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Key and bibliography of the genera of European Trichoptera larvae

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Abstract

The paper provides a synoptic key to the genera of final instar European Trichoptera larvae. The most important characters are illustrated by colour photos, with arrows highlighting the diagnostic features. A short descriptive text gives additional information for each decision and guides the reader through the determination process.

Key words: Trichoptera larvae, final instars, synoptic key, genera, Europe

Introduction

Based on the inventories of Graf *et al.* (2008a) and Malicky (2004, 2005), the European Trichoptera fauna encompasses 23 families (including Arctopsychidae and Ptilocolepidae, but excluding Apataniidae which is seen as a subfamily of Limnephilidae) and a total of 133 genera (including *Alpopsyche* Botosaneanu & Giudicelli 2004). Hitherto, no effort has been made to construct a key to all genera of European caddisfly larvae. There are good reasons for this: there is still a severe lack on larval descriptions; in fact, in approximately a fifth of all Limnephilid genera not even one larval description exists. Another difficulty is the fact that many genera are very heterogeneous which means that a given genus often keys more than once in the tables, possibly reflecting a polyphyletic status of the taxa. Finally, there are still debates on existing genus or even family concepts which will probably continue for a long time (e.g., *Stenophylax* versus *Micropterna*, *Dinarthrum* versus *Lepidostoma*, Arctopsychidae versus Hydropsychidae). Despite these shortcomings we feel that a first attempt on a key to European caddisfly genera has to be made in order to define and highlight the research deficits in larval taxonomy and to present a first and preliminary overview of the current knowledge. As a key format, we chose to use the proven synoptic layout which is also the basis for the Atlas on Central European Trichoptera larvae (Waringer & Graf 2011). The key uses all hitherto published larval descriptions we are aware of that are valid for European ecoregions 1 to 25 of the inventory by Graf *et al.* (2008), excluding only ecoregions X (North Africa) and Y (Asia Minor and Middle East; Fig. 1). The identification of Central European taxa to species level can be done by using the Atlas of Waringer & Graf (2011). In cases where only one species of a given genus is present in the area of this key, a note has been added. With respect to nomenclature and taxonomy, we closely follow Malicky (2004, 2005). Valuable additional information was obtained from the works of Morse (2011, 2012).

Material and methods

The information for constructing the key has been obtained by several methods:

- (1) **Rearing:** Adults were collected by using a hand net or a light trap. In the laboratory, females which had already copulated in the field were individually transferred to small plastic boxes lined with wet moss for oviposition. After oviposition, adults were preserved in glass vials containing ethanol (70%) and

identified. Subsequently, egg masses were transferred to water-filled, aerated containers and kept in a cool room. Rearing containers were equipped with leaves, sand, small stones and twig particles which matched their original habitat as support structures and to provide case-building material. Larvae were fed with different types of plant material and inspected daily. The method was described in detail by Malicky *et al.* (2002). Larval moultings were recorded; therefore it was possible to identify final instar larvae which were preserved in 70% ethanol.

- (2) **Gene sequencing:** Larvae which obviously were not yet included in existing keys were collected in the field. To support conspecific association between larval and adult specimens we sequenced and analyzed fragments of mitochondrial and nuclear genes (mtCOI, mtLSU, nuWG) following the methods outlined by Pauls *et al.* (2006, 2008).
- (3) **Other associated larvae:** Larval donations were made by colleagues and investigations were conducted with museum and collection material.
- (4) **Publications:** Published larval keys and descriptions were consulted. A summary of the most-used references for the construction of the key is given in Table 1.

The larvae were studied and photographed using a Nikon SMZ 1500 binocular microscope with DS-Fi1 camera and NIS-elements D 3.1 image stacking software for combining 8–35 frames in one focused image.



FIGURE 1. The area covered by the present key, showing the national borders of European countries (white lines) as well as the borders of European Ecoregions defined by Illies (1978) (blue lines): 1 = Iberic-Macaronesian Region, 2 = Pyrenees, 3 = Italy, Corsica and Malta, 4 = Alps, 5 = Dinaric Western Balkan, 6 = Hellenic Western Balkan, 7 = Eastern Balkan, 8 = Western Highlands, 9 = Central Highlands, 10 = Carpathians, 11 = Hungarian Lowlands, 12 = Pontic Province, 13 = Western Plains, 14 = Central Plains, 15 = Baltic Province, 16 = Eastern Plains, 17 = Ireland, 18 = Great Britain, 19 = Iceland, 20 = Borealic Uplands, 21 = Tundra, 22 = Fennoscandian Shield, 23 = Taiga, 24 = Caucasus, 25 = Caspian Depression.

TABLE 1. Summary of most-used references for the construction of the key. Further references for Central European species are included in the Atlas of Waringer & Graf (2011).

