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Distribution and Zoogeography of Vespidae Wasps in the Tashkent Oasis

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Abstract Scientific research related to the fauna of Vespidae has been carried out by specialized entomologists in America, Europe, Asia, Russia, and Central Asia. Their taxonomic classifications, biology, ecology, and economic importance have been analyzed in detail. However, despite the vast area, diverse orography, and unique ecological and landscape conditions of Uzbekistan, particularly the Tashkent oasis, studies on the Vespidae fauna have been almost non-existent. Based on this, we present data and analytical results regarding the Vespidae true wasps of Uzbekistan, specifically focusing on the Tashkent oasis region.

Keywords Vespidae, Species, Ecosystem, Biodiversity, Euparagiinae, Masarinae, Eumeninae, Stenogastrinae, Polistinae, Vespinae, Tropical connection

1. Introduction

Currently, there is no unified opinion regarding the taxonomy of the class Insecta. A similar situation is also observed in the classification of the order Hymenoptera. [1] We consider it appropriate to present the results of studies on the classification of true wasps according to the classification of the order Hymenoptera accepted by entomologists of the CIS countries, including Russia, as well as Europe and the USA. [5] According to this classification, the taxonomic position of the family Vespidae is as follows:

Insecta – Class Insects
Hymenoptera – Order Hymenoptera (Membrane-winged insects)
Apocrita – Suborder
Vespoidea – Superfamily
Vespidae – Family of True Wasps

Wasps belonging to this family are divided into groups based on their reproductive behavior and life forms — solitary and social species (Kurzenko N.V., 2012). [15]

1. Euparagiinae, Masarinae, Eumeninae, Stenogastrinae, Polistinae, Vespinae (Carpenter J.M., 1981). [7]

The first three groups include only solitary wasps. The last three groups represent a gradual development of social behavior, meaning they are social wasps that live in colonies. In addition, two small subfamilies are known only from photo records: Priorvespinae and Protovespinae (Antropov A.V. et al., 2009). [1]

Solitary populations consist of independent female wasps that build their own nests and raise their offspring without the participation of other castes. Social wasps, on the other hand, are distinguished by their collective behavior within the colony and the clear division of labor among its members.

They belong to the family Vespidae (True Wasps), which includes 6 subfamilies, 256 genera, and 5274 known species in the world fauna (Antropov A.V. et al., 2017). [2] Previously, these wasps were grouped into three subfamilies: social or paper wasps (Vespidae), pollen wasps (Masaridae), and potter wasps (Eumenidae). Today, however, all true wasps are classified under the family Vespidae, which unites six subfamilies: Euparagiinae, Masarinae, Eumeninae, Stenogastrinae, Vespinae, and Polistinae (Kurzenko N.V., 2012). [15]

The first three subfamilies consist of solitary species, while the latter three include social wasps that live in colonies.

In the southwestern part of the Nearctic region, there is a small relict group belonging to the subfamily Euparagiinae. This relict group is represented by a single modern genus, Euparagia (Cresson, 1879), which occurs in the southeastern part of North America and includes 10 species. The genus Euparagia (Cresson, 1879) is considered to be closely related to the genus Odynerus (Prezoto F., 2007 et al.). [16]

In addition, approximately 50 species of the subfamily Stenogastrinae (family Vespidae) are distributed across the southwestern Nearctic region, East Asia, and Australia (Carpenter J.M., 1991). [8] Within the Palearctic region, 1046 species belonging to 81 genera have been identified, and in Russia, there are currently 147 species representing

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31 genera (Kurzenko N.V., 1995). [13] The subfamily Masarinae includes 297 species belonging to 16 genera worldwide, 5 genera, 104 species in the Palearctic, and 2 species in Mongolia: Celonites kozlovi Kostylev, 1935 and Quartinia mongolica Morawitz, 1889 [9]. This subfamily is divided into two tribes: the Gayellini tribe, which includes 10 species belonging to 2 genera living in the Neotropical region. They are widely distributed in the warm and dry zones of the Palearctic and Afrotropical regions. In Russia, pollen wasps are found in the southern European part, as well as in the Caucasus and Central Asia.

