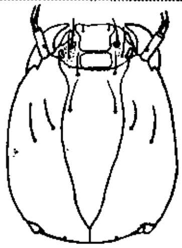

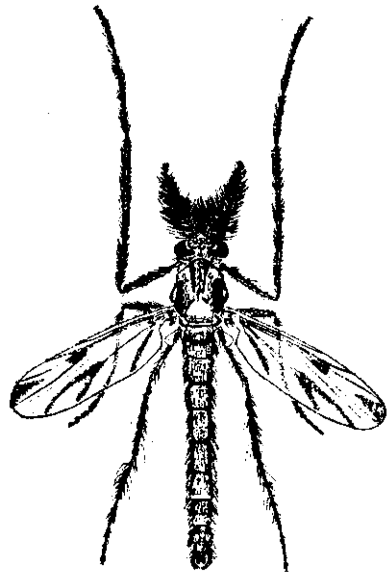

Identification Manual

for the

Larval Chironomidae (Diptera)

of

Florida

REVISED EDITION 1995

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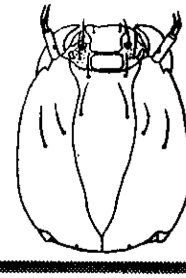
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FLORIDA



State of Florida
Department of Environmental Protection
Division of Water Facilities
Tallahassee

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Identification Manual for the Larval Chironomidae (Diptera) of Florida

by

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PREFACE TO THE 1995 REVISED EDITION

The first edition of this manual (Epler 1992) has met with great success. However, the taxonomy and our knowledge of the Chironomidae continues to change and grow. A summary of the changes follows.

Although it may appear that some names have "changed" (i.e., *Djalmabatista pulchra*), some of these changes are necessary to allow the species name to agree in gender with the genus name.

New keys are provided for *Corynoneura, Thienemanniella, Kiefferulus* and *Tanytarsus*. Revised/improved keys are provided for *Ablabesmyia, Nanocladius, Chironomus, Parachironomus* and *Polypedilum*.

Some of the taxonomic changes made are:

Nanocladius alternantherae Sublette is considered a junior synonym of *N. rectinervis* (Kieffer).

Orthocladiinae genus F is considered to be a *Parametriocnemus;* the single species known from Florida is now called *Parametriocnemus* sp. F Epler.

Chironomus pungens (Townes) is moved to *Kiefferulus*, where it becomes *K. pungens* (Townes).

The genus *Nimbocera* is considered a junior synonym of *Tanytarsus*. *Nimbocera limnetica* (Sublette) is moved to *Tanytarsus* and becomes *T. limneticus* Sublette.

Parachironomus sp. A is *P. supparilis* (Edwards); *P. chaetoalus* in the key in Epler (1992) is now called *Parachironomus* sp. B Epler (see Notes on species under *Parachironomus*).

And lots of other new information has been added!

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INTRODUCTION

The midge family Chironomidae is usually the most abundant macroinvertebrate group, in numbers of species and individuals, encountered in the majority of freshwater aquatic habitats. In addition, chironomids have invaded the sea and the land, being found 30 m down in the ocean and in dry hardwood forest litter. They form an integral part of the foodweb, serving as food for larger invertebrates, fish and birds. Many larvae possess giant chromosomes and have been used extensively in genetic research. Chironomids are recorded as pests in rice fields, and are considered nuisances when large emergences occur in close proximity to human habitations. They have also been implicated in allergenic reactions in humans (see Ali (1991) and Armitage et al. (1995) for an overview of pestiferous Chironomidae). However, to benthologists, the Chironomidae have long been known as potential indicators of water quality. Unfortunately, many of the larvae are very difficult to identify, and much of the literature is burdened with studies done with Chironomidae that were misidentified. A great deal of the confusion is due to the complexity of the taxonomy of the family. "Name-changing" may have appeared rampant to the non-taxonomist, but to date the result has been a more workable knowledge of the group, where characters from all life stages are employed to separate species and delimit genera. Ashe (1983) gives an excellent review of the taxonomic problems the Chironomidae have gone through. A comprehensive update of our knowledge of the biology and ecology of the Chironomidae has recently been published (Armitage et al. 1995).

Much of the confusion concerning identifications was settled in 1983 when the first volume of the "Holarctic Keys" (Wiederholm 1983; 1986; 1989) was published. The volumes combine keys, excellent illustrations and, most importantly, diagnoses for each genus. However, time and taxonomy march on. Many new genera and previously unknown larvae have been described and some previously described genera have been reorganized. In addition, the Holarctic keys bear a strong Palaearctic influence (due to the location of most of the authors). The excellent keys offered by Coffman & Ferrington (1984) are also out of date and lack diagnoses. The present manual is an attempt to update the taxonomy of the group for Florida, and to provide identification materials to allow species-level identification of many taxa. Beck & Beck (1959) provided a checklist of the Chironomidae of Florida; they listed 110 described species. This revised edition of the manual lists 122 described genera including about 280 described species known from the state (Appendix A). When one adds 9 undescribed genera and about 65 undescribed species, the totals for the state can be estimated at about 130 genera with about 350 species. But, rather than demonstrating the extent of our knowledge of the Chironomidae, this manual reflects our ignorance.

HOW TO USE THIS MANUAL

Area covered: This manual was written for use in the state of Florida, and will identify all genera known to me from the state, as well as many which may occur here but have not yet been recorded. Thus, it should identify most genera encountered on what is commonly called the Southeastern Coastal Plain, remembering that the greater the distance one is from Florida, the less effective the manual will be. This caveat applies to identifications made at the subfamily, generic and specific level. No doubt "odd" larvae will continue to turn up in Florida, especially in the northwestern and extreme southern portions of the state. Currently extralimital Nearctic genera with such potential include *Radotanypus, Thienemannimyia, Trissopelopia, Heleniella, Mesocricotopus, Sublettiella* and *Parapsectra*. With three exceptions, most of these larvae can be identified using Pinder & Reiss (1983); the larva of *Radotanypus* was described by Epler (1986b); see Murray & Fittkau (1985) for *Thienemannimyia*; the larva of *Sublettiella* is unknown.

Illustrations and abbreviations: The majority of the illustrations in this manual were produced by the author from Florida specimens, most of which were reared or otherwise associated. Most are somewhat schematic in that all parts of a structure were not drawn. For example, in the Chironominae, often only one ventromental plate was drawn, and only a portion of the ventromental striae were shown; premandibular brushes were not shown unless they were an important character, and the pecten mandibularis was not fully drawn on most mandibles. When specimens were unavailable or not suitable for illustration, figures were borrowed from other sources. Thus, some illustrations differ in the amount of shading, structures included, etc. If the illustrations were from publications other than my own, the source of each figure is cited at least once within the manual.

To reduce confusion, I have used few abbreviations. Those used are **AR** - antennal ratio (length of segment 1/remaining segments); **l.s.** - labral sclerite; **p.e.** - pecten epipharyngis. These structures and others are illustrated on pages 1.10-1.11.

Taxonomy: In general, I have not used the author's name(s) for genera and species within the text and keys; complete names are listed in Appendix A. For arrangement of tribes and subgenera, see Hudson et al. (1990) or Oliver et al. (1990).

Many larvae are undescribed or unassociated with the adult stages. Species definitions in the Chironomidae are, for the most part, based on the adult male. For several genera, several undescribed larval "types" are known. These have been given letter or number designators, such as "*Tanytarsus* sp. A" or "Chironomini genus III". These may represent taxa with described adults, or species new to science. When reared or otherwise associated with an identifiable life stage, the names can be updated. Several new species were reared during the course of this study. However, a manual such as this is not the proper place to publish new names and descriptions. Thus, as is noted in the text, these new species will be described in papers currently in progress.

The Keys: It is assumed that the reader is familiar with the use of dichotomous keys. Numbers in parentheses following the couplet number indicate the couplet that led to that position. Illustrations are usually arranged from left to right and/or top to bottom with regards to the order of statements in the couplet(s). ***Keys are written for fourth instar larvae!*** Measurements are only valid for fourth instar larvae, but ratios may still be useful for other instars. If you are new to chironomids, you'll have to start with the key for subfamilies that starts on page 1.12 at the end of this chapter.

The Layout: This manual is divided into nine sections. Subfamilies are arranged phylogenetically; each subfamily has its own section; sections are paginated separately. Each key to genera is followed by "generic units" 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. Diagnoses in this manual pertain to Florida taxa only! Although this manual is intended for stand-alone use, it will be most effective when used in conjunction with the more detailed diagnoses in Wiederholm (1983, 1986, 1989).

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. It should be understood that the Holarctic Keys (Wiederholm 1983, 1986, 1989) are *always* considered to be an additional reference. If there are no recent or pertinent references available, this section is omitted.

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

ACKNOWLEDGEMENTS

This manual is the result of the combined resources and helpfulness of many friends and colleagues. A great debt is owed to the pioneers of Florida Chironomidae studies, Elizabeth C. Beck and William M. Beck, Jr. Their collection, now mostly housed at Florida A & M University (FAMU) in Tallahassee, was examined for many records; a portion of their reared material was discovered and utilized. Additional useful material in the FAMU collection was that collected and curated by Dr. Annelle R. Soponis; much of the reared material used in preparation of this manual was found there. I am indebted to Dr. William L. Peters and Jan Peters for allowing access to the collection at FAMU.

Although the collection at FAMU was extremely useful, this study was greatly enhanced by the generous loan of material from several colleagues who lent extensive and/or important material from their collections: Michael J. Bolton (Ohio EPA), Broughton A. Caldwell (Georgia EPD), David L. Evans (Water & Air Research, Gainesville), Dr. Leonard C. Ferrington, Jr. (University of Kansas); Michael W. Heyn (Clemson University), William R. Karsteter (Environmental Planning & Analysis, Tallahassee), Robert P. Rutter (formerly with Kevin L. Irwin Consulting Ecologist, Inc., Fort Myers; now with FDEP, Punta Gorda) and Dr. J.E. Sublette (formerly at University of Southern Colorado, Pueblo; now in Tucson, AZ). Others who made specimens available were: Robert A. Mattson (Suwannee River Water Management District), Doug G. Strom (FDEP, Port St. Lucie) and Dr. David Wahl (American Entomological Institute, Gainesville).

I was also greatly assisted by several colleagues who provided reviews of the manuscript. Bohdan Bilyj (Otobicoke, Ontario, Canada) provided an in-depth review of the Tanypodinae section and allowed use of unpublished data from his current revision of *Larsia*. Michael W. Heyn allowed use of unpublished data from his *Glyptotendipes* revision. Others who provided valuable information, review or comments were Broughton A. Caldwell, Rick Cantrell (FDEP, Tallahassee), William R. Karsteter, Dr. F. Reiss (Zoologische Staatssammlung, Munich, Germany), Robert P. Rutter, Dr. Ole A. Sæther (University of Bergen, Bergen, Norway), David Smith (USEPA, Athens, GA), and Maria V. Spence (City of Lakeland). I owe a special debt to Russel Frydenborg and Kathy Lurding (FDEP, Tallahassee) for their continuous enthusiastic support, checking and reviewing the keys, and providing some of the unusual material discovered during this study.

Dr. Barry Merrill and Judy Merrill (Merrill Consultants, Dallas, TX) provided the bulk of the computer hardware utilized to produce this manual. I owe them a great debt, for without their support, I could not have produced this study.

This study could have never been started without the foresight, keen enthusiasm and hard work of James L. Hulbert (FDEP, Orlando). Jim's persistence got the contract through government mire, and kept things running smoothly throughout the study.

For this revised edition of the manual, I am again grateful for the comments and specimens provided by many people. For specimens, new records and information, I am indebted to Michael J. Bolton, Broughton A. Caldwell, Marie Dao (Reedy Creek Improvement District), Dr. Leonard C. Ferrington, Jr., Russ Frydenborg and Kathy Lurding, Peggy Morgan (FDEP, Tampa), Dr. M.L. Pescador (FAMU), Robert P. Rutter, Martin Spies (Orange Co. Vector Control District, Garden Grove, CA), Doug G. Strom, and Chris Wright (University of Kansas). Don Azuma and Dr. Jon Gelhaus (Academy of Natural Sciences of Philadelphia), Dr. J.E. Sublette and Dr. David Wahl provided important type material for comparison. Some important comparative material from Costa Rica was provided by Drs. Bern Sweeney and John Jackson (Stroud Water Research Center, Avondale, PA).

Last, and certainly not least, I am forever grateful to my wife Linda for her support, love and understanding throughout these projects.

SPECIMEN PREPARATION

Materials and equipment required:

Microscopes: You will need a dissecting (stereo) microscope for sorting larvae and mounting them on microscope slides. A compound microscope is necessary for identification; one with phase-contrast optics or better is recommended. The compound microscope should have several objective lenses: a low power (4X, which gives "40 power" with a 10X eyepiece) scanning lens, which makes it easier to locate your specimens on your slide, a 40X ("400 power") lens for most work and a 100X ("1000 power") oil-immersion lens; 10X and 20X objectives are also desirable, but are not necessary. Phase-contrast optics and a high power oil-immersion lens may be expensive, but are necessary for observing minute hyaline structures such as the S I, labral lamellae and the apical sensilla of the maxillary palp. Another necessity is a measuring reticle (a glass disc etched with a grid or ruler line, which fits into one of the microscope's eyepieces); this accessory is needed to provide accurate length measurements (often the only way to separate some species) and to calculate ratios. Be sure to calibrate your reticle with a stage micrometer (usually, a precisely etched glass slide is used) at all magnifications you will be using.

Microscope slides, cover slips (glasses) and boxes: Whatever size you find convenient. Round or square cover slips from 12 to 22 mm work well for most larvae. I favor the round ones because they allow more rotation and better positioning of your specimens. Good slide boxes for maintaining reference collections are a necessity.

Labels: These can be stick-on labels or, for large numbers of slides, transparent ("Scotch") tape. Use a dark pencil or a waterproof ink. Remember that a slide without a label is basically useless.

Mounting medium: CMC-10 (and variants) is widely used and is satisfactory for most applications. It does have a tendency to shrink away from the cover slip and produce air fingers, so ringing slides with additional mountant is recommended; and crystallization over time can be a problem. Much of the material in the Beck collection at FAMU was mounted in CMC; much of this material is in poor or unusable condition because of air fingers/bubbles and crystallization. Mounting material in Canada balsam produces superior slides, but is much more time consuming. All reared material should be mounted in Canada balsam, or another permanent medium, such as Euparal.

Sorting Chironomidae:

Mounting every chironomid in a sample is often not feasible. Many Chironomidae can be sorted to genus, even species, while still in fluid preservative. Some characters to use in sorting are:

1. Shape of head capsule. Some larvae have rounded head capsules, others are apically pointed. The triangulum occipitale provides a good character to separate larvae of *Kiefferulus* and *Goeldichironomus* (where it is large) from those of *Dicrotendipes* and *Chironomus* (small) while in fluid preservative.

2. Color or markings of the head capsule. The dorsum of the head may bear stripes, spots or bars. The postmentum or the posterior margin of the head capsule may be darkened.

3. Color of body. Best seen with live or fresh specimens. Some larvae may be white, cream, red, green or even purple!

4. General appearance of body. Is it "hairy"? Are the setae scattered or arranged in lines along the side of the body? Are the setae at the end of the abdomen long, short or absent? Is the body curved or the head distinctly bent?

5. Tubules ("gills"). Are ventral or lateral tubules present near the end of the abdomen? If present, how many pairs are there and how are they shaped?

6. Antennae. The shape and length of the antennae are diagnostic for many taxa. Note that the Tanytarsini have their antennae mounted on elongated bases. Note also that some larvae have retractile antennae (they can be pulled into the head capsule).

7. Size. Although different taxa may be different sizes, remember that different instars of one species will be of different dimensions.

Slide making: CMC.

1. Start with *clean* slides and cover slips!

2. Label the slide! Slides without labels are useless. Remember that a microscope inverts the image. If you want to be able to read your label and see your specimen oriented correctly, rotate your slide 180° after labeling (i.e., your slide label will be upside-down, not under the slide!). Then mount your specimens with the head "up" (see 4 below).

3. Place a drop or two of CMC on the slide. This will vary with how many larvae you are mounting and how big they are. You will learn this fast. It also sometimes pays to use an excess of mountant; when squeezed out from under the cover slip, it can be allowed to run over the edge of the slip. This aids in forming a seal, which prevents air fingers from forming.

4. Specimens may be mounted from alcohol or after a brief bath in distilled water. Using forceps or a needle, place the larva(e) in the mountant, *ventral side up*. Remove major bubbles with a needle. Don't worry about getting all the bubbles out. If you have a large series of what appears to be one taxon, you can mount a few with the dorsal side up. This can give better views of the frontal apotome necessary for identification in genera such as *Goeldichironomus*.

