

PHYTOPLANKTON OF THE TISA RIVER

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Abstract - Investigation of the Tisa River phytoplankton community was carried out directly after the cyanide spill in 2000. The investigation took place near Bečej from February of 2000 to January of 2001. We observed 374 taxa from eight algal divisions. The highest biodiversity was recorded among the divisions *Chlorophyta* and *Bacillariophyta*.

Key words: Tisa River, Serbia, phytoplankton, algae

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INTRODUCTION

The present paper reports the results of a one-year investigation of the Tisa River phytoplankton community.

The Tisa River is one of the largest Central European flatland rivers and the biggest Danube tributary (Uherkovich, 1971). It is one of the most important rivers of the Balkan region and Europe.

Phytoplankton investigation was carried out after the cyanide spill on the Tisa River in January of 2000.

The aim of this study was to determine biodiversity of the phytoplankton community in the Tisa River after this accident. Algae are one of the most important primary producers in almost every water ecosystem. At the same time, these organisms are very sensitive to changes in their environment.

MATERIAL AND METHODS

Investigation samples were collected from February of 2000 to January of 2001 near Bečej, weekly and monthly.

Sampling for qualitative analysis was carried out in February, March, April, June, July, September, and November of 2000, which enabled us to follow the seasonal dynamics of phytoplankton. The standard method was used for sample collection a plankton net was drawn through the water.

Samples for quantitative analysis were collected in one-liter plastic bottles every week from February 16, 2000 to January 31, 2001. Altogether, 55 quantitative samples were collected during this period.

Table 1. Participation of divisions in the phytoplankton community of the Tisza River

Division	Number of taxa	%
<i>Cyanophyta</i>	43	11,49
<i>Rhodophyta</i>	1	0,27
<i>Pyrrophyta</i>	6	1,60
<i>Xanthophyta</i>	7	1,87
<i>Chrysophyta</i>	4	1,07
<i>Bacillariophyta</i>	129	34,49
<i>Euglenophyta</i>	17	4,54
<i>Chlorophyta</i>	168	44,92
Total:	374	100

Phytoplankton taxa were determined in samples for qualitative analyses. Physical and chemical characteristics - air and water temperature, water pH, water clarity, and oxygen concentration in the water, were measured during collection of the qualitative samples.

RESULTS AND DISCUSSION

During the investigation period, we recorded eight algal divisions. The list of divisions and their participation in the phytoplankton community of the Tisa River are

Table 2. Continued

taxa	month:	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I
<i>A. granulata</i> morph. <i>curvata</i> CHODAT							+						
<i>A. granulata</i> var. <i>granulata</i> fo. <i>valida</i> (HUST.) SIMONSEN				+			+		+				
<i>Cocconeis pediculus</i> EHR.			+				+						
<i>C. placentula</i> EHR. var. <i>englypta</i> (EHR.) GRUN.		+											
<i>C. placentula</i> var. <i>lineata</i> (EHR.) VAN HEURECK		+					+				+		
<i>C. placentula</i> var. <i>placentula</i> EHR.		+	+		+						+		
<i>Cyclotella bodanica</i> GRUN. var. <i>bodanica</i> GRUN.		+											
<i>C. meneghiniana</i> KÜTZ.		+	+	+	+	+	+	+	+	+	+	+	+
<i>C. socialis</i> SCHÜTT						+							
<i>C. radiosa</i> (GRUN.) LEMM.		+											
<i>Cymatopleura solea</i> (BRÉB.) W. SMITH var. <i>solea</i>		+	+	+			+		+				
<i>C. solea</i> var. <i>apiculata</i> (W. SMITH) RALFS		+	+										
<i>Cymbella affinis</i> KÜTZ.		+	+	+	+			+	+		+	+	+
<i>C. caespitosa</i> (KÜTZ.) BRUN		+											+
<i>C. cistula</i> (EHR.) KIRCH.			+										
<i>C. gracilis</i> (EHR.) KÜTZ.			+										
<i>C. mesiana</i> CHOLNOKY											+		
<i>C. minuta</i> HILSE		+	+						+		+		+
<i>C. obscura</i> KRASSKE					+								
<i>C. prostrata</i> (BERK.) CL.		+	+										+
<i>C. proxima</i> REIMER											+		+
<i>C. silesiaca</i> BLEISCH											+		
<i>C. tumidula</i> GRUN.									+				
<i>C. turgidula</i> GRUN.		+											
<i>Cymbella</i> AG. sp.		+	+	+		+					+		
<i>Diatoma ehrenbergii</i> KÜTZ.			+										
<i>D. mesodon</i> (Ehr.) KÜTZ.		+											+
<i>D. moniliformis</i> KÜTZ.			+										+
<i>D. vulgaris</i> BORY var. <i>vulgaris</i>		+	+	+	+		+			+	+		+
<i>D. vulgaris</i> var. <i>producta</i> GRUN.			+								+		
<i>D. vulgaris</i> var. <i>distorta</i> GRUN.		+	+								+		
<i>D. vulgaris</i> var. <i>linearis</i> GRUN. in VAN HEURCK						+					+		
<i>Didymosphenia geminata</i> (LYNGE.) M. SCHNIDT.		+	+	+							+	+	+
<i>Fragilaria arcus</i> (EHR.) CL. var. <i>arcus</i>		+	+	+							+		+
<i>F. biceps</i> (KÜTZ.) L.-B.		+	+			+					+		
<i>F. capucina</i> DESM. var. <i>capucina</i> DESM.				+			+						