Within the subfamily Vespinae, there are 30 species belonging to 3 genera in the Palearctic region, and 11 species from 3 genera in Mongolia. The subfamily Eumeninae comprises 887 species belonging to 71 genera in the Palearctic region, and 79 species belonging to 20 genera in Mongolia. The subfamily Polistinae includes 25 species from 2 genera in the Palearctic region, and 8 species belonging to the genus Polistes in Mongolia (Buyanjargal B. et al., 2013a). [4]

Among social wasps, the Polistinae subfamily is considered the most widespread. It consists of 985 species belonging to 26 genera, being most abundant in the Neotropical regions (Pickett K.M., 2010). [19] The genus Polistes (Vespidae: Polistinae) represents the most widely distributed group among true wasps, including 222 species that occur in all biogeographic regions except Antarctica. Most of these species are found in tropical countries (Carpenter J.M., 1996).

Due to their wide distribution, high biodiversity, and ecological interactions with other organisms, these insects have become an important component of the Neotropical ecosystems (Silveira O.T., 2012). [18] Therefore, the Neotropical region is regarded as an area rich in the fauna and biodiversity of true wasps.

Faunistic studies related to true wasps (Vespidae) in Uzbekistan were carried out between 1984 and 2015. In particular, during the 1970s–1990s, researchers such as N.V. Kurzenko (1977), who studied Eumeninae (Hymenoptera: Vespoidea), A.G. Davletshina (1979), and T.T. Kulumbetova (1999) reported the occurrence of species such as Vespula germanica, Vespa orientalis, and Eumenes laevis (Kulumbetova T.T., 1991).

Later, Romankov, L. Castro, and L. Dvorak recorded the species Polistes dominula (Christ, 1791) in the Takhyakupir region of the Republic of Karakalpakstan and the Yangiabad district of Tashkent region.

In Uzbekistan, the species Antepipona barrei (Radoszkowski, 1893) was first recorded in the Bobotog area of Surkhandarya region; Antepipona deflenda (Gusenleitner, 1972) in the Kaltakul area of Hissar district, Kashkadarya region (1994); and Antepipona specifica (Morawitz, 1895) in the Chinoz district of Tashkent region (2003).

According to Van der Vecht and Fischer (1972) and Gusenleitner (1986), Antepipona tekensis (Kostylev, 1935) was found only rarely within Uzbekistan.

In addition, Katamenes sichelii tauriae (Giordani Soika, 1960) was recorded in the Kasokar area of Bukhara region, Paragymnomerus spiricornis turanicus (Kostylev, 1940) in the Urgut district of Samarkand region, and Stenodynerus chitgarensis (Giordani Soika, 1970) in the Hissar and Kaltakul areas of Kashkadarya region, though these species were also noted to occur rarely (Castro L. et al., 2010).

True wasps (Vespidae) are representatives of a diverse family belonging to the order Hymenoptera. Members of the Vespidae family are medium-sized insects, although some species can be small (2.5 mm) or large (up to 50 mm) in body length.

2. Materials and Methods

The present article is based on materials collected from various regions of the Tashkent oasis during 2024–2025, as well as on the results of conducted research and observations.

In collecting materials, the methods of Golub (2012) and Moericke (1951) were used, along with traditional entomological techniques, such as Moericke's plastic traps, sampling from shrubs, tree branches, residential and agricultural buildings, and the use of tools such as forceps, cameras, and others. [17]

Species identification was carried out according to the methods proposed by V.L. Kazenas (2016). (Figure 1)

To determine the distribution of true bees under natural and anthropogenic conditions, biomaterials were collected from various landscapes and agrocenoses of the Tashkent oasis.

