Pupae in nomenclature and identification: West Palaeartic Orthocladius s.str.
(Diptera: Chironomidae) revised

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Abstract. Orthocladius (Orthocladius) is a subgenus of one of the more speciose genera amongst the Holarctic chironomids of the subfamily Orthocladiinae. Although many names have been applied, adult males are difficult to distinguish. However, the immature stages often are known, and pupae discriminate taxa reliably.

Based predominantly upon examination of exuviae, Orthocladius atripluma Kieffer and Orthocladius mitisi Goetghebuer are syn.n. of Orthocladius glabripennis (Goetghebuer); Orthocladius smolandicus Brundin a syn.n. of Orthocladius holsatus Goetghebuer; Orthocladius lenzi Kieffer a syn.n. of Orthocladius oblidens (Walker); Orthocladius rhyacobius Kieffer, Orthocladius rhyacophilus Kieffer and Orthocladius excavatus Brundin are syn.n. of Orthocladius obmbratus Johannsen; Orthocladius saxicola Kieffer and Orthocladius curtiseta Sæther are syn.n. of Orthocladius rubicundus (Meigen).

Orthocladius (Orthocladius) vaillanti is described as sp.n., based upon distinctive pupal exuviae. Lectotypes are designated for Orthocladius rhyacobius Kieffer, Orthocladius rhyacophilus Kieffer, Orthocladius rivinus Kieffer, Chironomus rubicundus Meigen and Orthocladius saxicola Kieffer.

A key to the thirteen western palaeartic species is given.

Introduction

Chironomid systematics has been confused by a historic dichotomy between freshwater biologists using the immature stages as the basis for their studies and traditional taxonomists reliant on the adult stages. More recent workers have attempted to reconcile the disparate classifications with success at the generic level, but many problems remain in species nomenclature, no more so than in the holarctic genus Orthocladius Wulp.

Historically, Thienemann and his students reared midges through to the adult, but retained and described only the immature stages. The associated adults, sent to Kieffer for identification and description, are no longer extant in most cases. It is clear that often Kieffer redescribed the same species, up to ten or more times and, furthermore, Thienemann did not always use Kieffer's adult-based name for the associated immature stages. This led to a confusion of species concept and nomenclature which partly remains to the present day.
The immature stages, particularly the pupae, are as distinctive and valuable in chironomid identification as are the adults. Although the reared adults often are lost, the immature stages from Thiennemann's rearings are still extant in the Zoologische Staatssammlung, Munich. Hirvenoja & Fittkau realized that the identity of many unknown Kieffer names could be established from these immature stages and sought a ruling on type status from the International Commission of Zoological Nomenclature (Hirvenoja & Fittkau, 1971). The subsequent ruling of the International Commission of Zoological Nomenclature (1980) was that pupal (and larval) exuviae that is/are unequivocally associated by rearing with Kieffer's lost adult(s) of type status are parts of that type, even though unseen by Kieffer. Since Thiennemann's notebooks were meticulously maintained, it is possible to confirm unequivocal associations in many cases. We take this evidence in conjunction with the ruling as justifying the nomenclatural decisions taken in this paper. This course of action allows resolution of many of the problems besetting western Palearctic chironomid nomenclature through examination of the Thiennemann collection.

The genus Orthocladius is common, widespread and speciose and suffers from nomenclatural problems for the reasons outlined above. This instability of nomenclature prevents the synthesis of ecological and biogeographic information on species within this important genus.

Fortunately, in the genus Orthocladius, the pupae are more useful in delimiting species than any other life history stage. The recognition of 'pupal-taxa', reconciled with new morphological information on other life history stages, was adopted in revising Nearctic Orthocladius s.str. (Soponis, 1977), O. (Euorthocladius) Thiennemann (Soponis, in prep.) and O. (Eudactylocladus) Thiennemann (Cranston, 1984, and in prep.). In surveying the pupae of British Chironomidae, Langton (1984) recognized twelve 'pupal types' in the subgenus Orthocladius, a number that greatly exceeded the adult species recognised by Pinder (1978) and larval species by Cranston (1982). Names were applied to some of these pupal types but others were designated by a code.

