

The distribution of the aquatic and semiaquatic Heteroptera (Nepomorpha, Gerromorpha) in the middle basin of the River Olt

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Abstract:

In this work we are going to analyze the distribution of the species of aquatic and semi aquatic Heteroptera identified by us in the middle basin of the River Olt, function of the altitude where the collecting stations are situated and function of the types of habitats that were researched.

The presented facts might lead to the conclusion that the aquatic and the semi aquatic heteroptera in the researched area prefer a relatively low altitude, situated between 350-500m.

The greatest diversity of the aquatic and semi aquatic Heteroptera was recorded in the permanent swamps (30 species), followed by the natural lakes and the anthrop lakes (25 species per each), streams (22 species), temporary swamps (15 species) and rivers (11 species).

Keywords: Nepomorpha, Gerromorpha, distribution, altitude, habitat, the middle basin of the River Olt.

Introduction

The River Olt is the third, considering its size, among the rivers in Romania. It gathers its springs in The Eastern Carpathians and goes through different relief forms to its way to pouring out into Danube.

The middle basin of The River Olt is situated between Racoș and Râmnicu Vâlcea, having as borders The Târnava Plateau and The Odorhei Hills in the Northern part, The Perșani Mountains in the Eastern part, The Făgăraș Mountains in the Southern part and The Parâng Mountains in the Western part, all these having a surface of over 10.000km².

This area has some geologic, hydrologic, weather and space characteristics as well as specific anthrop ones that make it very interesting for any kind of approach regarding its biodiversity.

Materials and methods

The activity in the field, an essential part of the study, took place during 2000-2002 and 2004, being established 66 collecting and observations stations, distributed in such a way, in order to manage to cover the investigated zone and to comprise a great variety of habitats.

The different altitudes where the stations were situated had been established from 50m to 500m.

The habitats, from where was performed the collecting, falls into the following categories: natural lake, anthrop lake, permanent swamp, temporary swamp, stream or river.

Results and discussions

The first observation that we made, taking into account the data processed by us (table 1), was that all the species had a well defined continuity, considering the altitude, in the way that only *Hesperocorixa linnaei* Fieber, 1848, can be considered an exception (it can be found at the altitude of 400-450m and 500-700m, but missing between 450-500m).

Only one aquatic species and one semi aquatic belonging to Heteroptera that we found in the entire middle basin of the river Olt provide a good cover on the altitude of the researched area (*Microvelia reticulata* Burmeister, 1835 and *Notonecta glauca glauca* Linnaeus, 1758, that were gathered from the altitude of 300m till 2036m), and a number of 13 species are to be found on the entire area at the altitudes between 300-700m (4 from the Infraorder Gerromorpha: *Gerris thoracicus* Schummel, 1832, *Gerris odontogaster* Zetterstedt, 1828, *Gerris lacustris* Linnaeus, 1758, *Hydrometra stagnorum* Linnaeus, 1758 and 9 from the the Infraorder Nepomorpha: *Micronecta (Dichaetonecta) scholtzi* Fieber, 1860, *Corixa punctata* Illiger, 1807, *Sigara (Sigara) striata* Linnaeus, 1758, *Sigara (Subsigara) iactans* Jansson, 1983, *Sigara (Vermicorixa) lateralis* Leach, 1817, *Ilyocoris cimicoides cimicoides* Linnaeus, 1758, *Nepa cinerea* Linnaeus, 1758, *Notonecta viridis* Delcourt, 1909, *Plea minutissima minutissima* Leach, 1817). On the other hand there were only 10 species (*Gerris asper* Fieber, 1860, *Gerris costae costae* Herrich-Schaeffer, 1850, *Velia (Velia) rivulorum* Fabricius, 1775, *Hebrus (Hebrusella) ruficeps* Thomson, 1871, *Hydrometra gracilentata* Hor-

Table 1.

The presence of Heteroptera species at different altitudes in the researched area

