



FIRST FIND OF *POMATIAS RIVULARIS* (EICHWALD, 1829) (MOLLUSCA: POMATIIDAE) IN CROATIA

ÁKOS UHERKOVICH¹, DRAGICA PURGER² & JÁNOS CSIKY³

¹Molyhos Tölgy Bt. Építők útja 3/b. I. 6. H-7622 Pécs, Hungary
(e-mail: uhu941@gmail.com)

²Department of Animal Ecology, Institute of Biology, Faculty of Sciences,
University of Pécs, Ifjúság útja 6, H-7624, Pécs, Hungary
(e-mail: dragica@ttk.pte.hu)

³Department of Phytotaxonomy and Geobotany, Institute of Biology,
Faculty of Sciences, University of Pécs, Ifjúság útja 6, H-7624, Pécs, Hungary
(e-mail: moon@ttk.pte.hu)

Uherkovich, Á., Purger, D. & Csiky, J.: First find of *Pomatias rivularis* (Eichwald, 1829) (Mollusca: Pomatiidae) in Croatia. *Nat. Croat.*, Vol. 17, No. 3, 183–192, 2008, Zagreb.

Pomatias rivularis (Eichwald, 1829) specimens were collected on Bansko Brdo (or Bansko Hill, Baranya, Croatia) during spring 2007. This species proved to be new for the Croatian fauna. Populations of *Pomatias elegans* (O. F. Müller, 1774) were also found on Bansko Brdo, which is the only known area in Croatia where both these two species occur. The list of 40 mollusc species (35 snails, 5 bivalves) identified in the study area is presented. Among them, *Ena montana* (Draparnaud, 1801) was found for the first time in the NE part of the country.

Key words: Bansko Brdo, *Pomatias rivularis*, *Pomatias elegans*, mollusc fauna, loess, vegetation

Uherkovich, Á., Purger, D. & Csiky, J.: Prvi nalaz vrste *Pomatias rivularis* (Eichwald, 1829) (Mollusca: Pomatiidae) u Hrvatskoj. *Nat. Croat.*, Vol. 17, No. 3, 183–192, 2008, Zagreb.

Primjerci *Pomatias rivularis* (Eichwald, 1829) sakupljeni su tijekom proljeća 2007 na Banskom brdu (Baranja, Hrvatska). Ova je vrsta nova za faunu Hrvatske. Pronađene su i populacije vrste *Pomatias elegans* (O. F. Müller, 1774) također na Banskom brdu, koje je za sada jedino poznato područje u Hrvatskoj na kojem se pojavljuju obje ove vrste. U radu je priložen popis 40 vrsta mekušaca (35 vrsta puževa i 5 vrsta školjkaša) s područja Banskog brda i bliže okolice. Na ovom je popisu i *Ena montana* (Draparnaud, 1801), vrsta koja do sada nije bila zabilježena u sjeveroistočnom dijelu Hrvatske.

Ključne riječi: Bansko brdo, *Pomatias rivularis*, *Pomatias elegans*, fauna mekušaca, vegetacija, prapor

INTRODUCTION

Pomatias rivularis (Eichwald, 1829) is prosobranch land snail species distributed in Asia Minor, Anatolia (SCHÜTT, 2001), reaching the Caucasus and northern Iran, the Crimean peninsula (LIKHAREV & RAMMELMEIER, 1952) and the northern part of Syria and Palestine (SCHÜTT, 2001). In south-eastern Europe this species occurs in Romania (GROSSU, 1986), Bulgaria (DAMJANOV & LIKHAREV, 1975), Hungary (PINTÉR & SUARA, 2004) and in the area of former Yugoslavia it was found in Serbia and in Montenegro (ŠTAMOL & JOVANOVIĆ, 1990). The best known Hungarian locality of *Pomatias rivularis* is Bátorliget in the NE part of the country (SOÓS, 1943), but this species was recently found in the southern part of Hungary (MAJOROS, 1987; UHERKOVICH & TÓTH, 2001). This Pontic-Northeast-Balkan fauna element has not previously been found in Croatia (ŠTAMOL & JOVANOVIĆ, 1990).