In an attempt to validate the concept of 'pupal-taxa' and resolve the nomenclature, both authors independently visited and examined the Thiennemann collection in Munich. This paper presents the results of our studies in the form of an emended key to the pupal stage of Orthocladius s.str. with comments on the nomenclatural decisions taken. At present we are unable to present diagnoses and keys to the adults for lack of adequate associated material. However, where adult identity is certain, particularly in the light of Soponis' (1977) revision, we have referred to published descriptions. Furthermore, where questions have arisen concerning adult types, we have borrowed them to confirm taxonomic decisions taken on the immature stages.

Our studies have shown that there has been great confusion over the application of names in the subgenus and we are not in a position to review all previous authors' usages.

Methods and Materials

All material examined is slide mounted in either Canada Balsam or Euparal. Our pupal terminology follows that of Langton (1984). The following institutional abbreviations are used: BMNH; Entomology Department, The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.; CNC; Biosystematics Research Institute, Ottawa, Ontario, Canada K1A OC6 (Dr D. R. Oliver); MNHM; Museum National d'Histoire Naturelle, 45 Rue de Buffon, 75005 Paris, France (Dr L. Matile); IRSNB; Institut Royal des Sciences Naturelles de Belgique, Rue Vautier 29, B-1040 Bruxelles, Belgium (Dr P. Grootaert); ZSM; Zoologische Staatssammlung, Munchhausenstrasse, Munich, German Federal Republic (Dr F. Reiss).

Diagnosis

The pupae of Orthocladius s.str. can be recognized by the following differential characters: Four dorsocentral setae, the second thin, the rest robust. Apical transverse band of hooks on segment II extending less than 0.34 the breadth of the segments, usually of three or more transverse rows of hooks. Abdominal tergites III–IV with a small to extensive median point patch and a posterior transverse band of points to which it may be partly or completely fused.
Tergites II or III–V also with an apical transverse band of anteriorly directed spinules. Anal lobes often with apical teeth, sometimes fringed with hair-like teeth, and always bearing apically three setae which are usually hooked at their tip.

Key

The following key, modified from Langton (1984), will separate the known western palaeartctic pupae of Orthocladius s.str. (Comments in parentheses aid in identification but are not necessarily diagnostic):

1 Thoracic horn long, smooth and narrow, brown at base, colourless thereafter (Fig. 1g). Exuviae brown with transparent intersegmental bands. Anal lobes rounded externally and tapered from the middle to the apical setae (Fig. 4g) .............. Orthocladius frigidus (Zetterstedt)

2 If thoracic horn long and smooth, its length does not exceed 500 μm and posterior abdominal segments are pale .............. 2

2 Apical setae of anal lobes about as long as the lobes, brittle, not hooked at tip (Fig. 4a). All five lateral setae of segment VIII particularly conspicuous, over half the length of segment VIII and brown. Pedes spurii B absent (Fig. 2b). (Anal lobes with a lateral fringe of sparse hair-like teeth. Abdominal segments more or less evenly brownish. Thoracic horn as in Fig. 1e) .... Rheorthocladius sp. A of Thienemann, 1944

- Apical setae of anal lobes shorter than the length of the lobes and usually hooked apically (Fig. 4d). Pedes spurii B on segment II conspicuous. Lateral setae of segment VIII weak (only in vaillanti do two or three lateral setae, at most,

Fig. 1. Thoracic horn and precornal setae. a, glabripennis; b, obumbratus; c, pedestris; d, wetterensis; e, 'Rheorthocladius sp.A'; f, holsatus; g, frigidus; h, oblidens.
approach half the segment length). Pedes spurii B on segment II conspicuous 3

3 Abdominal tergites II–VI (or –VII) nearly or completely covered with points between the lateral muscle marks (Fig. 5b). (Anal lobes with an extensive fringe of hair-like teeth (Fig. 5c). Abdominal segments with a dark brown anterior transverse band continued posteriorly along the lateral muscle marks, the rest of the tergites and sternites paler) vaillanti sp.n.

