



# A Preliminary Study on the VESPIDAE WASPS (INSECTA: HYMENOPTERA) of Wildlife Institute of India Campus, Dehradun

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## Abstract

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The present paper deals with the diversity of wasps belong to the family Vespidae from Wildlife Institute of India campus, Dehradun. We reports here 10 species of wasps under 7 genera in 3 subfamilies for the first time from WII campus.

**Key words:** *Vespidae*,  
*Hymenoptera*, *WII Campus*,  
*Dehradun*

## 1. Introduction

The Wildlife Institute of India (WII) campus at Dehradun located in the Doon Valley at Garhwal region on the foothills of northern Himalaya which harbours rich floral and faunal diversity. The vegetation is natural and semi-natural consists of scrub, woodland and forest including stream bank vegetation and grassy banks.

There is no study of the wasps (Insecta: Hymenoptera) fauna of WII campus. In this paper, we are reporting 10 species of wasps belongs to the family Vespidae under 7 genera in 3 subfamilies.

## 2. Materials & Methods

The specimens studied here are added to the "National Zoological

Collections" of the Western Ghats Regional Centre, Zoological Survey of India, Kozhikode (ZSIK).

The following abbreviations used in the text for the Museums: BMNH – The Natural History Museum, London SW7 5BD, England; HDEO – Hope Department of Entomology, University Museum, Oxford, England; MCZ – Museum of Comparative Zoology, Harvard University, Cambridge, U.S.A.; NR – Naturhistoriska Riksmuseet, Stockholm; NZC – National Zoological Collections, Zoological survey of India, Kolkata, India; ZMUC – Zoological Museum of the University of Copenhagen, Denmark.

Abbreviations used for the terms: H = Head; M = Mesosoma; S =

Metasomal sterna; T = Metasomal terga.

### 3. Results & Discussion

#### Systematic List

Family VESPIDAE

Subfamily POLISTINAE

Tribe **Polistini**

Genus *Polistes* Latreille

Subgenus *Polistes* (*Gyrostoma*)

Kirby

1. *Polistes* (*Gyrostoma*) *olivaceus* (De Geer, 1773)

Tribe **Ropalidiini**

Genus *Ropalidia* Guérin-Méneville

2. *Ropalidia brevita* Das & Gupta, 1989.
3. *Ropalidia stigma* (Smith, 1858).
4. *Ropalidia variegata* (Smith, 1852)

Tribe **Polybiini**

Genus *Parapolybia* de Saussure

5. *Parapolybia varia varia* (Fabricius, 1787)

Subfamily VESPINAE

Genus *Vespa* Linnaeus

6. *Vespa auraria* Smith, 1852.
7. *Vespa tropica haematodes* Bequaert, 1936

Subfamily EUMENINAE

Genus *Allorhynchium* van der Vecht

8. *Allorhynchium argentatum* (Fabricius, 1804)

Genus *Anterhynchium* de Saussure

9. *Anterhynchium* (*Dirhynchium*) *flavomarginatum flavomarginatum* (Smith, 1852)

Genus *Antodynerus* de Saussure

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

#### Systematic Account

#### 1. *Polistes* (*Gyrostoma*) *olivaceus* (De Geer, 1773)

*Vespa olivacea* De Geer, 1773: 582.

Type and sex not mentioned, America (NR).

*Polistes* (*Gyrostoma*) *olivaceus*; Carpenter, 1996: 5.

*Diagnostic characters:* Occipital carina in female incomplete; ventral metapleuron almost impunctate; mesepisternum with distinct epicnemial carina and well developed dorsal episternal groove.

*Colour description:* Body yellow with variable black markings and few reddish markings. Black markings: basal and apical margin of clypeus narrowly, mandibular teeth, short line on raised part of interantennal space, mark above each antennal socket, band on vertex, occiput, line on antennal scape and flagellum above, in front of pronotal carina, mark on pronotum ventrally towards propleuron, mesoscutum (except a longer median and two shorter lateral yellow lines), almost all the thoracic sutures, line along the median groove of propodeum, T1 narrowly at base (sometimes absent), gastral tergites and sternites with bisinuate marks, line below coxae, another line on hind tibiae above. Reddish markings: pronotum partly dorsally, two curved lines on propodeum on sides, T2 at base and legs partly.

*Body length* (H+M+T1+T2): Female, 13-20 mm.