Species	Altitude						
	300-350	350-400	400-450	450-500	500-700	720	2036
<i>Gerris (Aquarius) paludum paludum</i>	+	+	+	+			
<i>Gerris asper</i>			+				
<i>Gerris thoracicus</i>	+	+	+	+	+		
<i>Gerris costae costae</i>			+	+			
<i>Gerris argentatus</i>		+	+	+	+		
<i>Gerris odontogaster</i>	+	+	+	+	+		
<i>Gerris lacustris</i>	+	+	+	+	+		
<i>Microvelia reticulata</i>	+	+	+	+	+		+
<i>Velia (Velia) rivulorum</i>					+	+	
<i>Hebrus pusillus pusillus</i>		+	+	+			
<i>Hebrus (Hebrusella) ruficeps</i>		+	+				
<i>Hydrometra stagnorum</i>	+	+	+	+	+		
<i>Hydrometra gracilentata</i>			+	+			
<i>Mesovelia furcata</i>		+	+	+	+		
<i>Mesovelia vittigera</i>		+	+	+	+		
<i>Micronecta (Dichaetonecta) scholtzi</i>	+	+	+	+	+		
<i>Cymatia coleoptrata</i>			+				
<i>Callicorixa praeusta praeusta</i>			+				
<i>Corixa punctata</i>	+	+	+	+	+		
<i>Hesperocorixa linnaei</i>			+		+		
<i>Hesperocorixa sahlbergi</i>		+	+	+			
<i>Paracorixa concinna concinna</i>			+				
<i>Sigara (Pseudovermicorixa) nigrolineata nigrolineata</i>		+	+	+	+		
<i>Sigara (Retrocorixa) limitata limitata</i>		+	+	+	+		
<i>Sigara (Retrocorixa) semistriata</i>			+				
<i>Sigara (Sigara) striata</i>	+	+	+	+	+		
<i>Sigara (Subsigara) iactans</i>	+	+	+	+	+		
<i>Sigara (Vermicorixa) lateralis</i>	+	+	+	+	+		
<i>Ilyocoris cimicoides cimicoides</i>	+	+	+	+	+		
<i>Nepa cinerea</i>	+	+	+	+	+		
<i>Ranatra linearis</i>	+	+	+	+			
<i>Notonecta viridis</i>	+	+	+	+	+		
<i>Notonecta glauca glauca</i>	+	+	+	+	+		+
<i>Plea minutissima minutissima</i>	+	+	+	+	+		
The total of the species in the altitude researched areas (intervals)	17	25	33	26	22	1	2
The number of stations in the altitude researched areas	3	12	21	18	10	1	1

váth, 1899, *Cymatia coleoprata* Fabricius, 1777, *Callicorixa praeusta praeusta* Fieber, 1848, *Hesperocorixa linnaei*, *Paracorixa concinna concinna* Fieber, 1848 and *Sigara (Retrocorixa) semistriata* Fieber, 1848) that were collected in only one or two altitude zones delimited by us.

We also noticed that *Gerris costae costae*, which is characterized in the literature of specialty as a mountainous species (POISSON 1957), appeared in our study only in the stations between 400-500m. On the other hand, *Velia (Velia) rivulorum* appeared in two stations at 507m and 720m (at the very foot of the Fagaras Mountains), in accordance with the information in the bibliography.

We mention that at the altitude of 720m was situated only one gathering point, in a mountain stream where we identified only *Velia (Velia) rivulorum* and of whose conditions are not favorable for

spectively 450-500m, where were identified nearly the same number of species (25 and 26, representing 73,53% and respectively 76,47% from the total of the aquatic and semi aquatic Heteroptera gathered by us in the middle basin of the River Olt, under the conditions that the number of the points from where were taken the samples was smaller between 350-400m (12 and 18 stations, representing 18,18% and respectively 27,27% from the total of 66 collecting stations).

It is to be noticed, on the diagram, how the decrease is continued on the altitude intervals, of 300-350 and 500-700m, stressed in the former case, where were gathered a number of 17 and respectively 22 species (representing 50,00% and respectively 64,71% of the total of aquatic and semi aquatic Heteroptera identified by us in the researched area), the differences being also to be found in the number of

