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MALACOFAUNISTICAL AND ECOLOGICAL DATA FROM THE TROAŞ VALLEY

T. Domokos and K. Váncsa

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Abstract. Detailed studies on the malacofauna of the Mureş River valley were initiated in the summer of 2000. Till 2002 14 sites were sampled on the flood-plain of the Mureş and in the adjacent territories. However, complex ecological statements require the knowledge of the whole malacofauna of the Mureş drainage area. As a first step data were gathered from the valleys of the Troaş and Dumbrovița streams. These sites, when compared to the other sites sampled so far, yielded numerous precious taxa which are under protection in the neighboring countries.
Thus the publication of these data is especially important, because no surveys on the malacofauna of this region have been carried out so far. Even professor Grossu in his grand comprehensive work Gastropoda Romaniae does not mention the malacofauna of the Zărand Mountains.
The topographical and hydrological conditions of the sampling sites, in total 10, are depicted on 4 figures. The list of species found is published in 4 tables.
In the 9th site of the Troaş valley, sampling was carried out along a transect, so the different habitats and species identified are depicted on separate figures. The differences between the ecological groups present in the biotopes are visualized via bar-charts.
Finally, data of these transect were compared with the data of another transect with the same character, took of in the verge of the Sălciva village on the Zam-Pass in 2001.

Keywords: Mollusk fauna, Troaş valley, malacofaunistical transect, Carpathian species.

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Introduction

From the summer of 2000 we took part in a research organized by the Universities of Szeged and Cluj-Napoca, which surveyed the Mureş River valley as an ecological corridor. In the course of the research 14 sites were sampled between 2000 and 2002, going through the Mureş River valley, to get a general picture of the malacofauna of the valley, which had not been studied previously on this scale.

Due to the shortage of time and funding, the survey was restricted only to an initial step implemented at a larger scale (Váncsa 2002; Domokos *et al*. 2002, Váncsa and Domokos 2003).

Data was collected in the Dumrovița stream valley (near Groşii Noii village) in the summer of 2001, followed by sampling in the Troaş stream valley during the summer of 2002 (Fig.1). The fieldwork was made possible by a natural science class of the Museum of Arad (Complexul Muzeal Arad).

At the reach of Mureş between Deva and Radna, the Zărand Mountain's short reach but high rushing rivers formed the drainage basin of the Almaş and the Bîrzava. These relatively narrow, high-gradient streams are usually seasonal with relatively low water outputs from precipitation and springs (Andó 1995, Sárkány-Kiss *et al*. 1997).

The streams of the Troaş valley (17 km long valley) and Dumbrovița valley (approximately 15 km long valley), subjected to surveying, belong to this basin, and they largely contribute to the growing ecological value of the Mureş valley. At a larger scale, together with the Mures river, they belong to the drainage area of the Tisa.

The Dumbrovița valley is situated west of the Troaş valley, its stream charging into the Mureş near Căpruța 25 km below Săvîrşin. Here the sampling took place in a forest reservation (Rezervația Naturală de tip forestier silvic Bîrzava) situated north of the village Groşii Noii.

The Troaş valley, surveyed at length in 2002, is on the SE side of the Zărand Mountains. The valley's waterflows start from a height of 800 m ASL and the Troaş stream gathering them goes to a height of 150 m ASL on the Lipova Plain, where it charges into the Mureş river under Săvîrşin. It gathers several minor permanent and seasonal streams like: Tisa, Galşa, Pietros and Cătălinii. In conformity with the valley character, we tried to collect samples from different stream valleys (Fig. 1).

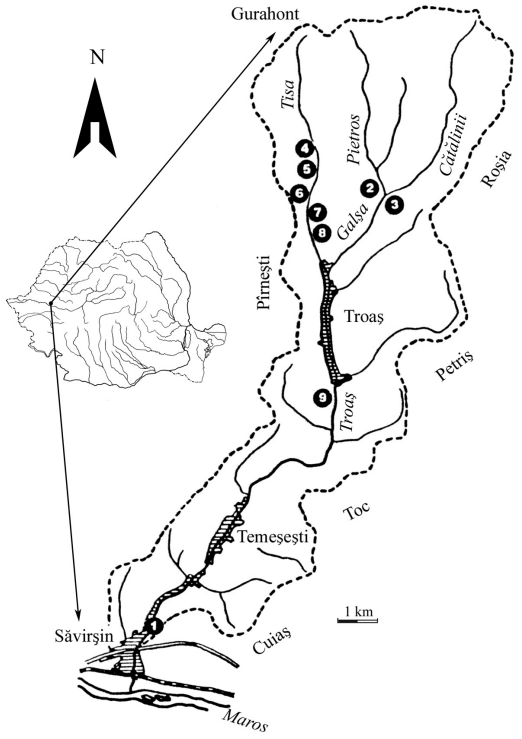


Fig. 1. The sampling sites in the Troaş ecohydrological system (Romania).

