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WASP FAUNA OF SUBFAMILIES EUMENINAE, VESPINAE AND POLISTINAE FROM SIBI, BALOCHISTAN, PAKISTAN

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ABSTRACT

This study identified Vespidae species from the subfamilies Eumeninae, Polistinae, and Vespinae in the Sibi district of Balochistan, Pakistan. A total of 9 species across 5 genera were recorded. Among them, four species belong to Eumeninae, three to Polistinae, and two to Vespinae. All species were documented for the first time from the Sibi district, with two species, *Anterhynchium (Anterhynchium) abdominale abdominale* and *Delta campaniforme campaniforme*, being reported for the first time from Balochistan province. Present study will serve as a foundation for future studies on Vespidae from Sibi and the wider Balochistan region.

1. INTRODUCTION

Vespidae is the largest family of order Hymenoptera with a cosmopolitan distribution and comprises more than 5000 species in 250 genera arranged in six subfamilies: Euparagiinae, Eumeninae, Masarinae, Polistinae, Stenogastrinae, and Vespinae (Carpenter, 1981 & 1982); Pickett & Carpenter, 2010). This family widely distributed in tropical Africa, South Africa, Asia, Australia and throughout temperate Eurasia and North to Central South America (van der Vecht, 1966). The vespid fauna of Pakistan has significance due to its transitional position between the Palearctic and Oriental regions. The distribution of vespid wasps in Pakistan have been well studied by many authors such as Nurse, 1903, 1904; Cameron, 1907; Meade-Waldo, 1910; Dover & Rao, 1922; Dover, 1925 [1924]; Kostylev, 1940; Chaudhry *et al.*, 1966; Das & Gupta, 1984, 1989; Archer, 1989; Carpenter, 1996; Carpenter & Kojima, 1997; Gusenleitner, 2006, 2007, 2008; Dvořák, 2007; Kumar, 2010; Bodlah *et al.*, 2011, 2012, 2015; Mahmood *et al.*, 2012, Siddiqui *et al.*, 2015; Shah 2015; Faiz *et al.*, 2016; Khan *et al.*, 2017; Rasool *et al.*, 2017; Rafi *et al.*, 2017; Rauf *et al.*, 2018; Durrani *et al.*, 2018; Qasim *et al.*, 2018a,b; 2022a,b.

Wasps have an important role in ecosystem as a biological control agent, effective pests, scavengers and pollinators (Fateryga, 2010). Many species of wasps are predators; they feed on spiders, crickets or immature of other insects and caterpillars (Goulet & Huber, 1993). However, almost all adult wasps feed on nectar but they also feed on juice of ripened fruits and nectar from the killed honey bees while solitary wasps paralyze their prey instead of killing it and store in nests for their larvae food (Spradbery, 1973). They also damage fruits and sting the people (Monceau *et al.*, 2014). Stinging of hornet and yellow jacket wasps is a serious risk for general people, especially in late summer and fall when their colonies become maximum in sizes and the people who suffer

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from acute sensitivity to wasp venom become at risk (Galloway, 2008).

The biogeographical location of district Sibi is within the arid and semi-arid region of Pakistan. This area is characterized by its dry climate, limited vegetation, and adaptations of flora and fauna to survive in harsh desert-like conditions. The region's specific coordinates are approximately 27°55' and 30°38'N latitude and 67°17' and 69°50'E longitude lying at the bank of the River Bolan in the Balochistan, Pakistan. The district is well-known for its natural geographic beauty and mountain ranges. This present study aimed to explore the Vespidae wasp fauna of the district Sibi from different localities such as Luni, Kurak, Khajjak, Lehri, Sibi city, Mandai from Balochistan Pakistan.

