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AQUATIC BEETLE FAUNA OF THE SZIGETKÖZ, NW HUNGARY (COLEOPTERA: HYDRADEPHAGA, HYDROPHILOIDEA)

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A SZIGETKÖZ VÍZIBOGÁR FAUNÁJA (COLEOPTERA: HYDRADEPHAGA, HYDROPHILOIDEA)

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KIVONAT: 2002 és 2005 között 132 mintavételi helyen vizsgáltuk a Szigetköz vízibogár faunáját. 70 vízibogárfaj előfordulását tudtuk regisztrálni (9 Haliplidae, 30 Dytiscidae, 2 Noteridae, 1 Gyrinidae, 1 Spercheidae, 2 Hydrochidae, 6 Helophoridae, 19 Hydrophilidae). 50 mintavételi helyen nem kerültek elő vízibogarak. Általánosságban elmondható, hogy a Szigetköz vízibogár faunájában az áramlást kedvelő fajok dominálnak, leggyakoribb fajok a *Laccophilus hyalinus*, *Haliplus fluviatilis*, *Platambus maculatus* és a *Laccobius minutus*. A különböző áramló vizek között a vízibogár-fauna alapján nem mutathatók ki különbségek, szinte a teljes áramló vízrendszerben ugyanazok a fajok kerültek elő az egyes mintavételi helyeken. A legnagyobb fajszámmal jellemezhető területek elsősorban a mentett oldal vízterei (pl. Araki-láp és Zsejkei-csatorna). Faunisztikai szempontból mindenképpen említést érdemel a *Hydroporus scalesianus*, a *Laccobius sinuatus* és a *Hydrochus megaphallus* előkerülése.

ABSTRACT: Between the years 2002 and 2004 faunistic samplings have made at 132 sampling sites in the Szigetköz. The occurrence of 70 species (9 Haliplidae, 30 Dytiscidae, 2 Noteridae, 1 Gyrinidae, 1 Spercheidae, 2 Hydrochidae, 6 Helophoridae, 19 Hydrophilidae) was reported. The relatively small total number of species is due to the homogenization of Szigetköz water system, differences among the aquatic beetle fauna of the different watercourses of Szigetköz were not detected. Almost the same species were found on every sampling site in the active alluvial floodplain. Most of species found in waterbodies of the Szigetköz are common or frequent in Hungary, but the occurrence of *Hydroporus scalesianus*, *Laccobius sinuatus* and *Hydrochus megaphallus* are nationwide important faunistic records.

Key words: aquatic coleoptera, faunistics, occurrence data

Introduction

One of the two wetlands along the Hungarian Danube, Szigetköz, is situated in the northwest part of Hungary between the main arm of the Danube (border to Slovakia) and the Mosoni Danube down streams from Rajka to the city of Győr. After the break through at Dévény the slope of the river bed decreases significantly leading to an enormous bed-load and deposition of suspended material building up the alluvial fan along with its side arm systems. The area of the Szigetköz is 375 km².

Before the nineties of the last century the hydrological regime of the water bodies was governed by the Danube. The separate side arm systems – in different degree and for various periods of time – were directly connected to the main arm, subject to both the Danube actual water level and the bottom level of the arms. The oxbow lakes on the active alluvial flood plain and on the flood-protected area generally got their water supply by ground water. They were directly connected with the main arm only during high flood periods.

In 1992, after the diversion of the Danube water to the operation channel of the power station Bős/Gabcikovo, a radical alteration occurred in the situation described above. In the abandoned main arm (Old Danube) the former water discharge (2000 m³sec⁻¹ on average) decreased to 50-400 m³sec⁻¹. The water level was lowered by 3-4 m, and hence the ground water level was lowered to a great extent, too. Most of the side arms lost their direct connection with the main arm as the water level of the Old Danube became lower than the bottom levels in the inlet cross-sections of the side arms. Both the water level and the area of the oxbow lakes supplied by ground water decreased to a great extent.

From 1993 several technical measures have been implemented in order to reduce the scarcity of water. Former independent side arm systems, oxbow lakes were interconnected by new artificial canals and short cuts or by dredged old natural arms to form a water supply system. To provide the supply system with water by natural gravity a bottom sill was built in the abandoned main arm at river kilometre 1843, at Dunakiliti in 1995.

