

An Updated Checklist of Family Vespidae (Insecta: Hymenoptera from Azad Kashmir and Gilgit-Baltistan, Pakistan

Zershina MARYAM^{1a} Muhammad ALI^{1b} Mehdi Hassan SHEHBAZ²
Riaz HUSSAIN^{3a} Muhammad QASIM⁴ Muhammad Asghar HASSAN^{3b*}

¹Department of Zoology, University of Baltistan, Skardu, Gilgit-Baltistan, PAKISTAN

²Department of Entomology, PMAS-Arid Agriculture University, Rawalpindi 46000, PAKISTAN

³Institute of Entomology, Guizhou University, Guiyang 550025, CHINA

⁴Department of Zoology, Kohsar University Murree, 47150, Punjab, PAKISTAN

e-mails: ^{1a}zershinamaryam222@gmail.com, ^{1b}muhammad.ali@uobs.edu.pk

²shehbazmehdi08@gmail.com, ^{3a}riazsodaywa@gmail.com, ⁴mqasim@kum.edu.pk

^{3b*}kakojan112@gmail.com

ORCID IDs: ^{1a}0000-0002-5571-3329, ^{1b}0000-0001-8788-394X, ²0009-0003-5787-7903

^{3a}0000-0003-3864-7996, ⁴0000-0002-4322-5221, ^{3b}0000-0003-2590-5781

ABSTRACT

Based on previous studies from 1947 to 2023, an updated checklist of the family Vespidae (Insecta: Hymenoptera) from Azad Kashmir and Gilgit-Baltistan has been compiled. This updated checklist comprises 39 species representing 16 genera and three subfamilies. Azad Kashmir represents 26 species in 10 genera, while Gilgit-Baltistan harbors 24 species in 11 genera among three subfamilies. Among these, 11 species are found in both regions. Additionally, *Eumenes coronatus coronatus* (Panzer, 1799) is only known in Azad Kashmir, whereas *Euodynerus fastidiosus fastidiosus* (de Saussure, 1853), *Euodynerus semisaecularis semisaecularis* (Dalla Torre, 1889), *Jucancistrocerus tachkensis* (Dalla Torre, 1889), *Oreumenoides edwardsi* (de Saussure, 1852), *Symmorphus crassicornis* (Panzer, 1798), *Symmorphus glasunowi* Morawitz, 1895, *Polistes associus* Kohl, 1898, and *Dolichovespula intermedia* (Birula, 1930) are only known from Gilgit-Baltistan. Furthermore, the following four species are widely distributed throughout the country: *Delta dimidiatipenne* (de Saussure, 1852), *Polistes wattii* Cameron, 1900, *Polistes olivaceus* (DeGeer, 1773), and *Vespa orientalis* Linnaeus, 1771.

Keywords: Hornets and yellow jackets, paper wasps, potter wasps, northern Pakistan, regional distribution.

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INTRODUCTION

Wasps, belonging to the order Hymenoptera, are a fascinating and diverse group of insects that have captured the curiosity of scientists and nature enthusiasts alike. They are members of the largest family, Vespidae, belonging to the superfamily Vespoidea (Goulet & Huber, 1993). This family is distributed worldwide and comprises more than 5000 described species and 250 genera under six subfamilies: Eumeninae, Euparagiinae, Masarinae, Polistinae, Stenogastrinae and Vespinae (Carpenter, 1981; Pickett & Carpenter, 2010; Gawas, Kumar, Pannure, Gupta, & Carpenter, 2020). Vespidae exhibits a wide distribution range spanning from tropical Africa and Australia, through Asia and temperate Eurasia, extending northward to Central South America (van der Vecht, 1966). The distribution of social wasps is primarily tropical, with a notable richness in species (Ebrahimi & Carpenter, 2008). Boasting high diversity at higher taxonomic levels, South-East Asia, emerges as a significant region for social wasps (Carpenter & Nguyen, 2013). Despite their often-fearsome reputation due to their ability to sting, wasps play critical roles in ecosystems as predators, pollinators, and agents of biological control. Their intricate behaviors, diverse body morphology, and ecological significance make them an intriguing subject for scientific studies (Sumner, Law, & Cini, 2018).

Despite extensive research on vespid fauna in Pakistan, taxonomic studies from northern areas, particularly from Azad Kashmir and Gilgit-Baltistan, have been relatively limited and underexplored. Among the notable studies conducted in Pakistan, Gusenleitner (2006) documented 23 species, including five new records of the subfamily Eumeninae, while Chaudhry, Chaudhry, & Khan (1966) identified eight species from Sindh and Balochistan. Gusenleitner (2007) reported 18 species, with 12 species recorded from Gilgit-Baltistan. Dvořák (2007) recorded 21 species, primarily from Baluchistan and Khyber Pakhtunkhwa. Siddiqui *et al* (2015) reported 19 species from the Pothwar region of Punjab, Pakistan. Faiz *et al* (2016) reported 14 species in eight genera from Gilgit-Baltistan. In a landmark contribution on the vespid wasp fauna of Pakistan, Rafi *et al* (2017) documented a total of 105 taxa, comprising 77 species and 28 subspecies. Among these, 12 species are documented from Azad Kashmir and 24 species from Gilgit-Baltistan, respectively. Recently, Qasim *et al* (2018) enlisted 17 species of Vespidae from Muzaffarabad, Azad Kashmir, Pakistan. Despite these efforts, significant gaps remain in our understanding of the diversity and distribution of Vespidae across Azad Kashmir and Gilgit-Baltistan. This study presents the first comprehensive and updated checklist of known species within the family Vespidae in Azad Kashmir and Gilgit-Baltistan.