Table 2. Continued

taxa	month:	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I
<i>F. capucina</i> var. <i>austriaca</i> (GRUN.) L.-B.		+											
<i>F. capucina</i> var. <i>mesolepta</i> (RABH.) RABH.		+											
<i>F. capucina</i> var. <i>rumpens</i> (KÜTZ.) L.-B.											+		
<i>F. capucina</i> var. <i>vaucheriae</i> (KÜTZ.) L.-B.				+			+		+		+		
<i>F. construens</i> (EHR.) GRUN. var. <i>construens</i>			+										
<i>F. crotonensis</i> KITTON		+					+		+				
<i>F. dilatata</i> (BRÉB.) L.-B.						+							
<i>F. ulna</i> Sippen <i>acus</i> sensu L.-B.			+			+			+				
<i>F. ulna</i> Sippen <i>ulna</i> sensu L.-B.		+	+	+		+	+		+	+	+	+	+
<i>F. ulna</i> (NITZSCH.) L.-B. Sippen <i>angustissima</i>											+		
<i>Frustulia vulgaris</i> (THWA.) DE TONI			+										
<i>Gomphonema acuminatum</i> EHR.		+											
<i>G. angu</i> EHR.		+											
<i>G. clavatum</i> EHR.			+										
<i>G. constrictum</i> EHR.		+											
<i>G. minutum</i> (AG.) AG.											+		
<i>G. olivaceum</i> (HORN.) BRÉB. var. <i>olivaceum</i>		+	+	+				+		+	+	+	+
<i>G. parvulum</i> (KÜTZ.) KÜTZ.											+		
<i>G. truncatum</i> EHR.											+		
<i>Gomphonema</i> AG. sp.											+		
<i>Gyrosigma acuminatum</i> (KÜTZ.) RABH.		+	+										
<i>G. spencerii</i> (W. SMITH) CL.		+	+			+	+	+	+			+	+
<i>Hantzschia amphioxys</i> (EHR.) GRUN.		+	+										
<i>Melosira varians</i> AG.		+	+	+	+		+				+	+	+
<i>Meridion circulare</i> (GREV.) Ag. var. <i>circulare</i>			+	+							+		
<i>M. circulare</i> var. <i>constrictum</i> (RALFS) VAN HEURCK		+	+										
<i>Navicula capitoradiata</i> GERM.		+					+				+		
<i>N. digitoradiata</i> (GREG.) RALFS		+									+		
<i>N. digitoradiata</i> var. <i>rostrata</i> HUST.							+						
<i>N. elginensis</i> (GREG.) RALFS		+				+							
<i>N. gregaria</i> DONKIN									+		+		
<i>N. halophilla</i> (GRUN.) CL.							+						
<i>N. lanceolata</i> (AG.) EHR.		+	+		+				+				
<i>N. mutica</i> KÜTZ. var. <i>mutica</i>							+						
<i>N. radiosa</i> KÜTZ.			+										
<i>N. rhynchocephala</i> KÜTZ.			+										
<i>N. riparia</i> HUST.											+		
<i>N. tripunctata</i> (O. F. MÜLL.) BORY									+		+		