According goal was to compare data of these valleys with data coming from the previous surveys implemented at the reach of the Mureş river above Săvîrşin in 2000, in order to see what kind of species derive from the Troaş and Dumbrovița valleys contributing to the enrichment of the malacofauna of the Mureş valley. Furthermore, the actual function rate of the ecological corridor along the 17 km length of the Troaş valley was also evaluated comparing data from nine sites. At sites where the quadrate sampling method was applied the deriving data was investigated cenologically as well.

In the summer of 2000, Gyurkovics and Szekeres were sampling in the forest near Slatina stream close to the nearest Julița village. This territory belongs to the drainage basin of the Almaş and the Bîrzava too. They collected only species belonging to the family Clausilidae, but to complete the malacofaunistical data of the Zărand Mountains they give us the following list of the collected species: *Balea stabilis* (Pfeiffer 1847) 7 pc.; *Balea biplicata* (Montagu 1803) 5 pc.; *Bulgarica vetusta* (Rossmässler 1836) 1 pc.; *Cochlodina laminata* (Montagu 1803) 3 pc.; *Laciniaria plicata* (Draparnaud, 1805) 3 pc.; *Ruthenica filograna* (Rossmässler, 1836) 12 pc. We owe thanks for their favour.

Description of the sampling sites

The *Alnus-Carpinus-Fraxinus* zone on the right banks of the Troaş stream. This biotope can be found under a steep granite slope before a big curve, close to the Mihai King's castle fence in Săvîrşin. Between the castle fence and the stream is a forest road boarded with iron barrier. On the shrub level there were: *Crataegus*, *Cornus* and *Corylus*; and herb-likes: *Salvia*, *Telekia*, *Galium*, *Rubus*, *Urtica*, *Cirsium*.

The right banks of the Pietroasa stream with *Alnus*, before it fuses with the Cătălinii stream. The float debris (2 dm^3) collected near the bridge is composed of basalt splinters, *Fagus*, *Carpinus* and *Corylus* yields. Supposedly the float debris comes from the drainage area under Gurahont.

A sunny and nettled place between the left bank of the Cătălinii stream and a forest-path, before the bridge of Galşa stream.

A squelchy place with bract, covered by herb-likes (*Asarum*, *Pteropsida*, *Salvia*, *Telekia*, *Urtica*), between a forest-path in the right banks of the Tisza stream and the foot of the mountain with beeches.

The 3-4 m high mossy cliff formed under the construction of the forest-path which goes in the Tisza valley; near of the sign 35 hm. (The cliff probably has magma origin, possibly basalt.)

Sunny grass-spot near the bridge of the stream which goes into the Tisa. We found two water snails on that little stream too.

