

An updated list of type material of Ephemeroptera Hyatt & Arms, 1890, deposited at the Zoological Museum of Hamburg (ZMH)

Michel Sartori^{1,2}, Martin Kubiak², Hossein Rajaei^{2,3}

1 *Museum of zoology, Palais de Rumine, Place Riponne 6, CH-1005 Lausanne, Switzerland* **2** *Zoologisches Museum, Centrum für Naturkunde (CeNak), Martin-Luther-King-Platz 3, 20146 Hamburg, Germany* **3** *Staatliches Museum für Naturkunde Stuttgart, Rosenstein 1, 70191 Stuttgart, Germany*

Corresponding author: *Michel Sartori* (Michel.sartori@vd.ch)

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Abstract

The type specimens of Ephemeroptera (Insecta) housed at the Zoological Museum of Hamburg (ZMH) are compiled in this document. The current nomenclature of all species is given. In total, Ephemeroptera type material of ZMH encompasses 161 species. Fifty-one holotypes and five lectotypes are present. Forty-one species are represented by syntypes, 85 by paratypes and five by paralectotypes. Material of two species (*Cinygma asiaticum* Ulmer, 1924 and *Pseudocloeon klapaleki* Müller-Liebenau, 1982) is missing. The present catalogue is an updated version of Weidner (1964a).

Keywords

Ephemeroptera, Hamburg, type specimens, Ulmer, ZMH

Introduction

The Ephemeroptera collection of the Zoological Museum of Hamburg (ZMH) contains 433 species and approximately 4,500 specimens. In total, 161 species are represented by type material. In this sense, this is one of the largest collections with the highest number of type specimens of this insect order in Germany. Furthermore, the mayfly collection together with the caddisfly collection comprise some of the oldest voucher material of the entomological collection at the ZMH which was mainly collected at the end of the 19th century and in the first decades of the 20th century by the Hamburgian entomologist Dr. h.c. Georg Ulmer (1877–1963) (e.g., Weidner 1964b).

Georg Ulmer was born in Hamburg on 5 March 1877. He was the oldest son of seven siblings. After his father died in 1889, he decided to become a school teacher. During his qualification time in the early 1890s, he began collecting insects in the vicinity of Hamburg (Ulmer 1964). Initially, he started to compile a beetle collection but since he observed a mass emergence of mayflies at the river Fulda near Kassel in 1898, he started to focus his collecting efforts and taxonomic studies on primarily aquatic insect groups like mayflies or caddisflies (Ulmer 1964). In 1899, he finished his teacher training and started his career as a board school teacher in Hamburg for 32 years until 1934. Beside his profession, he studied voluntarily the faunistics, biology, systematics and taxonomy of Ephemeroptera (e.g., Ulmer 1904a, 1926, 1939) and Trichoptera (e.g., Ulmer 1905, 1951), and other freshwater invertebrates (e.g., Ulmer 1901, 1902a).

His first publication (Ulmer 1900) was followed by 175 scientific publications until his death on 15 January 1963 (Illies 1964). In the first years of his scientific career, he mainly studied the faunistics and taxonomy of caddisflies in the vicinity of Hamburg (e.g., Ulmer 1902b), or other localities in Germany (e.g. Ulmer 1904b, 1915). From the year 1905 on, he intensively started to study the material from foreign countries (including tropical regions), which has been lent to him by colleagues or other institutions (e.g., Ulmer 1905).

Besides the Trichoptera, Ulmer worked on mayflies (e.g., Ulmer 1908, 1909, 1912). Between 1904 and 1943, he published thirty research papers on the systematics and taxonomy of Ephemeroptera (Kimmins 1963; Illies 1964) with the description of 111 species (Weidner 1964a). His studies on mayflies resulted in the fundamental revision of the Southeast Asian mayfly fauna with the description of numerous species (Ulmer 1939).

During World War II (in 1943), the Zoological Museum Hamburg (that time located near the central railway station) was bombed and nearly all dry preserved material housed in the collections was destroyed and burned in the fire. Only material deposited in ethanol was transferred into the underground networks and survived the war (Weidner 1967). The valuable Ephemeroptera and Trichoptera collection of Georg Ulmer was kept in his private house outside of Hamburg. In 1964, the insect collection of Georg Ulmer was donated to the ZMH (Weidner 1964b) providing the majority of the recent voucher material of the ZMH in these two insect orders.

Table 1. List of type material of Ephemeroptera Hyatt & Arms, 1890, deposited at the Zoological Museum of Hamburg, with the state and metamorphic stage of materials, current nomenclature, family assignment and complementary information. Abbreviations in this list are as follows: Type; HT = Holotype; LT = Lectotype; PT = Paratype(s); PLT = Paralectotype(s); ST = Syntypes. (state): (1) Specimen conserved in alcohol; (2) Pinned dry specimen; (3) Specimen or part of it mounted on microscopic slide. Stage: F = Female imago; M = Male imago; N = Nymph; SF = Female subimago; SM = Male subimago. Complementary information: a. Holotype wrongly designated by Weidner (1962, 1964a); b. Holotype designated by Ulmer on the label, not in the publication; c. Holotype apparently not in Stockholm (see http://www.nrm.se/download/18.1cb760b014a762ca801342e9/1421068753427/EPHEMEROPTERA_list.pdf); d. Specimen not labelled, but comes from the type series; e. Not type material! The types are the nymphs and the adults were only described in 1925; f. Only fore- and hindlegs in ZMH; g. Only fore wing in ZMH and remains in Naturkunde Museum, Berlin; h. Only foreleg; i. Only hind wing in ZMH and remains in Naturkunde Museum, Berlin; j. Only one forewing in ZMH and remains apparently not in Stockholm (http://www.nrm.se/download/18.1cb760b014a762ca801342e9/1421068753427/EPHEMEROPTERA_list.pdf); k. Wrongly considered by Ulmer, as a syn. of *E. bellieri* (Hagen).

