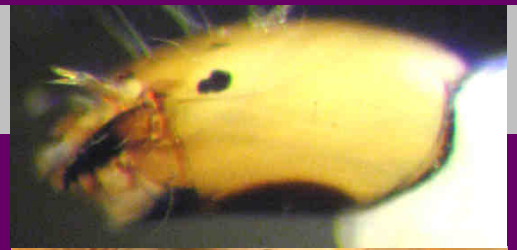


Orthoclaadiinae *sensu lato*

(Diptera: Chironomidae)

Keys to
Central European larvae
with respect to
macroscopic characters

Claus Orendt • Thomas Bendt



Orthocladiinae *sensu lato*

(Diptera: Chironomidae)

Orthocladiinae
Prodiamesinae
Diamesinae
Buchonomyiinae
Telmatogetoninae
Podonominae

**Keys to Central European larvae
with respect to macroscopic characters**

by Claus Orendt and Thomas Bendt

Contents

Page	
3	Preface and Acknowledgements
5	Introduction
11	References
13	Glossary
17	Keys
95	Special keys
95	<i>Cricotopus and Orthocladius</i>
108	<i>Eukiefferiella</i>
110	<i>Halocladius</i>
113	<i>Metriocnemus</i>
121	<i>Nanocladius</i>
122	<i>Parakiefferiella</i>
123	<i>Psectrocladius</i>
128	<i>Rheocricotopus</i>
131	Index

All rights reserved. © 2020 Deutsche Gesellschaft für Limnologie e. V., Essen, Germany

Printed by

Printed in Germany

ISBN 978-....

To be cited as:

Orendt C., Bendt, Th. (2020): Orthocladiinae *sensu lato* (Orthocladiinae, Prodiamesinae, Diamesinae, Podonominae, Buchonomyiinae, Telmatogetoninae) (Diptera: Chironomidae). Keys to Central European larvae with respect to macroscopic characters. - DGL-Arbeitshilfen (*DGL Tools*) 1-2020, 140 p. German Limnological Society (DGL) e. V., Essen. ISBN 978-....

Authors' addresses:

Dr. Claus Orendt, WaterBioAssessment, Brandvorwerkstr. 66, 04275 Leipzig, Germany; orendt@hydro-bio.de

Thomas Bendt, Heyerhütte 34, 47877 Willich, Germany; familiebendt@web.de

Orders: Deutsche Gesellschaft für Limnologie e. V., Geschäftsstelle, Rellinghauser Str. 334f, 45136 Essen, Germany; phone +49-(0)201-61 76 30 51, fax +49-(0)201-61 76 30 53; email: geschaeftsstelle@dgl-ev.de

Until quite recently, the identification of Chironomidae larvae was a challenging and time-consuming business reserved for specialists in certain academic positions. Although some monographic works (e.g. Wiederholm et al., 1983, Pankratova, 1970, 1977, 1983, Bíró, 1988, and others) were available and of great value for the specialist, their use was frequently restricted to regions or required quite a lot of time and effort to work successfully. Moreover, important information on taxonomic identification was scattered in many single papers, which is, however, also true at present. For beginners and those, who are not constantly working with larval identification, chironomids are a challenging taxonomic group but becoming easier with better keys and catalogues available. Frequently, many problems in the recognition of characters resulted from drawings or illustrations which mostly show an ideal picture differing in perspective and view from the observed view, even when the material is in good condition and well positioned. Taking photographs for illustrations required expensive equipment and black-white format, which did not always improve the images which depended also on the printing quality of the published book or journal. Traditions of observation practice (e. g. mounting on a slide after a maceration procedure) frequently require a time-consuming treatment prior to determination, sometimes resulting in losing visibility of some important characters. On the other hand, the importance of chi-

ronomids as bio-indicators in freshwater monitoring has been known for a long time (summarized earlier in Thienemann, 1954), and their ecological preferences were classified for subsequent use in monitoring programmes in several countries. Recently, efforts to base taxonomic identification work on molecular methods promised apparently easier and cheaper taxonomic identification than using morphological characters. However, methodological restrictions revealed that this may be a helpful tool only for special taxonomical questions (e. g., the scientific discussion of the taxonomical status of a morphological type). In biomonitoring and practical work, it is not applicable, as quantification of the community is not possible or not economical. Moreover, after some training, the single specimen collected can be quickly identified by observing morphological characters, to achieve a satisfactory taxonomic level identification.

This situation motivated us to help lower the threshold for identification work of chironomid larvae by providing a tool illustrated mainly by colour photographs. In 2012, a similarly designed identification tool for Chironomina (Orendt & Spies, 2012) was produced, in which we used macroscopic characters leading to identification to genus, species groups, and easily separable species, as far as possible. In our concept, we mostly compare more than one character and use the dichotomous approach in the identification line. A drawing is only given, when it was not possible

In freshwater ecosystems, chironomids are frequently the dominant component both in total biomass and in total species diversity. Thus, the species observed in the field reflect to a large extent the complexity and quality of habitats and life conditions. In a number of countries, they are part of the biological assessment system and monitoring, e. g. for the implementation of the EC Water Framework Directive. However, the identification of indicator taxa reveals some problems, as the specimens are frequently small compared to other macro-invertebrates. This volume will provide assistance in taxa determination, especially for beginners and those who are not regularly concerned with this insect family. The keys include larval taxa from six subfamilies. For Tanypodinae, Valenduuk & Moller Pillot (2007) published a key using mainly macroscopic characters. Later, Orendt & Spies (2012) followed the same approach for the Tribes Chironomini and Pseudochironomini of the subfamily Chironominae. Here, this concept is continued. The identification of genera and species should be performed as far as possible based on macroscopic characters using photographs, tables, and adjacent text. However, the characters of many of the species and genera of the Orthocladiinae and the other subfamilies are not as easy to observe as in the Chironomini. Often, the smaller body size requires higher optical resolution in order to examine the characters properly. This makes it more important to focus on existing typical and

visible characters such as head colouration, body hairs, body colouration, and shape, as a series of taxa can be identified by certain striking macroscopic features. Frequently, the use of a microscope is helpful and necessary, even if an extensive preparation will not be essential.

In this key, the subfamilies are not treated separately, as the cross over of characters of closely related subfamilies does not always allow strict definition of the groups. Sometimes, the appearance of a certain character in a taxon is variable, e. g. the central part of the mentum can have one or two teeth, or it appears so (e. g. due to tooth wear from feeding). In such cases, the identification line leads two different ways, which converge again later or they terminate in two different places, but of the same taxon. Using this method, the result of the determination can be improved.

In this book, the larvae of 76 genera from six subfamilies are included: Buchonomyiinae (1 genus), Podonominae (3), Telmatogetoninae (2), Diamesinae (6), Prodiamesinae (3), and Orthocladiinae (61). 12 more genera restricted to the northern and eastern parts of Europe according to Fauna Europaea are not included. But for the other regions of Europe, at least the identification of genera should be possible, as far as known to date. In 9 genera, the larval stage is not known. For selected genera (apart from monospecific genera), some larvae can be identified to species group and species level. In order to avoid

misidentifications, only those larvae were included, which were treated by various authors and which can be separated from each other with certainty. However, it should be understood that in many genera more species are recorded and described from the adult stage than are known from the larval stage. Thus, larval types found with the identification line may represent more species than are known today. In spite of this restriction, taxa included in the key can be reliably identified.

This work mainly utilizes the experience and knowledge of existing keys by Andersen et al. (2013), Biró (1988), Cranston (1982), Hirvenoja (1973), Janecek (2007), Moller Pillot (2009), Schmid (1993), various special publications, and our own observations. The notes on the habitats refer in general to Andersen et al. (2013), Janecek (2007), and Moller Pillot (2013), and also own observations. Apart from many original photographs, colleagues who provided pictures or drawings are credited and cited. For several taxa and characters, it was not possible to obtain photographs from slides or specimens. In such cases, illustrations from publications were used. The author(s) of each illustration used are cited and they are also listed in the Reference section.

The notes in the following sections are copied from the Introduction to the Chironomini key by Orendt & Spies (2012), with modifications for the special requirements in this work with the subfamilies treated here. We provide this, because

not all users will have the earlier work mentioned above and thus will not be able to consult it.

Equipment needed

To examine your material with regard to the morphological characters used in the keys you will need a dissecting scope with up to 75 x magnification, as well as a compound microscope with up to 400 x magnification. Using higher magnifications on a dissecting scope generally does not provide better viewing, as it exceeds the physical limits of optical resolution.