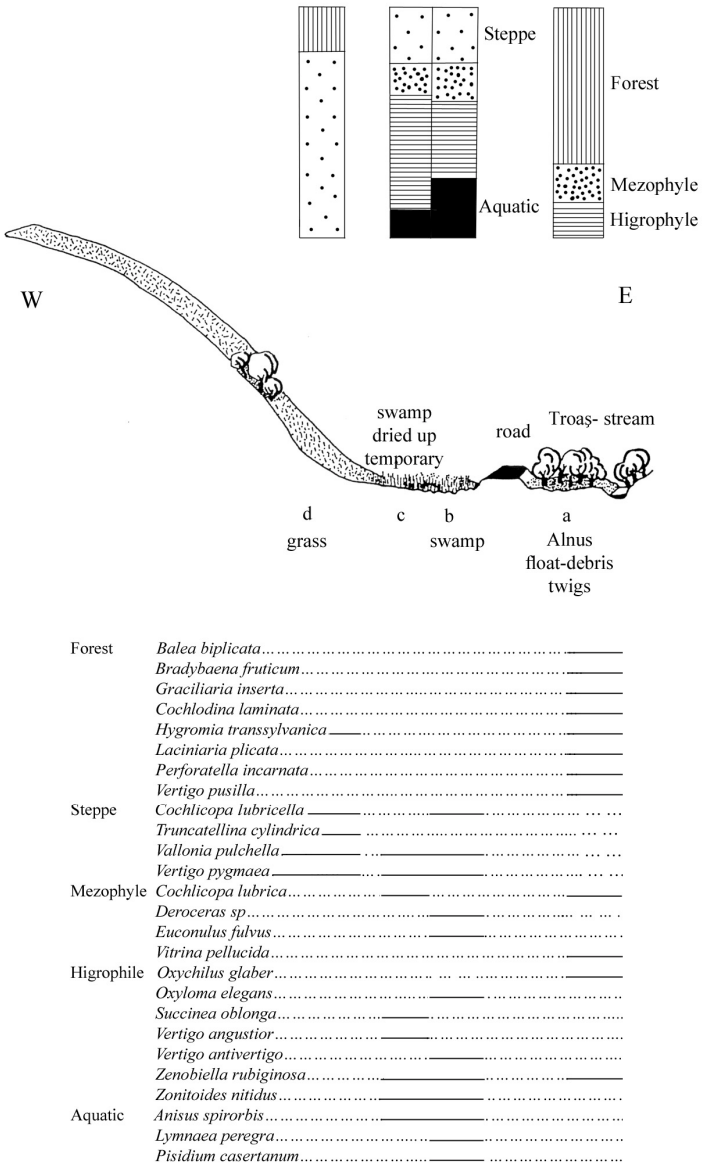


Fig. 2. The W-E oriented malacofaunistical transect and the band-diagrams of the Ložek's ecological species groups on the Troaş Valley (Fig. 1, sampling No. 9). The species groups are fused by authors.

Steep slope with stones near the forest-path on the left bank of the Tisa, and south of the sign of 20 hm.

A forest spot with *Alnus* on the two sides of Tisa stream, near the sign of 20 hm of the forest-path.

A four-biotope collecting transect, a few hundred meters south of the village of Troaş. The biotopes:

-the right bank of the Troaş stream with *Alnus*, east of the high road; in this biotope the soil was covered by alluvia, twigs and stumps

-a sunny and moist swamp with *Orchis*, on the west side of the high road

-a part of the swamp dried up during the summer

-mowed and at times burned grass (with *Crepis*, *Filipendula*, *Fragaria*, *Thymus*) on the steep slope west of the swamp with *Orchis*; on the grass were some bushes and above was bordered with forest.

Methods of collection and data processing

Because of the shortage of time and weather difficulties the sampling was carried out using different methods:

-via singling at the 1st, 3rd, 4th, 5th, 6th, 7th, 8th, 9a and 9b sampling sites (Figs 1. and 2.)

-via mass collection from the float-debris, at the 2nd sampling site

-via quadrate sampling (4 pc. 1/16 m^2) at the 9c and 9d sampling sites (Fig. 2.)

Two singling method have been systematically applied: the spread singling method, and the combined method of singling and quadrate sampling along the transect.

From the samples took with the quadrate method, the entities were sort out with a magnifier.

The following bibliography helped us in the determination of the species: Bába and Kovács (1975); Damjanov AND Likharev (1975); Domokos (1995); Grossu (1955, 1981, 1983, 1987); Kerney *et al*. (1983); Kiss (1981); Kiss and Pintér (1985); Ložek (1964); Pelbárt (2000); Pintér (1984); Pintér and Varga (1981); Richnovszky and Pintér (1979); Soós (1943).

The collected and processed malacological material is published in the Tables 1., 2., 3. and 4. From those tables it is possible to read the number of species and the number of entities by sampling sites, and in the case of quadrate samples the abundance (pc/m^2).

Because in the case of the 9th site, sampling was made all over a transect the results are represented in a complex figure (Fig. 2.). In the figure the found species are indicated by a continuous line under each biotope. The found species have been ranked into ecological groups (Ložek 1964). The percentage of the species groups in a biotope is illustrated by the band-diagrams over the transect's sketch.