Only few data known about the aquatic beetle fauna of Szigetköz, majority of them are unpublished yet. Older occurrence data were published from Mosonmagyaróvár by RÉVY (1943), nowadays CSABAI et al. (2001) provided sporadic data of aquatic beetle species from the Szigetköz.

Materials and methods

Samples were taken at altogether 132 places in the Szigetköz area in the years 2002-2004. Date of sampling were 01 July and 23 September in 2002, 15. May, 26-31 May, 22-27 July and 08-12 September in 2003, 23-26 July and 15 September in 2004. Breakdown of the number of sampling sites among flood prevention categories are as follows: 1) Danube main arm (Öreg-Duna, Old Danube), abandoned main arm, 18 sampling places altogether; 2) Active alluvial floodplain, 62 sampling places altogether; 3) Flood-protected area, 35 sampling places altogether; 4) "Mosoni" Danube, 17 sampling places altogether.

Different sampling methods were used: majority of aquatic beetles mentioned in this work were captured by sweeping with a long handled pond net just above the substrate, on water surface, and among the submerged or emergent vegetation. Beyond netting some beetles were captured by manual singling from surface of

submerged stones, wood stocks, etc. and in some cases with a triangle dredge. Beetles collected were preserved in situ in 70% alcohol.

Below in table 1. a total of 132 sampling sites are given with their name, in brackets with their administrative units with used abbreviations and flood prevention classification (Table 1., Figure 1.). In the cases of Danube main arm and Mosoni Danube the name of the water body or the nearest locality is followed by the river km mark (rkm).

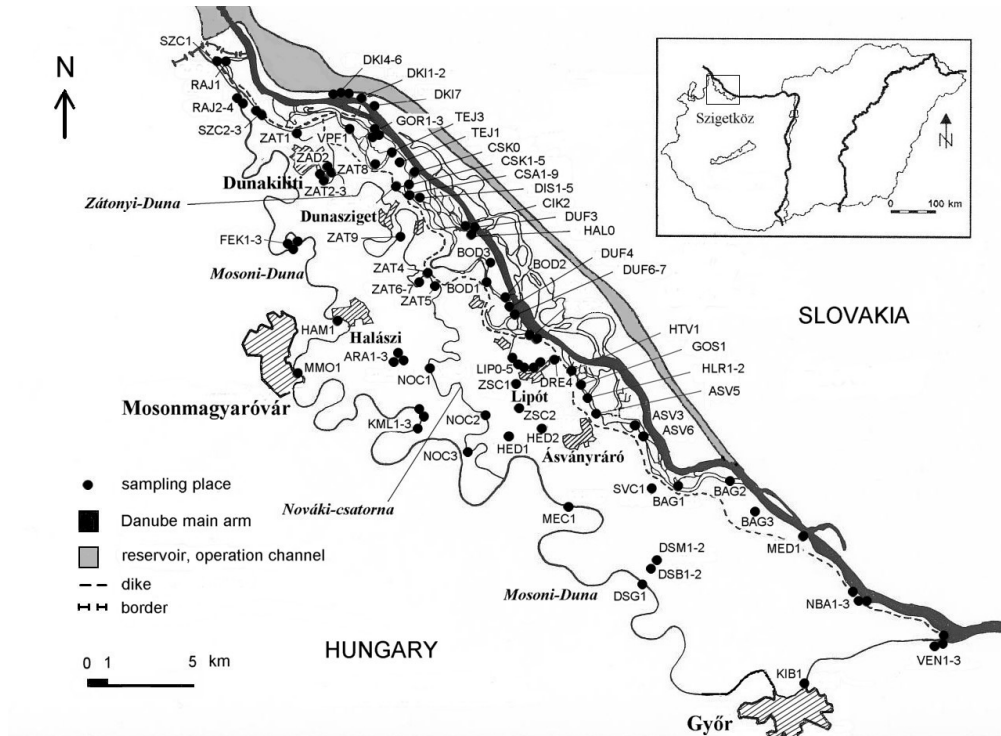


Figure 1. Sampling sites in Szigetköz. Due to the scale of the map the abbreviations of some near-by sampling localities overlap and are missing.

