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## Data on the mollusc fauna of Pădurea Craiului Mountains (Romania)

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**Abstract.** We compiled the malacofaunistic data from the Pădurea Craiului Mountains (Western part of Apuseni Mountains) based on references and on our malacologic material collected from 55 new sampling sites. Our faunistic investigation was focused primarily on the following taxa: Family Clausiliidae and Subfamily Vitreinae, *Bradybaena fruticum*, *Monachoides vicina*, *Helicigona* / *Drobacia banatica*, *Helix lutescens* and *Kovacsia kovacsi*. The malacofauna of the studied area consists of 96 terrestrial snails (Extinct: *Pomatias rivulare*), 40 freshwater snails (Extinct: *Theodoxus fluviatilis*, *T. danubialis*, *T. prevostianus*, *Anisus leucostoma*) and 10 mussels (Bivalvia). The faunal record includes altogether 146 taxa (from which five extinct species) and about 700 new units.

**Keywords:** snails, bivalves, taxonomy, distribution, extinction, Western Romania.

### Introduction

Pădurea Craiului Mountains covers about 750 km<sup>2</sup> and lies in the north-western part of the Apuseni Mountains, bordered by the Vad-Borod Basin on the North and by the Beiuș Basin on the South; the eastern border is demarcated by

the Iadului Valley. The Vârciorog-Dobrești alignment divides this fingered platform into an eastern unit with higher altitudes (e.g. the peak of Hodrângușa: 1026 m) and in a western unit with gradually dropping altitudes, called Pădurea Craiului Hills.

The geologic structure of the Pădurea Craiului Mountains exhibits a great variety of rocks in a mosaic-like arrangement. The deposits mostly belong to the Bihor Unit and Apusenides (Balintoni 1997, 2001). This structural unit represents a thick-skinned nappe with Variscan basement complex and its Mesozoic sedimentary cover (Haas & Péro 2004). The crystalline basement exposed to the east and southeast consist mainly of gneiss and micaschist. The sedimentary cover, as a result of early Alpin evolution, consists of Triassic-Jurassic-early Cretaceous carbonate sequences and includes limestones, dolomites and detritic complexes. The late Cretaceous (Senonian) detritic formations outcrop in the Roșia Basin, in the Remeți graben and Vad Basin (sandstones, conglomerates, clays). In the Vad-Borod and Beiuș Basins Neogene sediments (marls, sands, gravels, argillaceous shales, clays) overlie the Mesozoic formations. Long-term erosion in the karst terrains (more than 330 km<sup>2</sup>) produced a great variety of feature including gorges, karst capture depressions and plateaus penetrated by sinkholes and caves. In the Pădurea Craiului carbonate deposits a great variety of karst valleys were developed (see Onac 2002). The drainage-areas belong to the hydrographic basins of Crișul Repede and Crișul Negru rivers.

The annual rainfall in the Pădurea Craiului Mountains increases from west to east and ranges between 800-1200 mm (Orășanu 2010). Conversely, the mean annual temperature increases from east to west ranging between 4-8°C. The vegetation developed in these conditions consists of forests and grasslands. Important areas of this mountain range are covered by mixed deciduous forests (Groza 2006).

The study area in the east runs along the Iad River. At the outflow of Iad it changes to westward and follows the direction of Crișul Repede River into Vadu Crișului. Afterwards it follows the Birtin – Săbălciu – Oșorhei – Oradea direction. After that the study area follows in a line the Pețea rivulet – Sutului Valley – Cotiglet – Luncasprie – Remetea – Meziad – Iadului Valley. The study area is presented on the sketch map (Fig.1; see also Bordea 1978).

The malacofaunistic research of Pădurea Craiului Mountains gives an outline of one-sidedness, since it was researched only in the environs of the eastern (Vadul Crișului Gorge and its surroundings) and the western part (mainly Episcopiei Resort and Oradea) of the mountains. The past malacofaunistic data on the area comes from Kertész 1890 (Table 1/A, 1/B: column 1); Csiki 1902 (Table 1/A,

1/B: column: 2); Kormos 1904, 1905a, 1905b; Rotarides 1931 (included Kormos 1904, 1911a, 1911b and Soós 1915 (Table 1/A, 1/B: column 3); Soós 1943 (Table 1/A, 1/B: column 4); Bába & Kovács 1975 (included Rotarides 1942, 1943 –Table 1/A, 1/B column: 5.); Kovács 1977 (Table 1/A, 1/B: column 6); Váncsa 2006 (leg. Kovács in 1960 – 1990: Table 1/A, 1/B: column 7) as well as Sîrbu 2006. Sîrbu's lots of data are shown in Table 1/B: column 8 and later in the check-list referring to the freshwater mollusc fauna from our study area (Fig. 1; Bordea 1978).

Data from the collections of Munkácsy Mihály Museum (Békéscsaba) and the Hungarian National History Museum (Budapest) are shown in column 9 (Bába et al. 2005, Domokos & Váncsa 2005; Table 1/A, 1/B: column 9.a, 9.b) and 10.

Some more information is derived from the monographic work of Grossu [1981, 1983: *Arion ater* (Oradea), *Ceciliodes acicula* (Oradea: Lacul Pețea/ Episcopiei Resort), *Helicigona banatica* (Oradea: Lacul Pețea / Episcopiei Resort), *H. maeotica* (Stâna de Vale: upper course of Iad river), *Helicopsis instabilis* (Oradea: Mai 1 / Episcopiei Resort), *Laciniaria plicata* (Vadu Crișului: Peștera Ungurului), *Lehmannia valentiana* (Oradea: Mai 1 / Episcopiei Resort )] and from Majoros et al. [2008: *Biomphalaria tenagophila* (Răbăgani)].

In the molluscs collection of Alexandru V. Grossu from the study area the recent molluscs cannot be found in Museul Țării Crișurilor (Oradea) (Gagiu 2007).

Taking all into account, the number of discovered species in the study area (Fig. 1) based on references is 136.

### Description of the sampling sites

Sampling sites in chorological order (Fig. 2):

1. Meziad – Valea Peșterii, wooded Triassic limestone rock wall at the end of the gorge, 100 m far northward and southward from the bridge. The biotope faces west and is covered with dead leaves and mosses.  
4 May 2009
2. Meziad – Valea Peșterii, Peștera Meziad. Woody (hornbeam, beech) rock-glacier at the ramp of the cave. It is covered with dead leaves of forest and great burdock.  
4 May 2009
3. Meziad – 3 km far eastward from the settlement. Near to the left-side of the Meziad brook.  
4 May 2009



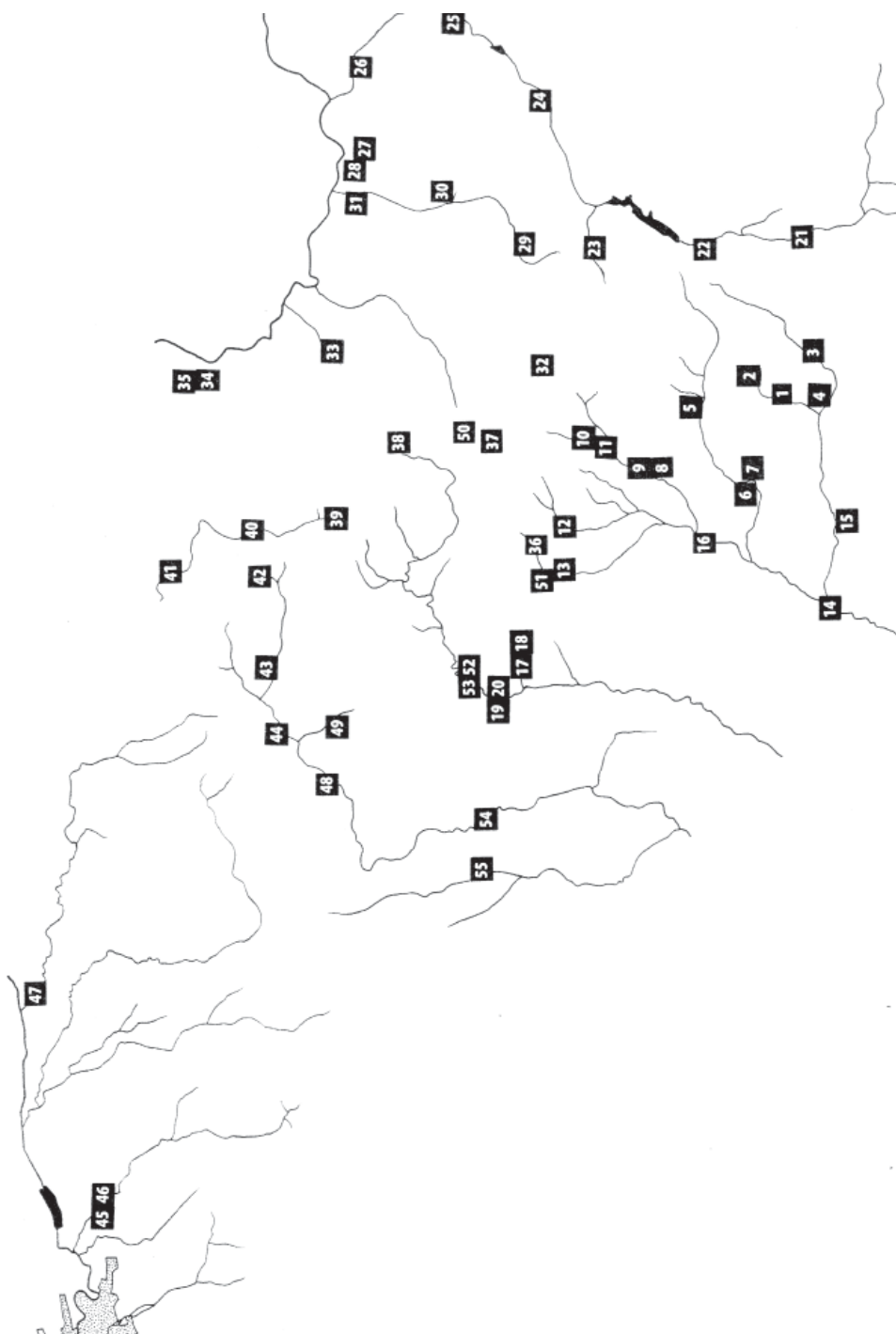


Fig. 2. The sketch map of the sampling sites in chronological order

4. Meziad – Valea Șasa, near to the settlement. Stony and sunny biotope. We found here a typical rock-vegetation.  
4 May 2009
5. Sohodol – Left side of the Sohodol brook. The sampling site is 3 km far from the church of the settlement. The green corridor is not symmetrical, since there is a forest only on the left (southern) bank of the brook. The right side of the brook is a plough-land. Sampling was carried out by using different methods: via singling and via mass. We also collected from the scum.  
5 May 2009
6. Sohodol – This biotope is between Căbești and Sohodol. Rock masses (exposed to west and covered by redzina and dead leaves of forest) on the left bank of the Sohodol brook under Vf. Ogoarelor. A relatively open biotope.  
5 May 2009
7. Sohodol – Right side of the Sohodol brook in front of sampling site No.6. It is a typical shrub-wooded and grassy brook side.  
5 May 2009
8. Lazuri – Cheile Lazurie, on rocks of the Șoimuș brook bed.  
5 May 2009
9. Lazuri – Cheile Lazurie, rock-vegetation, a relatively open biotope exposed to north.  
5 May 2009
10. Ponița – Valea Soimuș, the collected species were fixed on the stones of the Roșia brook.  
5 May 2009
11. Ponița – Travertine wall near to the bridge of Valea Roșie at the curve of an important unpaved road.  
5 May 2009
12. Ponița – Cheile Cuților, Pestera Cuților, rock vegetation. The sampling was carried out by using different methods: via singling and via mass collection. Thick humid and mouldy dead leaves (beech, hornbeam, cornus, lime) of forest. Living *Helix pomatia* specimens are frequent.  
5 May 2009
13. Roșia (Țarina) – Cheile Albioarei, rocks (exposed to west) under Peștera Uricioșii, near to the road. It is a stony and forest litter biotope.  
5 May 2009

14. Remetea / Magyarremete – Shrub and woody (willow, alder and poplar) left side of the Roșia brook near to the football field. A relatively dry green corridor (5 meters wide) biotope. We took samples from under small standing dead trees and bark of tree fallen to pieces.  
5 May 2009
15. Remetea / Magyarremete – Seasonal current between Remetea and Meziad. This is a sedgy biotope in the forest (willow, alder) on the north side of the asphalted road. The biotope is 20 meters wide, very humid and drenched.  
6 May 2009
16. Roșia – The green corridor is 300 m far southward from the water-mill, between the road and the brook arm. This Alnetum with great burdock (*Urtica*, *Petasites*, *Equisetum*) is situated on the left side of the Roșia brook. This very humid sampling site is only 5-3 meters wide.  
6 May 2009
17. Luncasprie – Valea Toplița. The bed of the Toplița brook. The species were fixed on the stones of the brook bed, high up the brook.  
6 May 2009
18. Luncasprie – Valea Toplița. We took samples in the environ of the cave (Peștera Toplița). A rock-glacier biotope with rock-vegetation (great burdock) close to the karst spring.  
6 May 2009
19. Luncasprie – Cheile Vida. The sampling site is northward from a small bridge. The collected species were fixed on the stones of the Vida brook.  
6 May 2009
20. Luncasprie – Cheile Vida. Cliffs on the right side of the gorge, in the close proximity of the bridge (fluviometer). Sampling method: via mass from detritic rock vegetation and soil.  
6 May 2009
21. Meziad – Valea Iadului, 2 km far northward from Cascada Iadolina close to the bridge. We took samples from sunny (rock vegetation) and shady (bridge pillar) biotopes.  
9 July 2009
22. Leșu – Valea Iadului, Leșu recreation area. There are cliffs near to the tour route marked with blue triangle, on the left side of Iad brook. This biotope is opposite to Valea Guga.  
9 July 2009

- 23.** Remeți – Poiana – Valea Leșului, Peștera cu apa, rock glacier. The sampling site is exposed to south and situated along the tour route marked with red triangle. Rock vegetation.  
9 July 2009
- 24.** Remeți –Valea Boții, 500 m far from the asphalted road (DJ 108J). A limestone quarry with rock vegetation.  
9 July 2009
- 25.** Munteni – Humid (flood) inundation area of the lad brook. This is a shady green corridor (willow, alder) with great burdock. From a part of the sampling might be scum!  
10 July 2009
- 26.** Bulz – Valea Iad. Loess vegetation on the left side of the lad brook. A relatively open and warm mossy biotope.  
10 July 2009
- 27.** Lorău – Valea Boiului. Great burdock on the alluvia of the brook, 100 m far northward from the Cascada Boiului.  
10 July 2009
- 28.** Lorău – Valea Boiului. On the left side of the brook, 500 m far north-westward from the Cascada Boiului. The sampling site (rock masses and beech forest litter) is on the downhill, at the foot of the rock wall.  
10 July 2009
- 29.** Damiș – Valea Mare (15 km far south-westward from Bratca). Mica schist outcrop of the downhill on the right side of the brook.  
10 July 2009
- 30.** Bratca – Valea Arsura. Loose travertine, forest litter (beech, walnut) on the right side of the brook.  
10 July 2009
- 31.** Bratca – karst spring (Izbuc Bratcanilor).The sampling site is covered by great burdock (bramble, nettle) and forest litter. The soil is hidden under ivy here and there and beaten by forest animal.  
11 July 2009
- 32.** Poiana Damiș – Ponorul Runcșor, his is the surroundings (Salix, beech) of the south end of the settlement. We collected from forest litter, logging stumps and fine logging, woody debris of hornbeam grove.  
11 July 2009
- 33.** Șuncuiuș – Cliffs over the karst spring (Izbuc Izbăndis) north-westward from the settlement. The examined narrow rock-shelves are wooded (Fagus) and covered with forest litter. The cliffs are exposed to north-



east. This sampling site is shady and relatively cool.

11 July 2009

- 34.** Birtin – Natural cutting of the temporary course were examined. The sampling site is southward from the settlement. The cutting is steep and covered with dead leaves of forest (locust, maple) and fine logging woody debris on both sides.

11 July 2009

- 35.** Birtin – This site can be found on the brook bed (bed of a concreted canal!) in the settlement, southward from the church.

11 July 2009

- 36.** Roșia (Țarina) – Forester's lodge northward from Peștera Ciur Izbuș. Pattern material originating from the ridges of the rock wall could be found by the side of the unpaved road (→ Ponița) edging the wood. The biotope is relatively open and exposed to north-west.

11 July 2009

- 37.** Zece Hotare – Limestone rock masses on both sides of the road DJ 764, in the surroundings of Peștera Sohodol and the road junction.

11 July 2009

- 38.** Tomnatic – sunny and humid marsh (*Carex*, *Juncus*, *Lysimachia*) at the sharp curve of the road DJ 764. Many living specimens.

11 July 2009

- 39.** Cornet – 3,7 km far from the settlement, near to a sharp curve of the road DJ 764, beech grove, dead leaves of forest (beech).

12 July 2009

- 40.** Gălășeni – Valea Mnierei, at the curve of the road DJ 764, 5 km far from the settlement. It is a typical dry rock vegetation.

12 July 2008

- 41.** Călățele Pădurea – The sampling site is near to the signboard of the settlement, rock vegetation at the edge of pine-grown. It is a relatively very dry biotope near to the road DJ 764.

12 July 2008

- 42.** Cornet – Wetland at the sharp turn of the road DJ 764, 1,9 km W from settlement. The sampling site is covered with great burdock.

12 July 2008

- 43.** Vânciorog – Peștera Osoi, detritic rock at the foot of the rock wall in the surroundings of the cave. This is a shady but dry nettle biotope on the rubble soil.

12 July 2008

44. Vârciorog – At the sharp turn of the Topa brook, southward from the settlement. We took samples from rock masses situated on the right side of the Topa. This green corridor (willow, alder, nettle and bramble) is some meters wide only.  
12 July 2009
45. Oșorhei – dried out concreted bed of the Tășad brook (covered by silt and dried out aquatic plant community). The studied area lies under the bridge and in its surroundings south-eastward from the national road (No. 1, E60). The sampling site is 2.5 km far from Crișul Repede, from the inflow of the Tășad rivulet.  
26 September 2009
46. Oșorhei – It is the grassy right side of the Tășad brook being exposed to west. The biotope lies south-eastward from the national road (Nr.1, E60).  
26 September 2009
47. Săbolciu – It is the marshy (Salicetum) biotope of the Cloșcoi brook between the national road (No.1, E60) and the railway.  
26 September 2009
48. Vârciorog – Valea Topa, this sunny and dry sampling site is 3 km far from the parting of the ways (Dl. Șermaș). The Arduous cliffs face the Peștera De sub Stan. Sampling via singling and mass.  
26 September 2009
49. Vârciorog – 2.7 km far southward from Șermas parting of the ways this is an Alnetum on the left side of the Vârciorogul brook. The ground is covered with moss humid dead leaves of forest (alder).  
26 September 2009
50. Zece Hotare – Prislop, it is 750 m far south-eastward from Chicera Buglei (784 m), the edge of beech forest, along the road DJ 764. We collected samples from rock masses as well as forest litter.  
26 September 2009
51. Roșia (Țarina) – Cheile Albioarei, moss rock vegetation on the western side of the gorge, 500 m far southward from the road junction (DJ 767C). Sampling via mass.  
27 September 2009
52. Luncasprie – Cheile Vida. The left side of the Vida brook. The rock masses of the gorge are exposed to north-west, overgrown with moss and covered by forest litter (Fagus).  
27 September 2009

53. Luncaspie – Cheile Vida. The examined biotopes face south-east and are close to Peștera Sifonaelor. We took samples on the right side of the Vida brook, from under the rock vegetation of the rock outcrop, as well as, we collected scum 1-2 m above brook level. The scum was surpassingly rich in species!  
27 September 2009
54. Topa de Sus – It is on the right side of the Topa brook, near to the bridge, between Ceișoara and Topa de Sus, about 150 m height above sea level.  
27 September 2009
55. Cotiglet – Valea Satului, at the bridge of the road (DC 197). Sandy and shady slope on the right side of the brook. Forest litter (alder, willow). About 200 m height above sea level.  
27 September 2009

### Methods

We took plotless samples from dead leaves of forest, big standing dead trees (snag), litters and fine woody debris, scum, etc. via singling (60 minutes/site) and via mass. It is generally known that singling increases the proportion of species of larger-size; therefore, we took the samples via singling, by hand in favour of species of larger-size (Familia Clausiliidae and subfamilia Vitreinae as well as *Bradybaena fruticum*, *Monachoides vicina*, *Drobacia* / *Helicigona banatica*, *Helix lutescens*, *H. pomatia*, *Kovacsia kovacsi*, *Lozekia transsylvanica*). We planed to glean in the central part of the mountain, too. The field research was carried out during 2009. This year was very droughty.

The sampling sites were selected from the mountain and in a few cases lowland areas according to the geomorphologic, hydrologic and accessibility features.

After cleaning and drying, we selected out and classified shells coming from malacologic material. In order to identify the species we used the taxonomic books or papers from Soós (1943); Pintér (1975); Grossu (1981, 1983); Kerney et al. (1983); Kiss & Pintér (1985); Nordsieck (1993, 2006); Pelbárt (2000). Our nomenclature follows A.V. Grossu (1993) with some modifications approximately and Glöer & Sîrbu (2005) in the case of freshwater Mollusc. From among the enumeration of species we reduced the subspecies and different forms, with the exception of Familia Clausiliidae. In this case, we used the nomenclature by the recommendation of Milkós Szekeres 2010.

## Results

During the investigation time (compilation and gleaning) 146 Mollusc taxa and approximately 700 new units were found (Table 1A, 1B, 2/1, 2/2, 2/3, 2/4, 3).