Results and discussion

Before all, we have to clear up that in our work we confine only to the publication of data. As long as we have little data available, we can't undertake to make serious analysis and comparisons. On the other hand, we think that the publication of collected and processed data and deducting preconclusions is real, because as we know in the Zărand Mountains nobody had done this kind of work before. So we take the first steps in malacological exploration of this area with the slogan: Somewhere it has to start.

First we set off the endemic and quasi-endemic species of this area because they increase the ecological value of the territory. The species with thin spread area are: *Argna* (*Agardhia*) *parreyssi*, *Graciliaria inserta, Helicigona banatica*. Between them the *Argna parreyssi* and *Helicigona banatica* occur only in Transylvania and in the Praecarpathicum area (Deli 1997), while the habitat of the *Graciliaria inserta* is in the Banat Mountains, in Retezat Mountains, in some places in the Metaliferi Mountains and in the valley of Temeş, Jiu and Sebeş. We have to mention also the Carpathian endemic species with biggest habitats like: *Balea stabilis, Campylea faustina, Hygromia transsylvanica, Perforatella dibothryon* and *Spelaeodiscus triaria* (Bába 1982, Grossu 1955, 1981, 1983, 1987, Ložek 1964).

Professor Lajos Soós told about *Argna* and *Orcula* that they are "notable endemic species" (Soós 1943). Soós wrote about the *Argna*, just like Grossu did on the *Orcula* that they both like limestone. This is surprising because we find them on granite stone. The northernmost boundary of the spread area of *Argna* according to Soós is the south-west corner of Transylvania. Later sources (Pintér *et al.* 1979) mention *Argna parreyssi* from Tiszatelek and Szeged too (both from float-debris), where it comes probably with the hydrochor expansion of the ecological corridor of the Tisza and Mureş Rivers (Deli 1997). We can't exclude the possibility that the specimens found in the alluvia in Szeged comes from the Troaş valley. We know from our experience that *Orcula jetschini* exist in the Bihar Mountains too.

One of the most interesting species found in the Troaş valley is the *Graciliaria inserta*. Its occurrence in the Zărand Mountains is a new literature data, because nobody had described it before from this place (2003, Szekeres pers. comm.).

After the literature data and the scientists opinion, it is a surprising fact that the two *Bulgarica* species *Bulgarica cana* and *Bulgarica vetusta* occur together in a relatively little area. After the ecological claim of this two species they can't be found usually in the same territory (2003, Szekeres pers. comm.).

At the 1st sampling site *Hygromia transsylvanica* making copulation was observed, possibly because of the rainy weather. On this place the *Helix lutescens* were darker than specimens from the Great Plains. Here we found as we know the biggest *Helicigona banatica* which was 35.6 mm wide and 17.7 mm high, besides it was a living specimen! This specimen is the biggest piece of the *Helicigona* collection of the Munkácsy Mihály Museum. On the basis of this short survey it seems that larger and more conical specimens dwell in the Troaş valley lives than in the Bihar Mountains.

