INVESTIGATIONS OF ALGAL FLORA OF "VERKHNEYE DVUOBYE" WETLANDS (OB-IRTYSH FLOODPLAIN): BRIEF DESCRIPTION OF EUGLENAL ALGAE

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As the investigations showed, in the main river channel and large branches with a high flow rate the Euglena, at the sufficient diversity, don't make a great numerosity. The Euglena role in the structure of algal complexes of playas, the lakes at the littoral shallow waters overgrown with highest aquatic vegetation (pondweed, hornwort, Canada water weed, sedge, etc.) is more noticeable at the retarded flow and well warmed water column.

As it is known, the founder of the Theory about the Earth biosphere, Academician Vernadsky V.I., in his "Sketches on Geochemistry" segregated "floodplain life concentrations", an example of which he considered to be the Amazon, Orinoco, Zambezi, Ob and Irtysh floodplains. In this question the author had opponents taking up the position that the Ob and Irtysh lowlands cannot serve the examples of "living matter concentration" as their ecosystems do not possess a great standing population (Lapo, 1987). But the main idea of Vernadsky V.I. consisted in the fact that against the background of the taiga and tundra visual environment of Eurasia and North America rich in more modest biota forms the lowlands of the great and small northern rivers of the Globe were, are and will be in the future not only life oases, but also outstanding natural regulators of the global ecological balance. In other words, the value of Siberian Rivers is beyond the scope of both purely biological and regional geographic views.

The territory of Priobye has always been the arena of the West Siberian Plain, Ural Country and the neighboring part of the Arctic sea basin hydrologic systems' dynamic interaction: the Ob channel is traced 200 km apart within the open part of the Kara Sea (Plotnikov, 1992).

The Ob basin area makes about 3 million km^2 with the length of 3676 km. Within the North of the Western Siberia the Ob crosses three bioclimatic subzones: south-, middle- and north-taiga ones. In the region of Khanty-Mansiysk the Ob merges with the Irtysh, forming a floodplain, which is called the "Ob-Irtysh" one in terms of the commonness of many natural-geographic features.

The floodplain of the Lower Ob falls within the domain of the Atlantic-Arctic influence of the Variable zone and is located in two bioclimatic subzones (Alisov, 1969). The Berezovsky middle-taiga floodplain district (the region of Khanty-Mansiysk - Berezovo) is the territory o our investigations. The middle-taiga floodplain landscapes (the inflow of the Irtysh – Belogorye – Berezovo – Vanzevat) are the passage type on the features of natural complexes' formation: here the natural boundaries of the south-taiga and north-taiga landscapes are combined (Vegetation …, 1969). The first ones are usual for the regions of high hypsometric layers; the second ones, by virtue of their great hydromorphy, - for the lowest parts of the floodplain. The On-Irtysh floodplain as "West Siberian phenomenon" is characterized by tremendous sizes (up to 60 km wide) and broad-crested floods – over 100 days (Petrov, 1979).

The Ob lowland has mainly a submeridional direction (Makaveyev and others, 1969): the channel flows undergo a constant effect of the Coriolis force steadily shifting the Ob channel eastwards, in the result of which a floodplain dry land band with oxbow lakes having a weak relation to the active channel flow appear from the western side. On their natural conditions such floodplains can be referred to amphibian landscapes (Petrov, 1979). The specific features of flood-

plain-forming processes in the Ob lowland have defined the formation of a huge complex of plain-type wetlands, a unique implement of which is sor surfaces – "playas". In these lake-like developments of the Ob, Irtysh and their tributaries secondary branches' channels of various sizes the optimal conditions for the formation of plankton and benthos standing populations in colossal scales are created. Like in the whole organic world the hierarchic pyramid of living beings here towers on the foundation formed by water plants and invertebrate animals. In the partnership of all the microbiota types such water represents in practice a high-caloric and nutrient "broth" (Nature of floodplain …, 1992). It is this very foundation in the aggregate with the features of the Ob-Irtysh floodplain hydrology that defines the development of the biota unique in its diversity and biomass. First of all, it concerns the algal flora (Valeyeva, Moskovchenko, 2001).

