

Diversity of Gastropoda in the Romanian sector of the Danube lower hydrographic basin

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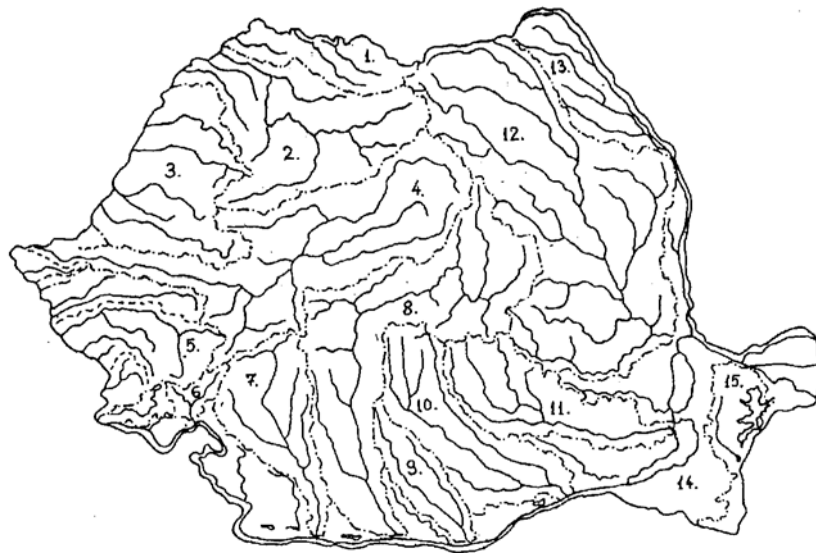
Keywords: Gastropoda, biodiversity, Danube

Introduction

The present paper is a synthesis on the distribution of the aquatic gastropods in the Romanian hydrographic network. The ecological category of the ecosystems to which they belong represents one of the decisive factors on which the distribution and location of aquatic Gastropoda depend (Grossu, 1993). Within the lower sector of the Danube basin, there can be found all the types of ecosystems that constitute into locations for the distribution of the Gastropods.

We compiled all available information (more than 150 studies published by different authors) on the occurrence of Gastropoda in springs, streams, rivers, lakes, the Danube, its flood plain, and the Danube Delta for the lower basin of the Danube River. To analyze the large scale distribution of the gastropods, the different ecosystems were grouped in 15 basins (Fig. 1).

Fig. 1. Distribution of Gastropoda within the hydrographic basins from Romania



1. The upper Tisa – 30 species; 2. The Someș – 30 species; 3. The Crișuri rivers – 39 species; 4. The Mureș – 35 species; 5. The Bega, the Timiș, the Caraș – 54 species; 6. The Nera, the Cerna – 51 species; 7. The Jiu – 28 species; 8. The Olt – 31 species; 9. The Vedea – 29 species; 10. The Argeș – 29 species; 11. The Ialomița – 31 species; 12. The Siret – 29 species; 13. The Prut – 31 species; 14. The Danube – 113 species (54 species along the Romanian sector); 15. The shore area – 96 species (82 species on the continental platform of the Black Sea, the Romanian sector)

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Methods

In order to globally evaluate the diversity and distribution of the species, an inventory of the gastropods within the Romanian hydrographic network was done. On this basis, I made, for the first time, a synthesis of the gastropods distribution in Romania.

Results and discussion

Altogether 135 species have been identified within the lower basin of the Danube River, (Cioboiu Codoban, 2003).

On the basis of a synthetic analysis, there were noticed significant differences in the species' presence in the hydrographic net (Table 1). The highest number of species was registered in the Danube.