– Armament of abdominal tergites much less extensive 4

4 Apical setae of anal lobes short, less than half the lobe length (Fig. 4h). Apical point band of tergite III extending about half as far laterally as the posterior band (Fig. 2f). (Thoracic horn as in Fig. 1h) oblidens (Walker)

– If apical setae of the anal lobes short, apical point band of tergite III extending much farther laterally (in most species equalling the width of the posterior band) 5

5 Posterior point band on tergite III extending further laterally than the apical band (Fig. 2a). All, or most, of the setae on sternite III forked or branched, this occurring to a lesser extent on sternites II and IV rivicus Kieffer

– Posterior point band on tergite III not extending farther laterally than the apical band. Forked or branch setae rare and usually confined to the apical segments 6

6 Median point band of tergites III–IV transverse; separate from posterior band, joined to it laterally or joined to it medially as well, but usually distinct (Fig. 2d). Points of median and posterior bands similar in size and form 7

– Median point patch of tergite II–IV usually completely fused to the posterior band to form a single trapezoidal patch; if transverse, then median and posterior points dissimilar in size. (No granulation present on tergites and sternites) 8

7 Anal lobes with apical teeth; the apical setae usually strongly hooked at tip (Fig. 4i). Tergites II–V normally with a postero-lateral patch of granules extending the hook row and apical bands to the tergite margin; ventrally on segments I–V these may be complete across the sternites or medially broken. Lateral setae of the posterior segments shorter and thinner (Fig. 4i). (Armament of tergites very variable, e.g. tergite III usually has a narrow irregular transverse median band, but occasionally the points cover the tergite except for bare anterior and postero-median areas) rubicundus (Meigen)

– Anal lobes without apical teeth or rarely with small colourless teeth; the apical setae often straight, at most gently curved. Tergites and sternites without granulation (Fig. 2e). Lateral setae of the posterior segments longer and more robust (Fig. 4f) sp.indet. oblidens Walker sensu Langton, 1984, misident.) 9

– Median and posterior points of different form and size, at least on tergite III, or conjunctives blotched with brown 10

8 Point patches on tergites III–V more or less trapezoidal with the points of median and posterior bands about the same size and form. Thoracic horn elongate, coarsely toothed (Fig. 1a). Conjunctives without brown blotches 11

9 Points of median patches on tergites III–V grading anterolaterally into fine spinules ("shagreen") (Fig. 3d). Anal lobes rarely with apical teeth; when present, colourless and small 12

– Points of median patches on tergites III–V obviously demarcated from the antero-lateral shagreen where there is a sudden drop in point size (Fig. 3c). Apical teeth of anal lobes usually brown, sturdy and often fused at base; occasionally colourless but always present 13

10 Tergites IV and V with points of median patch grading in size from mid-tergite outwards (Fig. 3d) glabripennis Goetghbeuer

– Tergites IV and V with the median points somewhat larger than more lateral and showing as a more or less circular area within point patch (Fig. 3a) maurus Goetghbeuer 11

11 Exuviae pale yellow. Thoracic horn 290–405 μm long sp.indet. (Pe 7 of Langton, 1984.)

– Exuviae brown with darker anterior and lateral margins to the tergites. Thoracic horn 420–480 μm long (Fig. 1b). (Anal lobes may be weakly fringed with hair-like teeth in addition to the apical teeth (Fig. 4b).) obumbraeus Johannsen 12

12 Points of the posterior transverse band of tergite III obviously smaller than those of the median and apical bands (Fig. 3b). Thoracic horn broad and contracted strongly in apical half, with small teeth (Fig. 1d). Anal lobes without apical teeth, but a lateral fringe may be weakly developed wetterensis Brundin

– Points of the posterior transverse band of tergite III not smaller than those of both the median and apical bands. Thoracic horn differently shaped (Fig. 1c, 1f) 13
Fig. 2. Dorsal armament of abdomen. a, rivinus segments II/III; b, 'Rheorthocladius sp. A' segments II/III; c, pedestris segment V; d, rubicundus segments II/III; e, sp.indet. segment III; f, oblidens segments II/III; g, holsatus segment V.
Fig. 3. Dorsal armament of abdomen. a, maius segment V; b, wetterensis segment III; c, obumbratus segment V; d, glabripennis segment V.

