

THE PROTOZOAN PLANKTON AND THEIR SAPROBITY RELATIONS IN THE MAROS (MUREŞ) RIVER

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Introduction

Protozoa are without doubt of great importance for both the natural living system and human activity. Their significance regarding the latter cannot be restricted only to the medical and/or veterinary aspects, as their role in the process of self purification or their use as indicator organisms is just as important.

The aims of our investigations were to determine the species composition, abundance relations of planktonic protozoan communities, and to follow the changes of the saprobity relations of the Maros River from its source to the mouth. This investigation was the very first for protozoological research.

Materials and Methods

Water samples were collected from 15 sampling sites along the Maros River. Each time 30 l water was filtered through a net of 10 mesh size. The method used for protozoa is the bromphenol blue test, applied to estimate the protozoa density in planktonic and periphytic communities (Bereczky 1985). In this technique the fresh sample is fixed in HgCl₂ solution and "stained" with bromphenol blue. This method allows an accurate counting of individuals in natural samples. We used Protargol impregnation (modified by Wilbert 1974), as well. Evaluation of saprobity by Foissner (1992).

Discussion

Though we looked through many protozoological works we did not find any previous protozoological investigations of the Maros. This was the reason why at first we wanted to get to know what kind of heterotrophic protists live in this river. We found 148 protozoa species from the source to the mouth:

Amoeba: 9
Testacea: 25
Heliozoa: 22
Ciliata: 92

Ciliata appeared to be the richest community. They are dominant according to both their species number and individual number. Regarding the species diversity and distribution three areas can be distinguished along the river.

The first section is between Izvorul Mure^o (source) and Sârma^o (62 km), where the species number was low-average and the individual number was in accordance with flow velocity (see Table 1-4).

From Rastoliþa (105 km) through Tîrgu Mure^o (188 riv km, retained water) to Gura Arie^oului (282 riv km) extends the region which we identified as the middle section. In this area at Ungheni-More^oti (207 km) we found the highest species number (39). This community - rich in species - is characteristic of eutrophic waters. In running waters, current rate is one of the most effective factors selecting distribution. In this section, because of the retained water, the river slows and thus the euplanktonic organisms multiply. At site 7 we found *Trachelophyllum clavatum* (Stokes Cl- ion 33.7 mg/l), which is of small density, but is a good indicator organism for salt water occurrence (Table 7).

At Gura Arie^oului (below Arie^o) the individual number decreases, which may refer to changes in the nearly natural conditions. A drastic anthropogenic environmental effect occurs at Sintimbru (355 km), proved by conductivity of 1117 s/cm and the total lack of protozoan communities. We could not identify even a single representative of the investigated groups (*Amoeba*, *Testacea*, *Ciliata*), only a few empty testacean shells and some ciliata cysts indicate the rich community mentioned above.

The third section of the river begins at Alba Iulia (376 km). The low species number and the high individual number is characteristic of mesosaprobic waters. That is without question. Only 8 species form the community where *Phascolodon vorticella* is dominant and this indicates advanced eutrophication.

The great masses of algae and at the same place the Protozoa become competitors and at this stage (mainly at 375, 445 and 520 km) the autotrophs push the heterotrophs out of the plankton. Under such conditions the afore-mentioned *Phascolodon vorticella* became absolutely dominant with $1359 \cdot 10^3 \text{ ind/m}^3$.

At Deva (455 riv km) the abundance of Protozoa increases and the community is invariably formed of euplanktonic organisms (Table 12).

At Zam (520 km) the individual number begins to decrease, later on at Pecica (676 km) and over Szeged (766 km) come into force such conditions which are characteristic of rivers of the same order (Table 13,14,15).

Most of the Protozoan species found in the Maros as indicators have unknown saprobial classification. The plankto-seston of the upper section is formed by many rare species and is similarly formed by the potamoplankton of the middle and lower sections.

