Lauterbornia 77: 37-62, D-86424 Dinkelscherben, 2014-07-07

Faunistic overview of Chironomidae (Insecta: Diptera) in lowland running waters of north-east Germany (Brandenburg) based on 10-year EU-Water Framework Directive monitoring programme

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With 8 figures and 5 tables

Keywords: Chironomidae, Diptera, Insecta, Brandenburg, Germany, Central European Lowlands, running water, check list, faunistics, larva, pupa, pupal exuviae, imago
Schlagwörter: Chironomidae, Diptera, Insecta, Brandenburg, Deutschland, Zentrales Flachland, Fließgewässer, Checkliste, Faunistik, Larve, Puppe, Imago

The results of a 10-year monitoring programme are used to provide a list of the Chironomidae taxa of running waters in Brandenburg, north-east Germany, Central European Lowlands ecoregion. The 573 taxa recorded, represent 58 % of the Chironomidae in the "Taxa list of the freshwater organisms of Germany". The 408 records with a valid species status include 56 % of the species, and the 121 genera include 73 % of the genera of the German Chironomidae fauna. The records are based on collections of all developmental stages and were derived from about 2350 samples taken during a 10-year monitoring programme up to 2013. The study shows how monitoring programmes with a clear strategy and proper data storage and management can make a substantial contribution to knowledge of the fauna of an ecoregion and provide a solid database for ecological analyses. Further data evaluation indicated an affinity of certain taxa to a particular water type, but further in-depth analysis is required.

1 Introduction

Until the end of the last century understanding about the distribution of Chironomidae in the northern lowlands of Germany was limited, because they were seldom included in waterbody studies. The situation was, however, better in parts of western Germany, where studies had been commenced by Thienemann (e.g. 1918, 1920, 1926) and a few others (e.g. Lundbeck 1926) on faunistic, ecological, and taxonomic aspects of waterbodies, especially lakes. In the case of running waters, studies on particular aspects helped increase the known faunistic inventary, although the research was often reported only in papers dealing with particular aspects or in unpublished documents (Böttger 2001, Böttger & Rudow 1995, Böttger & Pöpperl 1992, Holm 1988, Kretschmar & Böttger 1994, Martin & Otto 2003, Otto & Martin 2002, Pöpperl 1992, 1996, 1997, Pöpperl & Böttger 1991, Ringe 1970, Schmieds 1983/84, Söchtig 1990, Spänhoff et al. 2005). Even before the separation into two states after the end of the Second World War, Chironomidae were rarely surveyed in the eastern part of Germany. The early Chironomidae lists from Brandenburg (Neuhaus 1886) are out of date both taxonomically and as a documentationary record. During the period of the German Democratic Republic (1949-1989) little progress was made (Samietz 1989). Most of what was achieved came from lake studies (Mothes 1966 a, b, 1968, 1985), although not all was published formally (Mothes 1974, 1978). Albrecht (1953) recorded some Chironomidae taxa from River Plane, but for the lowland region of north-east and eastern Germany, the first detailed records came much later (Orendt 1997, 1998, 2000, Brunke 2004). However, these were insufficient to provide an overview of taxa for the whole region. Until 2005, only some 40 taxa were recorded, most with only low taxonomic precision. Quite probably a few more records could be found in docu-

ments with limited distribution, but it seems unlikely that any of these include detailed information. The situation is completely different from that in another European lowland region, The Netherlands, where Chironomidae have been integrated in national water monitoring programmes for many years. This has provided a good overview of the Dutch Chironomidae fauna, with well documented information available from earlier studies such as Moller Pillot (1984) and Moller Pillot et al. (1990).

The purpose of the present paper is to provide an overview of the current situation in the running waters of the Bundesland Brandenburg, as the previously poor situation has improved markedly since macroinvertebrates were included as one of the benthic quality components required for implementing the European Water Framework Directive (EU-WFD). The results are based on surveys made from 2004 to 2013 at a large number of sample sites from waterbodies covering all water types according to Meier et al. (2006) and Pottgiesser & Sommerhäuser (2008) and making full taxonomic identification of the Chironomidae. More detailed information is given below. The questions asked here about Brandenburg Chironomidae in running waters are:

1) Which species and lower taxa are recorded (i.e. species stock)?
2) How many of these are listed in the "Taxa list of the freshwater organisms of Germany" (= "LFG"), i.e. what proportion of the German Chironomidae fauna is represented in the running waters of Brandenburg?
3) Is it possible to allocate the taxa recorded to certain water types?

In addition to their use for routine water management, the survey programmes driven by the requirements of the EU-WFD and its performance by the LUGV Brandenburg (State Office for Environment, Health and Consumer Protection, Potsdam) Brandenburg had two major benefits regarding Chironomidae: (1) to provide a comprehensive overview of the fauna of this important freshwater animals in German lowland running waters, for the first time and in a relatively short period of time, and (2) to create an up-to-date database for the ecological specification of lowland Chironomidae of running waters (e.g. the German fauna index) to be used as a tool in biological water assessment.

2 Materials and methods

The data used here have been taken from Albrecht (1953), Orendt (1997), Brunke (2004) and in particular based on the database of the macroinvertebrate database of the Land Brandenburg (LUGV) obtained during monitoring from 2004 to 2011. Additional data from 2006 (Torsten Berger, pers. comm.) and 2013 (sampled by the authors), which have not yet integrated been in the database, are also included. No monitoring was performed during 2012 and some samples from 2013 remain to be processed. The data include larvae, pupae, pupal exuviae obtained from kicksampling according to the standard WFD procedure (Meier et al. 2006), and adults from net sampling among the riparian vegetation. Sorting was performed in the laboratory from preserved material. The database (2004-2011) holds records from 2320 samples at 896 sites from 201 water courses, all this involving 324 days in the field. Together with the additional 14 samples from 2006 and 36 samples from 2013 the overall total is 2369 samples from a 10-year period.

All authors involved in the taxonomic identification of the recorded Chironomidae specimens (Claus Orendt, Xavier-François Garcia, Berthold F. Janecek, Susanne Michiels, Claus-Joachim Otto) have considerable experience with commenting on all developmental stages. Records were extracted from the database according to the taxonomic level identified. Values for abundance were transformed to +/- format and merged with records from the other

sources. They were summarized both for the whole region and separated according to type of running water. This list contains the taxonomic levels specified in the "List of the freshwater organisms of Germany" (= "LFG") (2011), which comprises species, species group, subgenus, genus, tribe and subfamily. The latter two were, however, excluded from further evaluation, as they do not provide much information in terms of faunistics. Nomenclature was revized by the authors to their best knowledge and referring to the recent version of the online database in Fauna Europaea (Sæther & Spies 2013) and Spies & Saether (2004), in which also all synonyms are listed and which has the highest priority in questions of nomenclature.The first approach considering the distribution of the taxa recorded in the water types was performed using principal component analysis (PCA; PAST software package, Hammer 2012). Taxon presence was considered in relation to water type, with those examples with a single occurrence in one to two water types being eliminated from the analysis.

3 Area and water bodies investigated

The area of Brandenburg covers a part of the "Central European lowlands" with few places rising over 100 m a. s. The sites sampled while the monitoring were located all over the whole region (Fig. 1) and 85 % of the sites were sampled at least two and mostly three or more times. They represented 10 running water types (Fig. 2-5, Tab. 1) as defined by Pottgiesser & Sommerhäuser (2008). The sites differed in their ecological status according to WFD classification (EC 2000); in some cases the samples from a particular site also differed in their ecological status. Most were "bad" and "poor", but 16 % reached "good" or "high" status (Tab. 2).

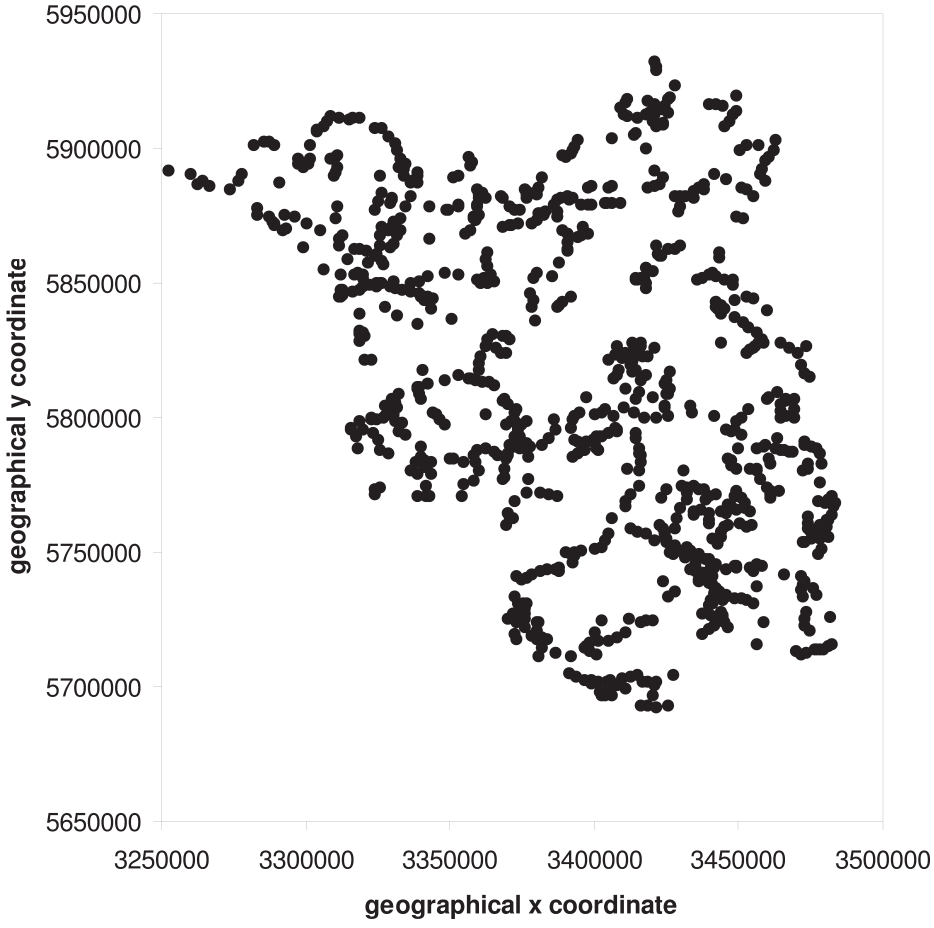

Fig. 1: Position of the sampling sites over the Land Brandenburg during the monitoring activities 2004-2013 covering the whole area of the land

