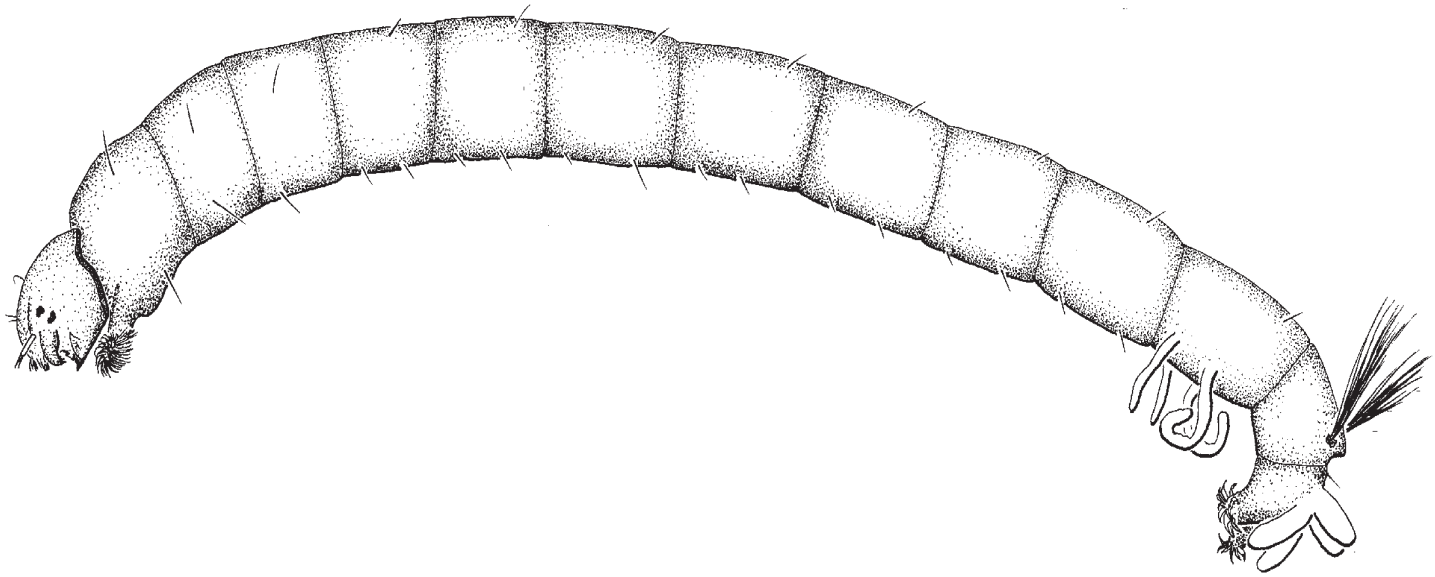

2017 Chironomidae Update

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Larval Chironomidae Identification Workshop
2-3 May 2017
Department of Entomology and Nematology
University of Florida, Gainesville, FL,

This handout will provide a summary on the myriad changes and advances in knowledge that have taken place since my 2001 Southeastern United States larval midge identification manual.

Many taxonomic changes have been made, many of which come from the 2013 revised Holarctic Keys for midge larvae (Andersen et al. 2013a). These keys update/revise the 1983 larval keys edited by Wiederholm (1983).

Extensive updates for the Tanytarsini are not included here, but a brief synopsis is provided. These updates were made in Epler (2014). See that manual for more detailed information.

TANYPODINAE

A recent paper (Silva & Ekrem 2015) has rearranged some generic limits, most of which agree with the changes made in Cranston & Epler (2013), plus a new combination.

Ablabesmyia - As an additional note for *A. peleensis* (couplet 3, p. 4.21), note that it has an AR of 4.8-6.3.

Bethbilbeckia is now considered part of ***Macropelopia***; thus its only included species, *B. floridensis* Fittkau & Murray, is now *Macropelopia floridensis* (Fittkau & Murray) (see Cranston & Epler 2013).

Cantopelopia, with one included Nearctic species, *C. gesta* Roback, has been synonymized with ***Monopelopia*** (see Cranston & Epler 2013). Thus the taxon is now *M. gesta* (Roback). An updated key for the larvae of all North American species of *Monopelopia* is provided below.

Coelotanypus - A reminder that the key for larvae (p. 4.34) only works for 4th instar specimens; mental tooth numbers vary from instar to instar. Thus earlier instar (2nd, 3rd) *C. tricolor* may not have 9 or more mental teeth.

Hayesomyia is now considered part of ***Thienemannimyia***; thus *H. senata* (Walley) is now *Thienemannimyia senata* (Walley) (see Cranston & Epler 2013). It is still very difficult to separate, at the generic level, the larvae of *Meropelopia* from those of many *Thienemannimyia*. One must rely on finding mature larvae with developing pupa thoracic horns for accurate generic placement.

Helopelopia was considered part of ***Conchapelopia*** by Cranston & Epler (2013); however Silva & Ekrem (2015) suggest that the two genera remain separate. Without associated adults, neither genus can be identified to species as larvae. Silva & Ekrem (2015) stated:

"*Helopelopia* is recovered with *Conchapelopia* as its closest relative in our analyses, at least not refuting the subgeneric status of this taxon. According to B. Bilyj (personal communication), *Helopelopia* can be distinguished in the larval stage by the following combination of characters: the basal maxillary palp is longer than 65 µm, with two segments and an apical sensillum b; the mandible has a small but distinctly visible accessory tooth, and the pseudoradula is narrow with parallel sides reaching the base. In *Conchapelopia* the sides of the pseudoradula tapers to a wider base. In *Helopelopia* pupae, the thoracic horn is rather distinctly elongated with a narrow tubular atrium that bifurcates apically into two short, broad diverticula supporting a small, rounded to oval plastron. In *Conchapelopia*, the plastron is generally larger occupying about a 1⁄3 of the lumen. It may be smaller as in *C. pallens (=gonoides)*, but differs in having more, longer and narrow apical diverticula (B. Bilyj, personal communication). The adult male of *Helopelopia* possesses a very distinctive hypopygium, bearing a modified gonostylus, which also warrants its separation from *Conchapelopia.* Moreover, the basomedial lobes between the gonocoxites are also different in having a separate ventral and dorsal filamentous lobes, whereas in *Conchapelopia* the two lobes are fused into one (B. Bilyj, personal communication). We believe that these distinct differences in all life stages are convincing arguments to accept *Helopelopia* and *Conchapelopia* as separate genera, at least until a species-level phylogeny is available for these taxa."

This is still, as with many taxa of the *Thienemannimyia* group, unsatisfactory because some of the larval characters suggested by Bilyj may not hold up when more material of *Helopelopia* species is examined from the entire range of the "genus". For the time being (until more work is done!), I am still considering the two as one genus, *Conchapelopia.* Stay tuned …

Labrundinia maculata Roback is considered a junior synonym of *Labrundinia longipalpus* (Goetghebuer). See Silva et al. 2011. *Labrundinia* was recently revised by Silva et al. (2014); keys for larvae, pupae and adults were provided.