Most species of known saprobity are oligo-beta, betamesosaprobic ones. Though we found alpha- and polysaprobic organisms several times downwards over Rastoliþa, their abundance, though essential to determine indicator values, never reached more than 20% of any community. We found a greater polysaprobic population of *Vorticella microstoma* only below Arie^o (282 km).

The saprobic indexes can be found as percentages in Table 16, they are characteristic of water in summers with high temperatures. In this period the elimination of dissolvable organic matters needs shorter time than in winter. Probably, in colder seasons we could find species which indicate much worse water quality.

Introducing the protozoan community according to their nutrition types helps the evaluation of trophy. It can be read from Table 17, that we found mainly algivorous,

algibacteriavorous and bacteriavorous organisms. Detritus- and bacteriavorous species, predators, omnivores and ectocommenzalists are relatively few.

At 207 km, and below Arie^o we found species in a relatively high percentage of unknown nutrition types. At Alba Iulia the algivorous dominance of 94.5% indicates a change of conditions from eutrophy to hypertrophy. Algivorous species are dominant at Szeged, too.

Summary

In the Maros River there exists a rich protozoan community which would be worth investigating systematically. I found many organisms, which I could identify only to species. This means that it would be possible to find new species for science with the help of quick examinations. I have to mention that the perishing of protozoa at Sîntimbru may indicate the beginning of more significant, irreversible environmental damage.

At numerous places I found amoeba belonging to the Naegleria genus, which can be identified to species only in laboratory cultures. Some stock of these amoeba has been stated pathogenic. It would be worth extending the investigations to this direction, too.

Reference

- Bereczky, M.Cs. (1985): Fixations- und Färbungsschnellverfahren bei quantitative ökologische Untersuchungen von Protozoen in Binnengewässer. Arch. Protistenk. 129: 187-190.
- Foissner, W. (1992): Taxonomic and nomenclatural revision of Sladacek's list of ciliates (Protozoa: Ciliophora) as indicators of water quality. Hydrobiologia 166:1-164.
- Wilbert, N. (1974): Eine verbesserte Technik der Protogol-impregnation für Ciliaten. Mikrokosmos 6: 171-178.

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Table 1.

Izvorul Mures (Marosfő) 1. 850 m a.s.l. 0 rkm		Areolla hemisphaerica Perty		A
Mayorella sp.	AB	Centropyxis aculeata Stein	ob	DB
Arcella gibbosa Penard	A	Centropyxis constricta Ehrenberg		DB
Arcella vulgaris Ehrenberg b	AB	Centropyxis hirsuta Deffandre		DB
Bullinula sp.	A	Cyclopyxis arcelloides (Penard)		DB
Centropyxis platystoma Penard	AB	Euglypha alveolata Dujardin	b	AB
Diffugia lobostoma Leidy	AB	Trinema onchelys Ehrenberg	b	B
Euglypha alveolata Dujardin	b	Trinema linea Penard	b	B
Quadrilella symmetrica Wallich	AB	Aspidisca marsupialis Penard		B
Aspidisca marsupialis Penard	B	Cyclidium sp.		B
Lagynophrya sp. ?		Enchelys sp.		?
Rakovicia sp. Tucoleseo ?		Holophrya hexatricha Savi		A
Thigmogaster potamophilus Foissner	AB	Oxytricha sp.		?
Vorticella citrina O.F. Muller	b	Prorodon sp.		?
Vorticella incisa Stiller	AB	Strobilidium sp.		?
Species number	14	Stylonychia mytilus complex	a	AB
Individual number 1000 x ind·m ³	153	Suctorina sp.		P
Saprobity relations (%) Nutrition types (%)		Trichodina sp.		EC
b 23.5	A 11.8	Trithigmostoma eucullulus (O.F. Muller) Jankowski		
sn 76.5	A·B 58.8	Vorticella nebulifera O.F. Muller	ob	AB
	B 17.6	Vorticella sp.		?
	? 11.8	Species number		24
		Individual number 1000 x ind·m ³		207
		Saprobity relations (%) Nutrition types (%)		
		ob 6.8		A 14.0
		b 18.8		A·B 17.0
		a 6.8		B 24.0
		sn 67.6		B·A 3.4
				D·B 17.4
				EC 3.4
				P 3.4
				? 17.0

Table 2.

