

TAXONOMIC DESCRIPTION OF THE *LIBELLULIDAE* FAMILY REPRESENTATIVES IDENTIFIED IN THE KASHKADARYO REGION

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Summary

Between 2020 and 2024, a comprehensive study was conducted in the Kashkadarya region to investigate the distribution and taxonomic composition of dragonflies belonging to the family Libellulidae, which falls under the suborder Anisoptera of the order Odonata. The main objective of this research was to analyze the presence and diversity of species within this family across various aquatic and semi-aquatic habitats in the region. The study included a systematic analysis of the species found, with an emphasis on their classification at the subfamily and genus levels.

As a result of this research, nine species of Libellulidae were identified in the studied area. These species were distributed across three subfamilies and three genera, reflecting the taxonomic richness of the region's dragonfly fauna. The analysis showed that one species belonged to the subfamily Libellulinae Rambur, 1842. Four species were identified within the genus *Orthetrum* Newman, 1833, one species belonged to the genus *Crocothemis* Brauer, 1868, and four species were assigned to the genus *Sympetrum* Newman, 1833.

This research not only highlights the diversity of the Libellulidae family in the Kashkadarya region but also contributes to the broader understanding of Odonata distribution in Central Asia. Given the ecological significance of dragonflies as bioindicators of freshwater ecosystem health, the findings of this study are valuable for biodiversity monitoring, conservation planning, and the sustainable management of aquatic habitats. The identification of these species and their classification enhances our taxonomic knowledge of regional entomofauna and provides a scientific basis for further ecological and environmental assessments.

Key words: dragonfly, genus, family, genus, species, representative, dominant, insecta, odonata, province, district, territory, Anisoptera, Libellulidae, *Orthetrum* Newman, *Crocothemis*, *Sympetrum*, *Orthetrum albistylum*, *Orthetrum Sabina*, *Sympetrum pedemontanum*.

Introduction. The order Odonata stands out among insects in the ecosystem due to its high morphological specialization, distinguishing it from representatives of other orders. Currently, about 40 families and more than 6650 species of dragonflies are known to science worldwide. They are considered among the most ancient insects, having appeared approximately 300 million years ago during the Carboniferous period [3]. Dragonflies are amphibiont insects: their adults (imagos) are adapted to live in the air, while their larvae are aquatic predators. At various stages of their development, dragonflies contribute significantly to the circulation of matter within biogeocenoses. In particular, they play an important role in regulating the population of pest insects in agricultural and forest ecosystems, as well as serving as bioindicators to assess environmental health. Additionally, in aquaculture ponds, dragonflies may compete with young fish for food and feed on aquatic invertebrates. Some species may also act as vectors for helminth infections in wild and domestic birds. Due to their food requirements, dragonflies regularly migrate over considerable distances. [1, 2, 4, 5, 6, 9, 10]. Taking into account the above-mentioned points, in the current era where anthropogenic factors are intensifying and natural ecosystems are undergoing significant changes, it is of scientific and practical importance to assess the current state of the Odonata order — one of the key groups of animals in our region.

This includes analyzing their faunistic composition, evaluating biodiversity, determining their economic importance and potential harm, and developing scientifically grounded recommendations for their study and management. Implementing these findings in practice can contribute meaningfully to the conservation and sustainable use of local ecosystems.

Materials and methods. In the course of this research, various zoological, entomological, morphological, hydrobiological, and morphometric methods were employed. The fieldwork was conducted during the spring, summer, and autumn seasons between 2020 and 2024, across 14 districts of the Qashqadaryo region. Sampling was carried out in different aquatic habitats, particularly in slow-flowing and stagnant water bodies such as lakes, streams, and irrigation systems including ditches, canals, and ariqs. Biological samples were collected from biotopes surrounding these water bodies. The expedition-route method developed by Dedyukhin [7] was used as the main sampling approach. For species identification of adult dragonflies (imago) and preparation of collection material, the methodologies of Fasulati, Kharitonov, Sukhachyova, and Lyabzina were followed [11, 12, 13]. To document fieldwork, a field diary was maintained, and a GPS navigator was used to record the exact locations of the study sites. Sampling of insect specimens (imago and larvae) was performed using standard ento-

mological nets, primarily along the banks of lakes, irrigation canals, and in cultivated agricultural lands. Species identification of dragonflies was carried out using the identification guides of Kazenas (2014) and Subramanian (2005) [2, 8]. In addition, the taxonomy and nomenclature of Odonata species were verified using international biodiversity databases such as Wikimedia, Wikipedia, and the Global Biodiversity Information Facility (GBIF) [14,15,16,17,18].

Results and Discussion. According to the research findings, a total of 10 species belonging to the family Libellulidae of the suborder Anisoptera were identified in the Kashkadaryo region. These species were systematically analyzed, and their taxonomic statuses were confirmed. Additionally, geographic coordinates for the distribution of these species within the Kashkadaryo region were recorded, providing valuable spatial data for further ecological and biogeographical studies.

