Research Article

A novel taxonomic over-view of family Vespidae of subtropical rain forest: Malakand, with three new records for Khyber Pakhtunkhwa and one for Pakistan

Shehzad Ahmad¹, Qadeem Khan¹, Qaiser Zaman^{1,2*}, Qaisar Jamal³, Gauhar Rahman², Muhammad Ismail¹, Ahmad Ullah¹, Roman Ali¹, Hamza Khan¹, Umar Ali¹ and Azaz Ahmad⁴

1. Department of Zoology, Government Postgraduate College Dargai, Malakand, Khyber Pakhtunkhwa, Pakistan

2. Department of Zoology, Abdul Wali Khan University, Mardan Pakhtunkhwa, Pakistan

3. Department of Zoology, University of Peshawar, Pakhtunkhwa, Pakistan

4. Department of Entomology, University of Agriculture, Peshawar, Pakhtunkhwa, Pakistan

Corresponding author's email: zoologist.qaiser@gmail.com

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Abstract

In present study, a sum of 363 specimens were collected during August-2017 to September-2018 by visiting 14 different habitats including fields, mountains and fruit shops in Malakand, Khyber Pakhtunkhwa, Pakistan. A total of 19 species and an additional subspecies of family Vespidae were identified belonging to 10 genera and three subfamilies: Vespinae, Polistinae and Eumeninae. Out of this one genus was recorded from subfamily Vespinae, two genera were recorded from subfamily Polistinae while six genera were recorded from subfamily Eumeninae. In current study one species: *Rhynchium oculatum leviscutis* was recorded for the first time from Pakistan, 3 species: *Rhynchium brunneum brunneum*, *Eumenes punctatus*, *Antepipona sibilans* were reported for the first time from Khyber Pakhtunkhwa while 14 species were recorded from district Malakand for the first time which are: *Polistes indicus*, *Polistes olivaceus*, *Polistes wattii*, *Ropalidia brevita*, *Delta dimidiatipenne*, *Delta esuriens*, *Delta pyriforme pyriforme*, *Ropalidia cyathiformis*, *Vespa orientalis*, *Vespa tropica*, *Vespa velutina*, *Allorhynchium metallicum*, *Anterhynchium abdominale abdominale*, *Rhynchium carnaticum*, and *Antepipona deflenda*.

Keywords: Eumeninae; Malakand; New records; Pakistan; Polistinae; Vespidae; Vespinae

Introduction

Family Vespidae belongs to order Hymenoptera, one of the 26 orders of class

Insecta. Hymenoptera comprising of more than 1, 00,000 described species and many more still to go [1]. Many species of

Hymenoptera possess two pairs of wings, and mouthparts are modified for biting, sucking and lapping in some species. Complete metamorphosis occurs in the species of Hymenoptera [2]. Order Hymenoptera is further subdivided into two suborders; Suborder Apocrita and Suborder Symphyta. Suborder Apocrita contains five superfamilies i.e., Vespoidea, Bethyloidea, Chalcidoidea, Sphecoidea and Scolioidea [3]. Vespidae is cosmopolitan in distribution. The members of Vespidae are called wasps having about 5000 species found in tropical regions throughout the world [4]. Both social and solitary wasps are found in family Vespidae [5]. Social wasps include two subfamilies i.e., Polistinae (paper wasps) and Vespinae (hornet wasps). The solitary wasps include subfamily Eumeninae (potter wasps), Stenogastrinae, Euparagiinae and Masarinae [6]. These are predators of different kinds of insect larvae [7]. Social wasps build their nests made of paper material composed of plant material and chewed up wood materials [8]. Solitary wasps build mud-homes. Social wasps live in community that includes queen (fertile female), males and workers (sterile females). Males have thirteen antennal segments and seven abdominal segments. Whereas queen and workers have six abdominal segments and twelve antennal segments [2]. The members of Vespoidea have 11 to 13 segments in their antennae and a constriction at the base of the abdomen. The fore wings contain 6 or more cells and a sting at posterior end of the abdomen [7].

Materials and Methods

Survey was carried in District Malakand, Khyber Pakhtunkhwa, Pakistan during August-2017 to September-2018. The collection was done using hand-nets and insecticide sprays. Samples were fixed on cork-board in insect boxes using insect pins. Naphthalene balls were used as preservative. The specimens were studied using stereo microscope (Olympus Stereo SZX16, Japan).

