

Freshwater bivalve molluscs in artificial reservoirs of Uzbekistan

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Abstract. Bivalve molluscs were studied for the first time in the water reservoirs of Kattakurgan and Chumkurgan districts and Jizzakh region, Uzbekistan. The occurrence of *Sinanodonta orbicularis*, *S. puerorum* and *S. gibba* and ecological groups are shown for the first time. During detailed studies of bivalve molluscs in artificial water reservoirs near mountainous areas it was found that a total of 8–11 species live in such reservoirs. Three species were found for the first time in artificial reservoirs: *Sinanodonta gibba*, *S. orbicularis* and *S. puerorum*. Only Unionidae and Corbiculidae were found in water reservoirs in flat lands. Kattakurgan water reservoir is located in the beautiful area of mountain. That's why different species of molluscs exist there. Bivalve molluscs extended in water reservoirs such as: *Colletopterum batrianum*, *C. cyreum sogdianum*, *Corbicula cor*, *C. purpurea* and *C. fluminalis* are entered to The Red Book of the Republic of Uzbekistan (Shernazarov 2006) because such species molluscs are rare and endemic. All bivalve molluscs can be considered as good filterers and play an important role in cleaning of water.

Key words: bivalvia, hydrobionts, pelolimnofil, peloreofil, reofil, water reservoirs

Introduction

The monograph *Semeistvo Unionidae* by Zhadin (1938) played an important role in the study of freshwater bivalves in Central Asia. Later on, general information about freshwater molluscs in Central Asia and their zoogeography was reported by Zhadin (1950, 1952), Starobogatov (1970) and Izzatullayev and Starobogatov (1984). Many new types of bivalves were introduced to science by Izzatullayev (1980, 1987) during detailed studies in Central Asia, summarised by Izzatullayev (2003) (Boymurodov 2002).

However, it is also important to study bivalve molluscs in artificial water reservoirs near mountains, which may represent new opportunities

for the expansion of rare, endemic and relict species. It was demonstrated in this article not only complex extension of special types, but also totally fauna complexes, differences between populations of one type. The occurrence of bivalve molluscs in artificial water bodies has resulted in colonisation of new habitats and subsequent range expansion of some species. Theoretical and practical studies of aquatic bivalves, their development and position of extension types in ecosystem are very important. The present study therefore focused on the ecology and occurrence in artificial water bodies of freshwater bivalve molluscs in Uzbekistan (Izzatullaev 1980).

Study areas

Fieldwork was conducted in three artificial water reservoirs near mountains:

1. The Kattakurgan reservoir is situated near the Zirabulok highlands of Zarafshan oasis. Benthic organisms were studied here. Location: in latitude 39° 12' .
2. The Chimkurgan reservoir was formed and activated in a riverbed near the mountain of Kashkadarya in 1959. Its total area is 49.2 km², length is 17.2 km and depth 33 m. The total capacity is 500 mln.m³. It provides 188 km of planting areas of Kamashi, Koson, Karshi and Guzor districts with water. Fish production has also been developed. The reservoir gets water through the Eski Angar (old waterway) canal from the Zarafshan river, which is the route through which bivalve molluscs arrived. Location: in latitude 38° 10' .
3. The Jizzakh reservoir was created among the mountains of Jizzakh region. Its total area is 12.7 km², depth is 26 m, width is 5.1 km and its length is 3.3 km. Location: in latitude 42° 18' .

Material and Methods

We began our study of freshwater bivalve molluscs in 1997 because their systematic structure, bio-ecological characteristics and occurrence in Uzbekistan had not been thoroughly investigated. All materials were collected from the Kattakurgan, Jizzakh and Chimkurgan water reservoirs and their respective inflow and outflow canals in spring, summer and autumn 1997–2009. The occurrence, habitats and spread of distribution of bivalves to artificial water bodies were studied.

Results and Discussion

Kattakurgan water reservoir

Izzatullayev (1978) reported six species and two subspecies of bivalve molluscs living in this reservoir. Two of them are edentates (big Bivalve molluscs, *Sinanodonta orbicularis*, *S. gibba* - without tooth type Unionidae family). Several species of fish, Balxash okun from Balxash, Xumbosh from the Far East and ok amur (white amur - Balxsh okuni, Xumbosh, ok amur- fish occurring in water reservoirs near mountains in Uzbekistan) were introduced for acclimatization of Kattakurgan reservoir in 1980–1985. *Colletopterum ponderosum volgense*, *Sinanodonta gibba* (from China), *S. orbicularis* and *S. puerorum* arrived together with the fish. During our investigation we found that bivalve molluscs brought with fish to artificial reservoirs have adjusted to the new conditions and have extended their range.

Molluscs live at a depth of 2.5-3 m or more and can be seen in the bank of the reservoir. Changing water level has an influence on hydrobionts, especially bivalve molluscs. Molluscs feed by filtering water and it can move 20-25 cm distance per hour. The water requirements of agriculture can result in substantial extraction of water from reservoirs and subsequent fall in water level in the summer, which has an influence on molluscs and other hydrobionts.

According to previous studies (e.g. Izzatullaev 1987) and the results of the present investigation there are nine species and two subspecies of bivalve molluscs in Kattakurgan reservoir belonging to two families and the peloreofil, pelolimnofil and reofil ecological groups.

