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CONTRIBUTION TO THE CHIRONOMIDAE (DIPTERA) FAUNA OF THE SAJÓ/SLANÁ RIVER, HUNGARY AND SLOVAKIA

A. MÓRA^{1*} – L. POLYÁK² – A. FARKAS³

¹Hungarian Academy of Sciences, Centre for Ecological Research, Balaton Limnological Institute, Klebelsberg Kunó 3, H-8237 Tihany, Hungary

²Department of Ecology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

³Department of Hydrobiology, University of Debrecen, Egyetem tér 1, H-4032 Debrecen, Hungary

* Corresponding author, e-mail: mora.arnold@okologia.mta.hu

ADATOK A SAJÓ/SLANÁ ÁRVASZÚNYOG-FAUNÁJÁHOZ (DIPTERA: CHIRONOMIDAE)

MÓRA ARNOLD¹ – POLYÁK LÁSZLÓ² – FARKAS ANNA³

¹MTA Ökológiai Kutatóközpont, Balatoni Limnológiai Intézet, 8237 Tihany, Klebelsberg Kunó út 3.

²Debreceni Egyetem, Ökológiai Tanszék, 4032 Debrecen, Egyetem tér 1.

³Debreceni Egyetem, Hidrobiológiai Tanszék, 4032 Debrecen, Egyetem tér 1.

ABSTRACT: In April 2012 chironomid pupal exuviae were collected at 13 sites along the Sajó River and at one site along the Bábony stream. Additionally, larvae were collected at a further site near the spring. The collected 12 larvae belonged to five species level taxa. During samplings 10 013 exuviae were collected, 9545 from the Sajó River and 468 from the Bábony stream. A total of 110 species level taxa were identified as exuviae. One species was only found as larvae, accordingly a total of 111 taxa were recorded. Three species (*Limnophyes spinigus*, *Orthocladius pedestris* and *Chironomus prasinus*) proved to be new to Slovakian fauna, while four species (*Corynoneura carriana*, *Eukiefferiella tirolensis*, *Orthocladius rivinus* and *Orthocladius ruffoi*) are new to the Hungarian fauna. As a final conclusion it can be stated that the chironomid fauna of the Sajó River is very rich with many rare and, in faunistical point of view, important species.

Keywords: exuviae, faunistics, Sajó, Slaná, Bábony stream

KIVONAT: 2012 áprilisában árvaszúnyog-exuviumokat gyűjtöttünk 13 mintavételi helyen a Sajó teljes szakaszán, és a Bábony-patak egy pontján. Emellett egy további helyen, a forrás közelében lárvákat is gyűjtöttünk. A gyűjtött 12 lárva öt faji szintű taxonba tartozott. A mintavételek során 10 013 bábbórt gyűjtöttünk, 9545-öt a Sajóból és 468-at a Bábony-patakból. Összesen

110 faji szintű taxont azonosítottunk exuvium alakban. Egy faj csak lárva alakban került elő, így összesen 111 taxon előfordulását bizonyítottuk. Három faj (*Limnophyes spinigus*, *Orthocladius pedestris* and *Chironomus prasinus*) a szlovák, négy faj (*Corynoneura carriana*, *Eukiefferiella tirolensis*, *Orthocladius rivinus* and *Orthocladius ruffoi*) a magyar faunára újnak bizonyult. Eredményeink alapján megállapítható, hogy a Sajó árvaszűnyogfaunája kiemelkedően gazdag, számos ritka, faunisztikai szempontból fontos fajjal.

Kulcsszavak: exuvium, faunisztika, Sajó, Slaná, Bábony-patak

Introduction

The Sajó River (Slaná in Slovakian) has been in the centre of public interest for a long time, being one of the most industrialized and most polluted rivers in Hungary and Slovakia (FEHÉR et al. 1999). In the 1990's, due to the changes in industrial technologies, the water pollution has considerably decreased. However, the ecological state of the river has remained "good" and "medium". The Bábony stream, an inflow of the Sajó River, also suffers severe pollutions, including heavy metals and organic compounds, as a result of various industrial activities (FICSÓR 2011).