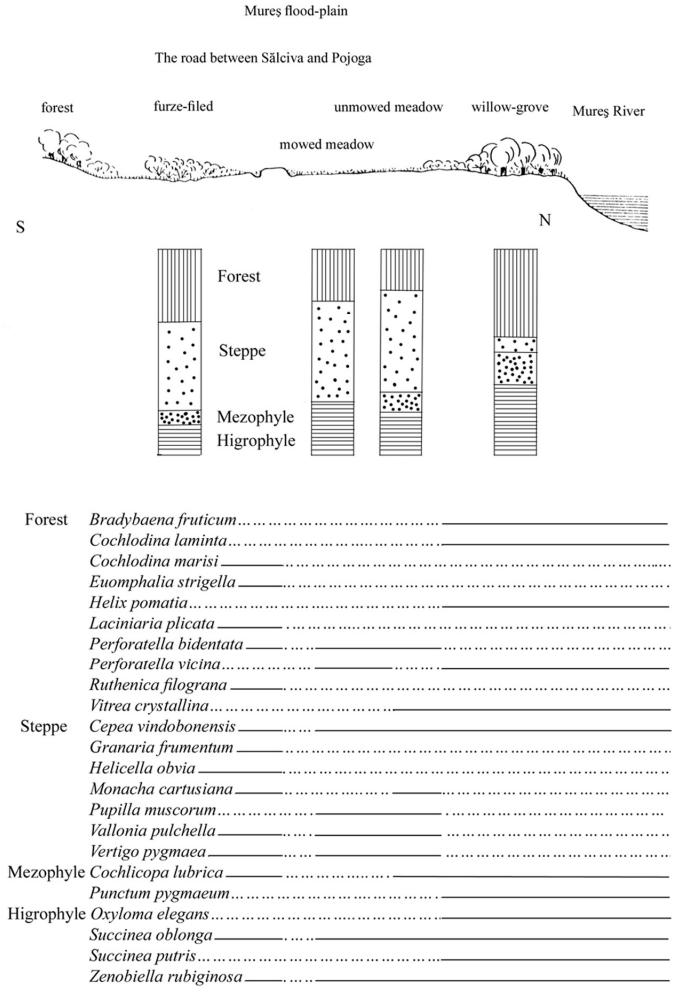


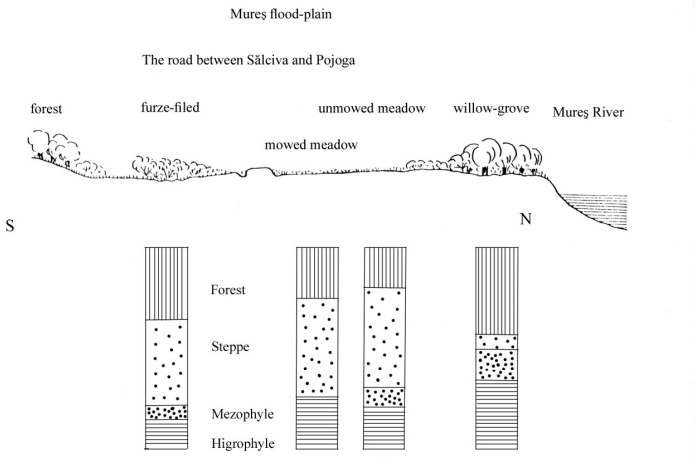
Fig. 3. The N-S oriented malacofaunistical transect on the Mureş River flood-plain, and species found here (07-12. 08. 2001).

At the 2nd sampling site we found the most interesting species from the Troaş valley in float-debris. Because they were in alluvia it would be worthy to find out where each species have their habitats.

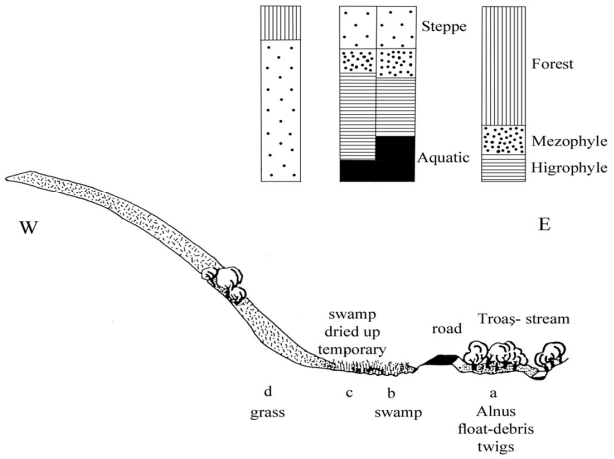
At the 5th sampling site we also had to work in rainy conditions and thanks to that we managed to observe the feeding of *Clausilia pumila* on the mossy cliff.

The water species we found at the 6th sampling site were *Ancylus fluviatilis* and *Lymnea peregra* in the little stream which flows into Tisa stream. Sárkány-Kiss, A. published in 1995 his *Ancylus fluviatilis* data concerning the Mureş River (Sárkány-Kiss 1995). The lower points where he found this species were near Răstolița, 105 rkm from the spring of the Mureş. Lower in the 600 km polluted reaches of Mureş River this species can not adapt to the conditions. On those territories the *Ancylus* lives on the highest reaches of streams which flow into Mureş.

During the research on the Mureş valley (in 2000) the nearest sampling site to the Troaş valley's 9th site was in the Zam-Pass on the verge of Sălciva village. In both places we took samples from 4 different biotopes along a transect. Since we draw the similar sketches about the sampling places and similar figure about the results, we think that via comparing the figures the registration of differences and causalities is feasible (Fig. 4).



Band-diagrams based on the transect from the Mureş flood-plain (07-12. 08. 2001.)



Band-diagrams based on the transect from the Troaş valley's 9th sampling place (06-08. 08. 2001.)

Fig. 4. Comparison of the two sampling place's band diagrams to register the malacofaunistical differences and causalities of the two transects.