5. Using clean forceps, place the cover slip over the mountant. Do this by gently lying one side down first, then releasing the slip to allow it to slowly settle over the larva(e). Don't drop the slip quickly; this will trap air under the cover slip.

6. Using forceps or the eraser end of a pencil, press the cover slip onto the larva(e) with sufficient pressure to spread the mandibles. This may require a good deal of pressure; be careful not to break the cover slip. It may be necessary to really "squash" the larvae! It is important to spread the mandibles and labrum in order to make structures visible which must be observed at 1000X. You may also orient larvae at this point by pushing or pressing on the cover slip in various ways.

If you are using large cover slips (22 X 22 mm), as many as 10 (or more) larvae may be mounted under one cover slip. Orient all larvae so that their heads are pointed in the same direction. It is often difficult to get all the larvae lying flat on their backs. In such cases, they can be laid on their sides, all facing the same direction. After the cover slip is placed over them, push it to one side, and most of the larvae will rotate onto their backs. With some practice, this becomes easy.

Some larvae may require that you remove the head capsule to orient it correctly. The head and body may be mounted under separate cover slips *on the same slide*; or with practice both can be mounted under one cover slip. Never discard any body parts!

7. Set the slides on a flat surface to dry, preferably on a slide tray in a well ventilated area. Drying may take 1-3 days, but can be sped up by placing slides in a drying oven. Do not dry slides at temperatures above 55° C. Do not stand slides on edge!

8. The next day, or after several hours if using a drying oven, inspect the slides for air holes or pockets. Fill these by placing a drop of CMC by the edge of the cover slip near the problem area(s); capillary action will pull the mountant under the cover slip in most cases. It may be necessary to ring the slide with more CMC to prevent further problems with air intrusion. I have found that it is not necessary to use anything other than CMC to ring CMC. It is a good idea to always ring slides you are planning on keeping.

Mistakes can be easily corrected by remounting. CMC is water soluble; soaking the slide(s) overnight (or longer, if the slide is old) in a covered container will allow you to remove the cover slip, add more mountant, reorient the larva(e) and add a new cover slip.

Remember, however, that CMC is not as permanent a mountant as Canada balsam or Euparal. I often use Canada balsam thinned with cellosolve, rather than xylene. Specimens are placed in hot 5-10% KOH for 5-15 minutes (until cleared), then distilled water, followed by glacial acetic acid and finally straight cellosolve. Then follow instructions as above (using balsam as the mountant), but you won't have to exert as much pressure to expose mouthparts. Note that the medium may cloud a bit initially, but this clears with heating and drying. Drying slides may take as long as three weeks, or more. Note also that shed larval skins do not require clearing before mounting.

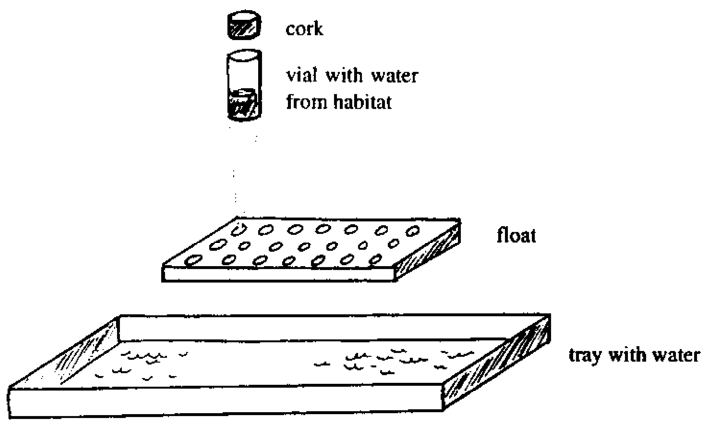
THINGS YOU CAN DO TO AID IN IDENTIFICATION

1. Maintain a voucher specimen collection of labeled slides. This is especially important for taxa given letter or number designators in lieu of "real names". Voucher specimens should be kept for every study.
2. Maintain a reference library, and keep up with the literature. The following publications are most useful: Armitage et al. (1995); Ashe (1983); Hudson et al. (1990); Oliver et al. (1990);

Sæther (1980); Simpson (1982); Wiederholm (1983, 1986, 1989). Do more than just read the keys in a publication!

3. Utilize pupae for identification. Often, pupae will be found with larval skins attached. These are easy to identify, and provide additional information useful for determination. Wiederholm (1986) provides keys and diagnoses which will identify the majority of Florida's Chironomidae genera. It is anticipated that a pupal key for Florida Chironomidae may be produced at a future date. Pupae are very important: I have seen countless samples in which many taxa were represented only by their pupal stages; imagine what this may do to diversity indices, if pupae are only listed as "unidentified Chironomidae pupae".

4. Rear larvae! This can not be stressed enough! Many common taxa are just not identifiable at the species level without another associated life stage (*Kiefferulus, Glyptotendipes, Dicrotendipes, Chironomus, Polypedilum,* and *Ablabesmyia,* to name a few), sometimes even at the generic level (*Cricotopus, Orthocladius*). Rearing is simple: collect live larvae in the field. While in the field, place each larva in a separate 2-4 dram vial with a small amount of water from the habitat, and place a cork or other permeable stopper in it (don't use cotton! Adults lose legs and antennae in it). Maintain an even temperature (this may require using a cooler; larvae are difficult to overcool for short periods, but succumb easily to high heat) and return to the lab. Or take a container (cooler) with samplers with live insects back to lab, and sort larvae there. In the lab, place the vials in rafts floating in water (see figure below), or if air conditioned, leave them



A simple rearing set-up

at room temperature. I've had good results at temperatures ranging from 15°-20+° C. This will vary depending on what and where you have collected, time of year, etc. Check vials daily. If you have collected fourth instar larvae, they may pupate, and eventually an adult may emerge. Allow the adult to harden for several hours or a day, and then knock it into the water with a squirt of alcohol. There you have it: an adult with its shed pupal and larval skins! Be sure to add preservative in an adequate strength (70-80% ethanol). Incomplete rearings (larva died in transition to pupa, or pupa died before adult emerged) can also be extremely valuable.

Reared larvae may be sent to experts for identification. You might be the person who makes an important association which allows better identifications for everyone. And, rearing and observing live larvae, pupae and adults can be fun!

5. Have your identifications verified by a qualified expert. Unfortunately, there are very few such experts in this country. Someone who has memorized a few keys and can say a few

long scientific names is not necessarily an expert! Although quality assurance may be closely monitored for such things as water chemistry, sampling methods and preparation, often little is done to assure that identifications are correct. This is especially important in long term monitoring programs. Identification can be a very technical and difficult process; it may take years and the study of thousands of specimens to develop the necessary skills. Don't identify specimens to a level beyond your capability. There is no shame in listing a specimen as a "*Dicrotendipes* sp." when you can not be positive of your determination at the species level (without associated material this may be necessary for many larvae).

If you are uncertain of a generic or species identification but are relatively sure that you're correct, you can use the modifier "cf.". This is an abbreviation for a Latin term (*conferre*) that means "compare". If you're uncertain about the genus, use: "cf. *Meropelopia*" (or whatever genus); if uncertain of the species use: "*Goeldichironomus* cf. *natans*" (or whatever). Question marks can also be used, but many workers place them incorrectly, which leads to confusion! This confusion is best avoided by not using question marks in names. Also, do not use the modifier "nr." (an abbreviation for "near"). This implies a close phylogenetic relationship between your specimen and another species. Many keys are artificial constructs used to identify organisms; they do not necessarily imply phylogenetic relationships. Thus if your specimen keys to a couplet but doesn't quite fit, it does not automatically follow that your specimen is "near" the other taxa in that couplet.

Before you send specimens to an expert, contact him/her and find out if he/she has the time to see your specimens, what fees may be charged and how the specimens should be prepared. See the Bulletin of the North American Benthological Society, Summer 1991, for a list of some taxonomists.

MORPHOLOGY

The majority of important structures are illustrated on the following pages. Terminology used in this manual follows Sæther (1980), Wiederholm (1983) and Epler (1987; 1988b). A detailed account of chironomid morphology is beyond the scope of this identification guide; however, a few structures bear additional mention.

In all subfamilies, the antennae provide important characters. A commonly used character is the antennal ratio, **AR**. This is the length of the basal antennal segment divided by the combined lengths of the remaining segments (the remaining segments are collectively termed the **flagellum**). The apical segments are sometimes difficult to discern, especially in those genera with 7- or 8-segmented antennae; phase-contrast optics aid in observing these structures.

The **prementum** is membranous structure located dorsal of the mentum that bears several structures important for identification.

Tanypodinae. The sensory structures at the apex of the maxillary palp have proven to be important in the generic identification of members of the *Thienemannimyia* group. Although previously called setae, this is anatomically incorrect. I have used **b** "**seta**" for the multi-segmented sensillum used to differentiate genera. In most specimens, this must be observed under an oil-immersion lens. It may take some practice before you are able to distinguish this structure from the other sensilla present.

The **ligula** is one of the most obvious structures of the head capsule; it is a dorsal appendage of the **prementum**. It is important that ligula be flat in order to compare relative lengths of the teeth. Also associated with the prementum is the membranous, somewhat triangular **M appendage**, which lies dorsal to the ligula. The M appendage bears a longitudinal band of minute spinules, the **pseudoradula** (except in *Tanypus*).

The setae of the head capsule are also very useful in identifying genera and some species. These setae were reviewed in detail by Kowalyk (1985).

Orthocladiinae. On the dorsal anteromedial surface of the labrum are located several important setae and lamellae. Most important of these are the **S I** and **S II**, and the **labral lamellae**. These structures may be minute and hyaline, and are best observed with a phase contrast microscope using an oil-immersion lens. The **premandibles** are located ventrally of the labrum; they are paired structures, not present in the Tanypodinae, that are of importance in identification in the Orthocladiinae and the Chironominae.

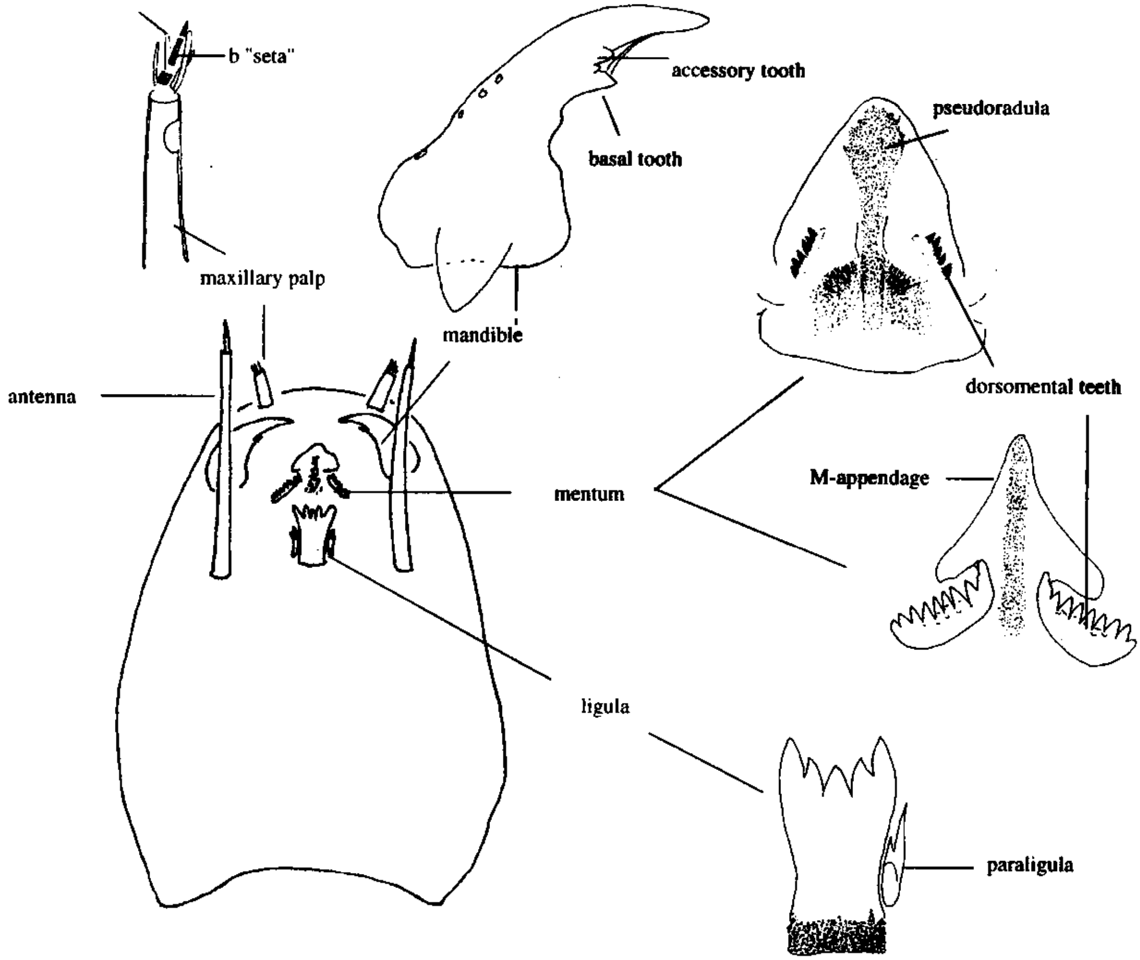
The **mentum**, sometimes referred to as the labial plate, labium or hypostomium, is one of the most noticeable structures of the head capsule. It is composed of a ventromentum and a dorsomentum. The **ventromental plates** are ventral and lateral extensions of the ventromentum. Their presence/absence and/or shape can be important. In some taxa a "beard", a group of setae, is present beneath these plates. In all Florida chironomids, with the exception of the prodiamesine *Odontomesa*, this beard is a **cardinal beard**; the setae arise from the cardo (the inner edge of the maxilla).

Another structure bears mentioning, the **pecten galearis** of the maxilla. This is a comb-like structure on the dorsal side of the maxilla useful in separating some genera.

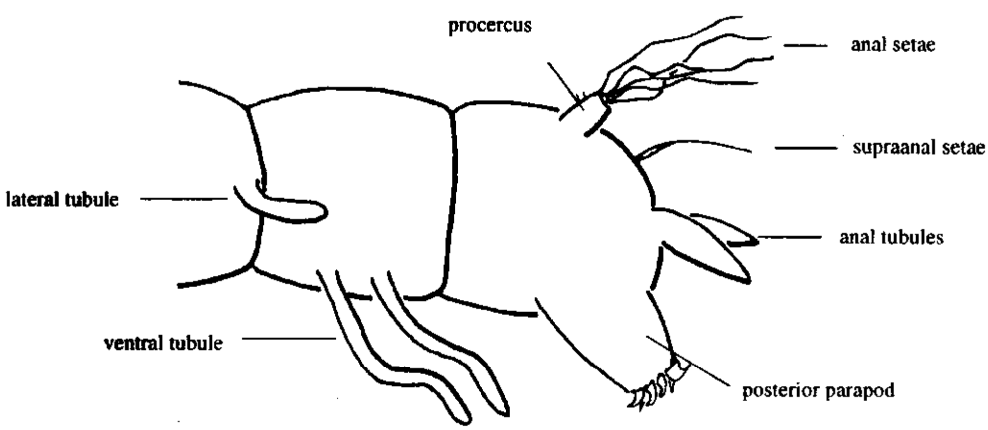
Chironominae. The dorsum of the head capsule is divided into several sclerites. An important structure is the **apotome**. The S3, or clypeal, setae often arise from a medial sclerite anterior to the apotome; this sclerite is then termed the clypeus. If the S3 setae are mounted on the apotome, it is called a frontoclypeal apotome (i.e., the clypeus is fused with the apotome); if they arise elsewhere, the apotome is termed a frontal apotome. If the setae do not arise on the clypeus, the medial sclerites anterior to the apotome are termed labral sclerites. In most cases I have avoided this complexity by using the broad term apotome for both types, and have called the clypeus and labral sclerites "medial sclerites anterior to the apotome".

The labral setae **S I** and **S II** are important for identifications in this subfamily also, as are the **premandibles**.