13 Tergites III–IV with the median and posterior point patches fused; the points small and of similar size and form (Fig. 2c). Exuviae usually very dark; conjunctives III/IV–VIII/IX blotched with small dark spots on a transparent/paler cuticle. Apical setae of anal lobes hooked (Fig. 4c) ........................................ pedestalis Kieffer

– Tergites III–VI with median point patch transverse, separate from the posterior band, of narrow, sharp points, differing markedly from the short, sturdy points of the posterior band (Fig. 2g). Apical setae of anal lobes straight (Fig. 4e). Exuviae pale; conjunctives not blotched ........................................ holsatus Goetghebuer

Orthocladius (Orthocladius) glabripennis

Dactylocladius glabripennis Goetghebuer, 1921: 85.
Orthocladius glabripennis (Goetghebuer); Pinder & Cranston, 1976: 19; Pinder, 1978: 72.

Orthocladius (s.str.) Pe5 Langton, 1984: 155.

We recognize Orthocladius glabripennis (Goetghebuer) from the redescription of Pinder & Cranston (1976) although there is much more extensive variation in setal counts and anal point shape than they describe. The pupa is keyed and described as Pe5 by Langton, and is unequivocally associated with adults of glabripennis.

The following synonyms of Orthocladius glabripennis (Goetghebuer) are established based upon discovery of type and related material:

Orthocladius atripluma Kieffer

Kieffer described Orthocladius atripluma from at least one male reared by Thiennemann from larvae collected in the Diemel, Westphalia. The description is more lengthy than usual but does not contain characters that are of current value in species delimitation in the genus Orthocladius. The type is believed to be lost. In
Fig. 4. Male and segments (dorsal on left, ventral on right). a, 'Rheorthocladius sp. A'; b, obumbratus; c, pedestris; d, rivinus, e, holsatus; f, sp.indet.; g, frigidus; h, oblidens; i, rubicundus.
ZSM there is one slide labelled ‘Rheothochladius atripluma’ containing a single pupal exuviae. The pupa appears to be conspecific with glabripennis (Langton’s Pe5). It is not possible unambiguously to connect this slide with the adult sent to Kieffer and we can infer no type status. The name atripluma does not appear to have attained any usage since the first description, so on this evidence we treat the name as a junior synonym of glabripennis.

Orthocladius mitisi Goetghebuer

Goetghebuer (1938: 458) described Orthocladius mitisi from an unstated number of adult males (but probably one) collected by Dr Mitis in ‘Basse Autrique’. In IRSNB there is one male labelled ‘Orthocladius mitisi 1938 Basse Autrique’ in pencil, ‘Type Goetghebuer’ in yellow and ‘Coll. et det., M. Goetghebuer Orthocladius mitisi Goetgh. R.I.Sc.N.B. 18.073’. This appears to be a holotype. The specimen is in very poor condition, an uncleaned whole mount lacking antennae, compressed between two layers of partially opaque celluloid. It is now remounted in Euparal on a slide and the genitalia indicate a similarity to Orthocladius glabripennis (Goetghebuer, 1921) as redescribed by Pinder & Cranston (1976).

In ZSM there are several slides labelled ‘Rheorthocladius mitisi n.sp. Goetghebuer’ and ‘Mitis’. There are both pupal exuviae and pharate adult males but no exuviae can unequivocally be associated with the adult holotype. However, these give an indication of the identity of mitisi since all pupal exuviae are identical to Langton’s Pe5, which is glabripennis. Furthermore, one pupal exuviae, identical to Pe5 and to the other exuviae labelled ‘mitisi’ has a label indicating that the associated adult was determined by Goetghebuer as glabripennis. The only doubt concerning the synonymy of mitisi as a junior synonym of glabripennis concerns the adult male antennal ratio, below 2.0 in mitisi, 2.5–3.0 in glabripennis. However, we do not consider this to be significant.