MATERIAL AND METHODS

The present checklist has been compiled using available literature published from 1947-2023 on the vespid wasp fauna of Azad Kashmir and Gilgit-Baltistan. Taxonomic classification follows that of Siddiqui *et al* (2015), Rafi *et al* (2017), and Gawas *et al* (2020). Genera and species names are arranged in alphabetical order within each subfamily, to make easier the search for a given taxon.

TAXONOMY

Family Vespidae Latreille, 1802

Subfamily Eumeninae Leach, 1815

Genus *Allorhynchium* van der Vecht, 1963

1- *Allorhynchium argentatum* (Fabricius, 1804)

Distribution in Pakistan. **Azad Kashmir:** Poonch (Rawalakot); **Gilgit-Baltistan:** Skardu, Ghizer; **Islamabad Capital;** **Khyber Pakhtunkhwa:** Abbottabad, Chitral (Bronze, Kalash Valley); **Punjab:** Attock, Chakwal, Jhelum, Lahore (Changa Manga), Multan, Rawalpindi; **Sindh:** Malir, Mirpur Khas, Thar, Thatta (Halaji Lake) (Chaudhry, Chaudhry, & Khan, 1966; Gusenleitner, 2007; Siddiqui et al, 2015; Faiz et al, 2016; Girish Kumar, Carpenter, & Sureshan, 2016; Rafi et al, 2017; Hassan et al, 2019; Khan, Rafi, Sultana, Munir, & Ahmad, 2022; Qasim et al, 2022). **Elsewhere:** Bhutan, India, Indonesia (Bali, Borneo, Java, Sulawesi, Sumatra), Laos, Malaysia, Myanmar, Nepal, Philippines, Singapore, Thailand, Vietnam (Girish Kumar et al, 2016; Nguyen, Nguyen, Tran, Nguyen, & Engel, 2023).

Genus *Antodynerus* de Saussure, 1855

2- *Antodynerus flavescens flavescens* (Fabricius, 1775)

Distribution in Pakistan. **Azad Kashmir:** Poonch (Banjosa Lake); **Islamabad Capital;** **Khyber Pakhtunkhwa:** Abbottabad (Havelian), Battagram (Allai), Mansehra (Balakot, Oghi), Malakand; **Sindh:** Ghotki, Karachi, Larkana (Garhi Khuda Bakhsh) (Rafi et al, 2017; Hassan et al, 2019; Ahmad et al, 2021; Khan et al, 2022). **Elsewhere:** Bangladesh, India (Girish Kumar & Carpenter, 2013).

3- *Antodynerus limbatus* (de Saussure, 1852)

Distribution in Pakistan. **Azad Kashmir:** Muzaffarabad; **Khyber Pakhtunkhwa:** Abbottabad; **Punjab:** Rawalpindi (Taxila); **Sindh:** Khairpur (Thari Mirwah), Larkana (Garhi Khuda Bakhsh), Naushahro Feroze (Mehrabbpur) (Gusenleitner, 2007; Rafi et al, 2017; Qasim et al, 2018; Khan et al, 2022). **Elsewhere:** China, India, Laos, Myanmar, Nepal, Thailand (Girish Kumar & Carpenter, 2013).

Genus *Delta* de Saussure, 1855

4- *Delta dimidiatipenne* (de Saussure, 1852)

Distribution in Pakistan. **Azad Kashmir:** Bagh, Poonch (Rawalakot), Muzaffarabad; **Balochistan:** Mastung (Hazarganji Chiltan National Park), Nushki, Quetta (Chiltan National Park); **Gilgit-Baltistan:** Astore (Doyan, Sukkhar), Ghizer, Hunza; **Islamabad Capital;** **Khyber Pakhtunkhwa:** Abbottabad, Dir, Hazara (Battagram), Mansehra (Balakot), Swat (Mingora), Peshawar; **Punjab:** Attock, Bahawalpur, Chakwal, D.G. Khan, Faisalabad, Gujrat, Gujranwala, Jhang, Jhelum, Khanewal, Khushab, Layyah, Mianwali, Multan, Muffazargarh, Rajanpur, Rawalpindi (Rawalpindi, Murree), Sargodah; **Sindh:** Dadu, Hyderabad, Karachi, Larkana, Sukkur, Tharparkar, Umakot (Gusenleitner, 2006; Bodlah,

Naeem, Khan, Bodlah, & Akhter, 2012; Mahmood, Ullah, Aziz, Hasan, & Inayatullah, 2012; Siddiqui et al, 2015; Faiz et al, 2016; Qasim et al, 2018; Rauf et al, 2018; Hassan et al, 2019; Hussain et al, 2019; Khan et al, 2022; Qasim et al, 2022). **Elsewhere:** Afghanistan, Algeria, Canary Islands, Chad, Djibouti, Egypt, Eritrea, Ethiopia, India, Iran, Jordan, Madagascar, Nepal, Oman, Palestine, Saudi Arabia, Somalia, Spain, Sudan, Syria, Tajikistan, Turkey, Turkmenistan, Uganda, U.A.E., Yemen (Srinivasan & Girish Kumar, 2010; Pannure, Belavadi, & Carpenter, 2016; Hassan et al, 2019; Rafi et al, 2017).

5- *Delta esuriens esuriens* (Fabricius, 1787)

Distribution in Pakistan: **Azad Kashmir:** Kotli; **Balochistan:** Quetta; **Islamabad Capital;** **Khyber Pakhtunkhawa:** Dir, Mansehra, Swat; **Punjab:** Attock, Bakhar, Kushab, Layyah, Mianwali, Multan, Muzaffargarh, Rahim Yar Khan (Khanpur), Rawalpindi (Bodlah et al, 2012; Mahmood et al, 2012; Siddiqui et al, 2015; Qasim et al, 2022). **Elsewhere:** India, Indonesia, Iran, Iraq, Israel, Laos, Mauritius, Myanmar, Nepal, New Caledonia, Oman, Philippines, Qatar, U.A.E., Vietnam, Saudi Arabia, Sri Lanka, Thailand (Gusenleitner, 2006; Srinivasan & Girish Kumar, 2010; Rafi et al, 2017).