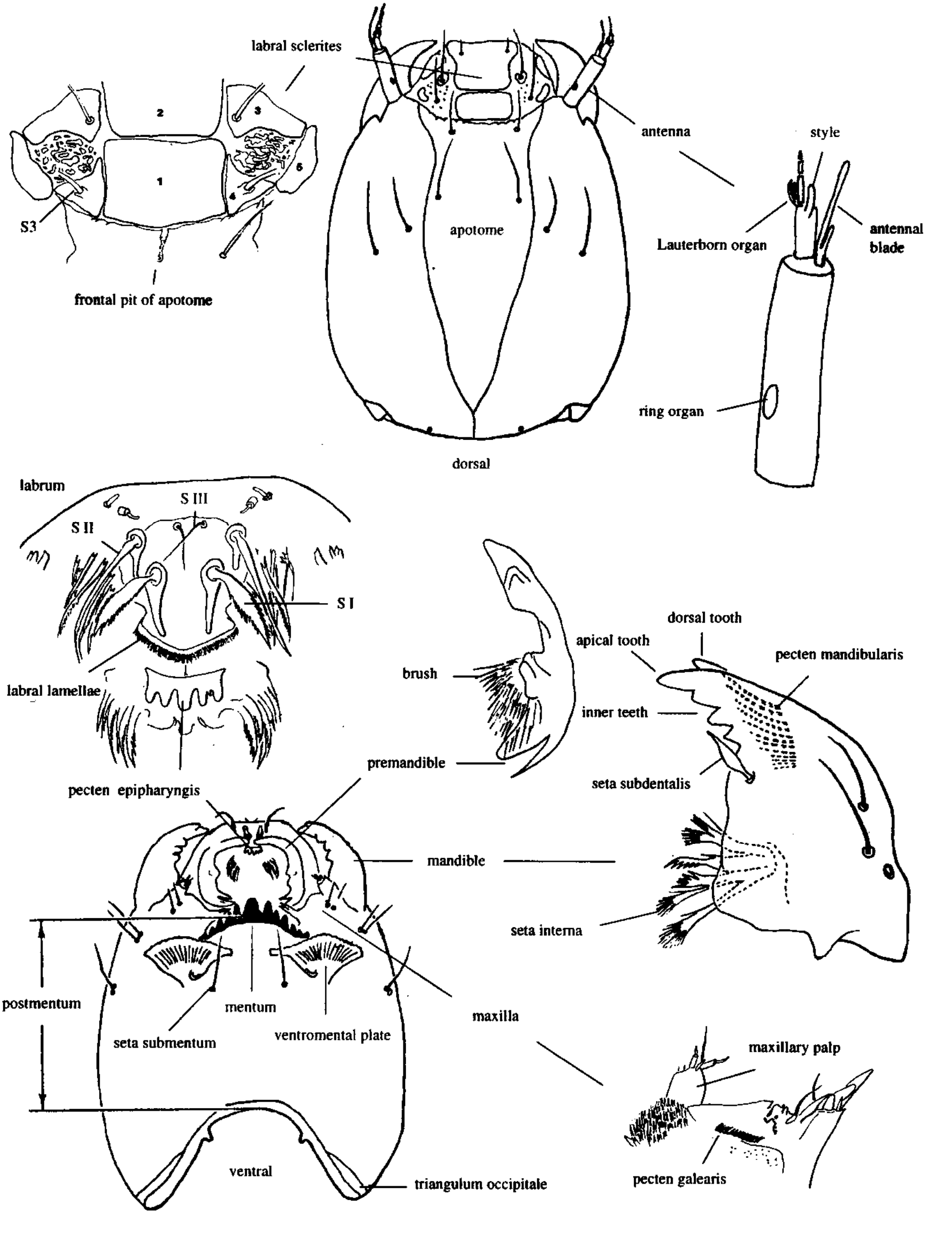
The **mentum** and striated **ventromental plates** are also of great importance in this subfamily. The ventromental plates lie under the maxillae; where the ventromental plates and the maxilla meet the striae of the ventromental plate are matched by grooves on the cardo of the maxilla; this area on the maxilla can be referred to as a maxillary plate. In the Chironominae, silk is extruded through the channels formed when the ventromental and maxillary plates are brought together. This silk is then combed by claws on the anterior parapods and is used to build tubes, catch-nets, etc.



Tanypodinae head structures



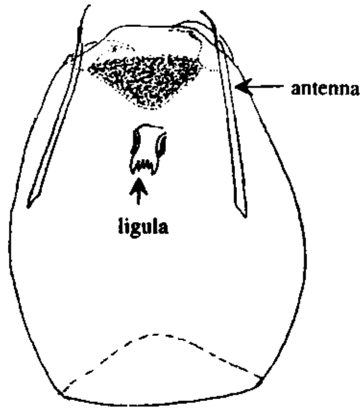
posterior body segments



Chironominae/Orthocladiinae head structures

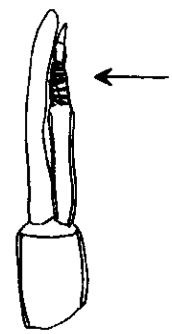
Key to Subfamilies of Florida Chironomidae

1 Antennae retractile (can be drawn into head); a large, well sclerotized ligula present .... **Tanypodinae** (Section 3)



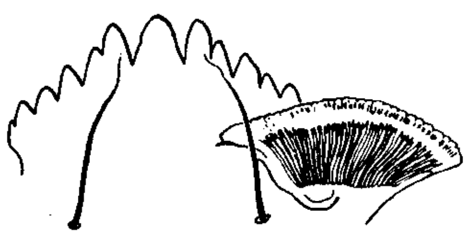
1' Antennae non-retractile (can not be drawn into head); ligula not well developed or sclerotized (if developed, usually brush-like) 2

2 (1') Third antennal segment annulated .. **Diamesinae** (Section 4)



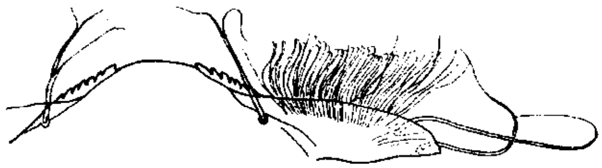
2' Third antennal segment not annulated 3

3 (2') Striated ventromental plates present (striae extremely reduced in *Stenochironomus* and *Xestochironomus*, which have a concave mentum with well developed teeth); no beard (setae) present beneath ventromental plates .... **Chironominae** (Section 7)



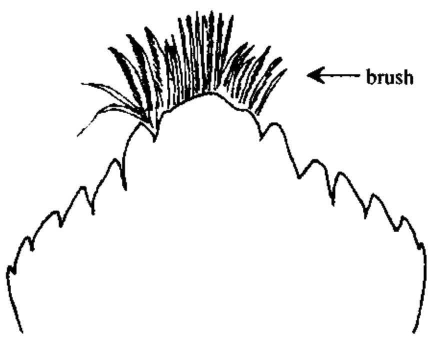
3' Ventromental plates, if present, never striated (a few ridges may be present in some *Nanocladius*); a weak to strong beard may be present beneath or adjacent to ventromental plates or mentum, or beard absent 4

4 (3') Ventromental plates large, with well developed beard; antennae 4 segmented ....**Prodiamesinae** (Section 5)

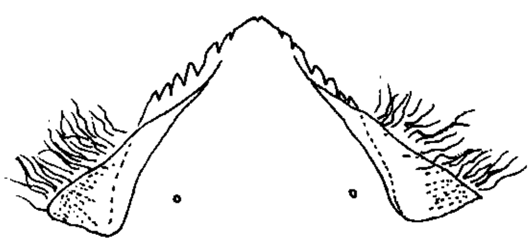


4' Ventromental plates smaller; if well developed then without beard or antennae with more than 4 segments 5

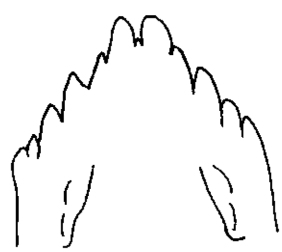
5 (4') Prementum with dense, well developed median brush; antennae short (less than 1/5 length of mandible), 4 segmented; ventromental plates and beard absent; exclusively marine in Florida .... **Telmatogetoninae** (Section 2)



5' Prementum without dense median brush; antennae usually longer and/or with more than 4 segments (if short with fewer than 5 segments, then segments indistinct and/or shorter than antennal blade); plates present or absent; mostly freshwater genera (at least one genus, *Clunio*, with 5 segmented antenna, is intertidal) ..... **Orthocladiinae** (Section 6)



with ventromental plates & beard



no ventromental plates or beard

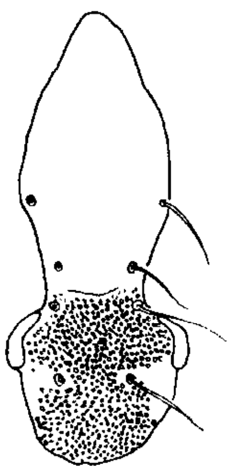
Subfamily TELMATOGETONINAE

DIAGNOSIS : **Antennae** 4 segmented, short (less than 1/5 length of mandible). **Labrum** with simple S setae. Labral lamellae absent. **Mentum** with 11-15 teeth, ventromental plates and beard absent. **Prementum** with dense, well developed median brush. **Body** with well developed anterior and posterior parapods. Procercus absent. Anal tubules absent in Florida species.

NOTES : This subfamily is apparently restricted to marine environments (coastal jetties; the Intracoastal Waterway) in Florida. Larvae are almost invariably associated with algae growing attached to rocks (jetties, etc.). Two genera, each represented by a single species, are present in Florida. Larvae of this subfamily may be mistaken for some orthoclad larvae, but can be easily distinguished by the dense median brush on the prementum, short antennae and the absence of procerci.

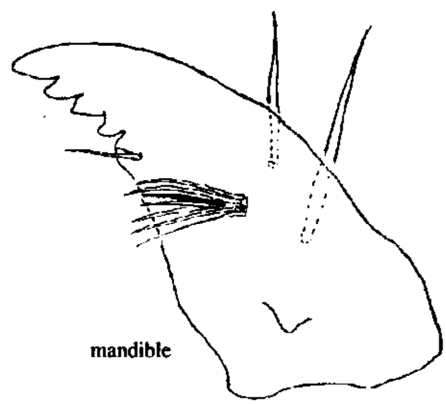
Key to the genera of Florida Telmatogetoninae

1 Anterodorsal portion of head without medial sclerites anterior to apotome; premandible simple; mandible apparently with 3 inner teeth or 4 inner teeth; mentum with 13 teeth .... ***Thalassomya***



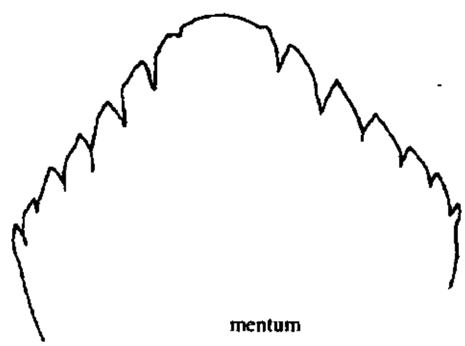
apotome

premandible



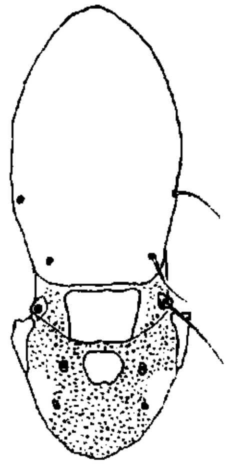
mandible

apex of mandible



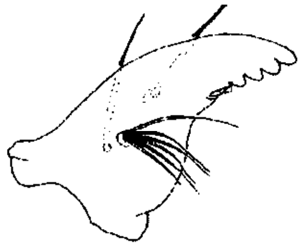
mentum

1' Anterodorsal portion of head with 2 well developed medial sclerites anterior to apotome; premandible with 3 blunt apical teeth; mandible with 4 inner teeth; mentum with 15 teeth (outer tooth very small; median tooth may appear notched) .... ***Telmatogeton***



apotome

premandible



mandible

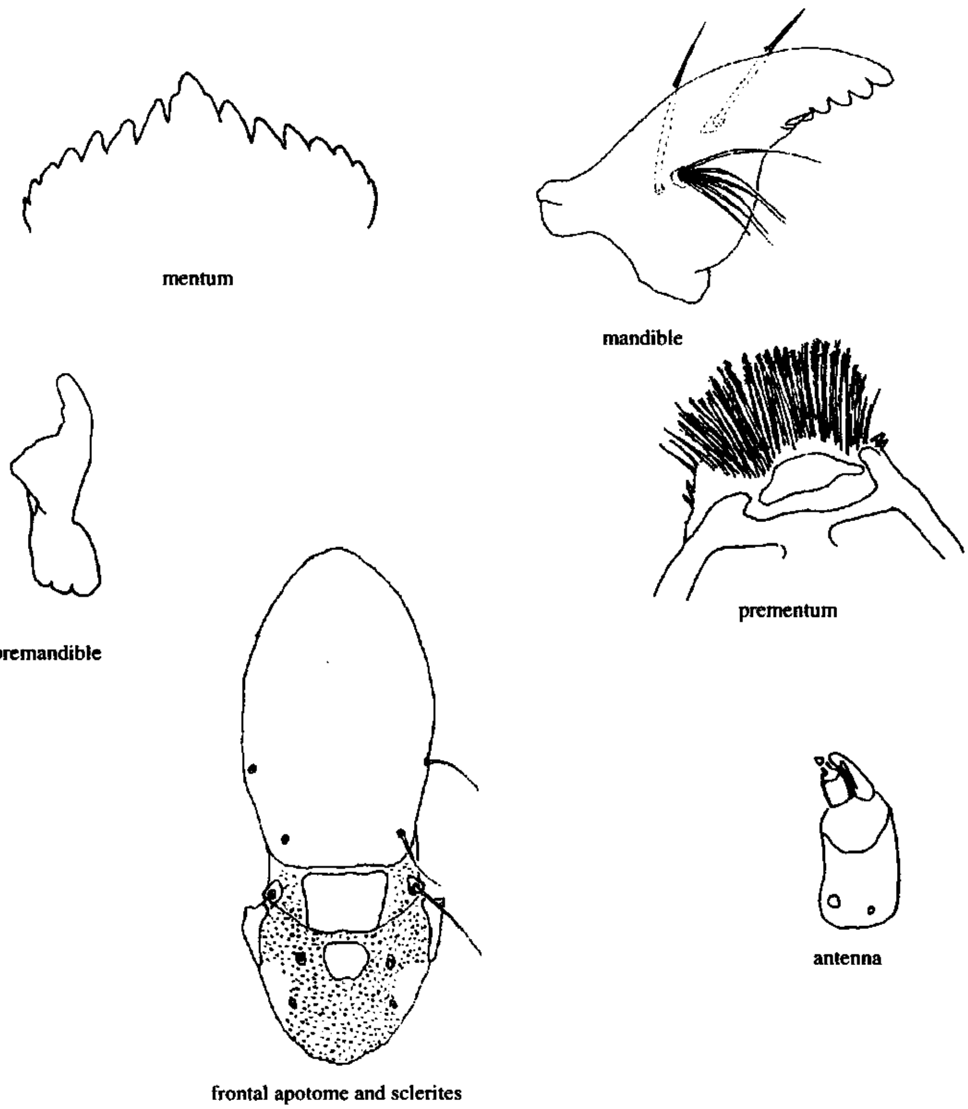
mentum

Genus ***Telmatogeton***

DIAGNOSIS: Separated from *Thalassomya* by the presence of sclerites anterior to the apotome; premandible with blunt apical teeth; and 15-toothed mentum.

NOTES: Only one species, *T. japonicus*, is known from Florida. I have found this species to be abundant in March on the rock jetties at St. Andrews State Recreation Area near Panama City; it has also been found on the jetties at the mouth of the St. Johns River near Mayport. Adults "swarm" on or immediately above the rocks of the jetties. Larvae and pupae can be collected from algae scraped from the rocks; larval and pupal exuviae are easily collected by skimming beachside foam produced by wave action.

ADDITIONAL REFERENCES: Tokunaga 1935; Wirth 1952.