*Material examined:* ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV.9824-



9828, 5♀, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution:* India: Andhra Pradesh, Arunachal Pradesh, Assam, Chhattisgarh, Gujarat, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Manipur, Meghalaya, Nagaland, Odisha, Rajasthan, Sikkim, Tripura, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere:* Afghanistan, Amirantes, Australia, Bangladesh, Cambodia, Chagos Archipelago, Chile (introduced), China, Egypt, Fiji, Indonesia, Iran, Japan (?), Laos, Madagascar, Malaysia, Marianas, Marquesas, Mauritius, Myanmar, Nepal, New Caledonia, New Zealand, Oman, Pakistan, Philippines, Reunion, Samoa, Seychelles, Singapore, Society Is., Sri Lanka, Tanzania, Thailand, Tongas, Tuamotu Archipelago, U.S.A., Vietnam.

## 2. *Ropalidia brevita* Das & Gupta, 1989

*Ropalidia (Anthreneida) brevita* Das & Gupta, 1989: 121. Holotype, male, Delhi (NZC).

*Ropalidia brevita*; Kojima *et al.*, 2007: 380.

*Diagnostic characters:* T1 proportionally wider with its maximum width in dorsal view nearly half as wide as that of T2; propodeum with paired, longitudinal basal carinae, with weak transverse striation and scattered shallow punctures between

basal carinae; striations lateral to carinae weak; propodeal orifice very narrow.

*Colour description:* Body red with the following yellow portions: clypeus, mandible (except a small black spot at base), supraclypeal area, interantennal space, inner orbit below ocular sinus, line below antennal socket, two faint marks on metanotum, two enlarged marks on apical half of propodeum, epicnemium, sides of mesosternum, fore and middle coxae in front, line on lateral side of hind coxa, fore metatarsus, basal four tarsal segments of middle leg, apical two thirds of middle metatarsus, second to fourth tarsal segments of hind leg, narrow and broad apical band on T1 and T2. In some portions black patches mixed with reddish body. The extent of yellow and black markings highly variable.

*Body length* (H+M+T1+T2): Female, 12 mm.

*Material examined:* ZSIK Regd. No. ZSI/WGRC/I.R.-INV.9829, 1♀, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution:* India: Assam, Chhattisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Odisha, Rajasthan, Sikkim, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere:* Pakistan.

### 3. *Ropalidia stigma* (Smith, 1858)

*Polybia stigma* Smith, 1858: 114, M. Type: Male, Malaysia: Sarawak (HDEO).

*Ropalidia stigma*; Kojima *et al.*, 2007: 384.

*Diagnostic characters:* Ventral metapleuron smooth without punctures; antenna thicker; first flagellomere nearly threefold as long as its apical width; second as long as wide; terminal slightly longer than its basal width.

*Colour description:* Body red with predominant yellow and some black markings. Yellow markings: Clypeus except a characteristic dark brown mark at middle extends up to base, mandible except reddish brown teeth, mark on inter antennal space, inner orbit below ocular sinus, broad line on temple, line on ventral side of scape, basal margin of pronotum narrowly, two large marks on scutellum, metanotum almost entirely, mesopleuron with a spot, two broad marks confluent almost entirely except at apex of middle of propodeum, sides of propodeum broadly, coxa almost entirely, broad line below fore femur, another narrow line below and a mark at the apex of middle femur, mark at apex and line on basal half of gastral petiole on each side, T2 and S2 narrowly at apex, and both tergite and sternite with large mark on each side at base. Black markings: Basal margin of clypeus narrowly, mark on vertex enclosing the ocelli, occiput, pronotum narrowly at base,

mesoscutum margined narrowly and broadly at apex, mesosomal sutures, metapleuron, mesosternum partly, propodeum (except for the yellow mark) and about half of gastral petiole at base.

*Body length* (H+M+T1+T2): 7.5-8.5 mm.

*Material examined:* ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV. 9830 & 9831, 2♀, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution:* India: Arunachal Pradesh, Assam, Chhattisgarh, Goa, Himachal Pradesh, Jharkhand, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura, Uttarakhand, West Bengal. *Elsewhere:* Nepal, Sri Lanka, Thailand, Vietnam, Malay Peninsula, Myanmar, Indonesia, China, Philippines.

### 4. *Ropalidia variegata* (Smith, 1852)

*Epipona variegata* Smith, 1852: 48, F, des. Type: Female, India: Poona (BMNH).

