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Research Article

The genus *Stizus* Latreille, 1802 (Hym., Bembicidae) in Uzbekistan

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Abstract. This article presents a faunistic survey of digger wasps of the genus *Stizus* Latreille, 1802 (Hymenoptera, Bembicidae) in Uzbekistan. Field research was conducted from 2021 to 2024 across various regions of the country. In total, 222 specimens representing 10 species of *Stizus* were documented. *Stizus eximius* F. Morawitz, 1894, is recorded for the first time in the digger wasp fauna of Uzbekistan. This species was collected on plants of the genus *Tamarix* L., 1753 in natural areas surrounding lakes. Among the collected material, *Stizus ruficornis* (J. Forster, 1771) (136 specimens, 61.26%) and *S. rufiventris* Radoszkowski, 1877 (33 specimens, 14.86%) were the most abundant and were widely distributed across all surveyed areas. All recorded species were documented for the first time within the territory of the Republic of Karakalpakstan. The diversity and distribution of *Stizus* species were compared with the fauna of neighboring Central Asian countries.

Keywords: Faunistic, *Stizus*, digger wasps, Kyzylkum Desert, Uzbekistan, Central Asia.

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Introduction

According to Sann *et al.* (2018), Spheciformes constitute a large and taxonomically diverse assemblage that includes ten families: Ammoplanidae, Ampulicidae, Astatidae, Bembicidae, Crabronidae, Mellinidae, Pemphredonidae, Philanthidae, Psenidae and Sphecidae. All these families belong to the superfamily Apoidea within the order Hymenoptera. The genus *Stizus* Latreille, 1802 belongs to the family Bembicidae and is distributed worldwide, except in Southeast Asia, Australia, and South America (Nemkov, 2012). Currently, the genus comprises 108 recognized species (Pulawski, 2025). To date, no targeted research has been conducted on the genus *Stizus* within the territory of Uzbekistan. However, information on its representatives can be found in the works of Radoszkowski (1877), Gussakovskij (1928, 1935), Davletshina *et al.* (1979), Islamov (1986), Kazenas (2001, 2002), and Nemkov (2012, 2015). Based on the analysis of available literature, 16 species of this genus are known to occur in Uzbekistan (Pulawski, 2025). The aim of the present study is to provide a detailed assessment of the species composition of the genus *Stizus* in the territory of Uzbekistan.

Materials and methods

Field investigations were conducted from 2021 to 2024 across various geographical regions of Uzbekistan, including the northwestern, northeastern, eastern, central, and southern parts of the country. The geographic coordinates of the sampling sites were recorded using the Maps.me application, and cartographic visualization was performed using ArcGIS Pro. Standard methods described by Golub *et al.* (2012) were employed for material collection, including the use of an entomological net and yellow plastic pan traps of the Moericke type (Moericke, 1951). Most digger wasps encountered on flowering plants in the studied regions were collected using an

entomological net. Captured specimens were removed with forceps and preserved either in 15 ml plastic vials containing 96% ethanol or stored in cotton-stoppered containers.

The collected material was delivered to the Entomology Laboratory of the Institute of Zoology. For specimen preparation, wings were softened in a humid chamber, after which the specimens were mounted on special plates and spread for further identification. Subsequently, the samples were labeled and added to the collection. Species identification of *Stizus* was performed using an SMZ-161-TL stereomicroscope. Identifications were based on keys and taxonomic literature by Pulawski (1978, 2025), Nemkov (2012), and Kazenas (1978, 2013), and confirmed by comparison with reference specimens housed in the Zoological Institute of the Academy of Sciences of the Republic of Uzbekistan. Additionally, international electronic catalogues and atlases were also consulted. Family-level classification follows the latest Apoidea taxonomy proposed by Sann *et al.* (2018). Species nomenclature and general distribution were adopted from Pulawski (2025). All specimens were deposited in the scientific collection of the Institute of Zoology of the Academy of Sciences of the Republic of Uzbekistan.

Results

Family Bembicidae Latreille, 1802

Genus *Stizus* Latreille, 1802

Stizus annulatus (Klug, 1845)

Material examined: 3♀, 1♂, Republic of Karakalpakstan, Kyzylkum Desert [42.483087, 60.567972], 30.05.2023; 1♀, [42.497556, 59.816574], 15.05.2024. 2♀, 1♂, Kungrad District, Ustyurt Plateau [43.861025, 57.596561], 08.06.2024; 3♀, 2♂, Republic of Karakalpakstan, Nukus, vicinity of Lake Ashshikol [42.507836, 59.640728], 13.05.2024.