Table 2. Continued

taxa	month:	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I
<i>S. minuta</i> BRÉB.					+								
<i>S. ovalis</i> BRÉB.		+											
<i>S. tenera</i> GREG.		+	+			+					+		
<i>Surirella</i> TURP. sp.													+
<i>Tabellaria fenestrata</i> (LYNG.) KÜTZ.											+		
<i>T. flocculosa</i> (ROTH.) KÜTZ.				+							+		
EUGLENOPHYTA													
<i>Euglena acus</i> EHR.			+	+	+	+							+
<i>E. ehrenbergii</i> KLEBS							+						
<i>E. oxyuris</i> SCHMARDTA						+	+		+				
<i>E. viridis</i> EHR.			+	+	+	+	+	+			+	+	
<i>Euglena</i> EHR. sp.					+	+							
<i>Lepocinclis</i> PERTY sp.							+						
<i>Phacus acuminatus</i> STOKES var. <i>acuticauda</i> (ROLL) POSCHMANN						+							
<i>P. orbicularis</i> POPOWA var. <i>orbicularis</i>		+				+		+					
<i>P. pyriformis</i> (EHR.) STEIN									+				
<i>Phacus</i> DUJ. sp.		+											
<i>Strombomonas</i> DEFLANDRE sp.						+							
<i>Trachelomonas armata</i> (EHR.) STEIN						+							
<i>T. hispida</i> (PERTY) STEIN var. <i>volvicensis</i> DREZ.							+						
<i>T. planctonica</i> SWIR. fo. <i>planctonica</i>			+	+	+	+				+	+		
<i>T. sycheyensis</i> PLAY.				+									
<i>T. volvocina</i> EHR.		+	+	+	+	+	+	+	+	+	+	+	+
<i>Trachelomonas</i> EHR. sp.				+		+	+				+		
CHLOROPHYTA													
<i>Acanthosphaera zachariasii</i> LEMM.						+	+		+				
<i>Actinastrum fluviatile</i> (SCHRÖD.) FOTT					+	+	+	+	+	+			
<i>A. hantzschii</i> LAGERH. var. <i>hantzschii</i> LAGERH.					+	+	+	+	+	+	+	+	
<i>A. hantzschii</i> var. <i>subtile</i> WOLOSZ.					+	+	+	+	+	+	+		
<i>Ankistrodesmus bibraianus</i> (RENSCH.) KORŠ.					+	+	+						
<i>A. fusiformis</i> CORDA							+			+			
<i>A. gracilis</i> (RENSCH.) KORŠ.				+	+	+	+	+	+		+		
<i>Chlamydomonas incerta</i> PASCH.				+		+	+	+	+		+		
<i>Chlamydomonas</i> EHR. sp.				+			+						
<i>Chlorella botryoides</i> BOYE-PET.							+						
<i>C. vulgaris</i> BELJ							+						
<i>Chlorella</i> BELJ. sp.						+							
<i>Cladophora</i> KÜTZ. sp.		+	+										
<i>Closterium aciculare</i> T. WEST					+						+		

