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Occurrence of Bivalve Mollusks in Biotopes in Aquatic Ecosystems of the Sangzor River

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A B S T R A C T

The present study showed that the bivalve mollusks of the Sangzor River have not been studied separately before our research ever. Also in this study identified 19 species of the bivalve mollusks and 2 subspecies species in the river and its surrounding water species, belonging to 2 families and 4 subgroups.

Introduction

Inventarization and use of biological resources is a problem of great significance facing mankind in the world for the time being.Especially,it is very important to further improve the living standards and rational use of available resources while the land part of the world is being cultivated widely,in improvement and use of water biological resources, water saving processes. It is worth noting that in the world aquatic biocenoses, bivalve mollusks play a major role in secondary productivity, and in some ponds, these type of mollusks can account for 70-80% of the biomass of benthos (Boymurodov, 2010). The Sangzor River starts from the springs at a height of about 3400 meters near the Guralash Pass in the Turkestan Range of Mountainsand it flows to the Tuzkon Lake at about 70 km northwest of Jizzakh Region, in the south-east of the Kyzylkum Desert.The length of the river is 198 km, andthe area of the basin is 3220 km^2 (the mountainous part of the river).The beginning part of the river is called Guralashsoy.After joining with Jontekasay near Kichik Qorashaqshaq Village, it starts being called the Sangzor River.Below the city of Jizzakh it is known as the Sangzor Qili.The Sangzor River is a network of the Turkestan Range of Mountains up to the village of Yorghak.

The river flows north-west through the wide valley between the Malguzar Mountains.The Sangzor River is a low-lying river. Its average annual water consumption is 4 m^3/sec.After crossing the Jizzakh oasis, the flow of the Sangzor river is often dried up or dumped by groundwater with very little irrigation waters as well.The Sangzor River is saturated with snow and rain water supply. Most of the annual water flow in March-June period and the river seems to flow full in May.In regulating the water of the SangzorRiver, Kukjarsoy, Okkurgonsoy, Tangatopdisoy, Sutariq, Bagmazorsoy and Novqasoy and others join the river.Some of these rivers even do not reach the Sangzor River.

Since our country gained its independence, much attention has been paid to protect the nature and conserve the biodiversity in our country.Remarkable results have been achieved in the use of water ecosystems in the country, protection of natural and artificial reservoirs (Boymurodov, 2010).

Currently, the species composition of *Unionidae* and *Canbiculidae* families of the bivalve mollusks along the Sangzor River, the study of the distribution patterns in natural and artificial watersheds and reservoirs, the substantiation of endem and endangered species and the factors influencing them are of vital scientific and practical significance.
In recent years, land reclamation and industrial development have led to a reduction in freshwater sources, their pollution and the disappearance of freshwater bivalve mollusks, which are of great importance in terrestrial and aquatic ecosystems (Annabelle Cuttelod, Mary Seddon and Eike Neubert, 2011).

The Eurasian continent differs from other continents in a large number of bivalve mollusks living in fresh water. In the European region of the continent, a variety of freshwater bivalve mollusks prevails.

Currently, more than 850 freshwater habitats are registered to live in freash water reservoirs and watersheds.Among 27 European countries, France (215 species), Spain (157 species), Italy (138 species), Greece (132 species) and Germany (124 species) prevail among the remaining countries in the number of freshwater bivalve mollusks. (Annabelle Cuttelod, Mary Seddon and Eike Neubert, 2011).

Bivalve mollusks and abdominal mollusks are common in freshwater bodies of the earth. Although bivalve mollusks are smaller in the number than the species of abdominal mollusks, they are superior to species and biomass within the area of occurrence (Bouchet, 2007).

Ancient fossil and archeological studies show that bivalve mollusks were formed about 500 million years ago in the Cambrian period. There are 9,200 species of bivalve molluscs in the world up to date, representing 106 families and 1,260 species (subgroups) (Huber Markus, 2010, Marine Proteins and Peptides, 2013).

48 species of bivalve mollusks live in freshwater in Europe, it is about 6% (Bogan, 2010). Of the 850 freshwater species in Europe, 48 belong to the *Bivalvia* class, 14 of them are members of the *Unionidae* family, and the *Corbiculidae* family is not present in Europe (Annabelle Cuttelod, Mary Seddon and Eike Neubert, 2011).

In the freshwater ponds of North America there are five family mollusks, of which the *Unionidae*, *Corbiculidae* and *Dreissenacea* species are the most common species there.There are 33 natural and 5 introductory species of bivalve mollusks and 6 species of *Corbiculidae* in North America and 227 of the 44 species of *Unionidae* (JamesH.,Thorp., Alanp,Covich, 1991).

There are more than 1,000 species of bivalve mollusks in the CIS countries, in particular in the Russian Federation. Of these, bivalve mollusks inhabit in freshwater ponds, seven *Bivalvia* families are scattered, among them the *Unionidae* family is larger than the other species (700 species) **(**Bogan, 2010).

