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Contribution to the macroinvertebrate fauna of the Hungarian Danube VI. Triclads (Platyhelminthes: Tricladida)

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ABSTRACT: This paper provides occurrence data of triclad species collected by the staff of the Hungarian Danube Research Station from 1995 to 2008. Altogether 198 samples from 110 sampling locations of the Hungarian Danube section (main channel, side branches, and adjacent wetlands) were processed, and 5/7 species were identified.

Introduction, materials and methods

The main objective of this paper is summarizing the faunistic results concerning triclads collected in different macroinvertebrate investigations carried out by the Hungarian Danube Research Station of the Hungarian Academy of Sciences in the water system of the River Danube (main channel, side branches, and adjacent wetlands) between 1995 and 2008.

Samples were fixed in-situ in 4% formaldehyde solution. After separation triclads were preserved in 70% ethanol. Speciemens were identified by using keys and descriptions by REYNOLDSON & YOUNG (2000), the nomenclature follows KENK (1974). In the "list of species" authors gave only the abbreviations of sampling sites (in alphabetic order) and methods, collecting dates, the number of captured individuals and the initials of collectors (in parentheses), respectively. (Species-pairs were listed in case if separation and identification was not possible on preserved material.) In the case of several specimens the fixation and preservation method (see above) applied to the overall macroinvertebrate samples made not possible the species identification. Occurrences of specimens could not be identified are not listed in detail, only the number of occurrences are displayed as "Tricladida sp." in Tab. 1. and Fig. 1.

Detailed descriptions of sampling sites (locality, position – lat/lon –, microhabitat type), sampling methods, name of the collectors can be found in NOSEK (2007). In this paper there are some additional sampling methods not listed in NOSEK (2007). During the investigations by means of artificial substrates (**M**) in long (**h**) and short (**r**) period colonization experiments two materials (clay (**A**) and gravel (**K**)) were used exposed on the surface (**F**) and at the bottom (**L**) of the River Danube. The different combinations of material, duration and location are denoted with the following codes of method **M/hAL, M/hKL, M/rAL** and **M/rKL**. Detailed description of the experiment is to be found in OERTEL (2002).

Results

Among of the 1581 samples collected from 451 sampling places between 1995 and 2008, 198 samples of 110 sampling places contained triclads. From the samples 5–7 planarian species were identified: *Planaria torva* (Müller OF, 1773), *Dugesia tigrina* (Girard, 1850),

Dendrocoelum romanodanubiale (Codreanu, 1949), *Dugesia lugubris* (Schmidt, 1861) / *Dugesia polychroa* (Schmidt, 1861), and *Polycelis nigra* (Müller OF, 1773) / *Polycelis tenuis* Ijima, 1884. *P. torva*, *D. lugubris*/*polychroa*, *P. nigra*/*tenuis* are characteristic of lowland waters in Europe. North American *D. tigrina* and Ponto-Caspian *Dendrocoelum romanodanubiale* are invasive species (Table 1.).

P. nigra/*tenuis* were found only in the Szigetköz (main channel, active alluvial floodplain and protected area) (1848–1794 river km). *D. lugubris*/*polychroa* occurred mostly in the active alluvial floodplain and in the protected area of the Szigetköz (1848–1794 river km) and in the waters of Gemenc and Béda-Karapancsa Landscape Protection Area (1497–1437 river km). Only a few specimens occurred in the main channel and in the Ráckevei-Soroksári Danube. *P. torva* was found in the same areas.

The non-native *D. tigrina* occurred mostly in the active alluvial floodplain and in the protected area of the Szigetköz, in the Ráckevei-Soroksári Danube as well as in Gemenc and Béda-Karapancsa. The also non-native *Dendrocoelum romanodanubiale* was found mostly in the main channel between Vének and the inflow of Sió Canal, only a few were found in other water bodies. The great number of occurrences at Göd (GOD1) is due to the several years intensive invaestigation in this area. The two invasive species may endanger the native triclads fauna.

Unidentified specimens were found everywhere but mostly in the Szigetköz.