Our knowledge on the aquatic macroinvertebrate assemblages of the Sajó River has been limited (see FARKAS et al. 2013; POLYÁK et al. 2013). Particularly few data are available on the chironomid fauna. Only larval data have been published from the Slovakian section of the river (MIŠÍKOVÁ ELEXOVÁ et al. 2010). In this work 48 taxa were listed, but only 18 were identified to species level due to that a lot of species are undescribed, cannot or hardly can be distinguished as larvae. The other taxa were identified to species group or genus level. From the Hungarian section of the Sajó River only sporadic data on the occurrence of five species have so far been published (MÓRA et al. 2005; SZÍTÓ 1981, 2001, 2002), while no data are available on the chironomids of the Bábony stream.

In this paper new occurrence data for the chironomid fauna of the Sajó River and the Bábony stream are presented, mostly based on collections of pupal exuviae and partly based on collections of larvae.

Materials and methods

The chironomid pupal exuviae were collected between 19 and 23 April 2012, at 13 sites (SAJ02–14) along the whole length (excluding the spring) of Sajó River and at one site along the Bábony stream (BÁB01). Samples were taken according to the European Standard EN 15196 (2006). Additionally, larvae were collected by standard pond net at a further site (SAJ01), near the spring (Fig. 1, Table 1). Exuviae and larvae were preserved in 70% ethanol. Later all specimens were prepared and mounted on microscope slides for detailed investigations. Larvae were identified using the keys by JANECEK (1998) and WIEDERHOLM (1983). Keys and descriptions by EKREM (2004), LANGTON & VISSER (2003) and STUR & EKREM (2006) were used for identification of exuviae. The nomenclature follows SÆTHER & SPIES (2012) for species names and LANGTON & VISSER (2003) for pupal exuvial forms.

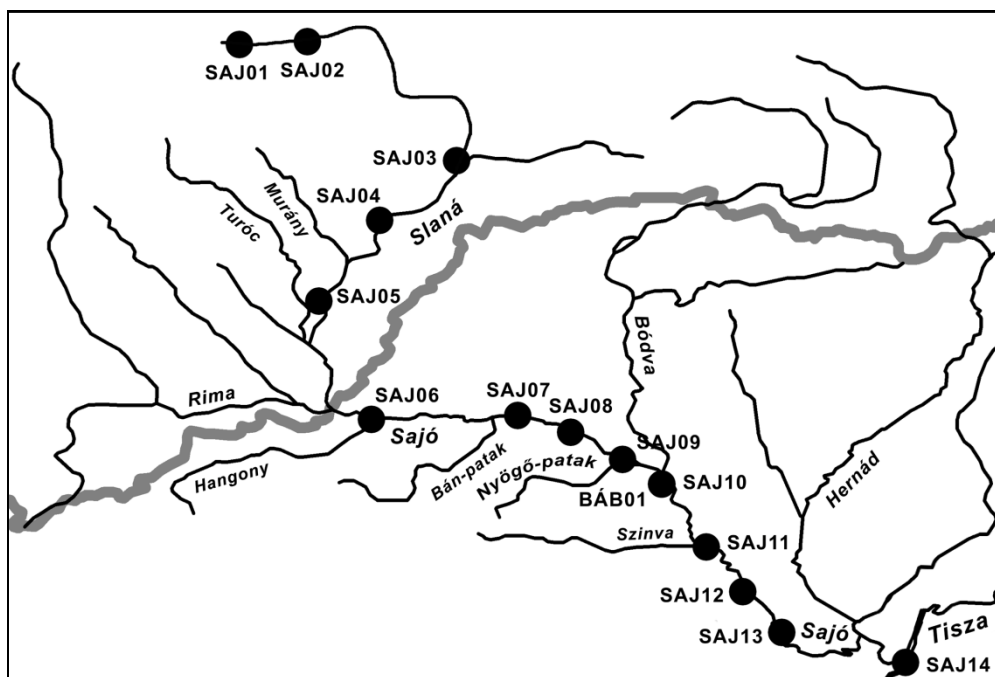


Fig. 1. Sampling sites along the Sajó River and the Bábony stream (for codes see Table 1; BÁB01 and SAJ10 are very close to each other and are shown by the same mark).

Table 1. Sampling sites along the Sajó River and at Bábony stream with the samplings date in April 2012 and geo-coordinates.

