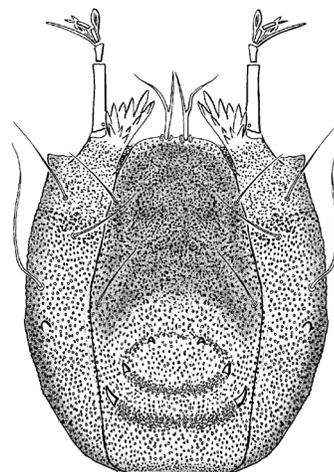
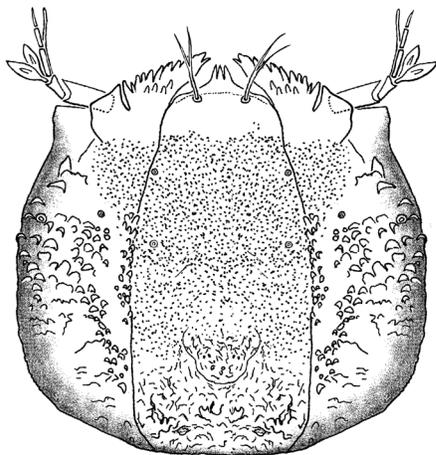


Identification Guide to the Larvae of the Tribe Tanytarsini (Diptera: Chironomidae) in Florida

J.H. Epler



On the cover: top row: *Neostempellina reissi*, *Cladotanytarsus* sp. A; bottom row: *Tanytarsus pathudsoni*, *Stempellina* sp. A

State of Florida
Department of Environmental Protection
Division of Environmental Assessment and Restoration
Tallahassee

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1 June 2014

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INTRODUCTION

The non-biting midge family Chironomidae (Insecta: Diptera) is well known for its use in biological studies (Epler 2001). Some groups of genera and/or species are known to inhabit water of high quality; others are well known dwellers in water of poor quality. Unfortunately, many of the larvae have been (and some still are) very difficult to identify, and much of the literature is burdened with studies done with Chironomidae that were misidentified.

The Tanytarsini are a tribe within the subfamily Chironominae of the family Chironomidae. They have been notoriously difficult to identify. For many years, the Tanytarsini of North America were the purview of Dr. James E. Sublette and his wife Mary. The Sublettes amassed a huge collection, the contents of which were always available for inspection, and Jim was always willing to provide identifications and offer sage advice. Unfortunately, university duties, other interests and health concerns conspired to limit the amount of material Jim and Mary managed to publish on Tanytarsini. Jim's death in 2012, following Mary's in 2007, has closed the door on further work by this couple.

We are indeed fortunate that the tanytarsine torch has been taken up by several other individuals, some in collaboration with the Sublettes. Dr. Torbjørn Ekrem and his wife Dr. Elisabeth Stur have produced many excellent works that have tremendously advanced our knowledge of the group. Dr. Wojciech Giłka has also stepped in and provided excellent publications, many on the notoriously difficult genus *Cladotanytarsus*.

A great deal of information has been published on the Tanytarsini since my earlier manuals (Epler 1992, 1995, 2001). This current manual is an extensively reworked update of the tanytarsine genera covered in those previous manuals and deals with a much greater number of tanytarsine taxa.

How to use this manual

Much of the general information dealing with Chironomidae, their collection, curation, slide-making, rearing, etc. are covered in Epler (2001)

and are not repeated here. The user is encouraged to obtain and use this reference, freely available through the Internet. Please see my web page at:

<http://home.comcast.net/~johnep3/index.html>

One should also obtain Andersen et al. (2013), a recent revision and update of the classic "Wiederholm Holarctic Keys" (Wiederholm 1983).

Area covered: This manual was written for use in the state of Florida, and will identify all tanytarsine genera known to me from the state, and includes those that may eventually be found here. For genera, the manual should be useful for most of the eastern United States. For species level identifications, the area immediately adjacent to Florida should be adequately covered, with the caveat that the further that one is from Florida, the less effective the manual will be.

Illustrations and abbreviations: The majority of the illustrations and photographs in this manual were produced by the author from southeastern US specimens, most of which were reared or otherwise associated. Some are somewhat schematic in that all parts of a structure are not drawn. For example, often only one ventromental plate is drawn, and only a portion of the ventromental striae are shown; premandibular brushes are often not drawn unless they are an important character, and the pecten mandibularis is not fully drawn on most mandibles. When specimens were unavailable or not suitable for illustration, figures were borrowed from other sources. If the illustrations were from publications other than my own, the source of each figure is cited at least once within the manual. *Abbreviations* used are explained in the Glossary that begins on page 3.

Taxonomy: In contrast to my earlier manual for the entire family Chironomidae of the Southeast United States (Epler 2001), this time I am including the species' author(s) in the keys and in the "Notes on species". With the large number of letter- or number-designated species in the Tanytarsini (sp. A, sp. 1, etc.) use of the author's name is important, because other workers (e.g., Jacobsen 2008) have also devised letter/

number designations for their unknown taxa.

Many larvae are undescribed or unassociated with the adult stages. These may represent taxa with described adults, or species new to science. Species definitions in the Chironomidae are, for the most part, based on the adult male. Many undescribed larval “types” are known on the species level and, in one instance, the genus level. These have been given letter or number designators, such as “*Tanytarsus* sp. B” or “Tanytarsini genus A”. Many new, undescribed species are included in this manual. However, a manual such as this is not the proper place to publish new names and descriptions, and we’ll have to be happy with letter-designated taxa. When reared or otherwise associated with an identifiable life stage, the taxa with letter-designated names can be updated.

Users must understand that correct identification of many taxa will require using characters available from the pupal stage. In very mature larvae about to pupate, the pupal structures can be seen beneath the larval cuticle. A page on general pupal structures is provided (p. 6).

The layout of this manual is somewhat similar to my earlier manuals, except this time there are no separate chapters. We start with the Introductory text, followed by a short glossary and morphology section, the main body of text, followed by a References section and a checklist of the Tanytarsini of Florida. As before, the main portion of the text deals with generic units that deal with each tanytarsine genus in alphabetical order. Each genus unit consists of several parts:

A *Diagnosis*, or short descriptive summary of the genus’ morphological characters which will separate it from similar taxa. Although this manual is intended for stand-alone use, it will be most effective when used in conjunction with the more detailed diagnoses in Epler et al. (2013). Note that the diagnoses in this manual pertain to character states of Florida taxa.

A *Notes* section which contains additional information concerning the taxonomy and biology of the genus.

An *Additional References* section lists additional literature that may give more information. Epler et al. (2013) and Epler (2001) are always considered to be additional references.

Illustrations of important body structures are included for each genus; a *Key to species* and a *Notes on species* section are included when possible.

The Keys: The keys are written for fourth instar larvae! Measurements are only valid for fourth instar larvae; ratios are rarely useful for other instars. Illustrations are usually arranged from left to right and/or top to bottom with regards to the order of statements in the couplet(s).

Note that an asterisk before a name indicates that the taxon has not been found in Florida.

Acknowledgements

I am deeply indebted to several individuals for making specimens available to me: Rick Abad, FDEP; Mike Bolton, Ohio EPA; Broughton Caldwell, Braselton, GA; Dr. Torbjørn Ekrem, NTNU University Museum, Trondheim, Norway; Mike Heyn, FDEP; Todd Risk, FDEP; Bob Rutter, Port Charlotte, FL; and Dr. Susana Trivinho-Strixino, Laboratório de Entomologia Aquática, Universidad Federal de São Carlos, São Carlos, Brazil.

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The late Dr. Jim Sublette, Tucson, AZ, provided advice, direction and incredible kindness throughout the decades of our friendship.

I gratefully thank Holly Powless, FDEP, for all her help in navigating the bureaucracy and handling the bean counters, making sure that I received my funding.

My wife Linda must once again be profusely thanked for her love, encouragement and tolerance throughout the production of this work. At least this time she was only a “manual widow” for a year!

GLOSSARY & ABBREVIATIONS

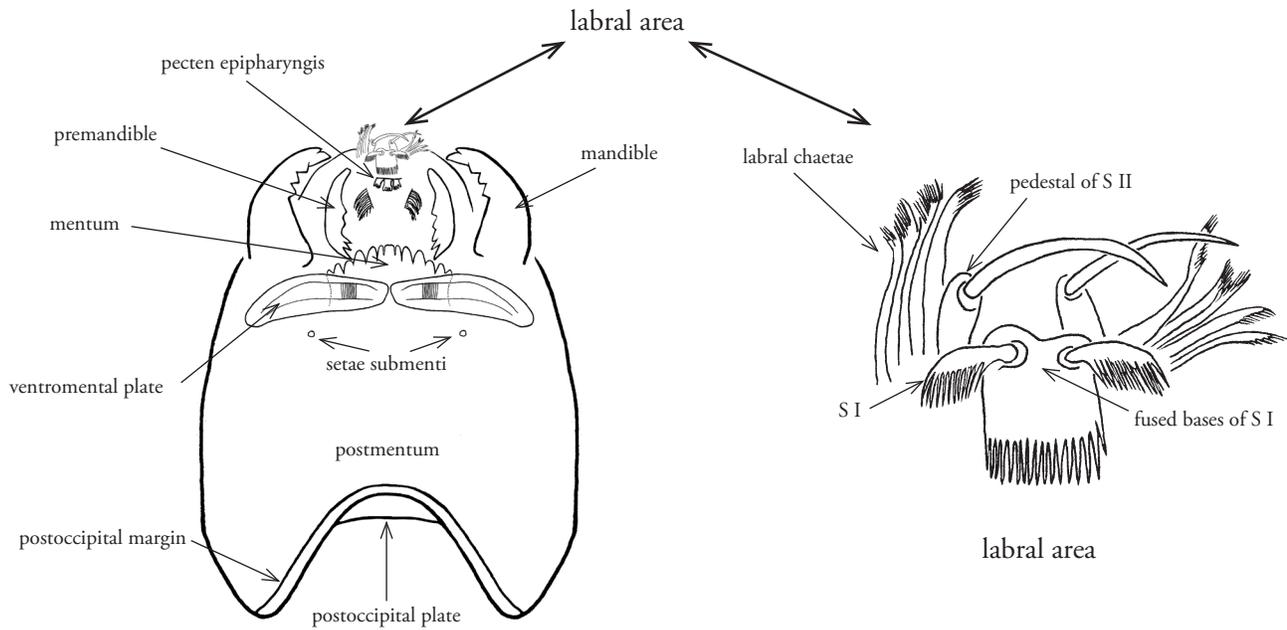
- accessory blade** - smaller elongate structure adjacent to antennal blade, usually partially fused with antennal blade at base .
- anal seta (setae)** - seta(e) located on apex of procercus; also termed procercal setae.
- antennal blade** - elongate structure adjacent to antennal flagellum, arising from apex of first segment.
- AR** - antennal ratio. In larvae, the ratio of the length of the basal antennal segment divided by the length of the combined apical segments (the flagellum). When I measure the flagellum, I measure from the bottom of segment 2 to the apex of the last segment; intersegmental membranes are included.
- bifid** - divided into two parts.
- cephalothorax** - the combined head and thoracic segments of the pupa.
- chaetae** (singular: **chaeta**) - hair-like outgrowths of the cuticle, similar to setae but not arising from a socketed base. May be simple or serrated.
- chaetulae laterales** - simple or pectinate blades on each side of the pecten epipharyngis.
- clypeus** - dorsal sclerite of the head immediately anterior to the frons that bears the S 3 setae.
- digitiform** - finger-like.
- distal** - towards the apex.
- dorsal** - referring to the upper surface or “top” side.
- dorsal accessory tooth** - dorsal tooth or teeth of mandible in addition to the “normal”, more apical and larger dorsal tooth.
- dorsum** - the upper surface; the “top” side.
- exuviae** - shed skin. “Exuviae” is the singular and plural form of this word; the use of the word “exuvium” is incorrect.
- FAB** - Florida Association of Benthologists.
- FAMU** - Florida A & M University, Tallahassee, FL.
- FDEP** - Florida Department of Environmental Protection.
- flagellum** - collective term for the apical segments of the antenna.
- frons** - elongate plate at center of dorsum of head formed by sutures that, in most taxa, will split and allow the next instar/pupa to emerge. If the clypeus is fused to the frons, it is termed the **frontoclypeus**.
- frontoclypeal setae** - the S 3 setae, borne on the fused clypeus and frons.
- labral lamella (lamellae)** - scale-like to plumose structures near middle of anterior margin of labrum.
- labral sclerite(s)** - central sclerite(s) directly anterior to clypeus and frons on dorsum of head.
- labrum** - the anterior dorsal portion of the head capsule, essentially the upper lip.
- lateral** - towards the side (also laterad)
- Lauterborn organs** - sensory organs on antennae, usually located on apex of second segment, but may arise elsewhere. May be on pedicels and collectively may appear leaf-like (in Tanytarsini).
- LOR** – Lauterborn organ ratio; length of Lauterborn organ, including the pedicel, divided by the combined lengths of antennal segments 3-5.
- maxilla (maxillae)** - mouthpart located near base of mandible; bears the maxillary palp. Composed of cardo, galea, lacinia, stipes (these structures essentially fused in chironomid larvae) and maxillary palp.
- maxillary plate** - basal ventral side of maxilla that lies above striae of ventromental plate; the striae of the maxillary plate join with the striae of the ventromental plate to form tubes through which silk may be expressed.
- medial** - referring to the middle or towards the middle.
- mentum (menta)** - toothed plate on anterior ventral margin of head capsule, composed of a fused ventromentum and dorsomentum.
- mola** - inner portion of mandible below teeth.
- nose** - nose-like projection on hind margin of pupal wing sheath.
- parapod(s)** - “legs” of larva; most larvae have a pair of anterior and a pair of posterior parapods (posterior pair often absent in terrestrial larvae).
- pearl row** - small round tubercles located near apical margin of pupal wing sheath.
- pecten epipharyngis** - structure located beneath the anterior central margin of the labrum, often composed of three scales, lamellae or may be a pectinate comb.

- pecten mandibularis** - group of setae near ventral apex of mandible.
- pectinate** - comb-like.
- pedes spurii B** - swelling or hump on the posterolateral margin of pupal tergite II.
- pedestal** - in tanytarsine larvae, the tubercle on the dorsum of the head capsule from which the antenna arises.
- pedicel** - stalk or stem.
- pharate** - stage within the cuticle of the preceding stage, such as the pharate pupa developed within the larval skin, or a pharate adult developed within the pupal skin.
- phytotelmata** - water held by plants, such as bromeliads, or tree holes, etc.
- plumose** - featherlike, extremely finely divided.
- postmentum** - ventral area of head capsule posterior to the mentum.
- postocciput** - the posterior margin of the head capsule.
- postoccipital plate** - shelf-like posterior extension of the ventromedial portion of the postocciput.
- premandible** - one of a pair of elongate movable structures beneath the labrum.
- premandibular brush** - group of setae near pre-mandible.
- procercus (procerci)** - tubercle located above the anus; bears the anal setae apically.
- proximal** - towards the base.
- ring organ** - a circular structure (campaniform sensillum) found on the basal segment of the antenna.
- S I, S II, S III, SIVA, S IVB** - major setae of the anterodorsal surface of the labrum.
- S 1 – S 12** - setae of the head capsule (not including the setae of the labrum listed above). They are numbered from the anterior end to the posterior end of the head and may have specific names for the structure from which they arise or to which they are closest. The S 3 setae, termed the clypeal or frontoclypeal setae, are the most referred to in this manual.
- seta interna** - seta located near base of dorsal side of mandible; it is usually apically branched.
- seta subdentalis** - seta on mandible proximal to inner teeth.
- setae submenti** (singular: **seta submenti**) - pair of setae immediately posterior to mentum.
- sternite** - for pupae refers to the ventral side of an abdominal segment.
- stria (striae)** - fine, impressed line; usually refers to lines on the ventromental plates of Chironominae (“strial ridges”). Striate or striated refers to a structure having striae.
- style** - small (usually) cylindrical sensory organ usually located at tip of second antennal segment; occasionally located near middle of segment.
- supraanal setae** - setae ventral to procerci and dorsal to anal tubules.
- T** - tergite (abdominal segment).
- taeniae** (singular **taenia**) - transparent, ribbon-like setae. On pupae, found at lateral margins of some abdominal tergites and bordering the anal lobe; adjective form: taeniate.
- taxon (taxa)** - a taxonomic unit, such as a species, genus, family, etc.
- tergite** - dorsal portion of a segment (in pupae refers to an abdominal segment).
- teneral** - recently molted. Teneral individuals usually do not have the “normal” coloration and portions of the body are not yet completely sclerotized (“hardened”).
- thoracic horn** - structure near the “shoulder” of pupa; in Tanytarsini may be tubular, ovoid, spindle-shaped or absent.
- tribe** - a taxonomic unit between the subfamily and genus; e.g., similar genera within a subfamily are grouped into tribes. The Tanytarsini are a tribe the subfamily Chironominae
- tubules** - in Tanytarsini tubular gill-like structures originating from near anus (anal tubules).
- venter** - the lower or “bottom” side.
- ventral** - referring to the lower or “bottom” side.
- ventromental plate(s)** - plate-like or shelf-like ventral outgrowth of the head capsule adjacent to each side of the mentum.
- vortex (vortices)** - circular group of spines located on posterolateral portion of some pupal abdominal sternites, formerly termed “pedes spurii A”.

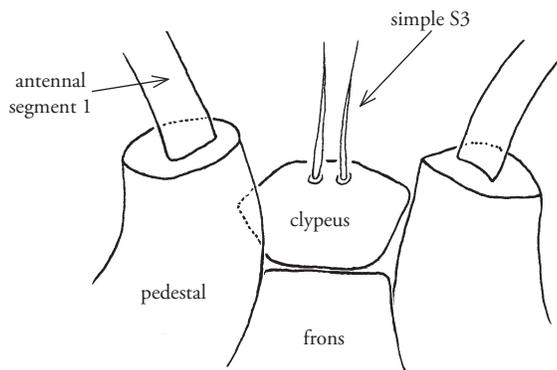
For more information see Cranston (2013), which updates many of the morphological terms used for larval chironomids, and Sæther (1980).

Generalized Tanytarsini Larval Structures

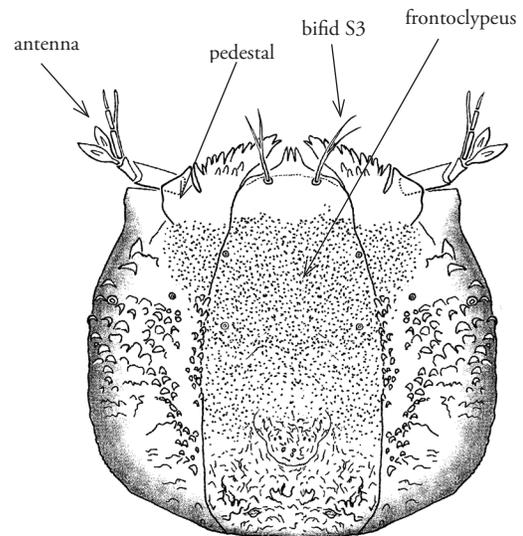
The figures below are provided as a very general guide to some of the head capsule structures commonly used in identification. For more information, see Cranston (2013), Epler (2001), Sæther (1980) and additional figures throughout this manual.



ventral view of generalized head capsule



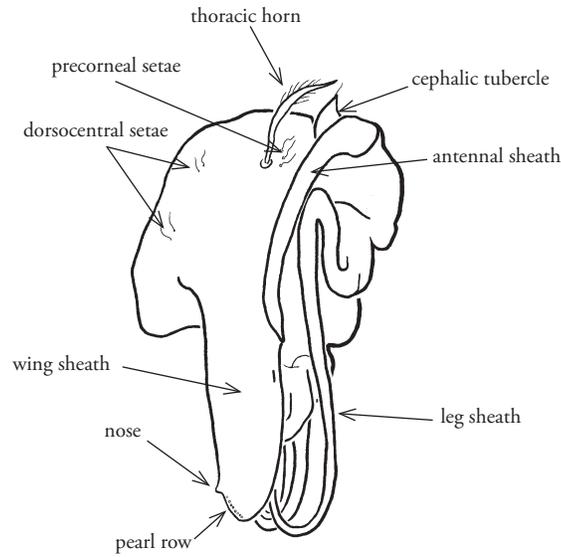
detail of the anterodorsal portion of the head capsule, showing an example of a separate clypeus (clypeal sclerite) and the frons



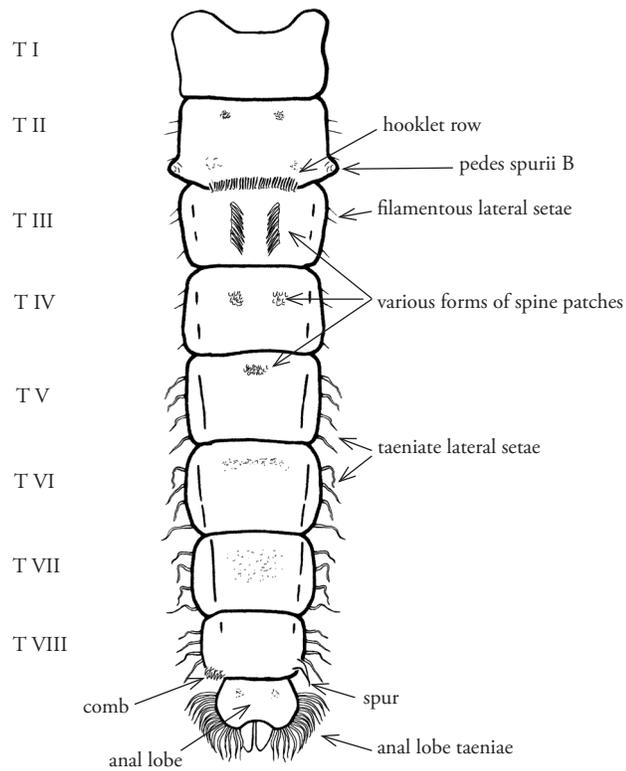
dorsal view of head capsule of *Neostempellina reissi*, an example of a larva with the frons and clypeus fused, forming a frontoclypeus

Generalized Tanytarsini Pupal Structures

The figures below are provided as a guide to some of the pupal structures commonly used in identification. For more information on chironomid pupae, see Jacobsen (2008), Sæther (1980) and Wiederholm (1986).



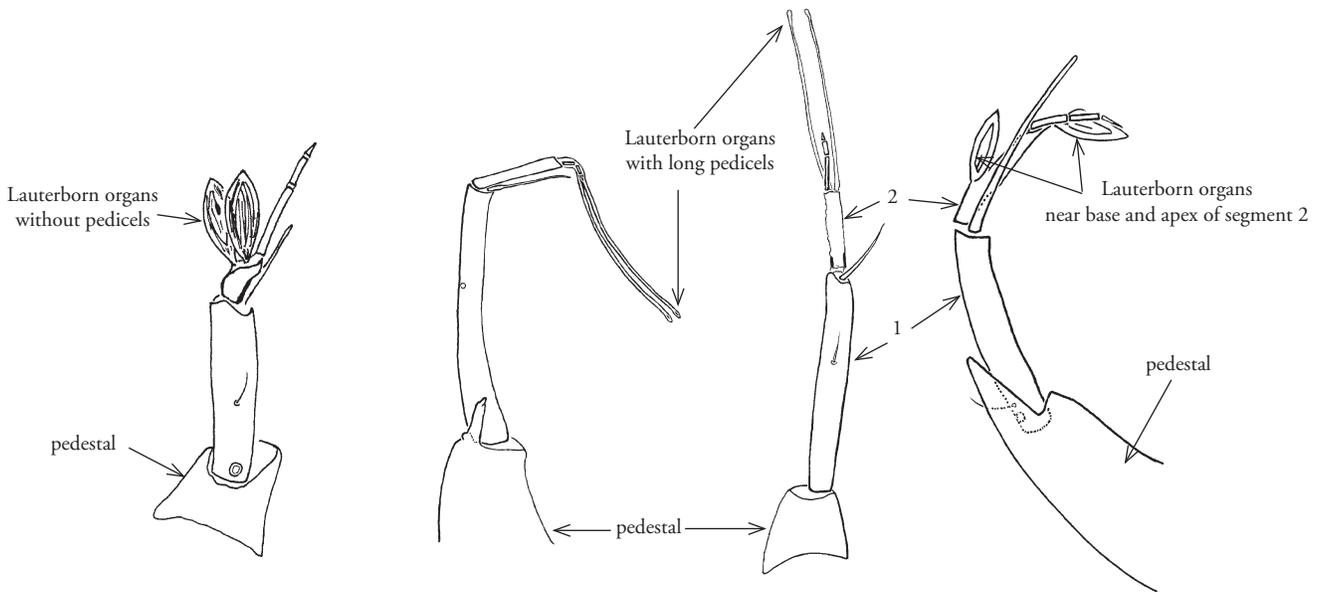
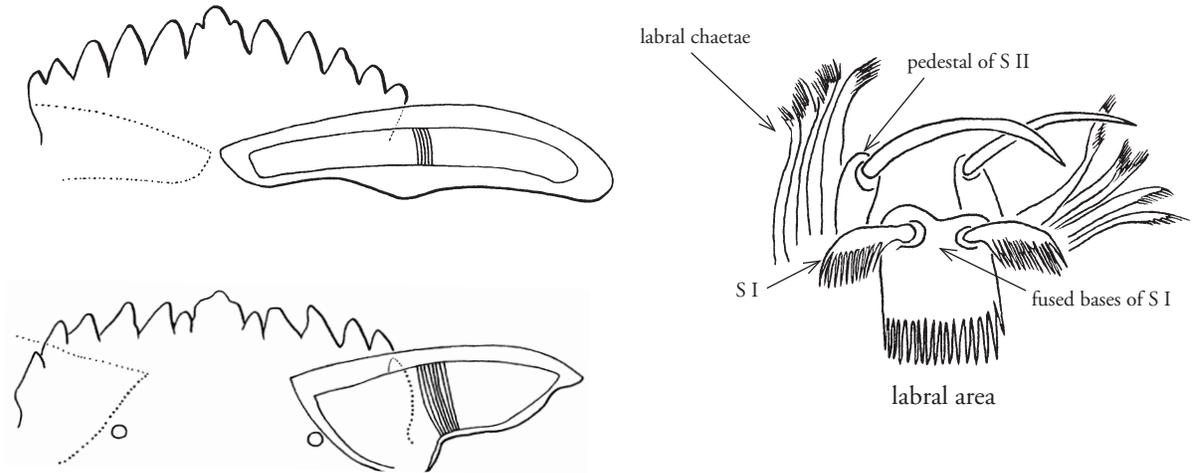
lateral view of cephalothorax



abdomen

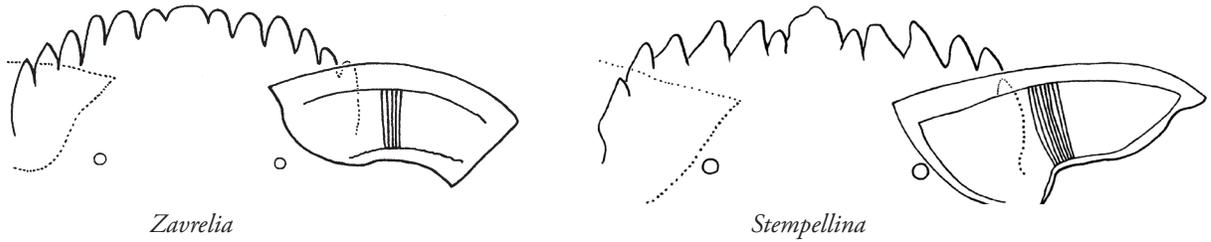
Key to genera of larval Tanytarsini of Florida

- 1 Ventromental plates well developed, with distinct striations; bases of S I fused; S II setae on long pedestals; antennae with 5 segments and mounted on a distinct elongate pedestal (base squat in one marine genus, *Pontomyia*); Lauterborn organs usually well developed and often mounted on short to long pedicels; Lauterborn organs at apex of segment 2 or alternate, with one near base and one at apex of segment 2 Tribe Tanytarsini 2

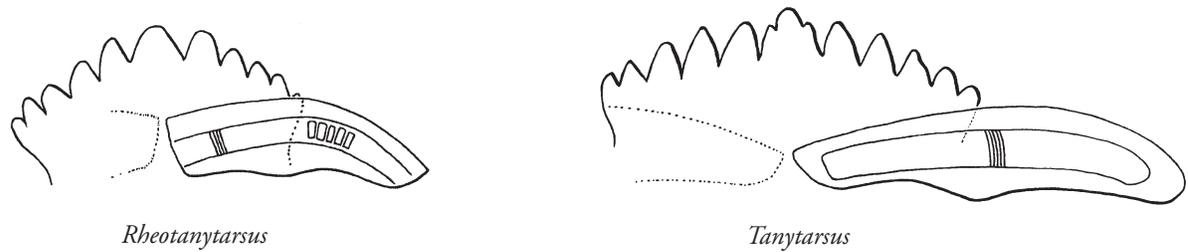


- 1' Ventromental plates present or absent, with or without striations; bases of S I usually separate and S II usually not on pedestal (if S I fused basally and/or S II on pedestals, then antennae with 6 segments and alternate Lauterborn organs at apices of segments 2 and 3); antennae with 4-8 segments and Lauterborn organs not on long pedicels, or inconspicuous NOT KEYED

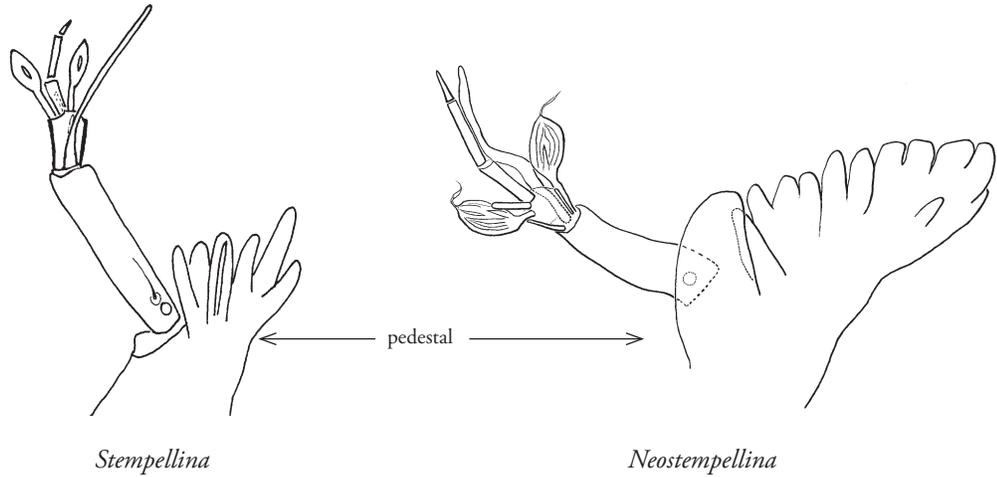
2(1) Ventromental plates squat, separated by at least the width of the 3 median teeth of the mentum; larva usually in a tubular transportable case 3



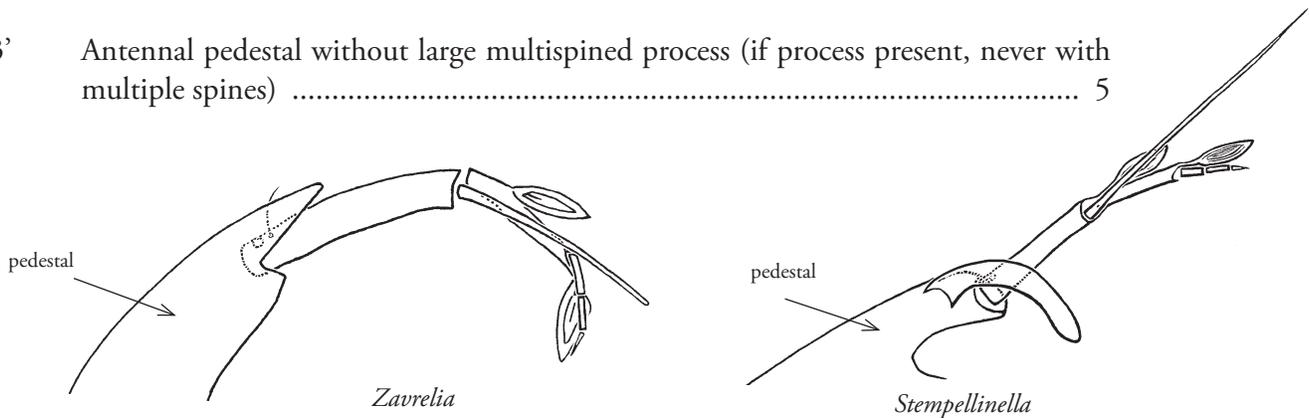
2' Ventromental plates wide and short, touching or almost touching medially; if larva in a case, the case is usually attached to a substrate and is not transportable 8



3(2) Antennal pedestal with large process bearing numerous spines 4



3' Antennal pedestal without large multispined process (if process present, never with multiple spines) 5

