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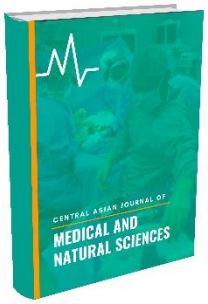

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DISTRIBUTION AND ECOLOGY OF UNIONIDAE AND CORBISULIDAE FAMILIES IN THE LOWER COURSE OF THE ZARAFSHON RIVER

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ABSTRACT: For the first time, we found out that 10 species are distributed in the lower reaches of the Zarafshan River in Navoi region, 7 species near the Tudakol reservoir, and 4 species after Bukhara city. There are 2 species in rocky biotopes of the river, 5 species in sandy areas, and 8 species in muddy areas. The species Sinanodonta gibba, Sinanodonta ruerorum and Sinanodonta orbicularis were recorded for the first time in the river biotopes. Bivalve molluscs belonging to the peloreophile and rheophile ecological groups are distributed in the coastal water ecosystems of the Zarafshan River. It was determined that peloreophiles make up 80% and rheophiles make up 20%. The abundance of peloreophiles has influenced the abundance of muddy biotopes suitable for mollusks in this area.

KEYWORDS: mollusk, Sinanodonta gibba, Sinanodonta puerorum,Corbicula cor.

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INTRODUCTION

The demand for biological resources of aquatic ecosystems, in particular for bivalve mollusk products, is increasing worldwide. Currently, 13,588.2 million tons of bivalve mollusks food raw materials

and the pearls in the size of US dollars 5.9 mln.are grown[1] and in developed countries they are used to clean water bodies[2]. At this point, it is important to search for the species composition of the Unionidae and Corbisulidae families, which have a special place in freshwater distribution among bivalve mollusks, and the possibilities of their practical use [1,3].

In the world, much attention is being paid to assessing the situation of molluscs distributed in large river basins fed by snow and glaciers as an object of possible disappearance of biological diversity. In this regard, among other things, the international and national database of mollusks distributed in the transboundary river basins was formed, modern methods of inventorying the representatives of the fauna were developed, effective methods of preservation and reproduction of rare and promising species were introduced. It should be noted that the drastic changes currently taking place in river ecosystems, including the change of the historical-seasonal regime of water bodies, inappropriate use of water resources and the placement of production enterprises in river streams, are special importance at the national level, and the identification of malakafaunistic areas prone to crisis, justification and protection of their distribution determines the launch of events.

At this point, periodic inventory of the malacafauna of little-studied river basins, determination of factors influencing their populations, assessment of the status of rare, endemic and economically important species is a great scientific and practical importance. That's why, the territorial species composition and distribution of bivalve mollusks of the Unionidae and Corbisulidae families, systematics, scientific works on their protection are carried out by foreign scientists J.H. Thorp., A. Covich (1991), D.C. Aldridge (1999), H. Marcus (2010), A.F. Bogan (2010), A. Cuttelod (2011) P. Bouchet (2017), and research on pearl cultivation in economic sectors, in particular in artificial water bodiesconducted by M. Haws (2002)), N.F. Mamangkey (2009), S. Rahayu (2009), S. Rahayu (2013) [2,4,5].

On determining regional diversity, taxonomic structure and signs of variability of bivalve mollusks in the CIS countries can be seen in the works by V.V. Bogatov, Ya.I. Starobogatov (2004), V.V. Bogatov (2014), N.I. Andreev (2009), G.P. Alyokhina (2007), V.F. Panov (2009), M.O. Son (2009), L.N. Yanovich (2013), A.L. Rijinashvili (2009), A.V. Sintyurina, A.B. Bigaliev (2009), D.V. Kuzmenkin (2015).It can be note that there is insufficient information on the distribution, morphology and resources of bivalve mollusks in different water bodies in our Republic. Information about this was reflected only in the researches by Z.I. Izzatullaev (1992, 2023), Kh.T. Boymurodov (2009, 2022) [6,7].

Based on the above, it can be noted that studying the distribution and ecology of bivalve mollusks of the Unionidae and Corbisulidae family in the lower reaches of the Zarafshan River is one of the urgent problems.

MATERIALS AND METHODS

The study of mollusks and the collection of materials from water bodies in the lower reaches of the Zarafshan River began in 2014. Materials for research were collected from water types in the lower reaches of the Zarafshan River in the spring, summer and autumn seasons of 2014-2022. A total of 241 samples

[1]South Sea Pearl Necklace Price Wholesale Pearls Lombok Indonesia (http://missjoaquim.com/southseapearls/blog/indonesian-pearls-in-figures)
[2]GE'S WATER & PROCESS TECHNOLOGIES (WWW.GEWATER.COM)

were studied, including 481 mollusks. These mollusk samples are large systematic works, in the identifiers Rijinashvili, 2005; Starobogatov, Izzatullaev, 1984, Izzatullaev, Boymurodov, 2010, Izzatullaev 2019 were studied with the methods mentioned.

