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Aquatic beetles (Insecta: Coleoptera) of selected Natura 2000 protected sites in eastern Slovakia – a new record for Slovakia and new distribution records

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Abstract: Results of faunistic research of aquatic Coleoptera in seven Natura 2000 Sites of Community Importance are presented in this paper. Altogether, 50 species were recorded. One species, *Helochares* (*Helochares*) *punctatus* Sharp, 1869, is recorded as new to the fauna of Slovakia. Three very rare species in Slovakia (*Dryops similaris* Bollow 1936, *Limnius intermedius* Fairmaire, 1881, and *Hydraena excisa* Kiesenwetter, 1849) were found at new sites. First faunistic records on aquatic Coleoptera from two important protected sites are presented. Furthermore, data on the occurrence of several species and on the water beetle diversity of partial river basins of Slovakia were considerably extended.

Key words: Coleoptera, first record, species richness, diversity, nature protection, Slovakia.

Introduction

Sites of Community Importance as a part of Special Areas of Conservation represent rare and endangered biotopes of the Natura 2000, an EU–wide network of nature protection which represents one of the most ambitious approaches to biodiversity conservation stepping up the EU contribution to averting global biodiversity loss (Viceníková & Polák 2003, COM 2011).

The knowledge on aquatic coleopterans of studied Natura 2000 sites and surrounding areas varies from site to site. Relatively well known is the aquatic coleopterofauna of the Latorica river basin with 158 species recorded (Roubal 1936a, 1941, Kodada *et al.* 1992, Jäch 1993, 1995, Kodada & Holecová 1996, Jászay & Kodada 1997, Majzlan 1997, Jászay 2001, Kodada *et al.* 2003, Zaťovičová *et al.* 2004, Mišíková Elexová *et al.* 2010, 2015) of which part is the Natura 2000 site "Stretavka" SKUEV0235, aquatic coleopterans fauna of the Bodrog river basin with 87 species (Roubal 1930, 1836a, Hrbáček 1951, Korbel 1977, Jäch 1988, 1990, 1995, 1998, Kodada *et al.* 2003, Mišíková Elexová *et al.* 2010, 2015) of which part is the Natura 2000 site "Bodrog" SKUEV0236, and the fauna of aquatic beetles of the Poprad river watershed with 39 species (Roubal 1930, 1936b, 1939a, 1939b, 1941, Balthasar 1936, Jäch 1988, Kodada 1990, Majzlan 1991, Kodada *et al.* 2003, Mišíková Elexová *et al.* 2010, 2015) where are located the Natura 2000 sites "Jarabinský prielom" (gorge) SKUEV0339, "Plavečské štrkoviská" (gravel deposit) SKUV0338, and "Beliansky potok" (brook) SKUEV0333. On the other hand, no information was published on aquatic beetles of the lakes of the Spišská Magura Mountains (Kodada *et al.* 2003) to which belong the Natura 2000 sites "Veľké osturnianske jazero" (lake) SKUEV0334 and "Malé osturnianske jazerá" (lakes) SKUEV0335.

The survey of invertebrates in selected Natura 2000 sites was carried out in the framework of the objectives of the project "Development of management plans for selected sites included in the Natura 2000". The biodiversity inventory of selected invertebrate groups is the essential step to prepare the proposal of management arrangement in aim to induce or keep favourable status of the Sites of Community Importance. Therefore, the main objective of the study presented here was to examine aquatic Coleoptera species diversity of Natura 2000 sites studied.

Material and methods

The material was collected by PM, JO, and LH with hydrobiological net (mesh size 0.35 mm) using the „kicking“ method, sweep netting, and manual collecting within all present aquatic microhabitats. Samples were taken within all present microhabitats, from whole flow profile, respectively till depth of 0.75 meters by deep or standing waters. Material was collected using hydrobiological net from sampling sites located in the Sites of Community Importance in Slovakia (Tab. 1, Fig. 1) on 14.V.2015 (sites 1, 2, 3, 4), 19.V.2015 (Site 6), 20.V.2015 (Site 5), 29.V.2015 (Site 6), 3.VI. 2015 (sites 1, 2, 3, 4), 10.VI.2015 (Site 5), 17.VI.2015 (sites 1, 2, 3, 4), 24.VI.2015 (Site 5), 21.VII.2015 (Site 6), and 22.VII.2015 (Site 7).