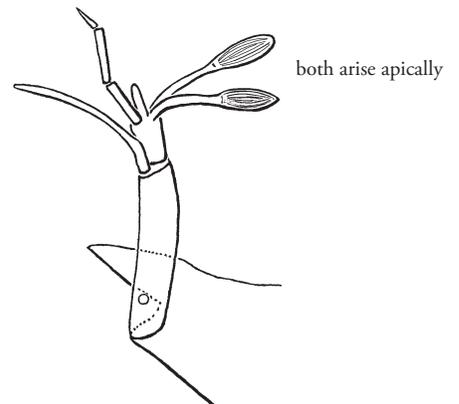
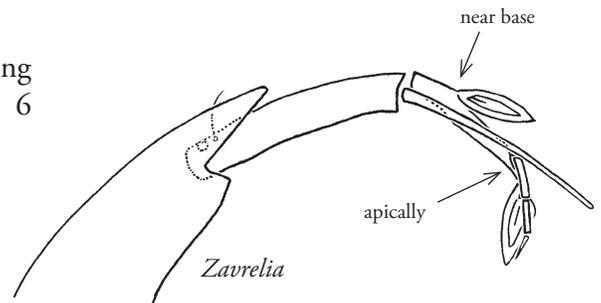
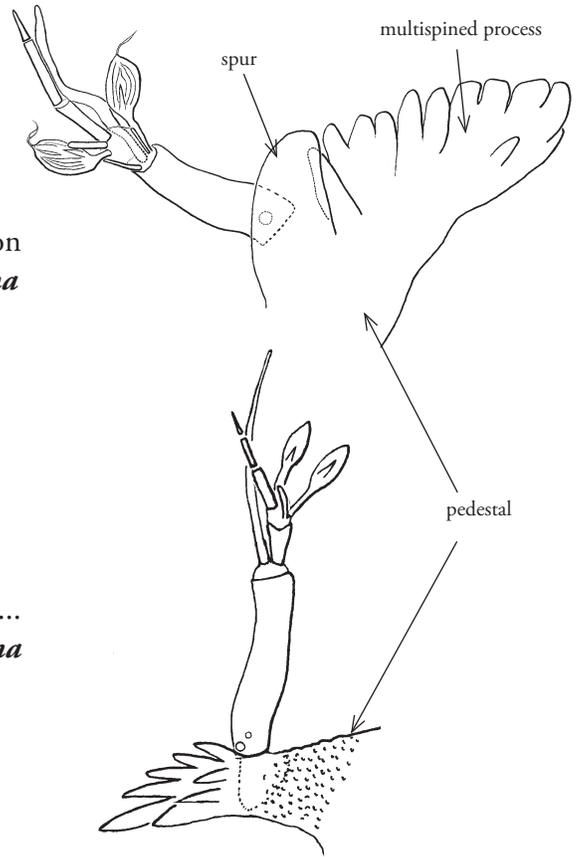


4(3) Antennal pedestal with well developed spur in addition to multispined process *Neostempellina*

4' Antennal pedestal with multispined process only *Stempellina*

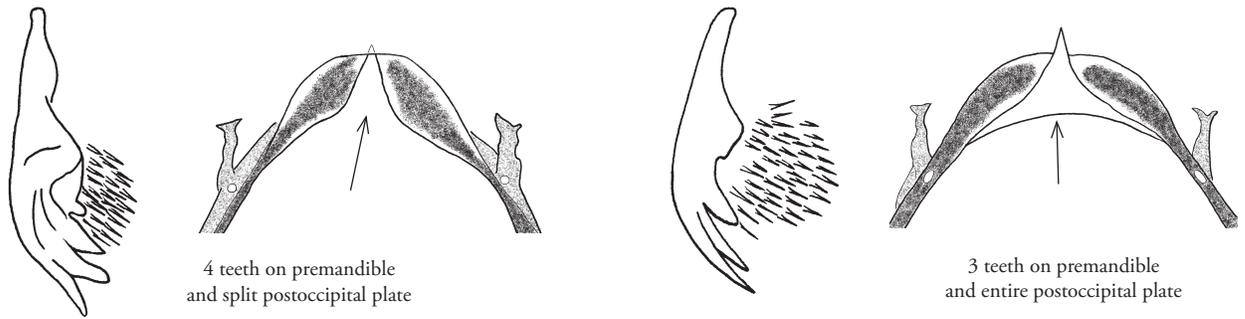
5(3') Antennal segment 2 with one Lauterborn organ arising apically, the other near the base 6

5' Antennal segment 2 with both Lauterborn organs arising apically 7

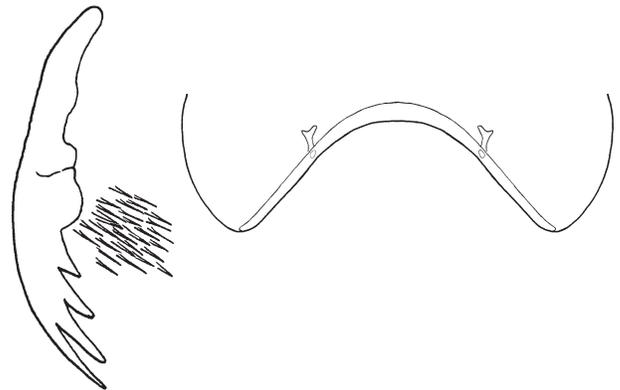


Tanytarsini genus A

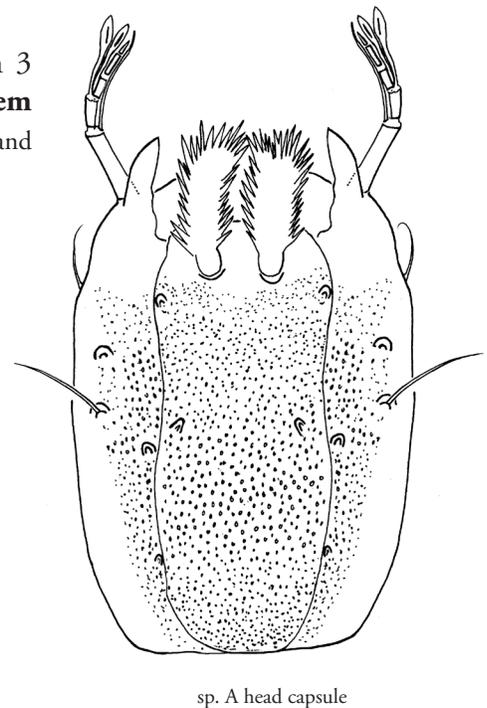
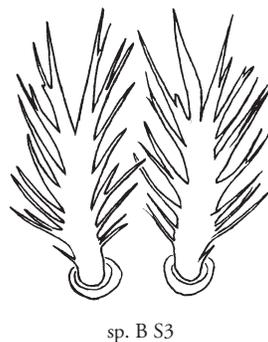
- 6(5) Premandible with 3-4 inner/apical teeth (4th tooth very small); postoccipital plate/margin with median separation or entire (if entire then premandible with only 3 teeth) *Stempellinella*



- 6' Premandible with 4 inner/apical teeth; postoccipital margin entire *Zavrelia*

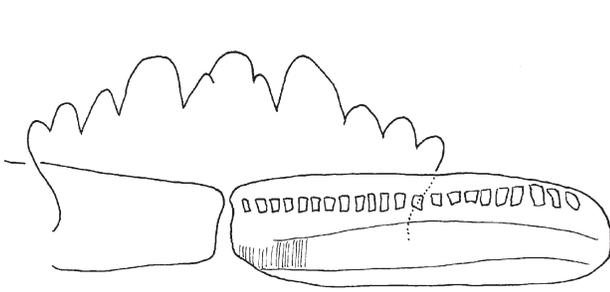


- 7(5') Frontoclypeal seta S3 large and plumose; premandible with 3 teeth **Tanytarsini* genus A Ekrem
(not known from Florida, but may eventually be found in northern and especially Panhandle counties)

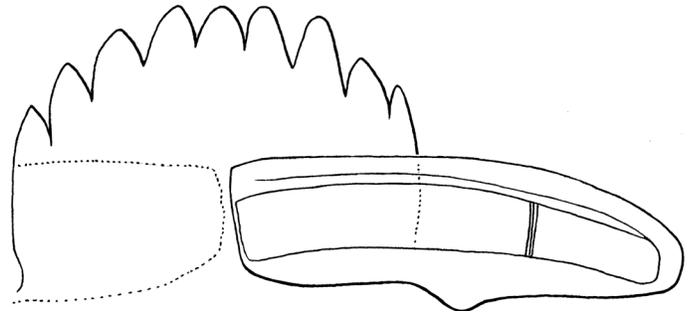


- 7' Frontoclypeal seta S3 simple, placed on prominent pedestal; premandible with 5 teeth
..... **Constempellina*
(not known from Florida and most likely will never be found here. Included in key only for comparison; not covered in this manual. See Notes under Tanytarsini genus A and Epler et al. (2013: 444) for more information on this taxon.)

8(2') Mentum with 4 pairs of lateral teeth (a minute 5th tooth may sometimes be appressed to the 4th) 9

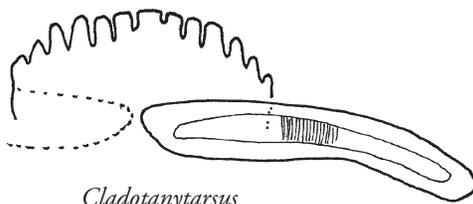


Pontomyia

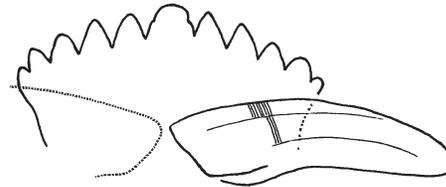


Neozavrelia

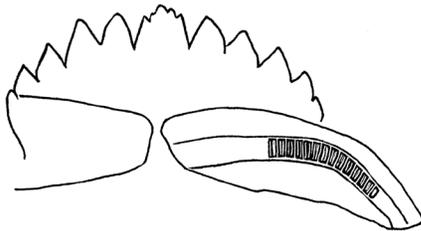
8' Mentum with 5 (or apparently more) pairs of well developed lateral teeth 10



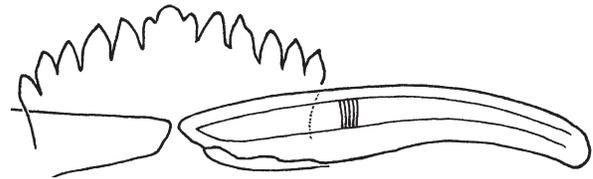
Cladotanytarsus



Paratanytarsus

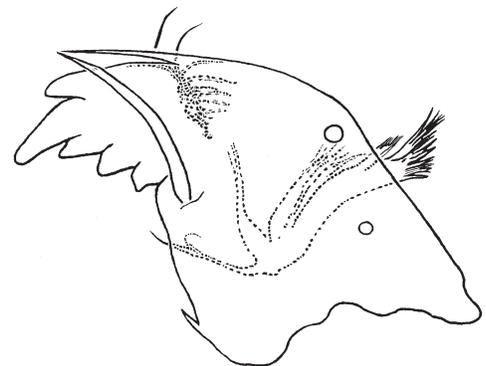
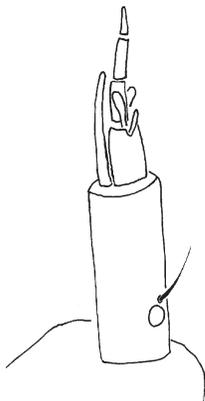


Rheotanytarsus

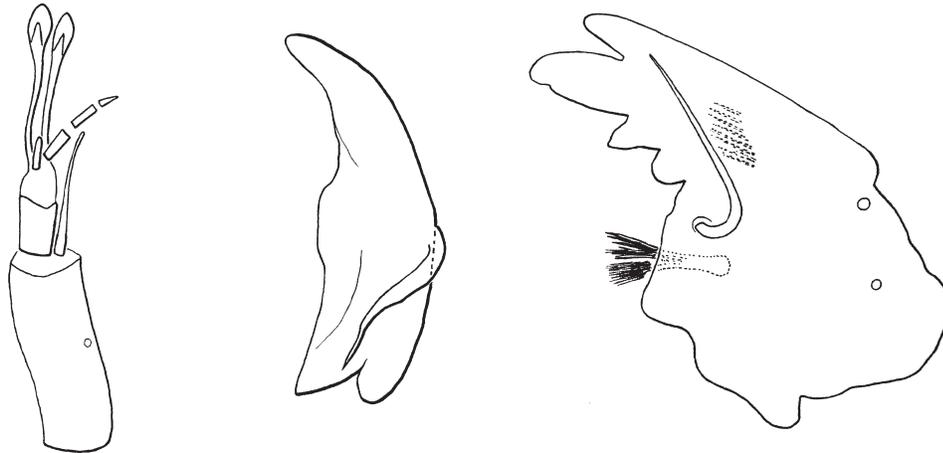


Tanytarsus

9(8) Antennae with sessile Lauterborn organs; premandible with numerous apical/subapical teeth; mandible with 3 inner teeth; exclusively marine ***Pontomyia***

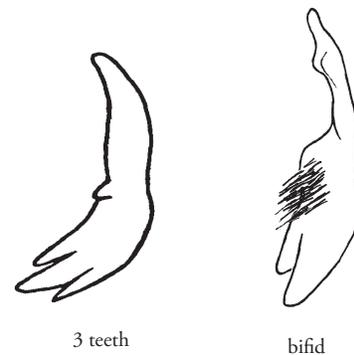


- 9' Antennae with Lauterborn organs on moderately long pedicels; premandible apically bifid with small, pale lateral spine; mandible with 2 inner teeth; in freshwater **Neozavrelia*
 (not known from Florida, but may eventually be found in northern and especially Panhandle counties)

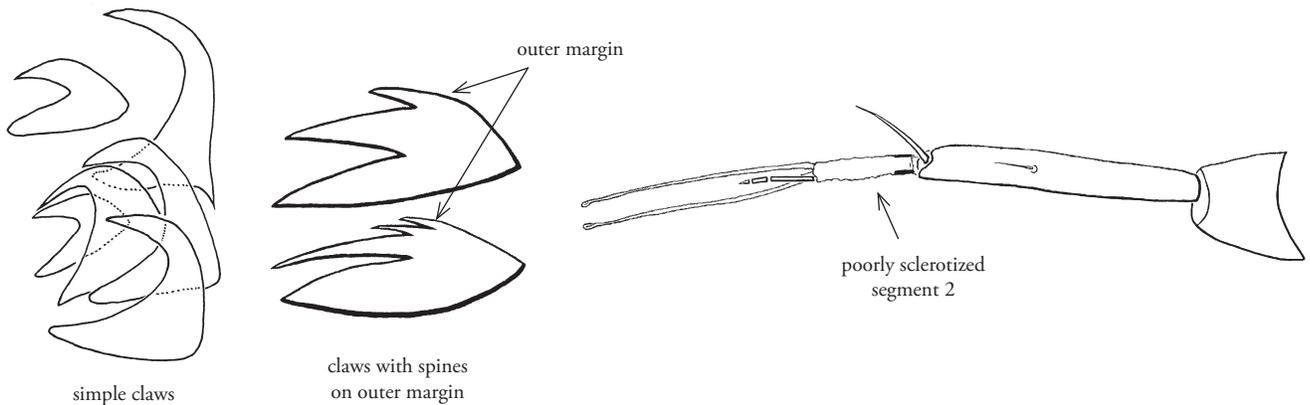


- 10(8') Premandible with 3 or more apical/subapical teeth 11

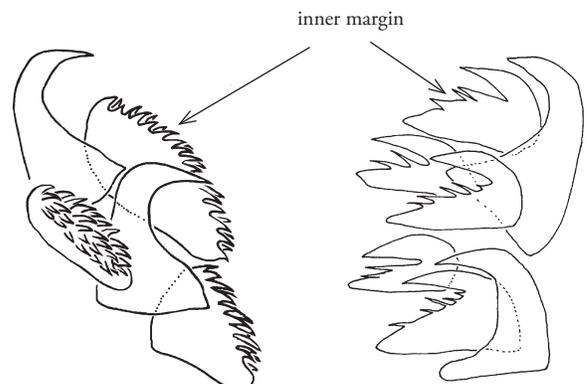
- 10' Premandible apically bifid 14



- 11(10) Claws of posterior parapods simple or with a few spines on **outer (upper)** margin; antennal segment 2 well sclerotized **OR** moderately to poorly sclerotized *Tanytarsus*



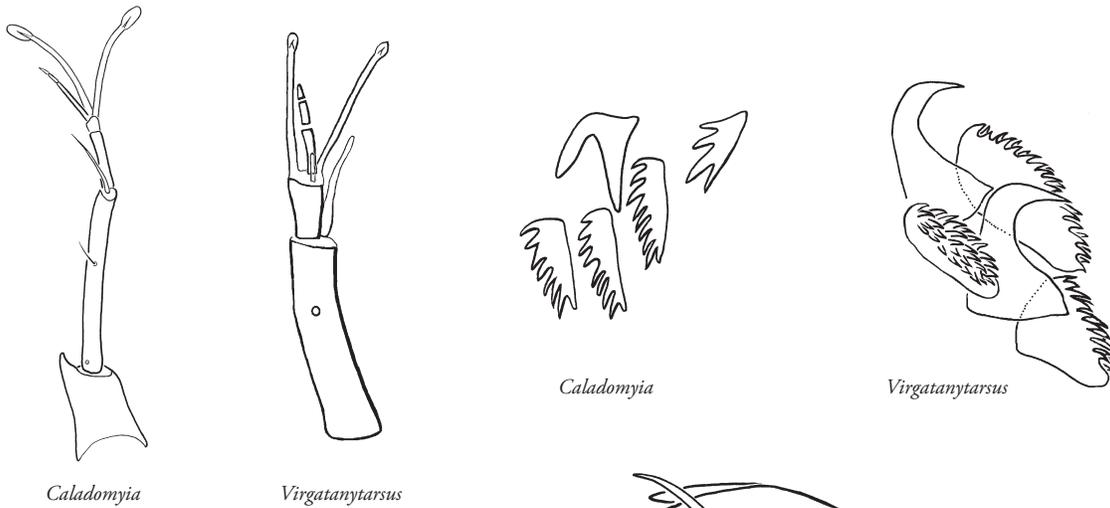
- 11' Some claws of posterior parapods with **inner** teeth/serrations; antennal segment 2 always well sclerotized 12



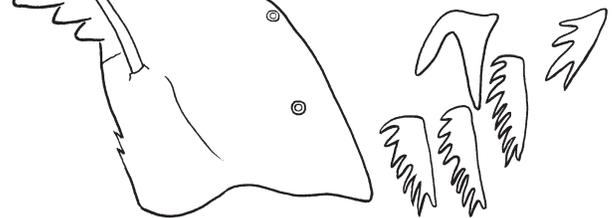
12(11') Antennal segment 2 wedge-shaped, wider at apex than at base; Lauterborn organs large, usually on very short pedicels (moderately long in one species); some posterior parapod claws with single row of inner teeth/serrations *Cladotanytarsus*



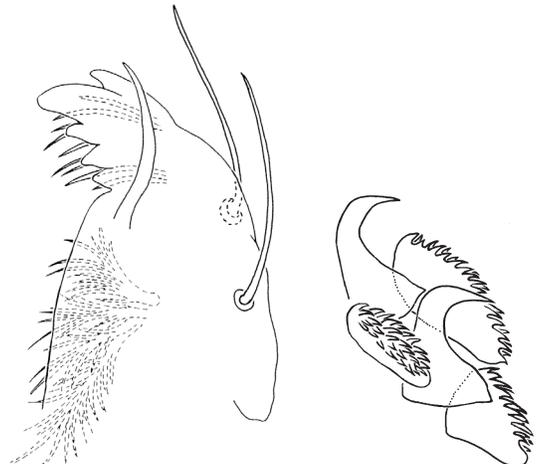
12' Antennal segment 2 cylindrical or at most slightly wedge-shaped; Lauterborn organs small, on long pedicels; some posterior parapod claws strongly serrated or with multiple rows of inner teeth 13



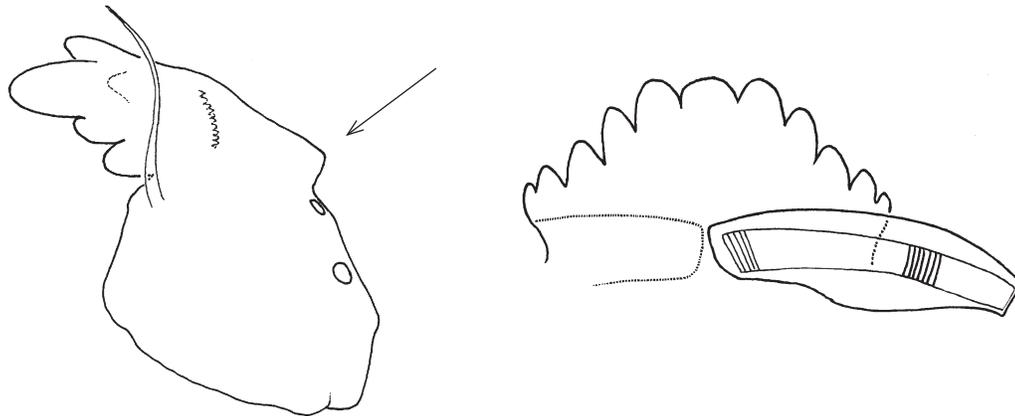
13(12') Mandible with 2 inner teeth; some posterior parapod claws with numerous serrations* *Caladomyia*
(not known from Florida, but may eventually be found here)



13' Mandible with 3 inner teeth; some posterior parapod claws with multiple rows of inner teeth* *Virgatanytarsus*
(not known from Florida, and probably does not occur in the Nearctic; see Notes under genus *Virgatanytarsus*)

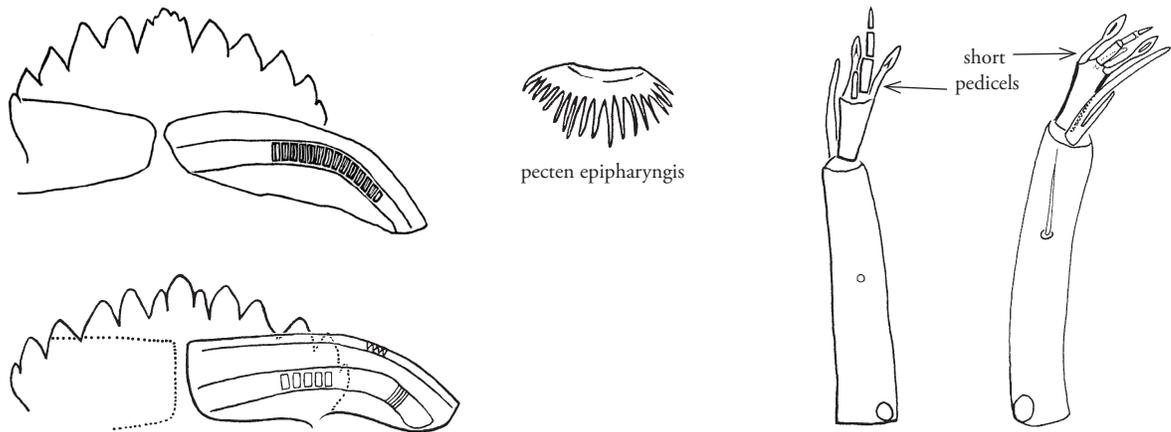


14(10') Mandible with pronounced lateral hump; 3 central teeth of mentum usually projecting strongly forward of lateral teeth *Sublettea*

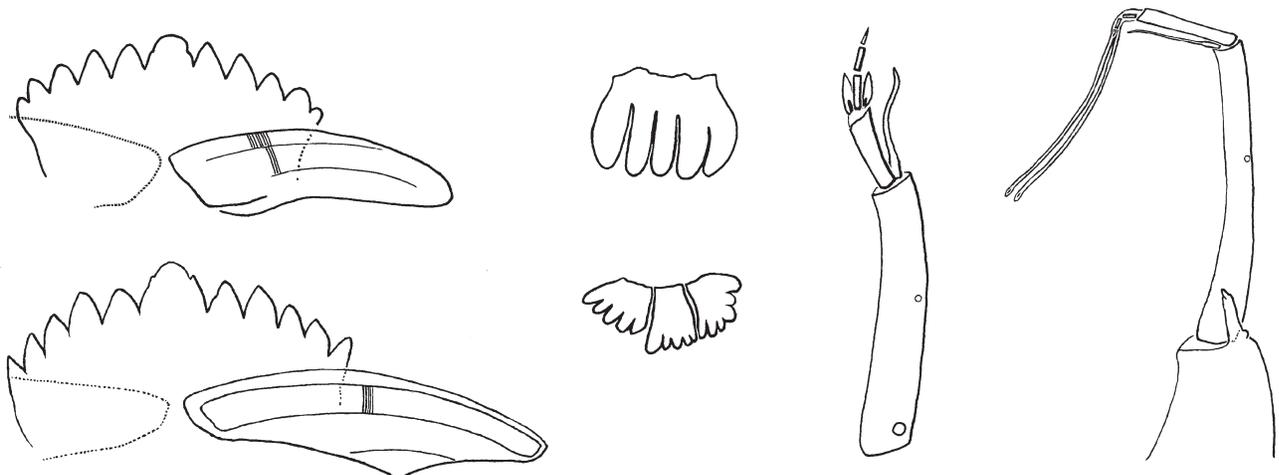


14' Mandible with or without lateral hump(s); 3 central teeth of mentum not projecting strongly forward of lateral teeth 15

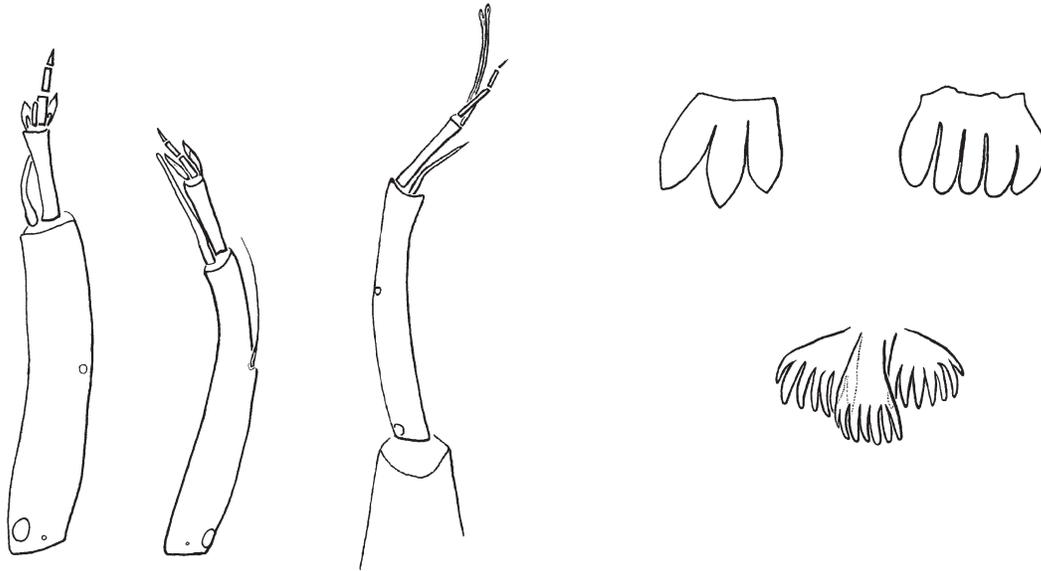
15(14') Ventromental plate striae coarse, appearing block-like; pecten epipharyngis a single multitoothed comb or weakly tripartite; Lauterborn organs on short pedicels that are shorter than or subequal to the length of segments 3-5 *Rheotanytarsus*



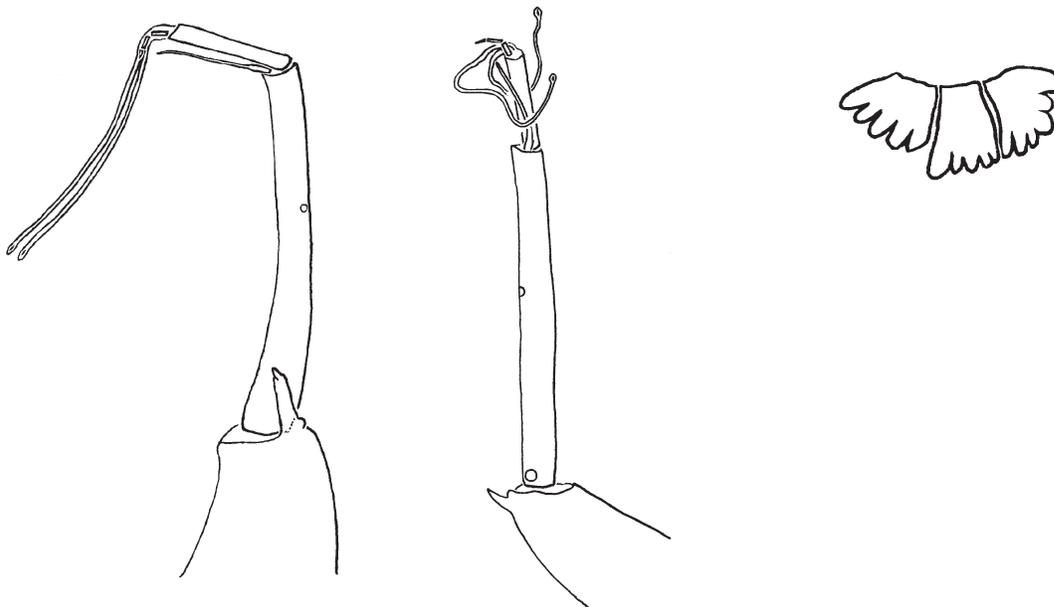
15' Ventromental plate striae fine and linear; pecten epipharyngis a 3-5 lobed plate, or of 3 distinct platelets with numerous apical teeth; Lauterborn organs sessile or on short to long pedicels 16



- 16(15') Lauterborn organs sessile or on pedicels that are at most no more than 2X length of antennal segments 3-5; pecten epipharyngis a 3-5 lobed plate, or of 3 distinct platelets with numerous apical teeth *Paratanytarsus*

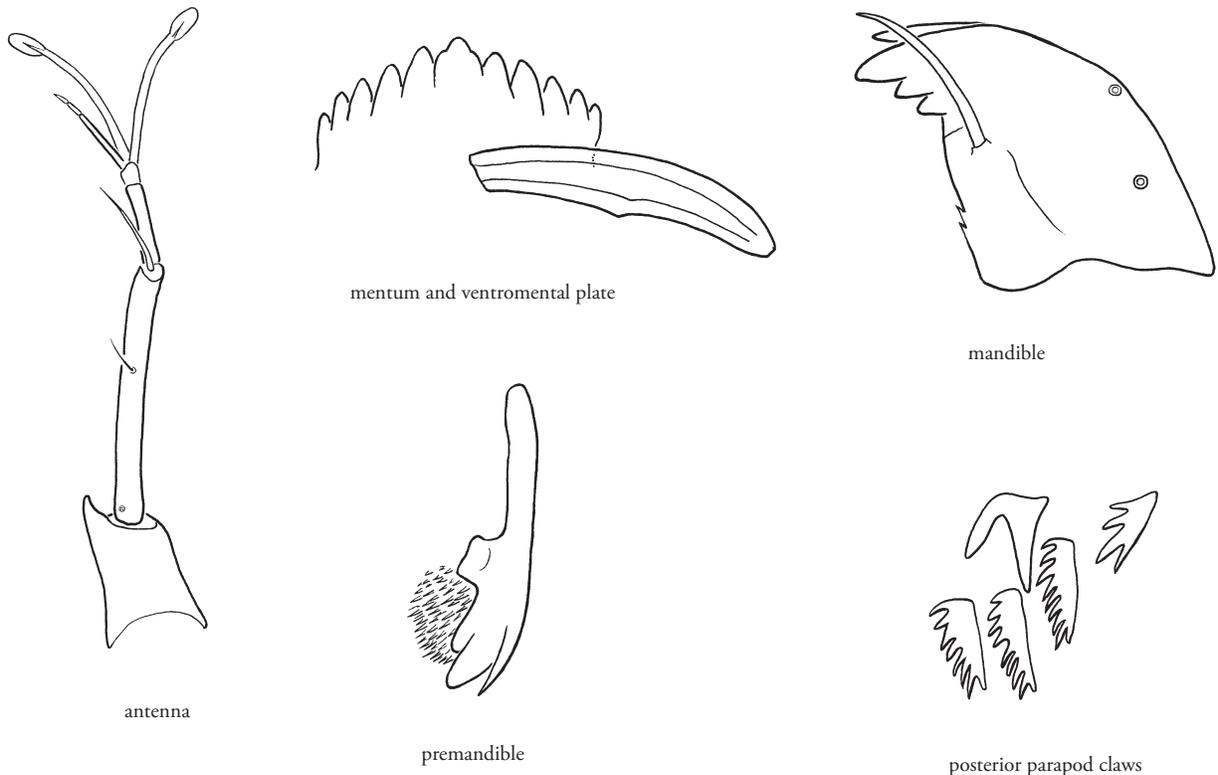


- 16' Lauterborn organs on long pedicels that are always more than 2X length of antennal segments 3-5; pecten epipharyngis always of 3 distinct platelets with numerous apical teeth *Micropsectra*



GENUS * *Caladomyia* Sæwedal

DIAGNOSIS: Distinguished by the antennal pedestal with a well developed apical tooth; antenna with segment 2 cylindrical, mostly well sclerotized; pecten epipharyngis of 3 distally serrated scales; premandible with 3 apical/subapical teeth; mentum with 5 pairs of lateral teeth; wide, thin ventromental plates that almost touch medially; 2 inner teeth on the mandible; and the claws of the posterior parapods, some of which bear numerous inner serrations.



Caladomyia spp.

