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Taxonomic study of polistineae species (Hymenoptera: Vespidae) of Dir, Pakistan

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Abstract

The objective of the present study was to find out the fauna of the social wasps of the subfamily Polistineae of Dir Khyber Pakhtoonkhwa Pakistan. Dir is situated in the North of Khyber Pakhtoonkhwa at an elevation of 1420 meters with an altitude of 35.1977° N and latitude 71.8749° E. A total of 248 specimens were collected from the study area from April, 2015 to November, 2017. The specimens represented eight species under two genera, *Polistes* and *Ropalidia*. The genus *Polistes* was represented in the area by six species *Polistes indicus*, *P. olivaceous*, *P. stigma*, *P. wattii*, *P. rothneyi* and *Polistes flavus* while the genus *Ropalidia* was represented by two species *R. brevata* and *R. cyathiformis*. Among these *P. olivaceous*, *P. wattii*, *P. flavus* and *R. brevata* were new record for Dir. It was also observed that *Polistes wattii* was the most abundant species in the area while *P. olivaceous* and *P. rothneyi* were widely distributed in the area. All these wasps were found predators on various fruit crops pests and play a pollinating role in the area.

Keywords: social wasps, polistes, ropalida, Dir

1. Introduction

Vespidae is an important family of the order Hymenoptera comprising about ten thousand species in six subfamilies; Stenogastrinae, Eumeninae, Eupragiinae, Masarinae, Polistineae and Vespinae, which includes both social and solitary forms^[1]. Most species of these wasps are solitary but few are social. The social wasp fauna of the Indian subcontinent is of special interest^[1] and South-East Asia is an important place for social wasps' diversity^[2]. Adult wasps are fascinating, generally predominantly black or brown but are often having yellow or white marking^[3] and play an important role in the functioning of ecosystems nearly everywhere around the globe, for example destroying pests of cultivated and ornamental plants^[4]. The present global knowledge on the wasp fauna is only good but the exact data for countries like Pakistan is still lacking. Only few studies^[4] have been reported from Pakistan, for example^[5-7]. The purpose of the present research work was to find out the fauna of the social wasps belonging to the subfamily Polistineae in the study area.

2. Materials and Methods

2.1 Sample collection

The specimens were collected from April, 2015 to November, 2017 through active search. Various localities like fields, gardens, parks and fruit markets were visited and the wasps collected with the help of aerial hand net.

2.2 Preservation

Just after catching the wasps were killed in the hand net with insecticide. The specimens were labeled and preserved in the insect boxes having naphthalene balls as preservative.

2.3 Identification

The specimens were observed for taxonomic characters under the stereoscope (Labomet CZM4-4X) and identified up to species level by running them through various keys like^[2, 8, 3].

3. Results

A total of 248 specimens of the subfamily Polistineae representing eight species under two genera were collected. Six species were belonging to the genus *Polistes* while two were of the

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genus *Ropalidia*. (Table 1).

General diagnostic characters of the family, subfamily, genera and species are given below.

Family Vespidae

Morphological Characters: Body length: 3.9-27.50 mm; Adult winged often yellow to brown with black markings or some time entirely black; dorsal rim of torulus is simple; eye with inner margin deeply emarginated; pronotum having postero dorsal margin V shaped and postero lateral apex acute and produced above anterior margin of tegula, the pronotum reaches the back to the tegulae; forewing generally longitudinally folded or sometimes without fold, the forewing having an extend discal cell (as long as the submedian cell); mesocoxa and metacoxa contiguous; hind wings are lacking distinct claval lobe and generally with distinct jugal lobe or some time absent; metasomal sternum I is divided from sternum II by deep constriction.

Subfamily Polistinae: Plate-1

The Polistinae is the most diverse sub-family of social wasps in terms of both species richness and diversity, with about 800 species worldwide. The Polistinae are primarily tropical (especially New-World tropics) in distribution but can be found world-wide. 29 genera have been recognized throughout the World by their petiolate body. The subfamily is distributed in to 4 tribes: Ropalidiini, Polistini, Mischocyttarini and Epiponini and 29 genera.