For examinations under the compound scope you will need microscope slides (with or without a central depression), cover slips, alcohol or water as the medium for observation, fine forceps, and at least one very fine dissecting needle. These equipment requirements do not exceed those required for determinations of other aquatic macroinvertebrates.

Dissecting versus compound microscope

The keys are based on features that are examinable under the dissecting scope. If a specimen's mandibles are insufficiently visible because they are folded too far into the oral cavity, they can be folded out using the fine needle. When microscopic characters have to be employed at all, their use is deferred towards the end of the respective determination path in the key wherever feasible. Apart from the general considerations discussed above, this avoids cumbersome moving back and

forth between the dissecting and the compound scope.

For microscopic examinations, the larva or head capsule is placed in a drop of fluid medium on a slide. When a cover slip is added and then moved gently with the needle or fine forceps, the object underneath can be rolled or turned into the position necessary for the respective observation. It may be necessary to improve the view to certain features by exerting slight pressure on the cover slip. When the observation of small features such as setae on the labrum is required, this region should be made freely visible by removing or bending away other characters with a needle, before the cover slip is placed. It will depend on the preferences, skill and experience of each observer, whether the examinations will be more successful with standard or depression slides.

When a specimen has been evaluated and the observation procedure was gentle enough to leave it in perfect condition, it can be removed, and either returned to the sample it came from or archived in a special reference collection. But it has also to be mentioned that frequently some characters such as the mandibles, labral region or mentum cleaned or separated for better visibility may not be available for use in a reference collection. However, in such cases it is worthwhile to take a photograph for documentation, if needed. It does not take long to gain the personal experience needed to apply these procedures with optimal results and without

problems. It is not necessary to perform elaborate further operations, unless one wishes to produce a museum quality, permanent voucher slide. In the latter case, possible steps to be taken consist of clearing the larval head capsule in carefully heated (but not boiling) 5-10% potassium hydroxide solution, rinsing in a sufficient quantity of distilled water, dehydration via alcohol baths of 70-80% and at least 96%, and embedding in a special mounting medium, e.g. in Euparal.

An intermediate method between the two mentioned is to place the larva after scarifying between the rim of the head capsule and the following 1st thorax segment on a slide, then add a drop of lactic acid (90%) on it, and position it in ventral view. The object can be observed and moved in the same way as described above. But after at most 5 minutes, the characters of the head can be more clearly discerned from the muscle tissue due to maceration. This method will facilitate the observation not only of large specimens but also of very dark characters. For preparing a permanent slide, polyvinyl-lactophenol should be added from the edges of the cover slip and dried for several days.

A modification of this method is to keep the larva in lactic acid for 1 or 2 days. For the preparation, the head is separated and covered with a cover glass in a drop of lactic acid in ventral view. The cover glass can now be pressed step by step with the greatest care and under visual control, until all details are clearly visible. This meth-

od is also suitable for the examination of claws and procerci. If the determination is unsuccessful, this preparation can be enclosed with Aquatex and sent to a specialist.

It depends on the aim, the ability, working preferences and experiences of the user which method of observation is used, as long as the result provides a correct identification.

Using the keys

Ideally, specimens to be keyed should represent the respective species' fourth (i.e., final) stage of larval development (instar). The keys describe characteristics as they are expressed in the 4th instar, and in some species some features can look different in earlier larval stages. Animals approaching pupation, i.e. the end of their final larval stage, can be recognised as such by their anterior body segments appearing distinctly swollen relative to the segments farther posterior, and occasionally also by features of the developing pupa or adult midge becoming visible underneath the larval skin, e.g. the adult eyes, wings or legs (see Fig. 1. However, distinctly swollen thoracic segments are typical for some genera such as *Corynoneura*, see p. 27, or *Synorthocladius*, see p. 53, as they are not expressed to such an extent in other genera).

If no such 'prepupae' are available within a presorted sample morphotype that is assumed to represent a single taxon, then specimens with the respective largest

head capsules in the lot should be keyed. However, some smaller larvae from the same lot should be keyed as well, to rule out that the morphotype includes larvae which look similar during presorting but actually represent two or more species that differ in final-instar body size. Colour patterns (e.g., of the head capsule) described in the key can be less distinctly expressed in some specimens, due to natural variation or to chemical fixation and preservation. In such cases, and whenever any key character is not clearly visible on a given animal, it is advisable to safeguard against mis-determinations by keying several specimens of the respective presorted morphotype.

Each key page presents the respective features to be evaluated in table-like form, with one vertical column for each general character (e.g. head capsule shape and colour, colouration of the body, configura-

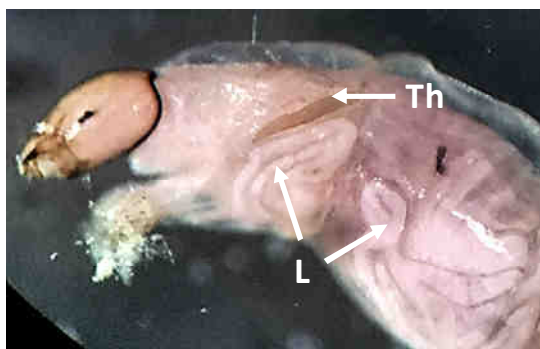
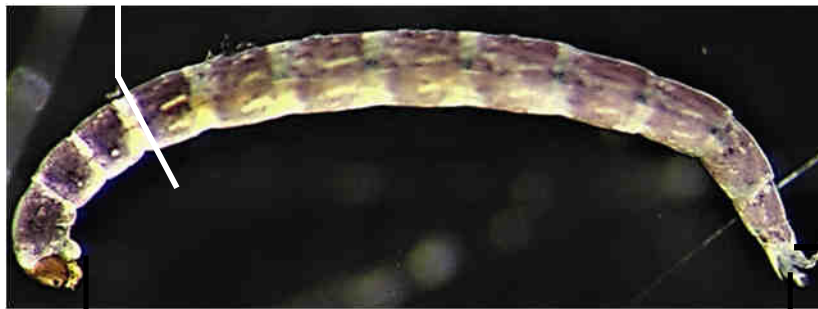


Fig. 1: Features of the developing pupa and adult midge underneath the larval skin (*Orthocladius* (*Orthocladius*) sp.). Th = thoracic horn; L = legs (Photo: Wenzl)

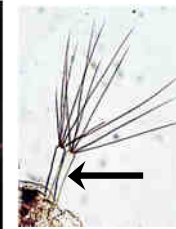
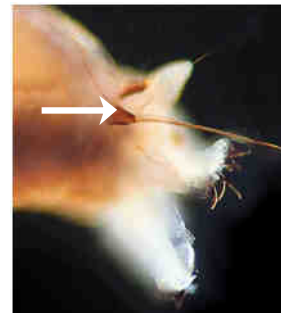
Body

Thorax
3 segments

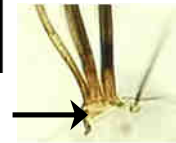
Abdomen
9 segments



Procerci



very long



reduced

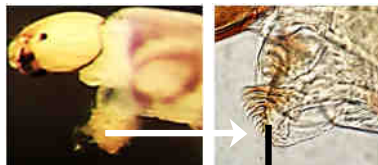
Body setae



simple

tuft

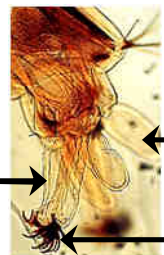
Anterior parapods



Claws



Posterior parapods



Anal tubules

Claws



Anal tubules absent

Dettinger-K.