The sources of the water plants of river flows are different. The connection between the species composition of a river and the water body, from which it flows out, is evident: lakes – sources or lakes – playas, through which the river flows down, surely exercise a significant influence on the development of the river plankton, promote a greater constancy of its quantitative and qualitative composition (Skabichevsky, 1974). A considerable role in the formation of river plankton population is played by river bottom water bodies, especially floodplain lakes constantly connected with the river: at the flood decline the plankton is driven to the main river channel. The sandy soils containing a great amount of the resting algal stages are an additional source of the river plankton enrichment both in quantitative and qualitative respects. I.e. the algae are not only transferred by the river flows, but also are "sorted" and live in the rivers.

The river channel heterogeneity is the cause of considerable differences of the algal flora down the stream. In the literary sources concerning the Arctic zone of Siberia the greatest algal species diversity, even of such a rather small group for these latitudes as euglena algae, compared to other arctic regions is registered. Probably, that is why the Ob-Irtysh floodplain, especially its wetlands, has been attracting the attention of aquatic biologists for many decades, algologists among them. In the second part of the XX century the algal flora research were activated in the described territory. The 60-s and 80-s years were the most meaningful and effective ones in this respect. A major contribution to the study of algae in this territory was made by the scientists of the Inferior Plants Laboratory of the Central Siberian Botanic Garden of the RAS (Novosibirsk). In July-August, 1964, Kuksn M.S., Cand. Sc. (Biology), carried out the rout investigations of the phytoplankton of 23 sor water bodies in the floodplain of the Lower Irtysh and Ob from Khanty-Mansiysk to Salekhard (Kuksn, 1970) as part of the "Hydrorybproyekt" Institute expedition. A considerable contribution to the study of the lower course of the Ob and its neighboring water bodies in the tundra forest belt was made by Safonova T.A. (1964, 1972), Dr. Sc. (Biology), whose interest is the euglena algae. The information of the algal flora of the considered territory is contained in the works of Kiselev I.A. (1970), Semenova L.A., Alexyuk V.A. (1983). The Lower Ob phytobenthos in the region of Belogorye – Oktyabrskoye is described by Levadnaya G.D. (1986).

In a series of works of Yurova (Valeyeva) E.I. (1974, 1975, 1976) the questions dealing with the algal flora of the Irtysh downstream – phytoplankton features, its horizontal and altitude distribution, seasonal dynamics, - are considered. In the author's thesis work (1975) there is the algal class-list containing 297 taxonomic units from 7 sections.

Table 1. List of Lower Ob water bodies' algae

№	Genus name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	p. *Trachelomonas* Ehr.	**17**	**14**	**11**	**17**	**17**	**12**	**12**	**17**	**11**	**20**	**9**	**15**	**21**	**12**	**19**	**17**	**23**	**15**	**16**	**10**	**20**
1	*T. abrupta* Swir.	+	+					+	+		+							+			+	+
2	*T. amphora* Swir.						+	+						+				+				
3	*T. armata* (Ehr.) Stein		+		+	+				+	+					+				+		
4	*T. arnoldii* Roll						+		+					+						+		+
5	*T. borealis* (Safon.) Safon. comb. nova							+						+		+	+					
6	*T. calva* Conrad emend. Safon.	+				+									+	+					+	
7	*T. caudata* (Ehr.) Stein				+						+	+							+			
8	*T. cerviculata* Stokes emend. Swir.			+						+			+			+						+
9	*T. cingeri* Roll		+					+						+				+				
10	*T. citriformis* Drez.	+		+			+		+		+								+			
11	*T. coronata* Swir.				+				+								+					
12	*T. curta* Da Cuhna									+			+	+							+	
13	*T. cylindrica* Ehr. sec. Playf.					+	+				+	+				+				+		
14	*T. dubia* Swir. emend. Defl.		+	+	+				+		+							+				
15	*T. ferox* (Skv.) Popova												+					+	+			
16	*T. globularis* (Awer.) Lemm.			+			+		+					+		+			+			
17	*T. granulata* Swir.	+				+			+									+	+			
18	*T. granulosa* Playf.	+	+		+			+			+				+		+					
19	*T. hexangulata* Swir.				+	+				+				+				+				+
20	*T. hispida* (Perty) Stein emend. Defl. var. *hispida*	+	+		+	+	+		+		+	+	+	+			+			+		+
21	*T. hispida* var. *crenulatocollis* (Maskell) Lemm.							+					+		+	+	+	+	+	+		+
22	*T. intermedia* Dang. f.	+		+		+	+		+		+		+	+				+		+		+