Senetea (Szenete) 2. 780 m a.s.l. 10 rkm				
Amoeba proteus (Pallas)	b	AB		
Vahlkampfia dubia Kahl	B			
Centropyxis platystoma Penard	AB			
Cyphoderia trochus Penard	AB			
Euglypha alveolata Dujardin	b	AB		
Quadrilella symmetrica Wallich		B		
Trinema onchelys Ehrenberg	b	B		
Histiobalantium sp.		?		
Holophrya hexatricha Savi		A		
Pseudoprorodon sp.		A		
Telotrichidium sp.		B		
Vorticella microscopica Fromentel		B		
Vorticella sp.		B		
Species number		13		
Individual number 1000 x ind·m ³		180		
Saprobity relations (%) Nutrition types (%)				
b 20.0				A 10.0
sn 80.0				A·B 20.0
				B 65.0
				? 5.0

Table 3.

Suseni (Gyergyóújfalu) 3. 744 m a.s.l. 16 rkm				
Mayorella vesperilio Penard	B			
Trichamoeba villosa Wallich	B			
Arcella gibbosa Penard	A			

Table 4.

Sarmas (Salomas) 4. 671 m a.s.l. 62 rkm				
Centropyxis constricta Ehrenberg	A			DB
Centropyxis discoides Penard	B		ob	DB
Aspidisca marsupialis Penard	B			B
Cyclidium sp.	B			B
Epistylis elegans Stiller	13			B
Glaucoma myriophylli Penard	180			BA
Lembadion lucens (Maskell)			b	A
Nassula sp.				?
Trichodina sp.				EC
Species number				9
Individual number 1000 x ind·m ³				99
Saprobity relations (%) Nutrition types (%)				
ob 9.1				A 27.3
b 27.3				A·B 27.3
sn 63.6				B·A 9.1
				D·B 18.1
				EC 9.1
				? 9.1

Table 5.

Rastolita (Rastonya) 5. 522 m a.s.l. 105 rkm	
Centropyxis aculeata Stein	ob
Centropyxis constricta Ehrenberg	
Cyclopyxis arcelloides (Penard)	
Diffugia oblonga Ehrenberg	
Diffugia sp. ures hej	
Euglypha alveolata Dujardin	b
Aspidisca marsupialis Penard	
Carhesium sp.	
Colpidium colpoda (Losana)	p
Enchelys simplex Kahl	
Epistylis elegans Stiller	
Epistylis sp.	
Lembadion lucens (Maskell)	b
Lembadion magnum (Stokes)	b
Paramecium caudatum Ehrenberg	a
Pseudocohnilembus pusillus (Quennerstedt) ap	
Vorticella similis Stokes	ob
Vorticella striata v. octava Stokes	p
Species number	
Individual number 1000 x ind·m ³	
Saprobity relations (%) Nutrition types (%)	
ob 8.7	A 30.4
b 30.4	A·B 4.3
a 8.7	B 26.1
ap 4.3	B+A 4.3
p 8.7	D-B 17.4
sn 39.1	P 4.3
	? 13.0

Table 6.