The transect from the flood-plain of the Mureş was more extensive (approximately 300 m long) and was situated at a lower elevation than the 9th sampling site from the Troaş valley (Fig. 3). The transect took in the Mureş flood-plain is made up of the following botanical areas:

-50 m wide grove wood, situated on the bank which is rich in plant species (a jungle like *Salicetum albae-fragilis*);

-beyond the grove extends cultivated lands like mowed meadow on the right side of the transect;

- the left side of the transect is the same but with unmowed meadows;

-and finally beyond the road, which connects the villages Sălciva and Pojoga, is a furze-field with mixed botanical domain.

The furze-field closes the transect but it is important to mention that beyond it there are grasslands again and finally the flood-plain is closed by the mountain slope covered by forests made up of alder and beech trees (Váncsa 2002; Domokos *et al.* 2002). So we can see that the two transects are made up of the same habitats and the order of habitats is not radically different too.

Table 1. Malacological material collected via singling in the Troaş valley (06-08. 06. 2002.)

Mollusc species found in the Toraş valley	Sampling sites								
	1.	2.	3.	4.	5.	6.	7.	8.	9.
Achantinula aculeata (O.F. MÜLLER, 1774)	-	11	-	-	-	-	-	-	-
Aegopinella minor (STABILE, 1864)	2	22	-	2	-	-	-	4	-
Acicula banatica (ROSSMÄSLER, 1842)	-	6	-	-	-	-	-	-	-
Ancylus fluviatilis (O.F. MÜLLER, 1774)	-	-	-	-	-	1	-	-	-
Anisus spirorbis (LINNÉ, 1758)	-	-	-	-	-	-	-	-	13
Argna parreyssi (PFEIFFER, 1848)	-	22	-	-	-	-	-	-	-
Balea biplicata (MONTAGU, 1803)	2	-	2	-	-	-	-	-	1
Balea stabilis (PFEIFFER, 1847)	-	4	-	3	-	-	-	3	-
Bradybaena fruticum (O.F. MÜLLER, 1774)	1,+	1	2	-	-	-	-	-	4
Bulgarica cana (HELD, 1836)	-	-	-	1	-	-	-	-	-
Bulgarica vetusta (ROSSMÄSLER, 1836)	-	-	-	-	4	-	1	-	-
Campylea faustina (ROSSMÄSLER, 1835)	-	1	-	-	2	-	-	-	-
Carychium minimum O.F. MÜLLER, 1774	-	24	-	-	-	-	-	-	-
Carychium tridentatum (RISSO, 1826)	-	61	-	-	-	-	-	-	-
Cepea vindobonensis (FERRUSAC, 1821)	+	-	-	+	-	-	1	-	-
Cochlicopa lubrica (O.F. MÜLLER, 1774)	-	30	-	-	-	2	-	-	12
Cochlicopa lubricella (PORRO, 1838)	-	1	-	-	-	-	-	5	67
Cochlodina laminata (MONTAGU, 1803)	-	13	-	1	-	-	1	-	3
Columella edentula (DRAPARNAUD, 1805)	-	6	-	-	-	-	-	-	-
Deroceras sp.	-	-	-	-	-	-	-	-	2
Ena obscura (O.F. MÜLLER, 1774)	-	4	-	1	-	-	-	-	-
Euconulus fulvus (O.F. MÜLLER, 1774)	-	-	-	-	-	-	-	-	1
Euomphalia srigella (DRAPARNAUD, 1801)	12	-	1	8	2	-	2	-	-
Glaciniaria inserta A. & G. B. VILLA	3	-	-	-	-	-	-	-	5
Helicigona banatica (ROSSMÄSLER, 1838)	2	5	1	2	2	-	3	3	-
Helix lutescens ROSSMÄSSLER, 1837	+	-	-	1	-	-	-	-	-
Helix pomatia LINNEUS, 1758	+	-	-	1	1	-	-	-	-
Hygromia transsylvanica (WESTERLUND, 1876)	-	-	-	-	1	-	1	-	5
Laciniaria plicata (DRAPARNAUD, 1805)	-	3	-	3	-	-	1	1	4
Lymnea peregra (O.F. MÜLLER, 1774)	-	-	-	-	-	1	-	-	12
Nesovitrea hammonis (SRTÖM, 1765)	-	-	-	-	-	-	1	-	-
Orcula doliolum (BRUGUÈRE, 1792)	4	80	-	3	-	-	-	5	-
Orcula jetschini KIMAKOWICZ, 1883	-	15	-	-	-	-	-	-	-
Oxychilus glaber (ROSSMÄSSLER, 1835)	-	-	-	-	-	-	-	-	1
Oxyloma elegans (RISSO, 1826)	-	1	-	-	-	-	-	-	7
Perforatella incarnata (O.F. MÜLLER, 1774)	3	1	-	-	-	1	-	1	4
Pisidium casertanum (POLI, 1791)	-	-	-	-	-	-	-	-	3
Ruthenica filograna (ROSSMÄSSLER, 1836)	22	4	3	5	-	-	-	1	2
Speliodiscus triaria (ROSSMÄSSLER, 1839)	-	3	-	-	-	-	-	-	-
Succinea oblonga DRAPARNAUD, 1801	-	2	4	1	-	-	-	-	8
Truncatellina cylindrica (FERUSSAC, 1807)	-	-	-	-	-	-	-	-	1
Vallonia costata (O.F. MÜLLER, 1774)	-	7	-	-	-	13	-	-	-
Vallonia pulchella (O.F. MÜLLER, 1774)	-	4	-	-	-	7	-	-	90
Vertigo angustior JEFFREYS, 1830	-	-	-	-	-	-	-	-	5
Vertigo antivertigo (DRAPARNAUD, 1801)	-	-	-	-	-	-	-	-	14
Vertigo pygmaea (DRAPARNAUD, 1801)	-	2	-	-	-	-	-	-	85
Vertigo pusilla O.F. MÜLLER, 1774	-	-	-	-	-	-	-	-	2
Vitrea crystallina (O.F. MÜLLER, 1774)	-	3	-	-	-	-	-	-	-
Vitrea diaphana (STUDER, 1820)	-	31	-	2	-	-	-	1	-
Vitrea subrimata (REINHARDT, 1871)	-	4	-	-	-	-	-	-	-
Vitrina pellucida (O.F. MÜLLER, 1774)	2	-	-	4	-	-	-	4	7
Zenobiella rubiginosa (SCHMIDT, 1858)	-	-	-	-	-	-	-	1	26
Zonitoides nitidus (O.F. MÜLLER, 1774)	-	9	-	-	-	-	-	2	8
Number of entities	57	380	13	39	12	25	11	31	392
Number of species	13	31	6	16	6	6	8	12	27