Table 1

Distribution of Gastropoda within the lower basin of the Danube

Crt. No.	Taxonomic composition	The upper Tisa	The Someş	The Crişuri	The Mureş	The Bega	The Timiş	The Caraş	The Nera	The Cerna	The Jiu	The Preajba	The Olt	The Vedea	The Argeş	The Ialomiţa	The Siret	The Prut	The Danube,	Its flood plain, the Danube Delta	The ecosystem type characteristic for the species	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1.	<i>Theodoxus fluviatilis</i>																	+	+	+	rv, lk	
2.	<i>Theodoxus pallasi</i>																			+	+	rv, lk
3.	<i>Theodoxus danubialis</i>	+				+	+	+	+	+										+	+	rv, lk
4.	<i>Theodoxus d. stragulata</i>					+	+	+												+	+	rv, lk
5.	<i>Theodoxus d. serratilinea</i>			+																+	+	rv, lk
6.	<i>Theodoxus transversalis</i>	+	+		+	+	+	+	+	+			+					+	+	+	+	ub
7.	<i>Theodoxus prevostianus</i>			+																+	+	rv, lk
8.	<i>Theodoxus euxinicus</i>																				+	lk
9.	<i>Viviparus viviparus</i>										+	+						+	+	+	+	rv, lk
10.	<i>Viviparus acerosus</i>		+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	ub
11.	<i>V. acerosus rumaenicus</i>																			+	+	rv, lk
12.	<i>Viviparus contectus</i>		+		+													+	+	+	+	rv, lk
13.	<i>Viviparus hungaricus</i>																			+	+	rv, lk
14.	<i>Valvata (V.) cristata</i>	+				+	+	+	+	+			+					+	+	+	+	rv, lk
15.	<i>Valvata (A.) pulchella</i>					+	+	+	+	+										+		rv
16.	<i>Valvata (C.) piscinalis</i>					+	+	+	+	+	+	+	+	+						+	+	ub
17.	<i>Valvata (C.) p. antiqua</i>					+	+	+												+	+	rv, lk
18.	<i>Valvata (B.) naticina</i>	+																		+	+	rv, lk
19.	<i>Hydrobia ventrosa</i>																				+	br
20.	<i>Pseudamnicola penchinati</i>																			+	+	rv, lk
21.	<i>Pseudamnicola razelmiana</i>																				+	br
22.	<i>Pseudamnicola leontina</i>																				+	br
23.	<i>Pseudamnicola dobrogica</i>																			+		rv
24.	<i>Paladilhia (P.) transylvanica</i>		+	+	+	+	+	+														st
25.	<i>Paladilhia (P.) carpathica</i>		+	+	+	+	+	+	+	+										+	+	ub
26.	<i>Paladilhia (P.) leruthi</i>				+	+	+	+														st
27.	<i>Bythinella molcsany</i>	+	+	+	+	+	+	+														sp
28.	<i>Bythinella dacica</i>				+	+	+	+	+	+	+											sp
29.	<i>Bythinella a. austriaca</i>				+	+	+	+	+	+	+											sp
30.	<i>Bythinella a. melanostroma</i>				+	+	+	+	+	+												sp
31.	<i>Potamopyrgus jenkinsi</i>					+	+	+												+	+	rv, lk
32.	<i>Lithoglyphus naticoides</i>				+	+	+	+	+	+			+							+	+	ub
33.	<i>Lithoglyphus apertus</i>	+												+		+				+	+	rv, lk
34.	<i>Lithoglyphus pigmaeus</i>																					rv
35.	<i>Bithynia mostarensis</i>																			+	+	lk
36.	<i>Bithynia tentaculata</i>			+	+										+	+	+	+	+	+	+	ub
37.	<i>Bithynia t. f. producta</i>			+																+		rv
38.	<i>Bithynia leachi</i>				+								+		+	+	+	+	+	+	+	rv, lk
39.	<i>Bythinia l. f. troschelli</i>													+						+	+	rv, lk
40.	<i>Bythinia l. f. Inflata</i>																				+	rv, lk
41.	<i>Micromelania (T.) lincta</i>																				+	br
42.	<i>Micromelania (T.) dimidiata</i>																			+	+	br