№	Genus name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	intermedia																					
23	*T. intermedia* f. *chanchinae* (Skv.) Popova		+		+					+	+			+		+	+					+
24	*T. intermedia* var. *spinifera* (Popova) Popova			+					+				+		+			+				
25	*T. kellogii* Skv.					+					+	+				+			+			
26	*T. komarovii* Skv.				+						+				+		+		+			+
27	*T. lacustris* (Drez.) emend. Balech	+		+										+		+				+	+	+
28	*T. lemmermanii* Wolosz.						+	+	+				+					+				
29	*T. longicauda* Swir.				+								+				+	+		+		
30	*T. manginii* Defl.				+						+				+			+				+
31	*T. nigra* Swir.	+			+				+			+	+	+			+		+			
32	*T. oblonga* Lemm. var. *oblonga*	+	+						+					+						+	+	
33	*T. oblonga* var. *ovalis* (Playf.) Popova		+							+				+	+			+			+	+
34	*T. oblonga* var. *pulcherrina* (Playf.) Popova	+					+						+									
35	*T. oblonga* var. *punctata* Lemm.			+		+				+	+					+	+	+				
36	*T. obovata* f. *klebsiana* (Defl.) Popova				+										+	+	+	+				
37	*T. obovata* Stokes emend. Delf. f. *obovata*	+							+										+	+		+
38	*T. ornata* (Swir.) Skv.					+		+			+						+	+				
39	*T. patellifera* Popova			+	+							+	+	+			+		+			
40	*T. planctonica* Swir. f. *planctonica*	+	+			+		+	+			+	+		+			+				+
41	*T. planctonica* f. *oblonga* (Drez.) Popova	+								+				+		+			+			
42	*T. pulchra* Swir.						+	+		+		+					+			+		
43	*T. raciborskii* Wolosz.				+						+					+				+		

№	Genus name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
44	*T. recticollis* Defl.		+						+	+				+				+	+			
45	*T. rotundata* Swir.					+										+				+	+	+
46	*T. scabra* Playf. var. *scabra*	+					+								+				+		+	+
47	*T. scabra* var. *borealis* Safon.					+		+		+						+	+					
48	*T. spatirincha* Skuja			+							+			+				+		+		
49	*T. superba* Swir. emend. Defl.					+		+					+	+			+	+				+
50	*T. verrucosa* Stokes				+											+				+	+	
51	*T. volvocina* Ehr. var. *volvocina*	+	+	+		+			+			+		+	+	+						+
52	*T. volvocina* var. *subglobosa* Lemm. emend. Swir.						+				+		+				+	+				
53	*T. volvocinopsis* Swir.	+	+			+					+											+
54	*T. woronichiniana* Popova					+												+		+	+	+
55	*T. woycickii* Koszw.				+						+			+	+	+			+			
	p. *Stronbomonas* Defl.	**3**	**2**	**2**	**1**	**1**	**3**	**1**	**2**	**1**	**2**	**3**	**2**	**2**	**1**	**2**	**3**	**2**	**3**	**1**	**2**	**3**
56	*S. acuminata* (Schmarda) Defl.	+		+		+	+			+		+	+					+				
57	*S. fluviatilis* (Lemm.) Defl.	+	+									+					+					+
58	*S. planctonica* (Wolosz.) Popova				+				+		+					+	+		+	+		+
59	*S. schauinslandii* (Lemm.) Defl.	+					+					+	+	+	+	+						
60	*S. tanlbovica* (Swir.) Defl.			+			+	+	+					+					+		+	+
61	*S. wermontii* Defl. var. *commune* Popova		+								+						+	+	+		+	
	p. *Euglena* Ehr.	**8**	7	**2**	**6**	**8**	**2**	**4**	**5**		**4**	**4**	7	**3**	**5**	7	**10**	**10**	**6**	**8**	7	**11**
62	*E. acus* Ehr. var. *acus*	+	+			+						+	+	+			+	+		+		+
63	*E. acus* var. *longispina* Defl.	+				+							+						+	+	+	
64	*E. bucharica* J. Klebs		+		+		+					+				+					+	+