„+" – indicate entities being in E1 existence form (active existence), which were not collected.

Table 2. Malacological material collected with quadrate method in Troaş valley from the 9/c sampling place. (08. 06. 2002.)

Species	The 9/c sampling place quadrates					
	1.	2.	3.	4.	Σ	A
Cochlicopa lubrica (O.F. MÜLLER, 1774)	5	-	-	1	6	24
Succinea oblonga (DRAPARNAUD, 1801)	8	-	-	-	8	32
Vallonia pulchella (O.F. MÜLLER, 1774)	28	10	9	1	48	192
Vertigo angustior (JEFFREYS, 1830)	3	2	-	-	5	20
Vertigo pygmaea (DRAPARNAUD, 1801)	26	23	19	4	72	288
Zenobiella rubiginosa (SCHMIDT, 1858)	2	-	-	-	2	8
Zonitoides nitidus (O.F. MÜLLER, 1774)	2	-	-	-	2	8
Number of entities	74	35	28	6	143	

Table 3. Malacological material collected with quadrate method in Troaş valley from 9/d sampling site. (08. 06. 2002.)

Species	The 9/d sampling places quadrates					
	1.	2.	3.	4.	Σ	A
Cochlicopa lubricella (PORRO, 1838)	10	4	13	38	65	260
Hygromia transsylvanica (WESTERLUND, 1876)	-	-	2	-	2	8
Truncatellina cylindrica (FERUSSAC, 1807)	-	-	1	-	1	4
Vallonia pulchella (O.F. MÜLLER, 1774)	8	3	11	19	41	164
Vertigo pygmaea (DRAPARNAUD, 1801)	2	-	6	1	9	36
Number of entities	20	7	33	58	118	

Table 4. Malacological material collected with singling method in Dumbrovița valley (near Groşii Noi). (06. 05. 2001.)