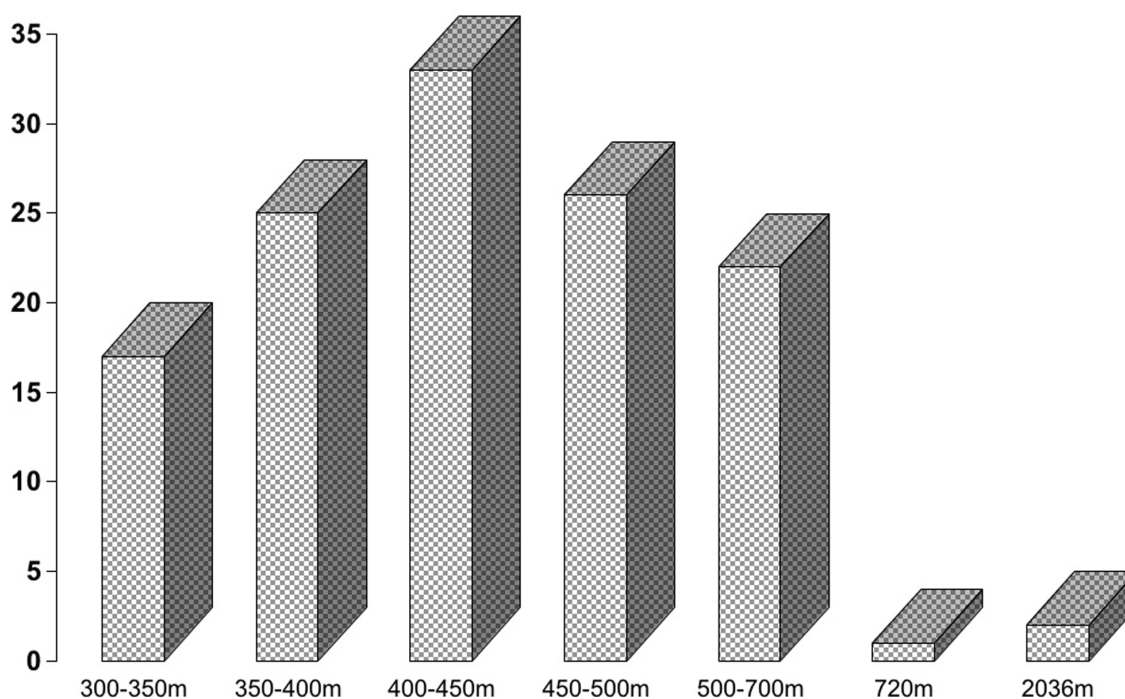


Fig. 1. The representation of the number of Heteroptera species function of altitude

the existence of other aquatic and semi aquatic Heteroptera. In the case of Bâlea Lake we think that, indeed the altitude is the restrictive factor of the spreading of the researched species, being collected only an aquatic Heteroptera and a semi aquatic one.

Most of the species (33 – representing 97,06% from the total of the aquatic and semi aquatic Heteroptera gathered by us in the middle basin of the River Olt) were gathered in the stations situated at 400-450m altitude, but this, under the conditions that at this altitude were to be found the most of the collecting points (21-representing 31,8% from the total of our collecting points).

Starting from this maximums there can be noticed (fig. 1), a decrease to 350-400m altitude, re-

the collecting points (3 and 10 stations, representing 4,55% and respectively 15,15% of the total of the collecting stations in the middle basin of the River Olt).

Analysing the table 2 is established the identification of a number of 9 aquatic and semi aquatic Heteroptera which are present in all those 6 types of habitats, which are quoted upper: *Gerris thoracicus*, *Gerris lacustris*, *Hydrometra stagnorum*, *Micronecta (Dichaetonecta) scholtzi*, *Sigara (Sigara) striata*, *Sigara (Vermicorixa) lateralis*, *Nepa cinerea*, *Notonecta viridis* and *Notonecta glauca glauca*. On the other side there are a number of 7 species, which prefer a single type of habitat: *Gerris asper*, *Gerris costae costae*, *Velia (Velia) rivulorum*, *Cymatia*

Table 2.

The presence of researched species in different types of habitats

Species	NL	AL	TS	PS	S	R
Gerris (Aquarius) paludum paludum	+	+	+		+	
Gerris asper				+		
Gerris thoracicus	+	+	+	+	+	+
Gerris costae costae					+	
Gerris argentatus	+	+		+	+	
Gerris odontogaster	+	+		+	+	
Gerris lacustris	+	+	+	+	+	+
Microvelia reticulata	+	+		+	+	+
Velia (Velia) rivulorum					+	
Hebrus pusillus pusillus	+	+		+	+	
Hebrus (Hebrusella) ruficeps	+	+		+	+	
Hydrometra stagnorum	+	+	+	+	+	+
Hydrometra gracilentata		+		+		
Mesovelia furcata	+	+		+		
Mesovelia vittigera	+	+		+		
Micronecta (Dichaetonecta) scholtzi	+	+	+	+	+	+
Cymatia coleoptrata				+		
Callicorixa praeusta praeusta				+		
Corixa punctata	+	+		+		
Hesperocorixa linnaei	+			+		
Hesperocorixa sahlbergi		+	+	+		
Paracorixa concinna concinna	+					
Sigara (Pseudovermicorixa) nigrolineata nigrolineata		+	+	+	+	
Sigara (Retrocorixa) limitata limitata	+		+	+		
Sigara (Retrocorixa) semistriata				+		
Sigara (Sigara) striata	+	+	+	+	+	+
Sigara (Subsigara) iactans	+	+	+	+	+	
Sigara (Vermicorixa) lateralis	+	+	+	+	+	+
Ilyocoris cimicoides cimicoides	+	+	+	+	+	
Nepa cinerea	+	+	+	+	+	+
Ranatra linearis	+	+		+	+	+
Notonecta viridis	+	+	+	+	+	+
Notonecta glauca glauca	+	+	+	+	+	+
Plea minutissima minutissima	+	+		+	+	
The total of species in the researched habitats	25	25	15	30	22	11
The number of stations in the researched habitats	6	8	6	12	24	10