6- *Delta viatrix* (Nurse, 1903)

Distribution in Pakistan: **Gilgit-Baltistan:** Astore; **Punjab:** Rawalpindi (Murree) (Faiz et al, 2016; Rafi et al, 2017). **Elsewhere:** Turkey (Yıldırım & Gusenleitner, 2012).

Genus *Eumenes* Latreille, 1802

7- *Eumenes coronatus coronatus* (Panzer, 1799)

Distribution in Pakistan: **Azad Kashmir:** Muzaffarabad (Rafi et al, 2017; Qasim et al, 2018). **Elsewhere:** Austria, Azerbaijan, Belarus, Belgium, Bulgaria, China, France, Germany, Greece, Israel, Iran, Italy, Japan, Kazakhstan, Korean Peninsula, Mongolia, Netherlands, Poland, Russia, Spain, Switzerland, Turkey, Turkmenistan, Ukraine (Gusenleitner, 1972; Rafi et al, 2017).

8- *Eumenes placens* Nurse, 1903

Distribution in Pakistan: **Azad Kashmir:** Muzaffarabad (Punjkot); **Punjab:** Rawalpindi (Murree) (Nurse, 1903; Qasim et al, 2018). **Elsewhere:** India (Gawas et al, 2020).

Genus *Euodynerus* Dalla Torre, 1904

9- *Euodynerus disconotatus* (Lichtenstein, 1884)

Distribution in Pakistan. **Balochistan:** Quetta; **Gilgit-Baltistan:** Gilgit (Jaglot) (Gusenleitner, 2006; 2007; Rafi et al, 2017). **Elsewhere:** Afghanistan, Armenia, Azerbaijan, Cyprus, Iran, Iraq, Jordan, Kazakhstan, Saudi Arabia, Tajikistan, Turkey, Turkmenistan, Uzbekistan (Fateryga, Proshchalykin, Maharramov, & Astafurova, 2021).

10- *Euodynerus fastidious fastidiosus* (de Saussure, 1853)

Distribution in Pakistan. **Gilgit-Baltistan:** Gilgit (Jaglot), Ghizer (Gusenleitner, 2007; Faiz et al, 2016; Rafi et al, 2017). **Elsewhere:** Afghanistan, Algeria, China, France, Greece, Iran, Italy, Kazakhstan, Lebanon, Morocco, Oman, Russia, Spain, Syria, Turkey, Ukraine, Uzbekistan (Gusenleitner, 2007; Rafi et al, 2017).

11- *Euodynerus semisaecularis semisaecularis* (Dalla Torre, 1889)

Distribution in Pakistan. Gilgit-Baltistan: Gilgit (Jaglot), Ghizer (Gusenleitner, 2007; Rafi et al, 2017). **Elsewhere:** China, Iran, Kazakhstan, Tajikistan, Turkmenistan, Turkey, U.A.E., Uzbekistan (Gusenleitner, 2007; Rafi et al, 2017).

Genus *Jucancistrocerus* Bluthgen, 1938**12- *Jucancistrocerus tachkensis* (Dalla Torre, 1889)**

Distribution in Pakistan. Gilgit-Baltistan: Ghizar (Gusenleitner, 2007; Rafi et al, 2017). **Elsewhere:** Afghanistan, Turkmenistan, Uzbekistan (Gusenleitner, 2007).

Genus *Katamenes* Meade-Waldo, 1910**13- *Katamenes dimidiatus dimidiatus* (Brullé, 1932)**

Distribution in Pakistan. Azad Kashmir: Poonch (Rawalakot); **Balochistan:** Mastung (Hazarganji Chiltan National Park) (Gusenleitner, 2006; Rafi et al, 2017). **Elsewhere:** Cyprus, Greece, Israel, Turkey (Yildirim, 2012; Gusenleitner, 2006; Rafi et al, 2017).

Genus *Knemodynerus* Blüthgen, 1940**14- *Knemodynerus excellens* (Pérez, 1907)**

Distribution in Pakistan. Azad Kashmir: Muzaffarabad; **Balochistan:** Quetta; **Punjab:** Multan; **Sindh:** Jacobabad, Sanghar (Shahdadpur), Sukkur (Gusenleitner, 2006; Rafi et al, 2017; Qasim et al, 2018; Khan et al, 2022). **Elsewhere:** India, Iran, Oman, Qatar, Saudi Arabia, Turkmenistan, U.A.E. (Gusenleitner, 2006; Rafi et al, 2017).

Genus *Oreumenoidea* Giordani Soika, 1961**15- *Oreumenoidea edwardsi* (de Saussure, 1852)**

Distribution in Pakistan. Gilgit-Baltistan: Gilgit (Jaglot) (Gusenleitner, 2007; Rafi et al, 2017). **Elsewhere:** India, Myanmar, Nepal, Sri Lanka, Thailand (Gusenleitner, 2007; Pannure et al, 2016).

Genus *Symmorphus* Wesmael, 1836**16- *Symmorphus crassicornis* (Panzer, 1798)**

Distribution in Pakistan. Gilgit-Baltistan: Astore (Faiz et al, 2016; Rafi et al, 2017). **Elsewhere:** Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, England, Finland, France, Germany, Greece, Hungary, India, Italy, Iran, Kazakhstan, Kyrgyzstan, Lithuania, Luxembourg, Mongolia, Netherlands, Poland, Pakistan, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Wales (Kim & Lee, 2006; Yildirim & Gusenleitner, 2012; Faiz et al, 2016; Gawas et al, 2020).