Fig. 2: Top left: Type 11, Pölzer Fließ near Dannenwalde (natural, 16.04.2011 (Photo: Müller). Top right: Type 11, Alte Oder near Hackenow (degraded), 30.05.2013 (Photo: Orendt). Bottom left: Type 12, Löcknitz (natural), 29.09.2008 (Photo: Müller). Bottom right: Type 12, Erpe in Berlin (degraded), 13.04.2013 (Photo: Müller)

Fig. 3: Top left: Type 14, Bardenitzer Mühlenfließ south of Bardenitz (natural), 23.04.2012 (Photo: Müller). Top right: Type 14, Panke in Berlin (degraded), 07.03.2013 (Photo: Müller). Bottom left: Type 15, Rhin near Rheinshagen (natural), 14.04.09 (Photo: Müller). Bottom right: Type 15, Letschiner Hauptgra - ben near Drei Kronen (degraded), 29.05.2013 (Photo: Orendt)

Fig. 4: Top left: Type 15g, Spree near Döbbrick (natural), 19.07.2013 (Photo: Müller). Top right: Type 15g, Große Spree in Berlin (degraded), 28.05.2013 (Photo: Orendt). Bottom left: Type 16, Kauskeseegraben south of Kieselwitz (natural), 24.05.2013 (Photo: Orendt). Bottom right: Type 17, Lausitzer Neis - se near Grießen (natural), 29.04.2012 (Photo: Müller)

Fig. 5: Top left: Type 19, Altzeschdorfer Mühlenfließ near Bruckmühle (natural), 30.05.2013. Top right: Type 19, Finowkanal upstream Drahthammer Schleuse (degraded), 28.05.2013. Bottom left: Type 20, Oder near Groß Neuendorf (semi-natural), 30.05.2013. Bottom right: Type 21, Schlaube near Rago - wer Mühle (natural) 24.05.2013 (All photos: Orendt)

Tab. 1: Water types according to Meier et al. (2006) and Pottgiesser & Sommerhäuser (2000), represented by the samples during the monitoring of the past 10 years. For illustrations see Fig. 2-5

Type 11	Small organic substrate-dominated rivers
Type 12	Mid-sized and large organic substrate-dominated rivers
Type 14	Small sand-dominated lowland rivers
Type 15	Mid-sized sand and loam-dominated lowland rivers
Type 15g	Large sand and loam-dominated lowland rivers
Type 16	Small gravel-dominated lowland rivers
Type 17	Mid-sized and large gravel-dominated lowland rivers
Type 19	Small streams in riverine floodplains
Type 20	Very large sand-dominated rivers
Type 21 (and 21 N)	Lake outflows

Tab. 2: Ecological status of the samples/sample sites investigated

Ecological status	number of samples/sample sites
high	6
good	389
moderate	651
poor	828
bad	480
unknown	14

4 Results

4.1 Dynamics of Chironomidae records

From 2006 onwards, a steep incline of knowledge started (Fig. 6). From 2008 on, a smaller increase was observed, but every year some previously unrecorded taxa could be added to the list. Evaluating the years with comparable collection method and taxonomic resolution (2006 -2013), the data reveal a smaller increase in each year sampled. From the last year 2013 to the former campaign, just two more taxa appeared, however, the curve of the log model curve (Fig. 7) does not show a clear saturation, yet. At present, no new species were observed for Germany, but for Brandenburg, an over 13fold increase of knowledge was observed since 2005.

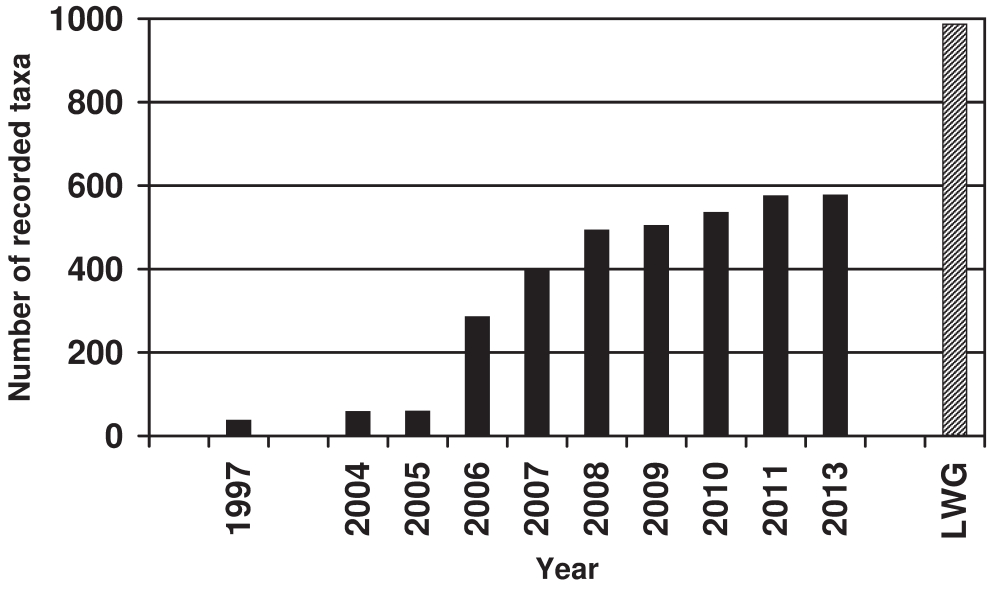

Fig. 6: Cumulative increase of the taxa recorded for the Land of Brandenburg. LWG = Number of taxa listed in the "List of the freshwater organisms of Germany", (LFG 2011)

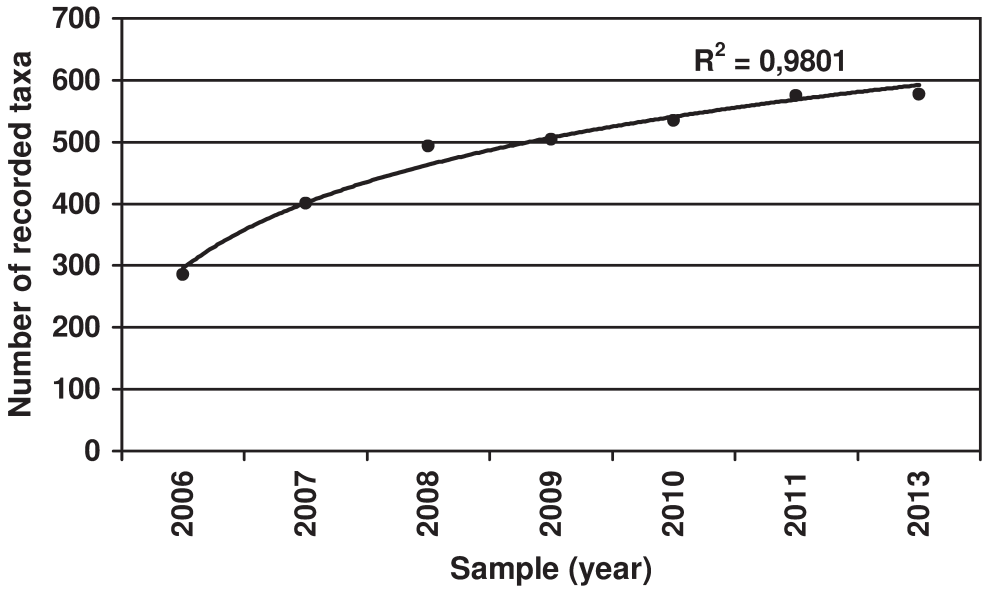

Fig. 7: Cumulative increase of the taxa recorded for the Land Brandenburg, superimposed by a log model curve to illustrate the tendency of saturation. Only data from 2006 to 2013 used, as the method of collecting was comparable between the samples (= years) in this period

4.2 List of taxa

The taxa for 2006-2013 total 573 (Tab. 3). This meets 58 % of the "Taxa list of the freshwater organisms of Germany" (LFG 2011) (total of 987, but this number is an overestimate, because some synonyms also still included, there. The records broken down to various taxonomic levels are presented in table 4.

From the total number of genera listed in the LFG (166), 121 appeared in Brandenburg (= 73 % of the German Chironomidae fauna). The number of presently valid species status (total of the LFG: 724) was 408 (= 56 % of the German Chironomidae fauna).