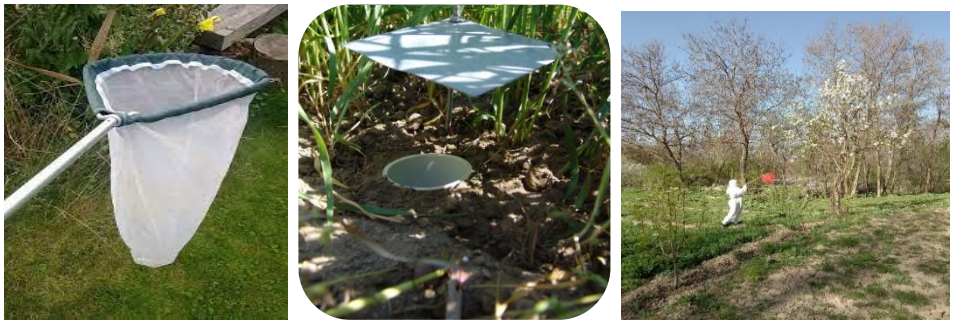

Figure 1. Research methods

Figure 2. Identification of species using laboratory methods

Table 1. Coordinate point of the area where the research was conducted

№	Location and Date of Material Collection	Coordinates
1	Tashkent region, Parkent district, Shampan village – 03.08.2024	41°20′59.840″N, 69°74′14.550″E
2	Tashkent region, Parkent district, Namdanak village – 03.08.2024	41°19′20.100″N, 69°71′08.190″E
3	Tashkent region, Ohangaron district – 27.05.2024	40°78′92.87″N 69°23′61.45″E
4	Tashkent region, Parkent district – 12.06.2024	41°23′97.35″N, 69°73′43.32″E
5	Tashkent region, Parkent district, Kumushkon village – 11.06.2024	41°31′84.320″N, 69°85′73.680″E
6	Tashkent region, Piskent district – 21.03.2025	41°18′51.630″N, 69°31′75.950″E
7	Tashkent region, Piskent district – 21.03.2025	40°86′84.420″N, 69°37′73.060″E
8	Tashkent region, Yangiyul district – 20.05.2025	41°15′91.380″N, 69°03′75.520″E
9	Tashkent region, Zangiota district, near the Chirchik River – 11–12.06.2025	41°16′74.720″N, 69°22′70.830″E
10	Tashkent region, Yangiyul district, orchard area – 19.06.2025	41°13′14.240″N, 69°10′13.780″E

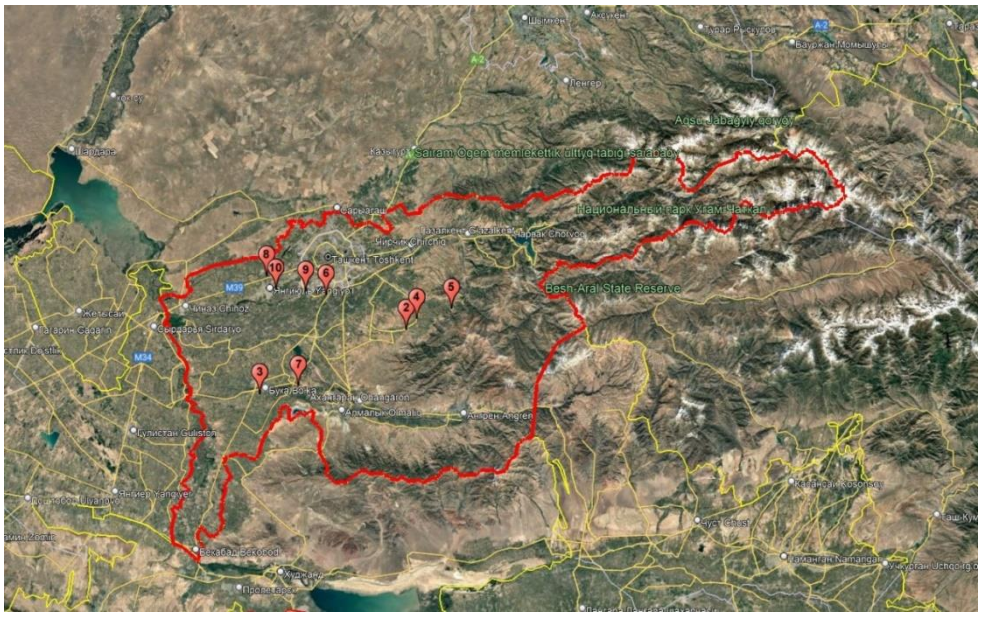

Figure 3. Map of the area where the research was conducted

For softening the bodies of the collected specimens, the method of Jurzitza (1975) was used. [12] For this purpose, the captured insects were placed into a wide-mouthed container, and a piece of ordinary cotton soaked in 70% ethyl alcohol was placed on top. After 10–15 minutes, the bees became softened, allowing them to be properly positioned, fixed, and prepared as collection specimens. The prepared samples were then organized and catalogued. (Figure 2).

During the collection of materials, the locations were recorded using GPS coordinates, and the obtained data were entered into a database.

When forming the database, the collection site and date, as well as the geographical coordinates of the area, were used as the main criteria. The list of the studied biotopes was numbered and presented accordingly (Table 1).

Based on the database formed during the research process, GIS maps were created to illustrate the distribution areas of Vespidae species in the Tashkent oasis (Figure 3).

The determination of zoogeographical regions and boundaries was carried out according to the method of F. Darlington (Darlington, F., 1966). [10]

Among the 13 studied species, 7 species (60%) belong to solitary wasps (subfamily Eumeninae), while the remaining 6 species (40%) are social wasps (subfamilies Polistinae and Vespinae).