Genus *Polistes* Latreille^[9-14]

Polistes olivaceous^[10, 15, 16]

Materials Examined: Dir 1 ♀ 5.vi.2014, 1 ♀ 2.vi.2015, 1 ♂ 27.vi.2015, 3 ♀ 19.viii.2015, 3 ♀ 17.vi.2016, 2 ♀ 3.x.2016, 1 ♀ 8.x.2016.

Morphological Characters: Body length: female 19.4-19.7 mm (n = 334) fore wing 18.4 – 19.3 mm; male 19-19.5 mm, fore wing 18-19.2 mm; propodeal striations present but not reaching the inner margin; median groove not deep (narrower); body light brown in colour, females with complete occipital carina; ocellocollar distance greater than interocellar distance.

Distribution: Afghanistan, Argentina, Australia, China, Chile, Europe, Turkey, northern Africa, Israel, Syria, Russia, Iran, Pakistan, Turkmenistan, India, Mongolia Uzbekistan and USA.^[16-19]

Polistes indicus Stofa, 1934.

Material Examined: Pakistan: Dir, 13-vi-2014, 3♀, 2♂, leg; 15- vii-2014, 3♀, leg; 10-viii-2014, 2♀, leg; 25- ix-2014, 1♀, leg; 10-iv-2014, 3♀, leg; 25-v-2014, 2♀, leg;

Morphological Characters: Body length: 14-16.5mm, forewing: 12-12.5mm; body yellowish brown with shiny gray; clypeus with strong hairs; abdomen brownish in colour; apical margin of the clypeus rounded in the middle; frons yellow; vertex black with two yellow spots; pronotum yellow with brown spots.

Distribution: Afghanistan, Pakistan, Iran, Iraq, United Arab Emirates and Oman^[20].

Remarks: *Polistes indicus* is different from *Polistes gallicus* by having yellow clypeus and strong hairs, yellowish brown

body colouration, coxa are yellow in colour.

Polistes rothneyi Vecht, 1968.

Material Examined: Pakistan: Dir Valley, 23- vi-2014, 1♀, 1♂, leg; 21-vii-2013, 3♀, 2♂, leg; 19-viii-2013, 1♀, leg; 19-ix-2013, 2♀, leg; 19-iv-2013, 3♀, 2♂, leg; 22-v-2013, 2♀, 3♂, leg.

Morphological Characters: Body length: Female: 15-18 mm, forewing: 16.5-17mm; body brown in colour; antenna brown; abdomen with thin black bands; clypeus with prominent hairs; thoracic suture black; hind tibia with incomplete black line.

Distribution: Pakistan, India and Nepal^[21].

Remarks: Das and Gupta reported this species from Pakistan^[6]. Siddiqui *et al.* reported this species from Islamabad, Mardan and Peshawar^[13]. Inayatullah reported this species from Gari Habibullah, Dir, Mansehra, Abbottabad, Miadam, Peshawar, Mardan and Punjab^[24] while Shah *et al.* reported from Abbottabad, Battagram and Mansehra^[25].

Polistes wattii Cameron, 1900

Polistes wattii Dalla Torre, 1904

Material Examined: Pakistan: Dir, 19- ix-2013, 2♀, leg; 19-iv-2013, 3♀, 2♂, leg; 22-v-2013, 2♀, 3♂, leg; 06-v-2013, 3♀, leg; 10-vi-2013, 3♀, leg; 7-vii-2013, 2♀, 2♂, leg; 09-viii-2013, 2♀, 2♂, leg.

Morphological Characters: Body length: both male and female are of same size 16-20 mm; female clypeus touching the eyes; forewing: 16-18mm; body brown in colour; Male: clypeus not touching the eyes; apophysis (elongate process of body wall) of sub genital plate long and narrow, not compressed at apex; with heavy pubescent; head and thorax almost uniform yellow in colour; In some specimens brownish yellow.