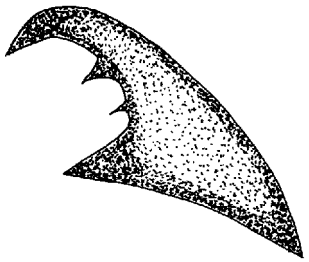
Monopelopia - *M. caraguata* Mendes, Marcondes & de Pinho, a South American species, has been collected from the Everglades by Rick Jacobsen. See Mendes et al. 2003. An updated key for the larvae of all North American species is provided below.

Paramerina and ***Reomyia*** have been synonymized with ***Zavrelimyia*** (Silva & Ekrem 2015), as was suggested by Cranston & Epler (2013) . Thus all species formerly placed in *Paramerina* and *Reomyia* are now in *Zavrelimyia* subgenus *Paramerina* (e.g., *Zavrelimyia (Paramerina) anomala* (Beck & Beck), *Z.(P.) testa* (Roback)), ***OR*** *Paramerina (Reomyia)* (e.g. *Z. (Reomyia) wartinbei* (Roback)), etc. Those species already in *Zavrelimyia* may be written as *Zavrelimyia (Zavrelimyia) sinuosa* (Coquillett), etc.

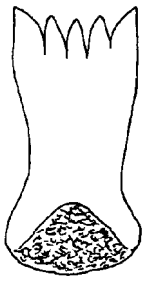
Pentaneura - *Pentaneura* sp. A Epler is *P. inyoensis* Sublette. In our area *P. inyoensis* is known from at least Kentucky and Ohio.

Key to *Monopelopia* larvae of North America

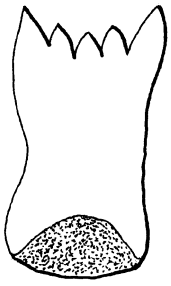
1 At least one dark claw on posterior parapod ……..…… 2



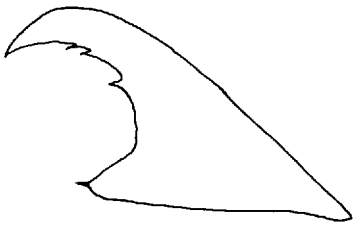
1’ All claws of posterior parapod colorless or pale yellow ……..……..…….. 3



2(1) Teeth of ligula in relatively straight line; procercus length/width 3.0 or less; common ……..…… ***M. boliekae*** Beck & Beck [SE US]

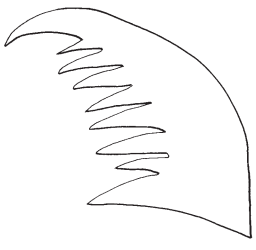


2’ Teeth of ligula in concave arc; procercus length/width > 4.0; rare …. ….....…… ***M. tenuicalcar*** (Kieffer) [E US]



3(1’) Small claws of posterior parapod with at most a few small teeth on inner surface ..... ***M. tillandsia*** Beck & Beck [FL]

3’ 2-3 small claws on posterior parapod with many large inner teeth 4

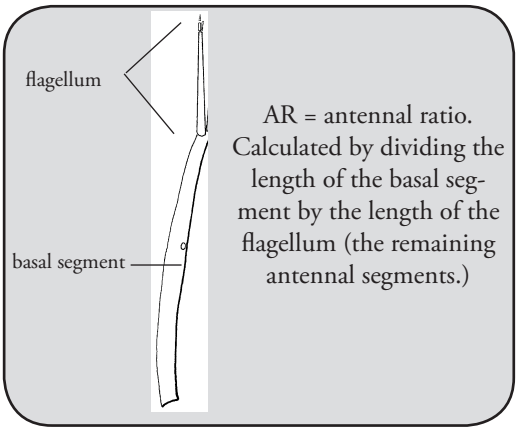


4 (3’) 3 small claws on posterior parapod with many large inner teeth .... ***M. gesta*** (Roback)[SE US]

4’ 2 small claws on posterior parapods with 5 or more large inner teeth 5

5(4’) AR 2.22-2.53 …..... ***M. mikeschwartzi*** Epler [Jamaica]

5’ AR 3.08-3.18 …..... ***M. caraguata*** Mendes, Marcondes & de Pinho [FL, Brazil]



Notes on species added

M. caraguata - This species was originally described from Brazil (Mendes et al. 2003), where it was found in bromeliad phytotelmata (water held by plants, such as bromeliads, tree holes, etc.). Jacobsen (2008) found pupal exuviae assignable to this species in solution holes in the Everglades. This difference in apparent habitat preferences may indicate that the two taxa are different. At least one other phytotelmatic species, the orthoclad *Phytotelmatocladius delarosai* Epler, is also known from Florida, Argentina and Brazil (see Epler 2010 and Siri & Donato 2014).

M. gesta - This species was previously placed in *Cantopelopia* Roback, but that genus was considered a synonym of *Monopelopia* by Cranston & Epler (2013). This was the sole Nearctic species placed in the now defunct genus.

ORTHOCLADIINAE

Corynoneura sp. B has been described as *C. floridaensis* Fu & Sæther (2012). In addition, I have found another (unassociated) larval type of *Corynoneura*. *Corynoneura* sp. I (that's a capital "i"), known to date only from South Carolina, will key to couplet 5 (p. 7.47); it has a mentum with 3 median teeth, but a posterior parapod subbasal seta similar to that of *C. floridaensis.*

Hydrobaenus - *H.* sp. O Epler (p. 7.80) has a very minute beard, best viewed with DIC ("Nomarski") optics. The beard is difficult (or impossible in some specimens) to see with phase contrast optics. It will still key to genus correctly!

Orthocladius - The taxon keyed as *Orthocladius* sp. "Jacobsen" (p. 7.99, couplet 3') has been described as *Orthocladius (Mesorthocladius) nimidens* Sæther. *Orthocladius frigidus* (Zetterstedt) and *O. vaillanti* Caldwell (couplet 5, p. 7.100) also belong with the subgenus *Mesorthocladius.* See Sæther 2005.

Paratrichocladius - Cranston & Krosch (2015) have placed *Paratrichocladius* as a subgenus within ***Cricotopus.*** Thus, we now have *Cricotopus (Paratrichocladius) rufiventris* (Meigen). Bear in mind that other species of *C. (Paratrichocladius)* may occur in the Southeast.

Rheocricotopus - *Rheocricotopus* sp. VA, originally known only from Virginia, has been found in central Kentucky and in Maryland and Wisconsin.

Tvetenia tshernovskii (Pankratova) replaces *T. vitracies* Sæther (also formerly known as *T. discoloripes*); see Przhiboro & Sæther (2010).

Orthocladiinae genus B Sæther is known from the Southeastern US (GA, SC) only as a pupa (Sæther 1982; B.A. Caldwell, pers. com.). Makarchenko & Makarchenko (2004) placed this taxon in their new genus, *Ninelia*, described from the Primorye region of far eastern Russia. The larva of the genus is undescribed, and the larva and adult of Sæther's Orthocladiinae genus B are unknown.