General distribution: Algeria, Azerbaijan, Egypt, Greece, Iran, Israel, Kazakhstan, Libya, Mongolia, Palestine, Syria, Tajikistan, Turkey, Turkmenistan, Uzbekistan (Pulawski, 2025).

Stizus bizonatus Spinola, 1839

Material examined: 1♀, Republic of Karakalpakstan, Kyzylkum Desert [42.436481, 60.525503], 30.05.2023; 1♂, Jizzakh Region, vicinity of Lake Tuzkan [40.631567, 67.32672], 29.06.2024

Distribution: Egypt, Ethiopia, Iran, Iraq, Saudi Arabia, Syria, Tajikistan, Turkmenistan, UAE, Uzbekistan (Pulawski, 2025).

Stizus dispar F. Morawitz, 1888

Material examined: 1♂, Republic of Karakalpakstan, Kyzylkum Desert [42.436277, 60.524797], 30.05.2023; 1♀, Kungrad District, Ustyurt Plateau [43.902589, 57.549738], 13.06.2023; 4♀, [44.233284, 57.908559], 07.06.2024.

Distribution: Iran, Kazakhstan, Tajikistan, Turkmenistan, Uzbekistan (Pulawski, 2025).

Stizus eximius F. Morawitz, 1894 (Fig. 1)

Diagnosis: Body length 22–28 mm. General coloration reddish to yellowish; mesosoma and anterior abdominal segments reddish, with yellow markings on pronotum and scutellum. Wings hyaline. Female antennae 12-segmented, male antennae 13-segmented. Inner margins of eyes subparallel, without emargination. Abdomen sessile; first sternite entirely situated beneath the tergite. Fore wing with three cubital cells (Nemkov, 2009).

Material examined: 1♀, Republic of Karakalpakstan, Takhtakupyr District, vicinity of Lake Korateren [43.226152, 60.395658], 22.06.2023; 1♂, Jizzakh Region, vicinity of Lake Aydar [41.016939, 65.968675], 25.06.2023 (Fig. 2). The species was identified on *Tamarix* sp.

Distribution: Kazakhstan, Turkmenistan (Pulawski, 2025) and **Uzbekistan (new record).**

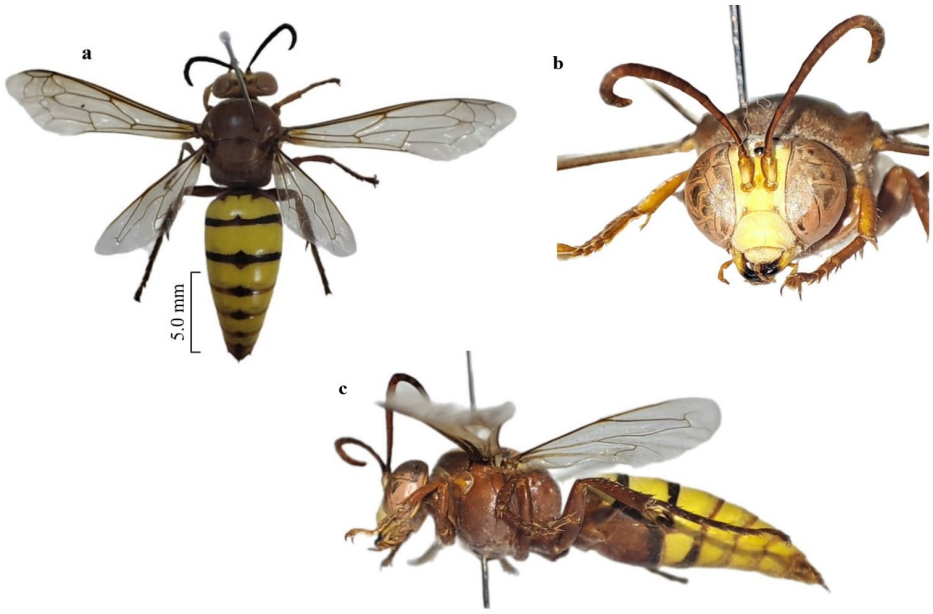

Fig. 1. *Stizus eximius* F. Morawitz, 1894, male from Uzbekistan. a) Habitus, lateral view; b) Head, frontal view; c) Habitus, dorsal view; [Photos by D. Musaev].