43.	<i>Micromelania (T.) ismailensis</i>																				rv	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
44.	<i>Clessiniola variabilis</i>																				+	br
45.	<i>Rissoa (R.) membranacea</i>																				+	lk
46.	<i>Rissoa (T.) parva</i>																				+	lk
47.	<i>Rissoa (T.) dolium</i>																				+	lk
48.	<i>Fagotia (F.) esperi</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
49.	<i>Fagotia (F.) e.f. pardalis</i>																					rv
50.	<i>Fagotia (F.) e.f. turgida</i>																					lk
51.	<i>Fagotia (F.) e.f. subtilis</i>																				+	lk
52.	<i>Fagotia (M.) acicularis</i>		+	+	+	+	+	+	+	+	+	+									+	ub
53.	<i>Amphimelania h. holandri</i>						+	+	+	+	+											st
54.	<i>Amphimelania h. afra</i>						+	+	+	+	+											sp
55.	<i>Amphimelania h. aequata</i>	+					+	+	+	+	+											st
56.	<i>Amphimelania h. aequalata</i>						+	+	+	+	+											st
57.	<i>Amphimelania parvula</i>						+	+	+	+	+											st
58.	<i>Cerythium vulgatum</i>																				+	br
59.	<i>Chrysallida (P.) interstineta</i>																				+	lk
60.	<i>Chrysallida (P.) pontica</i>																				+	br
61.	<i>Retusa (C.) truncatula</i>																					br
62.	<i>Retusa (C.) t.f. opima</i>																					br
63.	<i>Retusa (C.) striatula</i>																					br
64.	<i>Cylichnina robagliana</i>																					br
65.	<i>Acteocina pontica</i>																					br
66.	<i>Embletonia pulchra</i>																					br
67.	<i>Ovatella (M.) myosotis</i>																					br
68.	<i>Physa fontinalis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
69.	<i>Physa fontinalis f. bulla</i>		+																			rv
70.	<i>Physa fontinalis f. maior</i>	+											+								+	rv
71.	<i>Physa acuta</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
72.	<i>Aplexa hypnorum</i>				+				+	+	+	+									+	rv, lk
73.	<i>Lymnaea stagnalis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
74.	<i>Lymnaea s. f. vulgaris</i>																					lk
75.	<i>Lymnaea s. f. angulata</i>																					lk
76.	<i>Stagnicola palustris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
77.	<i>Stagnicola p.f. flavida</i>																				+	rv, lk
78.	<i>Stagnicola p.f. curta</i>			+																	+	rv, lk
79.	<i>Stagnicola p.f. fusca</i>																					lk
80.	<i>Stagnicola p. transsylvanica</i>		+	+	+																	lk
81.	<i>Stagnicola corvus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
82.	<i>Stagnicola turricula</i>	+	+	+	+																+	rv
83.	<i>Radix auricularia</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
84.	<i>Radix a. f. Contracta</i>																					lk
85.	<i>Radix ovata</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
86.	<i>Radix o.f. expansilabris</i>																				+	rv
87.	<i>Radix o.f. ampulla</i>						+	+	+					+	+	+						rv
88.	<i>Radix o.f. patula</i>						+	+	+							+				+		rv
89.	<i>Radix o.f. ampla</i>						+	+	+					+	+	+						rv
90.	<i>Radix o.f. piniana</i>													+		+						rv
91.	<i>Radix lagotis</i>																					lk
92.	<i>Radix peregra</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
93.	<i>Radix p.f. curta</i>																				+	rv, lk
94.	<i>Radix p.f. microstoma</i>																				+	rv, lk
95.	<i>Radix p.f. elongata</i>																				+	rv, lk
96.	<i>Radix p.f. melanopsisformis</i>																				+	rv, lk
97.	<i>Myxas glutinosa</i>																				+	rv, lk
98.	<i>Galba truncatula</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
99.	<i>Galba t.f. turrita</i>																					lk
100.	<i>Galba t.f. longispirata</i>																					lk
101.	<i>Galba t.f. oblonga</i>																					lk
102.	<i>Ancylus fluviatilis</i>						+	+	+	+	+	+									+	rv, lk
103.	<i>Ancylus f.f. cornu</i>													+								st
104.	<i>Acroloxus lacustris</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
105.	<i>Ferrissia wautieri</i>				+	+	+	+	+	+	+	+									+	rv, lk
106.	<i>Planorbis planorbis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
107.	<i>Planorbis p.f. submarginatus</i>			+		+	+	+	+	+	+	+										rv
108.	<i>Planorbis p.f. subcarinatus</i>																					lk
109.	<i>Planorbis carinatus</i>	+		+					+	+											+	rv, lk
110.	<i>Anisus (A.) spirorbis</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
111.	<i>Anisus s.f. dazurii</i>			+																	+	rv, lk
112.	<i>Anisus (A.) s.f. major</i>																				+	lk