Orthocladiinae genus E Epler is most likely a *Metriocnemus* (Andersen et al. 2013b: 234).

Orthocladiinae genus H Epler has been described as ***Phytotelmatocladius*** *delarosai* Epler (Epler 2010). As hypothesized by Epler (2010), the species has been shown to be parthenogenetic by Siri & Donato (2014).

CHIRONOMINAE: CHIRONOMINI

Generic Key - To accommodate *Polypedilum nubifer*, change couplet 27' (p. 8.12) to: "Antennae with 4-7 segments; if with 6 segments, then without alternate Lauterborn organs apically on segments 2 and 3; if with 5 segments, Lauterborn organs usually present at apex of segment 2, but may be present at apex of segment 2 and segment 3."

Asheum beckae is moved back to ***Polypedilum***; see *Polypedilum* below.

Chironomus - *Chironomus major* (p. 8.40, couplet 3), originally described as a larva only from Georgia by Wülker and Butler (1983), has been renamed *Chironomus magnus* (see White & Ramsey 2015). As noted in Epler (2001: 8.43), the old name "*C. major*" was a junior homonym. The species "*Chironomus major* Goetghebuer" was originally described in *Chironomus* but subsequently moved to *Parachironomus*. That name, as a subspecies of *Parachironomus varus* (Goetghebuer), is now a *nomen dubium* and can not be used. Thus the species is now called *Chironomus magnus* White & Ramsey.

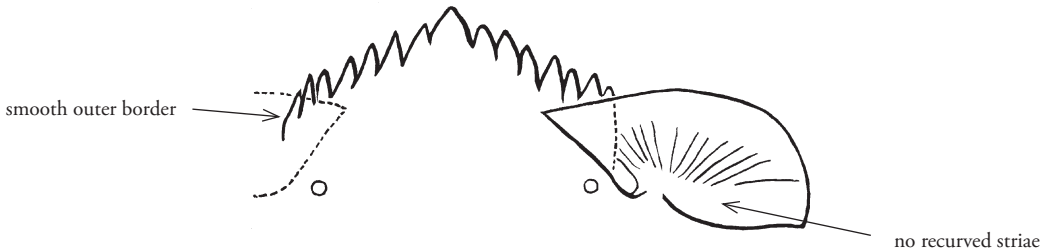
Dicrotendipes - *Dicrotendipes* sp. A has been described as *Dicrotendipes hulberti* Epler; see Epler 2016.

Einfeldia *brunneipennis* and *E. natchitocheae* (Sublette) have been moved to ***Chironomus***; thus specimens that key to couplet 54, p. 8.24, are *Chironomus.* As part of an effort to better define *Chironomus* and *Einfeldia* (see Epler et al. 2013: 400), some species previously placed in *Einfeldia* have been moved (temporarily?) to *Chironomus*. Thus the sometimes common inhabitant of eutrophic waters is now called *Chironomus natchitocheae* Sublette. However, this species may actually belong in the genus *Benthalia* Lipina, a name that is being used by some European workers. This is where the time honored phrase "more work is needed" comes into play! Note that the other two species keyed on p. 8.66, *E. pagana* (Meigen) and *E.* sp. A Epler, remain in *Einfeldia.*

Glyptotendipes chelonia (Townes) replaces *G. amplus* Townes (couplet 2 on p. 8.73). Research by Martin Spies (Zoologische Staatssammlung, Munich, Germany) indicated that *Tendipes (Einfeldia) chelonia* Townes is actually a *Glyptotendipes* and probably the same as *G. amplus*. His work also indicated that *G. amplus* is a *nomen dubium* (a species that can not be identified from its type) and thus unavailable; the species is now called *G. chelonia*. This species is a member of the subgenus *Heynotendipes*, which replaces the subgeneric name *Trichotendipes* (see Spies & Sæther 2004).

Parachironomus *supparilis* (Edwards) – (p. 8.108, couplet 6'). Martin Spies (2008) has recently "split" *Parachironomus supparilis* into three species; the species we have here is ***P. longistilus*** Paggi.

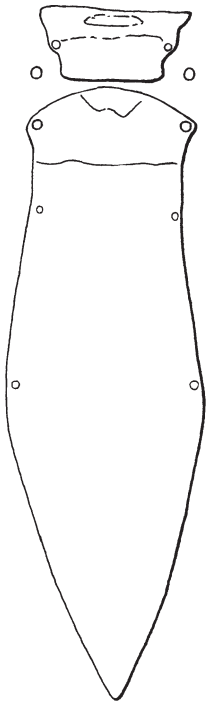
Parachironomus sp. D Epler has been found in Florida. This taxon will key to couplet 7 in Epler (2001) but has a smooth outer border to the mentum, has no recurved striae on the ventromental plate and the anterior border of the plate is smooth.



Parachironomus sp. D mentum

Phaenopsectra - Although I previously stated that the larvae of *Phaenopsectra flavipes* (Meigen) and *Ph. punctipes* (Wiedemann) were "inseparable", the two species can be separated as larvae. As seen below on the right, the larva of *Ph. punctipes* (Wiedemann) has a very deep, rounded notch (diastema) on the mandible, the mentum is steeply descending laterally, the 3 plates of the pecten epipharyngis are densely adorned with numerous small teeth (appears spiny like a hedgehog) and there usually is a strong, well defined line between the frons ("frontal apotome") and the weak sclerite (clypeus) anterior to it. This area is mostly membranous and can be difficult to interpret.

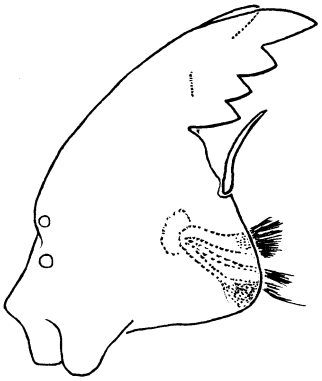
In *Ph. flavipes* the diastema is not deep and rounded, the mentum does not steeply descend laterally, the 3 plates of the pecten epipharyngis bear large teeth and the line between the frons and the clypeal sclerite anterior to it is weakly delimited or almost non-existent, similar to that of *Ph. obediens*, figured below on left.