Among the species of relatively large size we found the rare (frequency was lower than 25 %) *Acicula polita*, *Clausilia dubia*, *C. pumila*, *Helix lutescens*, *Macrogastra borealis*; *Bulgarica cana*, *Perforatella dibothrion*; *Orcula jetschini*; *Isognomostoma isognomostoma*; *Bradybaena fruticum*, *Vitrea transsylvanica*; *Acicula microspira*; *Vitrea diaphana*; *Trichia hispida*, *Pseudalinda stabilis*; *Euomphalia strigella*, *Monachoides vicina*; *Vitrea erjavecii* (in increasing order of the frequency), etc.

*Ruthenica filograna*, *Helicigona banatica*, *Kovacsia kovacsi*, *Bulgarica vetusta*, *Cochlodina laminate*, *Laciniaria plicata*, *Helix pomatia*, *Sphyradium doliolum*, *Trichia bielzi* are relatively frequent (the frequency was higher than 25%), taxa succeed one another in decreasing order of the frequency) in the Pădurea Craiului Mountains.

Our experience shows following taxa are absent in the Munții Pădurea Craiului: *Argna*, *Agardhiella* (→ Munții Meseșului, Munții Șesului), *Discus*, *Helicodiscus* / *Lucilla*. (→ Meseșului, Șesului and Codru-Moma Mountains). On the other hand *Acicula microspira*, *Ceciliodes acicula*, *Clausilia dubia*, *Orcula jetschini*, *Pyramidula rupestris*, *Vitrea erjavecii*, *Vitrea subrimata*, *Vitrea transsylvanica* were found in the actual sampling sites.

The number of aquatic snails (Gastropoda) and mussels (Bivalvia) is 40 and 10, respectively. Owing to the sampling methods the aquatic species of the Șesului, Meseșului and Codru–Moma Mountains cannot be compared.

In the comments of the check list there are some zoogeographical and bibliographical information relating to the individual species to be read.

### Check list in systematic order of the molluscs (Grossu 1993)

(This catalogue is based on all mentioned references and the author's information, gained in the Pădurea Craiului Mountains in 2009.)

#### Class Gastropoda

##### Subclass Prosobranchia

Familia Neritidae Rafinesque, 1815

*Theodoxus fluviatilis* (Linnaeus, 1758)

**Comments:** From the Pece / Pețea rivulet (near to Püspökfürdő / Episcopiei Resort) collected by A. Mayer (Kertész 1890). Present day status: extinct.

*Theodoxus danubialis* (C. Pfeiffer, 1828)

**Comments:** Püspökfürdő / Episcopiei Resort [col. of the Siebenbürgischer Verein für Naturwissenschaften in Hermannstadt: col. M. and R.W. von Kimakowicz (quoted by Sîrbu 2006) as well as Soós 1943].

According to Fehér et al. 2009b one Slovenian clade (Bušeča vas) of the *Theodoxus danubialis* is positioned on the central clades of the Bayesian COI tree of the *Theodoxus prevostianus* – *T. danubialis* group, near to the Romanian clade (Răbăgani) of the *T. prevostianus*. In our opinion one of furcation of these species was proceeding in the thermal water in the environs of Oradea and Răbăgani, along a fault line.

*Theodoxus prevostianus* (C. Pfeiffer, 1828)

**Comments:** Püspökfürdő / Episcopiei Resort [(1870 Mocsáry S. quoted Soós 1943). Sampled by Wagner J. in 1912, Papp J. in 1959, Kovács Gy. in 1960, 1982; Emődi J. and Perjési Gy. in 1984; Fehér Z. in 2001 (ex col. Hungarian Natural History Museum from Budapest = HNHM)].

For today this species is extinct (according to IUCN category) in Episcopiei Resort. By Sîrbu's opinion (2006) this presence was reported erroneously by Soós (1943), Grossu (1986, 1993) and Sárkány-Kiss et al. (1997), because to this extinct species exactly *T. danubialis*.

*Theodoxus prevostianus* sampled from Robogány / Răbăgani (col. of the Siebenbürgischer Verein für Naturwissenschaften in Hermannstadt: M. and R.W. von Kimakowicz; Soós 1943, Jurcsák 1969, Kovacs (Váncsa 2006) and Domokos in 1984 (ex col. Munkácsy Mihály Museum, Békéscsaba), Sîrbu 1999 (ex col. Hungarian Natural History Museum, Budapest = HNHM), 2001, Gagiú 2004, Sîrbu & Benedek 2005.

"In Romania collected at Răbăgani–Bihor and Băile Felix–Oradea." (Grossu 1993).

According to Fehér et al. 2009b *Theodoxus prevostianus* can be found between the central clade of the Bayesian COI tree of the *Theodoxus prevostianus* – *Theodoxus danubialis* group.

This species is known in Hungary, from the scum of the Sebes Körös / Crișul Repede River, at Körösladány settlement (ET00) (Pintér & Suara 2004). Maybe this scum was carried off from Episcopiei Resort.

E. Krolopp found fossil *Theodoxus* cf. *prevostianus*, *Fagotia acicularis* and *Fagotia esperi* in Lower Pleistocene layer series (173–174 m) of the alluvial cone of the Criș / Körös Rivers at the Vésztő settlement in Hungary (Rónai 1985).

## Familia Viviparidae Gray, 1847

*Viviparus acerosus* Bourguignat, 1862

**Comments:** Only from the Pece/Pețea rivulet at Nagyvárad / Grosswardein / Oradea (col. of the Siebenbürgischer Verein für Naturwissenschaften in Hermannstadt and Bielz 1867, as well as Kertész 1890) and near Nagyvárad / Oradea (Soós 1915).

## Familia Valvatidae Thomson, 1840

*Valvata cristata* O.F. Müller, 1774

**Comments:** Püspökfürdő / Episcopiei Resort near to Nagyvárad / Oradea (Kormos 1904, Sîrbu 2006)

*Valvata piscinalis* O.F. Müller, 1774

**Comments:** Nagyvárad / Oradea (Kertész 1890, Csiky 1902, Rotaridesz 1931, Soós 1943). We gleaned from the dried out, concreted bed of the Tășad brook (Oșorhei).

## Familia Pomatiasidae Gray, 1852

*Pomatias rivulare* Eichwald, 1829

**Comments:** Rontó / Rontău (Kormos 1911). Kormos states the existence of this species as subfossil. By our knowledge, since 1911 nobody has found the species alive in that site. Present day status: extinct.

## Familia Aciculidae Gray, 1850

*Acicula* / *Platyla polita* Hartmann, 1840 (→ Fig.3, Plate III: 4)

**Comments:** “In humid dead leaves on the forest ground; in Banat” (Grossu 1993). Firstly quoted by Kovács 1977 (col. 1975) from Defileul Crișului Repede (the gorge between Vadu Crișului and Șuncuiuș). We found it in a rocky biotope in Valea Peșteriei close to Meziad and in Cheile Vida (Luncasprie).

*Acicula perpusilla* Reinhardt, 1890

**Comments:** It was gleaned by Deli and Domokos in 2005 from the Defileul Crișul Repede (the gorge at Vadu Crișului).

*Acicula transsylvanica* A.Wagner, 1912

**Comments:** This species was earlier mentioned by Bába & Kovács 1975 as *Acicula perpusilla* Reinhard, 1880. (They collected between Vadu Crișului and Șuncuiș along the gorge). Later Kovács 1977 reconsidered the determination of the species based on P. Subai's revision, and changed its name *Acicula transsylvanica/similis* (Boeters et al. 1989).

*Acicula similis* Reinhardt, 1880

**Comments:** According to Boeters et al. 1989 = *Acicula transsylvanica* A. Wagner, 1912. Kovács (1977) notice it in the Defileul Crișului Repede (the gorge between Vadu Crișului and Șuncuiș). His units were revised by Subai. Subsequently this species cannot be found in the references (Váncsa 2006).

*Acicula microspira* Reinhardt, 1880 (→ Fig.3)

**Comments:** It cannot be found in Grossu's catalogue of the Molluscs from Romania (Grossu 1993), but this species is in the Molluscs collection of Kovács (sampled in 1974, 1975, 1982), part of the Molluscs collection of the Hungarian Natural History Museum (Váncsa 2006). By our opinion in rocky biotope it is more frequent compared to *Acicula polita*.

## Familia Moitessieridae Bourguignat, 1863

*Paladilhia/Paladilhiopsis transsylvanica* Rotarides, 1943 (Plate II: 8, 9)*Paladilhia/Paladilhiopsis leruthi* Boettger, 1940*Paladilhia/Paladilhiopsis carpatica* Soós, 1940

**Comments:** All three species were collected from karstic springs (● P.t.: Șuncuiș: Peștera Ungurului, Peștera Napișteanu / Unguru Mic Cave, Izbăndiș / Șuncuiș spring; Vadu Crișului: Vadu Crișului Cave, Peștera cu apă. ●● P.l.:

Călătea: Pestera Cuglis; Șuncuiș: Moanei Cave and scum from the Vida brook at Luncasprie. ●●● P.c.: Călătea: Pestera Cuglis.) Cited by, Boettger 1940; Rotaridesz 1943; Soós 1943; Grossu & Negrea 1963, 1984; Negrea 1966; Grossu 1981, 1986; Bába & Kovács 1975, Sîrbu in 2006. Their systematic status is doubtful (Sîrbu, 2006).

Familia Bythinellidae Radoman, 1976

*Bythinella austriaca* Frauenfeld, 1859 (Plate II: 8, 9)

**Comments:** It was found only near to Șuncuiș, in a small rivulet of the Mișid Valley (Sîrbu & Benedek 2004, Sîrbu 2006).

Familia Lithoglyphidae Troschel, 1857

*Lithoglyphus naticoides* (C. Pfeiffer, 1828)

**Comments:** "In the Holod rivulet downstream of Răbăgani" (Sîrbu 2006).

Familia Bithyniidae Gray, 1849

*Bithynia tentaculata* Linnaeus, 1758

**Comments:** Only from the Peșea rivulet near to Oradea (Sîrbu 2006)

Familia Thiaridae Troschel, 1857

*Fagotia acicularis* Férussac, 1823 (syn. *Esperiana daudebartii acicularis*)

**Comments:** Robogány / Răbăgani [col. SVNH, col. Bielz, col. Kimakowicz. Cited by Clessin 1887, Csiki 1902, Soós 1943, Jurcsák 1969, Váncsa 2006 (leg. Kovács 1984), Sîrbu 2006. Some individuals were collected by Domokos in 1984 (col. Munkácsy Mihály Museum, Békéscsaba, Hungary)]. E. Krolopp found fossil *Fagotia acicularis* and *F. esperi* in the Lower Pleistocene layer series (173-174 m) of the alluvial cone of the Criș / Körös Rivers at the Vésztő settlement in Hungary (Rónai 1985).



*Melanopsis parreyssi* Philippi, 1847

**Comments:** It is a relict and endemic species in Romania and Bulgaria (Angelov 2000). In Romania it was found in the thermal-water of the “Ochiul Mare” thermal lake (Püspökfürdő / Episcopiei Resort) (coll. of the Siebenbürgischer Verein für Naturwissenschaften in Hermannstadt: M. and R.W. von Kimakowicz; Kertész 1890; Kormos 1904, 1905a; Csiki 1906; Rotaridesz 1931; Soós 1943; Grossu 1981, 1986, 1993. Item sampled by Mikussay J. in 1933, Agócsy P. in 1943, Streda R. in 1952, Papp J. in 1959, Kovács in 1960, 1982 (Váncsa 2006), Pócs T. in 1965, Wiesinger M. in 1972, Kátai S. in 1976, Perjési Gy. in 1984, Orbán G. in 1998, Fehér Z. in 2001, Sîrbu 2001, 2006 (ex col. Hungarian Natural History Museum, = HNHM)).

Unanimously the Episcopiei Resort is a favourite sampling site for the malacologists from the beginning. Some individuals were gleaned by Gossu in 1951, Stoicescu in 1970, Voicu in 1974 from Băile Felix near to Oradea (ex col. HNHM). Wenz found a *Melanopsis* taxon in the lacustrine sedimentary layers of Băile 1 Mai / Episcopiei Resort (in tanatocoenosis with *Helicigona maeotica*) as well as in Miocene deposit (Prahova-Muscel) (Wenz 1942).

*M. parreyssi* is known in Hungary, from the scum of the Sebes Körös / Crişul Repede River, at Körösladány settlement (ET00, 80 river-km from Episcopiei Resort) (Pintér & Suara 2004). By our opinion this shell was carried off from Episcopiei Resort.

**Subclass Pulmonata**

Familia Ellobiidae Adams, 1855

*Carychium minimum* O.F. Müller, 1774

*Carychium tridentatum* (Risso, 1826)

**Comments:** These two species are in humid dead forest litter.

Familia Physidae Fitzinger, 1833

*Physa fontinalis* Linnaeus, 1758

**Comments:** It was sampled by P. M. Bănărescu from the Ochiul Mare thermal lake at Episcopiei Resort near to Oradea (Sîrbu, 2006)

*Physella acuta* Draparnaud, 1805

**Comments:** It was gleaned from the Ochiul Mare at Episcopiei Resort near to Oradea (Kovács sampled in 1982 quoted by Váncsa 2006; Sîrbu 2006).

*Aplexa hypnorum* Linnaeus, 1758

**Comments:** At Nagyvárad / Grosswardein / Oradea (Kertész 1890; coll. of the Siebenbürgischer Verein für Naturwissenschaften in Hermannstadt, coll. Kimakowicz - leg Riess 1899; Csiki 1902; Rotaridesz 1931; Soós 1943).

## Familia Ancyliida Rafinesque, 1815

*Ancylus fluviatilis* O. F. Müller 1774

**Comments:** It was found in the rapid flowing clean water of the brook, fixed on stones. It was sampled from Peștera cu Apă Bulz (Valea Iadului, Bulz), dam lake (Remeți) and Crișul Repede River at the outflow of Iad as well as in the Izbândis karstic spring (Șuncuiș) and the brooks of the Mișid Valley (Sárkány-Kiss et al. 1997, Sîrbu 2006). Gy. Kovács found it on the paved side of the Fehér-Körös/ Crișul Alb River at Gyula -Városerdő settlement in Hungary (ES 26 – Bába et al. 2005). We sampled it from Lazuri (Lazuri), Roșia (Ponița), Toplița (Luncasprie) and Vida (Luncasprie) brooks.

## Familia Acroloxidae Thiele, 1931

*Acroloxus lacustris* (Linnaeus, 1758)

**Comments:** Püspökfürdő / Episcopiei Resort (Kormos, 1904) and Răbăgani (Jurcsák 1969).

## Familia Ferrissidae Zilch, 1960

*Ferrisia wautieri* Miroli, 1960

**Comments:** Ochiul Mare thermal lake close to Episcopiei Resort (Kovács in 1982 cited by Váncsa 2006). Newly found in studied area by Sîrbu at Răbăgani (Sîrbu 2006).

## Familia Planorbidae Rafinesque, 1815

*Planorbis planorbis* (Linnaeus, 1758)

**Comments:** Nagyvárad / Grosswardein / Oradea (Mauritius and Richard Winnicki von Kimakowicz collection from Sibiu; Püspökfürdő / Episcopiei Resort (Kertész 1890, Kormos 1904); Nagyvárad / Oradea (Csiki 1902, Rotaridesz 1931).

*Anisus spirorbis* (Linnaeus, 1758)

**Comments:** Püspökfürdő / Episcopiei Resort (Kertész 1890, Csiki 1902, Soós 1943); Răbăgani (Sîrbu 2006).

*Anisus leucostoma* (Millet, 1813)

**Comments:** Püspökfürdő / Episcopiei Resort (Kormos, 1904, Soós 1943). It is absent from the catalogue of the Molluscs from Romania (Grossu 1993). Presently it appears in the catalogue (Falkner et al. 2001) as *Anisus septemgyratus*. In our opinion the state of existence of *A. leucostoma* is (sub)fossil or extinct.

*Anisus vortex* Linnaeus, 1758

**Comments:** Püspökfürdő / Episcopiei Resort (Soós 1943). This species is not be found in Grossu's catalogue.

*Gyraulus albus* O. F. Müller 1774

**Comments:** Nagyvárad / Oradea (Kertész 1890, Csiki 1902, Rotaridesz 1931, Soós 1943); Răbăgani (Sîrbu 2006).

*Armiger / Gyraulus crista* Linnaeus, 1758

**Comments:** Püspökfürdő / Episcopiei Resort near to Oradea (Rotaridesz 1931, Soós 1943).

*Hippeutis complanatus* Linnaeus, 1758

**Comments:** Puddles of the Crișul Repede River at Nagyvárad / Grosswardein/Oradea (col. Kimakowicz – 1883), Nagyvárad / Oradea (Csiki 1902) as well as Răbăgani (Sîrbu 2006).

*Segmentina nitida* (O.F. Müller, 1774)

**Comment:** Nagyvárad / Oradea (Kertész 1890, Csiki 1902, Rotarides 1931).

*Planorbarius corneus* Linnaeus, 1758

**Comment:** At Nagyvárad / Grosswardein/Oradea; Pețea rivulet and ponds (col. of the Siebenbürgischer Verein für Naturwissenschaften in Hermannstadt, Kimakowicz – leg. Ries, 1866); Ochiul Mare thermal lake at Episcopiei Resort (Sîrbu, 2006).

*Planorbella anceps* (Menke, 1830)

**Comments:** It is an adventive species, first sampled by M. Petrescu in 1999 from the thermal artificial pools in Felix Resort (Sîrbu 2006).

*Biomphalaria tenagophila* Orbigny, 1835

**Comments:** This species is not found in the Grossu's catalogue of the Molluscs from Romania, because this adventive planorbid was sampled first only in 2005 at Răbăgani (Majoros et al. 2008). Natural population of these snails are usually found in subtropical area (South America and Africa), in standing water or freshwater. In Răbăgani it lives in a hypothermal spring (25°C) finding vital condition.

Familia Lymnaeidae Rafinesque, 1815

*Lymnaea stagnalis* (Linnaeus, 1758)

**Comments:** Nagyvárad / Grosswardein / Oradea in water mill and pools (col. SVNH and col. Kimakowicz leg. 1879), Püspökfürdő / Episcopiei Resort (Kertész 1890).

*Pseudosuccinea columella* (Say, 1758)

**Comments:** It is an adventive species, first sampled by Sîrbu in 1999 from the Ochiul Mare thermal artificial pools in Episcopiei Resort (Sîrbu 2006).

*Stagnicola palustris* (O.F. Müller, 1774)

**Comments:** Püspökfürdő / Episcopiei Resort and other sites near to Nagyvárád / Grosswardein / Oradea (col. Kimakowicz leg.1879, Soós 1943, Sárkány-Kiss et al.1997)

*Stagnicola turricula* Held, 1836

**Comment:** Nagyvárád / Grosswardein /Oradea and Püspökfürdő / Episcopo Resort (col. Kimakowicz leg. 1883). Its presence is still doubtful, because there is no authentic anatomical evidence (Sîrbu 2006).

*Radix auricularia* (Linnaeus, 1758)

**Comments:** In the thermal lake (Ochiul Mare) and the Pece / Pețea rivulet at Püspökfürdő / Episcopiei Resort near to Nagyvárád / Oradea (Kormos 1904, Sîrbu 2006) as well as in Nagyvárád / Oradea (Soós 1915).

*Radix ovata* (Draparnaud 1805) syn. *Radix balthica* (Linné, 1758)

**Comments:** Nagyvárád / Grosswardein / Oradea (col. of the Siebenbürgischer Verein für Naturwissenschaften in Hermannstadt and col. Kimakowicz as well as Sîrbu 2006) and in the thermal brook at Robogány/Răbăgani (leg. Riess in 1879 cited by Sîrbu 2006).

*Radix peregra* (O.F. Müller, 1774) syn. *Radix labiata* Rossmässler, 1835

**Comments:** Episcopiei and Felix Resort (col. Kimakowicz quoted by Sîrbu 2006), Iad tributaries near to Remeți (Sárkány-Kiss et al.1997). "All these *Radix* quotations are doubtful because there is no anatomical evidence of these samplings and taxonomical criteria are strictly focused on such clues, at present" (Sîrbu 2006).

*Galba truncatula* (O.F. Müller, 1774)

**Comments:** Sampling sites: Nagyvárád / Oradea (Csiki 1902), Püspökfürdő / Episcopiei Resort near to Oradea (Kormos 1904), Crișul Repede riverbed at Șuncuiuș as well as at Vadu Crișului (leg. Kovács in 1974 quoted by

Váncsa 2006) and brooks in the Mişid Valley (Sîrbu, 2006), item the bed of the brook in the Valea Boiului (Lorău), Sohodol (Sohodol) and Vida (Luncasprie).

Familia Succinaeidae Beck, 1857

*Succinea oblonga* Draparnaud, 1805

**Comments:** This species is commonly referred as ubiquitous in the relevant literature (Horváth 1954; Krolopp 1961, 1963; Ložek 1963; Wagner 1977).

*Succinea putris* (Linnaeus, 1758)

*Oxyloma elegans* (Risso, 1826)

**Comments:** In this area, it is very often difficult to tell them (*Succinea putris* and *Oxyloma elegans*) apart on the basis of shell morphology. All three species well-know from early references (Kertész 1980, Csiki 1902, Rotaridesz 1931) from Nagyvárad / Oradea and his environment.