(adapted from Trivinho-Strixino & Strixino 2000, 2003)

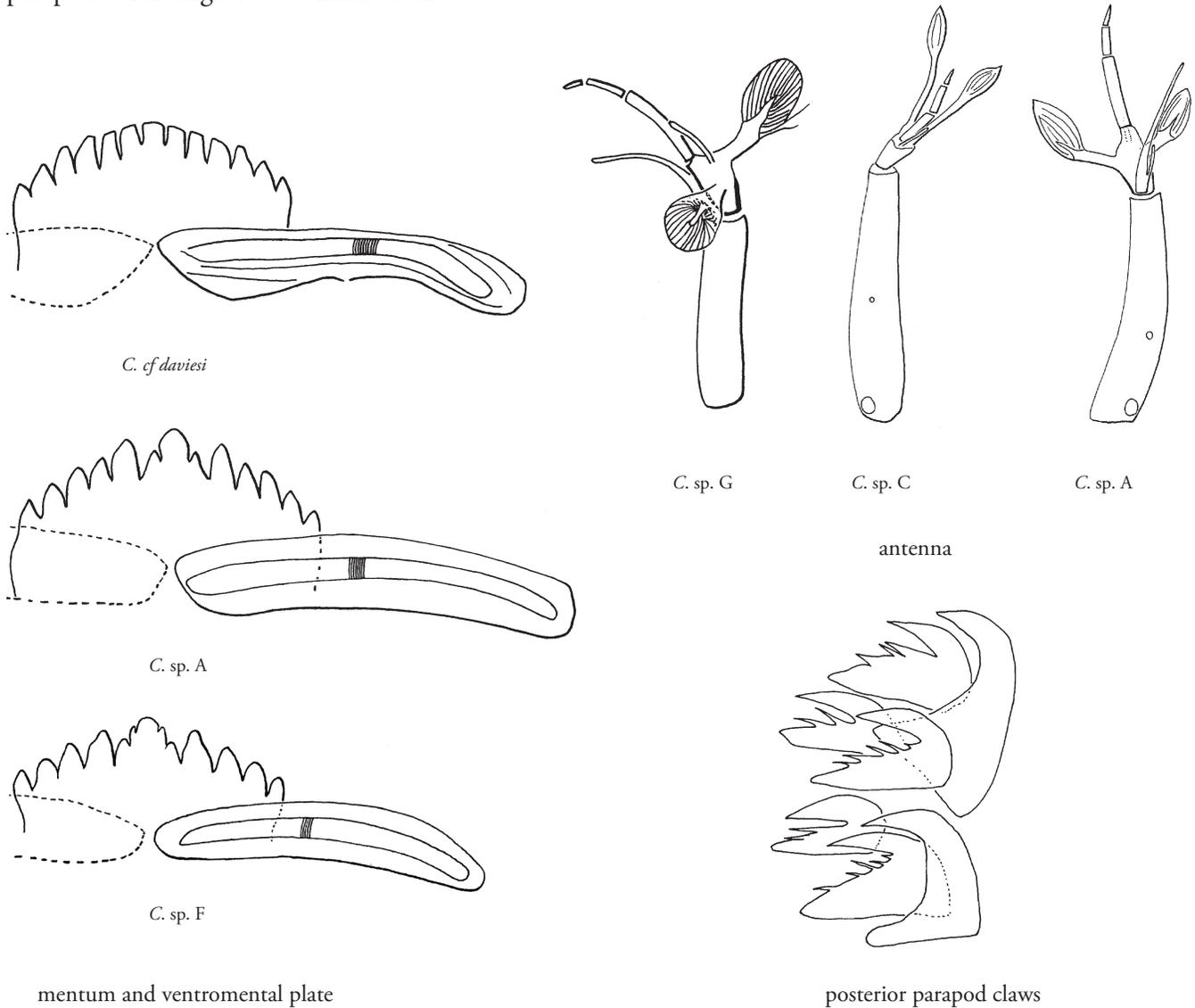
NOTES: *Caladomyia*, a mostly Neotropical genus, has not yet been found in Florida, but its presence in California, Oklahoma and Texas indicates that it may eventually be found here. Sæwedal (1981) originally established the genus based only on adult males. Trivinho-Strixino & Strixino (2000) described the immature stages, correcting an initial placement in *Nimbocera* of a *Caladomyia* species (*C. paulensis*) described only as a larva by Trivinho-Strixino & Strixino (1991). Reiff (2000) reviewed the adults of the genus; Trivinho-Strixino (2012) provided the most recent review of the genus and included keys for adult males, pupae and larvae.

Larvae are found in lentic habitats. The diagnosis here is based on Neotropical species; Nearctic larvae, when eventually described, may differ in some aspects.

ADDITIONAL REFERENCES: Reiff 2000; Sæwedal 1981; Trivinho-Strixino 2012; Trivinho-Strixino & Strixino 1991, 2000, 2003.

GENUS *Cladotanytarsus* Kieffer

DIAGNOSIS: Distinguished by the antennae with second segment short, wedge-shaped, wider at apex than at base; large Lauterborn organs on short pedicels (but at least one species with moderately long pedicels) at apex of antennal segment 2; pecten epipharyngis of 3 apically serrated scales; premandible with more than 3 apical/subapical teeth; wide, thin ventromental plates that almost touch medially; and some claws of posterior parapods with single row of inner teeth.



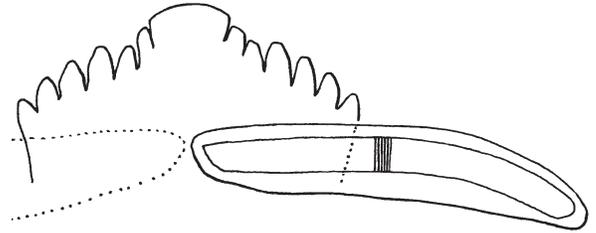
NOTES: A common, speciose genus (at least a dozen species in the Southeast US) with many undescribed taxa, *Cladotanytarsus* is in sore need of revision in the Nearctic. Dr. Wojciech Giłka, University of Gdańsk, Poland, is currently working on the genus and hopefully may solve some of our problems.

Larvae are found in many types of water bodies, including brackish water and hot springs. Species level identification is important; Bilyj & Davies (1989) found that some species were intolerant of acidification, but noted that *C. aeiparthenus* was apparently acidophilic. In Africa, mass emergences of *C. lewsi* (Freeman) create nuisance problems and allergic reactions in humans (Cranston et al. 1981).

ADDITIONAL REFERENCES: Bilyj & Davies 1989; Giłka 2011; Jacobsen & Bilyj 2007.

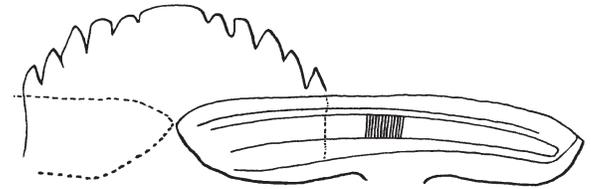
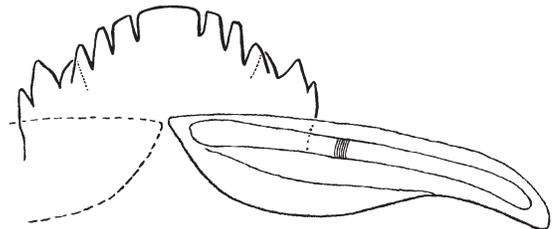
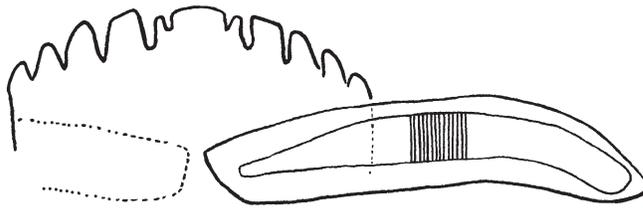
Key to *Cladotanytarsus* larvae of Florida

1 Mentum with large, dome-shaped median tooth that extends anteriorly far past lateral teeth
..... **C. sp. I Epler**

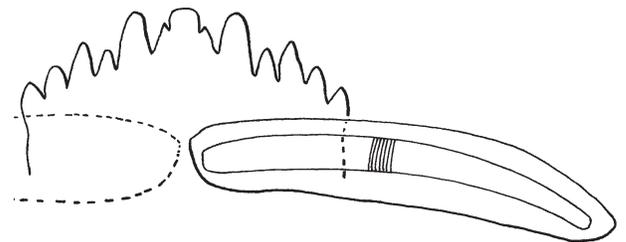
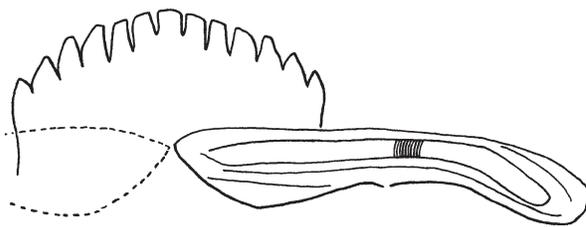


1' Median tooth/teeth of mentum not dome-like (see figures below) 2

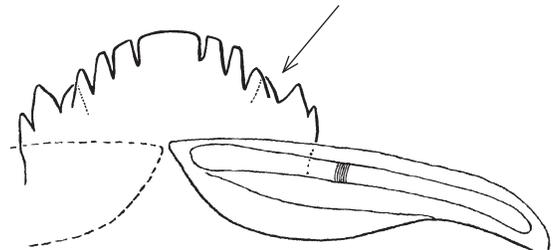
2(1') Mentum with broad median tooth 3



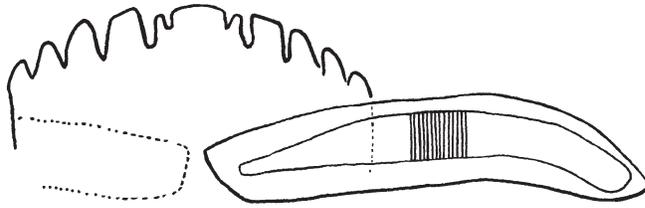
2' Mentum with 3 subequal median teeth or trifid triangular median tooth 5



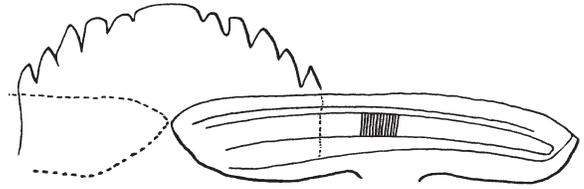
3(2) Mentum with 4th-6th lateral teeth displaced dorsally
..... **C. sp. D Epler**



3' Mentum without displaced lateral teeth 4



C. aeiparthenus



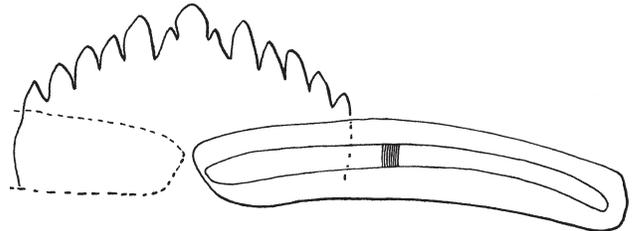
C. sp. G

4(3') Mentum width about 75 μm ; postmentum length about 130 μm ; [pupal thoracic horn elongate-ovoid, without chaetae] ***C. aeiparthenus* Bilyj**

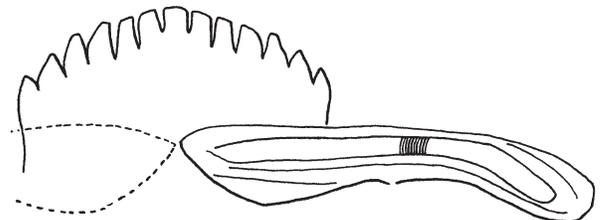
4' Mentum width about 45 μm ; postmentum length about 85 μm ; [pupal thoracic horn tubular-apically attenuate, with row of long chaetae] ***C. sp. G* Epler**

Specimens must be 4th instar for accurate measurements.

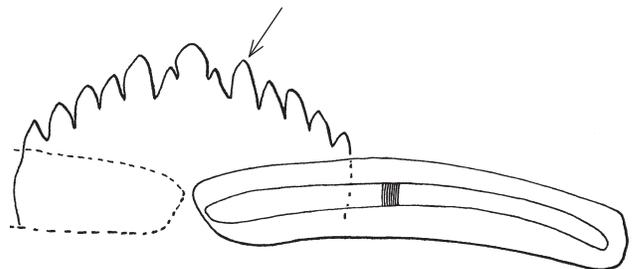
5(2') Mentum with trifold median tooth 6



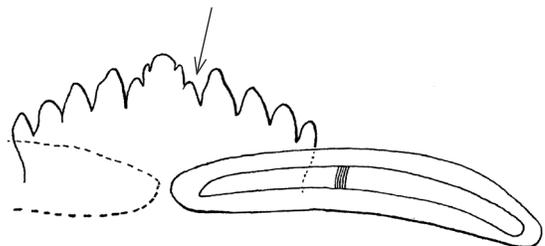
5' Mentum with 3 teeth at center subequal 10



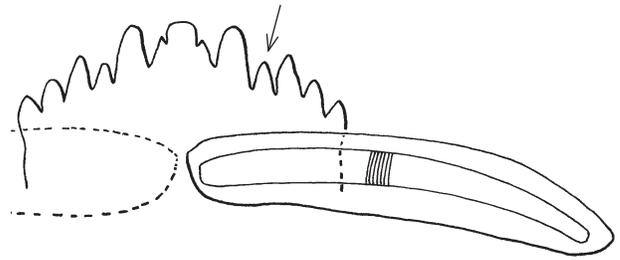
6(5) Mentum with large first lateral tooth 7



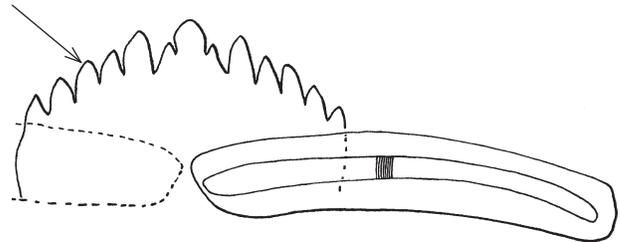
6' Mentum with reduced first lateral tooth 9



7(6) Mentum with 2nd lateral tooth reduced
 *C. viridiventris* (Malloch)



7' Mentum with 2nd lateral tooth subequal to
 3rd 8



C. sp. A

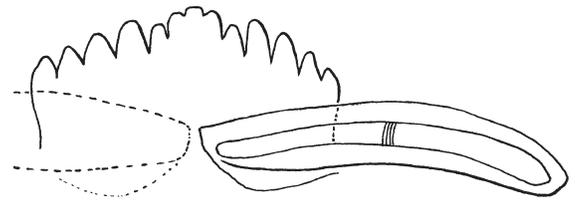
8(7') Head capsule light brown, usually with darkened
 postmentum; antennae darker brown; antennal
 segment 1 longer, 47-85, mean 74 μ m; [pupa with
 thoracic horn] ***C. sp. A* Epler**



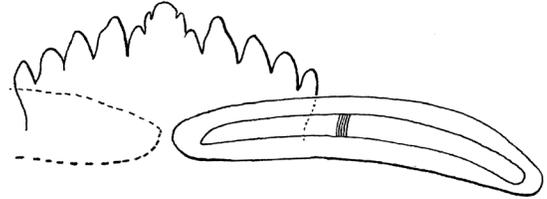
C. sp. A larva
 Alligator Lake

8' Antennae and head capsule pale yellow; antennal segment 1 48-56, mean 51 μ m; [pupa without
 thoracic horn] ***C. acornutus* Jacobsen & Bilyj**

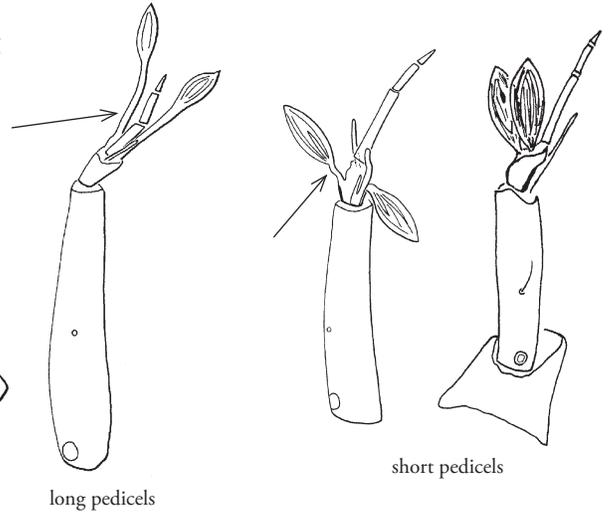
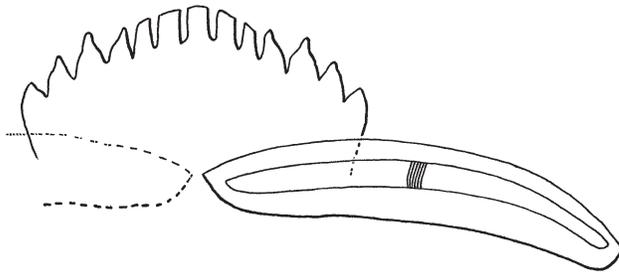
9(6') Apical tooth of mandible rounded .. * **C. sp. E Epler**
(not known from Florida)



9' Apical tooth of mandible pointed **C. sp. F Epler**

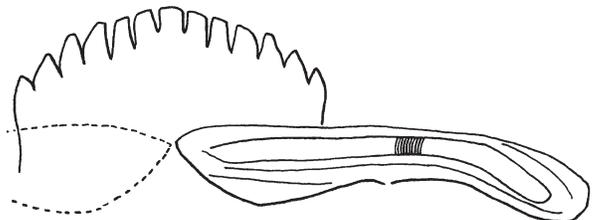


10(5') Lauterborn organs on long pedicels, organs extending beyond last antennal segment **C. sp. C Epler**

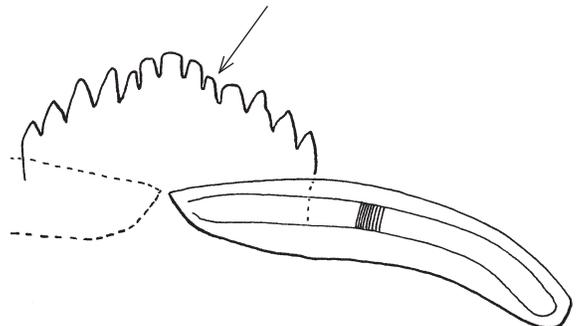


10' Lauterborn organs on shorter pedicels 11

11(10')Mentum with 2nd lateral tooth subequal to 1st **C. cf. daviesi Bilyj**



11' Mentum with 2nd lateral tooth smaller, thinner, than 1st **C. sp. H Epler**



Notes on species

Note that most of the taxa below are represented by larvae only. Associated pupae may demonstrate that several of these taxa may be synonyms. Note also that wear on the teeth of the mentum may alter its appearance!

- C. acornutus* Jacobsen & Bilyj - According to Jacobsen & Bilyj (2007: 152) this species is “one of the most abundant chironomid midges in the Florida Everglades”. Larvae are very similar to those of *C. sp. A*, but are smaller and much lighter in color. This species is most likely confined to the Everglades. Jacobsen (pers. comm.) believes this species to be an “outstanding indicator of unenriched, minimally disturbed habitats” in the Everglades. Any larva outside of the Everglades believed to be this species must be associated with a pupa/adult male for accurate identification. The FDEP collection has two larvae from the Everglades that may be this species, but their measurements are much larger (first antennal segment length 73 μm) than the published range for *C. acornutus* (48-56, mean 51 μm). I have seen one unassociated larva in the FDEP collection from an unnamed stream in Hendry County that may be this species, but without associated pupae and adult males these identifications must remain tentative. See also *C. sp. A* below.
- C. aeiparthenus* Bilyj - I have reared this species, originally described from Ontario, Canada, from peninsular Florida. It is apparently parthenogenetic; only females and female pupae are known (and, of course, the larva). The pupal thoracic horn is elongate-ovoid and bears no chaetae; it somewhat resembles a bunch of grapes (“racemose”).
- C. cf. daviesi* Bilyj - I have reared larvae from Florida which appear to be *C. daviesi*, but some pupae differ in having a higher number of taeniae on the anal lobes (20-21, instead of the 16-19 noted in the original description). This difference may be insignificant, but Dr. J.E. Sublette (pers. comm.) considered this taxon to be an undescribed species. I’ve seen material from Florida (reared), North Carolina and South Carolina. The apical tooth of the mandible is broadly rounded. A very common species.
- C. latissimus* Gilka - Known only from adults and pupae. Originally described from Polk County, Florida, I’ve seen adult males from Disney World near Orlando. This species and *C. subletteorum* belong with the subgenus *C. (Lenziella)*, a name that was recently resurrected by Gilka (2011). With the larva of only one *C. (Lenziella)* species described (*C. crusculus* (Sæther)), it is not yet possible to know which characters, if any, may separate larvae of the two subgenera; adults and pupae of the two subgenera can be separated (see Gilka 2011).
- C. subletteorum* Gilka - Known only from adults and pupae; described from material ranging from Leon County in the north to West Palm Beach in the south of Florida.
- C. viridiventris* (Malloch) - Formerly (Epler 2001) called “*C. sp. B*”. The trifold median tooth and reduced second lateral tooth are distinctive for this species. A widespread species, with records throughout the Nearctic. However, due to the similarity of adult males of many species, many of those records may be in error. The apical tooth of the mandible is pointed.
- C. sp. A* Epler - Usually a lentic species, usually with a darkened postmentum. I’ve seen material from Florida, North Carolina and South Carolina. Some larvae may appear to have only 2 inner teeth on the mandible. I have a series reared from Lofton Pond, south of Tallahassee, by Mike Heyn and Todd Risk. This series is slightly paler in color than a population in Alligator Lake (Columbia County) with which I am long familiar. It is assumed they represent the same taxon, but I have no associations of the Alligator Lake material. *Cladotanytarsus sp. A* is similar in the larval stage to *C. acornutus* Jacobsen, but has a brownish cast to the head capsule, browner antennal segments and usually a darkened postmentum; *C. acornutus* has a pale yellow head capsule with pale brown antennal segments. In addition, *C. acornutus* is much smaller; first antennal segment length 48-56, mean 51 μm , while that of *C. sp. A* is 47-85, mean 74 μm (see *C. acornutus* above). One reared specimen from Lofton Pond has a first antennal segment that is only 47 μm long, but all others reared had first antennal segment lengths > 77 μm . Pupae and adults indicate that *C. sp. A* is a different species. The pupa of *C. sp. A* has an elongate

thoracic horn (*C. acornutus* lacks a thoracic horn) and the adult male has acrostichal setae (lacking in male *C. acornutus*) and the genitalia are different (*C. sp. A* has well developed anal crests, weak in *C. acornutus*). Pupae of *C. sp. A* will key to *C. vanderwulpi* (Edwards) (a Palearctic species) in Bilyj & Davies (1989), but the adult male's genitalia indicate that it is not that species. The apical tooth of the mandible of both of these taxa is pointed.

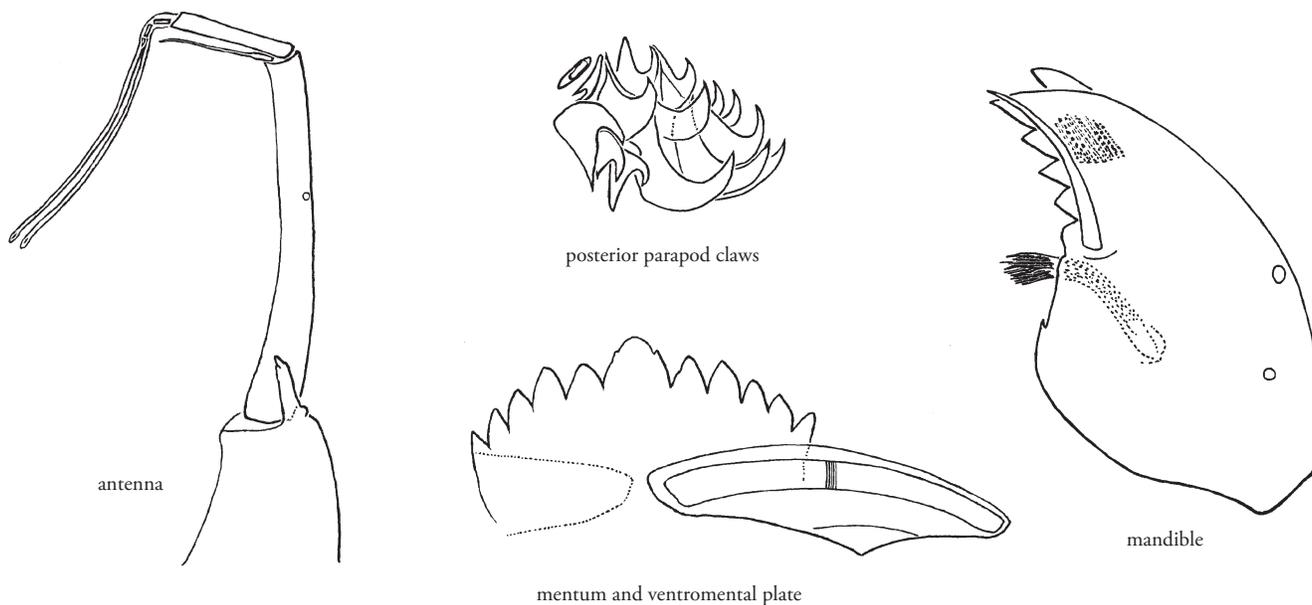
- C. sp. C* Epler - This species is unusual in that the Lauterborn organs are placed on long pedicels; otherwise it appears to be a typical *Cladotanytarsus*. Although Epler (2001) only saw material from Alabama streams, it has since been collected from the Alapaha River in Hamilton County, Florida. The apical tooth of the mandible is broadly rounded.
- C. sp. D* Epler - The displaced 4th, 5th and 6th lateral teeth of the mentum are distinctive. It does not appear to be a deformity, for I've seen material from three sites in North Carolina. It also occurs in Florida and it has been found in South Carolina (Ely Kosnicki, pers. comm). The apical tooth of the mandible is broadly rounded.
- C. sp. F* Epler - I've seen Florida material from a creek near Live Oak Creek in Okaloosa County and Alligator Lake in Columbia County; also known from Kentucky and North Carolina.
- C. sp. G* Epler - This taxon is known from a single larval-pupal association from a stream in northern Florida. Although the larva strongly resembles that of *C. aeiparthenus*, and apparently differs from it only in size, the pupa is entirely different from *C. aeiparthenus* and definitely represents another species. The pupal thoracic horn of *C. sp. G* is tubular-apically attenuate and bears a row of long chaetae, resembling that of *C. cf. daviesi*.
- C. sp. H* Epler - Very similar to *C. cf. daviesi*, but with a smaller, thinner second lateral tooth on the mentum; it may represent a variant of that species. In Florida known from Manatee County; I've also seen material from North and South Carolina.
- C. sp. I* Epler - The distinctive domed median tooth of the mentum will identify this taxon, which in Florida has been collected in Escambia and Gadsden Counties, Florida; it is also known from North Carolina. The apical tooth of the mandible is rounded.

Other species

- C. sp. E* Epler - Not recorded from Florida; known from North and South Carolina.

GENUS *Micropsectra* Kieffer

DIAGNOSIS: Distinguished by the Lauterborn organs on long pedicels that are always more than 2X length of antennal segments 3-5; pecten epipharyngis always of 3 distinct platelets with numerous apical teeth; bifid premandible; and wide, short ventromental plates that almost touch medially.



Micropsectra sp. A

NOTES: The genus *Micropsectra* now includes species formerly placed in *Parapsectra* Reiss and *Krenopsectra* Reiss (see Ekrem et al. 2010; Epler et al. 2013). However, none of the species that would have been placed in those genera occur in Florida. Anderson et al. (2013) offered a key for adult males of 21 described species of *Micropsectra* known from the Nearctic. Two additional species are parthenogenetic and thus known only as females in the adult stage; these two species were included in their key for pupae of 20 species. It is highly likely that there are many more undescribed species in the Nearctic. Note also that the species formerly called *Micropsectra* sp. D (Epler 2001) is now *Paratanytarsus longistilus* Bolton, Ekrem, Sublette & Sublette.

Several *Micropsectra* species are recorded for Florida from various sources, but I have not seen any adults from Florida. In Florida the genus is probably confined to the northern tier of counties. I have seen only *M. sp. A* and *M. dives/geminata* larvae from Florida.

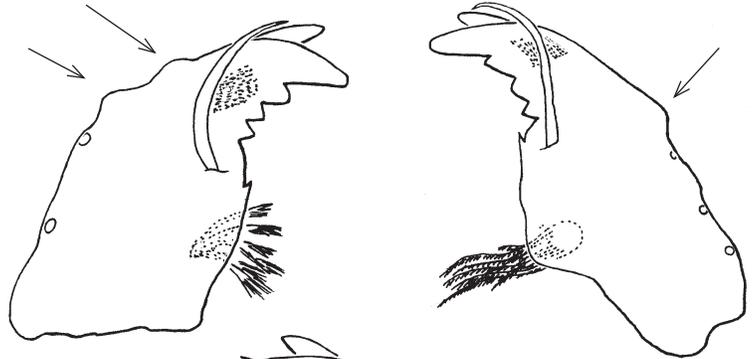
Larvae are found in a wide range of lotic and lentic habitats, but in the Southeast appear to be most abundant in mountain streams and springs.

The key that follows is basically the same as that in Epler (2001); it is offered on the outside chance that some of the taxa known from the Carolinas might be found here.

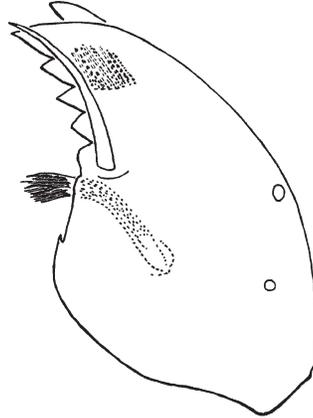
ADDITIONAL REFERENCES: Anderson et al. 2013; Oliver & Dillon 1994b; Säwedäl 1976, 1982; Stur & Ekrem 2006; Webb 1981.