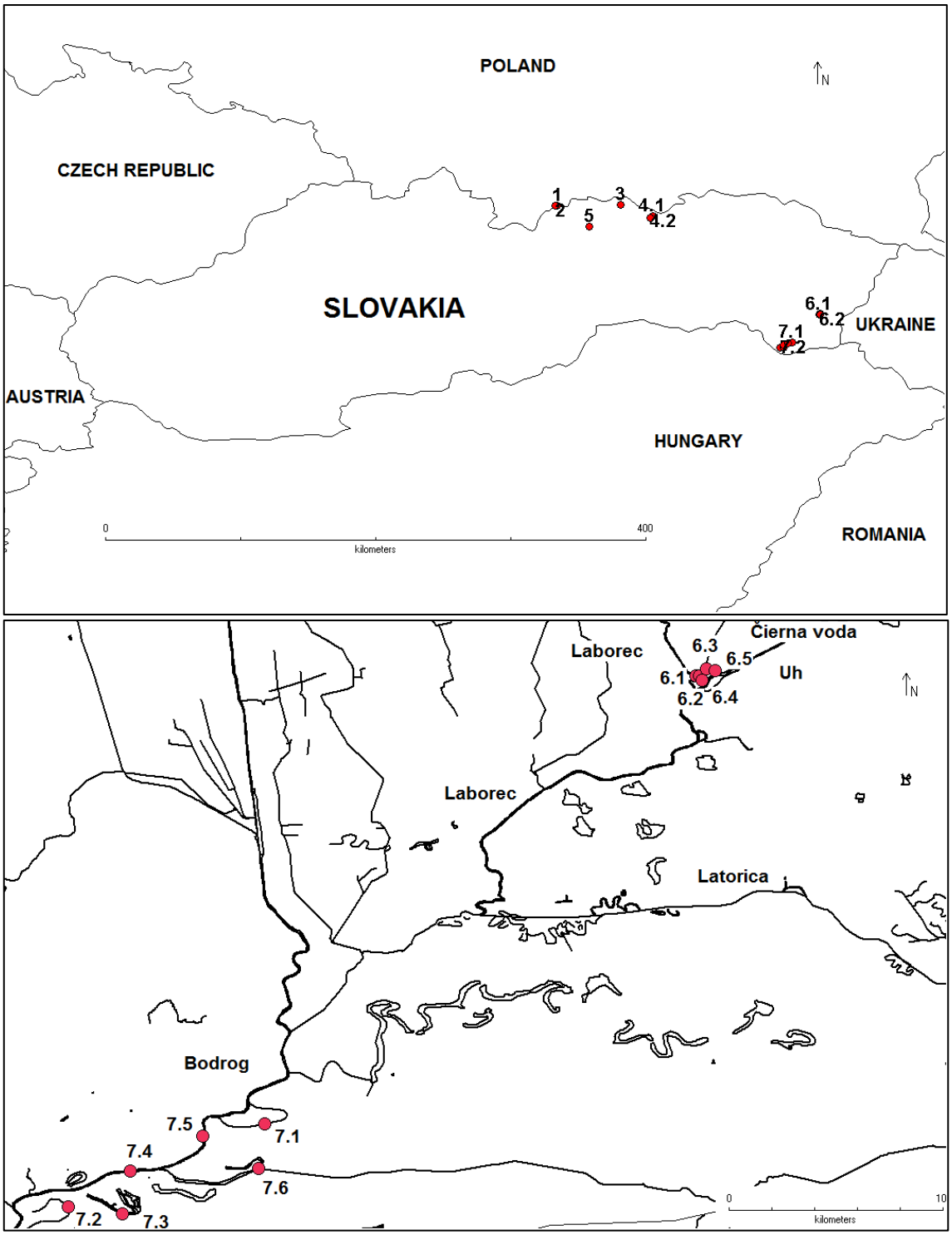

Fig 1: The maps with all sampling sites – general view (above) and detailed location of sites 6.1 to 6.5 and 7.1 to 7.6 on the map of the water bodies (below).

