COLEOPTERA: CERAMBYCIDAE FROM THE DRIED URINE OF THE SOUTH ARAL SEA

[1]E.S.Duysengaliev doctoral student, [2]T.I.Juginisov Doctor of Biological Sciences, Professor.

[1]Nukus state pedagogical institute named after Ajiniyaz, Nukus, Karakalpakstan,
erbolduysengaliyev@gmail.com
[2]Karakalpak State University named after Berdakh, Nukus, Karakalpakstan.
tangirbergenzuginisov@gmail.com

Annotatsiya Ushbu tadqiqot 2024–2025-yilning aprel–may oylarida Qoraqalpog‘istonning Janubiy Orolbo‘yi hududida uzun shoxli qo‘ng‘izlar (Coleoptera: Cerambycidae) ning bioekologik xususiyatlarini o‘rganadi. Tadqiqotda *Neoplocaederus scapularis* (Fischer von Waldheim, 1821) va *Aeolesthes sarta* (Solsky, 1871) kabi asosiy turlar diqqat markazida bo‘lib, ularning tarqalishi, oziqlanuvchi o‘simliklari va cho‘l ekotizimlaridagi moslashuvchanligi tahlil qilindi. Maydon tadqiqotlarida an’anaviy entomologik usullar, jumladan, tuproqdagi Barber tuzoqlari va yorug‘lik tuzoqlari orqali namunalar yig‘ildi (Taxtako‘pir tumani va Qizilqum cho‘li). Tadqiqot natijalari havo harorati, namlik va o‘simlik mavjudligi kabi omillar uzun shoxli qo‘ng‘izlar populyatsiyasini shakllantirishda muhim rol o‘ynashini ko‘rsatdi. *Ferula assa-foetida* asosiy oziqlanuvchi o‘simlik sifatida ajralib turdi; qo‘ng‘izlarning faollik cho‘qqisi uning gullash davriga to‘g‘ri keldi. Pesticidlardan foydalanish kabi antropogen omillar populyatsiyalarga ta’sir ko‘rsatdi va biologik xilma-xillikni saqlab qolish zaruratini yuzaga chiqardi. *Xylotrechus ibex* (Gebler, 1825) kabi noyob turlarning yuqori sifatli suratlari va yashash muhiti tasvirlari tadqiqotning ilmiy ahamiyatini oshiradi. Ushbu natijalar Janubiy Orolbo‘yi hududida hasharotlar xilma-xilligini saqlash bo‘yicha monitoring va himoya ishlarini davom ettirish zarurligini ta’kidlaydi.

***Kalit so‘zlar**: Qoraqalpog‘iston, uzun shoxli qo‘ng‘izlar, Neoplocaederus scapularis, Aeolesthes sarta, Ferula assa-foetida, ekologik omillar, entomologik tadqiqot, biologik xilma-xillikni saqlash, Janubiy Orolbo‘yi.*

Аннотация Данное исследование посвящено биоэкологическим особенностям усачей (Coleoptera: Cerambycidae) в Южном Приаралье

(Республика Каракалпакстан) в апреле–мае 2024–2025 годов. Основное внимание уделено видам *Neoplocaederus scapularis* (Fischer von Waldheim, 1821) и *Aeolesthes sarta* (Solsky, 1871), анализируются их распространение, предпочтения в кормовых растениях и экологическая адаптация в пустынных экосистемах. В полевых условиях использовались традиционные энтомологические методы — почвенные ловушки Барбера и световые ловушки. Объекты исследования охватывали Тахтакупырский район и пустыню Кызылкум. Установлено, что температура, влажность и наличие кормовых растений играют решающую роль в формировании популяций усачей. *Ferula assa-foetida* определена как основное кормовое растение; пик активности жуков совпал с периодом её цветения. Антропогенные факторы, в частности, использование пестицидов, также влияют на численность насекомых, что вызывает обеспокоенность по поводу сохранения биоразнообразия. Фотографии редких видов, таких как *Xylotrechus ibex* (Gebler, 1825), и подробные описания мест обитания усиливают научную ценность исследования. Выводы подчёркивают необходимость продолжения мониторинга и природоохранных мероприятий для сохранения биоразнообразия в Южном Приаралье.