Tirgu Mures (Marosvásárhely) 6. 307 m a.s.l. 188 rkm		
Amoeba priteus (Pallas)	b	AB
Mayorella sp.		?
Mayorella vespertilio Penard		AB
Arcella c.f. hemisphaerica Perty		AB
? Arcella discoides Ehrenberg	ob	AB
Centropyxis aculeata Stein	ob	DB
Cyphoderia ampulla Ehrenberg	ob	AB
? Euglypha alveolata Dujardin	b	AB
B Hyalosphaeria cuneata Stein		?
P Trinema enchelys Ehrenberg	b	?
B Heliozoa sp.		P
? Balanonema sapropelica Foissner		B
A Bizonula parva (Linnaeus) Corliss		B
A Chilodontopsis vorax (Stokes)	ba	BA
B Cyclidium sp.		?
BA Glaucoma myriophylli Penard		BA
A Halteria grandinella (O.F. Muller)	ba	?
B Holoprya hexatricha Savi		A
18 Lembadion lucens (Maskell)	b	A
207 Lembadion magnum (Stokes)	b	A
Litonotus fasciola (O.F. Muller)	a	P
Paramecium aurelia complex	b	B
Paramecium bursaria (Ehrenberg)	b	B
Rhabdostyla congregata Zacharis ?		
Tachysoma pollionella (O.F. Muller)	ap	BA
Tintinnidium semiciliatum Sterki		B
Tracheilus ovum Ehrenberg	ba	P
Trichodina sp.		EC
Vorticella incisa Stiller		AB
Species number		29
Individual number 1000 x ind·m ³		372
Saprobity relations (%) Nutrition types (%)		
ob 6.7	A 8.3	
b 28.8	A·B 22.0	
ba 6.7	B 25.5	
a 1.6	B·A 15.6	
ap 1.6	D-B 5.1	
sn 54.6	EC 8.6	
	P 4.8	
	? 9.9	

Table 7.

Unbeni-Moresti (Nyárádtó) 7. 287 m a.s.l. 207 rkm	
Amoeba proteus (Pallas)	b AB
Amoeba sp.	?
Mayorella sp.	?
Mayorella vesperilio Penard	AB
Arcella hemisphaerica Perty	A
Centropyxis constricta Ehrenberg	DB
Centropyxis platystoma Penard	DB
Cyclopyxis arcelloides Penard	DB
Cyphoderia ampulla Ehrenberg	ob
Diffugia oblonga Ehrenberg	DB
Euglypha alveolata Dujardin	b
Sphenoderia lenta Schlumberger	AB
Trinema enchelys Ehrenberg	b
Chilodontopsis vorax (Stokes)	ba
Colpidium campylum (Stokes)	p
Condylostoma vorticella (Ehrenberg)	b
Glaucoma myriophylli Penard	BA
Loxophyllum meleagris (O.F. Muller)	b
Nassula sp.	?
Oxytricha saprobia Kahl	ap
Paramecium aurelia complex	b
Paramecium bursaria (Ehrenberg)	a
Paramecium multimicronucleata (Powers)	B
Podophrya fixa (O.F. Muller)	p
Stentor polymorphus (O.F. Muller)	b
Stentor sp.	?
Tachysoma pellionella (O.F. Muller)	ap
Trachelium ovum Ehrenberg	ba
Trachelophyllum clavatum (Stokes)	?
Trithigmostoma eucullulus (O.F. Muller) Jankowski	a
Vorticella convallaria (Linnaeus)	b
Vorticella incisa Stiller	AB
Vorticella margaritata Fromentel	b
Vorticella mayeri Faure-Freimiet	b
Vorticella nebulifeta (O.F. Muller)	ob
Vorticella pieta (Ehrenberg)	o
Vorticella striata v. octava Stokes	p
Zoothamnium ramosissimum Sommer	BA
Peritricha (Telotroch phase)	?
Species number	39
Individual number 1000 x ind·m ³	938
Saprobity relations (%) Nutrition types (%)	
o 0.6	A 5.5
ob 4.8	A·B 20.5
b 21.2	B 11.6
ba 1.3	B+A 7.5
a 2.0	D·B 4.7
ap 2.0	P 1.9
p 5.4	O 2.8
sn 62.6	? 45.5

Table 8.