*Ropalidia variegata*; Kojima *et al.*, 2007: 387.

*Diagnostic characters:* Median line of median groove of propodeum indistinct, groove wider in the middle; median furrow of propodeum indistinct; T1 in lateral view with dorsal margin more or less evenly convex, highest at level of posterior margin of the sternum.



*Colour description:* Body reddish brown with predominant yellow markings. Yellow markings: mandible except for dark brown teeth, clypeus except reddish brown mark at base, supraclypeal area, inter antennal space, broad line along inner orbit up to ocular sinus, broad line on temple, ventral side of antenna, interrupted line on vertex behind the ocelli, spot in between median and lateral ocelli, line along pronotal carina, apical and basal margin of scutellum broadly, metanotum, mark on mesopleuron, two broad irregular marks on propodeum separated by reddish brown or blackish brown line, inner side of tegula, fore and middle coxae in front and greater part of hind coxa, line on fore and middle femur below and small mark on hind femur on sides, line on all tibiae above, two large spots at base of T2, broad apical fascia on T2 and comparatively small apical fascia on S2. Tarsi reddish brown with yellowish tinge. Wings transparent hyaline with stigma reddish brown and apical half of radial cell dark reddish brown.

*Body length* (H+M+T1+T2): 6.5 mm.

*Material examined:* ZSIK Regd. No. ZSI/WGRC/I.R.-INV. 9832, 1♀, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution:* India: Andhra Pradesh, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Jammu &

Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere:* Nepal, Pakistan, Malay Peninsula, Myanmar, Indonesia: Sulawesi, China.

##### 5. *Parapolybia varia varia* (Fabricius, 1787)

*Vespa varia* Fabricius, 1787: 293, des. Type: China (ZMUC).

*Parapolybia varia varia*; Kojima & Carpenter, 1997: 64, syns., distr.

*Diagnostic characters:* Median groove of propodeum shallow; T2 with yellow mark at base; petiole shorter than head width; occipital carina incomplete; interocular distance at clypeus about as long as or shorter than at vertex level.

*Colour description:* Reddish brown. Yellow markings: clypeus (except broad reddish brown mark in middle), mandible (except brown teeth), interantennal space, inner orbit up to ocular sinus, line on scape below, temple almost entirely, basal and apical margin of pronotum narrowly, mesoscutum with two narrow lines in middle, narrow line encircling scutellum and metanotum, propleuron partly, mesopleuron (except variable reddish brown marks), dorsal metapleuron almost entirely, mark of variable shape on ventral metapleuron, propodeum with two oval large marks and sides almost entirely, fore coxa in front, middle

and hind coxa almost entirely in front, broad line below femora, a mark on tibiae apically, two marks at apex of petiole, T2-T6 & S2-S6 with broad mark on each side. Wings yellowish hyaline.

*Body length* (H+M+T1+T2): 9-10 mm.

*Material examined*: ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV. 9833 & 9834, 2♀, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution*: India: Arunachal Pradesh, Assam, Delhi, Himachal Pradesh, Manipur, Meghalaya, Punjab, Sikkim, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere*: Nepal, Myanmar, Philippines, Malaysia, China, Japan, Indonesia.

#### 6. *Vespa auraria* Smith, 1852

*Vespa auraria* Smith, 1852: 46. "Northern India" (BMNH, HDEO?).

*Vespa auraria*; Bingham, 1897: 407, F, W, des.

*Diagnostic characters*: Clypeus moderately convex, its apical third depressed and punctate, apical margin emarginate, with distinct lateral lobes; temple less than 1.8x as wide as eye; posterior ocelli less than 3x farther from occiput than from eye; interocular distance shorter than ocellocular distance.

*Colour description*: Body black. Reddish brown markings: head, pronotal collar posteriorly, pronotum, tegula, scutellum, two lateral spots on metanotum,

propleuron ventrally and usually a triangular mark on mesopleuron. Antenna reddish or blackish brown. Mandible concolorous with clypeus except at apex including teeth black. Mesoscutum dark brown with a U-shaped mark touching scutellum, with golden brown glistering pubescence. Fore leg yellowish brown except inner basal corner of coxa, trochanter and basally in front of femur black. Mid and hind legs black except at apex of femur, apex of tibia and tarsi entirely reddish brown or yellowish brown. Bases of T1 and T2 brownish black or black, their margins and the visible part of the following segments usually yellowish brown. Base of S2 brownish black or black, their margins and visible part of the following sternites usually yellowish brown. Wings brownish hyaline. Head, thorax and gaster covered with fine blackish erect hairs. Gaster with a velvet appearance.