Remarks: In Uzbekistan, this species occurs exclusively in arid regions and is active during the summer months (June–July). Females excavate burrows 10–30 cm deep in the ground, where they lay eggs and provision the cells with paralyzed but still living prey for the developing larvae. Our observations indicate that the larvae feed on orthopteran insects such as locusts and grasshoppers (Orthoptera), as well as on representatives of the order Dermaptera (earwigs).

Stizus euchromus Handlirsch, 1892

Material examined: 1♀, Navoi Region, Kyzylkum Desert [41.677925, 64.318019], 24.06.2023; 1♂, Kashkadarya Region, Talimarjan District [38.394713, 65.476927], 19.04.2024; 1♂, Republic of Karakalpakstan, Kungrad District, Ustyurt Plateau [44.275504, 57.580816], 07.06.2024.

Distribution: Georgia, Iran, Turkmenistan, Uzbekistan (Pulawski, 2025).

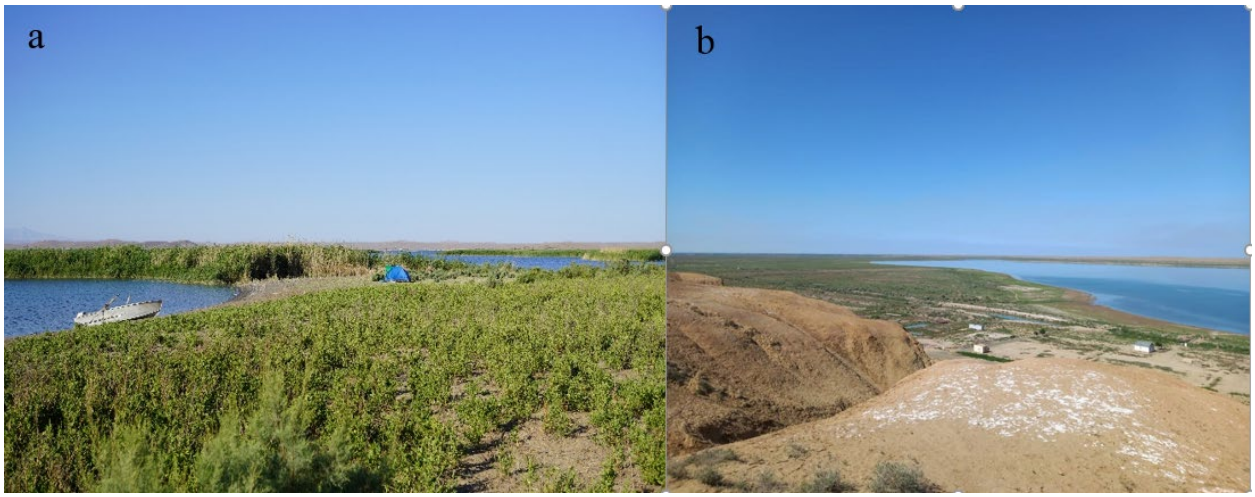

Fig. 2. Collection habitats *Stizus eximius* F. Morawitz, 1894. Lake Aydar (a) and Lake Korateren (b), [photos by SH. Nazarov and M. Embergenov].

Stizus handlirschi Radoszkowski, 1893

Material examined: 6♀, 1♂, Republic of Karakalpakstan, Karauzyak District [43.047164, 60.047678], 08.08.2023; 2♀, Republic of Karakalpakstan, Karauzyak District [42.868567, 59.968772], 11.08.2023.

Distribution: Iran, Pakistan, Tajikistan, Turkey, Turkmenistan, Uzbekistan (Pulawski, 2025).

Stizus koenigi F. Morawitz, 1888

Material examined: 2♂, Republic of Karakalpakstan, vicinity of the Aral Sea [44.699282, 58.101533], 18.05.2022; 1♀, Shomanay District, desert zone [42.806675, 58.669285], 22.07.2022; 1♀, Republic of Karakalpakstan, Kyzylkum Desert [43.228551, 60.693162], 28.07.2022; 6♀, 7♂, Republic of Karakalpakstan, Kungrad District, Ustyurt Plateau [44.402748, 57.675034], 17.06.2023.