In cases of some geographical terms we left the original Hungarian form for the localities being more identifiable: ág – arm; ágrendszer - arm system; bukó – weir; csatorna – canal; Duna főág - Danube main arm; gát – dike; holtág, morotva - oxbow lake; sziget - island; zárás – barrage.

Table 1. Sampling localities with administrative units, its abbreviations (abbrev.) and flood prevention classification (f.p.c.) – MA=Danube main arm (Őreg-Duna); MO=Mosoni-Duna; PA=Flood-protected area; PF=Active alluvial floodplain; *= aquatic beetles were not found.

Sampling localities (administrative units)	abbrev.	f.p.c.
1. Araki láp, SE, open water (Halászi)	ARA1	PA
2. Araki láp, NW, open water (Halászi)*	ARA2	PA
3. Araki láp, NW, reed stand (Halászi)	ARA3	PA
4. Ásványi-ág, Völgy-sziget (Ásványráró)	ASV3	FP
5. Ásványi ágrendszer, small arm of Halrekesztő-Duna (Ásványráró)	ASV5	FP
6. Ásványi ág, water level gauge (Ásványráró)	ASV6	FP
7. Bagaméri-ág, Pörös-sziget (Ásványráró)*	BAG1	FP
8. Bagaméri-ág, water level gauge (Ásványráró)*	BAG2	FP
9. Bagaméri ágrendszer, Nagy-Patkó (Győrzámoly)*	BAG3	FP
10. Bodaki ágrendszer I., small side arm (Kisbodak)	BOD1	FP
11. Bodaki-ágrendszer II., outlet of the arm system (Kisbodak)	BOD2	FP
12. Bodaki ágrendszer III, small arm at rkm 1831 (Dunasziget)	BOD3	FP
13. Cikolai ágrendszer at Dunasziget (Dunasziget)	CIK1	FP
14. Cikolai ágrendszer, outlet of the arm system (Dunasziget)	CIK2	FP
15. Cikolai ágrendszer, Kísvesszősi bukó I. (Dunasziget)*	CIK3	FP
16. Cikolai ágrendszer, Kísvesszősi bukó, II. (Dunasziget)	CIK4	FP
17. Cikolai ágrendszer at Cikolasziget I. (Dunasziget)	CIK5	FP
18. Cikolai ágrendszer, Nylon-gát (Dunasziget)	CIK6	FP
19. Cikolai ágrendszer, Jakabi zárás (Dunasziget)*	CIK7	FP
20. Cikolai ágrendszer, at Cikolasziget II. (Dunasziget)	CIK8	FP
21. Csákányi-Duna, Csákányi-bukó (Dunasziget)*	CSA1	FP
22. Csákányi-Duna, bay after Csákányi-bukó (Dunasziget)	CSA3	FP
23. Csákányi-Duna, Csákányi-bukó (Dunasziget)	CSA4	FP
24. Csákányi-Duna, rock filling I. (Dunasziget)*	CSA5	FP
25. Csákányi-Duna, rock filling II. (Dunasziget)*	CSA6	FP
26. Csákányi-Duna, rock filling III. (Dunasziget)*	CSA7	FP
27. Csákányi-Duna, reed stand I. (Dunasziget)	CSA8	FP
28. Csákányi-Duna, silt deposition (Dunasziget)*	CSA9	FP
29. Csákányi-Duna, Csákányi-bukó (Dunasziget)*	CSD1	FP
30. Csákányi-Duna, inlet (Dunasziget)*	CSK0	FP
31. Csákányi-Duna, pond weed I. (Dunasziget)	CSK1	FP
32. Csákányi-Duna, pond weed II. (Dunasziget)*	CSK2	FP
33. Csákányi-Duna, reed stand II. (Dunasziget)	CSK3	FP
34. Csákányi-Duna, reed stand III. (Dunasziget)	CSK4	FP
35. Csákányi-Duna, pond weed III. (Dunasziget)	CSK5	FP
36. Csákányi-Duna, bay, pond weed I. (Dunasziget)	CSO1	FP
37. Csákányi-Duna, bay, catstail stand (Dunasziget)*	CSO2	FP
38. Csákányi-Duna, bay, pond weed II. (Dunasziget)*	CSO3	FP
39. Disznós-ág, submerged willow roots (Dunasziget)	DIS1	FP
40. Disznós-ág, reed stand I. (Dunasziget)	DIS3	FP
41. Disznós-ág, reed stand II. (Dunasziget)	DIS4	FP