Familia Cochlicopidae Pilsbry, 1900

*Cochlicopa lubrica* (O.F. Müller, 1774)

*Cochlicopa lubricella* (Porro, 1838)

**Comments:** Both species are common in the study area. In many case there is no difference between them.

Familia Orculidae Pilsbry, 1913

*Orcula dolium* (Draparnaud, 1801)

**Comment:** Mézged / Meziad (Csiki 1902). It is a misidentification. Exactly it is *Orcula jetschini* (Soós 1943).

*Sphyradium doliolum* (Bruguière, 1792) (→ Fig. 4)

**Comments:** These species are frequent in rocky biotopes. It was found in Hungary

in the scum of the Tisza and Maros Rivers, at the settlement of Szeged (DS 32) (Pintér & Suara 2004). Maybe these scums derive from the Crișana or catchment area of the Mureș / Maros River.

*Orcula jetschini* M. Kimakowicz, 1883 (→ Fig.5, Plate I: 4, 5)

**Comments:** Only sporadically. Living specimens can be found very rare. First it was quoted from Mézged / Meziad by Soós 1943. This species is known from Hungary, from the scum of the Tisza River (DS 32: Szeged) (Pintér & Suara 2004). It may originate from Crișana.

Familia Pyramidulidae Wenz, 1923

*Pyramidula rupestris* (Draparnaud, 1801)

**Comments:** On the calcareous rocks.

Familia Valloniidae, Morse, 1864

*Vallonia pulchella* (O.F. Müller, 1774)

*Vallonia costata* (O.F. Müller, 1774)

**Comments:** Both are ubiquitous species.

*Achanthinula aculeata* (O.F. Müller, 1774)

**Comments:** This tiny species can be found in humid dead leaves of forest.

Familia Vertiginidae Fitzinger, 1833

*Vertigo pusilla* (O.F. Müller, 1774)(→Plate II: 7)

*Vertigo alpestris* (Alder, 1830)

**Comments:** First it was mentioned by Kovács 1977 from Defileul Crișului Repede (the gorge between Vadu Crișului and Șuncuiuș).

*Vertigo antivertigo* (Draparnaud, 1801)

*Vertigo pygmaea* (Draparnaud, 1801)

*Vertigo angustior* Jeffrey, 1830

*Columella edentula* (Draparnaud, 1805)

**Comments:** *Vertigo pusilla* and *V. alpestris* were sampled first in 1975, 1982, but *Columella edentula* in 1972, 1974 by Kovács from the Defileul Crișului Repede (the gorge between Vadu Crișului and Șuncuiuș) (Bába & Kovács 1975, Kovács 1977, Váncsa 2006). All these tiny species live in grass, in rock-vegetation, in humid (pro tempore dew--covered, vaporous) biotopes.

*Truncatellina cylindrica* (Férussac, 1822)

**Comments:** Usually it can be found in drier biotopes than the foregoing vertiginids.

Familia Pupillidae Turton, 1821

*Pupilla muscorum* (Linnaeus, 1758)

**Comments:** Ubiquitous species.

Familia Chondrinidae Steenberg, 1925

*Granaria frumentum* (Draparnaud, 1801)

*Chondrina clienta* (Westerlund, 1883)

*Chondrula tridens* (O.F. Müller, 1774)

**Comments:** We collected this tiny specimen (7.5/3.8 mm) from Cheile Cușilor (Ponița).

*Merdigera obscura* (O.F. Müller, 1774)

**Comments:** It is rare in the sampling area. This species is known from



scum of the Sebes-Körös River close to the settlement of Körösszegapáti ( ET41 – Pintér & Suara 2004) originated from Crişana.

Familia Clausiliidae Schmidt, 1857

*Cochlodina laminata* (Montagu, 1803) (→ Fig.6)

**Comments:** Püspökfürdő / Episcopiei Resort (Kertész 1890), Mézged / Meziad (Csiki 1902). Domokos found it in scum of the Hármaskörös River at Békésszentadrás (DS59) (Pintér & Suara 2004).

*Ruthenica filograna* (Rossmässler, 1836) (→ Fig.7)

**Comments:** First it was quoted by Csiki (1902) from Mézged / Meziad. This is the most frequent Clausiliid in the Western Carpathian Mountains. The dimensions of shells are very varied. It is known from scum of the Tisza River (DS32: Szeged – Pintér & Suara). Maybe this scum originates from the catchment area of the Criş / Körös River. This is a typical hydrochoria.

*Clausilia dubia* Draparnaud, 1805 (→ Fig.8, Plate I: 1-3)

**Comments:** Defileul / Gorge Crişul Repede (Bába & Kovács 1975). It is rare in area sampling (ValeaTopa, Valea Cuţilor).

*Clausilia pumila* C. Pfeiffer, 1828 (→ Fig.8)

**Comments:** It is relatively rare. We found it in Valea Roşia at Roşia and Remetea / Magyarremete. This species was found at Doboz (ES27) from the river scum (Domokos et al. 2003), the result of hydrochoria of Pădurea Craiului or Bihor Mountains.

*Macrogastra borealis bielzi* Nordsieck, 1993 (→ Fig. 8, Plate I: 1, 3)

**Comments:** This species and its forms are present as *M. latestriata* in 'The catalogue of the Molluscs from Romania' (Grossu, 1993). It is rare being only in Valea Topa and Valea Vida. It was found in Hungary, in the alluvia (scum) of the Tisza River, at the settlements of Tiszaszalka, Tiszavid (EU93), Tiszatelek (EU53), Szolnok (DT32) and Szeged (DS31, 32). Maybe these scums, in case of Szeged,

originate from the catchment area of the Körös / Criş River (Crişana) (Pintér & Suara 2004). It is a typical river transport.

*Laciniaria plicata* Draparnaud, 1805 (→ Fig.9, Plate III: 1-3)

**Comments:** Püspökfürdő / Episcopiei Resort (Kertész 1890), Mézged / Meziad (Csiki 1902, Soós 1915), Rév / Vadu Crişului (Csiki 1902, Grossu 1983). In Hungary it lives in woody flood plain (Snail Forest) of the Fekete-Körös River at the settlement of Gyulavári-Dénesmajor (ES26).

*Balea / Alinda biplicata* (Montagu, 1803)

**Comments:** Mézged/ Meziad (Csiki 1902), Defileul /Gorge Crişului Repede (Bába & Kovács 1975, Kovács 1977). In the studied area it is rare. We found only in the environs of Sohodol (sampling site No. 5) and Damiş (No. 29). This genus is in Grossu's catalogue (Grossu 1983) as *Balea biplicata*. After Szekeres (pers. com.) it is *Alinda biplicata*.

*Balea / Pseudalinda stabilis* (I. Pfeiffer, 1847) (→Fig.10)

**Comments:** This genus is in Grossu's catalogue (Grossu, 1983) as *Balea stabilis*. After Szekeres (pers. com.) it is *Pseudalinda stabilis*. It is rare in the studied area. We collected only on the eastern part of Pădurea Craiului.

*Bulgarica vetusta* (Rossmässler, 1836) (→ Fig.11, Plate I: 6-8)

**Comments:** Püspökfürdő / Episcopiei Resort (Kertész 1890), Barátka/ Bratca, (HNHM: Rotarides, Streda in 1912), Luncasprie (HNHM: Domokos in 1983), Bălnaca (HNHM: Kovács in 1975). This species is relatively common in the Western Carpathian Mountains, on the western part of Mîji. Apuseni (Domokos & Lennert 2007, 2009).

*Bulgarica cana* (Held, 1836) (→ Fig.8)

**Comments:** Mézged / Meziad (Csiki 1902). It is rare in area studied. We found this species only in the lad Valley (Valea ladului), on the eastern side of the Pădurea Craiului Mountains.

Familia Ferussaciidae Bruguière, 1883

*Cecilioides acicula* (O.F. Müller)

**Comments:** Püspökfürdő / Episcopiei Resort (Kormos 1904, Soós 1943, Grossu 1983).

Familia Endodontidae Pilsbry, 1894

*Punctum pygmaeum* (Draparnaud, 1805)

Familia Arionidae Gray, 1841

*Arion ater* Linnaeus, 1758

**Comments:** In the wood close to Püspökfürdő / Episcopiei Resort (Kertész 1890, Grossu 1983).

*Arion subfuscus* Draparnaud, 1801

*Arion circumscriptus* Johnston, 1828

**Comments:** Both species are determined based on specimens morphology and colour. In one instance (sampling site No.42) *A. circumscriptus* was identified by G. Majoros by means of anatomical investigation.

*Arion hortensis* Férussac, 1819

**Comments:** It is quoted by Kertész 1890 from Püspökfürdő / Episcopiei Resort.

Familia Vitrinidae Fitzinger, 1883

*Phenacolimax pellucida* (O.F. Müller, 1774)

Familia Zonitidae Mörch, 1864

*Zonitoides nitidus* (O.F. Müller, 1774)

*Vitrea transsylvanica* (Clessin, 1877) (→ Fig.12)

*Vitrea diaphana* (Studer, 1820) (→ Fig.12)

*Vitrea maritae* (M. Kimakowicz, 1890)

**Comments:** See below as *V. subrimata* (Ex verb. P. Subai and T. Deli.)

*Vitrea erjavecii* Brusina, 1870 (→ Fig.13)

**Comments:** According to Grossu (1993) this species is *Vitrea densegyrata* (M. Kimakowicz, 1890) collected by M. Kimakowicz from Borszék / Borsec in Görgényi-havasok / Munții Giurgeu (Soós 1943). Contrary to the contention of Grossu (1993) the authors are in a common view with Soós (1943). The experiences show *Vitrea erjavecii* as one of most frequent species of the *Vitrea* genus in Pădurea Craiului.

*Vitrea crystallina* (O.F. Müller, 1774)

**Comments:** Püspökfürdő / Episcopiei Resort (Kormos 1904). We gleaned it only near to Roșia (sampling site No.16).

*Vitrea subrimata* (Reinhardt, 1871)

**Comments:** This species is mentioned by Kovacs 1977 from the gorge between Vadu Crișului and Bănlaca.

*Vitrea* sp.

**Comments:** Specimens included in this place are undeterminable. All these *Vitrea* taxa are revised by T. Deli. From the seven *Vitrea* taxa two (*V. transsylvanica*, *V. diaphana*: Bába & Kovács 1975) and respectively three (*V. transsylvanica*, *V. diaphana*, *V. subrimata*: Kovács 1977) can be found in the references too.

*Nesovitrea hammonis* (Ström, 1765)

**Comments:** Defileul Crișului Repede (the gorge between Vadu Crișului

and Șuncuiuș) (Rotarides 1942). We found it in Valea Iad close to Bultz (No.26). In the Pădurea Craiului Mountains it is extremely rare.

*Aegopinella minor* (Stabile, 1864)

**Comments:** It is *Retinella nitens* in Grossu's (1993) opinion. According to CLECOM *Aegopinella nitens* (Michaud, 1831) is not the synonym of *Aegopinella minor* (Stabile, 1864).

*Aegopinella nitens* (Michaud, 1831)

**Comments:** In Pintér's opinion this species is in the Defileul / Gorge Crișului Repede at Vadu Crișului (Kovács 1977).

*Aegopinella epipedostoma* (Fagot, 1869)

**Comments:** According to Grossu 1993 it is *Retinella nitidula*. The systematic status of all three *Aegopinella* species is doubtful in the lack of anatomical investigation.

*Aegopinella pura* (Alder 1830)

*Oxychilus draparnaudi* (Beck, 1837)

*Oxychilus glaber* (Westerlund, 1881)

*Oxychilus depressus* (Sterki, 1880)

*Oxychilus montivagus* (M. Kimakowicz, 1890)

**Comments:** It is relatively frequent.

*Oxychilus* sp.

**Comments:** It is an undeterminable genus.

Familia Daudebardiidae Pilsbry, 1908

*Daudebardia kimakowiczi* A.J. Wagner, 1895

**Comments:** It is known from the literature (Bába & Kovács 1975, Kovács 1977, Vánca 2006) but cannot be found in Grossu's catalogue (Grossu 1993).

*Deudebardia transsylvanica* E.A. Bielz, 1859

**Comments:** It is mentioned by Kertész (1890) from Püspökfürdő / Episcopiei Resort.

*Carpathica calophana* Westerlund, 1881

**Comments:** In three instances (sampling sites No.14, 27, 39 – Remetea/ Magyarremete, Lorău, Tomnatic) it was determined by G. Majoros by means of anatomical investigation.

## Familia Milacidae Germain, 1930

*Milax / Tandonia rusticus/a* Millet, 1843

**Comments:** It is quoted from Nagyvárad / Oradea (Csiki 1902, Wagner 1930).

*Milax sp.*

**Comments:** It is an undeterminable genus.

## Familia Limacidae Rafinesque, 1815

*Limax maximus* Linnaeus, 1758*Limax cinereoniger* Wolf, 1803

**Comments:** Püspökfürdő / Episcopiei Resort (Kertész 1890). We took samples from a beech forest near to Cornet (sampling site No.39) and resolved to anatomical investigation by G. Majoros yet.

*Limax* sp.

**Comments:** It is an undeterminable genus.

*Lehmannia marginata* O: F. Müller, 1774

**Comments:** This species was collected in Püspökfürdő / Episcopiei Resort (Kertész 1890)

*Lehmannia valentiana* Férussac, 1823

**Comments:** Oradea Mai 1 / Episcopiei Resort (Grossu 1983). "In greenhouses synanthrop. In the humid area of mountains zone; on trees and stumps." (Grossu 1993).

*Bielzia coerulans* (M. Bielz, 1851)

**Comments:** It is very rare being observed only in the Mişid Valley in 2004 by Domokos.

*Deroceras laeve* (O.F. Müller, 1774)*Deroceras agreste* Linnaeus, 1758

**Comments:** This slug is cited by Kertész 1890 from Püspökfürdő/Episcopiei Resort.

*Deroceras reticulatus* (O.F. Müller, 1758)

**Comments:** This species is determined based on specimens morphology and colour.

*Deroceras* sp.

**Comments:** It is an undeterminable genus.

Familia Euconulidae H. B. Baker, 1928

*Euconulus fulvus* (O.F. Müller, 1774)

**Comments:** Based on the CLECOM, this species is *Euconulus praticola* (Reinhardt, 1883); according to Kerney et al. 1983, it is *Euconulus alderi* (Gray, 1840) [syn.: *E. fulvus* var. *alderi*].

Familia Bradybaenidae Pilsbry, 1939

*Bradybaena fruticum* (O.F. Müller, 1774) (→ Fig.14)

**Comments:** It is only in humid biotope.

Familia Helicidae Refinesque, 1815

*Helicella obvia* (Menke, 1828)

**Comments:** Püspökfürdő / Episcopiei Resort (Kertész 1890, Csiki 1902, Rotaridesz 1931, Soós 1943). This species is very rare in the studied area (Fig.1). We gleaned it only in Valley / Valea Iadolina close to settlement Bulz (→ sampling site No. 26).

*Helicopsis instabilis* (Rossmässler, 1838)

**Comments:** Oradea: Episcopiei Resort (Grossu 1983).

*Monacha cartusiana* (O.F. Müller, 1774)

*Perforatella bidentata* Gmelin, 1788)

**Comments:** Unique sampling site (No.16) was found near to Roşia 300 m far southward from the water-mill in Alnetum.

*Perforatella dibothrion* (M. Kimakowicz, 1890) (→ Fig. 5, Plate II: 4-6)

**Comments:** It is rare in Munţii Pădurea Craiului. First it was collected by Domokos in 2004 close to the Peşteră Moanei Cave (Bălnaca–Groşi).



*Monachoides vicina* (Rossmässler 1842) (→ Fig.15, Plate IV: 1-3)

**Comments:** This species is absent from the Munții Codru–Moma (Domokos & Lennert, 2007). The young *Monachoides vicina* individuals can be easily mixed up with *Hygromia* / *Lozekia transsylvanica* (Westerlund, 1876) or *Kovacsia kovacsi* (Varga & Pintér, 1972) individuals (Fehér et al. 2008).

*Zenobiella rubiginosa* (A. Schmidt, 1853)

*Trichia filicina* (L. Pfeiffer, 1841)

**Comments:** It is quoted by Soós 1943 from Jád-völgy / Valea Iadolina. This species is missing from Grossu's catalogue (1993).

*Trichia bielzi* (A. Schmidt, 1860) (→ Fig.16, Plate IV: 4-6)

*Trichia sericea* (Draparnaud, 1805)

**Comments:** It is difficult to tell *Z. rubiginosa* and *T. sericea* apart based on shell-morphology. Quoted by Bába & Kovács 1975.

*Trichia hispida* (O.F. Müller, 1774) (→ Fig.16)

*Euomphalia strigella* (Draparnaud, 1801) (→ Fig.17)

*Kovacsia kovacsi* Varga and Pintér, 1972 (→ Fig.18, Plate I: 9-11)

**Comments:** This genus (Varga & Pintér 1972) is a second clad (k-2) of the *Kovacsia kovacsi* (Fehér et al, 2008, 2009a), because *Kovacsia kovacsi* can be found in the Munții Pădurea Craiului, Munții Codru–Moma and Munții Zărand (Fehér et al, 2008, 2009a). In Hungary it is on the south-eastern part of the Hungarian Great Plain, in the woody area of the Körös-Maros interfluvies (Pintér & Suara 2004). *Kovacsia kovacsi*'s earlier presence was erroneously reported as *Hygromia kovacsi* (Nordsieck 1993, Fehér et al. 2008, 2009a).

*Isognomostoma isognomostoma* (Gmelin, 1788) (→ Fig.19, Plate III: 5, 6)

**Comments:** This species is very rare in the studied area.

*Helicigona / Drobacia banatica* (Rossmässler, 1838) (→ Fig. 20)

**Comments:** It is generally received in area studied also in the Munții Apuseni. (Domokos & Lennert, 2007, 2009). It can be found in Hungary, in the mansion park of Geszt (ES49) as well as in a flood plain forest (Dénesmajori Csigás-erdő, ES36) near to the settlement of Gyulavári (Pintér & Suara 2004). These biotopes result from the catchment area of the Criș Rivers (C. Repede respectively C. Negru.), from Crișana (Criș Rivers Basin, Romania). This is a typical hydrochoria. In Arsura Valley, close to the asphalted road (sampling site No. 30), we found fossil individuals (width of the shell on average: 30 mm) in the loose travertine wall. With width average to be fallen in at Vadu Crișului in Defileul Crișului Repede to.

*Helicigona maeotica* Wenz, 1926

**Comments:** By the side of the upper course lad brook scrubby specimens of *Helicigona banatica* (average shell width of 26.8 mm) can be found in coexistence with *Helicigona arbustorum*. According to Lupu 1966 and Grossu 1983 these scrubby specimens (average shell width of 24.1 mm) at Stâna de Vale have a living-place of the recent *Helicigona maeotica*. Wenz found this species in lacustrine sedimentary layers of Băile 1 Mai / Episcopiei Resort (in tanatocoenosis with *Melanopsis* taxon) as well as in deposit Miocene (Prahova-Muscel) (Wenz 1928, 1942). It surprises us, but *Helicigona maeotica* was found both in cool (Stâna de Vale) and warm (Miocene) environments!

*Helicigona / Arianta arbustorum* (Linneus, 1758) ( Plate II: 1, 3)

**Comments:** Püspökfürdő / Episcopiei (Kertész 1890). In our opinion this species can be found only in the mountain forest of the higher regions (the upper course of lad brook) of the Padurea Crăiului.

*Campylea / Helicigona faustina* (Rossmässler, 1835)

**Comments:** Defileul Crișului Repede (the gorge between Vadu Crișului and Șuncuiuș) (Bába & Kovács 1975, Kovács 1977, Váncsa 2006). By our calculations its frequency is only 12% in studied area. It is a typical denizen of the limestone gorge.

*Cepaea vindobonensis* (Férussac, 1821)

**Comments:** In Valea Topa (sampling site No.48) near to Vârciorog settlement we observed an interesting specimen with thick dark streak.

*Cepaea hortensis* (O.F. Müller, 1774)

**Comments:** We have information from Püspökfürdő / Episcopiei Resort (Kertész 1980, Csiki 1902, Soós 1904). This adventive species is absent from Grossu's catalogue (1993). Maybe this species is extinct in spit of the fact in Hungarian Great Plan sporadically (Pintér & Suara 2004) however the climate there is more extreme.

*Helix pomatia* Linnaeus, 1758 (→ Fig. 21)

**Comments:** In Cheile Cuților (sampling site No.12) we fell in with mass occurrence of this species in month of May.

*Helix lutescens* (Rossmässler, 1837) (→ Fig. 21)

**Comment:** It is rare in the studied area. It is interesting that this species had no occurrences in the Munții Codru–Moma (Domokos & Lennert, 2007).

**Class Bivalvia****Subclass Palaeiheterodonta Newell, 1965**

## Familia Unionidae Fleming, 1828

*Unio crassus* Lamarck, 1819

**Comments:** Pece/Pețea rivulet at Nagyvárad / Grosswardein / Oradea (col. Kimakowicz: leg. Riess in 1879), Sebes-Körös / Criș Repede at Nagyvárad / Oradea (Soós 1915) as well as Pețea rivulet upstream Oradea (Sîrbu 2006). We collected in the Tășad brook, 2.5 km far from the Crișul Repede River. These species were in the mud or sand bottom of rivers and rivulets.

*Anodonta cygnaea* Linnaeus 1758

**Comments:** It was observed only in the Pece / Pețea rivulet and

Püspökfürdő / Episcopiei Resort in the 19<sup>th</sup> century (col. Kimakowicz, leg Riess in 1878; Kertész 1890, Csiki 1902),

*Sinanodonta woodiana* (Lea, 1834)

**Comments:** Adventive species from China. Lots of individuals were sampled by Sîrbu in 2006 from the Ochiul Mare thermal lake (Episcopiei Resort) (Sîrbu 2006).