2. MATERIALS AND METHODS

Vespid wasps were collected from various localities within the Sibi district of Balochistan, Pakistan, during the period of 2022-2023. The selection of collection sites was based on the diversity of habitats within the district to ensure a comprehensive representation of the local Vespidae fauna. Habitats included areas with abundant vegetation, flowering plants, and other environments favorable to wasps. Specimens were collected using aerial nets, a standard method for capturing flying insects. The nets were carefully used to capture wasps from flowers, plants, and other suitable environments. Collections were made during daylight hours when wasps were most active, and in varying weather conditions to capture a diverse range of species. After capture, the wasps were immediately placed in collection jars containing 70% ethanol, which served as a preservative. The collected specimens were identified to the species level using a Labomed Luxao 6Z Stereo Zoom Microscope. Identification was conducted based on morphological characteristics, using key literature references, including: (Das & Gupta, 1984; Chaudhry *et al.*, 1966; Archer, 1989; Carpenter & Kojima, 1997; Carpenter, 1996; Gusenleitner, 2006, 2007, 2008; Dvorak, 2007; Kumar, 2010; Mahmood *et al.*, 2012; Siddiqui *et al.*, 2015; Rafi et al., 2017, Qasim *et al.*, 2022a). After identification, the specimens were properly labeled with collection data (e.g., locality, date, collector name) and deposited in the Biosystematics Laboratory at Balochistan Agriculture College, Quetta, Pakistan.

3. RESULTS

Family Vespidae Latreille, 1802
Subfamily Eumeninae Latreille, 1802 (Potter Wasps)

Genus: *Anterhynchium* de Saussure, 1863

1. *Anterhynchium (Anterhynchium) abdominale abdominale* (Illiger, 1802)

Material examined: Pakistan: Balochistan: District Sibi: Sibi city, 4.ii.2023. Leg. Mehmood Khan, 1♀; Kurak, 6.ii.2023, Leg. Mehmood Khan, 2♂.

Remarks: This is new record for Balochistan. Earlier this species was reported from Islamabad; Sindh: Karachi; Punjab: Faisalabad, Rawalpindi and Attock (Dover & Rao, 1922; Siddiqui *et al.*, 2015; Rafi *et al.*, 2017).

Distribution: India; Myanmar; Pakistan; Sri Lanka and Vietnam (Bingham, 1897; van der Vecht, 1963; Kumar & Sharma, 2014).

Genus Delta de Saussure, 1854–56

2. *Delta campaniforme campaniforme* (Fabricius, 1775)

Material examined: Pakistan: Balochistan: District Sibi: 20.vi.2022. Leg. Mehmood Khan, 2♂; Lehri, Leg. Mehmood Khan 1♀; Kurak 22.vi.2022, Leg. Mehmood Khan 2♂; Luni, 25.vi.2022

Remarks: New record for Balochistan. Already this species reported from Sindh: Ghotki (Khan *et al.*, 2018).

Distribution: Australia; China; Cambodia; India; Indonesia; Guangdong; Laos; Myanmar; Nepal; Malaysia; Palawan; Philippines; Thailand, Papua New Guinea; Singapore, U. S. A. Vietnam and Pakistan (Nguyen, 2015).

3. *Delta dimidiatipenne* (de Saussure 1852)

Material examined: Pakistan: Balochistan: District Sibi: Sibi City, 13. v.2022. Leg. Mehmood Khan, 1♂; Kurak, 14.v.2022, Leg. Mehmood Khan 2♂; Luni, 17.v.2022, Leg. Mehmood Khan, 1 ♀.

Remarks: Earlier this species reported from Baluchistan: Quetta and Noshkey; Islamabad; Punjab: Attock, Chakwal, Gujranwala, Gujrat, Jhelum, Jhang, Faisalabad, Murree, Multan,

Khanewal, Khyber-Pakhtunkhwa: Abbottabad, Balakot, Battagram, Dir, Mansehra, Peshawar; Azad Jammu and Kashmir: Muzaffarabad, Poonch, Banjosa Rawalakot, Bagh; Gilgit-Baltistan: Astore, Ghizer and Hunza; Sindh: Dadu, Larkana, Sukkur, Nagarparkar, Hyderabad, Umarkot, Korangi (Karachi) (Gusenleitner, 2006; Bodlah *et al.*, 2011; 2012; Mahmood *et al.*, 2012; Siddiqui *et al.*, 2015; Rafi *et al.*, 2017; Qasim *et al.*, 2022a).

Distribution: Afghanistan; Algeria; Chad; Djibouti; Egypt; Eritrea; Ethiopia; India; Iran; Jordan; Mauritania; Nepal; Niger; Morocco; Oman; Pakistan; Qatar; Saudi Arabia; Spain; Somalia; South Africa; Sudan; Syria; Tajikistan; Turkey; Turkmenistan; U.A.E.; Uganda; Yemen (Srinivasan & Kumar, 2010; Bodlah *et al.*, 2011; Siddiqui *et al.*, 2015; Rafi *et al.*, 2017).