Conventional signs:

NL: Natural Lakes, AL: Artificial Lakes, TS: Temporary Swamps, PS: Permanent Swamps, S: Streams, R: Rivers.

coleoptrata, *Callicorixa praeusta praeusta*, *Paracorixa concinna concinna* and *Sigara (Retrocorixa) semistriata*.

Putting together the data in the literature of specialty with the results obtained by ourselves, we

can say that the species with only one presence in the researched area, *Callicorixa praeusta praeusta* and *Sigara (Retrocorixa) semistriata* are characteristic for the swamps, and *Paracorixa concinna concinna* appears only in lakes.

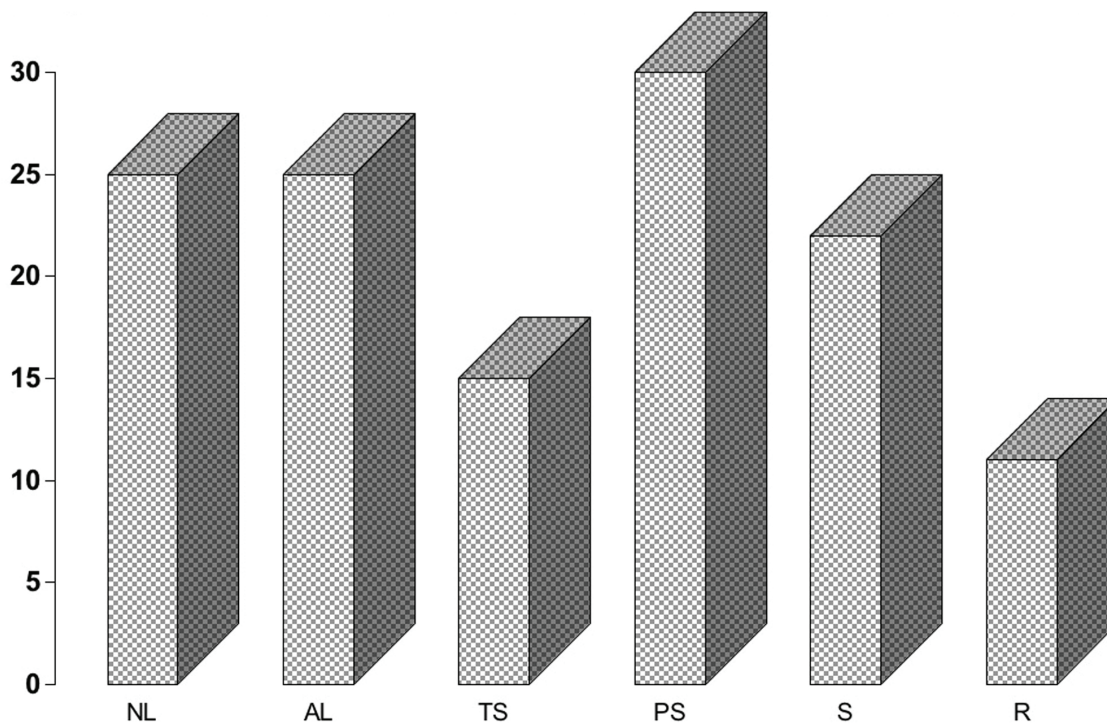


Fig. 2. The representation of the number of Heteroptera species identified in different habitats

There was noticed that a number of 12 species prefer the lentic habitats to the lenitic ones, from which 4 were found only in swamps (*Gerris asper*, *Cymatia coleoptrata*, *Callicorixa praeusta praeusta* and *Sigara (Retrocorixa) semistriata*), only one species was identified only in lakes (*Paracorixa concinna concinna*) and 7 species gathered both from swamps and lakes (*Hydrometra gracilentata*, *Mesovelgia furcata* MULSANT & REY, 1852, *Mesovelgia vittigera* HORVÁTH, 1895, *Corixa punctata*, *Hesperocorixa linnaei*, *Hesperocorixa sahlbergi* FIEBER, 1848 and *Sigara (Retrocorixa) limitata limitata* FIEBER, 1848). We can also notice that there is no species, which was collected only from those two types of lakes (natural and artificial ones) or only from those two types of swamps (permanent and temporary ones).

