QO‘QON DAVLAT PEDAGOGIKA INSTITUTI ILMIY XABARLARI
(2025-yil 3-son)

TABIIY FANLAR

NATURAL SCIENCES

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FIRST RECORDS OF SOME MACROZOOBENTHOS FROM CHASHMABULOQ SPRING, FERGHANA VALLEY

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Annotation. This article explores the macrozoobenthos species and their ecological characteristics in the Chashmabuloq water reservoir, located in the southern part of the Fergana Valley. The research was conducted during May–June 2024, during which over 300 biological samples were collected and identified to the species level. As a result, 5 species of leeches, 3 species of bivalve mollusks, 6 species of gastropod mollusks, and 1 species of crustacean were identified. Among the identified species, there are endemics specific to the Fergana Valley and organisms of ecological significance. The data obtained indicate that the Chashmabuloq water reservoir has high ecological stability. The research findings serve as an important foundation for assessing the ecological condition of the water and establishing biological monitoring.

Key words: Macrozoobenthos, Chashmabuloq, mollusks, leeches, crustaceans, ecological monitoring, bioindicator, biological diversity.

CHASHMABULOQ AYRIM MAKROZOOBENTOSLARIGA OID DASTLABKI QAYDLAR, FARG‘ONA VODIYSI

Annotatsiya. Mazkur maqolada Farg‘ona vodiysi janubida joylashgan Chashmabuloq suv havzasining makrozoobentos turlari va ularning ekologik xususiyatlari o‘rganildi. Tadqiqot 2024-yilning may–iyun oylarida olib borilib, 300 dan ortiq biologik namuna yig‘ildi va tur darajasigacha aniqlandi. Natijada, 5 tur zuluk, 3 tur ikkita pallali mollyuska, 6 tur qorinoyoqli mollyuska va 1 tur qisqichbaqasimon aniqlangan. Aniqlangan turlar ichida Farg‘ona vodiysiga xos endemiklar va ekologik ahamiyatga ega organizmlar mavjud. Olingan ma’lumotlar Chashmabuloq suv havzasining yuqori ekologik barqarorlikka ega ekanligini ko‘rsatdi.

Tadqiqot natijalari suvning ekologik holatini baholash va biologik monitoringni yo‘lga qo‘yishda muhim asos bo‘lib xizmat qiladi.

Kalit so’zlar: Makrozoobentos, Chashmabuloq, mollyuskalar, zuluklar, qisqichbaqasimonlar, ekologik monitoring, bioindikator, biologik xilma-xillik.

ПЕРВЫЕ СВЕДЕНИЯ О НЕКОТОРЫХ МАКРОЗООБЕНТОСАХ ИЗ ИСТОЧНИКА ЧАШМАБУЛАК, ФЕРГАНСКАЯ ДОЛИНА

Аннотация. В данной статье изучены виды макрозообентоса и их экологические особенности в водоёме Чашмабулак, расположенном на юге Ферганской долины. Исследование проводилось в мае–июне 2024 года, в ходе которого было собрано более 300 биологических образцов и определено их видовое разнообразие. В результате было выявлено 5 видов пиявок, 3 вида двустворчатых моллюсков, 6 видов брюхоногих моллюсков и 1 вид ракообразных. Среди обнаруженных видов имеются эндемики, характерные для Ферганской долины, а также организмы, имеющие экологическое значение. Полученные данные свидетельствуют о высокой экологической устойчивости водоёма Чашмабулак. Результаты исследования служат важной основой для оценки экологического состояния воды и организации биомониторинга.

Ключевые слова: макрозообентос, Чашмабулак, моллюски, пиявки, ракообразные, экологический мониторинг, биоиндикатор, биологическое разнообразие.

Introduction

Macrozoobenthos are animal organisms living at the bottom of water bodies and are visible to the naked eye (usually larger than 0.5 mm) [1]. They include insect larvae, annelid worms, mollusks, crustaceans, and other organisms. Macrozoobenthos play an important ecological role in aquatic ecosystems. They participate in the decomposition of organic matter, serve as a crucial link in the food chain, and are widely used as bioindicators for assessing the level of water pollution. Since their species composition and abundance are highly sensitive to water quality, physicochemical conditions, and anthropogenic factors, the study of these organisms holds significant scientific and practical value for ecological research.