Telmatogeton japonicus, larval structures

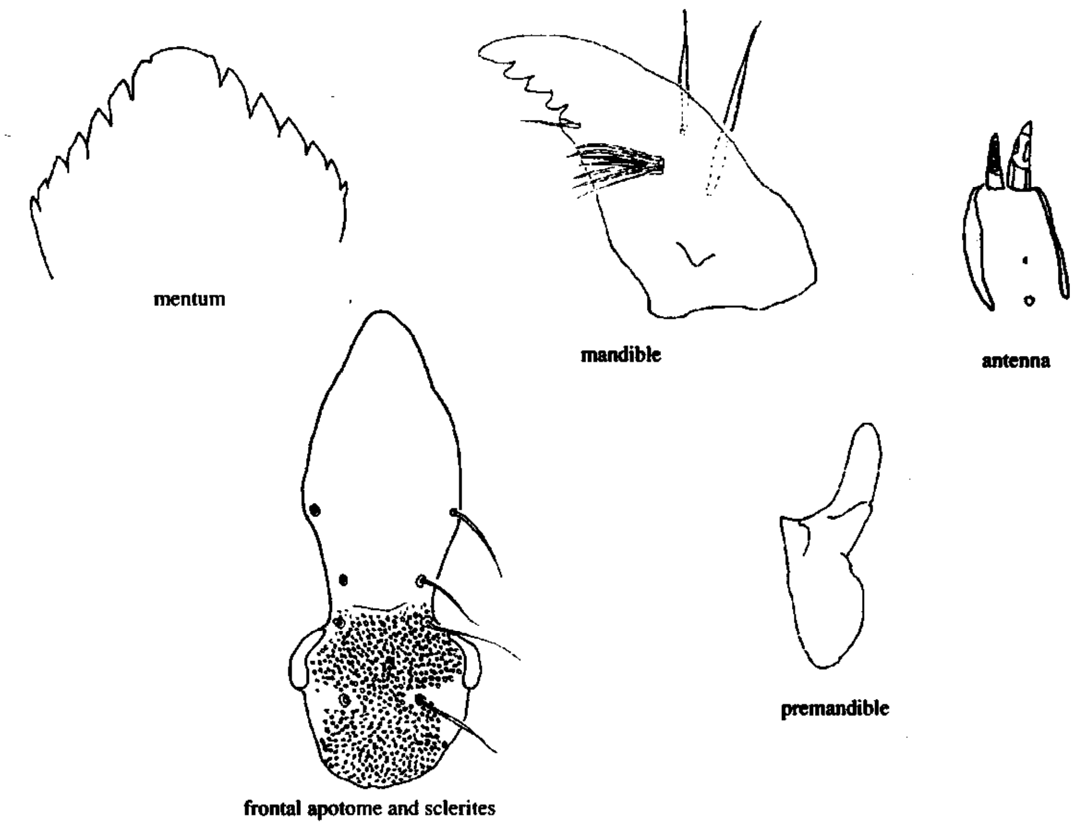
Genus *Thalassomya*

DIAGNOSIS: *Thalassomya* can be separated from *Telmatogeton* by the lack of distinct sclerites anterior to the apotome, the simple premandible and the lower number of teeth on the mentum.

NOTES: One species, *T. bureni*, is known from Florida. Wirth (1952) described the larva from specimens collected from algae on rocks at Lake Worth. I have collected larvae of *Thalassomya* from algae scraped from rocks in the Intracoastal Waterway in Pompano Beach, where they coexisted with larvae of the orthoclad genus *Clunio*. I have also collected adults of *T. bureni* on rock jetties in Key West.

Wirth (1952) described the larva of *T. bureni* with 11 mental teeth and 3 inner teeth on the mandible. However, specimens of *Thalassomya* I've collected possess 13 mental teeth (the outermost teeth are small and can be closely appressed to their neighbors) and 4 inner teeth on the mandible. Some specimens appear to have only 3 teeth, but apparently this is a result of the innermost tooth being closely appressed to the molar region of the mandible. My specimens were not reared; if one assumes only one species occurs in Florida, they represent *T. bureni.*

ADDITIONAL REFERENCES: Wirth 1949; 1952.



Thalassomya bureni, larval structures

Subfamily Tanypodinae

DIAGNOSIS: Antennae usually 4 segmented (5 in *Bethbilbeckia*), retractile into head capsule. **Labrum** with sensillae usually simple, occasionally multibranched, on pedicels or with expanded bladder-like bases. Labral lamellae absent. **Mentum** with large membranous triangular M appendage; dorsomental teeth present as separate or fused horizontal plates, in longitudinal rows, or as a few usually blunt teeth located laterad, or apparently absent. **Prementum** bears a large, well sclerotized 4-7 toothed ligula. **Body** with well developed procerci and anterior and posterior parapods; with or without lateral fringe of setae, sometimes with long setae. Anal tubules usually well developed in freshwater forms; reduced in brackish water taxa.

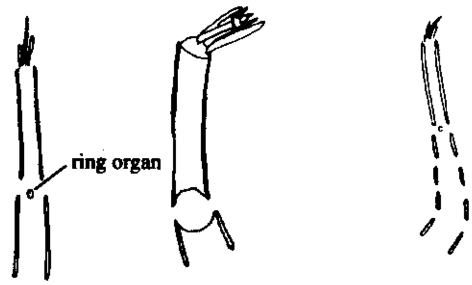
NOTES: Many members of this subfamily are free swimming/crawling predators; some apparently burrow in bottom mud. Larvae are found in a variety of aquatic habitats, from seeps to streams/rivers, ditches, ponds and lakes.

Most Tanypodinae genera are easily identified. However, one group of Pentaneurini, the *Thienemannimyia* group, presents some problems. You may have to be happy with an identification of "*Thienemannimyia* group sp." for many early instar larvae of this complex of closely related genera, which in Florida includes *Conchapelopia, Hayesomyia, Helopelopia, Meropelopia* and *Rheopelopia* (the genus *Thienemannimyia*, for which the group is named, is not known from Florida). Mature fourth instar larvae with developing pupal characters may be positively identified by the developing thoracic horn; this structure is illustrated for each of these genera in the diagnoses following the key.

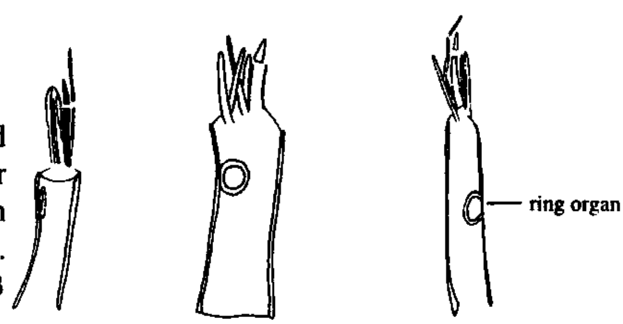
Key to the genera of Florida Tanypodinae

(The larva of *Cantopelopia* is unknown)

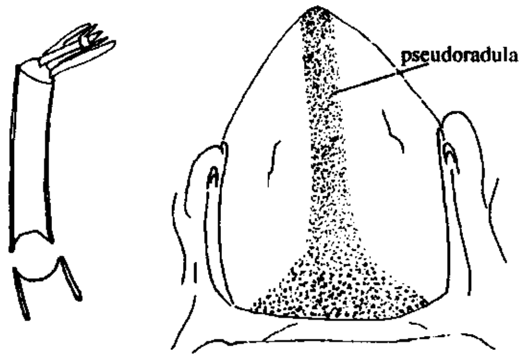
1 Maxillary palp with 2 or more distinct, well sclerotized segments; ring organ located intersegmentally 2



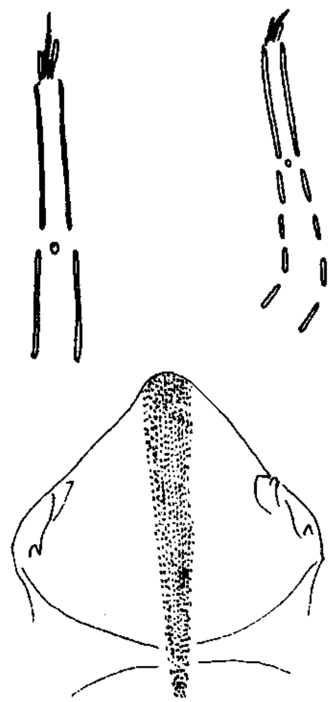
1' Maxillary palp with sclerotized basal segment with a ring organ or palp indistinctly segmented with ring organ on basal segment 3



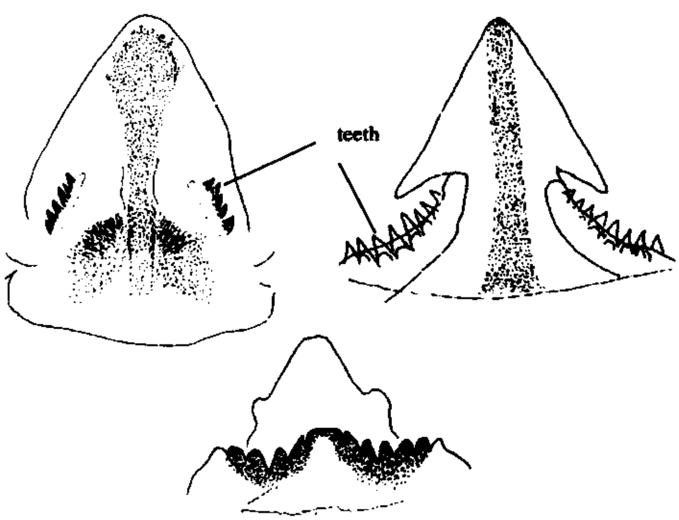
2 (1) Maxillary palp consists of 2 unequal segments, basal segment less than 1/2 length of second segment; pseudoradula broadened posteriorly, appearing attached to transverse bar, with granules of pseudoradula not arranged in longitudinal rows .... ***Paramerina***



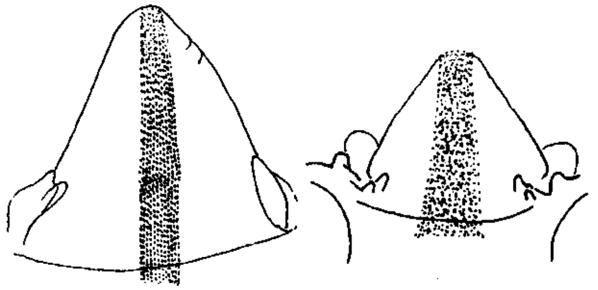
2' Maxillary palp with 2-5 segments; if only 2 segments then segments subequal in length or basal segment greater than ½ length of apical segment (be aware that in some species with more than 2 segments, basal segment may be very small); pseudoradula not broadened posteriorly, not appearing attached to transverse bar; with granules of pseudoradula arranged in longitudinal rows .... ***Ablabesmyia***



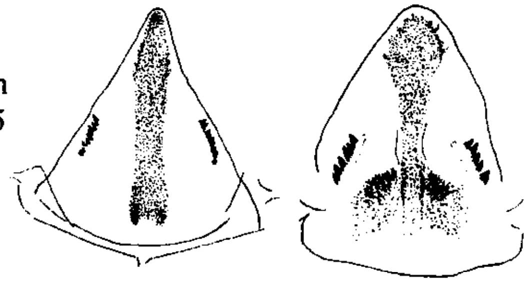
3 (1') Dorsomental teeth present in well developed transverse plates or in longitudinal rows; body usually with well developed lateral setal fringe 4



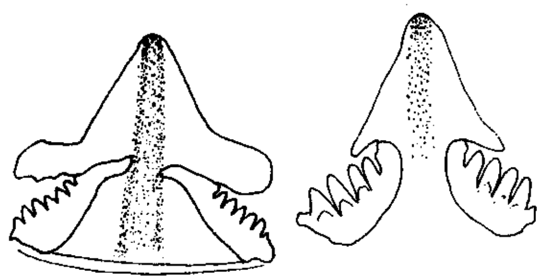
3' Dorsomental teeth apparently absent, not confined to well defined transverse plates or in longitudinal rows; body without lateral setal fringe (setae may be present, but are scattered) or with a weak fringe of 4 setae on body segments 4-10 (see couplet 23) 13



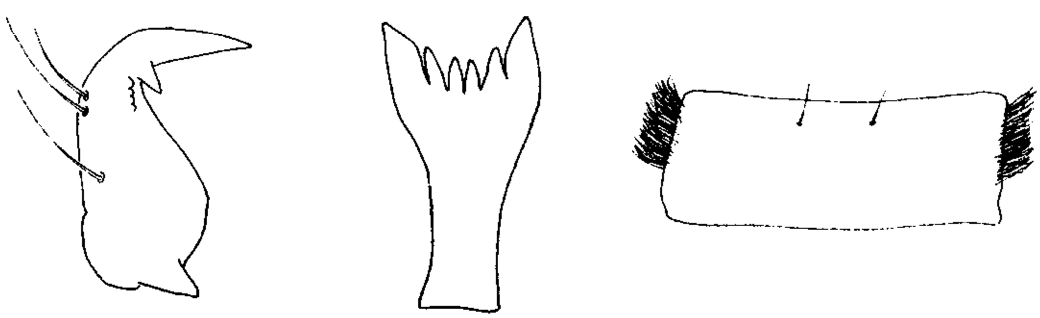
4 (3) Dorsomental teeth arranged in longitudinal rows 5



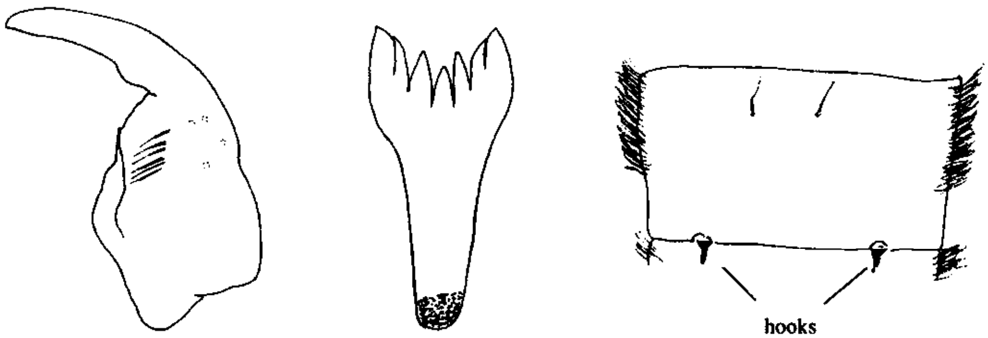
4' Dorsomental teeth arranged on transverse or somewhat diagonal plate(s) 6



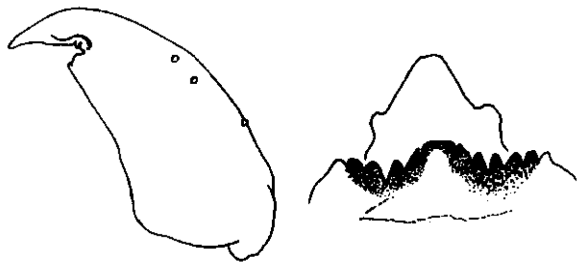
5 (4) Mandible with apical tooth strongly hooked; large basal tooth present; ligula usually with even number of teeth, with inner tooth at most only bent towards outer tooth; without pair of sclerotized hooks on posterior margin of body segment 3 .... ***Clinotanypus***



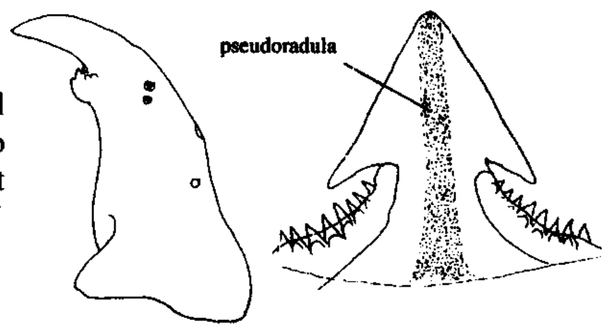
5' Mandible not strongly hooked; basal tooth low, rounded; ligula usually with odd number of teeth, with inner tooth strongly bent towards or on to outer tooth; a pair of sclerotized hooks present on posterior margin of body segment 3 .... ***Coelotanypus***



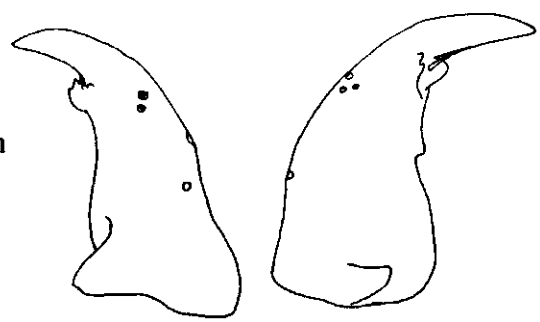
6 (4') Mandible with stout base, so that apical tooth appears small in relation to remainder of mandible; pseudoradula absent .... ***Tanypus***



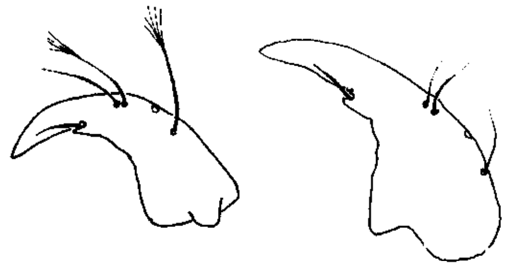
6' Mandible base not as stout, apical tooth appears large in relation to mandible; pseudoradula present 7



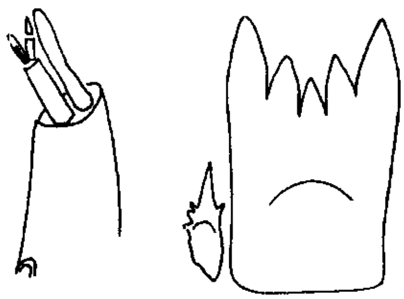
7 (6') Ligula with black teeth; mandible with large, blunt basal tooth 8