The use of new methods and techniques in scientific research studies by V.I. Jadin (1948, 1952), A.F. Alimov (1979), Ya.I. Starobogatov, Z.I. Izzatullaev (1989), S.I. Andreeva (2006), N.I. Andreev, S.I. Andreeva, A.N. Krasnogorova (2008) led to significant results in the study of bivalve mollusks.

As a result of deyзand thorough study of bivalve mollusks in the CIS watersheds and reservoirs, the majority of the territory of the CIS are studied the morphology, its role, ecology and formation of bivalve mollusks. (Andreeva, Andreev, Krasnogorova, 2008, 2009, RubinovaF.E., Ivanov Yu.N. 2005., Rijinashivili A.L. 2007, 2008, 2009)

Scientific works on systematization and distribution of species of bivalve mollusks are conducted by foreign scientists like James H. Thorp, Alanp Covich (1991), Aldridge (1999), Bouchet (2007), Huber Markus (2010), Bogan (2010), Annabelle Cuttelod and etc (2011) and research studies on pearl cultivation in sectors of the economy and, in particular, artificial ponds were conducted by scientists like Maria Haws (2002), Mamangkey and etc… (2009), Rahayu and etc... (2009); Sata Yoshida Srie Rahayu (2013),studies regarding population status assessment and global invasion species distribution were conducted by Alyokhina and etc. (2007); Panov and etc… (2009), Son (2009), Yanovich (2013) and Rijinashvili (2009), Sintyurina, Bigaliev (2009), Kuzmenkin (2015) conducted studies on the importance of bivalve mollusks in determining the level of water contamination.

Materials and Methods

Since the systematic composition of bivalve mollusks in the various water types of the Sangzor River, their bioecological features, the biotopic distribution and other important aspects have not been fully researched and studied, we started collecting species for our study beginning from the year of 2017.

Our research materials were collected in spring, summer and autumn seasons in the years from 2016 to 2019 for seafaring species of the Sangzor River.The published materials are known in science and studied by the methods of V.I. Jadin (1938-1952), Y.I. Starobogatov, Z.I. Izzatullaev (1984), Z.I. Izzatullaev, H.T. Boymurodov (2009).

In addition to manual collection, we have used several other collecting techniques of mollusks. In this study collected the mollusks in the mud along the shore sof the river with a steel net, and the mollusk under the water were collected with a sieve cut into a metal rack.

Results and Discussion

A review of the literature has shown that the bivalve mollusks of the Sangzor River have not been studied separately before our research ever. Our study identified 19 species of the bivalve mollusks and 2 subspecies species in the river and its surrounding water species, belonging to 2 families and 4 subgroups.

For the first time, it has been discovered that the *Unionidae* family of Chinese toothful species of *Sinanodonta* species - *S. gibba*, *S. puerorum* and *S. orbiculanis* were accidentally acclimated to the watersheds of Uzbekistan.This species is a native

representative subgroup of the *Sinanodanta s.str*. peculiar of East Asia (like Japan, Indo-China). As a result of acclimatization of Chinese complex fish (grass carp and others) to our region, they are distributed along all river basins (canals, reservoirs, fisheries) along with the larvae of molluscs.

Large bivalve molluscs do not live there because of the high flow of the Sangzor River in the narrow valley and low water temperatures and low organic matter content.

In the slopes of the middle stream of the Sangzor River, it is estimated that *Sinanodanta orbiculanis, S. puerorum and S. Gibba species*can be observed 1-1.5/m^2 in Gallaorol, Jizzakh and Pakhtakor Districts.

The first species is the most numerous and common of the above-mentioned species, with the total mollusks occurring in many parts of the river, where mud and macrophytes and reeds are high.Here they live at depths of 1–2 m, which can sometimes be found in sandy areas (Table 1).

All species of Chinese toothful were collected from the lower Sangzar River and the Jizzakh canal from these clusters. They were first identified in 2019 for the Sangzar River experience qualification.Chinese complex fish play an important role in the occurrence and distribution of these species in the Sangzor Riveras a whole.

In the lower terrain of the river, the distribution density decreases sharply compared to the middle part of the *S. gibba* species and occurs at 1.1–1 per 1 m2.This condition is considered to be due to the river pollution [Boymurodov, 2005; Izzatullaev, 2016).

Colletopterum sureum sogdianum and C. ronderosum volgense occur in the middle of the Sangar River in the post-Jizzakh Region at 1.2-1 per m^2, *C.ponderosum volgense* species is found in the lower reaches of the river in Pakhtakor District with a value of 0.4 per m^2.that is, the number and density of species is low and lower part of the river.

The amount of water in the Sangar River and accordingly the seasonal hydrological regime can be considered as one of the direct factors influencing the number of species of bivalve mollusks.Species of the *Corbiculidae* family *Corbiculacar, C.purpurea, C.fluminalis, Corbiculina ferghanensis, and C. tibitensis* can be found living dug in sandy soils at 2-3.5 per m^2 in waters in the Gallaorol and Pakhtakor Districts.