Family	References
Rhyacophilidae	Botosaneanu (1953, 1955, 1956a, b), Buholzer (1978), Coppa <i>et al.</i> (2012), Décamps (1965a, 1966), Edington & Hildrew (1995), Giudicelli & Botosaneanu (1999), Konar (1997, 2000), Kumanski (1971), Lepneva (1964), Moretti (1983), Tachet <i>et al.</i> (2010), Viedma & Garcia de Jalon (1980), Vieira-Lanero (2000), Vieria-Lanero <i>et al.</i> (2001a, 2008), Zamora-Muñoz <i>et al.</i> (1992, 1997)
Glossosomatidae	Botosaneanu (1959), Camargo & Garcia de Jalon (1987), Kumanski (1973), Lepneva (1964), Moretti (1983), Pitsch (1993), Ruiz <i>et al.</i> (2004), Solem & Gullefors (1996), Tachet <i>et al.</i> (2010), Vieira-Lanero (2000), Vieira-Lanero <i>et al.</i> (2001b), Wallace <i>et al.</i> (2003), Wiggins (1996)
Ptilocolepidae, Hydroptilidae	Botosaneanu (1956a, 1959), González <i>et al.</i> (2000), Ito & Higler (1992), Jaquemart & Coineau (1962), Marshall (1978, 1979), Moretti (1983), Solem (1972), Ulmer (1950), Vaillant (1951, 1952), Vieira-Lanero (2000), Vieira-Lanero <i>et al.</i> (2001b), Wallace <i>et al.</i> (2003), Wiggins (1996)
Philopotamidae	Botosaneanu (1956b), Lepneva (1964), Szczesny (1978a), Tachet <i>et al.</i> (2010), Vieira-Lanero (2000), Vieira-Lanero <i>et al.</i> (2001c), Wiggins (1996)
Arctopsychidae	Bongard (1990), Solem & Gullefors (1996), Wiggins (1996)
Hydropsychidae	Boon (1977), Botosaneanu (1959), Garcia de Jalon (1981, 1983), Karaouzas (2009), Kumanski <i>et al.</i> (2004), Szczesny (1974), Vieira-Lanero (2000), Vieira-Lanero <i>et al.</i> (2001d), Waringer & Graf (2009a), Wiberg-Larsen (1980), Zamora-Muñoz <i>et al.</i> (2002) Stroot <i>et al.</i> (1988)
Ecnomidae	Botosaneanu (1953), Coppa <i>et al.</i> (2010), Décamps (1965b), Graf <i>et al.</i> (2008b), Spinelli Batta & Moretti (1992), Tachet <i>et al.</i> (2010), Urbanic <i>et al.</i> (2003), Vaillant (1954a), Vieira-Lanero (2000), Wiggins (1996)
Psychomyiidae	Botsaneau (1964), Solem & Gullefors (1996), Tachet <i>et al.</i> (2001, 2010), Vieira-Lanero (2000), Vieira-Lanero <i>et al.</i> (2003, 2004, 2009), Wallace & Wallace (1983)
Polycentropodidae	Solem (1971), Solem & Gullefors (1996), Wallace <i>et al.</i> (2003), Wiggins (1996, 1998)
Phryganeidae	Botosaneanu (1974), Cianficconi & González (2009), Décamps (1970), González <i>et al.</i> (2005), Solem & Gullefors (1996), Vieira-Lanero (2000)
Brachycentridae	Lepneva (1966), Solem & Gullefors (1996), Weaver (2002)
Lepidostomatidae	Botosaneanu (1952, 1953, 1956a, b, 1959), Camargo & Garcia de Jalon (1988), Décamps (1961, 1962), Décamps & Magné (1966), Décamps & Pujol (1975), Gislason (1979), Graf & Waringer (1997), Graf <i>et al.</i> (2011), Higler (2005), Johansson <i>et al.</i> (1991), Kućinič <i>et al.</i> (2008, 2011a, b), Lepneva (1966), Malicky (1974a), Moretti (1983), Moretti & Pirisinu (1981), Pitsch (1993), Ruiz-García <i>et al.</i> (2004, 2007), Sainz-Barian & Zamora-Muñoz (2012), Solem (1983a, b), Solem & Johansson (1991), Solem & Gullefors (1996), Szczesny (1978b), Tachet <i>et al.</i> (2010), Tanida <i>et al.</i> (1999), Vieira-Lanero (2000), Vieira-Lanero <i>et al.</i> (1996, 1997, 2005), Wallace (1980), Wallace <i>et al.</i> (2003), Waringer (1987), Waringer <i>et al.</i> (2011 a, b; 2012a, b), Wiggins (1996)
Limnephilidae	Allaya <i>et al.</i> (2003), Botosaneanu (1956a), Giudicelli (1971), Gonzalez <i>et al.</i> (1989), Vieira-Lanero (2000)
Uenoidae	Botosaneanu (1953, 1956b), Garcia de Jalon (1977), Grenier <i>et al.</i> (1969), Lepneva (1966), Vieira-Lanero (2000)
Goeridae	Botosaneanu (1959), Coppa & Tachet (2007), Lepneva (1966), Solem & Gullefors (1996), Tachet <i>et al.</i> (2010), Vieira-Lanero (2000), Wallace (1981), Wallace <i>et al.</i> (2003), Wiggins (1996)
Leptoceridae	Coppa & Tachet (2010), Garcia de Jalon <i>et al.</i> (1987), Vieira-Lanero (2000), Wiggins (1996)
Calamoceratidae	Klima & Hodges (1987)
Odontoceridae	Garcia de Jalon & Vera (1978), Vieira-Lanero (2000)
Sericostomatidae	Giudicelli & Botosaneanu (1996), Lepneva (1966), Tachet <i>et al.</i> (2010), Vaillant (1954b), Vieira-Lanero (2000), Vieira-Lanero <i>et al.</i> (2002), Wiberg-Larsen (1979)
Beraeidae	Botosaneanu (1956c), Moretti (1983), Tachet <i>et al.</i> (2010), Vieira-Lanero (2000), Vieira-Lanero <i>et al.</i> (2001e)
Helicopsychidae	Solem (1970), Solem & Gullefors (1996), Wiggins (1996)
Molannidae	