Eight species of peloreofil were found in the clay of flow water (Table 1) and in deep argillaceous sediments a subspecies of pelolimnofil, *Colletopterum ponderosum volgense*, was found (Izzatullaev 2003). We identified reofil species (*Colletopterum bactria-*

num, *C. syreum sogdianum*) living in water flow canals crossing part of the reservoir.

In the gulf of the water reservoir and its right bank live *Sinanodonta orbicularis*, *S. gibba*, *S. puerorum*, *Colletopterum cyreum sogdianum*, *C. ponderosum volgense* and *Corbicula cor*. Of these, *Sinanodonta orbicularis*, *S. gibba* and *Corbicula cor* were most numerous. In the left bank of flowing water and outflow canals *Corbicula cor*, *C. purpurea*, *Corbiculina tibetensis*, *C. ferghanensis*, *Sinanodonta orbicularis* and *S. gibba* are extended 2-4 types of molluscs in 1 m². Molluscs live at a depth of 0.2–2.8 m where aquatic plants and cane grow (Izzatullaev and Boymurodov 1999).

Chimkurgan water reservoir

Eight species and two subspecies of molluscs have colonized the Chimkurgan water reservoir, which was created in Kashkadarya region in 1959 (Table. 1). Family Unionidae: *S. orbicularis*, *S. gibba*, *S. puerorum*, *C. cyreum sogdianum*, *C. ponderosum volgense*; Corbiculidae: *C. cor*, *C. purpurea*, *C. fluminalis*, *C. tibetensis*, *C. ferghanensis*. *Sinanodonta orbicularis*, *S. gibba*, *S. puerorum*, *Colletopterum cyreum sogdianum*, *C. ponderosum volgense*. *Corbicula cor* type molluscs live in the gulf and left bank water reservoir. Among them, the first, second and the last species are especially abundant. *Corbicula cor*, *C. purpurea*, *Corbiculina tibetensis*, *C. ferghanensis*, *Sinanodonta orbicularis*, *S. gibba* occur in the left bank and outgoing canals of water reservoir are extended 1-3 species of molluscs in 1 m deep. This molluscs are adjusted to living in biotope of water reservoirs created by humans and have extended their distributive range. There are 3 species of ecologic groups of two subspecies molluscs in water reservoir belong to pelolimnofil, pleoreofil and reofil. Among them 8 species of peloreofil, 1 species of reofil and 1 species of pilolimnofil belong to ecological group.

| Species | Sites (artificial reservoirs) | | | Ecological groups |
|-----------------------------------|-------------------------------|------------|----------|-------------------|
| | Kattakurgan | Chimkurgan | Jizzakh | |
| Family Unionidae | | | | |
| <i>Sinanodonta orbicularis</i> | + | + | - | Peloreofil |
| <i>S. gibba</i> | + | + | + | Peloreofil |
| <i>S. puerorum</i> | + | + | + | Peloreofil |
| <i>Colletopterum bactrianum</i> | + | - | - | Reofil |
| <i>C. cyreum sogdianum</i> | + | + | + | Reofil |
| <i>C. ponderosum volgense</i> | + | + | + | Pelolimnofil |
| Family Corbiculidae | | | | |
| <i>Corbicula cor</i> | + | + | + | Peloreofil |
| <i>C. purpurea</i> | + | + | + | Peloreofil |
| <i>C. fluminalis</i> | + | + | - | Peloreofil |
| <i>Corbiculina tibetensis</i> | + | + | + | Peloreofil |
| <i>C. ferghanensis</i> | + | + | - | Peloreofil |
| Total bivalve species (n): | 11 | 10 | 7 | |

Table 1. Bivalve molluscs found in artificial water reservoirs near mountains, their ecological and taxonomic characteristics and development (+ present; - absent).

The extension of fish has influenced the extension of two subspecies of molluscs in the banks of water reservoirs, which created by humans. In the last few years, Unionidae: *Colletoptenum bactrianum* and *C. cyreum sogdianum* are getting numerous (Izzatullaev and Boymurodov 2000).

The reason of their getting numerous is the level of water fall in water reservoirs and at the period of multiplying molluscs in early spring, the caviar (Glochidias) of the molluscs which live in the bank of nearby water and die, a lot small molluscs move through water to the plant areas by canals from water reservoirs and die there.

Jizzakh water reservoir

Eight species of bivalve molluscs were found in this reservoir belonging to two families: Unionidae (*Sinadonta gibba*, *S. puerorum*, *Colletoptenum cyreum sogdianum*, *C. ponderosum volgensye*) and Corbiculidae (*Corbicula cor*, *C. purpurea*, *Corbiculina tibetensis* and *C. ferghanensis* (Table 1).

Molluscs live in two types of habitat. Three types of edentates and *C. cyreum sogdianum*, *C. ponderosum volgensye* and *Corbicula cor* live in the gulf and left bank of the reservoir. The Corbiculidae as well as *Sinanodonta gibba* occur in moving water and outflow canals. Molluscs live at a depth of 0.2-1.8 m in places with clay and aquatic plants (Izzatullaev and Boymurodov 2001).

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