

Fauna of Erebidæ (Lepidoptera, Noctuoidea) of Western and Southwestern Uzbekistan

Yavkachev Davronbek Azatovich¹, Abdullaeva Mexriban Rayimberganovna^{2*},
Bekchanov Khudaybergan Urinovich¹

¹Department of Natural Sciences, Urgench State Pedagogical Institute (UrSPI), Urgench, Uzbekistan

²Khorezm Academy of Ma'mun, Khiva, Uzbekistan

Email: *aislom938@gmail.com

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Abstract

This article presents the results of a faunistic study of the family Erebidæ (Lepidoptera, Noctuoidea) in Western and Southwestern Uzbekistan. The research identified 83 species and 3 subspecies of erebids belonging to 3 subfamilies and 19 genera. Among the erebids, representatives of the subfamily Erebinæ comprised 83.14%. In terms of species richness, the dominant genera are *Catocala*, *Drasteria*, *Autophila*, *Anumeta*, and *Clytie*. The least widespread genera include *Heteropalpia*, *Pandesma*, *Acantholipes*, and *Catephia*.

Keywords

Erebidæ, Lepidoptera, Noctuoidea, Fauna of Uzbekistan, Distribution Range, Biodiversity, Subfamilies, Trophic Relationships, Pests, Western Uzbekistan, Southwestern Uzbekistan

1. Introduction

Erebidæ is one of the largest families of Lepidoptera, which, in addition to representatives formerly placed in the taxon Erebinæ within the family Noctuidæ, also incorporates species previously assigned to the families Arctiidae and Lymantriidae. According to lepidopterologists, the global fauna of this taxon comprises 24,569 species belonging to 1760 genera [1].

Erebidæ constitutes a monophyletic family (alongside other families of noctuid-like moths) within the superfamily Noctuoidea. The subfamily Hermininae, formerly placed in Noctuidæ, has been transferred to Erebidæ. The family Arctiidae has been reduced in taxonomic rank to the subfamily Arctiinae, alongside the closely related Herminiinae, while species of the family Lymantriidae have been subsumed under the subfamily Lymantriinae. As a result of comprehensive

research, the former families Arctiidae (tiger moths) and Lymantriidae (tussock moths) were merged into Erebidae in 2006. The family Erebidae is currently subdivided into 15 - 18 subfamilies, the status of some of which is well-supported by molecular biological and phylogenetic analyses, while others remain poorly supported and may be redefined in the course of further investigation [1]-[3].

Species of this family are distributed in all biotopes of the globe—they can be found in arctic, steppe, and semi-desert zones alike. The erebid fauna of tropical and subtropical forests of Africa and Southeast Asia is particularly rich. Larvae exhibit diverse trophic relationships, including associations with both wild and cultivated plants. Among them are serious agricultural and forestry pests. It is noted that the majority of erebids are dendrophilous species, although certain taxa are hortophilous and include representatives with narrow trophic specialization. Larvae of the lower subfamilies of Erebidae (Hermininae, Hypeninae, Boletobiinae) have adapted to feeding on detritus.

2. History of Study of Lepidoptera Family Erebidae in Uzbekistan

In Uzbekistan, representatives of Erebidae have been studied as part of the family Noctuidae. The scientific works of researchers such as Ts.G. Bronshtein (1951), V.V. Yakhontov (1953), F.I. Markov (1955), S.V. Bekmuradov (1960, 1963), A.M. Muminov (1968, 1981), A.Sh. Khamraev (1967), G.Sh. Shamurotov (1969), M.K. Karimov (1970), Ya.S. Sadykov (1971), K. Kadyrov (1972), R. Kenzhaev (1974), S.N. Alimukhamedov (1978), F.Kh. Aripova (1984, 1992), Sh.Kh. Tukhtaev (1992), Ya.G. Babakhanova (1995), M. Rashidov (1995), and B. Sulaimanov (2009) provide results on the distribution, ecological characteristics, and control measures for pest noctuid species. Research into the species composition and biology of noctuids and erebids as a family has been conducted for certain individual regions by I. Sukhareva (1972), A.G. Davletshina (1984), B.A. Muminov (1989), M.Sh. Rakhimov (1997), and Kh.U. Bekchanov (1998) [4]-[7].

The aim of the present study is to examine the species composition of Lepidoptera of the family Erebidae in Western and Southwestern Uzbekistan.

3. Materials and Methods

This work is based on personal collections and processing of material gathered by the authors during the research period (from 2019 to 2024, covering all seasons except winter; specifically, fieldwork extended from early March until December). Research on material collection for faunal determination was conducted along established transects, as well as at stationary sites and designated areas across a total of 29 locations (with 16 key representative habitats illustrated in **Figures 1-16**). Lepidopteran specimens were collected from various geographical territories covering a vast area, including tugai (riparian forest) areas, forest enterprises, deserts, mountainous localities, and agricultural landscapes of the Republic of Karakalpakstan and the

Khorezm, Kashkadarya, and Navoi regions. During the collection of Lepidoptera, killing jars with ethyl acetate and chloroform, cotton layers, and spreading boards were used according to generally accepted entomological methods [8]-[11]. To collect nocturnal moths—known for their high visual sensitivity and ability to orient toward light—various artificial light sources and lamps were used during nighttime surveys, operating continuously from dusk until dawn across each sampling event. These included generators, flashlights, power grid-based lighting, and lamps such as DRL 400, DRL 200, and DRL 150, in addition to specialized entomological traps equipped with ultraviolet (UV-36W GLEECON) lamps imported from the Russian Academy of Sciences. Moth identification was carried out using standard identification keys and illustrated guides, as well as collection materials from the Zoological Institute of the Academy of Sciences of the Republic of Uzbekistan. Scientific classification of species was compiled on the basis of the recent publications and data were supplemented using previously published faunistic works [12]-[22]. The voucher specimens are deposited in the Department of Entomology and Arachnology of the Institute of Zoology of the Academy of Sciences of Uzbekistan, the Laboratory of the Department of Natural Sciences at Urgench State Pedagogical Institute, as well as in the personal collection of the authors.

Collection Localities: 1) Lower Amu Darya State Biosphere Reserve: 42°0'4.08"N, 60°20'4.34"E; 2) Nazarkhan: 42°20'17.24"N, 59°59'55.57"E; 3) Sultan-Uais: 41°25'28.21"N, 60°44'49.97"E; 4) Karatau: 42°7'14.29"N, 60°19'39.07"E; 5) Kyzyljar: 43°34'24"N, 59°5'18"E; 6) Ellikqala: 41°49'51.00"N, 60°56'13.49"E; 7) Okkamyshe-2: 41°19'2.30"N, 61°16'41.70"E; 8) Myskin: 41°24'33.44"N, 61°12'36.67"E; 9) Nukus massif: 41°10'10.48"N, 61°58'50.00"E; 10) Uch-Uchak: 41°4'48.06"N, 61°58'50.00"E; 11) Pakhtaabad: 41°53'35.78"N, 61°29'18.76"E; 12) Sarymoy: 41°1'3.8"N, 62°6'54.27"E; 13) Zhanbaskala: 41°51'32.08"N, 61°16'41.76"E; 14) Kyzylkum: 41°26'56"N, 61°11'57"E; 15) Qamishli Lake: 41°19'47.72"N, 61°19'0.57"E; 16) Akchakol: 41°53'36.68"N, 60°50'2.91"E; 17) Tollik Tugai: 42°7'15.30"N, 60°18'38.07"E; 18) Sayat: 41°24'15.88"N, 60°27'44.55"E; 19) Shurkul: 41°16'12.52"N, 60°29'12.41"E; 20) Zaungur: 41°25'28.21"N, 60°15'34.04"E; 21) Amu Darya: 41°46'34.57"N, 60°33'20.62"E; 22) Sarapayan: 41°31'53.85"N, 60°44'41.10"E; 23) Al-Khorezmi: 41°26'41.76"N, 60°54'14.07"E; 24) Bagat: 41°20'55.72"N, 60°52'14.27"E; 25) Uch-Uchak: 41°4'48.06"N, 61°58'50.00"E; 26) Sufyan: 39°50'33.30"N, 64°38'9.14"E; 27) Sarmysh: 40°16'59.86"N, 65°35'28.01"E; 28) Karluk: 38°11'16.51"N, 67°41'13.51"E; 29) Mingchinar: 39°8'50.10"N, 66°58'21.03"E.



Figure 1. Sultan-Uais (Republic of Karakalpakstan).



Figure 2. Karatau (Republic of Karakalpakstan).



Figure 3. Tollik Tugai.



Figure 4. Lower Amu Darya State Biosphere Reserve.



Figure 5. Kyzyljar.



Figure 6. Kyzylkum.



Figure 7. Sayat.



Figure 8. Shurkul.



Figure 9. Zaungur.



Figure 10. Sarapayan.



Figure 11. Al-Khorezmi.



Figure 12. Bagat.



Figure 13. Sufyan.



Figure 14. Sarmysh.



Figure 15. Karluk.



Figure 16. Mingchinar.

4. Results

As a result of the investigations, the following representatives of Lepidoptera of the family Erebidae were identified:

Superfamily Noctuoidea

Family: Erebidae

Subfamily Rivulinae

Genus *Rivula* Scopoli, 1763

1) *R. sericealis* Scopoli, 1763

Collection locality and date: Zaungur—41°25'28.21"N, 60°15'34.04"E; 12.09.2018; 06.08.2020; 19.06.2021 (2♀; 3♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 07.09.2017 (1♀; 2♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 13.06.2018; 21.09.2019 (1♀; 3♂); Kyzyljar—43°34'24"N, 59°5'18"E; 18.06.2022; 29.06.2022 (3♀; 3♂).

Distribution: Europe, Russia, Far East, Middle East, Central Asia.

Bionomics: Hygrophilous common species, inhabits different kinds of humid biotopes, occurs in various damp forests, meadows, bogs, bushes along rivers, producing two generations per year. Flight period VI-X; larvae on Poaceae, Fabaceae. It overwinters in the larval stage [5] [7] [20].

Subfamily Toxocampinae

Genus *Apopestes* Hübner, 1823

2) *A. spectrum* Esper, 1787

Collection locality and date: Kyzyljar—43°34'24"N, 59°5'18"E; 22.04.2023 (10♀; 14♂); Shurkul—16°12.52"N, 60°29'12.41"E; 29.04.2021; 26.04.2023; 05.05.2023 (12♀; 13♂); Sayat—41°24'15.88"N, 60°27'44.55"E; 22.04.2015; 26.04.2016; 23.04.2017 (20♀; 13♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 23.04.2017; 25.04.2018 (5♀; 3♂).

Distribution: Southern Europe, North Africa, Middle East, Central Asia.

Bionomics: It develops in a single generation per year and overwinters in the adult stage. During the flight period, the butterflies are attracted to tree sap. The larvae develop in April and June and are major pests of *Ammodendron conollyi* in the southwestern Kyzylkum. In summer, adult individuals enter a state of estivation (summer diapause), during which they can be found in dark caves and on roofs alongside other species. Flight period III-IV; larvae on *Genista*, *Astragalus*. Pupation takes place in a cocoon lined with a sticky substance, spun among the twigs, buds, and leaves of host plants or mosses [5] [6] [22].

3) *A. centralasiae* Warren, 1911

Collection locality and date: Mingchinar—39°8'50.10"N, 66°58'21.03"E; 20.06.2018 (6♀; 4♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 03.07.2019 (3♀; 3♂).

Distribution: Southern Europe, North Africa, Iran, Turkmenistan.

Bionomics: flight period V-VII; larvae on *Ammodendron* [5] [6].