Our research results include the identification and description of 13 true wasp species, along with information on their collection sites, distribution, and zoogeographical characteristics.

As a result of the research conducted during the spring and summer seasons of 2024–2025, the composition of the Vespidae wasp species belonging to various subfamilies distributed in the Tashkent oasis was determined as follows:

Subfamily: Eumeninae s.str.

Genus: Euodynerus Dalla Torre, 1904

1. Species: *Ancistrocerus parietum* (Linnaeus, 1758)

Synonyms:

-*Ancistrocerus tardinotus* Bequard, 1925

-*Odynerus affinis* Herrich-Schäffer, 1839

-*Odynerus flavipes* Curtis, 1826

-*Odynerus geoffroyanus* Spinosa, 1808

-*Odynerus incisoides* Verhoeff, 1890

-*Odynerus incisus* Verhoeff, 1890

-*Odynerus ochlerus* de Saussure, 1852

-*Odynerus parietoides* Verhoeff, 1890

-*Odynerus parietum* (Linnaeus, 1758)

-*Odynerus similis* Curtis, 1826

Locality and collection date:

Tashkent region, Parkent district, Shampan village (Coordinates: 41°20′59.840″N, 69°74′14.550″E), 3 specimens, 03.08.2024.

Tashkent region, Ohangaron district (Coordinates: 40°78′92.87″N, 69°23′61.45″E), 1 specimen, 27.05.2024.

Tashkent region, Zangiota district, bank of the Chirchik River (Coordinates: 41°16′74.720″N, 69°22′70.830″E), 4 specimens, 12.06.2025.

Zoogeography: Europe, North Africa, Russia, Armenia, Azerbaijan, Türkiye, Iran, Uzbekistan, Kazakhstan, Mongolia, China, North America.

2. Species: *Antepipona specifica* (Morawitz, 1895)

Synonyms:

-*Odynerus curialis* Morawitz, 1895

Locality and collection date:

Tashkent region, Zangiota district, bank of the Chirchik River (Coordinates: 41°16′74.720″N, 69°22′70.830″E), 2 specimens, 12.06.2025.

Tashkent region, Yangiyul district, orchard area (Coordinates: 41°13′14.240″N, 69°10′13.780″E), 6 specimens, 19.06.2025.

Zoogeography: Azerbaijan, Iraq, Iran, Turkmenistan, Uzbekistan, Kyrgyzstan.

3. Species: *Eumenes jarkandensis* Blüthgen, 1938

Synonyms:

-*Eumenes turanicus* Blüthgen, 1943

Locality and collection date:

Tashkent region, Yangiyul district (Coordinates: 41°15′91.380″N, 69°03′75.520″E), 2 specimens, 20.05.2025.

Tashkent region, Parkent district, Shampan village (Coordinates: 41°20′59.840″N, 69°74′14.550″E), 3 specimens, 03.08.2024.

Tashkent region, Parkent district, Namdanak village (Coordinates: 41°19′20.100″N, 69°71′08.190″E), 1 specimen, 03.08.2024.

Zoogeography: Azerbaijan, Türkiye, Iran, Turkmenistan, Tajikistan, Uzbekistan, Mongolia, China.

4. Species: *Eumenes papillarius* (Christ, 1791)

Synonyms:

-*Eumenes bimaculatus* André, 1884

-*Eumenes bipunctis* de Saussure, 1852

-*Eumenes papillosus*

≡ *Sphex papillarius* Christ, 1791

Locality and collection date:

Tashkent region, Piskent district (Coordinates: 40°86′84.420″N, 69°37′73.060″E), 2 specimens, 21.03.2025.

Zoogeography: Europe, Azerbaijan, Türkiye, Syria, Israel, Iran, Pakistan, Uzbekistan, Turkmenistan, Kazakhstan, Mongolia.

5. Species: *Euodynerus rufinus* (Blüthgen, 1942)

Locality and collection date:

Tashkent region, Parkent district, Shampan village (Coordinates: 41°20′59.840″N, 69°74′14.550″E), 3 specimens, 03.08.2024.

Tashkent region, Yangiyul district (Coordinates: 41°15′91.380″N, 69°03′75.520″E), 2 specimens, 20.05.2025.

Tashkent region, Zangiota district, bank of the Chirchik River (Coordinates: 41°16′74.720″N, 69°22′70.830″E), 1 specimen, 12.06.2025.