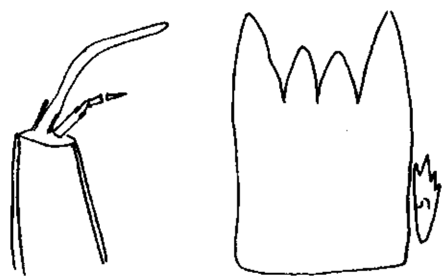
7' Ligula with pale or brownish-yellow teeth; basal tooth of mandible not large and blunt 9



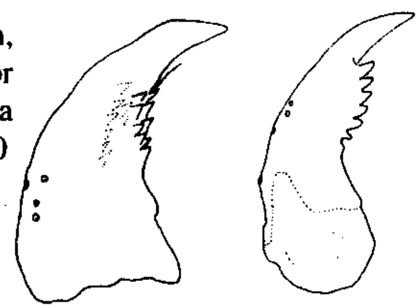
8 (7) Antennal blade subequal to length of flagellum; ligula with 5 teeth (4 in aberrant specimens) .... ***Procladius***

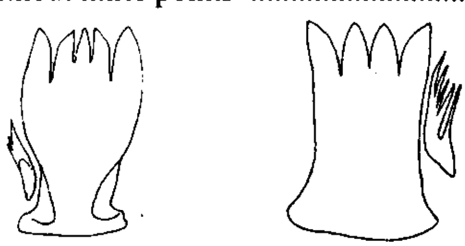


8' Antennal blade about twice as long as flagellum; ligula usually with 4 teeth, but may have 5 .... ***Djalmabatista***

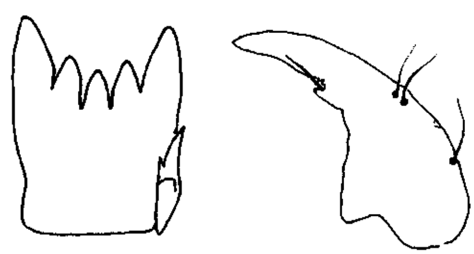


9 (7') Mandible with numerous additional teeth, either in several dorsal and ventral rows or arranged on inner side of mandible; paraligula without inner points 10

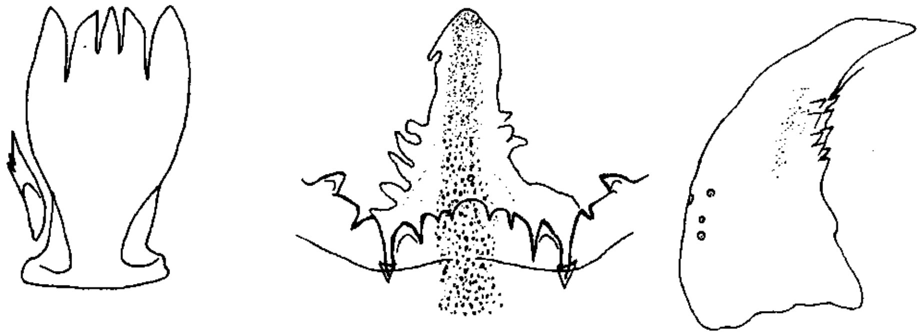




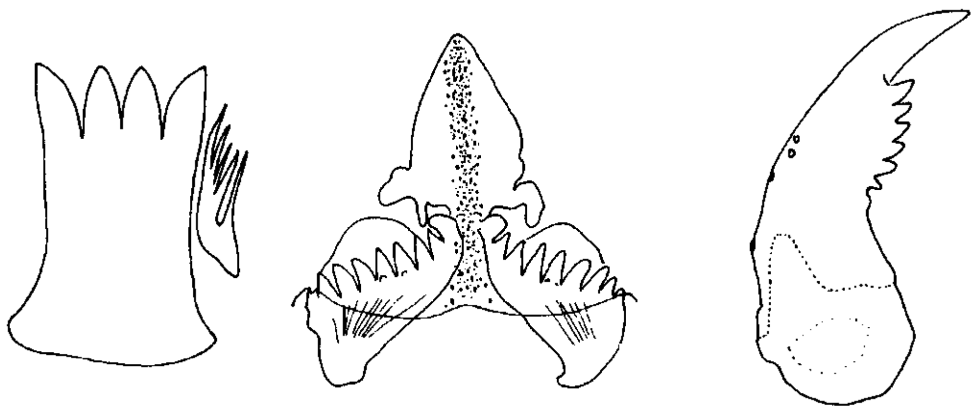
9' Mandible with at most a few small additional teeth near basal tooth; paraligula with inner teeth 11



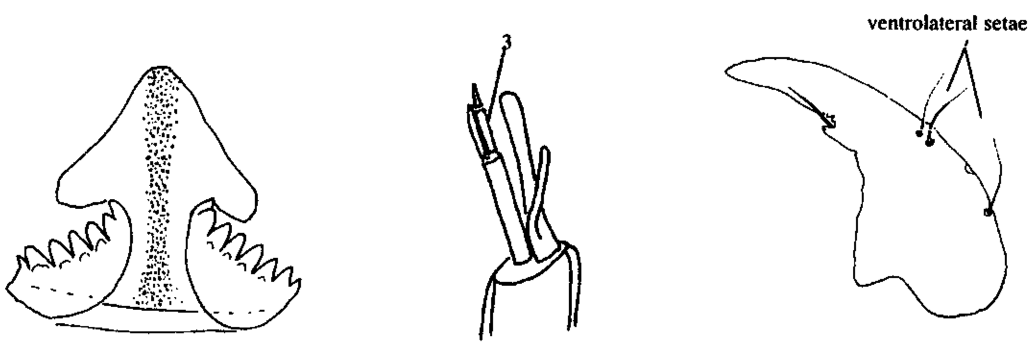
10 (9) Ligula with 5 teeth, inner tooth bent towards median tooth; dorsomental teeth arranged in concave arch; mandible with several rows of additional small dorsal and ventral teeth .... ***Fittkauimyia***



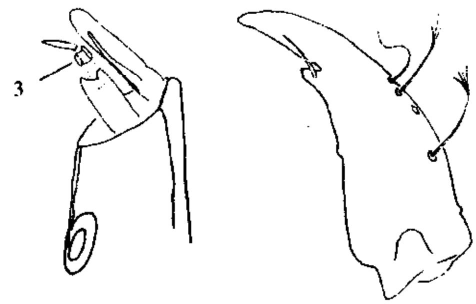
10' Ligula with 4 straight teeth; dorsomental teeth in straight transverse row; mandible with row of teeth on inner side .... ***Psectrotanypus***



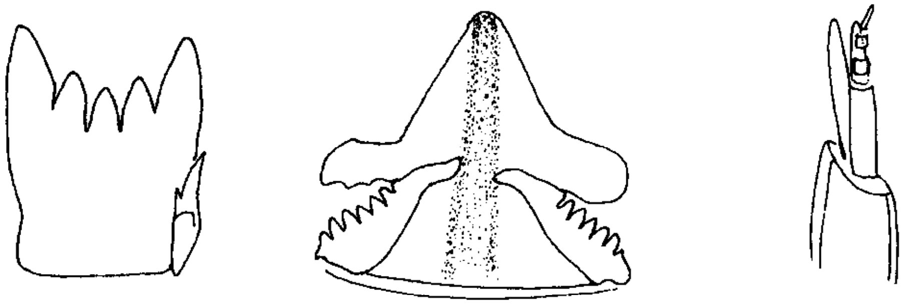
11 (9') Dorsomentum with 6 pairs of large teeth; 3rd antennal segment at least twice as long as wide; all ventrolateral setae of mandible simple .... ***Alotanypus***



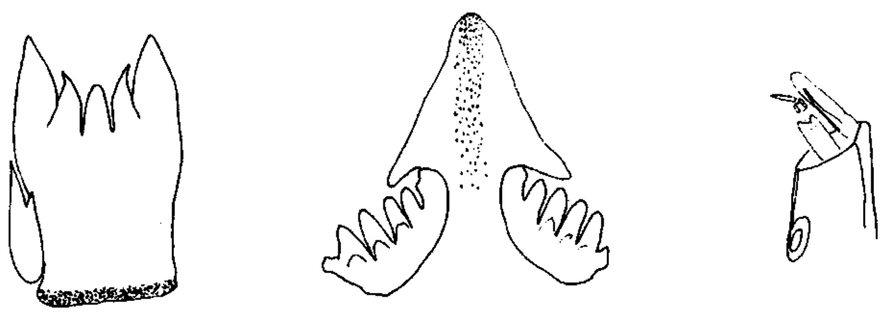
11' Dorsomentum with 4 or 5 pairs of large teeth (see couplet 12); 3rd antennal segment about as long as wide; at least 1 ventrolateral seta on mandible bifid or multibranched 12



12 (11') Inner tooth of ligula straight; dorsomentum with 5 pairs of large teeth and with medial extension which reaches or almost reaches pseudoradula; antenna with 5 segments .... ***Bethbilbeckia***

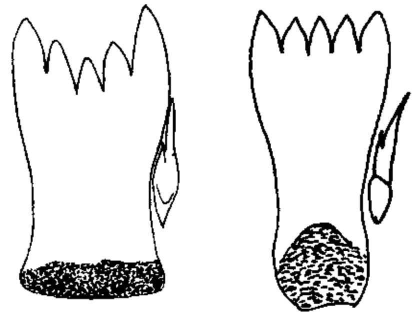


12' Inner tooth of ligula turned out; dorsomentum with 4 pairs of large teeth, without medial extension reaching pseudoradula; antenna with 4 segments .... ***Apsectrotanypus***

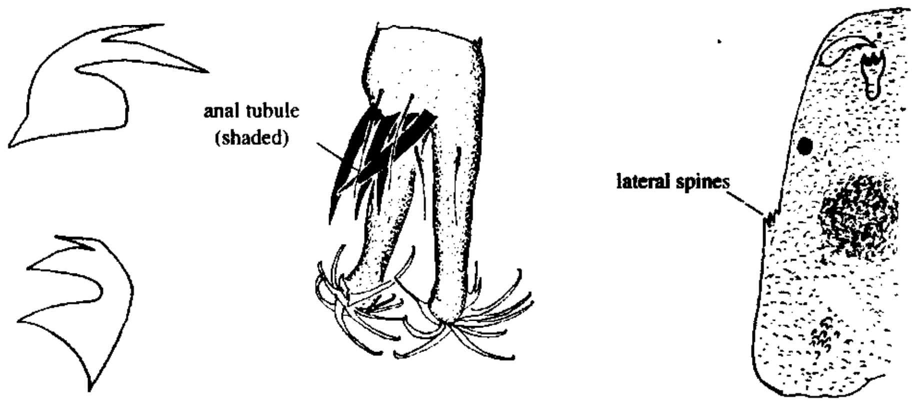


13 (3') Median tooth of ligula longer than inner teeth, reaching or surpassing level of outer teeth 14

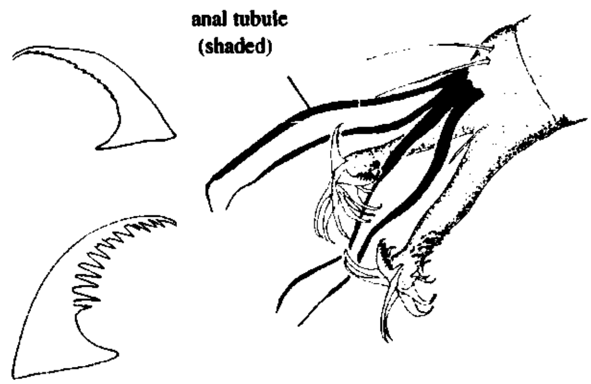
13' Median tooth of ligula less than or equal to inner teeth 15



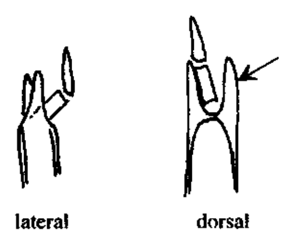
14 (13) One small claw on posterior parapod bifid; anal tubules shorter than posterior parapods; head sometimes with lateral spines or covered with numerous small points or granules, or both .... ***Labrundinia*** (in part)



14' One small or medium claw on posterior parapod with several inner spines; anal tubules longer than posterior parapods; head never with lateral spines or covered with small points or granules .... ***Nilotanypus***



15 (13') Apex of antennal segment 2 with large Lauterborn organs fused to apex, appearing like a tuning fork 16



15' Apex of antennal segment 2 without tuning fork appearance 18

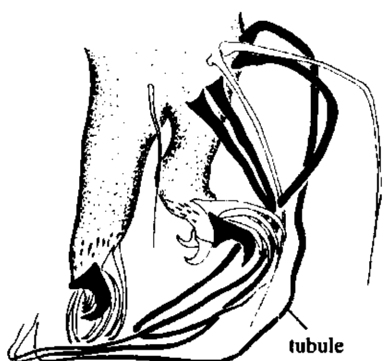
16(15) Paraligula trifid; small claws of posterior parapod with large inner tooth; all claws of posterior parapod pale .... ***Denopelopia***

16' Paraligula bifid (see couplet below); posterior parapod with either pale simple claws *or* with one dark claw and one or more small, clear pectinate claws 17

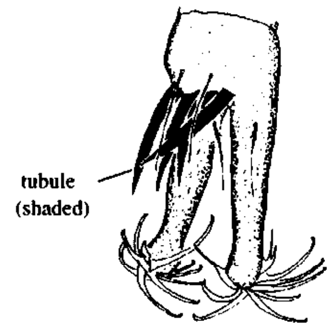
17 (16') Granulose area at base of ligula forming a basal band .... ***Krenopelopia***

17' Granulose area at base of ligula roughly triangular .... ***Monopelopia***

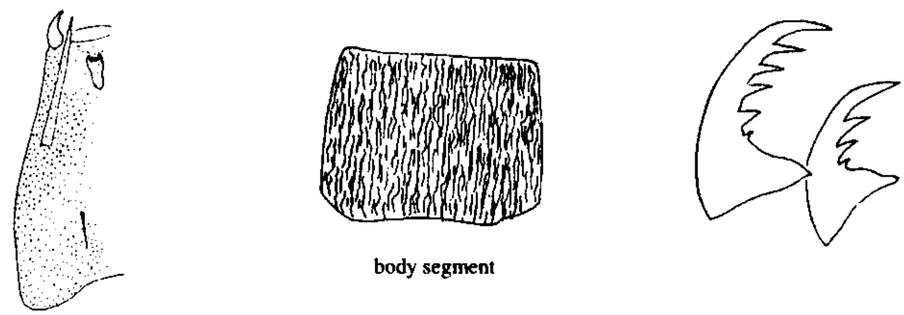
18 (15') Anal tubules long and thin; much longer than posterior parapods .... ***Pentaneura***



18' Anal tubules elongate-conical; at most equal to posterior parapods 19

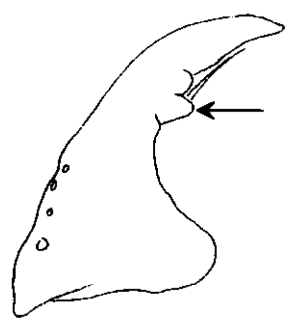


19 (18') Surface of head granulose; body surface with undulating longitudinal striae; 2-3 small claws of posterior parapod with 3 or more inner teeth .... ***Guttipelopia***

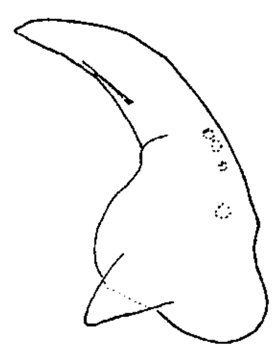


19' Surface of head usually without granules; body smooth, non-striate; at most 1 small claw of posterior parapod with a single inner tooth 20

20 (19) Mandible with large basal tooth 21



20' Mandible without large basal tooth 24



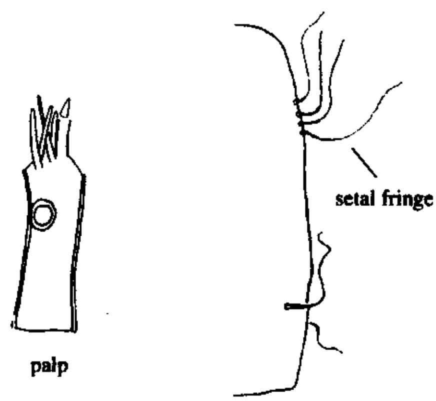
21 (20') One small claw of posterior parapod with inner tooth 22

21' Small claws of posterior parapod simple 23

22 (21) Head smooth, without lateral or ventral spines; inner tooth of small bifid claw on posterior parapod much shorter than upper tooth .... ***Zavrelimyia***

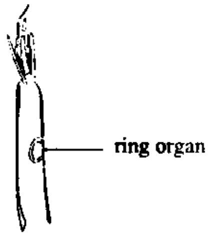
22' Head granulose, with weak, blunt lateral and ventral spines; inner tooth of small bifid claw on posterior parapod subequal to upper tooth .... ***Labrundinia*** (in part)

23 (21') Antennae short, about 1/3 length of head and 2X length of mandible; basal segment of palp with ring organ in apical 1/3; body segments 4-10 with small anterolateral fringe of 4 larger setae .... ***Natarsia***



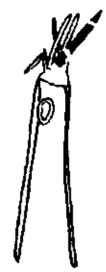
23' Antennae longer, about 1/2 length of head and at least 3X length of mandible; basal segment of palp with ring organ near middle; body segments without fringe .... ***Larsia***

24 (20') Basal segment of maxillary palp with ring organ at middle of segment or closer to base .... ***Hudsonimyia***



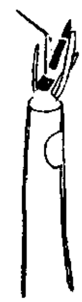
24' Basal segment of maxillary palp with ring organ in distal 1/3 .. ***Thienemannimyia*** group 25

(In Florida, this group of genera includes *Conchapelopia*, *Hayesomyia*, *Helopelopia*, *Meropelopia* and *Rheopelopia*. They are extremely difficult to separate; data in this key are based on 4th instar larvae. Earlier instar larvae may have to be identified as "*Thienemannimyia* group sp."; identifications should be verified by associated pupae or adults. The more northernly distributed genus *Thienemannimyia* apparently does not occur in Florida.)