Tab. 3: List of Chironomidae taxa recorded in lowland running waters of the Land Brandenburg up to 2013, taxonomic levels referring to the "List of the freshwater organisms of Germany", LFG 2010, with corrections and earlier used names and synonyms (according to Sæther & Spies 2013; see footnotes). Gr. = group; L = larva; P = pupa; Pe = pupal exuviae; A = adult. L/P/Pe = recorded as L and/or P and/or Pe, A = recorded as A

	Taxon	Author	Stage recorded
	TANYPODINAE		
1	Ablabesmyia	Johannsen 1905	L/P/Pe/A
2	Ablabesmyia longistyla	Fittkau 1962	L/P/Pe/A
3	Ablabesmyia monilis	(Linnaeus 1758)	L/P/Pe/A
4	Ablabesmyia monilis/phatta	·	L
5	Ablabesmyia phatta	(Egger 1864)	L/P/Pe
6	Anatopynia plumipes	(Fries 1823)	L/P/Pe
7	Apsectrotanypus trifascipennis	(Zetterstedt 1838)	L/P/Pe/A
8	Arctopelopia	Fittkau 1962	L/P/Pe
9	Arctopelopia barbitarsis	(Zetterstedt 1850)	L/P/Pe/A
10	Arctopelopia griseipennis	(van der Wulp 1859)	L/P/Pe
11	Arctopelopia melanosoma	(Goetghebuer 1933)	L/P
12	Clinotanypus nervosus	(Meigen 1818)	L/P/Pe/A
13	Conchapelopia	Fittkau 1957	L/P/Pe/A
14	Conchapelopia aagaardi	Murray 1987	L/P/Pe
15	Conchapelopia melanops	(Meigen 1818)	L/P/Pe/A

	Taxon	Author	Stage recorded
16	Conchapelopia viator	(Kieffer 1911)	A
17	Conchapelopia-Gr. (= Thienemannimyia-Gr.)	·	L/P/Pe/A
18	Guttipelopia guttipennis	(van der Wulp 1861)	L/P/Pe
19	Hayesomyia tripunctata	(Goethghebuer 1922)	L/P/Pe
20	Krenopelopia	Fittkau 1962	L/P/Pe/A
21	Krenopelopia binotata	(Wiedemann 1817)	A
22	Larsia atrocincta	(Goetghebuer 1942)	L/P/Pe
23	Macropelopia	Thienemann 1916	L/P/Pe
24	Macropelopia adaucta	Kieffer 1916	L/P/Pe
25	Macropelopia nebulosa	(Meigen 1804)	L/P/Pe/A
26	Macropelopia notata	(Meigen 1818)	L/P/Pe
27	Macropelopia notata-Gr.	·	L/P/Pe
28	Monopelopia tenuicalcar	(Kieffer 1918)	L/P/Pe
29	Natarsia	Fittkau 1962	L/P/Pe
30	Natarsia nugax	(Walker 1856)	L/P/Pe/A
31	Natarsia nugax/punctata	·	L/P/Pe
32	Natarsia punctata	(Fabricius 1805)	L/P/Pe/A
33	Nilotanypus dubius	(Meigen 1804)	L/P/Pe/A
34	Paramerina	Fittkau 1962	L/P/Pe
35	Paramerina cingulata	(Walker 1856)	L/P/Pe/A
36	Paramerina divisa	(Walker 1856)	L/P/Pe
37	Procladius	Skuse 1889	L/P/Pe/A
38	Procladius (Holotanypus)	Roback 1982	L/P/Pe
39	Procladius (Psilotanypus)	Kieffer 1906	L/P/Pe
40	Procladius choreus	(Meigen 1804)	L/P/Pe/A
41	Procladius culiciformis[1]	(Linnaeus 1767)	A
42	Procladius flavifrons	Edwards 1929	A
43	Procladius rufovittatus	(van der Wulp 1874)	L/P/Pe/A
44	Procladius sagittalis	(Kieffer 1909)	L/P/Pe/A
45	Procladius simplicistilus	Freeman 1948	L/P/Pe
46	Procladius suecicus	Brundin 1949	L/P/Pe
47	Psectrotanypus	Kieffer 1909	L/P/Pe
48	Psectrotanypus varius	(Fabricius 1787)	L/P/Pe/A
49	Rheopelopia maculipennis	(Zetterstedt 1838)	L/P/Pe
50	Rheopelopia ornata	(Meigen 1838)	L/P/Pe/A
51	Schineriella schineri	(Strobl 1880)	L/P/Pe/A
52	Tanypodinae Gen. sp.	-	L/P/Pe/A
53	Tanypus	Meigen 1803	L/P/Pe
54	Tanypus kraatzi	(Kieffer 1912)	L/P/Pe/A
55	Tanypus punctipennis	Meigen 1818	L/P/Pe/A
56	Tanypus vilipennis	(Kieffer 1918)	L/P/Pe/A
57	Telmatopelopia nemorum	(Goetghebuer 1921)	L/P/Pe
58	Telopelopia fascigera	(Verneaux 1970)	L/P/Pe/A
59	Thienemannimyia	Fittkau 1957	L/P/Pe
60	Thienemannimyia fusciceps	(Edwards 1929)	L/P/Pe
61	Thienemannimyia laeta	(Meigen 1818)	A
62	Thienemannimyia pseudocarnea	Murray 1976	A
63	Thienemannimyia vitellina	(Kieffer 1916)	L/P/Pe
64	Trissopelopia	Kieffer 1923	L/P/Pe
65	Trissopelopia longimanus[2]	(Staeger 1839)	L/P/Pe/A

1 = P. crassinervis Zetterstedt 1838

	Taxon	Author	Stage recorded
66	Xenopelopia	Fittkau 1962	L/P/Pe
67	Xenopelopia falcigera	(Kieffer 1911)	L/P/Pe/A
68	Xenopelopia nigricans	(Goetghebuer 1927)	L/P/Pe/A
69	Zavrelimyia	Fittkau 1962	L/P/Pe/A
70	Zavrelimyia hirtimanus[3]	(Kieffer 1918)	L/P/Pe
71	Zavrelimyia melanura	(Meigen 1804)	L/P/Pe/A
72	Zavrelimyia nubila	(Meigen 1830)	L/P/Pe/A
73	Zavrelimyia signatipennis	(Kieffer 1924)	L/P/Pe
	PRODIAMESINAE		
74	Monodiamesa	Kieffer 1922	L/P/Pe
75	Monodiamesa bathyphila	(Kieffer 1918)	L/P/Pe
76	Odontomesa fulva	(Kieffer 1919)	L/P/Pe/A
77	Prodiamesa	Kieffer 1906	L/P/Pe/A
78	Prodiamesa olivacea	(Meigen 1818)	L/P/Pe/A
79	Prodiamesa rufovittata	Goetghebuer 1932	L/P/Pe/A
80	Prodiamesinae Gen. sp.	·	A
	DIAMESINAE		
81	Diamesa	Meigen 1835	L/P/Pe
82	Diamesa cinerella-Gr.	·	L/P/Pe
83	Diamesa hamaticornis	Kieffer 1924	L/P/Pe
84	Diamesa insignipes	Kieffer 1908	L/P/Pe
85	Diamesa starmachi, cf.	Kownacki & Kownacka 1970	L/P/Pe
86	Diamesinae Gen. sp.	·	L/P/Pe
87	Potthastia	Kieffer 1922	L/P/Pe
88	Potthastia gaedii	(Meigen 1838)	L/P/Pe/A
89	Potthastia gaedii-Gr.	·	L/P/Pe
90	Potthastia longimanus[4]	Kieffer 1922	L/P/Pe/A
91	Potthastia longimanus-Gr.		L/P/Pe
	ORTHOCLADIINAE		
92	Acamptocladius reissi	Cranston & Sæther 1982	A
93	Acricotopus lucens	(Zetterstedt 1850)	L/P/Pe/A
94	Brillia	Kieffer 1913	L/P/Pe/A
95	Brillia bifida[5]	(Kieffer 1909)	L/P/Pe/A
96	Brillia longifurca	Kieffer 1921	L/P/Pe/A
97	Bryophaenocladius	Thienemann 1934	L/P/Pe/A
98	Bryophaenocladius aestivus	(Brundin 1947)	A
99	Bryophaenocladius illimbatus	(Edwards 1929)	A
100	Bryophaenocladius inconstans	(Brundin 1947)	A
101	Bryophaenocladius muscicola	(Kieffer 1906)	A
102	Bryophaenocladius nidorum	(Edwards 1929)	P/Pe/A
103	Bryophaenocladius tuberculatus	(Edwards 1929)	A
104	Bryophaenocladius xanthogyne	(Edwards 1929)	L/P/Pe
105	Camptocladius stercorarius	(De Geer 1776)	L/P/Pe/A
106	Cardiocladius	Kieffer 1912	L/P/Pe
107	Cardiocladius fuscus	Kieffer 1924	L/P/Pe/A
108	Chaetocladius	Kieffer 1911	L/P/Pe
109	Chaetocladius dentiforceps-Gr.		L/P/Pe/A
110	Chaetocladius piger	(Goetghebuer 1913)	L/P/Pe/A

2 = longimana (misspelled)
3 = hirtimana (misspelled)
4 = longimana (misspelled)
5 = B. modesta