Taxon	Original name	Author(s), year	Type (state)	Stage	Current nomenclature	Family	Literature & Complementary information
<i>alegrettae</i>	<i>Masartella alegrettae</i>	Ulmer, 1943	HT (2)	M	<i>Masartella alegrettae</i> Ulmer, 1943	Leptophlebiidae	(i.)
<i>ambiguum</i>	<i>Pseudocoen ambiguum</i>	Müller-Liebenau, 1982	PT (1)	N	<i>Liebiella ambigua</i> (Müller-Liebenau, 1982)	Baetidae	Waltz and McCafferty 1987
<i>ammophila</i>	<i>Oligoneuria ammophila</i>	Spieeth, 1938	PT (1)	N	<i>Homoconeria ammophila</i> (Spieeth, 1938)	Oligoneuriidae	Edmunds and Allen 1957
<i>anatolica</i>	<i>Rhithrogena anatolica</i>	Kazanci, 1985	PT (1)	M	<i>Rhithrogena anatolica</i> Kazanci, 1985	Heptageniidae	(d.)
<i>annandalei</i>	<i>Polymitarcyx annandalei</i>	Chopra, 1927	ST (1)	F	<i>Ephoron annandalei</i> (Chopra, 1927)	Polymitarcyidae	Hubbard and Srivastava 1985
<i>apicatum</i>	<i>Cloeon apicatum</i>	Navás, 1933	ST (2)	M	<i>Cloeon navasi</i> van Bruggen, 1957	Baetidae	van Bruggen 1957; (d.)
<i>balkanicus</i>	<i>Metreptus balkanicus</i>	Ulmer, 1920	HT (3)	M	<i>Metreptus balkanicus</i> (Ulmer, 1920)	Ameletidae	Puthz 1977a; (f)
<i>belgica</i>	<i>Torleya belgica</i>	Lestage, 1917	(PT) (2)	M, F	<i>Torleya major</i> (Klapalek, 1905a)	Ephemerellidae	(e.)
<i>bengalensis</i>	<i>Echyronurus bengalensis</i>	Ulmer, 1920	HT, PT (2, 3)	M, F, SM, SF	<i>Echyronurus bengalensis</i> Ulmer, 1920	Heptageniidae	(b.)
<i>berneri</i>	<i>Rheobacis berneri</i>	Müller-Liebenau, 1974	HT (1)	N	<i>Heterocoen berneri</i> (Müller-Liebenau, 1974)	Baetidae	McCafferty and Provonsha 1975
<i>bioerne</i>	<i>Centropilum bioerne</i>	Ulmer, 1909	PT (1)	F	<i>Afropilum bioerne</i> (Ulmer, 1909)	Baetidae	Gillies, 1990
<i>biobionicum</i>	<i>Deleatidium biobionicum</i>	Ulmer, 1938	PT (2)	F	<i>Meridialaris biobionica</i> (Ulmer, 1938)	Leptophlebiidae	Peters and Edmunds 1972; (g.)

Taxon	Original name	Author(s), year	Type (state)	Stage	Current nomenclature	Family	Literature & Complementary information
<i>bishopi</i>	<i>Platybaetis bishopi</i>	Müller-Liebenau, 1980a	HT (1)	N	<i>Platybaetis bishopi</i> Müller-Liebenau, 1980	Baetidae	
<i>boetgeri</i>	<i>Pseudocloeon boetgeri</i>	Ulmer, 1924	ST (1, 2, 3)	M, F	<i>Pseudocloeon boetgeri</i> Ulmer, 1924	Baetidae	
<i>borneonia</i>	<i>Epeorella borneonia</i>	Ulmer, 1939	LT, PLT (1, 2)	M, F, SF	<i>Epeorella borneonia</i> Ulmer, 1939	Heptageniidae	Sartori 2014c; (a.)
<i>braueri</i>	<i>Hagenulodes braueri</i>	Ulmer, 1920	PT (1)	M	<i>Hagenulodes braueri</i> Ulmer, 1920	Leptophlebiidae	
<i>brenneriana</i>	<i>Rhithrogena brenneriana</i>	Klapalek, 1905a	PT (1)	M	<i>Rhithrogena alpestris</i> Eaton, 1885 (syn.)	Heptageniidae	Puthz 1975
<i>brunneum</i>	<i>Cloeon brunneum</i>	Esben-Petersen, 1909	ST (1, 2)	M, F	<i>Americabaetis petersenii</i> (Hubbard, 1974) (syn. obj.)	Baetidae	Lugo-Ortiz and McCaffery 1999
<i>caenoides</i>	<i>Neophemeropsis caenoides</i>	Ulmer, 1939	LT, PLT (1, 3)	M, F, N	<i>Potamanthellus caenoides</i> (Ulmer, 1939)	Neophemeridae	Bae and McCaffery 1998
<i>camerunense</i>	<i>Pseudocloeon camerunense</i>	Ulmer, 1920	ST (1, 3)	M, F	<i>Ophelmatostoma camerunense</i> (Ulmer, 1920)	Baetidae	Gillies et al. 1990
<i>canariensis</i>	<i>Baetis canariensis</i>	Müller-Liebenau, 1971	HT, PT (1)	M, N	<i>Baetis canariensis</i> Müller-Liebenau, 1971	Baetidae	
<i>cavum</i>	<i>Cinygmula cavum</i>	Ulmer, 1927	PT (1)	M	<i>Cinygmula cavum</i> (Ulmer, 1927)	Heptageniidae	Levanidova 1972
<i>chinensis</i>	<i>Baetis chinensis</i>	Ulmer, 1936	ST (1)	M, F	<i>Baetis chinensis</i> Ulmer, 1936	Baetidae	
<i>chinensis</i>	<i>Heptagenia chinensis</i>	Ulmer, 1920	ST (2)	M	<i>Heptagenia chinensis</i> Ulmer, 1920	Heptageniidae	(d.)
<i>chinensis</i>	<i>Siphuriscus chinensis</i>	Ulmer, 1920	PT (3)	M	<i>Siphuriscus chinensis</i> Ulmer, 1920	Siphuriscidae	(f.)
<i>corsicus</i>	<i>Echyronurus corsicus</i>	Esben-Petersen, 1912a	PT (2)	M	<i>Echyronurus corsicus</i> Esben-Petersen, 1912	Heptageniidae	Belfiore 1987; (k.)
<i>costaricanus</i>	<i>Leptophyphes costaricanus</i>	Ulmer, 1920	HT (2, 3)	F	<i>Tricoryphodes costaricanus</i> (Ulmer, 1920)	Leptophyphidae	Bamgardner 2008
<i>crassinervis</i>	<i>Polyplocia crassinervis</i>	Ulmer, 1939	PT (2)	SM	<i>Polyplocia campylocella</i> Ulmer, 1939 (syn.)	Euthyplociidae	Demoulin 1953
<i>croaticus</i>	<i>Siphonurus croaticus</i>	Ulmer, 1920	PT (1, 3)	M	<i>Siphonurus croaticus</i> Ulmer, 1920	Siphonuridae	
<i>curvata</i>	<i>Paraleptophlebia curvata</i>	Ulmer, 1927	PT (1, 3)	M	<i>Paraleptophlebia strandii</i> (Eaton, 1901) (syn.)	Leptophlebiidae	Kluge 2009
<i>deigna</i>	<i>Liebebiella deigna</i>	Waltz & McCaffery, 1987	HT, PT (1, 3)	N	<i>Liebebiella vera</i> (Müller-Liebenau, 1981) (syn.)	Baetidae	Kluge and Novikova 2011
<i>difficilum</i>	<i>Pseudocloeon difficilum</i>	Müller-Liebenau, 1982	PT (1, 3)	N	<i>Liebebiella difficilis</i> (Müller-Liebenau, 1982)	Baetidae	Waltz and McCaffery 1987
<i>diptera</i>	<i>Hagenulopsis diptera</i>	Ulmer, 1920	ST (1)	M, SM, SF	<i>Hagenulopsis diptera</i> Ulmer, 1920	Leptophlebiidae	