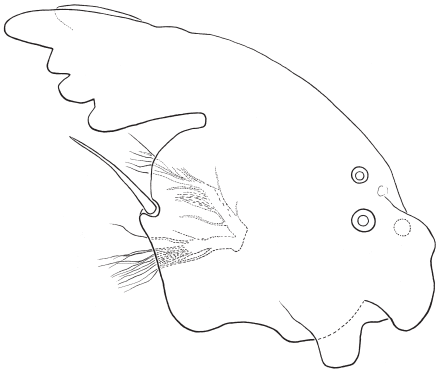
Ph. obediens
frons and clypeus

Ph. flavipes
pecten epipharyngis

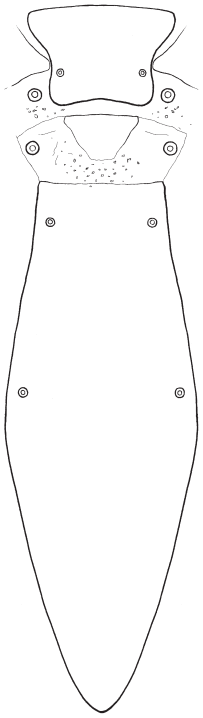
Ph. punctipes
pecten epipharyngis



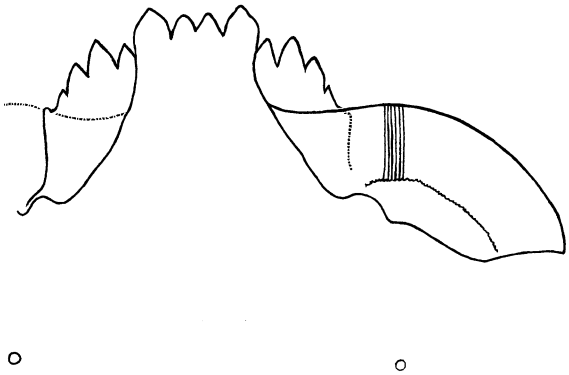
Ph. flavipes
mandible



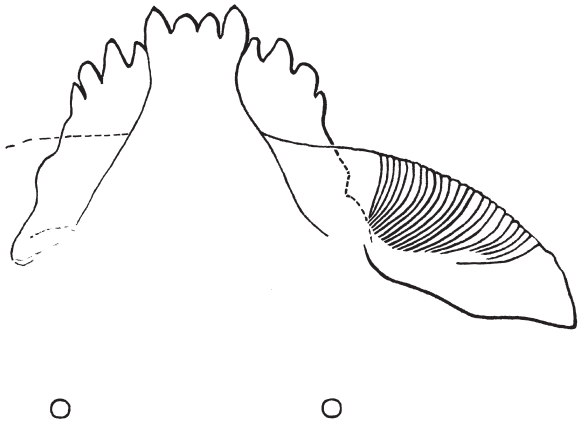
Ph. punctipes
mandible



Ph. punctipes
frons and clypeus



Ph. flavipes
mentum



Ph. punctipes
mentum

Polypedilum – there are several changes:

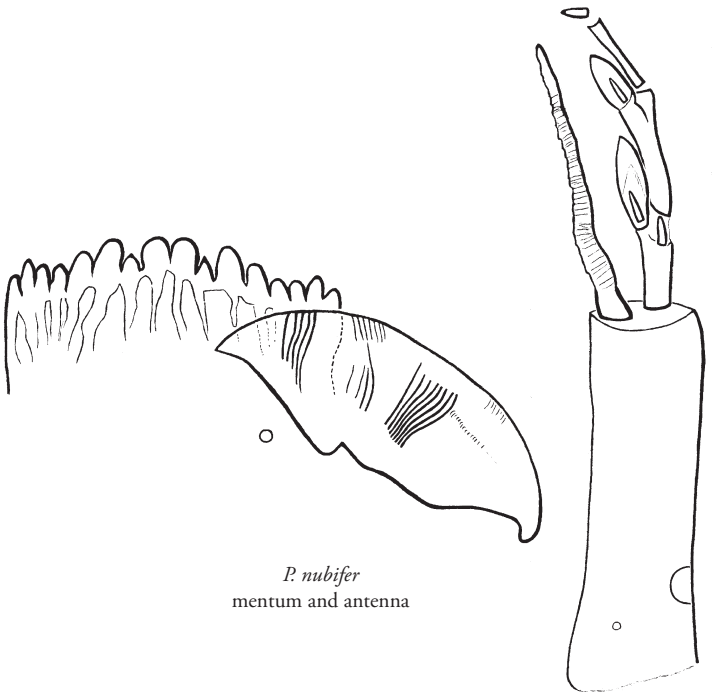
There are now 8 subgenera within *Polypedilum*: *Cerobregma, Kribionympha, Pentapedilum, Polypedilum, Probolum, Tripedilum, Tripodura* and *Uresipedilum* (see Sæther et al. 2010). Unfortunately, because of overlapping characters in the larvae, at this time it is not possible to construct a subgeneric key.

P. beckae (Sublette) (p. 8.128, couplet 6) – This species was moved to the genus *Asheum*, and then back to *Polypedilum.* See Epler et al. (2013: 431).

P. bergi Maschwitz - Material that keys here (p. 8.129, couplet 10) may best be called *P.* sp. FL. The mentum of *P. bergi* was described by Maschwitz & Cook (2000) with 7 pairs of lateral teeth and the bifid pair in the center. The mentum of the beast from Florida has only 6 pairs of lateral teeth. Mike Bolton (Ohio EPA) has seen larvae with 14 and 16 teeth ... but no associations of both types.

This may be variation or it may be indicative of 2 species. I have no associated material (adult male) for the P. sp. FL larva, so I backtracked from *P. bergi* and called it *P.* sp. FL. I have *P. bergi* adults from Alabama – all I've seen from the SE US. Maschwitz's material was all from "up north" - IN, MA, MI, MO, MN, NY, Ontario. Mike Bolton has it from OH.

P. nubifer Skuse - This species, the sole member of the subgenus *P.* (*Tripedilum*), is relatively new to the US. It has a typical *Polypedilum* mentum but has antennae with Lauterborn organs at the apices of segments 2 and 3. It will not key past couplet 27 (p. 8.12) in the generic key for Chironominae because of its oddball antennae. If couplet 27' is changed to: "Antennae with 4-7 segments; if with 6 segments, then without alternate Lauterborn organs apically on segments 2 and 3; if with 5 segments, Lauterborn organs usually present at apex of segment 2, but may be present at apex of segment 2 and segment 3", the species will key to *Polypedilum.*



P. nubifer
mentum and antenna

My *Polypedilum* sp. A (p. 8.128, couplet 7') has been described as *P. epleri* Oyewo & Jacobsen. See Oyewo & Jacobsen (2007).

Stelechomyia *perpulchra* (Mitchell) is now called ***Kribiodorum*** *perpulchrum* (Mitchell). This was due to research by Martin Spies; see Epler et al. (2013).

Chironomini genus III Epler has been reared from northern Florida and is an undescribed species of *Tribelos*.

CHIRONOMINAE: TANYTARSINI

Here is a brief synopsis of the recent changes made in tanytarsine taxonomy. For more information, see my 2014 Tanytarsini identification manual.