42. Disznós-ág, pond weed (Dunasziget)	DIS5	FP
43. Duna főág, 1843 rkm, gravel bank after the bottom sill (Dunakiliti)*	DKI1	MA
44. Duna főág, 1843 rkm, bottom sill (Dunakiliti)*	DKI2	MA
45. Duna főág, 1843,4 rkm, silt deposition above bottom sill (Dunakiliti)*	DKI4	MA
46. Duna főág, 1843,4 rkm, pond weed above bottom sill (Dunakiliti)*	DKI5	MA
47. Duna főág, 1843,4 rkm, rock filling above bottom sill (Dunakiliti)*	DKI6	MA
48. Duna főág, 1842,8 rkm, bay after the bottom sill (Dunakiliti)*	DKI7	MA
49. Doborgazi átvágás (Dunasziget)	DOB1	FP
50. Duna főág 1833 rkm (Dunasziget)*	DUF1	MA
51. Duna főág 1825,5 rkm, water level gauge (Dunaremete)*	DRE2	MA
52. Seepage canal, Sorjási bukó (Dunaremete)*	DRE3	FP
53. Catch drain near Lipót (Lipót)	DRE4	PA
54. Gravel pit pond at Dunaszeg (Dunaszeg)	DSB1	PA
55. Puddle near the gravel pit pond at Dunaszeg (Dunaszeg)	DSB2	PA
56. Mosoni-Duna, 33 rkm (Dunaszeg)	DSG1	MO
57. Dunaszegi morotva I. (Dunaszeg)	DSM1	PA
58. Dunaszegi morotva II. (Dunaszeg)	DSM2	PA
59. Duna főág, 1839 rkm (Dunasziget)	DUF1	MA
60. Duna főág, 1832 rkm (Dunasziget)	DUF3	MA
61. Duna főág, 1827,5 rkm (Dunasziget)	DUF4	MA
62. Pond after the outlet barrage of Bodaki-ágrendszer (Kisbodak)*	DUF6	MA
63. Pond beside the Duna főág, 1827,5 rkm (Kisbodak)	DUF7	MA
64. Mosoni-Duna, 102 rkm I. (Feketeerdő)	FEK1	MO
65. Morotva, E beside the Mosoni-Duna, 102 rkm (Feketeerdő)*	FEK2	MO
66. Mosoni-Duna, 102 rkm II. (Feketeerdő)*	FEK3	MO
67. Tejfalui-ág, Görgetegi-bukó, headwater (Dunasziget)	GOR1	FP
68. Tejfalui-ág, Görgetegi-bukó, tail water I. (Dunasziget)	GOR2	FP
69. Tejfalui-ág, Görgetegi-bukó, tail water II. (Dunasziget)*	GOR3	FP
70. Ásványi ágrendszer, Gombócosi sziget (Lipót)*	GOS1	FP
71. Fish ladder (Denk Páli bukó) (Dunasziget)*	HAL0	MA
72. Mosoni-Duna, 94 rkm (Halászi)	HAM1	MO
73. Canal at Hédervár (Hédervár)	HED1	PA
74. Zsejkei csatorna at Hédervár (Hédervár)	HED2	PA
75. Halrekesztői zárás, headwater (Ásványráró)	HLR1	FP
76. Halrekesztői zárás, tail water (Ásványráró)*	HLR2	FP
77. Small arm after Hatvanasi-bukó (Lipót)	HTV1	FP
78. Kálnoki csatorna at Máriakálnok (Halászi)	KAC1	PA
79. Mosoni-Duna, 12 rkm (Győr)	KIB1	MO
80. Mosoni-Duna, 70,5 rkm (Kimle)	KML1	MO
81. Mosoni-Duna, 71,2 rkm (Kimle)	KML2	MO
82. Puddle at Mosoni-Duna 71,2 rkm (Kimle)	KML3	MO
83. Lipóti morotva middle, reed stand (Lipót)	LIP2	PA
84. Lipóti morotva SW (Lipót)	LIP3	PA
85. Lipóti morotva E (Lipót)	LIP4	PA
86. Catch drain in Lipót (Lipót)	LIP5	PA
87. Mosoni-Duna, 48,2 rkm (Mecsér)	MEC1	MO