17- *Symmorphus glasunowi* Morawitz, 1895

Distribution. Gilgit-Baltistan: Kapalu (Zavattari, 1912; Rafi et al, 2017). **Elsewhere:** Kyrgyzstan, Tajikistan (Cumming, 1989; Zavattari, 1912; Rafi et al, 2017).

Subfamily Polistinae Lepeletier, 1836

Genus *Polistes* Latreille, 1802

18- *Polistes associus* Kohl, 1898

Distribution in Pakistan. Gilgit-Baltistan: Ghizar (Gusenleitner, 2007; Rafi et al, 2017). **Elsewhere:** Austria, Azerbaijan, Balkan Peninsula, China, Croatia, France, Greece, Hungary, Iran, Italy, India, Israel, Malta, Russia, Slovakia, Switzerland, Tajikistan, Turkey (Das & Gupta, 1989; Carpenter, 1996; Dvořák, 2005; Rafi et al, 2017; Goffová, Matisková, Selnekovič, Purkart, & Smetana, 2021; Schmid-Egger, van Achterberg, Neumeyer, Morinière, & Schmidt, 2017).

19- *Polistes dominula* (Christ, 1791)

Distribution in Pakistan. Azad Kashmir: Poonch (Rawalakot), Muzaffarabad; **Balochistan:** Mastung (Hazarganji), Ziarat; **Gilgit-Baltistan:** Gilgit (Jaglot), Ghizer, Hunza, Nagar, Skardu; **Islamabad Capital; Khyber Pakhtunkhwa:** Chitral (Bamboret, Brun); **Punjab:** Islamabad, Jhelum; **Sindh:** Nawabshah (Dvořák, 2007; Gusenleitner, 2007; Mahmood et al, 2012; Faiz et al, 2016; Rafi et al, 2017; Qasim et al, 2018; Hassan et al, 2019; Hussain et al, 2019). **Elsewhere:** Afghanistan, Argentina, Australia, Canary Islands, Canada, Chile, central and southern Europe, China, Cyprus, Germany, India, Iran, Israel, Jordan, Kazakhstan, Kyrgyzstan, Mongolia, New Zealand, Russia, Syria, Tajikistan, Turkey, Turkmenistan, South Africa, U.S.A. (Das & Gupta, 1989; Carpenter, 1996; Dvořák, 2007; Gusenleitner, 2007; Rafi et al, 2017; Schmid-Egger et al, 2017).

20- *Polistes gallicus* (Linnaeus, 1767)

Distribution in Pakistan. Balochistan: Mastung (Hazarganji), Ziarat; **Gilgit-Baltistan:** Ghizer, Gilgit (Jaglot), Hunza, Nagar, Skardu; **Khyber Pakhtunkhwa:** Abbottabad, Balakot, Battagram, Chitral, Mansera; **Punjab:** Jhelum (Dvořák, 2007; Gusenleitner, 2007; Mahmood et al, 2012; Faiz et al, 2016; Siddique et al, 2015; Rafi et al, 2017; Hussain et al, 2019). **Elsewhere:** Afghanistan, Armenia, Azerbaijan, China, Iran, Israel, Kyrgyzstan, Mongolia, Russia, Turkey, Turkmenistan, Ukraine (Carpenter, 1996; Dvořák, 2007; Gusenleitner, 2007).

21- *Polistes indicus* Stofa, 1934

Distribution in Pakistan. Azad Kashmir: Bagh, Muzaffarabad; **Balochistan:** Killa Saifullah; **Gilgit-Baltistan:** Astore, Diamer (Chilas), Gilgit (Jaglot), Ghizar, Hunza; **Khyber Pakhtunkhwa:** Abbottabad, Battagram, Balakot, Dir, Kohat, Mansehra, Peshawar; **Punjab:** Attock, Bahawalpur, Chakwal, Gujranwala, Jaglot, Jhelum, Layyah, Manserah, Multan, Rawalpindi; **Sindh:** Ghotki, Sukkur, Tando Allahyar (Dvořák, 2007; Gusenleitner, 2007; Mahmood et al, 2012; Siddiqui et al, 2015; Bodlah et al, 2016; Faiz et al, 2016; Rafi et al, 2017; Rauf et al, 2018; Hussain et al, 2019; Naz et al, 2020; Naheed et al, 2023; Qasim et al, 2018, 2023). **Elsewhere:** Afghanistan, India, Iran, Iraq, Oman, U.A.E. (Carpenter, 1996; Gusenleitner, 2007; Dvořák, 2007; Abbasi et al, 2008; Rafi et al, 2017).

22- *Polistes olivaceus* (DeGeer, 1773)

Distribution in Pakistan. Azad Kashmir: Bagh, Poonch (Rawalakot), Muzaffarabad;

Balochistan: Killa Saifullah; **Gilgit-Baltistan:** Astore, Nagar; **Islamabad Capital; Khyber Pakhtunkhwa:** Abbotabad, Attock, Balakot, Battagram, Chakwal, Manserah; **Punjab:** Attock, Chakwal, Gujranwala, Jhelum, Layyah, Rawalpindi; **Sindh:** Shikarpur (Mahmood et al, 2012; Siddiqui et al, 2015; Bodlah et al, 2016; Rafi et al, 2017; Qasim et al, 2018; Hassan et al, 2019; Hussain et al, 2019; Naz et al, 2020; Soomro et al, 2022; Naheed et al, 2023). **Elsewhere:** Afghanistan, Amirantes, Australia, Bangladesh, Bhutan, Cambodia, Chagos Archipelago, Chile, China, Easter Is., Egypt, Fiji, French Polynesia, Hawaii, India, Indonesia, Iran, Japan, Laos, Madagascar, Malaysia, Marianas, Marianas, Myanmar, Nepal, New Caledonia, New Zealand, Oman, Philippines, Réunion, Samoa, Seychelles, Singapore, Society Is., Sri Lanka, Tanzania, Thailand, Tonga, U.S.A., Vietnam, Zanzibar (Dover, 1929; Das & Gupta, 1989; Siddiqui et al, 2015; Rafi et al, 2017; Schmid-Egger et al, 2017).