Key to the genera of European Trichoptera larvae

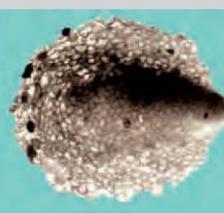
The keys are intended for final instar larvae only, although in many cases also penultimate instars will be correctly identified. Unfortunately, morphological final instar determination is only possible in three families: in Hydroptilidae, final instar larvae are recognised by the presence of a case, which is lacking in instars one to four; in Hydropsychidae, by the buds of pupal gills at the sides of the abdominal segments; and in Leptoceridae, by the pair of subocular ecdisial lines, which is present only in the final instar. For all other families, the largest larvae available should be taken for identification. Waringer & Graf (2011) listed final head widths of all Central European larvae known so far, which may be also helpful in determinations of instar.

Synoptic tables					
					Pro-, meso- and metanotum completely sclerotized
					Pro- and mesonotum completely incompletely sclerotized; mesonotum with >2 sclerites
				Pro- and mesonotum completely incompletely sclerotized; mesonotum with 1-2 sclerites	Table D
				Sclerites on pro- and mesonotum	Table C
				Pronotum only sclerotized	Table B
Table A					Table E
					Table F

Table A

Table B

Table C

Table C						
			Uenoidae: Thremma	Phryganeidae	Glossosomatidae	Sericostomatidae
		Prosternal horn present	X			
	Case shaped like a turtle shell			X		
	Case tubular				X	
	Case hood-shaped	X				
	First abdominal segment with 2 or 3 fleshy protuberances	X	X	X	X	
						Polycentropodidae: Pseudoneureclipsis*
						

* Only *P. lusitanicus* Malicky 1980 (Iberian peninsula, Western Plains): sclerotization of pro-, meso- and metanotum

Table D

* P. lusitanicus Malicky 1980 constructs fixed galleries made of sandgrains and detritus, whereas in *Brachyceratidea* transportable cases are built.

*** The cases of Sericostomatidae are tubular, those of Helicopsychidae are helicoid.

Table E

		Mesonotum: with 4 or 6, metanotum with 6 or 8 sclerites	Labrum: transverse row of long setae present	Goeridae
		Mesono- tum with 6, metanotum with 4 scler- rites		Brachycentridae
		First abdo- minal seg- ment with 2 or 3 fleshy protuberances		Sericostomatidae
Prosternal horn present		9th tergite sclerotized	X	Uenoidae: Thremma
			X	Molannidae
			X	Calamoceratidae: Calamoceras

Table F

Type of case or shelter	9th tergite sclerotized	Abdomen with tufted gills	Ventral apotome	short	long	Arctopsychidae: Arctopsyche*
Filtering nets		X				
Transportable cases			X		short	Hydropsychidae
					short	Ptilocolepidae & Hydropsytilidae
Filtering nets					short	Ecnomidae: Ecnomus
Fixed galleries					short	Polycentropodidae: Pseudoneureclipsis

* Only *A. laddogensis* (Kolenati 1859) (Central and Eastern Plains, Baltic Province, Scandinavia).

Rhyacophilidae

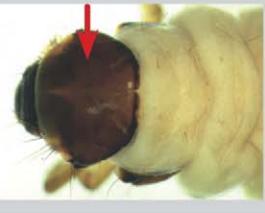


Second maxillary palp segment longer than first segment?

no	Philocrena*
yes	Rhyacophila

* In *Philocrena* (only *P. trialetica* Lepneva 1956; Caucasus), a species where abdominal gills are lacking, the pronotum is sculptured by ridgelike and tuberculate processes, and the anal claw is elongated and almost straight in its central third (Lepneva, 1964). In *Rhyacophila* species without abdominal gills, the pronotal surface is smooth and the whole anal claw is distinctly curved.

Glossosomatidae

			Dorsal case profile rounded; case with or without sand collar.	<i>Glossosoma</i>
			Dorsal case profile saddle-shaped; mesonotal sclerites large, reaching the anterolateral seta	<i>Agapetus*</i> <i>Synagapetus*</i>
Pronotum only sclerotized			X	<i>Catagapetus</i>

* Mesonotal sclerites small or almost lacking, not reaching the antero-lateral seta.

Ptilocolepidae & Hydroptilidae		Case equal in width at anterior and posterior end	X	Ptilocolepus** Micrptila**
	Dorsal sclerites present at all abdominal segments*	Tergite present only at last abdominal segment	X	X
	Dorsal sclerites present at first and last abdominal segments only (sometimes also on penultimate segment)	Mid- and hind legs much longer than fore legs; case flat, purse-shaped	X	X
		Case bottle-shaped	X	X
			X	X

* In caseless instars 1-4, dorsal sclerites are present at all abdominal segments throughout the genera.

** Ptilocolepus is the only genus of family Ptilocolepidae. Head widths in the fifth (case-bearing) instar in Ptilocolepus are significantly larger than in *Microptila minutissima* Ris 1897 (0.15 mm), the only species in this genus (Alps, Balkan peninsula).