	Taxon	Author	Stage recorded
111	Chaetocladius piger-Gr.		L/P/Pe
112	Chaetocladius vitellinus-Gr.		L/P/Pe
113	Corynoneura	Winnertz 1846	L/P/Pe/A
114	Corynoneura arctica	Kieffer 1923	L/P/Pe
115	Corynoneura carriana	Edwards 1924	L/P/Pe/A
116	Corynoneura celeripes	Winnerts 1852	A
117	Corynoneura celtica	Edwards 1924	A
118	Corynoneura coronata	Edwards 1924	A
119	Corynoneura edwardsi	Brundin 1949	A
120	Corynoneura gratias	Schlee 1968	A
121	Corynoneura lobata	Edwards 1924	L/P/Pe/A
122	Corynoneura scutellata	Winnerts 1846	L/P/Pe/A
123	Cricotopus	van der Wulp 1874	L/P/Pe/A
124	Cricotopus (Cricotopus)	van der Wulp 1874	L/P/Pe/A
125	Cricotopus (Isocladius)	Kieffer 1909	L/P/Pe/A
126	Cricotopus albiforceps	(Kieffer 1916)	L/P/Pe/A
127	Cricotopus annulator	Goetghebuer 1927	L/P/Pe/A
128	Cricotopus bicinctus	(Meigen 1818)	L/P/Pe/A
129	Cricotopus bicinctus-Gr.	·	L/P/Pe
130	Cricotopus festivellus	(Kieffer 1906)	L/P/Pe
131	Cricotopus festivellus-Gr.	·	L/P/Pe
132	Cricotopus flavocinctus	(Kieffer 1924)	L/P/Pe/A
133	Cricotopus fuscus	(Kieffer 1909)	L/P/Pe
134	Cricotopus intersectus	(Staeger 1839)	L/P/Pe/A
135	Cricotopus intersectus-Gr.	·	L/P/Pe
136	Cricotopus obnixus	(Walker 1856)	A
137	Cricotopus pallidipes	Edwards 1929	L/P/Pe/A
138	Cricotopus reversus	Hirvenoja 1973	L/P/Pe/A
139	Cricotopus sylvestris	(Fabricius 1794)	L/P/Pe/A
140	Cricotopus sylvestris-Gr.	·	L/P/Pe/A
141	Cricotopus tremulus-Gr.	·	L/P/Pe
142	Cricotopus triannulatus	(Macquart 1826)	L/P/Pe/A
143	Cricotopus triannulatus-Gr.	·	A
144	Cricotopus trifascia	Edwards 1929	L/P/Pe/A
145	Cricotopus trifasciatus	(Meigen 1810)	A
146	Cricotopus tristis	Hirvenoja 1973	L/P/Pe
147	Cricotopus vierriensis	Goetghebuer 1935	L/P/Pe/A
148	Diplocladius cultriger	Kieffer 1908	L/P/Pe/A
149	Epoicocladius ephemerae[6]	(Kieffer 1924)	L/P/Pe/A
150	Eukiefferiella	Thienemann 1926	L/P/Pe
151	Eukiefferiella brevicalcar	(Kieffer 1911)	L/P/Pe/A
152	Eukiefferiella claripennis	(Lundbeck 1898)	L/P/Pe/A
153	Eukiefferiella claripennis-Gr.	Goethghebuer 1934	L/P/Pe/A
154	Eukiefferiella coerulescens	(Kieffer 1926)	L/P/Pe/A
155	Eukiefferiella devonica-Gr.	·	L/P/Pe/A
156	Eukiefferiella gracei	(Edwards 1929)	L/P/Pe/A
157	Eukiefferiella ilkleyensis	(Edwards 1929)	L/P/Pe/A
158	Eukiefferiella lobifera, cf.		L/P/Pe
159	Eukiefferiella minor	(Edwards 1929)	A
160	Eukiefferiella minor/fittkaui		L/P/Pe

6 = E. flavens Saether 1969

	Taxon	Author	Stage recorded
161	Eukiefferiella similis	Goetghebuer 1939	L/P/Pe
162	Euryhapsis subviridis	(Siebert 1979)	L/P/Pe
163	Gymnometriocnemus brumalis	(Edwards 1929)	A
164	Gymnometriocnemus subnudus	(Edwards 1929)	A
165	Gymnometriocnemus subnudus-Gr.	·	L/P/Pe
166	Heleniella	Gouin 1943	L/P/Pe
167	Heleniella ornaticollis	(Edwards 1929)	L/P/Pe
168	Heleniella serratosioi	Ringe 1976	L/P/Pe
169	Heterotanytarsus	Spaerk 1923	L/P/Pe
170	Heterotanytarsus apicalis	(Kieffer 1921)	L/P/Pe/A
171	Heterotrissocladius	Spaerck 1923	L/P/Pe
172	Heterotrissocladius marcidus	(Walker 1956)	L/P/Pe/A
173	Heterotrissocladius scutellatus	(Goetghebuer 1942)	L/P/Pe
174	Hydrobaenus	Fries 1830	L/P/Pe
175	Hydrobaenus lugubris	Fries 1830	L/P/Pe
176	Hydrobaenus pilipes	(Malloch 1915)	L/P/Pe
177	Limnophyes	Eaton 1875	L/P/Pe/A
178	Limnophyes asquamatus	Soegaard Andersen 1937	A
179	Limnophyes difficilis	Brundin 1947	A
180	Limnophyes gurgicola	(Edwards 1929)	A
181	Limnophyes habilis	(Walker 1856)	A
182	Limnophyes minimus	(Meigen 1818)	A
183	Limnophyes natalensis	(Kieffer 1914)	A
184	Limnophyes madeirae[7]	Sæther 1990	L/P/Pe/A
185	Limnophyes pumilio	(Holmgren 1869)	A
186	Mesosmittia flexuella	(Edwards 1929)	A
187	Metriocnemus	van der Wulp 1874	L/P/Pe/A
188	Metriocnemus albolineatus	(Meigen 1818)	A
189	Metriocnemus eurynotus[8]	(Holmgren 1883)	L/P/Pe/A
190	Metriocnemus eurynotus-Gr.	·	L/P/Pe
191	Metriocnemus fuscipes	(Meigen 1818)	L/P/Pe/A
192	Metriocnemus hirticollis-Gr.	-	L/P/Pe
193	Metriocnemus inopinatus	Strenzke 1950	L/P/Pe
194	Metriocnemus inopinatus-Gr.	·	L/P/Pe
195	Metriocnemus picipes	(Meigen 1818)	A
196	Metriocnemus tristellus	Edwards 1929	A
197	Nanocladius	Kieffer 1913	L/P/Pe/A
198	Nanocladius balticus	(Palmen 1959)	L/P/Pe
199	Nanocladius dichromus[9]	(Kieffer 1906)	L/P/Pe/A
200	Nanocladius dichromus-Gr.	·	L/P/Pe
201	Nanocladius rectinervis	(Kieffer 1911)	L/P/Pe/A
202	Orthocladiinae Gen. sp.	·	L/P/Pe/A
203	Orthocladiini COP (Cricotopus/Orthocladius/Paratrichocladius)	·	L
204	Orthocladius	van der Wulp 1874	L/P/Pe/A
205	Orthocladius (Eudactylocladius)	Thienemann 1935	L/P/Pe
206	Orthocladius (Euorthocladius)	Thienemann 1935	L/P/Pe
207	Orthocladius (Orthocladius)	van der Wulp 1874	L/P/Pe/A
208	Orthocladius ashei	Soponis 1990	L/P/Pe

7 = L. prolongatus Freeman 1959
8 = M. obscuripes Holmgren 1869
9 = N. bicolor Zetterstedt 1838