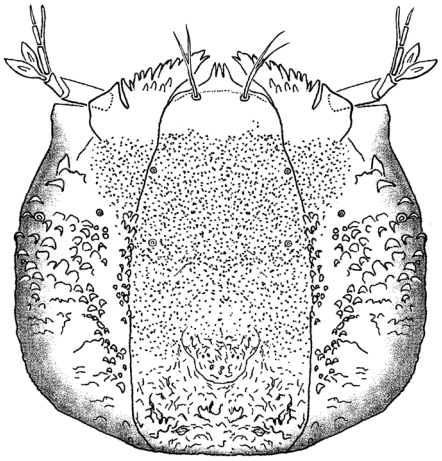
Cladotanytarsus - The species *C. acornutus* Jacobsen & Bilyj has been described from Florida (see Jacobsen & Bilyj 2007); my *C*. sp. B is *C. viridiventris* (Malloch).

Constempellina - The two taxa previously placed in *Constempellina* by Epler (2001) represent a new genus. This genus has not yet been completely described, but is being called Tanytarsini genus A Ekrem (see Epler et al. 2013).

Micropsectra - The genera *Krenopsectra* and *Parapsectra* have been synonymized with *Micropsectra* (see Epler et al. 2013). My *M*. sp. D and *Tanytarsus* sp. W are both *Paratanytarsus longistilus* Bolton, Ekrem, Sublette & Sublette.

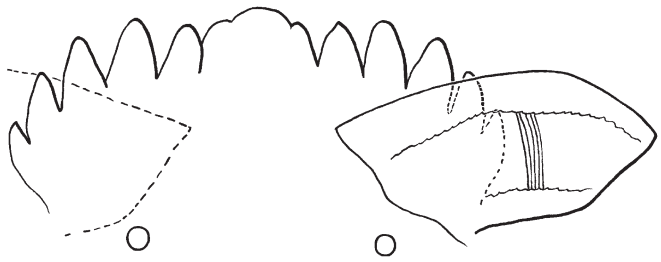
There is a typo in the key for *Micropsectra* on page 25; the last statement of couplet 2(1) should read "antennal segment 1 4-6 X as long as segment 2".

Stempellina - my *S*. sp. C is *Neostempellina reissi* Caldwell.

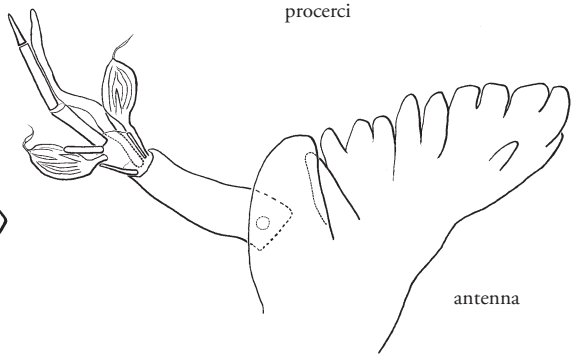


dorsal view of head

procerci



mentum



antenna

Neostempellina reissi

Stempellinella - My *S*. sp. A is *S. fimbriata* Ekrem; my *S*. sp. B is *S. boltoni* Ekrem; *S. cf. leptocelloides* (Webb) is *S. leptocelloides* (Webb). *Stempellina cf. subglabripennis* Brundin has been added. See Ekrem (2007) and Epler (2014).

Tanytarsus - The recent work on *Tanytarsus* by Ekrem et al. (2003), material associated by Broughton Caldwell (GA), Mike Bolton (OH EPA), Todd Risk (FDEP), and my own research and rearing has enabled us to put real names on many of my previously letter-designated taxa.

T. sp. A = *T. sepp* Ekrem, Sublette & Sublette

T. sp. C = *T. allicis* Sublette and *T. buckleyi* Sublette

T. sp. E and Q = *T. hastatus* Sublette & Sasa

T. sp. S = *T. gibbus* Ekrem, Sublette & Sublette

T. sp. Y = *T. messersmithi* Ekrem, Sublette & Sublette

The following species would have keyed to my old *T.* sp. G:

T. becki Ekrem, Sublette & Sublette
T. dendyi Sublette
T. epleri Ekrem, Sublette & Sublette
T. guerlus (Roback)
T. pathudsoni Ekrem, Sublette & Sublette
T. mendax Kieffer
T. wirthi Ekrem, Sublette & Sublette

The following species would have keyed to my old *T.* sp. L:

T. acifer Ekrem, Sublette & Sublette
T. confusus Malloch
T. neoflavellus Malloch
and the original *T*. sp. L Epler

Other new taxa have turned up; I ran out of English letters, so now we also have:

T. sp. alpha Epler
T. sp. beta Epler
T. sp. gamma Epler
T. sp. delta Epler
T. sp. epsilon Epler

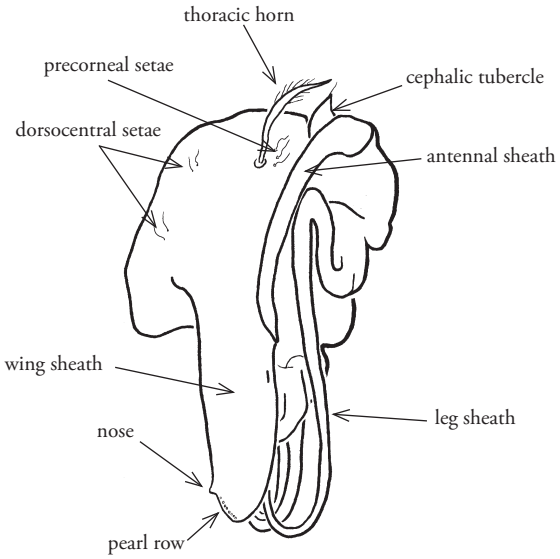
Needless to say, there are many other species of *Tanytarsus* (and other tanytarsines) out there- do not expect to be able to key every "*Tanytarsus*" to "species". This is especially true for those taxa grouped together as *Tanytarsus* sp. G and *T*. sp. L.

Zavrelia - *Z. aristata* Ekrem & Stur, known from Florida to New Brunswick, has been added to the SE US fauna; *Z. hudsoni* Ekrem & Stur was described from the Smoky Mountains area in Tennessee. These are the only two species of *Zavrelia* described from the Nearctic; see Ekrem & Stur (2009) and Epler (2014) for characters to separate the larvae of the two species.