The strikingly most number of occurrences and species was found in the Szigetköz (including Mosoni-Danube) (Fig. 1.). Probably the high variety of habitats made Szigetköz the most rich and diverse part in the Hungarian Danube. Other significant water bodies are the Ráckevei-Soroksári Danube, the Gemenc and Béda-Karapancsa Landscape Protection Areas. Only a few specimens occurred in the main channel between Vének and the inflow of Sió (apart from Göd) and in the Szentedrei-Danube.

No one triclad specimen was found downstream the inflow of Sió. The explanation of this phenomenon maybe that the majority of sampling sites below the inflow of Sió are of sandy or muddy substrate without macrovegetation or other firm parts like stones, e.c.t.

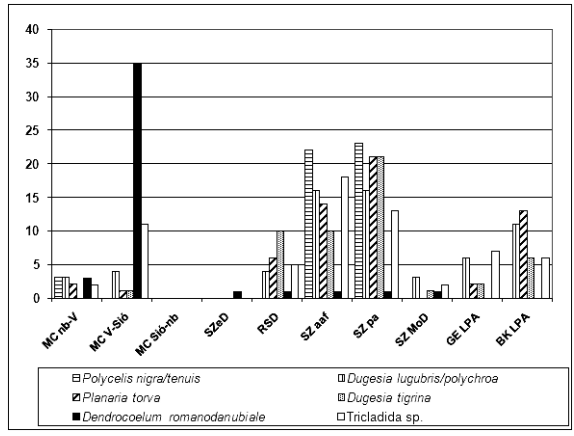

Fig. 1. Occurrences of triclads (Platyhelminthes: Tricladida) in the Hungarian section of River Danube, 1995–2008.

Table 1. Occurrences of triclads (Platyhelminthes: Tricladida) in the Hungarian section of River Danube, 1995–2008.

water body	code in Fig.1.	total number of sampling places	number of sampling places with triclads	number of occurrences					
				Polycelis nigra/ tenuis	*Dugesia lugubris/ polychroa*	*Planaria torva*	*Dugesia tigrina*	*Dendrocoelum romano-danubiale*	Tricladida sp.
Main channel, national boundary – Vének (1850–1794 rkm, along the Szigetköz)	MC nb-V	26	6	3	3	2	0	3	2
Main channel, Vének – inflow of Sió canal (1794–1497 rkm)	MC V-Sió	90	9	0	4	1	1	35	11
Main channel, inflow of Sió canal – national boundary (1497–1437 rkm, along the Gemenc and Béda-Karapancsa LPA)	MC Sió-nb	7	0	0	0	0	0	0	0
Szentendrei-Duna	SZeD	7	1	0	0	0	0	1	0
Ráckevei–Soroksári-Duna	RSD	41	11	0	4	6	10	1	5
Szigetköz, active alluvial floodplain	SZ aaf	75	28	22	16	14	10	1	18
Szigetköz, protected area	SZ pa	45	20	23	16	21	21	1	13
Szigetköz, Mosoni-Duna	SZ MoD	37	5	0	3	0	1	1	2
Gemenc Landscape Protection Area	GE LPA	82	10	0	6	2	2	0	7
Béda-Karapancsa Landscape Protection Area	BK LPA	41	20	0	11	13	6	0	6
total		**451**	**110**	**48**	**63**	**59**	**51**	**43**	**64**