	Taxon	Author	Stage recorded
209	Orthocladius consobrinus	(Holmgren 1869)	L/P/Pe/A
210	Orthocladius frigidus	(Zetterstedt 1838)	L/P/Pe
211	Orthocladius glabripennis	(Goetghebuer 1921)	A
212	Orthocladius holsatus	Goetghebuer 1937	A
213	Orthocladius lignicola	Kieffer 1914	L/P/Pe
214	Orthocladius luteipes	Goetghebuer 1938	L/P/Pe
215	Orthocladius maius	Goetghebuer 1942	A
216	Orthocladius oblidens	(Walker 1856)	L/P/Pe/A
217	Orthocladius excavatus[10]	Brundin 1947	L/P/Pe
218	Orthocladius pedestris	Kieffer 1909	A
219	Orthocladius rivicola-Gr.	·	L/P/Pe
220	Orthocladius rivinus	Potthast 1914	L/P/Pe
221	Orthocladius rivulorum	Kieffer 1909	L/P/Pe
222	Orthocladius rubicundus	(Meigen 1818)	L/P/Pe
223	Orthocladius ruffoi	Rossaro & Prato 1991	L/P/Pe
224	Orthocladius thienemanni	Kieffer 1906	L/P/Pe/A
225	Orthocladius wetterensis	Brundin 1956	L/P/Pe
226	Paracladius	Hirvenoja 1973	L/P/Pe
227	Paracladius conversus	(Walker 1856)	L/P/Pe/A
228	Paracricotopus niger	(Kieffer 1913)	L/P/Pe
229	Parakiefferiella	Thienemann 1936	L/P/Pe
230	Parakiefferiella bathophila	(Kieffer 1912)	L/P/Pe/A
231	Parakiefferiella coronata	(Edwards 1929)	A
232	Parakiefferiella nigra	Brundin 1949	L/P/Pe
233	Parakiefferiella triquetra	(Pankratova 1970)	L/P/Pe
234	Paralimnophyes	Brundin 1956	A
235	Parametriocnemus	Goetghebuer 1932	L/P/Pe
236	Parametriocnemus stylatus	(Spärck 1923)	L/P/Pe/A
237	Paraphaenocladius	Thienemann 1924	L/P/Pe/A
238	Paraphaenocladius exagitans	(Johannsen 1905)	A
239	Paraphaenocladius impensus	(Walker 1856)	L/P/Pe/A
240	Paraphaenocladius impensus-Gr.	·	L/P/Pe
241	Paraphaenocladius irritus	(Walker 1856)	A
242	Paraphaenocladius pseudirritus	Strenzke 1950	A
243	Parasmittia carinata	Strenzke 1950	L/P/Pe
244	Paratrichocladius	Santos Abreu 1918	L/P/Pe
245	Paratrichocladius rufiventris	(Meigen 1830)	L/P/Pe/A
246	Paratrichocladius skirwithensis	(Edwards 1929)	L/P/Pe/A
247	Paratrissocladius excerptus	(Walker 1856)	L/P/Pe/A
248	Parorthocladius	Thienemann 1935	L/P/Pe
249	Parorthocladius nudipennis	(Kieffer 1908)	A
250	Propsilocerus	Kieffer 1923	L/P/Pe
251	Psectrocladius	Kieffer 1906	L/P/Pe
252	Psectrocladius (Allopsectrocladius)	Wülker 1956	L/P/Pe
253	Psectrocladius calcaratus	(Edwards 1929)	A
254	Psectrocladius fennicus	Stora 1939	L/P/Pe
255	Psectrocladius limbatellus	(Holmgren 1869)	L/P/Pe
256	Psectrocladius limbatellus-/sordidellus-Gr.	·	L/P/Pe
257	Psectrocladius obvius	(Walker 1856)	L/P/Pe
258	Psectrocladius oligosetus	Wuelker 1956	L/P/Pe/A

10 = O. obumbratus Langton & Cranston 1991

	Taxon	Author	Stage recorded
259	Psectrocladius oxyura	Langton 1985	A
260	Psectrocladius platypus	(Edwards 1929)	L/P/Pe
261	Psectrocladius psilopterus	(Kieffer 1906)	L/P/Pe/A
262	Psectrocladius psilopterus-Gr.	·	L/P/Pe
263	Psectrocladius sordidellus	(Zetterstedt 1838)	L/P/Pe/A
264	Psectrocladius ventricosus	Kieffer 1925	A
265	Pseudorthocladius	Goethghebuer 1932	L/P/Pe/A
266	Pseudorthocladius curtistylus	(Goetghebuer 1921)	L/P/Pe/A
267	Pseudorthocladius filiformis	(Kieffer 1908)	L/P/Pe/A
268	Pseudorthocladius pilosipennis	Brundin 1956	A
269	Pseudorthocladius rectangilobus	Caspers & Siebert 1980	A
270	Pseudosmittia	Goethghebuer 1932	L/P/Pe/A
271	Pseudosmittia albipennis[11]	(Goetghebuer 1921)	A
272	Pseudosmittia obtusa	Strenzke 1960	L/P/Pe/A
273	Pseudosmittia trilobata	(Edwards 1929)	L/P/Pe/A
274	Rheocricotopus	Thienemann & Harnisch 1932	L/P/Pe/A
275	Rheocricotopus atripes	(Kieffer 1913)	A
276	Rheocricotopus chalybeatus	(Edwards 1929)	L/P/Pe/A
277	Rheocricotopus effusus	(Walker 1856)	L/P/Pe/A
278	Rheocricotopus fuscipes	(Kieffer 1909)	L/P/Pe/A
279	Rheosmittia spinicornis	(Brundin 1956)	L/P/Pe
280	Smittia	Holmgren 1869	L/P/Pe/A
281	Smittia aterrima	(Meigen 1818)	A
282	Smittia contingens	(Walker 1856)	A
283	Smittia edwardsi	Goetghebuer 1932	A
284	Smittia foliosa[12]	(Kieffer 1921)	A
285	Smittia leucopogon	(Meigen 1804)	A
286	Smittia nudipennis	(Goetghebuer 1913)	A
287	Smittia pratorum	(Goetghebuer 1927)	A
288	Smittia superata	Goetghebuer 1939	A
289	Synorthocladius semivirens	(Kieffer 1909)	L/P/Pe/A
290	Thienemannia	Kieffer 1909	L/P/Pe
291	Thienemannia fulvofasciata	(Kieffer 1921)	A
292	Thienemannia gracei	(Edwards 1929)	A
293	Thienemannia gracilis	Kieffer 1909	L/P/Pe
294	Thienemanniella	Kieffer 1911	L/P/Pe/A
295	Thienemanniella acuticornis	(Kieffer 1912)	L/P/Pe
296	Thienemanniella majuscula	(Edwards 1924)	A
297	Thienemanniella vittata	(Edwards 1924)	L/P/Pe
298	Trissocladius	Kieffer 1908	L/P/Pe
299	Tvetenia	Kieffer 1922	L/P/Pe
300	Tvetenia calvescens	(Edwards 1929)	L/P/Pe
301	Tvetenia calvescens-Gr.	·	L/P/Pe
302	Tvetenia discoloripes	(Goetghebuer & Thienemann 1936)	L/P/Pe
303	Tvetenia discoloripes-Gr.	·	L/P/Pe
304	Tvetenia tshernovskii[13]	(Pankratova 1968)	A
305	Tvetenia verralli	(Edwards 1929)	L/P/Pe/A

11 = P. curticosta Edwards 1929
12 erroneously "foliacea" in the database
13 = 'Tvetenia sp. A' in Schmid (1993); = Eukiefferiella vitracies Saether 1969

	Taxon	Author	Stage recorded
	CHIRONOMINAE/CHIRONOMINI		
306	Benthalia carbonaria[14]	(Meigen 1804)	A
307	Chironomidae Gen. sp.	·	L/P/Pe/A
308	Chironominae Gen. sp.	·	L/P/Pe/A
309	Chironomini Gen. sp.	·	L/P/Pe/A
310	Chironomus	Meigen 1803	L/P/Pe/A
311	Chironomus (Chironomus)	Meigen 1803	L/P/Pe
312	Chironomus acerbiphilus[15]	Tokunaga 1939	L/P/Pe
313	Chironomus acutiventris ssp.	·	L/P/Pe/A
314	Chironomus annularius	Meigen 1818	L/P/Pe
315	Chironomus annularius-Gr.	·	L
316	Chironomus aprilinus	Meigen 1818	L/P/Pe/A
317	Chironomus bernensis	Kloetzli 1973	L/P/Pe/A
318	Chironomus cingulatus	Meigen 1830	L/P/Pe/A
319	Chironomus commutatus	Keyl 1960	L/P/Pe
320	Chironomus dorsalis	Meigen 1818	L/P/Pe/A
321	Chironomus longistylus	Goetghebuer 1921	A
322	Chironomus lugubris	Zetterstedt 1850	A
323	Chironomus luridus	Strenzke 1959	L/P/Pe/A
324	Chironomus luridus-Gr.	·	L/P/Pe/A
325	Chironomus melanescens	Keyl 1961	L/P/Pe
326	Chironomus melanotus	Keyl 1961	L/P/Pe
327	Chironomus muratensis	Ryser, Scholl & Wuelker 1983	L/P/Pe
328	Chironomus nuditarsis	Keyl 1961	L/P/Pe/A
329	Chironomus nudiventris	Ryser, Scholl & Wuelker 1983	L/P/Pe/A
330	Chironomus nudiventris-Gr.	·	L/P/Pe
331	Chironomus obtusidens	Goetghebuer 1921	L/P/Pe/A
332	Chironomus[16] pallidivittatus	Edwards 1929	L/P/Pe/A
333	Chironomus piger	Strenzke 1956	A
334	Chironomus plumosus	(Linnaeus 1758)	L/P/Pe/A
335	Chironomus plumosus-Gr.	·	L/P/Pe
336	Chironomus prasinus	Pinder 1978	A
337	Chironomus pseudothummi	Strenzke 1959	L/P/Pe/A
338	Chironomus riparius[17]	Meigen 1804	L/P/Pe/A
339	Chironomus riparius-Gr.	·	L/P/Pe
340	Chironomus striatus	Strenzke 1959	L/P/Pe
341	Chironomus[18] tentans	Fabricius 1805	L/P/Pe/A
342	Cladopelma	Kieffer 1921	L/P/Pe/A
343	Cladopelma goetghebueri[19]	Spies & Sæther 2004	L/P/Pe
344	Cladopelma goetghebueri -Gr.	·	L/P/Pe
345	Cladopelma virescens	(Meigen 1818)	L/P/Pe/A
346	Cladopelma viridulum[20]	(Linnaeus 1767)	L/P/Pe/A
347	Cladopelma viridulum-Gr.[21]	·	L/P/Pe
348	Cryptochironomus	Kieffer 1918	L/P/Pe/A

14 = Einfeldia dissidens Walker 1856
15 = Ch. crassimanus Strenzke 1959
16 = Camptochironomus Kieffer 1918
17 = Ch. thummi Kieffer 1911
18 = Camptochironomus Kieffer 1918
19 = C. laterale (or = C. lateralis) (misspelled)
20 = C. viridula (misspelled)
21 "laccophila"-Gr. also included here (see Moller Pillot 2009a), as this is a nomen dubium