№	Genus name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
65	*E. deses* Ehr. f. *intermedia* Klebs							+	+						+			+			+	
66	*E. gracilis* Klebs							+						+				+	+			+
67	*E. hispida* Lemm.				+						+		+				+	+		+		
68	*E. korschikovii* Gojdies					+									+	+						
69	*E. limnophyla* Lemm.	+	+				+				+						+	+		+		
70	*E. oxyuris* f. *skwortzovii* (Popova) Popova		+						+				+			+		+	+			+
71	*E. oxyuris* Schmarda f. *oxyuris*	+	+		+	+							+				+		+		+	+
72	*E. pavlovskoensis* (Elenk. et V.Poljan.) Popova			+											+		+	+		+	+	
73	*E. pisciformis* Klebs			+		+		+						+				+				+
74	*E. proxima* Dang.				+							+								+		+
75	*E. spathirhynchas* Skuja	+														+			+		+	
76	*E. spirogyra* Ehr.	+			+	+					+	+	+			+	+			+		+
77	*E. tripteris* (Duj) Klebs	+	+		+						+		+		+		+	+				+
78	*E. variabilis* Klebs		+			+		+							+	+			+	+		+
79	*E. viridis* Ehr.	+				+			+							+		+			+	+
	p. *Phacus* Dujard	**1**	**1**		**1**	**2**		**2**	**2**		**2**	**1**	**2**	**2**	**1**	**1**	**2**	**2**	**1**	**2**	**1**	**2**
80	*Ph. acuminatus* Stokes	+									+	+					+	+	+			
81	*Ph. arnoldii* Swir.							+	+												+	
82	*Ph. caudatus* Hübner		+					+	+									+				+
83	*Ph. longicauda* (Ehr.) Duj				+	+					+		+	+		+				+		+
84	*Ph. parvulus* Klebs					+							+	+	+		+			+		
TOTAL		**29**	**24**	**15**	**25**	**28**	**17**	**19**	**26**	**12**	**27**	**17**	**26**	**28**	**19**	**29**	**31**	**37**	**25**	**27**	**20**	**36**

I. Irtysh downstream
1. Irtysh inflow
2. Konda inflow
3. Gornaya Branch
4. Chaginsky Sor
5. Shapshinsky Sor
6. Leushinsky Tuman
7. Cherny Sor
8. Pagilevo
9. Shubnoye Lake
10. Kamyshovoye Lake

II. Ob downstream
11. Ob river near Kabel village
12. Big Ob
13. Small Ob and floodplain water bodies
14. Mountain Ob
15. North Sos'va inflow and oxbow water bodies
16. Bolshoy Altymsky Sor
17. Bolshoy Karymkarsky Sor
18. Bolshoy Sor
19. Untorsky Sor
20. Vanzevatsky Sor
21. Bolshoy Kazymsky Sor

The first published work with the description of benthos and algal flora fouling in the Konda downstream belongs to Porkhacheva N.A. (1986): the list of the algae found out contains 69 specific and infraspecific taxonomic units.

Together with the development of oil and gas complex and intensifying of the technogenic press on the aquatic ecosystems in Priobye the character of the algological researches is being changed: the algal component of the examined water bodies is considered as an "indicator of their ecological state" at the development of rational nature management methods on rivers and other water body types. In this respect at the end of the 1970-s Naumenko Yu.V. (1985, 1986, 1988) carried out the Konda river lowlands' algal flora taxonomic composition investigations, the river's characteristics relative to pH, water salinity and other factors were given. In the material treated 198 new specific and infraspecific taxonomic units of algae from 6 sections has been found out. The author thinks that the overrepresentation of boreal species in the algal flora is due to the high bogginess of the territory.

In 1984-85 by the order of the "SibrybNIIproyekt" Institute the rout investigations of the Ob-Irtysh floodplain's algal flora in the region: the Konda inflow – the Irtysh inflow – the downstream of the Ob (Belogorye – Vanzevat), including the wetlands "Verkhneye Dvuobye" and the sor system, were carried out. 21 water bodies (table), a considerable part of which hadn't fallen within the eyeshot of the algologists before, were examined altogether.

In the work presented here only the results of the euglena algae qualitative determination have been given; other algal flora groups have been not considered due to a great volume of the practical material. 384 samples of the net plankton (mill silk N73) fixed by 5% formalin solution were treated altogether. The samples were looked through the MBI-6 microscope in 10 replicates. The identification of species was carried out on the determinants of native and foreign authors.

In the reviewed materials 84 specific and infraspecific taxonomic units from 4 geni of the *Euglenaceae* family were found out. Three species were not identified.