Code	Sampling sites	Date	Latitude (N)	Longitude (E)
SAJ01	Slaná, near the spring (Rejdová)	19.04.	48°47'05.39"	20°12'19.67"
SAJ02	Slaná (Rejdová)	19.04.	48°47'20.57"	20°17'53.06"
SAJ03	Slaná (Brzotín)	20.04.	48°37'37.18"	20°30'02.20"
SAJ04	Slaná (Plešivec)	20.04.	48°32'45.07"	20°23'46.25"
SAJ05	Slaná (Gemér)	20.04.	48°26'10.42"	20°18'48.56"
SAJ06	Sajó (Sajónémeti)	21.04.	48°16'30.12"	20°23'05.16"
SAJ07	Sajó (Sajókaza)	21.04.	48°16'50.13"	20°35'01.02"
SAJ08	Sajó (Berente)	21.04.	48°15'28.19"	20°39'20.77"
SAJ09	Sajó (Sajószentpéter)	22.04.	48°13'14.97"	20°43'34.67"
SAJ10	Sajó (Sajókeresztúr)	22.04.	48°11'14.65"	20°46'47.23"
SAJ11	Sajó (Miskolc)	22.04.	48°06'06.92"	20°50'24.36"
SAJ12	Sajó (Sajópetri)	22.04.	48°02'26.87"	20°53'21.42"
SAJ13	Sajó (Köröm)	23.04.	47°59'07.97"	20°56'32.63"
SAJ14	Sajó, Tiszaszederkény (Tiszaújváros)	23.04.	47°56'40.96"	21°06'38.24"
BÁB01	Bábony stream (Sajóecseg)	22.04.	48°11'14.82"	20°46'44.27"

Results and discussion

Larval data

Twelve larvae belonging to five taxa were collected near the spring, in 19 April 2012. Among them *Parametriocnemus stylatus* was the dominant (7 specimens). Further three larvae were identified to species level: two specimens of *Brillia bifida* and the only specimen of *Pseudodiamesa (Pseudodiamesa) branickii* (Nowicki, 1873). The latter species was found only as larvae during this study. Furthermore, two larvae, *Heleniella* sp. and *Orthocladius (Symposiocladius)* sp. were identified to genus (subgenus) level due to that many species belonging to these taxa are undescribed or cannot be distinguished as larvae. The occurrence of *Heleniella ornatocollis* (Edwards, 1939) in the Sajó River at Rozsnyó/Rožňava was mentioned by MIŠIKOVÁ ELEXOVÁ et al. (2010), while we found exuviae of *H. serratosioi* at Pelsőc/Plešivec (Table 2); both species can occur in the spring. Similarly, MIŠIKOVÁ ELEXOVÁ et al. (2010) recorded *Orthocladius (Symposiocladius) lignicola* Kieffer, 1914 from Sajópüspöki, while we collected *O. (S.) ruffoi* from the Sajó River at Sajóréde/Rejdová and Sajónémeti and also from the Bábonny stream (Table 2). Since the sampling site at Sajóréde is close to the spring, it is possible that the collected larval specimen belongs to *O. (S.) ruffoi*.

Exuvial data

During samplings 10 013 pupal exuviae were collected: 9545 in the Sajó River (site to site ranging from 280 to 1511) and 468 in the Bábonny stream. A total of 110 species level taxa belonging to five subfamilies were recorded (9 Tanypodinae, 6 Diamesinae, 2 Prodiamesinae, 56 Orthocladiinae and 38 Chironominae). The number of species ranged from 21 to 55 at the sites along the Sajó River and was 24 in the Bábonny stream (Table 2). Three species (*Conchapelopia pallidula*, *Psectrotanypus varius* and *Eukiefferiella claripennis*) were only found in the Bábonny stream.

In some cases the species level identification was not possible. The taxonomy of *Procladius* is still unclear and the majority of species belonging to this genus cannot be distinguished by morphological characters. However, the description of exuviae (LANGTON & VISSER 2003) of *Procladius choreus* is appropriate for identification. Besides those belonging to *P. choreus*, further exuviae of another *Procladius (Holotanypus)* sp. with distinctive exuvial characters were collected, but these were not identifiable due to insufficient keys. The exuviae of *Chironomus* sp. and *Cladotanytarsus* sp. could also not be identified exactly, but clearly differed from the other species of that genus. One taxon, *Thienemanniella* pe2b, could be identified as pupal exuvial form (LANGTON & VISSER 2003). This form includes two or more species which are not distinguishable as exuviae.

The chironomid fauna of the Sajó River and the Bábonny stream

According to the Fauna Europaea Database (SÆTHER & SPIES 2012) three species (*Limnophyes spinigus*, *Orthocladius pedestris* and *Chironomus prasinus*) proved to be new to the Slovakian fauna, while four species (*Corynoneura carriana*, *Eukiefferiella tirolensis*, *Orthocladius rivinus* and *Orthocladius ruffoi*) are new in the Hungarian fauna (see MÓRA 2012). Among them only *E. tirolensis* was listed as species expected to occur in Hungary (see MÓRA & DÉVAI 2004).