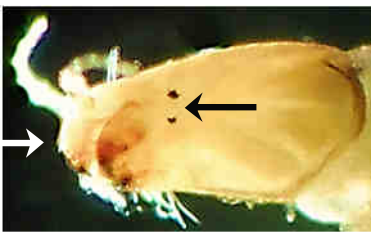

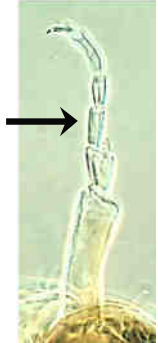



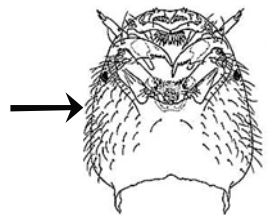

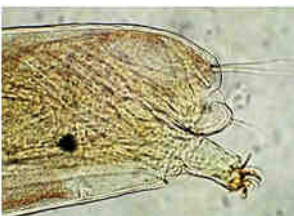






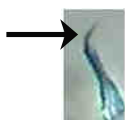


Anal setae



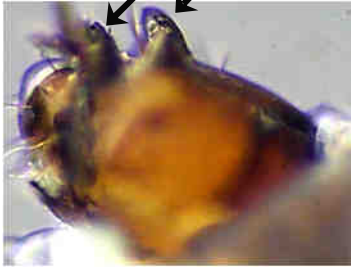
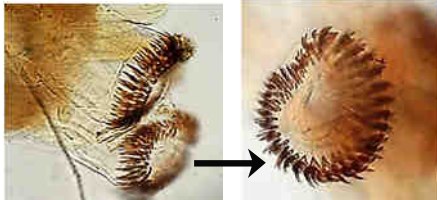

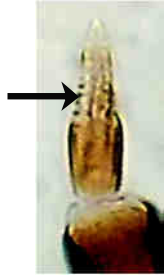
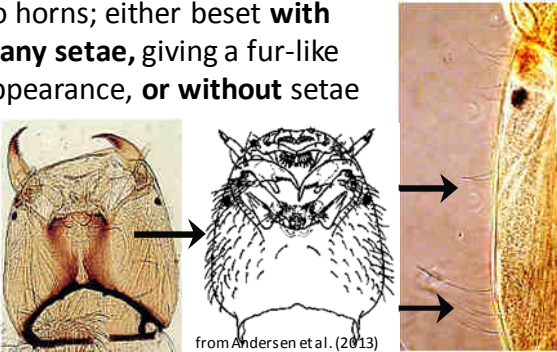


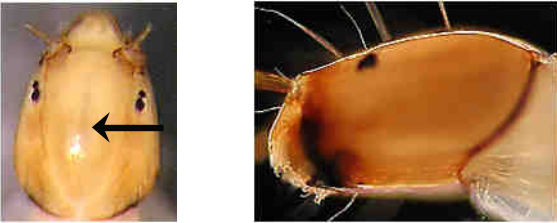
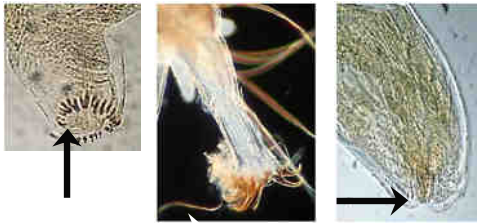
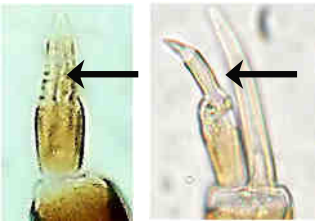
small

missing

1: Orthoclaadiinae - Prodiamesinae - Diamesinae - Podonominae - Buchonomyiinae - Telmatogetoninae

Head	Posterior end	Antenna (🔍)	
<p>elongate conical; 2 small eyespots in vertical arrangement</p> 	<p>acute, extending far beyond the parapods</p>  <p>← pointed abdominal end ← parapods</p>	<p>7-segmented, 3rd segment not annulated</p> 	<p>Orthoclaadiinae sp. 'acuticauda'</p> <p>in mobile sand substrates in running waters</p>
<p>not distinctly elongate and conical; 1-3 eyespots – if there are 2 small, clearly separate ones, then these are in diagonal or horizontal arrangement</p>    <p>or head beset with many setae, giving a fur-like appearance</p>  <p>from Andersen et al. (2013)</p> <p>dorsal side with 4-5 projections of various lengths</p> 	<p>rounded, not extending far beyond the parapods</p>    	<p>with 4-6 segments;</p>     <p>or 7-segmented, the 7th very fine; or 3rd segment annulated</p>  	<p>→ 2</p> <p>Orthoclaadiinae Prodiamesinae Diamesinae Podonominae Buchonomyiinae Telmatogetoninae</p>

2: Orthoclaadiinae - Prodiamesinae - Diamesinae - Podonominae - Buchonomyiinae - Telmatogetoninae

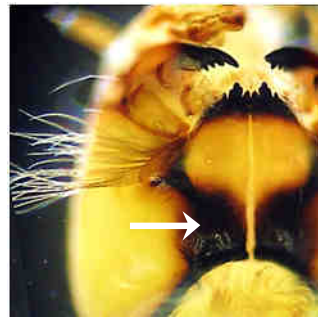
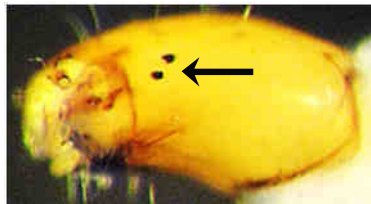
Head	Posterior parapods	Body surface	Antenna, 3rd segment (🐛)	
<p>dorsal side with 4-5 projections of various lengths</p> 	<p>claws arranged in a circle</p> 	<p>beset with dense network of small sclerites</p> 	<p>annulated</p> 	<p><i>Boreoheptagyia</i> sp. (Diamesinae)</p> <p>hygropetric, waterfalls</p>
<p>no horns; either beset with many setae, giving a fur-like appearance, or without setae</p>  <p>from Andersen et al. (2013)</p>	<p>claws not arranged in a circle</p> 	<p>no such sclerites</p>	<p>small and not annulated</p> 	<p><i>Protanypus</i> sp. (Diamesinae)</p> <p>deeper zones of oligo- or mesotrophic lakes near the Alps</p>
<p>no horns; usually bare – if setae are present in many areas of the head, these are widely scattered and not fur-like</p>  <p>Dettinger-K.</p>	<p>claw arrangement circular or non-circular, or claws absent</p> 	<p>no such sclerites</p>	<p>annulated or not</p> 	<p>→ 3 Orthoclaadiinae Prodiamesinae Diamesinae Podonominae Buchonomyiinae Telmatogetoninae</p>

4: Orthoclaadiinae - Prodiamesinae - Diamesinae - Podonominae - Buchonomyiinae - Telmatogetoninae

Head

Side of mentum ()

ventrally dark, laterally and dorsally yellow;
2 small eyespots of equal size in **diagonal**
arrangement

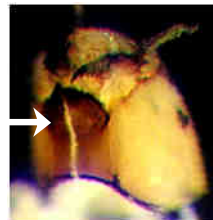
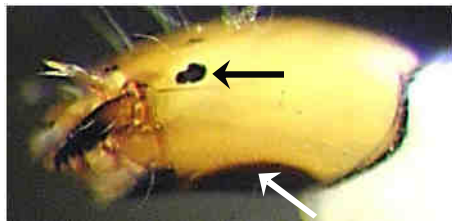


with long 'beard setae'
strong and conspicuous

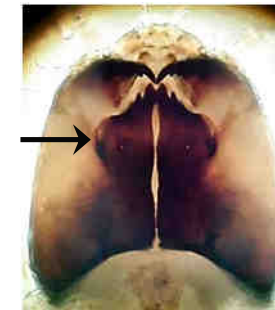


Prodiamesa olivacea
(Prodiamesinae)
mostly on sandy substrates
enriched with organic material
in flowing water with
sufficient oxygen supply, rarely
in stagnant water bodies
For Hungary and Bulgaria, Michai-
lova (1977) reports a very similar
species, *P. bureschi*. Material from
these localities, should be checked
with this reference.

ventrally dark, laterally yellow, dorsally somewhat darkened or yellow;
1 or 2 small anterior eyespots and 1 larger posterior spot, occasionally all fused
and appearing as 1 spot

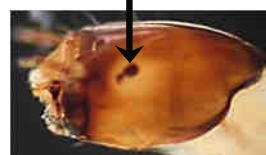
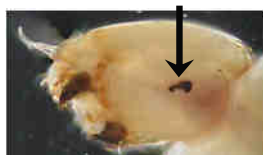
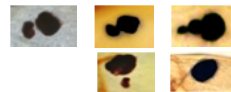


no long 'beard' setae

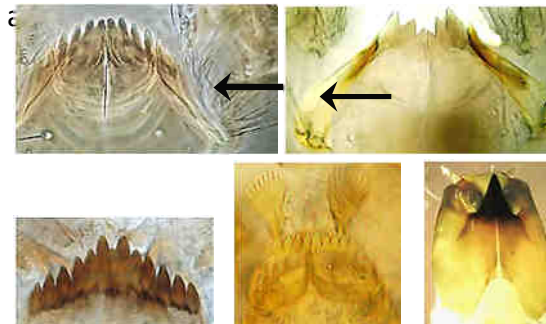


→ 5

uniformly coloured (completely dark, brownish or yellow),
at most yellow rings or paler areas around the eyespots, or
'cheeks'; 1 or 2 small anterior eyespots and 1 larger posterior
spot, occasionally all fused and appearing as 1 spot



long 'beard' setae present and fine, or



→ 8

13: Orthoclaadiinae

(long antennae)