Distribution: Afghanistan, China, India, Iraq, Iran, Oman, Pakistan, Saudi Arabia,^[26, 21, 27]

Remarks: Inayatullah reported this species from Pakistan^[24]. This species has also been reported by from Punjab, Muree, Taxilla and Karakoram Agriculture Reserve (Gilgit)^[28] again reported this species from Islamabad, Hunza, Kohistan, Swat, Mansehra, Chillas, Abbotabad, Mardan and Peshawar.

4. Discussion

The subfamily Polistinae is represented by two genera and eight species in the study area. Two species were in the genus *Ropalidia*, *R. brevata* and *R. cyathiformis*, while six species were in the genus *Polistes*, *P. flavus*, *P. indicus*, *P. olivaceous*, *P. rothneyi*, *P. stigma* and *P. wattii*.

Chaudhary *et al* while reporting a total of eight species of the family vespidae from Pakistan, reported only one species, *Polistes rothneyi*, of the subfamily Polistinae from Labarkot Hazara^[5]. It was also reported from Chitral Khyber Pakhtunkhwa and Jhelum by Das and Gupta^[6]. The presence of *Polistes rothneyi* in Pakistan was confirmed by Carpenter^[10] and Dvorak^[32]. The species was reported from Dir, Swat, Peshawar, Abbottabad and Mansehra by Aziz^[22]. Mahmood *et al* reported it from Attock and Rawalpindi^[24]. Shah confirmed the presence of the species in Mansehra^[31] while Rasool confirmed its presence in Swat by collecting the

species from various localities of District Swat [28]. The *Polistes indicus* was first reported from Pakistan by Das and Gupta and then by Carpenter [6, 10]. Dvorak reported it from Peshawar Khyber Pakhtunkhwa [32]. The same year it was reported by Gusenleitner from Gilgit [20]. It was reported from Kohat Khyber Pakhtunkhwa by Aziz [22]. The study of Mahmood *et al* showed that the species has a wide occurrence in Pakistan, as they reported it from Sindh and Punjab [24]. The presence of *Polistes indicus* in the Punjab was confirmed by Siddique *et al*, collecting samples from Jhelum, Chakwal, Attock and Rawalpindi [13]. *Polistes indicus* was reported from Mansehra by Shah [31] and from Gilgit Baltistan by Faiz [23]. The species was reported for the first time from Swat by Rasool [28].

Polistes wattii was for the first time reported from Pakistan by Das and Gupta [6] and later confirmed by Carpenter [10]. It was reported from Murree and Islamabad by Gusenleitner [20]. From the four districts, Peshawar, Mardan, Kohat and Dir, of Khyber Pakhtunkhwa it was reported by Aziz [22]. The species was reported from Punjab and Sindh by Mahmood *et al*, [24]. The study of Siddique *et al* showed the presence of the species in Rawalpindi and Attock [13]. *Polistes wattii* was reported from Mansehra by Shah [31] while Faiz [23] reported it

from Gilgit Baltistan. It was reported from Swat by Rasool [28]. *Polistes olivaceous* is only reported by Bodlah from Layyah Punjab [1], from Swat it was reported by Rasool [28] so this species is a first record for the study area. *Polistes stigma* was first reported from Madyan Swat by Mahmood *et al* [24] and then reported from Mansehra by Shah [31]. *Ropalidia cyathiformis* is reported from Swat [24], Rawalpindi, Chakwal and Jhelum [13]. Similarly, *Ropalidia brevata* is recorded from Abbottabad, Mansehra [22, 31], Islamabad, Rawalpindi, Chakwal, Jhelum [13] and Swat [28]. The species is new for Dir. *Polistes flavus* is reported previously only from Swat [28] and hence it is a second record for the country.