List of species

Planaria torva (Müller OF, 1773) – ADO1-HD: 2001.05.22., 1 (BE, CsG, NJ, ON) - ARA3-K: 2003.05.30., 2 (AS, BG, CsZ, NJ) – ASV3-K: 2003.09.09., 29 (BG, CsZ, NJ, ON) – BAG1-D: 2003.07.26., 1 (ME, NJ) – BAG2-D: 2003.09.09., 1 (BG, CsZ, NJ, ON) – BEK1-C: 2004.08.28., 4 (ME, NJ) – BFD1-K: 2004.08.26., 1 (ME, NJ) – BOD2-H: 2003.09.08., 2 (BG, CsZ, NJ, ON) – BOD2-K: 2001.10.09., 1 (NJ) – CIK2-K: 2001.10.09., 3 (NJ) – CIK8-K: 2004.07.24., 4 (ME, NJ) – CSA0-K: 2003.09.08., 2 (BG, CsZ, NJ, ON) – CSA3-K: 2003.09.09., 5 (BG, CsZ, NJ, ON) – DIS1-K: 2004.09.15., 4 (NJ) – DIS4-K: 2004.09.15., 3 (NJ) – DOM1-K: 2005.09.15., 1 (ON) – DSM1-K: 2004.07.26., 3 (ME, NJ) – DUF3-D: 2003.09.08., 1 (BG, CsZ, NJ, ON) – DUF4-C: 1999.10.27., 1 (NJ) – DUH4-K: 2005.09.14., 1 (NJ, ON) – ERT2-K: 2004.09.29., 1 (BG, CsZ, NJ, ON) – FEC2-K: 2004.08.26., 8 (ME, NJ); 2005.07.21., 9 (ME, NJ) – FUZ1-K: 2004.08.27., 1 (ME, NJ) – GOR2-K: 2003.09.08., 1 (BG, CsZ, NJ, ON) – HED2-K: 2004.07.26., 1 (ME, NJ) – KAD1-K: 2004.08.27., 2 (ME, NJ); 2005.07.22., 13 (ME, NJ) – KFC1-K: 2005.07.21., 2 (ME, NJ) – KFC4-K: 2004.09.29., 5 (BG, CsZ, NJ, ON) – KFC5-K: 2004.08.27., 1 (ME, NJ) – KKL1-K: 2005.09.14., 4 (NJ, ON) – KRC1-K: 2005.07.21., 2 (ME, NJ) – KRC3-K: 2005.07.21., 2 (ME, NJ) – LIP2-K: 2003.05.29., 2 (AS, BG, CsZ, NJ) – LIP3-K: 1998.09.02., 1 (NJ); 2001.09.05., 1 (NJ); 2003.09.11., 10 (BG, CsZ, NJ, ON); 2004.07.25., 1 (ME, NJ); 2008.09.25., 2 (NJ, ME) – LIP4-D: 2008.09.25., 1 (NJ, ME) – LIP4-K: 2004.07.25., 1 (ME, NJ); 2007.07.24., 1 (NJ, ME); 2008.07.17., 12 (NJ, ME); 2008.09.25., 2 (NJ, ME) – MAK1-K: 2005.09.15., 2 (ON) – NOC2-K: 2003.07.24., 1 (ME, NJ) – NOC3-K: 2003.09.10., 2 (BG, CsZ, NJ, ON) – SCH3-K: 2004.09.15., 2 (NJ) – SCH8-K: 2004.09.15., 2 (NJ) – SUG3-K: 2004.08.29., 2 (ME, NJ) – SZB3-K: 2005.09.15., 3 (ON) – TAS2-K: 2005.09.15., 1 (ON) – VAJ7-K: 2005.06.16., 1 (BG, CsZ, NJ, ON, VT) – ZAT1-D: 2003.07.23., 2 (ME, NJ) – ZAT4-K: 2003.07.26., 3 (ME, NJ) – ZAT5-K: 2004.07.23., 1 (ME, NJ) – ZAT8-K: 2003.09.08., 1 (BG, CsZ, NJ, ON) – ZSC1-K: 2003.07.24., 10 (ME, NJ)