113.	<i>Anisus (A.) septemgyratus</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub	
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
114.	<i>Anisus (A.) rotundatus</i>					+	+	+	+	+			+	+	+	+			+	+	rv, lk
115.	<i>Anisus (A.) r.f. grandis</i>																			+	lk
116.	<i>Anisus (D.) vortex</i>	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	ub
117.	<i>Anisus (D.) vorticulus</i>			+															+	+	rv, lk
118.	<i>Bathyomphalus contortus</i>				+	+	+	+	+	+				+	+	+			+	+	rv, lk
119.	<i>Gyraulus (T.) laevis</i>					+	+	+	+	+			+				+			+	rv, lk
120.	<i>Gyraulus (G.) albus</i>	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	ub
121.	<i>Gyraulus (G.) a.f. microombilicatus</i>			+															+	+	rv, lk
122.	<i>Gyraulus (G.) a.f. pseudocostulatus</i>																			+	lk
123.	<i>Gyraulus (G.) acronicus</i>					+	+	+	+	+							+	+	+		rv
124.	<i>Armiger crista</i>	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	ub
125.	<i>Armiger c.f. cristatus</i>					+	+	+	+	+					+				+	+	rv, lk
126.	<i>Armiger c.f. nautilius</i>					+	+	+	+	+									+	+	rv, lk
127.	<i>Armiger c.f. spinulosus</i>					+	+	+	+	+											rv, lk
128.	<i>Armiger c.f. bielzi</i>														+				+	+	rv, lk
129.	<i>Hipppeutis complanatus</i>	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	ub
130.	<i>Segmentina nitida</i>	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	ub
131.	<i>Planorbarius corneus</i>	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	ub
132.	<i>Planorbarius c.f. etruscus</i>																			+	lk
133.	<i>Planorbarius c.f. ammoceras</i>																			+	lk
134.	<i>Planorbarius c.f. elophilus</i>					+	+	+	+	+									+	+	rv, lk
135.	<i>Planorbarius c.f. similis</i>					+	+	+	+	+									+	+	rv, lk

br – brackish; lk – lake; rv – river; sp – spring; st – stream; ub – ubiquarian

The following species have the largest distribution: *Theodoxus transversalis*, *Viviparus acerosus*, *Fagotia (F.) esperi*, *Physa fontinalis*, *Physa acuta*, *Lymnaea stagnalis*, *Stagnicola palustris*, *Radix auricularia*, *Radix ovata*, *Galba truncatula*, *Acroloxus lacustris*, *Planorbis planorbis*, *Anisus (A.) spirorbis*, *Gyraulus (G.) albus*, *Armiger crista*, *Segmentina nitida*, *Planorbarius corneus* considered ubiquarian species (Cioboiu Codoban, 2003).

As opposed to the above-mentioned species, *Viviparus contectus*, *Valvata (A.) pulchella*, *Bythinella a. austriaca*, *Bithynia tentaculata f. producta*, *Amphimelania h. afra*, *Stagnicola palustris f. curta*, *Gyraulus (G.) acronicus*, *Armiger crista f. nautilus*, *Planorbarius corneus f. similis* were identified in a low number of rivers (Tittizer, 1990).

The species *Theodoxus euxinicus*, *Valvata (B.) naticina*, *Hydrobia ventrosa*, *Pseudamnicola razelmiana*, *P. dobrogica*, *Clessiniola variabilis*, *Rissoa (Rissostomia) membranacea*, *Cerithium vulgatum*, *Retusa (C.) truncatulla* display special characteristics. They were found both in fresh and brackish water ecosystems (Frank, 1987; Boschke, 1990; Nosek, 1996; Csanyi, 1996).

The Danube and its flood plain, inclusively the Danube Delta, yield the greatest diversity of fresh water species. This situation is due to the diversity of the ecosystems types (rivers, lakes, pools, marshes) so well integrated within this space (Buşniţă & Brezeanu, 1970; Negrea, 1994; Russev, 1998; Cioboiu & Brezeanu, 2000).

