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The terrestrial molluscan fauna in the Slovak part of the Danubian Lowland: an annotated checklist

Tomáš Čejka[1]

[1]Institute of Botany, Plant Science and Biodiversity Center, Slovak Academy of Sciences, Dúbravská cesta 9, SK-84523 Bratislava, Slovakia, e-mail: t.cejka@gmail.com

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Abstract. This work brings an annotated list of the terrestrial molluscan fauna from the Slovak part of the Danubian Lowland and contains a number of original findings based on field observations. Snails and slugs were collected using visual searches, snails were also sampled using leaf litter collections. Totals of 81 terrestrial gastropod species (45% of the total number of land gastropods in Slovakia) from 27 families were found in the 45 sites in the whole surveyed territory.

Checklist

Details of the distribution of locally scarce species are given in the following order: a number of the record (in square brackets); coordinates of the finding site; nearest municipality of the site (local name if known); habitat and the date of the last record. Most records come from the author, other collectors are named. In case the species is found in ten or fewer sites, we also give the coordinates of the sampling sites.

GASTROPODA

ACTEOPHILA

Carychiidae

Carychium Müller, 1774

C. minimum Müller, 1774 – widespread polyhygrophilous (strongly hygrophilous) species of the moistest habitat types (riparian habitats, wet types of floodplain forests, wet meadows).

C. tridentatum (Risso, 1826) – hygrophilous species with insular distribution especially in transient and hardwood floodplain forests.

STYLOMMATOPHORA

Succineidae

Succinea Draparnaud, 1801

S. putris (Linné, 1758) – widespread polyhygrophilous species of the moistest habitat types (riparian habitats, wet types of floodplain forests, wet meadows).

Oxyloma Westerlund, 1885

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O. elegans (Risso, 1826) – widespread polyhygrophilous species.

Succinella Mabille, 1871

S. oblonga (Draparnaud, 1801) – widespread hygrophilous species.

Cochlicopidae

Cochlicopa Férussac, 1821

C. lubrica (Müller, 1774) – widespread eurytopic species, but prefers moister patches.

C. lubricella (Porro, 1838) – xerotolerant species, typical for different types of xeric grassland.

C. nitens (Gallenstein, 1848) – scarce species, recently known only from two sites with viable populations. Distribution data: [1] 47.9048°N, 17.4846°E: Bodíky (Kráľovská lúka Nature Reserve); softwood floodplain forest, 15 May 2014; [2] 47.8230°N, 17.5905°E: village of Sap, softwood floodplain forest, 12 Jun 2012).

Orculidae

Granaria Held, 1838

G. frumentum (Draparnaud, 1801) – at few xeric sites at higher elevations, e.g. the elevated point bars of the paleochannels. Distribution data: [1] 47.9808°N, 17.7093°E; Ohrady (Petre); pseudo-steppe habitat on the former meander point bar; 15 Jun 2003. [2] 48.0952°N, 17.1604°E; Bratislava City (Podunajské Biskupice district); 15 May 2012; [3] 48.0400°N, 17.1751°E; Bratislava City (Čunovo); forest-steppe like habitat at the gravel elevation (*Crataegetum danubiale* sensu Jurko 1958); 10 May 2010.

Pupillidae

Pupilla Fleming, 1828

P. muscorum (Linné, 1758) – in open habitats (from xeric and wetland grassland, overgrown dam slopes etc.)

P. triplicata (Studer, 1820) – recently only at one site: 47.7688°N, 18.5200°E; Čenkovská step Nature Reserve, feather grass steppe on a calcareous sandy substrate; 13 May 2012, 27 Sep 2014; M. Horsák leg.

Valloniidae

Vallonia Risso, 1826

V. costata (Müller, 1774) – widespread semisilvicolous species (sparse woodland sensu lato).

V. enniensis (Gredler, 1856) – scarce open-country hygrophilous species: wet and waterlogged meadows; *V. enniensis* is an distinctive species of salt marshes. The only known recent site: 47.9555°N, 17.6880°E; Dolný Bar (Mohyla), wet meadow with short sedges; 5 Jun 2011.

V. excentrica Sterki, 1893 – probably widespread open-country species.

V. pulchella (Müller, 1774) – widespread open-country species sensu lato: xeric to wet meadows, open ruderals, dikes etc.

Acanthinula Beck, 1847

A. aculeata (Müller, 1774) – thermophilous forest species, widespread in Slovak woodland, but scarce in hardwood floodplain forests around the City of Bratislava (probably these are accidental occurrences comes

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from Small Carpathians Mts.); found only at two sites: [1] 48.1230°N, 17.1357°E; Bratislava (Petržalka – Hrabiny), hardwood floodplain forest (association *Fraxino Pannonicae-Ulmetum*); 15 May 2010; [2] 48.1222°N, 17.1601°E; Bratislava (Ružinov, Vlčie hrdlo), degraded stand of the hardwood floodplain forest; 12 Jun 2003.