Tab 1: Sampling sites location and basic characteristics

Site No	Site name Natura 2000 code	Geographical region, location	Character of locality	Altitude (m a.s.l.)	GPS of sampling localities
1	Veľké osturnianske jazero (lake) SKUEV0334	- geomorph. unit Spišská Magura; - buffer zone of the Pieniny National Park	- through-flow natural dystrophic lake; - water surface 0.25 ha; - created in the process of ice calving; - supplied by surface flows as well as underground springs	815	49°20´42´´N 20°13´03´´E
2	Malé osturnianske jazerá (lakes) SKUEV0335	- geomorph. unit Spišská Magura; - buffer zone of the Pieniny NP	- transition mires and quaking bogs; - water surface 0.06 ha; - formed when a layer of rocks slid on impenetrable basement	883	49°20´23´´N 20°12´15´´ E
3	Jarabinský prielom (gorge) SKUEV0339	- geomorph. unit Ľubovnianska vrchovina highlands and Pieniny; - limestone area of the Pieninské bradlá cliffs	- Malý Lipník brook - torrentile alpine river with ligneous vegetation with *Salix elaeagnos* - water shaped gorge with five cascades and large potholes (5 m in diameter and 3m deep)	652	49°20´54´´N 20°38´52´´E
4	Plavečské štrkoviská (gravel deposit) SKUV0338	- geomorph. unit of the Spišsko – šarišské medzihorie; - meanders of the Poprad River before the gravel-sands mining	- created through natural reclamation after the gravel-sands mining; - extensive water planes, wetlands, flooded forests; - 4.1 - part of the Ľubotínka brook[1]; - 4.2 – part of the Poprad River[2]	480	[1]49°16´15´´N 20°51´52´´E [2]49°15´31´´N 20°50´51´´E
5	Beliansky potok (brook) SKUEV0333	- geomorph. unit of Tatras - buffer zone of the Tatra NP	- Beliansky potok brook; - slowly flowing steam with ligneous vegetation - dominant sandy and gravel substrate - Poprad river basin	650	49°11´57´´N 20°25´56´´E
6	Stretavka SKUEV0235	- geomorph. unit of Východoslovenská rovina Plain (Eastern Slovak Plain) - Protected Landscape Area Latorica	- 6.1 - Laborec – potamal[1]; - 6.2 - Laborec – oxbow[2]; - 6.3 - the confluence of Laborec and Uh rivers – potamal[3]; - 6.4 - Čierna voda – channel[4]; -6.5 - Uh – oxbow lake[5]	103	[1]48°36´18´´N 21°59´26´´E [2]48°36´17´´N 21°59´31´´E [3]48°36´28´´N 21°59´42´´E [4]48°36´11´´N 21°59´35´´E [5] 48°36´26´´N 21°59´55´´E
7	Bodrog SKUEV0236	- geomorph. unit of Východoslovenská rovina Plain (Eastern Slovak Plain) - Protected Landscape Area Latorica	- 7.1 - Véč - oxbow lake of the Bodrog river[1]; - 7.2 - Klin nad Bodrogom - oxbow lake of the Bodrog river[2]; - 7.3 - Streda nad Bodrogom - oxbow lake of the Bodrog river[3]; - 7.4 – Slovenské Nové Mesto - Bodrog river - potamal[4]; - 7.5 - Ladmovce - Bodrog river - potamal[5]; - 7.6 - Somotor – channel[6]	97 - 99	[1]48°24´57´´N 21°48´3´´E [2]48°22´50´´N 21°43´31´´E [3]48°22´39´´N 21°44´54´´E [4]48°23´45´´N 21°45´06´´E [5]48°24´38´´N 21°46´56´´E [6]48°23´49´´N 21°48´21´´E

Tab 2: Number of aquatic beetle species found at studied Natura 2000 sites

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Dytiscidae	2	2	-	-	2	4	3
Gyrinidae	-	-	-	1	-	-	-
Haliplidae	-	-	-	1	-	3	1
Noteridae	-	-	-	-	-	1	1
Dryopidae	-	-	-	-	-	2	-
Elmidae	-	-	7	1	3	1	1
Heloporidae	-	1	-	-	1	4	-
Hydraenidae	-	1	1	-	2	1	-
Hydrochidae	-	-	-	-	-	2	1
Hydrophilidae	-	3	-	1	-	5	5
Total	**2**	**7**	**8**	**4**	**8**	**23**	**12**

Material obtained was preserved in 90% ethanol in the field. In the laboratory, the material was identified by CESC and is deposited in the collection of Departamento de Zoología, Facultad de Ciencias, Universidad de Granada, Spain. Genitalia extractions were performed by means of microdissection. Genitalia were posteriorly mounted on slides in dimethyl hydantoin formaldehyde resin for study under the microscope. Photographs were made by CESC with a Biological Microscope OXFORD TRADE (10x20) with a camera CANON DIGITAL IXUS 9015 and a universal digital camera adapter KONUS.