References:

1. Alisov B.P. Climate of USSR. M.: Higher School, 1969, p. 250.

2. Valeyeva E.I. Flora of plankton algae of Irtysh downstream / Autoabstract, Sverdlovsk, 1975, p.18.

3. Valeyeva E.I., Moskovichenko D.V. Role of wetlands in stable development of North of Western Siberia. Tymen: Publishing House of RAS, 2001, p. 228.

4. Vernadsky V.I. Sketches on Geochemistry. M., L.: Gosizdat, 1927, p. 188.

5. Kiselev I.A. On algal flora of Gulf of Ob together with some data for Lower Ob and Irtysh algae // Algae and mushrooms of Siberia and Far East. Novosibirsk: Nauka. Siberian department, 1970, part 1(3), pp. 41-54.

6. Kuksn M.S. Phytoplankton of sor system of Ob and lowlands of Irtysh // Algae and mushrooms of Siberia and Far East. Novosibirsk: Nauka. Siberian department, 1972, part 2(4), pp. 3-44.

7. Lapo A.V. Traces of past biospheres, or a story about how the biosphere is organized and what is left of the biospheres of the geological past. M.: Znaniye, 1987, p. 208.

8. Levadnaya G.D. Phytobenthos composition of Lower Ob in the sector of villages Belogorye – Oktyabrskoye // New about flora of Siberia. Novosibirsk: Nauka, Siberian department, 1986, pp. 23-31.

9. Makaveyev N.N., Khmeleva N.V. General features of river bed evolution in river turns and methods of their investigations // Experimental geomorphology. M.: Publishing House of Moscow University, 9162, Issue 2, pp. 7-25.

10. Naumenko Yu.V. On Lower Irtysh phytoplankton composition // USSR AS Repoter, Novosibirsk, Nauka, Siberian department, 1986, pp. 45-49.

11. Naumenko Yu.V. Phytoplankton of Ob, Lower Irtysh and its changes under the effect of anthropogenic factors. Autoabstract …, Novosibirsk, 1985, p. 16.

12. Naumenko Yu.V. Konda phytoplankton // USSR AS Reporter, 1988, pp. 66-67.

13. Petrov I.B. Ob-Irtysh floodplain. Novosibirsk: Nauka, 1979, p. 136.

14. Plotnikov V.V. Introduction // Nature of Lower Ob floodplain: land ecosystems. Yekaterinburg, 1992, pp. 3-10.

15. Popova T.G., Safonova T.A. Euglena algae expansion in USSR territory // Aquatic and terrestrial communities of Siberian inferior plants. Novosibirsk: Nauka, Siberian department, 1974, pp. 15-28.

16. Porkhacheva N.A. Phytobenthos of Irtysh downstream // New about flora of Siberia. Novosibirsk: Nauka, Siberian department, 1986, pp.14-23.

17. Nature of Lower Ob floodplain: land ecosystems. Yekaterinburg, 1992, p. 214.

18. West Siberian Plain vegetation. Map M 1: 1 500 000 / under the editorship of Mikhailovsky V.Ya. M.: SDGC, 1976, p. 4.

19. Safonova T.A. Algae of Ob downstream water bodies and neighboring forest tundra areas // Algae and mushrooms of Siberia and Far East. Novosibirsk: Nauka. Siberian department, 1964, Part 1, pp. 130-147.

20. Safonova T.A. On Trachelomonas Ehr. (Euglena algae) genus expansion in water bodies of Ob floodplain // Biological Institute of AS of USSR, 1972, Issue 19, pp. 352-361.

21. Safonova T.A. Euglena algae of Western Siberia, Novosibirsk: Nauka, Siberian department, 1987, p. 192.

22. Semenova L.A., Alexyuk V.A. Ob downstream phytoplankton // Biology and Ecology of Lower Ob ecosystem's aquatic organisms. Sverdlovsk: USSR AS, 1983, pp. 32-42.

23. Skabichevsky A.P. Infraspecific evolution of inferior plants and taxonomia questions // Problems of inferior plants' phylogeny. M.: Nauka, 1974, pp. 7-19.

24. Yurova E.I. Seasonal dynamics of Lower Irtysh phytoplankton // Ukrainian botanic magazine, 1975, Vol. XXXII, N3, pp. 349-352.

25. Yurova E.I. Irtysh downstream phytoplankton features // USSR AS Reporter, 1994, N5, Issue 1, pp. 133-135.