25 (24') Maxillary palp with b "seta" 2-segmented 26

25' Maxillary palp with b "seta" 3-segmented 28



26 (23) Basal segment of maxillary palp shorter than antennal segment 2; median 3 teeth of ligula subequal; maximum width of anterior portion of ligula 1.3-1.7X width at base .... ***Rheopelopia*** (in part)

26' Basal segment of maxillary palp equal to or longer than antennal segment 2; median tooth of ligula lower than inner teeth; maximum width of anterior portion of ligula 1.1-1.2X basal width 27

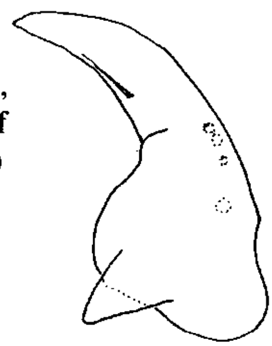
27 (24') Length of antennal segment 1 divided by mandible length = 1.5 or less; caudal margin of head capsule usually with darker subtriangular area .... ***Hayesomyia***

27' Length of antennal segment 1 divided by mandible length greater than 1.75; caudal margin of head capsule may be darkened, but usually not as a subtriangular area .... ***Meropelopia***

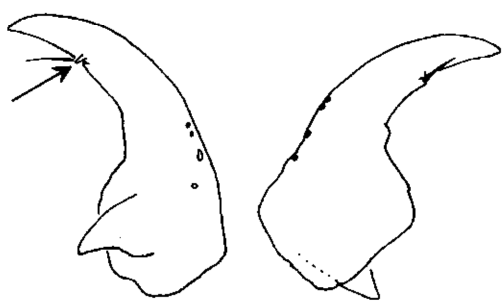
(*Thienemannimyia*, which apparently does not occur in Florida, will key here. Note that its basal antennal segment is produced into a point on its outer side, lacking in *Meropelopia;* the basal ring of the antennal blade is as long as wide in *Thienemannimyia*, but 2X as long as wide in *Meropelopia*, and antennal segment 2 is 5X as long as wide in *Thienemannimyia*, but 8X as long as wide in *Meropelopia*.)

28 (25') Basal and accessory teeth of mandible extremely reduced, accessory tooth visible only at 1000X; subbasal seta of posterior parapod may be bifid .... ***Rheopelopia*** (in part)

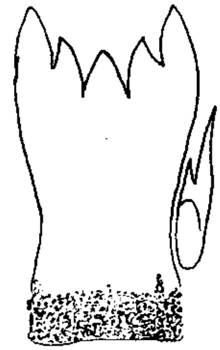
(species from this "species group" of *Rheopelopia* not recorded from Florida)



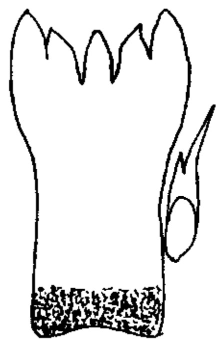
28' Basal and accessory teeth larger; subbasal seta of posterior parapod simple 29



29 (28') Central tooth of ligula about as long as wide; length of maxillary palp/width at ring organ 4.6 or more .... ***Helopelopia***



29' Central tooth of ligula about twice as long as wide; length of maxillary palp/width at ring organ 4.4 or less .... ***Conchapelopia***



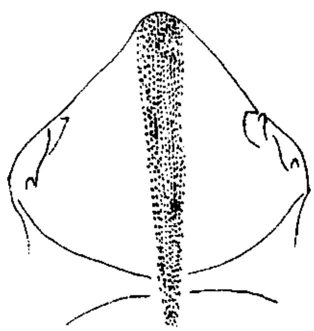
Genus ***Ablabesmyia***

DIAGNOSIS: The large basal tooth of the mandible; maxillary palpus with 2 or more segments; pseudoradula not broadened posteriorly, not connected to a transverse bar, and with its granules arranged in longitudinal rows, will distinguish this genus.

NOTES: *Ablabesmyia* is one of the most common tanypods in Florida. Roback (1985) noted that *Ablabesmyia* larvae were found over a pH range of <4.1 - >8.1, but were predominantly found in a circumneutral range of 6.1-7.0. He also observed that they preferred softer, less alkaline water. Roback also stated that larvae of the subgenus *Karelia* (which includes all species with a 2-segmented maxillary palpus, except *A. annulata*) were most often encountered in lakes, ponds and swamps, but were also found in large shallow streams. Most other species in the genus were found in flowing water.

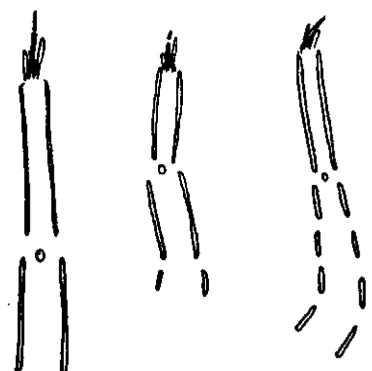
Many name changes have taken place in this genus. See the checklist (Appendix A) and notes on the species following the key. Identification of many species is difficult, especially in the subgenus *Karelia*. Species level identifications of specimens with 2-segmented palps (the subgenus *Karelia,* with the exception of *A. annulata,* which is placed in the subgenus *Asayia*) and members of the *A. rhamphe* group should be considered at best uncertain. **Note** that early instar larvae may not possess the full complement of maxillary palpus segments! Rear larvae to positively identify species! Some concepts used in the following key are adapted from Roback (1985).

ADDITIONAL REFERENCES: Roback 1971; 1982a; 1985; Roback et al. 1980.

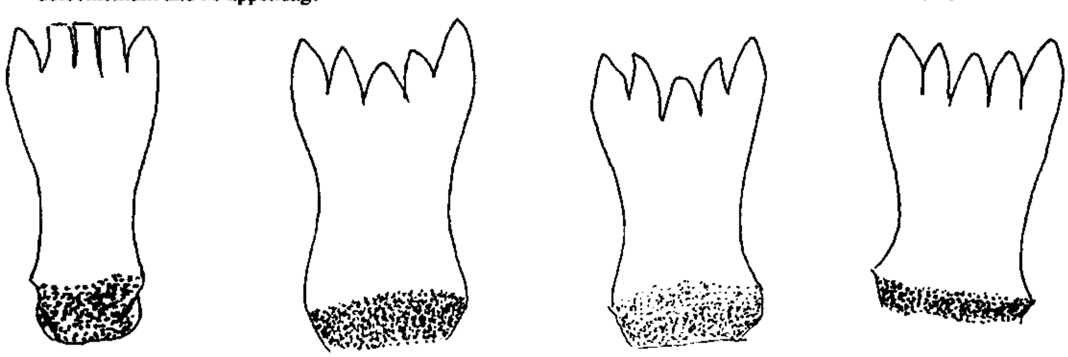


dorsomentum and M-appendage

mandible



maxillary palpi



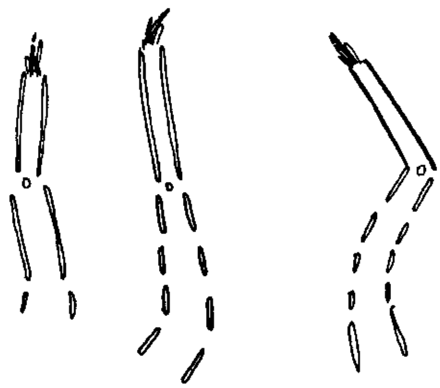
ligulae of several species

Key to Florida *Ablabesmyia*

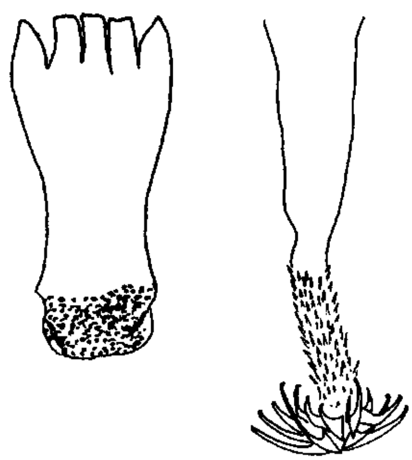
1 Maxillary palpus with 2 sclerotized segments 2

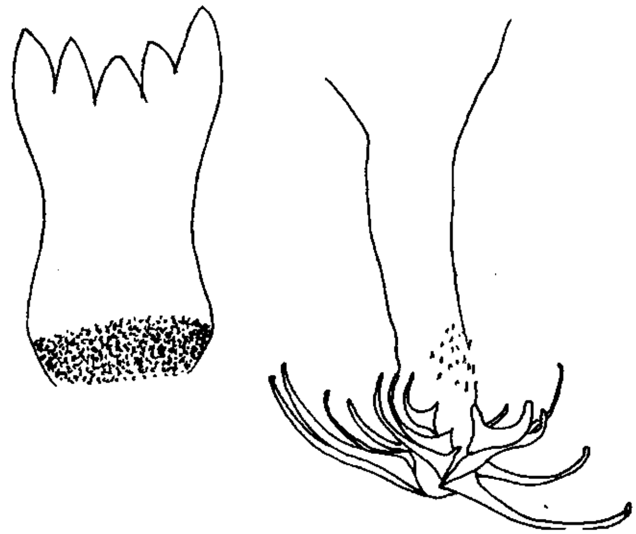
CAUTION! Do not mistake membranous base of maxillary palp for a segment.

1' Maxillary palpus with 3 or more sclerotized segments (basal segment may be small) 7



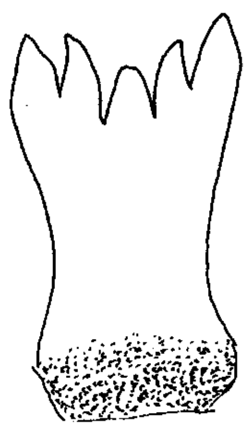
2 (1) Apices of ligula teeth even; procercus length 7-8X width; numerous well developed lateral hooklets on distal 4/10 of posterior parapod .... *A. annulata*





2' Apices of ligula teeth form a concave arc; procercus length 2-4X width; lateral hooklets on posterior parapod smaller and less numerous .... ***A. (Karelia)* sp.** 3
(these species are difficult to separate; reared associations are highly desirable)

3 (2') Apex of inner tooth of ligula directed relatively straight forward; 1-3 dark claws on posterior parapod .... ***A. peleensis***



3' Apex of inner tooth of ligula directed slightly outward; 0-3 dark claws on posterior parapod 4

4 (3') Posterior parapod with all claws pale; length of apical palpal segment 1.7-3X length of basal segment .... ***A. philosphagnos***

4' Posterior parapod with 1-3 claws darker than others (difference in color may be slight); length of apical palpal segment 0.9-1.7X length of basal segment 5

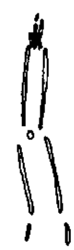
5 (4') Posterior parapod with 3 darker claws; ratio of length of apical palpal segment/basal palpal segment 0.9-1.3 (mean 1.2); AR = 4.6-5.2 (mean 4.8) .... ***A. cinctipes***

5' Posterior parapod with 1-2 darker claws; apical palpal segment/basal palpal segment 1.2-2.3 ; AR either around 4.0 or 4.7-6.1 6

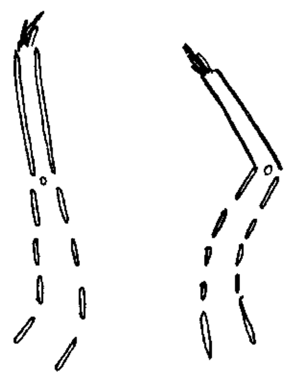
6 (5') AR = 4.7-6.1; basal antennal segment/mandible length 2.6-3.2 .... **A. sp. B**

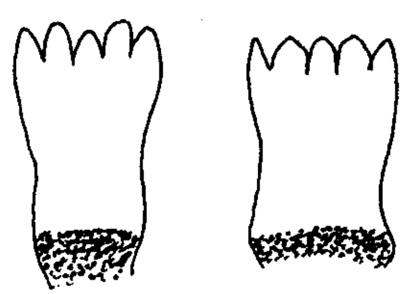
6' AR around 4.0; basal antennal segment/mandible length 2.3 .... **A. sp. A**

7 (1') 3 sclerotized palpal segments 8



7' 5 or 6 sclerotized palpal segments 9

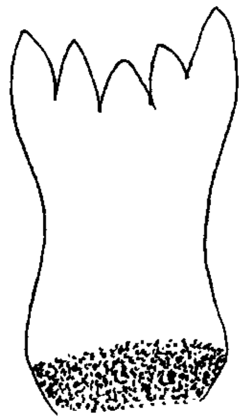




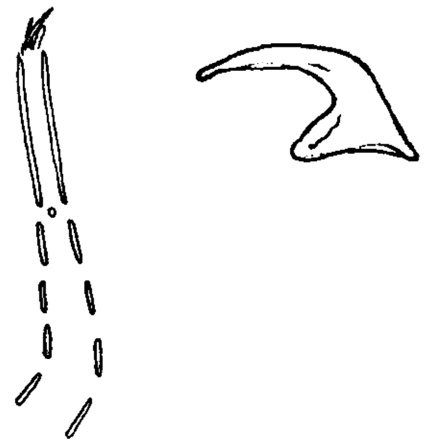
8 (7) Apices of ligula teeth even or almost so; found only in freshwater mussels (Unionidae) .... ***A. janta***

8' Apices of ligula form a concave arc; free-living .... ***A. rhamphe* group**

(larvae of *A. parajanta*, *A. rhamphe* and some *A. janta* are inseparable without associated adults)



9 (7') 5 palpal segments; small claw of posterior parapod without expanded base ..... ***A. mallochi***

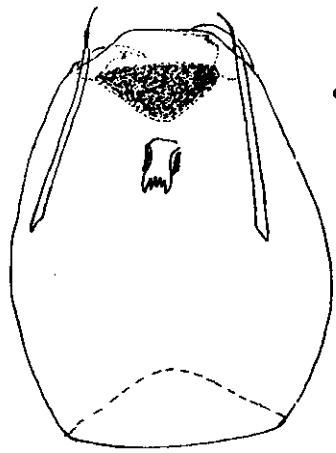


9' 6 palpal segments; small claw of posterior parapod with or without expanded base 10

with expanded base

without expanded base

10 (9') Head with a dorsal anteromesal brown spot; small claw of posterior parapod without expanded base .... ***A. hauberi***



10' Head without a dorsal anteromesal brown spot; small claw of posterior parapod with expanded base .... ***A. aspera***

Notes on species

A. annulata - This species is unmistakable with its 2-segmented palpus, ligula with even teeth and numerous large spines on the posterior parapods. It is not keyed correctly in Beck (1976; 1979).

A . aspera - Probably uncommon in Florida. Roback (1985) recorded it from Duval and Nassau Counties; R. Rutter (pers. comm.) has found larvae in Osceola Co; and I have seen larvae from the Suwannee River basin. I have seen *A. aspera* larvae with a small amount of brown anteromesally, but not as large or as dark as that of *A. hauberi*. Be sure to observe the small claw of the posterior parapod.