Beyond the new species to the Hungarian fauna many rare taxa (recorded from only few sites in Hungary) were found. Among them those only recorded from one site are mentioned here. *Cricotopus cylindraceus* was only known from Kis-

Balaton (SZITÓ 1994). *Rheopelopia maculipennis* and *Microtendipes britteni* was only recorded from the River Zala (MÓRA et al. 2008). Four species (*Orthocladius ashei*, *O. rivicola*, *Tvetenia verralli* and *Tanytarsus eminulus*) were most recently collected in the Szentendre-Duna (MÓRA & FARKAS 2012). The occurrence of a further species, *Diamesa insignipes*, was based on nearly 50-year-old data in Hungary: larvae of this species were collected in Visegrád Mountains and Torna Karst in 1964 (BERCZIK 1968). Accordingly, the new record of this species from the Bábony stream is an important result in faunistical point of view.

This study revealed a rich chironomid fauna in the Sajó River. Due to our results are based on a single spring collection, much more species could be expected to occur in the river. A similar high number of species was recorded from Hungarian rivers, the Upper-Tisza (MÓRA et al. 2006) and the Szentendre-Duna (MÓRA & FARKAS 2012), as well as from Slovakian rivers, the River Hron (BITUŠÍK et al. 2006) and the River Nitra (BITUŠÍK & ZÁBORSKÁ 1999). However, these comparisons must be taken into consideration with reservations due to the different water types, sampling methods and sampling frequencies.

Unfortunately, no data are available before and from the period of water pollution, thus the changes in chironomid assemblages cannot be revealed. However, based on the high number of chironomid taxa and the diverse assemblages, a good water quality can be presumed in the whole length of the Sajó River.

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Taxa	Sampling sites														
	SAJ02	SAJ03	SAJ04	SAJ05	SAJ06	SAJ07	SAJ08	SAJ09	SAJ10	SAJ11	SAJ12	SAJ13	SAJ14	BÁB01	összesen
<i>Prodiamesa olivacea</i> (Meigen, 1818)		1	128	22	40	41	145	68	14	2	7			2	470
Orthoclaadiinae															
<i>Brillia bifida</i> (Kieffer, 1909)	2		1												3
<i>Brillia longifurca</i> Kieffer, 1921			1			6		18	3	1	27	3			59
<i>Cardiocladius fuscus</i> Kieffer, 1924					3			1		5	19	8	1		37
<i>Corynoneura carriana</i> Edwards, 1924							1		2	6	9	2	8		28
<i>Corynoneura gratias</i> Schlee, 1968			17	8											25
<i>Cricotopus (C.) albiforceps</i> (Kieffer, 1916)											2				2
<i>Cricotopus (C.) annulator</i> Goetghebuer, 1927		12	26	65	102	41	3	3	10	24	58	9	8		361
<i>Cricotopus (C.) bicinctus</i> (Meigen, 1818)		17	13	8	21	9	5	1	4	3	51	23	15	1	171
<i>Cricotopus (C.) curtus</i> Hirvenoja, 1973		19	276	302	49	30	6	6	3	39	77	21	9		837
<i>Cricotopus (C.) cylindraceus</i> (Kieffer, 1908)					1	3	1	1	1	3	10	3			23
<i>Cricotopus (C.) similis</i> Goetghebuer, 1921				1		1									2
<i>Cricotopus (C.) tremulus</i> (Linnaeus, 1758)		433	229	68	3	2									735
<i>Cricotopus (C.) triannulatus</i> (Macquart, 1826)					169	23	1	11	36	61	103	24	6	2	436
<i>Cricotopus (C.) trifascia</i> Edwards, 1929					19						10	24			53
<i>Cricotopus (C.) tristis</i> Hirvenoja, 1973					6	3		1	2	9	2				23
<i>Cricotopus (C.) vierriensis</i> Goetghebuer, 1935					1	21	5		5	5	29	35		1	102
<i>Cricotopus (I.) sylvestris</i> (Fabricius, 1794)									1				1	12	14
<i>Eukiefferiella brevicealcar</i> (Kieffer, 1911)		1	34	220	19	2				5					281