Results and Discussion

A total of 363 specimens were collected representing three subfamilies of the family Vespidae. The subfamily Polistinae was

represented by two genera: *Polistes* and *Ropalidia*; and five species: *Polistes indicus*, *Polistes olivaceus*, *Polistes wattii*, *Ropalidia cyathiformis* and *Ropalidia brevita*. The subfamily Vespinae contains one genus: *Vespa* and three species i.e., *Vespa orientalis*, *Vespa tropica* and *Vespa velutina*. Subfamily Eumeninae was represented by six genera: *Delta*, *Allorhynchium*, *Anterhynchium*, *Rhynchium*, *Eumenes* and *Antepipona*; and eleven species and an additional subspecies i.e., *Delta dimidiatipenne*, *Delta esuriens*, *Delta pyriforme*, *Allorhynchium metallicum*, *Anterhynchium abdominale*, *Anterhynchium bengalense*, *Rhynchium oculatum leviscutis*, *Rhynchium carnaticum*, *Rhynchium brunneum brunneum*, *Eumenes punctatus*, *Antepipona sibilans* and *Antepipona deflenda*.

Keys to the subfamilies

Body features of all the species were compared to the keys of Das & Gupta (1989) and Carpenter & Nguyen (2003).

Subfamily polistinae

A total of 105 Specimens of subfamily Polistinae were collected including five species, *Polistes indicus*, *Polistes olivaceus*, *Polistes wattii*, *Ropalidia brevita* and *Ropalidia cyathiformis*.

Polistes indicus Stolf, 1934 (Fig. 1)

Material examined

Haryankot 9♂ (4/9/2017), 1♂ (21/9/2017), Ghanidheri 1♂ (15/9/2017), 1♂ (4/10/2017).

Distribution

India, Pakistan, Iran, Iraq, Afghanistan, Oman and UAE [9-11].

Remarks

Polistes indicus has been reported from Gilgit Baltistan [12]; from Hunza, Chillas, Kohat, Abad Khel, Bahawalpur, Sindh: Ghotki, Sukkur, Allahyar Pinhwar; from Dir and Pothwar [13]; from Sindh [14]. Present study confirmed the habitats of this species for the first time from subtropical rain forest of Malakand.

Polistes olivaceus De Geer, 1773 (Fig. 2)

Material examined

Ghanidheri 2♀ (15/09/2017), 1♀ (03/10/2018), 1♀ (06/05/2017), 1♀

(11/06/2018), 1♀ (27/06/2018), 1♀
 (31/06/2018), 1♀ (12/07/2018), 2♀
 (13/08/2018), 1♀ (10/07/2018), 1♀
 (12/07/2018), 1♀ (15/07/2018), 1♀
 (11/08/2018), 1♀ (14/08/2018), 1♀
 (25/08/2018), 2♀ (26/08/2018), Haryankot 2♀
 (22/09/2017), Khatakoshah 3♀ (19/08/2018),
 Meherdai 5♀ (29/08/2018), Petaw 1♀
 (02/09/2018).

Distribution

Bangladesh; Bhutan; Cambodia; Chagos Archipelago; Chile, Easter Is. (introduced); China (including Hong Kong and Taiwan); Egypt; Fiji; French Polynesia; Hawaii; Indonesia; Iran; Japan; Laos; Madagascar; Malaysia; Marianas; Mauritius; Myanmar; Nepal; New Caledonia; New Zealand (introduced); Oman; Pakistan; Philippines; Réunion; Samoa; Seychelles; Singapore; Society Is.; Sri Lanka; Tanzania; Thailand; Tonga; U.S.A. (introduced); Vietnam [7, 13, 15, 16].

Remarks

Early reported from Rawalpindi and Gilgit Baltistan [17]; from Dir [13]; from Gilgit Baltistan, Punjab [18]; from region of Pothwar [13]. We reported this species for the first time from subtropical rain forest of Malakand.

Polistes wattii Cameron, 1900 (Fig. 3)

Material examined

Haryankot 1♀ (04/09/2017), Ghanidheri 1♀
 (10/06/2018), 1♀ (28/06/2018), 3♀
 (31/06/2018), 1♀ (04/07/2018), 1♀
 (05/07/2018), 2♀ (06/07/2018), 2♀
 (09/07/2018), 1♀ (10/07/2018), 13♀
 (25/07/2018), 1♀ (16/08/2018), 1♀
 (18/08/2018), Dargai 1♀ (03/07/2018),
 Khatakoshah 4♀ (19/08/2018), Meherdai 1♀
 (29/08/2018), Petaw 1♀ (02/09/2018).