88. Duna főág, 1806 rkm, bridge at Medve (Gyórzámoly)*	MED1	MA
89. Mosoni-Duna, 88 rkm (Mosonmagyaróvár)	MMO1	MO
90. Cikolai ágrendszer, small arm at Nagy-ciglés (Dunasziget)	NAC1	FP
91. Duna főág, 1802,5 rkm, Nagybajcs I. (Nagybajcs)*	NBA1	MA
92. Duna főág, 1802 rkm, Nagybajcs II. (Nagybajcs)*	NBA2	MA
93. Duna főág, 1801,5 rkm, Nagybajcs III. (Nagybajcs)*	NBA3	MA
94. Nováki-csatorna at Püski (Püski)	NOC1	PA
95. Nováki-csatorna at Arak (Halászi)	NOC2	PA
96. Nováki-csatorna at Novákpuszta (Darnózseli)	NOC3	PA
97. Mosoni-Duna upper lock head, Rajka (Rajka)*	RAJ1	FP
98. Mosoni-Duna 120,8 rkm (Rajka)	RAJ2	MO
99. Mosoni-Duna 120,9 rkm (Rajka)*	RAJ3	MO
100. Mosoni-Duna 120,75 rkm (Rajka)*	RAJ4	MO
101. Schisler-holtág, silt deposition (Dunasziget)	SCH0	FP
102. Schisler-holtág E (Dunasziget)	SCH1	FP
103. Schisler-holtág, reed stand I. (Dunasziget)	SCH3	FP
104. Schisler-holtág, feed water canal (Dunasziget)	SCH4	FP
105. Schisler-holtág, catstail stand (Dunasziget)	SCH5	FP
106. Schisler-holtág, pond weed I. (Dunasziget)	SCH6	FP
107. Schisler-holtág, pond weed II. (Dunasziget)*	SCH7	FP
108. Schisler-holtág, pond weed III. (Dunasziget)*	SCH8	FP
109. Szavai csatorna at "Ásványi" pumping station (Ásványráró)	SVC1	PA
110. Seepage canal headwater at Rajka (Rajka)	SZC1	PA
111. Seepage canal tail water at Rajka (Dunakiliti)	SZC2	PA
112. Seepage canal tail water at Dunakiliti (Dunakiliti)*	SZC3	PA
113. Tejfaluszigeti ágrendszer I. (Dunasziget)	TEJ1	FP
114. Tejfaluszigeti ágrendszer, Szigeti Duna (Dunasziget)*	TEJ2	FP
115. Tejfaluszigeti ágrendszer II., at main arm 1839 rkm (Dunasziget)	TEJ3	FP
116. Mosoni-Duna, 1,5 rkm, I., submerged willow roots (Vének)*	VEN1	MO
117. Mosoni-Duna, 1,5 rkm, II., gravel bank (Vének)*	VEN2	MO
118. Mosoni-Duna, 1,5 rkm, III., silt deposition (Vének)*	VEN3	MO
119. Main canal of water supply system at Dunakiliti (Dunakiliti)*	VPF1	FP
120. Zátonyi-Duna at Dunasziget (Dunakiliti)*	ZAD1	PA
121. Zátonyi-Duna at Dunakiliti I. (Dunakiliti)*	ZAD2	PA
122. Zátonyi-Duna inlet at Dunakiliti (Dunakiliti)	ZAT1	PA
123. Zátonyi-Duna at Dunakiliti II. (Dunakiliti)*	ZAT2	PA
124. Zátonyi-Duna at Dunakiliti III. (Dunakiliti)	ZAT3	PA
125. Zátonyi-Duna at Bodak I. (Püski)	ZAT4	PA
126. Zátonyi-Duna at Bodak II. (Püski)	ZAT5	PA
127. Zátonyi-Duna at Bodak III. (Püski)	ZAT6	PA
128. Zátonyi-Duna at Bodak IV. (Püski)	ZAT7	PA
129. Zátonyi-Duna at Dunakiliti IV. (Dunakiliti)	ZAT8	PA
130. Zátonyi-Duna at Cikolasziget (Dunasziget)	ZAT9	PA
131. Zsejkei-csatorna at Lipót (Lipót)	ZSC1	PA
132. Zsejkei-csatorna at Darnózseli (Darnózseli)	ZSC2	PA