Distribution: Afghanistan, Iran, Kazakhstan, Libya, Tajikistan, Tunisia, Turkmenistan, Uzbekistan (Pulawski, 2025).

Stizus praestans F. Morawitz, 1893

Material examined: 1♀, Republic of Karakalpakstan, Kungrad District, Ustyurt Plateau [44.393150, 57.670481], 17.06.2023.

Distribution: Azerbaijan, Iran, Kazakhstan, Tajikistan, Uzbekistan (Pulawski, 2025).

Stizus ruficornis (J. Forster, 1771)

Material examined: 8♀, 4♂, Republic of Karakalpakstan, Nukus, Ashshikol vicinity [42.507814, 59.640686], 07.05.2021; 7♀, 6♂, Republic of Karakalpakstan, Chimbay District, desert zone [43.124719, 59.769114], 11.05.2021; 4♀, 5♂, Republic of Karakalpakstan, Turtkul District [41.981767, 61.193300], 02.06.2021; 9♀, 5♂, Republic of Karakalpakstan, Lower Amudarya State Biosphere Reserve, Tallik zone [41.936636, 60.469533], 12.07.2021; 19♀, 7♂, Republic of Karakalpakstan, Shumanay District, desert zone [42.816317, 58.659989], 22.07.2022; 1♀, Republic of Karakalpakstan, Turtkul District [41.939621, 61.167003], 29.08.2022; 3♀, Fergana Region, Yazyavan District [40.682028, 71.396960], 16.05.2023; 2♂, Khorezm Region, Yangiaryk District [41.317406, 60.448196], 30.05.2023; 11♀, Republic of Karakalpakstan, Kyzylkum Desert [43.274074, 60.543351], 31.05.2023; 8♂, Republic of Karakalpakstan, Kungrad District, Ustyurt Plateau [44.393150, 57.670481], 17.06.2023; 5♂, Navoi Region, Kyzylkum Desert [41.676928, 64.317959], 24.06.2023; 2♀, 4♂, Republic of Karakalpakstan, Karaozek District [43.033869, 60.039803]; 8♀, [43.047722, 60.047997], 08.08.2023; 1♂, Khorezm Region, Kyzylkum Desert [41.056866, 62.027392], 28.04.2024; 2♂, Samarkand Region, Jomboy District [39.462748, 66.379740], 07.05.2024; 9♀, 6♂, Republic of Karakalpakstan, Nukus, Ashshikol vicinity [42.507836, 59.640728], 15.05.2024.

Distribution: Algeria, Angola, Azerbaijan, China, Egypt, Ethiopia, France, Gambia, Ghana, Greece, Iran, Israel, Italy, Jordan, Kazakhstan, Libya, Madagascar, Malta, Morocco, Namibia, Nigeria, Oman, Palestine, Portugal, Romania, Russia, Saudi Arabia, Spain, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, UAE, Ukraine, Uzbekistan, West Africa, Yemen (Pulawski, 2025).

Stizus rufiventris Radoszkowski, 1877

Material examined: 2♀, 6♂, Republic of Karakalpakstan, Kungrad District, vicinity of the Aral Sea [44.721289, 58.046893], 18.05.2022; 4♂; Republic of Karakalpakstan, Nukus, vicinity of Lake Ashshikol [42.507418, 59.640398], 07.06.2022; 3♂, Jizzakh Region, Gallyaaral District [40.128447, 67.522141], 30.05.2023; 3♀, Republic of Karakalpakstan, Kyzylkum Desert [42.735786, 59.991375], 01.06.2023; 5♂, Republic of Karakalpakstan, Kungrad District, Ustyurt Plateau [44.393150, 57.670481], 17.06.2023; 2♀, 3♂, Navoi Region, Kyzylkum Desert [41.676529, 64.317872], 24.06.2023; 5♀, Republic of Karakalpakstan, Nukus [42.642756, 59.314453], 20.08.2023.

Distribution: Algeria, Azerbaijan, Egypt, Georgia, Iran, Kazakhstan, Mongolia, Russia, Tajikistan, Turkey, Turkmenistan, UAE, Ukraine, Uzbekistan (Pulawski, 2025).

