

Some Zooplankton Species Found in Lake Kumsulton

Sanoyeva Xosiyat Ortik kizi ¹

¹ Bukhara State University, Lecturer of the Department of Zoology and General Biology

Abstract:

the article details the cultural heritage object in Uzbekistan, Lake Kumsulton, and the zooplankton found in it.

Keywords: Qumsulton, material cultural heritage, Bukhara, Karakol, Archaeology, Khadicha, Dengizkul LAKE, Brachionus, Rotifera, Notholca acuminata, Brachionus angularis angularis, Keratella cochleares, A. Salinus, Diaphanosoma brach, Daphnia longispina, D. Pulex.

Introduction. In the following years, mankind has been doing a lot of work to study derivatives that arose under the influence of natural factors, their nature, and conditions of origin. In particular, industry specialists and scientists are conducting research in this area. One of these objects is Lake Kumsultan. Lake Kumsultan is an object of cultural heritage of Uzbekistan. An archaeological monument that arose in the Middle Ages. This lake is located in the Karakul district of Bukhara region, the exact location is 30 km southeast of the ancient city of Poikent. This territory, protected as state property, was included in the national list of real estate objects of tangible cultural heritage by the decree of the Cabinet of Ministers of the Republic of Uzbekistan dated October 4, 2019 - taken under state protection. On the basis of the Law of the Republic of Uzbekistan dated May 7, 1993 No. 384 "on assigning the status of a state reserve to Lake Kumsultan", on October 25, 2010, the khokimiyat of the Dzhandor district adopted a resolution "on protected natural territories".

Research methodology. Lake Kumsultan was formed in the 1980s due to wastewater flowing from the agricultural fields of Karaulbazar district and effluents from the southern tributaries of the Khadicha River and sea lakes. Lake Kumsultan is located on the territory adjacent to the borders of the Dzhondarsky, Bukharsky and Alatsky districts of the Bukhara region. The total area of the lake is 7,200 hectares, of which the water part is 3,800 hectares, and reed beds, swamps and part of the land not used in agriculture is 3,400 hectares.

The area of the natural lake Kumsultan is home to various species of wild animals, as well as birds listed in the Red Book. The natural lake Kumsultan, adjacent to the districts of Jandor district, Karakul district and Bukhara district of Bukhara region, is located in a desert area, and in winter the temperature here is colder than in other places, so it is a little more difficult for animals and birds living here to find food. Therefore, in order to preserve species diversity, employees of the Bukhara Regional Department of Ecology and Environmental Protection and the Bukhara Society of Hunters and Athletes jointly conduct biotechnical activities in the lake area.

In spring and summer, the amount of zooplankton in the lake is 20.6-24.2 thousand/m³ with a biomass of 1.2-1.35 g/m³. By the autumn season, these indicators are recorded in the amount of 4.8-6.2 thousand/m³, and their total biomass is 0.42-0.5 g/m³.

One of the main tasks of scientific research is to study the consumption of natural food reserves by larvae and larvae of fish of Lake Kumsultan, as well as the dominant zooplankton and zoobenthos that drink in the lake. Fish common in the reservoirs of Central Asia, their nutrition has been studied by many scientists (Nikolsky 1937, Pardaev 1978). These researchers provided detailed information on the amount of zooplankton, zoobenthos and other types of food at different stages of development of fish and toad larvae.

Larvae of fish from Lake kumsultan in the period of 10.9-15.4 mm of body length feed mainly on rotifers of zooplankton, and in their diet rotifers make up 70-80%. During the period when the body length of the larvae is 15-20 mm, rotifers account for 20-30%, while the dominant species of Cladoceras and copepods (daphnia, ceriodaphnia, hidorus, arctodiptomus) account for 40-50%. It has been established that the transition of larvae to the larval stage begins at 25 mm, when they reach 60-70% of the zooplankton and zoobenthos content in their diet.

Analysis and results. In the process of studying the zooplankton and zoobenthos of Lake Kumsultan, many of their species have been identified, of which I will focus in the article on some of the bottom crustaceans. During the analysis of hydrobiological samples from the lake, 33 zooplankton species were returned to the laboratory of the Bukhara Regional Department of Ecology and Environmental Protection, of which 19 species belong to the class of Rotatoria rotifers, 11 species belong to the class of horned baleen crustaceans (*Cladocera*) and 3 species belong to the class of curacepoda (*copepoda*). Recurrent zooplankton species are listed as common in the inland waters of the province. Among the recurrent species of *indigenous crustaceans*, *Diaphnia longispina*, *Daphnia pulex*, *ceriodaphnia reticulata*, *Arctodiptomus salinus* are numerically and biomass dominant species. *Brachionus Brachionus* is a genus of planktonic rotifers from the family Brachionidae of the order Ploima. Representatives of the genus live in marine, brackish and fresh waters. They are distinguished by a wide flattened and serrated shell on the anterior edge, an unpaired eye near the tactile tube and a long ringed leg. Like many other rotifers, brachions are able to tolerate drying out.

Rotifera - are a type of primary-mouthed animals previously classified as a group of primary-cavity worms. The main characteristic feature is the presence of the so-called circulatory apparatus - a ciliary formation at the anterior end of the body, which is used for nutrition and movement. About 1,500 species of rotifers are known, mostly freshwater inhabitants, but they are also found in the sea and moist soils. Most rotifers are freely movable, but there are also attached forms. The vast majority of species are free-living, but parasites and commensals are also found.