Zoogeography: Azerbaijan, Syria, Kazakhstan, Uzbekistan. (Fatergya, 2023) [11]

Genus: ***Eustenancistrocerus* Blüthgen, 1938**

6. Species: *Eustenancistrocerus askhabadensis* (Radoszkowski, 1886)

Synonyms:

-*Odynerus quettaensis* Cameron, 1907

-*Odynerus sarykorum* Kostylev, 1929

Locality and collection date:

Tashkent region, Parkent district, Namdanak village (Coordinates: 41°19′20.100″N, 69°71′08.190″E), 1 specimen, 03.08.2024.

Zoogeography: Azerbaijan, Turkmenistan, Mongolia, Uzbekistan.

Genus: ***Katamenes* Meade-Waldo, 1910**

7. Species: *Katamenes dimidiatus* (Brullé, 1832)

Synonyms:

≡ *Eumenes dimidiatus* Brullé, 1832

Locality and collection date:
Tashkent region, Ohangaron district
(Coordinates: 40°78′92.87″N, 69°23′61.45″E),
1 specimen, 27.05.2024.
Tashkent region, Parkent district, Kumushkon village
(Coordinates: 41°31′84.320″N, 69°85′73.680″E),
3 specimens, 11.06.2024.

Zoogeography: Türkiye, Syria, Iran, Afghanistan, Central Asian countries. (Fatergya, 2023) [11]

Subfamily: Polistinae

Genus: *Polistes* Latreille, 1802

8. Species: *Polistes wattii* (Cameron, 1900)

Locality and collection date:
Tashkent region, Parkent district
(Coordinates: 41°23′97.35″N, 69°73′43.32″E),
17 specimens, 12.06.2024.
Tashkent region, Yangiyul district
(Coordinates: 41°15′91.380″N, 69°03′75.520″E),
22 specimens, 20.05.2025.
Tashkent region, Zangiota district, bank of the Chirchik River
(Coordinates: 41°16′74.720″N, 69°22′70.830″E),
31 specimens, 12.06.2025.

Zoogeography: Iraq, Iran, Afghanistan, Pakistan, China, India, Turkmenistan, Uzbekistan, southern Kazakhstan, Tajikistan. (Fatergya, 2023) [11]

9. Species: *Polistes dominula* (Christ, 1791)

Synonyms:
-*Vespa dominula* Christ, 1791

Locality and collection date:
Tashkent region, Parkent district
(Coordinates: 41°23′97.35″N, 69°73′43.32″E),
11 specimens, 12.05.2024.
Tashkent region, Yangiyul district
(Coordinates: 41°15′91.380″N, 69°03′75.520″E),
18 specimens, 20.05.2025.
Tashkent region, Piskent district
(Coordinates: 40°86′84.420″N, 69°37′73.060″E),
42 specimens, 21.03.2025.

Zoogeography: North Africa, Israel, Iran, Afghanistan, Pakistan, Syria, Turkmenistan, Türkiye, Uzbekistan, Northern India.

Subfamily: Vespinae

10. Species: *Dolichovespula sylvestris* (Scopoli, 1763)

Synonyms:
-*Dolichovespula xinjiangensis* Lee, 1986
-*Vespa anglica* Leach Sm., 1843
-*Vespa campanaria* Fowler, 1833
-*Vespa frontalis* Latreille, 1802
-*Vespa holsatica* Fabricius, 1793
-*Vespa parietum* Harris, 1776
-*Vespa pilosella* Costa, 1858
-*Vespa sylvestris* Scopoli, 1763
-*Vespula sylvestris* (Scopoli, 1763)

Locality and collection date:
Tashkent region, Piskent district
(Coordinates: 40°86′84.420″N, 69°37′73.060″E),
7 specimens, 21.03.2025.
Tashkent region, Ohangaron district
(Coordinates: 40°78′92.87″N, 69°23′61.45″E),
3 specimens, 27.05.2024.

11. Species: *Vespula rufa* (Linnaeus, 1758)

Synonyms:
-*Paravespula rufa* (Linnaeus, 1758)
-*Vespa intermedia* (Buysson, 1904)
-*Vespa rufa* Linnaeus, 1758
-*Vespa schrenckii* (Radoszkowski), 1861
-*Vespa sibirica* Andr é, 1884
-*Vespula grahami* Archer, 1981
-*Vespula obscura* Lee, 1986

Locality and collection date:
Tashkent region, Piskent district
(Coordinates: 41°18′51.630″N, 69°31′75.950″E),
4 specimens, 21.03.2025.
Tashkent region, Ohangaron district
(Coordinates: 40°78′92.87″N, 69°23′61.45″E),
11 specimens, 27.05.2024.