Distribution

Afghanistan; China; India; Iran; Iraq; Mauritius; Oman; Pakistan; Saudi Arabia; Tajikistan; Turkmenistan; U.A.E. [7, 15, 18].

Remarks

Early reported from Rawalpindi and Attock [13]; from Gilgit Baltistan [15]; from Islamabad and Multan [17]; from Dir [14, 19]. Present study reported *Polistes wattii* for the

first time from subtropical rain forest of Malakand.

Ropalidia brevita Das & Gupta, 1989 (Fig. 4a, b)

Material examined

Ghanidheri 1♂ (15/09/2017), 1♀
 (04/06/2018), 1♀ (10/06/2018), Petaw 2♂, 9♀
 (02/09/2018).

Distribution

India, Pakistan [7, 13, 15].

Remarks

Earlier reported from Abbottabad, Ghari Habibullah, Mansehra and Islamabad [18]; from Islamabad-Rawalpindi, Attock, Murree, Jhelum and Chakwal [13]; from Rawalpindi [17]; from Sindh: Hyderabad, Mirpur Khas and Umakot [14]. This study recorded *Ropalidia brevita* for the first time from subtropical rain forest of Malakand.

Ropalidia cyathiformis Fabricius, 1804 (Fig. 5)

Material examined

Haryankot 1♀ (22/09/2017), Ghanidheri 3♀
 (27/09/2017), 2♀ (05/06/2018), 1♀
 (27/06/2018), 1♀ (01/07/2018), 1♀
 (03/07/2018), 2♀ (10/07/2018), 1♀
 (15/08/2018), 2♀ (16/08/2018), Dargai 1♀
 (03/07/2018).

Distribution

Pakistan [18], Nepal, India, Sri Lanka, Burma, Java, Malaya, Sumba, Sulawesi [7], Indonesia, Vietnam, Thailand, China, Malaysia, Philippines, Myanmar [20].

Remarks

Early reported from Swat [18]; from Pothwar [13]; Rawalpindi [17]. Present report is for the first time from subtropical rain forest of Malakand.

Subfamily Vespinae

Vespa orientalis Linnaeus, 1771 (Fig. 6)

Material examined

Heroshah 17♀ (31/08/2017), Haryankot 1♀
 (21/09/2017), Warter 1♀ (14/05/2018),
 Ghanidheri 3♀ (19/04/2018), 1♀
 (12/05/2018), 2♀ (13/05/2018), 2♀
 (01/06/2018), 1♀ (04/06/2018), 2♀
 (14/06/2018), 2♀ (26/06/2018), 1♀
 (31/06/2018), 2♀ (09/07/2018), 1♀
 (11/07/2018), 1♀ (12/07/2018), 2♀

(15/07/2018), 1♀ (19/07/2018), 2♀
 (30/07/2018), 3♀ (02/08/2016), 1♀
 (04/08/2018), 2♀ (08/08/2018), 1♀
 (15/09/2018), Dargai 2♀ (03/07/2018),
 Khatakoshah 8♀ (19/08/2018), Meherdai 5♀
 (29/08/2018), Petaw 2♀ (02/09/2018).

Distribution

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; Pakistan; Romania; Russia; Saudi Arabia; Somalia; Syria; Tajikistan; Turkey; Turkmenistan; U.A.E.; Uzbekistan; Yemen [7, 15, 20].

Remarks

Early report from Punjab [7]; from Chitral, Brun and Bamboret valley [10]; from Mardan, Abbottabad and Islamabad [18]; from Attock, Rawalpindi-Islamabad, Murree, Chakwal and Jhelum [13]; from Abbottabad, Mansehra, Battagram, Havelian, Alai, Balakot and Baffa [17]. We confirmed the presence of *Vespa orientalis* for the first-time from subtropical rain forest of Malakand.

Vespa tropica Linnaeus, 1758 (Fig. 7)

Material examined

Heroshah 33♀ (31/08/2017) Ghanidheri 1♀
 (06/05/2018), 1♀ (16/05/2018), 1♀
 (18/05/2018), 2♀ (30/05/2018), 1♀
 (16/08/2018), Warter 1♀ (14/05/2018),
 Meherdai 2♀ (29/08/2018), Petaw 1♀
 (02/09/2018).

