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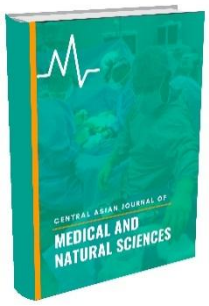

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Development indicators and dynamics of Zooplankton Lake Karateren

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ABSTRACT: *Zooplankton is one of the most important functional links in the ecosystem of any body of water. Its composition, structure and level of development determine the direction and intensity of the flow of substances and energy in watercourses and reservoirs. Zooplankton is a good food source for zoobenthos and fish, and being an active filter feeder plays an important role in the self-purification of water bodies.*

Introduction.

To date, insufficient attention has been paid to the study of zooplankton in water bodies of Uzbekistan. The reason for this is the unstable hydrological regime of the functioning of water bodies, a long period of formation of aquatic ecosystems, and, as a consequence, the absence of stable formed communities, or problems of a socio-economic nature that have existed in science in recent decades.
Zooplankton is one of the most important functional links in the ecosystem of any body of water. Its composition, structure and level of development determine the direction and intensity of the flow of substances and energy in watercourses and reservoirs. Zooplankton is a good food source for zoobenthos and fish, and being an active filter feeder plays an important role in the self-purification of water bodies. Knowledge of the structural and functional characteristics of zooplankton allows using the data as a system of biocenotic level for indicative purposes. We can use the knowledge about the structure of zooplankton in diagnosing the states of ecosystems at the stages of their natural development or in assessing changes in this process under the influence of anthropogenic factors.

Despite the fact that the species composition of the lake has been intensively studied since the middle of the last century, the currently studied data on the quantitative development and qualitative state of zooplankton communities have a non-systemic approach in the zooplankton communities of these reservoirs, where rotifers predominated quantitatively: in spring and summer, or during the entire

vegetative period. But at the same time, the maximum development of quantitative indicators in Lake Karateren falls on July-August.

Purpose of the study.

The aim of our research was to study the current ecological state of the aquatic biocenosis of Karaterenskoye Lake, to determine the taxonomic structure, biomass and abundance of zooplankton, and the dynamics of the development of zooplankton communities in April, June, August 2018-2019.

Methods.

Samples were collected using a small conical Judy net, 15 cm in diameter (gas No. 76), filtering 50 liters of water through the hole in the net [Salazkin A.A. et al., 1984]; 50 ml samples were fixed with 4% formalin or 70% alcohol and transported to the laboratory, where three groups of zooplankton (Copepoda, Rotifera, Cladocera) were determined using a binocular universal research microscope "Optika" microsopes. made in Italy. using generally accepted qualifiers [Kutikova 1970, Monchenko, 1974].

Results.

With the regulation of rivers and the formation of reservoirs, a number of environmental factors change, the lake acquires a different look from rivers, and a new plant and animal population of the reservoir is formed. The rheophilic forms of animals and plants are replaced by the limnophilic forms. For planktonic organisms, a decrease in the rate of water exchange plays a particularly important role, since during intensive water exchange, the resting stages of zooplankter eggs are removed from the lake, which is reflected in the quantitative indicators of plankton development. In addition, in reservoirs, the process of accumulation of suspended solids and bottom sediments is increasing, the intensity of vertical mixing changes, due to depth, transparency, hydrochemical and temperature regimes change. The process of formation of zooplankton in any body of water is considered to be over when the rate of its transformation slows down and the ratio of species and forms becomes more or less constant. Due to the fact that the development of zooplankton communities in the lake is completely dependent on their hydrological regime, the maximum development of communities occurs at the time when the full level of filling of the established temperature and hydrological regimes is established (June-August). In this regard, in April 2017-2019, the zooplankton of Lake Karateren was very poorly developed, only single representatives of rotifers of the Trichocercidae family were found in the coastal zone, and from Cladocera representatives of the Chydoridae family: Alona rectangula, Chydor ussphaericus, and the Daphnidae family: Daphni agaleata, and a representative of the Copepoda group, Harpacticoida, Onycocamptus mohammed, was also found.