Discussion

Specimen collection conducted in various regions of the Republic of Uzbekistan from 2021 to 2024 provides new insights into the genus *Stizus*. Two species, *S. ruficornis* and *S. rufiventris*, are the most widespread and frequently encountered across all surveyed areas. Additionally, *S. eximius* was recorded for the first time in Uzbekistan. This species was found in the northwestern and central parts of the country, particularly in habitats associated with *Tamarix* vegetation near lakes. The new records of species belonging to the genus *Stizus* (Hymenoptera: Bembicidae) significantly contribute to the understanding of the genus's biodiversity in Uzbekistan. The data substantially expand the current knowledge of *Stizus* species in the region. Notably, *S. eximius*, previously known from Turkmenistan, and Kazakhstan, is now confirmed within Uzbekistan's fauna. This finding underscores the insufficient and uneven study of Bembicidae diversity in the country and highlights the need for continued comprehensive faunistic surveys. The genus *Stizus* is represented in Uzbekistan by 17 species, indicating a relatively high diversity compared with neighboring Central Asian countries. Uzbekistan hosts the largest number of *Stizus* species (17), followed by Turkmenistan (15), while both Tajikistan and Kazakhstan have 12 species each, and only two species was found in Kyrgyzstan (Antropov *et al.*, 2017; Pulawski, 2025)(Table 1).

Within Uzbekistan, the distribution of *Stizus* species shows a strong concentration in the western and northwestern regions, particularly Republic of Karakalpakstan, Khorezm and Navoi regions (Fig. 3). These areas include extensive sandy zones of the Kyzylkum Desert and deltaic zones near the Aral Sea, which represent typical habitats for the genus. Multiple species, including *S. annulatus*, *S. ruficornis*, *S. koenigi*, and *S. rufiventris*, were recorded sympatrically in these regions. Diversity decreases eastward, with only a few species such as *S. eximius* and *S. handlirschi* recorded from the foothill and mountain areas of Navoi Region. This gradient corresponds to changes in soil type and vegetation: *Stizus* species prefer loose, sandy substrates suitable for burrow construction, which are less common in elevated zones. In terms of abundance, *S. ruficornis* clearly dominates the wasp fauna of Uzbekistan, accounting for 61.26 % of all collected specimens (Table 2). This species exhibits broad ecological tolerance and occurs in all surveyed regions, confirming its adaptability to diverse desert environments. The second most frequent species, *S. rufiventris* (14.86 %), also shows wide distribution across arid and semi-arid landscapes. In contrast, *S. praestans*, *S. bizonatus*, and *S. euchromus* are rare and localized, representing less than 2% of the total material. Their limited occurrence may be related to microhabitat specificity, as indicated by the small number of records from neighboring countries, or to restricted sampling in certain ecological zones.

Table 1. Species of the genus *Stizus* Latreille, 1802 in Uzbekistan and neighboring countries

No	Speicies	Uzbekistan	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan
1	*Stizus annulatus* (Klug, 1845)	+	+	-	+	+
2	*Stizus bipunctatus* (F. Smith, 1856)	+	+	+	+	-
3	*Stizus bizonatus* Spinola, 1839	+	-	-	+	+
4	*Stizus dispar* F. Morawitz, 1888	+	+	-	+	+
5	*Stizus emir* Handlirsch, 1901	+	-	-	+	+
6	*Stizus euchromus* Handlirsch, 1892	+	-	-	-	+
7	***Stizus eximius*** F. Morawitz, 1894	+	+	-	-	+
8	*Stizus fasciatus* (Fabricius, 1781)	+	+	-	+	-
9	*Stizus fedtschenkoi* Radoszkowski, 1877	+	+	-	-	+
10	*Stizus handlirschi* Radoszkowski, 1893	+	-	-	+	+
11	*Stizus histrio* F. Morawitz, 1888	+	+	-	-	+
12	*Stizus koenigi* F. Morawitz, 1888	+	+	-	+	+
13	*Stizus lacteipennis* Mocsáry, 1883	-	-	-	-	+
14	*Stizus perrisi* Dufour, 1838	+	+	+	-	-
15	*Stizus praestans* F. Morawitz, 1893	+	+	-	+	-
16	*Stizus pubescens* Klug [in Waltl, 1835]	+	-	-	+	+
17	*Stizus ruficornis* (J. Forster, 1771)	+	+	-	+	+
18	*Stizus rufiventris* Radoszkowski, 1877	+	+	-	+	+
19	*Stizus spectrum* Handlirsch, 1901	-	-	-	-	+
	Total	**17**	**12**	**2**	**12**	**15**