Key to *Micropsectra* larvae of the southeastern United States

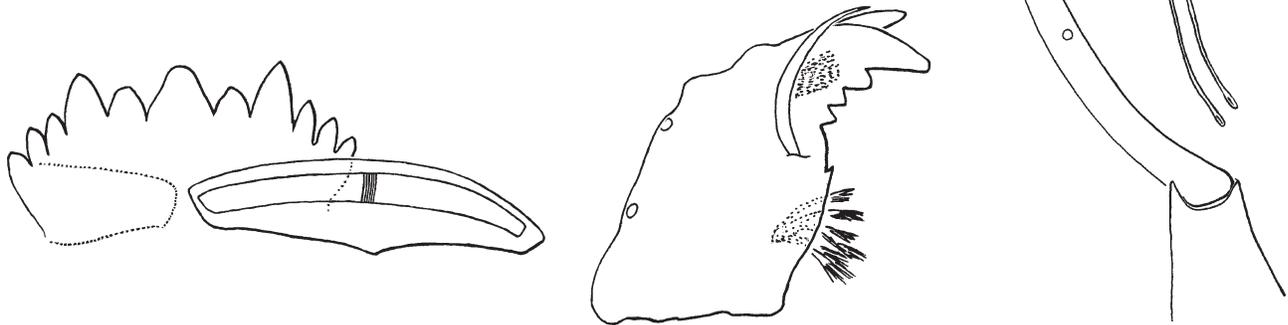
1 Outer margin of mandible with 1 or 2 small humps 2



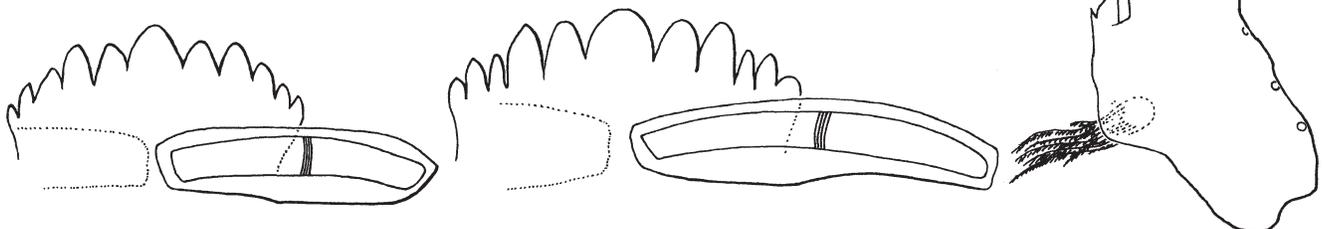
1' Outer margin of mandible without humps 5



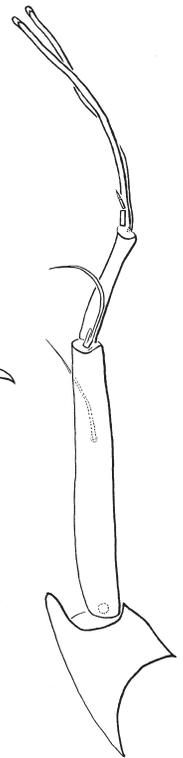
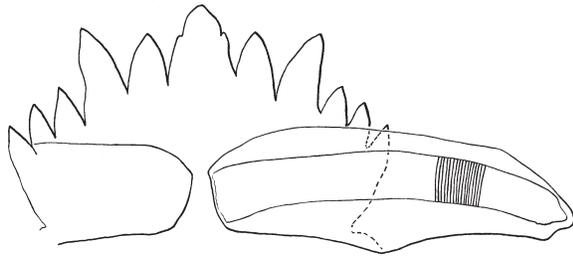
2(1) Mentum with reduced first lateral tooth; outer margin of mandible with 2 humps; antenna with segment 2 wider at apex than at base; antennal segment 1 4-6X as long as segment 1 * *M. sp. B* Epler (not known from Florida)



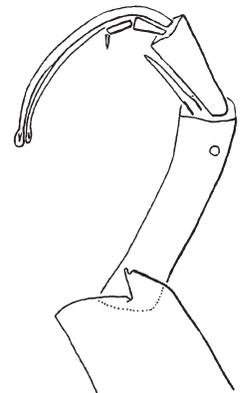
2' Mentum with first and second lateral teeth subequal (first may appear slightly lower than second); outer margin of mandible with 1 hump; antenna not as above 3



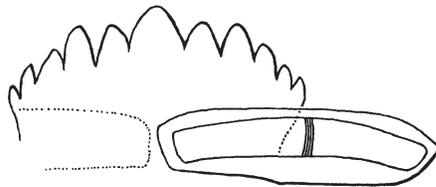
- 3(2') Second lateral tooth of mentum very large; first antennal segment about 2.5X as long as second; second antennal segment about as wide at apex as at base; antennal pedestal with large spur **M. sp. F Epler**



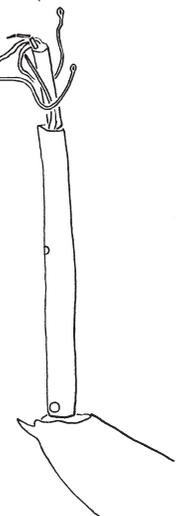
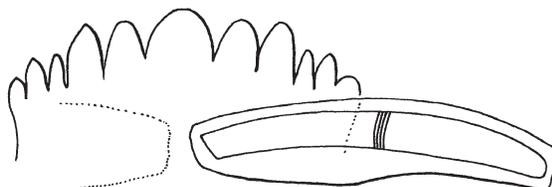
- 3' Second lateral tooth of mentum not as large; first antennal segment about 2-4X as long as second, if about 2.5X as long as second, then with expanded apex; second antennal segment either about as wide at apex as at base or wider at apex than base; spur on antennal pedestal not as large 4



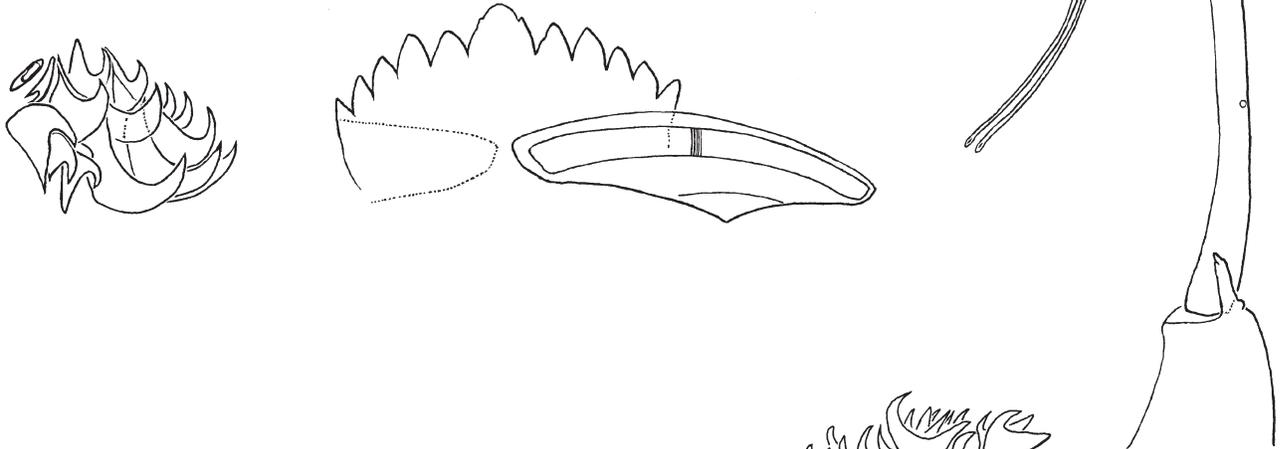
- 4(3') First antennal segment 2-2.5X as long as second; second antennal segment wider at apex than base * **M. sp. C Epler**
(not known from Florida)



- 4' First antennal segment about 4X as long as second; second antennal segment about as wide at apex as at base * **M. sp. E Epler**
(not known from Florida)



5(1') Each hind parapod with 25 or fewer claws (usually about 15) ... ***M. sp. A* Epler**

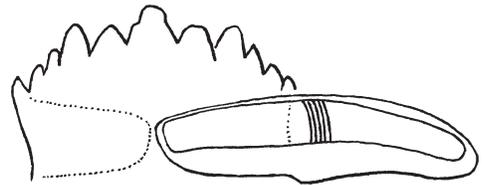


5' Each hind parapod with 40 or more claws 6

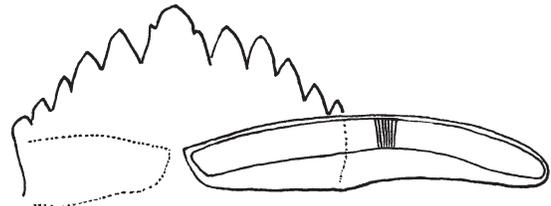


6(5') Mentum with first lateral tooth lower than or even with second so that mentum appears straight across median and first 2 pairs of lateral teeth

***M. dives* (Johannsen) and *M. geminata* Oliver & Dillon**
(larvae are basically inseparable; identify as "*Microspectra dives/geminata*")



Mentum with teeth more in an even arch
..... ****M. polita* (Malloch)**
(not known from Florida)



Notes on species

The larvae of *M. dives* (Johannsen) and *M. geminata* Oliver & Dillon are apparently inseparable. I've seen larvae from Holmes County in the FDEP collection. Until adults are collected or larvae of this type reared, it is unknown which species occur in Florida (it could be both). Unassociated larvae that key to the first part of couplet 5 should be identified as "*M. dives/geminata*". Both species are listed below, as are several other species known from the Southeast (under "Other species").

M. dives (Johannsen) - I've seen adults of this species from the Smoky Mountains in North Carolina; it is very similar to the more recently described *M. geminata*. It is quite possible that some records of *M. dives* in the literature may refer to *M. geminata*. See *M. geminata* below.

M. geminata Oliver & Dillon - Oliver & Dillon (1994b) described this species, which is very similar to *M. dives*. I have seen adults from North and South Carolina. The mentum width character used by Oliver & Dillon (1994b:204) to separate the larvae of *M. dives* and *M. geminata* (that of *M. dives* > 100 µm, of *M. geminata* < 95 µm) will not work, based on reared material of *M. geminata* I've examined from the Canadian National Collection in which the mentum widths of two larvae were 124 and 134 µm.

M. xantha (Roback) - This species is recorded for Florida by Oliver et al. (1990).

I have not seen any material of this species from Florida; the larva is undescribed. Anderson et al. (2013) redescribed this species and designated a neotype (holotype has been lost). The adult of *M. xantha* is most similar to *M. connexa* (Kieffer), and is also similar to *M. dives*, *polita* and *recurvata*.

M. sp. A Epler - Epler (2001) found this to be the most widespread and common species in the Southeast based on larval material available to him ranging from North Carolina to northern Florida; it is the only species found "with regularity" in Florida. Several species may be "lumped" into this taxon. Differences in the length of the spur on the antenna pedestal and the distance between the bases of the S 3 (clypeal) setae might be useful characters for separation, but in the material I've examined there were no clear cut boundaries between character states. Without associated pupae or adult males I am reluctant to assign "species" status to any of the "variants" assigned to this taxon. Steiner et al. (1982) keyed a species with a bulbous base on the second antennal segment (*M. sp. 5*, figs. 31 and 35); I've seen a similar specimen from North Carolina, as well as similarly deformed antennae on several other taxa, and consider it to be an aberrant *M. sp. A*.

M. sp. F Epler - Known from a series of larvae from a tributary to Turkey Creek below the Niceville landfill in Okaloosa County, Florida. The outer hump of the mandible is not as noticeable on earlier instar larvae.



aberrant second antennal segment of *M. sp. A*

Other species

M. polita (Malloch) - I have not seen any larvae, pupae or adults from the Southeast but adults are recorded from South Carolina (J.E. Sublette, pers. comm.). It was redescribed by Webb (1981) and Oliver & Dillon (1994b) but not in sufficient detail. Its placement in the key is based on reared material from New York. Other taxa in the Carolinas, *M. sp. E* and *M. sp. 4*, have a pupa similar to that of *M. polita*, but the adults are decidedly different. Another species, *M. nigripila* (Johannsen), may occur in the Southeast and will probably key to *M. polita* in the key above. Following Oliver & Dillon (1994b), the larva of *M. nigripila* has 14-22 bluntly rounded teeth on its labral lamella (*M. polita* has 24-31 narrower, more pointed teeth), the scales of its pecten epipharyngis have 3-5 teeth, with the middle one usually with 3 teeth (*M. polita* 4-7 teeth, with middle one usually with 4) and the median mental teeth are usually uniformly dark or with slightly lighter edges (*M. polita* with definite light medial area). However, Oliver & Dillon (1994b) did not describe the claws of the posterior parapod; I have not seen associated larval material of *M. nigripila* and thus do not know if the species will actually key with *M. polita* in the key above.

M. recurvata Goetghebuer - Listed for North and South Carolina by Oliver et al. (1990); I have not seen any southeastern material of this species; the larva is undescribed.

M. sp. B Epler - I've examined larvae of this taxon from North Carolina. The mandible has two small lateral humps, the first lateral teeth of the mentum are much smaller than the second lateral teeth and the apex of the second antennal segment is wider than the base.

M. sp. C Epler - I've seen larvae of this taxon from a seep in the Smoky Mountains in North Carolina. It is somewhat similar to *M. sp. B* but the mandible has only one lateral hump, the first lateral teeth of the mentum are not as small and the ratio of the length of the second antennal segment to the first is lower.

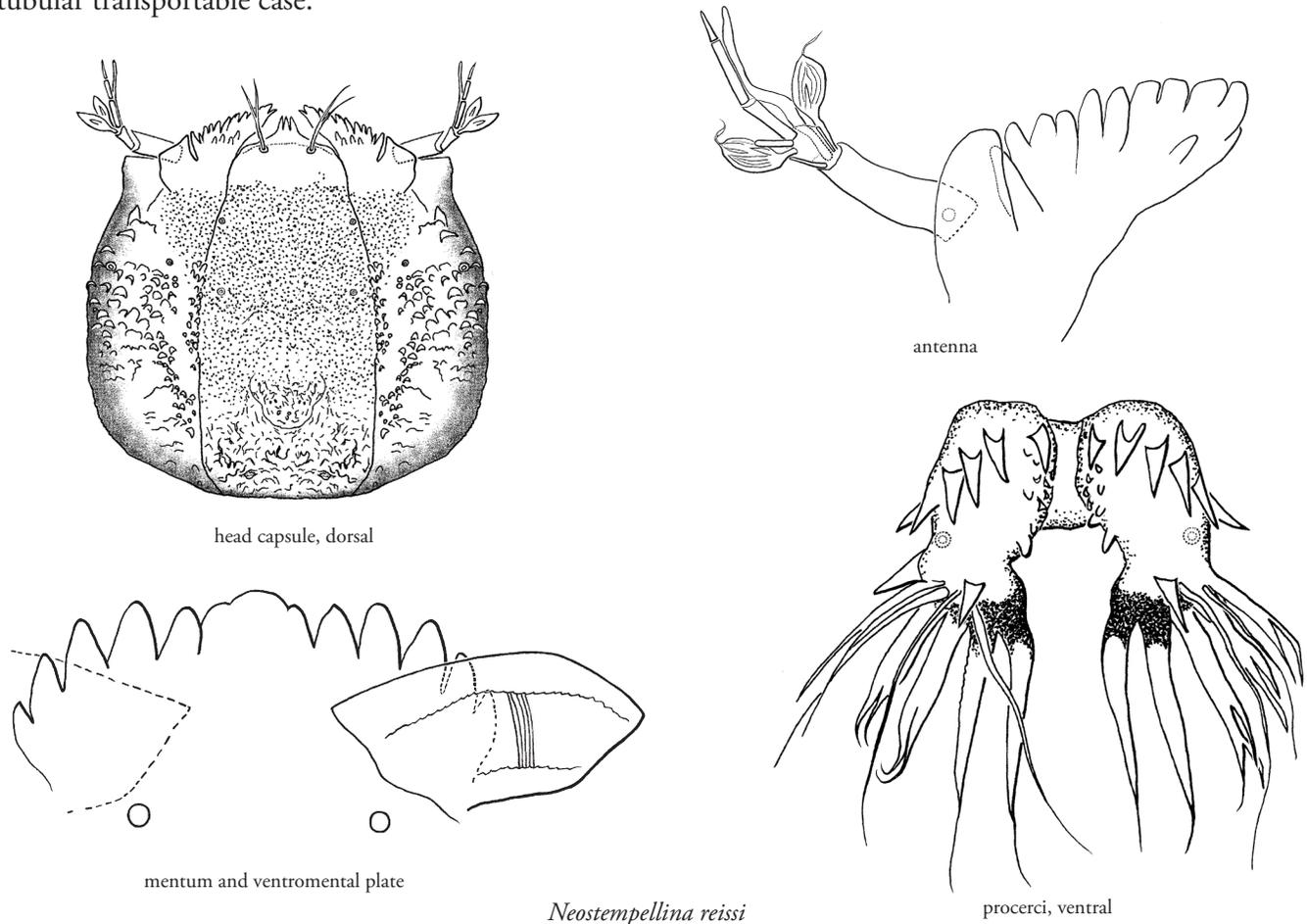
M. sp. E Epler - I've examined specimens (reared but in less than satisfactory condition) from a creek in South Carolina. The pupa has an abdominal spinule pattern similar to *M. polita*, but the adult and larva are quite different. The larva has a small hump on the outer margin of the mandible.

M. sp. 4 Epler - Known from adults and pupae from the Smoky Mountains in North Carolina; the pupa is similar to that of *M. polita*.

M. sp. 6 Epler - Known only from adults from the Smoky Mountains in North Carolina.

GENUS *Neostempellina* Reiss

DIAGNOSIS: Distinguished by the head capsule with numerous granulations and tubercles and/or spines; antennal pedestal with a broad spur and a larger multitoothed process; antennal segment 2 slightly wedge shaped, apically with a pair of Lauterborn organs on short pedicels; pecten epipharyngis of 3 apically serrated scales; bifid premandible; squat ventromental plates separated medially by at least the width of the 3 median mental teeth; proceri strongly sclerotized, with numerous spines and projections; and the curved, tapered, tubular transportable case.



NOTES: A single species, *Neostempellina reissi* Caldwell, is known from Florida, where it appears to be limited to the northern part of the state. This species was called “*Stempellina* sp. C” in Epler (2001). It was erroneously assigned to *Constempellina* in Epler (1995); see Epler (2001: 8.147) for lengthy discussion on taxonomy and nomenclature. Caldwell (2000) originally described the adult male of this species from Maine; Caldwell et al. (2010) described the adult female and immature stages.

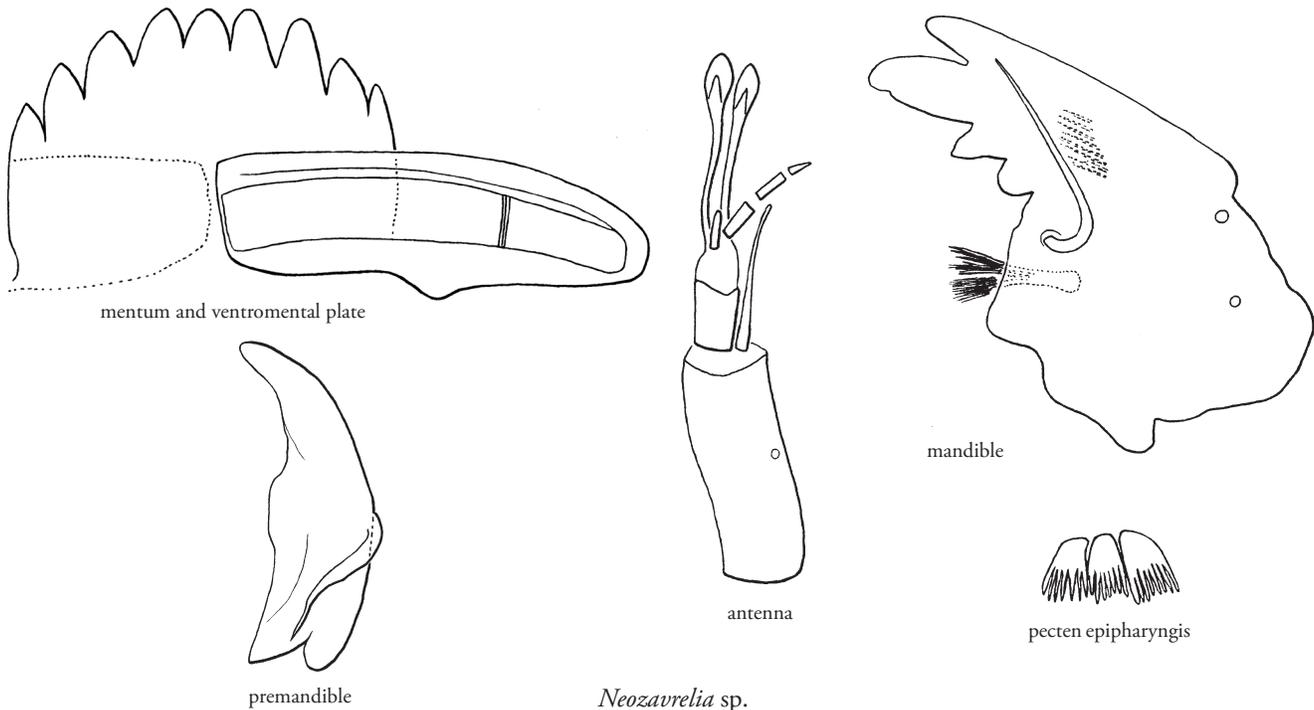
The antennal pedestal is complex, with a hatchet-shaped spur dorsally and an additional, moose-antler-like multispined process beneath it; the number of smaller spines on the dorsum of the process is variable. The proceri are also complex, with strongly sclerotized spines and filaments. The proceri of *Stempellina* cf. *subglabripennis* (Brundin) are somewhat similar, but the antennal pedestal of *S. cf. subglabripennis* has only a multispined process, and no spur.

Larvae are found in springs and spring runs, streams and rivers.

ADDITIONAL REFERENCES: Caldwell 2000; Caldwell et al. 2010

GENUS * *Neozavrelia* Goetghebuer

DIAGNOSIS: Distinguished by the antennal pedestal without an apical spur; antennal segment 2 slightly wedge-shaped, distal portion unsclerotized, with Lauterborn organs on moderately long, thick pedicels arising apically; pecten epipharyngis of 3 scales with numerous fine apical teeth; bifid premandible with small, pale lateral spine; mandible with 1 dorsal tooth and 2 inner teeth; mentum with 4-5 pairs of lateral teeth (5th pair, if present, minute and appressed to 4th); and wide, short ventromental plates that almost touch medially.



NOTES: *Neozavrelia* was first reported from the southeastern US by Caldwell et al. (1997) and was included in Epler (2001) based on unassociated larval material from Ohio and North Carolina, and a pupal exuviae from Georgia. Ekrem (2006) offered a checklist of *Neozavrelia* species of the world but included no records from North America; additionally, Gilka (2012), referencing only adult males, moved several Japanese species from *Cladotanytarsus* to *Neozavrelia*.

I've recently re-examined the larval material from Ohio and the pupal exuviae from Georgia, in addition to larvae from Alaska and West Virginia. These specimens all appear to represent *Neozavrelia* but differ from most described larvae in having a noticeable hump on the outer margin of the mandible. The figure of the mandible of *Neozavrelia optoputealis* Cranston, described from Australia (Cranston 1998), appears to show a smaller hump on the outer margin of the mandible.

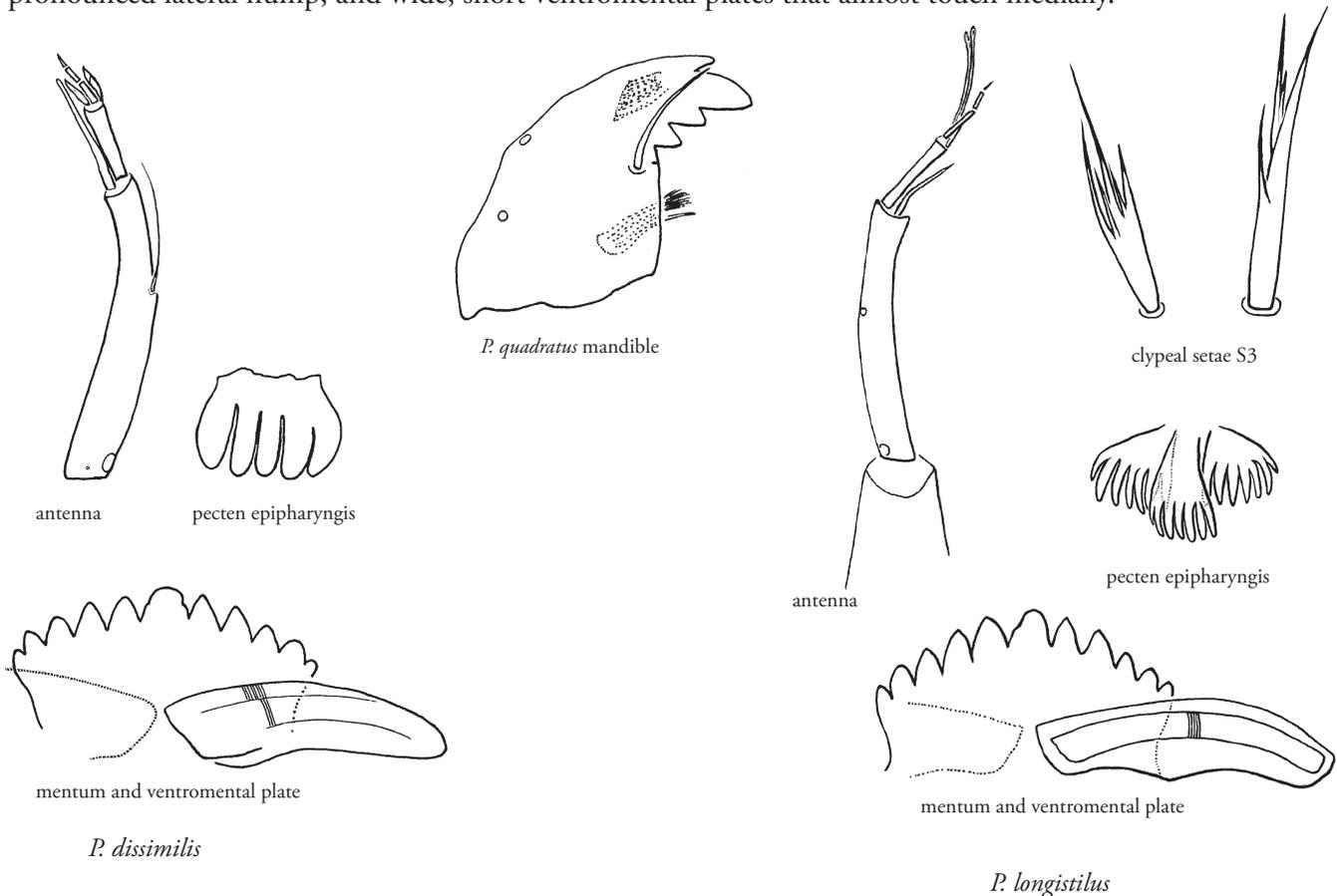
Some of the larvae from Ohio possess a mentum with a minute 5th lateral tooth that is appressed to the base of the 4th lateral tooth. The single larva from Alaska differs from the Ohio and West Virginia larvae in having a mentum with a very small 4th lateral tooth; it probably represents a different species, perhaps one of the several known from the western Palaearctic (see Ekrem 2006).

Neozavrelia has not been found in Florida, but the possibility exists that it could be found in the northern tier of counties and especially the Panhandle. Larvae are recorded from hygropetric habitats as well as streams, rivers and lakes.

ADDITIONAL REFERENCES: Cranston 1998; Ekrem 2006; Gilka 2012; Thienemann 1942.

GENUS *Paratanytarsus* Thienemann & Bause

DIAGNOSIS: Distinguished by the antennae with Lauterborn organs at the apex of segment 2 that are sessile or on pedicels that are at most no more than 2X length of antennal segments 3-5; pecten epipharyngis a 3-5 lobed plate, or of 3 distinct platelets with numerous apical teeth; bifid premandible; mandible without a pronounced lateral hump; and wide, short ventromental plates that almost touch medially.



NOTES: The taxonomy of Nearctic *Paratanytarsus* is less than desirable; an in-depth revision of the Nearctic taxa, utilizing all life stages, is much needed. Identifications of larvae must be confirmed with pupal or adult males stages; unfortunately there are no published keys for these life stages for the Nearctic *Paratanytarsus*. Sublette (1964) described the adults of two species (as *Tanytarsus*) found in Florida, *P. quadratus* and *P. recens* (see Notes on species). Reiss & Säwedal (1981) provided keys for Palearctic males and pupae of the genus, some of which *may* occur here.

Bolton et al. (2010) expanded the concept of *Paratanytarsus* with the inclusion of *P. longistilus*; the adults and larvae of this species differ from most described species in the genus (see Notes on species).

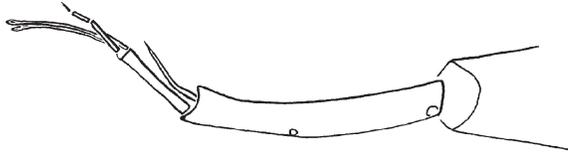
Larvae are found in a variety of aquatic habitats, including brackish water.

The following key must be regarded as extremely tentative; antennal segment measurements are not to be regarded as definitive and larvae should be associated with a pupa or adult male for identification.

ADDITIONAL REFERENCES: Bolton et al. 2010; Langton et al. 1988; Reiss & Säwedal 1981; Sublette 1964.

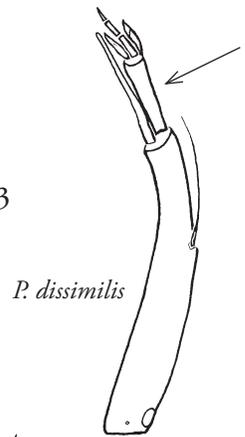
Key to *Paratanytarsus* larvae of Florida

- 1 Antenna with Lauterborn organs on moderately long pedicels; pecten epipharyngis consists of 3 distinct platelets with numerous apical teeth *P. longistilus* Bolton, Ekrem, Sublette & Sublette

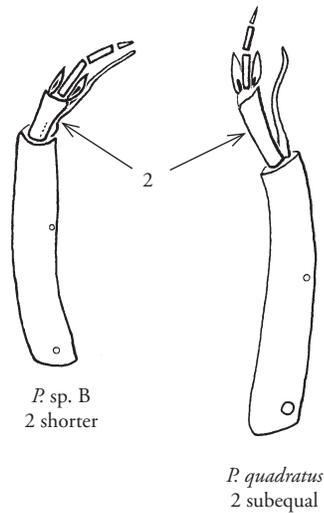


- 1' Lauterborn organs sessile at apex of antennal segment 2; pecten epipharyngis a 3-5 lobed plate 2

- 2(1') Second antennal segment longer than combined segments 3-5 3



- 2' Second antennal segment equal to or shorter than combined segments 3-5 4



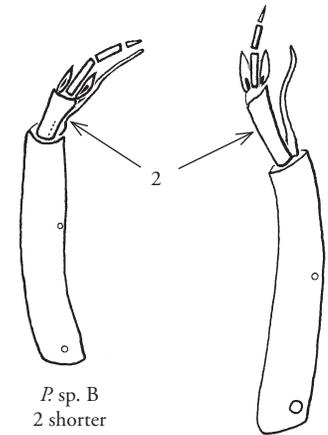
- 3(2) Pecten epipharyngis with 5 lobes *P. dissimilis* (Johannsen)



- 3' Pecten epipharyngis with 3 lobes * *P. sp. D* Epler
(not known from Florida; see Notes on species)



4(2') Second antennal segment shorter than combined segments 3-5 .. 5



4' Second antennal segment subequal to combined segments 3-5 ..
4 species key here, separable only by pupal characters 6

P. quadratus
2 subequal

5(4) First antennal segment less than 70 µm long ***P. sp. B* Epler**

Specimens must be 4th instar for accurate measurements. This couplet must be regarded as extremely tentative; these two taxa may be clinal variants of the same species. See Notes on species.

5' First antennal segment more than 100 µm long * ***P. laccophilus* (Edwards)**
 (not known from Florida)

The larvae of the following four taxa are apparently inseparable. However, if you have a late 4th instar larva with a developed pupa within, you may be able to key it below.

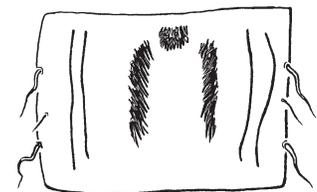
6(4') A well developed pupal thoracic horn present, covered with numerous fine chaetae ***P. quadratus* (Sublette)**



pupal thoracic horn of *P. quadratus*

6' Pupal thoracic horn absent, vestigial, or if present, not covered with numerous fine chaetae 7

7(6') Pupal abdominal tergite IV with longitudinal bands of spines; usually found in drinking water systems ***P. grimmii* (Schneider)**



P. grimmii

7' Pupal abdominal tergite IV without longitudinal bands; found in ponds 8

8(7') Pupal abdominal tergite II with a pair of ovoid spine patches; apex of wing sheath with small row of "pearls" * ***P. sp. E* Epler**
 (not known from Florida)



P. sp. E

8' Pupal abdominal tergite II without a pair of ovoid spine patches; wing sheath without pearl row ***P. recens* (Sublette)**

Notes on species

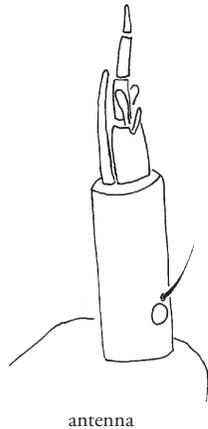
- P. dissimilis* (Johannsen) - A common species; in Epler (1995) this species was called "*P. sp. A*". I only identify larvae of this species as *P. dissimilis* if I have associated adult males (usually pharate males within pupae) in the same samples as the larvae. Adult males have microtrichia along the base of the digitus lacking in similar species of *Paratanytarsus*.
- P. dubius* (Malloch) - Known only as an adult from Florida, the larva is undescribed.
- P. grimmii* (Schneider) - Jacobsen (2008) reported this species from a small enriched ditch near Homestead in southern Florida. It is a parthenogenetic species (females only) that is sometimes a pest in drinking water supplies. The larva is apparently inseparable from those of *P. quadratus*, *P. recens* and *P. sp. E*. Given the lack of discriminatory larval and adult female characters, the pupa is the only stage of this species that can be identified to species! See Langton et al. (1988) for more information, including descriptions of all life stages, on this unusual species, found worldwide in drinking water systems.
- P. longistilus* Bolton, Ekrem, Sublette & Sublette - Epler (2001) provisionally placed this taxon in *Micropsectra* as "*M. sp. D*", and due to an obscured premandible, in *Tanytarsus* as "*T. sp. W*". Instead of the usual 3-5 lobed plate-like pecten epipharyngis and sessile or very short pediceled Lauterborn organs of most *Paratanytarsus* larvae, *P. longistilus* has a pecten epipharyngis of 3 separate platelets and moderately long pedicels on its Lauterborn organs.
- P. quadratus* - Epler (2001) pointed out that this species, originally described in *Tanytarsus* (Sublette 1964), belongs with *Paratanytarsus*. It was called "*P. sp. C*" in Epler (1995). A common species, at least in northern Florida, but it requires an association with its pupa for accurate identification. The larva is apparently inseparable from those of *P. grimmii*, *P. recens* and *P. sp. E*.
- P. recens* (Sublette) - Identification of this species was possible through a reared male from South Carolina and several pupae with pharate males from Walton County, Florida. As an adult, *P. recens* is very similar to *P. quadratus* and like it, was originally described in *Tanytarsus* (Sublette 1964). It also is very similar to *P. varelus* (Roback). Sublette (1964: 143) noted this similarity but stated that if Roback's (1957) "specimen is accurately figured this is a distinct new species". An examination of the type of Roback's *Calopsectra varela* will be necessary to solve this confusion; should they be the same species, Roback's name would have precedence. Note that Oliver et al. (1990) and Oliver & Dillon (1994a) failed to place *P. varelus* in *Paratanytarsus*, leaving it in *Tanytarsus*.
- P. sp. B* Epler - Known only as a larva. This may be the same species as *P. laccophilus* but without associated material identification is uncertain. Larvae of the two taxa are separable by antennal segment 1 lengths, but this may only be a clinal variation.
- P. sp. 2* Epler - An undescribed species known from a male I collected near the Chipola River in Florida Caverns State Park, Jackson County, Florida, and a pharate male pupa from the Suwannee River.

Other species

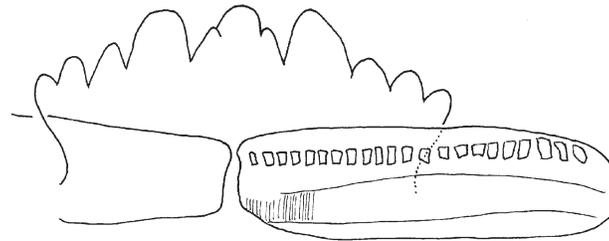
- P. laccophilus* (Edwards) - Not known from Florida, in the Southeast this taxon is known from a larval exuviae/pupal association from Lake Norman in North Carolina. Reared material (male and female) from Ohio, courtesy of Mike Bolton, appears to be the same as the North Carolina material. It may be the same as *P. sp. B*.
- P. sp. D* Epler - Known from a single larva from North Carolina that is similar to *P. dissimilis*, but has a 3 lobed pecten epipharyngis.
- P. sp. E* Epler - Known from a single reared female from a beaver pond in central Georgia. Larvae are inseparable from those of *P. grimmii*, *P. quadratus* and *P. recens*.

GENUS *Pontomyia* Edwards

DIAGNOSIS: Distinguished by the antennae mounted on a squat pedestal, with sessile Lauterborn organs at apex of segment 2; pecten epipharyngis of 3 distally serrated scales; premandible with more than 3 apical/sub-apical teeth; mentum with 4 pairs of lateral teeth; wide, short ventromental plates that almost touch medially; mandible with 3 inner teeth; some posterior parapod claws with outer teeth; and marine habitat.