The very similar, related species, *P. elegans* (O. F. Müller, 1774) with a Mediterranean-West-European distribution is common on the Adriatic coast and occurs also in the other regions in Croatia (ŠTAMOL & JOVANOVIĆ, 1990). In Hungary it lives along the Drava River (VARGA, 1995; VARGA & UHERKOVICH, 1998) and at several other localities (PINTÉR & SUARA, 2004). Both species occur in Serbia at several locations (ŠTAMOL & JOVANOVIĆ, 1990). Closest to the investigated area is Fruška Gora, where the sympatric occurrence of these two species (near Čerević village) has been reported (ŠTAMOL & JOVANOVIĆ, 1990), nevertheless only *Pomatias rivularis* was found recently (SÓLYMOS *et al.*, 2004).

MATERIAL AND METHODS

Field work was done between March and May 2007. We used direct search, the larger specimens being collected by hand. Some soil samples were worked on to find smaller snails. Nomenclature follows that of the CLECOM-project (FALKNER *et al.*, 2001). After determination, the molluscs were prepared and deposited in Somogy County Museum in Kaposvár (Hungary). Some specimens of the most important species were deposited in Croatian Natural History Museum in Zagreb.

Bansko Brdo (also known as Banska kosa) (CR16, CR17, CR26, CR27, CR37 UTM grids) is a loess plateau which stretches in the NE-SW direction along 21 km (Fig. 1.) in Baranya, NE Croatia. Its highest summit is 251 m. Loess valleys are oriented in the northwest-southeast direction. On the south-eastern part of Bansko Brdo there are very steep, 25-58 m high loess cliffs (BOGNAR, 1990). The potential vegetation of the loess plateau and southern slopes was loess steppe and oak woodland. On northern facing slopes and valleys oak and hornbeam forests were distributed. Some places were originally covered by species-rich loess steppe grasslands (CSIKY *et al.*, 2008; PURGER & CSIKY, 2008; PURGER *et al.*, 2008). The majority of these lands had been converted to agricultural fields, and only small fragments of loess vegetation have remained unploughed.

Geo-coding of sites was made by GPS device. Site names are as given on tourist maps.

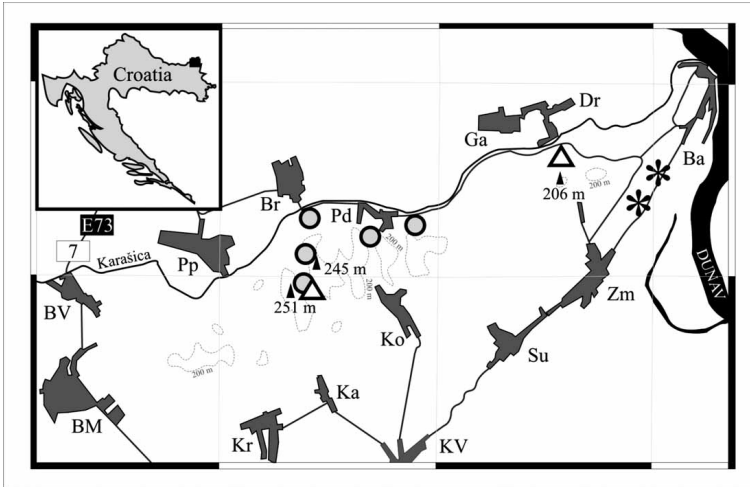


Fig. 1. Distribution of rare mollusc species (circle – *Pomatias rivularis*, asterisk – *Pomatias elegans*, triangle – *Ena montana*) in BANSKO BRDO.

Abbreviations: **Ba**: Batina; **BM**: Beli Manastir; **Br**: Branjina; **BV**: Branjinski Vrh; **Dr**: Draž; **Ga**: Gajić; **Ka**: Kamenac; **Kr**: Karanac; **Ko**: Kotlina; **KV**: Kneževi Vinogradi; **Pd**: Podolje; **Pp**: Popovac; **Su**: Suza; **Zm**: Zmajevac (drawn by J. Csiky and T. Nikolić).