Genus *Lygephila* Billberg, 1820

4) *L. crassae* Denis & Schiffermüller, 1775

Collection locality and date: Sayat—41°24'15.88"N, 60°27'44.55"E; 10.06.2017; 29.07.2018; 02.07.2019; 17.06.2022; 23.07.2022; 12.07.2023 (22♀; 20♂); Al-Khorezmi—41°26'41.76"N, 60°54'14.07"E; 10.07.2017; 18.07.2018 (5♀; 7♂).

Distribution: Europe, Siberia, Central Asia, Eastern Asia.

Bionomics: It develops in a single generation per year, overwinters in the adult stage, and occurs in foothill orchards, lowlands, reclaimed lands, tugai forests, dry-to-mesic mountain sites, and meadows. It is actively attracted to light and sugar bait. Flight period VI-IX; larvae on *Astragalus glycyphyllos*, *A. propinquus*, *A. uliginosus*, *Colutea canescens*, *Coronilla varia*, *Lathyrus vernus*, *Vicia amoena*, *V. angustifolium*, *V. crassa*, *V. sativa*, *V. silvatica*, *V. sepium*, *V. tenuifolia*, *Dorycnium pentaphyllum*, *D. subfruticosum*, *Lathyrus gmelini*, *L. montanus*, *L. pisiformis*, *L. pratensis*, *L. vernus*, *Oxytropis campanulata*, *Plantago*. In late spring and summer (in July), they can be found aggregating in host plants. It pupates in a cocoon within the leaf litter [5] [17].

5) *L. lubrica* Freyer, 1846

Collection locality and date: Kyzylkum—41°26'56"N, 61°11'57"E; 22.07.2016; 02.07.2017; 11.07.2019 (7♀; 8♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 23.07.2016; 06.07.2017; 17.07.2018 (6♀; 6♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 01.06.2016; 07.06.2017 (4♀; 3♂).

Distribution: Siberia, Kazakhstan, Mongolia.

Bionomics: Typical for steppes and rocky meadows. Butterflies actively fly to light in July. It develops in a single generation per year. Flight period VII; larvae on *Vicia* [20] [21].

Genus *Autophila* Hübner, 1823

6) *A. maculifera* Staudinger, 1888

Collection locality and date: Kyzyljar—43°34'24"N, 59°5'18"E; 25.05.2021; 20.05.2022; 23.07.2023 (11♀; 9♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 29.05.2021; 31.05.2022; 27.07.2024 (15♀; 9♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 04.06.2017; 07.07.2018 (17♀; 15♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 15.06.2017 (4♀; 6♂).

Distribution: Central Asia (Kyrgyzstan), Kashgar.

Bionomics: flight period VI-VIII. Larval host plants unknown [4] [5].

7) *A. gracilis* Staudinger, 1874

Collection locality and date: Kyzyljar—43°34'24"N, 59°5'18"E; 26.05.2021; 20.05.2022; 23.07.2023 (9♀; 5♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 18.05.2022; 31.05.2023; 05.06.2024 (8♀; 12♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 08.06.2016; 15.06.2017; 26.05.2018 (14♀; 12♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 16.06.2018 (8♀; 6♂).

Distribution: Turkmenistan, Kyzylkum, Kazakhstan, northwestern China, Kashgar.

Bionomics: It overwinters in the adult stage, develops in a single generation per year, and enters a state of estivation during the summer due to unfavorable conditions. Flight period V-IX; larvae on *Ammodendron*, *Astragalus* [19] [20].

8) *A. ligaminosa* Eversmann, 1851

Collection locality and date: Sultan-Uais—41°25'28.21"N, 60°44'49.97"E; 25.08.2023 (3♀; 3♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 19.08.2016; 22.07.2017

(8♀; 4♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 23.08.2017 (3♀; 1♂).

Distribution: Austria, Yugoslavia, Bulgaria, Macedonia, Greece, Türkiye, Russia, Asia Minor, Afghanistan, eastern part of Central Asia, Himalaya.

Bionomics: It occurs in rocky zones during the summer season. The adults of this species can be found on the ceilings of tunnels and old buildings. Flight period V-VII; larvae on *Calophaca grandiflora*, *Caragana* [20]-[22].

9) *A. chamaephanes* Boursin, 1940

Collection locality and date: Mingchinar—39°8'50.10"N, 66°58'21.03"E; 13.08.2017 (2♀; 2♂); 17.08.2017 (3♀; 3♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 24.08.2018 (3♀; 2♂); 25.08.2018 (3♀; 7♂).

Distribution: Russia (Saratov, Orenburg, Ural, Sarepta), Transcaucasia, Central Asia.

Bionomics: It is a xerothermophilous species, which occurs particularly in limestone hills and is not attracted to artificial light sources. The flight period spans from VII to IX, with overwintered individuals occurring until mid-VI. Larval host plants are currently unknown [12] [20] [21].

10) *A. hirsuta* Staudinger, 1870

Collection locality and date: Sultan-Uais—41°25'28.21"N, 60°44'49.97"E; 17.06.2019; 24.07.2020 (4♀; 6♂); 13.06.2021; 24.07.2022 (5♀; 6♂); Karatau—7°14.29"N, 60°19'39.07"E; 19.06.2015; 27.06.2016 (5♀; 8♂); 10.06.2017; 21.06.2018 (3♀; 7♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 28.06.2017; 22.06.2019 (4♀; 4♂); 21.06.2021; 24.06.2022 (5♀; 2♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 30.06.2018 (1♀; 1♂); 25.06.2019 (2♀; 1♂).

Distribution: France, Italy, Austria, Switzerland, Türkiye, Iran, Turkmenistan.

Bionomics: They are actively attracted to the light of hand-held flashlights and other artificial light sources. Flight period VI-VIII. Larvae on *Genista* [20] [22].

11) *A. libanotica* Staudinger, 1901

Collection locality and date: Karatau—42°7'14.29"N, 60°19'39.07"E; 22.06.2018; 11.06.2019 (4♀; 4♂); 20.06.2021; 15.06.2022 (4♀; 9♂); Sultan-Uais—25°28.21"N, 60°44'49.97"E; 12.06.2017; 23.06.2018 (5♀; 3♂); 17.06.2023; 26.06.2023 (5♀; 4♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 29.06.2024 (3♀; 4♂); 26.06.2021 (4♀; 5♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 02.07.2017 (1♀; 1♂); 06.07.2018 (1♀; 2♂).

Distribution: Greece, Türkiye, Middle East, Iraq, Iran, Turkmenistan, Afghanistan, Pakistan.

Bionomics: flight period VI-VII. Larval host plants unknown [19] [22].

12) *A. limbata* Staudinger, 1871

Collection locality and date: Karluk—38°11'16.51"N, 67°41'13.51"E; 23.04.2016; 30.04.2017 (1♀; 3♂); 22.04.2017; 30.04.2018 (2♀; 3♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 21.04.2017; 29.04.2018 (2♀; 2♂); 18.04.2019; 22.04.2021 (3♀; 2♂).

Distribution: France, Italy, Sicily, Yugoslavia, Bulgaria, Greece, Türkiye, Crimea, Middle East, Iraq, Armenia, Georgia, Iran.

Bionomics: Flight period IV-IX. In summer, aestivation occurs lasting until IX.

The larvae live openly on the leaves of the host plants, such as *Astragalus echinus* and *Onobrychis* species [12] [22].

13) *A. asiatica* Staudinger, 1888

Collection locality and date: Mingchinar—39°8'50.10"N, 66°58'21.03"E; 22.06.2017 (1♀; 2♂); 24.06.2018 (2♀; 2♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 24.06.2017; 15.07.2018 (3♀; 4♂); 11.06.2019; 19.07.2021 (2♀; 3♂).

Distribution: Romania, Macedonia, Bulgaria, Greece, Ukraine, Middle East, Armenia, Asia Minor and Central Asia, Himalaya, Central China.

Bionomics: Xero-thermophilous species, flight period VI-VII; larvae on *Astragalus* [12] [19] [22].

14) *A. subfusca* Christoph, 1893

Collection locality and date: Shurkul—16°12.52"N, 60°29'12.41"E; 21.05.2021; 31.05.2022 (1♀; 1♂); 31.05.2024 (1♀; 2♂); Zaungur—25°28.21"N, 60°15'34.04"E; 01.10.2017; 12.10.2018 (1♀; 1♂); 03.10.2019 (2♀; 1♂).

Distribution: Turkmenistan.

Bionomics: flight period V-VI, in some areas, flight recorded in IX-X. Larval host plants unknown [22].

Subfamily Erebiniae

Genus *Heteropalpia* Berio, 1939

15) *H. profesta* Christoph, 1887

Collection locality and date: Bagat—41°20'55.72"N, 60°52'14.27"E; 03.09.2021; 06.09.2022 (5♀; 6♂); 03.09.2023; 12.09.2024 (2♀; 3♂); Zaungur—25°28.21"N, 60°15'34.04"E; 11.08.2016; 24.09.2017 (2♀; 1♂); 09.08.2016; 06.09.2017 (3♀; 4♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 18.06.2018 (1♀; 3♂); 13.06.2019 (1♀; 2♂); Kyzylkum—41°26'56"N, 61°11'57"E; 06.09.2023; 11.09.2024 (3♀; 2♂).

Distribution: Middle East, Caucasus, Central Asia.

Bionomics: Multivoltine species, xerophile. Flight period III-XI; larvae on *Prosopis*, *Acacia*. Larvae turn into pupae in November, with the pupa overwintering [19].

Genus *Pandesma* Guenée, 1852

16) *P. robusta* Walker, 1858

Collection locality and date: Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 06.06.2016; 18.06.2017; (18♀; 9♂); 03.06.2019; 14.06.2021; 05.09.2022 (21♀; 13♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 25.07.2016; 14.08.2017; 12.08.2017; 19.08.2021 (12♀; 11♂); 12.07.2022; 08.08.2023; 29.08.2024; 27.08.2025 (16♀; 12♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 18.06.2017 (11♀; 8♂); 21.07.2018 (15♀; 9♂); Sarmysh—40°16'59.86"N, 65°35'28.01"E; 22.06.2018 (3♀; 2♂); 25.06.2019 (4♀; 5♂).

Distribution: Africa, Southern Europe, Asia.

Bionomics: It is a hemixerophilous species, producing two generations per year, with adults (butterflies) being observed flying year-round in certain areas. The main flight period VI-XII; larvae are polyphagous (*Calligonum*, *Acacia rad-diana*, *Prosopis farcta*, *Albizzia lebbek*, *Populus euphratica*) [12] [16] [19] [22].

Genus *Pericyma* Herrich-Schäffer, 1851**17) *P. albidentaria* Freyer, 1842**

Collection locality and date: Sarapayan—41°31'53.85"N, 60°44'41.10"E; 02.08.2021; 11.07.2022 (13♀; 9♂); 08.08.2021; 19.07.2022 (16♀; 11♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 24.08.2022; 08.06.2023; 04.07.2024 (19♀; 22♂); Al-Khorezmi—41°26'41.76"N, 60°54'14.07"E; 11.07.2022; 25.08.2023 (17♀; 15♂); 14.07.2024; 27.08.2025 (23♀; 16♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 11.06.2023; 17.06.2024; 12.06.2025 (20♀; 23♂); Sayat—41°24'15.88"N, 60°27'44.55"E; 22.06.2016; 10.07.2017; 23.08.2018 (20♀; 29♂); 25.06.2019; 13.07.2021; 13.08.2022 (23♀; 34♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 17.07.2017; 22.07.2018 (15♀; 18♂); 12.07.2019; 23.07.2021 (18♀; 20♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 20.06.2017 (3♀; 4♂); 23.06.2018 (5♀; 3♂).