Distribution

Bhutan; Brunei; Cambodia; China; Indonesia; Laos; Malaysia; Myanmar; Nepal; Pakistan; Philippines; Singapore; Sri Lanka; Thailand; Vietnam [13, 15, 16].

Remarks

Early reported from Attock, Chakwal and Rawalpindi [13]; from Islamabad, Margalla hills, Rawalakot and Rawalpindi [17]; from Peshawar, Abbottabad and Islamabad [18]; from Azad Jammu and Kashmir [14]. We reported *Vespa tropica* for the first time from subtropical rain forest of Malakand.

Vespa velutina Lepeletier, 1836 (Fig. 8)

Material examined

Ghanidheri 1♀ (02/05/2018), 12♀
 (11/07/2018), 1♀ (15/08/2018), 1♀
 (16/08/2018), Petaw 6♀ (02/09/2018).

Distribution

Afghanistan; Bhutan; China (including Taiwan); Indonesia; Laos; Malaysia; Myanmar; Pakistan; South Korea [introduced]; Thailand; Vietnam [7, 15, 16].

Remarks

Early reported from Khyber Pakhtunkhwa [7, 10]; from Islamabad; Gilgit-Baltistan: Diamar, Afzal, Gilgit, Nomal, Chilas, Shangla, Charbagh, Swat, Garihabibullah, Shougran, Abbottabad and Nathiagali [18]; from Islamabad-Rawalpindi, Murree, Chakwal, Jhelum and Attock [13]; from Gilgit-Baltistan [15]; from Punjab, Khyber Pakhtunkhwa Islamabad and Azad Jammu and Kashmir [17]. This study reports the species of *Vespa velutina* for the first time from subtropical rain forest of Malakand.

Subfamily Euneninae

Delta dimidiatipenne Saussure, 1852 (Fig. 9a, b)

Material examined: Warter 2♂ (14/05/2018), 1♂ (04/07/2018), Ghanidheri 1♀
 (29/05/2018), 1♀ (04/06/2018), 1♀
 (11/06/2018) 1♀ (26/06/2018), 1♀
 (02/07/2018), 1♀ (25/08/2016).

Distribution: Afghanistan; Africa; Algeria; Arabia; Canary Islands; Chad; Djibouti; Egypt; Eritrea; Ethiopia; Iran; Madagascar; Mauritania; Nepal; Niger; Pakistan; Palestine; Spain; Somalia; South Africa; Sudan; Syria; Turkey; Uganda; Yemen [4, 15].

Remarks: Early reported from Islamabad-Rawalpindi, Murree, Chakwal and Jhelum [15]; from Swat [21]; from Multan, Mingora, Astore, Sukkhur and Azad Jammu and Kashmir [17]. Present study recorded *Delta dimidiatipenne* for the first time from subtropical rain forest of the study area.

Delta esuriens Fabricius, 1787 (Fig. 10a, b)

Material examined

Haryankot 1♂ (23/09/2017), Ghanidheri 2♀
 (09/05/2018), 1♀ (19/05/2018), 1♀
 (01/06/2018), 1♀ (11/06/2018), 1♀
 (12/06/2018), 1♀ (22/06/2018), 1♂

(01/07/2018), 1♂ (04/07/2018), 1♀
 (14/07/2018), 1♀ (16/07/2018), 1♀
 (18/07/2018), 1♀, 1♂ (22/07/2018), 1♂
 (30/07/2018), 1♀ (01/08/2018), 1♀
 (04/08/2018), 1♂ (11/08/2018), 1♀
 (14/08/2018), 1♂ (17/08/2018), 1♂
 (18/08/2018), 1♀ (19/08/2018), 1♀
 (30/08/2018), Wartair 5♀, 3♂ (14/05/2018),
 2♂ (09/06/2018), Petaw 2♂ (02/09/2018).

Distribution

Arabia; China; Bhutan; Indonesia; Iran; Iraq;
 Israel; Laos; Mauritius; Myanmar; New
 Caledonia; Oman; Pakistan; Philippines;
 Qatar; Saudi Arabia; Thailand; Sri Lanka;
 United Arab Emirates; Vietnam [12, 15].

Remarks

Early reported from Khyber Pakhtunkhwa:
 Mansehra, Dir and Khanpur [18]; from
 Rawalpindi-Islamabad, Chakwal and Attock
 [13]; from Islamabad, Jammu & Kashmir [17]
 and from Lower Dir [19]. *Delta esuriens*
 reported for the first time from subtropical
 rain forest of Malakand by present study.