Global distribution data of the species were obtained from Nilsson & Hájek (2016) for Dytiscidae, Mazzoldi (2003) for Gyrinidae, van Vondel (2003) for Haliplidae, Nilsson (2013) for Noteridae, Kodada & Jäch (2006) for Dryopidae, Jäch *et al.* (2016) for Elmidae, Przewoźny & Fikáček (2016) for Helophoridae, Hydrochidae and Hydrophilidae, Trizzino *et al.* (2013) for Hydraenidae (*Hydraena*) and Jäch (2004) for Hydraenidae (*Limnebius*). Data on the distribution in Slovakia were obtained from Kodada *et al.* (2003), Zaťovičová *et al.* (2004), Hamerlík *et al.* (2006), Čiamporová–Zaťovičová & Čiampor (2008, 2011), Mišíková Elexová *et al.* (2010, 2015), Majzlan (2010, 2014), Majzlan & Cunev (2011), and Novikmec *et al.* (2015). The list of river basins of Slovakia taken from Šporka *et al.* (2003) was applied.

Results

Altogether, 50 aquatic Coleoptera species were recorded from seven Natura 2000 Sites of Community Importance surveyed in this study with minimum of two species and maximum of 23 species at one sampling site (Tab. 2). Below, we present the list of records. New data extending the knowledge on the occurrence in individual Slovak river basins are marked with asterisk (*).

Faunistic records

SUBORDER ADEPHAGA
FAMILY DYTISCIDAE

Agabus labiatus (Brahm, 1790)
Distribution: Eurasian. Slovakia: basins of the rivers: Morava, Danube, upper Váh, lower Váh, Nitra & Žitava, Hron, Bodrog.
Material examined: Site 7.2, 21.VII.2015, 1♀

Graptodytes bilineatus (De Geer, 1774)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Nitra & Žitava, Bodrog, Latorica.
Material examined: Site 7.3, 22.VII.2015, 1♂

Graptodytes pictus (Fabricius, 1787)
Distribution: European. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Hornád, Latorica; Spišská Magura lakes*.
Material examined: Site 1, 3.VI.2015, 1♀; Site 2, 3.VI.2015, 1♀

Hydroglyphus geminus (Fabricius, 1792)
Distribution: Palearctic and oriental. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Nitra & Žitava, Hron, Slaná, Bodrog, Latorica; High Tatra lakes.
Material examined: Site 6.4, 29.V.2015, 1♂

Hydroporus nigrita (Fabricius, 1792)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Hron; High Tatra lakes, Spišská Magura lakes*.
Material examined: Site 2, 14.V.2015, 2♂, 1♀

Hydroporus palustris (Linnaeus, 1761)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Nitra & Žitava, Hron, Slaná, Latorica; High Tatra lakes, Spišská Magura lakes*.
Material examined: Site 1, 3.VI.2015, 1♀; Site 6.4, 29.V.2015, 7♂

Hyphydrus ovatus (Linnaeus, 1761)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Nitra & Žitava, Hron, Slaná, Latorica.
Material examined: Site 6.2, 19.V.2015, 1♂, 1♀; Site 6.4, 29.V.2015, 3♂, 1♀

Laccophilus hyalinus (De Geer, 1774)
Distribution: Palearctic. Slovakia: river basins of the rivers: Morava, Danube, Nitra & Žitava, Bodrog, Latorica.
Material examined: Site 6.1, 19.V.2015, 1♂, 3♀; Site 6.2, 19.V.2015, 6♀; 21.VII.2015, 5♂, 8♀; Site 6.3, 22.VII.2015, 4♂, 5♀; Site 7.4, 22.VII.2015 1♂, 1♀

Laccophilus poecilus Klug, 1834
Distribution: Palearctic. Slovakia: river basins of the rivers: Morava, Danube, Bodrog*, Latorica.
Material examined: Site 7.1, 22.VII.2015, 1♀; Site 7.2, 21.VII.2015, 2♀

Oreodytes samarkii sanmarkii (Salhberg, 1826)
Distribution: Holarctic. Slovakia: river basins of the rivers: upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Hron, Slaná, Hornád, Latorica.
Material examined: Site 5, 20.V.2015, 4♂; the same, 10.VI.2015, 2♀

Platambus maculatus (Linnaeus, 1758)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Hron, Ipeľ, Slaná, Hornád, Bodrog, Latorica, Tisa; High Tatra lakes.
Material examined: Site 5, 20.V.2015, 1♂, 1♀; the same, 24.VI.2015, 1♂

FAMILY GYRINIDAE

Orectochylus (*Orectochylus*) ***villosus villosus*** O. F. Müller, 1776
Distribution: Eurasian. Slovakia: river basins of the rivers: Danube, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Ipeľ, Hron, Slaná, Hornád, Bodrog, Latorica.
Material examined: Site 4.1, 17.VI.2015, 1♀; Site 4.2, 17.VI.2015, 3♂, 3♀; the same, 3.VI.2015, 1♂, 1♀

