespid wasps (Hymenoptera: Vespidae: Vespinae & Polistinae) in Bhutan. *J Insect Biodivers Syst.* **3**(2): 91-104.
- Gawas SM, Gupta A. 2017. First record of *Polistes* (*Polistella*) *dawnae* Dover and Rao (Hymenoptera: Vespidae) from India. *J Biol Control* **31**(2): 79-81. <https://doi.org/10.18311/jbc/2017/15914>
- Gawas SM, Girish Kumar P, Gupta A, Sureshan PM. 2019. Checklist of vespid wasps (Hymenoptera: Vespidae) of Goa, India, with new records and a key to species. *Zootaxa* **4585**(2): 269-294. <http://dx.doi.org/10.11646/zootaxa.4585.2.3>
- Giordani Soika A. 1976. Vespidi ed Eumenidi raccolti in Corea (Hymenoptera). *Annales d'Histoire Nationale de Hungary* **68**: 287-293.
- Girish Kumar P, Carpenter JM. 2013. A taxonomic review of the genus *Antodynerus* de Saussure, 1855 (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent. *Zootaxa* **3731**(2): 267-278. <https://doi.org/10.11646/zootaxa.3731.2.7>
- Girish Kumar P, Carpenter JM. 2018. A taxonomic review of the genus *Vespula* Thomson (Hymenoptera: Vespidae: Vespinae) from the Indian subcontinent. *Halteres* **9**: 86-110. <http://doi.org/10.5281/zenodo.1258043>
- Girish Kumar P, Mazumdar PC. 2015. New distributional record of *Delta conoideum* (Gmelin, 1790) (Hymenoptera: Vespidae: Eumeninae) from India. *Devagiri J Sci.* **1**(1): 01-05.
- Girish Kumar P, Sharma G. 2012. A review of the little known Genus *Orancistrocerus* van der Vecht (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent. *Hexapoda* **19**(2): 14-22.
- Girish Kumar P, Sharma G. 2013. A taxonomic study on the genus *Rhynchium* Spinola (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent. *Rec Zool Surv India* **113**(2): 105-122.
- Girish Kumar P, Sharma G. 2014. Taxonomic studies on vespid wasps (Hymenoptera: Vespoidea: Vespidae) of Sunderbans Biosphere Reserve, West Bengal, India Part 1. *Rec Zool Surv India* **114**: 563-580.
- Girish Kumar P, Sharma G. 2015a. A review of the genus *Allorhynchium* van der Vecht, 1963 (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent. *Prommalia.* **3**: 20-34.
- Girish Kumar P, Sharma G. 2015b. Taxonomic studies on Vespid Wasps (Hymenoptera: Vespoidea: Vespidae) of Chhattisgarh, India. *JJoTT* **7**(14): 8096-8127. <https://doi.org/10.11609/jott.2426.7.14.8096-8127>
- Girish Kumar P, Srinivasan G. 2010. Taxonomic studies of hornet wasps (Hymenoptera: Vespidae) *Vespa* Linnaeus of India. *Rec Zool Surv India* **110**: 7-80.
- Girish Kumar P, Sureshan PM. 2018. A taxonomic review on the genus *Pareumenes* de Saussure (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent. pp. 233-245. In: Kaul BL (Ed.). *Advances in Fish and Wildlife Ecology and Biology*. Published by Astral International Pvt. Ltd., New Delhi.
- Girish Kumar P, Sureshan PM. 2019. Insecta: Hymenoptera: Aculeata. *Zoological Survey of India, Fauna of Namdapha Tiger Reserve, Arunachal Pradesh, Conservation Area Series.* **65**: 165-202.

- Girish Kumar P. 2010. Taxonomic studies of hornet wasps (Hymenoptera: Vespidae) *Vespa* Linnaeus of India. *Rec Zool Surv India* **110**: 57-80.
- Girish Kumar P. 2013a. A revision of the genus *Subancistrocerus* de Saussure (Hymenoptera: Vespidae: Eumeninae) from Indian subcontinent. pp. 53-68. In: Gupta VK. and Verma AK (Eds.). *Animal Diversity, Natural History and Conservation*. Vol. 2. Daya Publishing House, New Delhi.
- Girish Kumar P. 2013b. A taxonomic revision of *Phimenes* Giordani Soika (Hymenoptera: Vespidae: Eumeninae) of Indian subcontinent. *Rec Zool Surv India* **113**(3): 119-135.
- Girish Kumar P. 2013c. A taxonomic study on the genus *Anterhynchium* de Saussure (Hymenoptera: Vespidae: Eumeninae) from Indian subcontinent. *Rec Zool Surv India* **113**(4): 139-158.
- Girish Kumar P, Carpenter JM, Sharma G. 2014a. A review of the genus *Paraleptomenes* Giordani Soika, 1970 (Hymenoptera: Vespidae: Eumeninae: Odynerini) from the Indian subcontinent, with the description of a new species from the eastern Himalayas. *Zootaxa* **3802**(1): 131-143. <https://doi.org/10.11646/zootaxa.3802.1.11>
- Girish Kumar P, Carpenter JM, Sureshan PM. 2016a. Additions to the knowledge of the genus *Allorhynchium* van der Vecht from the Indian subcontinent with the description of a new species from Kerala (Hymenoptera: Vespidae: Eumeninae). *Halteres* **7**: 29-34. <http://doi.org/10.5281/zenodo.54869>
- Girish Kumar P, Carpenter JM, Sureshan PM. 2016b. A taxonomic review of the genus *Antepipona* de Saussure, 1855 (Hymenoptera: Vespidae: Eumeninae) from India. *Zootaxa* **4150**(5): 501-536. <https://doi.org/10.11646/zootaxa.4150.5.1>
- Girish Kumar P, Carpenter JM, Sureshan PM. 2016c. A taxonomic review of the genus *Parancistrocerus* Bequaert (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent with the description of three new species. *Halteres* **7**: 136-156. [10.5281/zenodo.192283](https://doi.org/10.5281/zenodo.192283)
- Girish Kumar P, Carpenter JM, Castro L, Sureshan PM. 2017b. A taxonomic review of the Indian species of the genus *Eumenes* Latreille (Hymenoptera: Vespidae: Eumeninae). *Zootaxa* **4317**(3): 469-498. <https://doi.org/10.11646/zootaxa.4317.3.3>
- Girish Kumar P, Carpenter JM, Kishore L, Shareef KM. 2014b. Additional notes on the genus *Apodynerus* Giordani Soika, 1993 (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent. *Halteres* **5**: 46-50.