Delta pyriforme pyriforme Fabricius, 1775
 (Fig. 11)

Material examined

Ghanidheri 1♂ (21/09/2018).

Distribution

Bhutan; Cambodia; China (including Taiwan
 and Hong Kong); Hawaii; Indonesia; Laos;
 Malaysia; Moluccas; Myanmar; Nepal; New
 Guinea; Pakistan; Sri Lanka; Thailand;
 Vietnam [12, 15].

Remarks

Previously reported from Punjab, Peshawar
 and Islamabad [18]; from Islamabad-
 Rawalpindi [13]. For the first time present
 study reported *Delta pyriforme pyriforme*
 from subtropical rain forest of Malakand.

Allorhynchium metallicum de Saussure, 1852
 (Fig. 12a, b)

Material examined

Ghanidheri 1♀, 1♂ (15/09/2017), 4♀
 (12/05/2018), 1♂, 1♀ (15/05/2018), 1♂
 (16/05/2018), 1♀ (17/05/2018), 1♀
 (06/06/2018), 1♂ (21/06/2018), 2♀, 1♂
 (23/06/2018), 1♂ (24/06/2018), 1♀, 1♂
 (27/06/2018), 1♀ (28/06/2018), 1♀
 (30/06/2018), 1♀ (01/07/2018), 2♀

(03/07/2018), 1♀ (11/07/2018), 1♂, 1♀
 (21/07/2018), 3♀ (04/08/2018), 2♂, 1♀
 (14/08/2018), 1♂ (17/08/2018), 1♀
 (05/09/2018), Haryankot 1♀ (23/09/2017),
 Dargai 2♀ (03/07/2018), Khatakoshah 4♀, 4♂
 (19/08/2018), Meherdai 1♀ (29/08/2018),
 Petaw 1♀ (02/09/2018).

Distribution

China; Bhutan; Indonesia; Laos; Malaysia;
 Myanmar; Nepal; Pakistan; Philippines;
 Singapore; Thailand [4, 13, 15, 22].

Remarks

Early reported from Chakwal, Attock, Jhelum,
 Rawalpindi and Islamabad [12]; from Khyber-
 Pakhtunkhwa: Chitral; Punjab: Changa Manga
 and Gilgit-Baltistan: Skardu [16].
Allorhynchium metallicum reported for the
 first time from subtropical rain forest of
 Malakand by this study.

Anterhynchium abdominale abdominale
 Illiger, 1802 (Fig. 13a, b)

Material examined

Khatakoshah 2♂, 3♀ (19/08/2018),
 Ghanidheri 1♂, 1♀ (06/09/2018), Meherdai
 2♀ (29/08/2018), Petaw 2♀ (02/09/2018).

Distribution

Pakistan, India, Sri Lanka, China, Myanmar
 and Vietnam [4, 15].

Remarks

Early reported from Islamabad [17]. This
 study reported *Anterhynchium abdominale*
abdominale for the first time from subtropical
 rain forest of Malakand.

Rhynchium oculatum leviscutis Cameron,
 1908 (Fig. 14a, b)

Material examined

Ghanidheri 1♀ (25/05/2018), 1♂
 (30/06/2018).

Distribution

India, Afghanistan [4, 15].

Remarks

Present study reported this species for the first
 time from Pakistan as there was no previous
 record of this species documented from the
 country.

Rhynchium carnaticum Fabricius, 1798 (Fig.
 15a, b)

Material examined

Ghanidheri 1♀ (11/09/2017), 1♀ (30/06/2018), 1♂ (14/08/2018), 1♀ (18/08/2018), 1♀ (08/09/2018), Petaw 1♂ (02/09/2018).

Distribution

Pakistan, India, Sri Lanka and Indonesia [15, 23].

Remarks

Early report from Swat [21]. *Rhynchium carnaticum* reported for the first time from subtropical rain forest of the area by present study.

Rhynchium brunneum brunneum Fabricius, 1793 (Fig. 16)

Material examined

Ghanidheri 1♀ (07/05/2018), 1♀ (23/09/2018).

Distribution

Bangladesh; Bhutan; Cambodia; China (including Taiwan); Indonesia; Laos; Malaysia; Marianas; Myanmar; Nepal; New Britain; Pakistan; Palau; Seychelles; Thailand; Vietnam [4, 15].