Ludus-Gheja (Ludas) 8. 263 m a.s.l. 270 rkm	
Amoeba proteus (Pallas)	b AB
Amoeba sp.	?
Mayorella sp.	?
Mayorella vesperilio Penard	B
Naeglaria sp.	?
Pelomyxa palustris Greef	p BA
Arcella gibbosa Penard	A
Cochliopodium bilimbosum Auerbach	B
Sphenoderia lenta Schlumberger	?
Chilodontopsis vorax (Stokes)	ba BA
Cinetochilum margaritaceum (Ehrenberg)	p B
Codonella cratera Leidy	ob BA
Coleps hirtus v. lacustris Faure-Freimiet	P
Colpes nolandi Kahl	P
Condylostoma vorticella (Ehrenberg)	b O
Enchelyomorpha vermicularis (Smith)	p ?
Enchelys simplex Kahl	?
Epistylis plicatilis Ehrenberg	a B
Epistylis rotans Svoc	ob B
Euplotes eurytomus (Wrzesniokowski)	a O
Euplotes patella f. planktonicus Kahl	O
Glaucoma myriophylli Penard	BA
Glaucoma scintillans Ehrenberg	p B
Holophrya hexatracha Savi	AB
Litonotus faciola (O.F. Muller)	a P
Pleuronema crassum Dujardin	BA
Prorodon sp.	?
Stentor coeruleus Ehrenberg	O
Stentor igneus Ehrenberg	b O
Stentor polymorphus (O.F. Muller)	b O
Tachysoma pellionella (O.F. Muller)	ap BA
Vorticella incisa Stiller	BA
Vorticella monilata Tatem	B
Vorticella nebulifeta (O.F. Muller)	ob BA
Species number	34
Individual number 1000 x ind·m ³	352
Saprobity relations (%) Nutrition types (%)	
ob 6.0	A 2.0
BA b 12.2	A·B 6.2
ba 2.0	B 13.9
a 8.2	B·A 20.2
ap 2.0	P 8.2
p 7.9	O 25.0
sn 61.4	? 24.4

Table 9.

Gura-Ariesului (Aranyos) 9. 262 m a.s.l. 282 rkm	
Amoeba sp.	
Mayoralia sp.	
Trichamoeba villosa Wallich	
Arcella hemisphaerica Perty	
Centropyxis constricta Ehrenberg	
Trinema enchelys Ehrenberg	b
Coleps hirtus v. lacustris Faure-Fremiet	
Colpidium colpoda (Losana)	p
Euplotes curystomus (Wrzesniokowski)	a
Loxophyllum meleagris (O.F. Muller)	b
Spirostomum ambiguum (O.F. Muller)	a
Stentor igneus Ehrenberg	b
Tintinnidium sp.	
Vorticella convallaria (Linnaeus)	b
Vorticella microstoma Ehrenberg	
Vorticella nebulifera (O.F. Muller)	ob
Vorticella sp.	
Peritricha (Telotroch phase)	
Species number	18
Individual number 1000 x ind·m ³	318
Saprobity relations (%) Nutrition types (%)	
ob 6.9	A 2.2
b 6.6	B 24.8
a 9.1	B-A 11.6
p 18.9	D-B 2.2
sn 59.1	P 4.4
	O 4.4
	? 50.3

Table 10.

Sintimbru (Marosszentimre) 10. Küküllő, Tmavelli, 229 m a.s.l. 355 rkm
Neither Amoeba, Testacea nor Ciliata can be found in the collected samples.

Table 11.

Alba Julia (Gyulafehérvár) 11. 213 m a.s.l. 376 rkm	
? Arcella arenaria Greeff	A
? Coleps hirtus (O.F. Muller)	ba P
B Euplotes moebiusi Kahl	p B
A Holosticha sp.	?
DB Phascolodon vorticella Stein	b A
B Ureolalia sp.	EC
P Urosona butschlii Schewiakoff	p B
B Vorticella similis Stokes	ob A
O Species number	8
Individual number 1000 x ind·m ³	1431
Saprobity relations (%) Nutrition types (%)	
O ob 0.6	A 96.2
? b 95.0	B 1.9
A ba 0.6	EC 0.6
? p 1.9	P 0.6
BA sn 1.9	? 0.6

Table 12.