Orthocladius (Orthocladius) holsatus

Orthocladius smolandicus Brundin, 1947: 22;

Goetghebuer described Orthocladius holsatus from a male reared by Meuche. In ZSM we have been able to find only a female pupal exuviae labelled ‘Aschebergen Tail G.P. See, 11.6.36 Meuche 108’ with ‘holsatus’ added (presumably later) in Thienemann’s handwriting. Although this slide is of a different sex to the specimen described by Goetghebuer, it is evident that the ZSM female pupa is identical with holsatus of subsequent authors. Humphries (1937) described the pupa of holsatus under the genus Trichocephalus based upon a pupal pattern that more resembled that genus (now subsumed under Cricotopus) than Orthocladius. Later generic placements of holsatus reflect this confusion. Eventually Thienemann (1942) placed the species in his genus Pararhoccadius, for species like holsatus that had a ‘Trichocephaloid-type’ pupa and an ‘inserpens-type’ larv. Pararhoccadius was preoccupied and in his revisionary treatment of Cricotopus and its allies, Hirvenoja resolved the matter, recognizing that the correct placement, as indicated by Goetghebuer, is in Orthocladius.

Brundin’s description of Orthocladius smolandicus as a new species recognized the similarity to holsatus. Differences used to separate the species were based on Goetghebuer’s original description and the supposition that since the taxon had been placed in Trichocephalus the adult of holsatus must have had the hairy eyes characteristic of this group. As shown above, this placement was based solely upon the immature stages: the adult eyes are bare as in Orthocladius.

O. smolandicus, as redescribed by Soponis, is characterized in the adult by a large number of dorso-central setae arranged in 2–3 rows. This is quite characteristic of pharate adults associated with holsatus-type pupae and we have no hesitation in synonymizing smolandicus with holsatus.

Orthocladius (Orthocladius) maius

Orthocladius maius Goetghebuer, 1942; 663. Orthocladius (s.str.) Pe 6 Langton, 1984: 163.

Goetghebuer (1942: 664) described Orthocladius maius from an undescribed number of
specimens from Lunzer See, Upper Austria, reared by Ruttnner. There are two males in the IRSNB, each partially embedded in celluloid, now slide mounted in Euparal. One bears a yellow type label, the other lacks any type label. The type male bears additional labels 'Lunzersee (Nieder Donau) V.1941, Dr Thienemann', 'Orthocladius maurus n.sp.' and 'R.I.Sc.N.B. 18.073 Coll. et det. M. Goetghebuer'. The second specimen bears the labels 'Lunzersee 23.V.40 Dr Thienemann', 'Orthocladius maurus n.sp.' and 'R.I.Sc.N.B. 18.073 Coll. et det. M. Goetghebuer'.

In ZSM there are several slides of larvae, pupae and pupal exuviae from Lunz although none can be associated with the type unambiguously and therefore no type status can be determined. The pupa indicates that maurus is a distinct species, referred to by Langton (1984) as Pe6. It resembles Langton's Pe5 (glabripennis) but consistently differs in the appearance of tergite IV and V, having distinct circular areas of larger points. Furthermore, the hypopygium shows it to be distinct from glabripennis.

Orthocladius (Orthocladius) oblidens

Chironomus oblidens Walker, 1856: 180.  
Orthocladius (Orthocladius) sp. 'a' Pinder, 1978: 72; Langton, 1984: 150 (sub Orthocladius Pe2 Langton); Rieradevall, 1985: 116. nec Orthocladius (s.str.) oblidens Walker sensu Langton, 1984: 154 [misident.]

We recognize Chironomus oblidens Walker from the holotype slide in the BMNH and the redescription of the type by Soponis (1977). The holotype is somewhat atypical for the species, which led Pinder (1978) to recognized a related but distinct species 'a'.

In Langton's study of the pupal exuviae he recognized different pupal types respectively associated with species 'a' (Langton's Pe2) and 'oblidens'. However, Langton's 'oblidens' pupa is not associated with adults so determined, nor with any other species recognized in this study, and the taxon is uncertain.

Material in ZSM from a number of localities in Germany, particularly the River Fulda, demonstrates that the names oblidens and rubicundus have been widely used for a single, but rather variable, pupal type associated with adults indistinguishable from oblidens Walker, but different from rubicundus (q.v.). We conclude that oblidens is a rather variable species, ranging in male hypopygial shape from that of the type (Pinder, 1978: Fig. 113B) to that of species 'a' (Pinder, 1978: Fig. 113A).

