

Research Article

Taxonomic study on potter wasps (Hymenoptera: Vespidae: Eumeninae) of Malakand, Pakistan

Riaz Ahmad¹, Muhammad Zahid¹, Muhammad Rasool², Mudassir Shah³, Muhammad Sajid^{1*}, Muhammad Tariq Khan⁴ and Pir Habib Ullah¹

1. Department of Zoology Islamia College University, Peshawar-Pakistan

2. Department of Zoology, Dr. Khan Shaheed Govt: Degree College Kabal Swat-Pakistan

3. Department of Zoology, Govt: Superior Science College Peshawar-Pakistan

4. Department of Science and Environmental Studies, The Education University of Hong Kong, Tai Po, New Territories-Hong Kong

*Corresponding author's email: Muhammadsajid541@gmail.com

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Abstract

The present study was done in district Malakand, Khyber Pakhtunkhwa, Pakistan. This study was conducted to record the biodiversity of subfamily Eumeninae in district Malakand. The specimens were collected from diverse localities of Malakand through active search with the use of hand net. The captured specimens were then killed by spraying insecticides in the hand nets. The killed specimens were transferred to bottles having 95% ethanol, cyanide and ethyl acetate. The specimens were then placed in freezer for 1 or 2 days to prevent any fungal contamination. The entomological pins were used for the pinning of dead specimens. The dried wasps were labeled and transferred to insect boxes having naphthalene balls as a preservative. The dried wasps were then observed and identified up to species and subspecies level with the help of previous published literature. A total of 7 species (*Delta dimidiatipenne*, *Antodynerus limbatus*, *Rhynchium carnaticum*, *Allorhynchium argentatum*, *Katamenes dimidiatus*, *Antepipona sibilans* and *Antepipona deflenda*), 3 subspecies (*Delta pyriformepyriforme*, *Delta esuriensesuriens* and *Antodynerus flavesens flavesens*) under 6 genera (*Delta*, *Antodynerus*, *Rhynchium*, *Allorhynchium*, *Katamene* and *Antepipona*) of the subfamily Eumeninae are reported. These taxa are recorded for the first time from district Malakand, Khyber Pakhtunkhwa, Pakistan.

Keywords: *Antepipona*; *Antodynerus*; *Allorhynchium*; *Delta*; *Katamene*; *Rhynchium*

Introduction

The subfamily Eumeninae is the largest and diverse subfamily of the family Vespidae. It contains 3,773 species under 205 genera. The wasps belonging to this subfamily are present throughout the world [1]. The

Eumeninae is the primary lineage of the family Vespidae. The members of Eumeninae are generally named as “potter wasps”. It is more abundant and varied group having many species as compared to other subfamilies of the Vespidae. They are

the common predators in most ecosystems [2]. They are called potter wasps because members of genus *Eumenes* and other similar genera made their nest from mud [3]. Eumeninae wasps are classified in 3 tribes which are Zethini, Odynerini, and Eumenini [4]. Potter wasps are solitary wasps some species show primitive social behavior. Larvae of Eumeninae wasps are predators of many insect larvae while the adult of this subfamily feed on nectar. Eumeninae is economically very important because they are the predators of many pests. These wasps are also called mason wasps [5]. Size of the adult is about 2mm to 28mm. Some species have *Petiolate metasoma* but most wasps are not Petiolate. Parategula present on mesoscutum, tarsal claws are bifid, hind coxa has longitudinal carina on dorsal side and three sub marginal cells present in forewing [6]. They cannot form colony and have no labour division. The female of solitary wasps capture the insect, paralyze their prey (insect) by stinging and bring it to their nests. Each cell in the nests of potter wasps is filled by one insect (single). The wasps lay eggs in these prey filled cells and seal them. Solitary wasps construct their nest from clay and mud. Spider wasps are the largest wasps among Potter wasps [7]. Some solitary wasps are burrowers in soil or wood while some species of the genera *Calligaster* and *Zethus* construct nests from plant materials [8]. The wasps of this subfamily used different methods for nest construction. One female (single female) starts the nest construction from different materials used mud or clay sometimes used vegetable and plant materials. On the basis of nests locations (habitats) Eumeninae wasps are of three types, i.e. renters, excavators and builders. Most species of this group are provisioners [9].