Table 2. Continued

taxa	month:	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I
<i>C. acerosum</i> (SCHR.) EHR. ex RALFS var. <i>acerosum</i>						+	+		+				
<i>C. acerosum</i> var. <i>minus</i> (HANTZSCH) KOSS.							+						
<i>C. gracile</i> BRÉB. ex RALFS							+						
<i>C. idiosporum</i> W. & G. S. WEST var. <i>idiosporum</i>											+		
<i>C. lineatum</i> EHR. var. <i>lineatum</i>							+						
<i>C. moniliferum</i> (BORY) EHR.			+				+						
<i>C. navicula</i> (BRÉB) LUTKEA			+										
<i>C. praelongum</i> BRÉB. var. <i>praelongum</i>							+						
<i>C. prorum</i> BRÉB.				+									
<i>C. tumidum</i> JOHNS					+		+						
<i>Closterium</i> NITZSCH sp.								+					
<i>Coelastrum astroideum</i> DE-NOT.					+	+	+	+	+	+			
<i>C. microporum</i> NÄG. in A. BR. var. <i>microporum</i> NÄG.				+	+	+	+	+	+	+	+		
<i>C. microporum</i> var. <i>octaedricum</i> (SKUJA) SODOMK.							+						
<i>C. reticulatum</i> (DANG.) SENN. var. <i>cubanum</i> KOM.					+	+	+	+	+	+	+		
<i>Coenochloris hindakii</i> KOM.							+						
<i>C. ovalis</i> KORŠ.					+		+	+	+	+	+		
<i>Coenocystis planctonica</i> KORŠ.							+						
<i>Cosmarium</i> CORDA sp.								+					
<i>Crucigenia fenestrata</i> (SCHMIDLE) SCHMIDLE					+								
<i>C. smithii</i> (BOURR. & MAGNUN) KOM.					+								
<i>C. tetrapedia</i> (KIRCHN.) W. & G. S. WEST					+	+	+	+	+	+	+	+	+
<i>Crucigeniella crucifera</i> (WOLLE) KOM.					+	+	+		+	+	+		+
<i>C. neglecta</i> (FOIT & Ettl) KOM.					+		+				+		
<i>C. pulchra</i> (W. & G. S. WEST) KOM.					+	+	+	+	+	+	+		+
<i>C. rectangularis</i> (NÄG.) KOM.						+	+	+	+		+		
<i>C. saquei</i> KOM.					+	+	+		+		+		
<i>Dictyosphaerium ehrenbergianum</i> NÄG.							+						
<i>D. granulatum</i> HIND.					+	+	+	+	+	+	+		
<i>D. pulchellum</i> WOOD var. <i>pulchellum</i>				+	+	+	+		+	+	+		
<i>D. pulchellum</i> WOOD var. <i>minutum</i> DEFL.							+		+				
<i>D. tetrachotomum</i> PRINTZ. var. <i>falax</i> KOM.					+	+	+						
<i>D. tetrachotomum</i> var. <i>tetrachotomum</i> PRINTZ.			+	+	+	+	+	+	+	+	+		
<i>Dictyosphaerium</i> NÄG. sp.							+						
<i>Didymocystis planctonica</i> KORŠ.					+		+						

Table 2. Continued

taxa	month:	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I
<i>Eudorina cylindrica</i> THOMASSON						+							
<i>E. elegans</i> EHR.			+	+		+	+						
<i>Eutetramorus planctonicus</i> (KORŠ.) BOURR							+						
<i>Golenkinia radiata</i> CHOD.					+	+	+	+	+	+	+	+	
<i>Gonium pectorale</i> O. F. MÜLL.					+		+						
<i>Hyaloraphidium contortum</i> PASCH. & KORŠ.			+	+	+	+	+	+	+	+	+	+	+
<i>Kirchmeriella contorta</i> (SCHMIDLE) BOHL. var. <i>contorta</i>					+	+	+	+	+	+			
<i>K. contorta</i> var. <i>elongata</i> (G. M. SMITH) KOM					+								
<i>K. contorta</i> var. <i>elegans</i> (PLAYF.) KOM.					+								
<i>K. diana</i> (BOHL.) COMAS var. <i>major</i> (KORŠ.) COMAS						+							
<i>K. obesa</i> (W. WEST) SCHMIDLE					+	+	+	+	+	+			
<i>K. irregularis</i> (G. M. SMITH) KORŠ. var. <i>irregularis</i>					+	+	+	+	+	+	+		
<i>Lagerheimia balatonica</i> (SCHERFF. in KOL) HEND.												+	
<i>L. ciliata</i> (LAGERH.) CHOD. var. <i>ciliata</i>						+							
<i>L. citrifomis</i> (SNOW) COLL.							+						
<i>L. longiseta</i> (LEMM.) WILLE var. <i>major</i> G. M. SMITH					+		+						
<i>L. wratislaviensis</i> SCHRÖD.							+	+		+			
<i>Lobomonas ampla</i> PASCHER						+							
<i>Micractinium bornhemense</i> (CON.) KORŠ.					+	+	+	+					
<i>M. pusillum</i> FRES.					+	+	+	+	+	+	+		
<i>M. quadrisetum</i> (LEMM.) G. M. SMITH					+	+	+		+	+			
<i>Monoraphidium contortum</i> (THUR.) KOM.- LEGN.	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>M. griffithii</i> (BERK.) KOM.-LEGN.		+	+	+	+	+	+	+	+	+	+	+	
<i>M. komarkovae</i> NYG.		+	+	+	+	+	+	+	+	+	+	+	+
<i>Nephrocytium agardhianum</i> NÄG.									+				
<i>Oedogonium</i> LINK sp.													+
<i>Oocystidium ovale</i> KORŠ.							+						
<i>Oocystis borgei</i> SNOW					+	+	+	+	+		+		
<i>O. lacustris</i> CHOD.						+							
<i>O. marssonii</i> LEMM.					+		+		+		+		
<i>O. naegelii</i> A. BR.							+						
<i>O. submarinum</i> LAGERH var. <i>variabilis</i> SKUJA						+							
<i>Oocystis</i> A. BR. sp.									+			+	