RESULTS

During botanical field work empty shells of some larger land snails, including *Pomatias rivularis* were collected near Kamenac on March 15, 2007. Several days later empty shells and living specimens of *Pomatias rivularis* were found by the authors at several sites (Tab. 1).

Tab. 1. Collecting sites of *Pomatias rivularis* in BANSKO BRDO

Settlement	Locality	Altitude	UTM	Longitude E	Latitude N
Kamenac	Valley, 0,5 km E from TV transmitter, black-locust <i>Robinia pseudoacacia</i> forest	220 m	CR27	18°41'45"	45°47'52"
Kamenac	Valley, 0,8 km E from TV transmitter, »mixed«, degraded forest	193 m	CR27	18°41'52"	45°47'54"
Branjina	Kamenjak, NW slope, »mixed«, degraded forest	200 m	CR27	18°41'58"	45°47'55"
Branjina	Nad mlinom, along road	95 m	CR27	18°41'51"	45°48'54"
Podolje	Valley toward Kotlina	125 m	CR27	18°42'18"	45°48'31"
Podolje	1 km W, black-locust <i>Robinia pseudoacacia</i> forest along road	100 m	CR27	18°42'57"	45°49'01"

Pomatias rivularis shells were first found near Kamenac, close to the TV transmitter tower (Fig. 1.). A large flat area on the top of the hill is planted with vineyards.

Eastwards there are stream valleys with relatively steep sides covered mostly by secondary forests dominated by non-native trees, e.g. the black locust (*Robinia pseudacacia*) and Circassian walnut (*Juglans regia*). These »mixed« forests consists of alien and native trees as well (*Tilia tomentosa*, *Acer campestre*, *Ulmus minor*, *Fraxinus ornus*). Despite the tree layer being degraded, semi-natural herb and shrub layers with valuable, rare plants are still to be found (*Euonymus verrucosus*, *Lonicera caprifolium*, *Staphylea pinnata*, *Viburnum lantana*, *Scutellaria altissima*, *Helleborus odoratus*, *Tamus communis*, *Scilla bifolia* agg.). Some parts of the area were probably used as vineyards and orchards, since some old fruit trees and many ruins of garden structures and cellars can be recognized.

Along the northern foothills of Bansko Brdo this snail and its shells were found also on pasture and in black-locust forest used by shepherds as daytime resting place. These sites are usually trampled, so the herb layer is very poor. Around elder trees (*Sambucus nigra*) there were also many shells.

On other spots there are black locust forest and its typical undergrowth. In these places there is no semi-natural vegetation but only a very few degradation-tolerant species, mostly *Urtica dioica*, *Parietaria officinalis*, *Chelidonium majus*, *Veronica hederifolia*, *Galium aparine*, *Geum urbanum*, *Brachypodium sylvaticum* grow.

The density of *Pomatias rivularis* was remarkably high: somewhere more than a hundred shells were counted per square metre. The density is rather uneven: in similar biotopes this snail will be absent in some places, present in high numbers in others.



Fig. 2. Forest with black-locust tree, eastwards from the TV transmitter near Kamenac, a typical biotope of *Pomatias rivularis* in the study area. (photo: Á. Uherkovich).



Fig. 3. Loess slopes with fragments of thermophilous forest between Zmajevac and Batina, the habitat of *Pomatias elegans* in Bansko Brdo. (photo: D. Purger).

The biotopes of *Pomatias rivularis* are the relative humid ones of the hilly region, mostly on northern slopes, valleys running to the north (Fig. 2) and along the northern foothills bordered by the Karašica River. There are poor snail communities. Mostly, very common, widely distributed species live here: *Helix pomatia* Linnaeus, 1758, *Fruticicola fruticum* (O. F. Müller, 1774), *Zebrina detrita* (O. F. Müller, 1774), *Xerolenta obvia* (Menke, 1828), *Trichia erjavecii* (Brusina, 1870), *Monachoides incarnatus* (O. F. Müller, 1774) etc. The most interesting species of this community is *Ena montana* (Draparnaud, 1801), which has not been detected in the NE part of Croatia previously (Fig. 1). It occurs also along the Drava, both on the Hungarian (Zákány, Gyékényes) and the Croatian (Brodić) side (HÉRA & ŠTAMOL, 2007; HÉRA & UHERKOVICH, 2008).