23- *Polistes quadricingulatus* Gusenleitner, 2006

Distribution in Pakistan. Azad Kashmir: Poonch: Rawalakot (Banjosa); **Islamabad Capital; Khyber Pakhtunkhwa:** Chitral (Bamboret valley, Brun) (Dvořák, 2007; Khan et al, 2017; Rafi et al, 2017) **Elsewhere:** India, Laos, Nepal, Pakistan (Dvořák, 2007; Rafi et al, 2017).

24- *Polistes stigma tamulus* (Fabricius, 1798)

Distribution in Pakistan. Azad Kashmir: Bagh, Muzaffarabad, Poonch (Ali Sojal, Banjosa Lake, Hajira, Khaigala, Paniola, Rawalakot); **Balochistan:** Killa Saifullah; **Khyber Pakhtunkhwa:** Abbottabad (Ayubia, Havelian), Battagram, Mansehra (Baffa, Balakot, Oghi), Swat (Miadam, Saidu Sharif); **Punjab:** Rawalpindi (Murree, Parriata); **Sindh:** Karachi (Malir) (Mahmood, Ullah, Aziz, Hasan, & Inayatullah, 2012; Rafi et al, 2017; Qasim et al, 2018; Hassan et al, 2019; Hussain et al, 2019; Naz et al, 2020). **Elsewhere:** India, Sri Lanka, Vietnam (Girish Kumar & Sharma, 2014; Gawas et al, 2020).

25- *Polistes rothneyi carletoni* van der Vecht, 1968

Distribution in Pakistan. Azad Kashmir: Muzaffarabad, Poonch (Banjosa, Khaigala, Paniola, Rawalakot); **Gilgit-Baltistan:** Astore, Daimer, Ghizer, Gilgit (Bagrot, Juglot); **Islamabad Capital; Khyber Pakhtunkhwa:** Abbotabad (Ayubia, Havelian), Chitral (Bamboret Valley, Brun), Attock, Dir, Hazara, Manserah (Baffa, Balakot, Garhi Habibullah), Mardan, Peshawar, Swat (Malam Jaba, Miandam); **Punjab:** Attock, Gujranwala, Jhelum, Layyah, Rawalpindi (Rawalpindi, Murree) (Chaudhry et al, 1966; Dvořák, 2007; Mahmood et al, 2012; Siddiqui et al, 2015; Bodlah et al, 2016; Faiz et al, 2016; Rafi et al, 2017; Qasim et al, 2018; Hassan et al, 2019; Naheed et al, 2023). **Elsewhere:** India, Nepal (Gawas et al, 2020).

26- *Polistes wattii* Cameron, 1900

Distribution in Pakistan. Azad Kashmir: Poonch (Rawalakot); **Balochistan:** Killa Saifullah; **Gilgit-Baltistan:** Chilas, Daimer, Ghizer, Hunza, Nagar, Skardu; **Islamabad Capital; Khyber Pakhtunkhwa:** Abbottabad, Dir, Kohat, Mansehra, Mardan, Peshawar; **Punjab:** Attock, Bahawalpur, Gujranwala, Multan, Rawalpindi; **Sindh:** Ghotki, Karachi, Shikarpur, Sukkur, Tando Allahyar (Mahmood et al, 2012;

Siddique et al, 2015; Faiz et al, 2016; Khan, Khan, Rafi, & Qasim, 2017; Rafi et al, 2017; Hassan et al, 2019; Naz et al, 2020; Soomro et al, 2022; Naheed et al, 2023; Qasim et al, 2023). **Elsewhere:** Afghanistan, China, India, Iran, Iraq, Mauritius, Oman, Saudi Arabia, Tajikistan, Turkmenistan, U.A.E. (Gawas et al, 2020; Schmid-Egger et al, 2017).

Genus *Parapolybia* de Saussure, 1854

27- *Parapolybia escalerae* (Meade-Waldo, 1911)

Distribution in Pakistan. Gilgit-Baltistan: Gilgit; **Khyber Pakhtunkhwa:** Chitral (Faiz et al, 2016; Mahmood et al, 2012; Rafi et al, 2017). **Elsewhere:** Iran, Iraq, Turkey (Ali, Ameen, & Ahmed, 2023).

Genus *Ropalidia* Guérin-Ménéville, 1831

28- *Ropalidia brevita* Das & Gupta, 1989

Distribution in Pakistan. Azad Kashmir: Muzaffarabad, Poonch (Banjosa Lake, Rawalakot); **Islamabad Capital;** **Khyber Pakhtunkhwa:** Abbottabad (Havelian), Attock, Mansehra (Balakot, Ghari Habibullah); **Punjab:** Chakwal, Gujranwala, Jhelum, Rawalpindi (Rawalpindi, Murree) (Mahmood et al, 2012; Siddiqui et al, 2015; Naheed et al, 2023). **Elsewhere:** India (Gawas et al, 2020).