FAMILY HALIPLIDAE

Haliplus (*Haliplus*) ***fluviatilis*** Aubé, 1836
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Nitra & Žitava, Hron, Bodrog*, Latorica.
Material examined: Site 6.2, 19.V.2015, 1♂; the same, 21.VII.2015, 2♂; Site 6.4, 21.VII.2015, 3♂, 3♀; Site 7.4, 22.VII.2015, 6♂

Haliplus (*Haliplus*) ***ruficollis*** (De Geer, 1774)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Hron, Bodrog, Latorica*.
Material examined: Site 6.2, 19.V.2015, 1♂; the same, 21.VII.2015, 8♂; Site 7.2, 21.VII.2015, 1♂; Site 7.3, 22.VII.2015, 1♂; Site 7.3, 22.VII.2015, 1♂; Site 7.6, 22.VII.2015, 1♂

Haliplus (*Liaphlus*) ***laminatus*** Schaller, 1783
Distribution: European. Slovakia: river basins of the rivers: Morava, Danube, Nitra & Žitava, Poprad (Dunajec)*, Hornád, Bodrog, Latorica.
Material examined: Site 4.1, 17.VI.2015, 1♂, 1♀

Peltodytes caesus (Duftschmid, 1805)
Distribution: West-palearctic. Slovakia: river basins of the rivers: Morava, Danube, Hornád, Bodrog, Latorica.
Material examined: Site 6.2, 19.V.2015, 1♀; the same, 21.VII.2015, 1♀

FAMILY NOTERIDAE

Noterus clavicornis (De Geer, 1774)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, lower Váh, Nitra & Žitava, Hron, Ipeľ, Bodrog, Latorica.
Material examined: Site 6.2, 19.V.2015, 1♂, 2♀; the same, 21.VII.2015, 1♂

Noterus crassicornis (O. F. Müller. 1776)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Ipeľ, Slaná, Bodrog*, Latorica.
Material examined: Site 7.2, 21.VII.2015, 1♂, 1♀

FAMILY DRYOPIDAE

Dryops auriculatus (Geoffroy, 1785)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Ipeľ, Latorica.
Material examined: Site 6.4, 29.V.2015, 3♀

Dryops similaris Bollow, 1936
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Latorica*.
Material examined: Site 6.4, 29.V.2015, 1♂

SUBORDER POLYPHAGA
FAMILY ELMIDAE

Elmis aenea (P. W. J. Müller 1806)
Distribution: European. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Ipeľ, Hron, Slaná, Hornád, Bodrog, Latorica.
Material examined: Site 3, 14.V.2015, 1♂; Site 4.2, 17.VI.2015, 1♂; Site 5, 20.V.2015, 2♂; the same, 24.VI.2015, 2♂

Elmis maugetii maugetii Latreille, 1802
Distribution: European. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Hron, Slaná, Hornád, Bodrog, Latorica.
Material examined: Site 3, 14.V.2015, 18♂; the same, 3.VI.2015, 5♂; the same, 17.VI.2015, 1♂; Site 4.1, 3.VI.2015, 1♂; the same, 17.VI.2015, 1♂

Esolus parallelepipedus (P. W. J. Müller, 1806)
Distribution: West-palearctic. Slovakia: river basins of the rivers: upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec)*, Ipeľ, Hron, Hornád, Bodrog, Latorica.
Material examined: Site 3, 14.V.2015, 1♀

Limnius intermedius Fairmaire, 1881
Distribution: West-palearctic. Slovakia: rare species, formerly recorded only in the Bodrog and Latorica river basins. Confirmed at one site (Jarabinský prielom (gorge), Malý Lipník brook) in the Poprad (Dunajec)*.
Material examined: Site 3, 5.VI.2015, 1♀

Limnius perrisi perrisi (Dufour, 1843)
Distribution: European. Slovakia: river basins of the rivers: Danube, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Ipeľ, Hron, Slaná, Hornád, Bodrog, Latorica; High Tatra lakes.
Material examined: Site 3, 5.VI.2015, 1♀; Site 5, 20.V.2015, 1♀

Limnius volckmari (Panzer, 1793)
Distribution: European. Slovakia: river basins of the rivers: Danube, Morava, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Ipeľ, Hron, Slaná, Hornád, Bodrog, Latorica.
Material examined: Site 3, 14.V.2015, 1♂, 1♀; the same, 5.VI.2015, 1♀; Site 5, 10.VI.2015, 1♂