### **Subclass Heterodonta Newmayer, 1884**

Familia Pisidiidae Gray, 1857

*Pisidium amnicum* (O.F. Müller, 1774)

**Comments:** Leg. Domokos in 1982 from Lacul Peștera cu apă at Vadu Crișului, (col. Munkácsy Mihály Museum as well as Bába at al. 2005) and Sîrbu from the Holod River and Băii brook at Răbăgani (Sîrbu 2006).

*Pisidium casertanum* (Poli, 1791)

**Comments:** Peștera cu apă (Váncsa 2006: leg. Kovács in 1982) and Lacul Peștera cu apă at Vadu Crișului (Bába at al. 2005: leg. Domokos in 1982). The spring near to the Mișid brook, close to the entrance of Unguru Mic Cave / Peșteră Napișteanu as well as Băii rivulet at Răbăgani (Sîrbu 2006).

*Pisidium subtruncatum* Malm, 1855

**Comments:** Sampling sites: Lacul Peștera cu apă at Vadu Crișului (Bába at al. 2005: leg. Domokos in 1984), Munteni dam lake in Valea Iadului and spring near the Mișid flow in the Crișul Repede River as well as Băii rivulet at Răbăgani (Sîrbu 2006).

*Pisidium personatum* Malm, 1855

**Comments:** In the karstic brook flowing out from the cave from Bulz as well as in rivulets and spring near to the Mișid flowing into the Crișul Repede River (Sîrbu 2006).

*Pisidium nitidum* Jenins, 1832

**Comments:** It is known from Munteni dam lake in Iad Valley (Sîrbu 2006).

*Pisidium* sp.

**Comments:** This specimen was included by us in the *Pisidium* genus category.

*Sphaerium corneum* (Linnaeus, 1758)

**Comments:** At Oradea (col. Muzeul Țării Crișurilor). Newly we found it in catchment area of the Criș Repede River, exactly one or two km far from the Criș Repede River in brook Tăsad (Oșorhei) and rivulet Cloșcoi (Săbolciu).

*Sphaerium* / *Musculium lacustre* (O.F. Müller, 1774)

**Comments:** Sampled from „pool of concrete on the Băii Brook at Răbăgani” (Sîrbu 2006).

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**Table 1/A.** Sampling sites and land snail taxa (recent name according to Pelbárt 2000) of the study area based on references

| Taxa                                             | 1. | 2. | 3. | 4. | 5.  | 6. | 7. | 9.a | 9.b | 10. |
|--------------------------------------------------|----|----|----|----|-----|----|----|-----|-----|-----|
| 1. <i>Acanthinula aculata</i>                    |    |    |    | +  | (+) | +  | +  | +   |     |     |
| 2. <i>Acicula</i> / <i>Platyla microspira</i>    |    |    |    |    |     |    | +  |     | +   | +   |
| 3. <i>Acicula perpusilla</i>                     |    |    |    |    | +   |    |    | +   |     |     |
| 4. <i>Acicula</i> / <i>Platyla polita</i>        |    |    |    |    |     | +  | +  |     |     |     |
| 5. <i>Acicula transsylvanica</i> !               |    |    |    |    |     | +  |    |     |     |     |
| 6. <i>Aegopinella minor</i>                      |    |    |    |    | +   |    | +  | +   |     |     |
| 7. <i>Aegopinella nitens</i>                     |    | +  |    |    |     | +  | +  |     | +   |     |
| 8. <i>Aegopinella pura</i>                       |    |    |    |    | +   | +  | +  | +   | +   | +   |
| 9. <i>Alinda</i> / <i>Balea biplicata</i>        |    | +  |    |    | +   | +  | +  | +   |     |     |
| 10. <i>Bielzia coerulans</i>                     |    |    |    |    |     |    |    | ++  |     |     |
| 11. <i>Arion ater</i>                            | +  |    |    |    |     |    |    |     |     |     |
| 12. <i>Arion hortensis</i>                       | +  |    |    |    |     |    |    |     |     |     |
| 13. <i>Bradybaena fruticum</i>                   | +  | +  | +  |    | +   | +  | +  | +   | +   | +   |
| 14. <i>Bulgarica cana</i>                        |    | +  |    |    | +   |    |    |     |     |     |
| 15. <i>Bulgarica vetusta</i>                     | +  |    |    |    | +   | +  | +  | +   | +   | +   |
| 16. <i>Campylea</i> / <i>Helicigona faustina</i> |    |    |    |    | +   | +  | +  | +   | +   |     |
| 17. <i>Carychium minimum</i>                     |    |    | +  |    | +   |    | +  |     |     |     |
| 18. <i>Carychium tridentatum</i>                 |    |    |    |    | +   | +  | +  | +   | +   | +   |
| 19. <i>Cecilioides acicula</i>                   |    |    | +  | +  |     |    |    |     |     |     |
| 20. <i>Cepaea hortensis</i>                      | +  | +  | +  | +  |     |    |    |     |     |     |
| 21. <i>Cepaea vindobonensis</i>                  | +  |    |    |    | +   | +  | +  | +   | +   | +   |
| 22. <i>Chondrina clienta</i>                     | +  | +  |    |    | +   | +  | +  | +   | +   | +   |
| 23. <i>Chondrula tridens</i>                     | +  | +  | +  |    |     |    |    |     | +   |     |
| 24. <i>Clausilia dubia</i>                       |    |    |    |    | +   |    |    |     |     |     |
| 25. <i>Cochlodina laminata</i>                   | +  |    |    |    | +   | +  | +  | +   | +   | +   |
| 26. <i>Cochlicopa lubrica</i>                    | +  | +  | +  |    |     |    |    |     | +   |     |
| 27. <i>Cochlicopa lubricella</i>                 |    |    |    |    |     |    |    |     | +   |     |
| 28. <i>Columella edentula</i>                    |    |    |    |    | +   |    |    | +   |     |     |
| 29. <i>Deroceras agreste</i>                     | +  |    |    |    |     |    |    |     |     |     |
| 30. <i>Daudebardia kimakowiczi</i>               |    |    |    |    | +   | +  | +  |     |     |     |
| 31. <i>Daudebardia transsylvanica</i>            | +  |    |    |    |     |    |    |     |     |     |
| 32. <i>Euconulus fulvus</i>                      |    |    |    |    |     |    |    |     | +   |     |
| 33. <i>Euomphalia strigella</i>                  | +  | +  | +  |    | +   | +  | +  | +   |     | +   |
| 34. <i>Granaria frumentum</i>                    | +  | +  |    |    | +   | +  | +  | +   | +   | +   |
| 35. <i>Helicella obvia</i>                       | +  | +  | +  | +  |     |    |    | +   |     | +   |

|                                                                      |   |   |   |   |     |   |   |   |   |   |
|----------------------------------------------------------------------|---|---|---|---|-----|---|---|---|---|---|
| 36. <i>Helicigona</i> / <i>Arianta arbustorum</i>                    | + |   | + |   |     |   |   |   | + |   |
| 37. <i>Helicigona</i> / <i>Drobacia banatica</i>                     | + | + | + | + | +   | + | + | + | + | + |
| 38. <i>Helix lutescens</i>                                           | + | + | + |   |     |   | + | + |   |   |
| 39. <i>Helix pomatia</i>                                             | + |   | + |   | +   | + | + | + |   |   |
| 40. <i>Hygromia/Lozekia transsylvanica</i> → <i>Kovacsia kovacsi</i> |   |   |   |   | +   | + | + | + | + |   |
| 41. <i>Isognomostoma isognomostoma</i>                               |   |   |   |   |     | + | + | + | + |   |
| 42. <i>Laciniaria plicata</i>                                        | + | + | + |   | +   | + | + | + |   | + |
| 43. <i>Lehmannia marginata</i>                                       | + | + | + |   |     |   |   |   |   |   |
| 44. <i>Limax cinereoniger</i>                                        | + |   | + |   |     |   |   |   |   |   |
| 45. <i>Limax maximus</i>                                             |   | + |   |   |     |   |   |   |   |   |
| 46. <i>Merdigera</i> / <i>Ena obscura</i>                            |   |   |   |   |     |   | + | + |   |   |
| 47. <i>Milax rusticus</i>                                            |   | + | + | + |     |   |   |   |   |   |
| 48. <i>Monacha cartusiana</i>                                        | + | + | + |   |     |   | + | + |   |   |
| 49. <i>Monachoides vicina</i>                                        |   |   |   |   |     |   |   | + | + |   |
| 50. <i>Nesovitrea hammonis</i>                                       |   |   |   |   | (+) |   |   |   |   |   |
| 51. <i>Orcula jetschini</i>                                          |   |   |   | + |     |   |   | + |   |   |
| 52. <i>Orcula dolium</i>                                             |   | + | ! |   |     |   |   |   |   | + |
| 53. <i>Oxychilus depressus</i>                                       |   |   |   | + | +   | + | + | + |   |   |
| 54. <i>Oxychilus glaber</i>                                          |   |   |   | + | +   | + | + | + |   |   |
| 55. <i>Oxychilus montivagus</i>                                      |   |   |   |   |     |   | + |   | + | + |
| 56. <i>Oxyloma elegans</i>                                           | + | + | + |   |     |   | + |   |   |   |
| 57. <i>Perforatella dibothrion</i>                                   |   |   |   |   |     |   |   | + |   |   |
| 58. <i>Phenecolimax</i> / <i>Vitrina pellucida</i>                   |   | + |   |   | +   | + | + | + |   | + |
| 59. <i>Pomatias rivulare</i>                                         | + | ! |   | + | !   |   |   |   |   |   |
| 60. <i>Pseudalinda</i> / <i>Balea stabilis</i>                       |   |   |   |   |     |   |   | + | + |   |
| 61. <i>Punctum pygmaeum</i>                                          |   |   |   |   | +   | + | + |   |   | + |
| 62. <i>Pupilla muscorum</i>                                          | + | + | + |   |     |   |   |   |   |   |
| 63. <i>Pyramidula rupestris</i>                                      |   | + |   |   | +   | + | + |   |   |   |
| 64. <i>Ruthenica filigrana</i>                                       |   | + |   |   | +   | + | + | + | + | + |
| 65. <i>Sphyradium</i> / <i>Orcula doliolum</i>                       |   |   |   |   | +   | + | + | + |   |   |
| 66. <i>Succinea oblonga</i>                                          | + | + | + |   |     |   |   |   | + |   |
| 67. <i>Succinea putris</i>                                           | + | + | + |   |     |   |   |   |   |   |
| 68. <i>Trichia bielzi</i>                                            |   | + |   |   | +   | + | + | + | + | + |
| 69. <i>Trichia filicina</i>                                          |   |   |   | + |     |   |   |   |   |   |
| 70. <i>Trichia hispida</i>                                           |   |   |   |   | +   |   |   |   |   |   |
| 71. <i>Trichia sericea</i>                                           |   |   |   |   | +   |   |   |   |   |   |
| 72. <i>Truncatellina cylindrica</i>                                  |   |   |   |   | +   | + | + |   |   |   |

|                                  |           |           |           |           |           |           |           |           |           |           |
|----------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 73. <i>Vallonia costata</i>      |           | +         | +         |           |           | +         | +         |           |           |           |
| 74. <i>Vallonia pulchella</i>    |           | +         | +         |           | +         |           | +         |           | +         |           |
| 75. <i>Vertigo alpestris</i>     |           |           |           |           |           | +         | +         |           |           |           |
| 76. <i>Vertigo angustior</i>     |           |           | +         | +         |           |           |           |           |           |           |
| 77. <i>Vertigo pusilla</i>       |           |           |           |           |           | +         | +         |           |           |           |
| 78. <i>Vitrea crystallina</i>    |           |           | +         |           |           |           |           |           | +         |           |
| 79. <i>Vitrea diaphana</i>       |           |           |           |           | +         | +         | +         |           |           |           |
| 80. <i>Vitrea erjavecii</i>      |           |           |           |           |           |           |           | +         |           |           |
| 81. <i>Vitrea subrimata</i>      |           |           |           |           |           | +         | +         |           |           |           |
| 82. <i>Vitrea transsylvanica</i> |           |           |           |           | +         | +         | +         | +         |           |           |
| 83. <i>Zenobiella rubiginosa</i> |           |           |           | +         |           |           |           | +         |           |           |
| 84. <i>Zonitoides nitidus</i>    | +         | +         | +         |           |           |           |           |           |           |           |
| <b>Total by column</b>           | <b>29</b> | <b>30</b> | <b>27</b> | <b>12</b> | <b>38</b> | <b>36</b> | <b>44</b> | <b>38</b> | <b>27</b> | <b>19</b> |

**Table 1/B.** Sampling sites and freshwater mollusc taxa (recent name according to Pelbárt 2000) of the study area based on references (++ – Newly found in this area by Sîrbu 2006, Majoros et al. 2008; bold letters denote that these taxa are adventives).

| <b>Snail taxa</b>                         | <b>1.</b> | <b>2.</b> | <b>3.</b> | <b>4.</b> | <b>5.</b> | <b>7.</b> | <b>8.</b> | <b>9.</b> | <b>10.</b> |
|-------------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| 1. <i>Acroloxus lacustris</i>             |           |           | +         |           |           |           | +         |           |            |
| 2. <i>Ancylus fluviatilis</i>             |           |           |           |           |           |           | +         | +         | +          |
| 3. <i>Anisus leucostoma</i>               |           |           | +         | +         |           |           |           |           |            |
| 4. <i>Anisus spirorbis</i>                | +         | +         | +         | +         |           |           | +         | +         |            |
| 5. <i>Anisus vortex</i>                   |           |           | +         | +         |           |           |           |           |            |
| 6. <i>Aplexa hypnorum</i>                 | +         | +         | +         | +         |           |           | +         |           |            |
| 7. <b><i>Biomphalaria tenagophila</i></b> |           |           |           |           |           |           |           |           | ++         |
| 8. <i>Bithynia tentaculata</i>            |           |           |           |           |           |           | ++        |           |            |
| 9. <i>Bythinella austriaca</i>            |           |           |           |           |           |           | ++        |           |            |
| 10. <i>Fagotia acicularis</i>             | +         |           |           |           |           | +         | +         | +         | +          |
| 11. <i>Ferrissia wautieri</i>             |           |           |           |           |           | +         | +         |           |            |
| 12. <i>Galba truncatula</i>               |           | +         | +         |           |           | +         | +         | +         |            |
| 13. <i>Gyraulus albus</i>                 | +         | +         | +         | +         |           |           | +         | +         |            |
| 14. <i>Gyraulus cista</i>                 |           |           | +         | +         |           |           | +         |           |            |
| 15. <i>Hippeutis conplanatus</i>          |           | +         | +         | +         |           |           | +         |           |            |
| 16. <i>Lithoglyphus naticoides</i>        |           |           |           |           |           |           | +         |           |            |
| 17. <i>Lymnaea stagnalis</i>              | +         |           |           |           |           |           | +         | +         |            |
| 18. <i>Melanopsis parreyssi</i>           | +         | +         | +         | +         |           | +         | +         |           | +          |
| 19. <i>Paladilhia carpatica</i>           |           |           |           |           |           |           | ++        |           |            |

|                                      |           |           |           |           |          |           |           |           |          |
|--------------------------------------|-----------|-----------|-----------|-----------|----------|-----------|-----------|-----------|----------|
| 20. <i>Paladilhia leruthi</i>        |           |           |           | +         |          |           | +         |           |          |
| 21. <i>Paladilhia transsylvanica</i> |           |           |           | +         | +        | +         | +         | +         | +        |
| 22. <i>Physa fontinalis</i>          |           |           |           |           |          |           | ++        |           |          |
| 23. <i>Physella acuta</i>            |           |           |           |           |          | +         | +         |           | +        |
| 24. <i>Planorbarius corneus</i>      | +         | +         | +         |           |          |           | +         |           |          |
| 25. <i>Planorbella anceps</i>        |           |           |           |           |          |           | ++        |           |          |
| 26. <i>Planorbis planorbis</i>       | +         | +         | +         |           |          | +         |           |           |          |
| 27. <i>Pseudosuccinea columella</i>  |           |           |           |           |          |           | ++        |           |          |
| 28. <i>Radix auricularia</i>         |           | +         | +         |           |          |           | +         | +         | +        |
| 29. <i>Radix ovata / balthica</i>    |           | +         | +         |           |          |           | +         |           |          |
| 30. <i>Radix peregra / labiata</i>   | +         | +         | +         |           |          | +         | +         | +         |          |
| 31. <i>Segmentina nitida</i>         | +         | +         | +         |           |          |           |           |           |          |
| 32. <i>Stagnicola palustris</i>      | +         |           | +         | +         |          |           | +         |           |          |
| 33. <i>Stagnicola turricula</i>      |           | +         |           |           |          |           | +         |           |          |
| 34. <i>Theodoxus danubialis</i>      | +         |           |           |           |          |           |           |           |          |
| 35. <i>Theodoxus fluviatilis</i>     | +         |           |           |           |          |           |           |           |          |
| 36. <i>Theodoxus prevostianus</i>    |           | +         | +         | +         |          | +         | +         | +         | +        |
| 37. <i>Valvata cristata</i>          |           |           | +         |           |          |           | +         |           |          |
| 38. <i>Valvata piscinalis</i>        | +         | +         | +         | +         |          |           | +         |           | +        |
| 39. <i>Viviparus acerosus</i>        | +         |           | +         |           |          |           | +         |           |          |
| <b>Bivalve taxa</b>                  |           |           |           |           |          |           |           |           |          |
| 1. <i>Anodonta cygnaea</i>           | +         | +         | +         |           |          |           | +         |           |          |
| 2. <i>Pisidium amnicum</i>           |           |           |           |           |          |           | +         | +         |          |
| 3. <i>Pisidium casertanum</i>        |           |           |           |           |          | +         | +         | +         |          |
| 4. <i>Pisidium nitidum</i>           |           |           |           |           |          |           | ++        |           |          |
| 5. <i>Pisidium personatum</i>        |           |           |           |           |          |           | ++        |           |          |
| 6. <i>Pisidium subtruncatum</i>      |           |           |           |           |          |           | +         | +         |          |
| 7. <i>Sinanodonta woodiana</i>       |           |           |           |           |          |           | ++        |           |          |
| 8. <i>Sphaerium corneum</i>          | +         |           |           |           |          |           | +         |           |          |
| 9. <i>Sphaerium lacustris</i>        |           |           |           |           |          |           | ++        |           |          |
| 10. <i>Unio crassus</i>              | +         |           | +         |           |          |           | +         |           |          |
| <b>Total by column</b>               | <b>18</b> | <b>16</b> | <b>23</b> | <b>13</b> | <b>1</b> | <b>10</b> | <b>42</b> | <b>13</b> | <b>9</b> |

Sampling sites of 1) **Kertész**: Nagyvárad / Oradea, Püspökfürdő / Episcopiei Resort;  
 2) **Csiki**: ► Nagyvárad / Oradea – *Anodonta cygnaea*, *Aplexa hypnorum*, *Bradybaena fruticum*, *Chondrula tridens*, *Cochlicopa lubrica*, *Galba truncatula*, *Gyraulus albus*, *Helicigona banatica*, *Helix lutescens*, *Hippeutis complanata*, *Laciniaria plicata*

*Lechmannia marginata*, *Limax maximus*, *Monacha cartusiana*, *Planorbarius corneus*, *Planorbis planorbis*, *Radix peregra*, *Segmentina nitida*, *Stagnicola palustris*, *Succinea oblonga*, *Vallonia costata*, *Valvata piscinalis*, *Zonitoides nitidus* ►Püspökfürdő / Episcopiei Resort – *Anisus spirorbis*, *Cepaea hortensis*, *Euomphalia strigella*, *Helicella obvia*, *Helicigona banatica*, *Limax maximus*, *Melanopsis parreyssi*, *Monacha cartusiana*, *Oxyloma elegans*, *Pupilla muscorum*, *Radix auricularia*, *Radix ovata*, *Radix peregra*, *Stagnicola palustris*, *Succinea putris*, *Theodoxux prevostianus*, *Vallonia pulchella* ►Félicfürdő / Felix Resort: – *Limax maximus* ►Mézged / Meziad – *Aegopinella nitens*, *Alinda* / *Balea biplicata*, *Bulgarica cana*, *Chondrula clienta*, *Granaria frumentum*, *Orcula dolium?* (→jetschini), *Pupilla muscorum*, *Pyramidula rupestris*, *Ruthenica filigrana*, *Trichia bielzi*, *Vitrina* / *Phenacolimax pellucida* ►Rév / Vadul Crişului – *Euomphalia strigella*, *Laciniaria plicata*; **3) Rotarodesz**: Félicfürdő / Felix Resort, Nagyvárád / Oradea, Pecszenmárton / Sânmartin, Püspökfürdő / Episcopiei Resort, Rontó / Rontău; **4) Soós**: Jád-völgy / Valea Iadului, Kalota / Călăţea, Körösbánlaka / Bălnaca, Mézged / Meziad, Nagyvárád / Oradea, Püspökfürdő / Episcopiei Resort, Rév / Crişul Repede; **5) Bába & Kovács**: Defileul Vadu Crişului / Rév [(+) only in the paper of Rotaridesz]; **6) Kovács**: between Vadu Crişului and Bălnaca along the gorge; **7) Váncsa**: (sampling sites of Kovács: Băila 1 Mai / Episcopiei Resort, Bălnaca, Vadu Crişului, Meziad); **8) Sîrbu**: Bultz, Episcopiei Resort, Felix Resort, Oradea, Peţea rivulet, Răbăgani, Remeti, Şuncuiuş, Vadu Crişului; **9)** Data of Munkácsy Mihály Museum (Békéscsaba, Hungary): a) between Vadu Crişului and Bălnaca-Groşi along the gorge as well as Valea Luncilor, b) Meziad, Valea Iadului (Stâna de Vale), Luncaspie - column 9 includes some more items (Sárkány-Kiss et al. 1997); **10)** Data of the Hungarian National History Museum (HNHM) without the data of Kovacs, which are shown in columns 6-7).