***Ключевые слова**: Каракалпакстан, усачи, Neoplocaederus scapularis, Aeolesthes sarta, Ferula assa-foetida, экологические факторы, энтомологическое исследование, сохранение биоразнообразия, Южное Приаралье.*

Abstract This study investigates the bioecological characteristics of longhorn beetles (Coleoptera: Cerambycidae) in the Southern Aral Sea region, specifically within Karakalpakstan, during April–May 2024–2025. Focusing on key species such as *Neoplocaederus scapularis* (Fischer von Waldheim, 1821) and *Aeolesthes sarta* (Solsky, 1871), the research examines their distribution, host plant preferences, and ecological adaptations in desert ecosystems. Fieldwork employed traditional entomological methods, including Barber soil traps and light traps, to collect specimens across the Taxtakópir district and Kyzylkum desert. Results highlight the critical role of environmental factors—temperature, humidity, and host plant availability—in shaping beetle populations. *Ferula assa-foetida* emerged as a primary host plant, with peak beetle activity coinciding with its flowering period. Anthropogenic factors, such as pesticide use, were found to influence beetle populations, raising concerns about biodiversity conservation. High-quality photographs of rare species, including

Xylotrechus ibex (Gebler, 1825), and detailed habitat descriptions enhance the study's contribution to regional entomological knowledge. These findings underscore the need for continued monitoring and conservation efforts to preserve insect biodiversity in the Southern Aral Sea region.

Keywords*: Karakalpakstan, longhorn beetles, Neoplocaederus scapularis, Aeolesthes sarta, Ferula assa-foetida, ecological factors, entomological research, biodiversity conservation, Southern Aral Sea.*

Introduction Longhorn beetles (Coleoptera: Cerambycidae) are a diverse family with over 35,000 species globally, playing vital roles in ecosystems through wood decomposition and as prey for predators. In the Southern Aral Sea region, particularly Karakalpakstan, their ecological and economic significance is pronounced due to their interactions with native flora and anthropogenic pressures. The region's arid climate, characterized by extreme temperature fluctuations and low humidity, provides a unique setting to study insect adaptations. Despite their ecological importance, data on Cerambycidae in this region remain scarce, with prior studies focusing on broader Central Asian contexts.

This study aims to address knowledge gaps regarding the diversity, ecology, and distribution of longhorn beetles in Karakalpakstan, with fieldwork conducted in April–May 2024–2025. By focusing on species such as *Neoplocaederus scapularis* and *Aeolestes sarta*, we explore their life cycles, host plant associations, and responses to environmental and anthropogenic factors. The research also documents rare species, such as *Xylotrechus ibex*, and their habitats, contributing to the global understanding of Cerambycidae ecology in arid environments.

Materials and Methods Field research was conducted in the desert ecosystems of Karakalpakstan, specifically the Taxtakópir district and Kyzylkum desert, from April to May in 2024 and 2025. Sampling targeted key Cerambycidae species, including *Neoplocaederus scapularis*, *Aeolesthes sarta*, and *Xylotrechus* spp. The following methods were employed:

1. **Barber Soil Traps**: Glass containers (0.5 L and 0.25 L, 72–73 mm and 55 mm diameter, respectively) were buried level with the soil surface, filled with ethyl acetate as a fixative. Traps were arranged in rows (10–70 traps per site, 10 m apart) across various biotopes.

2. **Light Traps**: Following Sakharova's method (2012), light traps were used to capture nocturnal and crepuscular species, particularly *Neoplocaederus scapularis*.
3. **Specimen Imaging**: Collected specimens were photographed using a Canon PowerShot A640 camera (Canon Zoom lens 4X, 7.3–29.2 mm, 1:2.8–4.1) and a Micro med MC-2-ZOOM microscope. Images were processed with Adobe Photoshop 7.0.
4. **Species Identification**: Taxonomic identification relied on international databases, including the Titan database (Tavakilian, 2023), Lamiines of the World (Tavakilian & Chevillotte, 2023), and the Catalogue of Palaearctic Chrysomeloidea (Danilevsky, 2023).