Table 1: Number of specimens collected in the present study

S. No	Species	Number
1	<i>Polistes indicus</i>	26
2	<i>Polistes rothneyi</i>	43
3	<i>Ropalida brevata</i>	16
4	<i>Polistes wattii</i>	94
5	<i>Polistes stigma</i>	39
6	<i>Polistes olivaceous</i>	30
	Total	248

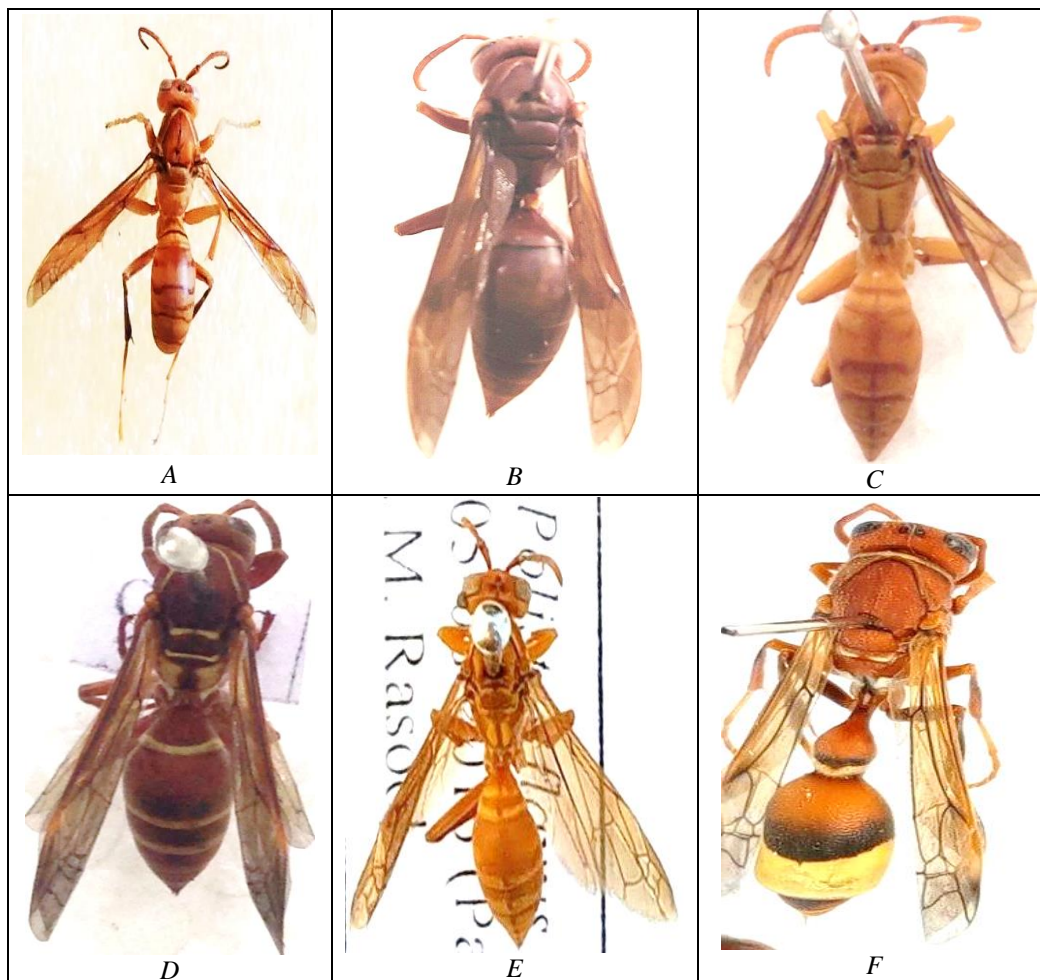


Plate 1: Sub family Polistinae, A-*P. indicus*, B-*P. rothneyi*, C-*P. wattii*, D-*P. stigma*, E-*P. olivaceous*, F- *R. brevata*.

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