On the southern part of Bansko Brdo some isolated populations of *Pomatias elegans* (O. F. Müller, 1774) were also found (Fig. 1). The habitat of this species is thermophilous oak forest with *Quercus pubescens*, *Fraxinus ornus* and *Ulmus minor* in the tree layer (Fig. 3). Both the structure and the species composition are quite nat-

ural. The area of these fragmented stands is much smaller than the area of degraded forests where *Pomatias rivularis* occurs.

During the spring 2007 we visited many points in Bansko Brdo searching for sites of *Pomatias rivularis* and collecting molluscs. Altogether 40 species were determined: 35 snails and 5 bivalves, these latter ones along the Karašica and along the Danube. As the mollusc fauna of this region is not well known, all the registered species are listed.

The list of molluscs collected in Bansko Brdo and surroundings

- Viviparus acerosus* (Bourguignat, 1862) – Batina: Danube.
- Pomatias elegans* (O. F. Müller, 1774) – Batina: fragment of oak forest; Zmajevac: fragment of oak forest.
- Pomatias rivularis* (Eichwald, 1829) – Branjina: Kamenjak, NW slope; Branjina: nad Mlinom; Kamenac: TV Transmitter; Podolje: Black-locust forest; Podolje: valley toward Kotlina.
- Bithynia tentaculata* (Linnaeus, 1758) – Batina: Danube.
- Stagnicola fuscus* (C. Pfeiffer, 1821) – Zmajevac: close to Suza, loess canyon.
- Planorbarius corneus* (Linnaeus, 1758) – Podolje: along Karašica river.
- Carychium tridentatum* (Risso, 1826) – Beli Manastir: Haljevo forest.
- Succinea putris* (Linnaeus, 1758) – Batina: Danube; Podolje: along Karašica river; Podolje: valley toward Kotlina; Zmajevac: close to Suza, loess canyon; Zmajevac: willow grove on flood area.
- Cochlicopa lubricella* (Rossmässler, 1834) – Draž: Filakovi, abandoned orchard; Kamenac: TV Transmitter.
- Sphyradium doliolum* (Bruguière, 1792) – Podolje: valley toward Kotlina.
- Acanthinula aculeata* (O. F. Müller, 1774) – Beli Manastir: Haljevo forest.
- Granaria frumentum* (Draparnaud, 1801) – Kamenac: TV Transmitter; Podolje: valley toward Kotlina; Zmajevac: loess cliff.
- Ena montana* (Draparnaud, 1801) – Draž: Filakovi, abandoned orchard; Kamenac: TV Transmitter.
- Merdigera obscura* (O. F. Müller, 1774) – Batina: Danube; Draž: Filakovi, abandoned orchard; Kamenac: TV Transmitter; Podolje: valley toward Kotlina.
- Zebrina detrita* (O. F. Müller, 1774) – Batina: oak forest fragment; Branjina: Kamenjak, NW slope; Branjina: nad Mlinom; Draž: Filakovi, abandoned orchard; Kamenac: TV Transmitter; Podolje: valley toward Kotlina; Popovac: Zlatno brdo; Zmajevac: loess cliff.
- Cochlodina laminata laminata* (Montagu, 1803) – Draž: Filakovi, abandoned orchard.
- Clausilia pumila pumila* C. Pfeiffer, 1828 – Branjina: Kamenjak, NW slope; Podolje: valley toward Kotlina.
- Laciniaria plicata* (Draparnaud, 1801) – Podolje: valley toward Kotlina.
- Balea biplicata* (Montagu, 1803) – Draž: Filakovi, abandoned orchard.
- Punctum pygmaeum* (Draparnaud, 1801) – Beli Manastir: Haljevo forest.