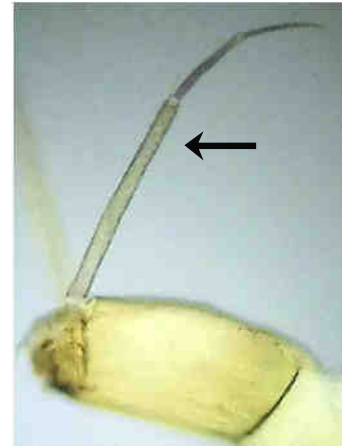
Head

long, slender;

antenna **with 4 segments and longer** than head capsule



Bendt



***Corynoneura* sp.**
(Orthoclaadiinae)

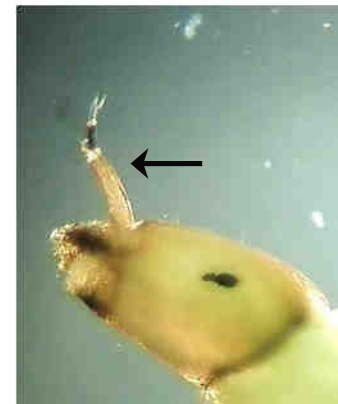
on various habitats in many
sorts of water body types

longish, but not slender in appearance;

antenna with **5 segments and 1/2 to 3/4** head length



Bendt


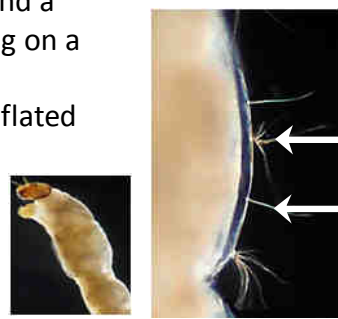
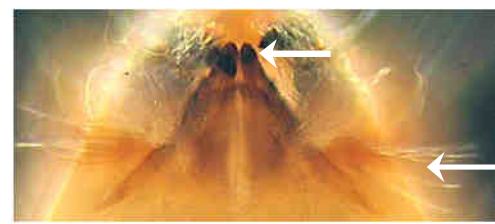
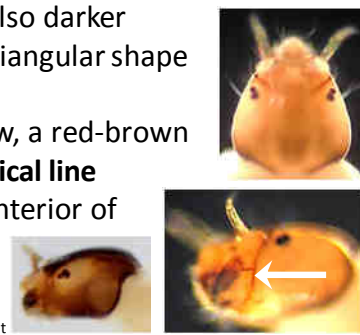
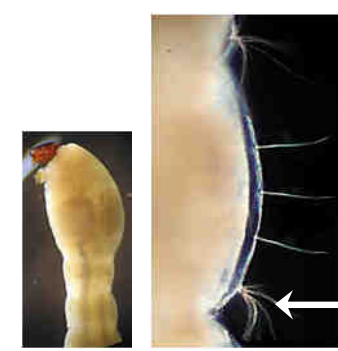
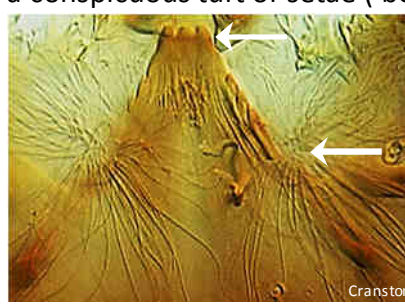

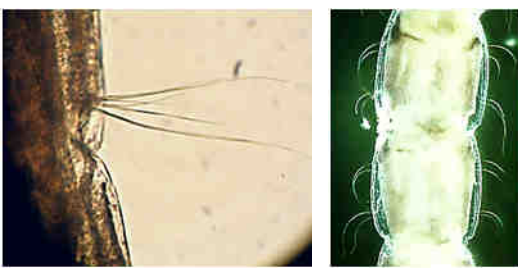




Thienemanniella
sp.
(Orthoclaadiinae)

in flowing waters

37: Orthocradiinae

(Proceri and anal tubules present, with long simple setae or tufts of setae on abdomen)

Abdominal body setae	Mentum ()	Head	
<p>a short single seta and a short tuft alternating on a segment; thorax somewhat inflated</p> 	<p>acute-triangular; 2 median teeth; laterally a conspicuous tuft of setae ('beard')</p> 	<p>yellow, but also darker variations; triangular shape in outline; in lateral view, a red-brown oblique vertical line somewhat anterior of the middle</p>  <p style="text-align: center;"><small>Bendt</small></p>	<p><i>Synorthocladus semivirens</i></p> <p>frequently found in flowing water courses, but also in northern and pre-Alpine lakes</p>
<p>only L4 as a short tuft, the anterior short setae are simple; thorax somewhat inflated</p> 	<p>acute-triangular; 3 median teeth; laterally a conspicuous tuft of setae ('beard')</p>  <p style="text-align: right;"><small>Cranston</small></p>	<p>brown; otherwise similar to <i>S. semivirens</i>, but the vertical line is hard to discern; frequently pale rings around the eye spots</p> 	<p><i>Parorthocladus nudipennis</i></p> <p>mainly in cold mountain brooks</p>
<p>L4 or also anterior setae as short to long tufts or single setae of at least 1/2 segment length</p>  <p style="text-align: center;"><small>Madden</small></p>	<p>broad triangular or wider; 1 or 2 median teeth; no 'beard'</p> 	<p>yellow to dark brown; no special character</p> 	<p>→ 38</p> <p><i>Paralimnophyes</i> <i>Cricotopus</i> (in part) <i>Orthocladus</i> (in part)</p>

39: Orthoclaadiinae

(Abdominal setae simple or inconspicuous)

Posterior end

1 or 2 very long anal setae, 1/3 or 1/2 of the body length

Make sure that you observe a specimen in good condition, otherwise the setae may be broken off.



→40

anal setae (often much) shorter than 1/4 of body length, the length of a segment or shorter



Bendt



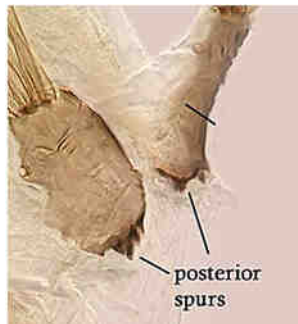
→41

49: Orthoclaadiinae

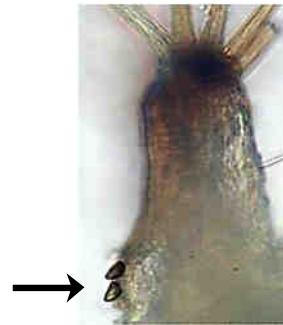
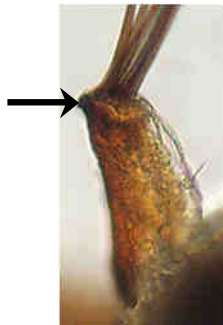
(Abdominal setae simple or inconspicuous, 2 median teeth on mentum)

Procerci ()

with 1 or more sclerotized conspicuous or small **spurs or projections** at various positions; may be very small (lateral view)



Cranston



→ 50

Metricnemus
Psectrocladius
(both in part)

without spurs or projections, backside sclerotized or not



→ 63

50: Orthoclaadiinae

(Abdominal setae simple or inconspicuous, 2 median teeth on mentum, proceri with spurs)

Mentum ()

Eyes

Head

Body

the median teeth smaller and lower than 1st laterals or equally high; **no 'beard'** on ventromental plates



In this taxon, also 1 median tooth occurs, but this is treated in the identification line with '1 median tooth' (key page 41).