Table 2/1. Sampling sites and terrestrial snail taxa of the study area

|     | Taxa                            | Sampling sites |    |    |    |    |    |    |    |    |     |     |     |     |     |     |
|-----|---------------------------------|----------------|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
|     |                                 | 1.             | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. | 10. | 11. | 12. | 13. | 14. | 15. |
| 1.  | <i>Acanthinula aculeata</i>     | +              |    |    |    | +  |    |    |    |    |     |     | +   |     |     |     |
| 2.  | <i>Acicula microspira</i>       | +              |    |    |    |    |    |    |    |    |     |     | +   |     |     |     |
| 3.  | <i>Acicula polita</i>           | +              |    |    |    |    |    |    |    |    |     |     |     |     |     |     |
| 4.  | <i>Aegopinella epipedostoma</i> | +              | +  |    |    |    |    | +  |    |    |     |     | +   | +   |     |     |
| 5.  | <i>Aegopinella minor</i>        |                |    |    |    |    |    |    |    |    |     |     |     |     |     |     |
| 6.  | <i>Aegopinella pura</i>         |                |    |    |    |    |    |    |    |    |     |     |     |     |     |     |
| 7.  | <i>Alinda biplicata</i>         |                |    |    |    | +  |    |    |    |    |     |     |     |     |     |     |
| 8.  | <i>Arion circumscriptus</i>     |                |    | +  |    |    |    |    |    |    |     |     |     |     |     |     |
| 9.  | <i>Arion subfuscus</i>          |                |    |    |    |    |    |    |    |    |     |     |     |     | +   |     |
| 10. | <i>Bradybaena fruticum</i>      |                |    |    |    |    |    |    |    |    |     |     |     |     | +   |     |
| 11. | <i>Bulgarica cana</i>           |                |    |    |    |    |    |    |    |    |     |     |     |     |     |     |
| 12. | <i>Bulgarica vetusta</i>        | +              | +  |    | +  | +  | +  |    | +  | +  | +   | +   | +   | +   |     |     |
| 13. | <i>Campyloea faustina</i>       |                |    |    |    |    |    |    | +  | +  | +   |     |     |     |     |     |
| 14. | <i>Carpatica calophana</i>      | +              |    |    |    | +  |    |    |    |    |     |     |     |     |     | +   |
| 15. | <i>Carychium minimum</i>        |                |    |    |    | +  |    | +  |    |    |     |     |     |     |     |     |
| 16. | <i>Carychium tridentatum</i>    | +              |    |    |    | +  |    |    |    |    |     | +   |     |     |     |     |
| 17. | <i>Cecilioides acicula</i>      |                |    |    |    |    |    |    |    |    |     |     |     |     |     |     |
| 18. | <i>Cepaea vindobonensis</i>     |                |    |    | +  |    |    |    |    |    |     |     | +   | +   | +   |     |

|     |                                       |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----|---------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19. | <i>Chondrina clienta</i>              | + | + |   | + |   | + |   | + | + | + | + |   |   |
| 20. | <i>Chondrula tridens</i>              |   |   |   |   |   |   |   |   |   | + |   | + |   |
| 21. | <i>Clausilia dubia</i>                |   |   |   |   |   |   |   |   |   | + |   |   |   |
| 22. | <i>Clausilia pumila</i>               |   |   |   |   |   |   |   |   |   |   |   | + |   |
| 23. | <i>Cochlicopa lubrica</i>             |   |   |   |   | + |   | + |   |   |   |   | + |   |
| 24. | <i>Cochlicopa lubricella</i>          |   |   |   | + |   |   | + |   |   | + |   |   |   |
| 25. | <i>Cochlodina laminata</i>            | + | + |   |   | + |   |   | + | + | + | + | + |   |
| 26. | <i>Columella edentula</i>             |   |   |   |   | + |   | + |   |   |   |   |   | + |
| 27. | <i>Deroceras laevis</i>               |   |   |   |   | + |   |   |   |   |   |   |   |   |
| 28. | <i>Deroceras reticulatum</i>          | + |   |   |   |   |   |   |   |   |   |   |   |   |
| 29. | <i>Deroceras</i> sp.                  |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 30. | <i>Euconulus fulvus</i>               |   |   |   |   | + |   | + |   |   |   |   |   |   |
| 31. | <i>Euomphalia strigella</i>           |   |   |   |   |   |   | + |   |   | + |   | + |   |
| 32. | <i>Granaria trumentum</i>             | + | + |   | + |   |   |   | + | + | + | + |   |   |
| 33. | <i>Helicella obvia</i>                |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 34. | <i>Helicigona/Drobacia banatica</i>   | + | + | + |   | + | + | + |   |   |   |   | + |   |
| 35. | <i>Helix lutescens</i>                | + |   |   |   |   |   |   |   |   |   |   |   |   |
| 36. | <i>Helix pomatia</i>                  |   |   | + |   | + | + |   | + |   | + |   | + |   |
| 37. | <i>Isognomostoma isognomostoma</i>    |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 38. | <i>Kovacsia kovacsi</i>               | + | + | + | + | + |   | + | + | + | + | + | + | + |
| 39. | <i>Laciniaria plicata</i>             | + | + |   |   | + |   |   | + | + |   | + |   |   |
| 40. | <i>Limax cinereoniger</i>             |   |   | + |   |   |   |   |   |   |   |   |   |   |
| 41. | <i>Limax maximus</i>                  |   |   |   |   |   |   |   | + |   |   |   |   |   |
| 42. | <i>Limax</i> sp.                      |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 43. | <i>Macrogastra borealis</i>           |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 44. | <i>Merdigera obscura</i>              |   |   |   |   |   | + |   | + | + |   | + |   |   |
| 45. | <i>Milax</i> sp.                      | + |   |   |   |   |   |   |   |   |   |   |   |   |
| 46. | <i>Monacha cartusiana</i>             |   |   |   |   | + |   |   |   |   |   |   |   |   |
| 47. | <i>Monachoides vicina</i>             |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 48. | <i>Nesovitrea hammonis</i>            |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 49. | <i>Orcula jetschini</i>               |   |   |   |   | + |   |   |   |   |   |   |   |   |
| 50. | <i>Oxychilus depressus</i>            |   |   |   |   | + |   |   |   |   |   |   |   |   |
| 51. | <i>Oxychilus draparnaudi</i>          |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 52. | <i>Oxychilus inopinatus</i>           |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 53. | <i>Oxychilus montivagus</i>           | + | + | + |   | + |   |   | + | + | + | + |   |   |
| 54. | <i>Oxychilus</i> sp.                  |   |   |   |   |   |   |   |   |   | + |   |   |   |
| 55. | <i>Oxyloma elegans</i>                |   |   |   |   |   |   | + |   |   |   |   |   |   |
| 56. | <i>Perforatella dibothrion</i>        |   |   |   |   | + |   |   |   |   |   |   |   |   |
| 57. | <i>Perforatella bidentata</i>         |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 58. | <i>Phenacolimax/Vitrina pellucida</i> | + | + | + |   | + | + |   | + | + | + | + |   |   |
| 59. | <i>Pseudalinda stabilis</i>           | + | + |   |   | + |   |   |   |   |   |   |   |   |
| 60. | <i>Punctum pygmaeum</i>               |   |   |   |   | + |   |   |   |   |   |   |   |   |
| 61. | <i>Pupilla muscorum</i>               |   |   |   |   |   |   |   |   |   | + |   |   |   |
| 62. | <i>Pyramidula rupestris</i>           |   |   |   | + |   |   |   |   |   | + |   |   |   |
| 63. | <i>Ruthenica filograna</i>            | + | + | + |   | + | + | + | + | + | + | + |   | + |
| 64. | <i>Sphyradium doliolum</i>            |   | + |   |   |   |   |   | + | + |   | + |   |   |
| 65. | <i>Succinea oblonga</i>               |   |   |   |   | + |   |   |   |   |   |   | + | + |
| 66. | <i>Succinea putris</i>                |   |   |   |   | + |   |   |   |   |   |   |   |   |
| 67. | <i>Trichia bielzi</i>                 | + | + |   |   | + |   |   | + | + |   | + |   |   |
| 68. | <i>Trichia hispida</i>                |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 69. | <i>Truncatellina cylindrica</i>       |   |   |   |   |   |   |   |   |   | + |   |   |   |
| 70. | <i>Vallonia costata</i>               |   |   |   |   | + |   | + |   |   | + |   |   |   |
| 71. | <i>Vallonia pulchella</i>             |   |   |   | + | + |   | + |   |   | + |   |   |   |
| 72. | <i>Vertigo angustior</i>              |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 73. | <i>Vertigo antivertigo</i>            |   |   |   |   | + |   |   |   |   |   |   |   |   |
| 74. | <i>Vertigo pusilla</i>                |   |   |   |   | + |   |   |   |   |   |   |   |   |

|     |                              |           |           |          |          |           |          |           |           |           |           |           |           |          |
|-----|------------------------------|-----------|-----------|----------|----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|
| 75. | <i>Vertigo pygmaea</i>       |           |           |          |          | +         |          |           |           |           |           |           |           |          |
| 76. | <i>Vitrea crystallina</i>    |           |           |          |          |           |          |           |           |           |           |           |           |          |
| 77. | <i>Vitrea erjevici</i>       | +         | +         | +        |          | +         |          |           |           |           |           | +         |           |          |
| 78. | <i>Vitrea diaphana</i>       |           | +         |          |          |           | +        |           | +         |           |           |           |           |          |
| 79. | <i>Vitrea subrimata</i>      |           |           |          |          |           |          |           |           |           |           |           |           |          |
| 80. | <i>Vitrea transsylvanica</i> |           |           |          |          | +         |          |           |           |           |           |           |           |          |
| 81. | <i>Vitrea</i> sp.            |           |           |          |          |           |          |           |           |           |           |           |           |          |
| 82. | <i>Zenobiella rubiginosa</i> |           |           |          |          |           | +        |           |           |           |           |           |           |          |
| 83. | <i>Zonitoides nitidus</i>    |           |           | +        |          | +         | +        | +         | +         |           |           | +         |           |          |
|     | <b>Number of taxa</b>        | <b>22</b> | <b>16</b> | <b>9</b> | <b>8</b> | <b>36</b> | <b>8</b> | <b>16</b> | <b>16</b> | <b>15</b> | <b>25</b> | <b>16</b> | <b>12</b> | <b>5</b> |

**Table 2/2.** Sampling sites and terrestrial snail taxa of the study area

|     | Taxa                                |                |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-------------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|     |                                     | Sampling sites |     |     |     |     |     |     |     |     |     |     |     |     |
|     |                                     | 16.            | 18. | 20. | 21. | 22. | 23. | 24. | 25. | 26. | 27. | 28. | 29. | 30. |
| 1.  | <i>Acanthinula aculeata</i>         | +              |     | +   |     |     |     |     |     |     |     |     |     |     |
| 2.  | <i>Acicula microspira</i>           |                |     | +   |     |     |     |     |     |     |     |     |     |     |
| 3.  | <i>Acicula polita</i>               |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 4.  | <i>Aegopinella epipedostoma</i>     |                | +   |     |     |     | +   |     |     |     |     |     |     |     |
| 5.  | <i>Aegopinella minor</i>            | +              | +   | +   |     |     | +   |     |     |     |     |     |     |     |
| 6.  | <i>Aegopinella pura</i>             |                | +   |     |     |     |     | +   |     |     | +   |     |     |     |
| 7.  | <i>Alinda biplicata</i>             |                |     |     |     |     |     |     |     |     |     |     | +   |     |
| 8.  | <i>Anon circumscriptus</i>          |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 9.  | <i>Anon subfuscus</i>               |                |     |     |     |     |     |     | +   |     |     |     |     |     |
| 10. | <i>Bradybaena fruticum</i>          | +              |     |     |     |     | +   |     | +   |     |     |     |     |     |
| 11. | <i>Bulgarica cana</i>               |                |     |     | +   | +   |     |     |     |     |     |     |     |     |
| 12. | <i>Bulgarica vetusta</i>            |                | +   | +   |     |     | +   | +   |     |     |     | +   |     | +   |
| 13. | <i>Campylea faustina</i>            | +              |     |     |     |     |     | +   |     |     |     |     |     |     |
| 14. | <i>Carpatia calophana</i>           |                | +   |     |     |     |     |     |     |     | +   |     |     |     |
| 15. | <i>Carychium minimum</i>            | +              |     |     |     |     |     |     |     |     |     |     |     |     |
| 16. | <i>Carychium tridentatum</i>        |                |     |     |     |     |     |     |     |     | +   |     |     |     |
| 17. | <i>Cecilioides acicula</i>          |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 18. | <i>Cepaea vindobonensis</i>         | +              |     |     |     |     |     |     |     |     |     |     |     |     |
| 19. | <i>Chondrina clienta</i>            |                |     | +   |     |     |     | +   |     |     |     |     |     |     |
| 20. | <i>Chondrula tridens</i>            |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 21. | <i>Clausilia dubia</i>              |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 22. | <i>Clausilia pumila</i>             | +              |     |     |     |     |     |     |     |     |     |     |     |     |
| 23. | <i>Cochlicopa lubrica</i>           | +              |     |     |     |     |     |     | +   | +   | +   |     |     |     |
| 24. | <i>Cochlicopa lubricella</i>        |                |     | +   |     |     |     |     |     | +   |     |     |     | +   |
| 25. | <i>Cochlodina laminata</i>          |                | +   | +   |     | +   | +   |     | +   |     |     | +   |     | +   |
| 26. | <i>Columella edentula</i>           | +              |     |     |     |     |     |     | +   |     |     |     |     |     |
| 27. | <i>Deroceas laevis</i>              |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 28. | <i>Deroceas reticulatum</i>         | +              |     |     |     |     |     |     |     |     |     |     |     |     |
| 29. | <i>Deroceas sp.</i>                 |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 30. | <i>Fuconulus fulvus</i>             |                |     |     | +   | +   |     |     |     |     |     |     |     |     |
| 31. | <i>Fuomphalia strigella</i>         |                |     |     |     |     |     | +   | +   | +   |     |     |     | +   |
| 32. | <i>Granaria trumentum</i>           |                |     | +   |     |     |     |     |     |     |     |     |     | +   |
| 33. | <i>Helicella obyia</i>              |                |     |     |     |     |     |     |     | +   |     |     |     |     |
| 34. | <i>Helicigona/Drobacia banatica</i> | +              | +   |     | +   | +   | +   | +   | +   |     | +   | +   |     | +   |
| 35. | <i>Helix lutescens</i>              |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 36. | <i>Helix pomatia</i>                | +              |     | +   |     | +   | +   | +   | +   |     | +   |     |     |     |
| 37. | <i>Isoognomostoma isognomost.</i>   |                | +   |     |     |     | +   |     |     |     |     | +   |     |     |
| 38. | <i>Kovacsia kovacsi</i>             |                | +   | +   |     | +   |     |     |     |     |     |     |     | +   |
| 39. | <i>Laciniana plicata</i>            |                | +   | +   | +   | +   | +   | +   | +   |     |     | +   |     | +   |
| 40. | <i>Limax cinereoniger</i>           |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 41. | <i>Limax maximus</i>                |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 42. | <i>Limax sp.</i>                    |                | +   | +   |     |     |     |     |     |     |     |     |     |     |
| 43. | <i>Macrogastra borealis</i>         |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 44. | <i>Merdigera obscura</i>            |                |     |     |     |     |     |     |     |     |     |     |     | +   |
| 45. | <i>Milax sp.</i>                    |                | +   |     |     |     |     |     |     |     |     |     |     |     |
| 46. | <i>Monacha cartusiana</i>           |                |     | +   |     |     |     |     |     |     |     |     |     |     |
| 47. | <i>Monachoides vicina</i>           |                |     |     |     |     | +   |     | +   |     | +   | +   | +   |     |
| 48. | <i>Nesovitrea hammonis</i>          |                |     |     |     |     |     |     |     | +   |     |     |     |     |
| 49. | <i>Orcula jetschini</i>             |                |     |     |     |     |     |     |     |     | +   |     |     |     |
| 50. | <i>Oxychilus depressus</i>          |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 51. | <i>Oxychilus draparnaudi</i>        | +              |     |     |     |     |     |     |     |     |     |     |     |     |
| 52. | <i>Oxychilus inopinatus</i>         |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 53. | <i>Oxychilus montivagus</i>         | +              | +   | +   |     |     | +   | +   |     |     |     | +   |     |     |



|     |                                       |           |           |           |          |           |           |           |           |           |           |           |          |           |
|-----|---------------------------------------|-----------|-----------|-----------|----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|
| 54. | <i>Oxychilus</i> sp.                  |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 55. | <i>Oxyloma elegans</i>                | +         |           |           |          |           |           |           |           |           |           |           |          |           |
| 56. | <i>Perforatella dibothrion</i>        |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 57. | <i>Perforatella bidentata</i>         | +         |           |           |          |           |           |           |           |           |           |           |          |           |
| 58. | <i>Phenacolimax/Vitrina pellucida</i> | +         | +         | +         |          |           |           | +         |           | +         | +         | +         |          | +         |
| 59. | <i>Pseudolinda stabilis</i>           |           |           |           |          | +         | +         |           |           | +         | +         | +         |          |           |
| 60. | <i>Punctum pygmaeum</i>               |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 61. | <i>Pupilla muscorum</i>               |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 62. | <i>Pyramidula rupestris</i>           |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 63. | <i>Ruthenica filograna</i>            |           | +         | +         | +        |           |           | +         | +         |           | +         | +         |          | +         |
| 64. | <i>Sphyradium doliolum</i>            | +         |           | +         |          |           |           |           |           |           | +         | +         |          | +         |
| 65. | <i>Succinea oblonga</i>               | +         |           |           |          |           |           |           |           |           | +         |           |          |           |
| 66. | <i>Succinea putris</i>                |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 67. | <i>Trichia bielzi</i>                 |           | +         |           |          | +         |           | +         |           |           | +         | +         |          |           |
| 68. | <i>Trichia hispida</i>                |           |           |           |          |           |           |           | +         |           | +         |           |          |           |
| 69. | <i>Truncatellina cylindrica</i>       |           |           |           | +        |           |           |           |           | +         |           |           |          |           |
| 70. | <i>Vallonia costata</i>               | +         |           |           |          |           |           |           |           | +         |           |           |          |           |
| 71. | <i>Vallonia pulchella</i>             | +         |           | +         |          |           |           |           |           | +         |           |           |          |           |
| 72. | <i>Vertigo angustior</i>              |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 73. | <i>Vertigo antivertigo</i>            |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 74. | <i>Vertigo pusilla</i>                |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 75. | <i>Vertigo pygmaea</i>                |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 76. | <i>Vitrea crystallina</i>             | +         |           |           |          |           |           |           |           |           |           |           |          |           |
| 77. | <i>Vitrea erjavecii</i>               |           | +         |           |          |           | +         | +         |           |           | +         | +         |          |           |
| 78. | <i>Vitrea diaphana</i>                |           |           |           |          | +         | +         | +         |           |           |           | +         |          |           |
| 79. | <i>Vitrea subrimata</i>               |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 80. | <i>Vitrea transsylvanica</i>          |           | +         | +         |          |           |           | +         |           |           | +         |           |          |           |
| 81. | <i>Vitrea</i> sp.                     |           |           |           |          |           |           |           |           |           |           |           |          |           |
| 82. | <i>Zenobiella rubiginosa</i>          | +         |           |           |          |           |           |           |           |           |           |           |          |           |
| 83. | <i>Zonitoides nitidus</i>             | +         |           |           |          |           |           |           |           |           | +         |           |          |           |
|     | <b>Number of taxa</b>                 | <b>24</b> | <b>18</b> | <b>19</b> | <b>6</b> | <b>10</b> | <b>14</b> | <b>15</b> | <b>11</b> | <b>10</b> | <b>18</b> | <b>14</b> | <b>3</b> | <b>12</b> |