Table 2. Continued

taxa	month:	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I
<i>Oonephris obesa</i> (W. WEST) FOTT									+				
<i>Pandorina morum</i> (O. F. MÜLL.) BORY			+		+	+	+	+	+	+	+		
<i>P. smithii</i> CHODAT							+						
<i>Pediastrum biradiatum</i> MEYEN var. <i>biradiatum</i>						+					+		
<i>P. biradiatum</i> var. <i>longecornutum</i> GUTW.								+	+	+	+		
<i>P. boryanum</i> (TURP.) MENEH. var. <i>brevicorne</i> A. BR.									+				
<i>P. boryanum</i> var. <i>boryanum</i> (TURP.) MENEH.			+			+	+	+	+	+	+		
<i>P. boryanum</i> var. <i>cornutum</i> (RACIB.) SULEK						+	+		+	+	+	+	+
<i>P. boryanum</i> var. <i>longicorne</i> REINSCH.						+	+	+	+	+	+		
<i>P. duplex</i> MEYEN var. <i>duplex</i>		+	+	+	+	+	+	+	+	+	+		
<i>P. duplex</i> var. <i>gracillimum</i> W. & G. S. WEST					+	+	+	+	+				
<i>P. duplex</i> var. <i>subgranulatum</i> RACIB.						+	+	+	+		+		
<i>P. duplex</i> var. <i>rugulosum</i> RACIB.						+							
<i>P. simplex</i> MEYEN. var. <i>echinulatum</i> WITTR.								+	+				
<i>P. simplex</i> var. <i>simplex</i> MEYEN.		+					+		+		+		
<i>P. simplex</i> var. <i>sturnii</i> (REINSCH.) WOLLE						+			+				
<i>P. tetras</i> (EHR.) RALFS					+		+	+	+	+			
<i>Polyedriopsis spinulosa</i> (SCHMIDLE) SCHMIDLE					+	+	+		+				
<i>Pyramimonas delicatula</i> GRIFFITHS		+		+	+	+	+	+	+				
<i>P. tetrarynchus</i> SCHMARDA		+		+	+								
<i>Scenedesmus acuminatus</i> (LAGER.) CHOD. var. <i>acuminatus</i> (LAGER.) CHOD.					+	+	+	+	+	+	+	+	+
<i>S. acuminatus</i> var. <i>elongatus</i> G.M. SMITH sensu HORTOB.					+	+	+		+				
<i>S. acuminatus</i> var. <i>minor</i> G.M. SMITH				+			+						
<i>S. acuminatus</i> var. <i>tetradesmoides</i> G.M. SMITH				+	+	+	+						
<i>S. acutus</i> MEYEN var. <i>acutus</i>		+			+	+	+	+		+	+	+	
<i>S. acutus</i> var. <i>globosus</i> HORTOB.					+								
<i>S. armatus</i> CHOD.							+			+			
<i>S. bicaudatus</i> DEDUS.					+	+	+	+	+	+	+	+	
<i>S. brevispina</i> (G.M. SMITH) CHOD.									+				
<i>S. denticulatus</i> LAGERH.									+				
<i>S. dimorphus</i> (TURP.) KÜTZ.					+	+		+	+		+		
<i>S. disciformis</i> (CHOD.) FOTT & KOM. fo. <i>disciformis</i>					+		+	+		+			