Several studies have been conducted on macrozoobenthos in the water bodies of the Fergana Valley. In particular, V.I. Jadin, based on the data of P.P. Arkhangelsky, described a new species for science — *Pseudomnicola archangelskii* — from the Shahimardon springs in the Fergana Valley [2]. Later, the morphology and distribution of this species were thoroughly studied, and it was classified under the family Horatiidae. This mollusk species has been included in the Red Book of Uzbekistan.

A.M. Mukhamadiev studied the hydrobiota of the Fergana Valley and identified several aquatic gastropod mollusk species found in springs, including *Costatella acuta*, *Planorbis planorbis*, *P. tangitarensis*, *Anisus ladacensis*, *Radix auricularia*, and *R. lateralis* [3].

Malacologist Z.I.Izzatullaev provided a detailed account of the taxonomic composition, biological characteristics, distribution, zoogeography, historical development, and economic significance of freshwater mollusks of Central Asia. He also presented scientific information on species found in the Fergana Valley. Notably, he described two species new to science — the gill-bearing mollusk *Valvatamnicola schahimardanica* and *Colletopterum kokandicum*. Both species have been included in the Red Book of Uzbekistan. In addition, he was the first to classify *Costatella integra*, a species collected from regions of Central Asia [4, 5].

In recent years, X.X. Solijonov and F.U. Umarov have conducted research on the biodiversity and ecology of leeches and aquatic gastropod mollusks in the water bodies of the Fergana Valley [6, 7]. As a result of their studies, 13 species of leeches and 29 species of aquatic gastropod mollusks were identified in the region's water bodies. Additionally, F. Umarov and A. Pazilov carried out specialized malacological research in 12 springs located in the Andijan region, where the gastropod mollusks found in these springs were comprehensively analyzed [8].

A review of the literature shows that most of the studies conducted so far have been focused on the mollusk group, while research covering other major macrozoobenthos groups is limited and fragmented. In particular, there is no scientific data available on the macrozoobenthos of Chashmabuloq. Therefore, the aim of this study is to investigate the species composition and ecological characteristics of certain macrozoobenthos groups in Chashmabuloq — including leeches, bivalve and gastropod mollusks, as well as crustaceans.

Material and methods

Chashmabuloq is located in the village of Chashma, in the southern part of the Fergana Valley (39°56'18.5"N 71°12'42.1"E) (Figure 1).

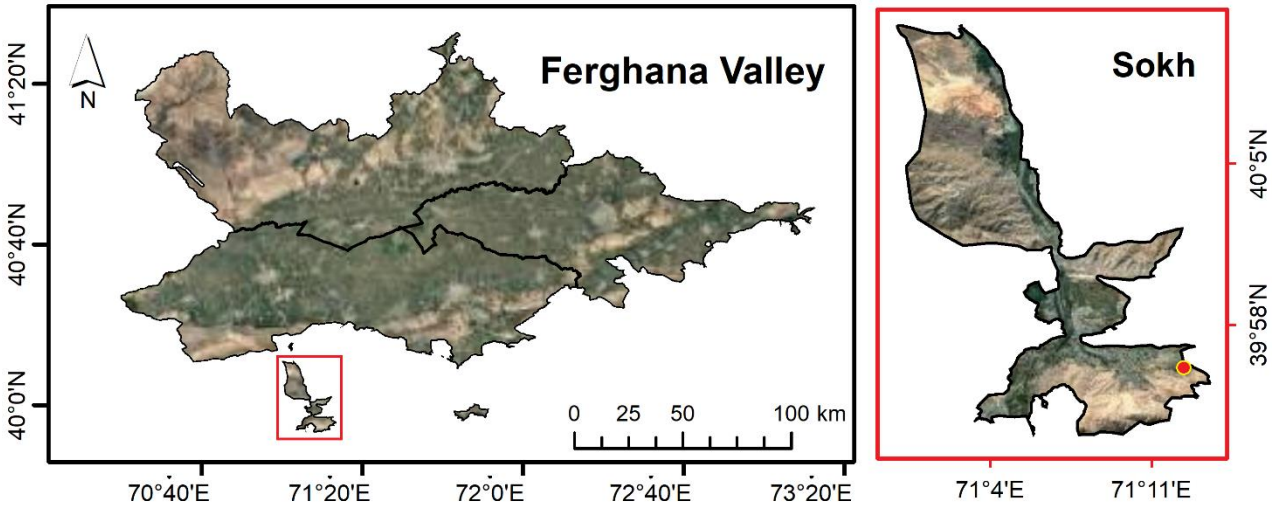

Figure (1): Location of Chashmabuloq (red dot) in Sokh District of the Fergana Valley.