- Vitrea crystallina* (O. F. Müller, 1774) – Zmajevac: loess cliff.
- Zonitoides nitidus* (O. F. Müller, 1774) – Zmajevac: willow grove on flood area.
- Morlina glabra striaria* (Westerlund, 1881) – Podolje: valley toward Kotlina.
- Aegopinella minor* (Stabile, 1864) – Draž: Filakovi, former orchard; Kamenac: TV Transmitter; Podolje: Black-locust forest.
- Aegopinella ressmanni* (Westerlund, 1883) – Beli Manastir: Haljevo forest; Podolje: valley toward Kotlina.
- Fruticicola fruticum* (O. F. Müller, 1774) – Branjina: Kamenjak, NW slope; Draž: Filakovi, former orchard; Kozarac: Haljevo forest; Podolje: valley toward Kotlina; Popovac: Zlatno brdo; Zmajevac: loess cliff; Zmajevac: willow grove on flood area.
- Euomphalia strigella strigella* (Draparnaud, 1801) – Batina: oak forest fragment; Branjina: nad Mlinom; Draž: Filakovi, abandoned orchard; Draž: Trojnaš hill; Kamenac: TV Transmitter; Podolje: valley toward Kotlina; Popovac: Zlatno brdo; Zmajevac: close to Suza, loess canyon; Zmajevac, loess cliff.
- Monacha cartusiana* (O. F. Müller, 1774) – Draž: Filakovi, abandoned orchard; Kamenac: TV Transmitter; Podolje, along Karašica river; Popovac: Zlatno brdo; Zmajevac: loess cliff.
- Trichia hispida* (Linnaeus, 1758) – Kamenac: TV Transmitter; Podolje: valley toward Kotlina; Popovac: Zlatno brdo; Zmajevac: loess cliff; Zmajevac: willow grove on flood area.
- Trichia erjaveci* (Brusina, 1870) – Branjina: Kamenjak, NW slope; Draž: Filakovi, abandoned orchard; Kamenac: TV Transmitter; Kozarac: Haljevo forest; Podolje: Black-locust forest; Podolje: valley toward Kotlina.
- Monachoides incarnatus incarnatus* (O. F. Müller, 1774) – Batina: Danube; Kamenac: TV Transmitter; Kozarac: Haljevo forest; Zmajevac: loess cliff.
- Xerolenta obvia obvia* (Menke, 1828) – Batina: oak forest fragment; Branjina: Kamenjak, NW slope; Draž: Filakovi, abandoned orchard; Draž: Trojnaš hill; Kamenac: TV Transmitter; Popovac: Zlatno brdo; Zmajevac: loess cliff.
- Arianta arbustorum arbustorum* (Linnaeus, 1758) – Batina: Danube; Draž: Filakovi, abandoned orchard; Zmajevac: close to Suza, loess canyon.
- Cepaea vindobonensis* (A. Férussac, 1821) – Batina: oak forest fragment; Draž: Filakovi, abandoned orchard; Draž: Trojnaš hill; Kamenac: TV Transmitter; Podolje: along Karašica river; Podolje: Black-locust forest; Podolje: valley toward Kotlina; Popovac: Zlatno brdo; Zmajevac: loess cliff.
- Helix pomatia* Linnaeus, 1758 – Branjina: Kamenjak, NW slope; Draž: Filakovi, abandoned orchard; Kamenac: TV Transmitter; Kozarac: Haljevo forest; Podolje: Black-locust forest; Podolje: valley toward Kotlina; Popovac: Zlatno brdo; Zmajevac: loess cliff.
- Unio pictorum latirostris* Küster, 1853 – Batina: Danube; Podolje: along Karašica river;
- Unio tumidus zeleborei* Zelebor, 1851 – Batina: Danube.
- Corbicula fluminea* (O. F. Müller, 1774) – Batina: Danube.
- Sphaerium rivicola* (Lamarck, 1818) – Batina: Danube.
- Dreissena polymorpha polymorpha* (Pallas, 1771) – Batina: Danube.