Table 2/3. Sampling sites and terrestriell snail taxa of the study area

|     | Taxa                            |                |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|---------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|     |                                 | Sampling sites |     |     |     |     |     |     |     |     |     |     |     |     |
|     |                                 | 31.            | 32. | 33. | 34. | 36. | 37. | 38. | 39. | 40. | 41. | 42. | 43. | 44. |
| 1.  | <i>Acanthinula aculeata</i>     | +              |     |     |     |     |     |     |     |     |     |     |     |     |
| 2.  | <i>Acicula microspira</i>       |                |     |     |     |     | +   |     |     |     |     |     |     |     |
| 3.  | <i>Acicula polita</i>           |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 4.  | <i>Aegopinella epipedostoma</i> |                |     | +   |     |     |     |     |     |     |     |     |     | +   |
| 5.  | <i>Aegopinella minor</i>        | +              |     |     |     | +   |     |     |     | +   | +   |     | +   |     |
| 6.  | <i>Aegopinella pura</i>         | +              |     |     |     |     |     |     |     |     |     |     | +   |     |
| 7.  | <i>Alinda biplicata</i>         |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 8.  | <i>Arion ciorcumscriptus</i>    |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 9.  | <i>Arion subfuscus</i>          |                |     |     |     |     |     |     |     |     |     | +   |     |     |
| 10. | <i>Bradybaena fruticum</i>      |                |     |     | +   |     |     |     |     |     |     |     |     |     |
| 11. | <i>Bulgarica cana</i>           |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 12. | <i>Bulgarica vetusta</i>        | +              |     | +   |     | +   | +   |     |     | +   |     |     | +   | +   |
| 13. | <i>Campylea faustina</i>        |                |     | +   |     |     |     |     |     |     |     |     |     |     |
| 14. | <i>Carpatica calophana</i>      | +              |     |     |     |     |     |     | +   |     |     |     |     |     |
| 15. | <i>Carychium minimum</i>        |                |     |     |     |     |     |     |     |     |     | +   |     |     |
| 16. | <i>Carychium tridentatum</i>    |                |     |     |     |     |     | +   |     |     |     | +   |     |     |
| 17. | <i>Cecilioides acicula</i>      |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 18. | <i>Cepaea vindobonensis</i>     |                |     | +   | +   |     |     |     |     |     | +   |     |     |     |
| 19. | <i>Chondrina clienta</i>        |                |     |     |     | +   | +   |     |     | +   |     |     |     |     |
| 20. | <i>Chondrula tridens</i>        |                |     |     |     |     |     |     |     |     | +   |     |     |     |
| 21. | <i>Clausilia dubia</i>          |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 22. | <i>Clausilia pumila</i>         |                |     |     |     |     |     |     |     |     |     |     |     |     |
| 23. | <i>Cochlicopa lubrica</i>       |                |     |     |     |     |     | +   |     |     |     | +   |     | +   |
| 24. | <i>Cochlicopa lubricella</i>    | +              |     | +   |     |     | +   | +   |     | +   |     |     | +   |     |
| 25. | <i>Cochlodina laminata</i>      | +              |     | +   |     | +   |     |     |     |     |     |     |     | +   |
| 26. | <i>Columella edentula</i>       |                |     |     |     |     |     | +   |     |     |     | +   |     |     |
| 27. | <i>Deroceras laevis</i>         |                |     |     |     |     |     | +   |     |     |     |     |     |     |

|     |                                       |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
|-----|---------------------------------------|-----------|----------|-----------|----------|-----------|-----------|-----------|----------|-----------|----------|-----------|-----------|-----------|---|---|---|---|--|
| 28. | <i>Deroceras reticulatum</i>          |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 29. | <i>Deroceras sp.</i>                  |           |          |           |          |           | +         |           |          |           |          |           |           | +         | + |   |   |   |  |
| 30. | <i>Euconulus fulvus</i>               |           |          |           |          |           |           |           |          |           |          |           |           | +         |   |   |   |   |  |
| 31. | <i>Euomphalia strigella</i>           | +         |          |           |          |           |           |           |          |           |          |           |           |           | + | + |   |   |  |
| 32. | <i>Granaria frumentum</i>             |           |          | +         |          |           |           |           |          |           |          |           | +         |           |   | + |   |   |  |
| 33. | <i>Helicella obvia</i>                |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 34. | <i>Helicigona/Drobacia banatica</i>   | +         |          | +         | +        | +         |           |           | +        |           |          |           |           |           |   |   |   | + |  |
| 35. | <i>Helix lutescens</i>                |           |          |           | +        |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 36. | <i>Helix pomatia</i>                  | +         |          |           |          |           | +         |           |          | +         |          |           |           |           |   | + |   |   |  |
| 37. | <i>Isognomostoma isognomost.</i>      |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 38. | <i>Kovacsia kovacsi</i>               | +         | +        | +         |          | +         | +         | +         |          | +         | +        |           |           |           |   | + | + |   |  |
| 39. | <i>Laciniaria plicata</i>             |           |          | +         |          |           | +         |           |          | +         |          |           |           |           |   |   |   |   |  |
| 40. | <i>Limax cinereoniger</i>             |           |          |           |          |           |           |           | +        |           |          |           |           |           |   |   |   |   |  |
| 41. | <i>Limax maximus</i>                  |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 42. | <i>Limax sp.</i>                      | +         |          | +         |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 43. | <i>Macrogastra borealis</i>           |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   | + |  |
| 44. | <i>Merdigera obscura</i>              |           |          | +         |          | +         | +         |           |          | +         |          |           |           |           |   | + | + |   |  |
| 45. | <i>Milax sp.</i>                      |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 46. | <i>Monacha cartusiana</i>             |           |          |           | +        |           |           |           |          |           |          |           |           | +         |   |   | + |   |  |
| 47. | <i>Monachoides vicina</i>             |           |          |           | +        |           | +         |           | +        |           |          |           |           |           |   | + | + |   |  |
| 48. | <i>Nesovitrea hammonis</i>            |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 49. | <i>Orcula jetschii</i>                |           |          | +         |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 50. | <i>Oxychilus depressus</i>            |           |          |           |          |           |           |           |          | +         |          |           |           |           |   |   |   |   |  |
| 51. | <i>Oxychilus draparnaudi</i>          | +         |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   | + |  |
| 52. | <i>Oxychilus inopinatus</i>           |           |          |           |          |           |           |           |          |           |          | +         |           |           |   |   |   |   |  |
| 53. | <i>Oxychilus montivagus</i>           | +         |          | +         | +        |           |           |           |          | +         |          |           |           |           |   |   |   |   |  |
| 54. | <i>Oxychilus sp.</i>                  |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 55. | <i>Oxyloma elegans</i>                |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 56. | <i>Perforatella dibothrion</i>        |           |          | +         |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 57. | <i>Perforatella bidentata</i>         |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 58. | <i>Phenacolimax/Vitrina pellucida</i> | +         |          | +         | +        | +         | +         | +         | +        | +         | +        |           |           |           |   | + |   |   |  |
| 59. | <i>Pseudalinda stabilis</i>           | +         |          | +         |          |           |           |           |          | +         |          |           |           |           |   |   |   |   |  |
| 60. | <i>Punctum pygmaeum</i>               |           |          |           |          |           |           |           | +        |           |          |           |           |           |   |   |   |   |  |
| 61. | <i>Pupilla muscorum</i>               |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 62. | <i>Pyramidula rupestris</i>           |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 63. | <i>Ruthenica filograna</i>            | +         |          | +         | +        | +         | +         |           |          | +         |          |           |           |           |   | + | + |   |  |
| 64. | <i>Sphyradium doliolum</i>            |           |          | +         |          | +         | +         |           |          | +         |          |           |           |           |   | + |   |   |  |
| 65. | <i>Succinea oblonga</i>               |           |          |           |          |           |           |           |          |           |          |           |           |           | + |   |   |   |  |
| 66. | <i>Succinea putris</i>                |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 67. | <i>Trichia bielzi</i>                 | +         |          | +         |          | +         |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 68. | <i>Trichia hispida</i>                |           |          |           |          |           |           | +         |          |           |          |           |           | +         |   |   | + |   |  |
| 69. | <i>Truncatellina cylindrica</i>       |           |          |           |          |           | +         | +         |          |           |          |           |           |           |   |   |   |   |  |
| 70. | <i>Vallonia costata</i>               |           |          | +         |          |           |           |           |          |           |          |           |           |           | + |   |   |   |  |
| 71. | <i>Vallonia pulchella</i>             |           |          | +         |          | +         |           |           |          |           | +        | +         |           | +         | + |   |   |   |  |
| 72. | <i>Vertigo angustior</i>              |           |          |           |          |           |           |           |          |           |          |           |           |           | + |   |   |   |  |
| 73. | <i>Vertigo antivertigo</i>            |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 74. | <i>Vertigo pusilla</i>                |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 75. | <i>Vertigo pygmaea</i>                |           |          |           |          |           |           | +         |          |           |          |           |           |           |   |   |   |   |  |
| 76. | <i>Vitrea crystallina</i>             |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 77. | <i>Vitrea erjeveci</i>                | +         |          |           |          | +         |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 78. | <i>Vitrea diaphana</i>                |           |          |           |          |           |           |           | +        |           |          |           |           |           |   |   |   |   |  |
| 79. | <i>Vitrea subrimata</i>               |           |          | +         |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 80. | <i>Vitrea transsylvanica</i>          |           |          | +         |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 81. | <i>Vitrea sp.</i>                     |           |          | +         |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 82. | <i>Zenobiella rubiginosa</i>          |           |          |           |          |           |           |           |          |           |          |           |           |           |   |   |   |   |  |
| 83. | <i>Zonitoides nitidus</i>             |           |          | +         |          |           |           |           |          |           |          |           |           | +         |   |   |   |   |  |
|     | <b>Number of taxa</b>                 | <b>19</b> | <b>1</b> | <b>26</b> | <b>9</b> | <b>13</b> | <b>14</b> | <b>11</b> | <b>7</b> | <b>14</b> | <b>7</b> | <b>14</b> | <b>15</b> | <b>14</b> |   |   |   |   |  |

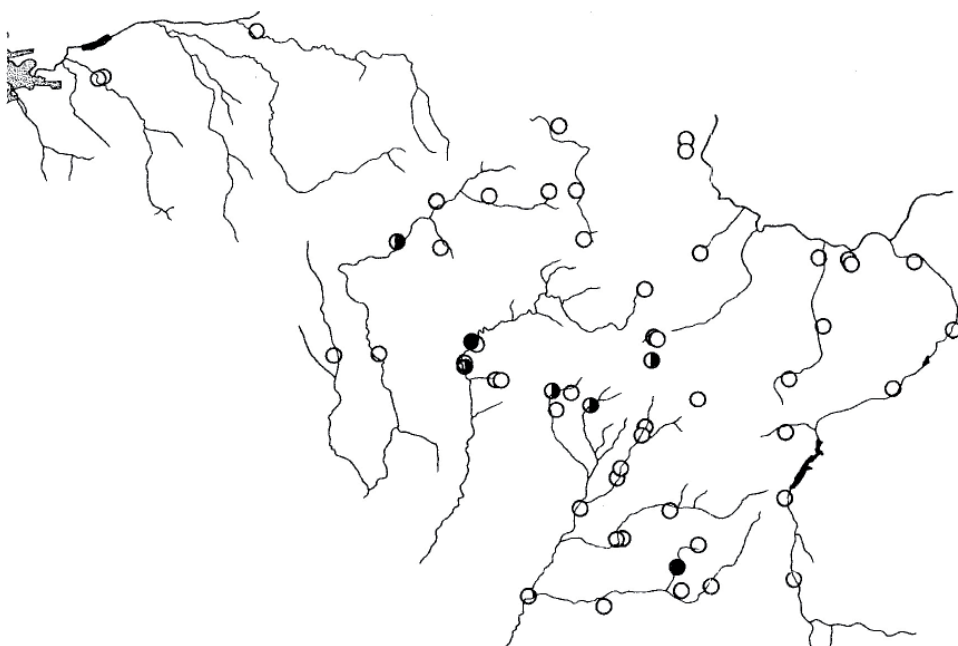
Table 2/4. Sampling sites and terrestriell snail taxa of the study area

|     | Taxa                                | Sampling sites |     |     |     |     |     |     |     |     |     | 1-55 |
|-----|-------------------------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
|     |                                     | 46.            | 47. | 48. | 49. | 50. | 51. | 52. | 53. | 54. | 55. |      |
| 1.  | <i>Acanthinula aculeata</i>         |                |     | +   |     |     |     |     | +   |     |     | 8    |
| 2.  | <i>Acicula microspira</i>           |                |     | +   |     |     | +   |     | +   |     |     | 7    |
| 3.  | <i>Acicula polita</i>               |                |     |     |     |     |     |     | +   |     |     | 2    |
| 4.  | <i>Aegopinella epipedostoma</i>     |                |     | +   |     |     |     |     |     |     |     | 10   |
| 5.  | <i>Aegopinella minor</i>            |                |     |     |     | +   |     |     | +   |     |     | 13   |
| 6.  | <i>Aegopinella pura</i>             |                |     |     |     |     |     |     |     |     |     | 5    |
| 7.  | <i>Alinda biplicata</i>             |                |     |     |     |     |     |     |     |     |     | 2    |
| 8.  | <i>Arion circumscriptus</i>         |                |     |     |     |     |     |     |     |     |     | 1    |
| 9.  | <i>Arion subfuscus</i>              |                |     |     |     |     |     |     |     |     |     | 3    |
| 10. | <i>Bradybaena fruticum</i>          |                |     |     |     |     |     |     |     |     | +   | 6    |
| 11. | <i>Bulgarica cana</i>               |                |     |     |     |     |     |     |     |     |     | 2    |
| 12. | <i>Bulgarica vetusta</i>            |                |     | +   |     | +   | +   |     | +   |     |     | 26   |
| 13. | <i>Campylea faustina</i>            |                |     |     |     |     |     |     | +   |     |     | 7    |
| 14. | <i>Carpatica calophana</i>          |                |     |     |     |     |     | +   |     |     |     | 8    |
| 15. | <i>Carychium minimum</i>            |                | +   |     |     |     |     |     | +   |     |     | 6    |
| 16. | <i>Carychium tridentatum</i>        |                |     |     |     |     | +   |     | +   |     |     | 8    |
| 17. | <i>Cecilioides acicula</i>          |                |     |     |     |     |     |     | +   |     |     | 1    |
| 18. | <i>Cepaea vindobonensis</i>         | +              | +   | +   |     |     | +   |     | +   | +   | +   | 15   |
| 19. | <i>Chondrina clienta</i>            |                |     |     |     |     | +   |     | +   |     |     | 15   |
| 20. | <i>Chondrula tridens</i>            |                |     |     |     |     |     |     |     | +   |     | 4    |
| 21. | <i>Clausilia dubia</i>              |                |     | +   |     |     |     |     |     |     |     | 2    |
| 22. | <i>Clausilia pumila</i>             |                |     |     |     |     |     |     |     |     |     | 2    |
| 23. | <i>Cochlicopa lubrica</i>           |                |     |     |     |     | +   |     | +   | +   |     | 13   |
| 24. | <i>Cochlicopa lubricella</i>        |                |     |     |     |     | +   |     |     | +   |     | 15   |
| 25. | <i>Cochlodina laminata</i>          |                |     | +   |     | +   | +   | +   | +   |     | +   | 25   |
| 26. | <i>Columella edentula</i>           |                |     |     |     |     |     |     | +   |     |     | 8    |
| 27. | <i>Deroceras laevis</i>             |                | +   |     |     |     |     |     |     |     |     | 3    |
| 28. | <i>Deroceras reticulatum</i>        |                |     |     |     |     |     |     |     |     |     | 2    |
| 29. | <i>Deroceras sp.</i>                |                |     |     |     |     |     |     |     |     |     | 3    |
| 30. | <i>Euconulus fulvus</i>             |                |     |     |     |     |     |     | +   |     |     | 6    |
| 31. | <i>Euomphalia strigella</i>         |                |     | +   |     |     |     |     | +   |     |     | 12   |
| 32. | <i>Granaria frumentum</i>           |                |     |     |     |     | +   |     | +   |     |     | 14   |
| 33. | <i>Helicella obvia</i>              |                |     |     |     |     |     |     |     |     |     | 1    |
| 34. | <i>Helicigona/Drobacia banatica</i> |                |     | +   | +   | +   |     | +   | +   |     | +   | 29   |
| 35. | <i>Helix lutescens</i>              | +              |     |     |     |     |     |     |     |     |     | 3    |
| 36. | <i>Helix pomatia</i>                | +              |     | +   |     |     |     |     |     |     |     | 19   |
| 37. | <i>Isognomostoma isognomost.</i>    |                |     | +   |     |     |     |     | +   |     |     | 5    |
| 38. | <i>Kovacsia kovacsi</i>             |                |     | +   |     |     | +   | +   | +   |     |     | 31   |
| 39. | <i>Laciniaria plicata</i>           |                |     | +   |     | +   |     | +   |     |     |     | 21   |
| 40. | <i>Limax cinereoniger</i>           |                |     |     |     |     |     |     |     |     |     | 1    |
| 41. | <i>Limax maximus</i>                |                |     | +   |     |     |     |     |     |     |     | 2    |
| 42. | <i>Limax sp.</i>                    |                |     |     |     |     |     | +   | +   |     |     | 6    |
| 43. | <i>Macrogastra borealis</i>         |                |     |     |     |     |     |     | +   |     |     | 2    |
| 44. | <i>Merdigera obscura</i>            |                |     |     |     | +   |     |     |     |     |     | 12   |
| 45. | <i>Milax sp.</i>                    |                |     | +   |     |     |     |     |     |     |     | 3    |
| 46. | <i>Monacha cartusiana</i>           | +              |     |     |     |     |     |     |     | +   |     | 7    |
| 47. | <i>Monachoides vicina</i>           |                |     |     | +   |     |     |     | +   | +   | +   | 14   |
| 48. | <i>Nesovitrea hammonis</i>          |                |     |     |     |     |     |     |     |     |     | 1    |
| 49. | <i>Orcula jetschini</i>             |                |     |     |     |     |     |     | +   |     |     | 4    |
| 50. | <i>Oxychilus depressus</i>          |                |     |     |     |     |     |     |     |     |     | 2    |
| 51. | <i>Oxychilus draparnaudi</i>        | +              |     |     |     |     |     |     |     | +   |     | 5    |
| 52. | <i>Oxychilus inopinatus</i>         |                |     |     |     |     |     |     |     |     |     | 1    |
| 53. | <i>Oxychilus montivagus</i>         |                |     | +   |     |     |     | +   | +   |     |     | 21   |
| 54. | <i>Oxychilus sp.</i>                |                |     |     |     |     |     |     |     |     |     | 1    |
| 55. | <i>Oxyloma elegans</i>              | +              | +   |     |     |     |     |     |     |     |     | 4    |
| 56. | <i>Perforatella dibothrion</i>      |                |     |     |     |     |     |     | +   |     |     | 3    |

|     |                                       |          |          |           |          |          |           |           |           |           |          |            |
|-----|---------------------------------------|----------|----------|-----------|----------|----------|-----------|-----------|-----------|-----------|----------|------------|
| 57. | <i>Perforatella bidentata</i>         |          |          |           |          |          |           |           |           |           |          | 1          |
| 58. | <i>Phenacolimax/Vitrina pellucida</i> |          | +        |           |          | +        |           | +         |           |           |          | 29         |
| 59. | <i>Pseudalinda stabilis</i>           |          |          |           |          |          |           |           |           |           |          | 11         |
| 60. | <i>Punctum pygmaeum</i>               |          |          |           |          | +        |           | +         |           |           |          | 4          |
| 61. | <i>Pupilla muscorum</i>               |          |          |           |          | +        |           | +         | +         |           |          | 4          |
| 62. | <i>Pyramidula rupestris</i>           |          | +        |           |          | +        |           | +         |           |           |          | 5          |
| 63. | <i>Ruthenica filograna</i>            |          | +        |           |          | +        | +         | +         |           |           |          | 32         |
| 64. | <i>Sphyradium doliolum</i>            |          | +        |           | +        |          |           | +         | +         |           |          | 18         |
| 65. | <i>Succinea oblonga</i>               |          |          |           |          |          |           |           |           |           | +        | 7          |
| 66. | <i>Succinea putris</i>                |          | +        |           |          |          |           |           |           |           |          | 2          |
| 67. | <i>Trichia bielzi</i>                 |          |          | +         |          | +        |           | +         |           |           |          | 18         |
| 68. | <i>Trichia hispida</i>                |          | +        | +         |          |          |           | +         | +         |           |          | 9          |
| 69. | <i>Truncatellina cylindrica</i>       |          | +        |           |          | +        |           | +         |           |           |          | 8          |
| 70. | <i>Vallonia costata</i>               |          | +        |           |          | +        |           | +         |           |           |          | 10         |
| 71. | <i>Vallonia pulchella</i>             |          |          | +         |          | +        |           | +         | +         |           |          | 17         |
| 72. | <i>Vertigo angustior</i>              |          |          |           |          |          |           | +         |           |           |          | 2          |
| 73. | <i>Vertigo antivertigo</i>            |          | +        |           |          |          |           |           |           |           |          | 2          |
| 74. | <i>Vertigo pusilla</i>                |          |          |           |          |          |           | +         |           |           |          | 2          |
| 75. | <i>Vertigo pygmaea</i>                |          |          |           |          | +        |           |           |           |           |          | 3          |
| 76. | <i>Vitrea crystallina</i>             |          |          |           |          |          |           | +         |           |           |          | 2          |
| 77. | <i>Vitrea erjavecii</i>               |          |          |           |          |          |           | +         |           |           |          | 13         |
| 78. | <i>Vitrea diaphana</i>                |          | +        |           |          |          | +         | +         |           |           |          | 11         |
| 79. | <i>Vitrea subrimata</i>               |          |          |           |          |          |           | +         |           |           |          | 2          |
| 80. | <i>Vitrea transsylvanica</i>          |          | +        | +         |          |          |           | +         |           |           |          | 9          |
| 81. | <i>Vitrea</i> sp.                     |          |          |           |          |          |           | +         |           |           |          | 2          |
| 82. | <i>Zenobiella rubiginosa</i>          | +        | +        |           | +        |          |           |           |           | +         |          | 6          |
| 83. | <i>Zonitoides nitidus</i>             | +        | +        |           | +        |          |           | +         | +         |           |          | 15         |
|     | <b>Number of taxa</b>                 | <b>8</b> | <b>8</b> | <b>27</b> | <b>6</b> | <b>9</b> | <b>19</b> | <b>10</b> | <b>46</b> | <b>12</b> | <b>7</b> | <b>695</b> |