Vertiginidae

Columella Westerlund, 1878

C. edentula (Draparnaud, 1805) – not very frequent hygrophilous species, its occurrence is untypical for the Danube floodplain forests (probably these are accidental occurrences comes from Small Carpathians Mts.). Records are concentrated in the Bratislava hardwood floodplain forests.

Truncatellina Lowe, 1852

T. cylindrica (Férussac, 1807) – open-country species: sunny dry and mesic open habitats on calcareous substrate, typically under *Sedum* and *Artemisia* (dikes and Danubian pseudo-steppe habitats, open semi-ruderal sites).

Vertigo Müller, 1773

V. antivertigo (Draparnaud, 1801) – polyhygrophilous species, scarce in the surveyed area: swampy meadows, river, ditch and pond margins, found even in regularly flooded areas. Fragmented areal in the Danubian Lowland. Distribution data: [1] 47.87335°N, 17.67124°E; Pataš, sedge wetland; 17 May 2012 (Čejka et al. 2014); [2] 47.88097°N, 17.64193°E; Pataš; a bank of the drainage ditch overgrown by tall sedges and reed. [3] 47.77161°N, 17.75238°E; Číčov, waterlogged reed stand; 15 Apr 2015.

V. moulinsiana (Dupuy, 1849) – rare polyhygrophilous species. Restricted to old calcareous wetlands, marshes and fens, beds of reed, along pond shores and river or ditch banks: [1] 47.87335°N, 17.67124°E; Pataš, sedge wetland; 17 May 2012 (Čejka et al. 2014, 2015a); [2] 47.88097°N, 17.64193°E; Pataš; a bank of the drainage ditch overgrown by tall sedges and reed.

V. pygmaea (Draparnaud, 1801) – relatively frequent at open habitats of very variable humidity, from dry sunny slopes with little vegetation to humid or marshy meadows.

Enidae

Chondrula Beck, 1837

C. tridens (Müller, 1774) – rare xerophilous species known only from four sites in Podunajská rovina Lowland. Distribution data: [1] 48.03993°N, 17.17621°E, Bratislava (Čunovo, Ostrovné lúčky Nature Reserve, Sparse xeric shrubland on gravel elevation (*Crataegetum danubiale*); 8 May 2013; [2] 47.81949°N, 18.65790°E; Nána (Vŕšok Nature Reserve), xeric grassland on blown calcareous sand; 7 Jun 2011; [3] 47.76961°N, 18.31906°E; Virt (Mašan Nature Reserve), blown calcareous sand; 27 Sep 2014; [4] 47.92062°N, 18.160291°E; Nesvady (Líščie diery Nature Reserve); 12 Apr 2015.

Merdigera Held, 1838

M. obscura (Müller, 1774) – thermophilous species preferring deciduous forests in warmer areas, occurring mostly in lower altitudes. It also lives in the litter of drier scrubland. It is common on limestone substrates, but it is not an explicitly calciphile species. The species does not avoid human affected areas, it often occurs also in urban areas.

It is a rare species in the Danube Lowland area, and it was found only in the small floodplain forest patch at Bratislava City: 48.13207°N, 17.11366°E; Bratislava, Petržalka; 13 May 2015; 4 live ind.

Clausiliidae

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Cochlodina Férussac, 1821

C. laminata (Montagu, 1803) – ecologically less demanding forest species, which is abundant in the Danubian Lowland, especially in hardwood floodplain forests, where it lives near trunks, under the bark and in the plant litter.

Clausilia Draparnaud, 1805

C. pumila C. Pfeiffer, 1828 – the forest hygrophilous species with insular distribution. It prefers wetter types of floodplain forests, where it dwells under the litter on wet ground, under fallen trunks, to a lesser extent under their bark.

Alinda H. et A. Adams, 1855

A. biplicata (Montagu, 1803) – frequent forest eurytopic species. It occurs mainly from the softwood floodplain forests to hardwood floodplain forests near trunks and under the bark.

Férussaciidae

Cecilioides Férussac, 1814

C. acicula (Müller, 1774) – widespread species in sunlight Danubian steppes (pseudo-steppes or forest-steppes) on calcareous substrate. It inhabits upper soil layers down to 50 cm deep.

C. petitiana (Benoit, 1862) – only one recent record: 48.15179°N, 17.12570°E ; Bratislava City (Karadžičova Street); mowed lawn on a busy street.