*Body length* (H+M+T1+T2): Fertile female, 15-16 mm.

*Material examined*: ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV. 9836-9839, 4♀, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution*: India: Arunachal Pradesh, Assam, Chhattisgarh, Jammu & Kashmir, Jharkhand, Himachal Pradesh, Madhya Pradesh, Meghalaya, Mizoram, Nagaland, Punjab, Sikkim, Tripura, Uttarakhand, Uttar Pradesh, West



Bengal. *Elsewhere*: Afghanistan, China, Laos, Malaysia, Myanmar, Nepal, Pakistan, Thailand and Yemen.

**7. *Vespa tropica haematodes* Bequaert, 1936**

*Vespa tropica* var. *haematodes* Bequaert, 1936: 336, 338. Holotype: Female, India: "Kooloo" (MCZ).

*Diagnostic characters*: Sterile female: Body rather large and thick, covered with strong and stiff hairs; clypeus coarsely punctate, apical margin hairy; apical margin of clypeus with a broad emargination, its apico-lateral angle triangular; lower vertical area of pronotum with strong transverse ridges near pronotal pit.

*Colour description*: Head and antenna reddish brown; pronotum dorsally and scutellum reddish brown; mesoscutum anteriorly with two short reddish brown lines; legs partly reddish brown; gaster blackish brown to black except T2 yellow with a slight brown area basally and S2 yellow with a large brown area basally.

*Body length* (H+M+T1+T2): 20.5 mm.

*Material examined*: ZSIK Regd. No. ZSI/WGRC/I.R.-INV. 9835, 1♀, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution*: India: Bihar, Chhattisgarh, Haryana, Himachal Pradesh, Karnataka, Kerala, Odisha, Pondicherry, Sikkim, Tamil Nadu, Tripura, Uttarakhand, West Bengal.

*Elsewhere*: Bhutan; China; Myanmar; Nepal; Pakistan; Sri Lanka; Vietnam.

**8. *Allorhynchium argentatum* (Fabricius, 1804)**

*Vespa argentata* Fabricius, 1804: 260. Type: male, "Sumatra" (ZMUC).

*Allorhynchium argentatum*; van der Vecht, 1963: 60 (list), fig. 5a.

*Diagnostic characters*: Male: Clypeus pyriform, the apex truncate and emarginate; last antennal article hooked apically and almost reaching apex of tenth antennal segment in curved position; T1 and T2 with medium size, closely arranged and moderately dense punctures, interspaces in average equal to punctures, of almost uniform density and thickness except at lateral and apical portions strongly punctured; S7 with distinctly uplifted basal area.

*Colour description*: Body entirely black except clypeus almost entirely yellow, a yellow line in between antennal toruli and inner eye margin; tarsal claws blackish brown; wings dark with purple reflections.

*Body length* (H+M+T1+T2): Male, 16 mm.

*Material examined*: ZSIK Regd. No. ZSI/WGRC/I.R.-INV. 9840, 1♂, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution*: India: Andaman & Nicobar Islands, Arunachal Pradesh, Assam, Chhattisgarh, Himachal Pradesh, Karnataka, Kerala, Meghalaya, Mizoram, Sikkim, Tamil Nadu, Tripura, Uttarakhand, Uttar Pradesh, West Bengal. *Elsewhere*:

Indonesia (Sumatra, Java, Bali, Borneo, Sulawesi); Laos; Malaysia; Nepal, Pakistan; Philippines, Singapore; Thailand.

**9. *Anterhynchium (Dirhynchium) flavomarginatum flavomarginatum* (Smith, 1852)**

*Rhynchium flavo-marginatum* Smith, 1852: 35, male, China (BMNH).

*Anterhynchium flavomarginatum flavomarginatum*; van der Vecht, 1963: 78 (key), 80, figs. 5f, 6b (in subgenus *Dirhynchium*; China; Sikkim).

*Diagnostic characters*: Narrow basal part of S1 transversely striates; triangular area at base of propodeum much longer than wide, bordered on each side by deep groove; declivity of propodeum bordered dorsally by somewhat strong irregular carina, which forms a tooth at the lateral end.