Taxa	Sampling sites														összesen
	SAJ02	SAJ03	SAJ04	SAJ05	SAJ06	SAJ07	SAJ08	SAJ09	SAJ10	SAJ11	SAJ12	SAJ13	SAJ14	BÁB01	
<i>Eukiefferiella claripennis</i> (Lundbeck, 1898)														1	1
<i>Eukiefferiella clypeata</i> (Thienemann, 1919)			3	5											8
<i>Eukiefferiella devonica</i> (Edwards, 1929)	12	8	58	106	3										187
<i>Eukiefferiella fuldensis</i> Lehmann, 1972	1														1
<i>Eukiefferiella gracei</i> (Edwards, 1929)		2		1	3										6
<i>Eukiefferiella minor</i> (Edwards, 1929)	1														1
<i>Eukiefferiella tirolensis</i> Goetghebuer, 1938	2	1	7			1									11
<i>Heleniella serratosioi</i> Ringe, 1976			16												16
<i>Heterotrissocladius marcidus</i> (Walker, 1856)			2												2
<i>Hydrobaenus distylus</i> (Potthast, 1914)													1		1
<i>Limnophyes spinigus</i> Sæther, 1990			1												1
<i>Nanocladius (N.) dichromus</i> (Kieffer, 1906)										6	12	16	32	1	67
<i>Nanocladius (N.) parvulus</i> (Kieffer, 1909)			6	4											10
<i>Nanocladius (N.) rectinervis</i> (Kieffer, 1911)		2	3	4		2			1	2					14
<i>Orthocladius (Eud.) fuscimanus</i> (Kieffer, 1908)		1													1
<i>Orthocladius (Euo.) ashei</i> Söponis, 1990	27	3	2	2	2										36
<i>Orthocladius (Euo.) rivicola</i> Kieffer, 1911	1	7	2	11	1					2	26	5			55
<i>Orthocladius (Euo.) thienemanni</i> Kieffer, 1906		1	4		13	18	12	2	18	20	50	10		419	567
<i>Orthocladius (M.) frigidus</i> (Zetterstedt, 1838)	4														4
<i>Orthocladius (O.) glabripennis</i> (Goetghebuer, 1921)		4	12		11	2	43	1	10	7	116	16	2	5	229

Taxa	Sampling sites														összesen
	SAJ02	SAJ03	SAJ04	SAJ05	SAJ06	SAJ07	SAJ08	SAJ09	SAJ10	SAJ11	SAJ12	SAJ13	SAJ14	BÁB01	
<i>Orthocladius (O.) oblidens</i> (Walker, 1856)		2			3	2	3		1	1	20	4		1	37
<i>Orthocladius (O.) pedestris</i> Kieffer, 1909			10	1	16	13	30				1	1		1	73
<i>Orthocladius (O.) rhyacobius</i> Kieffer, 1911	8	146	137	12	2	1	1			1	2	1			311
<i>Orthocladius (O.) rivinus</i> Potthast, 1914			1		2	12	3	1	3	1	4				27
<i>Orthocladius (O.) rubicundus</i> (Meigen, 1818)	8	140	341	197	50	17	4	4	7	3	6		1		778
<i>Orthocladius (O.) wetterensis</i> Brundin, 1956			2	1	4	9	2			3	15				36
<i>Orthocladius (S.) ruffoi</i> Rossaro & Prato, 1991	1				1									1	3
<i>Paracladius conversus</i> (Walker, 1856)					4					1	1	1			7
<i>Parametricnemus stylatus</i> (Spärck, 1923)	4	1	12	10	7	6	2	2	3						47
<i>Paratrichocladius rufiventris</i> (Meigen, 1830)	1	5	4	5	15	10	18	1	10	19	33	4	1	1	127
<i>Parorthocladius nudipennis</i> (Kieffer, 1908)	1														1
<i>Rheocricotopus (Ps.) chalybeatus</i> (Edwards, 1929)					10	2	1	1		17	22	15		1	69
<i>Rheocricotopus (Rh.) fuscipes</i> (Kieffer, 1909)	6	2	13	2											23
<i>Synorthocladius semivirens</i> (Kieffer, 1909)		4	38	220	62	1									325
<i>Thienemanniella pe2b</i> Langton, 1991	1		1	2											4
<i>Tvetenia bavarica</i> (Goetghebuer, 1934)	2														2
<i>Tvetenia calvescens</i> (Edwards, 1929)	79	9	37	183	366	18	3	5	14	13	7	1	1		736
<i>Tvetenia verralli</i> (Edwards, 1929)		3	6	12	11	10		1		6	15	9			73
Chironominae															
<i>Chironomus (Ch.) bernensis</i> Klötzli, 1973				6	17	1	38	14	12	7	8	3			106