*** Only *T. fagesii* (Guinard 1879) (widespread throughout Europe).

Hydroptiliidae 1



Case flat, silken,
with integrated
algal filaments



Tarsal claw	Case flat, covered with sand, clay or diatoms
	abruptly curved, with thick basal spur



Tarsal claw
recurved, with thin
basal spur



Case seedlings with longitudinal ridges



Case ovoid; bud-like appendages at abdominal segments

X

Ithytrichia

Orthotrichia
Stactobia*

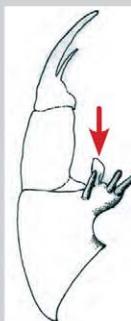
Hydrontiliidae?



Tibial process of fore leg with
slim, pinnate spine; hygro-
petric species

Hydroptila
Microptila

X

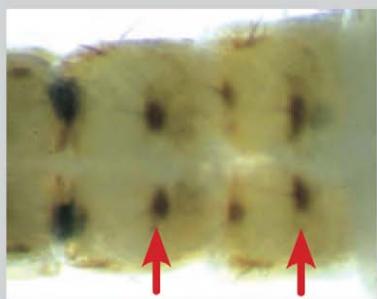


Tibial process of fore leg with broad, spatulate spine

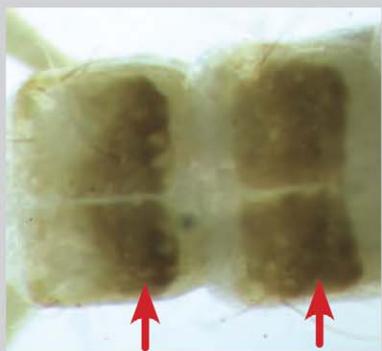
X

* Only S. risi (Felber 1908) (widespread throughout Europe).

Hydropsittidae 2



Meso- and metanotum with dark markings



Meso- and metano-
tum uniformly light
coloured

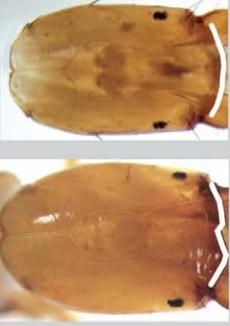


Allotrichia
Agraylea

X

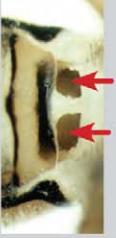
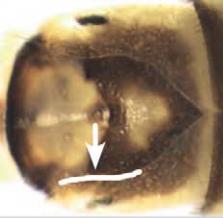
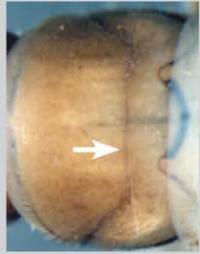
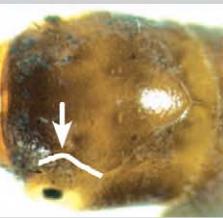
X

Philopotamidae

		Black lateral and posterior pronotal margin interrupted by a light spot	X	Chimarra*
		Black lateral and posterior pronotal margin not interrupted by a light spot	X	Wormaldia
		Anterior margin of frontoclypeus with shallow notch or evenly rounded	X	Philopotamus Dolophilodes**
		Anterior margin of frontoclypeus deeply notched	X	

* Only *C. marginata* (Linnaeus 1767) (widespread throughout Europe).

** The larva of the only *Dolophilodes* species in the area of this key (*D. ornata* Ulmer 1909; Caucasus area) is unknown.

Hydropsychidae					
		Posterior prosterites well developed			Cheumatopsyche
		Posterior prosterites lacking or reduced to small sclerotized points	X	X	Hydropsyche
		Frontoclypeus barely constricted at eye level	X	X	Diplectrona
		Frontoclypeus sharply constricted at eye level; meso- and metanotum with transverse sutures	X		
					

Psychomyiidae

Pronotum with posterolateral thickening	Anterior part of coxopleurite of fore leg with 2 vertical bars	Anterior part of coxopleurite of fore leg with 1 vertical bar only	Submental sclerite sections longer than wide	Submental sclerite sections wider than long	Psychomyia partim	Psychomyia partim*
X	X	X	X	X	X	Paduniella*
					X	Tinodes
					X	Lype

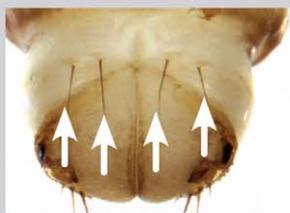
* Genus Paduniella (known from the Pyrenees, France and Russia) can be identified by the presence of 7-8 spines at the anal claw (Coppa et al., 2010a; Tachet et al., 2010) whereas only 2-3 spines are present in *Psychomyia fragilis* (Pictet 1834) and *P. klapaleki* Malicky 1995.

Limnephilidae*

* The northern Chilosigmini genus *BrachyPsyche* (only *B. sibirica* (Martynov 1924)) is unknown in the larval stage. We are not aware of any larval descriptions of the following genera: *Chaetopterygini*: *Badukiella* (only *B. prohibita* Mey & Müller 1979), *Chaetopterna* (only *C. satunini* Martynov 1913), *Chaetopteroidea*, *Kelgena*, *Psilopteryx*; *Limnophilini*: *Astratodes* (only *A. turanus* Martynov 1928); *Stenophylacini*: *Anisogamus* (only *A. difformis* (McLachlan 1867)), *Chiophylax*, *Isogamus*, *Psilopterna*.

** In widespread *Ironoquia dubia* (Stephens 1837) (subfamily Dicosmoecinae), the only species of this genus, typically 5 long setae are present along the ventral edge of each meso- and metafemur, whereas only 2 long setae are there in the northern and northeastern Limnephilini genus *Lenarchus* (Solem & Gullefors, 1996).