Dugesia tigrina (Girard, 1850) – ASV3-D: 2003.09.09., 51 (BG, CsZ, NJ, ON) – ASV3-K: 2003.09.09., 26 (BG, CsZ, NJ, ON) – BAD1-K: 2004.08.27., 2 (ME, NJ) – BAG1-D: 2003.07.26., 4 (ME, NJ) – BEB3-K: 2004.09.28., 3 (BG, CsZ, NJ, ON) – BOD2-H: 2003.09.08., 3 (BG, CsZ, NJ, ON) – BOD2-K: 2003.09.08., 6 (BG, CsZ, NJ, ON) – BOK1-K: 2004.08.28., 10 (ME, NJ) – CSA0-K: 2003.09.08., 1 (BG, CsZ, NJ, ON) – CSA3-K: 2003.09.09., 2 (BG, CsZ, NJ, ON) – CSO1-K: 2004.09.15., 1 (NJ) – DIS4-K: 2004.09.15., 1 (NJ) – DOM1-K: 2005.06.23., 6 (NJ, ON) – DOM1-K: 2005.09.15., 8 (ON) – DSG1-H: 2003.05.28., 1 (AS, BG, CsZ, NJ, VT) – DUH4-K: 2005.09.14., 1 (NJ, ON) – FEC3-K: 2005.07.22., 2 (ME, NJ) – FUZ2-K: 2004.08.27., 1 (ME, NJ) – GOD1-H: 1999.08.17., 2 (ON) – KFC4-K: 2004.09.29., 6 (BG, CsZ, NJ, ON) – KKL1-K: 2005.09.14., 11 (NJ, ON) – LIP3-K: 2001.09.05., 1 (NJ); 2003.09.11., 2 (BG, CsZ, NJ, ON); 2008.09.25., 21 (NJ, ME) – LIP4-D: 2008.09.25., 1 (NJ, ME) – LIP4-K: 2007.07.24., 5 (NJ, ME) – LIP4-K: 2008.07.17., 2 (NJ, ME) – MAK1-K: 2005.09.15., 4 (ON) – NOC2-D: 2003.09.10., 11 (BG, CsZ, NJ, ON) – NOC2-K: 2003.07.24., 15 (ME, NJ); 2003.09.10., 26 (BG, CsZ, NJ, ON) – NOC3-K: 2003.07.24., 1 (ME, NJ) – SCH3-K: 2003.09.09., 13 (BG, CsZ, NJ, ON) – SMA2-K: 2005.09.14., 6 (NJ, ON) – SOR2-K: 2005.09.14., 3 (NJ, ON) – SUG3-K: 2004.08.29., 2 (ME, NJ) – SUG6-K: 2000.07.15., 4 (CsG) – SZB3-K: 2005.09.15., 1 (ON) – TAS2-K: 2005.06.23., 1 (NJ, ON); 2005.09.15., 2 (ON) – ZAT3-K: 1999.10.27., 1 (NJ) – ZAT4-K: 1998.09.01., 3 (NJ); 1998.10.14., 15 (NJ); 2003.07.26., 3 (ME, NJ); 2008.07.17., 1 (NJ, ME); 2008.09.25., 3 (NJ, ME) – ZAT5-K: 2003.09.09., 1 (BG, CsZ, NJ, ON); 2004.07.23., 1 (ME, NJ) – ZAT7-K: 2003.09.09., 7 (BG, CsZ, NJ, ON) – ZAT8-K: 2003.09.08., 3 (BG, CsZ, NJ, ON) – ZAT9-K: 2003.07.24., 1 (ME, NJ)

Dendrocoelum romanodanubiale (Codreanu, 1949) – DRE2-C: 1997.09.09., 3 (NJ) – DUF1-K: 1999.08.31., 1 (NJ) – DUF7-K: 2003.07.25., 1 (ME, NJ) – DUH1-HD: 2001.05.23., 1 (BE, CsG, NJ, ON) – DUJ1-HD: 2001.05.22., 1 (BE, CsG, NJ, ON) – ESZ1-H: 2002.07.03., 2 (AS, BG, NJ, VT) – FEK1-D: 2003.09.10., 2 (BG, CsZ, NJ, ON) – GOD1-H: 1999.08.17., 5 (ON); 1999.09.07., 4 (ON); 1999.09.28., 10 (ON); 1999.10.19., 19 (ON); 1999.11.09., 8 (ON); 2000.04.18., 1 (ON); 2000.05.09., 1 (ON); 2000.05.30., 7 (ON); 2000.06.20., 1 (ON); 2000.08.22., 1 (ON); 2000.09.12., 5 (ON); 2000.10.03., 8 (ON); 2000.10.24., 6 (ON); 2000.11.14., 13 (ON); 2000.12.05., 10 (ON); 2000.12.27., 14 (ON); 2001.01.16., 2 (ON); 2001.02.06., 13 (ON); 2001.03.01., 2 (ON); 2001.04.11., 3 (ON); 2001.05.02., 3 (ON); – GOD1-M/hAL: 1999.08.17, 1 (ON, NJ) – GOD1-M/hKL: 1999.05.25, 2 (ON, NJ); 1999.06.15, 1 (ON, NJ) – GOD1-M/rAL: 1999.07.27, 2 (ON, NJ); 1999.08.17, 1 (ON, NJ) – GOD1-M/rKL: 1999.07.27, 1 (ON, NJ); 1999.08.17, 1 (ON, NJ); 1999.09.28, 1 (ON, NJ) – HAL1-H: 1998.07.30., 1 (CsG, ON) – SUT1-H: 1998.06.09., 1 (CsG, NJ, ON) – SZU1-HD: 2001.05.23., 4 (BE, CsG, NJ, ON) – TAH1-H: 2002.09.25., 1 (NJ, ON) – TAT3-H: 2002.07.03., 6 (AS, BG, NJ, VT) – TAT4-D: 2002.07.03., 1 (AS, BG, NJ, VT) – ZAT2-C: 1999.07.13., 1 (NJ)