On the other hand we noticed that only two species were collected only from lenitic habitats, these being collected only from streams (*Gerris costae costae* and *Velia (Velia) rivulorum*)

Making a comparison between rivers and streams we remark the fact that there wasn't any species only in rivers, there being 11 species collected only from streams (*Gerris (Aquarius) paludum paludum* Fabricius, 1794, *Gerris costae costae*, *Gerris argentatus* Schummel, 1832, *Gerris odontogaster*, *Velia (Velia) rivulorum*, *Hebrus pusillus pusillus* Fallén, 1807, *Hebrus (Hebrusella) ruficeps*, *Sigara (Pseudovermicorixa) nigrolineata nigrolineata* Fieber, 1848, *Sigara (Subsigara) iactans*, *Ilyocoris cimicoides cimicoides* and *Plea minutissima minutissima*), because the lenitic habitats a better represented.

The greatest biodiversity (30 – representing 88,24% from the total of aquatic and semi aquatic Heteroptera collected by us in the middle basin of the River Olt) was collected from the permanent swamps (fig. 2), under the condition that this habitat comprises 12 collecting points (which represent 18,18% of the total of our collecting stations). There is interesting to remark the fact that in the temporary swamp, in those 6 collecting points (9,09% from the total of 66 collecting stations) were collected 15 species (44,12% of the species found by us in the entire middle basin of the River Olt), so exactly half, both from the number of stations, as well as from the number of species found in the permanent swamps. This progression is not to be found in the comparison regarding the number of individuals, where, as it was expected, the scale is in the favour of permanent swamps (4860, respectively 165 samples). For the other lentic habitats we remark the fact that there was collected the same number of species (25 – representing 73,53% from those 34 species identified by us in the middle basin of the River Olt), there appearing relatively small differences in the number of collecting points (6 stations in the natural lakes and 8 in the artificial lakes, representing 9,09% and respectively 12,12% from the total of our collecting stations), where from we can draw the conclusion that the man influence does not affect the existence and development of the aquatic and semi aquatic Heteroptera. This observation is being strengthened by the similarity of the number of the collected individuals (2.811 from the natural lakes and respectively 2.102 from the artificial lakes).

In the case of the lenitic habitats was noticed

Table 3.

The reference of the number of species and respectively the number of individuals to the number of collecting stations for those 6 researched habitats

The Habitat	Stations number	Collected species number/ Habitat	“Species” Coefficient Species number/ Stations number	Individuals number/ Habitat	Individuals” coefficient Individuals number/ station number
Natural Lakes	6	25	4.17	2.811	468.5
Artificial Lakes	8	25	3.13	2.102	262.8
Temporary Swamps	6	15	2.50	165	27.5
Permanent Swamps	12	30	2.50	4.860	405.0
Streams	24	22	0.92	1.782	74.3
Rivers	10	11	1.10	123	12.3

that the aquatic and semi aquatic researched Heteroptera prefer the streams to the rivers, from where were collected a number of 22 respectively 11 species (representing 64,71% and respectively 32,35% from the total of the species identified by us in the researched area. The differences being found again in the number of the collecting points (24 and 10 stations, representing 36,36% and respectively 15,15% from the total number of collecting stations in the middle basin of the River Olt), there existing a differentiation in the number of collected individuals from the two habitats (1782 from the streams and 123 from the rivers).

For a more complete analysis we introduced two coefficients obtained from the scale of the number of species and respectively the number of individuals found in the collecting stations in those habitats (table 3).

From this table one can notice a predisposition of the researched species for the lentic habitats (with the exception of the temporary swamps in the case of the total number of collected individuals), followed by streams, where the lentic zone is better expressed and, at a great distance from rivers where the conditions are not good for the existence of many aquatic and semi aquatic Heteroptera species.

Conclusions

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The presented facts might lead to the conclusion that the aquatic and the semi aquatic heteroptae in the researched area prefer a relatively low altitude, situated between 350-500m.

The greatest diversity of the aquatic and semi aquatic Heteroptera was recorded in the permanent swamps (30 species), followed by the natural lakes and the anthrop lakes (25 species per each), streams (22 species), temporary swamps (15 species) and rivers (11 species).

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Received: 25.11.2007

Accepted: 29.11.2007

Printed: 28.10.2008