Punctidae

Punctum Morse, 1864

P. pygmaeum (Draparnaud, 1801) – frequently occurring species, especially in drier types of softwood and hardwood floodplain forests. It avoids regularly flooded areas.

Helicodiscidae

Lucilla Lowe, 1852

L. scintilla (Lowe, 1852) – a minute, blind and subterranean snail living in rootlet holes and shrinkage cracks down to depths of a metre from the surface (Kerney 1999). It is native in North America; to Europe it was probably introduced in the second half of the 20th century. Only one record in the Danubian Lowland: 48.13972°N, 17.11083°E, Bratislava City, a flood debris of the Danube River, 2 ind., 20 Mar 1999, originally published as *Helicodiscus* (*Hebetodiscus*) *singleyanus inermis* (Čejka 2000);

L. singleyana (Pilsbry, 1889) – ecology and distribution see *L. scintilla.* Distribution data: [1] 48.13972°N, 17.11083°E, Bratislava, a flood debris of the Danube River, 5 ind., 20 Mar 1999, T. Čejka, originally published as *Helicodiscus* (*Hebetodiscus*) *singleyanus inermis* (Čejka 2000); [2] 48.25896°N, 17.78736°E, Šoporňa, a deposit of the reservoir, 1 ind., 16 May 2004, J. Šteffek & B. Bielčík leg.

Discidae

Discus Fitzinger, 1833

D. rotundatus (Müller, 1774) – forest generalist, also common in various secondary habitats (ruins, stone pits, abandoned quarries, footings of old walls, orchards, gardens, also penetrating ruderal habitats) (Ložek 1955). In the alluvia of smaller streams it is a species of secondary alluvial communities, but it is not a typical alluvial species. It has not been reported from the Danube region before. The Danubian findings

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probably have a Small Carpathian origin (similar to *Acanthinula aculeata*). The species was also confirmed in other localities in the section Bratislava – Devín to Vlčie Hrdlo. On the right bank of the Danube so far in only one locality (floodplain forest near the Bratislava-Rusovce castle park). It has not been documented downstream of the Danube. Kučeravý (1995) mentions it from Lower Morava River (Horný Les Nature Reserve), also known from Upper Morava River floodplain (Moravia, Czech Republic). In Podyjí region it is widespread almost continuously in slope forests, but rarely occurs in meadows (Vašátko & Ložek 1997).

Gastrodontidae

Zonitoides Lehmann, 1862

Z. nitidus (Müller, 1774) – a widespread species in humid to waterlogged habitats.

Euconulidae

Euconulus Reinhardt, 1883

E. fulvus (Müller, 1774) – quite catholic, found in a wide range of damp as well as rather dry habitats from open areas to forests.

Euconulus alderi (Gray, 1840) – relatively rare wetland (polyhygrophilous) species in the Danubian floodplain. Several records are concentrated mostly in softwood floodplain forests and natural/semi-natural riparian zones (e.g. riparian habitats along old drainage ditches). Distribution data: [1] 47.77732°N, 17.72977°E; Číčov (Číčovské Rameno river branch), riparian vegetation; 15 Jun 2015; [2] 47.77205°N, 17.75314°E; Číčov (Hámske tŕstie), on the *Phragmites* and *Typha* stems; 13 May 2013; [3] 47.95882°N, 17.71085°E; Dolný Bar (Horgás); bottom of the former branch overgrown with *Phragmites australis*, *Schoenoplectus tabernaemontani* with *s*poradic occurrence of *Cladium mariscus;* 10. Jun 2010; [4] 47.90416°N, 17.48486°E; Bodíky (Kráľovská lúka); softwood floodplain forest; 23 Jun 2015; [5] 47.88054°N, 17.64248°E; Pataš (Patašský Kanál drainage ditch); riparian zone; 11 Sep 2017; [6] 47.87366°N, 17.67106°E; Pataš (Bahno); sedges and *Typha* stand; 18 May 2013; [7] 48.16538°N, 16.99556°E; Bratislava – Devín (Devínske Rameno river branch); on the sedges in a riparian zone; 29 Apr 2015; [8] 47.82374°N, 17.59379°E; Sap (Erčéd); softwood floodplain forest, on the soil surface; 9 May 2011; [9] 47.84388°N, 17.55671°E; Gabčíkovo (Istragov); softwood floodplain forest, on the soil surface; 15 Sep 2009.

Zonitidae

Vitrea Fitzinger, 1833

V. contracta (Westerlund, 1871) – the snail lives in the top soil layer in drier places in woodland as well as Danubian pseudo-forest-steppes and pseudo-steppes (habitats at gravel elevations), mostly in over gravelly or gravel sand soils. Scattered throughout surveyed area.