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<i>diporti</i>	<i>Ephemera diporti</i>	Lestage, 1921	PT (2)	M	<i>Ephemera diporti</i> Lestage, 1921	Ephemeridae	
<i>eatoni</i>	<i>Rhithrogena eatoni</i>	Esben-Petersen, 1912a	PT (2)	F	<i>Rhithrogena eatoni</i> Esben-Petersen, 1912	Heptageniidae	(d.)
<i>edmundsi</i>	<i>Platybaetis edmundsi</i>	Müller-Liebenau, 1980b	HT (1)	N	<i>Platybaetis edmundsi</i> Müller-Liebenau, 1980	Baetidae	
<i>ehrhardi</i>	<i>Thraulius ehrhardti</i>	Ulmer, 1920	ST (1, 2, 3)	M, F	<i>Needhamella ehrhardti</i> (Ulmer, 1920)	Leptophlebiidae	Dominguez and Flowers 1989
<i>eloisae</i>	<i>Derethina eloisae</i>	Sartori, 2008	PT (1)	N	<i>Derethina eloisae</i> Sartori, 2008	Teloganodidae	Sartori et al. 2008
<i>feuernborni</i>	<i>Pseudoligoneuria feuernborni</i>	Ulmer, 1939	ST (1, 3)	N	<i>Chromatrys magnifica</i> Navás, 1932 (syn.)	Oligoneuriidae	Kluge 2004
<i>flexus</i>	<i>Siphilurus flexus</i>	Clemens, 1913	PT (1)	M	<i>Siphloplecton basale</i> (Walker, 1853) (syn.)	Merretopodidae	McDunnough 1924
<i>fluviatile</i>	<i>Cloeon fluviatile</i>	Ulmer, 1920	PT (1, 3)	M, F	<i>Cloeon fluviatile</i> Ulmer, 1920	Baetidae	
<i>formosana</i>	<i>Ephemera formosana</i>	Ulmer, 1920	PT (2, 3)	M, F, SM, SF	<i>Ephemera formosana</i> Ulmer, 1920	Ephemeridae	
<i>formosanus</i>	<i>Chironetes formosanus</i>	Ulmer, 1912	ST (1, 2, 3)	M, SF	<i>Isonychia formosana</i> (Ulmer, 1912)	Isonychiidae	Ueno 1931
<i>frustorfferi</i>	<i>Masartella frustorfferi</i>	Ulmer, 1943	PT	SF	<i>Masartella brieni</i> (Lestage, 1924) (syn.)	Leptophlebiidae	Pescador and Peters 1990
<i>fuegiensis</i>	<i>Ameletus fuegiensis</i>	Lestage, 1935	HT (1, 3)	N	<i>Metamonius anceps</i> (Eaton, 1885) (syn.)	Nesameletidae	Mercado and Elliott 2004
<i>fulmeki</i>	<i>Acentrella fulmeki</i>	Ulmer, 1939	HT, PT (1, 3)	M, F	<i>Labiobaetis fulmeki</i> (Ulmer, 1939)	Baetidae	McCaffery and Waltz 1995
<i>fusca</i>	<i>Atalophlebia fusca</i>	Ulmer, 1920	HT (1)	M	<i>Koornonga fusca</i> (Ulmer, 1920)	Leptophlebiidae	Campbell and Suter 1988; (c.)
<i>gornostajevi</i>	<i>Epeorus gornostajevi</i>	Tshernova, 1981	PT (1)	M	<i>Epeorus gornostajevi</i> Tshernova, 1981	Heptageniidae	
<i>grandis</i>	<i>Chironetes grandis</i>	Ulmer, 1913	ST (1, 3)	M	<i>Isonychia grandis</i> (Ulmer, 1913)	Isonychiidae	Ulmer 1924
<i>guranica</i>	<i>Heptagenia guranica</i>	Belov, 1981	PT (1)	M	<i>Heptagenia guranica</i> Belov, 1981	Heptageniidae	
<i>haenschii</i>	<i>Euthyphlocia haenschii</i>	Ulmer, 1942	PT (2)	M	<i>Euthyphlocia haenschii</i> Ulmer, 1942	Euthyphlociidae	
<i>horai</i>	<i>Potamanthellus horai</i>	Lestage, 1930	HT (2)	SM	<i>Potamanthellus amabilis</i> (Eaton, 1892) (syn.)	Neoephemeridae	Bae and McCaffery 1998
<i>butanis</i>	<i>Dudgeodes butanis</i>	Sartori, 2008	PT (1)	N	<i>Dudgeodes butanis</i> Sartori, 2008	Teloganodidae	Sartori et al. 2008