Table 2. Continued

taxa	month:	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I
<i>S. ecornis</i> (EHR.) CHOD. var. <i>ecornis</i>		+		+	+	+	+	+	+	+	+		+
<i>S. ecornis</i> var. <i>polymorphus</i> CHOD.							+						
<i>S. ellipticus</i> (W. & G. S. WEST) CHOD.											+		
<i>S. ellipsoideus</i> CHOD.				+									
<i>S. hortobagyi</i> PHILIPSE							+				+		
<i>S. intermedius</i> CHOD. var. <i>intermedius</i>					+	+	+	+	+	+	+		
<i>S. intermedius</i> var. <i>acaudatus</i> HORTOB.					+	+	+		+	+	+	+	
<i>S. linearis</i> KOM.						+	+	+		+	+		+
<i>S. longispina</i> CHOD.		+		+	+			+	+	+			
<i>S. magnus</i> MEYEN		+	+	+	+	+	+	+	+	+	+	+	
<i>S. multicauda</i> MAEJ.							+						
<i>S. nanus</i> CHOD.			+	+			+						
<i>S. obliquus</i> (TURP.) KUTZ.									+	+			
<i>S. obtusus</i> MEYEN fo. <i>obtusus</i>					+								
<i>S. onensis</i> CHOD.		+				+	+		+				
<i>S. opolenis</i> P. RICHT.					+			+	+	+	+		
<i>S. opolenis</i> var. <i>aculeatus</i> HORTOB.				+									
<i>S. opolenis</i> var. <i>bicaudatus</i> HORTOB.					+						+		
<i>S. opolenis</i> var. <i>corinatus</i> LEMM							+		+				
<i>S. ovalternus</i> CHOD. var. <i>graevenitzii</i> (BERN.) CHOD.							+		+				
<i>S. protuberans</i> FRITSCH. var. <i>danubians</i> UHERK.							+						
<i>S. protuberans</i> var. <i>minor</i> LEY									+				
<i>S. quadricauda</i> (TURP.) BRÉB. sensu CHOD.		+	+	+	+	+	+	+	+	+	+	+	+
<i>S. sempervirens</i> CHOD.		+	+		+	+	+	+	+	+	+	+	
<i>S. smithii</i> TEIL.					+	+	+	+	+	+	+	+	
<i>S. spinosus</i> CHOD.						+							
<i>S. verrucosus</i> ROLL					+		+	+	+	+			
<i>Scenedesmus</i> MEYEN sp				+	+								
<i>Schroederia nitzschoides</i> (G. S. WEST) KORŠ.						+							
<i>S. robusta</i> KORŠ.		+			+	+	+	+	+				
<i>S. setigera</i> (SCHRÖD.) LEMM.				+	+	+		+			+		
<i>Sphaerocystis planctonica</i> (KORŠ.) BOURR.						+							
<i>Sphaerolopsis gloeosphaera</i> (PASCH. et JAHODA) ETTL. H. et O.			+	+	+	+	+	+	+	+	+		+
<i>Staurostrum chaetoceros</i> (SCHRÖD.) G. M. SMITH							+	+	+				
<i>S. gracile</i> RALFS		+				+	+	+		+			
<i>S. inflexum</i> BRÉB.						+							