Macronychus quadrituberculatus P. W. J. Müller, 1806
Distribution: West-palearctic. Slovakia: river basins of the rivers: Morava, upper Váh, Ipeľ, Bodrog, Latorica. Critically endangered species (Holecová & Franc 2001).
Material examined: Site 6.3, 22.VII.2015, 1♂, 1♀; Site 7.4, 22.VII.2015, 1♂, 3♀

Riolus subviolaceus (P. W. J. Müller, 1817)
Distribution: European. Slovakia: river basins of the rivers: Morava, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec)*, Hron, Slaná, Hornád, Bodrog, Latorica; High Tatra lakes.
Material examined: Site 3, 14.V.2015, 2♂, 1♀

FAMILY HELOPHORIDAE

Helophorus (*Helophorus*) ***grandis*** Illiger, 1798
Distribution: Holarctic. Slovakia: river basins of the rivers: Morava, Poprad (Dunajec), Latorica*; High Tatra lakes.
Material examined: Site 5, 24.VI.2015, 1♀; Site 6.4, 29.V.2015, 1♂, 1♀

Helophorus (*Rhopalohelophorus*) cf. ***brevipalpis brevipalpis*** Bedel, 1881
Distribution: Holarctic. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Nitra & Žitava, Hron, Bodrog, Latorica; High Tatra lakes.
Material examined: Site 6.2, 21.VII.2015, 1♀

Helophorus (*Rhopalohelophorus*) ***flavipes*** Fabricius, 1792
Distribution: European. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Nitra & Žitava, Poprad (Dunajec), Hron, Slaná, Bodrog; High Tatra lakes, Spišská Magura lakes*.
Material examined: Site 2, 14.V.2015, 1♂

Helophorus (*Rhopalohelophorus*) ***granularis*** (Linnaeus, 1760)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Hron, Latorica.
Material examined: Site 6, 19.V.2015, 1♂

Helophorus (*Rhopalohelophorus*) ***montenegrinus*** Kuwert, 1885
Distribution: European. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Poprad (Dunajec), Hron, Slaná, Latorica; High Tatra lakes.
Material examined: Site 6.4, 29.V.2015, 2♂, 1♀

FAMILY HYDRAENIDAE

Hydraena (*Hydraena*) ***excisa*** Kiesenwetter, 1849
Distribution: European. Slovakia: river basins of the rivers: upper Váh, Nitra & Žitava, Poprad (Dunajec), Slaná, Hornád, Latorica.
Material examined: Site 5, 20.V.2015, 6♂, 9♀

Hydraena (*Hydraena*) ***gracilis gracilis*** Germar, 1824
Distribution: European. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, lower Váh, Nitra & Žitava, Poprad (Dunajec), Ipeľ, Hron, Slaná, Hornád, Bodrog, Latorica; High Tatra lakes.
Material examined: Site 3, 14.V.2015, 1♂, 3♀; the same, 5.VI.2015, 1♀; Site 5, 20.V.2015, 7♂, 4♀

Hydraena (*Hydraena*) ***palustris*** Erichson, 1837
Distribution: European. Slovakia: river basins of the rivers: Morava, Danube, Latorica; Spišská Magura lakes*.
Material examined: Site 6.2, 21.VII.2015, 1♂

Limnebius (*Limnebius*) ***truncatellus*** Thunberg, 1794
Distribution: West-palearctic. Slovakia: river basins of the rivers: Danube, upper Váh, Nitra & Žitava, Poprad (Dunajec), Hron, Slaná, Latorica; Spišská Magura lakes*.
Material examined: Site 2, 3.VI.2015, 1♀

FAMILY HYDROCHIDAE

Hydrochus crenatus (Fabricius, 1792)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Nitra & Žitava, Hron, Bodrog*, Latorica.
Material examined: Site 6.2, 19.V.2015, 1♂; the same, 21.VII.2015, 1♂; Site 6.4, 29.V.2015, 1♂, 3♀; Site 7.6, 22.VII.2015, 1♂, 1♀

Hydrochus elongatus (Schaller, 1783)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Latorica.
Material examined: Site 6.2, 19.V.2015; the same, 1♀, 21.VII.2015, 2♀; Site 6.4, 29.V.2015, 1♂