Family: Libellulidae (Rambur, 1842)

Subfamily: Libellulinae Rambur, 1842

Genus: *Libellula* Linnaeus, 1758

1. *Libellula quadrimaculata* Linnaeus, 1758 (1-picture)

Location and Date of Collection:

Kashkadaryo region, Guzar District: 1 female (♀), 3 males (♂), coordinates 38° 36'21"N, 66°16'55"E; Kasbi District: 3 males (♂), coordinates 38°36'50.10"N, 65° 42'08.09"E; collected on May 15, 2021.

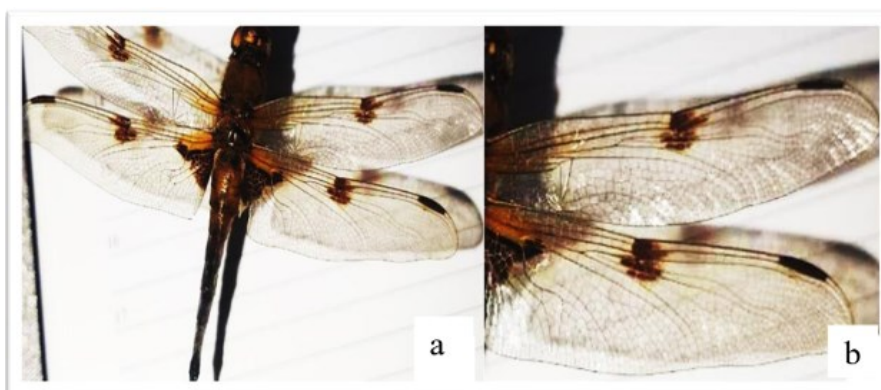


Figure 1. *Libellula quadrimaculata* Linnaeus, 1758: a - overall morphology; b - wing morphology.

Family: Libellulidae (Rambur, 1842)
Subfamily: Libellulinae Rambur,
1842

Genus: *Orthetrum* Newman, 1833

2. *Orthetrum albistylum* (Selys, 1842)

Location and Date of Collection:
Qashqadaryo Region, Qarshi District: 2 males (♂), 1 female (♀), coordinates 38°50'42.39"N, 65°56'54.13"E; Guzar District: 3 males (♂), 1 female (♀), coordinates 38°50'45.93"N, 66°04'45.01"E; Yakkabog' District: 4 males (♂), 1 female (♀), coordinates 39°02'36.21"N, 66°50'20.36"E; collected on June 3, 2021.

3. *Orthetrum brunneum* (Fonscolombe, 1837)

Location and Date of Collection:
Qashqadaryo Region, Koson District: 2 males (♂), 1 female (♀), altitude 624 m, coordinates 39°02'39.96"N, 65°41'13.19"E; Qarshi District: 3 males (♂), 1 female (♀), coordinates 38°50'42.39"N, 65°56'54.13"E; Guzar District: 4 males (♂), 1 female (♀), coordinates 38°50'45.93"N, 66°04'45.01"E; collected on July 16, 2022.

4. *Orthetrum cancellatum* Linnaeus, 1758

Location and Date of Collection:
Qashqadaryo Region, Guzar District: 2 males (♂), 1 female (♀), coordinates 38°50'45.93"N, 66°04'45.01"E; Yakkabog' District: 3 males (♂), 1 female (♀), coordinates 39°02'36.21"N, 66°50'20.36"E; collected on July 6, 2021.

5. *Orthetrum sabina* (Drury, 1770)

Location and Date of Collection:
Qashqadaryo Region, Qarshi District: 2 males (♂), 1 female (♀), coordinates 38°50'42.39"N, 65°56'54.13"E; Qamashi District: 3 males (♂), 1 female (♀), coordinates 38°56'01"N, 66°14'39"E; collected on August 16, 2022.

Subfamily: *Sympetrinae* Tillyard,
1917

Genus: *Crocothemis* Brauer, 1868

6. *Crocothemis erythraea* (Brullé, 1832)(2- picture)

Location and Date of Collection:
Qashqadaryo Region, Qarshi District: 2 males (♂), 1 female (♀), coordinates 38°50'42.39"N, 65°56'54.13"E; Qamashi District: 3 males (♂), 1 female (♀), coordinates 38°56'01"N, 66°14'39"E; collected on August 16, 2022.

Genus: *Sympetrum* Newman, 1833

7. *Sympetrum flaveolum* (Linnaeus, 1758)

Location and Date of Collection:
Qashqadaryo Region, Yakkabog' District: 4 males (♂), 1 female (♀), coordinates 39°01'19.78"N, 66°47'07.64"E; collected on June 7, 2022.