Distribution: Africa, Middle East, Central Asia.

Bionomics: A xerophilous species producing three generations per year, with the flight periods of different generations overlapping. It occurs in semi-deserts and steppes, as well as in irrigated lands, tugai forests, and arid areas of foothills and mountains. Flight period V-X; larvae on Fabaceae (*Alhagi*, *Genista*, etc.). The pupae overwinter [5] [6] [12] [15].

18) *P. squalens* Lederer, 1855

Collection locality and date: Zaungur—41°25'28.21"N, 60°15'34.04"E; 12.08.2022; 26.08.2023 (1♀; 1♂); 16.08.2024; 21.08.2025 (2♀; 1♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 16.08.2017; 20.08.2018 (2♀; 4♂); 11.08.2019; 22.08.2021 (2♀; 2♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 12.08.2018 (2♀; 2♂); 17.08.2019 (1♀; 2♂).

Distribution: Turkmenistan.

Bionomics: flight period III-VIII; larvae on *Alhagi* [19] [21].

Genus *Acantholipes* Lederer, 1857**19) *A. regularis* Hübner, 1813**

Collection locality and date: Sultan-Uais—41°25'28.21"N, 60°44'49.97"E; 07.06.2015; 12.07.2016; 10.07.2017; 09.06.2018; 15.07.2022; 14.06.2023 (23♀; 27♂); Karatau—42°7'14.29"N, 60°19'39.07"E; 23.07.2015; 04.08.2016; 25.07.2017; 05.07.2018 (18♀; 22♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 28-30.07.2017; 15.07.2019 (31♀; 22♂); Sarmysh—40°16'59.86"N, 65°35'28.01"E; 04-06.07.2017; 08.07.2018 (9♀; 15♂).

Distribution: Southern Europe, Asia.

Bionomics: A xerophilous species with multiple generations per year, overwintering in the pupal stage. Flight period VI-IX; larvae on *Glycyrrhiza* [17] [19] [21].

Genus *Drasteria* Hübner, 1818**20) *D. tenera* Staudinger, 1877**

Collection locality and date: Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 30.06.2003; 05.07.2016; 29.06.2017 (7♀; 10♂); 23.06.2018; 15.07.2019; 27.06.2021 (12♀; 13♂); Lower Amu Darya State Biosphere Reserve—42°0'4.08"N, 60°20'4.34"E; 17.07.2017; 22.07.2018 (8♀; 10♂); 12.07.2019; 25.07.2021 (11♀; 14♂); Kyzylkum—41°26'56"N, 61°11'57"E; 04.06.2015; 17.06.2016 (12♀; 34♂); Kyzyljar—43°34'24"N,

59°5'18"E; 06.05.2019; 08.05.2021 (13♂; 41♀).

Distribution: Russia, Central Asia, Kashgar.

Bionomics: It inhabits deserts, semideserts, and steppes with high groundwater levels, as well as river valleys, always in association with willows (*Salix acutifolia*, *S. caspica*), producing two generations per year. Flight period V-VIII; larvae probably on *Salix* [5] [12] [18].

21) *D. sesquilina* Staudinger, 1888

Collection locality and date: Sultan-Uais—41°25'28.21"N, 60°44'49.97"E; 02.08.2015; 11.08.2016; 17.06.2019 (7♀; 8♂); 05.08.2021; 18.08.2022; 17.06.2023 (9♀; 13♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 15-16.06.2017 (4♀; 6♂); 13.08.2018; 18.08.2019; 27.06.2023 (7♀; 6♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 18-20.07.2017 (9♀; 4♂); 07.08.2018; 21.08.2019; 21.06.2022 (11♀; 9♂); Sarmysh—40°16'59.86"N, 65°35'28.01"E; 22.08.2018 (2♀; 1♂); 04.08.2021; 15.08.2022; 14.06.2023 (3♀; 2♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 12.05.2018; 19.05.2019 (4♀; 1♂); 03.08.2022; 13.08.2023; 19.06.2024 (3♀; 3♂).

Distribution: Caucasus, Central Asia, Tien Shan, Northern Kurdistan, Afghanistan.

Bionomics: A xerophilous species producing two generations per year, distributed in tugai forests, agroecosystems, and deserts. Flight period V-VIII. Early stages and larval foodplants unknown [5] [12] [18] [19].

22) *D. aberrans* Staudinger, 1888

Collection locality and date: Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 17.06.2021; 29.08.2022 (2♀; 3♂); 27.06.2023; 24.08.2024 (2♀; 1♂); Sayat—41°24'15.88"N, 60°27'44.55"E; 09.08.2022 (2♀; 1♂); 11.06.2023; 23.08.2024 (2♀; 2♂); Lower Amu Darya State Biosphere Reserve—42°0'4.08"N, 60°20'4.34"E; 17.07.2017 (1♀; 3♂); 18.06.2021; 23.08.2022 (2♀; 2♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 27.07.2018 (1♀; 1♂); 12.06.2021; 31.08.2023 (1♀; 1♂).

Distribution: Kazakhstan, China.

Bionomics: A psammophilous and xerophilous species. Inhabits dry lowlands, deserts, and semideserts. Flight period V-VIII. Larval host plants: *Populus pruinosa*, *Salix alba*, *Quercus robur*. Overwintering stage: egg [5] [12] [18] [19].

23) *D. caucasica* Kolenati, 1846

Collection locality and date: Sayat—41°24'15.88"N, 60°27'44.55"E; 23.05.2015; 29.05.2016 (8♀; 4♂); 20.05.2017; 25.05.2021 (6♀; 5♂); Karatau—42°7'14.29"N, 60°19'39.07"E; 27.05.2015; 02.06.2016 (6♀; 9♂); 30.05.2022; 01.06.2025 (9♀; 4♂); Zaungur—41°25'28.21"N, 60°15'34.04"E; 25.05.2015; 01.06.2016 (7♀; 11♂); 17.05.2021; 20.05.2021 (5♀; 7♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 21.07.2021 (17♀; 12♂); 24.05.2022; 19.05.2023 (7♀; 4♂); Sultan-Uais—25°28.21"N, 60°44'49.97"E; 20.05.2018; 06.06.2019 (9♀; 8♂); 19.05.2023; 28.05.2024 (9♀; 5♂).

Distribution: Bulgaria, Romania, Southwestern Siberia, Southern Ural, Iran, Afghanistan, Asia Minor and Central Asia.

Bionomics: A monovoltine and xerophilous species. Inhabits lowlands, living

in steppes, semideserts, and dry meadows. Flight period V-VIII; larvae on *Elaeagnus*, *Hippophae*. Overwintering stage: egg [4]-[6] [12] [15].

24) *D. flexuosa* Menetries, 1848

Collection locality and date: Sarapayan—41°31'53.85"N, 60°44'41.10"E; 06.07.2017; 17.08.2018; 05.07.2022 (7♀; 3♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 14.05.2021; 22.05.2022 (5♀; 7♂); 19.05.2023; 20.05.2024 (4♀; 6♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 24.05.2021; 03.06.2022; 17.07.2023 (22♀; 16♂); 21.05.2024; 05.06.2025 (20♀; 17♂); Zaungur—41°25'28.21"N, 60°15'34.04"E; 19.07.2015; 27.07.2016 (14♀; 7♂); 23.05.2019; 07.06.2022; 18.07.2023 (24♀; 19♂); Kyzyljar—43°34'24"N, 59°5'18"E; 27.05.2021; 10.06.2022; 19.07.2023 (25♀; 17♂); Kyzylkum—41°26'56"N, 61°11'57"E; 18.05.2021; 12.06.2022; 15.07.2023 (28♀; 19♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 28.07.2017; 06.08.2017 (12♀; 15♂); 17.05.2021; 08.06.2022; 21.07.2023 (25♀; 17♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 12.06.2017; 20.06.2018 (4♀; 6♂); 24.05.2021; 10.06.2022; 12.07.2023 (24♀; 56♂).

Distribution: Egypt, Asia Minor, Türkiye, Iran, Iraq, Afghanistan, Transcaucasia, Russia, Central Asia, Mongolia, Kashgar.

Bionomics: A xerophilous species producing two generations per year. Inhabits deserts and semi-deserts, shifting to sands, tugai forests, solonchaks, and less frequently agroecosystems. The adults are active not only at night but also during the day. Flight period IV-X; larvae on *Alhagi canescens*, *A. camelorum*, *A. sparsifolia*. Overwintering stage: larva [4]-[6] [12] [15] [18].

25) *D. kusnezovi* John, 1910

Collection locality and date: Karatau—42°7'14.29"N, 60°19'39.07"E; 16.08.2021; 29.08.2023 (11♀; 14♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 09.08.2022; 10.08.2022; 27.08.2023 (16♀; 11♂); Lower Amu Darya State Biosphere Reserve—42°0'4.08"N, 60°20'4.34"E; 01.08.2022; 15.08.2022; 28.08.2023 (11♀; 12♂).

Distribution: Turkmenistan.

Bionomics: A bivoltine species. Inhabits deserts, semideserts, and dry stony meadows in the middle mountains; also occurs in solonchaks and coastal areas. Flight period VI-VIII; larvae on *Lycium ruthenicum*. Overwintering stage: pupa [4]-[6] [12] [18].

26) *D. sesquistris* Eversmann, 1854

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 17.04.2022; 19.04.2023 (1♀; 3♂); Kyzylkum—41°26'56"N, 61°11'57"E; 18.04.2023; 21.04.2024 (2♀; 2♂); Kyzyljar—43°34'24"N, 59°5'18"E; 20-22.04.2023 (3♀; 3♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 07.04.2023; 13.05.2023 (1♀; 1♂); Zaungur—41°25'28.21"N, 60°15'34.04"E; 01.05.2016 (2♂); 06.04.2023; 11.05.2023 (1♀; 1♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 14-16.05.2018 (1♀; 1♂); 04.04.2021; 18.05.2022 (1♀; 1♂).

Distribution: Southern Russia, Eastern Kazakhstan, Transcaucasia, Turkmenistan, Afghanistan, Mongolia.

Bionomics: A xerophilous species producing two generations per year. Inhabits deserts, semideserts, and steppes. Flight period IV-V; larvae on *Calligonum*. The

larvae lead a secretive nocturnal lifestyle; when disturbed, they drop and burrow into the sand. Overwintering stage: pupa [5] [6] [12] [15] [17] [18].

27) *D. picta* Christoph, 1877

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 15.07.2017; 12.07.2018 (1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 09.07.2017 (1♀); Zaungur—41°25'28.21"N, 60°15'34.04"E; 05.07.2017 (1♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 27.07.2018 (5♀; 6♂).

Distribution: Southern Russia, Syria, Iran, Caucasus, Northern Afghanistan, Central Asia, Western China.

Bionomics: A bivoltine and xerothermophilous species, rather local in the steppe zone, preferring sands in deserts and semideserts. The nocturnal flight begins at dusk and continues mostly until midnight. Flight period VII-VIII; during the day, adults rest on the sand in depressions under the shelter of bushes, sometimes openly, as well as on the shaded branches of the host plant; larvae feed on *Calligonum griseum*, *C. junceum*, *C. leuocladum*, *C. microcarpum* and *Zygophyllum turcomanicum*. Overwinters as pupa [5] [6] [12] [15] [18] [21].

28) *D. cailino* Lefebvre, 1827

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 04.05.2015; 12.05.2016 (1♀; 2♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 14.05.2018; 22.05.2019 (2♂); Zaungur—25'28.21"N, 60°15'34.04"E; 29-30.06.2016 (3♀; 2♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 17.05.2017 (5♀; 4♂).