The upper and middle streams of the Sangzar River have hot springs, which run from the ground under the influence of hydrostatic pressure.In the mountains there are more springs and water eyes than in the plain terrace.Small bivalve mollusks were collected from the springs of the mountain part of the river.Seven species of mollusks belonging to the *Euglesa and Odhneripisidium* families have been found in the Sangzar river banks (Table 1).

The present study identified 19 species of bivalve mollusks and 2 subspecies in the Sangzor River and surrounding water reservoirs and watersheds, belonging to 4 families and 6 subgroups. Of the species listed in the table: *Euglesa hissarica, E. obliquata, Odhneripisidium polytimeticum lara* are more common than the others.They occur at 1-4 per $1m^2$.

The other species are relatively rare. *uglesa hissaricf, Odhneripisidium terekense, O. issikkulense* are being shown for the first time to show from the Sangzor river basin.

Table.1 Density, biotope distribution, and ecological group of bivalve mollusks in the Sangzor River

№	Types	Density inthe river flow, m2			Biotopes			Ecological groups
		Upper	Middle	Lower	rocky terrain	sandy terrain	mud	
	*Unionidae*family							
	Sinanodontasubgroup							
1.	*Sinanodontaorbicularis*	-	1,2±0,2	-	-	-	+	peloreophil
2.	*Sinanodontagibba*	-	1,1±0,1	1,2±0,2	-	-	+	peloreophil
3.	*Sinanodonta puerorum*	-	1,3±0,3	-	-	-	+	peloreophil
	Colletopterum subgroup							
4.	*Colletopterum bactrianum*	-	1,0±0,1	-	-	-	+	reophil
5.	*Colletopterum cyreum sogdianum*	-	1,2±0,1	1,1±0,2	-	-	+	reophil
6.	*Colletopterum ponderosum volgense*	-	1,2±0,3	-	-	-	+	pelolimnnophil
7.	*Colletopterum kokandicum*		-	-	-	-	-	pelolimnnophil
	Euglesidae family							
	Euglesia subgroup	4,2±0,4	-					
8	*Euglesa hissarica*	4,1±0,3	-	-	-	+	-	pelolimnnophil

9	*Euglesa heldreichi*	4,3±0,3	-	-	-	+	-	peloreophil
10	*Euglesa turkestanica*	3,0±0,1	-	-	-	+	-	pelolimnnophil
11	*Euglesa obliquata*	3,0±0,1	-	-	-	+	-	pelolimnnophil
12	*Euglesa turanica*	4,2±0,1	-	-	-	+	-	pelolimnnophil
	Pisididae family							
	Odhneripisidium subgroup							
13	*Odhneripisidium terekense*	4,0±0,3	-	-	-	-	-	cranophil
14	*Odhneripisidium issykkulense*	3,0±0,4	-	-	+	+	-	cranophil
15	*Odhneripisidium sogdianum*	4,0±0,2	-	-	-	+	-	cranophil
16	*Odhneripisidium polytimeticum*	5,0±0,3	-	-	+	+	-	cranophil
17	*Odhneripisidium behningi*	4,0±0,3	-	-	-	+	-	cranophil
	Corbiculidae family							
	Corbiculdae subgroup							
18	*Corbicula cor*	-	2,1±0,9	-	-	+	-	peloreophil
19	*Corbicula purpurea*	-	2,2±0,3	-	+	+	-	peloreophil
20	*Corbicula fluminalis*	-	2,0±0,6	-	-	+	-	peloreophil
	Corbiculina урэu							
21	*Corbiculina tibetensis*	-	3,9±0,3	2,5± 0,4	-	+	+	peloreophil
22.	*Corbiculina ferghanensis*	-	4,2±0,6	2,1± 0,2	+	+	-	peloreophil
	Total types:	***11***	***11***	***4***	***4***	***14***	***7***	

These bivalve mollusks are cranophiles and pelolimnophils, living in springs and spring eyes, according to their habitat.The length of the Sangzar River and the presence of all the biotopes in which the mollusks are inhabited have made the reservoir a favorable reservoir for the mollusks.However, it should be noted that although all species are found in the river, they differ in density.For example, although *Sinanodanta*species is found in rivers, its density is lower than in other watersheds.The Sangzar River is an ideal reservoir for the reproduction and distribution of *Corbiculina*subgroup species.

Among the bivalve mollusks, the species is not very common in the lower Sangzor River, except for the *Corbiculina.tibitensis* species, which is found in the middle and lower reaches of the river, and this species is widely adapted to the habitat and the variability of the hydrological regime of the river.

Species of endemic and rare species and the subspecies include *Colletoptenum cyreum sogdianum, C.fluminalis, C. purpurea, C. cor.* which are adapted to a narrow range of habitat in the middle and lower reaches of the Sangzor River. Although they are distributed in the middle part of the river, the poor hydrological regime of the lower reaches and the high level of pollution affect their distribution.

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