29- *Ropalidia colorata colorata* van der Vecht, 1941

Distribution in Pakistan. Azad Kashmir: Muzaffarabad; **Khyber Pakhtunkhwa:** Peshawar; **Punjab:** Rawalpindi (Murree) (van der Vecht, 1941; Qasim et al, 2018). **Elsewhere:** India (van der Vecht, 1941; Das & Gupta, 1989; Gawas et al, 2020).

Subfamily Vespinae Latreille, 1802

Genus *Vespa* Linnaeus, 1758

30- *Vespa basalis* Smith, 1852

Distribution in Pakistan. Azad Kashmir: Muzaffarabad, Poonch (Hajira, Mandhol, Rawalakot); **Gilgit-Baltistan:** Locality unknown; **Islamabad Capital;** **Khyber Pakhtunkhwa:** Abbottabad (Havelian), Battagram, Manserah (Balakot, Baffa), Mardan; **Punjab:** Attock, Rawalpindi (Mahmood et al, 2012; Siddiqui et al, 2015; Khan et al, 2017; Rafi et al, 2017; Qasim et al, 2018). **Elsewhere:** Bhutan, China, India, Indonesia, Laos, Myanmar, Nepal, Thailand, Vietnam (Archer, 1989; Carpenter & Kojima, 1997; Nguyen, 2007; Mahmood et al, 2012; Gawas et al, 2020).

31- *Vespa mandarinia* Smith, 1852

Distribution in Pakistan. Azad Kashmir: Muzaffarabad; **Islamabad Capital;** **Khyber Pakhtunkhwa:** Abbottabad, Mansehra (Rafi et al, 2017). **Elsewhere:** Bhutan, China, India, Japan, Korea, Laos, Malaysia, Myanmar, Nepal, Pakistan, Russia, Sri Lanka, Thailand, Vietnam (Carpenter & Kojima 1997; Gawas et al, 2020).

32- *Vespa orientalis* Linnaeus, 1771

Distribution in Pakistan. Azad Kashmir: Bagh, Poonch (Banjosa Lake, Rawalakot, Thorar, Mandhol); **Balochistan:** Noshki, Quetta, Chiltan National Park Hazar Ghanji;

Gilgit-Baltistan: Astore, Chilas, Ghizer, Gilgit (Jaglot, Nomal Valley); **Islamabad Capital:** National Agriculture Research Centre; **Khyber Pakhtunkhwa:** Abbottabad, Bannu, Battagram (Allai), Charsadda, Chitral (Bamburet Valley, Brun), Dir, Peshawar (Warsak), Killa Saifullah, Kohat, Khyber (Jamrud), Kohistan, Mardan, Mansehra (Baffa, Balakot); **Punjab:** Abbottabad (Havelian), Attock, Bahawalnagar, Chakwal, Faisalabad, Gujrat, Gujranwala, Jhelum, Khanewal, Lodhran, Multan, Rawalpindi (Rawalpindi, Murree), Vehari; **Sindh:** Shikarpur (Mahmood et al, 2012; Siddique et al, 2015; Khan et al, 2017; Rafi et al, 2017; Durrani et al, 2018; Hassan et al, 2019; Naz et al, 2020; Soomro et al, 2022; Qasim et al, 2018, 2023; Naheed et al, 2023). **Elsewhere:** Afghanistan, Albania, Algeria, Bahrain, Bosnia & Herzegovina, Bulgaria, China, Croatia, Cyprus, Egypt, Ethiopia, Georgia, Greece, Iran, Iraq, Israel, Italy, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Libya, Macedonia, Malta, Montenegro, Nepal, Oman, Romania, Russia, Saudi Arabia, Somalia, Syria, Tajikistan, Turkey, Turkmenistan, U.A.E., Uzbekistan, Yemen (Carpenter & Kojima, 1997; Girish Kumar & Srinivasan, 2010; Mahmood et al, 2012; Gawas et al, 2020).

33- *Vespa tropica* (Linnaeus, 1758)

Distribution in Pakistan. Azad Kashmir: Bagh, Poonch (Hajira, Rawalakot, Mandhol), Muzaffarabad; **Islamabad Capital:** Margilla Hills, National Agricultural Research Centre; **Khyber Pakhtunkhwa:** Abbottabad (Havelian), Battagram, Chitral, Mardan, Mansehra (Baffa, Balakot), Peshawar; **Punjab:** Attock, Chakwal, Rawalpindi (Siddique et al, 2015; Khan et al, 2017; Rafi et al, 2017; Qasim et al, 2018). **Elsewhere:** Afghanistan, Bhutan, Brunei, Cambodia, China, India, Indonesia, Laos, Myanmar, Malaysia, Nepal, Philippines, Papua New Guinea, Singapore, Sri Lanka, Thailand, Vietnam (Carpenter & Kojima, 1997; Dvořák 2007; Mahmood et al, 2012; Gawas et al, 2020).

34- *Vespa velutina* Lepeletier, 1836

Distribution in Pakistan. Azad Kashmir: Bagh, Poonch (Banjosa Lake, Rawalakot, Mandhol), Muzaffarabad; **Gilgit-Baltistan:** Diامر (Chilas), Ghizer (Gahkuch), Gilgit, Hunza, Nagar, Skardu; **Islamabad Capital:** National Agricultural Research Centre; **Khyber Pakhtunkhwa:** Abbotabad (Nathia Gali), Battagram, Balakot, Chitral, Dir, Mansehra (Garhi Habibullah, Shougran), Shangla, Swat (Charbagh, Jaba); **Punjab:** Attock, Chakwal, Gujranwala, Jhelum, Rawalpindi (Rawalpindi, Murree) (Dvořák 2007; Mahmood et al, 2012; Siddique et al, 2015; Khan et al, 2017; Rasool, Zahid, & Shah, 2017; Faiz et al, 2016; Rafi et al, 2017; Hassan et al, 2019; Hussain et al, 2019; Naheed et al, 2023). **Elsewhere:** Afghanistan, Bhutan, China, India, Indonesia, Laos, Malaysia, Myanmar, Portugal, South Korea, Spain, Thailand, Vietnam (Carpenter & Kojima 1997; Dvořák 2007; Mahmood et al, 2012; Gawas et al, 2020).