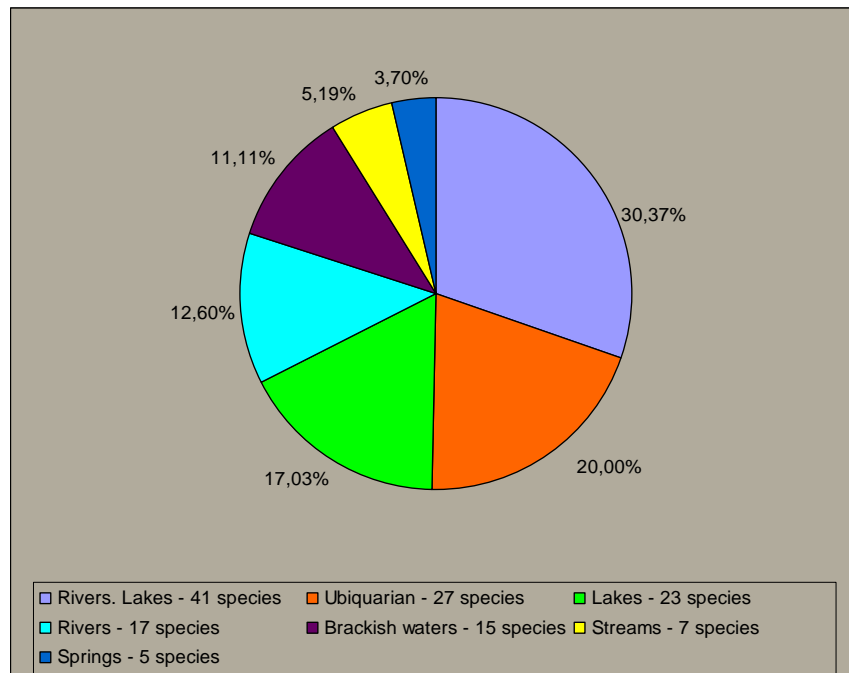
The ecological framing of the gastropods from the hydrographic basins of Romania emphasizes that the most frequent species are the fluvial-lacustrine (41), followed by the ubiquarian species (27), the reophile species (17), the brackish species (15), and the cryophilic species (12) in springs, streams (Fig. 2).

Conclusions

By analysing the distribution of Gastropoda within the Romanian sector of the Danube lower hydrographic basin, it results that the greatest diversity of species characterizes the Danube.

The flood plain, the Danube Delta and the rivers display a well-balanced distribution of the Gastropoda species.

Fig. 2 Distribution of the Gastropoda according to the ecosystem type (percent)



The global evaluation of the diversity of aquatic Gastropoda in Romania represents our contribution to the knowledge of the Danube's hydrographic basin biodiversity.

References

- BOSCHKE, E.G. (1990): Kommensale peritriche ciliaten der Mollusken des sowjetischen. Abschnittes der Donau Limnologische Berichte Der. 28 Tagung Der IAD, Varna: 268 – 271.
- BREZEANU, Gh., ENĂCEANU, Virginia (1969): Structura calitativă și cantitativă a biocenozelor din Dunăre – Hidrobiologia t.10, București: 13 – 26.
- BUȘNIȚĂ, Th., BREZEANU, Gh. (1970): Hydrobiologische untersuchung der Donau und ihrer zuflusse im abschnitt des Donaudurchbruches în Monografia zonei Porților de Fier – Editura Academiei Române, București: 226 – 237.
- CIOBOIU, Olivia, BREZEANU, Gh.. (2000): The Gastropoda Diversity in the Romanian Area of Danube pools, in Relation with Habitat Types – Limnological Reports, volume 33, Proceedings 33rd Conference, Osijek, Croatia: 15 – 19.
- CIOBOIU CODOBAN, Olivia (2003): Gastropodele din apele continentale ale României și zona litorală a Mării Negre – Editura Sitech Craiova: 1 – 95
- CSANYI, B. (1996): Macrozoobenthon community of the Danube River between Rajka and Mohacs (1849 – 1447 km) – 31 Konferenz der IAD, Limnologische Berichte Donau: 551 – 557.
- FRANK, K. (1987): Die Molluskenfauna des Osterreichischen Donautales – 26 Arbeitstagung der IAD, Passau / Deutschland: 354 – 358.
- GROSSU, Al.V. (1993): The catalogue of the mollusks from Romania – Trav. Museum d'Histoire Naturelle Grigore Antipa, vol. XXXIII, București: 291 – 366.

NEGREA, Alexandrina (1994): Contribution a l'étude faunistique et biogéographique des Gastropodes du secteur roumain du Danube – *Annls. Limnol.* 30: 179 – 195.

NOSEK, J.N. (1996): Untersuchung der Wirbellosen Wassermakrofauna in der Kleinen Schuttinsel (Szigetkoz) – 31. Konferenz der IAD, Baja, Ungarn. Wissenschaftliche Referate: 255 – 260.

RUSSEV, B. (1998): Das Makrozoobenthos der Donau – Dynamik der Veränderungen durch anthropogenen Einfluß Plankton und Benthos der Donau. Ergebnisse der Donau – Forschung Band 4, Österreich, Viena: 257 – 364.

TITTIZER, Th. (1990): Über den Einfluß hydrodynamischer und gewässermorphologischer Faktoren auf das Makrozoobenthos der Donau und ihrer Nebenflüsse. *Limnologische Berichte Der* – 28. Tagung der IAD, Varna, Bulgarien: 79 – 90.