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<i>hyalinus</i>	<i>Echyronurus hyalinus</i>	Ulmer, 1912	ST (1, 2, 3)	M, F, SM, SF	<i>Afronurus hyalinus</i> (Ulmer, 1912)	Heptageniidae	Kang and Yang 1994
<i>insularis</i>	<i>Rhithrogena insularis</i>	Esben-Petersen, 1913	PT (2)	M, F	<i>Rhithrogena insularis</i> Esben-Petersen, 1913	Heptageniidae	(d.)
<i>irina</i>	<i>Cinygmula irina</i>	Tshernova & Below, 1982	PT (1)	M	<i>Cinygmula irina</i> Tshernova & Below, 1982	Heptageniidae	
<i>jacobsoni</i>	<i>Tricoryphus jacobsoni</i>	Ulmer, 1913	ST (1, 3)	M, F	<i>Sparsorhynchus jacobsoni</i> (Ulmer, 1913)	Tricorythidae	Sroka and Soldán 2008; (a.)
<i>japonicus</i>	<i>Chironomites japonicus</i>	Ulmer, 1920	ST (1, 2, 3)	M, F	<i>Isonychia japonica</i> (Ulmer, 1920)	Isonychiidae	Ueno 1931; (a.)
<i>javanicus</i>	<i>Afronurus javanicus</i>	Ulmer, 1939	HT (1)	M	<i>Afronurus javanicus</i> Ulmer, 1939	Heptageniidae	
<i>javanicus</i>	<i>Baetis javanicus</i>	Ulmer, 1913	ST (1, 2, 3)	F	<i>Baetis javanicus</i> Ulmer, 1913	Baetidae	
<i>jorgenseni</i>	<i>Campsurus jorgenseni</i>	Esben-Petersen, 1912b	ST (1)	M, F	<i>Campsurus jorgenseni</i> Esben-Petersen, 1912	Polymitarcyidae	
<i>jorgenseni</i>	<i>Cloon jorgenseni</i>	Esben-Petersen, 1909	ST (1, 3)	M, F	<i>Americabaetis jorgenseni</i> (Esben-Petersen, 1909)	Baetidae	Lugo-Ortiz and McCaffery 1999
<i>karnyi</i>	<i>Hagenulus karnyi</i>	Ulmer, 1939	ST (1, 3)	SM, SF	<i>Choroiterpes (Euthmaulus) karnyi</i> (Ulmer, 1939)	Leptophlebiidae	Peters and Edmunds 1970
<i>krapelini</i>	<i>Pseudocloon krapelini</i>	Klapalek, 1905b	LT, PLT (1, 3)	M, SM	<i>Pseudocloon krapelini</i> Klapalek, 1905	Baetidae	Wälz and McCaffery 1985
<i>krieghoffi</i>	<i>Chironophora krieghoffi</i>	Ulmer, 1920	ST (2)	M, S	<i>Ephemerella mucronata</i> (Bengtsson, 1909) (syn.)	Ephemerellidae	Jacob 1974
<i>luciscoerulei</i>	<i>Tasmanophlebia luciscoerulei</i>	Tillyard, 1933	PT (1)	SF	<i>Tasmanophlebia luciscoerulei</i> Tillyard, 1933	Oniscigastridae	(d.)
<i>laminatum</i>	<i>Deleatidium laminatum</i>	Ulmer, 1920	PT (3)	M	<i>Meridialaris laminata</i> (Ulmer, 1920)	Leptophlebiidae	Peters and Edmunds 1972; (h.)
<i>lamurientis</i>	<i>Thalerosphyrus lamurientis</i>	Sartori, 2014e	HT, PT (1, 3)	N	<i>Thalerosphyrus lamurientis</i> Sartori, 2014	Heptageniidae	
<i>latifrons</i>	<i>Cinygmula latifrons</i>	Tshernova & Below, 1982	PT (1)	M	<i>Cinygmula hirasana</i> (Imanishi, 1935) (syn.)	Heptageniidae	Kluge 1995
<i>latus</i>	<i>Tricoryphus latus</i>	Ulmer, 1916	PT (1, 2, 3)	M	<i>Tricoryphus latus</i> Ulmer, 1916	Tricorythidae	
<i>lestagei</i>	<i>Atalophlebiodes lestagei</i>	Ulmer, 1938	ST (1, 3)	N	<i>Meridialaris lestagei</i> (Ulmer, 1938)	Leptophlebiidae	Dominguez et al. 2006