V. crystallina (Müller, 1774) – forest hygrophilous species with optimum occurrence in softwood floodplain forests.

Aegopinella Lindholm, 1927

A. minor (Stabile, 1864) – in the surveyed area, the species occurs only in the driest types of habitats (the driest types of hardwood floodplain forests, xeric grassland and pseudo-forest-steppes).

A. nitens (Michaud, 1831) – eurytopic and mesohygrophilous species. The most constant and often the most numerous species in drier types of softwood floodplain forests, but its hygric optimum is in transient and hardwood floodplain forests. It does not tolerate frequent flooding and permanently waterlogged habitats. It usually dwells in leaf litter, under fallen trunks, rotting wood and under the bark.

Nesovitrea Cooke, 1921

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N. hammonis (Strøm, 1765) – in the area between Bratislava and Číčov this species is rare, although elsewhere in Slovakia it is a relatively frequent and numerous species, especially in alder carrs and wet meadows. It prefers wetter sites, otherwise, it is catholic (also common on oligotrophic substrates). Within the surveyed area it occurred only in one locality (dry variant of the softwood floodplain forest). Waldén (1981) found that *Nesovitrea hammonis* has its optimum in low pH areas and vice versa, in high pH habitats, this species is less numerous or absent, explaining its relatively rare occurrence in the Danube area of carbonate-rich soils. Millar & Waite (1999) achieved similar results in the UK. Distribution data: [1] 48.03844°N, 17.46400°E; Horná Potôň (Hetméň); 3 ind.; softwood floodplain forest; 21 Nov 2013; [2] 47.94935°N, 17.54433°E; Jurová (Dobor), 36 ind., degraded floodplain forest in the site of the palaeomeander; 8 Aug 2005; [3] 47.76886°N, 18.51996°E; Mužla (Čenkovská step); pseudo-steppe on the calcareous blown sands; 2 ind.; 15 May 2010.

Oxychilus Fitzinger, 1833

O. draparnaudi (Beck, 1837) – it lives in ground litter and under stones usually in secondary habitats. Formerly a purely synanthropic species found in greenhouses and cellars, it gradually entered other habitats and especially those in towns and cities and their environs. Frequent in parks, cemeteries etc.

O. hydatinus (Rossmässler, 1838) – circum-Mediterranean steppe terricolous species, only two records in Slovakia (Dvořák et al. 2004). Distribution data: [1] 48.14707°N, 17.12220°E; Bratislava city, Ondrejský Cintorín cemetery, on the soil surface under the remains of roof covering; 3 Dec 2002, 7 Oct 2003; L. Dvořák leg.; [2] 48.05762°N, 17.25706°E; Kalinkovo village, cemetery, under a plank deeply embedded in the soil, L. Dvořák leg.

O. inopinatus (Uličný, 1887) – sub-Carpathian-Balkan steppe terricolous species. Distribution data: [1] 47.76886°N, 18.51996°E; Mužla (Čenkovská step); pseudo-steppe on the calcareous blown sands; 2 ind.; 15 May 2010; [2] 47.81949, 18.65790; Nána (Hegyfarok=Vŕšok Nature Reserve); xeric grassland on calcareous wind-blown sands; 17 Oct 2006.

Vitrinidae

Daudebardia Hartmann, 1821

Daudebardia brevipes (Draparnaud, 1805) – hygrophilous woodland species. Largely subterranean, requires deep soils. In central Europe predominantly in alder forests (Welter-Schultes 2012). Only the occurrence near the Little Carpathians is documented: 48.23195°N, 17.21242°E; Svätý Jur; autochthonous virgin alder swamp wood lying in a low basin (*Carici elongatae-Alnetum*); 3 Nov 2005, one living individual; Čejka & Dvořák (2007).

Semilimax Gray, 1847

S. semilimax (J. Férussac, 1802) – forest hygrophilous species, associated with softwood- and wetter types of hardwood floodplain forests.

Vitrina Draparnaud, 1801

V. pellucida (Müller, 1774) – common catholic species, found in a wide range of various habitat types including disturbed and secondary ones. In the surveyed area it avoids flooded areas (e.g. riparian habitats or softwood floodplain forests).

Milacidae

Tandonia Lessona et Pollonera, 1882

T. budapestensis (Hazay, 1880) – uncommon species, found almost exclusively in human induced habitats. Thermophilous species and thus limited to lowlands. Most often found in a leaf litter in parks and gardens, chiefly in large cities and agglomerations. Distribution data: [1] 48.14440°N, 17.07328°E; Bratislava City,

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riparian ruderal site; 3 Dec 2002; [2] 48.10611°N, 17.11742°E; Bratislava City (Petržalka district); hardwood floodplain forest; 15 May 2005; [3] 47.89432°N, 17.58719°E; Gabčíkovo, park on the site of a former floodplain forest; 25 Sep 2014; M. Horsák leg.; [4] 47.88110°N, 17.62233°E; Gabčíkovo; riparian hardwood floodplain forest; 5 Sep 2014.