DISCUSSION

The centre of *Pomatias rivularis* distribution lies in Asia Minor and the Caucasus. To the north-westward it expands across the eastern Balkans to Serbia, to the south-eastern Carpathians and South Pannonia. Molecular diversity of the seven populations of *P. rivularis* from Serbia, Romania, Montenegro and Hungary has been surveyed (FEHÉR *et al.*, 2008). The results show that all investigated populations are identical in a high level. FEHÉR *et al.* (2008) concluded that these populations are relatively young ones, that expanded to western areas in the Holocene.

In the eastern Mecsek Mts. (S. Hungary) *Pomatias rivularis* was found mostly in disturbed biotopes (UHERKOVICH & TÓTH, 2001), abandoned pastures and a rhyolite quarry and in pasture bordered by beech trees. Other biotopes seemed to be native beech and ravine forest used as pasture in the past.

Bansko Brdo is the only area in Croatia where both *Pomatias rivularis* and *P. elegans* species occur. In the study area *Pomatias rivularis* lives in degraded secondary forests on the northern slopes and valleys, while *P. elegans* occurs in fragments of semi-natural thermophilous oak woods on the southern slopes. The size of population of the former species is larger, because the extent of its habitat is also larger.

Examples of *Granaria frumentum* (Draparnaud, 1801) were found in the study area. In Croatia the occurrence of *Granaria illyrica* (Rossmässler, 1835) was known. This is treated by some authors, e.g. GITTEBERGER (1973) as a form of *Granaria frumentum* (Draparnaud, 1801). Studies of the geographic variation of the latter species in central and southeast Europe showed that the subspecies *illyrica* is confined to a narrow zone along the Adriatic Sea (SÓLYMOS *et al.*, 2003).

Based on our preliminary data, the occurrence of *Pomatias rivularis*, *P. elegans* and *Ena montana* reflects biogeographical significance of Bansko Brdo.

ACKNOWLEDGEMENTS

The authors are grateful to Vesna Štamol and an anonymous referee for valuable comments on the earlier version of the MS. We thank Dávid A. Schäffer and Béla Tallósi for collaboration in fieldwork, Stjepan Krčmar for valuable information about the study area. This survey was carried out with permission given by Ministry of Culture of Republic Croatia. It was supported by INTERREG III A, SLO-HU-CRO 2006/01/167/HU Project.

Received January 14, 2008

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SUMMARY

**First find of *Pomatias rivularis* (Eichwald, 1829)
(Mollusca: Pomatiidae) in Croatia**

Á. Uherkovich, D. Purger & J. Csiky

Pomatias rivularis (Eichwald, 1829) examples were collected on six localities in the northern part of BANSKO BRDO (Baranya, Croatia) during spring 2007. This species with Pontic-Northeast-Balkan distribution is new for the Croatian fauna. In the investigated area it lives in degraded secondary forests, in black-locust *Robinia pseudoacacia* forests and on pastures. On the southern part of BANSKO BRDO some isolated populations of *Pomatias elegans* (O. F. Müller, 1774) were also found. The habitat of this species is semi-natural thermophilous oak forest with *Quercus pubescens*, *Fraxinus ornus* and *Ulmus minor* in the tree layer. Both the structure and the species composition are quite natural. The area of these fragmented stands is much smaller than the area of degraded forests where *Pomatias rivularis* occurs. BANSKO BRDO is the only known area in Croatia where both of these species occur. The list of 40 mollusc species (35 snails, 5 bivalves) identified in the study area is also presented. One of them, *Ena montana* (Draparnaud, 1801) has been found for the first time in the north-east part of the Croatia. Examples of the typical form of *Granaria frumentum* (Draparnaud, 1801) were found in the study area.

Based on our preliminary data, the occurrence of *Pomatias rivularis*, *Pomatias elegans* and *Ena montana* reflects the great biogeographical significance of BANSKO BRDO.