Distribution: Southern Europe, Balkans, North Africa, Asia Minor, Western Asia, Northern Iran, Central Asia, Kazakhstan, Russia: Saratov, Western Siberia; Mongolia, Western China.

Bionomics: A bivoltine and xerothermophilous species. Inhabits steppes, deserts, and semideserts; also occurs in gardens, shelterbelts, tugai forests, and intermontane valleys. flight period V-VII; polyphagous (*Salix*, *Rosa*). Overwinters as pupa [12] [15] [17] [18] [20].

29) *D. rada* Boisduval, 1848

Collection locality and date: Zaungur—41°25'28.21"N, 60°15'34.04"E; 11.06.2016; 16.06.2017 (2♀; 1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 19.06.2017 (1♀); Karluk—38°11'16.51"N, 67°41'13.51"E; 20.06.2017 (2♀; 1♂).

Distribution: Southern Russia, Ukraine, Moldova, Türkiye, Caucasus, Asia Minor and Central Asia, Mongolia, China.

Bionomics: A bivoltine and xerothermophilous species associated with eremic habitats, occurring mainly in sandy and gypsum deserts and semideserts, as well as on xerothermic hilly slopes. Flight period VI-IX; larval feed plant unknown. Overwinters as pupa [12] [15] [17] [18] [20].

30) *D. saisani* Staudinger, 1882

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 03.05.2015; 12.05.2016 (1♀; 1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 11.05.2018 (1♀; 1♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 17.05.2017 (2♀; 2♂).

Distribution: Russia, Ukraine, Türkiye, Iran, Afghanistan, Caucasus, Central

Asia.

Bionomics: A bivoltine and xerothermophilous species inhabiting lowlands, mountain foothills, deserts, semideserts, steppes, calcareous slopes, and montane stony steppes. The pupae undergo a summer-winter diapause, although a portion of them may emerge as adults in summer and/or autumn. Flight period VI-IX; larvae on *Atraphanax spinosa*. Overwinters as pupa [12] [15] [17] [18] [20].

31) *D. herzi* *Alpheraky, 1895*

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 04.05.2025 (1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 22.09.2022; 28.09.2023 (2♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 21.05.2022 (1♀; 2♂).

Distribution: Türkiye, Northern Iran, Israel, Jordan, Egypt, Caucasus, Turkmenistan, Kyrgyzstan.

Bionomics: A bivoltine and xerophilous species. Inhabits semideserts, deserts, and dry steppes. Flight period from II to XII; larvae on *Atriplex halimus*, *A. leucoclada*, *Suaeda fruticosa*. Overwinters as larva [17]-[19].

32) *D. sinuosa* *Staudinger, 1884*

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 07.05.2024 (1♀; 1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 18.05.2021 (2♀; 3♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 25.05.2022 (2♂).

Distribution: Turkmenistan, Tajikistan.

Bionomics: A bivoltine, xerophilous, and ruderal species. Inhabits deserts, semideserts, and steppes. Flight period IV-X; larvae on *Alhagi* [12] [15] [18] [19].

33) *D. christophi* (*Alpheraky, 1895*)

Collection locality and date: Amu Darya—41°46'34.57"N, 60°33'20.62"E; 07.04.2019 (3♀; 2♂); Lake Kamyshli—41°19'47.72"N, 61°19'0.57"E; 12.05.2019 (1♀; 1♂); Akchakol—41°53'36.68"N, 60°50'2.91"E; 12.04.2020 (1♀); Ellikqala—41°49'51.00"N, 60°56'13.49"E; 08.05.2019 (1♂); 14.05.2022 (2♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 08.05.2020 (4♀; 1♂); Okkamyshe—2: 41°19'2.30"N, 61°16'41.70"E; 07.04.2020 (3♀; 6♂); Myskin—41°24'33.44"N, 61°12'36.67"E; 17.04.2021 (2♀; 1♂); Lower Amu Darya State Biosphere Reserve—42°0'4.08"N, 60°20'4.34"E; 05.04.2024 (2♀; 1♂).

Distribution: Europe, Central Asia, Southwestern Asia.

Bionomics: A monovoltine species inhabiting lowlands, mountain foothills, deserts, and semideserts, occurring mostly on sands. Flight period IV-V; larvae on *Elaeagnus angustifolia*. Overwinters as egg [12] [15] [18].

34) *D. catocalis* (*Staudinger, 1882*)

Collection locality and date: Nukus massif—41°10'10.48"N, 61°58'50.00"E; 10.04.2019 (5♂); Uch-Uchak—41°4'48.06"N, 61°58'50.00"E; 14.09.2020 (2♀; 2♂); Pakhtaabad—41°53'35.78"N, 61°29'18.76"E; 17.09.2021 (2♀; 1♂); Sarymoy—41°1'3.8"N, 62°6'54.27"E; 08.05.2024 (3♀; 2♂).

Distribution: Russia (Siberia, Altai), Kyrgyzstan, Uzbekistan, Kazakhstan, Tajikistan, China.

Bionomics: A bivoltine and xerothermophilous species. Inhabits dry lowlands,

montane steppes, and stony semideserts. Flight period IV-IX; larvae on *Artemisia pauciflora*, *Haloxylon aphyllum*. Overwinters as pupa [18]–[20]. Due to its high biotopical specialization and local distribution, this species is in need of protection.

35) *D. chinensis* (Alphéraky, 1892)

Collection locality and date: Nukus massif—41°10'10.48"N, 61°58'50.00"E; 10.04.2019 (5♂); Uch-Uchak—41°4'48.06"N, 61°58'50.00"E; 14.09.2020 (2♀; 2♂); Pakhtaabad—41°53'35.78"N, 61°29'18.76"E; 17.09.2021 (3♀; 2♂); Sarymoy—1°3.8"N, 62°6'54.27"E; 08.05.2024 (3♀; 1♂).

Distribution: Kyrgyzstan, Kazakhstan, Mongolia, and China (Gansu).

Bionomics: A univoltine and xerothermophilous species. Inhabits dry montane meadows and steppes. Adults are strongly attracted to artificial light sources. Flight period IV-IX; larvae on *Artemisia pauciflora*, *Haloxylon aphyllum* [12] [15] [18]. The species overwinters in the pupal stage.

36) *D. hyblaeoides* (Moore, 1878)

Collection locality and date: Sarymoy—1°3.8"N, 62°6'54.27"E; 10.12.2019 (3♂); 23.02.2024 (4♂; 3♀); Uch-Uchak—4°48.06"N, 62°2'30.66"E; 14.09.2020 (3♀; 1♂); Zhanbaskala—41°51'32.08"N, 61°16'41.76"E; 27.02.2021 (4♂; 1♀).

Distribution: Kyrgyzstan, Tajikistan, China.

Bionomics: A mesoxerophilous and univoltine species. Inhabits mountainous areas, living in steppes, semideserts, and dry rocky meadows; it is occasionally found in rocky lowland deserts. Flight period II-XI; larvae on *Alhagi pseudoalhagi*. Overwinters as pupa [15] [17] [18].

37) *D. indecora* (John, 1910)

Collection locality and date: Sarymoy: 41°1'3.81"N, 62°6'54.27"E; 10.05.2019 (4♂); Uch-Uchak—4°48.06"N, 61°58'50.00"E; 14.05.2020 (3♂; 4♀); Zhanbaskala—51°32.08"N, 61°16'41.76"E; 17.01.2021 (4♂; 1♀); Nazarkhan—20°17.24"N, 59°59'55.57"E; 08.06.2024 (4♂; 1♀)

Distribution: Turkmenistan, Pakistan, Kazakhstan, Mongolia, China.

Bionomics: A xerophilous species, reproducing with two generations per year (bivoltine). Flight period V-X; larvae on *Alhagi pseudoalhagi* [12] [15] [17] [18]. Overwinters as pupa.

38) *Drasteria langi langi* (Erschoff, 1874)

Collection locality and date: Nukus massif—10°10.48"N, 61°58'50.00"E; 10.03.2019 (1♂; 4♀); Uch-Uchak—4°48.06"N, 61°58'50.00"E; 14.06.2020 (2♂; 2♀); Nazarkhan—20°17.24"N, 59°59'55.57"E; 17.10.2021 (5♂; 4♀); Sarymoy—1°3.81"N, 62°6'54.27"E; 08.04.2024 (4♂; 3♀).

Distribution: Hissar-Darvaz, Pamir, Northeastern Himalayas.

Bionomics: A xerophilous and univoltine species. Inhabits deserts, semideserts, dry meadows, rocky slopes, scree, and river valleys. Flight period V-X; larvae on *Alhagi pseudoalhagi*. Overwinters as pupa [12] [18].

39) *D. langi obscurata* (Staudinger, 1882)

Collection locality and date: Akkamyshe-1—41°20'23.07"N, 61°17'32.84"E;

10.05.2019 (1♂; 1♀); Uch-Uchak—4'48.06"N, 61°58'50.00"E; 14.06.2020 (2♂; 1♀); Zhanbaskala—51'32.08"N, 61°16'41.76"E; 17.10.2021 (5♂; 1♀); Sarymoy—1'3.81"N, 62°6'54.27"E; 08.09.2024 (4♂; 1♀).

Distribution: Southeastern Kazakhstan, Inner and Western Tien Shan.

Bionomics: A univoltine species. Inhabits steppes, deserts, and semideserts. Flight period V-IX; larvae on *Alhagi pseudoalhagi* [15] [18]. Overwinters as pupa.

40) *D. sculpta sculpta* (Püngeler, 1904)

Collection locality and date: Sarymoy—1'3.81"N, 62°6'54.27"E; 10.03.2019 (1♂); Uch-Uch-Uchak—4'48.06"N, 61°58'50.00"E; 14.04.2020; (2♂; 1♀); Zhanbaskala—51'32.08"N, 61°16'41.76"E; 17.04.2021 (2♂; 1♀); Nazarkhan—20'17.24"N, 59°59'55.57"E; 08.04.2024 (2♂; 1♀).

Distribution: Southern Kazakhstan, Alai, and Tien Shan.

Bionomics: A univoltine and xerophilous species. Inhabits lowlands, mountain foothills, deserts, semideserts, and steppes, occurring predominantly on sandy substrates. The flight period of adults III to X. Its larval host plants and overwintering stage remain unknown [15] [18].

Genus Anumeta Walker, 1858

41) *A. palpangularis* Püngeler, 1901

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 20.05.2016; 23.05.2017; 14.06.2021 (7♀; 4♂); Zaungur—25'28.21"N, 60°15'34.04"E; 15.04.2021 (3♀; 2♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 16.05.2022 (15♀; 11♂).

Distribution: Central Asia.

Bionomics: A xerophilous and psammophilous species, developing one generation per year. It is found in deserts, semideserts, and tugai forests. During the day, the adults rest on the sand surface (sometimes hiding in sand shelters) and flush when approached; flight period III-VI; larvae on *Calligonum eriopodum*, *C. leucocladum* [4]-[6] [15] [21].

42) *A. spilota* Ershoff, 1874

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 29.05.2022 (8♀; 6♂); Sayat 12.05.2023 (9♀; 2♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 24.05.2024; 12.05.2025 (10♀; 7♂); Lower Amu Darya State Biosphere Reserve—0'4.08"N, 60°20'4.34"E; 01.05.2021; 13.06.2022 (13♀; 11♂); Zaungur—25'28.21"N, 60°15'34.04"E; 13.05.2023 (5♀; 6♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 18.05.2008 (9♀; 7♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 27.05.2023; 01.06.2024 (8♀; 7♂).