Limnephilidae 1



Gills consisting of single filaments only

Anterior third of pronotum with transverse	Venter of 9th abdominal segment with 4 long setae
--	---

X		X	Apatania*
X	X		Parachiona**
X		X	Leptotauius***
X		X	Limnephilus partim****
			Arctopora****

* The larvae of the Apataniinae genus Apataniana (present in Greece only) are still unknown.

** Only *P. picornis* (Pictet 1834) (widespread).

*** Only the alpine species *L. gracilis* Schmid 1955.

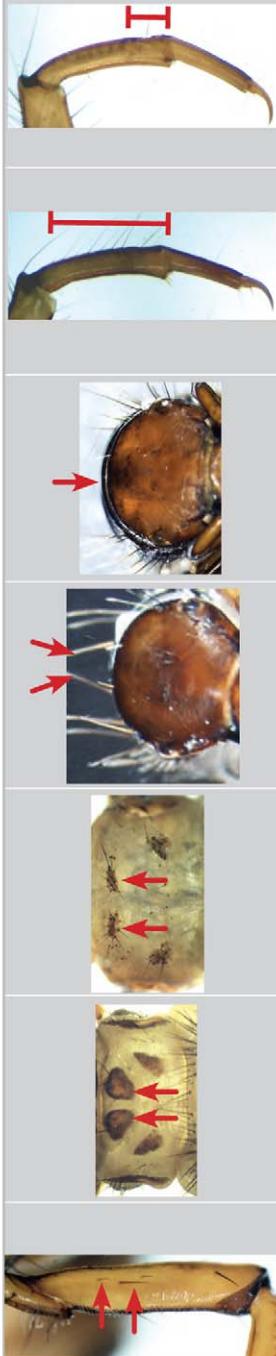
**** In the northern and northeastern genus Arctopora (only *A. trimaculata* (Zetterstedt 1840), each posteromedian metanotal sclerite is replaced by 2 setae, whereas in the Limnephilus species keyed out here each posteromedian metanotal sclerite is replaced by more than 2 setae (Solem & Gullefors, 1996).

Limnephilidae 2.1	
Head and pronotal coloration	Coloration of pronotal spines
black brown	pale yellow

Limnephiliidae 2.2		
Pronotum granulation:	Start of lateral fringe	
	fine	second segment Metanoea
	coarse	second segment Drusus partim
	coarse	third segment Drusus partim* Ecclisopteryx partim*

* In the Drusus species keyed here, the pronotal ridge (in anterior view) has a median incision which is lacking in the Ecclisopteryx species.

Limnephilidae
2.3



Setae present at the faces of mid- and hind femora

Anterior metanotal sclerites longer than their median separation

Micropterna partim

Dorsal setae only at distal third of 2nd and 3rd tibia

Dorsal setae at the entire length of 2nd and 3rd tibia

Drusus partim

* The *Allogamus* species keyed out here (*A. pertuli* Malicky 1974; Greece) can be identified by a setal band anterior of the lateral protuberance on the first abdominal segment; such a setal band is lacking in the two other genera. The *Annitella* species keyed out here (*A. apfelbecki* (Klapalek 1899)) is only present in Bosnia & Herzegovina, Croatia, Kosovo, Montenegro, Serbia and Slovenia. With the exception of Slovenia, the *Melampophylax* species keyed out here are lacking. In Slovenia, *A. apfelbecki* can be separated by head width which is > 1.10 mm and by hind tarsal length which is > 0.70 mm in fifth instar larvae.

Allogamus partim*

Annitella partim*

Melampophylax partim*

Drusus partim

Micropterna partim

Allogamus partim*

Annitella partim*

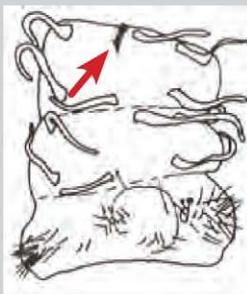
Melampophylax partim*

Drusus partim

Limnephilidae 2.4

Drusus partim

Limnephilidae 2.4**



Start of lateral fringe:

posterior third of third segment

anterior margin of third segment

posterior third of second segment

Echlisopteryx partim

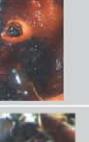
Drusus partim

*Leptodrusus**
Drusus partim*

* The only species in genus *Leptodrusus*, *L. budtzi* (Ulmer 1913), has a distinct transverse rim at the end of the anterior third of the pronotum and is an endemic of Sardinia, Corsica and the Balearic Isles. In the *Drusus* species keyed here, a transverse rim is lacking.

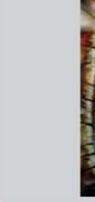
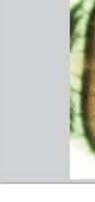
** The insufficiently known genus *Monocentra* (only *M. lepidoptera* Rambur 1842; France, Italy) will most probably also key out here.