Genus *Vespula* Thomson, 1869

35- *Vespula flaviceps* (Smith, 1870)

Distribution in Pakistan. Azad Kashmir: Bagh, Poonch (Banjosa Lake, Rawalakot); **Punjab:** Rawalpindi (Murree); **Khyber Pakhtunkhwa:** Abbottabad (Nathiagali), Batgram, Swat (Dvořák, 2007; Mahmood et al, 2012; Bodlah, Siddiqui, Akram, & Naem,

2015; Hassan et al, 2019; Hussain et al, 2019; Rafi et al, 2019). **Elsewhere:** China, India, Japan, Korea, Laos, Myanmar, Nepal, Russia, Thailand, Vietnam (Carpenter & Kojima 1997; Dvořák 2007; Mahmood et al, 2012; Gawas et al, 2020).

36- *Vespula germanica* (Fabricius, 1793)

Distribution in Pakistan. **Azad Kashmir:** Bagh; **Balochistan:** Ziarat; **Gilgit-Baltistan:** Diamer (Chilas), Ghizer, Gilgit, Hunza, Nagar, Skardu; **Punjab:** Rawalpindi; **Khyber Pakhtunkhwa:** Abbottabad (Ayubia, Havelian), Battagram, Chitral, Dir, Mansehra (Baffa), Swat (Chaudhry et al, 1966; Dvořák 2007; Mahmood et al, 2012; Siddique et al, 2015; Faiz et al, 2016; Rafi et al, 2017; Hussain et al, 2019). **Elsewhere:** Afghanistan, Albania, Algeria, Argentina, Armenia, Austria, Australia, Azerbaijan, Azores, Belarus, Belgium, Bulgaria, Bosnia & Herzegovina, Canada, Chile, China, Croatia, Czech Republic, Denmark, England, Estonia, Finland, France, Germany, Georgia, Greece, Hungary, Iceland, Iran, Iraq, Ireland, Israel, India, Italy, Jordan, Kazakhstan, Korea, Kyrgyzstan, Lebanon, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Mayotte, Moldova, Morocco, Mongolia, Nepal, Norway, Netherlands, New Zealand, Poland, Portugal, Russia, Romania, Serbia, Sweden, Scotland, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tajikistan, Turkey, Turkmenistan, Tunisia, Ukraine, Uzbekistan, U.K., Ukraine, U.S.A. (Carpenter & Kojima, 1997; Dvořák, 2007; Rafi et al, 2017; Gawas et al, 2020).

37- *Vespula nursei* Archer, 1981

Distribution in Pakistan. **Azad Kashmir:** Bagh; **Khyber Pakhtunkhwa:** Abbottabad (Ayubia), Dir (Mahmood et al, 2012; Rafi et al, 2017; Hussain et al, 2019). **Elsewhere:** Bhutan, China, India, Philippines (Carpenter & Kojima, 1997; Rafi et al, 2017; Gawas et al, 2020).

38- *Vespula vulgaris* (Linnaeus, 1758)

Distribution in Pakistan. **Gilgit-Baltistan:** Astore, Hunza; **Khyber Pakhtunkhwa:** Lower Dir, Upper Dir **Balochistan:** Quetta (Faiz et al, 2016; Rafi et al, 2017; Rauf et al, 2018; Durrani et al, 2018). **Elsewhere:** Albania, Argentina, Australia, Austria, Azerbaijan, Belarus, Belgium, Bosnia & Herzegovina, Bulgaria, Chile, China, Croatia, Czech Republic, Denmark, Estonia, England, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, India, Iran, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Mexico, Moldova, Mongolia, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russia, Serbia, Scotland, Slovakia, Slovenia, Spain, Sweden, Switzerland, Syria, Tahiti, Turkey, U.K., Ukraine (Carpenter & Kojima 1997; Faiz et al, 2016; Rafi et al, 2017; Gawas et al, 2020).

39- *Dolichovespula intermedia* (Birula, 1930)

Distribution in Pakistan. **Gilgit-Baltistan:** Shish Kot, Afzal, Dih, Sost, Chillum and Markhun (Mahmood et al, 2012). **Elsewhere:** Afghanistan, China, India, Kazakhstan, Kyrgyzstan, Mongolia, Pakistan, Tajikistan, Turkmenistan, Uzbekistan (Carpenter & Kojima, 1997; Mahmood et al, 2012).

DISCUSSIONS

A total of 39 species of vespid wasp, belonging to 12 genera in three subfamilies are known to vast areas of Azad Kashmir and Gilgit Baltistan. These subfamilies include Eumininae, Polistinae and Vespinae. Among these, Eumininae is the most diverse with 10 genera and 17 species, followed by Polistinae with three genera and 12 species, while Vespinae is the least diverse with three genera and nine species. The most species-rich genera are *Polistes* (nine), *Vespa* (five), *Vespula* (four), *Delta* (three), *Euodynerus* (three), *Antodynerus* (two), *Eumenes* (two), *Symmorphus* (two), and *Ropalidia* (two), among others. The present findings highlight that Azad Kashmir and Gilgit Baltistan harbour a diverse fauna of vespid wasps. These results underscore the importance of further research to explore the potential discovery of new species, as well as new records for the country or new to these regions. Such investigations would contribute significantly to our understanding of the biodiversity and ecological dynamics of these regions so it is hoped that this compilation will serve as a valuable resource for future discovery and conservation efforts pertaining to wasps in Pakistan.