Springs are classified into hot and calm types based on the nature of their emergence to the surface. Hot springs are formed as a result of underground waters rising due to hydrostatic pressure, gases, and steam. Calm springs, on the other hand, emerge when groundwater layers

are either blocked or exposed by impermeable rocks, or due to karst processes. Special attention was given to the location of the springs, the consistency of their water flow, and their richness in hydrobiota, and they were analyzed by dividing them into three groups: springs located in the lower stream cones of rivers, springs in foothill plains, and springs in mountainous foothill areas [3]. Chashmabuloq is a natural spring typical of the mountainous foothill region and belongs to the hot spring type [9].

Chashmabuloq is located at an altitude of 1,498 meters above sea level. The water temperature is 12–13°C, and the pH level of the environment is neutral, at 7 [9]. The spring is more than 10 meters wide and has an estimated depth of about 1.5–2 meters. This aquatic ecosystem, rich in hydrobiota, is characterized by a high level of biological diversity. Although the water is used for drinking purposes, anthropogenic impacts are minimal, allowing the spring to maintain its natural state. The presence of large surrounding trees creates a favorable environment for the hydrobiota living in this aquatic biotope (Figure 2).

Figure (2): General overview of the Chashmabuloq biotope.

Research in Chashmabuloq was conducted during May and June of 2024. Samples were collected manually using a hydrobiological net and forceps. In total, over 300 material samples were gathered. For mollusks and crustaceans, 70% ethanol was used directly for fixation. Leeches were first paralyzed by placing them in 10% ethanol for 30 minutes, after which they were transferred to a 96% ethanol solution for preservation. Macrozoobenthos samples were identified to the species level using the identification keys of E.J.Lukin, Ya.I.Starobogatov, and Z.Izzatullaev [4, 5, 10, 11]. Key morphological characteristics served as the primary basis for species differentiation [10]. For taxonomic classification of the identified species, the works of E.J.Lukin (1976), R.T.Sawyer (1986), E.Borda and M.E.Siddall (2004), Z.Izzatullaev (2018), and I.A.Barishev (2023) were utilized [1, 4, 11, 12, 13].

Results and discussion

As a result of the conducted research, the following macrozoobenthos were identified in Chashmabuloq: 5 species of leeches belonging to 4 genera and 4 families; 3 species of bivalve mollusks belonging to 1 genus and 1 family; 6 species of gastropod mollusks from 4 genera and 3 families; and 1 species of crustacean from 1 genus and 1 family.

Leeches

Phylum: Annelida Lamarck, 1809
Class: Clitellata Michaelsen, 1919
Subclass: Hirudinea Lamarck, 1818
Order: Rhynchobdellida Blanchard, 1894
Suborder: Glossiphoniiformes Tessler and de Carle, 2018
Family: Glossiphoniidae Vaillant, 1890
Genus: *Alboglossiphonia* Lukin, 1976
Species (1): ***Alboglossiphonia hyalina* (Müller, 1774)**
Genus: *Helobdella* Blanchard, 1896
Species (2): ***Helobdella stagnalis* (Linnaeus, 1758)**
Order: Arhynchobdellida Blanchard, 1894
Suborder: Hirudiniformes Caballero, 1952
Family: Haemopidae Richardson, 1969
Genus: *Haemopis* Savigny, 1822
Species (3): ***Haemopis sanguisuga* (Linnaeus, 1758)**
Suborder: Erpobdelliformes Sawyer, 1986
Family: Erpobdellidae Blanchard, 1894
Genus: *Erpobdella* Blainville, 1818
Species (4): ***Erpobdella octoculata* (Linnaeus, 1758)**
Species (5): ***Erpobdella nigricollis* (Brandes, 1900)**

Bivalve Mollusks

Phylum: Mollusca
Class: Bivalvia Linnaeus, 1758
Order: Unionifarmes Stoliczka, 1871
Family: Unionidae Rafinesque, 1820 oilasi
Genus: *Corbicula* Megerle von Mühlfeld, 1811
Species (1): ***Corbicula ferghanensis* Kursalova & Starobogatov, 1971**
Species (2): ***Corbicula cor* (Lamarck, 1818)**
Species (3): ***Corbicula tibetensis* Prashad, 1929**