Genus: *Vespa* Linnaeus, 1758

12. Species: *Vespa orientalis* (Linnaeus, 1771)

Synonyms:
-*Vespa aegyptiaca* Andr é, 1884
-*Vespa aegyptiaca* Vallot, 1802
-*Vespa fusca* Christ, 1791
-*Vespa indica* Wroughton, 1889
-*Vespa jurinei* de Saussure, 1854
-*Vespa quadripunctata* Forskal, 1775
-*Vespa turcica* Drury, 1773

Locality and collection date:
Tashkent region, Parkent district, Kumushkon village
(Coordinates: 41°31′84.320″N, 69°85′73.680″E),
22 specimens, 11.06.2024.
Tashkent region, Ohangaron district
(Coordinates: 40°78′92.87″N, 69°23′61.45″E),
28 specimens, 27.05.2024.
Tashkent region, Piskent district
(Coordinates: 40°86′84.420″N, 69°37′73.060″E),
56 specimens, 21.03.2025.
Tashkent region, Ohangaron district
(Coordinates: 40°78′92.87″N, 69°23′61.45″E),
21 specimens, 27.05.2024.
Tashkent region, Zangiota district, bank of the Chirchik River
(Coordinates: 41°16′74.720″N, 69°22′70.830″E),
14 specimens, 12.06.2025.

Zoogeography: Turkmenistan, Tajikistan, Uzbekistan, Afghanistan, Pakistan, China, India, America, Germany. (Fatergya, 2023) [11]

Genus: *Vespula* Thomson, 1869

13. Species: *Vespula germanica* (Fabricius, 1793)

Synonyms:
-*Vespa germanica* J.C. Fabricius, 1793
-*Vespa macularis* Olivier, 1792

Locality and collection date:
Tashkent region, Parkent district, Kumushkon village

(Coordinates: 41°31′84.320″N, 69°85′73.680″E),
9 specimens, 11.06.2024.

Tashkent region, Zangiota district, bank of the Chirchik River
(Coordinates: 41°16′74.720″N, 69°22′70.830″E),
11 specimens, 12.06.2025.

Tashkent region, Ohangaron district
(Coordinates: 40°78′92.87″N, 69°23′61.45″E),
9 specimens, 27.05.2024.

Tashkent region, Yangiyul district
(Coordinates: 41°15′91.380″N, 69°03′75.520″E),
10 specimens, 20.05.2025.

Tashkent region, Yangiyul district, orchard area
(Coordinates: 41°13′14.240″N, 69°10′13.780″E),
9 specimens, 19.06.2025.

Zoogeography: Turkmenistan, Tajikistan, Uzbekistan, Iceland, New Zealand, Australia, Africa, Chile, Argentina, America, Canada.

3. Result and Discussion

Nearly 150 years of research have been devoted to compiling the taxonomic list of true wasps (Vespidae) in Uzbekistan.

In the Tashkent oasis, early studies by Morawitz (1895) identified Euodynerus strigatus and Antepipona deflenda. Later, P. Blüthgen (1939–1955) recorded species such as Onychopterocheilus fausti, Odynerus melanocephalus, Pseudepipona herzi, and Pseudepipona herrichii.

During 1925–1940, G. Kostylev reported Chlorodynerus arenicola and Polistes dominula. A. Giordani Soika (1970) documented Katamenes sichelii and Onychopterocheilus fausti (Morawitz, 1873).

J. Van Der Vecht & Fischer (1972) studied Antepipona specifica and Eumenes sareptanus.

Later, A.G. Davletshina (1979) reported Vespa orientalis and Dolichovespula sylvestris, while T.T. Kulembetova (1999) identified Polistes gallicus, Vespula rufa, and Vespa orientalis.

4. Conclusions

In conclusion, during 2024–2025 field studies, 13 species of the family Vespidae, belonging to 3 subfamilies and 7 genera, were identified in various natural and anthropogenic habitats of the Tashkent oasis.

Among them, 6 species were recorded for the first time in this region.

The representatives of the Vespidae family were found to be distributed almost throughout the entire oasis, with Polistes dominula, Vespa orientalis, and Vespula germanica being the most widespread species, for which collection specimens were obtained.

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