	Taxon	Author	Stage recorded
349	Cryptochironomus albofasciatus	(Staeger 1839)	A
350	Cryptochironomus defectus	(Kieffer 1913)	L/P/Pe
351	Cryptochironomus denticulatus	(Goetghebuer 1921)	L/P/Pe
352	Cryptochironomus obreptans	(Walker 1856)	L/P/Pe/A
353	Cryptochironomus obreptans-Gr.	·	L/P/Pe
354	Cryptochironomus redekei	(Krusemann 1933)	L/P/Pe
355	Cryptochironomus rostratus	Kieffer 1921	L/P/Pe/A
356	Cryptochironomus supplicans	(Meigen 1830)	A
357	Cryptotendipes	Lenz 1941	L/P/Pe
358	Cryptotendipes holsatus	Lenz 1959	L/P/Pe
359	Cryptotendipes pseudotener	(Goetghebuer 1922)	L/P/Pe/A
360	Cryptotendipes usmaensis	(Pagast 1931)	L/P/Pe
361	Cyphomella cornea	Sæther 1977	L/P/Pe
362	Demeijerea rufipes	(Linnaeus 1761)	L/P/Pe/A
363	Demicryptochironomus	Lenz 1941	L/P/Pe
364	Demicryptochironomus neglectus	Reiss 1988	L/P/Pe
365	Demicryptochironomus vulneratus	(Zetterstedt 1838)	L/P/Pe/A
366	Dicrotendipes[22]	Kieffer 1913	L/P/Pe/A
367	Dicrotendipes lobiger	(Kieffer 1921)	L/P/Pe/A
368	Dicrotendipes nervosus	(Staeger 1839)	L/P/Pe/A
369	Dicrotendipes notatus	(Meigen 1818)	L/P/Pe/A
370	Dicrotendipes notatus-Gr.	·	A
371	Dicrotendipes pulsus[23]	(Walker 1856)	L/P/Pe/A
372	Dicrotendipes tritomus	(Kieffer 1916)	L/P/Pe
373	Einfeldia pagana	(Meigen 1838)	L/P/Pe/A
374	Endochironomus	Kieffer 1918	L/P/Pe
375	Endochironomus albipennis	(Meigen 1830)	L/P/Pe/A
376	Endochironomus tendens	(Fabricius 1775)	L/P/Pe/A
377	Glyptotendipes	Kieffer 1913	L/P/Pe/A
378	Glyptotendipes barbipes	(Staeger 1839)	L/P/Pe
379	Glyptotendipes caulicola	Kieffer 1913	L
380	Glyptotendipes cauliginellus[24]	(Kieffer 1913)	L/P/Pe/A
381	Glyptotendipes glaucus	(Meigen 1818)	A
382	Glyptotendipes glaucus/pallens	·	L/P/Pe
383	Glyptotendipes imbecillis	(Walker 1856)	L/P/Pe/A
384	Glyptotendipes ospeli	Contreras-Lichtenberg & Kiknadze 2000	L/P/Pe
385	Glyptotendipes pallens	(Meigen 1804)	L/P/Pe/A
386	Glyptotendipes paripes	(Edwards 1929)	L/P/Pe/A
387	Glyptotendipes scirpi[25]	(Kieffer 1915)	L/P/Pe/A
388	Glyptotendipes signatus	(Kieffer 1909)	L/P/Pe
389	Harnischia	Kieffer 1921	L/P/Pe
390	Harnischia curtilamellata	(Malloch 1915)	L/P/Pe/A
391	Harnischia fuscimanus[26]	Kieffer 1921	A
392	Kiefferulus tendipediformis	(Goetghebuer 1921)	L/P/Pe/A
393	Lipiniella araenicola	Shilova 1961	L/P/Pe/A
394	Microchironomus	Kieffer 1918	L/P/Pe
395	Microchironomus deribae	(Freeman 1957)	A

22 = Limnochironomus Kieffer 1920
23 = D. modestus sensu Contreras-Lichtenberg (1986), not Say 1823
24 = G. gripekoveni Kieffer 1913
25 = G. mancunianus Edwards 1929
26 = fuscimana (misspelled)

	Taxon	Author	Stage recorded
396	Microchironomus tener	(Kieffer 1918)	L/P/Pe/A
397	Microtendipes	Kieffer 1915	L/P/Pe/A
398	Microtendipes britteni	(Edwards 1929)	L/P/Pe
399	Microtendipes chloris	(Meigen 1818)	L/P/Pe/A
400	Microtendipes chloris/pedellus-Gr.	·	L/P/Pe/A
401	Microtendipes confinis	(Meigen 1830)	A
402	Microtendipes diffinis	(Edwards 1929)	A
403	Microtendipes nitidus	(Meigen 1818)	A
404	Microtendipes pedellus	(De Geer 1776)	L/P/Pe/A
405	Microtendipes rydalensis	(Edwards 1929)	L/P/Pe/A
406	Microtendipes rydalensis-Gr.	·	L/P/Pe
407	Microtendipes tarsalis	(Walker 1856)	A
408	Nilothauma brayi	(Goetghebuer 1921)	L/P/Pe
409	Parachironomus	Lenz 1921	L/P/Pe/A
410	Parachironomus biannulatus[27]	(Staeger 1839)	A
411	Parachironomus digitalis	(Edwards 1929)	L/P/Pe/A
412	Parachironomus frequens	(Johannsen 1905)	L/P/Pe/A
413	Parachironomus frequens-Gr.	·	A
414	Parachironomus gracilior[28]	(Kieffer 1918)	L/P/Pe/A
415	Parachironomus gracilior -Gr.	·	L/P/Pe
416	Parachironomus mauricii	(Kruseman 1933)	L/P/Pe
417	Parachironomus monochromus	(van der Wulp 1875)	A
418	Parachironomus parilis	(Walker 1856)	A
419	Parachironomus swammerdami	(Kruseman 1933)	A
420	Parachironomus tenuicaudatus	(Malloch 1915)	A
421	Parachironomus varus	(Goetghebuer 1921)	A
422	Parachironomus vitiosus	(Goetghebuer 1921)	L/P/Pe/A
423	Parachironomus vitiosus-Gr.	·	L/P/Pe
424	Paracladopelma	Harnisch 1923	L/P/Pe
425	Paracladopelma camptolabis	(Kieffer 1913)	L/P/Pe/A
426	Paracladopelma camptolabis-Gr.	·	L/P/Pe
427	Paracladopelma laminatum[29]	(Kieffer 1921)	L/P/Pe/A
428	Paracladopelma laminatum-Gr.	·	L/P/Pe/A
429	Paracladopelma mikianum[30]	(Goetghebuer 1937)	L/P/Pe
430	Paracladopelma nigritulum[31]	(Goetghebuer 1942)	L/P/Pe/A
431	Paracladopelma nigritulum-Gr.	·	L/P/Pe
432	Paralauterborniella nigrohalteralis	(Malloch 1915)	L/P/Pe
433	Paratendipes	Kieffer 1911	L/P/Pe
434	Paratendipes albimanus	(Meigen 1818)	L/P/Pe/A
435	Paratendipes albimanus-Gr.	·	L/P/Pe
436	Paratendipes plebeius	(Meigen 1818)	A
437	Phaenopsectra	Kieffer 1921	L/P/Pe/A
438	Phaenopsectra flavipes	(Meigen 1818)	L/P/Pe/A
439	Phaenopsectra punctipes	(Wiedemann 1817)	A
440	Polypedilum	Kieffer 1912	L/P/Pe/A

27 In some cases, P. biannulatus was recorded as larva, but Vallenduuk (2013) notes that the larva of this species is not known. According to the author misidentifications are possible (and probably happened), when using Moller Pillot (2009b): "...the species name P. biannulatus should be corrected to P. vitiosus."

28 = arcuatus Goetghebuer 1919

29 = laminata (misspelled)

30 = mikiana (misspelled)

31 = nigritula (misspelled)