A. cinctipes - The immature stages of this species have been described recently by Caldwell (1993). He found larvae living in a shallow, well-water fed pond with a high pH (7.6-8.8) and conductivity (410-494 µmhos/cm @ 25°C), the highest yet noted for an *Ablabesmyia* sp. Differences in coloration of the claws of the posterior parapod are subtle and make this species, as with the majority of species in the subgenus *Karelia,* difficult to identify. It will not key correctly in Beck (1976; 1979). It is likely that this species name has been misused often, and most records of *A. cinctipes* based on larvae are probably erroneous.

A. hauberi - This species is unmistakable with its 6-segmented palpus and anteromesal brown spot. It may be a southern form of *A. aspera.*

A. janta - This species has been reared from freshwater mussels in Florida, but has been found free-living in Tennessee. Roback (1985) described 3 varieties for this species, one of which may have been missassociated; thus "true" *A. janta* may not key out with the *A. rhamphe* group as in the above key. Associated adult males are necessary for correct species level identification.

A. mallochi - Probably the most common species in the genus in Florida. The names *auriensis, ornata* and *tarella* are synonyms. Common in streams and rivers, and is apparently somewhat tolerant of organic pollution. More empirical data are needed.

A. parajanta - As a larva, not separable from *A. rhamphe.* Should be identified as "*A. rhamphe* group." Associated adult males are necessary for correct species level identification.

A. peleensis - This species can usually be identified by the inner teeth of the ligula which point directly forward. This character can be quite variable and is dependent on the angle at which the ligula is viewed. Roback (1985) noted two larval types, based on differences of the dark claws on the posterior parapods. One type has the base of one of the dark claws expanded; the other does not. Both types occur in Florida.

A. philosphagnos - This species has no dark claws on the posterior parapods, according to Roback (1985). Thus, it will not key correctly in Beck (1976; 1979).

A. rhamphe - As a larva, not separable from *A. parajanta.* Should be identified as "*A. rhamphe* group." Associated adult males are necessary for correct species level identification.

A. sp. A - This taxon is based on larvae from south Florida which do not fit any description as given in Roback (1985). The larvae may represent an undescribed species. Morphometrically, it is closest to *A. illinoensis,* which apparently (and probably) does not occur in Florida. This unknown taxon must be reared before it can be properly named.

A. sp. B -This taxon is known only from south Florida; it is abundant in Lake Okeechobee. Although the larva will key to *A. idei* in Roback (1985), its antennal ratio is lower than the range given in that publication; pupae and adults I have reared from Lake Okeechobee do not fit the concept of that species. This is a new species which will be described in all life stages in a forthcoming publication.

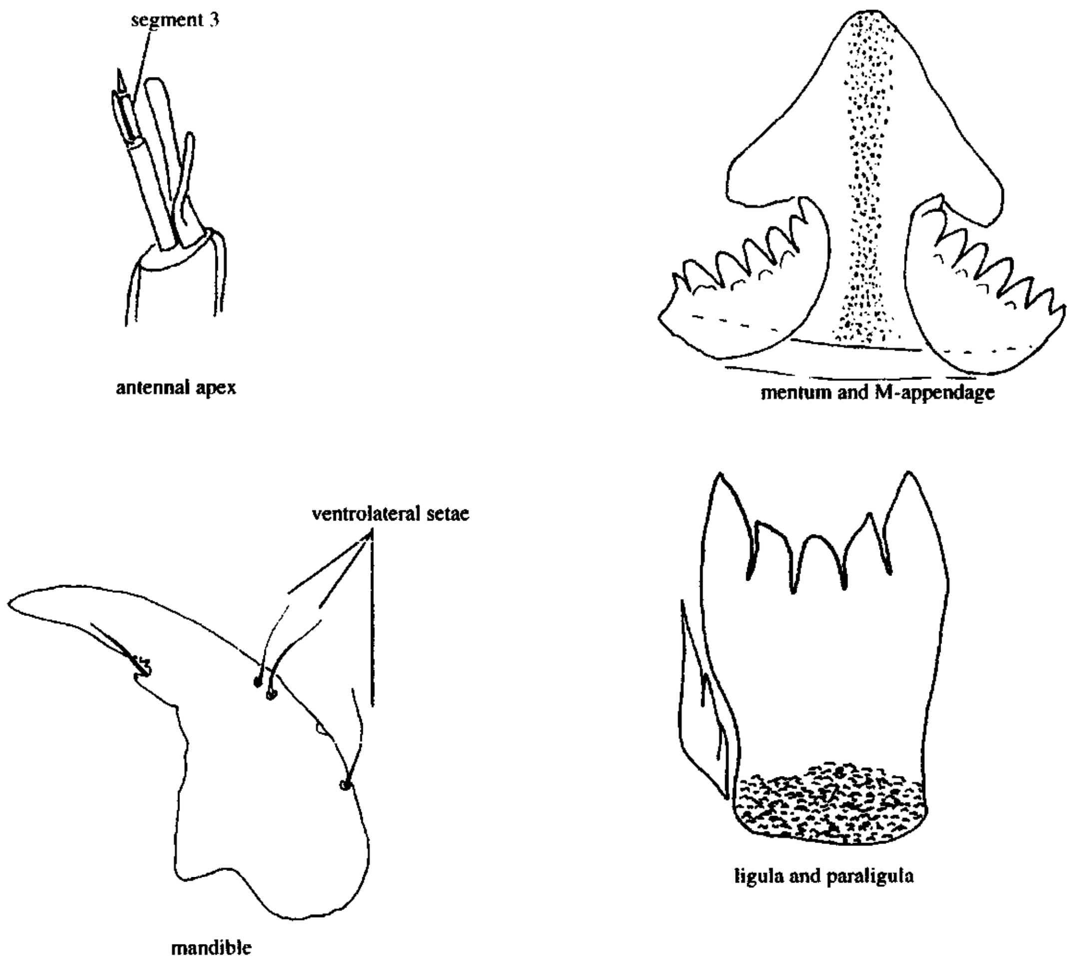
Other species: *A. americana* is keyed in Beck & Beck (1966b) and Beck (1976; 1979). This name is a junior synonym of *A. monilis,* a northern species not known to occur in Florida (it has been recorded from South Carolina). If larval specimens of *A. monilis* were encountered in Florida, they would key to the *A. rhamphe* group, from which, on a practical basis, they are inseparable as larvae.

Genus ***Alotanypus***

DIAGNOSIS: *Alotanypus* can be distinguished by the lateral fringe of setae on the body; well developed dorsomental plates with 6 large and 1 small tooth; the long third antennal segment (at least twice as long as wide); and the mandible with all ventrolateral setae simple.

NOTES: One species, *A. aris*, occurs in the Southeast, recorded from Alabama and North Carolina in addition to Florida. I have examined specimens from Mule Creek, south of Torreya State Park. Larvae are recorded from acid (pH 3.9-4.0) water in springs, seeps and bogs (Roback 1978; 1987). I collected the specimens illustrated below from bogs in Maine.

ADDITIONAL REFERENCES: Roback 1971; 1978; 1987.



Alotanypus aris, larval structures

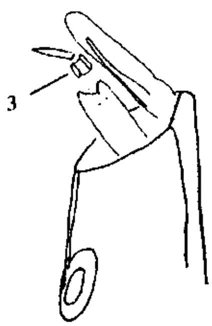
Genus *Apsectrotanypus*

DIAGNOSIS: The lateral setal fringe of the body; ligula with inner teeth turned out; well developed dorsomental tooth plates, each with 4 large and 1 small tooth; and the branched ventrolateral setae 2 and 3 of the mandible will separate this genus.

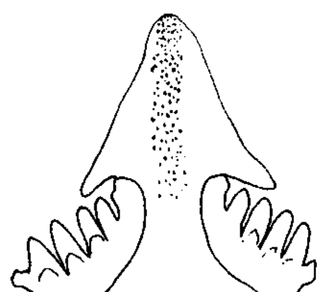
NOTES: One species, *A. johnsoni*, is known from Florida. It occurs in small streams. I have seen specimens from Peters Creek and Long Branch in Clay Co., and from the Perdido River system in extreme western Florida. Specimens in the Beck collection at FAMU had been identified as "*Macropelopia decedens*". Although listed in Oliver et al. (1990) as occurring in Florida, *M. decedens* is a northern species and probably will not be found here. The records in Oliver et al. (1990) refer to *A. johnsoni* and *Bethbilbeckia floridensis* (there are specimens of the latter species in the Beck collection at FAMU identified as *M. dena*, a junior synonym of *M. decedens*).

Another closely related genus, *Brundiniella*, will key to couplet 12 in the tanypod key. It can be distinguished by the presence of an expanded claw on the posterior parapod. *Brundiniella* is not recorded from Florida, and is unlikely to occur here.

ADDITIONAL REFERENCES: Roback 1971; 1978.

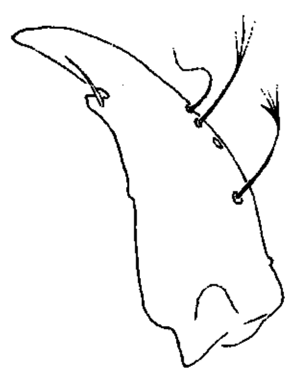


apex of antenna



mentum and M-appendage

ligula and paraligula



mandible

Apsectrotanypus johnsoni, larval structures

Genus ***Bethbilbeckia***

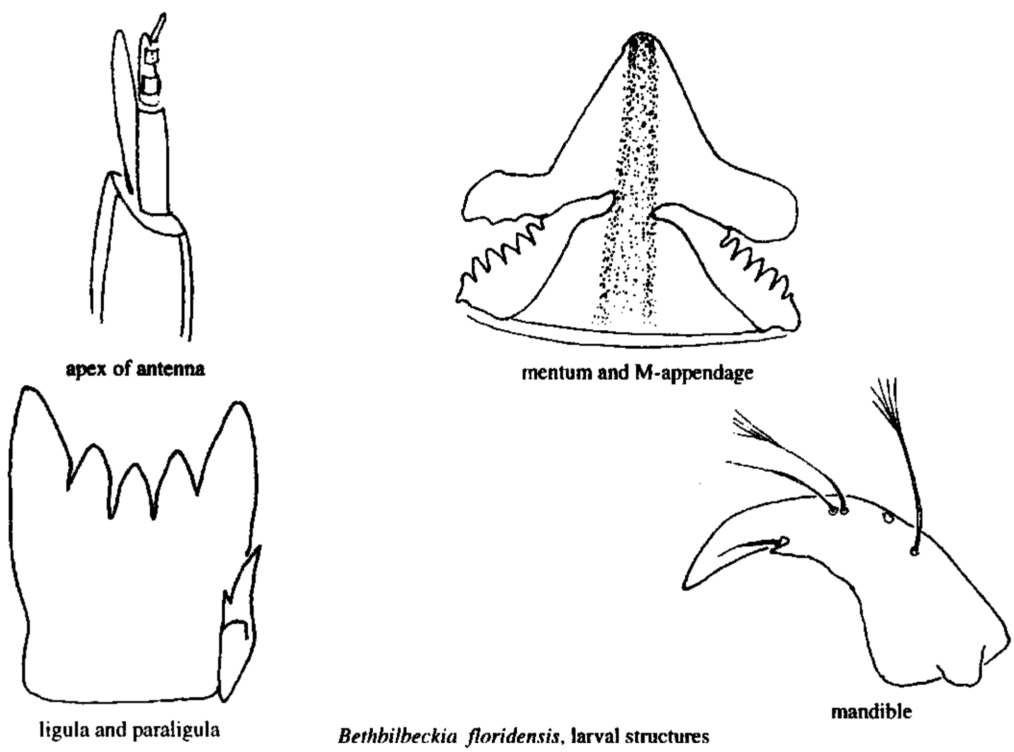
DIAGNOSIS: The weak lateral setal fringe on the body; ligula with inner teeth directed forward; dorsomental plates with 6 (5 large, 1 small) teeth each and with a medial extension which reaches or almost reaches the pseudoradula; and 5 segmented antenna will distinguish this genus.

NOTES: *Bethbilbeckia*, with only 1 species, *B. floridensis*, was recently described (Fittkau & Murray 1988) from specimens reared from Peters Creek in Clay Co. I have also seen adult specimens from the FAMU Biological Station in Okaloosa Co. The genus occurs at least as far north as Ohio (Bolton 1992). Larval specimens of *B. floridensis* found in the Beck collection at FAMU were labeled as "*Macropelopia dena* Roback", a junior synonym of *M. decedens*. Most records in the southeast U.S. for *M. decedens*, a northern species, are probably *Bethbilbeckia* or *Apsectrotanypus* (q.v.), although I have seen larval specimens of *Macropelopia* from the Smoky Mountains.

Fittkau & Murray (1988) state that mandibular ventrolateral seta 3 is simple. However, their illustration (fig. 15) shows this seta as bifid. On one unassociated larval specimen I've examined this seta is multibranched. This specimen also has 6 large teeth on one side of the mentum; the lateral fringe of body setae is weak.

Another closely related genus, *Brundiniella*, will key to couplet 12 in the tanypod key. It can be distinguished by the presence of an expanded claw on the posterior parapod. *Brundiniella* is not recorded from Florida, and is unlikely to occur here.

ADDITIONAL REFERENCES: Fittkau & Murray 1988.



Bethbilbeckia floridensis, larval structures

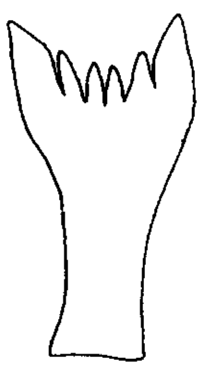
Genus *Clinotanypus*

DIAGNOSIS: *Clinotanypus* is distinguished by the well developed lateral setal fringe; the strongly hooked apical tooth and large pointed basal tooth of the mandible; dorsomental teeth in longitudinal rows; and an even number of teeth on the ligula.

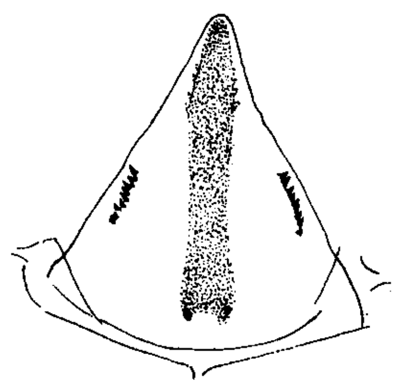
NOTES: Larvae occur in ponds and lakes as well as streams and rivers. They prefer soft sediments and can be found in "clean" water or water that has been organically enriched. Roback (1976) recorded the following water chemistry parameters for the genus: pH < 4.0-9.0, with a mean of 6.2; total hardness 0-300 ppm, mean 69.8; alkalinity 0-200, mean 47.8; specific conductivity 0-600 μmhos @ 25 °C, mean 140.6. It has been found in water with a dissolved oxygen level of less than 4 ppm (Roback 1974b).

One species, *C. pinguis*, is widely distributed in the eastern U.S. However, 3 additional species occur in Florida. Two of these are known only as adults. The immature stages of the third species, *C. aureus*, were described from a single reared specimen from the Devil's Millhopper, a large sinkhole near Gainesville. Roback (1976) separated the larvae of *C. aureus* and *C. pinguis* on measurements of the first antennal segment and the maxillary palpus. With such a small sample size, the range of variation is unknown. All these species may be variants of a single species. Unless reared, all *Clinotanypus* larvae should be identified as "*Clinotanypus* sp.".

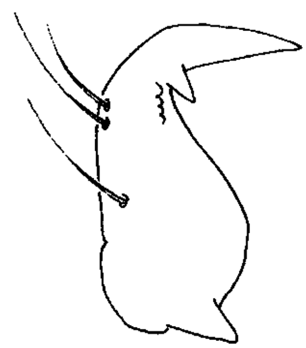
ADDITIONAL REFERENCES: Boesel 1974; Roback 1971; 1976.



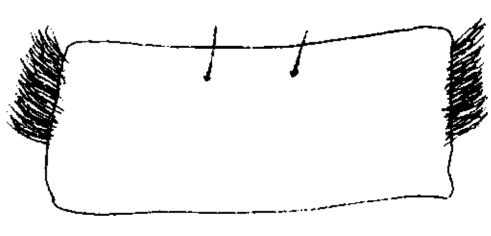
ligula



mentum and M-appendage



mandible



body segment 3

Genus *Coelotanypus*

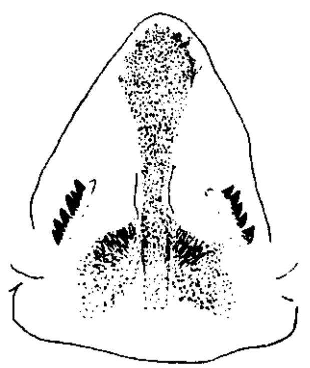
DIAGNOSIS: The well developed lateral setal fringe; smoothly curved apical tooth with low, rounded basal tooth of the mandible; dorsomental teeth in longitudinal rows; ligula with an odd number of teeth; and a pair of sclerotized hooks on the posterior margin of body segment 3 distinguish this genus.