In the lower reaches of the Zarafshan River, there are several methods of manual collection of mollusks from rivers, canals, and reservoirs: mollusks were collected from the mud near the shores with a steel net, and from the water bodies with a sieve with a metal mesh fence. We used dredges to collect hydrabionts. Shellfish density was measured with meter scales. The received information has been processed. The samples taken from the lower layers are mixed with water. As a result, small mollusks sank to the bottom and they were immediately removed, washed in a sieve and separated. The collected mollusks were fixed in 70% alcohol, and then analyzed. In some cases, samples of mollusks preserved in 4% formalin were used, and dry shells were stored in containers of various sizes. Comparator method was widely used for grouping, equalization and identification of mollusk shells [6,7].

The size of large shells was measured using a caliper, and the size of small shells was measured using an eyepiece micrometer MBS-1. When studying the shell, it is strengthened with plasticine, and it was achieved that the axis of the surface and the base surface is parallel. The data were processed using statistical methods. Saproblik index was determined based on the Rybalsky classification. Pollution index (IP) of water bodies was found according to the generally accepted method. The water velocity was measured with a hydrometric vertushka - GR 21M.

RESULTS AND THEIR DISCUSSION Zarafshan River is mentioned in historical sources with names such as Politimet, Namik, Rudi Mosaf, Rudi Sharg', Daryoyi Ko'hak. Since the 18th century, it has been called Zarafshan, its length is 781 km, the area of its basin is 41,680 km^2, and the mountainous part of its basin is 17,710 km^2. Zarafshan River begins with the name Mastchokhdarya from the Zarafshan glacier at the junction of the Turkestan, Zarafshan and Oloy ridges - (Blue water) and after flowing for 200 km, joins Mastchoh and Fondaryo and takes the name Zarafshan. Near the Cho'ponota hill, Zarafshan divides into two large branches - Okdarya and Karadarya [8, 9, 10, 11].

Water from the Amudarya is brought to the lower part of the Zarafshan River through the Amu-Bukhara canal. The bivalve mollusks on the Amudarya coast are distinguished by the richness of their species composition. The Amu-Bukhara canal takes water from the Amudarya and discharges a large amount of water into the Zarafshan River basin, and fish and bivalve mollusks pass along with the water. As a result of the research, 9 species of bivalve mollusks belonging to the Unionidae and Corbiculidae families belonging to 2 families and 4 genera were found in the waters of the Zarafshan River downstream. species and 1 subspecies were identified (Table 1). The distribution of bivalve mollusks belonging to the Unionidae and Corbiculidae families in the lower reaches of the Zarafshan River was studied by conducting continuous observations in three areas. The entrance to the Navoi region, near the Tudakol reservoir and the part after the city of Bukhara were analyzed. In the entrance to Navoi region, species of the Unionidae family are distributed biotopes of *Sinanodonta gibba 1.1, S. orbicularis 1.2, S. puerorum 1.1* copies in 1 m^2.

Colletopterum bactrianum 0.4, C. cyreum sogdianum 0.6 of the *Colletopterum genus* are found in

the slow-flowing marshy areas of the river. These species differ from the Sinanodonta genus by their relatively small density. *Colletopterum ponderosum volgense* species were not found in these aquatic ecosystems. *Colletopterum ponderosum volgense* is distributed in reservoirs downstream of the Zarafshan River, and the changing water level is a limiting factor for its occurrence in the river.

Corbicula cor 0.9, C. fluminalis 0.8, C. purpurea 1.1 from the genus Corbicula of the family Sorbiculidae are distributed in the sandy and rocky biotopes of the river. From the genus *Corbiculina*, *Corbiculina tibetensis 2.1, C. ferghanensis 2.4*, this part of the river is distinguished by its density in water ecosystems. Among these, the first one is more numerous, total mollusks are abundant in muddy parts of the river, where macrophytes and reeds grow a lot. Here they live at depths of 0.2-1.5 m, sometimes they can also be found in sandy places.

7 species of bivalve mollusks are distributed near the Tudakol reservoir of the Zarafshan river. We defined *Sinanodonta gibba 0.9, S. orbicularis 0.8, S. puerorum 1.1 and Colletopterum cyreum sogdianum 0.3* from the Onionidae family. It was defined *Colletopterum bactrianum* was not distributed in the part of the river close to the reservoir, these species are rare endemics. *Corbicula purpurea 0.9, Corbiculina tibetensis 1.6, C. ferghanensis 1.2* are distributed in sandy biotopes of ponds and small water bodies around the river. *Corbicula cor and C. fluminalis,* considered stenobionts, were not found in the area of the Tudakol reservoir of Zarafshan River.

A small number of species and a relatively low density were observed in the waters of this region, due to which the unfavorable water environment for mollusks may have had its effect. Among these mollusk, all species of Chinese echinoderms were also collected from the waters near the territory of the Tudakol reservoir.