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<i>lieftincki</i>	<i>Heptagenia lieftincki</i>	Ulmer, 1939	HT, PT (1, 3)	M, F	<i>Compoeneria lieftincki</i> (Ulmer, 1939)	Heptageniidae	Sartori 2014a
<i>lobatus</i>	<i>Echyonurus lobatus</i>	Ulmer, 1924	ST (1, 2, 3)	M, F, SF	<i>Afronurus lobatus</i> (Ulmer, 1924)	Heptageniidae	Mol 1987
<i>longilobata</i>	<i>Leptophlebia longilobata</i>	Tshernova, 1928a	PT (1, 3)	M	<i>Paraleptophlebia longilobata</i> (Tshernova, 1928)	Leptophlebiidae	Tiuova and Kluge 2016
<i>longus</i>	<i>Tricoryphus longus</i>	Ulmer, 1916	PT (1, 2, 3)	M, F	<i>Tricoryphus longus</i> Ulmer, 1916	Tricorythidae	
<i>lucida</i>	<i>Atalophlebia lucida</i>	Ulmer, 1920	HT (1)	M	<i>Thraulophlebia lucida</i> (Ulmer, 1920)	Leptophlebiidae	Demoulin 1955; (c)
<i>macedonicus</i>	<i>Rhoenanthus macedonicus</i>	Ulmer, 1920	HT (2)	M	<i>Neophemera maxima</i> (Joly, 1871)	Neophemeridae	Bae and McCaffery 1998
<i>maculipennis</i>	<i>Thraulus maculipennis</i>	Ulmer, 1920	HT (1)	M	<i>Hermanella maculipennis</i> (Ulmer, 1920)	Leptophlebiidae	Dominguez and Flowers 1989
<i>magificus</i>	<i>Rhoenanthus magificus</i>	Ulmer, 1920	PT (1, 2, 3)	M	<i>Rhoenanthus magificus</i> Ulmer, 1920	Potamanthidae	
<i>major</i>	<i>Choroterpides major</i>	Ulmer, 1939	HT, PT (1, 3)	M, N	<i>Dilatogathus major</i> (Ulmer, 1939)	Leptophlebiidae	Kluge 2012
<i>malaisei</i>	<i>Cinygna malaisei</i>	Ulmer, 1927	PT (1, 3)	M	<i>Cinygna malaisei</i> (Ulmer, 1927)	Heptageniidae	Levanidova 1972
<i>marginatus</i>	<i>Thraulus marginatus</i>	Ulmer, 1913	ST (1, 3)	M, F	<i>Chorotopes (Eubraulius) marginatus</i> (Ulmer, 1913)	Leptophlebiidae	Peters and Edmunds 1970
<i>media</i>	<i>Ephemera media</i>	Ulmer, 1936	ST (2)	M, F, SM, SF	<i>Ephemera media</i> Ulmer, 1936	Ephemeridae	(a.)
<i>media</i>	<i>Teloganopsis media</i>	Ulmer, 1939	HT, PT (1, 3)	M, N	<i>Teloganopsis media</i> Ulmer, 1939	Ephemerellidae	Ubero-Pascal and Sartori 2009; Sartori 2014f; (d.)
<i>melli</i>	<i>Thalerosphybus melli</i>	Ulmer, 1926	PT (2, 3)	M, F	<i>Epeorus melli</i> (Ulmer, 1926)	Heptageniidae	Zhou et al. 2007
<i>mexicana</i>	<i>Heptagenia mexicana</i>	Ulmer, 1920	PT (3)	M	<i>Maccaffertium mexicanum</i> (Ulmer, 1920)	Heptageniidae	Wang and McCaffery 2004; (f)
<i>njoebergi</i>	<i>Euphyurus njoebergi</i>	Ulmer, 1917	PT (1, 3)	M	<i>Ulnerophlebia njoebergi</i> (Ulmer, 1917)	Leptophlebiidae	Demoulin 1955
<i>montium</i>	<i>Thraulus montium</i>	Ulmer, 1943	HT (2)	M	<i>Traverella montium</i> (Ulmer, 1943)	Leptophlebiidae	Allen 1973
<i>multus</i>	<i>Baetis multus</i>	Müller-Liebenau, 1984	PT (3)	N	<i>Labiobaetis multus</i> (Müller-Liebenau, 1984)	Baetidae	McCaffery and Waltz 1995
<i>nasuta</i>	<i>Heptagenia nasuta</i>	Ulmer, 1939	ST (1, 2)	M, F	<i>Trichogenia nasuta</i> (Ulmer, 1939)	Heptageniidae	Webb et al. 2006; (a)
<i>natans</i>	<i>Chankagenesia natans</i>	Buldowsky, 1935	PT (1)	M, F	<i>Chankagenesia natans</i> Buldowsky, 1935	Palingeniidae	
<i>necatii</i>	<i>Echyonurus necatii</i>	Kazanci, 1987	PT (1)	SM	<i>Electrogena necatii</i> (Kazanci, 1987)	Heptageniidae	Kazanci 2001