	Taxon	Author	Stage recorded
441	Polypedilum (Polypedilum)	·	L/P/Pe
442	Polypedilum acifer	Townes 1945	L/P/Pe
443	Polypedilum aegyptium	Kieffer 1925	L/P/Pe
444	Polypedilum albicorne	(Meigen 1838)	L/P/Pe/A
445	Polypedilum arundineti[32]	(Goetghebuer 1921)	A
446	Polypedilum bicrenatum	Kieffer 1921	L/P/Pe/A
447	Polypedilum bicrenatum/pullum	·	L/P/Pe
448	Polypedilum convictum	(Walker 1856)	L/P/Pe/A
449	Polypedilum cultellatum	Goetghebuer 1931	L/P/Pe/A
450	Polypedilum laetum	(Meigen 1818)	L/P/Pe
451	Polypedilum laetum-Gr.	·	L/P/Pe
452	Polypedilum nubeculosum	(Meigen 1804)	L/P/Pe/A
453	Polypedilum nubeculosum-Gr.	·	L/P/Pe
454	Polypedilum pedestre	(Meigen 1830)	L/P/Pe/A
455	Polypedilum pullum	(Zetterstedt 1838)	A
456	Polypedilum scalaenum	(Schrank 1803)	L/P/Pe/A
457	Polypedilum scalaenum-Gr.	·	L/P/Pe/A
458	Polypedilum sordens	(van der Wulp 1875)	L/P/Pe/A
459	Polypedilum tritum	(Walker 1856)	L/P/Pe/A
460	Polypedilum uncinatum	(Goetghebuer 1921)	L/P/Pe
461	Polypedilum uncinatum-Gr.	·	L/P/Pe
462	Robackia	Sæther 1977	L/P/Pe
463	Robackia demeijerei	(Krusemann 1933)	L/P/Pe
464	Saetheria reissi	Jackson 1977	L/P/Pe/A
465	Sergentia	Kieffer 1922	A
466	Sergentia coracina	(Zetterstedt 1850)	A
467	Stenochironomus	Kieffer 1919	L/P/Pe
468	Stenochironomus fascipennis	(Zetterstedt 1838)	A
469	Stenochironomus gibbus	(Fabricius 1794)	L/P/Pe/A
470	Stictochironomus	Kieffer 1919	L/P/Pe/A
471	Stictochironomus sticticus	(Fabricius 1781)	L/P/Pe
472	Synendotendipes[33] dispar	(Meigen 1830)	L/P/Pe/A
473	Synendotendipes[34] dispar-Gr.	·	L/P/Pe/A
474	Synendotendipes[35] impar	(Walker 1856)	A
475	Tribelos intextum	(Walker 1856)	L/P/Pe/A
476	Xenochironomus	Kieffer 1921	L/P/Pe
477	Xenochironomus xenolabis	(Kieffer 1916)	L/P/Pe/A
478	Zavreliella marmorata	(van der Wulp 1859)	L/P/Pe/A
	CHIRONOMINAE/TANYTARSINI		
479	Cladotanytarsus	Kieffer 1921	L/P/Pe/A
480	Cladotanytarsus atridorsum	Kieffer 1924	L/P/Pe/A
481	Cladotanytarsus iucundus	Hirvenoja 1962	A
482	Cladotanytarsus lepidocalcar	Krueger 1938	L/P/Pe
483	Cladotanytarsus mancus	(Walker 1856)	L/P/Pe/A
484	Cladotanytarsus mancus-Gr.	·	L/P/Pe/A
485	Cladotanytarsus molestus	Hirvenoja 1962	A
486	Cladotanytarsus nigrovittatus	(Goetghebuer, 1922)	L/P/Pe/A
487	Cladotanytarsus pallidus	Kieffer 1922	A

32 = arundinetum (misspelled)
33 = Endochironomus Grodhaus 1987
34 = Endochironomus Grodhaus 1987
35 = Endochironomus Grodhaus 1987

	Taxon	Author	Stage recorded
488	Cladotanytarsus teres	Hirvenoja 1962	A
489	Cladotanytarsus vanderwulpi	(Edwards 1929)	L/P/Pe/A
490	Cladotanytarsus bicornutus[36]	Kieffer 1922	A
491	Corynocera	Zetterstedt 1837	L/P/Pe
492	Micropsectra	Kieffer 1909	L/P/Pe/A
493	Micropsectra apposita[37]	(Walker 1856)	L/P/Pe/A
494	Micropsectra apposita-Gr.	·	L/P/Pe/A
495	Micropsectra aristata	Pinder 1976	L/P/Pe
496	Micropsectra atrofasciata	(Kieffer 1911)	L/P/Pe/A
497	Micropsectra atrofasciata-Gr.	·	L/P/Pe/A
498	Micropsectra attenuata	Reiss 1969	A
499	Micropsectra roseiventris[38]	(Kieffer 1909)	L/P/Pe
500	Micropsectra junci	(Meigen 1818)	L/P/Pe/A
501	Micropsectra lindebergi	Säwedal 1976	L/P/Pe
502	Micropsectra nana[39]	(Meigen 1818)	L/P/Pe/A
503	Micropsectra notescens	(Walker 1856)	L/P/Pe/A
504	Micropsectra notescens Gr.	·	L/P/Pe/A
505	Micropsectra pallidula[40]	(Meigen 1830)	L/P/Pe/A
506	Micropsectra radialis	Goetghebuer 1939	L/P/Pe
507	Micropsectra recurvata	Goetghebuer 1928	L/P/Pe
508	Neostempellina thienemanni	Reiss 1984	L/P/Pe
509	Neozavrelia fuldensis	Fittkau 1954	A
510	Paratanytarsus	Thienemann & Bause 1913	L/P/Pe/A
511	Paratanytarsus austriacus	(Kieffer 1924)	L/P/Pe/A
512	Paratanytarsus dimorphis	Reiss 1965	L/P/Pe/A
513	Paratanytarsus dissimilis	(Johannsen 1905)	L/P/Pe/A
514	Paratanytarsus dissimilis-Gr.	·	L/P/Pe/A
515	Paratanytarsus grimmii	(Schneider 1885)	L/P/Pe
516	Paratanytarsus inopertus	(Walker 1856)	L/P/Pe/A
517	Paratanytarsus brevicalcar[41]	(Kieffer 1909)	L/P/Pe
518	Paratanytarsus laetipes	(Zetterstedt 1850)	A
519	Paratanytarsus lauterborni	(Kieffer 1909)	L/P/Pe/A
520	Paratanytarsus tenellulus	(Goetghebuer 1921)	L/P/Pe/A
521	Paratanytarsus tenuis	(Meigen 1830)	A
522	Rheotanytarsus	Thienemann & Bause 1913	L/P/Pe/A
523	Rheotanytarsus curtistylus	(Goetghebuer 1921)	L/P/Pe/A
524	Rheotanytarsus muscicola	Thienemann 1929	L/P/Pe/A
525	Rheotanytarsus pentapoda	(Kieffer 1909)	L/P/Pe/A
526	Rheotanytarsus photophilus	(Goetghebuer 1921)	L/P/Pe/A
527	Rheotanytarsus reissi	Lehmann 1970	A
528	Rheotanytarsus rhenanus	Klink 1983	L/P/Pe
529	Rheotanytarsus ringei	Lehmann 1970	L/P/Pe/A
530	Stempellina	Thienemann & Bause 1913	L/P/Pe/A
531	Stempellina bausei	(Kieffer 1911)	L/P/Pe/A
532	Stempellinella	Brundin 1947	L/P/Pe/A

36 = C. wexionensis Brundin 1947
37 = M. contracta Reiss 1965
38 = M. fusca Auctt.; see Stur & Ekrem (2006)
39 = Parapsectra Reiss 1969
40 = M. bidentata Brundin 1949
41 = P. intricatus (Goetghebuer 1921)

	Taxon	Author	Stage recorded
533	Stempellinella brevis	(Edwards 1929)	L/P/Pe/A
534	Stempellinella brevis-Gr.	·	L/P/Pe
535	Stempellinella edwardsi[42]	Spies & Sæther 2004	L/P/Pe/A
536	Stempellinella flavidula	(Edwards 1929)	A
537	Tanytarsini Gen. sp.	·	L/P/Pe/A
538	Tanytarsus	van der Wulp 1874	L/P/Pe/A
539	Tanytarsus aculeatus	Brundin 1949	L/P/Pe
540	Tanytarsus brundini	Lindeberg 1963	L/P/Pe/A
541	Tanytarsus brundini/curticornis	·	L/P/Pe
542	Tanytarsus buchonius	Reiss & Fittkau 1971	L/P/Pe/A
543	Tanytarsus chinyensis	Goetghebuer 1934	L/P/Pe/A
544	Tanytarsus curticornis	Kieffer 1911	L/P/Pe/A
545	Tanytarsus ejuncidus	(Walker 1856)	L/P/Pe/A
546	Tanytarsus eminulus	(Walker 1856)	L/P/Pe/A
547	Tanytarsus eminulus-Gr.	·	A
548	Tanytarsus excavatus	Edwards 1929	A
549	Tanytarsus gracilentus	(Holmgren 1883)	L/P/Pe
550	Tanytarsus gregarius	Kieffer 1909	A
551	Tanytarsus heusdensis	Goetghebuer 1923	L/P/Pe/A
552	Tanytarsus lestagei	Goetghebuer 1922	L/P/Pe/A
553	Tanytarsus lestagei-Gr.	·	L/P/Pe/A
554	Tanytarsus longitarsis	Kieffer 1911	A
555	Tanytarsus lugens	(Kieffer 1916)	A
556	Tanytarsus mancospinosus	Ekrem & Reiss 1999	A
557	Tanytarsus medius	Reiss & Fittkau 1971	L/P/Pe/A
558	Tanytarsus mendax	Kieffer 1925	L/P/Pe/A
559	Tanytarsus nemorosus	Edwards 1929	L/P/Pe
560	Tanytarsus niger	Soegaard Andersen 1937	A
561	Tanytarsus nigricollis/usmaensis	·	L/P/Pe
562	Tanytarsus occultus	Brundin 1949	L/P/Pe/A
563	Tanytarsus palettaris	Verneaux 1969	L/P/Pe/A
564	Tanytarsus pallidicornis	(Walker 1856)	L/P/Pe/A
565	Tanytarsus sinuatus	Goetghebuer 1936	L/P/Pe/A
566	Tanytarsus striatulus	Lindeberg 1976	L/P/Pe
567	Tanytarsus usmaensis	Pagast 1931	L/P/Pe/A
568	Tanytarsus verralli	Goetghebuer 1928	L/P/Pe/A
569	Tanytarsus volgensis[43]	Miseiko 1967	A
570	Virgatanytarsus	Pinder 1982	L/P/Pe
571	Virgatanytarsus arduennensis	(Goetghebuer 1922)	L/P/Pe
572	Zavrelia	Thienemann & Bause 1913	L/P/Pe
573	Zavrelia pentatoma	Kieffer & Bause 1913	L/P/Pe/A

Tab. 4: Taxonomic levels identified (based on Tab. 3)

Taxonomic level	number
Species	408
Species group/subgenus	75
Genus	121
Higher	9
Total taxa number	573

42 = S. minor Edwards 1929
43 = T. fimbriatus Reiss & Fittkau 1971

4.3 Distribution of the taxa in the water types

Using PCA the first two components counted for 92.2 % of the cumulative variance for the water types (Tab. 5). The biplot (Fig. 8) suggests two main groups of water types, which can be defined by their Chironomidae fauna, but the component scores (Tab.5) reveal that only a small number can be grouped, some to "larger water types (rivers) and lake outlets" and the others to"gravel-dominated streams". However, the loadings on the components were not high, and they were distributed over two or three components. The first group loaded higher in the third component, which contributed very few to the overall variance. The water types of the second group loaded low in either of the components. Thus, a defined grouping is weak based on this dataset of presence-absence-data and this method of evaluation leaving each water type more or less an individual.