8. *Sympetrum meridionale* (Selys, 1841)

Location and Date of Collection:
Qashqadaryo Region, Guzar District: 2 males (♂), 1 female (♀), coordinates 38°23'19"N, 66°01'25"E; Qamashi District: 3 males (♂), 1 female (♀), coordinates 38°56'01"N, 66°14'39"E; Koson District: 4 males (♂), 1 female (♀), coordinates 39°02'39.96"N, 65°41'13.19"E; Qarshi District: 5 males (♂), 1 female (♀), coordinates 38°50'42.39"N, 65°56'54.13"E; collected on July 10, 2021.

9. *Sympetrum pedemontanum* (Müller in Allioni, 1766)

Location and Date of Collection:
Qashqadaryo Region, Kasbi District: 2 males (♂), 1 female (♀), coordinates 38°23'19"N, 66°01'25"E; Qamashi District: 3 males (♂), 1 female (♀), coordinates 38°56'01"N, 66°14'39"E; Yakkabog' District: 4 males (♂), 1 female (♀), coordinates 39°01'19.78"N, 66°47'07.64"E; collected on August 30, 2022.

10. *Sympetrum striolatum* (Charpentier, 1840) (3.14-rasm, 41-ilova)

Location and Date of Collection:
Qashqadaryo Region, Koson District: 3 males (♂), 1 female (♀), coordinates 39°02'39.96"N, 65°41'13.19"E; Qamashi District: 3 males (♂), 1 female (♀), coordinates 38°52'03.95"N, 66°19'26.39"E; Yakkabog' District: 4 males (♂), 1 female (♀), coordinates 39°01'19.78"N, 66°47'07.64"E; collected on June 7, 2022.

Based on the collected materials, it can be observed that 10 species belonging to the family Libellulidae of the suborder Anisoptera are found across all agrocenoses in the Qashqadaryo region. In terms of total species number, the genus *Libellulinae* Rambur, 1842 accounts for 10%, the genus *Orthetrum* Newman, 1833 for 40%, *Crocothemis* Brauer, 1868 for 10%, and *Sympetrum* Newman, 1833 for 40%.

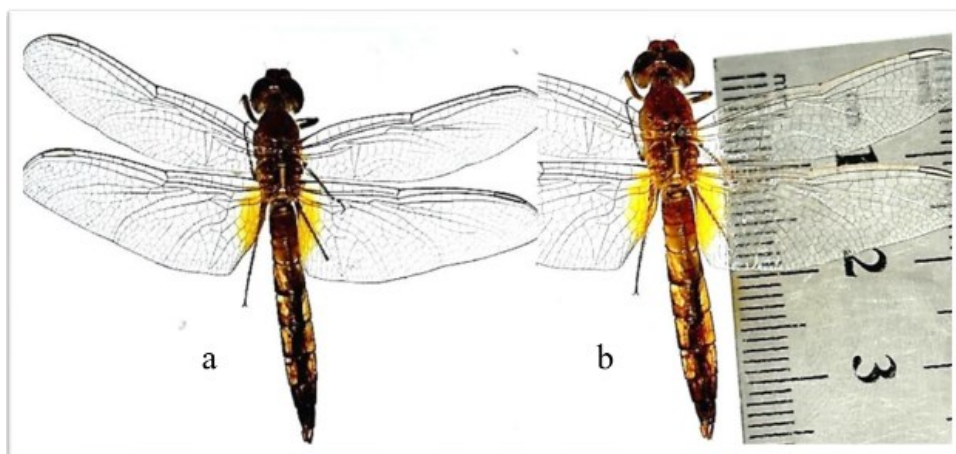


Figure 2. *Crocothemis erythraea* (Brullé, 1832): a - overall morphology; b - wing morphology.

Conclusion.

Dragonflies (Odonata) are amphibiotic insects, spending much of their larval stage in aquatic environments. Accordingly, the variation in the distribution of dragonfly species across regions is closely related to the ecological conditions, including hydroengineering structures, flora, fauna, and climate. Dragonflies exhibit a high degree of adaptability to ecological habitats, especially to artificial aquatic biotopes created by humans. During the study of the Qashqadaryo region, we observed the impact of anthropogenic factors on the decrease and increase of dragonfly species composition. Our analysis confirms that in districts with natural aquatic ecosystems such as Yakkabog', Qamashi, and Guzar, there is a greater abundance and dominance of species. Conversely, in districts influenced by anthropogenic factors where artificial water bodies exist, such as Qarshi and Koson, the species number is also notably distributed, although somewhat lower. These findings underscore the importance of monitoring and conserving both natural and artificial aquatic habitats to maintain dragonfly biodiversity and ecological balance in the region.