*Colour description*: Body black with some yellow to yellowish white and markings. Yellow to yellowish white: mark at interantennal space, line on front of scape, two marks on pronotum, small spot on each side of dorsal lateral side of propodeum, narrow interrupted subapical line on posterior margins of T1 and T2. Brown: tarsal claws. Wings infumated, iridescent in certain lights.

*Body length* (H+M+T1+T2): Female, 12.5 mm.

*Material examined*: ZSIK Regd. No. ZSI/WGRC/I.R.-INV. 9841, 1♀, 10-13.viii.2017, WII Campus,

Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Distribution*: India: Assam, Delhi, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Meghalaya, Sikkim, Tamil Nadu, Uttarakhand, West Bengal. *Elsewhere*: Pakistan; Nepal; Myanmar; Borneo; Laos; Vietnam; China; Mongolia; Korea; Japan.

**10. *Antodynerus limbatus* (de Saussure)**

*Rhynchium limbatum* de Saussure, 1852: 117, female, pl. 13 fig. 10, "L'Amérique?" (coll. de Romand).

*Antodynerus limbatus*; Gusenleitner, 1987: 267 (Nepal).

*Diagnostic characters*: Clypeus with moderately deep punctures on middle; frons, ocular sinus, vertex and temple strongly punctured; area inside ocellar triangle smooth; median area of propodeum strongly concave, with a broadly elongate fovea from which median carina runs to orifice with few strong transverse striations posteriorly; postero-lateral margin almost entirely rounded with a strong transversely carinate projection, below that with strong transverse striations.

*Colour description*: Body brownish red with yellow to brownish yellow and black markings. Usually these colours inter mixed in many areas. Yellow to brownish yellow: mandible except at lateral and apical margins brown, basal and lateral sides of clypeus (rarely entirely yellow), inner and





outer eye margins, lower sides of temple and occiput, ventral side of scape, tegula, parategula, sometimes a spot on mesopleuron below tegula, apex of T1 to T5 and S2 to S5 (sometimes not prominent or absent). Black: inner antennal space, antennal toruli, a vertical line from toruli towards lower frons, around ocellar area, occiput except at lower portion, anterior margins of anterior face of pronotum, mesoscutum except at broad median area reddish brown, margins of scutellum, propleuron, mesopleuron except at reddish brown area at middle, metapleuron, propodeum except at two broad large reddish brown area on either side, basal area of tergites and sternites (sometimes not visible externally). Legs brown inter mixed with black and yellow, usually at base of coxa, trochanter and basal half of femora black, remaining portion brown to yellowish brown. Wings yellowish hyaline.

*Body length* (H+M+T1+T2): 10-12 mm.

*Material examined*: ZSIK Regd. Nos. ZSI/WGRC/I.R.-INV. 9842-9851, 7♂ & 3♀, 10-13.viii.2017, WII Campus, Dehradun district, Uttarakhand, India, coll. P. Girish Kumar.

*Ethology*: Symbiotic associations with mites were observed in many

specimens of this wasp. Mites usually occupy the posterior pits of the propodeum and rarely other areas such as the lateral sides of propodeum, metasoma, etc.

*Distribution*: India: Arunachal Pradesh, Assam, Delhi, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Manipur, Meghalaya, Mizoram, Nagaland, Rajasthan, Sikkim, Tripura, Uttarakhand, West Bengal. *Elsewhere*: Myanmar; Nepal; Pakistan; China (Tibet); Laos; Thailand.

#### **4. Conclusion**

The present paper deals with the diversity of wasps belong to the family Vespidae from Wildlife Institute of India campus, Dehradun. We reports here 10 species of wasps under 7 genera in 3 subfamilies for the first time from WII campus. Subfamily Polistinae is with 5 species, Eumeninae with 3 species and Vespinae with 2 species.

#### **5. Acknowledgements**

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Plate 1



*Polistes (Gyrostoma) olivaceus* (De Geer), female



*Ropalidia brevita* Das & Gupta, female



*Ropalidia stigma* (Smith), female



*Ropalidia variegata* (Smith), female



*Parapolybia varia varia* (Fabricius), female

## Plate 2



*Vespa auraria* Smith, female



*Vespa tropica haematodes* Bequaert, female



*Allorhynchium argentatum* (Fabricius), male



*Anterhynchium (Dirhynchium) flavomarginatum*  
*flavomarginatum* (Smith), female



*Antodynerus limbatus* (de Saussure), male



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