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<i>necopinatus</i>	<i>Baetis necopinatus</i>	Müller-Liebenau, 1981	HT (1, 3)	M	<i>Labiobaetis necopinatus</i> (Müller-Liebenau, 1981)	Baetidae	McCaffery and Waltz 1995
<i>nigrescens</i>	<i>Baetis nigrescens</i>	Navás, 1932	ST (2)	M	<i>Baetis nigrescens</i> Navás, 1932	Baetidae	Müller-Liebenau 1971
<i>nigrescens</i>	<i>Tasmanophlebia nigrescens</i>	Tillyard, 1933	PT (1)	F, N	<i>Tasmanophlebia nigrescens</i> Tillyard, 1933	Oniscogastridae	(d.)
<i>nigropunctata</i>	<i>Caenis nigropunctata</i>	Klapalek, 1905b	ST (2, 3)	F	<i>Caenis nigropunctata</i> Klapalek, 1905	Caenidae	Malzacher 2015
<i>nigropunctatula</i>	<i>Caenis nigropunctatula</i>	Malzacher, 2015	HT, PT (1, 3)	M, F	<i>Caenis nigropunctatula</i> Malzacher, 2015	Caenidae	
<i>nitidum</i>	<i>Centropilum nitidum</i>	Ulmer, 1916	ST (2)	F	<i>Bugillestia nitida</i> (Ulmer, 1916)	Baetidae	Lugo-Ortiz and McCaffery 1996
<i>novatus</i>	<i>Baetis novatus</i>	Müller-Liebenau, 1981	HT (3)	N	<i>Baetis novatus</i> Müller-Liebenau, 1981	Baetidae	
<i>obscurum</i>	<i>Pseudocloeon obscurum</i>	Ulmer, 1913	ST (3)	M	<i>Pseudocloeon obscurum</i> Ulmer, 1913	Baetidae	Müller-Liebenau 1981
<i>olivascens</i>	<i>Baetis olivascens</i>	Ulmer, 1939	HT, PT (1, 3)	M, SM, SF	<i>Baetis olivascens</i> Ulmer, 1939	Baetidae	
<i>operosus</i>	<i>Baetis operosus</i>	Müller-Liebenau, 1984	PT (3)	N	<i>Labiobaetis operus</i> (Müller-Liebenau, 1984)	Baetidae	McCaffery and Waltz 1995
<i>orientale</i>	<i>Pseudocloeon orientale</i>	Müller-Liebenau, 1982	PT (1)	N	<i>Liebiella orientale</i> (Müller-Liebenau, 1982)	Baetidae	Waltz and McCaffery 1987
<i>orientalis</i>	<i>Palingenia orientalis</i>	Chopra, 1927	PT (2)	M	<i>Palingenia orientalis</i> Chopra, 1927	Palingeniidae	
<i>orientalis</i>	<i>Raprobetopus orientalis</i>	Müller-Liebenau, 1978	HT (3)	N	<i>Baetopus orientalis</i> (Müller-Liebenau, 1978)	Baetidae	Jacob 1991
<i>ornata</i>	<i>Rhibrogeniella ornata</i>	Ulmer, 1939	HT, PT (1, 3)	M, F	<i>Rhibrogeniella ornata</i> Ulmer, 1939	Heptageniidae	Sartori 2014d
<i>ornatum</i>	<i>Procloeon ornatum</i>	Tshernova, 1928b	LT (1, 3)	M	<i>Procloeon ornatum</i> Tshernova, 1928	Baetidae	Sowa 1975
<i>paradoxa</i>	<i>Anagenesia paradoxa</i>	Buldovsky, 1935	PT (1)	M, F	<i>Anagenesia paradoxa</i> Buldovsky, 1935	Palingeniidae	
<i>parvus</i>	<i>Echynurus parvus</i>	Ulmer, 1912	ST (1, 2, 3)	M, F	<i>Rhibrogena parva</i> (Ulmer, 1912)	Heptageniidae	Sartori 2014b
<i>patagonica</i>	<i>Atalophlebia patagonica</i>	Lestage, 1931	HT (1, 3)	F	<i>Meridiolaris patagonica</i> (Lestage, 1931)	Leptophlebiidae	Peters and Edmunds 1972
<i>pekinensis</i>	<i>Caenis pekinensis</i>	Malzacher, 2016	HT, PT (1, 3)	N	<i>Caenis pekinensis</i> Malzacher, 2016	Caenidae	

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<i>pekingensis</i>	<i>Baetis pekingensis</i>	Ulmer, 1936	HT, PT (1)	M, F, SM, SF	<i>Alainites pekingensis</i> (Ulmer, 1936)	Baetidae	Waltz et al. 1994
<i>peruvianus</i>	<i>Baetis peruvianus</i>	Ulmer, 1920	ST (2)	M, SM	<i>Andestops peruvianus</i> (Ulmer, 1920)	Baetidae	Lugo-Ortiz and McCaffery 1999
<i>pescadori</i>	<i>Jubabacis pescadori</i>	Müller-Liebenau, 1980b	HT (3)	N	<i>Jubabacis pescadori</i> Müller-Liebenau, 1980	Baetidae	
<i>peterseni</i>	<i>Leptophyphes peterseni</i>	Ulmer, 1920	ST (1, 3)	M, F, SM, SF	<i>Leptophyphes peterseni</i> Ulmer, 1920	Leptophlebiidae	
<i>petersi</i>	<i>Rheobacis petersi</i>	Müller-Liebenau, 1974	HT (1)	M, N	<i>Heterocheon petersi</i> (Müller-Liebenau, 1974)	Baetidae	McCaffery and Provonsha 1975
<i>philippinensis</i>	<i>Caenodus philippinensis</i>	Ulmer, 1924	ST (1, 2, 3)	M	<i>Caenis philippinensis</i> (Ulmer, 1924)	Caenidae	Kluge 1985
<i>pictipennis</i>	<i>Ephemeru pictipennis</i>	Ulmer, 1924	ST (2)	M, F	<i>Ephemeru pictipennis</i> Ulmer, 1924	Ephemeridae	
<i>powelli</i>	<i>Lachlania powelli</i>	Edmunds, 1951	PT (1)	M, F, N	<i>Lachlania sakatschevanensis</i> Ide, 1941 (syn.)	Oligoneuriidae	McCaffery 1996
<i>proba</i>	<i>Choroterpes proba</i>	Ulmer, 1939	ST (1, 3)	N	<i>Choroterpes proba</i> Ulmer, 1939	Leptophlebiidae	
<i>prominens</i>	<i>Habrophlebiodes prominens</i>	Ulmer, 1939	HT (1, 3)	M	<i>Habrophlebiodes prominens</i> Ulmer, 1939	Leptophlebiidae	
<i>pseudorhodani</i>	<i>Baetis pseudorhodani</i>	Müller-Liebenau, 1971	HT, PT (1)	M, N	<i>Baetis pseudorhodani</i> Müller-Liebenau, 1971	Baetidae	
<i>puigae</i>	<i>Teloganopsis puigae</i>	Ubero-Pascal & Sartori, 2009	PT (1)	N	<i>Teloganopsis puigae</i> Ubero-Pascal & Sartori, 2009	Ephemerellidae	
<i>pulcher</i>	<i>Afronurus pulcher</i>	Ulmer, 1930	PT (1)	SM, SF	<i>Afronurus collaris</i> (Navás, 1930) (syn.)	Heptageniidae	Demoulin 1956
<i>purpurata</i>	<i>Ephemeru purpurata</i>	Ulmer, 1920	PT (2)	M	<i>Ephemeru purpurata</i> Ulmer, 1920	Ephemeridae	
<i>ranauensis</i>	<i>Caenis ranauensis</i>	Malzacher, 2015	HT, PT (1, 3)	M, F	<i>Caenis ranauensis</i> Malzacher, 2015	Caenidae	
<i>rhenicola</i>	<i>Caenis rhenicola</i>	Malzacher, 1976	HT, PT (1)	M	<i>Caenis pusilla</i> Navás, 1913 (syn.)	Caenidae	Alba-Tercedor and Malzacher 1986
<i>rossicus</i>	<i>Echyonurus rossicus</i>	Tshernova, 1928b	PT (1)	M	<i>Kageronia fuscogrisea</i> (Retzius, 1783) (syn.)	Heptageniidae	Puthz 1977b
<i>sauteri</i>	<i>Ephemeru sauteri</i>	Ulmer, 1912	PT (2)	M, F	<i>Ephemeru sauteri</i> Ulmer, 1912	Ephemeridae	
<i>scotti</i>	<i>Caenis scotti</i>	Ulmer, 1930	PLT (1)	M, F	<i>Caenis scotti</i> Ulmer, 1930	Caenidae	
<i>seminiger</i>	<i>Simobraulius seminiger</i>	Ulmer, 1939	HT (1)	M	<i>Simobraulius seminiger</i> Ulmer, 1939	Leptophlebiidae	Grant and Peters 1993
<i>sexfasciata</i>	<i>Anatolphebia sexfasciata</i>	Ulmer, 1916	HT (1, 3)	M	<i>Anatolphebia sexfasciata</i> (Ulmer, 1916)	Leptophlebiidae	Harker 1954; (j)