**Table 3.** Sampling sites as well as aquatic snails (1-8) and valves (1-3) taxa of the study area

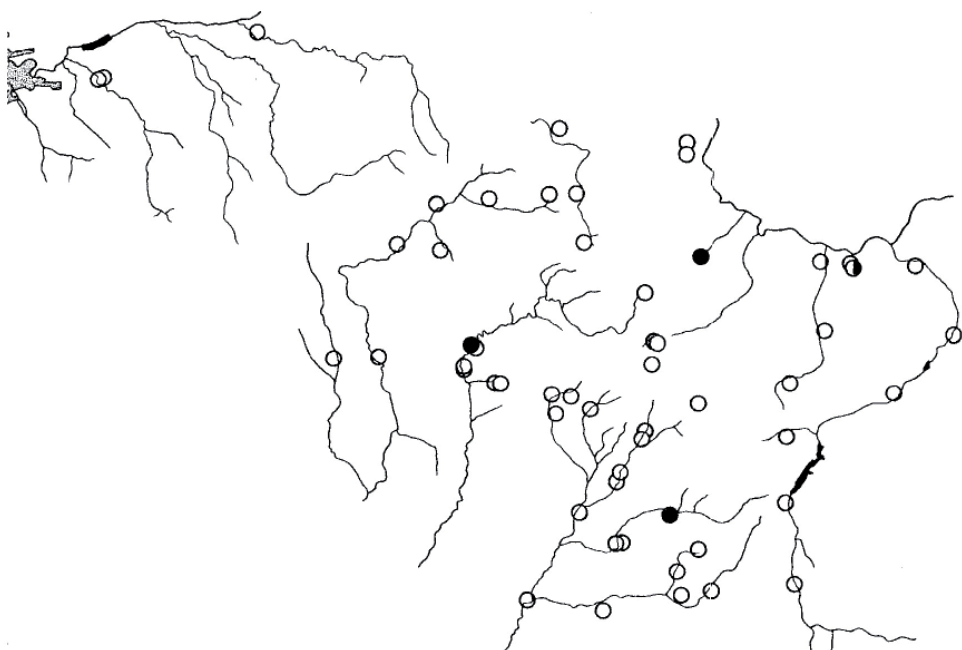
|    | Taxa                       | Sampling sites |    |    |     |     |     |     |     |     |     |     |     |     |       |
|----|----------------------------|----------------|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
|    |                            | 5.             | 7. | 8. | 10. | 16. | 17. | 19. | 27. | 35. | 45. | 47. | 53. | 54. | 1-55. |
| 1. | <i>Ancylus fluviatilis</i> |                |    | +  | +   |     | +   | +   |     |     |     | +   |     | 5   |       |
| 2. | <i>Anisus spirorbis</i>    |                |    |    |     |     |     |     |     |     |     | +   |     | 1   |       |
| 3. | <i>Lymnaea truncatula</i>  | +              | +  |    |     |     |     | +   |     |     |     | +   |     | 4   |       |
| 4. | <i>Paladilhopsis</i> sp.   |                |    |    |     |     |     |     |     |     |     | +   |     | 1   |       |
| 5. | <i>Radix auricularia</i>   |                |    |    |     |     |     |     |     | +   |     |     |     | 1   |       |
| 6. | <i>Radix labiata</i>       |                | +  | +  | +   | +   | +   | +   | +   | +   |     | +   |     | 9   |       |
| 7. | <i>Radix</i> sp.           | +              |    |    |     |     |     |     |     |     |     |     |     | 1   |       |
| 8. | <i>Valvata piscinalis</i>  |                |    |    |     |     |     |     |     | +   | +   |     |     | 2   |       |
| 1. | <i>Pisidium</i> sp.        |                |    |    |     |     |     |     |     |     |     | +   | +   | 2   |       |
| 2. | <i>Sphaerium corneum</i>   |                |    |    |     |     |     |     |     | +   | +   |     |     | 2   |       |
| 3. | <i>Unio crassus</i>        |                |    |    |     |     |     |     |     | +   |     |     |     | 1   |       |
|    | Number of taxa             | 2              | 2  | 2  | 2   | 1   | 2   | 2   | 1   | 1   | 5   | 2   | 6   | 1   | 29    |



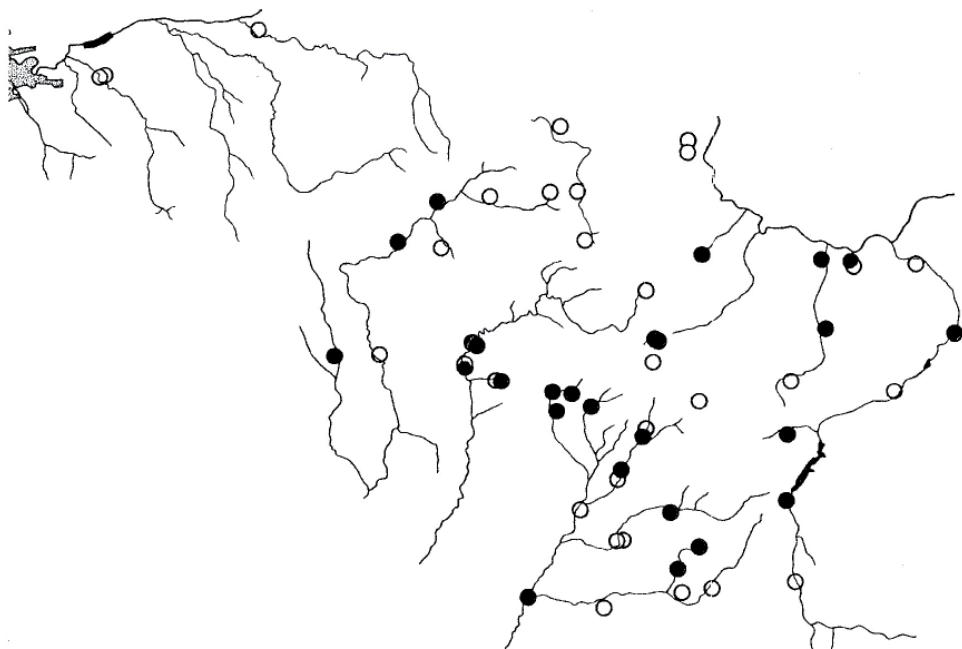
**Fig. 3.** Distribution of *Acicula polita* (full circles) and *Acicula microspira* (full circles as well as semi-full circles from left to right white and black) in the Pădurea Craiului Mts.



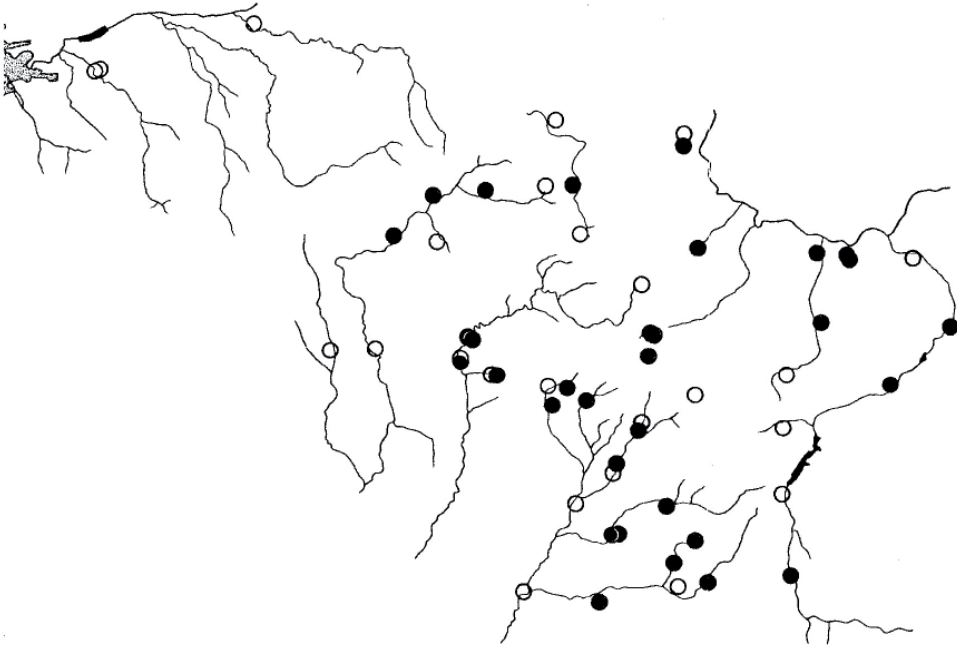
**Fig. 4.** Distribution of *Sphyradium doliolum* in the Pădurea Craiului Mts. (Full circles where *S.d.* was found.)



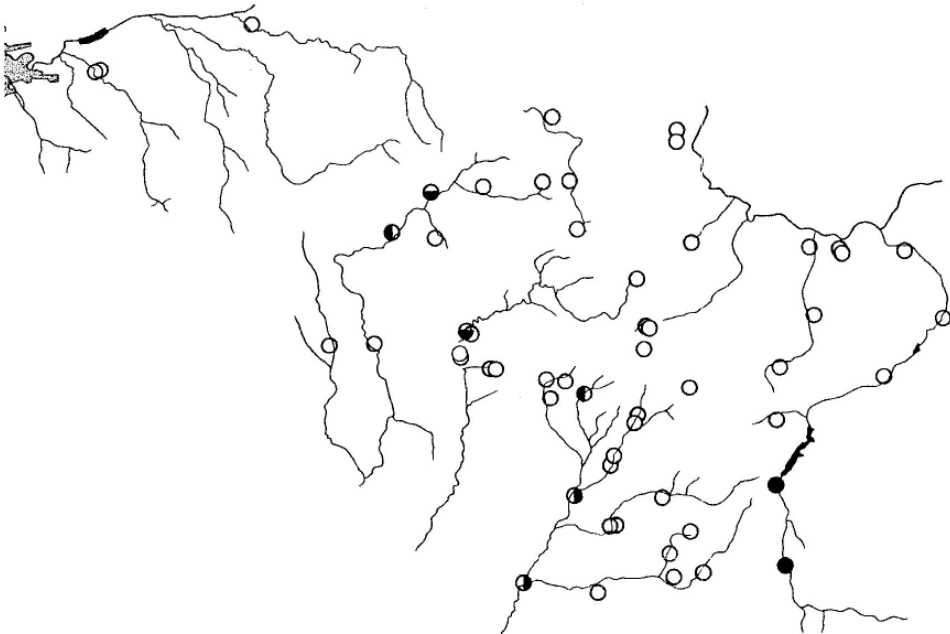
**Fig. 5.** Distribution of *Orcula jetschini* and *Perforatella dibothrion* in the Pădurea Craiului Mts. (full circles: both species, semi-full circles/ from left to right white and black we collected only *O.j.*)



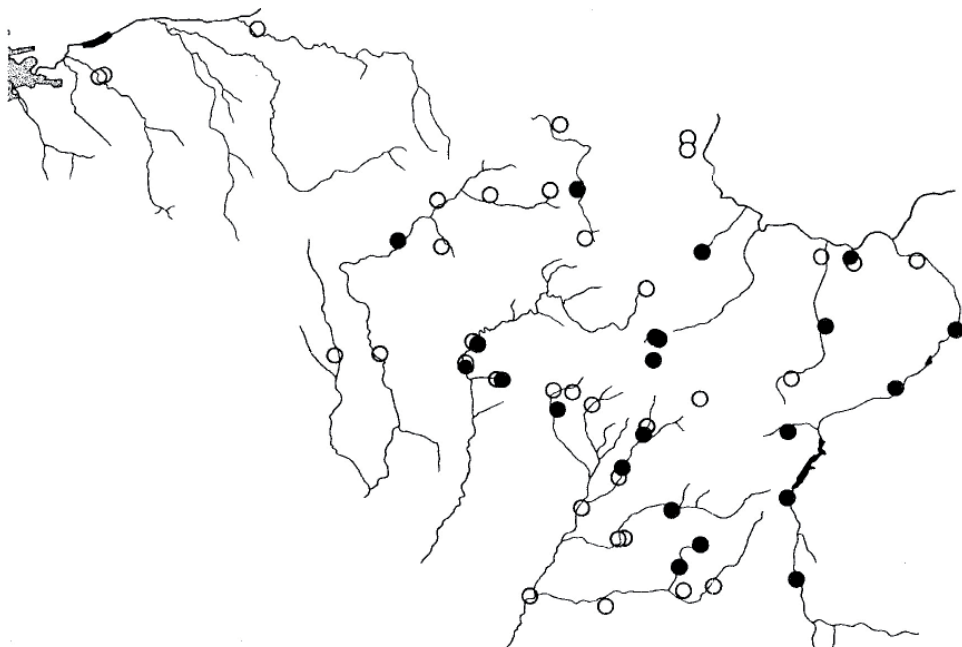
**Fig. 6.** Distribution of *Cochlodina laminata* in the Pădurea Craiului Mts. (Full circles where *C.l.* was found.)



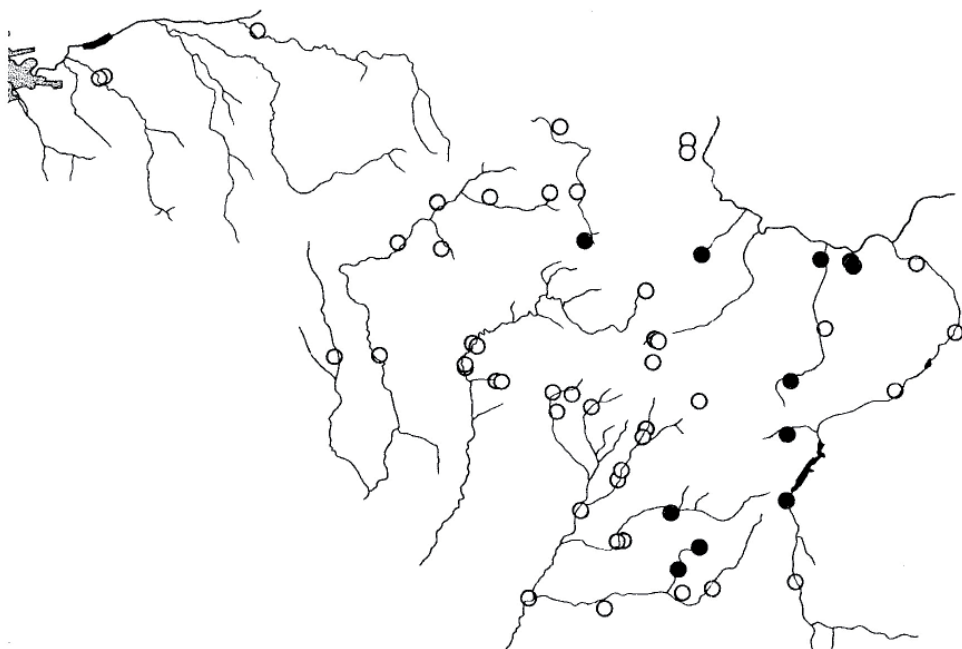
**Fig. 7.** Distribution of *Ruthenica filograna* in the Pădurea Craiului Mts.  
(Full circles where *R. f.* was found.)



**Fig. 8.** Distribution of *Clausilia dubia* (semi-full circles/from left to right black and white), *Clausilia pumila* (semi-full circles from left to right white and black), *Macrogastra borealis bielzi* (semi-full circles over to lower white and black) and *Bulgarica cana* (full circles) in the Pădurea Craiului Mts.

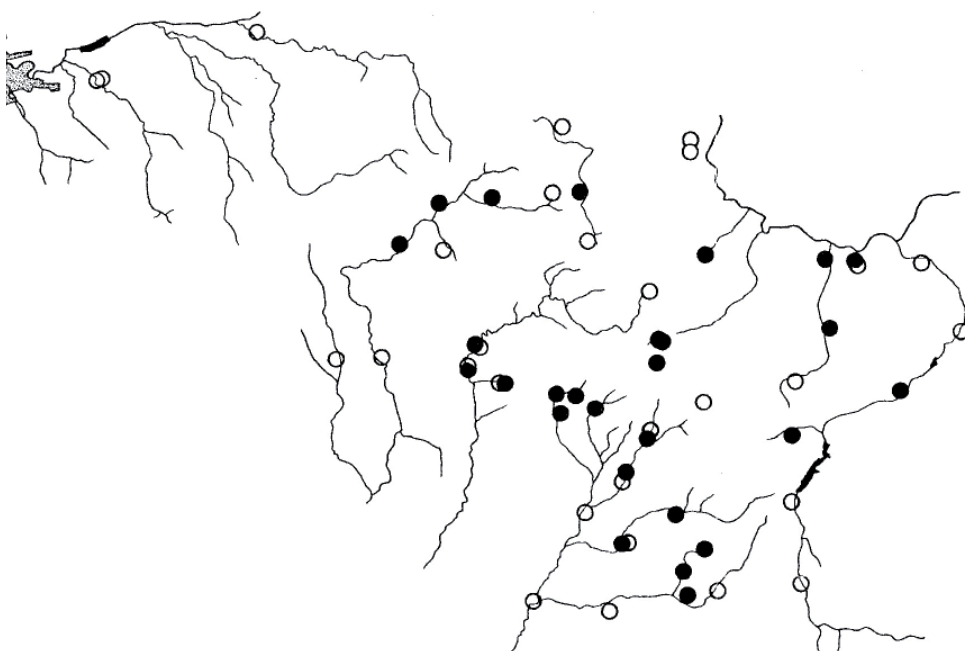


**Fig. 9.** Distribution of *Laciniaria plicata* in the Pădurea Craiului Mts.  
(Full circles where *L. p.* was found.)

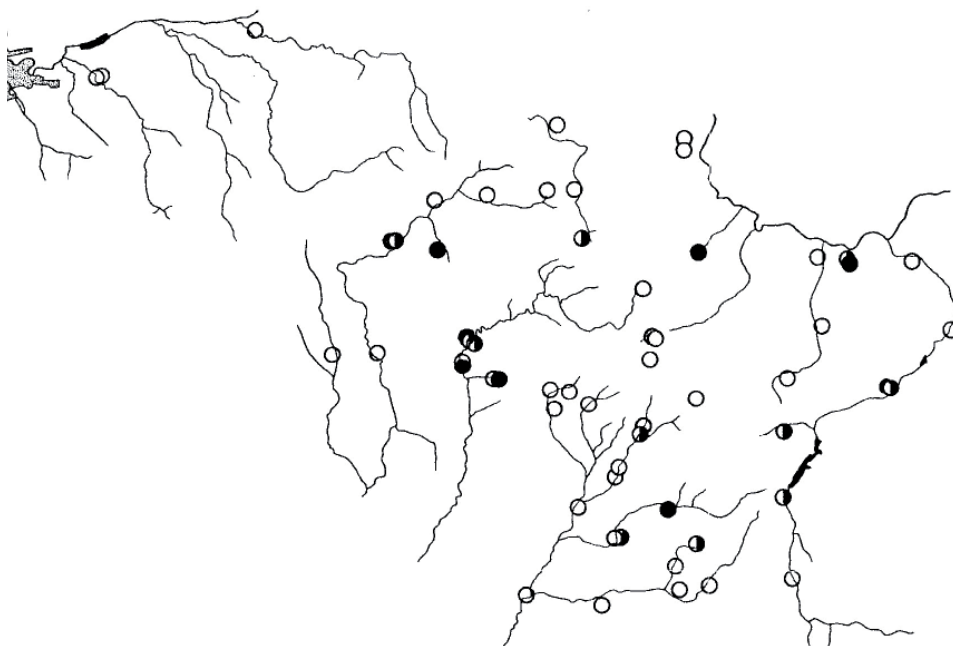


**Fig. 10.** Distribution of *Pseudolinda stabilis* in the Pădurea Craiului Mts.  
(Full circles where *P. s.* was found.)

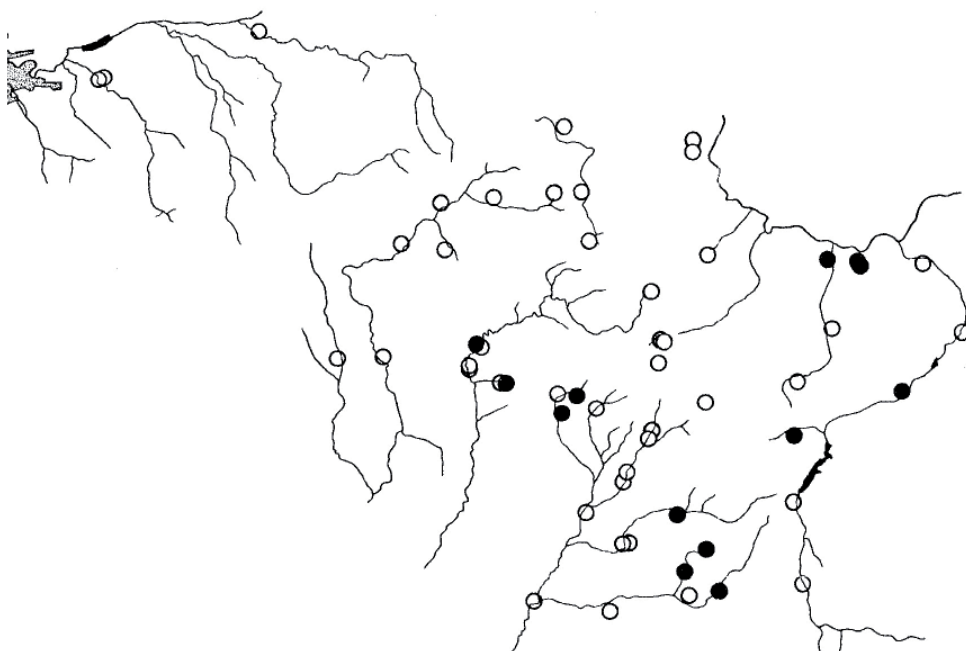




**Fig. 11.** Distribution of *Bulgarica vetusta* in the Pădurea Craiului Mts.  
(Full circles where *B. v.* was found.)



**Fig. 12.** Distribution of *Vitrea transsylvanica* (full circles) and *Vitrea diaphana* (Semi-full circles/ from left to right white and black) in the Pădurea Craiului Mts.