Deva (Dáva) 12. 182 m a.s.l. 455 rkm	
Naegleria sp.	?
Halteria grandinella (O.F. Muller)	ba ?
Halteria oblonga Kellicott	?
Phascolodon vorticella Stein	b A
Strobilidium sp.	?
Vorticella mayeri Faure-Fremiet	b B
Vorticella sp.	?
Species number	7
Individual number 1000 x ind·m ³	2420
Saprobity relations (%) Nutrition types (%)	
b 95.4	A 94.5
ba 1.4	B 0.9
sn 3.2	? 4.5

Table 13.

Zam (Zám) 13. 155 m a.s.l. 520 rkm	
Astramoeba radiosa Dujardin	ba B
Naegleria sp.	?
Actinosphaerium eichonii (Ehrenberg)	ob P
Coleps hirtus v. lacustris Faure-Fremiet	P
Phascolodon vorticella Stein	b A
Stylonychia pustulata (O.F. Muller)	b A
Vorticella citrina O.F. Muller	B
Vorticella mayeri Faure-Fremiet	b B
Species number	8
Individual number 1000 x ind·m ³	1969
Saprobity relations (%) Nutrition types (%)	
ob 11.7	A 81.6
b 82.1	B 2.8
ba 1.7	P 12.8
sn 4.5	? 2.8

Table 14.

Pecica (Peeske) 14. 97 m a.s.l. 675 rkm		
Naegleria sp.		
Centropyxis constricta Ehrenberg		
Euglypha alveolata Dujardin	b	
Actinosphaerium eichonii (Ehrenberg)	ob	
Codonella cratera Leidy	ob	
Condylostoma vorticella (Ehrenberg)	b	
Epistylis plicatilis Ehrenberg	a	
Holophrya hexatricha Savi	AB	
Litonotus lamella (Ehrenberg) Schewiakoff	b	
Oxytricha saprobia Kahl	ap	
Paramecium aurelia complex	b	
Paramecium caudatum Ehrenberg	a	
Paramecium putrinum Clapadereci & Laehman	p	
Phascolodon vorticella Stein	b	
Prorodon sp.		
Trichodina sp.		
Vorticella convallaria (Linneaus)	a	
Vorticella microstoma Ehrenberg	p	
Vorticella natans (Faure-Fremiet)	b	
Vorticella nebulifeta (O.F. Muller)	ob	
Vorticella sp.		
Vorticella striata v. octava Stokes	p	
Peritricha (Telotroch phase)		
Species number		23
Individual number 1000 x ind·m ³		638
Saprobity relations (%) Nutrition types (%)		
ob 15.5	A 34.5	
b 41.4	A·B 17.2	
a 10.3	B 17.2	
ap 3.4	D·B 1.7	
p 10.3	P 8.6	
sn 19.0	O 5.2	
	? 15.5	

Table 15.

Szeged 15. 82.5 m a.s.l. 766 rkm		
? Trinema enehelys Ehrenberg	b	B
DB Actinosphaerium eichonii (Ehrenberg)	ob	P
AB Codonella cratera Leidy	ob	AB
P Cyclidium citrullurs (Cohn)	a	B
AB Euplotes euryostomus (Wrzesniowski)	a	O
O Euplotes moebiusi Kahl	p	B
B Oxytricha saprobia Kahl	ap	O
Paramecium caudatum Ehrenberg	a	B
P Phascolodon vorticella Stein	b	A
O Prorodon sp.		?
B Strobilidium humile Penard	b	A
B Strobilidium velox Faure-Fremiet		A
B Strobilidium viride Stein	b	A
A Vorticella nebulifeta (O.F. Muller)	ob	AB
? Vorticella picta (Ehrenberg)	o	AB
? Vorticella similis Stokes	ob	A
AB Vorticella sp.		?
B Species number		23
A Individual number 1000 x ind·m ³		638
AB Saprobity relations (%) Nutrition types (%)		
? o 1.5	A 62.1	
B ob 15.1	A·B 12.1	
? b 56.1	B 7.6	
23 a 4.5	P 3.0	
638 ap 3.0	O 4.5	
p 1.5	? 10.6	
sn 18.2		