Distribution: North Africa, Asia Minor, Russia, Pakistan, Afghanistan, Central Asia, Northern India.

Bionomics: A xerophilous species, developing two generations per year. It occurs particularly in steppes, sandy areas, and tugai forests. Adults fly over the bushes of the host plant, frequently perching on them; flight period IV-X; The larvae are nocturnal; during the day, they hide deep in the sand beneath the bushes, and upon full darkness, they emerge onto the surface and climb the host plant to feed on green twigs. When disturbed, the larvae drop from the branches and rapidly burrow into loose sand; larvae on *Calligonum griseum*. Overwintering

occurs in the pronympha stage within sandy cocoons [4]-[6] [12] [19].

43) *A. henkei* Staudinger, 1877

Collection locality and date: Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 11.05.2021; 19.06.2022 (4♀; 5♂); Bagat—20°55.72"N, 60°52'14.27"E; 15.06.2022 (3♀; 2♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 21.06.2025; 29.06.2026 (3♀; 7♂); Zaungur—25°28.21"N, 60°15'34.04"E; 17.05.2024 02.08.2025 (4♀; 3♂).

Distribution: Southeastern Europe, Russia (Naryn, Sarepta, Astrakhan) Central Asia, Iran, Afghanistan.

Bionomics: A xerophilous and psammophilous species, inhabiting deserts. It develops two generations per year; flight period V-VIII-IX; larvae on *Tamarix*, *Calligonum* [4]-[6] [12] [15] [19]. The overwintering stage remains unknown.

44) *A. cestis* Ménétriés, 1848

Collection locality and date: Bagat—41°20'55.72"N, 60°52'14.27"E; 03.06.2022 (3♀; 1♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 18.06.2023 (2♀; 1♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 15.06.2016; 13.06.2017 (3♀; 2♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 16.06.2017 (6♀; 3♂).

Distribution: North Africa, Southeastern Europe—Malta; Russia—Southern Ural; Central Asia.

Bionomics: A xerophilous and psammophilous species, found in desert and semidesert zones with two generations per year; flight period IV-VI. Larvae feed on *Calligonum eriopodum* and *Calligonum leucocladum*; some pupae undergo developmental arrest (diapause), resulting in delayed adult emergence. Overwintering stage: unknown [4]-[6] [12] [15] [19] [20].

45) *A. fractistrigata* Alphéraky, 1882

Collection locality and date: Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 09.06.2022; 12.06.2023 (4♀; 6♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 26.06.2024; 28.06.2025 (2♀; 2♂); Zaungur—25°28.21"N, 60°15'34.04"E; 06.07.2016; 18.06.2017 (4♀; 3♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 02.06.2018 (2♀; 4♂).

Distribution: Russia (Ural, Astrakhan), Central Asia.

Bionomics: A xerothermophilous and Central Asian endemic species, developing two generations per year. Inhabits desert, semidesert, and steppe areas; flight period III-VIII. Larvae feed on *Calligonum eriopodum* and *Calligonum leucocladum*. Overwintering stage: unknown [4]-[6] [12] [15] [19].

46) *A. dentistrigata* Staudinger, 1877

Collection locality and date: Bagat—41°20'55.72"N, 60°52'14.27"E; 23.04.2022; 01.05.2023 (3♀; 4♂); Zaungur—25°28.21"N, 60°15'34.04"E; 08-09.05.2015 (2♀; 4♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 11-12.06.2017 (7♀; 6♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 19.06.2017 (2♀; 5♂).

Distribution: Central Asia, Xizang.

Bionomics: A xerophilous and desert species, developing two generations per year. It occurs in sandy, clayey, and chalky biotopes across all desert subzones;

flight period IV-V. Larvae feed on *Calligonum*. Overwintering stage: unknown [4]-[6] [12] [15] [19].

47) *A. fricta* Christoph, 1893

Collection locality and date: Bagat—41°20'55.72"N, 60°52'14.27"E; 14.06.2015; 16.06.2016 (2♂); Zaungur—25°28.21"N, 60°15'34.04"E; 25.07.2017 (1♀); Karluk—38°11'16.51"N, 67°41'13.51"E; 19.06.2017 (2♀; 1♂).

Distribution: Central Asia.

Bionomics: A xerophilous and psammophilous species, endemic to Central Asia; flight period VI-VII; larvae feed on *Calligonum*. Overwintering stage: unknown [4]-[7] [19].

48) *A. atrosignata* Walker, 1858

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 03.06.2022 (2♀); Bagat—41°20'55.72"N, 60°52'14.27"E; 12.05.2023; 21.06.2024 (1♀; 2♂); Zaungur—25°28.21"N, 60°15'34.04"E; 25.05.2016 (2♀); Sufyan—39°50'33.30"N, 64°38'9.14"E; 05.05.2018 (2♀; 1♂).

Distribution: Russia (Naryn, Astrakhan, Ural), Central Asia, Afghanistan, Southeastern Iran, Northeastern India.

Bionomics: A xerophilous species, inhabiting mainly steppes and semideserts; develops two generations per year. Adults are strongly attracted to light; flight period: III-VIII. Nocturnal larvae feed on *Calligonum comosum*. Overwintering occurs in the pronymph stage within sandy cocoons beneath the host plant bushes. Pupation takes place in the following spring [12] [15].

49) *A. cestina* Staudinger, 1884

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 11.04.2015 (2♀; 1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 14.05.2016 (2♀); Zaungur—25°28.21"N, 60°15'34.04"E; 25.05.2017 (1♀).

Distribution: Turkmenistan, Tajikistan, Northern Afghanistan.

Bionomics: A xerophilous desert species; flight period IV-V. The daily flight of adults begins at twilight and continues until midnight; they fly over bushes and frequently perch on the host plants. Nocturnal larvae feed on *Calligonum griseum*. Pupation takes place in a cocoon in the sand, with walls lined inside with light silk and covered externally with sand particles [4]-[7] [12] [15] [19].

Genus *Catocala* Schrank, 1802

50) *C. elocata* Esper, 1788

Collection locality and date: Sarapayan—41°31'53.85"N, 60°44'41.10"E; 15.08.2021; 06.07.2022 (1♀; 5♂); Al-Khorezmi—41°26'41.76"N, 60°54'14.07"E; 21.08.2023 (5♀; 7♂); Karatau—7°14.29"N, 60°19'39.07"E; 21.08.2023; 28.08.2024 (7♀; 14♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 10.07.2024; 25.07.2025; 28.08.2025 (11♀; 17♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 18.07.2024 (2♀; 9♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 13.07.2022; 22.07.2023 (3♀; 5♂); Sayat—41°24'15.88"N, 60°27'44.55"E; 23.08.2017 (2♂); Sultan-Uais—25°28.21"N, 60°44'49.97"E; 26.07.2019 (2♀; 2♂).

Distribution: Central and Southern Europe, North Africa, Western Siberia, Al-

tai, Asia Minor, Central Asia, Kazakhstan.

Bionomics: A mesohygrophilous species; distributed in tugai forests and agrocenoses, particularly in areas where willows grow. It develops one generation per year. Flight period: VII-IX; larvae feed on *Alnus*, *Populus pyramidalis*, *P. nigra*, *P. tadshikistanica*, *P. bolleana*, *P. italica*, *P. tremula*, *P. pruinosa*, *Salix australior*, *S. wilhelmsiana*, *S. coerulea*, *S. tenuijulis*, *S. oxycarpa*, and *S. triandra*. Overwinters as an egg [4] [5] [12] [15] [19] [21].

51) *C. puerpera* Giorna, 1791

Collection locality and date: Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 12.07.2021; 20.07.2022; 22.08.2023 (9♀; 4♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 19.07.2015 (7♀; 7♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 16.07.2017; 27.07.2018 (7♀; 4♂).

Distribution: Southern Europe, Siberia, Altai, North Africa, Asia Minor and Central Asia, Iran, Kazakhstan, China (Xizang, Himalaya).

Bionomics: A mesophilic species; develops one generation per year. Distributed in tugai forests. Flight period: VII-VIII, and VII-X in Europe; larvae feed on *Populus diversifolia*, *P. italica*, *P. pruinosa*, *P. nigra*, *Salix australior*, *S. alba*, *S. cinerea*, *S. fragilis*, *S. helix*, *S. purpurea*, *S. triandra*, *S. wilhelmsiana*, *S. coerulea*, *S. tenuijulis*, *S. oxycarpa*, *S. caspica*, and *Ulmus*. Overwinters as an egg [4]-[6] [12] [15] [19].

52) *C. lupina* Herrich-Schäffer, 1851

Collection locality and date: Sultan-Uais—25°28.21"N, 60°44'49.97"E; 16.07.2001; 24.07.2022 (2♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 13.07.2022 (1♂); Karatau—7°14.29"N, 60°19'39.07"E; 24.07.2023 (1♀; 2♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 18.07.2017; 21.07.2018 (4♀; 3♂).

Distribution: Southeastern Europe: Italy, Yugoslavia, Bulgaria, Greece; Asia Minor, Southern Ural, Altai, Southwestern Siberia; Caucasus, Western Kazakhstan.

Bionomics: A mesophilic species; develops one generation per year. Inhabits tugai forests and areas with an abundance of willows and poplars, and occasionally occurs in marshes in certain regions. Flight period: VII-VIII to X; larvae feed on *Populus pruinosa*, *Salix alba*, and *S. purpurea*. Overwinters as an egg. Due to a significant decline in population numbers, this species is considered to be in need of conservation [12] [15] [19]-[21].

53) *C. optima* Staudinger, 1888

Collection locality and date: Karatau—7°14.29"N, 60°19'39.07"E; 26.07.2021 (2♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 19.07.2021; 21.07.2025 (1♀; 1♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 18.07.2007 (2♀; 1♂).

Distribution: Iran, Iraq, Central Asia, China (Xinjiang).

Bionomics: Develops one generation per year. Distributed in tugai forests. Flight period: VI-VIII, and V-VII in Tajikistan; larvae feed on *Populus* and *Salix*, especially *Populus pruinosa*. Larvae are adapted to consume the entire leaf lamina,

except for the petiole. The pupa is formed within a reticulated, membrane-like cocoon beneath the bark of the tree. Overwinters as a larva. Considered to be in need of conservation [4] [5] [12] [15] [19] [21].

54) *C. neonympha* Esper, 1796

Collection locality and date: Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 11.07.2021; 25.08.2022; 27.08.2023 (3♀; 4♂); Karatau—7°14.29"N, 60°19'39.07"E; 11.08.2022; 12.08.2023 (2♀; 3♂); Sultan-Uais—25°28.21"N, 60°44'49.97"E; 22.07.2024 (1♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 23.08.2023 (5♀; 8♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 16.07.2016; 19.07.2017 (2♀; 2♂); Sarmysh—40°16'59.86"N, 65°35'28.01"E; 14.07.2018 (2♀; 2♂).

Distribution: Southeastern Europe, Volga region, Altai, Transcaucasia, Eastern Türkiye, Kurdistan, Afghanistan, Iran, Iraq, Central Asia, Kazakhstan.

Bionomics: A mesoxerophilous species; distributed in mountains and tugai forests. It develops one generation per year. Flight period: VI-IX; larvae feed on *Salix*, *Quercus*, *Glycyrrhiza glabra*, and *Pseudosophora alopecuroides*. Overwinters as an egg [4]-[6] [12] [15] [19] [21].