They are shown for the first time for the malacofauna of the lower reaches of the Zarafshan River. Chinese toothless fish are also common in riverside fisheries. They came to this area as a result of acclimatization of Chinese complex fishes: white amur, carp. Because the larvae of Chinese toothless glochidia are parasitic in these fish. Along with live mollusks, their empty shells are also found in the river.

It was found that 4 types of bivalve mollusks are distributed in the lower reaches of the Zarafshan River after the city of Bukhara. The density of *Sinanodonta orbicularis 0.9, S. ruerorum 0.6* is distributed in the waters of the part of the river where there is permanent water, and the density is less than that of the biotopes of the entrance to Novoi city. *Corbiculina tibetensis 1.1 and C. ferghanensis 1.0* are distributed in sandy and rocky biotopes.

The state of the populations of *Solletopterum bactrianum, Colletopterum cureum sogdianum, Corbicula cor, Corbicula fluminalis* and *Corbicula purpurea*, which are endemic and rare species distributed in the lower reaches of the Zarafshon River and included in the "Red Book", and measures for their protection were developed. The developed measures were implemented in the activities of the State Committee for Ecology and Environmental Protection of the Kogon, Gijdivon, Navoi Region, Karmana and Kyziltepa District Departments of the Bukhara Region to preserve rare animal species in their habitat.

allowed to protect and preserve populations.

Based on the saprobic nature of bivalve mollusks of the Unionidae and Corbiculidae families, recommendations were made for determining the level of cleanliness of freshwater bodies. Prepared recommendations were used to determine the level of organic pollution of fish breeding ponds in the project No. 21-ON-2019 "Natural food base in the cultivation of commercial fish fry - methods and practical importance of cultivation of plankton organisms" made it possible to assess the quality.

Table 1

The density of bivalve molluscs in the lower reaches of the Zarafshan River, distribution in biotopes and ecological groups (n= 10, m²/piece)

№	Types	Density in river flow, м²			Biotopes			Ecological groups
		Entrance to Navoi region	Near Tudakol Reservoir	The part after the city of Bukhara	rocky terrain	sandy lands	clays	
1.	*Sinanodontagibba*	1,1±0,2	0,9±0,1	-	-	-	+	Peloreophil
2.	*Sinanodontaorbicularis*	1,2±0,4	1,1±0,3	0,9±0,1	-	-	+	Peloreophil
3.	*Sinanodonta puerorum*	1,1±0,3	0,8±0,2	0,6±0,1	-	-	+	Peloreophil
4.	*Colletopterum bactrianum*	0,4±0,1	-	-	-	-	+	Rheophile
5.	*Colletopterum cyreum sogdianum*	0,6±0,1	0,3±0,1	-	-	-	+	Rheophile
6.	*Colletopterum ponderosum volgense*	-	-	-	-	-	-	-
7.	*Corbicula cor*	0,9±0,1	-	-	-	+	-	Peloreophil
8.	*Corbicula fluminalis*	0,8±0,1	-	-	-	+	+	Peloreophil
9.	*Corbicula purpurea*	1,1±0,2	0,9±0,1	-	+	+	-	Peloreophil
10.	*Corbiculina tibetensis*	2,1±0,4	1,6±0,3	1,1± 0,2	-	+	+	Peloreophil
11.	*Corbiculina ferghanensis*	2,4±0,5	1,2±0,2	1,0± 0,2	+	+	+	Peloreophil
Total types:		**10**	**7**	**4**	***2***	***5***	**8**	

CONCLUSIONS

1. The distribution of 10 species in the lower reaches of the Zarafshan River, the entrance to the Navoi region, 7 species near the Tudakol reservoir, and 4 species after the city of Bukhara was studied.
2. A decrease in the number and density of species was observed in the lower part of the river, due to the change of the water level and the influence of the hydrochemical composition of the water. Hydrochemical indicators of water were found to be within the permissible limits of the village of Sultanabad, the entrance to Navoi region. Oxygen content O_2 4.9±0.2 mg/l, Oil and oil products 0.04±0.01 mg/l, Phenol 0.001 mg/l, Chloride (Cl) 282±14 mg/l, Water mineralization 820± 26 mg/l. It was studied that the hydrochemical indicator of waters in the part after the city of Bukhara is more than the allowed amount. Oxygen content O_2 3.4±0.1 mg/l Oil and oil products 0.05±0.01 mg/l, Phenol 0.001 mg/l, Chloride (Cl) 328±22

mg/l, Water mineralization 1122±36 The fact that it is more than mg/l has shown its effect on the number and density of species.

3. There are 2 species in the rocky biotopes of the river, 5 species in sandy areas, and 8 species in muddy areas distributed. Bivalve mollusks belonging to the peloreophile and rheophile ecological groups are distributed in the coastal water ecosystems of the Zarafshan River. It was determined that peloreophiles make up 80% and rheophiles make up 20%. The abundance of peloreophiles has influenced the abundance of muddy biotopes suitable for molluscs in this area.

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