Materials and Methods

Study area

District Malakand is located among 34-22' to 34-41' north latitudes and 71-37' to 72-14' east longitudes. It is attached to district Swat by a series of hills on the east-north. It is connected to Mohmand Agency and Bajawar Agency through a range of mountains on the west and to district Dir Lower on north. It is also linked to district Bunir on east, district Charsada on south to west and district Mardan on south to east. Total area of the district is about 952 km² (District Census Report, 1998).

Specimens' collection

The specimens were collected from diverse localities of Malakand through active search with the use of the hand net. The specimens were caught from both plan area (public parks, old and new buildings, flowering plants, agronomic crops, gardens, fruit markets, vegetable markets, fields, and other vegetation) and mountains (grasses, springs water, damp area, water stream, small, and large trees) of the Malakand. The captured specimens were then killed by spraying insecticides (Black Cobra) in the hand nets.

Preservation of the specimens

The killed specimens were transferred to bottles having 95% ethanol, cyanide and ethyl acetate. The specimens were then placed in freezer for 1 or 2 days to prevent any fungal contamination. The entomological pins were used for the pinning of dead specimens. The dried wasps (specimens) were labeled and transferred to insect boxes. Naphthalene balls were present in each insect box as a preservative.

Microscopy

Specimens were observed through Stereomicroscope (Nikon Japan) to record taxonomically important structures.

Photography

Pictures of the specimens were captured through Canon camera.

Specimens' identifications

The collected wasps were observed and identified up to species and subspecies level with the help of previous published latest literature [5, 9-21].

Measurements

The measurements of the complete body (body length), and body parts of the specimens were done through Digital Calliper.

Results and Discussion

The present study was conducted in district Malakand, Khyber Pakhtunkhwa, Pakistan. Total of 7 species *Delta dimidiatipenne* (de Saussure, 1852), *Antodynerus limbatus* (de Saussure, 1852), *Rhynchium carnaticum* (Fabricius, 1798), *Allorhynchium argentatum* (Fabricius, 1804), *Katamenes dimidiatus* (Brulle 1832), *Antepipona sibilans* (Cameron, 1903), *Antepipona deflenda* (Saunders, 1853) and 3 subspecies *Delta pyriformepyriforme* (Fabricius, 1775), *Delta esuriensesuriens* (Fabricius, 1787), *Antodynerousflavesens flavesens* (Fabricius, 1775) under 6 genera *Delta*, *Antodynerus*, *Rhynchium*, *Allorhynchium*, *Katamene* and *Antepipona* of the subfamily Eumeninae were reported. All the reported species and subspecies were not previously recorded in district Malakand.

Systematic List

Order Hymenoptera

Family Vespidae

Subfamily Eumeninae

Genus: *Delta* de Saussure, 1885

1. *Delta pyriformepyriforme* (Fabricius, 1775)
2. *Delta esuriensesuriens* (Fabricius, 1787)
3. *Delta dimidiatipenne* (de Saussure, 1852)

Genus: *Antodynerus* de Saussure, 1855

4. *Antodynerous flavesens flavesens* (Fabricius, 1775)
5. *Antodynerus limbatus* (de Saussure, 1852)

Genus: *Rhynchium* Spinola, 1806

6. *Rhynchium carnaticum* (Fabricius, 1798)

Genus: *Allorhynchium* van der Vecht, 1963

7. *Allorhynchium argentatum* (Fabricius, 1804)

Genus: *Katamenes* Meade-Waldo, 1910

8. *Katamenes dimidiatus* (Brulle 1832)

Genus: *Antepipona* de Saussure, 1855

9. *Antepipona sibilans* (Cameron, 1903)

10. *Antepipona deflenda* (Saunders, 1853)

Genus: *Delta* de Saussure, 1885

1. *Delta pyriformepyriforme* (Fabricius, 1775)

Material examined

Tangi Hills 1 ♀ 5.iv 2018, Tangi Hills 1 ♀ 12.iv 2018, Agra Hills 1 ♀ 30.iv 2018, Malakand Hills 1 ♂ 29. vi 2018, Agra Village 1 ♀ 1.vii 2018, Haryankot 1 ♂ 12.viii 2018, Pirano Hills 1 ♀ 13.viii 2018, KotManzari Baba 1 ♀ 31.viii 2018.