T. kusceri (Wagner, 1931) – non-native species in Slovakia, its original area is southeastern Europe. First record come from the Bratislava City in 2014 (Korábek et al. 2016). Within the Danubian Lowland, it occurs only in the Greater Bratislava, mostly in degraded remnants of alluvial forests.

Limacidae

Limax Linné, 1758

L. cinereoniger Wolf, 1803 – forest eurytopic species, typical for the alluvial woodland in the Danubian Lowland. Within the Danube Region we found it only in one locality (see below). It is likely that he got here with the adjacent part of the Malé Karpaty Mts. Šteffek (1979) mentions it in the second half of the 1970s from the locality „Topoľovec Lodge“ (Bratislava, Podunajské Biskupice district). The site was a hardwood floodplain forest with *Fraxinus excelsior*, *Ulmus carpinifolia*, *Quercus robur*, *Acer campestre*, *Populus alba*, *Crataegus monogyna*, *Cornus sanguinea* and *Ligustrum vulgare*. Distribution data: [1] 48.14821°N, 17.02925°E; Bratislava, Karlova Ves (Sihoť Island); hardwood floodplain forest, 15 May 2000.

L. maximus Linné, 1758 – anthropotolerant species of the cultural landscape as well as urban floodplain forest remnants. Records are concentrated in the vicinity of Bratislava (Rusovce, Čunovo districts), one finding comes from a hard floodplain forest near the village Číčov (47.77449°N, 17.73809°E), where it probably spread from a nearby allotment.

Ambigolimax Pollonera, 1887

A. valentianus (Férussac, 1821) – limacid slug originally native to the Iberian Peninsula that has become a widespread synanthrope in greenhouses and anthropogenically altered environments, including the USA and Canada (for details see Vendetti et al. (2018). In 30 May 2020, one individual of this species was found outdoors on the edge of the open-air horticultural facility in Bratislava City (48.1509°N, 17.0314°E, J. Čapka leg.), determination was confirmed by dissection. There are no greenhouses in the vicinity of the find, it is probable that this species was imported together with gardening material and escaped into the wild. The slug *Ambigolimax valentianus* was confirmed outdoors of eastern Germany (Ludwig et al. 2015), so it is possible that it will survive outside the greenhouses in Slovakia as well.

Agriolimacidae

Since little attention has been paid in the past to the distribution of species in this family, the species below are likely to be more frequent than is indicated by distributional data.

Deroceras Rafinesque, 1820

D. agreste (Linné, 1758) – the species is associated with open, rather wet habitats. Common in wet floodplain meadows, cultivated areas and sites in towns and cities.

D. invadens Reise, Hutchinson, Schunack et Schlitt, 2011 – non-indigenous species, its origin is not fully clear but it may come from Italy (details in Reise et al. 2011). It is repeatedly introduced into greenhouses and now occurs also in cultivated areas. Distribution data: [1] 48.14693°N, 17.07261°E; Bratislava City; greenhouse of the Botanical garden; 21 May 2003; L. Dvořák & T. Čejka; [2] 48.15129°N, 17.03141°E; Bratislava City; horticulture centre, under the flowerpots and old woodboards; 1 Aug 2017; T. Čejka & J. Čačaný.

D. laeve (Müller, 1774) – strongly hygrophilous species, common in riparian habitats, wet meadows, wetlands and waterlogged sites in floodplain forests.

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D. reticulatum (Müller, 1774) – anthropotolerant (semisynathropic) species, common eurytopic species. It avoids frequently flooded areas.

Deroceras rodnae Grossu & Lupu, 1965 – hygrophilous and calciphile woodland species. Only the occurrence near the Little Carpathians is documented: 48.23195°N, 17.21242°E; Svätý Jur; autochthonous virgin alder swamp wood lying in a low basin (*Carici elongatae-Alnetum*); 3 Nov 2005, 5 individuals; Čejka & Dvořák (2007).

D. sturanyi (Simroth, 1894) – eurytopic species, preferring wetter microhabitats. Most often found in meadows, predominantly near water (along drainage ditches, rivers and channels). Also under solitary trees and shrubs, in gardens, cemeteries, rural habitats, is commonly dispersed as a synanthrope.