Limnephilidae 3*

Limnephiliidae 3*						
	Dorsal head surface flattened	Lateral protuberance with 0-3 sclerites without setae and with central hole	Hind femur with >1 proximo-dorsal setae	9th abdominal segment with >1 posterolateral setae	X	X
	With rim around frontoclypeus	Lateral protuberance with 1 large sclerite without setae and with 1-3 holes	Hind femur with 1 proximo-dorsal seta	9th abdominal segment with only 1 posterolateral seta	X	Cryptothrix **
	Head and pronotum with dense cover of woolly hairs	Dorsal head surface flattened	X	X	X	Drusus partim
			X	X	X	Limnephiliidae 3.1
			X	X	X	Halesus partim
			X	X	X	Limnephiliidae 3.2
			X	X	X	Limnephiliidae 3.3
			X	X	X	Drusus partim

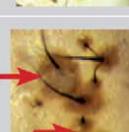
* The northern Chilostigmata genus Chilostigma (only *C. sieboldi* McLachlan 1876) keys out here (Tanida et al., 1999); this is probably also the case in *Grensia* (only *G. praeterita* Ross 1944).

** Only one alpine species: *C. nebulicola* McLachlan 1867.

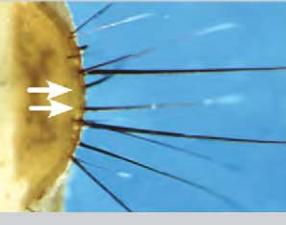
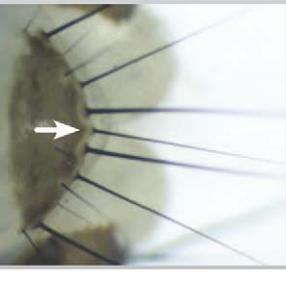
Limnephilidae 3.1					Limnephilidae 3.2				
	Pronotal surface covered by numerous black setae and spines	Anterior face setae present at 3-4 mid and hind femora	Head spinules restricted to 2 small areas behind the eyes	Head spinules cover large areas of parietalia and frontoclypeus		Pronotum concolorous	Anterior metanotal sclerites longer than their median separation?	Setal group present between posterior metanotal sclerites	
X	X	(X)	X	X	X	yes	no	X	Allogamus partim
X	X	X	X	X	X			X	Potamophylax partim
X	X	X	X	X	X			X	Platyphylax*
X	X	X	X	X	X			X	Potamophylax partim*
									Stenophylax
									Acrophylax
									Platyphylax

* Only *Platyphylax frauenfeldi* (Brauer 1857). In the Potamophylax species keyed here, a setal group is present between the metanotal sclerites; however, such a setal group is lacking in *Platyphylax*.

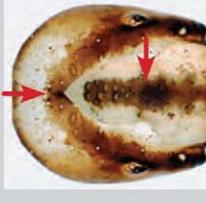
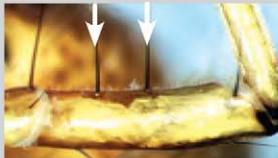
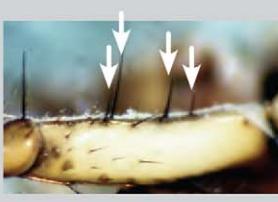
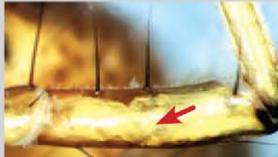
Limnephilidae 3.3

Limnephilidae	3.3							
								
								
								
								
								
	Pronotum con-colorous	Case made of watermoss leaves	Setal bases at first abdominal sternum large and often fused	Setal bases at first abdominal sternum small and isolated	Anterior metanotal sclerites longer than their median separation	Anterior metanotal sclerites shorter than their median separation	X	Allogamus partim
	Anterior third of pronotum darker than the posterior section	X	X	X	X	X	X	Consorophylax
	With setal band anterior of the lateral pro-tuberance	X	X	X	X	X	X	Chaetopterygopsis
		X	X	X	X	X	X	Pseudopsilosptyx*
		X	X	X	X	X	X	Limnephilidae 3.3.1
		X	X	X	X	X	X	Limnephilidae 3.3.2

* Only P. zimmeri (McLachlan 1876) (Alps, Central Highlands and Carpathians).

Limnephilidae 3.3.1				
		Inner margins of antero-median sclerites almost parallel, sclerite margins smooth	X	Allogamus partim Alpopsyche*
With setae posterior of dorsal protuberance		Inner margins of antero-median sclerites divergent, sclerite margins irregular	X	Melampophylax partim Annitella partim
			X	
* Only Alpopsyche ucenorum (McLachlan 1876) (restricted to the western Alps in France, Italy and Switzerland).				
Limnephilidae 3.3.2				
		rough	X	
		smooth		
		2 central setae on ninth abdominal dorsal sclerite		Case outline:
		1 central seta on ninth abdominal dorsal sclerite	X	
				rough
			X	smooth
				Chaetopteryx
				Halesus partim

Limnephilidae 4

					
					
	With 2 strong ventral edge setae on mid femur; additional slender setae may be present				
	With 3 or more strong ventral edge setae on mid femur				
	Without additional face setae on mid and hind femora				
	Additional setae present at least at 1 face of mid and hind femora	X	X	X	X
		Mesophylax*	Dicosmoecus*	Nemotauius**	
		Frontoclypeus with dark mushroom pattern; case tubular, with long twigs		Frontoclypeus with dark band of equal width; parietalia with U-shaped pattern	
		Limnephilidae 4.1	Limnephilidae 4.2		
				Anabolia partim	

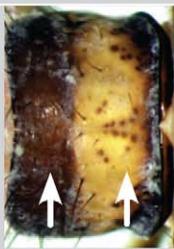
* In *Dicosmoecus palatus* (McLachlan 1872), a Northeastern Dicosmoecinae species, the tibiae have several pairs of stout, spur-like setae along the ventral edge whereas in the Stenophylacini genus *Mesophylax* only one apical pair of such setae is present.