The following synonymy is established based on re-examined material.

Orthocladius lenzi Kieffer

Kieffer (1924: 69) described both sexes of Orthocladius lenzi and a variety, from the grand lac de Ploën and Schaalsee. No adult type material is extant. The type locality of Ploën (=Ploën) indicates that the material came from Thienemann or one of his group and may well have been reared. However, in ZSM there is a single slide of a pupal exuviae labelled only 'Orthocladius lenzi var Puppe' in the handwriting of Thienemann. The pupa is identical with Langton's Pe2, in turn associated with oblidens Walker. Although the pupa has no unequivocal type status, we believe that it is evidence enough to synonymize lenzi with oblidens, as has been suggested by some previous workers.

Orthocladius (Orthocladius) obumbatus

Orthocladius (s.str.) Pe9 Langton, 1984: 155.

We recognize Orthocladius obumbatus Johannsen from the redescription of type and novel material by Soponis (1977). In addition we have examined Nearctic material in the BMNH and CNC identified by Soponis. We
have not re-examined the type. Nearctic pupae of *obumbratus* are identical to Langton's Pe9.

The following synonyms are established based upon examination of types and associated material.

**Orthocladius rhyacobius** Kieffer

Kieffer (1911: 181) described *Orthocladius rhyacobius* from material reared by Thienemann in a short diagnosis in a key. As with many of the species described by Kieffer, the description is inadequate and the types are believed to be lost. In ZSM there is one slide labelled 'Fuellbecke Zuflus. str. I Orthocladius rhyacobius Kieffer' with one male and one female pupal exuviae. Kieffer's description does not indicate which sex he had available and we believe that the Thienemann material represents syntype exuviae of adults sent to Kieffer. We therefore designate the female exuviae as lectotype, the male as paralectotype and have added a red ZSM label indicating this. Both exuviae are identical to *obumbratus* Johannsen as figured and redescribed by Soponis (1977: 78).

**Orthocladius rhyacophilus** Kieffer

As with *rhyacobius* (q.v.), *Orthocladius rhyacophilus* was described only in a key (Kieffer, 1911: 182). The description shows that both sexes were available to Kieffer, but, as is often the case, the description is inadequate and types are believed to be lost. In ZSM there is a slide labelled 'Eurepe, 22 iv.1910, Orthocladius rhyacophilus Kieffer', with two female pupal exuviae. We believe that these represent syntype exuviae of adults sent to Kieffer. We therefore designate as lectotype the exuviae ringed in ink (on the right with the slide label facing) and the other as paralectotype. A red ZSM label indicates this designation. Both exuviae are identical to *obumbratus* Johannsen as figured and redescribed by Soponis (1977: 78).

**Orthocladius dispar** Goetghebuer

Goetghebuer (1942: 14) described *Orthocladius dispar* from both sexes of adults received from 'Forelleinteich' by Thienemann. Thienemann's notebooks contain the further information that the adults were reared from the canal at the Forelleinteich, Lunz [Austria, Tyrol]. One slide exists in ZSM containing five pupal exuviae on a single slide labelled 'Rhe-orthocladius dispar n.sp. Goetg. Lünz 1942 No 133d J an Goetgh'. These pupal exuviae apparently are those from which emerged the adults that Goetghebuer described as *dispar*. Although no individual exuviae can unequivocally be associated with Goetghebuer's material, they can be considered parts of the syntypic series, because Goetghebuer did not designate a holotype.

All five syntypic exuviae are identical to *obumbratus* Johannsen as figured and described by Soponis (1977: 78). Although we have not examined the adults sent to Goetghebuer (whose description could fit most *Orthocladius* species), we confidently make the synonymy with *obumbratus* based on identity of pupae.