1 egg-shaped spot or small front spot fused with large hind spot



dark brown, brown, yellow or yellowish brown



violet (esp. anteriorly), alternating with white rings



or more pale, strongly or weakly violet or brown coloration

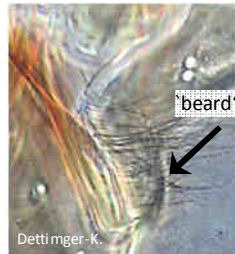


***Metriocnemus eurynotus* group**

→ D4 *Metriocnemus*

the median teeth larger and higher, but at least as large as the 1st lateral teeth;

with or without 'beard' on ventromental plates



small front spots separated from large hind spot



check several specimens, if possible, as the spots can sometimes be close together

pale or yellowish







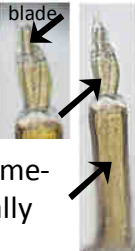











pale or marbled (stain coloured)



→ 62



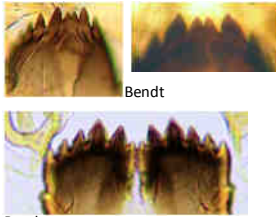

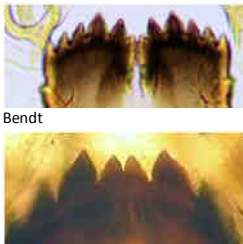
Psectrocladius rheocricotopus (both in part)

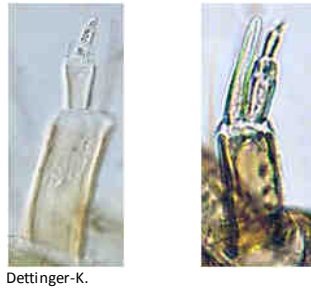
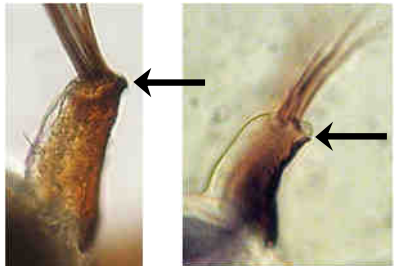
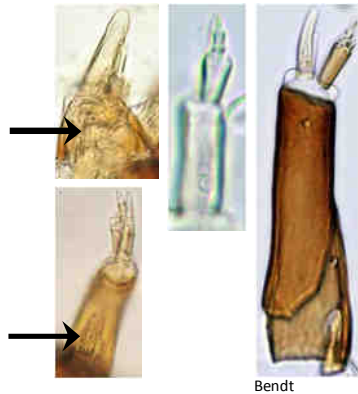
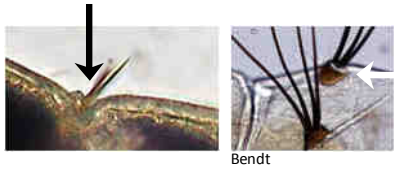
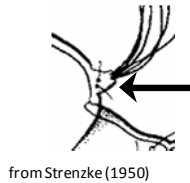
A2: Cricotopus/Orthocladius

Mentum 	Antenna 	Body setae (abdomen) 	Labrum 	
<p>the 1st, 2nd and 6th of the 6 pairs of lateral teeth strongly reduced; median tooth up to 6 x wider than 1st laterals</p>	<p>1st segment >2 x as long as wide; 2nd segment somewhat medially widened</p> 	<p>setae at the posterior end of the segment very short or absent</p> 	<p>premandible with 1 tooth</p> 	<p><i>Cricotopus (I.) trifascia</i> group</p> <p>hard substrates, rheophilic</p>
<p>the 1st, 2nd and 6th of the 6 pairs of lateral teeth strongly reduced; median tooth up to 3 x wider than 1st laterals</p>	<p>1st segment >2 x as long as wide; 2nd segment not widened</p> 	<p>posterior end of segment with a bundle of setae, as long as the segment</p> 	<p>premandible with 2 teeth</p> 	<p><i>Cricotopus (I.) pilitarsis</i> (= sp. 'Jasmunder Bodden' in Orendt et al., 2013)</p> <p>lakes and brackish coastal waters</p>
<p>5 uppermost teeth protruding</p>	<p>1st segment 1.5 x as long as wide</p> 	<p>a bundle of 8-15 setae, as long as the segment</p> 	<p>premandible with 1 tooth</p> 	<p><i>Cricotopus (I.) obnixus</i> group</p> <p>water plants (Moller Pillot, 2009)</p>
<p>3 uppermost teeth protruding</p>	<p>1st segment as long as wide</p> 	<p>posterior end of segment with a bundle of ca. 10 setae, as long as the segment</p> 	<p>premandible with 1 tooth</p> 	<p><i>Cricotopus (I.) brevipalpis</i> group</p> <p>mining in <i>Potamogeton</i> leaves (Moller Pillot, 2009)</p>

D1: Metriocnemus/Thienemannia


















(Abdominal setae simple or inconspicuous)









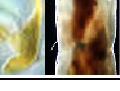









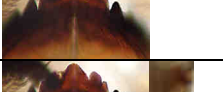





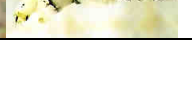
Procerci	Antenna	Mentum ()	Body	
<p>procerci as long a wide or very small (invisible); without spur; anal setae hardly or well visible</p>	<p>small or very long; 1st segment <1->2 x as long as wide</p>	<p>1 median tooth</p>  <p>Bendt</p> <p>or 2 median teeth</p>  <p>Bendt</p>	<p>uniformly dark</p> <p>or light purple with or without white rings</p> <p>or whitish; anterior parapods close together or fused, with or without claws</p>	<p>→ D2</p>
<p>procerci with a spur; anal setae well visible</p>	<p>normal; 1st segment 2 x as long as wide or longer</p>	<p>1 median tooth</p>  <p>or 2 median teeth</p>  <p>Bendt</p>	<p>pale or greenish, often marbled with brown, grey or purple;</p> <p>or purple with white rings;</p> <p>2 anterior parapods with claws</p> <p>or only a pad with small claws</p>	<p>→ D3</p>








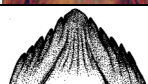
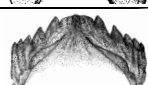

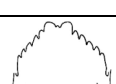
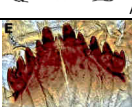










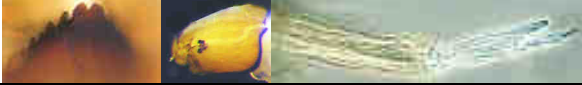
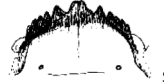
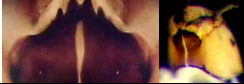
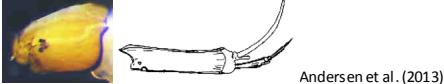




Labrum



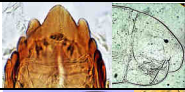
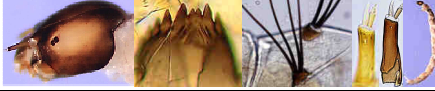

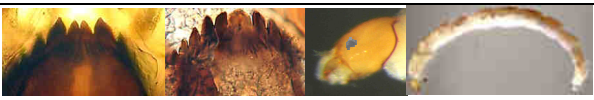
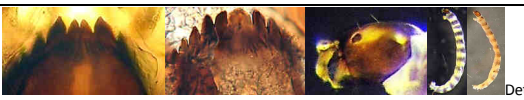



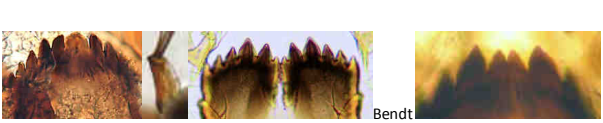
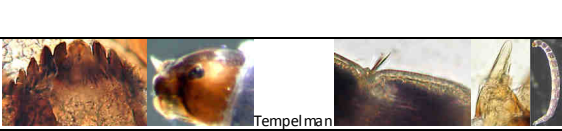
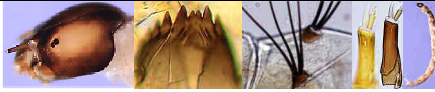
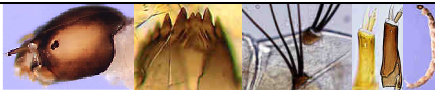
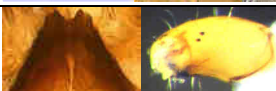


Mentum






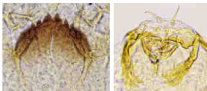
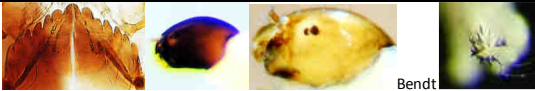