Table 2. List of *Stizus* species collected in the present study in Uzbekistan, with the number and percentage of specimens

№	Species name	Specimens	%
1	*Stizus annulatus* (Klug, 1845)	13	5.86
2	*Stizus bizonatus* Spinola, 1839	2	0.90
3	*Stizus dispar* F. Morawitz, 1888	6	2.70
4	*Stizus euchromus* Handlirsch, 1892	3	1.35
5	***Stizus eximius*** F. Morawitz, 1894	2	0.90
6	*Stizus handlirschi* Radoszkowski, 1893	9	4.05
7	*Stizus koenigi* F. Morawitz, 1888	17	7.66
8	*Stizus praestans* F. Morawitz, 1893	1	0.45
9	*Stizus ruficornis* (J. Forster, 1771)	136	61.26
10	*Stizus rufiventris* Radoszkowski, 1877	33	14.86
Total		**222**	**100**

Comparative analysis across Central Asia reveals that ten species (*S. annulatus*, *S. dispar*, *S. fasciatus*, *S. histrio*, *S. koenigi*, *S. ruficornis*, *S. rufiventris*, *S. praestans*, *S. handlirschi*, and *S. euchromus*) are shared between Uzbekistan and Turkmenistan, indicating strong faunal affinity between these two countries. This similarity can be attributed to the comparable desert ecosystems and climatic conditions along their common border. Conversely, Kyrgyzstan hosts only two species (*S. bipunctatus* and *S. perrisi*), both of which are also widespread in Uzbekistan, suggesting that the Kyrgyzstan's mountainous terrain is less favorable for *Stizus* species. From a zoogeographical perspective, the *Stizus* fauna of Uzbekistan is predominantly Turanian, closely linked with the desert complex of the Turan lowlands. The presence of widely distributed species such as *S. ruficornis* and *S. rufiventris* reflects stable populations adapted to continental arid conditions. Meanwhile, species shared with southern Kazakhstan and Tajikistan suggests faunal continuity along the desert-steppe and piedmont transitions of Central Asia. Overall, the western deserts of Uzbekistan represent a key center of diversity for the genus *Stizus* in Central Asia. The combination of climatic aridity, open sandy habitats, and xerophytic vegetation provides optimal ecological conditions for nesting and foraging activities. Further surveys in the less-studied eastern and southern regions of the country are expected to reveal additional species and clarify the biogeographical relationships of *Stizus* within the Central Asia. Ongoing research on invertebrate biodiversity in Uzbekistan, including the present study, will contribute valuable data to enhance national biodiversity management and support the protection of vulnerable arid-land ecosystems.