Body measurements

The length of the female is 23-28.4 mm and the length of the fore wing of female is about 22.1-22.3 mm. The body length of male is 21.5 mm and the length of fore wing of male is 18 mm.

Distribution

Pakistan, India, Nepal, Vietnam, Thailand, China, Sri Lanka, Bhutan and Myanmar (Fig. 1) [22].

Remarks

In Pakistan *Delta pyriformepyriforme* was earlier reported from Khyber Pakhtunkhwa: Lower Dir: Talash [23] and from Punjab: Rawalpindi [24], Bahawalpur, Rawalpindi, Rajanpur, Jhelum, D.G. Khan, Attock, Sargodha, Bakha, Khushab, Layyah, Jhang and Muzafargarh Mianwali [6]. Gusenleitner recorded it from Islamabad [25]. Khan *et al* reported it from Azad Jammu and Kashmir: Poonch: Rawalakot [26]. In the current study it is first time reported from Malakand.



Figure 1. *Delta pyriformepyriforme* (Fabricius, 1775)

2. *Delta esuriensesuriens* (Fabricius, 1787)

Material examined

Tangi hills 1 ♀ 1.v 2018, Meshta 1 ♀ 20.v 2018, Meshta Hills 1 ♀ 26.v 2018, Qulangi 2 ♀ 3.vi 2018, Matkani hills 1 ♂ 10.vii 2018, Matkanisulgar 1 ♂ 29.vii 2018, Bosaq Road 1 ♀ 30.vii 2018, Jalawanan 1 ♂ 19.viii 2018, Wartier1 ♀ 25.viii 2018, KotManzarigul baba 3 ♀ 31.viii 2018,

Body measurements

The length of the female is 17.1-18 mm and the fore wing length of female is 13-14.3 mm. The length of the male is 14-15.5 mm and the length of the fore wing of male is 10.9-11.2 mm.

Distribution

Pakistan, India, Iran, Mauritius, Israel, Iraq, Qatar, UAE, Indonesia, Oman, Sri Lanka, Laos, Myanmar, New Caledonia, Philippines, Vietnam, Saudia Arabia, and Thailand (Fig. 2) [22].

Remarks

It is newly reported from Malakand. *Delta esuriensesuriens* was earlier recorded from Pakistan: Sindh: Qambar, Ubauro, PanoAqil, Nagarpakar and Gorakh Hills [27], Khyber Pakhtunkhwa: Lower Dir: Rabat and Upper Dir: Sheringal [23], Islamabad and Punjab: Chakwal, Rawalpindi and Attock [24] and Baluchistan: Quetta [28].



Figure 2. *Delta esuriensesuriens* (Fabricius, 1787)

3. *Delta dimidiatipenne* (de Saussure, 1852)

Material Examined

Qulangi1♀ 27.iv2018, Shenki Hills 1 ♀ 28.iv 2018, Meshta Hills 2 ♀ 30.iv 2018,

Qulangi Shulgar 1 ♀ 1.v 2018, Haryankot hills 1 ♀ 3.vi 2018, Tana2 ♀ 7.vi 2018, Alladand 1 ♂ 9.vi 2018, Tarayi1 ♀ 11.vi 2018, Bosaq 2 ♀ 31.vii 2018, Patak 1 ♀ 11.ix 2018.

Body measurements

The length of the female is 25-26.2 mm and its fore wing is 21.5-22 mm while the length of male is 22.8 mm and the length of the fore wing of male is 21 mm.

Distribution

India, Pakistan, Mauritania, South Africa, Oman, Egypt, Afghanistan, Sudan, Algeria, Saudi Arabia, Chad, Nepal, Djibouti, Ethiopia, Morocco, Syria, UAE, Eritrea, Uganda, Yemen, Qatar, Turkmenistan, Jordan, Iran, Niger, Turkey, Tajikistan, Spain, and Somalia [22]. UAE, North Africa, Yemen and Nepal (Fig. 3) [29].