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<i>sikorai</i>	<i>Euthyplocia sikorai</i>	Vayssière, 1895	PT (1, 3)	N	<i>Proboscidioplocia sikorai</i> (Vayssière, 1895)	Euthyplociidae	Demoulin 1966
<i>sinensis</i>	<i>Iron sinensis</i>	Ulmer, 1926	PT (2, 3)	M	<i>Epeorus sinensis</i> (Ulmer, 1926)	Heptageniidae	Edmunds and Traver 1954
<i>soror</i>	<i>Baetis soror</i>	Ulmer, 1908	ST (1)	M, F	<i>Offiadens soror</i> (Ulmer, 1908)	Baetidae	Lugo-Ortiz and McCaffery 1998
<i>souai</i>	<i>Rhithrogena souai</i>	Puthz, 1972	HT (2)	M	<i>Rhithrogena souai</i> Puthz, 1972	Heptageniidae	
<i>sudanense</i>	<i>Centropilum sudanense</i>	Ulmer, 1916	PT (1)	M, SM	<i>Bugilliesia sudanense</i> (Ulmer, 1916)	Baetidae	Lugo-Ortiz and McCaffery 1996
<i>sumatrana</i>	<i>Baetis sumatrana</i>	Ulmer, 1939	ST (1, 3)	M, F	<i>Baetis sumatrana</i> Ulmer, 1939	Baetidae	Müller-Liebenau 1981
<i>sumatranus</i>	<i>Echoporus sumatranus</i>	Ulmer, 1939	HT (1, 3)	F	<i>Rhithrogena sumatrana</i> (Ulmer, 1939)	Heptageniidae	Sartori 2014b
<i>thienemanni</i>	<i>Compsoneuriella thienemanni</i>	Ulmer, 1939	LT, PLT (1, 2, 3)	M, F, N	<i>Compsoneuriella thienemanni</i> Ulmer, 1939	Heptageniidae	Sartori 2014a
<i>tibiale</i>	<i>Cinygna tibiale</i>	Ulmer, 1920	PT (1, 3)	M	<i>Rhithrogena tibiale</i> (Ulmer, 1920)	Heptageniidae	Tshernova and Belov 1982
<i>tibialis</i>	<i>Atopopus tibialis</i>	Ulmer, 1920	PT (2, 3)	M, F	<i>Atopopus tibialis</i> Ulmer, 1920	Heptageniidae	
<i>traverae</i>	<i>Rheobaetis traverae</i>	Müller-Liebenau, 1974	HT (1)	N	<i>Heterochaeton curtosum</i> (McDunnough, 1923) (syn.)	Baetidae	McCaffery and Provonsha 1975
<i>triangularis</i>	<i>Siphonurus triangularis</i>	Clemens, 1915	PT (1)	M, F, N	<i>Siphonurus quebecensis</i> (Provancher, 1878) (syn.)	Siphonuridae	McDunnough 1925
<i>truncatus</i>	<i>Campsurus truncatus</i>	Ulmer, 1920	PT (2)	M, F	<i>Campsurus truncatus</i> Ulmer, 1920	Polymitarcyidae	
<i>ulmeri</i>	<i>Asionurus ulmeri</i>	Braasch & Soldán, 1986	HT, PT (1, 3)	N	<i>Asionurus ulmeri</i> Braasch & Soldán, 1986	Heptageniidae	
<i>ulmeri</i>	<i>Baetis ulmeri</i>	Müller-Liebenau, 1981	HT (1, 3)	M	<i>Labiobaetis ulmeri</i> (Müller-Liebenau, 1981)	Baetidae	McCaffery and Waltz 1995
<i>ulmeri</i>	<i>Behningia ulmeri</i>	Lestage, 1930	HT (1)	N	<i>Behningia ulmeri</i> Lestage, 1930	Behningiidae	
<i>ulmeri</i>	<i>Dudgeodes ulmeri</i>	Sartori, 2008	HT, PT (1, 3)	M, SM, F, N	<i>Dudgeodes ulmeri</i> Sartori, 2008	Teloganodiidae	Sartori et al. 2008 Sartori 2014f
<i>ulmeri</i>	<i>Trichogenia ulmeri</i>	Braasch & Webb, 2006	HT, PT (1, 3)	N	<i>Trichogenia ulmeri</i> Braasch & Webb, 2006	Heptageniidae	