D. turcicum (Simroth, 1894) – thermophilous inhabitant of hardwood floodplain forests; typically found in leaf litter and under the bark in moist places. Balkan species with recently discovered, isolated occurrence in central Europe (Reise & Hutchinson 2001). Fairly common in alluvial forests, but the distribution is so far poorly known. Distribution data: [1] 48.10063°N, 17.12457°E; Bratislava (Petržalka, Pieskovisko); hardwood floodplain forest (*Ulmo-Fraxinetum*); 15 May 2004, 12 Oct 2019; [2] 48.11173°N, 17.12023°E; Bratislava (Petržalka, beside the Kutlíkova Street); hardwood floodplain forest close by the gravel pit; 13 May 2017; [3] 48.10536°N, 17.11829°E; Bratislava (Petržalka, Zrkadlový háj); hardwood floodplain forest close by the gravel pit; 15 May 2004, 19 Nov 2019; [4] 47.99088°N, 17.34291°E; Dobrohošť (Dunajské kriviny); transient floodplain forest; 6 Jun 2016; [5] 47.89432°N, 17.58719°E; Gabčíkovo (manor-house park); 24 Sep 2014; M. Horsák leg. [6] 48.06169°N, 17.15100°E; Bratislava (Rusovce); hardwood floodplain forest; 21 Mar 2019. [7] 47.87411°N, 17.67086°E; Pataš, a strip of tall herbs along the drainage ditch; 24 Sep 2014; M. Horsák leg.

Boettgerillidae

Boettgerilla Simroth, 1910

B. pallens Simroth, 1912 – anthropotolerant species, prefers urban forests and various secondary or human induced habitats (parks, cemeteries, ruderals) on calcareous substrate, scarce in natural habitats. In the Danubian Lowland it also occurs in natural floodplain forests. Distribution data: [1] 48.11726°N, 17.08773°E; Bratislava (Petržalka), old cemetery; 7 Oct 2003; [2] 48.12234°N, 17.20789°E; Bratislava (Podunajské Biskupice), cemetery; 7 Oct 2003; [3] 48.14701°N, 17.16675°E; Bratislava (Prievoz); cemetery; 7 Oct 2003; [4] 48.05231°N, 17.14405°E; Bratislava (Rusovce); cemetery; 7 Oct 2003; [5] 48.12918°N, 17.13971°E; Bratislava (Petržalka, Soví les); transient floodplain forest; 11 Jun 2018; [6] 48.10036, 17.12607; Bratislava (Petržalka, Pieskovisko); hardwood floodplain forest; 19 Nov 2019; [7] 47.99088°N, 17.34291°E; Dobrohošť (Dunajské kriviny); hardwood floodplain forest; 6 Jun 2016.

Arionidae

Arion Férussac, 1819

A. distinctus Mabille, 1868 – anthropotolerant species, frequently in cultivated regions and disturbed habitats, but also in more or less natural deciduous forests and shrublands. In the Danubian Lowland scarcely in urban habitats (parks, cemeteries, ruderals), locally also in more natural habitats. A rapid colonist of waste ground and frequently spread by man. Distribution data: [1] 48.06169°N, 17.15100°E; Bratislava (Rusovce); hardwood floodplain forest; 21 Mar 2019; [2] 48.13024°N, 17.11870°E; Bratislava (Petržalka); small secondary floodplain forest; 13 May 2015; [3] 48.14432°N, 17.07346°E; Bratislava (Karlova Ves, lodenica); ruderals along the Danube river embankment; 18 May 2004; [4] 48.15126°N, 17.03139°E; Bratislava (Karlova Ves, horticulture centre Agapé), below plant pots and wooden boards; 1 Aug 2017.

A. fasciatus (Nilsson, 1823) – the anthropotolerant species, prefers cultivated areas, frequent in gardens and wastegrounds, but also in shady habitats under trees and shrubs, under fallen trunks, wooden boards, among herbage and ground litter. In the Danubian Lowland lives mostly in disturbed habitats. Distribution

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data: [1] 48.22842°N, 17.20676°E; Svätý Jur (Jurský Šúr Nature Reserve); sparse deciduous forest (former area of the Biological Station of the Faculty of Natural Sciences, Comenius University); 14 Apr 2010; [2] 47.82966°N, 17.96220°E; Čalovec; willow stand with *Phragmites australis* in the palaeomeander; 27 Aug 2006; [3] 47.86796°N, 18.11423°E; Martovce (Gamota); wet meadow wit tall herbs; 7 Jun 2006; [4] 47.92446°N, 17.44747°E; Bodíky; poplar plantation; 15 Jun 2003;

A. fuscus (Müller, 1774) – one of the few slug species adapted to surface flooding. It has ecological optimum in moister types of softwood floodplain forests. It often occurs along with species *Arianta arbustorum*, *Clausilia pumila, Semilimax semilimax* and *Trochulus striolatus danubialis*. It is frequent in the Danube alluvial woodland between Bratislava and Číčov.