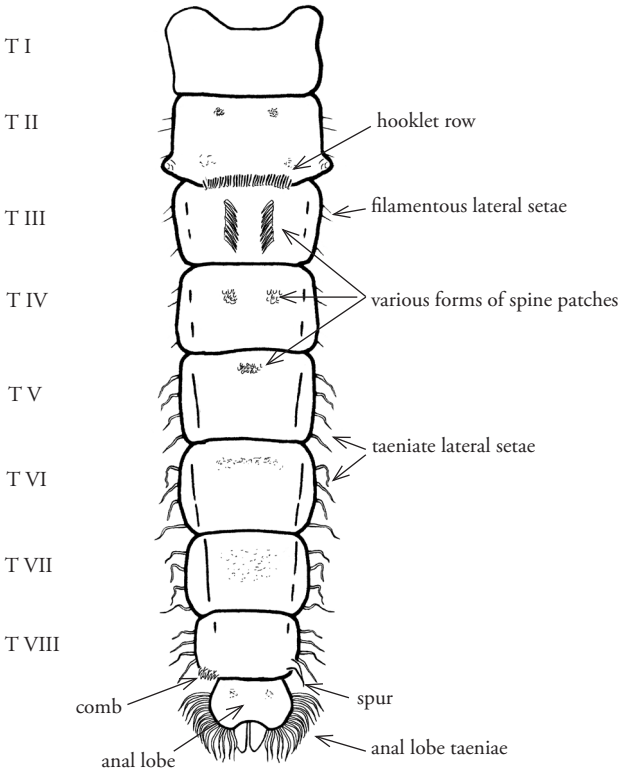
PUPAL MORPHOLOGY

Pupae can provide important characters that aid in identification. Finding larvae that have a developed pupa within the larval skin (a "pharate" pupa) can be of great assistance. It may be the only way to identify larvae of some members of the *Thienemannimyia* complex to genus - the developed thoracic horn (on the "shoulder" of the pupa) differs from genus to genus - it is especially useful in separating larvae of *Thienemannimyia* from those of *Meropelopia.* See Epler (2001).

For more information on chironomid pupae, see Ferrington et al. 2008, Jacobsen (2008), Sæther (1980) and Wiederholm (1986).



lateral view of cephalothorax



dorsal view of abdomen

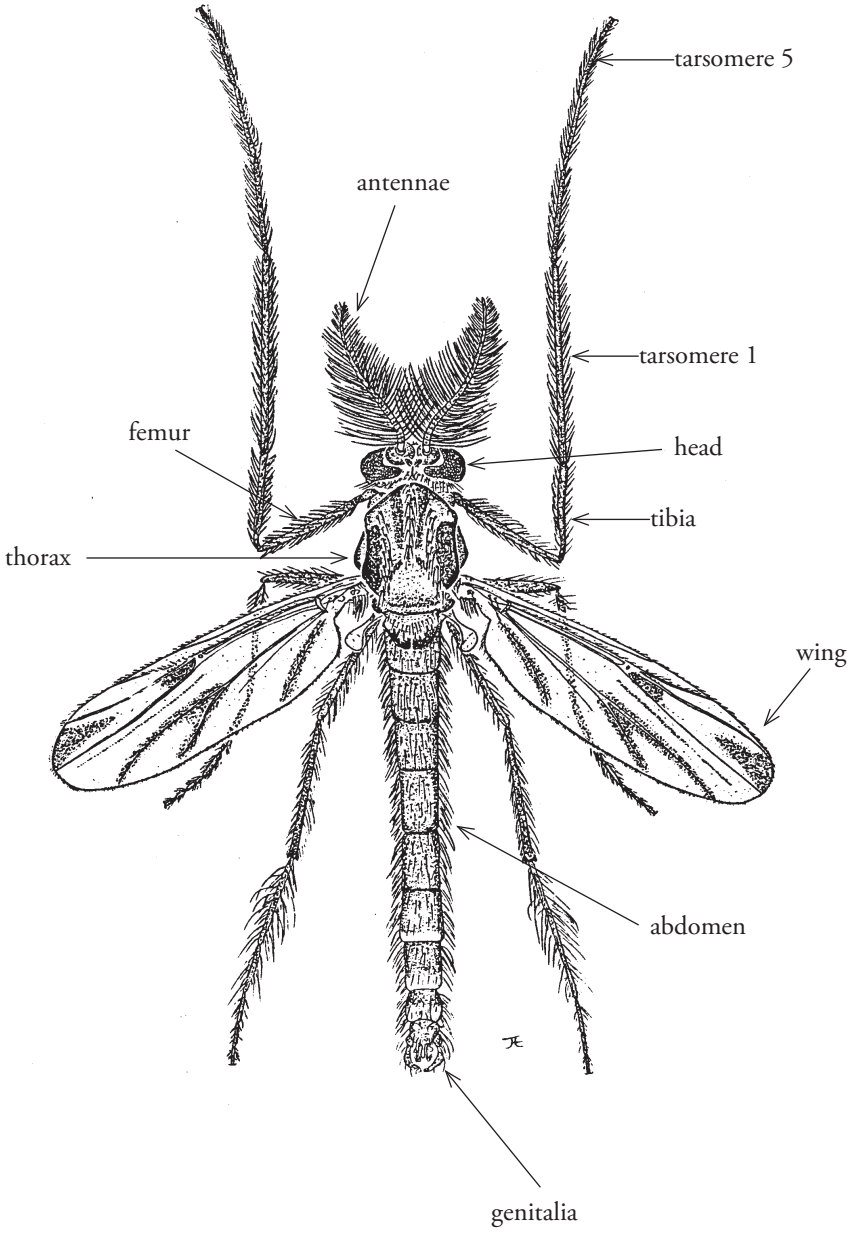
Tanytarsus allicis tergites III-IV

Tanytarsus buckleyi tergites III-IV

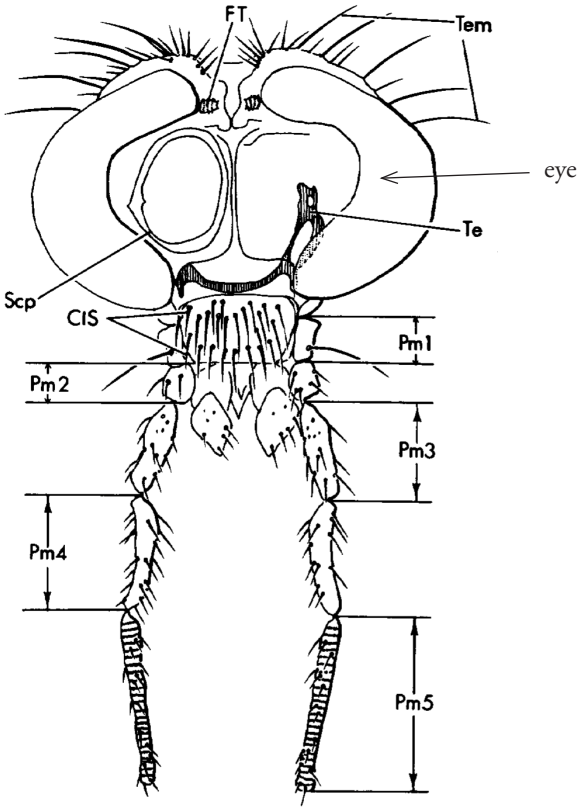
Pupal characters can help separate species. Here we can see the differences in spine patches between two *Tanytarsus* species. Such characters are often visible with pharate pupae within the larva.

ADULT MORPHOLOGY (males)

Most species in Chironomidae are based on characters of the adult male, especially the structures of the male genitalia. Other structures are of importance as well, such as the antennal ratio (AR), various ratios of leg segments, setae on the thorax - and lots more!