At the end of June, quantitative samples were taken in the phytophilic zone (30 meters from the coast in the zone overgrown with higher aquatic vegetation, represented by hornwort, pondweed and reeds) and in the open water zone: 60 m from the coast, there was no zooplankton, and perhaps this was due to the fact that that plankton was eaten by weedy fish present here in large numbers. The plant zone was quantitatively dominated by the calanoid group with a number of 8588.2 ind./m3 and a biomass of 89.03 mg / m3. The total biomass of crustaceans was 121.11mg / m3. Qualitative samples of zooplankton were collected by stretching a small Jedi net from the coast up to 100 m from a boat. In May, June 2017-2019. The species composition of zooplankton showed good development of two groups of crustaceans: cladocerans and copepods (2 species of Copepoda and 6 species of Cladocera):

Thermocyclops taihokuensis. Mesocyclops ogunnus, Chydorus sphaericus, Bosmina longirostris, Diaphonosoma brachiurum, Daphnia hyaline, Moina macrocopa, Alona rectangular. Thermocyclops vermifer and Moina macrocopa dominated.

At the end of August 2017-2019, the water level in the lake decreased, and the phytophilic complex dropped out of the biocenosis, and the plant strip dried up, and no longer recovered until the end of the growing season and the dominant position was taken by purely planktonic forms: the cyclops group, where the dominant Microcyclops karvei and Thermocyclops vermifer appeared (Lindberg 1935), the species Diaphonosoma brachiurum predominated from the cladocerans, representatives of the Hidorid family, Moyna and Bosmina were very rare, disappeared from the Daphnia hyaline community, but 4 species of rotifers were found, 6 species of Copepoda were most developed from this group Thermocyclops vermifer (Table-1).

The qualitative composition of the zooplankton of Lake Karateren in June and August 2017-2019.

Табл-№1

Table-№1	Table-№1	Table-№1
Species composition June August	Species composition June August	Species composition June August
Rotifera	Rotifera	Rotifera
1. Asplanchna priodonta Gosse - +	1. Asplanchna priodonta Gosse - +	1. Asplanchna priodonta Gosse - +
2. Asplanchna herricki Gerne - ++	2. Asplanchna herricki Gerne - ++	2. Asplanchna herricki Gerne - ++
3. Trichocer ca pussila Jennings - +	3. Trichocer ca pussila Jennings - +	3. Trichocer ca pussila Jennings - +
4. Fillinia sp. Bory de St. Vincent - +	4. Fillinia sp. Bory de St. Vincent - +	4. Fillinia sp. Bory de St. Vincent - +
Cladocera	Cladocera	Cladocera
1. Bosmina longi rostris O.F.Muller + ++	1. Bosmina longi rostris O.F.Muller + ++	1. Bosmina longi rostris O.F.Muller + ++
2. Chydorus sphaericus O.F. Muller ++ -	2. Chydorus sphaericus O.F. Muller ++ -	2. Chydorus sphaericus O.F. Muller ++ -
3. Daphnia hyaline Leydigi ++ -	3. Daphnia hyaline	3. Daphnia hyaline

	Leydigi ++ -	Leydigi ++ -
4. Alona rectangula Sars + -	4. Alona rectangula Sars + -	4. Alona rectangula Sars + -
5. Diaphanosoma mongolianum Fischer ++ ++++	5. Diaphanosoma mongolianum Fischer ++ ++++	5. Diaphanosoma mongolianum Fischer ++ ++++
6. Moina macrocopa Straus +++ +	6. Moina macrocopa Straus +++ +	6. Moina macrocopa Straus +++ +
Copepoda	Copepoda	Copepoda
1. Thermocyclops taihokuensis ++++ +++	1. Thermocyclops taihokuensis ++++ +++	1. Thermocyclops taihokuensis ++++ +++
2. Mesocyclops ogunnus Onabamiro ++ +	2. Mesocyclops ogunnus Onabamiro ++ +	2. Mesocyclops ogunnus Onabamiro ++ +
3. Microcyclops karvei Kiefer & Moorthy + +++	3. Microcyclops karvei Kiefer & Moorthy + +++	3. Microcyclops karvei Kiefer & Moorthy + +++
4. Acantocyclops venustus Norman & Scott ++ ++++	4. Acantocyclops venustus Norman & Scott ++ ++++	4. Acantocyclops venustus Norman & Scott ++ ++++
5. Thermocyclops rylovi Smirnov +++ ++	5. Thermocyclops rylovi Smirnov +++ ++	5. Thermocyclops rylovi Smirnov +++ ++

(the frequency of occurrence of species is estimated according to the following system + - occurs singularly / very rarely: ++ - occurs rarely (in the sample ≥25%); +++ - occurs moderately (in the sample from 25-50%), ++++ - occurs abundantly (50-100% in the sample), dominant species.