Remarks

Early reported from Rawalpindi and Attock [13]. We reported *Rhynchium brunneum brunneum* for the first time from Khyber Pakhtunkhwa Province of Pakistan as there was no previous record of this species documented from this Province.

Eumenes punctatus de Saussure, 1852 (Fig. 17)

Material examined

Ghanidheri 1♀ (15/09/2017), 1♀ (29/09/2018), 1♀ (30/09/2018), Haryankot 2♀ (22/09/2017).

Distribution

Pakistan, Russia, China, Sri Lanka, India, Japan, Korea and Russia [7, 15].

Remarks

Early report from Attock [13]. We reported *Eumenes punctatus* for the first time from Khyber Pakhtunkhwa Province of Pakistan as there was no previous record of this species documented from this Province.

Antepipona sibilans Cameron, 1903 (Fig. 18a, b)

Material examined

Haryankot 1♀ (22/09/2018), Ghanidheri 1♀ (22/08/2018), 1♀ (26/08/2018), Meherdai 1♀, 1♂ (29/08/2018).

Distribution

Pakistan, Nepal and India [4].

Remarks

Early report from Attock, Rawalpindi, Islamabad and Chakwal [13]. Present study collected *Antepipona sibilans* for the first time from Khyber Pakhtunkhwa Province of Pakistan.

Antepipona deflenda Saunders, 1853 (Fig. 19)

Material examined

Ghanidheri 1♀ (11/09/2017), 2♀ (25/08/2018).

Distribution

Pakistan, China, Iraq, Iran, Turkey, Uzbekistan, Albania, Lebanon, Austria, Russia, Germany, France, Portugal and Spain [24].

Remarks

Early report from Swat [21]. We reported *Antepipona deflenda* for the first time from subtropical rain forest of Malakand.

Figure (1-12a): 1. *Polistes indicus* ♀, 2. *Polistes olivaceus* ♀, 3. *Polistes wattii* ♀, 4a. *Ropalidia brevita* ♀, 4b. *Ropalidia brevita* ♂, 5. *Ropalidia cyathiformis* ♀, 6. *Vespa orientalis* ♀, 7. *Vespa tropica* ♀, 8. *Vespa velutina* ♀, 9a. *Delta dimidiatipenne* ♀, 9b. *Delta dimidiatipenne* ♂, 10a. *Delta esuriens* ♀, 10b. *Delta esuriens* ♂, 11. *Delta pyriforme pyriforme* ♀, 12a. *Allorhynchium metallicum* ♀

Figure (11b-19) 12b. *Allorhynchium metallicum*♂, 13a. *Anterhynchium abdominale*♀, 13b. *Anterhynchium abdominale*♂, 14a. *Rhynchium oculatum leviscutis*♀, 14b. *Rhynchium oculatum leviscutis*♂, 15a. *Rhynchium carnaticum*♀, 15b. *Rhynchium carnaticum*♂, 16. *Rhynchium brunneum brunneum*♀, 17. *Eumenes punctatus*♀, 18a. *Antepipona sibilans*♀, 18b. *Antepipona sibilans*♂, 19. *Antepipona deflenda*♀

Conclusion

In conclusion, we have identified total 19 species of wasps from district Malakand, among which one *Rhynchium oculatum leviscutis* was 1st record from Pakistan, 3 species: *Rhynchium brunneum brunneum*, *Eumenes punctatus*, *Antepipona sibilans* was

1st record from Khyer Pakhtunkhwa, while 14 species: *Polistes indicus*, *Polistes olivaceus*, *Polistes wattii*, *Ropalidia brevita*, *Delta dimidiatipenne*, *Delta esuriens*, *Delta pyriforme pyriforme*, *Ropalidia cyathiformis*, *Vespa orientalis*, *Vespa tropica*, *Vespa*

velutina, *Allorhynchium metallicum*, *Anterhynchium abdominale abdominale*, *Rhynchium carnaticum*, and *Antepipona deflenda*. were recorded from district Malakand for the first time

Authors' contributions

Conceived and designed the experiments: Q Khan & Q Zaman, Performed the experiments: S Ahmad, Q Zaman, M Ismail, Ahmadullah, R Ali, U Ali & Q Jamal, Analyzed the data: S Ahmad, Q Zaman & Q Khan, Contributed materials/ analysis/ tools: Q Khan, Q Zaman & G Rahman, Wrote the paper: Q Zaman, Q Khan, S Ahmad & H Khan.

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