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<i>ubneriana</i>	<i>Caenis ubneriana</i>	Malzacher, 2015	HT, PT (1, 3)	M, F	<i>Caenis ubneriana</i> Malzacher, 2015	Caenidae	
<i>umbata</i>	<i>Teloganella umbata</i>	Ulmer, 1939	HT (1)	SF	<i>Teloganella umbata</i> Ulmer, 1939	Teloganellidae	
<i>ungicularis</i>	<i>Euphyurus unguicularis</i>	Ulmer, 1917	PT (1)	M	<i>Austrophlebiodes unguicularis</i> (Ulmer, 1917)	Leptophlebiidae	Campbell and Suter 1988
<i>ungiculatus</i>	<i>Campsurus unguiculatus</i>	Ulmer, 1920	ST (2)	M	<i>Tortopsis unguiculatus</i> (Ulmer, 1920)	Polymitarcyidae	Molineri 2010
<i>ussingi</i>	<i>Rhithrogena ussingi</i>	Esben-Petersen, 1910	PT (2)	M	<i>Rhithrogena germanica</i> Eaton, 1885 (syn.)	Heptageniidae	Sowa 1971
<i>verum</i>	<i>Pseudocoon verum</i>	Müller-Liebenau, 1982	PT (1, 3)	N	<i>Liebiella vera</i> (Müller-Liebenau, 1981)	Baetidae	Wälz and McCaffery 1987
<i>virens</i>	<i>Cloeon virens</i>	Klapalek, 1905b	ST (2, 3)	M, F	<i>Cloeon virens</i> Klapalek, 1905	Baetidae	
<i>vitellinum</i>	<i>Centropilum vitellinum</i>	Ulmer, 1939	HT (2)	M	<i>Centropilum vitellinum</i> Ulmer, 1939	Baetidae	
<i>winckleri</i>	<i>Isonychia winckleri</i>	Ulmer, 1939	ST (2)	M, F, SF	<i>Isonychia winckleri</i> Ulmer, 1939	Isonychiidae	(a.)
<i>wui</i>	<i>Leptophlebia wui</i>	Ulmer, 1936	ST (1)	M, F	<i>Leptophlebia wui</i> Ulmer, 1936	Leptophlebiidae	
<i>wui</i>	<i>Caenis wui</i>	Malzacher, 2016	HT, PT (1,3)	N	<i>Caenis wui</i> Malzacher, 2016	Caenidae	
Missing material							
<i>asiaticum</i>	<i>Cinygma asiaticum</i>	Ulmer, 1924	ST (2)	M	<i>Incertae sedis</i>	Heptageniidae	Tshernova and Belov 1982
<i>klapaleki</i>	<i>Pseudocoon klapaleki</i>	Müller-Liebenau, 1982	PT (1)	N	<i>Liebiella klapaleki</i> (Müller-Liebenau, 1982)	Baetidae	Wälz and McCaffery 1987

Georg Ulmer was an outstanding specialist and his comprehensive studies on the faunistics and taxonomy of various groups of freshwater invertebrates formed the foundation of the recent taxonomy and systematics of those groups, especially Ephemeroptera and Trichoptera.

In addition to Ulmer's collection, the ZMH also stores primary type material described by other authors, such as Klapalek (1905a,b), Lestage (1930, 1935), Malzacher (1976, 2015, 2016), Müller-Liebenau (1971, 1974, 1980a, b, 1981), and Sartori (2008, 2014e). An interesting finding was the discovery of several paratypes of species described by Esben-Petersen (e.g. 1909, 1912a, b, 1913), which were not labelled as such but come from the type series, judging from the dates and places on labels. More information on these mayfly specialists can be found at http://www.ephemeroptera.de/inhaltsverzeichnis/Galerie____/galerie____.html, a webpage maintained by Udo Jacob and Arne Haybach.

The only attempt, prior to this type catalogue, has been made by Weidner (1962, 1964a, 1977), who published a list of Ephemeroptera type material deposited in ZMH, without any taxonomic remarks. At that time, 121 species were mentioned. This catalogue is accessible online (<https://www.cenak.uni-hamburg.de/sammlungen/zoologie/entomologie/typenkatalog.html>).

Multiple subsequent taxonomic surveys utilizing a variety of different, high-resolution methods (morphological and molecular) led not only to the description of many new taxa, but also several supraspecific changes (e.g. Peters and Edmunds 1972; Puthz 1977; Braasch and Soldán 1986; Campbell and Suter 1988; Gillies 1990; Grant and Peters 1993; McCafferty and Waltz 1995; Lugo-Ortiz and McCafferty 1996, 1999; Sartori et al. 2008; Sartori 2014a, b, c.).

The catalogue that follows is arranged alphabetically by species name, followed by the original combination, author(s) name and year of publication. For each entry, an actual nomenclature (valid names or synonymy) is given. The kind of type and the metamorphic stage of specimens are abbreviated as indicated in the table header. The present study is a completely independent and new work; data reported by Weidner were not copied as a base for this catalogue. This study is entirely original work, based on the first author's specimen-by-specimen examination of the ZMH collections from December 2013 to June 2014. Recent publications by Malzacher (2015, 2016) on Ulmer's collection were also added.

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