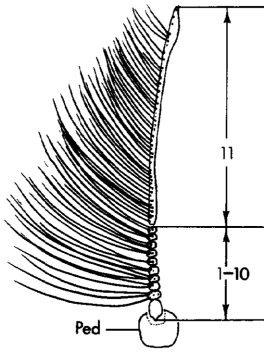


male *Dicrotendipes thanatogratus* Epler



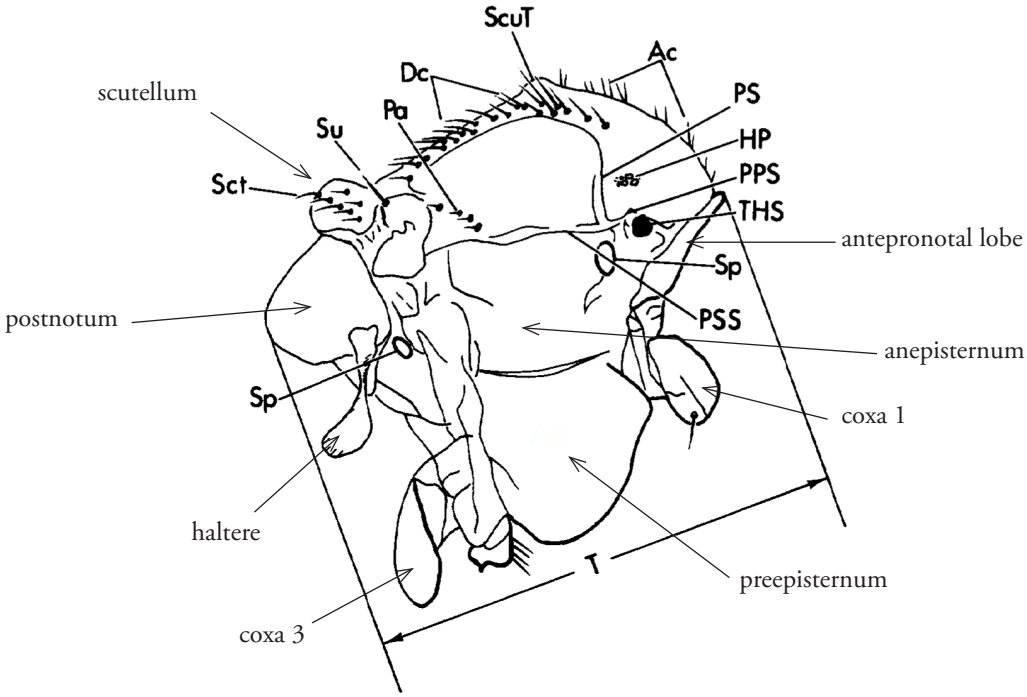
head, frontal view

ClS - clypeal setae; FT - frontal tubercle;
Pm1-5 - palpomeres 1-5; Scp- scape; Tem - temporal setae;
Te - tentorium



male antenna

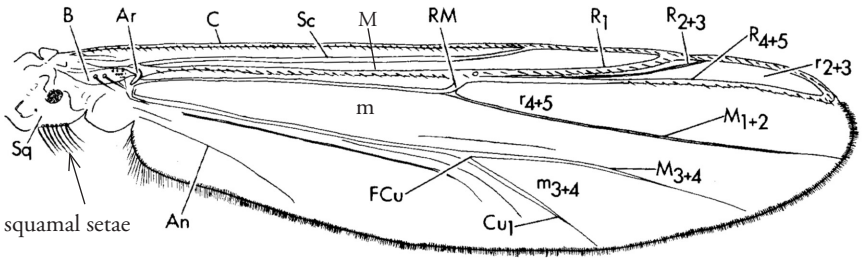
the antennal ratio (AR) is calculated by dividing the length of the last flagellomere (in this case, flagellomere 11) by the combined lengths of the basal flagellomeres (in this case, 1-10). Ped - pedicel



thorax, lateral view

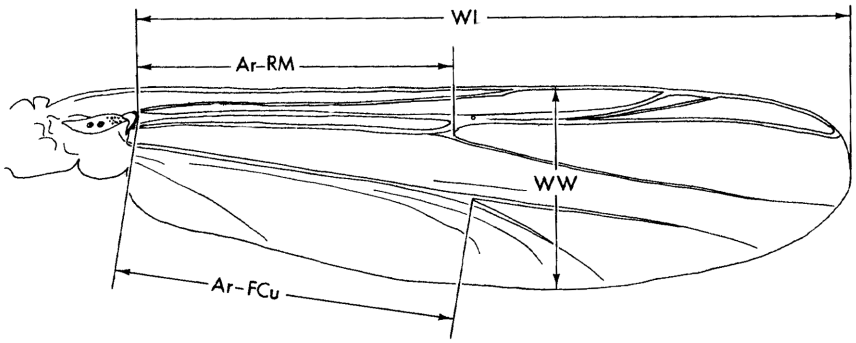
Ac- acrostichal setae; Dc - dorsocentral setae; HP - humeral pit; Pa - prealar setae;
PPS - postpronotal suture; PS - parapsidal suture; PSS - prescutoscutal suture; Sct - scutellar setae;
ScuT - scutellar tubercle; Sp - spiracle; Su - supraalar seta; T - thorax length; THS - thoracic scar

Characters on the wings include: length; width; shape; color patterns; wing veins (placement, lengths, ratios, setae); squamal setae; wing membrane setae and other characters

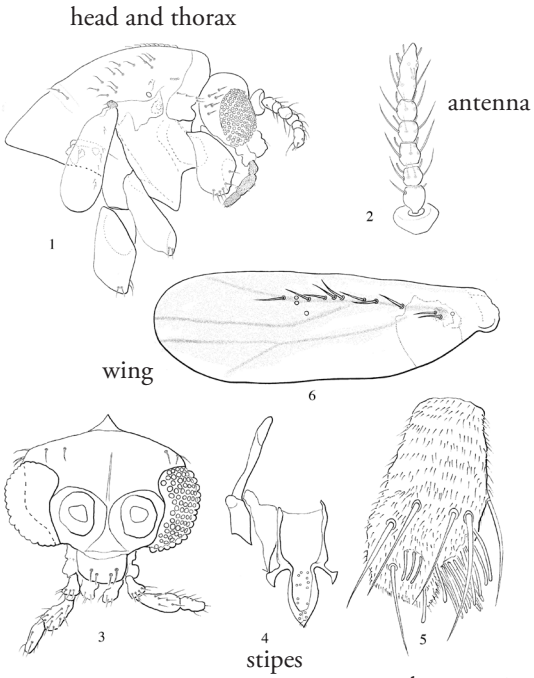


Wing with veins and cells indicated

An - anal vein; Ar - arculus; B - brachiolum; C - costa; Cu_1 - 1st cubital vein; FCu - fork of cubital vein; m - media cells (numbers indicate cell number); M - media vein (numbers indicate vein number); r - radial cells (numbers indicate cell number); R - radial veins (numbers indicate vein number); RMc - crossvein RM; Sc - subcosta; Sq - squama. Note that vein names are upper case, wing cells are lower case.