Remarks

During this study it is first time reported

from Malakand. In Pakistan, *Delta dimidiatipenne* was previously reported from Sindh: Larkana, Dadu city, Sukkur, Kotri, Hyderabad, Umarmkot, Nagarparkar, and Korangi [27]. It was recorded from Khyber Pakhtunkhwa: Swat: Takhatiband Mingora and Kabal [30] and from Khyber Pakhtunkhwa: Lower Dir: Chakdara [23]. It was described from Gilgit-Baltistan: Hunza and Ghizer [31]. In Punjab it was reported from Jhelum, Rawalpindi, Murree, Chakwal, and Attock [24]. Gusenleitner recorded from Baluchistan: Quetta [28]. Khan *et al.* identified from Azad Jammu and Kashmir: Poonch and Banjosa [26].



Figure 3. *Delta dimidiatipenne* (de Saussure, 1852)

Genus: *Antodynerus* de Saussure, 1855

4. *Antodynerus flavesens flavesens* (Fabricius, 1775)

Material examined

Pirkhel Bica 1 ♀ 19.vii 2018, Bosaq 2 ♀ 30.vii 2018, Agra Village 1 ♂ 3.viii 2018, Agra Hills 1 ♂ 3.viii 2018.

Body measurements

The female body length is 10.5-12.2 mm and the length of female fore wing is 9-9.5mm while the length of male is 11 mm and the fore wing length of male is 8.8 mm.

Distribution

Pakistan, Bangladesh and India (Fig. 4) [22].

Remarks

Antodynerus flavesens flavesens was reported from Islamabad [22].



Figure 4. *Antodynerus flavesens flavesens* (Fabricius, 1775)

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

Material examined

Shinki Hills 2 ♀ 9.v 2018, Korjaba Hills 1 ♀ 19.v 2018, Meshta Hills 1 ♀ 26.v 2018, Kabir Hills 1 ♂ 4.vii 2018, AgraHils 1 ♀ 21.vii 2018, Inzargi Hills 1 ♂ 3.viii 2018.

Body measurements

Length of the female is 15-15.8 mm and the length of the fore wing of female is 10.2-11 mm. The length of the male body is 12 mm and the fore wing length is 9.7 mm.

Distribution

Pakistan, India, China, Nepal, Myanmar, Thailand and Laos (Fig. 5) [22].

Remarks

Earlier from Pakistan *Antodynerus limbatus* was described from Sindh: Dokri, Mehrabpur and ThariMirwah [27]. It was reported from Khyber Pakhtunkhwa: Abbottabad and Kashmir: Muzafarabad [22]. It was also recorded from Punjab Taxila [25].



Figure 5. *Antodynerus limbatus* (de Saussure, 1852)

Genus: *Rhynchium* Spinola, 1806

6. *Rhynchium carnaticum* (Fabricius, 1798)

Material examined

Haryankot, 1 ♀ 20.vii 2018

Body measurements

The length of the body is 16.8 mm and the length of the fore wing is 13 mm.

Distribution

Sri Lanka, Indonesia, India and Pakistan (Fig. 6) [22].

Remarks

Rhynchium carnaticum was earlier reported from Khyber Pakhtunkhwa Swat: Takhtaband [30]. This species was also previously recorded from Sindh: Karachi [16, 31].



Figure 6. *Rhynchium carnaticum* (Fabricius, 1798)

Genus: *Allorhynchium* van der Vecht, 1963

7. *Allorhynchium argentatum* (Fabricius, 1804)

Material examined

Agra 1 ♂ 21.vii 2018

Body measurements

The length of male is 13 mm and the length of fore wing of the male is 11.1 mm.

Distribution

Malaysia, Thailand, Laos, India, Bhutan, Myanmar, Philippines, Pakistan, Nepal, Indonesia, Laos and Singapore (Fig. 7) [22].

Remarks

Previously in Pakistan *Allorhynchium argentatum* was recorded from Sindh: Halaji Lake, Malir and Mirpur Khas [27], Khyber Pakhtunkhwa: Lower Dir: Timergara [23],

Khyber Pakhtunkhwa: Chitral: Bronze and Kalash, From Punjab: Lahore: Changa Manga and from Gilgit-Baltistan: Skardu: City Road [22]. It was reported from Islamabad and Punjab: Chakwal Rawalpindi, Jhelum and Attock [24]. This species was also recorded from Gilgit-Baltistan: Skardu and Ghizer [32]. In the present study, it is a newly recorded species in Malakand.