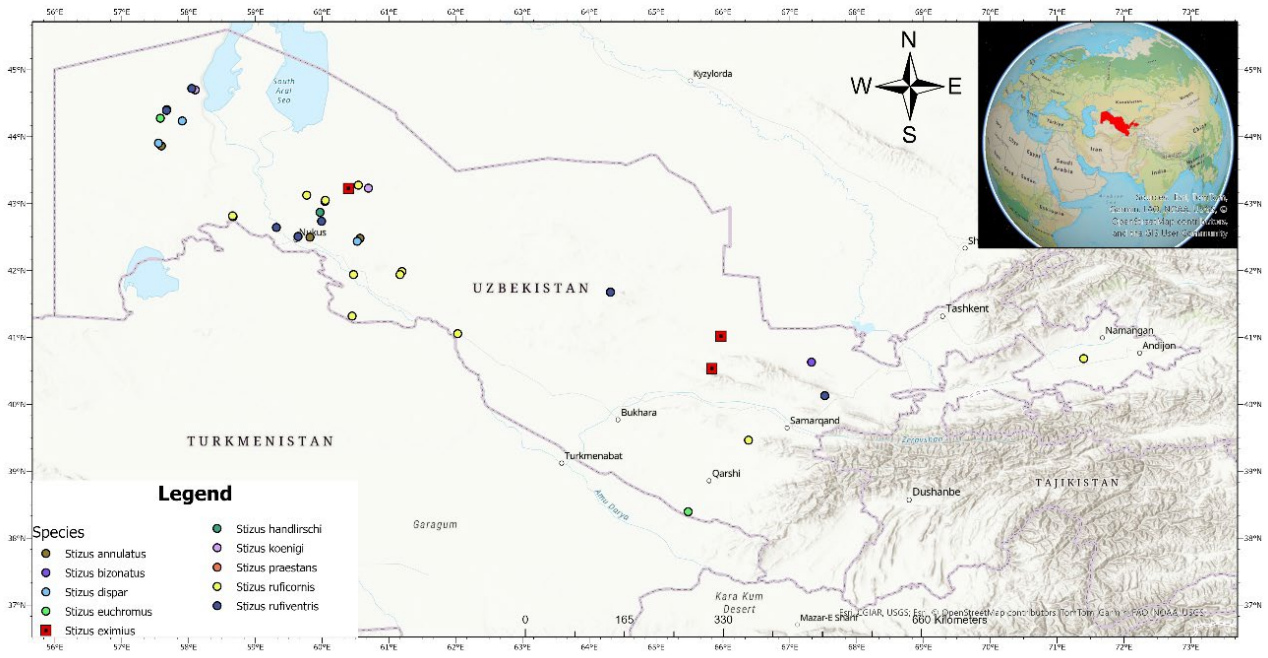

Fig. 3. Distribution of species of the genus *Stizus* in Uzbekistan

Author's Contributions

Muratbay Embergenov Amanbaevich: Conceptualization, Investigation, Writing – original draft; **Dilshod Musaev Muhammadjanovich**: Investigation, Validation, Writing – review & editing; and **Akbarali Doniyorov Narzullaevich**: Investigation, Visualization, Resources, Writing – review & editing; **Nazarov Shokhruz Normuminovich**: Investigation, Data Curation, Writing – review & editing; A. **Makhsetbay Medetov Zhapakovich**: Conceptualization, Methodology, Validation, Supervision, Project administration, Writing – original draft, Writing – review & editing. The authors read and approved the final version of the manuscript.

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Data Availability Statement

All specimens examined in this study are deposited in the scientific collection of the Institute of Zoology, Academy of Sciences of the Republic of Uzbekistan, Tashkent and are available by the curator upon request. Additional data supporting the findings of this study are available within the article.

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Ethics Approval and Consent to Participate

Insects were used in this study. All applicable international, national, and institutional guidelines for the care and use of animals were followed. This article does not contain any studies with human participants performed by the author.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Generative AI statement

The authors declare that no Gen AI was used in the creation of this manuscript.

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Research Article

جنس *Stizus* Latreille, 1802 (Hym., Bembicidae) در ازبکستان

موراتبای امبرگنوف [۱،۲]، دلشاد موسائف [۲]، اکبرعلی دونیوروف [۳]، شوخروز نظروف [۲] و مخستبای مدتوف [۲]

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چکیده: این مقاله به بررسی فونستیک زنبورهای حفار از جنس *Stizus* Latreille, 1802 (Hymenoptera, Bembicidae) در ازبکستان می‌پردازد. پژوهش‌های میدانی طی سال‌های ۲۰۲۱ تا ۲۰۲۴ در مناطق مختلف این کشور انجام شد. در مجموع، ۲۲۲ نمونه متعلق به ۱۰ گونه از این جنس جمع‌آوری و شناسایی گردید. گونه *S. eximius* F. Morawitz, 1894 برای نخستین بار از فون زنبورهای حفار ازبکستان گزارش می‌شود. این گونه بر روی گیاهان متعلق به جنس *Tamarix* L., 1753 در زیستگاه‌های طبیعی پیرامون دریاچه‌ها جمع‌آوری شد. در میان نمونه‌های گردآوری‌شده، *S. ruficornis* (J. Forster, 1771) یا *S. S. rufiventris Radoszkowski*, 1877 با ۱۳۶ نمونه (۶۱،۲۶٪) و ۳۳ نمونه (۱۴.۸۶٪) فراوان‌ترین گونه‌ها بودند و در تمامی مناطق مورد بررسی پراکنش گسترده‌ای داشتند. تمامی گونه‌های ثبت‌شده برای نخستین بار از قلمرو جمهوری قره‌قالپاقستان گزارش می‌شوند. همچنین، تنوع و پراکنش گونه‌های *Stizus* با فون زنبورهای حفار کشورهای همجوار آسیای مرکزی مورد مقایسه قرار گرفته است.

کلمات کلیدی: فونستیک، *Stizus*، زنبورهای حفار، کویر کیزیلقوم، ازبکستان، آسیای مرکزی

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