The size of the rotifers does not exceed 2 mm (on average much smaller). The representative of this type, *Ascomorpha minima*, is the smallest multicellular animal, its size is about 40 microns. Due to the small size of the tissue, it often acquires a syncytial structure. The type as a whole is characterized by eutelia - constancy of cellular composition, that is, a constant number of cells in all individuals of the same species. Some rotifers are capable of falling into prolonged cryptobiosis and remaining in this state for thousands of years.

Notholca acuminata Ehrenberg-The shell is broadly oval in shape, the width exceeds half the length. The anterior dorsal spines are straight, the median and lateral ones are longer than the intermediate ones. The posterior edge of the shell is rounded, without a tail spike. The folds on the posterior edge of the abdominal plate resemble the contours of the blade of a wide axe. It is typical for plankton of various reservoirs, mainly in northern and temperate latitudes. It is widespread throughout the world in winter and spring in fresh brackish waters.

Brachionus angularis angularis Gosse- characterized by an angular shell with a sculpture in the form of faces and dots. The spikes at the foot hole are poorly developed, converged and slightly bent inwards. According to our data, its smallest dimensions were established in the spring, the length of the shell is 109-111 mk.

Keratella cochleares-Snail keratella has an oval lorica, an outer protective cuticle similar to a shell. There are three pairs of spikes at the front end. The central pair bends towards the ventral surface, the next pair slightly diverges, and the outer pair converges. There is a single red eye. There is also a central funnel-shaped mouth, and on both sides of it there are rings of cilia that twist and help transfer food particles into the mouth. They are also used for movement. There are two forms of this rotifer; some individuals have a long spine at the posterior end, while others do not. None of the forms has a foot.

Branchous - Cladocera are small planktonic crustaceans, one of the most massive and extremely diverse animals in the external structure of plankton, benthos and neuston internal. The most well-known representatives of the order are freshwater planktonic crustaceans of the genus *Daphnia*, which are sometimes called "water fleas". They inhabit mainly fresh waters, although a number of species live in brackish, salty (including seas) and even in hypergaline reservoirs. Most species are either primary filterers that extract food directly from the water column, or secondary filterers that first clean it from the substrate and then filter it out.

A number of representatives of the Chydoridae and Macrothricidae extract food without filtration, among them there are corpse-eaters and even ectoparasites

Diaphanosoma brach is a very widespread species that inhabits the surface layers of the reservoir. It is interesting to note that diaphanosome is a stable component of zooplankton not only in dystrophic, but also in eutrophic reservoirs.

Daphnia longispina is a planktonic branchous crustacean, one of the animals that are sometimes called water fleas for their characteristic jerky movement. *Daphnia longispina* is found in various parts of the reservoir. *Daphnia* are small crustaceans, the body size of adults is from 0.6 to 6 mm. *Daphnia* are typical planktonic crustaceans, spending most of their time in the water column. Various species inhabit small temporary reservoirs-littoral and pelagic lakes.

Daphnia pulex - It is an arthropod whose body segments are difficult to distinguish. It can be recognized only by appendages - only one pair per segment and by studying its internal anatomy. The head is clearly visible and consists of six segments that have fused together in the form of an embryo. She has a mouthpiece and two pairs of antennae, the second pair of which is enlarged into powerful organs used for swimming. There is no clear separation between the thorax and the abdomen, which together carry five pairs of appendages. The shell surrounding the animal extends posteriorly to the spine. Like most other *daphnia* species, *Daphnia pulex* reproduces by cyclic parthenogenesis, alternating sexual and asexual reproduction.

Copepods -the "paddle-legs" are a group of small crustaceans. Some species are planktonic (living in the water column), some are benthic - living in bottom sediments.

Like other crustaceans, oarfish have a larval form. In oarfish, the egg hatches into the shape of a nauplius, with a head and tail, but without a real thorax or abdomen. The larva molts several times until it looks like an adult, and then, after several more molts, reaches the development of an adult.

The nauplius form is so different from the adult form that it was once thought to be a separate species.

Arctodiaptomus salinus - an osmoconformer, for survival in conditions of osmotic stress, it uses cellular-level mechanisms - accumulates osmolites. We found *Arctodiaptomus salinus* at high salinity, where *Dunaliella salina* bloomed. *Dunaliella salina* enhances the synthesis of osmolites at high salinity; they can account for up to 80% of the dry weight of cells. An increase in salinity negatively affects the number of species, and temperatures negatively affect the size of crustaceans. Our experiments have shown that crustaceans are able to survive to a salinity of 90-100 %, previously experiments by other authors showed that the upper limit for the species is 70%. *Arctodiaptomus salinus* is an osmoconformer; therefore, osmoregulation can only occur at the cellular level. It can be assumed that in nature, at salinities above 100 %, crustaceans consume exosmolites with food.

The presence of *Arctodiaptomus salinus* at high salinities coincided with bursts of flowering of *Dunaliella salina*, in which, at high salinities, osmolites can make up to 80% of the dry mass of cells. Probably, *Arctodiaptomus salinus*, consuming *dunaliella*, receives enough osmolytes so as not to waste its energy resources on their synthesis at high salinities.

CONCLUSION

It is known that at the moment in our country mathematics with natural sciences

several decisions have been made on a national scale regarding the activation of integration. To this end, a number of scientific studies were carried out by professors and teachers of the University of the Bukhara state. It is worth saying that usually mathematical models consist of differential equations with simple or private derivatives, which can be solved by predicting information about the change in the process. With the help of recorded models, it is also possible to study the reproduction of species of plants and animals and their impact on ecology. Considering the reserve of phytoplankton, zooplankton, benthos and high algae of the lake in terms of food reserves received, it fell into the mesotrophic category of water bodies, and the annual fishing of white Hawn Bream, White amur and carp fish with chavoks weighing 40-50 gr gives the lake the opportunity to increase fish productivity.

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