Figure 7. *Allorhynchium argentatum* (Fabricius, 1804)

Genus: Katamenes Meade-Waldo, 1910

8. Katamenes dimidiatus (Brulle 1832)

Material examined

Chenar gar 1 ♀, 6.iv 2018, Agra 1 ♀ 24.iv 2018, Bosaq 1 ♀ .v 2018

Body measurements

Body length is 18.3-18.8 mm and the length of fore wing is 15-16 mm.

Distribution

Iran, India, Pakistan, Afganistan, Central Asia, Kazakhstan, Turkey, Mongolia, Syria, Israel, Russia, Europe, Caucasus and Cyprus (Fig. 8) [29].

Remarks

In Malakand it is newly reported. Previously in Pakistan it was reported by Gusenleitner from Baluchistan: Quetta: Chiltan National Park and Hazarganji [28].



Figure 8. *Katamenes dimidiatus* (Brulle, 1832)

Genus: Antepipona de Saussure, 1855

9. Antepipona sibilans (Cameron, 1903)

Material examined

Toti 1 ♀ 31.vii 2018, Bosaq 1 ♂ 4.viii. 2018

Body measurements

The length of the female is 7.5 mm and fore wing is 6 mm. The length of the male is 7 mm and fore wing length is 5.8 mm.

Distribution

West Bengal, Pakistan, Nepal and India (Fig. 9) [22].

Remarks

In Pakistan *Antepipona sibilans* was previously recorded from Sindh: Larkana,

Ratodero, Ghotkhi and Sukkur [27]. It was recorded from Khyber Pakhtunkhwa: Swat: Kabal [30]. Rafi *et al.* [22] described it from Punjab: Multan. From Islamabad it was reported by Siddiqui *et al.* [24].



Figure 9. *Antepipona sibilans* (Cameron, 1903)

10. Antepipona deflenda (Saunders, 1853)**Material examined**

Chenar Gar 7♀ 9.v 2018, KowarJaba3♀ 19.v 2018, Meshta 1 ♀ 20.v 2018, Agra 2 ♀ 24.v 2018, Meshta Hills 7 ♀ 26.v 2018, Agra Hills 6 ♀ 23.vi 2018, Meshta 1 ♀ 1.vii 2018, Kabir Hills 2 ♀ 4.vii 2018, Inzargi 3 ♀ 4.vii 2018.

Body measurements

The length of the body is 7-8 mm while the fore wing length is 5.2-6 mm.

Distribution

Pakistan, Tajikistan, France, Uzbekistan, Algeria, China, Iran, Israel, Kazakhstan, Montenegro, Portugal, Switzerland, Turkey, Albania, Austria, Croatia, Germany, Iraq, Italy, Jordan, Lebanon, Morocco, Russia, Spain, Slovakia, Ukraine and Czech Republic [22].

Remarks

This Species is first time recorded from Malakand. *Antepipona deflenda* was earlier reported from Khyber Pakhtunkhwa: Swat: Kabal by Rasool *et al.* [30].



Figure 10. *Antepipona deflenda* (Saunders, 1853)

Conclusion

The current study reported a detail formal taxonomic description Eumeninae fauna collected from district Malakand, Khyber Pakhtunkhwa, Pakistan. A total of 7 species and 3 subspecies under 6 genera of subfamily Eumeninae are reported. The

recorded subspecies and species are *Delta pyriforme*, *Delta esuriens*, *Delta dimidiatipenne*, *Antodynerus flavesens*, *Antodynerus limbatus*, *Rhynchium carnaticum*, *Allorhynchium argentatum*, *Katamenes dimidiatus*, *Antepipona sibilans*

and *Antepipona deflenda*. All the reported species and subspecies are first time recorded from district Malakand.

Authors' contributions

Collected specimens: Riaz Ahmad, Identified the specimens: M Zahid, R Ahmad & M Rasool, Helped in the preparation of manuscript: M Sajid, M Shah, MT Khan & P Habibullah.

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