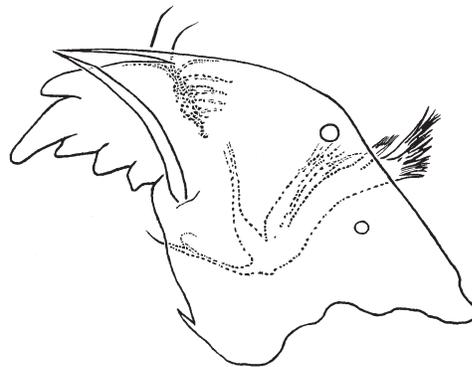
antenna



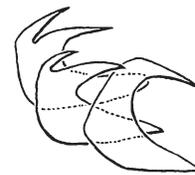
mentum and ventromental plate



premandible



mandible



posterior parapod claws

Pontomyia natans

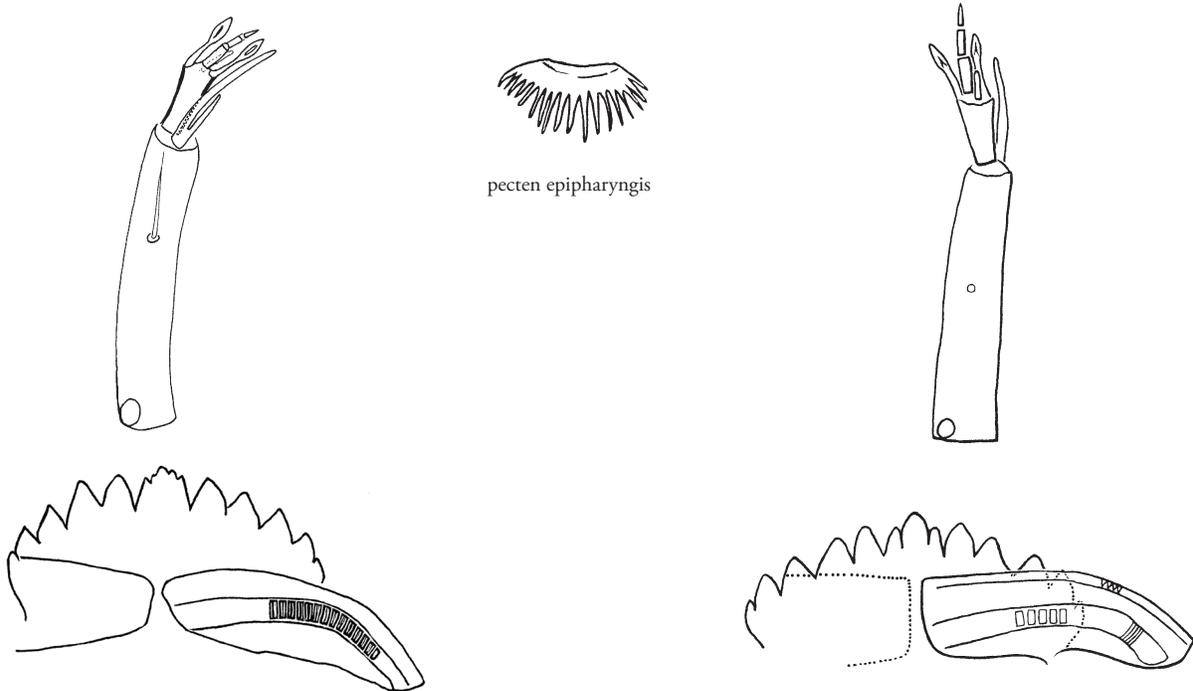
NOTES: Larvae of *Pontomyia* are truly marine insects, having been found in water 30 meters deep off Belize (Bretschko 1981) and in algae on the backs of the Hawksbill sea turtle (*Eretmochelys imbricata* (L.)) off Puerto Rico (Schärer & Epler 2007). In North America the genus is known only from Florida.

Recent molecular work (Huang et al. 2014) indicated that the species found in Florida and throughout the Caribbean is *P. natans* Edwards, which is a cosmopolitan species distributed throughout the Atlantic, Pacific and Indian Oceans.

ADDITIONAL REFERENCES: Bretschko 1981; Huang & Cheng 2011; Huang et al. 2014; Schärer & Epler 2007; Soong et al. 1999.

GENUS *Rheotanytarsus* Thienemann & Bause

DIAGNOSIS: Distinguished by the slightly wedge shaped antennal segment 2, apically bearing a pair of Lauterborn organs on short pedicels that are shorter than or subequal to the length of segments 3-5; single, broad, multitoothed pecten epipharyngis (may be incompletely trifid, but this not seen in Florida larvae); and wide, short ventromental plates that almost touch medially, with some striae appearing coarsely block-like.



R. exiguus group sp., antenna, mentum and ventromental plate

R. pellucidus, antenna, mentum and ventromental plate

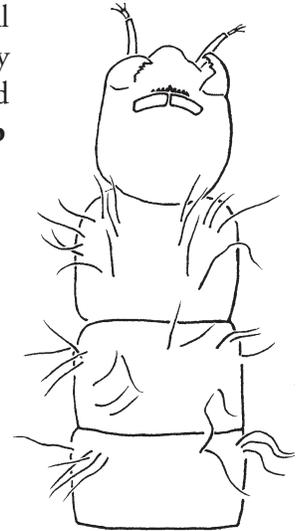
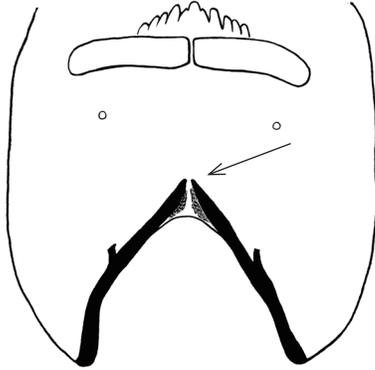
NOTES: *Rheotanytarsus* larvae may be very common and abundant, but are poorly known on the species level. In Florida, they may be divided into two taxa: the *R. exiguus* group, which contains many species, all undescribed except for *R. exiguus* (Johannsen), and the single species *R. pellucidus* (Walker). Although the genus was being revised by Rosina Kyerematen, nothing has been published on the Nearctic fauna except for information on *R. exiguus* and *R. pellucidus* provided in Kyerematen et al. (2000) and Kyerematen & Andersen (2002).

Rheotanytarsus larvae are usually found in streams and rivers, and are often associated with aquatic plant communities, where they build tubes on leaves and stems. Larvae may also be found in the littoral area of lakes, where wave action simulates flowing water conditions. Larvae attach their cases to a number of surfaces, including plants, rocks, boats and many kinds of aquatic animals. In Florida, they have been found on alligators (W.M. Beck, pers. comm), and I have found a tube on the barbel of a madtom catfish. They commonly attach their tubes to several insect species, such as odonate larvae (*Macromia*, *Neurocordulia*; I've seen a *R. exiguus* group larva on the leg of *Enallagama coecum* (Hagen)) and the megalopteran *Corydalus*. I have found *R. exiguus* group and *R. pellucidus* larvae on the same specimen of the snail *Viviparus georgianus* (Lea).

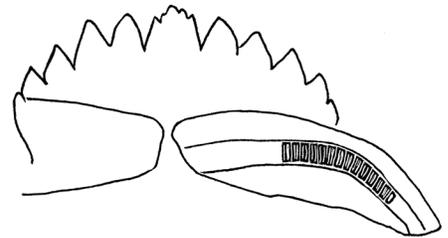
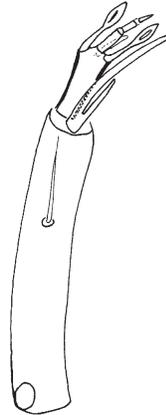
ADDITIONAL REFERENCES: Kyerematen et al. 2000; Kyerematen & Andersen 2002; Kullberg 1988.

Key to *Rheotanytarsus* larvae of Florida

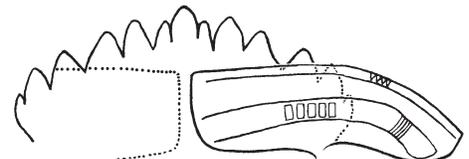
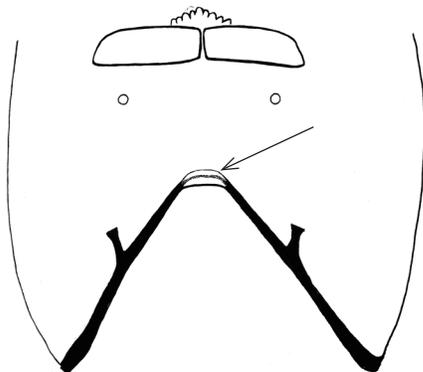
- 1 First 3 body segments with long dorsal setae; anterior portion of the postoccipital margin V-shaped; AR 2.0 or more; median tooth of mentum usually shallowly trifold; head capsule yellow-brown to pale brown; larval/pupal tube attached directly to substrate ***R. exiguus* (Johannsen) group**



AR = antennal ratio.
 Calculated by dividing the length of the basal segment by the length of the flagellum (the remaining antennal segments.)



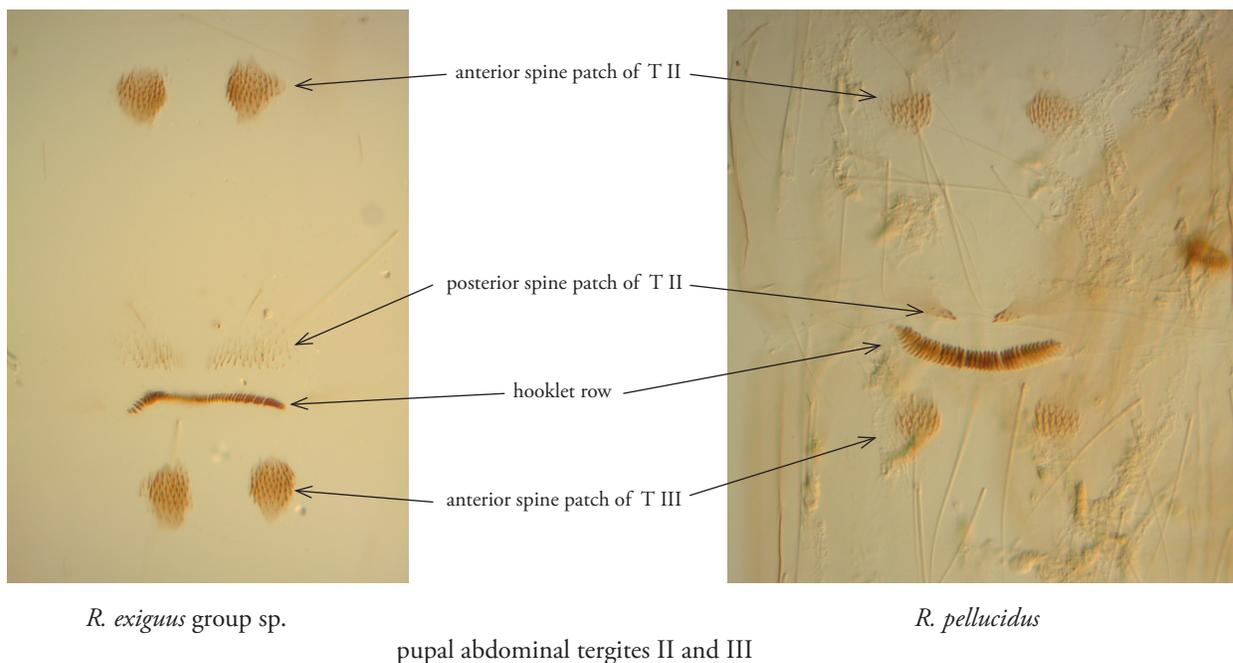
- 1' 3rd body segment with dorsal setae shorter than those on first 2 segments; anterior portion of the postoccipital margin rounded; AR < 2.0; median tooth of mentum deeply trifold; head capsule usually pale brown; larval/pupal tube attached to substrate with a long petiole ***R. pellucidus* (Walker)**



Notes on species

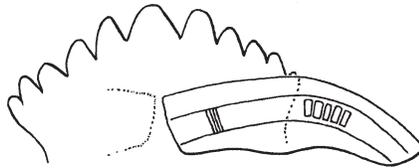
R. exiguus group - A species group, based on adult males, that consists of several species, most of which are undescribed, except for *R. exiguus* (Johannsen). None of these taxa are reliably separated as larvae (except perhaps *R. sp. A*; see below). The most common species of the group is the ubiquitous *R. exiguus*. Larvae of this group construct tubes that are attached to the substrate lengthwise along one side. Although the median tooth of the mentum is usually shallowly trifid, I have seen some larvae with a deeply trifid median tooth. Whether these represent a different species is unknown; without associated pupae and adults this will remain a good question! In fluid preserved specimens, the long dorsal setae on all three thoracic segments (first three body segments) of *R. exiguus* group species are usually easily seen. Other characters that may help separate *R. exiguus* group larvae from those of *R. pellucidus* are the V-shaped anterior portion of the postoccipital margin (thanks to Broughton Caldwell for pointing this out at my recent FAB Tanytarsini workshop), the smaller body size (see *R. pellucidus* below), wider ventromental plates in most *R. exiguus* (3-5 times broader than long; only about 2-3 times as broad as long in *R. pellucidus*); the lighter head capsule color of *R. exiguus* group members; and the longer Lauterborn organ petioles in *R. exiguus* group species, in which the organs extend past the apex of antennal segment 4; in most *R. pellucidus* larvae the organs do not extend beyond antennal segment 4 (observation of this depends on how flat the antennae are mounted). A good pupal character, observable on late 4th instar larvae with a well developed pupa within, is the presence of two small semi-triangular posteromedian groups of spinules on a darker background on tergite II of *R. pellucidus*; these groups point inward with larger spinules on their inner apices. In *R. exiguus* group pupae these groups of spinules are not triangular, are not on a darker background and do not have heavier spinules towards the center.

R. pellucidus (Walker) - This species was formerly known as *R. distinctissimus* (Brundin). Like the *R. exiguus* group, this is a ubiquitous species throughout the eastern US; both taxa often occur together in samples. Larvae are small, somewhat dark headed (but not as dark as *R. sp. A* below), and construct tubes that are attached to the substrate using a long petiole. The short setae on body (thoracic) segment 3 (shorter than those present on segments 1 and 2) will usually separate this taxon easily from the *R. exiguus* group and *R. sp. A*. Note also the more rounded anterior portion of the postoccipital margin. Mature larvae of *R. pellucidus* are considerably smaller than those of *R. exiguus* group members (length about 3 mm in *R. pellucidus*, over 4 mm in *R. exiguus* group).



Other species

- * *R. sp. A* - A taxon with a brown to dark reddish-brown head capsule, known from streams in North and South Carolina; not known from Florida. Note that it has an AR of < 2.0 and thus may key with *R. pellucidus* above but it has long dorsal setae on the first 3 body (thoracic) segments and the median tooth of the mentum is at most slightly notched. It is probably a member of the *R. exiguus* group, but without full rearings and a clear definition for this group in North America its placement remains uncertain. During preparation of this manual, specimens were not available for examination of the postoccipital margin, but this taxon should have one similar to that figured in the first part of couplet 1 for the *R. exiguus* group; all other members of the *R. exiguus* group that I've examined had a similar postoccipital margin. There may be two species included in *R. sp. A*. In the small sample available to Epler (2001), one larva had a longest seta on the first thoracic segment that was over 230 μm long; on the other specimens, longest setae ranged in length from 105-125 μm . Whether these taxa represent different species or just variants is unknown. All larvae available to Epler (2001) were not associated with larval tubes, so the manner in which the tubes were attached to a substrate is unknown.

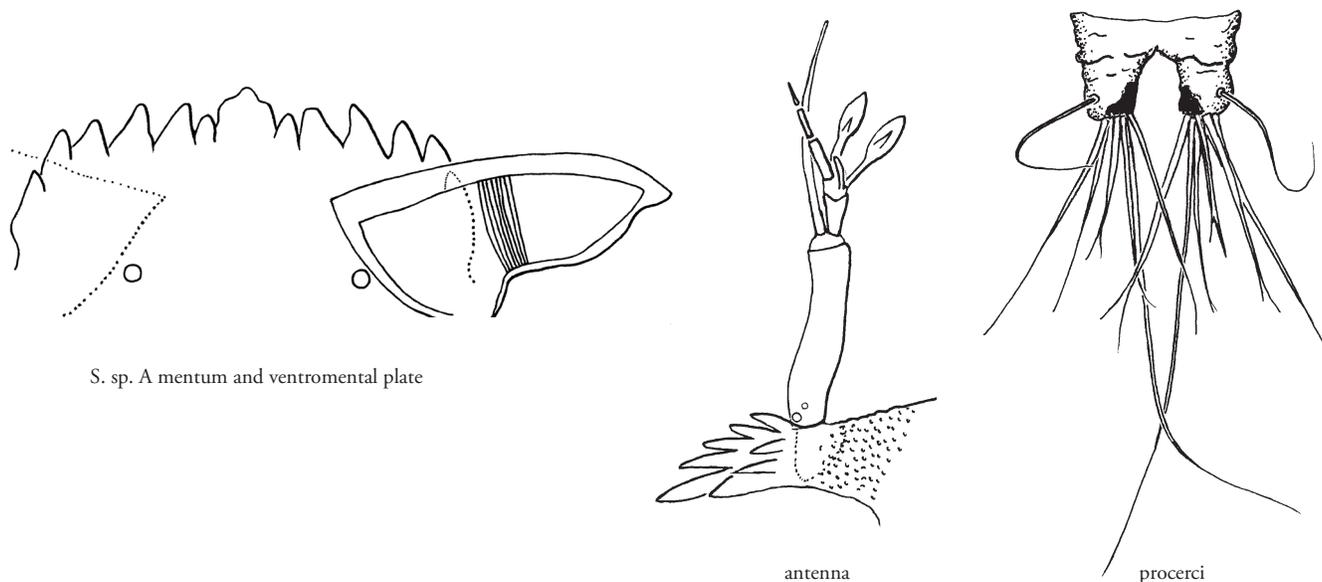


Rheotanytarsus sp. A



GENUS *Stempellina* Thienemann & Bause

DIAGNOSIS: Distinguished by the head capsule with numerous granulations and tubercles and/or spines; well developed palmate spur on the antennal pedicel, without an extra spur or tooth on pedicel; antennal segment 2 wedge-shaped, with both Lauterborn organs arising apically; bifid S 3 (clypeal) setae; pecten epi-pharyngis of 3 slender spines; premandible with 2-5 teeth; squat ventromental plates separated medially by at least the width of the 3 median mental teeth; proceri with sclerotized areas; and its portable tubular sand case.



S. sp. A mentum and ventromental plate

antenna

proceri

Stempellina sp. A

NOTES: Two species of *Stempellina*, at least one apparently undescribed, are known from Florida. Note that the taxon referred to as “*Stempellina* sp. C” in Epler (2001) is now called *Neostempellina reissi* Caldwell; see Epler (2001: 8.147) and Caldwell et al. (2010) for discussion on its taxonomy and nomenclature. A third *Stempellina* species, also apparently undescribed, is known from the Carolinas and may eventually be found in the northern part of Florida. Additional species occur in the eastern Nearctic.

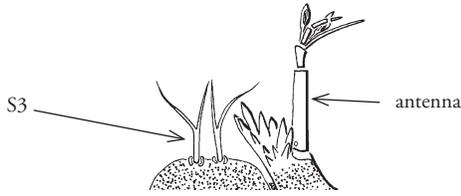
Although Webb (1969) included 3 species of *Stempellina* only one, *S. rodesta* Webb, is a *Stempellina*. “*Stempellina*” *leptocelloides* Webb belongs with *Stempellinella*; “*Stempellina*” *ranota* Webb is a *Constempellina*. Caldwell et al. (1997) listed 3 described species of *Stempellina* for the southeastern US. Of those, the taxon called *S. cf. subglabripennis* (Brundin) here, may be their *S. subglabripennis*; adult males are necessary for species confirmation. Another of the species listed by Caldwell et al. (1997), *S. almi* Brundin, may be exclusively Palaearctic and may not occur here - or could be one of the letter-designated species here or in Bolton (2012)!

Stempellina larvae live in tubular, tapered portable cases similar to those of *Constempellina*, *Neostempellina* and Tanytarsini genus A, and are reportedly lotic and lentic (Hudson et al. 1990); material I’ve seen came only from streams and rivers.

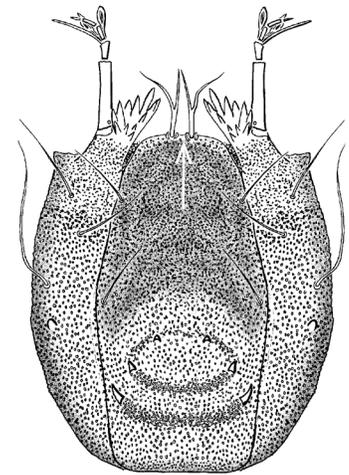
ADDITIONAL REFERENCES: Brundin 1948; Gilka 2005; Webb 1969.

Key to *Stempellina* larvae of Florida

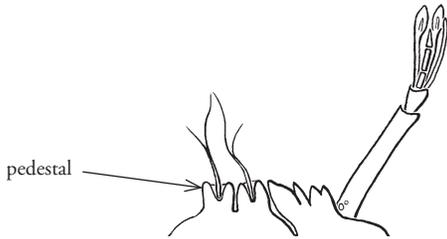
- 1 Frontoclypeal setae (S3) not arising from elongate pedestals
 **S. sp. A Epler**



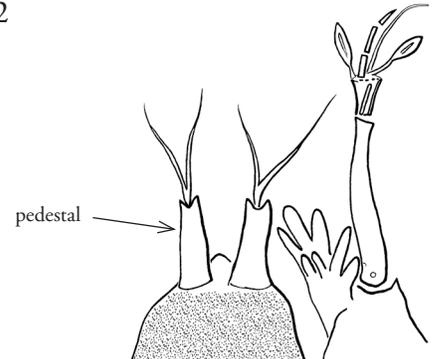
S. sp. A



- 1' Frontoclypeal setae (S3) arising from elongate pedestals 2

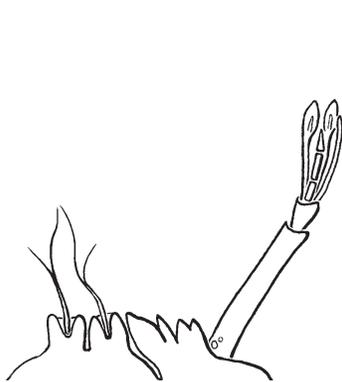


S. sp. B

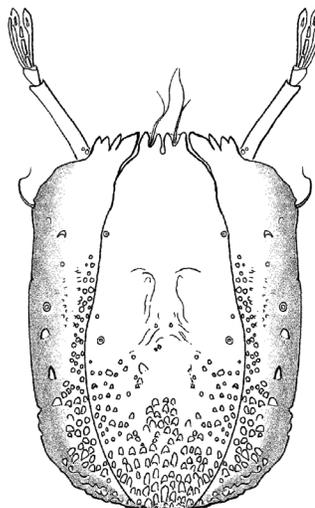


- 2(1') Pedicels of S3 extremely elongate; posterior portion of frontoclypeus with a pair of spines **S. cf. subglabripennis (Brundin)**

- 2' Pedicels of S3 not as elongate; posterior portion of frontoclypeus with numerous rounded tubercles, but no spines ***S. sp. B Epler**
 (not known from Florida, but may occur in northern counties/Panhandle)



S. sp. B



frontoclypeus and antenna of
S. cf. subglabripennis

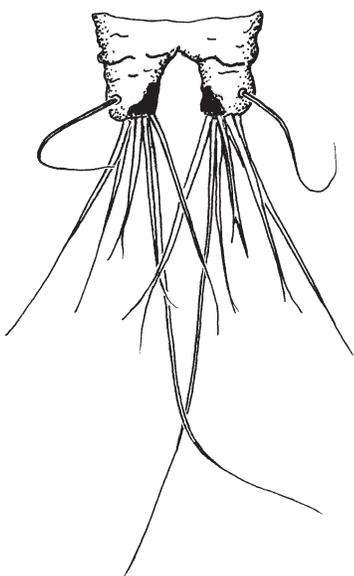
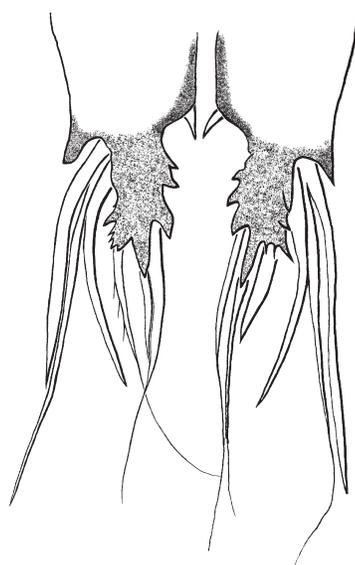
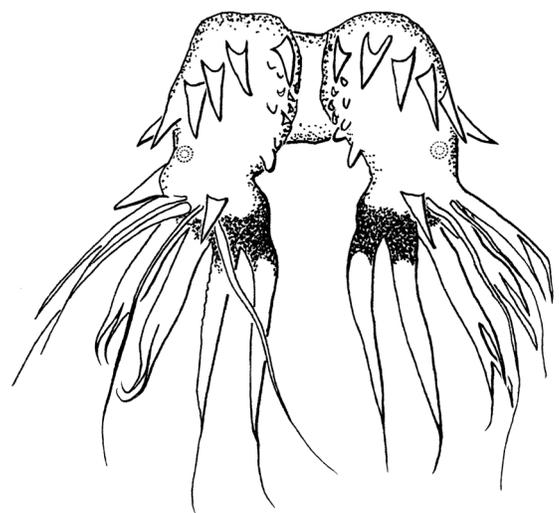
spine

Notes on species

- S. cf. subglabripennis* (Brundin) - In Florida known only from the western Panhandle. The extremely long S3 pedestals and unusual procerci are characteristic. These appear similar to those illustrated for *S. subglabripennis* (Brundin) by Brundin (1948: figs. 6, 19). Also distinctive is the single pair of spines on the posterior portion of the frontoclypeus. This taxon is the same as the larva keyed as *S. poss. subglabripennis* (Brundin) by Bolton (2012) (I've examined Bolton's material). Adult males are necessary for confirmation of the species. The procerci of *S. cf. subglabripennis* are complex and somewhat similar to those of *Neostempellina reissi*, but differ in being less spiny and having a large multitoothed process ventrally (see below).
- S. sp. A* Epler - The most common *Stempellina* in the state, found from the Panhandle to at least as far south as the Peace River drainage. The S3 setae are not on long pedestals; the posterior portion of the frontoclypeus bears at least 2 pairs of darker, larger spines. I have larval/pupal/adult male associations of this species. Although the male is somewhat similar to *S. almi* Brundin and *S. rodesta* Webb, and may be the source of the records for those species in Caldwell et al. (1997), it appears to be undescribed. It is similar to *S. tervolae* Gılka, a Fennoscandian species, in having spinulae between the crests of the anal point. The larva is similar to that of *S. sp. 2* Bolton (Bolton 2012), but differs in having 2-3 pairs of spines posteriorly on the frontoclypeus; *S. sp. 2* has one pair of larger spines; adult male genitalia are also different. The larva is also somewhat similar to that of *S. johansenii* Thienemann & Bause as keyed by Bolton (2012), but lacks the large tubercles on the side of the head.

Other species

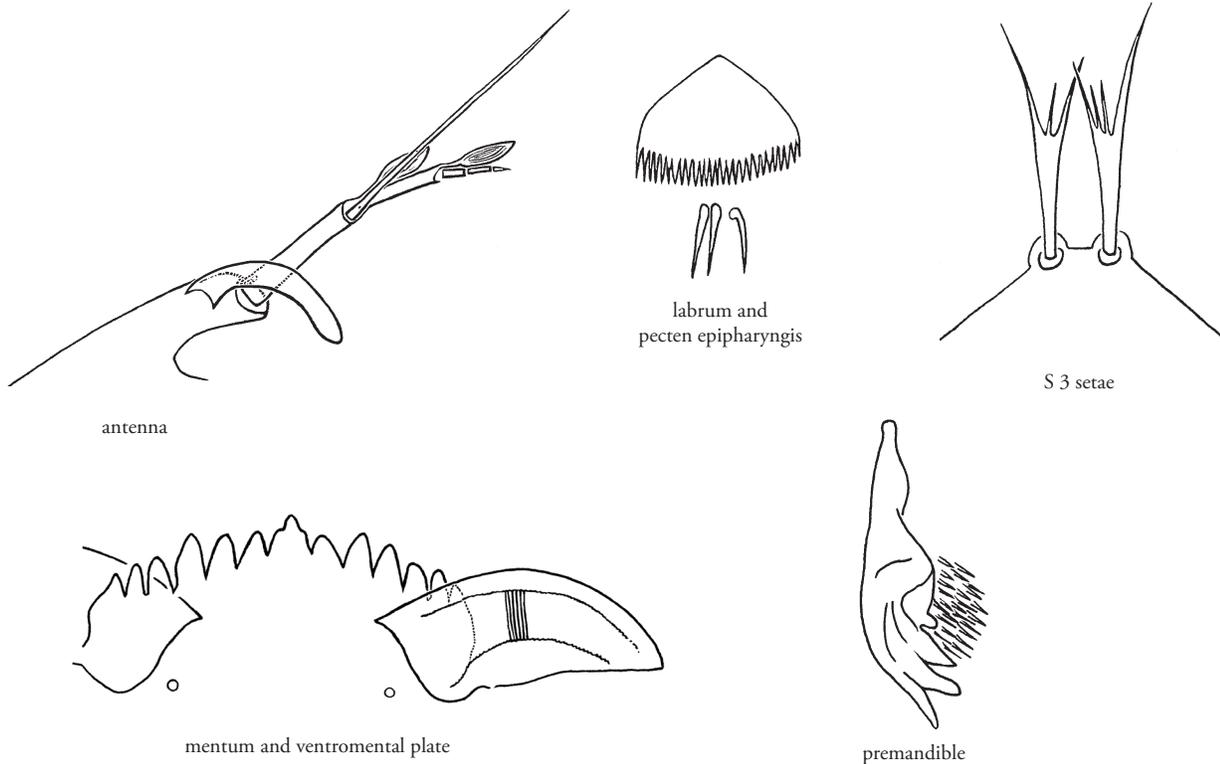
- S. sp. B* Epler - This taxon is not known from Florida; I've only seen material from North Carolina. There is a slight chance that it may turn up in the northern portion of Florida. Like *S. cf. subglabripennis*, this species has large pedestals from which the S3 setae arise, but they are not as long as those of *S. cf. subglabripennis*; it also lacks the pair of spines on the posterior portion of the frontoclypeus and the ventral multitoothed process on the procerci present on *S. cf. subglabripennis*. The procerci of *S. sp. B* are similar to those of *S. sp. A*.

*Stempellina* sp. A, dorsal*Stempellina cf. subglabripennis*, ventral*Neostempellina reissi*, ventral

procerci

GENUS *Stempellinella* Brundin

DIAGNOSIS: Distinguished by the well developed spur on the antennal pedicel; 5 segmented antennae with one set of Lauterborn organs arising apically, the other from near the base of segment 2; simple or apically divided S 3 (clypeal) setae; pecten epipharyngis of 3 slender spines; premandible with 3-4 teeth; squat ventromental plates separated medially by at least the width of the 3 median mental teeth; divided or entire (1 species) postoccipital plate; and its portable, straight-sided sand case.



Stempellinella fimbriata Ekrem

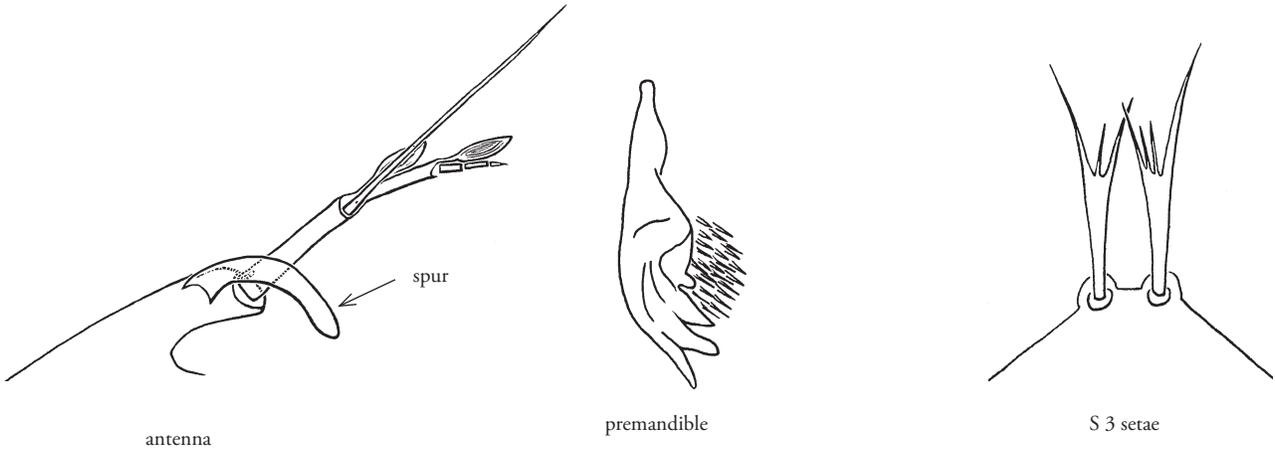
NOTES: *Stempellinella* was recently revised by Ekrem (2007) and the three taxa that were keyed in Epler (2001) now have available names; two species are known from Florida. The genus is very similar to *Zavrelia* but two of the southeastern US species can be separated from that genus by the divided postoccipital margin (complete in *Zavrelia*).

Stempellinella larvae are found in springs, streams and rivers; they have also been recorded from lakes. Larvae construct transportable tubular cases made of sand, silt and detritus.

ADDITIONAL REFERENCES: Ekrem 2007; Webb 1969.