The text describes two species of cyclops Thermocyclops taihokuensis, Thermocyclops vermifer.

Thermocyclops talhokuensis Harada, 1931

Description. Female. Body length. Antennulae 17-segmented. The first segment of the antennae bears 3 bristles, the third - 9 bristles. Connecting plates P1-P3 without ornament, P4 - with two rows of sets on the caudal surface. Well-developed rounded outgrowths of P4 connecting plates bear 6-7 relatively small spines. The inner margins of the P1-P3 bases bear stoops, P1 also has a long styloid seta, the edges of the P4 bases are bare. Armament of Enp3P4 is characteristic: the inner spine is straight and long (noticeably longer than the segment itself), bears large spines on both sides, usually more than 3 times longer than the outer spine. P5 is the usual structure for the genus. The appendages of the second segment are approximately the same length. The lateral surfaces of the last thoracic segment are bare. The length to width ratio of the lateral wings of the spermatic receptacle is about 3, they are strongly curved backward. Urosomite bears two groups of 5-7 spines on the posterior ventral margin. L / W trucks 2.9-3.3. The ends of the inner middle setae of the furka are not sharply bent to the ventral side.

Male. The ratio of the lengths of the extreme appendages is P6 2.0-2.4.

Ecology. Inhabitant of plankton of fresh and low-mineralized water bodies - lakes, canals, fish ponds.

Distribution. A new representative of the Aral fauna (Mirabdullayev, Turemuratova, 1996). Recorded in lakes Murtazakul, Zhekenli, Akbasly, Muynak Bay, Sarybas, fish-water ponds and rice paddies. It is widely distributed in small water bodies of Central Asia, China, Indo-China, Japan (Malinovskaya, Ten, 1983; Mirabdullayev, Kuzmetov, 1997).

Taxonomic notes. This species was previously known in the fauna of Central Asia as Th. aslaticus Kiefer, 1932 (Khaitov, 1972; Mukhamediev and Umarov, 1974). As Kiefer himself (1938) has shown, these are synonyms.

Thermocyclops vermifer (Lindberg 1935)

Description. Female. Body length. Antennulae 17-segmented. The first segment of antennae bears 3 setae, the third usually 9, less often 8 setae. Connecting plates P1-P3 without ornament, P4 - with two rows of setules on the caudal surface. Well-developed rounded outgrowths of the P4 connecting plates bear relatively small spines. Inner margins of P1 – P3 bases bear setules, P1 also have a long styloid seta; margins of P4 bases are glabrous. Exo- and endopodites of swimming legs are three-segmented. Inner spine of Ep3R4 slightly curved, approximately equal in length to the segment itself, and usually 2.5–3.0 times as long as the outer spine. P5 is the usual structure for the genus. Inner spine of second segment equal to or slightly longer than outer setae. The lateral surfaces of the last thoracic segment are bare. The length-to-width ratio of the lateral wings of the spermatic receptacle is about 3, they are not very strongly bent back. Uroomyte bears two groups of 4-6 spines on the posterior ventral margin. Furcal branches not pubescent. Lateral seta 0.6 times length of furrow. The bases of furcal setae are devoid of spines. The ends of the inner middle setae of the furka are not sharply bent to the ventral side. External seta P6 of male approximately three times as long as spine.

Ecology. Inhabitant of plankton lakes, ponds, both fresh and brackish water. It is the intermediate owner of the rishta (hence the name - "verml-fer").

Distribution. Recorded by us in the lakes Karateren, Aktuba, Birkazanly, Akshakul, Shegekul, Atalyk, Alikul, in Kazakhdarya, Yerkindarya, Amudarya, in rice paddies of the Mayab complex ... It is common in water bodies of the more southern regions of Uzbekistan (Mirabdullayev, Kuzmetov, 1997), eastern Turkmenistan (Baza ¬rova, Kuzmetov, Mirabdullaev, 1998), in Afghanistan, India (Lindberg, 1938; 1948), Russia (Alekseev, 1995), Tajikistan (Ulomsky, 1963).