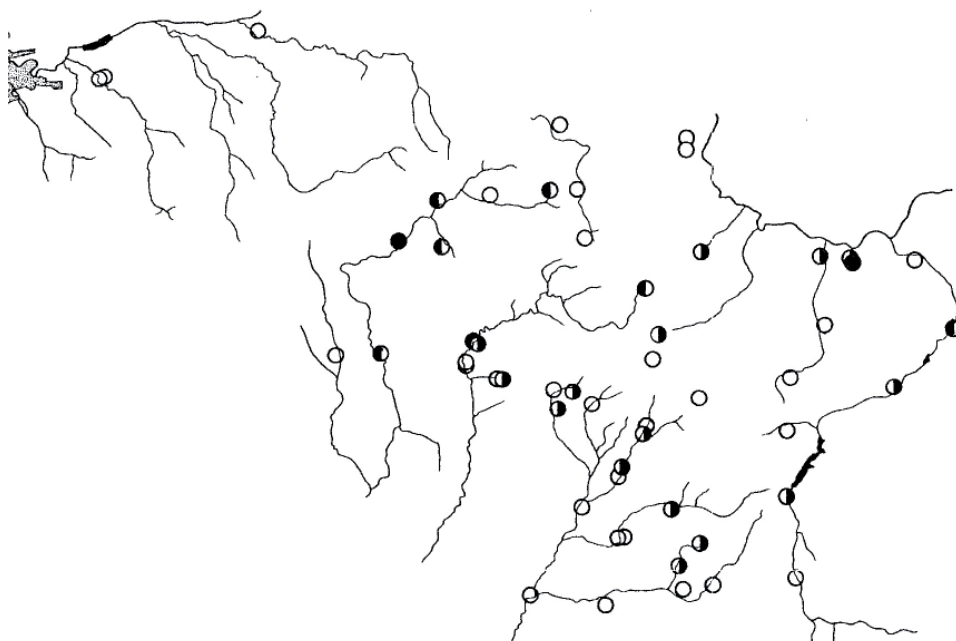
**Fig. 13.** Distribution of *Vitrea erjavecii* in the Pădurea Craiului Mts. (Full circles where *V. e.* was found.)



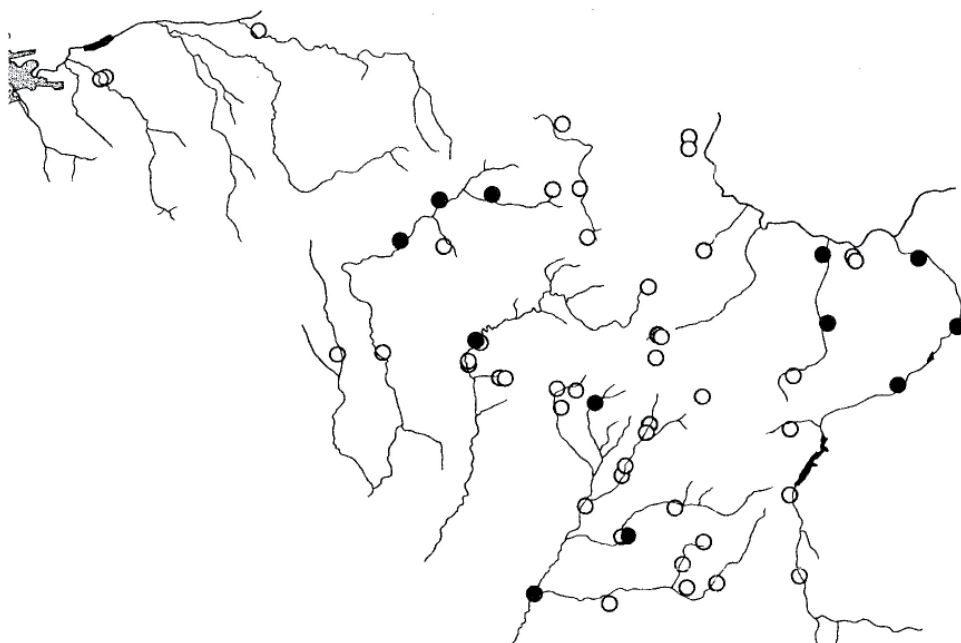
**Fig. 14.** Distribution of *Bradybaena fruticum* in the Pădurea Craiului Mts. (Full circles where *B. f.* was found.)



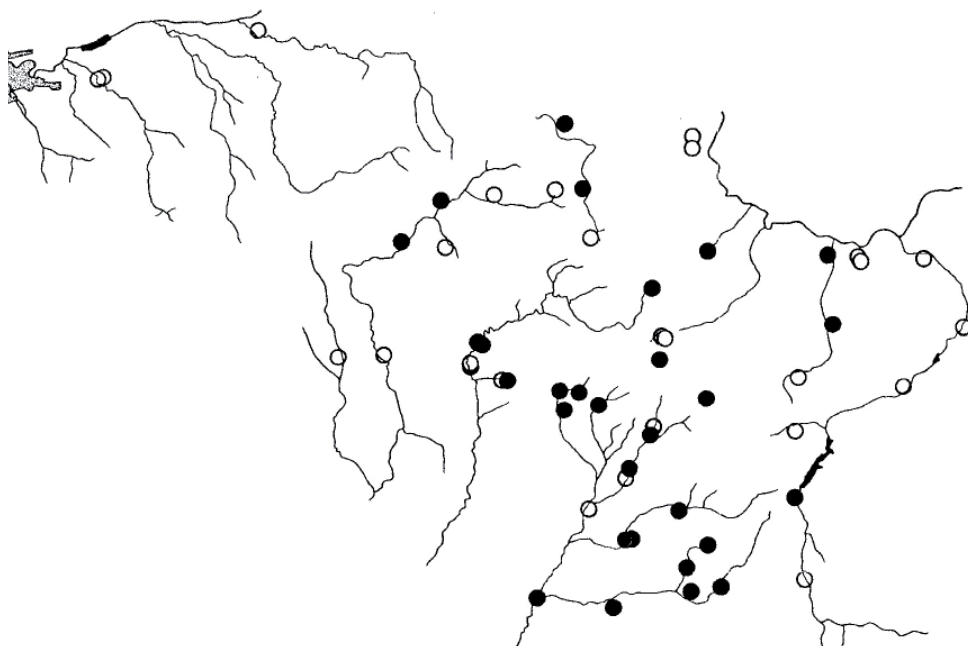
**Fig. 15.** Distribution of *Monachoides vicina* in the Pădurea Craiului Mts. (Full circles where *M. c.* was found.)



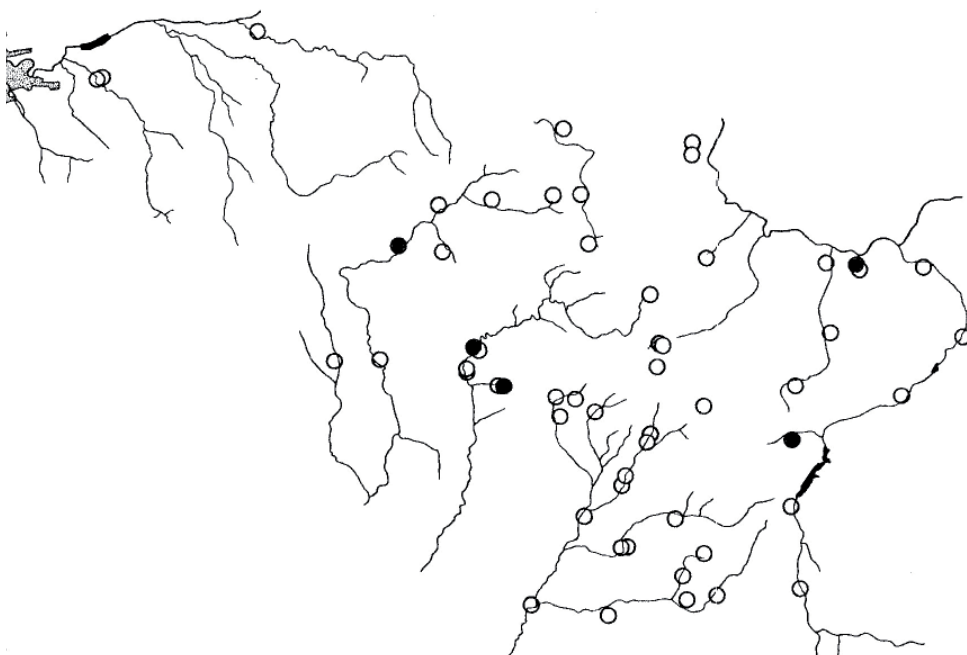
**Fig. 16.** Distribution of *Trichia bielzi* (Full and semi-full circles/ from left to right white and black.) and *Trichia hispida* (Full and semi-full circles/ from left to right black and white.) in the Pădurea Craiului Mts.



**Fig. 17.** Distribution of *Euomphalia strigella* in the Pădurea Craiului Mts. (Full circles where *E. s.* was found.)



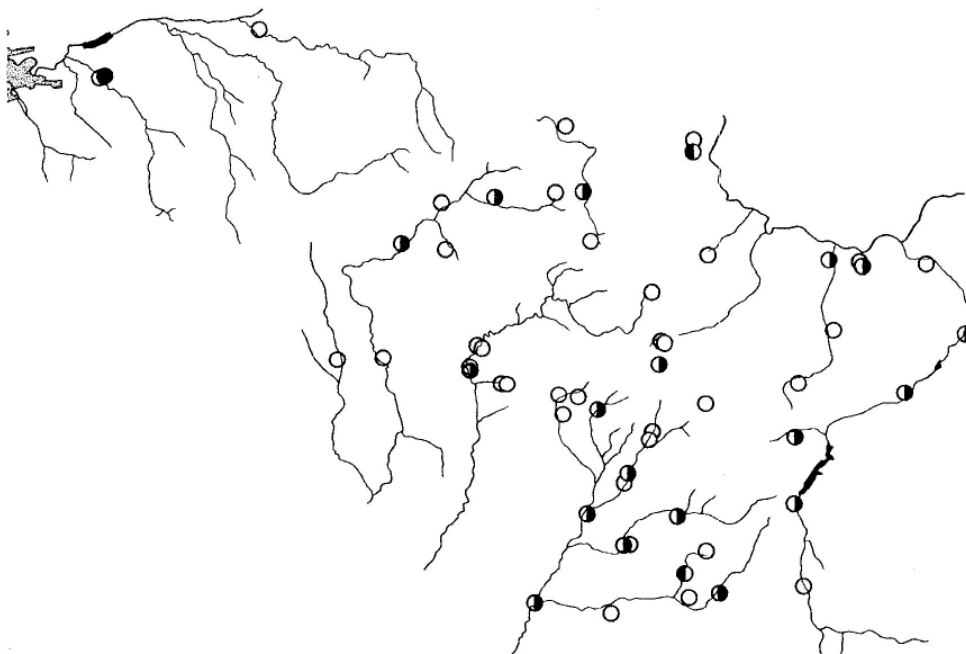
**Fig. 18.** Distribution of *Kovacsia kovacsi* in the Pădurea Craiului Mts. (Full circles where *K. k.* was found.)



**Fig. 19.** Distribution of *Isognomostoma isognomostoma* in the Pădurea Craiului Mts. (Full circles where *I. i.* was found.)



**Fig. 20.** Distribution of *Helicigona/ Drobacia banatica* in the Pădurea Craiului Mts. (Full circles where *H. b.* was found.)



**Fig. 21.** Distribution of *Helix pomatia* (semi-full circles/from left to right white and black), and *Helix lutescens* (semi-full circles/from left to right black and white) in the Pădurea Craiului Mts.

### Explanation of Plates

Plate I: 1–3: *Macrogastra borealis*; 4, 5: *Orcula jetschini*; 6–8: *Bulgarica vetusta*; 9–11: *Kovacsia kovacsi*. Scale equals 2 mm

Plate II: 1–3: *Helicigona* / *Arianta arbustorum*; 4–6: *Perforatella dibothrion*; 7: *Vertigo pusilla*; 8, 9: *Paladilhia* / *Paladilhiopsis*. Scale equals 2 mm

Plate III: 1–3: *Laciniaria plicata*; 4: *Acicula polita*; 5, 6: *Isognomostoma isognomostoma*. Scale equals 2 mm

Plate IV: 1–3: *Monachoides vicina*; 4–6: *Trichia bielzi*. Scale equals 2 mm

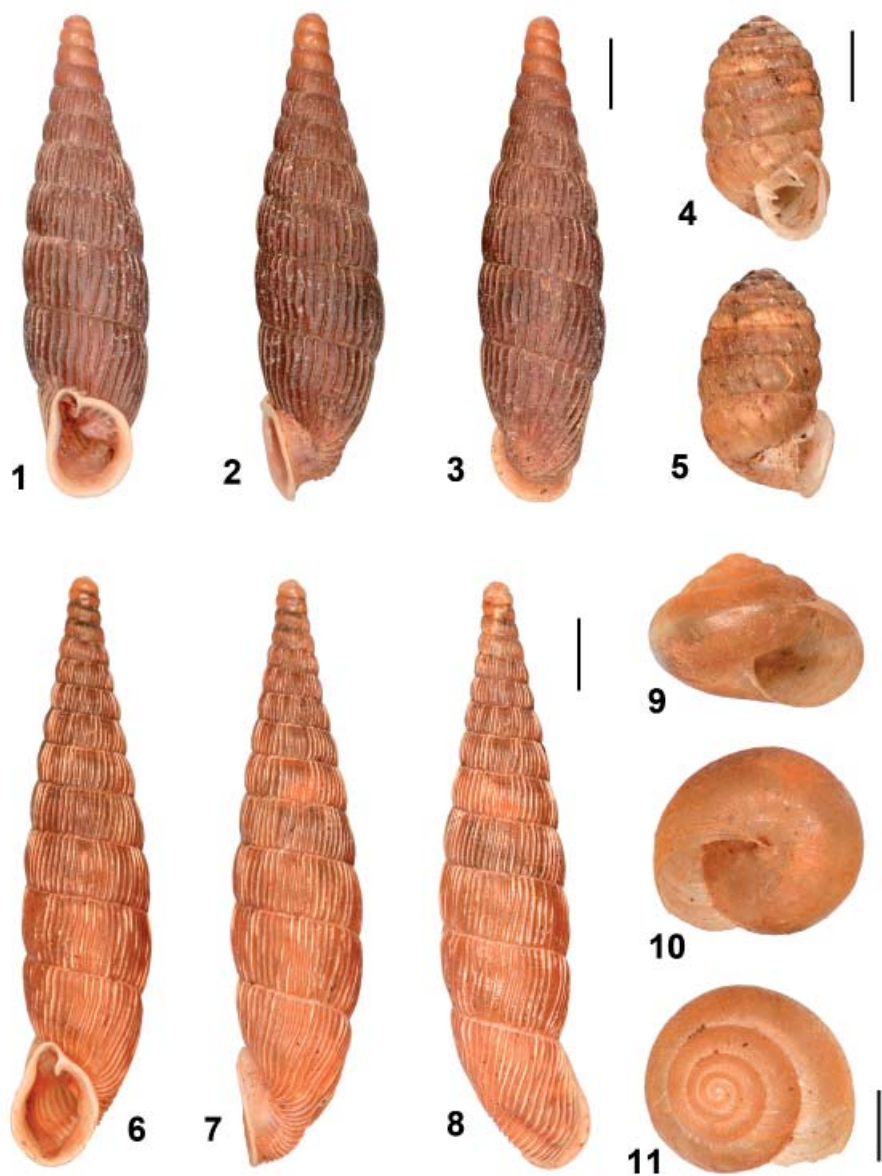


Plate I.





Plate II.

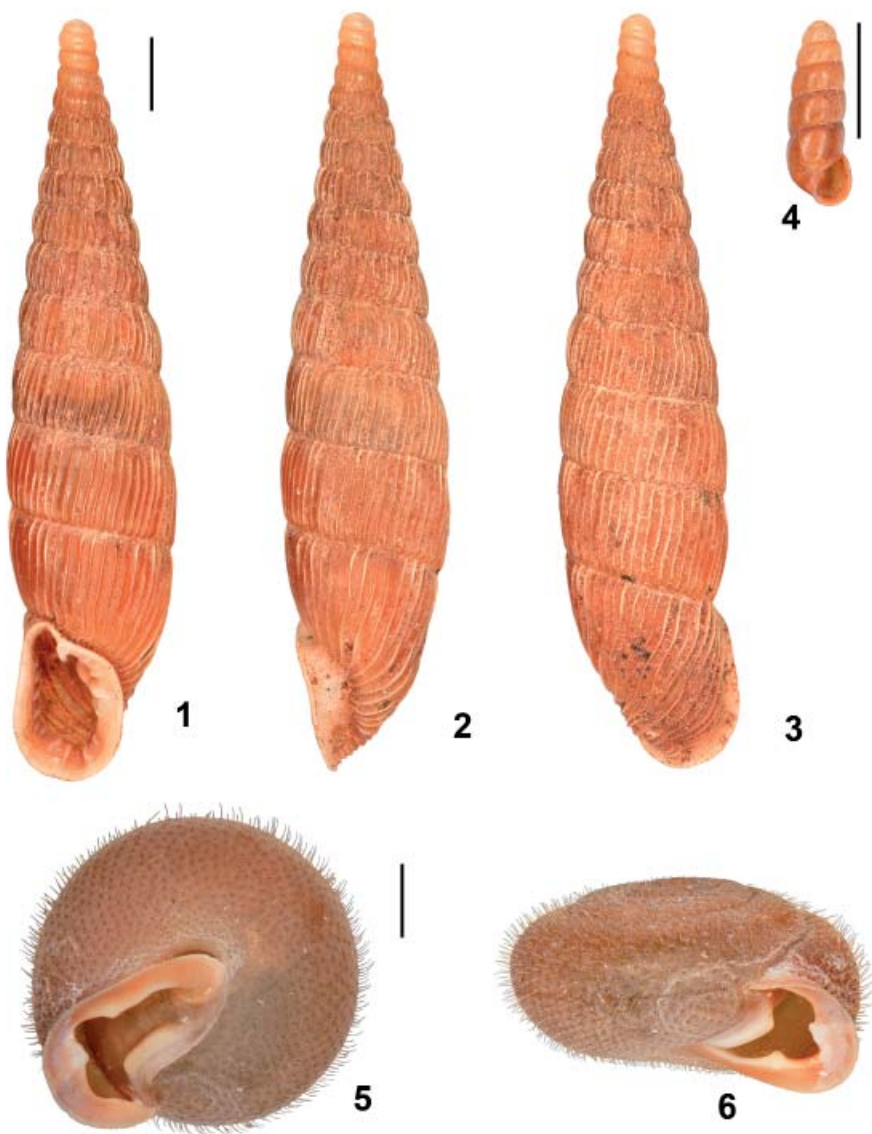


Plate III.

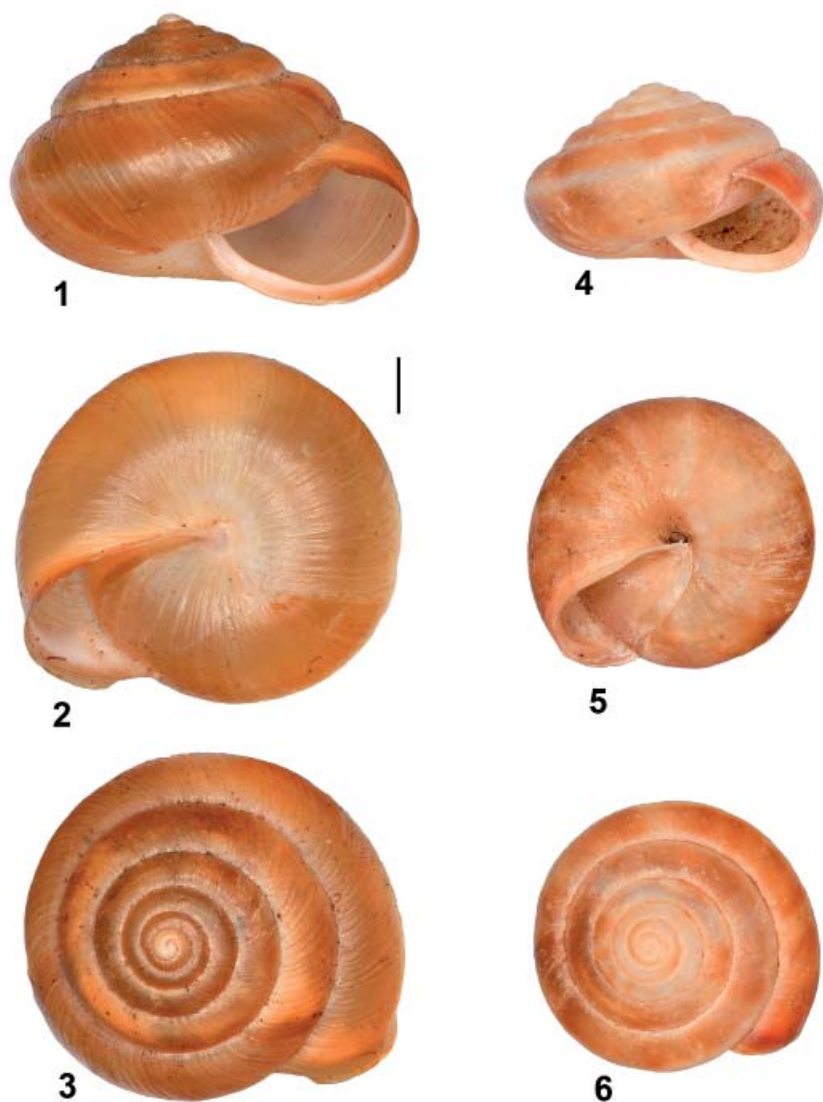


Plate IV.