** Only *N. punctatolineatus* (Retzius 1783) (widespread).

Limnephilidae 4.1



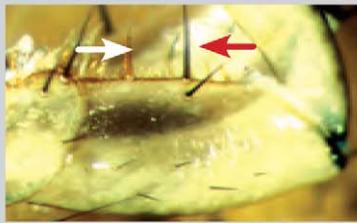
Pronotum
concolorous;
transverse rim
may be darker



Anterior third
of pronotum
darker than re-
maining prono-
tal surface



Ventral edge setae of fore femur contrasting in colour (pale/dark)	Both ventral edge setae pale
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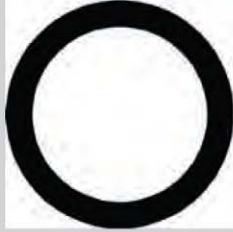
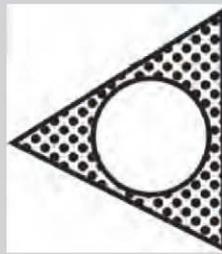
Limnephilus partim
Limnephilidae 4.1.1

Anabolia partim*
Glyphoptaelius*

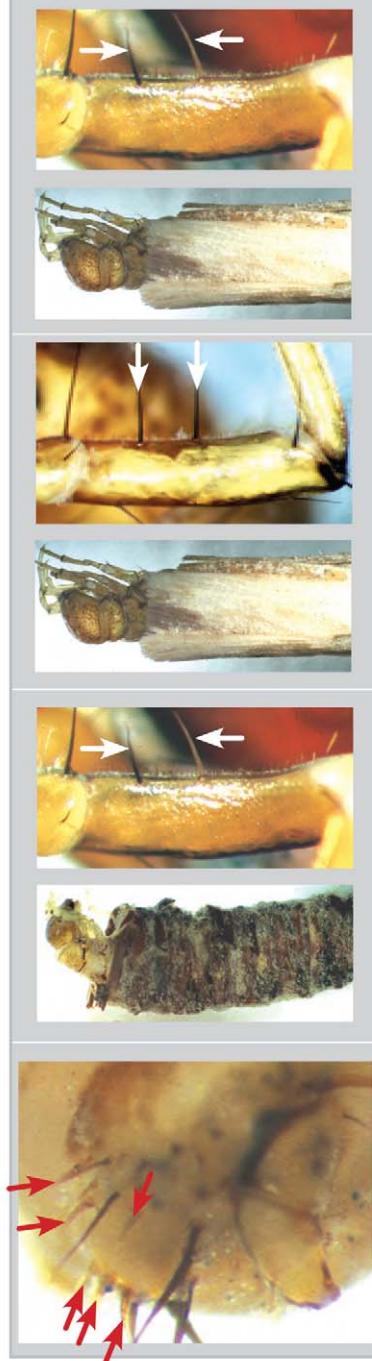
Anabolia partim*
Glyphotaelius*

* *Anabolia*: first femur with additional face setae; case cross section triangular; *Glyphotaelius*: first femur without additional face setae; case flattened, made from large circular leaf pieces.

Limnephilidae 4.1.1

		curved	straight	straight	Anabolia partim
		Head with distinct pleural bands		straight	Limnephilus partim
		Case with circular cross section	X		Limnephilus partim
		Case with triangular cross section	X	curved	Limnephilus partim Asynarchus

Limnephilidae 4.2



With setae between posteromedian metanotal sclerites

Case curved; ventral setae at mid and hind femora contrasting in colour (dark/pale)

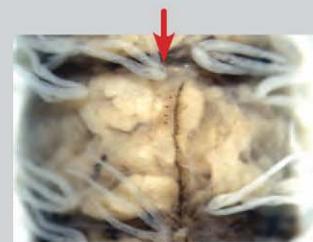
Case straight; ventral setae at mid and hind femora both dark in colour

Case straight; ventral setae at mid and hind-femora contrasting in colour (dark/pale)

X	X	X	Limnephilus partim
	X		Limnephilus partim
X	X		Rhadicoleptus*
		X	Limnephilidae 4.2.1
		X	Grammotaulius partim

* Only the widespread species *R. alpestris* (Kolenati 1848).

Limnephilidae 4.2.1



2nd abdominal segment with presegmental lateral gills

Head with parietal and frontoclypeal bands

Head without distinct bands; small pale areas near the frontoclypeal suture may be present

X

X

X

Limnephilus partim

Limnephilidae 4.2.2

Limnephilus partim

Limnephilidae 4.2.2



Start of lateral fringe on segment:

Head width >1.9 mm

2-3

Limnephilus partim

2

Limnephilus partim

3

Grammotaulius partim

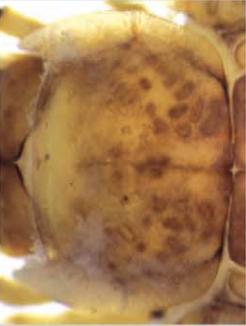
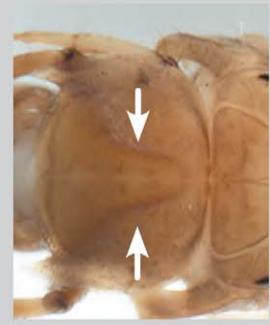
Goeridae

* Only the widespread *G. pilosa* (Fabricius 1775).