Results and discussion

Our samplings at 132 sites result in occurrence of 1143 individuals of aquatic beetles belonging to 70 taxa ((9 Haliplidae, 30 Dytiscidae, 2 Noteridae, 1 Gyrinidae, 1 Spercheidae, 2 Hydrochidae, 6 Helophoridae, 19 Hydrophilidae).

In cases of 50 sites aquatic beetles were not found (marked with “*” in table 1.). The 70 aquatic beetle species found are the 33% of the Hungarian fauna. The most common species were *Laccobius hyalinus* (49 sites), *Haliplus fluviatilis* (46 sites), *Platambus maculatus* (18 sites) and *Laccobius minutus* (18 sites). These species are rheophil taxa inhabiting slow-flowing or running waters.

From the faunistical point of view the most valuable territories characterized by high aquatic beetle species richness were ARA1 (19 species), SZC1 (19 species) ASV5 (15 species), BOD1 (14 species), ZAT9 (14 species), MMO1 (13 species), LIP4 (12 species) and KML1 (12 species). The occurrence of species found in each sampling sites were summarized in Table 2.

Most of the species found in waterbodies of the Szigetköz are common or frequent in Hungary (CSABAI 2003), but the occurrence of *Hydroporus scalesianus*, *Laccobius sinuatus* and *Hydrochus megaphallus* are nationwide important faunistic records.

The total number of species (70) is relatively small in contrast of other similar territories. The small total number of species is due to the homogenization of Szigetköz water system, differences among the aquatic beetle fauna of the different watercourses of Szigetköz were not detected. Almost the same species were found on every sampling sites in the active alluvial floodplain.

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Species	Sampling sites														Σ
	SZC2	TEJ1	TEJ3	ZAT1	ZAT3	ZAT4	ZAT5	ZAT6	ZAT7	ZAT8	ZAT9	ZSC1	ZSC2		
<i>Helophorus minutus/paraminutus</i>															1
<i>Helophorus montenegrinus</i> Kuwert, 1885															1
<i>Helophorus nubilus</i> Fabricius, 1776															1
Hydrophilidae															
<i>Coelostoma orbiculare</i> (Fabricius, 1775)															1
<i>Anacaena limbata</i> (Fabricius, 1792)						■				■	■				15
<i>Laccobius bipunctatus</i> (Fabricius, 1775)	■					■				■	■				13
<i>Laccobius minutus</i> (Linnaeus, 1758)						■	■			■	■		■		18
<i>Laccobius sinuatus</i> Motschulsky, 1849	■														3
<i>Laccobius striatulus</i> (Fabricius, 1801)	■									■					5
<i>Chaetarthria seminulum</i> (Herbst, 1797)															1
<i>Cymbiodyta marginella</i> (Fabricius, 1792)															6
<i>Enochrus bicolor</i> (Fabricius, 1792)						■									2
<i>Enochrus coarctatus</i> (Gredler, 1863)															1
<i>Enochrus melanocephalus</i> (Olivier, 1792)											■				2
<i>Enochrus quadripunctatus</i> (Herbst, 1797)															1
<i>Enochrus testaceus</i> (Fabricius, 1801)															6
<i>Helochares obscurus</i> (O.F.Müller, 1776)															3
<i>Hydrobius fuscipes</i> (Linnaeus, 1758)							■								5
<i>Hydrochara caraboides</i> (Linnaeus, 1758)						■									4
<i>Limnoxenus niger</i> Zschach, 1788															2
<i>Hydrophilus piceus</i> (Linnaeus, 1758)															1
<i>Berosus signaticollis</i> (Charpentier, 1825)															2
Σ	3	3	1	1	1	10	3	1	5	8	14	2	3		

Table 2. Occurrence of 70 aquatic beetle taxa found in the 82 sampling sites (■ = imago data, ● = larval data, ■ = both).