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UDC 593.161.3

EUGLENOID FLAGELLATES OF THE WATER BASINS IN THE SOUTH OF TYUMEN REGION

ABSTRACT. *The purpose of this article is the study of the specific structure and features of the regional distribution of the euglenoid flagellates in the water basins of the south of Tyumen region. During the research 68 species of euglenoids from 13 genera in 8 different water basins of Ishim and Ishim district have been defined. The most widely-spread genera are the Phacus (20 species), Euglena and Trachelomonas (16 species each). All the surveyed water basins contained the Euglena caudata, E. oblonga, Trachelomonas rotunda, and Monomorphina pyrum. The data on the seasonal dynamics of the presence and numbers of the euglenoid flagellates are given. The population peak of the euglenoids is registered in summer months. The greatest taxonomical variety and the maximum number of stenotopic species characterize the dead channels. Comparison of the specific structures of the euglenoid flagellates according to the faunistic indexes of Jaccard-Malyshev and Chekanovskiy-Sorensen reveals differences in the faunae of the protozoa in the majority of the reservoir couples.*

KEY WORDS. *Euglenoid flagellates, fauna, seasonal dynamics.*

Euglenoid flagellates (Euglenozoa, Euglenoidea) are a widely-spread group of single-celled animals. The majority of their representatives inhabit fresh continental waters. Euglenoid populations are numerous mostly in shallow fresh still water basins in the forest and wooded steppe zones [1], [2]. Here they present one of the dominating groups of organisms of microplankton and microbenthos and play an important role in the existence of hydro-biocenoses. However there are not enough data on the fauna, seasonal dynamics and distribution of euglenoids in water basins of different regions.

The aim of our research is to study the species composition and peculiarities of the spatial distribution of euglenoid flagellates in the water basins of the south of Tyumen region.

Materials and methodology. We collected research material from the water basins in the town of Ishim (rivers (r.) Ishim and Karasul, dead river arms (d.r.a.) Ishimchik and Bezymyannaya, lakes Chertovoye and Anikino) and Ishim region (r. Dyatel and d.r.a. Malaya) in 2010-2011. Samples were taken with the use of standard protistological and hydro-biological methods [3] and [4]. We studied the samples using a phase-contrast microscope Biomed-6 with a camera adapter VidaTec, with 15x40 magnification. All the found forms were photographed.

We described the species belongingness of the discovered organisms according to the descriptions contained in [5], [6], and [7]. For the purpose of comparison of

the species composition of the uglenoids of the studied water basins we used Jaccard's coefficient in Malyshev's modification (K_{j-m}) and the Chekanovsky-Sorensen index of similarity (I_{cs}) [8] and [9].

Findings of the research. We discovered 68 species of free-living euglenoid flagellates that belong to 13 genera in the water basins of the south of Tyumen region. As for the species diversity, genus *Phacus* prevails. It is represented by 20 species. Then come *Euglena* and *Trachelomonas* comprising 16 species (fig. 1) [10].

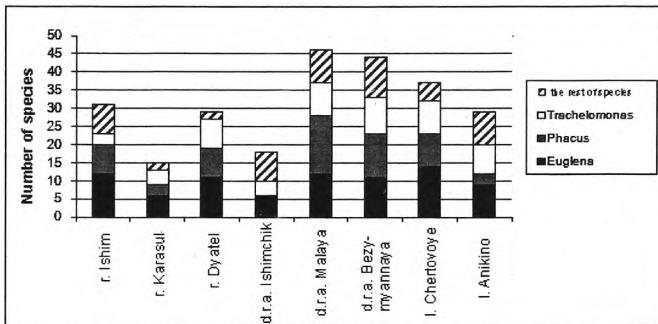


Fig. 1. Species diversity of euglenoid flagellates in the water basins of the south of Tyumen region

Diversity and occurrence of different species of flagellates are different in each water basin under study.

In the samples from **r. Ishim** we found 31 species of euglenoids (45.6% of the total number of the species) from 9 genera. The most common are *Euglena acus*, *E. caudata*, *E. oblonga*, *E. velata*, *Monomorphina pyrum*, and *Trachelomonas volvocinopsis*. Their number increases from April to August. The biggest diversity of flagellates was noted at the end of the summer when we found some rare species in the samples which could not be met in the other months. *Phacus fominii* was one of such species found in the river Ishim.

The fauna of euglenoids of the **river Karasul** is represented by 15 species from 5 genera, or 22.1% of the total number of the species. The most common are *Euglena pisciformis*, *E. oblonga*, *E. hemichromata*, *Trachelomonas rotunda* and *T. oblonga*. The biggest diversity of flagellates was observed in June-July. In the samples the species specific to this basin were not discovered.

In the **river Dyatel** we found 29 species of flagellates from 4 genera (42.6% of the total number of the species). During the whole period of observation (summer months) the species diversity of euglenoids was high. The most common are *Euglena velata* and *Trachelomonas volvocinopsis*. These species reach here their maximum relative number (150-260 sp/ml). A specific feature of the euglenoid fauna of the river Dyatel is the absence of heterotrophic species in the samples which may indicate a low content of organic substances in the water. *Trachelomonas crebea* and *T. pseudobulla* are specific to this water basin.

In the *Ishimchik dead river arm*, we discovered 18 species of euglenoid flagellates that belong to 6 genera (26.5% of the total number of the species). The most common are *Euglena oblonga*, *Enthosiphon sulcatum* and *Trachelomonas oblonga*. In this water basin the species diversity of euglenoids gradually increases during summer reaching its peak in August. The number of the majority of the species is low not exceeding 20-30 sp/ml. We have found no specific species in the *Ishimchik dead river arm*.