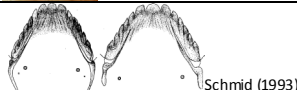








Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Acamptocladus</i> sp.	91	Orthoclaadiinae	
<i>Acricotopus lucens</i>	25	Orthoclaadiinae	
<i>Allocladius</i> sp.	39, 40	Orthoclaadiinae	
<i>Boreoheptagyia</i> sp.	18	Orthoclaadiinae	
<i>Brillia bifida</i>	22, 69, 83	Orthoclaadiinae	
<i>Brillia longifurca/flavifrons</i>	69, 83	Orthoclaadiinae	
<i>Brillia</i> sp.	68, 83	Orthoclaadiinae	
<i>Bryophaenocladus</i> sp.	42	Orthoclaadiinae	 Andersen et al. (2013)
<i>Buchonomyia thienemanni</i>	39	Buchomyiinae	 both Cranston
<i>Camptocladus stercorarius</i>	43	Orthoclaadiinae	 Cranston
<i>Cardiocladus</i> sp.	71, 108	Orthoclaadiinae	
<i>Chaetocladus dentiforceps</i> group	76, 92, 93	Orthoclaadiinae	
<i>Chaetocladus melaleucus</i> group	72, 73	Orthoclaadiinae	 Dettinger-K.
<i>Chaetocladus piger</i> group	79-81, 83, 84-87, 90	Orthoclaadiinae	 Dettinger-K.
<i>Chaetocladus</i> sp. Herkenbosch	76	Orthoclaadiinae	 Klink in Moller Pillot (1984)
<i>Chaetocladus vitellinus</i> group	92	Orthoclaadiinae	
<i>Clunio</i> sp.	37	Orthoclaadiinae	 Dettinger-K.






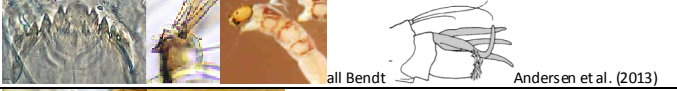


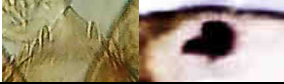







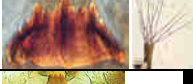

Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Corynoneura</i> sp.	29	Orthoclaadiinae	 both Dettinger-K.
<i>Cricotopus (Cricotopus) bicinctus</i>	103, 104	Orthoclaadiinae	 both Dettinger-K.  Cuppen/Tempelman
<i>Cricotopus (Cricotopus) fuscus</i> group	103	Orthoclaadiinae	 all Dettinger-K.
<i>Cricotopus (Cricotopus) pilosellus</i>	97, 98	Orthoclaadiinae	 both Cuppen/Tempelman
<i>Cricotopus (Cricotopus) sp.</i>	100, 104	Orthoclaadiinae	 Dettinger-K.
<i>Cricotopus (Cricotopus) tibialis</i> group	103	Orthoclaadiinae	
<i>Cricotopus (Cricotopus) tremulus</i> group	102	Orthoclaadiinae	 Schmid (1993) 
<i>Cricotopus (Isocladus) brevipalpis</i> group	95, 96	Orthoclaadiinae	 all Hirvenoja (1973)
<i>Cricotopus (Isocladus) intersectus</i> group	99	Orthoclaadiinae	 Hirvenoja (1973)
<i>Cricotopus (Isocladus) laricomalis</i> group	99	Orthoclaadiinae	 Hirvenoja (1973)  Bendt
<i>Cricotopus (Isocladus) obnixus</i> group	95, 96	Orthoclaadiinae	 Schmid (1993)  Hirvenoja (1973)
<i>Cricotopus (Isocladus) pilitarsis</i>	95, 96	Orthoclaadiinae	 Dettinger-K. 
<i>Cricotopus (Isocladus) reversus</i> group	99	Orthoclaadiinae	
<i>Cricotopus (Isocladus) sp.</i>	95, 97	Orthoclaadiinae	
<i>Cricotopus (Isocladus) sylvestris</i> group	97	Orthoclaadiinae	
<i>Cricotopus (Isocladus) trifascia</i> group	95, 96	Orthoclaadiinae	
<i>Cricotopus (Nostococladus) lygropis</i>	95, 101	Orthoclaadiinae	 Ashe & Murray (1980) 
<i>Cricotopus (Paratrichocladus) sp.</i>	100	Orthoclaadiinae	 










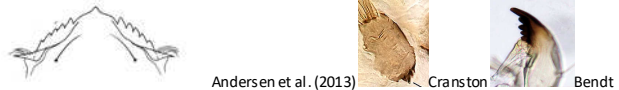
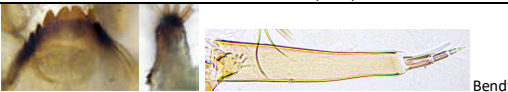


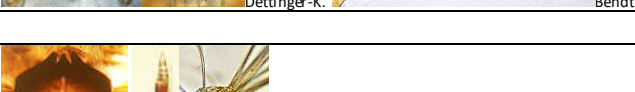


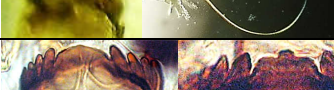

Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Cricotopus/Orthocladius</i>	54, 95-107	Orthoclaadiinae	 bozh Hirvenoja (1973)
<i>Diamesa dampfi</i> group	51, 52	Diamesinae	 Bendt
<i>Diamesa incallida</i>	38	Diamesinae	 Bendt  Rossaro & Lencioni (2015)
<i>Diamesa</i> sp.	38	Diamesinae	
<i>Diplocladius cultriger</i>	25	Orthoclaadiinae	
<i>Dratnalia potamophylaxi</i>	79, 91, 92-94	Orthoclaadiinae	 Schiffels
<i>Epoicocladius ephemerae</i>	30	Orthoclaadiinae	
<i>Eukiefferiella brevicar</i> group	108	Orthoclaadiinae	 Schmid (1993)
<i>Eukiefferiella clypeata</i>	89	Orthoclaadiinae	
<i>Eukiefferiella devonica</i> group	108	Orthoclaadiinae	
<i>Eukiefferiella gracei</i>	109	Orthoclaadiinae	
<i>Eukiefferiella gracei</i> group	108	Orthoclaadiinae	
<i>Eukiefferiella minor/fittkai</i>	109	Orthoclaadiinae	 Schmid (1993)
<i>Eukiefferiella similis</i>	109	Orthoclaadiinae	 Schmid (1993)
<i>Eukiefferiella</i> sp.	71, 72, 75, 76, 89, 108-109	Orthoclaadiinae	
<i>Eurycnemus crassipes</i>	67, 68, 70	Orthoclaadiinae	 Andersen et al. (2013)
<i>Euryhopsis</i> sp.	67, 68, 70	Orthoclaadiinae	 from Namayaney & Culp (2016)

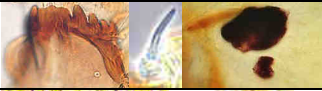
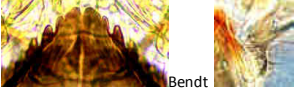




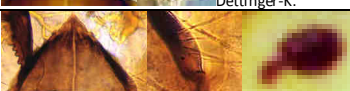







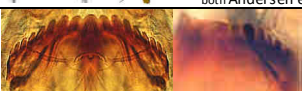



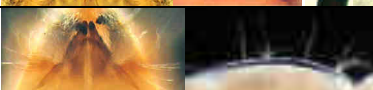

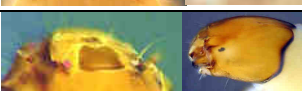

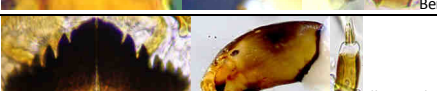






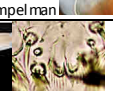

Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Georthocladus</i> sp.	35	Orthoclaadiinae	 Andersen et al. (2013)
<i>Gymnometriocnemus</i> sp.	44	Orthoclaadiinae	
<i>Halocladus (Halocladus) fucicola</i>	111	Orthoclaadiinae	 Dettinger-K.
<i>Halocladus (Halocladus) millenarius</i>	111	Orthoclaadiinae	
<i>Halocladus (Halocladus) variabilis</i>	111, 112	Orthoclaadiinae	 Dettinger-K.
<i>Halocladus (Halocladus) variabilis</i> group	111	Orthoclaadiinae	
<i>Halocladus (Halocladus) varians</i>	111, 112	Orthoclaadiinae	 Dettinger-K.
<i>Halocladus (Psammocladus) braunsi</i>	110	Orthoclaadiinae	 Dettinger-K.
<i>Heleniella</i> sp.	79-81,83	Orthoclaadiinae	
<i>Heterotanytarsus apicalis</i>	28	Orthoclaadiinae	
<i>Heterotrissocladus grimshawi</i>	86	Orthoclaadiinae	
<i>Heterotrissocladus maeaeeri</i>	72, 73	Orthoclaadiinae	 Saether (1975)
<i>Heterotrissocladus marcidus</i> group	22, 85, 94	Orthoclaadiinae	
<i>Heterotrissocladus subpilosus</i>	86	Orthoclaadiinae	 Andersen et al. (2013)
<i>Hydrobaenus lugubris</i> group	90	Orthoclaadiinae	 Bendt
<i>Hydrobaenus pilipes</i> group	90	Orthoclaadiinae	 Andersen et al. (2013) Bendt
<i>Hydrosmittia</i> sp.	39, 40	Orthoclaadiinae	 Namayandeh & Culp Andersen et al.
<i>Krenosmittia</i> sp.	56	Orthoclaadiinae	