Species sampled in the Dumbrovița valley	Number of entities
Balea stabilis (L. PFEIFFER, 1847)	6
Cochlodina laminata (MONTAGU, 1803)	2
Euomphalia srigella (DRAPARNAUD, 1801)	2
Helicigona banatica (ROSSMÄSLER, 1838)	2
Helix lutescens (ROSSMÄSSLER, 1837)	2
Laciniaria plicata (DRAPARNAUD, 1805)	2
Perforatella dibothryion (KIMAKOWICZ, 1890)	1
Number of entities	17

At first sight the most striking difference is the richness in steep species of the transect from Sălciva. This comes from the morphological differences of the territories.

In Troaş valley we found forest species (*Balea biplicata, Hygromia transsylvanica, Perforatella incarnata, Vertigo pusilla*) which weren't traceable in the flood-plain of the Mureş, against that in Zam-Pass the forests are relatively close.

The grown appearance of *Vertigo* species in the Troaş valley shows a variety of habitat and a bigger diversity. Almost each ecological group is represented by *Vertigo* (*Vertigo pusilla* – forest species; *Vertigo pygmaea* – steppe species; *Vertigo angustior* and *Vertigo antivertigo* – higrophyle species) except the mezophyle species group. Against that near Sălciva we found only the commune *Vertigo pygmaea*.

At the sampling of Sălciva transect we didn't bother with water species, so the comparison of this group is not competent.

Comparing the hygrophile species turn out again the diversity of the population from Troaş valley, since against the four species found in the flood-plain of the Mureş (*Oxyloma elegans, Succinea oblonga, Succinea putris* and *Zenobiella rubiginosa*) here we came across much more valuable species in larger numbers like *Oxychilus glaber*, *Oxyloma*

elegans, Succinea oblonga, *Vertigo angustior*, *Vertigo antivertigo, Zenobiella rubiginosa* and *Zonitoides nitidus*.

Until the transect from the Troaş valley has a ditch form, till the Zam-Pass transect has a platter profile. In the Zam-Pass the transect was 300 m long while in Troaş valley the terrain circumstances let to be surveyed only a 100 m long transect. This morphological and dimensional difference becomes visible in the band-diagrams when compared. In the Zam transect's band-diagrams it can be well sensed that there is a gradual transition between biotopes. Conversely, the Troaş valley transect's diagrams register drastical changes, except for the fine transition between the two part of the swamp, which is understandable regarding the genetic connections of the 9b and 9c biotopes. On the grass of the 9d sampling site we found only steppe species, except *Hygromia transsylvanica*, which is a forest species and it was found near the bushes.

In abstraction we conclude that along the transect of the 9th sampling site we can find a considerably diverse malacofauna. In the Troaş valley the 9th sampling site is the second (with 27 species), regarding the species number, behind the 2nd site (with 30 species), whose samples originate from alluvia collected from a wider territory. The malacofauna which comes from the alluvia is incomparably colored taking account of having 10 species which was not found in the other samples.

In the Dumbroviţa valley we had short time to collect and because of that the collected material is poor. But in spite of what we think is important to mention it for serving data. The going of anyone to collect mollusc again on this place in reasonable time is very improbable. The *Perforatella dibothrion* was the most interesting species we met here, because this species was found only in Deda-Pass on the bank with *Telekia* of a by-stream of Mureş (Váncsa 2002, Váncsa and Domokos 2003). This species is also a Carpathian endemism.

Conclusion

In the Dumbroviţa valley, near Groşii Noii village we recorded 7 species and 17 entities.

In the Troaş valley a total 53 species and 959 entities were found. A part of the collected entities was sent to the Museum of Arad, the other part enrich the malacological collection of the Munkácsy Mihály Museum.

At the sapling sites a lot of rare Transylvanian or Carpathian endemism were found like: *Argna parreyssi, Graciliaria inserta, Hygromia transsylvanica, Orcula jetschini, Perforatella dibothryon, Spelaeodiscus triaria*. These species deserve the protection. We have to mention here that none of these gastropod species appear on the list of the protected species in Romania, so referring to them can not render protection to the habitats either.

This publication proves that is worth to extend the malacological researches over metamorphic and magma rock's soils, which at first sight seem to be poor in species.

The transect researches proves that the morphology of the valleys influence the diversity of the malacofauna found in them, and the character of the transitions between the band-diagrams of habitats.

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