4. *Delta esuriens esuriens* (Fabricius, 1787)

Material examined: Pakistan: Balochistan: District Sibi: Sibi City, 17.vi.2022. Leg. Mehmood Khan, 2♂; Khajjak, 20.vi.2022, Leg. Mehmood Khan, 3♂.

Remarks: This species already reported from Baluchistan: Quetta, Chiltan National Park Hazar Ghanji; Islamabad; Punjab: Attock Chakwal, Bakhar, Layyah, Multan, Shujabad, Mianwali, Muzafargarh, Head Fareed, Khanpur and Rawalpindi; Khyber-Pakhtunkhwa: Dir, Swat, Abbottabad, Balakot and Mansehra; Azad Jummu and Kashmir: Kohala, Kotli (Gusenleitner, 2006; Bodlah *et al.*, 2012; Mahmood *et al.*, 2012; Siddiqui *et al.*, 2015; Rafi *et al.*, 2017; Durrani *et al.*, 2018; Qasim *et al.*, 2022a).

Distribution: India; Indonesia; Iran; Iraq; Israel; Laos; Mauritius; Myanmar; New Caledonia; Oman; Pakistan; Philippines; Qatar; Saudi Arabia; Sri Lanka; Thailand; U. A. E.; Vietnam (Gusenleitner, 2006a; Srinivasan & Kumar, 2010; Bodlah *et al.*, 2012; Mahmood *et al.*, 2012).

Subfamily Polistinae Latreille, 1802 (Paper wasps)

Genus *Polistes* Latreille, 1802

5. *Polistes (Polistes) indicus* Stolfa 1934

Material examined: Pakistan: Balochistan: District Sibi: Luni, 7.ii.2023. Leg. Mehmood Khan, 1♂; Sibi City, 11.ii.2023, Leg. Mehmood Khan, 2♂; Mandai, 15.ii.2023, Leg. Mehmood Khan, 1♀.

Remarks: Already reported this species from Balochistan: Quetta, Chiltan National Park Hazar Ghanji; Punjab: Attock, Chakwal, Multan, Jhelum, Rawalpindi, Bahawalpur: Chak, 28 BC; Khyber-Pakhtunkhwa: Abbottabad, Alia, Ayubia, Baffa, Balakot, Battagram, Havelian, Oghi, Mansehra, Abad Khel, Kohat, Upper and Lower Dir, Peshawar; Sindh: Allahyar Pinhwar, Ghotki, Sukkur, Taj Mohammad Ruk; Gilgit-Baltistan: Chillas, Hunza, Gasdas, Ghizar valley, Jaglot, Thiee, Astore and Gilgit; Azad Jummu and Kashmir: Muzaffarabad (Dvořák, 2007; Gusenleitner, 2007; Mahmood *et al.*, 2012; Siddiqui *et al.*, 2015; Rafi *et al.*, 2017; Durrani *et al.*, 2018; Qasim *et al.*, 2022a)

Distribution: Afghanistan; Iran; Iraq; India; Oman; Pakistan; U.A.E. (Carpenter, 1996; Gusenleitner, 2007; Dvořák, 2007; Siddiqui *et al.*, 2015).

6. *Polistes (Gyrostoma) olivaceus* (DeGeer, 1773)

Material examined: Pakistan: Balochistan: District Sibi: Luni, 10.ii.2023. Leg. Mehmood Khan, 2♂; Sibi, 16.ii.2023, Leg. Mehmood Khan, 3♀; Khajjak, 17.ii.2023, Leg. Mehmood khan, 2♂.

Remarks: Already this species reported from Islamabad; Gilgit-Baltistan: Nagar; Punjab: Rawalpindi, Attock, Chakwal and Jhelum. Khyber-Pakhtunkhwa: Mansehra, Naran, Balakot, Baffa, Oghi, Battagram, Allai, Abbottabad, Ayubia and Havelian; Azad Jammu and Kahmir: Muzaffarabad (Mahmood *et al.*, 2012; Siddiqui *et al.*, 2015; Shah, 2015; Rafi *et al.*, 2017).

Distribution: Afghanistan; Cambodia; China; Egypt; Fiji; French Polynesia; India; Indonesia; Iran; Japan; Laos; Madagascar; Malaysia; Marianas; Mauritius; Myanmar; Nepal; New Caledonia; Oman; Réunion; Samoa; Seychelles; Singapore; Sri Lanka; Taiwan; Tanzania: Zanzibar; Thailand; Tonga; Vietnam; introduced into Australia: Chile; Easter Is.; Hawaii; New Zealand (Das & Gupta, 1989; Mahmood *et al.*, 2012).