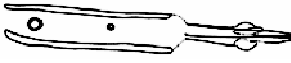






Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Lasiodiamesa</i> sp.	33	Podonominae	
<i>Limnophyes</i> sp.	90	Orthoclaadiinae	
<i>Mesosmittia flexuella</i>	44	Orthoclaadiinae	
<i>Metriocnemus carmencitabertorum</i>	117	Orthoclaadiinae	 all Bendt
<i>Metriocnemus cavicola</i> (syn. <i>martinii</i>)	119	Orthoclaadiinae	 all Bendt
<i>Metriocnemus eurynotus</i> group <i>hirticollis</i> type	58, 61, 64, 66, 115, 116	Orthoclaadiinae	 Bendt
<i>Metriocnemus eurynotus</i> group <i>hygropetricus</i> type	58, 61, 64, 66, 115, 116	Orthoclaadiinae	 Dettinger-K.
<i>Metriocnemus fuscipes</i> group	115, 119	Orthoclaadiinae	 all next Bendt
<i>Metriocnemus inopinatus</i>	60, 118	Orthoclaadiinae	 Strenzke (1950) all Bendt
<i>Metriocnemus scirpi</i>	92, 119, 120	Orthoclaadiinae	 all both Strenzke (1950)
<i>Metriocnemus</i> sp.	54, 58, 65, 79, 91, 92, 99, 113- 120	Orthoclaadiinae	 Bendt
<i>Metriocnemus terrester</i> group	60, 118	Orthoclaadiinae	 Tempelman
<i>Metriocnemus tristellus</i>	117	Orthoclaadiinae	 all Bendt
<i>Metriocnemus ursinus</i>	117	Orthoclaadiinae	 all Bendt
<i>Monodiamesa</i> sp.	47	Prodiamesinae	
<i>Nanocladius</i> sp.	78-80, 82	Orthoclaadiinae	
<i>Nanocladius balticus</i>	121	Orthoclaadiinae	

Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Nanocladius dichromus</i> group	121	Orthoclaadiinae	
<i>Nanocladius parvulus</i>	121	Orthoclaadiinae	
<i>Nanocladius rectinervis</i>	121	Orthoclaadiinae	
<i>Odontomesa fulva</i>	25	Prodiamesinae	
Orthoclaadiinae sp. ' <i>acuticauda</i> '	17	Orthoclaadiinae	
Orthoclaadiinae sp. "Berka vor dem Hainich, Thüringen"	129	Orthoclaadiinae	
<i>Orthocladus (Eudactylocladius)</i> sp.	105	Orthoclaadiinae	
<i>Orthocladus (Euorthocladus) luteipes</i>	107	Orthoclaadiinae	
<i>Orthocladus (Euorthocladus) rivicola/ashei</i>	107	Orthoclaadiinae	
<i>Orthocladus (Euorthocladus) rivulorum</i>	105	Orthoclaadiinae	
<i>Orthocladus (Euorthocladus) saxosus</i>	106	Orthoclaadiinae	
<i>Orthocladus (Euorthocladus)</i> sp.	104	Orthoclaadiinae	
<i>Orthocladus (Euorthocladus) thienemanni</i>	106	Orthoclaadiinae	
<i>Orthocladus (Euorthocladus) thienemanni</i> group	106	Orthoclaadiinae	
<i>Orthocladus (Mesorthocladus) frigidus</i>	106	Orthoclaadiinae	
<i>Orthocladus (Orthocladus)</i> sp.	105	Orthoclaadiinae	
<i>Orthocladus (Pogonocladus) consobrinus</i>	68	Orthoclaadiinae	

Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Orthocladus (Symposiocladius) holsatus</i>	95, 97, 98	Orthoclaadiinae	 Bendt
<i>Orthocladus (Symposiocladius) lignicola</i>	24	Orthoclaadiinae	
<i>Paraboreochlus minutissimus</i>	33	Podonominae	
<i>Parachaetocladus abnobaesus.</i>	56	Orthoclaadiinae	
<i>Paracladius</i> sp.	71	Orthoclaadiinae	 Dettinger-K.
<i>Paracricotopus niger</i>	58, 61	Orthoclaadiinae	 all Bendt Andersen et al. (2013)
<i>Parakiefferiella bathophila</i>	77, 113, 122	Orthoclaadiinae	
<i>Parakiefferiella</i> cf. <i>coronata</i>	113, 122	Orthoclaadiinae	
<i>Parakiefferiella</i> cf. <i>gracillima</i>	113, 122	Orthoclaadiinae	
<i>Parakiefferiella</i> sp.	77, 122	Orthoclaadiinae	 Schmid (1993)
<i>Parakiefferiella triquetra</i>	77	Orthoclaadiinae	
<i>Paralimnophyes longiseta</i>	54, 87	Orthoclaadiinae	 all Bendt
<i>Parametriocnemus</i> sp.	31	Orthoclaadiinae	 last 2 Bendt
<i>Paraphaenocladus</i> sp.	45	Orthoclaadiinae	 last 3 Dettinger-K.
<i>Parasmittia carinata</i>	43	Orthoclaadiinae	 both Andersen et al. (2013)
<i>Paratrissocladus excerptus</i>	85	Orthoclaadiinae	
<i>Parochlus kiefferi</i>	33	Podonominae	
<i>Parorthocladus nudipennis</i>	53	Orthoclaadiinae	 Cranston

Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Potthastia gaedii</i> group	48	Diamesinae	
<i>Potthastia longimanus</i> group	48	Diamesinae	
<i>Prodiamesa cf. dephinensis</i>	47	Prodiamesinae	 Schmid (1993)
<i>Prodiamesa olivacea</i>	20, 47	Prodiamesinae	
<i>Prodiamesa rufovittata</i>	47	Prodiamesinae	
<i>Propilocerus lacustris</i>	23	Orthoclaadiinae	
<i>Protanypus</i> sp.	18	Diamesinae	 Andersen et al. (2013)
<i>Psectrocladius</i> (<i>Allopsectrocladius</i>) sp.	62, 124	Orthoclaadiinae	 Dettinger-K., Bendt
<i>Psectrocladius</i> (<i>Mesopsectrocladius</i>) <i>barbatipes</i>	63, 124	Orthoclaadiinae	
<i>Psectrocladius</i> (<i>Monopsectrocladius</i>) <i>calcaratus</i>	63, 127	Orthoclaadiinae	 Andersen et al. (2013), Cranston, Bendt
<i>Psectrocladius</i> (<i>Psectrocladius</i>) <i>barbimanus</i>	126	Orthoclaadiinae	 Bendt
<i>Psectrocladius</i> (<i>Psectrocladius</i>) <i>limbatellus</i> / <i>sordidellus</i> group	126	Orthoclaadiinae	 Dettinger-K., Cranston, Bendt
<i>Psectrocladius</i> (<i>Psectrocladius</i>) <i>psilopterus</i> group	63, 127	Orthoclaadiinae	 Dettinger-K., Bendt
<i>Psectrocladius</i> sp.	78, 123	Orthoclaadiinae	
<i>Pseudodiamesa</i> sp.	50	Diamesinae	
<i>Pseudokiefferiella parva</i>	50	Diamesinae	
<i>Pseudorthocladus</i> sp.	56	Orthoclaadiinae	
<i>Pseudosmittia</i> sp. "sensu lato"	39	Orthoclaadiinae	

Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Pseudosmittia</i> sp.	39, 40	Orthoclaadiinae	
<i>Rheocricotopus chalybeatus</i>	129	Orthoclaadiinae	 Bendt  both Dettinger-K.
<i>Rheocricotopus fuscipes</i>	129	Orthoclaadiinae	 both Dettinger-K.
<i>Rheocricotopus glabricollis</i>	130	Orthoclaadiinae	 Dettinger-K.
<i>Rheocricotopus</i> sp.	78, 128, 130	Orthoclaadiinae	 Dettinger-K.
<i>Rheocricotopus unidentatus</i>	64	Orthoclaadiinae	 all Bendt
<i>Rheosmittia</i> sp.	28	Orthoclaadiinae	
<i>Smittia</i> sp.	42	Orthoclaadiinae	 both Dettinger-K.
<i>Stilocladius montanus</i>	77	Orthoclaadiinae	 both Bendt 
<i>Symbiocladius rhithrogenae</i>	19	Orthoclaadiinae	
<i>Sympotthastia</i> sp.	51	Diamesinae	 both Andersen et al. (2013) 
<i>Syndiamesa</i> sp.	23, 51, 52	Diamesinae	   
<i>Synorthocladius semivirens</i>	53	Orthoclaadiinae	 Bendt 
<i>Telmatogeton japonicus</i>	36	Telmatogetoninae	 Bendt 
<i>Thalassomya frauenfeldi</i>	36	Telmatogetoninae	 all 3 Bendt  Cranston
<i>Thalassosmittia thalassophila</i>	37	Orthoclaadiinae	 Andersen et al. (2013)  Tempelman  Dettinger-K.
<i>Thienemannia</i> sp.	60, 118, 120	Orthoclaadiinae	   all Bendt
<i>Thienemanniella</i> sp.	29	Orthoclaadiinae	

Taxon	Page no.	Subfamily	Mentum and prominent characters
<i>Tokunagaia</i> sp.	88, 89	Orthoclaadiinae	 Andersen et al. (2013)
<i>Trissocladus</i> sp.	92, 94	Orthoclaadiinae	 Bendt
<i>Tvetenia calvescens</i> group	79, 80	Orthoclaadiinae	
<i>Tvetenia discoloripes</i> group	72-74	Orthoclaadiinae	   Schmid (1993)
<i>Tvetenia tshernovskii</i>	72-74	Orthoclaadiinae	  Schmid (1993)
<i>Zalutschia</i> sp.	82, 92-94	Orthoclaadiinae	   

Other illustrated keys for Chironomidae larvae

Orendt C. & Spies M. (2012): **Chironomini (Diptera: Chironomidae: Chironominae). Key to Central European larvae using mainly macroscopic characters. Second, revised edition.**
Leipzig, 64 p., ISBN 978-3-00-038842-2; available only as PDF-file, 30.00 €
Preview and orders: www.hydro-bio.de/chironomidae.htm

Orendt C. & Spies M. (2012): **Chironomus Meigen (Diptera: Chironomidae). Key to the larvae of importance to biological water analysis in Germany and adjacent areas. Bestimmungsschlüssel zu den für die biologische Gewässeranalyse bedeutenden Larven in Deutschland und angrenzenden Gebieten.**
Bilingual edition (German/English), *Zweisprachige Ausgabe (deutsch/englisch)*
Leipzig, 24 p., ISBN 978-3-00-038789-0; available only as PDF-file, 15.00 €
Preview and orders: www.hydro-bio.de/chironomidae.htm

Umweltbundesamt (Ed.)
Orendt C., Dettinger-Klemm A. & Spies M. (2013): **Bestimmungsschlüssel für die Larven der Chironomidae (Diptera) der Brackgewässer Deutschlands und angrenzender Gebiete. [Identification keys to the larvae of Chironomidae (Diptera) in brackish waters of the German North and Baltic Sea areas.]. German edition.**
Umweltbundesamt Berlin, "Berichte der Qualitätssicherungsstelle Nr. 1", 243 p., ISSN 2194-7902
Order for free from Umweltbundesamt, Berlin: www.umweltbundesamt.de

Other DGL Tools (DGL-Arbeitshilfen)

DGL-Arbeitshilfe 1-2017
Faasch H. (2017): **Identification guide to genera of aquatic Coleoptera larvae. Bestimmungshilfe für aquatische Käferlarven-Gattungen.** Bilingual edition (English and German). - Editor: Dt. Ges. für Limnologie (German Limnological Society) e. V., Hardegsen, 136 p., ISBN 978-3-9818302-0-0.
Price: 25.00 € + shipping costs

DGL-Arbeitshilfe 1-2015
Faasch H. (2015): **Identification guide to aquatic and semi-aquatic Diptera larvae. Bestimmungshilfe für aquatische und semiaquatische Dipterenlarven.** Bilingual edition (English and German). - Editor: Dt. Ges. für Limnologie (German Limnological Society) e. V., Hardegsen, 179 p., ISBN 978-3-9813095-6-0. Price: 25.00 € + shipping costs

DGL-Arbeitshilfe 1-2014
Arbeitskreis "Flachseen" der DGL [Work group shallow lakes] (2014):
Handlungsempfehlung zur Abschätzung der Chancen einer Wiederansiedlung von Wasserpflanzen bei der Restaurierung von Flachseen in Deutschland.
Editor: Dt. Ges. für Limnologie (German Limnological Society) e. V., Hardegsen,
ISBN-Nr.: 978-3-9813095-4-6, Price: 10.00 € + shipping costs

Orders: DGL-Geschäftsstelle, Rellinghauser Str. 334f, D - 45136 Essen, Germany
geschaeftsstelle@dgl-ev.de

These richly illustrated keys (with more than 1,650 figures, mostly as photographs in colour) separate **larvae of non-biting midges** of the subfamilies Orthoclaadiinae, Prodiamesinae, Diamesinae, Buchonomyiinae, Telmatogetoninae, and Podonominae by **genera or some smaller taxa**. At least for genera, the geographical range covers the **central, western, and southern part of Europe**. Like earlier published identification keys for Chironomini and Pseudochironomini (Diptera: Chironominae) in 2012, this tool is **directed mainly at workers with little previous experience** in chironomid larvae, to facilitate more identifications of these organisms and better use of the information they offer to **science and management applications**. Although frequently smaller body size and larger variety as in Chironomini seem to require more precise observation, the keys maintain the emphasis on morphological **features that are visible macroscopically without elaborate preparations, wherever possible**. For a series of genera, higher taxonomic resolution is possible either in separate sections included in this book or in offering references to special literature, with which further determinations can be attempted. Finally, the index provides not only taxon name and page number, but gives also a thumbnail picture of prominent characters to support the remembering and re-finding of the taxa.

*Dieser mit über 1.650 meist fotografischen Abbildungen illustrierte Bestimmungsschlüssel trennt die **Zuckmücken-Larven** der Unterfamilien Orthoclaadiinae, Prodiamesinae, Diamesinae, Buchonomyiinae, Telmatogetoninae und Podonominae nach Gattungen und kleineren taxonomischen Einheiten. Der geografische Geltungsraum umfasst zumindest für die Gattungen **Mittel-, West- und Südeuropa**. Wie der Bestimmungsschlüssel für Chironomini und Pseudochironomini von 2012 richtet sich auch dieses Werk vor allem an **Zuckmücken-Unerfahrene**, denen der **Einstieg in die Bestimmung von Chironomiden-Larven** in Wissenschaft und Wasserwirtschaft erleichtert werden soll. Obwohl die größere Formenvielfalt und oftmals kleinere Körpergröße scheinbar höhere Ansprüche an die Bestimmungsarbeit als Chironomini stellen, wurde die Orientierung an **makroskopischen Merkmalen ohne aufwändige Präparation weitestmöglich** beibehalten. Bei einigen Gattungen kann eine weitergehende Bestimmungen in speziellen Bestimmungsteilen oder anhand der verwiesenen Spezialliteratur versucht werden. Im Index sind neben jedem Taxon außer der Seitenzahl ein oder mehrere Miniaturbilder von markanten Merkmalen gestellt, die die gesuchten Taxa leichter sich merken und wiederfinden lassen.*