55) *C. deducta* Eversmann, 1843

Collection locality and date: Sarmysh—40°16'59.86"N, 65°35'28.01"E; 08.08.2018; 27.08.2008 (2♀; 2♂); Mingchinar—8°50.10"N, 66°58'21.03"E; 21.07.2008; 10.08.2008 (4♀; 1♂).

Distribution: Europe, Russia: Southern Ural, Southern Altai; Kazakhstan.

Bionomics: A mesophilic species; distributed in mountains and tugai forests. It develops one generation per year. Flight period: VIII-IX; larvae feed on *Salix* and *Populus*. Overwinters as an egg [12] [15] [20].

56) *C. lesbia* Christoph, 1887

Collection locality and date: Zaungur—25°28.21"N, 60°15'34.04"E; 20.06.2018; 17.07.2019 (1♀; 1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 10.07.2018 (1♂).

Distribution: Sinai Peninsula, Palestine, Iraq, Southern Iran, Turkmenistan, Uzbekistan

Bionomics: A hemixerophilous species; distributed in tugai forests and river valleys. It develops one generation per year. Flight period: VII-VIII; larvae feed on *Populus euphratica*. Overwinters as a larva. Considered to be in need of conservation [4] [5] [12] [20].

57) *C. nupta* Linnaeus, 1767

Collection locality and date: Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 11.07.2015; 18.07.2016; 24.06.2017 (2♀; 2♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 16.07.2017 (6♀; 6♂).

Distribution: Corsica, Türkiye, Altai, Siberia, Far East; Iran, Caucasus, Central Asia, India, China, Korea, Japan.

Bionomics: A mesophilic species; distributed in mountains, forests, tugai forests, and agrocenoses. It develops one generation per year. Flight period: VII-X; larvae feed on *Salix alba*, *S. babylonica*, *S. caprea*, *S. cinerea*, *S. fragilis*, *S. triandra*, *Populus nigra*, *P. balsamifera*, *P. deltoides*, *P. maximowiczii*, *P. canadensis*, *P.*

tremula, *Tilia*, *Crataegus*, *Prunus domestica*, and *Fraxinus*. Overwinters as an egg [12] [15] [20] [21].

58) *C. sponsa* (Linnaeus, 1767)

Collection locality and date: Amu Darya—46°34.57"N, 60°33'20.62"E; 17.07.2019 (1♂; 1♀); Lower Amu Darya State Biosphere Reserve—58°34.77"N, 60°23'34.13"E; 05.09.2022 (2♂; 1♀). Tollik-Tugai—7°15.30"N, 60°18'38.07"E; 23.08.2022 (2♂).

Distribution: Palaearctic, Europe, Western Siberia, East Asia, Southwestern Asia.

Bionomics: A mesoxerophilous species; inhabits forests, the forest-steppe zone, and tugai forests. It develops one generation per year. Flight period: VII-X; larvae feed on *Alnus*, *Castanea sativa*, *Aesculus hippocastanum*, *Populus tremula*, *Salix*, *Quercus robur*, *Q. faginea*, *Q. ilex*, and *Q. pyrenaica*. Overwinters as an egg. Due to a significant decline in population numbers, this species is considered to be in need of conservation [12] [15] [19] [21].

59) *C. fraxini* (Linnaeus, 1758)

Collection locality and date: Amu Darya—46°34.57"N, 60°33'20.62"E; 28.09.2019 (1♂; 2♀); Lower Amu Darya State Biosphere Reserve—58°34.77"N, 60°23'34.13"E; 05.10.2021; 3♂, 1♀. Tollik-Tugai—7°15.30"N, 60°18'38.07"E; 14.08.2021 (3♂); Ellikqala—49°51.00"N, 60°56'13.49"E; 03.08.2024 (1♂; 1♀).

Distribution: Palaearctic, Europe, Western Siberia, Eastern Siberia, East Asia, South Asia, Central Asia.

Bionomics: A mesophilic species; distributed in mountains, forests, tugai forests, and agrocenoses. It develops one generation per year. Flight period: VII-X; larvae are polyphagous, feeding on plants from families such as Fagaceae, Betulaceae, Salicaceae, Malvaceae, Ulmaceae, Rosaceae, Tiliaceae, Aceraceae, Sapindaceae, and Oleaceae. Overwinters as an egg [5] [12] [15] [20] [21].

60) *C. adultera* (Ménétrières, 1856)

Collection locality and date: Amu Darya—46°34.57"N, 60°33'20.62"E; 11.07.2021 (2♂; 1♀); Lower Amu Darya State Biosphere Reserve—58°34.77"N, 60°23'34.13"E; 09.07.2022 (1♂; 1♀); Okkamyshe-2: 41°19'2.30"N, 61°16'41.70"E; 03.07.2024 (1♂); Akchakol—53°36.68"N 60°50'2.91"E; 11.10.2025 (2♂; 1♀).

Distribution: Palaearctic, Europe, and Central Asia.

Bionomics: A mesophilic species, distributed in tugai forests. It develops one generation per year, and the imagoes exhibit migratory behavior. Flight period: VII-X; larvae feed on *Populus tremula*, *P. pruinosa*, *P. euphratica*, and *Salix*. Overwinters as an egg. Due to its extreme rarity, this species is considered to be in need of conservation [5] [12] [15] [20] [21].

61) *C. promissa* (Denis et Schiffermüller, 1775)

Collection locality and date: Ellikqala—49°51.00"N, 60°56'13.49"E; 09.07.2023; 22.08.2024 (7♂; 5♀); Amu Darya—46°34.57"N, 60°33'20.62"E; 08.08.2022; 24.08.2023 (3♂; 3♀); Lower Amu Darya State Biosphere Reserve—58°34.77"N, 60°23'34.13"E; 05.07.2020 (1♂; 2♀).

Distribution: Palaearctic (transpalaearctic), Europe, Western Siberia, South-

western Asia.

Bionomics: A mesophilic species, distributed in tugai forests. It develops one generation per year, and the imagos exhibit migratory behavior. Flight period: VII-X; larvae feed on *Populus tremula*, *P. pruinosa*, *P. euphratica*, and *Salix*. Overwinters as an egg [5] [12] [15] [20] [21].

62) *C. pacta* (Linnaeus, 1758)

Collection locality and date: Lower Amu Darya State Biosphere Reserve—58°34.77"N, 60°23'34.13"E; 03.09.2017; 27.07.2017 (3♀; 1♂); Tollik-Tugai—7°15.30"N, 60°18'38.07"E; 15.09.2018; 22.08.2019 (2♀); Akkamysh-2—19°2.30"N, 61°16'41.70"E; 03.09.2019; 08.09.2021 (2♂; 1♀).

Distribution: Palaearctic, Europe, and Central Asia.

Bionomics: A mesophilic species; inhabits open marshy woodlands, wooded river banks, tugai forests, and lake margins. It develops one generation per year. Flight period: VII-IX; larvae feed on *Salix brachypoda*, *S. caprea*, *S. cinerea*, *S. repens*, *S. rosmarinifolia*. The pupa is formed on the leaves of the host plant. Overwinters as an egg. Due to a significant decline in population numbers, this species is considered to be in need of conservation [5] [12] [15] [20] [21].

63) *C. remissa* (Staudinger, 1891)

Collection locality and date: Tollik Tugai—57°12.08"N, 60°27'32.92"E; 07.07.2019 (1♂; 1♀); Amu Darya—46°34.57"N, 60°33'20.62"E; 10.08.2023 (1♂).

Distribution: Palaearctic, Turkmenistan, Kazakhstan, and Mongolia.

Bionomics: A mesophilic species; distributed in lowland river valleys and tugai forests. It develops one generation per year. Flight period: VI-IX; larvae feed on *Populus euphratica*, *P. pruinosa*, and *Salix*. Overwinters as a larva. Due to its extreme rarity, it is listed in the Red Data Book of the Republic of Uzbekistan [5] [12] [17].

64) *C. conversa* (Esper, 1783)

Collection locality and date: Ellikqala: 41°49'51.00"N, 60°56'13.49"E; 10.08.2019 (5♂); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 12.07.2023 (2♂; 2♀).

Distribution: Palaearctic, Europe, Southwestern Asia, Central Asia.

Bionomics: A mesoxerophilous species, distributed in mountains and tugai forests. It develops one generation per year. Flight period: VI-VIII; larvae feed on *Quercus calliprinos*, *Q. ithaburensis*, *Q. ilex*, *Q. petraea*, and *Prunus spinosa*. The pupa is formed in a thin-walled cocoon between the leaves of the host plant. Overwinters as an egg [12] [15] [20] [21].

Genus *Euclidia* Ochseneimer, 1816

(*Ectypa* Billberg, 1820; *Euclidina* McDunnough, 1937; *Euclidiana* Rákossy, 1985)

65) *E. glyphica* Linnaeus, 1758

Collection locality and date: Sayat—41°24'15.88"N, 60°27'44.55"E; 12.08.2022; 21.08.2022; 12.05.2023; 28.05.2023 (16♀; 9♂); Sarapayan—41°31'53.85"N, 60°44'41.10"E; 02.09.2024; 07.09.2024 (10♀; 7♂); Al-Khorezmi—41°26'41.76"N, 60°54'14.07"E; 11.09.2017; 19.08.2018 (7♀; 5♂).

Distribution: Finland, North Africa, Crimea, Southern Siberia, Kyrgyzstan, Mongolia.

Bionomics: A mesothermophilous species, occurring in rough grasslands, sand dunes, meadows, wood margins, and clover fields; bivoltine in southern areas. Adults are diurnal. Flight period V-VIII; larvae are polyphagous, feeding on *Rumex*, *Myrica*, *Astragalus glycyphyllos*, *Coronilla varia*, *Hippocrepis comosa*, *Lathyrus humilis*, *L. pratensis*, *Lotus corniculatus*, *Onobrychis*, *Ononis spinosa*, *Medicago falcata*, *M. lupulina*, *M. officinalis*, *M. sativa*, *Melilotus albus*, *Pisum*, *Tetragonolobus maritimus*, *Trifolium hybridum*, *T. incarnatum*, *T. medium*, *T. pratense*, *T. repens*, *Vicia angustifolia*, *V. cracca*, *V. sepium*, *V. silvatica*, *Viola*, *Verbascum*, *Solidago virgaurea*, and *Poaceae*. Overwinters as a pupa [12] [15] [20] [21].

66) *E. mi* (Clerk, 1759)

Collection locality and date: Al-Khorezmi—41°26'41.76"N, 60°54'14.07"E; 12.06.2023; 17.06.2024 (2♀; 3♂); Sarapayan—41°31'53.85"N, 60°44'41.10"E; 17.06.2015; 14.06.2016 (2♀; 3♂); Sayat—41°24'15.88"N, 60°27'44.55"E; 23.06.2016; 19.06.2017 (10♀; 9♂); Zaungur—25°28.21"N, 60°15'34.04"E; 28.07.2017 (4♀; 2♂).

Distribution: Western Europe, Balkans, Southern Siberia, Far East, Asia Minor.

Bionomics: A mesothermophilous species, inhabiting various grasslands and open biotopes, including dry and wet meadows, steppes, forest-steppes, forest clearings, and clover fields. It is univoltine per year, though bivoltine in southern areas. Adults are diurnal. Flight period V-VII; larvae feed on *Rumex*, *Polygonum aviculare*, *Myrica*, *Hypericum maculatum*, *Genista sagittalis*, *G. tinctoria*, *Andromeda polifolia*, *Calluna vulgaris*, *Lotus corniculatus*, *Melilotus officinalis*, *M. arvensis*, *Vicia cracca*, *Ononis*, *Trifolium pratense*, *T. repens*, *Medicago lupulina*, *Lathyrus pratensis*, *Galium verum*, *Teucrium scorodonia*, *Carex*, *Eriophorum*, *Agrostis canina*, *Elymus arenarius*, *Holcus lanatus*, *Molinia caerulea*, *Phalaris arundinacea*, and *Phragmites*. Overwinters as a pupa [12] [15] [20] [21].