7. *Polistes (Gyrostoma) wattii* Cameron 1900

Material examined: Pakistan: Balochistan: District Sibi: khajjak, 6.ii.2023. Leg. Mehmood Khan, 3♂; Kurak, 8.ii.2023, Leg. Mehmood Khan, 2 ♂; Sibi city, 10.ii.2023, Leg. Mehmood Khan, 1♂.

Remarks: Already reported this species from Balochistan: Quetta, Chiltan National Park Hazar Ghanji; Islamabad; Punjab: Attock, Rawalpindi,

Abbaspur, Multan, Khanewal, Kabirwala, Kahror Pakka, Lodhran, Shujabad, Jahanian, Mian Channu, Vehari, Bahawalpur (Chak 28 BC), Habib Massan; Murree, Taxila, Salt Range (Khewra); Sindh: Karachi. Allahyar Pinhwar, Drago, Ghotki, Rajab Ali Bharo, Sukkur, Kirthar National Park, Mirpur Khas, Umarkot, Jacobabad,; Khyber-Pakhtunkhwa: Abbottabad, Dir, Kohat, Mansehra, Mardan, Peshawar, Warsak; Gilgit-Baltistan: Basha, Chillas, Dassu, Diamer, Gilgit, Sukkhur, Juglot Ghizer, Hunza-Nagar and Skardu; Azad Jummu and Kashmir: Muzaffarabad, Poonch, Rawalakot (Das & Gupta,1984; 1989; Gusenleitner, 2007; Mahmood *et al.*, 2012; Siddiqui *et al.*, 2015; Shah, 2015; Khan *et al.*, 2017; Khan *et al.*, 2018)

Distribution: Afghanistan; China; India; Iran; Iraq; Mauritius; Oman; Pakistan; Saudi Arabia; Tajikistan; Turkmenistan; U.A.E. (Das & Gupta, 1989; Gusenleitner, 2007; Kumar, 2010).

Subfamily Vespinae Linnaeus, 1758
(Yellow jackets and Hornets)

Genus *Vespa* Linnaeus, 1758

8. *Vespa orientalis* Linnaeus 1771

Material examined: Pakistan: Balochistan: District Sibi: Sibi city, 21.ii.2023. Leg. Mehmood Khan, 4♂; Kurak, 26.ii.2023, Leg. Mehmood Khan, 2♂; Luni, 28.ii.2023, Leg. Mehmood Khan, 3♀.

Remarks: Already reported this species from Balochistan: Quetta, Chiltan National Park Hazar Ghanji; Islamabad; Punjab: Multan, Khanewal, Jahanian, Kabirwala, Vehari, Abdul Hakim, Burewala, Lodhran, Dunyapur, Fort Abbas Attock, Chakwal, Murree, Rawalpindi; Sindh: Dadu City, Mirpur Mathelo, Kandhkot, Kirthar National Park, Mirpur Khas; Gilgit-Baltistan: Astore, Ghizer, Chillas, Dassu, Gilgit, Jaglot, Nomal; Khyber-Pakhtunkhwa: Bamboret valley, Brun and Chitral; Abbottabad, Bannuu, Charsada, Kohat, Mansehra, Mardan, Peshawar and Warsak, Jamrud, Chilas, Basha, Alai, Baffa, Balakot, Battagram, Dir, Havelian and Mansehra; Azad Jummu and Kashmir: Rawalakot, Topa, Thorar, Mandhol and Muzaffarabad (Das & Gupta, 1984; 1989; Gusenleitner, 2007; Dvořák, 2007; Mahmood *et al.*, 2012; Siddiqui *et al.*, 2015; Khan *et al.*, 2017; Durrani *et al.*, 2018; Khan *et al.*, 2018; Qasim *et al.*, 2022a).