A. rufus (Linné, 1758) – forest hygrophilous species. Dissection and inspection of genital morphology are necessary to distinguish from externally similar slug *A. vulgaris*. Based on the dissection, this species was confirmed only at one site (48.23076°N, 17.21003°E; Svätý Jur – Jurský Šúr Nature Reserve; alder carr; 5 May 2006.

A. vulgaris Moquin-Tandon, 1855 – strongly anthropotolerant species, inhabits cultivated habitats of any kind, in the Danubian plain also in natural habitats such as riparian habitats, drier types of floodplain forests or mesic meadows. Serious horticultural pest in large parts of Europe. The records are concentrated mainly in the area of Greater Bratislava and in urban areas.

Bradybaenidae

Fruticicola Held, 1838

F. fruticum (Müller, 1774) – the species lives in sparse floodplain forests and their margins, also in mesic and dry alluvial shrubland. Found throughout surveyed area.

Hygromiidae

Euomphalia Westerlund, 1889

E. strigella (Draparnaud, 1801) – inhabitant of open and semi-open dry habitats (e.g. alluvial shrubland). Common in suitable places throughout surveyed area.

Monacha Fitzinger, 1833

M. cartusiana (Müller, 1774) – not frequently found from dry to wet open habitats and in various ruderal habitats. Distribution data: [1] 47.82371°N, 17.96624°E; Čalovec; a willow strip in the palaeomeander; 19 Aug 2006; [2] 47.86796°N, 18.11423°E; Martovce (Gamota), wet alluvial meadow; 7 Jun 2006; [3] 47.83574°N, 17.94936°E; Štúrová (Chrobačia lúka); the open edge of the palaeomeander; 8 Jun 2006; [3] 47.79285°N, 18.13038°E; Komárno (Apáli); the edge of the river branch; 8 Jun 2006; [4] 47.74501°N, 18.17906°E; Komárno (Veľký Harčáš); mesic meadow; 15 Jun 2015.

Trochulus Chemnitz, 1786

T. hispidus (Linné, 1758) – typical alluvial species in Slovakia. In the Danube region it can be characterised as hygrophilous, although in other areas of the former Czechoslovakia it is often found in various secondary habitats (gardens, orchards, ruins, etc.). It tolerates floods well, often found on oligotrophic substrates.

T. striolatus danubialis (Clessin, 1874) – unlike Western European populations, in the Danube region it acts as a relatively strongly hygrophilous species. Not very frequent in the surveyed area. Distribution data: [1] 47.90452°N, 17.48494°E; Bodíky (Kráľovská lúka); softwood floodplain forest; 23 May 2016; [2] 47.87908°N, 17.51301°E; Baka; softwood floodplain forest; 15 Apr 2006; [3] 47.84385°N, 17.55869°E; Gabčíkovo (Istragov); softwood floodplain forest; [4] 47.98865°N, 17.34873°E; Dobrohošť (Dunajské kriviny); softwood floodplain forest; 15 May 2014; [5] 47.82404°N, 17.59401°E; Sap (Erčéd); softwood floodplain forest; [6] 47.78693°N,

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17.67747°E; Kľúčovec (Sporná sihoť); softwood floodplain forest; [7] 47.76649°N, 17.72293°E; Číčov (Starý les); softwood floodplain forest.

Petasina Beck, 1847

P. unidentata (Draparnaud, 1805) – inhabitant of the floodplain woodland (except the wettest types of the floodplain forests). Found in suitable places throughout surveyed area.

Helicopsis Fitzinger, 1833

H. striata (Müller, 1774) – only native species of the Helicellinae in Slovakia, critically endangered. Numerous population still surviving in the Nature Reserve Čenkovská Step Pannonian steppe (see below), in less numerous populations also at some sites on calcareous blown sands of Hronská pahorkatina Upland (subunit of the Danubian Lowland). Distribution data: [1] 47.76887°N, 18.51988°E; Mužla (Čenkov, NPR Čenkovská step); Pannonian steppe on the blown sands; 24 Sep 2018; [2] 47.7695°N, 18.318675°E; Marcelová (Mašan); Pannonian steppe on the blown sands; 24 Sep 2018; [3] 47.79827°N, 18.2686°E; Marcelová (NPR Marcelovské piesky); Pannonian steppe on the blown sands; 15 May 2010; [4] 47.92311°N, 18.159724°E; Nesvady (Líščie diery); Pannonian steppe on the blown sands; 15 May 2010; [5] 47.811652, 18.214453; Chotín (Chotínske piesky); Pannonian steppe on the blown sands; 15 May 2010.