** Only L. partita Navas 1917 (Iberian peninsula).

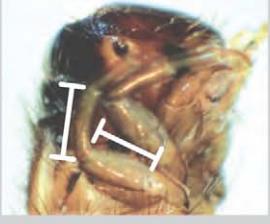
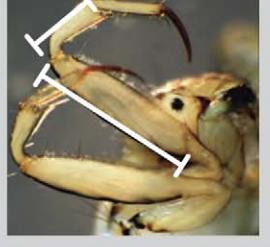
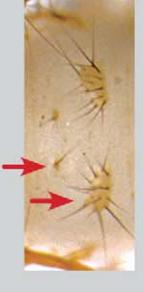
*** The anterior edge of the head depression is bordered by a ridge with saw-like teeth (in the widespread *L. niger*) or with wart-shaped tubercles (in *L. incanus*, known from the Caucasus only); such teeth or tubercles are lacking in the Silo species keyed out here.

Goeridae 1

		
	Pronotum with 1 broad, triangular hump	
	Epipleura (dorsal view) pointed	X
	Epipleura parallel-sided	X

	Lithax partim	Silonella*	Silo partim
Pronotum with none or with 3 humps	X		
X		X	
		X	

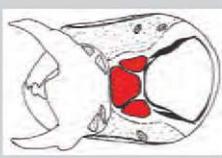
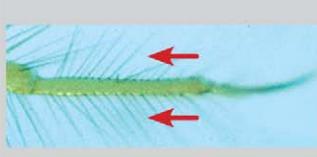
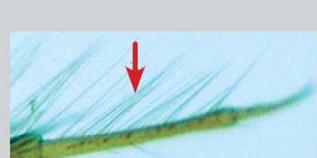
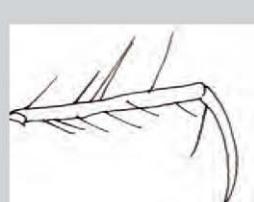
* Only *S. aurata* (Hagen 1864), known from Spain, Sardinia and Corsica.

Brachycentridae		Lepidostomatidae	
	Mid- and hind femur as long as tibia		Metanotum: anteromedian and posteromedian sclerites with 1 seta each
	Mid- and hind femur twice as long as tibia		Metanotum: anteromedian sclerites with 1 seta each, posteromedian sclerites with >1 setae each

Weaver (2002) included genus *Dinarthrum* (represented by three species from Southern Russia) in genus *Lepidostoma*; indeed, the *Dinarthrum* larvae described so far closely resemble *Lepidostoma* larvae (both share, among others, the metanotal sclerotization pattern depicted above for *Lepidostoma*). We were not able to detect any differentiation characters for these two genera. In his atlas, Malicky (2004) retained both genera. Another caucasian species (*Martino-mya tripartita* (Martynov 1913)) is unknown in the larval stage.

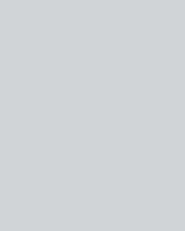
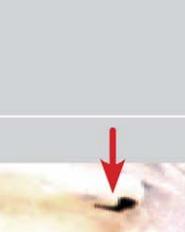
* The larvae of genus *Parasetodes* (only *P. respersella* (Rambur 1842)) are unknown.

Leptoceridae 1

		Hind tarsus with one row of dense setal fringes	Hind tarsus with 2 rows of dense setal fringes	Ventral apotome undivided	Ventral apotome tripartite	Oecetis partim	Erotesis	Triaenodes	<i>Ylodes</i> *
				X		X			
					X		X		
						X			
							X		
		Hind tarsus with sparse setae only							
		X							
			X						
				X					
					X				

* According to Lepneva (1966), however, the hind leg natatorial setae of *Y. internus* (McLachlan 1857) (Caucasus, Caspic Depression) are as in *T. bicolor* (Curtis 1834) which implies that 2 dense setal fringes are present in this species.

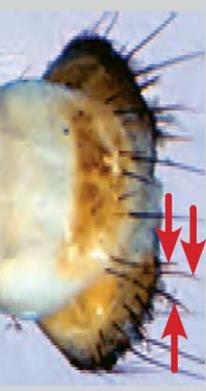
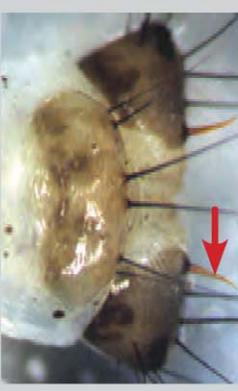
Sericostomatidae*

Sericostomatidae*			
	no	yes	
	Anterolateral corners of pronotum rounded in all instars; parietal carina meets coronal suture	Black comma-like marking present at lateral protuberance.	
	X	X	X

* The larvae of genus *Cerasma* (only *C. cornuta* McLachlan 1876; Caucasus area) are unknown.

*** Genus *Schizopelex* is known from the Iberian peninsula, France, Greece and the Caucasus. According to Vieira Lanero (2000), the anterior projection of the propleuron of *Schizopelex festiva* (Rambur 1842) is long and corniform and the ventral pronotal margin almost straight; in *Sericostoma*, however, the anterior projection is shorter, not corniform, and the ventral margin of the pronotum is convex.

Molannidae

		Anal proleg with one or several short, thick dorsal setae	Molannodes*
	Claws of hind legs thin and strongly elongated	X	Molanna
	Claws of hind legs short and stout	X	

* Only the widespread species *M. tinctus* (Zetterstedt 1840).

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