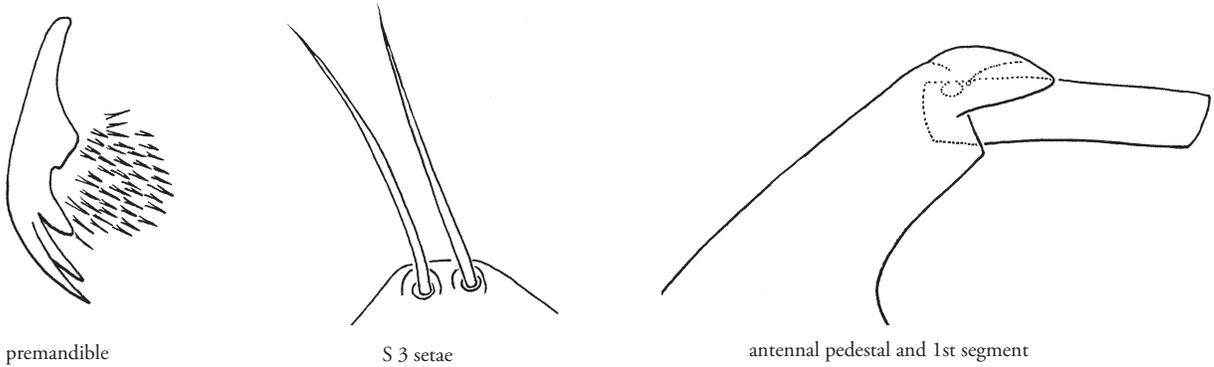
Key to *Stempellinella* larvae of Florida

- 1 Antennal pedestal with long, curved blunt spur; premandible with 4 apical/subapical teeth; S 3 (clypeal) setae apically divided; postoccipital plate split ***S. fimbriata* Ekrem**

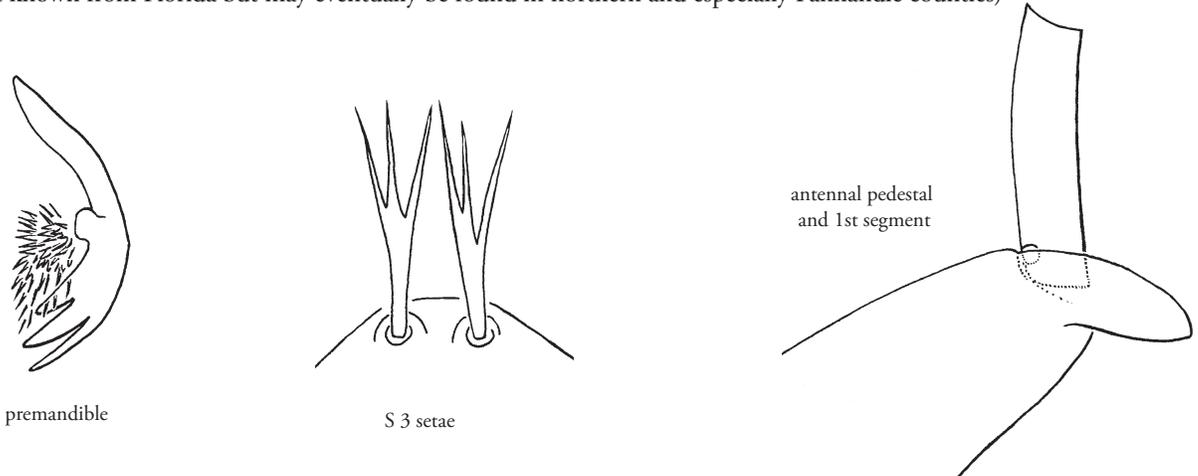


- 1' Spur of pedestal not as long; premandible with 3 apical/subapical teeth; S 3 setae simple or divided (see figs. below); postoccipital plate split or entire 2

- 2(1') S 3 setae simple; spur on antennal pedestal shorter; postoccipital plate entire ***S. leptocelloides* (Webb)**



- 2' S 3 apically divided; spur on antennal pedestal longer; postoccipital plate split * ***S. boltoni* Ekrem**
(not known from Florida but may eventually be found in northern and especially Panhandle counties)

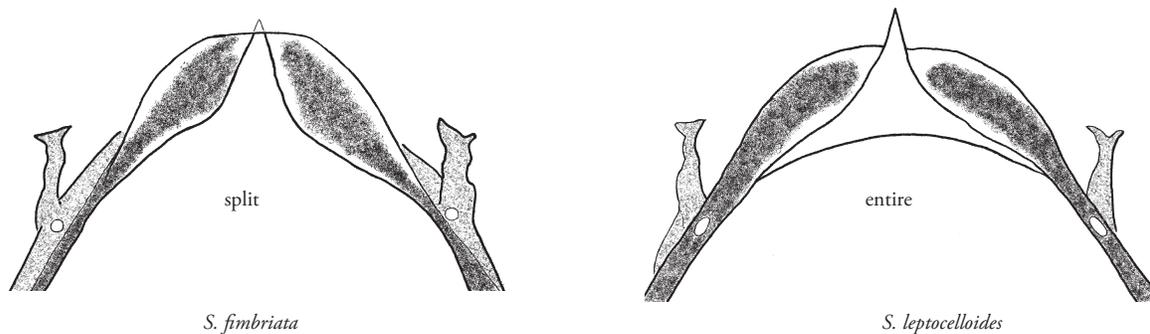


Notes on species

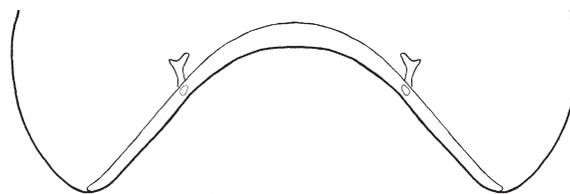
- S. fimbriata* Ekrem - Formerly (Epler 2001) called “*Stempellinella* sp. A”, this is the most common species of *Stempellinella* in Florida. A widespread species, found as far north as Juneau, Alaska and Churchill, Manitoba, Canada, south to southern Florida.
- S. leptocelloides* (Webb) - Following Ekrem’s (2007) excellent revision of the genus, my tentative identification of this taxon as “*S. cf. leptocelloides*” in Epler (2001) was confirmed. Another widespread species, found from British Columbia, Canada, to southern Florida. The postoccipital plate (a shelf-like extension of the median portion of the ventral postoccipital border) is entire in this species, but its premandible bears only 3 teeth, separating it from *Zavrelia* species.

Other species

- S. boltoni* Ekrem - This species was called “*Stempellinella* sp. B” in Epler (2001). It has not been found in Florida, but may eventually turn up in the northern tier of counties and/or the Panhandle. Described from Ohio (Ekrem 2007), I’ve seen material from Ohio, North Carolina, Pennsylvania and Virginia.
- S. sublettorum* Ekrem - I have a single male from Great Smoky Mountains National Park in Tennessee; the immature stages of this species are unknown. This is the first record for this species outside of its type locality in New Brunswick, Canada. It probably does not occur in Florida.



Stempellinella postoccipital plates



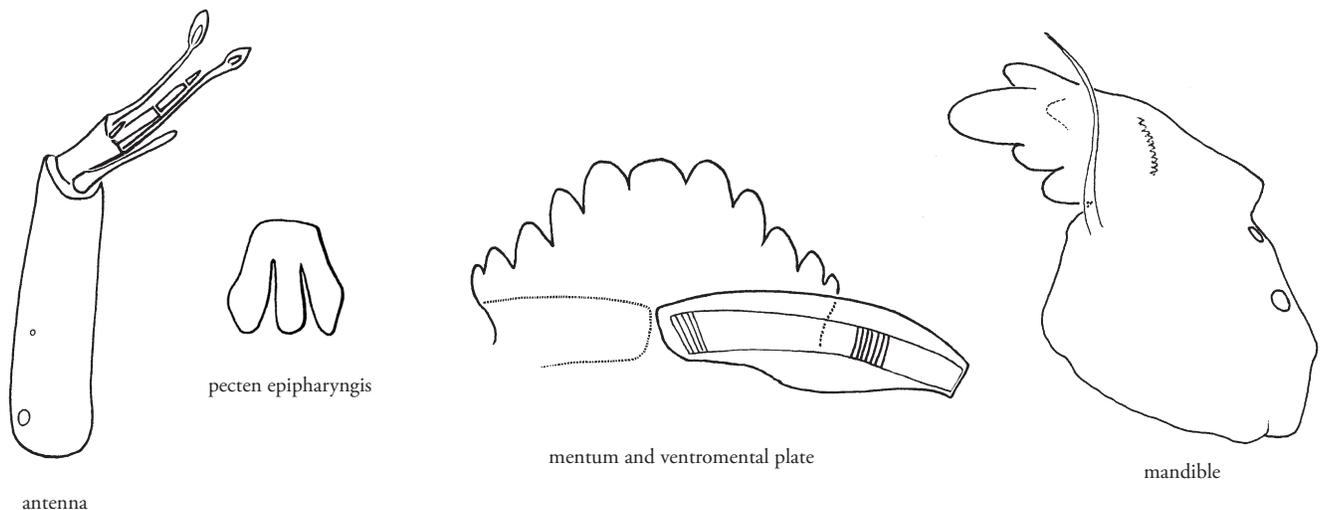
Zavrelia postoccipital margin

Postoccipital plate/margin

The ventral margin of the postocciput may bear a thin plate-like extension that Ekrem et al. (2003) had termed the “postoccipital plate”. It has provided an additional character for species separation in *Tanytarsus* and is also useful in separating some *Stempellinella* from *Zavrelia*. It can be quite difficult to discern in some *S. leptocelloides* specimens, leading one to think the plate is split. Always check the number of teeth on the premandible!

GENUS *Sublettea* Roback

DIAGNOSIS: Distinguished by the antennae with second segment well sclerotized, wider apically than basally, with apical Lauterborn organs on moderately long pedicels; pecten epipharyngis with 3 distal lobes; bifid premandible; mentum with 11 teeth, with 3 central teeth projecting anteriorly; wide, short ventromental plates that almost touch medially; mandible with 2 inner teeth and 2 dorsal teeth, with a pronounced hump on outer margin; and with simple posterior parapod claws.



NOTES: One species, *Sublettea coffmani* (Roback), is described from the Nearctic; the genus is also known from the Neotropical and Oriental regions. In Florida, *Sublettea* is known from larval specimens collected in Gadsden County, but without adult males species level identification can not be certain.

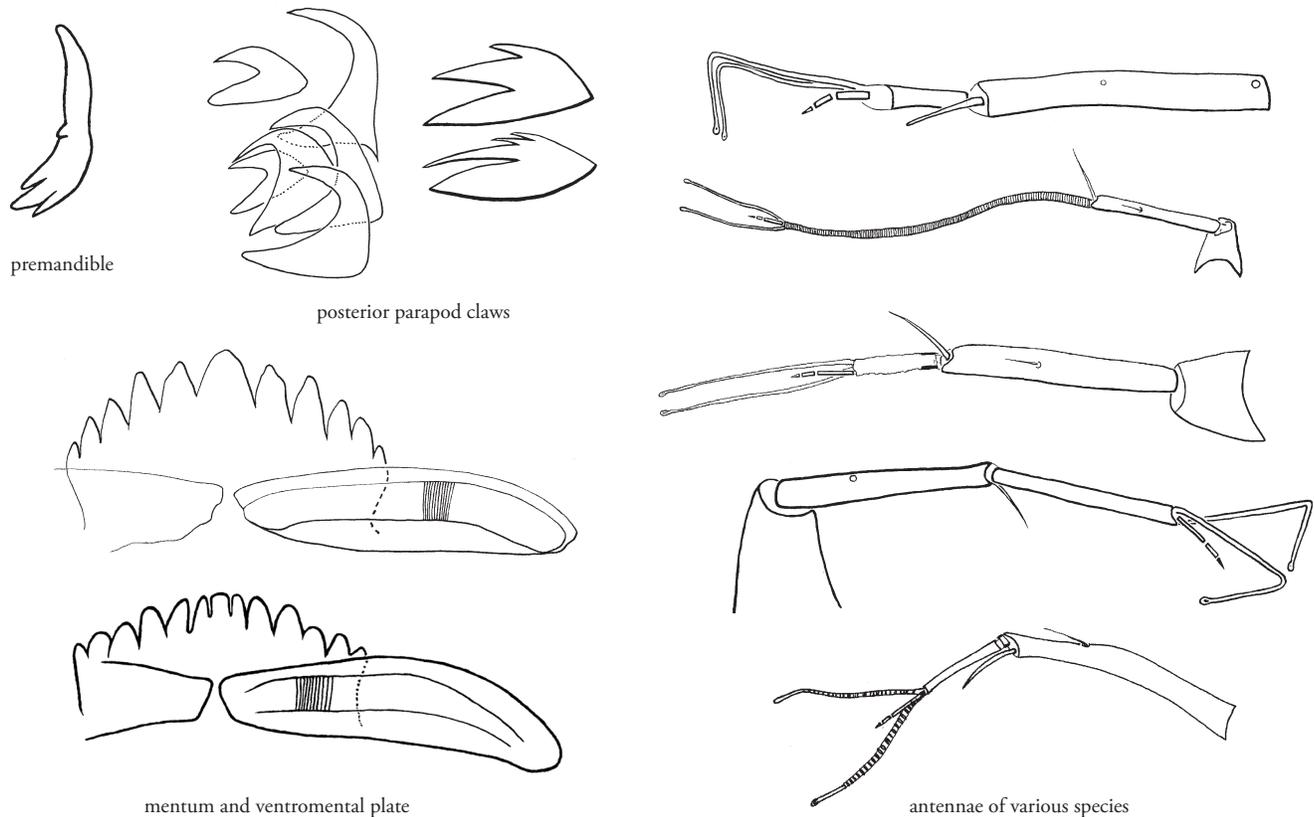
Sublettea may be mistaken for the taxon called *Neozavrelia* in this manual, but that taxon has a pecten epipharyngis consisting of 3 distally serrated plates, 9 teeth on the mentum and only one dorsal tooth on the mandible. The pecten epipharyngis and lack of an outer mandibular hump will separate *Rheotanytarsus* larvae from those of *Sublettea*.

In material from Pennsylvania, North Carolina and Florida that I've examined, the thickness of the pedicels of the Lauterborn organs varies from thick to, less commonly, thin. It is unknown whether this is genetic, environmental or an artifact of mounting or mounting media. There is also variation in how far the pedicels extend, with some extending past the apex of the antennal flagellum as figured above.

ADDITIONAL REFERENCES: Roback 1975.

GENUS *Tanytarsus* van der Wulp

DIAGNOSIS: Distinguished by the pecten epipharyngis of 3 distally serrated scales; premandible with 3-5 apical/subapical teeth; wide, short ventromental plates that almost touch medially; and claws of posterior parapods simple or with a few spines on outer margin



NOTES: A very speciose and common genus, *Tanytarsus* larval species-level identification has dwelt in limbo until recent work, especially that of Ekrem et al. (2003), and the availability of recently associated material, has made it possible to put “real” names on many species. Species-level identification for many species is still very difficult, or impossible, without associated pupae and adult males; one may still have to rely on letter-designated group names (“*T. sp. L complex*”; “*T. sp. G complex*”) for identifications. Note that these species groups based on larval characters may not be congruent with groups, such as the *T. confusus* aggregate of Ekrem et al. (2003), that are based on pupal or adult characters.

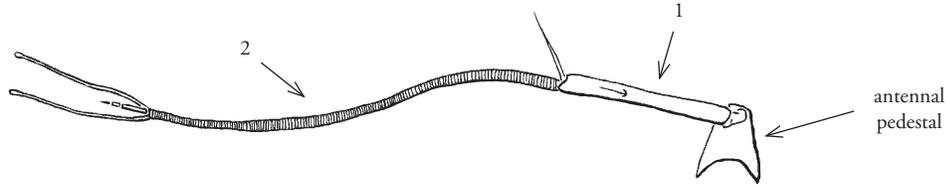
Tanytarsus larvae are found in a variety of aquatic habitats, from phytotelmata, spring runs, streams, rivers, ponds, lakes, and even brackish/salt water. They can be found in areas of poorer water quality (*T. limneticus* and members of the *T. sp. G complex*) as well as “healthy” water bodies.

ADDITIONAL REFERENCES: Ekrem et al. 2003; Reiss 1972; Sanseverino 2005; Sanseverino et al. 2010; Spies 1998; Sublette 1964; Sublette & Sasa 1994.

Key to *Tanytarsus* larvae of Florida

It can not be stressed enough – use extreme caution in utilizing this key and placing species names on your specimens. There are far too few completely associated specimens of many of these species to construct a fool-proof key. There may be overlap in some measurement ranges that may become apparent when more larvae are reared to pupae and adult males, which may render portions of the key unreliable. **The key is based on 4th instar larvae**; earlier instars may differ. If at all possible, utilize pharate pupae (larvae with developing pupae within), and associated pupae and adult males ... and be sure to read “Notes on species”.

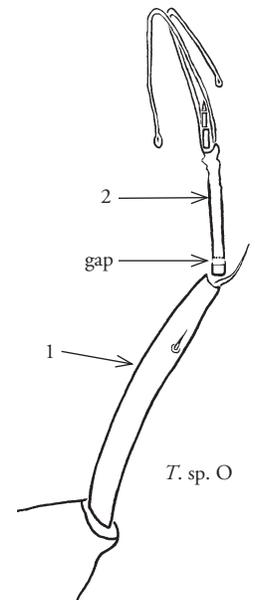
1 Antennal segment 2 long and annulated ***T. sp. F* Epler**



1' Antennal segment 2 not long and annulated (although pedicels of Lauterborn organs may be annulated) 2

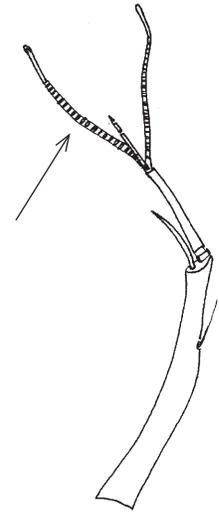
2(1') Antennal segment 2 with a narrow ring near its base separated from remainder of segment by a narrow unsclerotized area 3

2' Antennal segment 2 with base solidly sclerotized, OR most of segment 2 weakly sclerotized, or sclerotized only near base, but never with ring as above 5

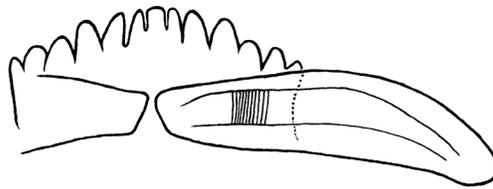


3(2') Pedicels of Lauterborn organs annulated ***T. limneticus* Sublette**

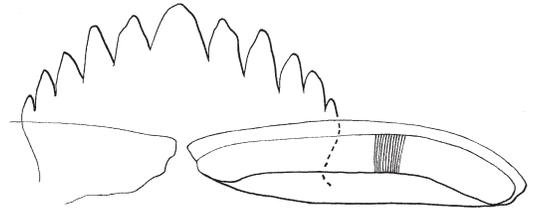
3' Pedicels of Lauterborn organs not annulated 4



- 4(3') Median tooth of mentum deeply trifid; clypeal setae S3 thick, bifid or divided, almost coarsely serrate in some, arising from a small tubercle
 **T. sp. O Epler**

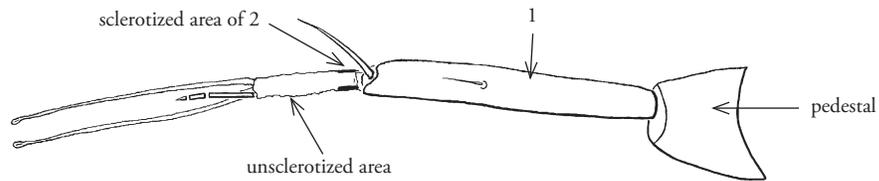


- 4' Median tooth of mentum simple; S3 setae thin, simple, not arising from small tubercle **T. sp. B Epler**



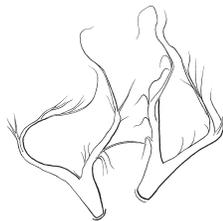
Because of the variability of sclerotization, some taxa may key either way in the following couplet

- 5(2') Antennal segment 2 mostly unsclerotized, or with a small section near the base (usually less than 50% of length of segment) weakly sclerotized 6

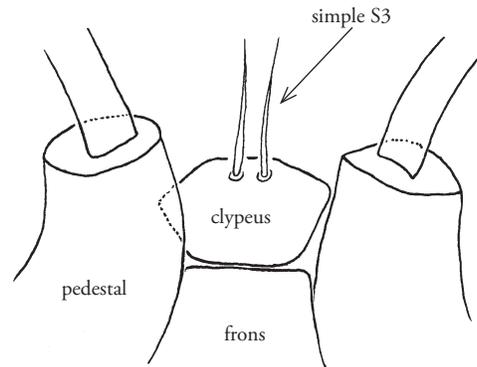


- 5' Antennal segment 2 for the most part (at least 60%) well sclerotized 15

- 6(5) Clypeal setae S3 plumose, bifid/plumose, or coarsely branched, or trifid/bifid 7

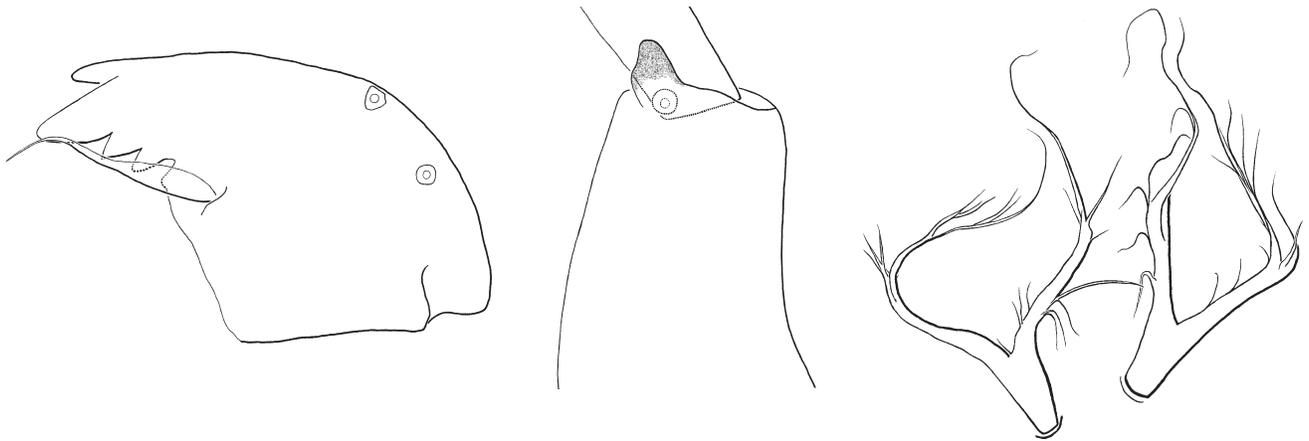


various types of non-simple S3 setae



- 6' Clypeal setae S3 simple, at most with a few fine lateral "hairs" 11

7(5') Mandible with 2 free inner teeth (a proximal 3rd inner tooth may be partially separated in some specimens); antennal pedestal with dark (usually), rounded spur apically; S3 setae deeply bifid, with each branch secondarily split into numerous "twigs" **T. sp. delta Epler**



7' Mandible with 3 free inner teeth; antennal pedestal without rounded spur apically (may be pointed, but without definite spur); S3 plumose, or coarsely branched, or deeply bifid, or with numerous apical divisions (see figures below) 8

8(7') S3 setae deeply or shallowly bifid, plumose or finely dissected apically **T. sepp Ekrem, Sublette & Sublette** (= *T. sp. A* Epler)
[see also *T. sp. alpha* Epler]



8' S3 setae more coarsely branched, or bifid (and not plumose apically), or with numerous apical divisions (figs. below) 9

9(8') S3 setae deeply bifid, with each branch secondarily split into numerous "twigs" **T. sp. alpha Epler**



9' S3 setae with 3 to numerous apical divisions, not as above 10

10(9') S3 setae deeply divided almost to base, usually appear somewhat cylindrical **T. messersmithi Ekrem, Sublette & Sublette**
(= *T. sp. Y* Epler)



10' S3 setae not as deeply divided, may appear flattened
***T. gibbus* Ekrem, Sublette & Sublette** (= *T. sp.* S Epler)

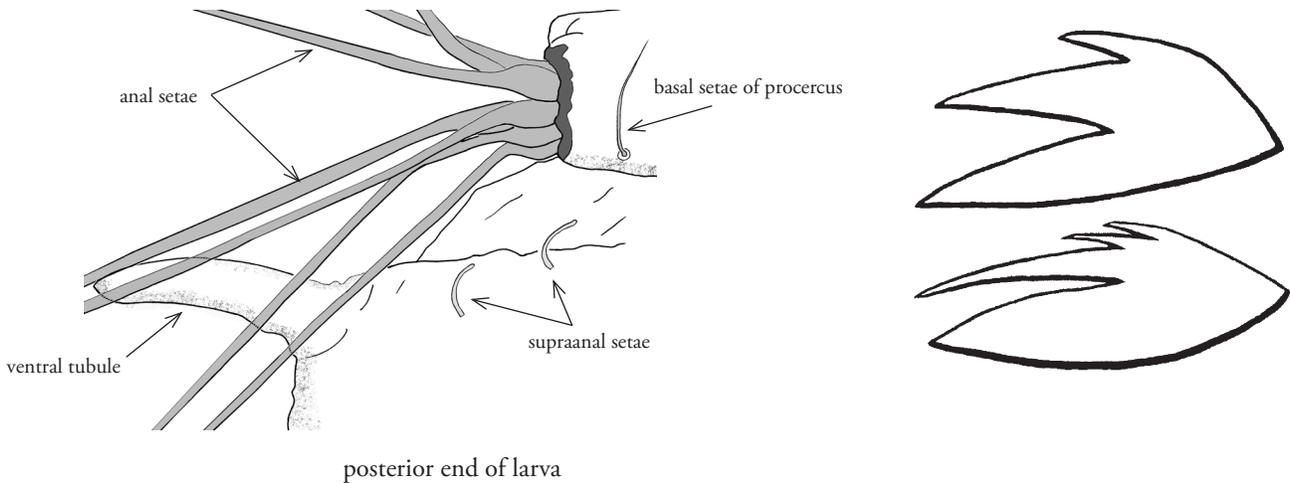


11(6') Mandible with 2 inner teeth ***T. sp. V* Epler**

11' Mandible with 3 inner teeth 12

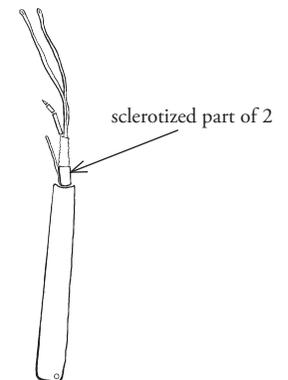
The following taxa (couplets 12-14) will key to my “old” *T. sp. L*. Please proceed with caution because these taxa may only be identifiable with complete associations of larva, pupa and adult male. It may be best to stop here and call your specimen “*Tanytarsus sp. L* Epler complex”. Note that because these larvae key together, it does not imply that they are closely related.

12(11') Supraanal setae minute (15-20 μm) but stout, with blunt/rounded apex (may require 1000X to observe; do not confuse supraanal setae with basal seta of procercus); one or more claws on posterior parapod sometimes with outer accessory spine(s) ***T. sp. L* Epler** (this is the original *T. sp. L*)



12' Supraanal setae much longer and larger; claws on posterior parapods without outer accessory spines; 13

13(12') Less than 50% of antennal segment 2 well sclerotized
 ***T. acifer* Ekrem, Sublette & Sublette**

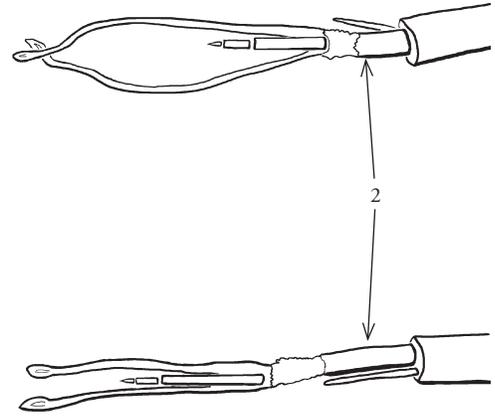


T. acifer

13' 50% or more of antennal segment 2 well sclerotized 14

14(13') About 50% of antennal segment 2 well sclerotized; LOR 2.22- 2.58; S II simple; [pupal anal lobe with > 40 taeniae] ***T. confusus* Malloch** (in part)

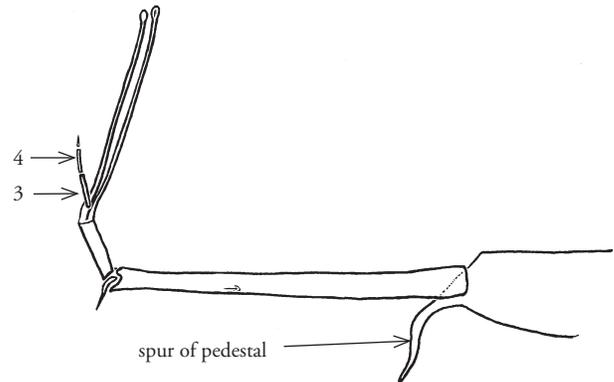
LOR = Lauterborn organ ratio; length of Lauterborn organ (and pedicel) divided by combined lengths of antennal segments 3-5



14' More than 50% of antennal segment 2 well sclerotized; LOR 1.70- 1.80; S II pectinate; [pupal anal lobe with < 40 taeniae] ***T. neoflavellus* Malloch**

- 15(5') Mandible with 2 inner teeth 16
- 15' Mandible with 3 inner teeth 26

16(15) Antennal pedestal with long spur; antennal segment 3 subequal to segment 4 ***T. sp. M* Epler**



16' Antennal pedestal without spur, or if spur present, it is shorter and triangular and each posterior parapod with 50+ claws (see next couplet); antennal segments 3 and 4 variable 17

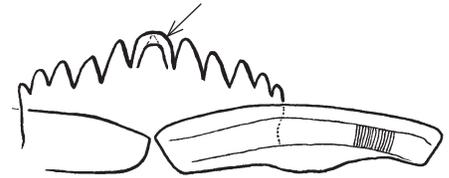
17(16') Each posterior parapod with more than 50 claws arranged in a semicircle ***T. sp. X* Epler**

17' Each posterior parapod with far fewer than 50 claws (usually about 20) 18



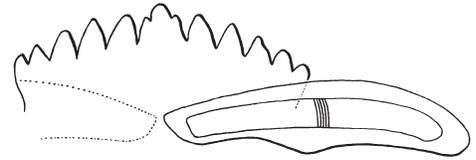
T. sp. X posterior parapod claws

18(17') Median tooth of mentum simple, with thickened margin completely around the tooth 19



T. sp. R

18' Median tooth of mentum simple or trifold, without thickened margin completely around the tooth (sides of median tooth may be thickened) 20



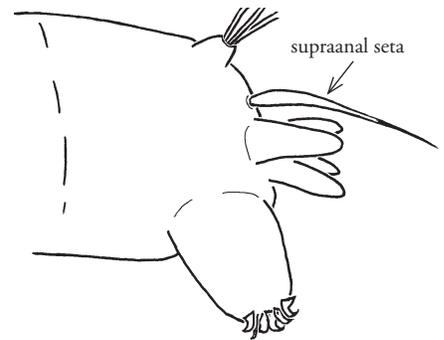
T. sp. I

19(18) Clypeal setae S3 arise from pointed tubercles; supraanal setae weak, at most as long as anal tubules **T. sp. K Epler**



S3 setae

19' S3 do not arise from pointed tubercles (there may be a raised area near bases of setae); supraanal setae robust and much longer than anal tubules **T. sp. R Epler**



20(18') Supraanal setae much longer than anal tubules (figure above) 21

20' Supraanal setae shorter than or subequal to anal tubules 24

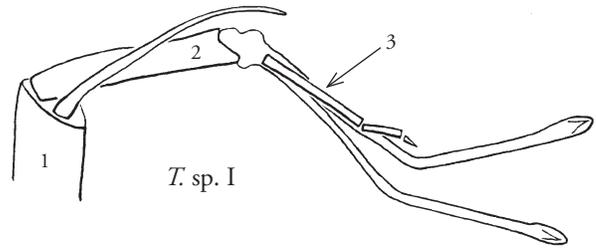
21(20) Pedicels of Lauterborn organs short **T. sp. H Epler**

21' Pedicels of Lauterborn organs long 22

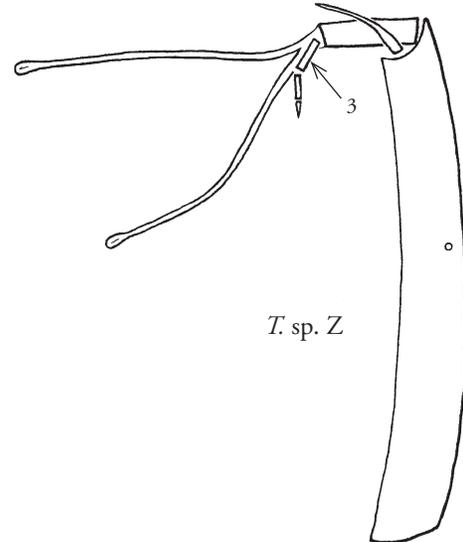


T. sp. H

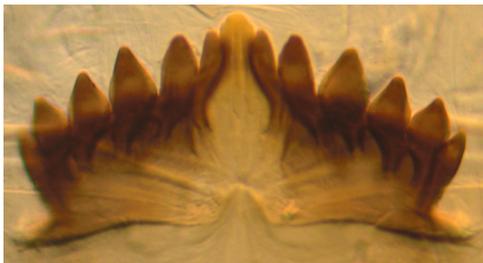
22(21') Antennal segment 3 long ***T. sp. I* Epler**