Distribution: Afghanistan; Algeria; Albania; Bahrein; Bosnia and Herzegovina; Bulgaria; China; Croatia; Cyprus; Egypt; Ethiopia; Georgia; Greece; Italy; Iraq; Israel; Iran; India; Jordan; Kazakhstan; Kyrgyzstan; Lebanon; Libya; Macedonia; Malta; Montenegro; Nepal; Oman; Pakistan; Russia; Romania; Saudi Arabia; Somalia; Syria; Turkey; Turkmenistan; Tajikistan; Uzbekistan; U.A.E.; Yemen; introduced into Czech Republic; Spain; Madagascar; Mexico; U.S.A. (Das & Gupta 1984, 1989; Carpenter & Kojima, 1997; Dvořák 2007).

Genus: *Vespula* Thomson, 1869

9. *Vespula germanica* (Fabricius, 1793)

Material examined: Pakistan: Balochistan: District Sibi: Khajjak, 5.iv.2023. Leg. Mehmood Khan, 1♂; Leg. kurak, 8.iv.2023, Mehmood Khan, 1♂.

Remarks: Already reported from Balochistan: Ziarat, Kalat; Khyber-Pakhtunkhwa: Swat, Kalam, Balakot, Baffa, Chitral, Bamboret valley, Brun, Dir, Abbottabad, Mansehra, Havelian, Ayubia; Gilgit-Baltistan: Daimer, Chillas, Gulmit, Khyber, Khuramabad, Shish kot, Gulkin, Passu, Aliabad, Nagar, Denor, Sost, Misger, Ghizer, Skardu and Gilgit (Chaudhry *et al.*, 1966; Dvořák, 2007; Mahmood *et al.*, 2012; Shah, 2015; Faiz *et al.*, 2016).

Distribution: Austria; Armenia; Algeria; Azores; Albania; Belarus; Belgium; Bulgaria; Canada; China; Croatia; Czech Republic; Denmark; England; France; Germany; Gerogia; Greece; Hungary; Iran; Ireland; Israel; India; Kazahkstan; Korea; Luxembourg; Malta; Morocco; Mongolia; Norway; Netherlands; Pakistan; Poland; Portugal; Russia; Romania; Sweden; Scotland; Slovenia; Spain; Switzerland; Syria; Taiwan; Tajikistan; Turkey; Turkmenistan; Tunisia; Ukraine; Uzbekistan and U.K.; introduced into Ascension Island; Argentina; Australia; Canada; Chile; Iceland; New Zealand; South Africa; U. S. A. (Carpenter & Kojima 1997; Dvořák 2007; Mahmood *et al.*, 2015).

4. DISCUSSION

The findings of this study highlight the rich diversity of Vespidae wasps in the Sibi district, Balochistan, Pakistan. The identification of 9 species across 5 genera within three subfamilies (Eumeninae,

Polistinae, and Vespinae) underscores the ecological significance of this region.

The documentation of four species belonging to the subfamily Eumeninae (*Anterhynchium (Anterhynchium) abdominale abdominale*, *Delta campaniforme campaniforme*, *Delta dimidiatipenne*, and *Delta esuriens esuriens*), three species from the subfamily Polistinae (*Polistes (Polistes) indicus*, *Polistes (Gyrostoma) olivaceus*, and *Polistes (Gyrostoma) watti*), and two species from the subfamily Vespinae (*Vespa orientalis* and *Vespula germanica*) is significant. Notably, all these species have been recorded for the first time from the Sibi district, indicating a gap in prior research in this area. Furthermore, two species, *Anterhynchium (Anterhynchium) abdominale abdominale* and *Delta campaniforme campaniforme*, were recorded for the first time from Balochistan province.

The presence of such a diverse array of Vespidae species is indicative of the ecological health of the Sibi district. Wasps, as both predators and pollinators, play crucial roles in ecosystems by contributing to the pollination of various plants. The identification of these species can provide valuable insights into the local ecosystem's dynamics and the role these wasps play in maintaining ecological balance.

Additionally, the findings suggest that the Sibi district, and potentially other underexplored areas of Balochistan, may harbor even more undiscovered species of Vespidae. This study serves as a foundation for future research, encouraging further exploration and documentation of wasp species in the region.

5. CONCLUSION

This study highlights the rich diversity of Vespidae wasps in the Sibi district, Baluchistan, Pakistan indicating a healthy ecosystem where wasps play key roles as predators and pollinators. The limited scope of the present study emphasizes the importance of further research in this region to find potentially undiscovered vespid species. These findings would provide a valuable foundation for related future studies.

6. CONFLICT OF INTEREST

All authors have declared that there is no conflict of interests regarding the publication of this article.

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