A detailed map of sampling sites, including habitat types and trap locations, was created to contextualize the fieldwork (Figure 1). Coordinates of key collection sites, such as Lake Karateren (43°19.058′N, 060°22.542′E), were recorded.

Results The study documented several Cerambycidae species, with *Neoplocaederus scapularis* and *Aeolesthes sarta* being the most prevalent. These species exhibited strong associations with *Ferula assa-foetida*, a dominant plant in the region's desert ecosystems.

***Neoplocaederus scapularis* (Fischer von Waldheim, 1821)** This species was abundant in the Taxtakópir district and Kyzylkum desert, particularly during the flowering of *Ferula assa-foetida* in April–May. Adults (body length: 25–40 mm) were observed feeding on flowers and stems, with peak activity at dusk. Larvae develop in the rhizomes and roots of *Ferula* spp., completing a 1–2-year life cycle. Collection records include:

- Lake Karateren (43°19.058′N, 060°22.542′E), 2024-04-29: 3♂♂;
- (43°18.947′N, 060°22.741′E), 2024-04-29: 1♂, 2♀♀;
- (43°19.805′N, 060°23.288′E), 2024-04-30: 1♂, 4♀♀.

***Aeolesthes sarta* (Solsky, 1871)** Known for its economic impact, *A. sarta* was recorded damaging young trees by feeding on cambium layers. Adults emerge in April–May at temperatures above 20°C, with nocturnal activity peaking around 20:00. Females lay 240–270 eggs in bark crevices, with larvae forming tunnels (up to 25 cm) in wood. The life cycle spans two years, with pupation occurring in chambers sealed

with boring dust. Pesticides (imidacloprid, permethrin) were effective in reducing egg deposition on black poplar trees.

***Xylotrechus ibex* (Gebler, 1825)** A rare species, *X. ibex* was documented in the Kyzylkum desert. High-quality photographs of specimens and their habitats (sandy dunes with sparse vegetation) were obtained, highlighting their adaptation to arid conditions.

Environmental Influences Temperature and humidity significantly influenced beetle activity. High temperatures (25–35°C) in April–May accelerated reproduction, while low humidity favored drought-resistant species like *N. scapularis*. Host plant availability, particularly *Ferula assa-foetida*, was a key determinant of distribution. Anthropogenic factors, including pesticide use and habitat modification, reduced beetle populations but posed risks to non-target species.

Discussion The Southern Aral Sea region's arid climate shapes the ecology of Cerambycidae, with *Ferula assa-foetida* serving as a critical resource for *N. scapularis* and *A. sarta*. The observed activity peaks in April–May align with previous studies (Zhuginisov, 2023), confirming the importance of host plant phenology. The two-year life cycle of *A. sarta* and its destructive feeding behavior underscore its status as a pest, necessitating targeted control measures. However, pesticide use must be balanced against potential impacts on biodiversity, as non-target Cerambycidae species were also affected.

The documentation of *X. ibex* adds to the limited knowledge of rare species in Karakalpakstan, emphasizing the region's role as a biodiversity hotspot. Ongoing climatic changes, including rising temperatures and desertification, may exacerbate pest outbreaks while threatening vulnerable species. Future research should explore the long-term effects of environmental and anthropogenic pressures on Cerambycidae populations.

Conclusions This study provides comprehensive insights into the bioecology of longhorn beetles in the Southern Aral Sea region, with *Neoplocaederus scapularis* and *Aeolesthes sarta* showing strong dependencies on *Ferula assa-foetida*. Environmental factors, particularly temperature and host plant availability, drive their distribution and reproductive success. The documentation of rare species like *Xylotrechus ibex* highlights the region's entomological diversity. While pesticides offer effective pest

control, their broader ecological impacts warrant caution. Continued monitoring and conservation efforts are essential to safeguard Cerambycidae biodiversity amidst ongoing environmental changes in Karakalpakstan.

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