Dugesia lugubris (Schmidt, 1861) / ***Dugesia polychroa*** (Schmidt, 1861) – ASV2-C: 2002.07.09., 1 (NJ) – BAG1-D: 2003.07.26., 1 (ME, NJ) – BDH1-K: 2004.08.28., 1 (ME, NJ) – BFD1-K: 2004.08.26., 3 (ME, NJ) – BOD2-K: 2001.10.09., 1 (NJ) – CIK2-K: 2001.10.09., 3 (NJ); 2007.07.23., 1 (NJ, ME) – CSA2-CK: 1998.09.01., 1 (NJ) – CSA6-C: 2004.09.15., 1 (NJ) – CSO1-K: 2004.09.15., 4 (NJ) – CSO2-K: 2004.09.15., 2 (NJ) – DIS1-K: 2004.09.15., 1 (NJ) – DIS3-K: 2004.09.15., 3 (NJ) – DIS4-K: 2004.09.15., 1 (NJ) – DIS5-D: 2004.09.15., 2 (NJ) – DKD1-K: 2005.06.14., 1 (BG, CsZ, NJ, ON,

VT) – DND5-K: 2005.06.15., 1 (BG, CsZ, NJ, ON, VT) – DSB2-K: 2004.07.26., 1 (ME, NJ) – DSM1-K: 2004.07.26., 16 (ME, NJ) – DSM2-K: 2004.07.26., 2 (ME, NJ) – DUF3-K: 1997.07.28., 3 (NJ); 1997.09.09., 2 (NJ) – DUF4-C: 1998.09.01., 1 (NJ) – DUH4-K: 2005.09.14., 2 (NJ, ON) – FEC1-K: 2004.09.30., 1 (BG, CsZ, NJ, ON) – FEC2-K: 2005.07.21., 4 (ME, NJ) – GOD1-H: 1999.10.19., 1 (ON); 2001.03.01., 1 (ON) – GOR1-K: 2004.07.24., 2 (ME, NJ) – HSI1-K: 2004.09.27., 2 (BG, CsZ, NJ, ON) – KAD1-K: 2004.08.27., 1 (ME, NJ); 2005.07.22., 1 (ME, NJ) – KAD2-K: 2005.07.22., 1 (ME, NJ) – KFC1-K: 2005.07.21., 14 (ME, NJ) – KFC4-K: 2004.09.29., 3 (BG, CsZ, NJ, ON) – KKL1-K: 2005.06.23., 1 (NJ, ON) – KML1-K: 2003.07.23., 1 (ME, NJ) – KML2-K: 2003.07.23., 6 (ME, NJ) – KML3-K: 2003.07.23., 2 (ME, NJ) – KRC1-K: 2005.07.21., 4 (ME, NJ) – KRC3-K: 2005.07.21., 7 (ME, NJ) – LIP3-K: 1997.07.28., 1 (NJ); 1997.09.09., 2 (NJ), 1999.10.28., 1 (NJ), 2004.07.25., 2 (ME, NJ), 2008.09.25., 1 (NJ, ME) – LIP4-K: 2004.07.25., 1 (ME, NJ); 2008.07.17., 6 (NJ, ME); 2008.09.25., 1 (NJ, ME) – NOC2-K: 2003.07.24., 4 (ME, NJ) – NOC3-K: 2003.07.24., 1 (ME, NJ) – NYD1-K: 2005.06.14., 1 (BG, CsZ, NJ, ON, VT) – NYD2-K: 2005.06.14., 4 (BG, CsZ, NJ, ON, VT) – RAC1-HD: 2001.05.23., 1 (BE, CsG, NJ, ON) – SCH2-K: 2001.09.05., 1 (NJ) – SCH8-K: 2004.09.15., 1 (NJ) – SMI3-K: 2005.09.14., 5 (NJ, ON) – SUG3-K: 2004.08.29., 2 (ME, NJ) – TAT4-D: 2002.07.03., 1 (AS, BG, NJ, VT) – VAC2-C: 1998.05.27., 1 (CsG, ON) – ZAT1-K: 2003.07.23., 1 (ME, NJ) – ZAT7-K: 2003.09.09., 1 (BG, CsZ, NJ, ON) – ZAT9-K: 2003.07.24., 1 (ME, NJ)