Table 2. Continued

taxa	month:	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I
<i>Stigeoclonium</i> KÜTZ. sp.		+											
<i>Tetraedron caudatum</i> (CORDA) HANSG.					+	+	+	+	+	+	+	+	
<i>T. incus</i> (TEIL.) G. M. SMITH											+		
<i>T. longispinum</i> (PERTY) HANSG. <i>sensu</i> GUCINSKI						+						+	
<i>T. minimum</i> (A. BR.) HANSG.					+	+	+	+	+	+	+		
<i>T. triangulare</i> KORŠ.						+	+	+					
<i>Tetrastrum elegans</i> PLAYF					+		+			+	+	+	
<i>T. glabrum</i> (ROLL) AHLSTR. & TIFF.				+	+	+	+	+	+	+	+	+	+
<i>T. heteracanthum</i> (NORDST.) CHOD.					+	+					+		
<i>T. hortobagyi</i> HAJDU					+		+						
<i>T. staurogeniaeforme</i> (SCHRÖD.) LEMM.					+	+	+	+	+	+	+	+	+
<i>T. triacanthum</i> KORŠ.					+		+						
<i>T. triangulare</i> (CHOD.) KOM.					+		+	+	+	+	+		+
<i>Trenbaria crassispina</i> G. M. SMITH							+	+	+	+			
<i>T. schmidleii</i> (SCHRÖD.) FOTT. & KOVAČ							+	+	+	+			
<i>Ulothrix</i> KÜTZ. sp.			+				+						
<i>Westella botryoides</i> (W. WEST) DE-WILD.						+	+						
<i>Willea vilhelmii</i> (FOTT) KOM.					+			+					

given in Table 1.

Table 2 gives the list of determined phytoplankton taxa with their monthly distribution in the Tisa River.

Altogether we recorded 374 taxa (Tables 1 and 2), which indicates high biodiversity of the phytoplankton community in this ecosystem, regardless of the cyanide spill and heavy metal pollution at the beginning of the investigation period. Data indicating a rich and heterogeneous phytoplankton community in the Tisa River were also recorded previously (Uherkovich, 1971; Guelmino, 1973; Subakov, 2000; Branković and Budakov, 2001).

The results indicate that *Chlorophyta* was the qualitatively dominant division, while *Bacillariophyta* was subdominant during the investigation period.

The highest biodiversity of green algae was during the summer and autumn period, whereas *Bacillariophyta* was the dominant group during the colder period of the year. A similar situation was observed earlier (Kalafatić *et al.* 1982; Đukić *et al.* 1994; Dulić and Mrkić, 1998; Subakov, 2000). This is consistent with ecological characteristics of these algae (Trainor,

1978; Blaženčić, 2000) and ecological conditions in the given ecosystem during the period of investigation (Ržaničanin, 2004).

A significant number of taxa were found within *Cyanophyta*, while representatives of *Euglenophyta* were less numerous. Most taxa of the *Cyanophyta* and *Euglenophyta* found in the Tisa River were characteristic of slow, flatland rivers and stagnant water, and they were also registered during earlier investigations (Protić, 1939; Uherkovich, 1971; Guelmino, 1973; Kalafatić *et al.* 1982; Pujin *et al.* 1999; Subakov, 2000).

Rhodophyta, *Pyrrophyta*, *Xanthophyta*, and *Chrysophyta* were represented by a small number of taxa. Their participation in the phytoplankton community of the Tisa River was extremely small. Earlier studies likewise revealed a small number of taxa from these divisions (Protić, 1939; Szabados, 1966; Uherkovich, 1971; Guelmino, 1973; Kalafatić *et al.* 1982; Dulić and Mrkić, 1998; Pujin *et al.* 1999; Subakov, 2000; Branković and Budakov, 2001).

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ФИТОПЛАНКТОН РЕКЕ ТИСЕ

АНА РЖАНИЧАНИН, М. ЦВИЈАН И ЈЕЛЕНА КРИЗМАНИЋ

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Након изливања цијанида 2000. године извршено је једногодишње истраживање диверзитета фитопланктона реке Тисе код Бечеја. Утврђено је присуство 374 таксона из 8 раздела алги: *Cyanophyta*, *Rhodophyta*, *Pyrrophyta*, *Xanthophyta*, *Chrysophyta*, *Bacillariophyta*, *Euglenophyta* и *Chlorophyta*. Највећи

диверзитет забележен је у оквиру раздела *Chlorophyta*, док је раздео *Bacillariophyta* био субдоминантан. По броју таксона издвајали су се још *Cyanophyta* и *Euglenophyta*, док је диверзитет осталих забележених раздела био занемарљив.