The fauna of euglenoids of the *Malaya dead river arm* is represented by 46 species, or 67.6% of the total number of the species. The most common are *Euglena oblonga*, *E. hemichromata*, *E. mutabilis*, *Trachelomonas volvocinopsis* and *Enthosiphon ovatus*. The monthly distribution of the species is uneven. Maximum numbers are registered in June and August. In July a drastic drop in the species diversity and number is observed which is probably connected with the change in the hydro-chemical conditions and mainly in the increase in the amount of organic substances in the water. The basin in question is characterized by the maximum number of stenotopic species. The species typical for the d.r.a. Malaya are *Heteronema acus*, *Ph. Elegans*, *Ph. hispidulus ssp. glabrus*, *T. horrida* and *T. superba*.

In the *Bezmyannaya dead river arm* we have found 44 species from 10 genera (64.7% of the total number of the species). The most often met are *Euglena caudata*, *E. hemichromata*, *E. velata*, *Trachelomonas oblonga* and *T. rotunda*. The maximum number of the species was registered in June however their numbers were not big. In July and August euglenoid diversity decreases but the numbers of many species increase (e.g. *Euglena pisciformis*: from 50 to 90 sp/ml).

The fauna of euglenoids in *lake Chertovoye* includes 37 species, or 54.4% of the total number of the species. The most common are *Euglena caudata*, *E. velata*, *Trachelomonas rotunda*, *T. oblonga*, and *T. volvocinopsis*. During the whole period of observation the species diversity was rather high except in May when the numbers of the protozoa were minimal. The species specific for the lake are *E. acus ssp. angularis*, *T. assimetrika*, and *T. cervicula*.

Lake Anikino has 29 species of euglenoids from 10 genera (42.6% of the total number of the species). The most common are *Euglena oblonga* and *E. pisciformis*. The number of the species changes increasing from May to July and decreasing in August-September. The specific species are *Menoidium pellicidium* and *Phacus lismorensis*.

The following species are common for the studied basins: *Astasia curvata*, *petalomonas medicanellata*, *Euglena acus*, *E. caudata*, *E. oblonga*, *E. pisciformis*, *E. polymorpha*, *E. texta*, *E. velata*, *Monomorpha pyrurum*, *Phacus pleuronectes*, *Ph. Triquetrus*, *Trachelomonas hispida*, *T. oblonga*, *T. rotunda*, *T. volvocinopsis*. The abovementioned protozoa form a nucleus on the basis of which communities of euglenoid flagellates of basins of different types are formed.

The studied water basins of the town of Ishim and Ishim region are of different origins, typology, hydrological and hydro-chemical characteristics which conditions some differences in the species compositions of the euglenoid cenoses. Values of the faunal indices used for the comparison of the species compositions of euglenoids vary within a wide range (table 1).

Table 1

**Comparison of the species composition of euglenoid flagellates
in the studied water basins**

Water basins		index of Jaccard-Malyshev (Kj-m)							
		r. Ishim	r. Karasul	r. Dyatel	d.r.a. Ishimchik	d.r.a. Malaya	d.r.a. Bezymyannaya	l. Chertovoye	l. Anikino
index of Chekanovskiy-Sorensen (Ics), %	r. Ishim		-0,4	-0,3	-0,3	-0,1	0,1	-0,2	-0,2
	r. Karasul	43,5		-0,1	-0,5	-0,5	-0,4	-0,3	-0,2
	r. Dyatel	53,3	63,6		-0,6	-0,2	-0,1	0,1	-0,2
	d.r.a. Ishimchik	53,1	42,4	34,0		-0,4	-0,2	-0,4	-0,3
	d.r.a. Malaya	59,7	42,6	58,7	43,8		0,3	0,02	-0,1
	d.r.a. Bezymyannaya	69,3	44,1	60,3	58,1	77,8		0	-0,1
	l. Chertovoye	58,8	53,8	69,7	43,6	67,5	66,7		-0,1
	l. Anikino	56,7	63,6	55,2	51,1	61,3	63,0	63,6	

We observed insignificant similarity of the species compositions in the pair d.r.a. Malaya – d.r.a. Bezymyannaya (Kj-m=0.3; Ics+77.8%). These water basins are former turns of the riverbed of the river Ishim i.e. are of the same origin and possess a similar hydrological mode. However the d.r.a. Bezymyannaya is characterized by an insignificant similarity with the river euglenoid fauna (Kj-m=0.1; Ics=69.3%). In spite of the rather old age of the dead river arm and absence of any connection with the river during the period of high water influx of water occurs due to human economical activities. The most significant differences in the euglenoid faunas are registered in the pair d.r.a. Ishimchik – the river Dyatel (Kj-m=-0.6; Ics=34%). These water objects differ in their typology as a consequence have quite different living environments of the protists. We have found no absolute similarity or difference in the species compositions of euglenoids in the water basins under study.

Conclusions.

1. The fauna of free living euglenoid flagellates in the water basins of Tyumen region is represented by 68 species from 13 genera. The basis of taxonomic diversity is formed by phototrophic euglenoids (genera *Euglena*, *Phacus* and *Trachelomonas*) whose share in the total number of the species is 55.6-93.1%.

2. The d.r.a. water basins possess the biggest taxonomic diversity with 82.3% of all the discovered protozoa.

3. The maximum number of euglenoid species in the samples was observed in the period from June to August; the minimum – in April-September which is explained by the change in the temperature and hydro-chemical conditions in the water basins during the year.

4. In the majority of the researched pairs of the water basins there are some differences in the species compositions of the protozoa.

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