Tab. 5: Results of the principal component analysis. Matrix: variance/covariance

Component	1	2	3	
ordination of water types				
Eigenvalue	1304.03	250,061	42,5342	
% variance	77.4	14.8	2,5	
ordination of taxa				
Eigenvalue	23011,4	9455,77	1744,67	
% variance	60.9	25.4	3.4	
Component loadings (river types)				
11	0,428	-0,189	-0,187	Small organic substrate-dominated rivers
12	0,302	0,331	-0,120	Mid-sized and large organic substrate-dominated rivers
14	0,529	-0,648	0,319	Small sand-dominated lowland rivers
15	0,239	-0,131	-0,039	Mid-sized sand and loam-dominated lowland rivers
19	0,484	0,306	-0,575	Small streams in riverine floodplains
21	0,324	0,345	0,356	Lake outflows
15g	0,193	0,353	0,324	Large sand and loam-dominated lowland rivers
20	0,104	0,279	0,531	Very large sand-dominated rivers
16	0,035	-0,060	0,059	Small gravel-dominated lowland rivers
17	0,021	0,017	-0,002	Mid-sized and large gravel-dominated lowland rivers

5 Discussion

5.1 Taxa stock

Although only two more taxa were observed in 2013, the curve for the logarithmic model still does not indicate a clear saturation (Fig. 6), and further surveys are required to show the probable total number of taxa. However, even if the results deserve the observation of some more years for a realistic prognose, most of the Chironomidae fauna of Brandenburg, which can be recorded in running waters with the collection methods used, can be considered as presently known. About 100 samples from 2013 remain to be evaluated and pans are underway for the 2014 survey programme. An important point to consider is whether adults or pupal exuviae will be included in further collections, since this would permit many identifications to be made, which are impossible from larvae or pupae. However, adults pose a problem in that they can move over a certain distance, so the record for a species from a riparian vegetation is no guarantee that it also inhabits the adjacent waterbody. The allocation of an adult to a par-

ticular waterbody (and hence water types) needs to be made with care (but does not create problems using pupal exuviae). For instance, the genus *Gymnometriocnemus* is known to have a terrestrial larval stage, but was recorded for the same sample as completely aquatic species (*Procladius crassinervis*, *Cryptochironomus rostratus*).

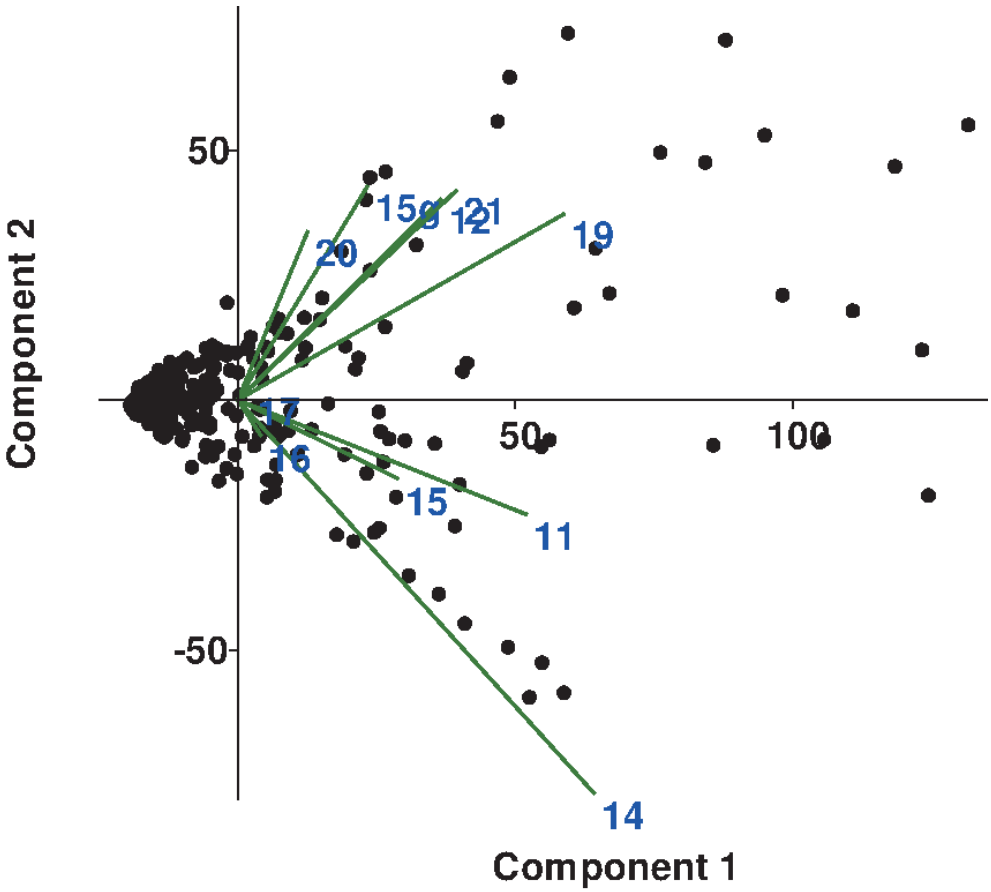

Fig. 8: PCA biplot of of the component scores of water types (numbers and green lines) and taxa (dots). Codes for water types, see Tab. 1. Further details, see text in sections 4.3 and 5.3

Apart from statistical limitation mentioned the surveys to date provide a comprehensive overview of the taxa stock, far more than just a list of the dominant taxa. Table 3 can be considered as a checklist for Chironomidae of running waters in the lowlands of north-east Germany. Comparisons with data from north-western Germany and preferably also regions of The Netherlands and Poland will clarify whether or not this list can be combined and supplemented for a broader geographical range (i. e. the "central European lowlands").

5.2 Problems of the taxa list

The programme has also some taxonomic problems very clear. Many nomenclatural changes were made during the period of the study in the years reported here, in part due to straightforward corrections such as spelling and in part taxonomic status, based also on the use of molecular and other new methods (e.g. Ekrem et al. 2010; see Sæther & Spies 2013). Some well known names have been replaced, such as (*Brillia modesta* becoming *B. bifida*). Some earlier records must be considered doubtful or unclear because the literature was unsatisfactory at the time they were (e.g. *Cladopelma* "*laccophila*" is now considered as a nomen dubium and should be named *C. viridulum* group).

5.3 Distribution of the taxa in the water types

Analysis showed a high gradient in the data, and certain taxa had at least some affinity with a particular watertype, i.e. found more often in one than in the other water types. However, grouping of water types based on similarity taxonomic composition was unconvincing: it failed to help characterize leaving each water type as more or less distinct.

This (see Tab. 2) indicates that other parameters than the occurrences in water types influenced the distribution of the taxa in the water bodies investigated. But this is possibly masked by the evaluation methods and the approach performed, here, and needs further and more precise data analysis with the integration of other parameters than water type. However, the evaluations showed that the quality of the data is sufficient for an advanced data analysis concerning distribution of Chironomidae and ecology. More information is stored in the database of the LUGV (e.g. ecological status, index of saprobity, features of substrata) allowing such more extensive ecological analysis

6 Conclusions

Implementation of the EU-WFD has led to major changes in water assessment and the management structure of the responsible authorities. In spite of being collected within a relatively short time period, the Brandenburg data base assessed here has proved of great value in providing a comprehensive overview of the Chironomidae fauna in German lowland running waters. The determination of Chironomidae at species level is relatively uncommon for German water authorities. The present success should be taken as a good example and encourage authorities in other regions to do the same. Future survey programmes will reveal:

1) How many more species will be recorded in Brandenburg?
2) How does the evaluation of the data from lake investigations increase the number of all Chironomidae taxa recorded in Brandenburg?
3) Which special lowland Chironomidae species occur in the Land Brandenburg?
4) How can further ecological evaluations of the data improve contribution of Chironomidae as indicators for official assessments of the ecological status of water bodies?

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Acknowledgements

We are greatly indebted to Jörg Schönfelder and Dirk Langner from the State Office for Environment, Health and Consumer Protection (LUGV) in Potsdam, who were responsible for the monitoring programmes and the management of the data. Many thanks for their co-operation and the supply of the data base. Lots of thanks also to Brian Whitton, Durham, for the linguistical revision and useful comments on the manuscript.

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Received: 2014-02-15
Accepted: 2014-03-07

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