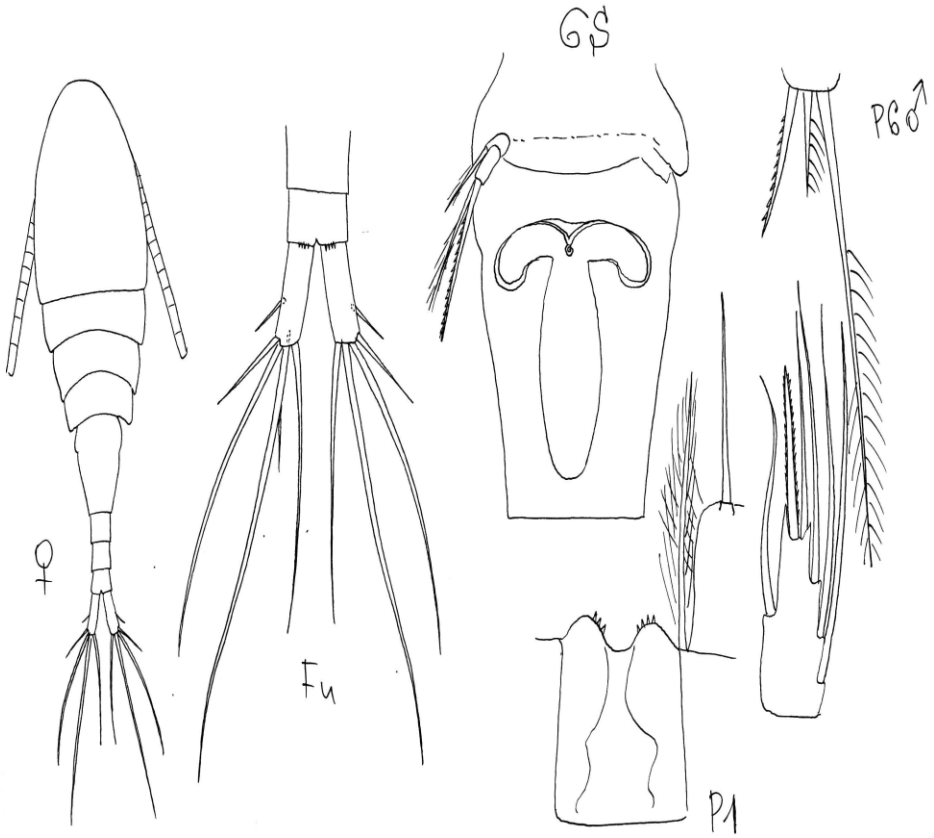

Figure: 1 Thermocyclops vermifer (Lindberg 1935).

1-General view of the female, Fu-furka, GS-genital segment, P1-connecting plate of the legs of the I-pair, P6-leg of the VI-pair of males.

Taxonomic notes. A new representative of the fauna of Karakalpakstan and Uzbekistan. Previously probably mistakenly identified with Th. crassus. Described by Ulomsky (1963) from the vicinity of Dushanbe Th. crassus forms kairakkumensis is definitely a synonym for Th. vermifer. Described by Lindberg (1936) from northeastern Iran by Th. crassus persicus is apparently also a synonym for this species.

Klefer (1938) suggested that Th. vermifer is identical to the Th. decipiens, is also reliably known from tropical Asia (Defaye et al., 1988). However, as recently shown by Mirabdullayev and Kuzmetov (Mirabdullayev and Kuzmetov, 1997), these species are significantly different in the ornament of the last thoracic segment, a slightly longer furka, and the P6 structure of the male.

Conclusion.

In Lake Karateren, the zooplankton is moderately developed, with a predominance of the phytophilic complex consisting of cladocerans and calanoid, at a normal water level in the summer with a drop in water level at the end of summer, the copepod complex began to prevail.

The current ecological state of the aquatic biocenosis of Lake Karateren was studied, taxonomic structures, biomass and abundance of zooplankton were determined for April, June and August 2018-2019.

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