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**Қашқадария облысы аумағынан
анықталған Libellulidae
тұқымдасының өкілдерінің
таксономиялық
сипаттамасы**

Аңдатпа

2020–2024 жылдар аралығында Қашқадария облысында Odonata отрядының Anisoptera қосалқы отрядына жататын Libellulidae тұқымдасына кіретін инеліктердің таралуы мен таксономиялық құрамын зерттеуге бағытталған кешенді ғылыми жұмыс жүргізілді. Зерттеудің басты мақсаты – өңірдегі түрлі су маңындағы және сулы экожүйелерде таралған түрлерді анық-

тау, олардың туыстық және қосалқы тұқымдастар бойынша жүйеленуін талдау болды.

Жүргізілген далалық бақылаулар мен зертханалық сәйкестендіру нәтижесінде Libellulidae тұқымдасына жататын 9 түр анықталды. Бұл түрлер 3 қосалқы тұқымдасқа және 3 туысқа жатады, бұл аймақтың инелік фаунасының таксономиялық әртүрлілігін көрсетеді. Зерттеу нәтижесінде Libellulinae Rambur, 1842 қосалқы тұқымдасына 1 түр, Orthetrum Newman, 1833 туысына 4 түр, Crocothemis Brauer, 1868 туысына 1 түр, ал Sympetrum Newman, 1833 туысына 4 түр тиесілі екені анықталды.

Бұл зерттеу Libellulidae тұқымдасының Қашқадария облысындағы әртүрлілігін көрсетіп қана қоймай, Орталық Азиядағы инеліктердің таралуын түсінуге де өз үлесін қосады. Инеліктердің тұщы сулы экожүйелердің экологиялық жағдайының биоиндикаторы ретіндегі маңыздылығын ескерсек, бұл деректер биоәртүрлілікті бақылау, табиғатты қорғау шараларын жоспарлау және ресурстарды тұрақты басқару үшін маңызды. Түрлердің таксономиялық жүйеленуі алдағы экологиялық және қоршаған орта жағдайын бағалауға арналған зерттеулерге ғылыми негіз болады.

Түйінді сөздер: инелік, мон, тұқымдас, туыс, түр, өкіл, басым түр, insecta, odonata, облыс, аудан, аумақ, Anisoptera, Libellulidae, Orthetrum Newman, Crocothemis, Sympetrum, Orthetrum albistylum, Orthetrum sabina, Sympetrum pedemontanum.

Материал баспаға 25.05.25 түсті

**Таксономическое описание
представителей семейства
Libellulidae, выявленных на
территории Каискадарьинской
области**

Аннотация

В период с 2020 по 2024 годы в Каискадарьинской области было проведено всестороннее исследование, направленное на изучение распространения и таксономического состава стрекоз семейства Libellulidae, относящегося к подотряду Anisoptera отряда Odonata. Основной целью работы было выявление видового разнообразия представителей данной группы в различных водных и околоводных экосистемах региона, а также проведение систематического анализа с определением их принадлежности к подсемействам и родам.

В результате полевых наблюдений и лабораторной идентификации было выявлено 9 видов семейства Libellulidae, относящихся к 3 подсемействам и 3 родам, что свидетельствует о богатстве таксономического состава стрекоз региона. Анализ показал, что один вид принадлежит к подсемейству Libellulinae Rambur, 1842. Четыре вида отнесены к роду Orthetrum Newman,

1833, один вид — к роду Crocothemis Brauer, 1868, и ещё четыре вида — к роду Sympetrum Newman, 1833.

Полученные данные не только подчеркивают разнообразие представителей семейства Libellulidae в Каискадарьинской области, но и вносят вклад в общее понимание распространения стрекоз в Центральной Азии. Учитывая их роль в качестве биоиндикаторов состояния пресноводных экосистем, результаты данного исследования являются важными для мониторинга биоразнообразия, планирования охранных мероприятий и устойчивого управления природными ресурсами. Таксономическая систематизация видов служит научной основой для дальнейших экологических исследований и оценки состояния окружающей среды.

Ключевые слова: стрекоза, группа, семья, поколение, вид, представитель, доминант, insecta, odonata, область, район, территория, Anisoptera, Libellulidae, Orthetrum Newman, Crocothemis, Sympetrum, Orthetrum albistylum, Orthetrum Sabina, Sympetrum pedemontanum.

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Authors' contribution. The largest contribution is distributed as follows:

Z.B. Norqobilova — developed the research concept, coordinated the overall study, and participated in the fieldwork and species identification. She also contributed to the data analysis and taxonomic classification.

A.Yu. Raxmatullayev - performed field sampling across the districts, processed the biological material, and conducted the morphological and ecological characterization of the identified species.

B.O. Davronov - compiled and structured the manuscript, formatted the species descriptions, managed the references, and ensured consistency in the scientific presentation.

All authors have contributed to the interpretation of data, reviewed the manuscript critically, and approved the final version for publication.

Conflict of interest. The authors declare no conflict of interest.