FAMILY HYDROPHILIDAE

Anacaena bipustulata (Marsham, 1802)
Distribution: West-palearctic. Slovakia: reported from river basins of the rivers: Danube (Korbel 1951), Nitra & Žitava, Bodrog (Roubal 1930), but these records were recognised as misidentification without documentation in accessible collections by Kodada *et al.* (2003). We recorded this species at one site (Bodrog river at Slovenské Nové Mesto) in the Bodrog river basin.
Material examined: Site 7.4, 22.VII.2015, 1♂

Anacaena globulus (Paykull, 1798)
Distribution: West-palearctic. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Nitra & Žitava, Poprad (Dunajec)*, Ipeľ Slaná, Bodrog, Latorica; Spišská Magura lakes*.
Material examined: Site 2, 14.V.2015, 9♀; the same, 3.VI.2015, 2♀; Site 4.1, 3.VI.2015, 1♀; Site 6.2, 19.V.2015, 1♂

Coelostoma (*Coelostoma*) ***orbiculare*** (Fabricius, 1775)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, lower Váh, Hron. Records published by Majzlan (2010, 2014), Majzlan & Cunev (2011). Seems to be widely distributed in Slovak spring systems (Havlík 2014).
Material examined: Site 2, 21.VII.2015, 1♀

Enochrus (*Enochrus*) ***melanocephalus*** (Olivier, 1793)
Distribution: Palearctic. Slovakia: river basins of the rivers: Danube, lower Váh, Nitra & Žitava, Ipeľ, Bodrog, Latorica.
Material examined: Site 7.6, 22.VII.2015, 1♀

Enochrus (*Lumetus*) ***ochropterus*** (Marsham, 1802)
Distribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, lower Váh; Spišská Magura lakes*.
Material examined: Site 2, 14.V.2015, 1♂

Helochares (*Helochares*) ***obscurus*** (O. F. Müller, 1776)
Ditribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, Nitra & Žitava, Bodrog, Latorica*; High Tatra lakes.
Material examined: Site 6.2, 21.VII.2015, 2♂; Site 7.2, 21.VII.2015, 3♂

Helochares (*Helochares*) ***punctatus*** Sharp, 1869
Disribution: Eurasian. First record for Slovakia. Recorded in the Latorica river basin* at one site (the Čierna voda – channel).
Material examined: Site 6.4, 29.V.2015, 1♂, 7♀

Hydrobius fuscipes (Linnaeus, 1758)
Ditribution: Holarctic. Slovakia: river basins of the rivers: Morava, Danube, Nitra & Žitava, Hron, Bodrog, Latorica; High Tatra lakes.
Material examined: Site 7.2, 21.VII.2015, 2♀

Hydrochara caraboides (Linnaeus, 1758)
Ditribution: Eurasian. Slovakia: river basins of the rivers: Morava, Danube, upper Váh, Nitra & Žitava, Hron, Bodrog, Latorica.
Material examined: Site 6.2, 19.V.2015, 1♂, 1♀; Site 6.4, 29.V.2017, 1♂

Hydrophilus piceus (Linnaeus, 1758)
Distribution: Palearctic. Slovakia: river basins of the rivers: Danube, lower Váh, Nitra & Žitava, Hron, Ipeľ, Latorica. Vulnerable species (Holecová & Franc 2001).
Material examined: Site 6.4, 19.V.2015, 1♂

Limnoxenus niger (Gmelin, 1790)
Distribution: West-palearctic. Slovakia: river basins of the rivers: Morava, Danube, Hron, Ipeľ, Bodrog*.
Material examined: Site 7.2, 2.VII.2015, 1♂

Discussion

Altogether, 50 species of aquatic beetles were found in the seven Natura 2000 sites surveyed in this inventory sampling campaign which belong to 4 families of Adephaga suborder and 6 families of Polyphaga suborder. These species were representatives of 10 families (12 families are present in Slovakia) and constitute 15% of the number of species known from Slovakia excluding reports of species which are regarded as misidentification (Kodada *et al.* 2003). Most of species recorded belong to the family Dytiscidae. We found 11 dytiscid species which makes almost 10% of the species of this family known from Slovakia. The other species belong to family Gyrinidae (1 species; 10% of the species known from Slovakia), family Haliplidae (4; 22%), Noteridae (2; 100%), Dryopidae (2; 67%), Elmidae (8; 47%), Helophoridae (5; 19%), Hydraenidae (4; 9%), Hydrochidae (2; 29%), and Hydrophilidae (11; 24%). While the running waters (sites 3, 4, and 5) are preferably inhibited by Elmidae and Hydraenidae which is in accordance with results obtained by other studies of Slovak rivers, e.g.