Gastropod Mollusks

Phylum: Mollusca
Class: Gastropoda Cuvier, 1795
Subclass: Pectinibranchia Blainville, 1814
Order: Littorinimorpha Golikov et Starobogatov, 1975
Family: Lymnaeidae Rafinesque, 1815
Genus: *Lymnaea* Lamack, 1799
Species (1): ***Lymnaea stagnalis* (Linnaeus, 1758)**

Species (2): ***Lymnaea subdisjuncta* (G. Nevill, 1878)**
Genus: *Radix* Montfort, 1810
Species (3): *Radix auricularia* (Linnaeus, 1758)
Family: Physidae Fitzinger, 1833
Genus: *Physella* Haldeman, 1842
Species (4): ***Physella acuta* (Draparnaud, 1805)**
Family: Planorbidae Rafinesque, 1815
Genus: *Planorbis* O.F.Müller, 1773
Species (5): ***Planorbis planorbis* (Linnaeus, 1758)**
Species (6): ***Planorbis tangitarensis* Germain, 1918**

Crustaceans

Phylum: Arthropoda Gravenhorst, 1843
Class: Malacostraca Latreille, 1802
Subclass: Eumalacostraca
Order: Amphipoda Latreille, 1816
Family: Gammaridae Latreille, 1802
Genus: *Gammarus* Fabricius, 1775
Species: ***Gammarus pulex* (Linnaeus, 1758)**

Analysis of leeches shows that 4 families, 4 genera and 5 species have been identified from this group. Species belonging to families such as Glossiphoniidae, Haemopidae, and Erpobdellidae exhibit ecologically diverse lifestyles: some are predatory, while others are parasitic or free-living organisms. They provide accurate information about the oxygen content, amount of organic matter, and overall pollution level of the water body. For example, species like *Erpobdella octoculata* and *Haemopis sanguisuga* are sensitive to pollution, and their presence indicates good water quality.

Among bivalve mollusks, three species of the genus *Corbicula* belonging to the family Unionidae have been identified. Among them, *C. ferghanensis* is an endemic species specific to the Fergana Valley, confirming the region's biological richness. These mollusks are known as filter-feeding organisms, and their abundance indicates that the water body's purification processes are occurring naturally.

Gastropod mollusks are structurally more diverse, with six species recorded belonging to three families and four genera. Among these, species such as *Lymnaea stagnalis*, *Physella acuta*, and *Planorbis planorbis* are widespread and ecologically significant organisms. Some species, especially those belonging to the genera *Lymnaea* and *Planorbis*, are also known as intermediate hosts of parasitic worms, making them epidemiologically relevant. Therefore, the analysis of this group is important not only in ecological terms but also for public health.

From the group of crustaceans, only one species – *Gammarus pulex* – was identified. This species inhabits clean, oxygen-rich waters, and its presence indicates the high water quality in

Chashmabuloq. *Gammarus pulex* also plays an important role in the food chain, serving as a food source for larger aquatic animals.

Overall, the research results show that the Chashmabuloq water body is rich in biological diversity, which indicates its ecological stability. The identification of macrozoobenthic species serves as a reliable indicator for assessing the ecological state of the water. In this regard, it is important to regularly continue such studies in the area, monitor the existing fauna, and contribute to the conservation of the natural environment.

Conclusion

According to the research results, a total of 15 species of macrozoobenthos were identified in the Chashmabuloq water body. Among them, 5 species belong to leeches, 3 to bivalve mollusks, 6 to gastropod mollusks, and 1 species to crustaceans. Among these are ecologically significant and endemic organisms specific to the Fergana Valley. This indicates that the Chashmabuloq water body is rich in biological diversity and represents an ecologically stable ecosystem. The identified species can serve as bioindicators in assessing the ecological condition of the water body. Therefore, regular monitoring of macrozoobenthos in this area is of great importance for the protection of water resources and the conservation of natural ecosystems.

Acknowledgments

This research was conducted within the framework of the practical project titled “Study of leeches (Hirudinea) in Uzbekistan: species composition, bioecological characteristics, distribution in water types, economic importance and development of conservation measures for rare species” with the project number ALM-202303153-01 at Samarkand State University.

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