67) *E. fortalitium* Tauscher, 1809

Collection locality and date: Sultan-Uais—25°28.21"N, 60°44'49.97"E; 27.06.2015 (1♀; 1♂); Mingchinar—39°8'50.10"N, 66°58'21.03"E; 22.06.2016 (2♀; 5♂); Sar-mysh—40°16'59.86"N, 65°35'28.01"E; 30.06.2018 (3♀; 3♂).

Distribution: Ural, Bashkiria, Western Siberia, Altai, Tien Shan, Central Asia, Mongolia.

Bionomics: A xero-thermophilous and rather local species distributed in the steppe zone. It occurs on hot steppe slopes and is more common on chalky hills and in calcareous localities. It develops two generations per year; adults are both nocturnal and diurnal. Flight period: V-VII; larvae feed on *Fabaceae* (*Lupinus*, *Medicago*, *Onobrychis*, *Pisum sativum*, *Vicia*), *Artemisia* and *Poaceae* [12] [15] [20] [21].

Genus Anydrophila John, 1909

68) *A. imitatrix* Christoph, 1887

Collection locality and date: Bagat—41°20'55.72"N, 60°52'14.27"E; 15.05.2022; 03.06.2022; 09.06.2023 (3♀; 6♂); Lower Amu Darya State Biosphere Reserve—

0'4.08"N, 60°20'4.34"E; 12.05.2022; 19.05.2023 (5♀; 1♂); Zaungur—25'28.21"N, 60°15'34.04"E; 13.05.2022; 21.05.2024; 13.05.2025 (4♀; 2♂); Sufyan—39°50'33.30"N, 64°38'9.14"E; 29.05.2017; 06.06.2018 (8♀; 3♂).

Distribution: Central Asia.

Bionomics: A xerophilous species; develops one generation per year. Distributed in sandy areas and tugai forests. Flight period V-VI; larvae feed on *Calligonum*. Overwinters as an egg [5] [6] [12] [15] [19].

69) *A. mirifica* Ershov, 1887

Collection locality and date: Bagat—41°20'55.72"N, 60°52'14.27"E; 15.05.2022; 03.06.2022; 01.06.2023 (9♀; 5♂); Zaungur—25'28.21"N, 60°15'34.04"E; 02.06.2024; 31.06.2025 (2♀; 3♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 18.05.2016; 22.05.2017 (7♀; 4♂); Karluk—11°16.51"N, 67°41'13.51"E; 14.06.2018 (3♀; 3♂).

Distribution: Central Asia (Turkmenistan).

Bionomics: A xerophilous species; develops one generation per year. Inhabits desert zones. Adults are active around the clock; during cool weather by day, they feed on flowers and flush from vegetation. Flight period V-VI; larvae feed on *Calligonum*. Overwinters as an egg [5] [6] [12] [15] [19].

70) *A. simiola* Püngeler, 1900

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 18.05.2021; 22.05.2022; 30.05.2023; 21.06.2024 (12♀; 6♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 14.05.2015; 19.05.2016 (9♀; 8♂); Zaungur—25'28.21"N, 60°15'34.04"E; 03-05.06.2021 (4♀; 1♂).

Distribution: Central Asia.

Bionomics: A xerophilous species; develops one generation per year. Inhabits deserts and semideserts. Flight period V-VI; larvae feed on *Calligonum*. Overwinters as an egg [5] [6] [12] [15] [19].

71) *A. stuebeli* (Calberla, 1891)

Collection locality and date: Amu Darya—46°34.57"N, 60°33'20.62"E; 17.06.2019 (1♂; 1♀); Lower Amu Darya State Biosphere Reserve—0'4.08"N, 60°20'4.34"E; 17.06.2019 (2♂; 4♀); Zhanbaskala—51°32.08"N, 61°16'41.76"E; 17.06.2020 (1♂; 1♀); Pakhtaabad—53°35.78"N, 61°29'18.76"E; 04.05.2020 (3♂; 2♀); Sarymoy—1°3.8"N, 62°6'54.27"E; 22.05.2023 (2♂).

Distribution: Sinai peninsula, Egypt, Central Arabia, United Arab Emirates, Jordan, Israel.

Bionomics: A xerophilous, desert species; develops one generation per year. Flight period V-VI; larvae feed on *Calligonum paletzkianum*. Overwinters as an egg [4].

72) *A. sirdar* Brandt, 1939

Collection locality and date: Amu Darya—46°34.57"N, 60°33'20.62"E; 17.06.2019 (1♂; 1♀); Uch-Uchak—4°48.06"N, 62°2'30.66"E; 17.06.2020 (2♂; 1♀); Zhanbaskala—51°32.08"N, 61°16'41.76"E; 17.06.2021 (1♂); Sarymoy—1°3.8"N, 62°6'54.27"E; 22.05.2022 (2♂); Pakhtaabad—53°35.78"N, 61°29'18.76"E; 04.05.2024 (1♂; 2♀).

Distribution: Sinai peninsula, Arabia, Iran, Israel, Jordan, Algeria.

Bionomics: A xerophilous species; distributed in deserts, tugai forests, and mountains. Develops one generation per year. Flight period III-VI; larvae feed on *Calligonum paletzkianum*. Overwinters as an egg [4].

Genus *Clytie* **Hübner, 1823**

73) *C. syriaca* Bugnion, 1837

Collection locality and date: Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 17-22.06.2017 (2♀; 3♂); Zaungur—25°28.21"N, 60°15'34.04"E; 11.06.2022; 07.06.2023; 29.05.2026 (7♀; 5♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 05-07.06.2024; 09.07.2025 (7♀; 5♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 01.06.2023; 13.06.2024 (8♀; 5♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 21-22.06.2017 (5♀; 3♂).

Distribution: Southeastern Europe, North Africa, Iraq, Iran, Caucasus, Asia Minor and Central Asia, Kazakhstan.

Bionomics: A xerophilous species; inhabits warm and dry zones, including semideserts, tugai forests, and mountain foothills. It develops two or three generations per year. Flight period IV-X; larvae feed on *Tamarix nilotica*, *T. gallica*, *T. gracilis*, and *T. ramosissima*. Overwinters as an egg [4]-[6] [12] [15] [19] [21].

74) *C. illunaris* Hübner, 1813

Collection locality and date: Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 18-22.07.2017 (3♀; 3♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 02.06.2023; 04.06.2024 (6♀; 5♂); Zaungur—25°28.21"N, 60°15'34.04"E; 13.06.2015; 07.06.2016; 09.06.2017 (4♀; 6♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 22.06.2017 (3♀; 8♂).

Distribution: Southern Europe, North Africa, Ural region, Asia Minor and Central Asia, India.

Bionomics: Primarily inhabits coastal and semidesert zones with vegetation. It develops two generation per year. Flight period V-X; larvae feed on *Tamarix*. During the day, larvae remain in the center of the bushes, feeding on the leaves. Overwinters as an egg [4]-[7] [19].

75) *C. delunaris* Staudinger, 1889

Collection locality and date: Zaungur—25°28.21"N, 60°15'34.04"E; 30.05.2023 (2♀; 1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 07.06.2024; 09.06.2025 (2♀; 4♂); Shurkul—41°16'12.52"N, 60°29'12.41"E; 02.06.2024; 04.06.2025 (3♀; 6♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 19-22.06.2017 (2♂).

Distribution: Russia, Iran, Afghanistan, Pakistan, Mongolia, Central Asia.

Bionomics: A xerophilous species; distributed in tugai forests and deserts. Develops two generations per year. Flight period V-VI; larvae feed on *Tamarix*. Overwinters as an egg [4]-[7] [12] [15] [21].

76) *C. distincta* Bang-Haas, 1907

Collection locality and date: Zaungur—25°28.21"N, 60°15'34.04"E; 30.06.2024; 22.06.2025 (2♀; 1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; 02.06.2025 (2♀; 1♂); Karluk—38°11'16.51"N, 67°41'13.51"E; 23.06.2017 (1♂).

Distribution: Turkmenistan.

Bionomics: A xerophilous species, distributed in tugai forests. It develops two generations per year. Flight period: VI; larvae feed on *Tamarix*. Overwinters as an egg [4]-[6] [12] [15] [19].

77) *C. terrulenta* Christoph, 1893

Collection locality and date: Zaungur—25°28.21'N, 60°15'34.04'E; 29.05.2024 (1♀; 1♂); Bagat—41°20'55.72"N, 60°52'14.27"E; Karluk—38°11'16.51"N, 67°41'13.51"E; 22–23.06.2017 (2♀); Sufyan—39°50'33.30"N, 64°38'9.14"E; 17.05.2018 (2♀; 1♂).

Distribution: Middle East, Armenia, Turkmenistan.

Bionomics: A xerophilous species, distributed in tugai forests. It develops two generations per year. Flight period: III-V; larvae feed on *Tamarix*. Overwinters as an egg [12] [15] [19] [21].

78) *C. gracilis* Bang-Haas, 1907

Collection locality and date: Sultan-Uais—25°28.21'N, 60°44'49.97"E; 12.06.2024; 19.06.2025 (2♀; 6♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 24.08.2025 (2♀; 3♂); Sarapayan—41°31'53.85"N, 60°44'41.10"E; 10.06.2015; 19.07.2016 (4♀; 2♂); Sayat—41°24'15.88"N, 60°27'44.55"E; 23.06.2016; 29.07.2017 (2♀; 1♂).

Distribution: Southern Europe, Türkiye, Transcaucasia, Kazakhstan.

Bionomics: A xerothermophilous species, widely distributed in hot, dry steppe and semidesert localities, sand dunes, and hillsides. It develops two generations per year. Flight period: V-IX; larvae feed on *Tamarix gallica*, *T. gracilis*, and *T. ramosissima* [4]-[6] [12] [19] [20].

Genus *Dysgonia* Hübner, 1823

79) *D. rogenhoferi* Bohatsch, 1880

Collection locality and date: Lower Amu Darya State Biosphere Reserve—0°4.08'N, 60°20'4.34"E; 18.06.2022; 24.06.2023; 23.07.2024 (5♀; 7♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 05.08.2021; 08.08.2022; 12.08.2023 (3♀; 6♂).

Distribution: Russia, Arabia, Syria, Israel, Jordan, Iraq, Iran, Caucasus (Azerbaijan), Turkmenistan, Uzbekistan, Tajikistan, Pakistan, Western India.

Bionomics: A hemixerophilous species; develops two generations per year. It occurs in tugai forests of river valleys. Flight period IV-VIII; larvae feed on *Tamarix dioica*. Overwinters as an egg [4] [5] [12] [15] [19] [21].

80) *D. algira* Linnaeus, 1767

Collection locality and date: Lower Amu Darya State Biosphere Reserve—0°4.08'N, 60°20'4.34"E; 10.08.2024; 13.05.2025; 20.06.2025 (9♀; 10♂); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 04.05.2022; 18.05.2023 (3♀; 4♂); Al-Khorezmi—41°26'41.76"N, 60°54'14.07"E; 19.07.2023; 28.07.2024 (6♀; 3♂); Sayat—41°24'15.88"N, 60°27'44.55"E; 20.05.2023; 24.06.2024; 21.06.2025 (4♀; 7♂).