**Orthocladius excavatus** Brundin

Brundin described *Orthocladius excavatus* from adult males alone — his description and figure (1947: Fig. 38) and subsequent figure (1956: Fig. 67) demonstrate the variation in genitalia characters that we and other authors have seen in this taxon. Soponis (1977), in discussing *excavatus* in relation to *O. obumbratus*, was able to detect only minute differences in genitalia that we believe lie within the range of this single variable taxon. To further substantiate our synonymy, we have seen numerous pupal *Orthocladius* in ZSM identified as *excavatus* that cannot be distinguished from *obumbratus*. We have not examined Brundin's type(s) in making this decision.

**Orthocladius (Orthocladius) pedestris**


*Orthocladius* (s.str.) Pe10 Langton, 1984: 166.

*Orthocladius* (s.str.) *rhyacobius* Kieffer, sensu Langton, 1984: 166.

Kieffer (1909: 48) described *Orthocladius pedestris* cursorily in a key, based on an adult and larva collected from Vollme, Westphalia by Thienemann. The description is totally inadequate for recognition and the adult type is believed to be lost.
In ZSM is a pupal exuviae on a slide labelled ‘Vollme bei Daherlnick Orthocladius pedestris n.sp.’. This appears to be the only remaining original material of *pedestris* and we consider it to have holotype status and accordingly have identified it as such with a red ZSM label. Under the same coverslip is an exuviae of *Orthocladius frigidus* Zetterstedt.

The holotype exuviae is identical to Langton’s Pe10, an exuvial type previously without an associated name. The name *pedestris* appears to be valid and the following name is believed to be synonymous.

*Dactylocladius tubicola* Kieffer

Kieffer (1909: 12) described *Dactylocladius tubicola* briefly in a key, based on adult and larva collected from Glör, Westphalia, by Thienemann. The description is totally inadequate for recognition and the adult type is believed lost. In ZSM is a pupal exuviae on a slide labelled ‘Glör, 30.v.1908 Dactylocladius tubicola’. This appears to be the only remaining original material of *tubicola* and we consider it to have holotype status and accordingly have identified it as such with a red ZSM label.

The exuviae is very similar to that of *pedestris* and Langton’s Pe10, but differs slightly in the presence of 5–8 fine setae on the margin towards the apex of the anal lobe, as illustrated by Thienemann (1944: Fig. 69). In view of the small sample size of *pedestris* exuviae, we cannot tell if this is more than individual variation, and hence treat *tubicola* as a tentative junior synonym of *pedestris*.

*Orthocladius (Orthocladius) rivinus*

*Orthocladius rivinus* Kieffer, 1915: 85.
*Orthocladius* (s.str.) Pe3 Langton, 1984: 150.

Kieffer (1915: 85) described *Orthocladius rivinus* from the male with the only collection data given as ‘Deutschland (Westfalen)’. However, earlier in the paper in the description of a ceratopogonid, Kieffer stated that material from Germany came from Dr Thienemann. No adult material is extant and it is believed to be lost. In the ZSM there is a slide labelled ‘Salzkotten Bach Orthocladius rivinus K’ in Thienemann’s handwriting, containing two pupal exuviae.

Thienemann’s notebook contains a letter from Kieffer to Thienemann dated 12.ii.1914 demonstrating that these are the exuviae of the specimens sent to Kieffer that were described as *rivinus*. The undistorted exuviae is designated here, ringed and labelled as lectotype, the other as paralectotype.

The type pupae of *rivinus* corresponds with Langton’s Pe3 and is a valid species of *Orthocladius* s.str.

*Orthocladius (Orthocladius) rubicundus*

*Chironomus rubicundus* Meigen, 1818: 35.
*Orthocladius rubicundus* (Meigen); Pinder, 1978: 72; Langton, 1984: 152.
*Orthocladius curtiseta* Sæther, 1973: 58 (nom.n. for *breviseta* Sæther, preocc. Kieffer, 1923.)
*Syn.n.*

Through the courtesy of Dr Loic Matile we have been able to examine the three specimens lying under *rubicundus* in the Meigen collection MNHM. All have been dissected and mounted on slides in Euparal: a male in good condition is designated here as lectotype and so labelled; a female and a male lacking an abdomen are paralectotypes. The species conforms to the concept used by British workers, following Edwards (1929), who had examined Meigen’s types. It is identical to the species referred to by workers in continental Europe as *saxicola* (q.v.) and in the Nearctic region as *curtiseta* (q.v.).