- Girish Kumar P, Shareef KM, Kishore L, Carpenter JM. 2013a. A taxonomic study on the Oriental genus *Apodynerus* Giordani Soika (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent. *Biosystematica* **7**(1): 23-31.
- Girish Kumar P, Shareef KM, Kishore L, Carpenter JM. 2013b. A taxonomic review of the Oriental genus *Labus* de Saussure, 1867 (Hymenoptera: Vespidae: Eumeninae) from the Indian subcontinent. *Biosystematica* **7**(2): 29-37.
- Girish Kumar P, Srinivasan G, Carpenter JM. 2013c. A taxonomic study on the genus *Tropidodynerus* Blüthgen (Hymenoptera: Vespidae: Eumeninae) from the Indian sub-continent. *Prommalia* **1**(1): 162-174.
- Girish Kumar P, Sureshan PM, Manju P. 2017a. Additions to the knowledge on the paper wasp genus *Ropalidia* Guérin- Méneville (Hymenoptera: Vespidae: Polistinae: Ropalidini) from India. *Spare Nature* 6-17.
- Jonathan JK, Kundu BG. 2003. Insecta: Hymenoptera: Vespidae. *Zool Surv India* (State Fauna Series 9, Fauna of Sikkim) (Part-4). 369-392.
- Kojima JI, Kishore L, Nguyen LTP, Saito F. 2007. Taxonomic notes on the paper wasps of the genus *Ropalidia* in the Indian subcontinent (Hymenoptera: Vespidae). *Entomol Sci.* **10**(4):373-393. <https://doi.org/10.1111/j.1479-8298.2007.00237.x>
- Kundu BG, Ghosh SN, Roychowdhury S. 2006. Insecta: Hymenoptera: Aculeata (Vespidae and Apidae). *Zool Surv India* (State Fauna Series, Fauna of Arunachal Pradesh) **13**(2): 427-448.
- Kundu BG, Girish Kumar P, Kazmi SI, Roychowdhury S. 2010. Insecta: Hymenoptera: Aculeata (Vespidae and Apidae). *Zool Surv India* (Fauna of Uttarakhand, State Fauna Series) **18**(2): 725-748.
- Pannure A, Belavadi VV, Carpenter JM. 2016. Taxonomic studies on potter wasps (Hymenoptera: Vespidae: Eumeninae) of south India. *Zootaxal* **4171**(1): 1-50. <http://dx.doi.org/10.11646/zootaxa.4171.1.1>
- Rafi MA, Carpenter JM, Qasim M, Shehzad A, Zia A, Khan MR, Mastoi MI, Naz F, Ilyas M, Shah M, Bhatti AR. 2017. The vespidae fauna of Pakistan. *Zootaxa* **4362**(1): 1-28. <https://doi.org/10.11646/zootaxa.4362.1.1>

- Schulz WA. 1906. *Spolia Hymenopterologica*. Insel Creta. 355pp. Paderborn. <https://doi.org/10.5962/bhl.title.59757>
- Smith F. 1870. Descriptions of some new species of Apidae and Vespidae collected by Mr. Horne. *Trans Zool Soc London* **7**: 186-196.
- Smith F. 1873. Descriptions of Aculeate Hymenoptera of Japan, collected by Mr. George Lewisat Nagasaki and Hiogo. *Trans Royal Entomol Soc London*. **21**(2): 181-206. <https://doi.org/10.1111/j.1365-2311.1873.tb00641.x>
- Sonan J. 1929. On *Vespa* from Formosa. *Trans Nat Hist Soc Formosa* **19**: 136-149
- Srinivasan G, Girish Kumar P. 2009. Taxonomic studies of the Hover Wasps (Hymenoptera: Vespidae; Stenogastrinae) of Arunachal Pradesh, India. *Rec Zool Surv India* **109**(3): 37-40
- Srinivasan G, Girish Kumar P. 2010. New records of potter wasps (Hymenoptera: Vespidae: Eumeninae) from Arunachal Pradesh, India: five genera and ten species. *JoTT* 1323-1324. <https://doi.org/10.11609/JoTT.o2468.1313-22>
- Srinivasan G, Girish Kumar P. 2013. A study on Vespidae wasps (Insecta: Hymenoptera: Vespidae) of Itanagar Wildlife Sanctuary, Arunachal Pradesh. *Rec Zool Surv India* **113**(1): 115-127.
- Stolfa DE. 1934. Due nuovi Vespidi Indiani. *Bollettino del Museo civico di Storia Naturale di Venezia* **1**: 47-49.
- Tie-sheng, L. 1986. Notes on the genus *Vespula* from China (Hymenoptera, Vespidae). *Sinozoologia* **4**: 201-206.