Table 1. Regional distribution data of known vespid species in Azad Kashmir and Gilgit-Baltistan.

S. No.	List of species	Regional Distribution						
		AK	BA	GB	ICT	KPK	PB	SD
Family Vespidae								
Subfamily Eumeninae Leach, 1815								
Genus <i>Allorhynchium</i> van der Vecht, 1963								
1	<i>Allorhynchium argentatum</i> (Fabricius, 1804)	*		*	*	*	*	*
Genus <i>Antodynerus</i> de Saussure, 1855								
2	<i>Antodynerus flavescens flavescens</i> (Fabricius, 1775)	*		*		*		*
3	<i>Antodynerus limbatus</i> (de Saussure, 1852)	*				*	*	*
Genus <i>Delta</i> de Saussure, 1885								
4	<i>Delta dimidiatipenne</i> (de Saussure, 1852)	*	*	*	*	*	*	*
5	<i>Delta esuriens esuriens</i> (Fabricius, 1787)	*	*		*	*	*	
6	<i>Delta viatrix</i> (Nurse, 1903)			*			*	
Genus <i>Eumenes</i> Latreille, 1802								
7	<i>Eumenes coronatus coronatus</i> (Panzer, 1799)	*						
8	<i>Eumenes placens</i> (Nurse, 1903)	*					*	
Genus <i>Euodynerus</i> Dalla Torre, 1904								
9	<i>Euodynerus disconotatus</i> (Lichtenstein, 1884)		*	*				
10	<i>Euodynerus fastidiosus fastidiosus</i> (de Saussure, 1853)			*				
11	<i>Euodynerus semisaecularis semisaecularis</i> (Dalla Torre, 1889)			*				
Genus <i>Jucancistrocerus</i> Bluthgen, 1938								
12	<i>Jucancistrocerus tachkensis</i> (Dalla Torre, 1889)			*				
Genus <i>Katamenes</i> Meade-Waldo, 1910								
13	<i>Katamenes dimidiatus dimidiatus</i> (Brullé, 1932)	*	*					
Genus <i>Knemodynerus</i> Blüthgen, 1940								
14	<i>Knemodynerus excellens</i> (Pérez, 1907)	*	*				*	*
Genus <i>Oreumenooides</i> Giordani Soika, 1961								
15	<i>Oreumenooides edwardsi</i> (de Saussure, 1852)			*				
Genus <i>Symmorphus</i> Wesmael, 1836								
16	<i>Symmorphus crassicornis</i> (Panzer, 1798)			*				

table
continued

S. No.	List of species	Regional Distribution						
		AK	BA	GB	ICT	KPK	PB	SD
17	<i>Symmorphus glasunowi</i> Morawitz, 1895			*				
Subfamily Polistinae Lepeletier, 1836								
Genus <i>Polistes</i> Latreille, 1802								
18	<i>Polistes associus</i> Kohl, 1898			*				
19	<i>Polistes dominula</i> (Christ, 1791)	*	*	*		*	*	*
20	<i>Polistes gallicus</i> (Linnaeus, 1767)		*	*		*	*	
21	<i>Polistes indicus</i> Stolfa, 1934	*	*	*		*	*	*
22	<i>Polistes stigma tamulus</i> (Fabricius, 1798)	*	*			*	*	*
23	<i>Polistes olivaceus</i> (DeGeer, 1773)	*	*	*	*	*	*	*
24	<i>Polistes quadricingulatus</i> Gusenleitner, 2006	*			*	*		
25	<i>Polistes rothneyi carletoni</i> van der Vecht, 1968	*		*	*	*	*	
26	<i>Polistes wattii</i> Cameron, 1900	*	*	*	*	*	*	*
Genus <i>Parapolybia</i> de Saussure, 1854								
27	<i>Parapolybia escalerae</i> (Meade-Waldo, 1911)			*		*		
Genus <i>Ropalidia</i> Guérin-Méneville, 1831								
28	<i>Ropalidia brevita</i> Das & Gupta, 1989	*			*	*	*	
29	<i>Ropalidia colorata colorata</i> van der Vecht, 1941	*				*	*	
Subfamily Vespinae Latreille, 1802								
Genus <i>Vespa</i> Linnaeus, 1758								
30	<i>Vespa basalis</i> Smith, 1852	*		*	*	*	*	
31	<i>Vespa mandarinia</i> Smith, 1852	*			*	*		
32	<i>Vespa orientalis</i> Linnaeus, 1771	*	*	*	*	*	*	*
33	<i>Vespa tropica</i> (Linnaeus, 1758)	*		*		*	*	
34	<i>Vespa velutina</i> Lepeletier, 1836	*		*	*	*	*	
Genus <i>Vespula</i> Thomson, 1869								
35	<i>Vespula flaviceps</i> (Smith, 1870)	*				*	*	
36	<i>Vespula germanica</i> (Fabricius, 1793)	*	*	*		*	*	
37	<i>Vespula nursei</i> Archer, 1981	*				*		
38	<i>Vespula vulgaris</i> (Linnaeus, 1758)		*	*		*		
Genus <i>Dolichovespula</i> Rohwer, 1916								
39	<i>Dolichovespula intermedia</i> (Birula, 1930)			*				

Abbreviations: AK = Azad Kashmir; BA = Baluchistan; GB = Gilgit-Baltistan; ICT = Islamabad Capital; KPK = Khyber Pakhtunkhawa; PB = Punjab; SD = Sindh.

CONFLICT OF INTEREST

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

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