Zaťovičová *et al.* (2004) and Čiamporová–Zaťovičová & Čiampor (2008), Dytiscide and Hydrophilidae were the most species rich families in standing waters and lowland rivers (sites 1, 2, 6, and 7).

The present records of *Helochares* (*Helochares*) *punctatus* increase species richness of the family Hydrophilidae in Slovakia to 46 species. The aedeagus characteristics of *Helochares* (*Helochares*) *punctatus* and *Helochares* (*Helochares*) *obscurus* found in the study area (Fig. 2) conform to those figured by Hansen (1982: 203, Figs. 5–6). Also, two scarce species were recorded within this study. *Limnius intermedius* was recorded only once from Slovakia in the Latorica river Basin (Jászay 2001) and we found it in the Poprad river basin (Jarabinský prielom, the Malý Lipník brook). *Dryops similaris* was formerly recorded only from Morava and Danube river basins and we confirmed this species in the Latorica river basin. *Hydraena excisa* was only reported from the upper Váh and Slaná river basins and we recorded this species at one site in the Poprad (Dunajec) river basin (Beliansky potok brook).

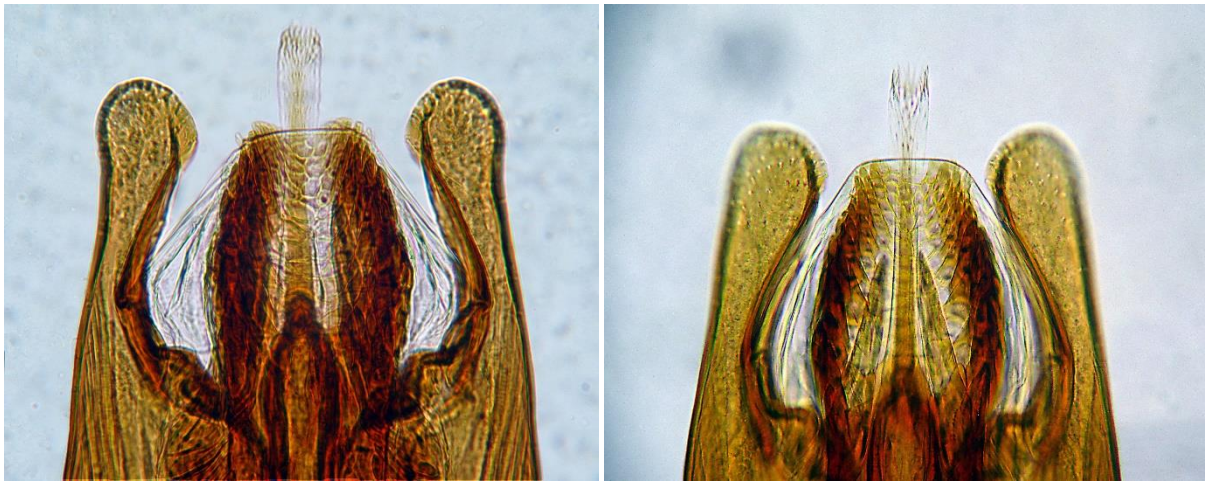

Fig. 2: *Helochares* (*Helochares*) *punctatus* (left) and *Helochares* (*Helochares*) *obscurus* (right) – aedeagus

Conclusions

Aside from the new record for Slovakia, this study markedly contributes to the knowledge of the aquatic coleopterans fauna of Natura 2000 sites studied but also to the knowledge on the aquatic beetle fauna of some Slovak river basins which were considerably less studied when compared to the well–known river basins, e. g. Danube, Morava, Váh river basins (Kodada *et al.* 2003), or the High Tatra lakes (Čiamporová–Zaťovičová & Čiampor 2011). We present the first inventory of the Veľké osturnianske jazero (lake) (2 species) and Malé osturnianske jazerá (lakes) (7 species) and extend the knowledge on the occurrence of some species in river basins. For the Poprad (Dunajec) river basin, we increased the number of species from 39 to 44 by records of *Esolus parallelepippedus*, *Limnius intermedius*, *Riolus subviolaceus*, *Haliplus laminatus*, and *Anacaena globulus*. For the Bodrog river basin, the number of species increase to 92 by records of *Laccophilus poecilus*, *Haliplus fluviatilis*, *Hydrochus crenatus*, *Limnoxenus niger*, and *Noterus crassicornis*. For the Latorica river basin, the number of species increase to 165 by records of *Dryops similaris*, *Haliplus ruficollis*, *Helephorus grandis*, *Helochares obscurus*, and *H. punctatus*.

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