A – alga, A·B – alga·bacterium, B – bacterium, D – detritus.
 EC – ectocomens, P – predator, O – omnivorus.

Table 16.

Saprobity relations %			
Izvorul Mures	b 23.5		ba 2.0
	sn 76.5		a 8.2
Senetca	b 20.0		ap 2.0
	sn 80.0		p 7.9
Suseni	ob 6.8	Gura-Ariesului	sn 61.4
	b 18.8		ob 6.9
	a 6.8		b 6.6
	sn 67.6		a 9.1
Sarmas	ob 9.1		p 18.2
	b 27.3	Sintimbru -Alba Julia	sn 59.1
	sn 63.6		ob 0.6
Rastolita	ob 8.7		b 95.0
	b 30.4		ba 0.6
	a 8.7		p 1.9
	ap 4.3	Deva	sn 1.9
	p 8.7		b 95.4
	sn 39.1		ba 1.4
Tirgu Mures	ob 6.7	Zam	sn 3.2
	b 28.8		ob 11.7
	ba 6.7		b 82.1
	a 1.6		ba 1.7
	ap 1.6	Pecica	sn 4.5
	sn 54.6		ob 15.5
Uheni-Moresti	o 0.6		b 41.4
	ob 4.8		a 10.3
	b 21.2		ap 3.4
	ba 1.3		p 10.3
	a 2.0	Szeged	sn 19.0
	ap 2.0		o 1.5
	p 5.4		ob 15.1
	sn 62.6		b 56.1
Iudus-Gheja	ob 6.0		a 4.5
	b 12.2		ap 3.0
			p 1.5
			sn 18.2

Table 17.

Nutrition types %					
Izvorul Mures	A	11.8	O	2.8	
	A-B	58.8	?	45.5	
	B	17.6	A	2.0	
	?	11.8	A-B	6.2	
Seneta	A	10.0	B	13.9	
	A-B	20.0	B-A	20.2	
	B	65.0	P	8.2	
	?	5.0	O	25.0	
Suseni	A	14.0	?	24.4	
	A-B	17.0	A	2.2	
	B	24.0	B	24.8	
	B-A	3.4	B-A	11.6	
	EC	17.0	D-B	2.2	
Sarmas	A	27.3	P	4.4	
	B	27.3	O	4.4	
	B-A	9.1	?	50.3	
	D-B	18.1		-	
Rastolita	EC	9.1	Alba Julia	A	96.2
	?	9.1		B	1.9
	A	30.4		EC	0.6
	A-B	4.3		P	0.6
	B	26.1	Deva	?	0.6
Tirgu Mures	B-A	4.3		A	94.5
	D-B	17.4		B	0.9
	P	4.3	Zam	?	4.5
	?	13.0		A	81.6
	A	8.3		B	2.8
Unheni-Moresti	A-B	22.0		P	12.8
	B	25.5		?	2.8
	B-A	15.6	Pecica	A	34.5
	D-B	5.1		A-B	17.2
	EC	8.6		B	17.2
	P	4.8		D-B	1.7
?	9.9		P	8.6	
Szeged	A	5.5		O	5.2
	A-B	20.5		?	15.5
	B	11.6		A	62.1
	B-A	7.5		A-B	12.1
	D-B	4.7		B	7.6
P	1.9		P	3.0	
			O	4.5	
			?	10.6	