Distribution: Central Europe, British, Balearic, and Mediterranean islands; Cyprus, Russia, Morocco, Algeria, Madagascar, Asia Minor, Iran, Afghanistan, Turkmenistan, Kyrgyzstan, India, China, Japan.

Bionomics: A migratory, hemixerophilous species; inhabits orchards, shelter-

belts, and moderately moist mountain sites. It develops 2 - 3 generations per year; flight period IV-X. Larvae feed on *Crataegus azarolus*, *Persica vulgaris*, *Rubus idaeus*, *R. caesius*, *R. dalmaticus*, *R. fruticosus*, *Salix caprea*, *Populus euphratica*, *Cytisus*, *Genista*, *Beta*, *Lycopersicon esculentum*, *Lythrum*, *Citrus*, *Ficus carica*, *Punica granatum*, *Vitis*, *Ricinus communis*, *Parietaria judaica*, *P. officinalis*, *Inula crithmoides*, and *Zea mays*. Overwinters as a pupa [4]-[6] [12] [15] [19] [21].

Genus *Prodotis* John, 1910

81) *P. stolidus* Fabricius, 1775

Collection locality and date: Shurkul—41°16'12.52"N, 60°29'12.41"E; 22.05.2022; 30.05.2023 (2♀; 6♂); Zaungur—25°28.21"N, 60°15'34.04"E; 15.06.2021; 03.10.2023; 20-23.10.2024 (6♀; 9♂).

Distribution: Northern and Central Europe, Mediterranean, Egypt, Western and Southern Africa, Middle East, Kazakhstan, Central Asia, Northern India, China, Australia.

Bionomics: A subcosmopolitan and hemixerophilous, multivoltine species. It occurs in orchards and irrigated lands. Flight period: II-X; larvae are polyphagous, feeding on *Prunus*, *Rubus caesius*, *R. idaeus*, *R. mucosus*, *Quercus*, *Brassica oleracea*, *Beta vulgaris*, *Alhagi camelorum*, *Lotus corniculatus*, *Medicago sativa*, *Sesbania aculeata*, *S. bispinosa*, *Paliurus aculeatus*, *Ziziphus jujuba*, *Z. lotus*, *Z. mauritiana*, *Tribulus*, *Linum usitatissimum*, *Coriaria myrtifolia*, and *Lannea coromandelica*. Overwinters as a pupa [12] [15] [19]-[21].

Tribe Euclidiini (Guenée, 1852)

Genus *Gonospileia* Hübner, 1823

82) *G. munita* (Hübner, 1813)

Collection locality and date: Amu Darya—46°34.57"N, 60°33'20.62"E; 17.05.2019 (12♂; 43♀); Okkamyshe-2—19°2.30"N, 61°16'41.70"E; 07.06.2020 (12♂; 34♀); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 05.06.2021; 01.08.2022 (13♂; 25♀); Lower Amu Darya State Biosphere Reserve—0°4.08"N, 60°20'4.34"E; 27.08.2022; (18♂; 28♀).

Distribution: Russia, Kazakhstan, Tajikistan, Turkmenistan, Kyrgyzstan, Iran, Afghanistan, China, Mongolia, and Pakistan.

Bionomics: A xero-thermophilous species inhabiting the steppe zone; occurs locally in dry, saline, and calcareous steppe habitats. It develops two generations per year and is associated with the banks of permanent and temporary water bodies, areas with shallow groundwater, and chink slopes. Flight period V-VIII; larvae feed on *Glycyrrhiza glabra*. Overwinters as pupa [4] [5] [12] [15] [19]-[21].

83) *G. triquetra* (Denis & Schiffermüller, 1775)

Collection locality and date: Okkamyshe-2: 41°19'2.30"N 61°16'41.70"E; 04.06.2021; 17.06.2021 (15♂; 31♀); Tollik Tugai—42°7'15.30"N, 60°18'38.07"E; 13.06.2024; 17.06.2024 (26♂; 43♀).

Distribution: Southeastern Europe, Kazakhstan, Asia Minor.

Bionomics: Develops two generations per year. Inhabits hot and dry, gypseous, and saline steppes. Flight period V-VIII; larvae feed on *Astragalus sieversianus*

and *Populus pruinosa*. Overwinters as a pupa [12] [15] [17] [19] [20].

84) *G. amudarya* (Weisert, 1998)

Collection locality and date: Amu Darya—46°34.57"N, 60°33'20.62"E; 17.05.2019 (18♂; 28♀); Tollik Tugai—57°12.08"N, 60°27'32.92"E; 07.07.2020 (14♂; 34♀); Okkamysh-2—19°2.30"N, 61°16'41.70"E; 27.08.2022 (12♂; 34♀).

Distribution: Turkmenistan, Tajikistan

Bionomics: This mesoxerophilous species is distributed in tugai and anthropogenic landscapes, producing two generations per year. Flight period V–VIII; larvae on *Glycyrrhiza glabra*. The active larval period occurs in July–August. The overwintering stage is the egg [12] [19].

Tribe Ophiuini (Guenée, 1837)

Genus *Catephia* Ochsenheimer, 1816

85) *C. alchymista* (Denis & Schiffermüller, 1775)

Collection locality and date: Ellikqala—49°51.00"N, 60°56'13.49"E; 03.08.2023 (2♂; 2♀).

Distribution: Europe, Western Siberia, Southwestern Asia.

Bionomics: Thermophilous species, occurs in woodlands, in steppe oak forest patches, in parks and gardens. Flight period VII–VIII; larvae on *Quercus* and *Ulmus*. Usually univoltine, but in some years it produces three generations. Overwinters as pupa [12] [15] [20].

Genus *Minucia* Moore, 1885

86) *M. lunaris* (Denis & Schiffermüller, 1775)

Collection locality and date: Ellikqala—49°51.00"N, 60°56'13.49"E; 10.07.2021 (4♂; 1♀); Akchakul—53°36.68"N, 60°50'2.91"E; 28.07.2022 (2♂; 2♀).

Distribution: Europe, Western Siberia, Southwestern Asia.

Bionomics: Meso-xerophilous species, occurs in open oak woodlands in clearings, woodsides, meadows and glades. Common in dry and warm patches of oak forest in steppe areas. One generation in V and VI. Flight period V–VI; larvae on *Quercus*. Overwinters as pupa [12] [15] [20].

5. Discussion

The results of our study significantly extend the current understanding of the Erebidae fauna in Western and Southwestern Uzbekistan. Our data corroborate the taxonomic classifications proposed by Lafontaine and Fibiger (2006) and Van Nieukerken *et al.* (2011), confirming high species richness within the sampled biotopes. The molecular phylogenetic framework established by Zahiri *et al.* (2011, 2012) provides a robust basis for our observations on the structural diversity of local populations.

Our findings regarding species distribution in arid landscapes generally align with the patterns observed by Sukhareva (1972) in the Kyzylkum Desert and Gorbunov (2011) in the Western Kazakhstan steppes. However, while regional checklists (such as those by Fibiger & Hacker, 2004; Goater *et al.*, 2003) often report narrower distribution ranges and rigid zoogeographical boundaries for these taxa,

our data demonstrate that populations in the Turan Lowland exhibit remarkable ecological plasticity under extreme xeric conditions. The presence of species exhibiting both cryptic and deimatic coloration patterns in our survey further emphasizes the importance of environmental pressures in shaping phenotype evolution in this group. Furthermore, while early regional assessments (e.g., Shchetkin, 1965) assumed strictly fixed flight periods for desert and valley lepidopteran species, our multi-year observations indicate notable micro-phenological shifts, suggesting that local populations respond dynamically to shifting environmental and thermal pressures.

While our study underscores the ecological resilience of Erebidae in managed ecosystems, the observed decline in specialized taxa associated with fragile tugai habitats—such as *C. lupina* and *C. optima*—raises serious concerns. These species are highly sensitive to habitat fragmentation and the degradation of riparian forests caused by hydrological changes. This vulnerability, a concern also noted in broader regional biodiversity surveys, warrants urgent attention and highlights the need for a shift from general biodiversity monitoring to targeted conservation strategies for these indicator species. Future research should also evaluate the impacts of climate-driven shifts in host plant availability.

Despite the rigorous sampling effort across multiple stations, this study has certain limitations. First, the faunistic survey was restricted to selected fixed stations, which may not capture the full micro-habitat heterogeneity of Western and Southwestern Uzbekistan. Second, light-trap sampling is inherently biased toward nocturnal and phototactic species, potentially underrepresenting non-phototactic or cryptic elements of the local fauna. Third, the lack of continuous microclimatic and high-resolution hydrological data at every sampling point limits our ability to completely isolate the direct drivers of population fluctuations from broader landscape changes. Future research should integrate long-term ecological monitoring and molecular analyses to further clarify these complex trophic and zoogeographical networks.

6. Conclusion

In conclusion, this comprehensive study provides up-to-date faunistic, taxonomic, and ecological data on the superfamily Noctuoidea, specifically focusing on the family Erebidae within Western and Southwestern Uzbekistan. Based on multi-year field surveys conducted across 16 primary sampling stations within Western Uzbekistan (including Karakalpakstan, Khorezm, Qashqadaryo, and Navoi regions) and spanning extensive field campaigns from 2015 to 2025 in the Qashqadaryo Oasis, the research establishes that the local Erebidae fauna comprises a total of 83 species and 3 subspecies. Taxonomically, this diversity is distributed across three subfamilies: Rivulinae accounts for 1.20% (1 species), Toxocampinae represents 15.66% (13 species), and the dominant subfamily Erebinae constitutes 83.14% (69 species) of the total fauna, aligning with modern taxonomic and molecular phylogenetic frameworks. The overwhelming dominance of

Erebinae, alongside xerophilous taxa within genera such as *Drasteria*, highlights the exceptional adaptability of these moths to the arid and hyper-arid conditions of the Turan Lowland. Furthermore, the analysis of larval host plant trophic networks and adult flight dynamics reveals a strong synchronization between moth phenology and the vegetative cycles of regional desert and riparian flora, while observed micro-phenological shifts indicate that local populations dynamically adjust to environmental and thermal pressures. Although many widespread species maintain stable population trends, specialized taxa associated with fragile riparian ecosystems—such as *Catocala lupina* and *C. optima*—exhibit a concerning decline driven by habitat fragmentation and hydrological degradation, underscoring the critical need to transition from broad biodiversity tracking to targeted, habitat-specific conservation strategies for vulnerable indicator species. Ultimately, these findings establish a robust baseline for future long-term ecological monitoring, conservation planning, and biogeographical research in the Amu Darya basin and adjacent Central Asian regions.

Author Contributions

Conceptualization, Bekchanov Khudaybergan Urinovich and Yavkachev Davronbek Azatovich; methodology, Bekchanov Khudaybergan Urinovich and Yavkachev Davronbek Azatovich; validation, Bekchanov Khudaybergan Urinovich, Yavkachev Davronbek Azatovich, and Abdullaeva Mexriban Rayimberganovna; formal analysis, Bekchanov Khudaybergan Urinovich and Yavkachev Davronbek Azatovich; investigation, Bekchanov Khudaybergan Urinovich, Yavkachev Davronbek Azatovich, and Abdullaeva Mexriban Rayimberganovna; resources, Yavkachev Davronbek Azatovich and Bekchanov Khudaybergan Urinovich; data curation, Yavkachev Davronbek Azatovich; writing—original draft preparation, Yavkachev Davronbek Azatovich; writing—review and editing, Yavkachev Davronbek Azatovich; visualization, Yavkachev Davronbek Azatovich; supervision, Bekchanov Khudaybergan Urinovich; project administration, Bekchanov Khudaybergan Urinovich. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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