*Orthocladius saxicola* Kieffer

As with *rhacobius* (q.v.), *Orthocladius saxicola* was described only in a key (Kieffer, 1911: 181). The description, implying that a female was available but unclear about the male, is typically inadequate and types are believed to be lost.

In ZSM there is a slide labelled ‘Orthocladius Dactylocladius saxicola Kieff (Wildhausen 4 größere form)’ with one male and two female pupal exuviae. Further data in Thienemann’s notebook indicates ‘2.x.09 in der Ruhe oberhalb Oventrop (etwas verschmertz durch Papier- abwasser)’ and that the emerged adults were
sent to Kieffer who described them as *saxicola* sp.n. We therefore believe these exuviae to be syntypes and have designated the male as lectotype, the females as paralectotypes. A red ZSM label indicates this designation.

In Britain, this species has been referred to as *rubicundus* as adult (Pinder, 1978), pupa (Langton, 1984) and larva (Cranston, 1982). Examination of the types of *rubicundus* Meigen (see above) confirms that *saxicola* is a junior synonym of *rubicundus*.

*Orthocladius curtiseta*

Sather (1969: 65) described *Orthocladius breviseta* from British Columbia, Canada, as being closely related to *Orthocladius saxicola* Kieffer. Sather (1973) later recognized that
breviseta had been used earlier for an Orthocladius by Kieffer and proposed the replacement name curtiseta, under which name Soponis (1977) redescribed the species but did not add to the known range. Soponis (1977) concurred with Sæther (1969) in noting the resemblance of the species to saxicola, but neither author made a comparison with European material. Examination (by P.S.C.) of the reared type of breviseta in CNC confirms that it is a junior synonym of saxicola of European workers, and hence of rubicundus Meigen.

Orthocladius (Orthocladius) vaillanti sp.n.

Orthocladius (Orthocladius) vaillanti Langton & Cranston, sp.n.
Orthocladius (s.str.) Pe1 Langton, 1984: 157 (part).

Langton’s (1984) distinctive pupal exuvial type 1 (Pe1) has proved to encompass two species. One is represented by material in ZSM, namely a single slide with three exuviae beneath a single coverslip, labelled ‘Rheorthocladius Vaillanti, Algier, La Cliffe, 1951 No 29, Vaillant’ in the handwriting of Thienemann. This name appears not to have been published, and in our view it is an undescribed species and we here validate the name, as vaillanti. The species may be recognized from the preceding key and the following pupal characters.

Frontal warts bulbous, somewhat granular. Cephalic tubercles rounded, weak. Frontal setae strong, about 100 µm long. Thoracic horn apparently very weak and easily broken off; the only fragment remaining (Fig. 5a) is transparent with dark brown base. Abdominal tergites II—VI nearly or completely covered with acute points between the lateral muscle marks (Fig. 5b), the points strongest on segment VI, somewhat less strong on III—V, and noticeably weaker on II; tergite VII is similarly armed but the points are smaller and evanescent medioposteriorly. Only four lateral setae on segment VIII, conspicuously long and dark. Anal lobes almost completely fringed with hair-like teeth, the most posterior reduced to short spines in two of the three specimens; apical setae strongly hooked at tip (Fig. 5c).

The three damaged exuviae are mounted under a single coverslip, the middle specimen is here designated the holotype and the other two the paratypes.

The second species present under Pe1 is identical to the pupa Thienemann (1944: 598) called Rheorthocladius sp.A. Despite its relative abundance, no adults have ever been associated with this pupal type and we refrain from formally naming it because of the abundance of named, but as yet unreared, Orthocladius species.

Orthocladius (Orthocladius) wetterensis

Orthocladius (Orthocladius) wetterensis Brundin, 1956: 105.
Orthocladius (s.str.) Pe8 Langton, 1984: 156.

Orthocladius wetterensis is one of the most readily recognizable adult male Orthocladius in being microtrichose at the apex of the gonostylus. Based on this character possessed by pharate adult males from Malham Tarn (Yorkshire) and the River Chew (Avon) we have no hesitation in applying this name to Langton’s Pe8.

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