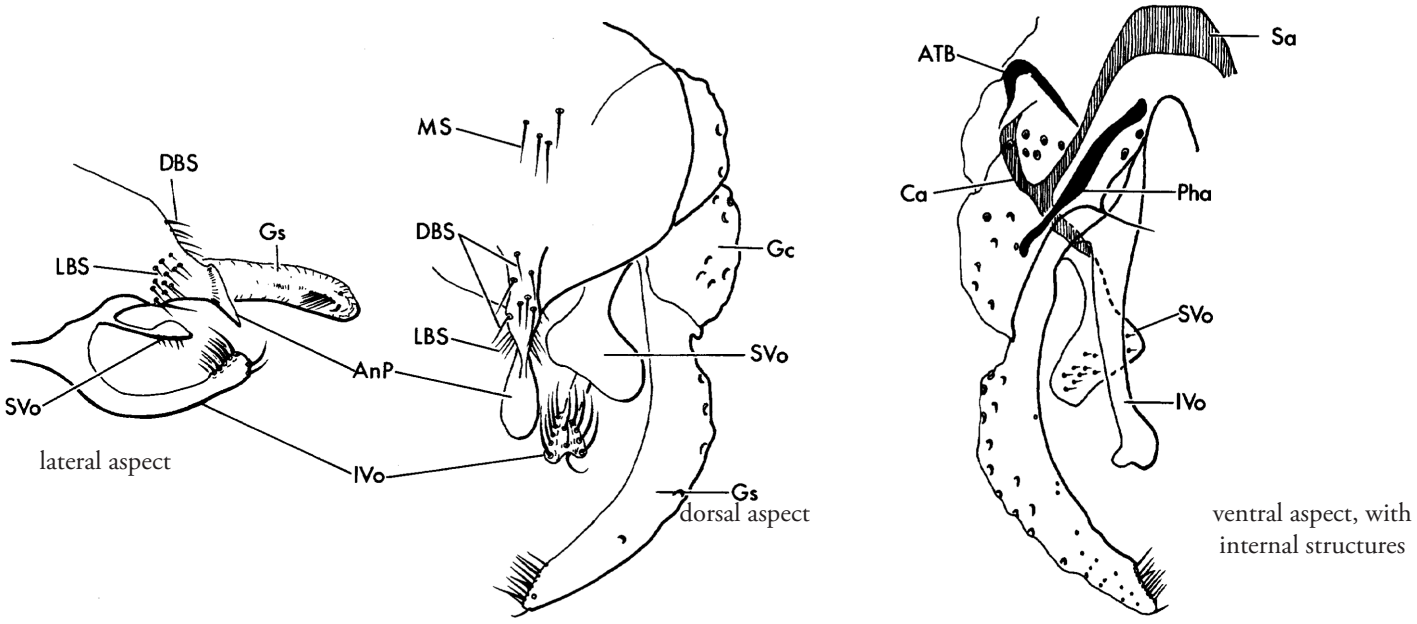
wing measurement methods



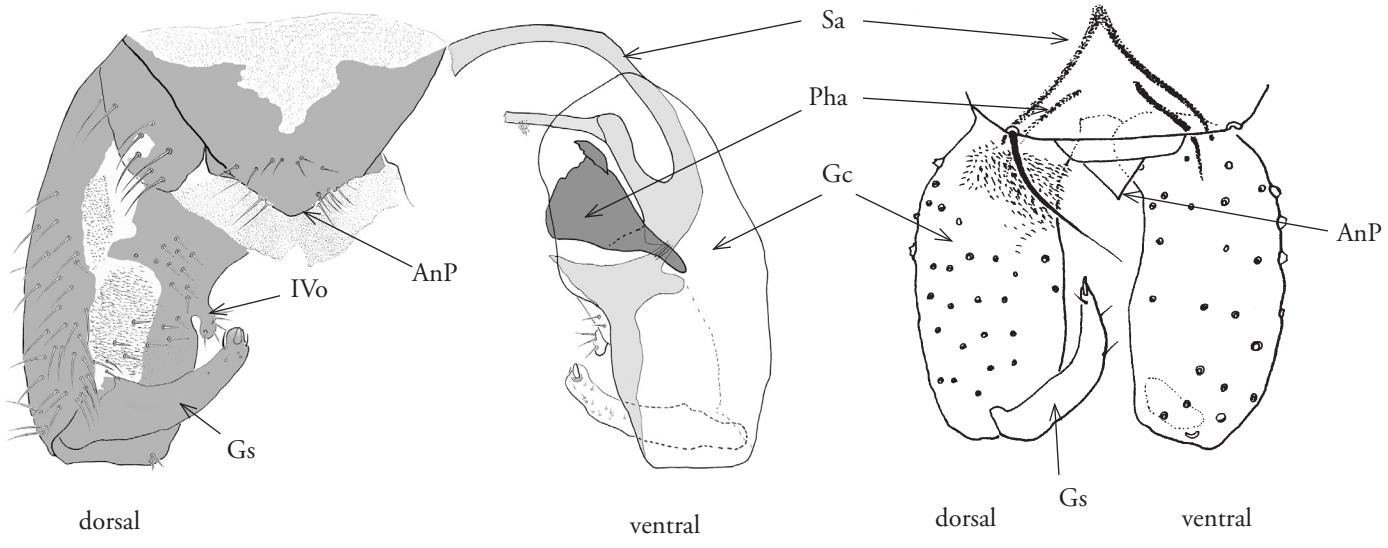
mating pair of *Bryophaenocladius chrissichuckorum*
(photo by Giff Beaton)

And then there are weirdos like *Bryophaenocladius chrissichuckorum* Epler, with very reduced antennae, brachypterous (short) wings and palpomeres (see Epler 2012).

Male genitalia often provide the characters that delimit species in the Chironomidae. Of course, to complicate matters, genitalic structures useful for genus and/or species separation vary greatly from subfamily to subfamily. Note that some structures are absent from some taxa, and many other structures. The Tanytarsini, for example, have all kinds of weird structures not illustrated below.



Typical genitalia for subfamily Chironominae (*Dicrotendipes*)



subfamily Orthocladiinae (*Bryophaenocladius*)

subfamily Tanypodinae (*Monopelopia*)

AnP - anal point; ATB - anal tergal band; Ca - coxapodeme; DBS - dorsal basal setae; Gc - gonocoxite; Gs - gonostylus; IVo - inferior volsella; LBS - lateral basal setae; MS - median setae; Pha - phallapodeme; Sa - sternapodeme ; SVo - superior volsella.

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KEEP UP-TO-DATE VIA THE WEB

There are several reliable sources of information available through that "series of tubes" called "The Internet".

The **Chironomid Home Page** at:

http://www.chironomidae.net/

For updates on many things chironomid related, including errors in the later printings of the new Holarctic Keys, Martin Spies runs the **Chironomid Exchange Forum** at:

http://www.chironomidae.net/chiroforum/

My web site, **Chironomidae and Water Beetles of Florida**, features news about chironomid taxonomy and provides updates and corrections to my manual(s):

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