Polycelis nigra (Müller OF, 1773) / ***Polycelis tenuis*** Ijima, 1884 – BAG2-D: 2003.09.09., 3 (BG, CsZ, NJ, ON) – BOD2-K: 1998.09.01., 2 (NJ); 1998.10.14., 4 (NJ); 1999.08.31., 3 (NJ) – CIK2-K: 1998.09.01., 2 (NJ); 1998.10.14., 2 (NJ); 2001.07.02., 2 (NJ); 2001.10.09., 2 (NJ); 2003.07.25., 2 (ME, NJ); 2007.07.23., 2 (NJ, ME) – CIK8-K: 2004.07.24., 2 (ME, NJ) – CSA1-C: 2001.07.02., 1 (NJ) – CSK4-K: 2004.09.15., 1 (NJ) – CSO1-K: 2004.09.15., 1 (NJ) – DIS1-K: 2004.09.15., 2 (NJ) – DIS3-K: 2004.09.15., 6 (NJ) – DIS4-K: 2004.09.15., 17 (NJ) – DIS5-D: 2004.09.15., 17 (NJ) – DKI2-C: 1998.09.01., 1 (NJ) – DRE4-K: 2004.07.25., 3 (ME, NJ) – DSM1-K: 2004.07.26., 1 (ME, NJ) – DUF3-K: 1998.10.14., 8 (NJ) – DUF4-C: 1997.07.28., 1 (NJ) – GOR1-K: 2004.07.24., 10 (ME, NJ) – LIP2-K: 2003.05.29., 6 (AS, BG, CsZ, NJ) – LIP3-K: 1997.07.28., 1 (NJ); 2001.07.02., 4 (NJ); 2001.09.05., 1 (NJ); 2003.07.24., 2 (ME, NJ); 2003.09.11., 3 (BG, CsZ, NJ, ON); 2004.07.25., 9 (ME, NJ); 2008.07.17., 5 (NJ, ME) – LIP4-K: 2003.07.24., 2 (ME, NJ; 2004.07.25., 4 (ME, NJ); 2007.05.16., 2 (NJ); 2007.07.24., 1 (NJ, ME); 2008.09.25., 5 (NJ, ME) – NOC3-K: 2003.07.24., 2 (ME, NJ); 2003.09.10., 5 (BG, CsZ, NJ, ON) – SCH2-K: 2001.09.05., 3 (NJ) – SCH4-K: 2003.05.27., 1 (AS, BG, CsZ, NJ, VT); 2003.07.25., 1 (ME, NJ) – SVC1-K: 2004.07.25., 7 (ME, NJ) – ZAT1-K: 2003.07.23., 1 (ME, NJ) – ZAT3-K: 2007.07.23., 1 (NJ, ME) – ZAT4-K: 2001.07.02., 2 (NJ) – ZAT8-K: 2003.09.08., 4 (BG, CsZ, NJ, ON) – ZSC1-K: 2003.07.24., 3 (ME, NJ)

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