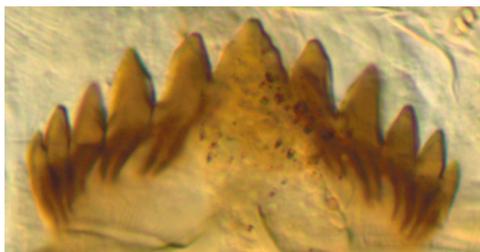
22' Antennal segment 3 short 23



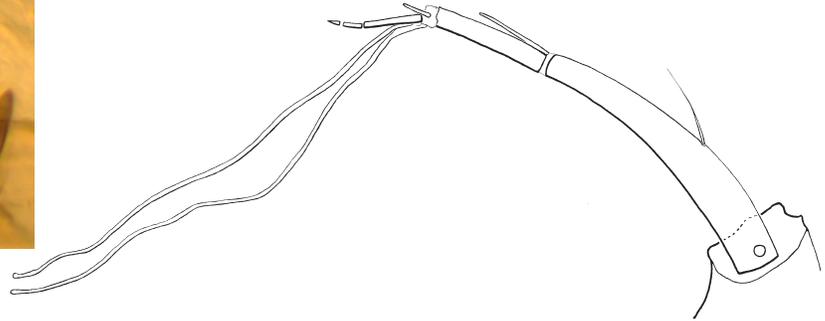
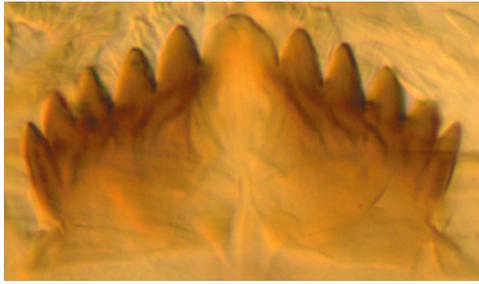
23(22') Median tooth of mentum pale with dark lateral margins; mandible with molar area dark ***T. sp. Z* Epler**



23' Median tooth of mentum completely pale or pale brown; mandible with molar area light * ***T. sp. SC-A* Epler**
(not known from Florida, but may occur in northern part of state)

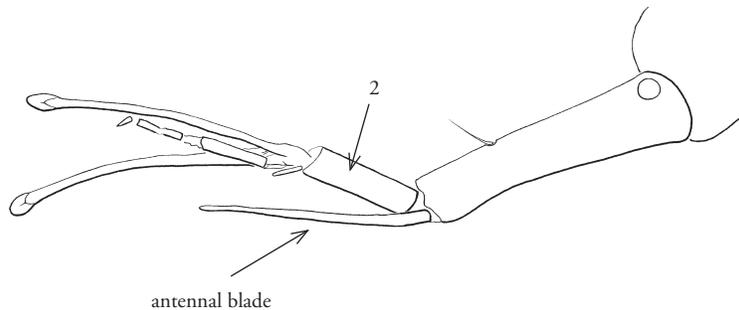


24(20') Median tooth of mentum completely pale; antennal segment 1 long, 175-190 (150-178) μm , antennal segment 2 long, 63-75 (45-60) μm ; Lauterborn organ pedicels much longer than combined lengths of antennal segments 1+2; apparently restricted to phytotelmata ***T. cf. bromelicola* Cranston**

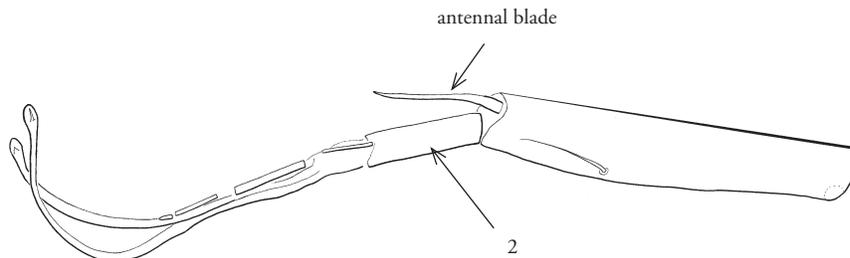


24' Median tooth of mentum dark or slightly paler with darker margins; antennal segments 1 and 2 shorter (for 1, 53-100 μm ; for 2 23-38 μm); Lauterborn organ pedicels shorter than combined lengths of antennal segments 1+2; not restricted to phytotelmata 25

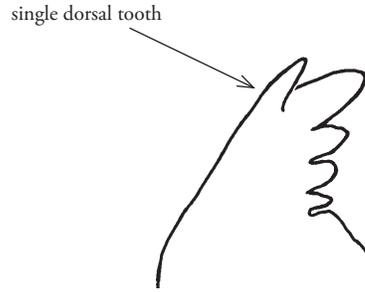
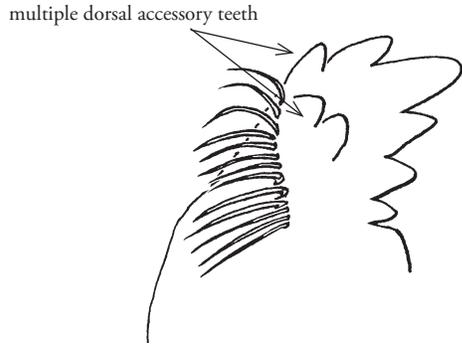
25(24') Antennal blade much longer than antennal segment 2; antennal segment 1 53-63 μm long; median tooth of mentum slightly paler than lateral teeth, with darker margins ***T. sp. gamma* Epler**



25' Antennal blade at most as long as antennal segment 2; antennal segment 1 88-100 μm long; median tooth of mentum as dark as lateral teeth ***T. sp. J* Epler**



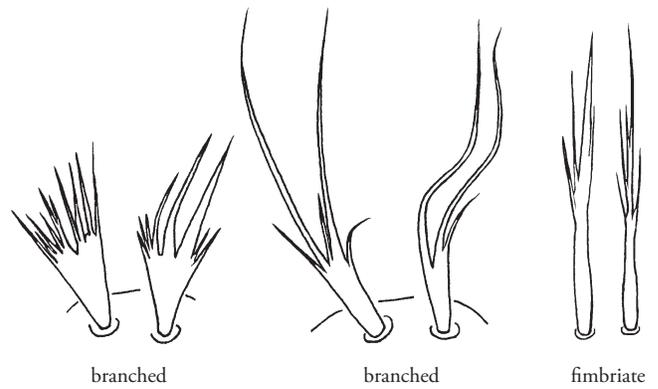
26(15') Mandible with 1 dorsal tooth and at least one additional dorsal accessory tooth 27



26' Mandible with only 1 dorsal tooth 32

27(26) Clypeal setae S3 simple 28

27' Clypeal setae S3 branched or apically fimbriate (with slender thin lateral branches) 29

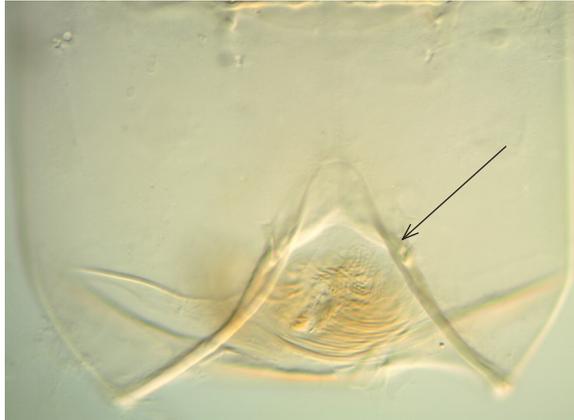


28(27) Ventral margin of postocciput dark [pupal tergites III and IV each with 2 longitudinal rows of long spines] ***T. buckleyi* Sublette** (= *T. sp.* C Epler, in part)



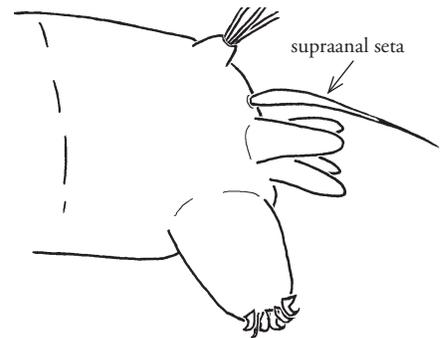
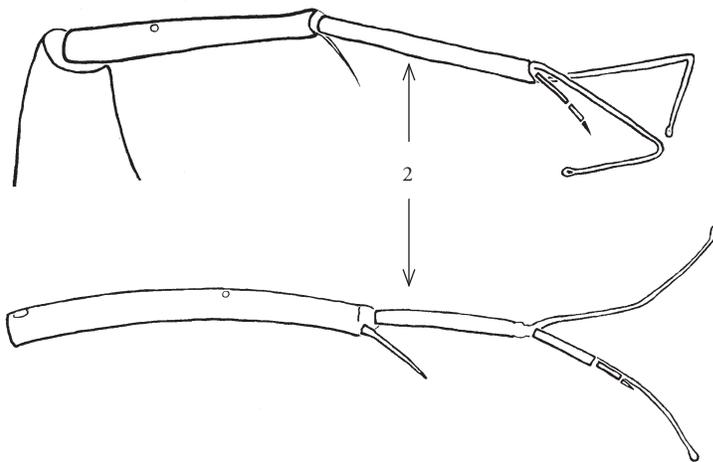
pupal tergites III and IV

- 28' Ventral margin of postocciptut light [pupal tergites III and IV each with 2 ovoid patches of short spines] ***T. allcis* Sublette** (= *T. sp.* C Epler, in part)

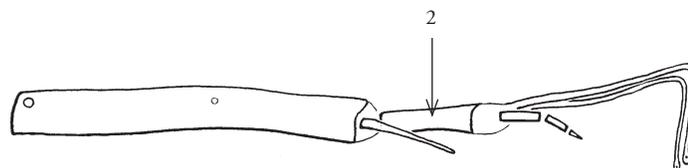


pupal tergites III and IV

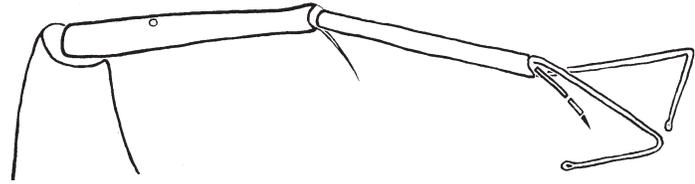
- 29(27') Antennal segment 2 about 40% or more length of antennal segment 1; antennal segment 3 long; supraanal setae longer than anal tubules 30



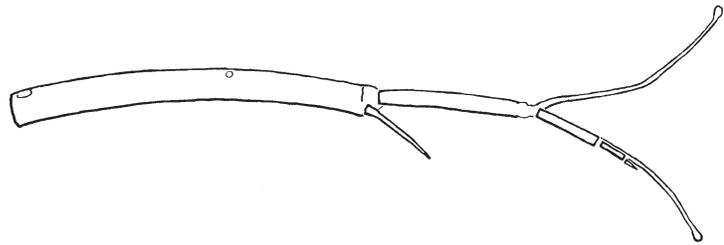
- 29' Antennal segment 2 at most about 1/3 length of antennal segment 1; antennal segment 3 short; supraanal setae subequal to anal tubules 31



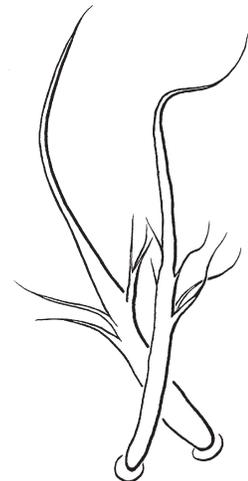
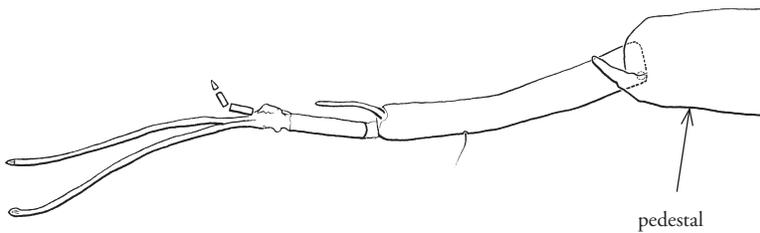
30(29) Clypeal setae S3 apically fimbriate, branches thin; premandibles at most slightly darkened apically, usually not as dark as mentum and mandibular teeth **T. sp. P Epler**



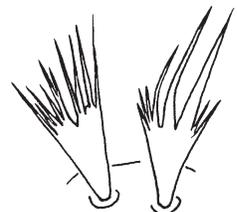
30' Clypeal setae S3 more deeply divided, branches stouter; premandibles apically darkened, usually as dark as mentum and mandibular teeth **T. sp. N Epler**



31(29') Antennal pedestal with long apical spine; S3 setae fimbriate, with longer pedicel, more cylindrical
..... **T. sp. epsilon Epler**

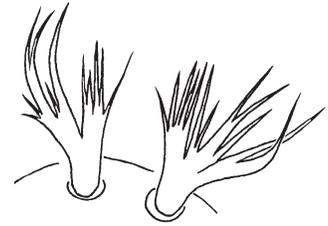


31' Antennal pedestal without long spine; S3 setae more deeply divided, palmate **T. sp. D Epler**



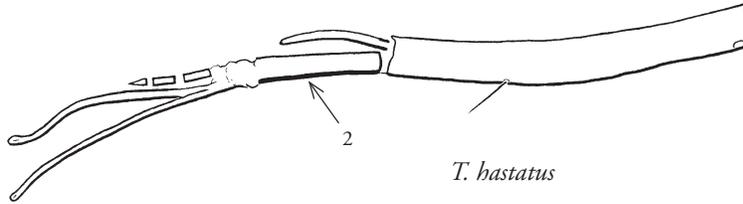
32(26') Clypeal setae S3 branched ***T. sp. U* Epler**

32' Clypeal setae S3 simple 33



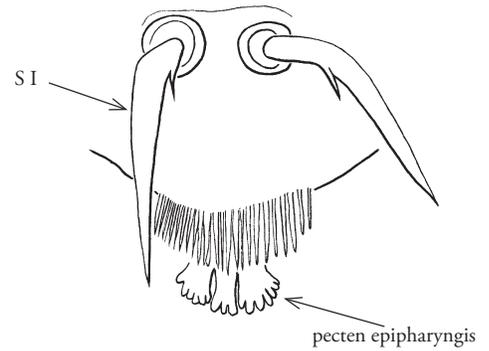
T. sp. U

33(32') Sclerotized portion of antennal segment 2 long, greater than or equal to about 1/3 length of antennal segment 1 ***T. hastatus* Sublette & Sasa** (= *T. sp. E* Epler and *T. sp. Q* Epler)

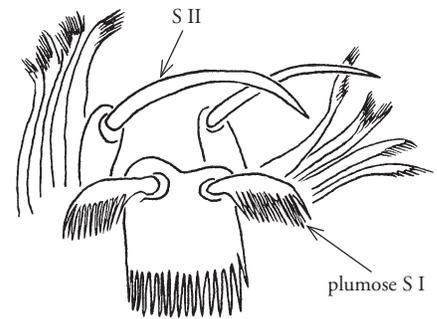


33' Sclerotized portion of antennal segment 2 short, less than 1/3 length of antennal segment 1 34

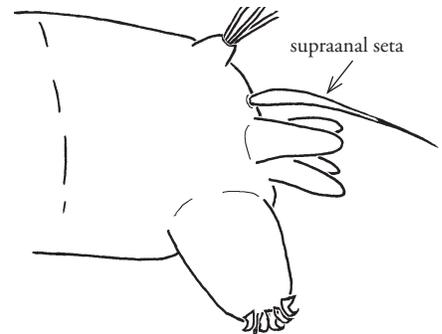
34(33') Labral seta S I with only 1-3 teeth * ***T. pelsuei* Spies**
(not known from Florida, but may eventually be found here)



34' Labral seta S I pectinate/plumose 35



35(34') Supraanal setae longer than anal tubules ... ***T. sp. T* Epler**

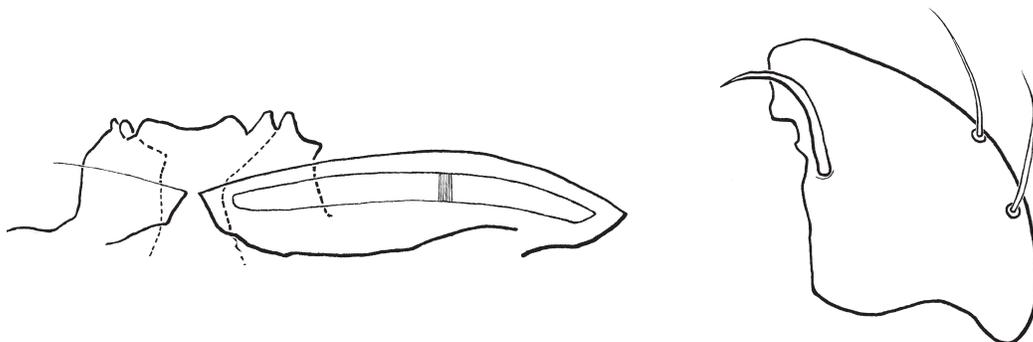


35' Supraanal setae shorter than or subequal to anal tubules ***T. sp. G* Epler complex** 36

The *Tanytarsus* sp. G complex

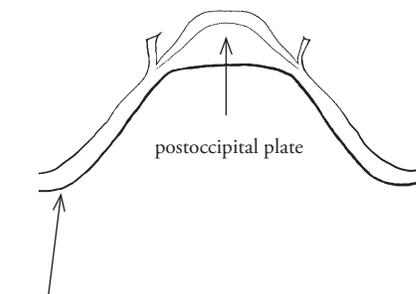
Beyond this point, it may be necessary to have a complete association of larva, pupa and adult to attempt species level identification. Even with complete associations, this group of species is very difficult to identify without reference specimens and years of experience working with pupae and adults. The species here would have keyed to *T. sp. G* in Epler (2001). Florida species that may key here are *T. becki*, *T. dendyi*, *T. epleri*, *T. guerlus*, *T. mendax*, *T. pathudsoni* and *T. wirthi* – plus at least one other undescribed taxon. Some *T. confusus* may also key here; this species is already keyed above as part of the *T. sp L* complex. This species must be associated with at least a pupa to be identified. I've also included *T. martini* (couplet 37) and *T. pelsuei* (in key above, couplet 34), which may occur in Florida (see Notes on species). Mature larvae of *T. wirthi* may be readily identifiable because of the short Lauterborn organ pedicels, which extend only a short distance beyond the end of the fifth antennal segment. However, use caution and rely on associated pupae and/or adult males to confirm your identification. One must use Ekrem et al. (2003) for pupal and adult identifications of this group of species; some of the characters used in the key from this point are derived from the larval key and descriptions in that work. DO NOT assume that you can take any *Tanytarsus* larva and run it through the larval key in Ekrem et al. (2003) to identify it; that key covers only described taxa from the *eminulus*, *gregarius*, *lugens* and *mendax* groups (the *lugens* group apparently does not occur in Florida). An additional caveat – because for many of these taxa only shriveled larval exuviae are available, I am not able to confirm that all these species have short supraanal setae – but they probably do.

36(35')Mentum and mandibles appear distorted and/or extremely worn ***T. sp. beta* Epler**

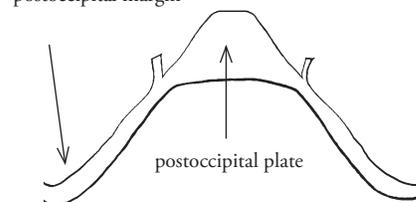


36' Mentum and mandibles normal 37

37(36')Postoccipital plate small
 * ***T. martini* Ekrem, Sublette & Sublette**
 (not known from Florida, but may eventually be found here)

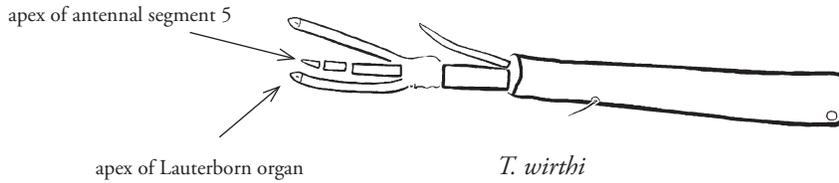


37' Postoccipital plate large 38



Antennal segment 2 of *T. guerlus* is not described and thus the species will probably fall somewhere below

38(37') Lauterborn organs scarcely surpassing apex of antennal segment 5 *T. wirthi* Ekrem, Sublette & Sublette



38' Lauterborn organs extend well beyond apex of antennal segment 5 39

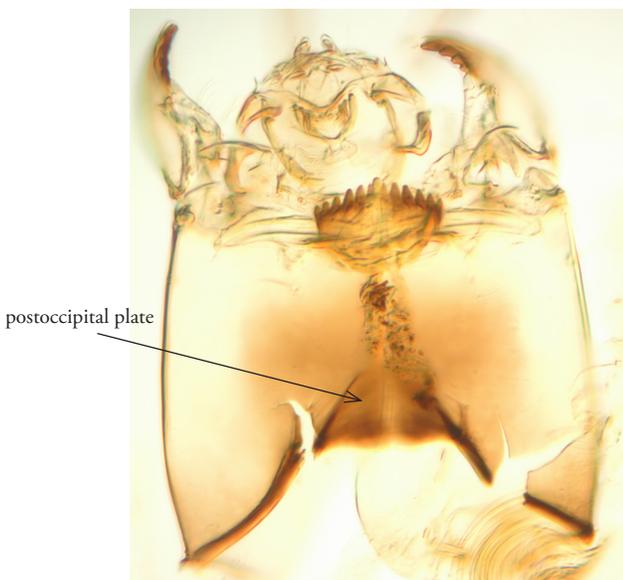
39(38') Antennal segment 2 almost completely sclerotized 40

39' Antennal segment 2 with 3/4 or less sclerotized 41

40(39) Antennal segment 1 < 130 μm long; labral chaetae simple or pectinate *T. dendyi* Sublette

40' Antennal segment 1 > 140 μm long; labral chaetae pectinate *T. mendax* Kieffer

41(39') Postoccipital plate and postmentum brown to dark brown; antennal segment 1 138-148 μm long; antennal segment 3 longer than or subequal to sclerotized portion of antennal segment 2 *T. epleri* Ekrem, Sublette & Sublette



T. epleri



T. pathudsoni

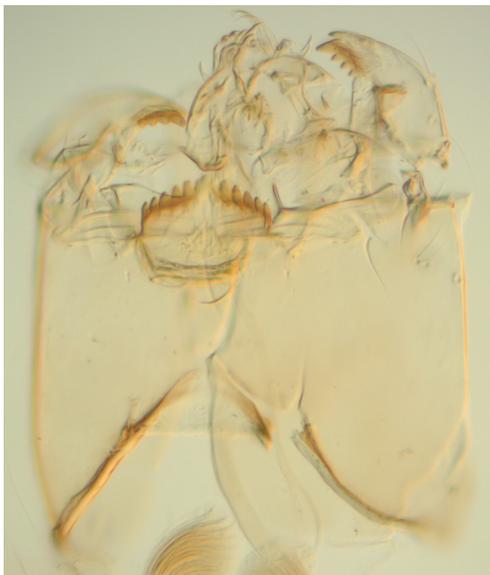
41' Postoccipital plate and postmentum pale yellow to light brown; antennal segment 1 more than 145 μm long; antennal segment 3 shorter than sclerotized portion of antennal segment 2 42

- 42(41') Antennal segment 1 over 200 μm long (also see couplet 14) **T. confusus Malloch** (in part)
- 42' Antennal segment 1 less than 200 μm long 43
- 43(42') Median tooth of mentum with dark lateral margins; head capsule light brown; mandible without minute dorsal accessory tooth [pupal T IV with pair of longitudinal rows of long spines well developed, with the spines changing direction and pointing anteriorly at about the anterior third] **T. pathudsoni Ekrem, Sublette & Sublette**



T III
T IV

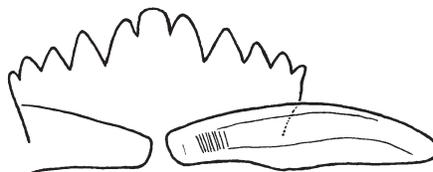
- 43' Median tooth of mentum mostly pale, but may have darker lateral margins (see Notes); head capsule pale yellow-brown; mandible sometimes with minute dorsal accessory tooth [pupal T IV with pair of short longitudinal rows of short spines] **T. becki Ekrem, Sublette & Sublette**



T III
T IV

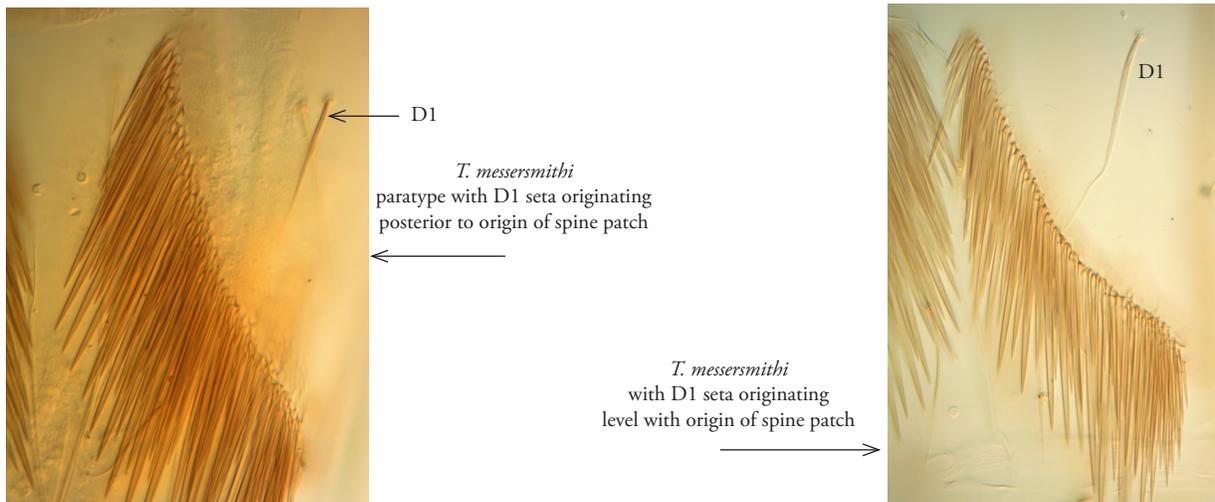
Notes on species

- T. acifer* Ekrem, Sublette & Sublette - As noted in Ekrem et al. (2003), the pedicels of the Lauterborn organs of *T. acifer* have a basal area that is slightly more sclerotized than the remainder of the pedicel, but this character is very difficult to discern. This species will key to *T. sp. L* in Epler (1995, 2001), which is now known to be comprised of several species. These larvae are very difficult to separate; identifications should only be considered accurate if the larvae are associated with a pupa and/or adult male. It may be best to consider these larvae as “*T. species L* Epler group”; see *T. sp. L* below. Widespread from Florida to Minnesota and Canada.
- T. allicis* Sublette - One of a pair (at least) of species that made up the former *T. sp. C* Epler. The only consistent difference between the larvae of *T. allicis* and *T. buckleyi* is the darkened ventral postoccipital margin of *T. buckleyi*; that of *T. allicis* is light colored. Pupae of the two species are very different. The pupa of *T. allicis* has small ovoid spine patches on abdominal tergites 3 and 4; that of *T. buckleyi* has elongate patches of long spines on T III and T IV. Adult males of these two species are confusingly similar, with some *T. allicis* bearing median volsellae that are very similar to those of *T. buckleyi* (see Sublette 1964: figs. 101 and 102), while others bear a distinctive median volsella as figured by Sublette (1964: fig. 103). Originally described from Louisiana; found throughout Florida.
- T. becki* Ekrem, Sublette & Sublette - Another species that will most often key to *T. sp. G* in Epler (1995, 2001). The larva as described by Ekrem et al. (2003) has a very minute additional dorsal tooth on its mandible between the apical tooth and the dorsal tooth. This character may be difficult to discern; both paratypes (reared larva/pupa/adult) in the FAMU collection lack this tooth. The menta of the two FAMU paratype larval exuviae have a pale median tooth, but the mentum figured by Ekrem et al. (2003:fig. 54) shows darker lateral margins. As with *T. dendyi*, *T. epleri*, *T. guerlus*, *T. pathudsoni*, *T. mendax* and *T. wirthi* larvae, it may be best to identify these larvae as “*T. species G* Epler group”, unless the larva is associated with a pupa and/or an adult male. Found throughout the eastern US.
- T. cf. bromelicola* Cranston - A species apparently confined to phytotelmata (water held by plants, such as in bromeliads or in tree holes). Florida larvae are similar to those described as *Tanytarsus bromelicola* from Puerto Rican bromeliad phytotelmata by Cranston (2007), but the Florida larvae appear to have a longer antennal segment 2. I recently mounted several rearings (all females) of a *Tanytarsus* species I had collected from *Tillandsia* in 1980, unreared larvae of which I had sent to Cranston after a pre-publication review of the manuscript describing *T. bromelicola*. These larvae, and the larval exuviae from the recently mounted rearings, can not be reliably assigned to his species. In the key above, the lower numbers in parentheses for antennal segment lengths are the shorter measurements given by Cranston (2007) for his larvae. Associated pupal exuviae have about 45 taeniae in the anal fringe (on each side); *T. bromelicola* has 30-37 such taeniae. Until the Florida taxon is completely associated, including definitive male specimens, it must remain as *T. cf. bromelicola*. I have never included this species in any of my previous keys.
- T. buckleyi* Sublette - One of a pair of species that was included in the former *Tanytarsus sp. C* Epler (the other is *T. allicis*; see above). A very common species from at least New York to Florida, west to New Mexico, and apparently more common than *T. allicis*. Both species have a similar mentum (along with *T. sp. D*), with the central 3 teeth slightly fused basally and somewhat set apart from the remaining lateral teeth.



T. buckleyi, mentum and ventromental plate

- T. confusus* Malloch – This species and *T. neoflavellus* are very similar in all life stages. Most larval specimens will key to *T. sp. L* in Epler (1995, 2001), but some may key to the *T. sp. G* Epler complex. Caution must be used in applying this name to specimens that have not been associated with a pupa or adult male. Reared larvae from Lofton Pond in Leon County, Florida, differ from reared material examined from Ohio in having a much longer first antennal segment, but pupae and adults appear to be *T. confusus*. There is also variation in the amount of sclerotization of the second antennal segment; thus this species is keyed twice in the key above. This species and several others (*T. epleri*, *T. guerlus*, *T. neoflavellus*, *T. pathudsoni* and *T. sepp*) make up the Florida members of the “*T. confusus* aggregate” of Ekrem (2003). These species all share a common pupal character: the longitudinal rows of long spines on T IV are well developed, with the spines changing direction and pointing anteriorly at about the anterior third (see couplet 43). Note that this character state also occurs in *T. limneticus*. Note also that in *T. confusus*, *T. neoflavellus* and some *T. epleri* pupae, the curved longitudinal rows of long spines on T III are continued anteriorly as a lightly sclerotized line that may bear small spinulae, appearing similar to a set of parentheses. Widespread from Florida to Minnesota.
- T. dendyi* Sublette – This species falls within my *T. sp. G* complex and is basically inseparable from the other larvae of that complex without associated pupae or adult males. Ekrem et al. (2003) stated that the labral chaetae of *T. dendyi* were simple. However, a reared male from Ohio (ex Bolton collection) has labral chaetae that are pectinate. It may be that the larvae of *T. dendyi* and *T. mendax* can not be reliably separated without an associated pupa or adult male. Widespread in the Nearctic.
- T. epleri* Ekrem, Sublette & Sublette – This species falls within my *T. sp. G* complex and is basically inseparable from the other larvae of that complex without other associated life stages. The pupa is easily recognized by the pair of large frontal warts in addition to the large cephalic tubercles; the longitudinal rows of long spines on T IV are well developed, with the spines changing direction and pointing anteriorly at about the anterior third (as in the figure for couplet 43). Widespread in the eastern US.
- T. gibbus* Ekrem, Sublette & Sublette – Formerly known as *Tanytarsus sp. S* Epler. Very similar to *T. messersmithi* in the larval stage, with overlap in some of the supposedly distinguishing characters. The clypeal S3 setae are usually not as deeply incised towards the base as those of *T. messersmithi*, but this appears to be variable. If one is fortunate to have a well developed pharate pupa within a 4th instar larva, the species may often be identified by the position of the D1 seta on the 3rd abdominal tergite of the pupa: in *T. gibbus* this seta originates posteriorly to the anterior origin of the longitudinal patch of long spines; in most *T. messersmithi* it originates anteriorly to the anterior origin of the spine patch. Note, however, that there is variation in the placement of this seta (a paratype in my collection has its D1 setae clearly originating posterior to the anterior origin of the spine patch) and it may be necessary to have an associated adult male to identify this species. The male’s anal point is rounded apically in *T. gibbus*, but noticeably notched in *T. messersmithi* (see Ekrem et al. 2003). Found throughout the SE US.