Xerolenta Monterosato, 1892

X. obvia (Menke, 1828) – inhabitant of dry and open, mostly secondary habitats. It prefers dug ground with easily accessible calcium (embankments, levee slopes, lawns near buildings, fallows etc.). It probably reached Slovakia from the Pontic region at the beginning of the Christian era (Horsák et al. 2013).

Pseudotrichia Schileyko, 1970

P. rubiginosa (Rossmässler, 1838) – this strongly hygrophilous species lives in wetlands in the flood zones. The habitat is characterised by areas of bare mud, covered with an important layer of litter and by a sparse community of tall herbs often including nitrophilous plants species (*Phalaris arundinacea*, *Phragmites australis* etc.). The species likes fluctuating water level, so shells are mostly covered with mud. It has been declining in the floodplains over the last two decades in relation to changes in the hydropedological regime. Distribution data: [1] 48.10002°N, 17.12411°E; Bratislava City (Petržalka, Chorvátske Rameno river branch); riparian zone of the channelised river arm; 12 Jul 2007; [2] 47.76592°N, 17.72772°E; Číčov (Číčovské Rameno arm); riparian habitat; 2 Jun 2014; [3] 47.77219°N, 17.75286°E; Číčov (Hámske tŕstie); waterlogged reed stand; 13 Apr 2012; [4] 47.91587°N, 17.44508°E; Bodíky (Bodícka brána); growth of *Phalaris arundinacea* and *Phragmites australis* on an oligotrophic loamy-sandy substrate; 15 May 2005; [5] 47.90461°N, 17.48519°E; Bodíky (Kráľovská lúka); riparian habitat close to the abandoned arm and softwood floodplain forest; 14 Jun 2016; [6] 47.84356°N, 17.55592°E; Gabčíkovo (Istragov); reed stand and sparse growth of the softwood floodplain forest; 10 May 2011; [7] 47.83805°N, 17.58019°E; Sap (Išpánsky Dunaj); riparian habitat close to the abandoned arm and softwood floodplain forest; 2 May 2005; [8] 47.82305°N, 17.59786°E; Sap (Erčéd); reed stand and sparse growth of the softwood floodplain forest; [9] 47.78937°N, 17.68586°E; Kľúčovec (Sporná sihoť); riparian habitat close to the abandoned arm and softwood floodplain forest; 11 Oct 2018; [10] 47.78549°N, 17.67980°E Kľúčovec (Starý les); riparian habitat close to the abandoned arm and softwood floodplain forest; 11 Oct 2018; [11] 47.86796°N, 18.11423°E; Martovce (Gamota); wet meadow; 9 Apr 2010.

Monachoides Gude et Woodward, 1921

M. incarnatus (Müller, 1774) – very frequent species, especially in drier floodplain forest types including disturbed ones.

Urticicola Lindholm, 1927

U. umbrosus (C. Pfeiffer, 1828) – frequent inhabitant of wet floodplain forests, densely overgrown by tall herbs (e.g. *Urtica*, *Solidago*, *Aster* spp.)

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Helicidae

Arianta Turton, 1831

A. arbustorum (Linné, 1758) – forest hygrophilous species, research has shown that the species has optimum in wetter types of softwood alluvial forests (Čejka et al. 2008, Čejka & Hamerlík 2009). The species is well adapted to floods (probably not only because of its greater mobility).

Cepaea Held, 1838

C. hortensis (Müller, 1774) – common in softwood floodplain forests and various damp places overgrown by trees, bushes or tall herbs. The eastern limit of distribution is in Slovakia and the species is absent in approximately the eastern half of the country.

C. nemoralis (Linné, 1758) – the species appeared in Slovakia for the first time in 2015 in a garden horticultural center situated in the alluvium of the Danube (Čejka 2015b). It is likely that it will not only spread in the alluvium of the Danube River in the future.

Caucasotachea Boettger, 1909

C. vindobonensis (C. Pfeiffer, 1828) – originally thermophilic (xerotolerant) forest-steppe species, penetrating also to various secondary habitats: xeric grassland, embankments, levee slopes. The species prefers shrub enclaves or shrubby edges on pseudo-steppe areas.

Cornu Born, 1778

C. aspersum (Müller, 1774) – the species appeared in Slovakia for the first time in 2015 in a garden horticultural center situated in the alluvium of the Danube (Čejka 2015c).

Helix Linné, 1758

H. lucorum Linné, 1758 – the species was first recorded in the Danube Lowland in 2013. A numerous population was found in Bratislava City. Snails were found in ruderal bushes bordering the place of a former school gym (for details see Čejka & Čačaný 2014).

H. pomatia Linné, 1758 – the species of sparse alluvial woodland. Also common in shrub habitats. Common also in secondary habitats: gardens, parks, levee slopes, semi-ruderal to ruderal habitats. It prefers a calcareous substrate.

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