Taxa	Sampling sites														összesen
	SAJ02	SAJ03	SAJ04	SAJ05	SAJ06	SAJ07	SAJ08	SAJ09	SAJ10	SAJ11	SAJ12	SAJ13	SAJ14	BÁB01	
<i>Chironomus (Ch.) nudiventris</i> Ryser et al., 1983								2	4				1		7
<i>Chironomus (Ch.) plumosus</i> (Linnaeus, 1758)							16								16
<i>Chironomus (Ch.) prasinus</i> Pinder, 1978			9	2	17	33	56	20	35	5	10	2		2	191
<i>Chironomus (Ch.) riparius</i> Meigen, 1804											2				2
<i>Chironomus (Chironomus) sp.</i>								9	4	4	8	3			28
<i>Cryptochironomus rostratus</i> Kieffer, 1921										1	1	1			3
<i>Harnischia fuscimanus</i> Kieffer, 1921							1	5	37	43	23	3	29	1	142
<i>Kiefferulus (K.) tendipediformis</i> (Goetghebuer, 1921)											1				1
<i>Microtendipes britteni</i> (Edwards, 1929)					2										2
<i>Microtendipes pedellus</i> (De Geer, 1776)			1	1	85	66	9	124	26	3	3	1		1	320
<i>Paracladopelma laminatum</i> (Kieffer, 1921)						2		1							3
<i>Paralauterborniella nigrohalteralis</i> (Malloch, 1915)													50		50
<i>Paratendipes albimanus</i> (Meigen, 1818)											1				1
<i>Phaenopsectra flavipes</i> (Meigen, 1818)											1		3		4
<i>Polypedilum (Po.) laetum</i> (Meigen, 1818)								4	10	3	34	2	1	3	57
<i>Polypedilum (Po.) nubeculosum</i> (Meigen, 1804)							2	1	1	2	3				9
<i>Polypedilum (Po.) pedestre</i> (Meigen, 1830)										1	1				2
<i>Polypedilum (T.) acifer</i> Townes, 1945											24	9	2		35
<i>Polypedilum (U.) convictum</i> (Walker, 1856)											1				1
<i>Polypedilum (U.) cultellatum</i> Goetghebuer, 1931									1		20	4	23		48

Taxa	Sampling sites														összesen
	SAJ02	SAJ03	SAJ04	SAJ05	SAJ06	SAJ07	SAJ08	SAJ09	SAJ10	SAJ11	SAJ12	SAJ13	SAJ14	BÁB01	
<i>Stictochironomus pictulus</i> (Meigen, 1830)									1		2				3
<i>Cladotanytarsus (C.) mancus</i> (Walker, 1856)								1	1		1		1		4
<i>Cladotanytarsus (Cladotanytarsus) sp.</i>												1			1
<i>Micropsectra appositalcontracta</i>	2														2
<i>Micropsectra atrofasciata</i> (Kieffer, 1911)	111	2	31	20						1					165
<i>Micropsectra pallidula</i> (Meigen, 1830)	6														6
<i>Paratanytarsus dissimilis</i> (Johannsen, 1905)												1	1		2
<i>Paratanytarsus inopertus</i> (Walker, 1856)								1							1
<i>Rheotanytarsus curtistylus</i> (Goetghebuer, 1921)						3		3							6
<i>Rheotanytarsus photophilus</i> (Goetghebuer, 1921)												1			1
<i>Rheotanytarsus rhenanus</i> Klink, 1983				8	7	49	15	91	66	112	97	84	39		568
<i>Stempellina almi</i> Brundin, 1947													3		3
<i>Tanytarsus brundini</i> Lindeberg, 1963					2	2			2	1	1				8
<i>Tanytarsus ejuncidus</i> (Walker, 1856)					3	28	4	115	73	32	18	11	8	4	296
<i>Tanytarsus eminulus</i> (Walker, 1856)						4		29	3	15	7	2	2	1	63
<i>Tanytarsus heusdensis</i> Goetghebuer, 1923								2	12	25	30	15	23		107
<i>Tanytarsus pallidicornis</i> (Walker, 1856)					1										1
összesen	280	896	1506	1511	1155	497	444	551	436	529	1079	381	280	468	10013
taxonszám	21	29	39	33	41	39	33	34	36	45	55	40	28	24	110