- T. guerlus* (Roback) - All available associated material of this species lacks the apical antennal segments and Lauterborn organs. This species probably falls within my *T. sp. G* complex and is basically inseparable from the other larvae of that complex without other associated life stages. The pupa has the longitudinal rows of long spines on T IV well developed, with the spines changing direction and pointing anteriorly at about the anterior third (as in the figure for couplet 43).
- T. hastatus* Sublette & Sasa – Formerly known as *Tanytarsus sp. E* Epler and *T. sp. Q* Epler. This species was originally described from Guatemala (Sublette & Sasa 1994). At the end of the description for *T. hastatus*, Sublette & Sasa (1994: 56) wrote: “An undescribed species from the southern U.S.A. is closely related but differs in the shape of the superior volsella.” However, it appears that the superior volsella (a part of the adult male genitalia) exhibits a good amount of variation (see Sanseverino 2005: fig. 28) and the populations in Florida and the Neotropics are considered to represent the same species.
- T. limneticus* Sublette – A distinctive species with the basal portion of antennomere 2 separated from the remainder of the segment by an unsclerotized area and annulated pedicels for its Lauterborn organs. All immature material I’ve collected of this species has come from eutrophic water bodies. Steiner & Hulbert (1982: 232) noted that “*Nimboecera pinderi* does not appear to be an ideal organism for use in a water quality program since it displays wide tolerances for many parameters”. Based solely on its resemblance to a larva from Chile described by Reiss (1972), Steiner & Hulbert (1982) described the larva as “*Nimboecera pinderi*”. Based on reared material provided by B.A. Caldwell, Epler (1995, 2001) recognized the adult as the previously described *T. limneticus* Sublette (Sublette 1964) and considered *Nimboecera pinderi* a junior synonym. Reiss (1972) had established *Nimboecera* because the adults of the single described species, *N. patagonica* Reiss, were distinctive in having reduced wings (“brachypterous”), antennae and legs. However, these modifications are most likely due to the species’ extreme environment in south Chile. There are several other *Tanytarsus* species with larvae similar to *T. limneticus* in the Neotropics. Sanseverino et al. (2010) redescribed “*N. patagonica* and *T. limneticus* and considered *Nimboecera* a junior synonym of *Tanytarsus*. Also note that the pupa of *T. limneticus* resembles those of the “*T. confusus* aggregate” (see *T. confusus* above), bearing well developed longitudinal rows of long spines on T IV, with the spines changing direction and pointing anteriorly at about the anterior third. *Tanytarsus limneticus* is known from Florida north to North Carolina, and west to Louisiana; Oliver et al. (1990) also listed it from Alberta, Canada.
- T. mendax* Kieffer - This species falls within my *T. sp. G* complex and is basically inseparable from the other larvae of that complex without other associated life stages. See also *T. dendyi* above. A Holarctic species, widespread throughout the Nearctic.
- T. messersmithi* Ekrem, Sublette & Sublette – Formerly known as *T. sp. Y* Epler. This species was not included in the keys of Epler (1995, 2001), but was added, as *T. sp. Y*, via Epler’s website in 2006. As a larva and pupa this species is very similar to that of *T. gibbus* (q.v.). Both species have at least one posterior parapod claw with outer accessory spines. Widespread throughout the eastern and central US, north to Quebec.
- T. neoflavellus* Malloch - This species and *T. confusus* are very similar in all life stages. Larval specimens will key to *T. sp. L* in Epler (2001). Caution must be used in applying this name to specimens that have not been associated with a pupa or adult male. Note that in the pupa the longitudinal rows of long spines on T IV are well developed, with the spines changing direction and pointing anteriorly at about the anterior third (as in the figure for couplet 43). Widespread throughout the Nearctic.
- T. pathudsoni* Ekrem, Sublette & Sublette - Ekrem et al. (2003) listed a single specimen for a Florida record of this species, for a single pharate male (developed male within pupa) from the Santa Fe River in Gilchrist County. Pupal characters indicate this species is closely related to several other species found in Florida: *T. confusus*, *T. epleri*, *T. guerlus*, *T. neoflavellus* and *T. sepp*, named the *T. confusus* aggregate by Ekrem (2003). In the pupae of these species the longitudinal rows of long spines on T IV are well developed, with the spines changing direction and pointing anteriorly at about the anterior third. Note that the pupa of *T. limneticus*, apparently not closely related, shares a similar spine configuration on

pupal tergite IV (see *T. confusus* above). I now have additional associations of *T. pathudsoni* including the larval exuviae; it falls within my *T. sp. G* complex and is basically inseparable from the other members of that complex without other associated life stages. Characters used in the key are derived from 3 larvae I reared from the Wakulla River. Known from northern Florida to Texas.

- T. sepp* Ekrem, Sublette & Sublette – Formerly known, in part, as *Tanytarsus sp. A* Epler. Widespread, at least as far north as New York, Ohio and Ontario in the East, west to California and northwest to the Northwest Territories of Canada. The pupa of this species has the longitudinal rows of long spines on T IV well developed, with the spines changing direction and pointing anteriorly at about the anterior third (as in the figure for couplet 43). Widespread throughout the Nearctic.
- T. wirthi* Ekrem, Sublette & Sublette – In Florida this species appears to be a common member of the *T. sp. G* complex and is probably the taxon most often called “*T. sp. G*” previously. Mature larvae may be identifiable because of the short Lauterborn organ pedicels, which extend only a short distance beyond the end of the fifth antennal segment; most specimens also have premandibles that are darkened apically. However, use caution and rely on associated pupae and/or adult males to confirm your identification. Widespread throughout the United States.
- T. sp. B* Epler – This taxon appears to be limited to the Florida peninsula.
- T. sp. D* Epler - The larva of this species resembles those of *T. allicis* and *T. buckleyi* in that the central 3 teeth of the mentum are close together and dorsal accessory teeth are present on the mandible, but the S3 setae of *T. sp. D* are branched.
- T. sp. F* Epler - This species is very similar in all life stages to the Brazilian species, *T. obiriciae* Trivinho-Strixino & Sonoda (see Trivinho-Strixino & Sonoda 2006). Through the kindness of Dr. Susana Trivinho-Strixino, I was able to obtain material of *T. obiriciae*. There are slight differences in the larvae (antennal segment 1 of *T. obiriciae* is about 10X long as wide; *T. sp. F* about 8X) and pupae (thoracic horn of *T. obiriciae* smooth; *T. sp. F* with scattered fine chaetae) of these two taxa, but adults appear to be inseparable. More associated material is needed!
- T. sp. G* Epler complex - An aggregate of several species that in Florida includes *T. becki*, *T. dendyi*, *T. epleri*, *T. guerlus*, *T. pathudsoni*, *T. mendax*, *T. wirthi* and *T. sp. beta* Epler, the larvae of which are very difficult, if not impossible, to separate without associated pupae and adult males. See under individual names for more information. These species are not necessarily related; some share common characters as larvae, but not as pupae or adults. Note that due to variation in the sclerotization of antennal segment 2, some *T. confusus* may also key here - as well as keying to the *T. sp. L* complex.
- T. sp. H* Epler - An unusual species with very short Lauterborn organ pedicels, this taxon has been found near the mouths of several Florida Gulf Coast rivers. Pupae and adults remain unknown.
- T. sp. I* Epler - A reared male specimen in my collection from North Carolina may be this species, but its last three antennal segments are obscured by detritus. The North Carolina specimen is an undescribed species with a distinctive median volsella that bears 2 semi-circular plate-like lamellae. Note that this species' name represents the letter “I” and not the Roman numeral I (one).
- T. sp. J* - I have seen this species from the northern part of the state down to the Everglades. Jacobsen (2008) found this species (as his *T. sp. E* Jacobsen) to be abundant in enriched marsh sites in the northern Everglades.
- T. sp. K* Epler - The two inner teeth of the mandible, the median tooth of mentum with its thickened margin that runs completely around the tooth, and the simple S3 arising from a tubercle with pointed apices distinguish this taxon. Pupae and adults remain unknown.
- T. sp. L* Epler - As noted in Epler (2001: 8.162), several species will key to this taxon. The original specimen of *T. sp. L* in my reference/voucher collection is a specimen with minute (15-20 µm), but thick, supraanal setae with a blunt/rounded apex; these setae were brought to my attention by Todd Risk (FDEP). The taxon also has some posterior parapod claws with small outer spines. Thanks to the work of Ekrem et al. (2003), some of the taxa that would key to *T. sp. L* in Epler (1995, 2001) can now be supplied with valid names. In Florida these are the original *T. sp. L*, *T. acifer*, *T. confusus* and *T. neoflavellus*. The

original *T. sp. L* remains undescribed as a pupa and adult. See under the individual species' names for more information. Note that separation of these species is very difficult and, with the exception of the original *T. sp. L* (because of its unique supraanal setae - which can be very difficult to discern or may be missing), should be confirmed with associated pupal and/or adult stages, or with pharate pupae (4th instar larvae with a developed pupa inside). It may be best to leave identifications of unassociated larvae as "*T. sp. L* Epler complex". Based on pupal structures, there are at least two "groups" of species that will key to this *T. sp. L* "complex": *T. confusus* and *T. neoflavellus* are closely related due to similar pupal characters (along with *T. epleri*, *T. guerlus*, *T. pathudsoni* and *T. sepp*), while *T. acifer* has pupal characters more similar to other species. The typical phrase applies here: "More work is needed"!

- T. sp. M* Epler - A fairly common species throughout the Southeast. The long spur on the antennal pedestal is distinctive, but this spur may be difficult to discern if it is pointed towards or away from the observer. This species can be confused with others, such as *T. sp. T*, if it is difficult to discern whether there are 2 or 3 inner mandibular teeth. Note that *T. sp. M* has only two inner teeth on the mandible, a pale median tooth on the mentum (sometimes darker laterally), simple S3 setae and antennal segment 3 is about as long as 4; *T. sp. T* has 3 inner teeth, a median tooth on the mentum which is usually dark (but may be pale with darker lateral margins) and a much longer antennal segment 3, which is about twice as long as segment 4. Both species have long supraanal setae.
- T. sp. N* Epler - A species with numerous dorsal accessory teeth on the mandible and premandibles that are as dark apically as the mentum and mandibular teeth. Bear in mind that larvae which have recently molted may not have their structures as dark as "older" larvae. The long second antennal segment 2 may confuse this species with *T. sp. P*, but the more deeply dissected S3 of *T. sp. N* should separate most specimens. Both taxa have pupae with a pair of longitudinal rows of long spines on abdominal tergites 3 and 4. Associated adult males will be necessary to elucidate whether the two taxa are separate species or perhaps variants of a single species. *Tanytarsus sp. N* appears to be more common in the northern part of the state, but there is a specimen from Palm Beach County in the FDEP collection.
- T. sp. O* Epler - This taxon occurs throughout the Southeast. The second antennal segment is often weakly sclerotized, but the separate little ring-like section near the base is always evident. Note also the trifid median tooth of the mentum and the fimbriate S3 setae on the clypeus. The mandible usually has 2 inner teeth but sometimes may appear to have 3.
- T. sp. P* Epler - The very long antennal segment 2 and fimbriate S3 setae distinguish this undescribed species. I have seen specimens from Alabama, Florida and North Carolina in which the posterior portion of the head capsule is dark brown. Material I have before me now indicates that these specimens appear to be 3rd instars. Mature larvae of this taxon often have the head capsule slightly darkened posteriorly. Until reared material is available, I am loathe to call these two different taxa. See also *T. sp. N* above.
- T. sp. R* Epler - This species appears to be confined to the Florida peninsula.
- T. sp. T* Epler - Larvae possess a small spine/tooth on the apex of the antennal pedestal. Indirectly associated material indicate that it is an undescribed species. This species may be confused with some *T. sp. M* if the mandibular teeth and the pedestal spur are not easily discernible. Note the differences in antennal segment 3: in *T. sp. T* it is much longer than segment 4; in *T. sp. M* it is about the same length. Both species have long supraanal setae. Note also that more than one taxon may be included here; reared material will be necessary to determine whether some differences observed, such as the size of the spur on the antennal pedestal, are indicators of species differences or environmental influences.
- T. sp. U* Epler - This species has been named by the Subletttes, but the description has not been published and their name is not available; "paratypes" are in several collections. This taxon occurs throughout the Southeast; I have rearings from Florida and South Carolina.
- T. sp. V* Epler - A species with a poorly sclerotized antennal segment 2, but only two inner teeth on the mandible. It has simple S3 setae and lacks the dark, rounded apical spur on the antennal pedestal found in *T. sp. delta*. Note that this species' name represents the letter "V" and not the Roman numeral V (five).

- T. sp. X* Epler - An unusual species for a *Tanytarsus*, with numerous (~60) claws on each parapod, arranged in a semicircle, very similar to those of some *Micropsectra* species. The mentum also resembles that of some *Micropsectra* species, but the premandible has three well defined apical teeth. Known from lentic habitats in Washington County; associated specimens will be necessary to determine its true generic identity. Note that this species' name represents the letter "X" and not the Roman numeral X (ten).
- T. sp. Z* Epler - Previously (Epler 2001) known from Georgia and North Carolina; in Florida now known from Escambia County.
- T. sp. alpha* Epler - A species with S3 setae similar to those of *T. sepp*, but the "trunks" of the setae are longer and they are less dissected apically. It is also similar to *T. sp. delta*, but *T. sp. alpha* has 3 definite inner teeth on the mandible and lacks a spur on the antennal pedestal. Known from only a single larva from Cypress Creek in Pasco County. This may be an aberrant *T. sepp*. I have seen one other specimen with S3 setae somewhat similar to *T. sp. alpha*, but that specimen was noticeably aberrant in having multiple sets of chaetulae laterales. Until associated with a pupa and adult male, this remains a letter-designated taxon.
- T. sp. beta* Epler - This taxon is for a series of unusual larvae that have apparently deformed mandibles and menta; they appear somewhat similar to the larva of *Corynocera ambigua* Zetterstedt (see Epler et al. 2013, fig. 10.74). I have seen examples of other *Tanytarsus* species, especially *T. buckleyi*, in which the mandibles and mentum are extremely worn, but specimens of *T. sp. beta* are different. The lateral margins of the mentum curl around dorsally above the inner lateral teeth, and lie above the plane of the mentum; the mandibles lack dorsal and apical teeth, but may have the apparent remnant of the proximal inner tooth present. These specimens were collected and reared by Bob Rutter from Sunshine Lake (November 1998) and Sunrise Waterway (January 2000) in Port Charlotte, Charlotte County, Florida. They key to the *T. sp. G* Epler complex. Even if these larvae prove to be deformed because of environmental conditions, it does appear the adults represent an undescribed species. Adult males lack median tergite setae, have a pointed anal point and anal tergite bands that extend to the anal point.
- T. sp. gamma* Epler - A species known only from southern Florida, where it has been collected from marshes and borrow pits. Similar to, but smaller than, *T. sp. J*, but the long antennal blade distinguishes this taxon. The median tooth of the mentum may appear paler than the lateral teeth, but has dark lateral margins. This species was first found by Bob Rutter and called "*Tanytarsus sp. XX* Rutter" (the name represented the Roman numeral XX (twenty)).
- T. sp. delta* Epler - Somewhat similar to *T. sp. alpha*, but has only two inner teeth on the mandible and a definite rounded spur on the apex of the antennal capsule. This species was first noted by Todd Risk and called "*Tanytarsus sp. 1* Risk".
- T. sp. epsilon* Epler - The spur on the antennal pedestal will distinguish this species from others with numerous dorsal accessory teeth on the mandible. This species was first noted by Todd Risk and labeled "*Tanytarsus sp. 4* Risk". To date known only from some Panhandle counties (Escambia, Gadsden, Walton).

Former *T. sp. Q* Epler is now considered to be the same as former *T. sp. E* Epler and is thus *T. hastatus*.
 Former *T. sp. W* is *Paratanytarsus longistilus* Bolton, Ekrem, Sublette & Sublette; see *Paratanytarsus*.

Other species

- * *T. martini* Ekrem, Sublette & Sublette - Not recorded from Florida but probably occurs here; Ekrem et al. (2003) give several records from southern South Carolina; in general, species found in South Carolina are also found in northern Florida. Larvae of this species will key to my *T. sp. G* complex. In addition to the small postoccipital plate, this species' labral seta S II has only one small spinule; other taxa in the

T. sp. G complex have simple or pectinate S II setae. Widespread throughout the Nearctic.

- * *T. pelsuei* Spies – Originally described by Spies (1998) from California, where it was considered a nuisance species due to mass emergences of adults. The late Dr. J.E. Sublette identified some of my Florida material as this species, but further examination indicates that the Florida material represents an undescribed species, referred to as *T. sp. beta* Epler in this work (see above). The larva of *T. pelsuei* is distinctive because it has labral S I setae that bear only 1-3 apical divisions, instead of being pectinate/plumose as in most other members of the genus. Adult males of *T. sp. beta* also differ from those of *T. pelsuei* in lacking median tergite setae, and have a pointed anal point and anal tergite bands that extend to the anal point.
- * *T. sp. SC-A* Epler - This taxon is not known from Florida, but its presence in South Carolina (Savannah River Plant area) indicates that it may be found in Florida. This species is very similar to *T. sp. Z* Epler and may be a variant of it. The two taxa do appear to be different, but more material is necessary.

List of Epler's letter-designated *Tanytarsus* species with available names

- T. sp. A* = *T. sepp* Ekrem, Sublette & Sublette
- T. sp. C* = *T. allicis* Sublette and *T. buckleyi* Sublette
- T. sp. E* = *T. hastatus* Sublette & Sasa
- T. sp. Q* = *T. hastatus* Sublette & Sasa
- T. sp. S* = *T. gibbus* Ekrem, Sublette & Sublette
- T. sp. Y* = *T. messersmithi* Ekrem, Sublette & Sublette

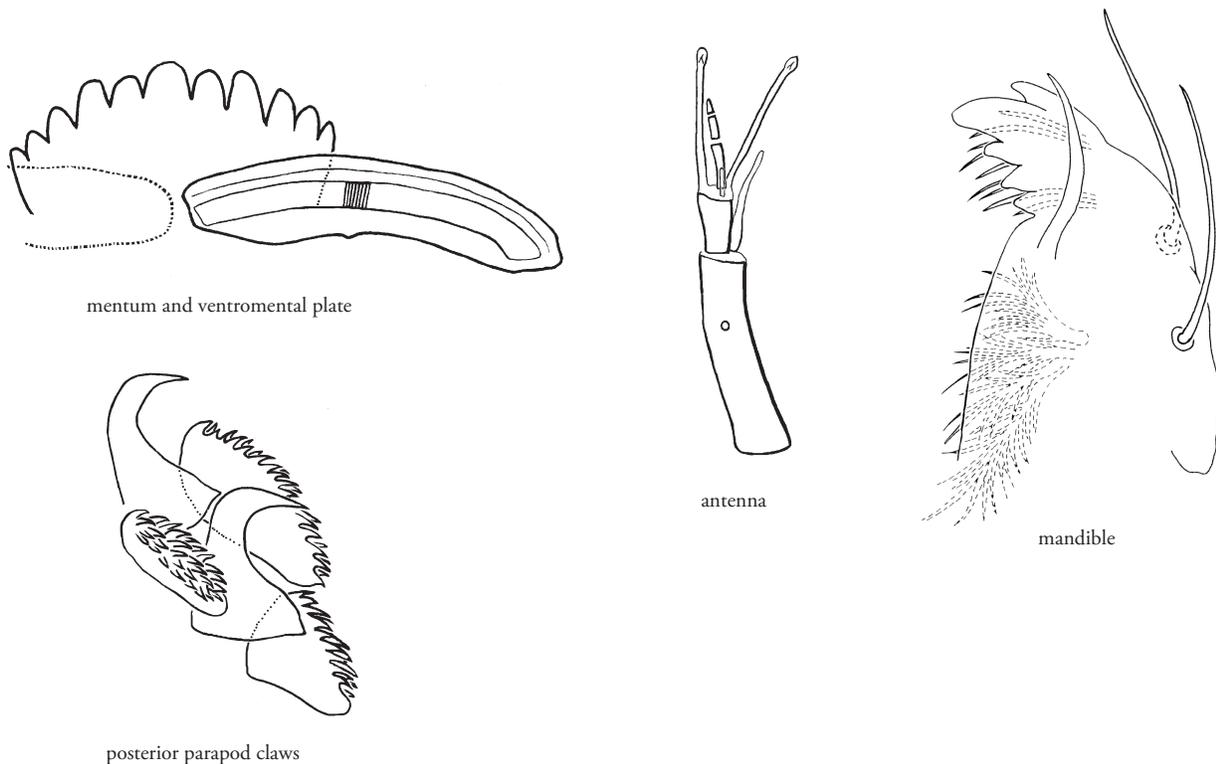
In addition, these taxa now have numerous available names

- 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, and *T. wirthi* Ekrem, Sublette & Sublette
- T. sp. L* = *T. acifer* Ekrem, Sublette & Sublette, *T. confusus* Malloch, *T. neoflavellus* Malloch (and *T. sp. L* Epler)

Of course, all of this is subject to change with additional information!

GENUS * *Virgatanytarsus* Pinder

DIAGNOSIS: Distinguished by the antennae with sclerotized second segment with apical Lauterborn organs on moderately long pedicels; pecten epipharyngis of 3 distally serrated plates; premandible with more than 3 apical/subapical teeth; mentum with 5 pairs of lateral teeth; wide, short ventromental plates that almost touch medially; mandible with 3 inner teeth; and some posterior parapod claws with that are pad-like, with numerous small hooklets arranged in multiple rows.



Virgatanytarsus sp.
(adapted from Epler et al. 2013)

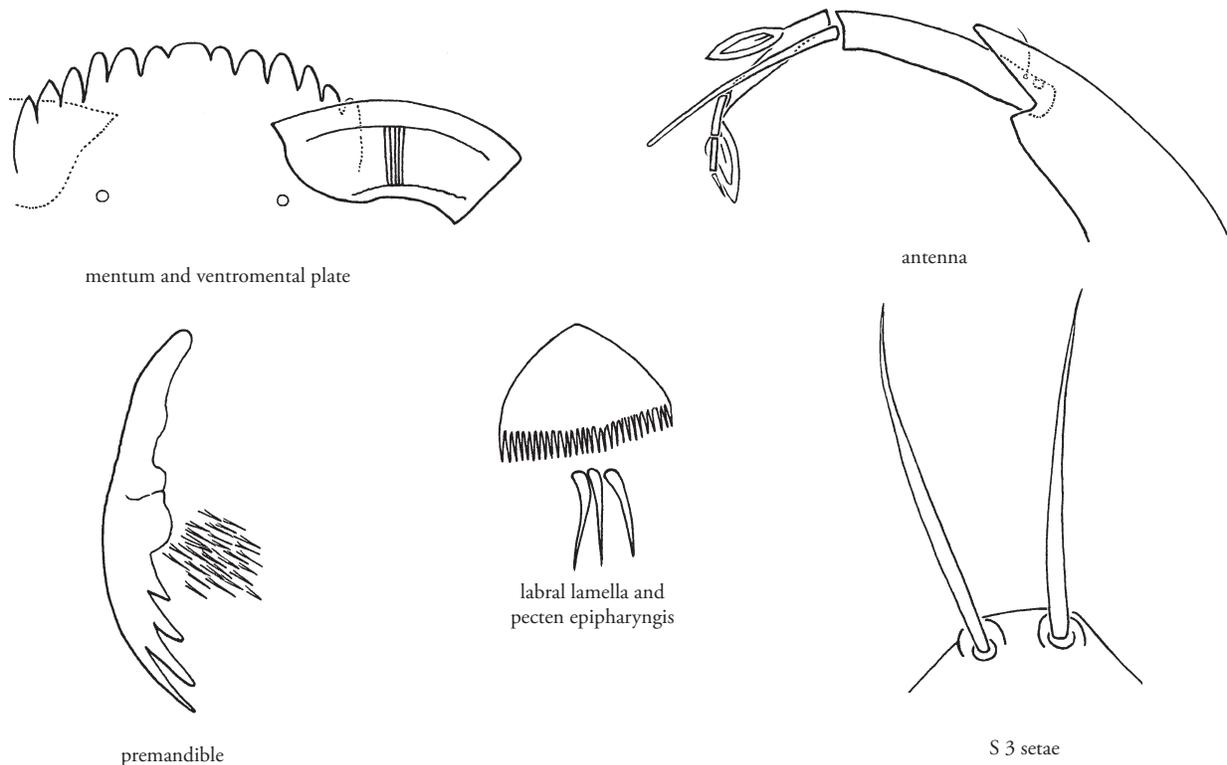
NOTES: Leeper & Taylor (1998) reported a “*Virgatanytarsus* (?)” species (an adult identified by L. Ferrington) from a South Carolina temporary wetland pond, and Epler (2001) reported a single adult, putatively identified as a *Virgatanytarsus*, collected from a stream in Georgia by B.A. Caldwell. The Georgia material has been reexamined and determined to be *Paratanytarsus* (B.A. Caldwell, pers. comm., 2014). I have not seen the South Carolina material and it does not appear to be available. Epler et al. (2013) reported *Virgatanytarsus* only from the Palaearctic and Afrotropical regions. It is most likely this genus does not occur in the Nearctic, but it is included here on the outside chance that it does turn up. The figures above are based on a European species.

In Europe, larvae are found in small rivers and the littoral zone of lakes, where they live on stony substrata and submerged macrophytes.

ADDITIONAL REFERENCES: Pinder 1982.

GENUS *Zavrelia* Kieffer, Thienemann & Bause

DIAGNOSIS: Distinguished by the short, straight spur on the antennal pedicel; antennal segment 2 with one Lauterborn organ arising near base, the other apically; simple S 3 setae; pecten epipharyngis of 3 slender, simple chaetae; premandible with 4 teeth; squat, widely separated ventromental plates; entire postoccipital plate; and the transportable case.



Z. aristata Ekrem & Stur

NOTES: An uncommon genus, only *Z. aristata* Ekrem & Stur is known from Florida, from specimens collected in Gadsden County. Note that this does not mean that any *Zavrelia* larva collected in Florida will be *Z. aristata*. At least two described species of *Zavrelia* are now known from the Southeast US; *Z. hudsoni* Ekrem & Stur was described from springs/small streams in Tennessee (Ekrem & Stur 2009). Mature (4th instar) larvae of the two species may be separated by measurements of the antenna: *Z. aristata* with antennal segment 1 65-70 μm long; antennal blade 125-150 μm long; *Z. hudsoni* with antennal segment 1 55 μm long; antennal blade about 115 μm long. For species level identification, larvae should be associated with pupae or adults; see Ekrem & Stur (2009).

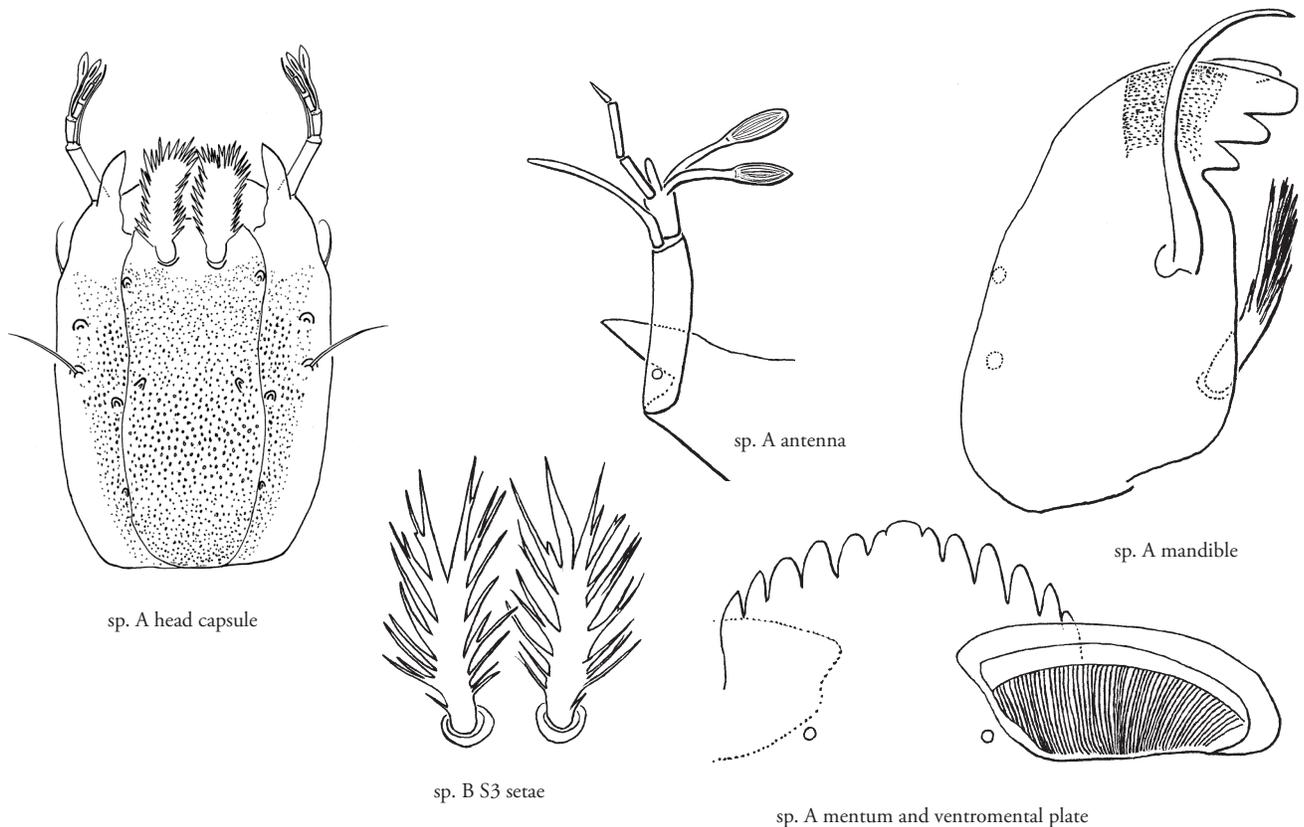
Zavrelia is very similar to *Stempellinella*, but may be separated by the 4 toothed premandible and the entire postoccipital plate in *Zavrelia*. Some Florida *Stempellinella* (*S. fimbriata* Ekrem) may have a 4 toothed premandible, but the postoccipital margin is divided. One species, *S. leptocelloides*, has an entire postoccipital plate but has a 3 toothed premandible (see *Stempellinella*); see figures on page 45.

In Ekrem & Stur (2009) and Epler et al. (2013) the pecten epipharyngis is described as consisting of “3 small, unserrated chaetae and a broad anterior scale”. The anterior scale is difficult to discern but the 3 spine-like chaetae are usually easily seen.

ADDITIONAL REFERENCES: Ekrem & Stur 2009.

GENUS ***Tanytarsini** genus A Ekrem

DIAGNOSIS: Distinguished by the granulate head capsule; antennal pedastal with apical spur; antennal segment 2 wedge shaped, with a pair of Lauterborn organs on short pedicels at apex; S 3 setae enlarged, plumose; pecten epipharyngis of 3 serrated scales; premandible with 3 teeth; squat ventromental plates separated medially by at least the width of the 3 median mental teeth; and the portable, curved, tubular sand case.



NOTES: This taxon has not been found in Florida, but may eventually be collected in the northern tier of counties and/or the Panhandle. There are two known species in the Southeast US; they were tentatively placed in *Constempellina* by Epler (2001) but differ from that genus in the pupal and adult stages (see Epler et al. 2013: 457). The two species can be separated by their S 3 setae; those of sp. A, known from North Carolina, are thick and densely plumose; those of sp. B, known from Ohio and Alabama, are more thinly plumose.

The larvae are stream dwellers; the portable sand cases they construct are similar to those of *Constempellina*, *Neostempellina* and *Stempellina*.

ADDITIONAL REFERENCES: Epler et al. (2013)

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CHECKLIST OF THE TANYTARSINI OF FLORIDA

Cladotanytarsus Kieffer*acornutus* Jacobsen & Bilyj*aeiparthenus* Bilyj*cf. daviesi* Bilyj*latissimus* Gilka*subletteorum* Gilka*viridiventris* (Malloch)

[= sp. B Epler]

sp. A Epler

sp. C Epler

sp. D Epler

sp. F Epler

sp. G Epler

sp. H Epler

sp. I Epler

Micropectra Kieffer*dives* (Johannsen)/*geminata* Oliver & Dillon*xantha* (Roback)

sp. A Epler

sp. F Epler

Neostempellina Reiss*reissi* Caldwell[= *Stempellina* sp. C Epler]*Paratanytarsus* Thienemann & Bause*dissimilis* (Johannsen)

[= sp. A Epler]

dubius (Malloch)*longistilus* Bolton, Ekrem, Sublette & Sublette[= *Micropectra* sp. D Epler; *Tanytarsus* sp. W Epler]*quadratus* Sublette

[= sp. C Epler]

recens (Sublette)

sp. B Epler

sp. 2 Epler

Pontomyia Edwards*natans* Edwards*Rheotanytarsus* Thienemann & Bause*exiguus* (Johannsen)*pellucidus* (Walker)[= *distinctissimus* Brundin]*Stempellina* Thienemann & Bause*cf. subglabripennis* (Brundin)

sp. A Epler

Stempellinella Brundin*leptocelloides* (Webb)*fimbriata* Ekrem

[= sp. A Epler]

Sublettea Robackprobably *coffmani* (Roback)*Tanytarsus* Wulp*acifer* Ekrem, Sublette & Sublette*allicis* Sublette

[= sp. C Epler, in part]

becki Ekrem, Sublette & Sublette*Tanytarsus* (continued)*cf. bromelicola* Cranston*buckleyi* Sublette

[= sp. C Epler, in part]

confusus Malloch*dendyi* Sublette*epleri* Ekrem, Sublette & Sublette*gibbus* Ekrem, Sublette & Sublette

[= sp. S Epler]

guerlus (Roback)*hastatus* Sublette & Sasa

[= sp. E Epler, sp. Q Epler]

limneticus Sublette[= *Nimbocera pinderi* Steiner & Hulbert]*mendax* Kieffer[= *xanthus* Sublette]*messersmithi* Ekrem, Sublette & Sublette

[= sp. Y Epler]

neoflavellus Malloch*pathudsoni* Ekrem, Sublette & Sublette*sepp* Ekrem, Sublette & Sublette

[= T. sp. A Epler]

wirthi Ekrem, Sublette & Sublette

sp. B Epler

sp. D Epler

sp. F Epler

sp. G Epler complex

sp. H Epler

sp. I Epler

sp. J Epler

sp. K Epler

sp. L Epler complex

sp. M Epler

sp. N Epler

sp. O Epler

sp. P Epler

sp. R Epler

sp. T Epler

sp. U Epler

sp. V Epler

sp. X Epler

sp. Z Epler

sp. alpha Epler

sp. beta Epler

sp. gamma Epler

sp. delta Epler

sp. epsilon Epler

Zavrelia Kieffer, Thienemann & Bause*aristata* Ekrem & Stur