NOTES: *Coelotanypus* larvae are found in/on bottom sediments in marshes, ponds, lakes and the slower portions of streams and rivers. At least one species, *C concinnus*, can be found in, but is not necessarily limited to, extremely eutrophic water bodies.

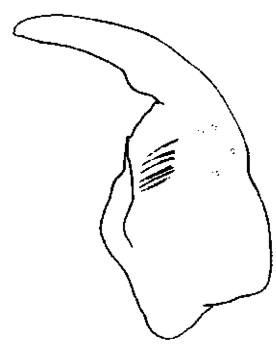
Although most *Coelotanypus* larvae possess a ligula with an odd number of teeth, specimens are often found with an even number of teeth. The converse may also be true with the closely related genus *Clinotanypus*.

The key which follows is constructed from data in Roback (1974a); the data are based on 4th instar larvae which were reared to the adult stage. The antennal ratios should work for most 3rd instar larvae as well, but measurements of the basal segment of the maxillary palpus will hold true only for 4th instar larvae.

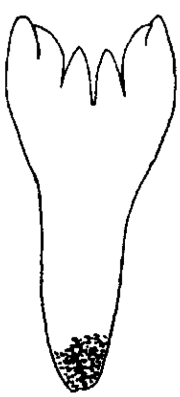
ADDITIONAL REFERENCES: Boesel 1974; Roback 1971; 1974a.



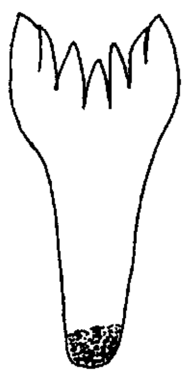
mentum and M-appendage



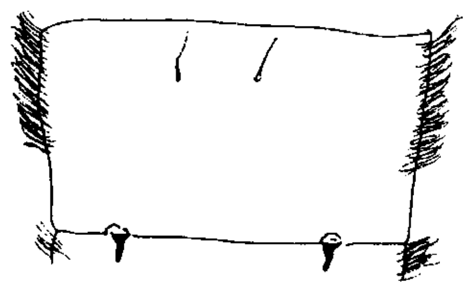
mandible



aberrant ligula



normal ligula



body segment 3 (note posterior sclerotized hooks)

Coelotanypus sp., larval structures

Key to Florida *Coelotanypus*

1 Mentum with 9 or more teeth on each side .... *C. tricolor*

1' Mentum with 5-8 teeth on each side 2

2 (1') AR = 7.0 or more; basal segment of maxillary palp > 70 µm (4th instar larvae only!) .... *C. concinnus*

2' AR < 6.7; basal segment of maxillary palp < 70 µm (4th instar larvae only!) .... *C. scapularis*

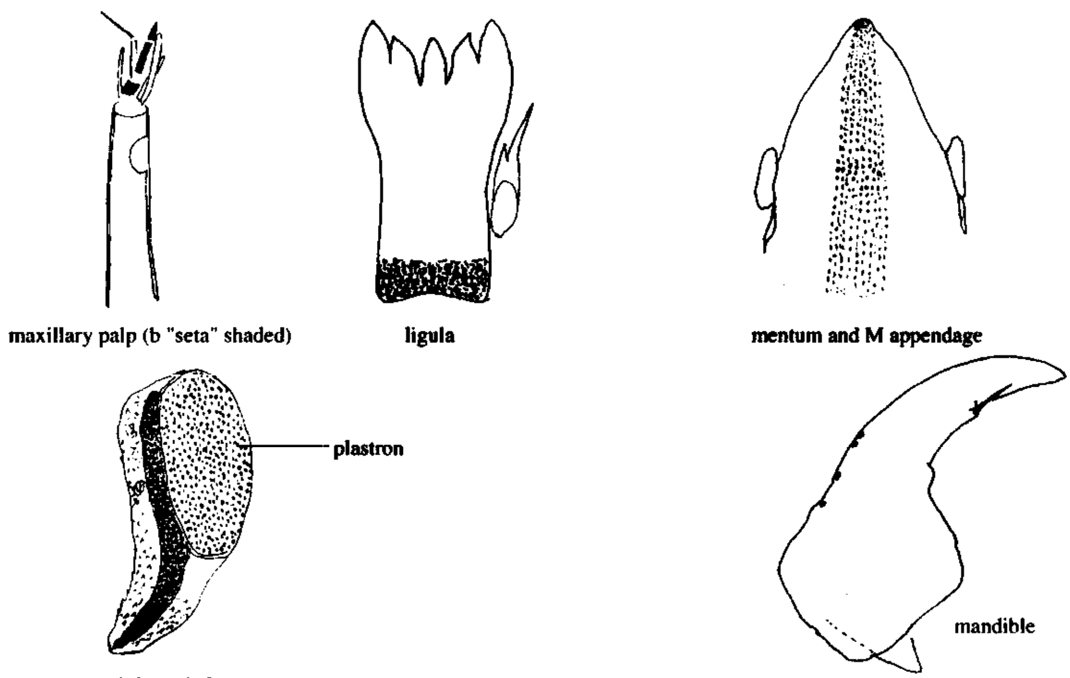
Genus *Conchapelopia*

DIAGNOSIS: *Conchapelopia* larvae are distinguished by long scattered body setae; the 3 segmented b "seta" on the maxillary palp; ring organ in distal third of maxillary palp; mandible with small basal and accessory teeth; ratio of maxillary palp length/width at ring organ 4.4 or less; pseudoradula with 8-12 rows of coarse granules; and central tooth of ligula about twice as long as wide.

NOTES: *Conchapelopia* is a member of the *Thienemannimyia* group. Separation of the genera of this group is difficult. Late 4th instar larvae can be positively identified if the developing pupal thoracic horn is visible (see figure below); note the large plastron plate. Taxa which were considered subgenera of *Conchapelopia* have been elevated to generic status (*Helopelopia, Meropelopia*); many taxa previously identified or keyed in Beck (1976;1979) as "*Conchapelopia*" may belong to these two genera or *Hayesomyia* or *Rheopelopia.* Four species are recorded from Florida; species separation of unassociated larvae is not practically possible. Fittkau & Murray (1983) stated that *Conchapelopia* larvae have a pseudoradula of about 8 longitudinal rows of granules. This character is difficult to discern, and many associated Florida larvae I've seen have about 10-12 rows.

Conchapelopia larvae have been recorded from waters with a pH range of 5.1-8.0, with most records at a pH of < 7.0; specific conductivity ranged from 0-400 µmhos @ 25°C, with most records below 300; total hardness from 0-250+ ppm, most records below 200; alkalinity 0-200 ppm, most below 40; and water temperatures ranged from 9-28°C.

ADDITIONAL REFERENCES: Beck & Beck 1966; Roback 1971; 1981.



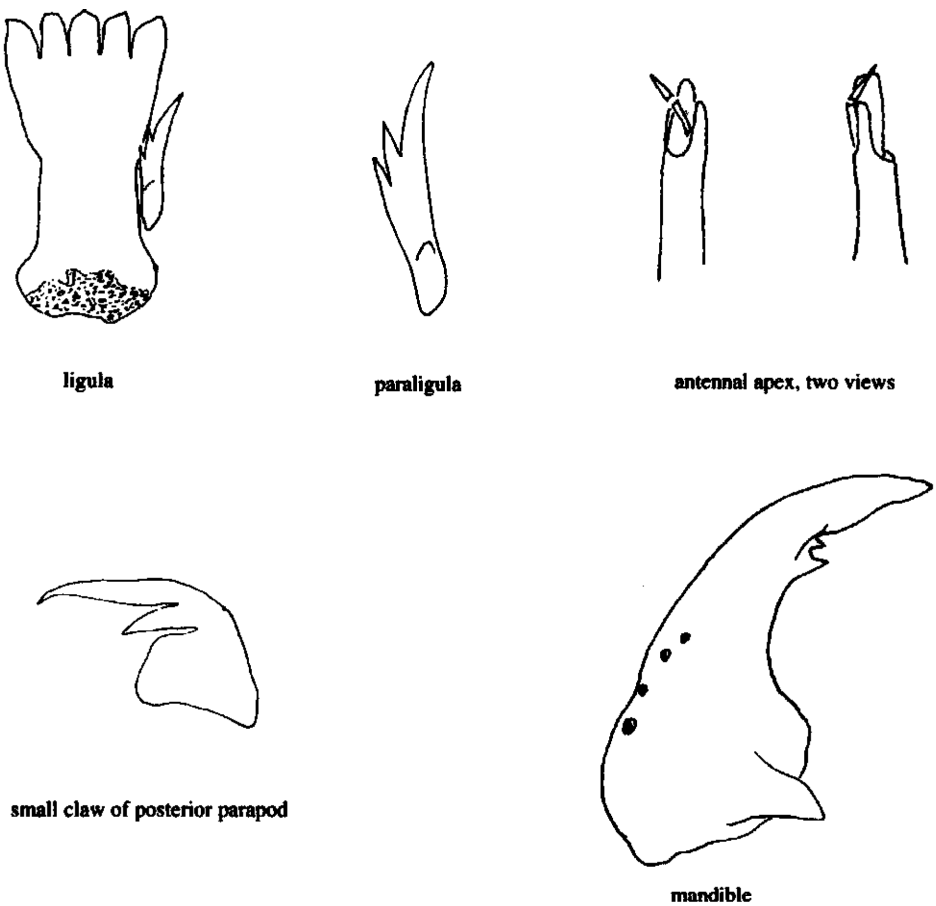
Conchapelopia, larval & pupal structures

Genus ***Denopelopia***

DIAGNOSIS: *Denopelopia* larvae are distinguished by the large Lauterborn organs "fused" to the apex of antennal segment 2, giving a tuning fork appearance; the trifid paraligula; lack of well developed dorsomental tooth plates; 2 small claws of posterior parapod with a large inner tooth; and all claws of posterior parapod pale.

NOTES: One species, *D. atria*, is described for this genus. Previously known only from the type locality, a drainage ditch near the Punta Gorda DEP office in Charlotte Co., I have recently examined larvae from the Orlando area. I've also reared this species from a vegetation-choked pond in a cattle pasture in southwestern Costa Rica. The immature stages occur in shallow water and can withstand low DO (0.3 mg/l) and high iron (108 mg/l) levels.

ADDITIONAL REFERENCES: Roback & Rutter 1988.



Denopelopia atria, larval structures

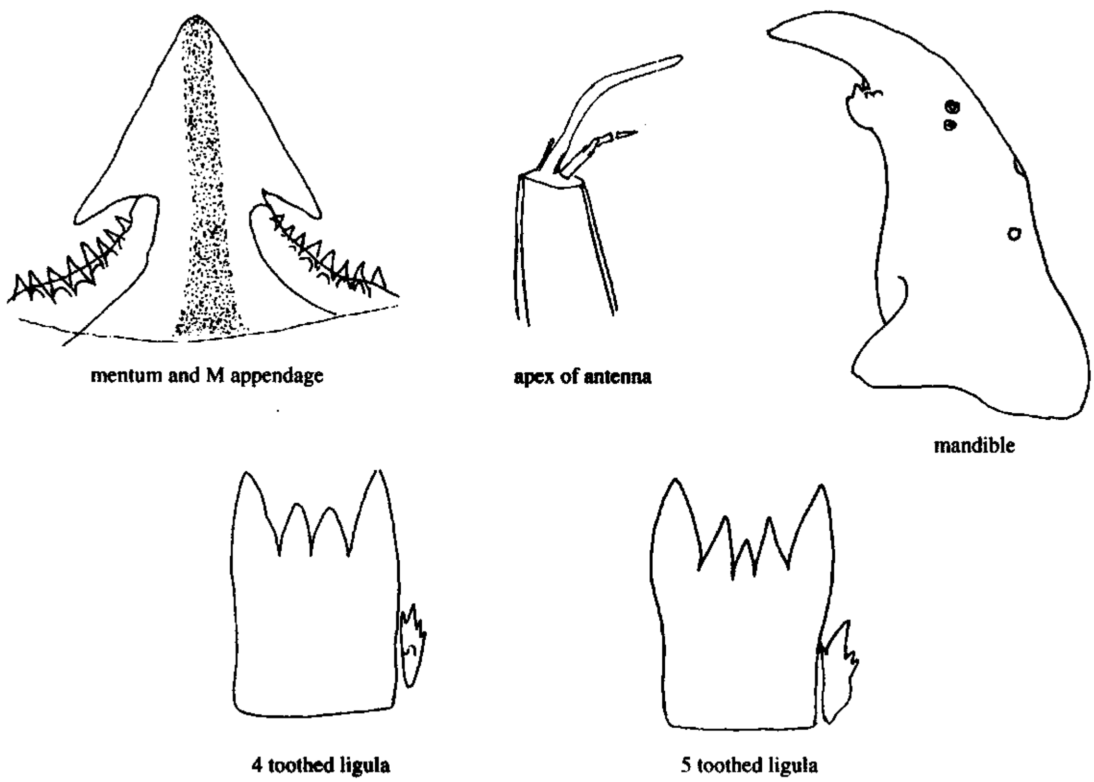
Genus ***Djalmabatista***

DIAGNOSIS: This genus closely resembles *Procladius*, but may be separated by the long antennal blade, which is about twice (or more) the length of the flagellum (segments 2-4), and by its (usually) 4 toothed ligula. Like *Procladius*, it has a well developed lateral setal fringe and well developed dorsomental teeth arranged on plates.

NOTES: One species, *D. pulchra*, is known from Florida. It was formerly placed in the genus *Procladius*, subgenus *Calotanypus*, as *P. (C.) maculatus*. Although this species usually has a 4 toothed ligula, 5 toothed "variants" may be encountered. Roback (1980) noted that some South American species of *Djalmabatista* had 5 toothed ligulae. Thus, some 5 toothed "variants" may represent a different species. However, until reared, no definite statements on their taxonomic position can be made. Tennessen & Gottfried (1983) found high variation in ligula tooth numbers in *D. pulchra* from northern Alabama. It may be wise to note the existence of these 5 toothed taxa as "*Djalmabatista pulchra* variant".

Djalmabatista larvae occur in ponds, lakes, streams and rivers. They apparently prefer soft water, low alkalinity, a slightly acidic to circumneutral pH, and were tolerant of moderate levels of iron (Roback & Tennessen 1978).

ADDITIONAL REFERENCES: Roback 1971, 1980, 1989; Roback & Tennessen 1978; Tennessen & Gottfried 1983.



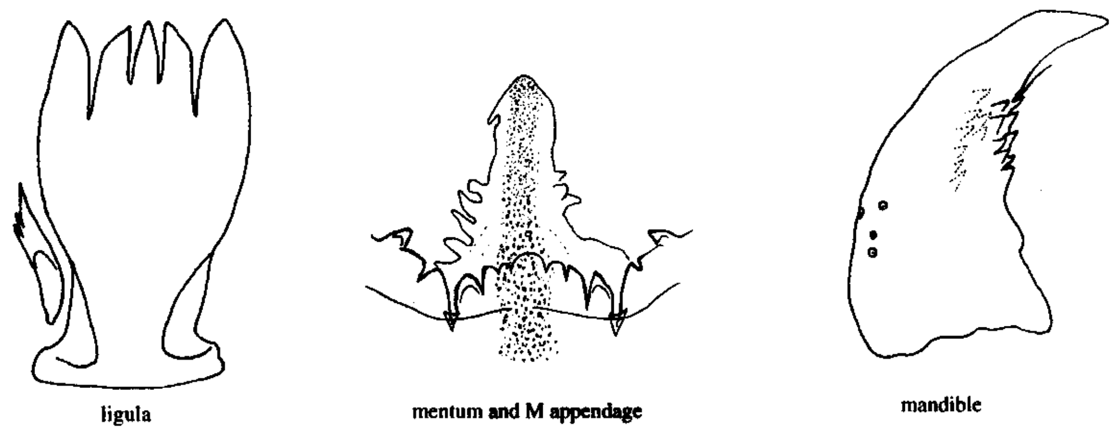
Djalmabatista, larval structures

Genus *Fittkauimyia*

DIAGNOSIS: *Fittkauimyia* is easily diagnosed by the dorsomental teeth arranged in a concave arc; multiple dorsal and ventral accessory teeth on the mandible; and its distinctive ligula.

NOTES: One species, *Fittkauimyia serta*, is known from Florida. The larva has not yet been conclusively associated with the adult, which was formerly classified in the genus *Parapelopia*. *Parapelopia* was tentatively synonymized with *Fittkauimyia* by Roback (1982b), based on associated specimens of another species from Australia; Oliver et al (1990) list it as a junior synonym. *Fittkauimyia* larvae are found in marshes, ponds, lakes, streams and rivers.

ADDITIONAL REFERENCES: Roback 1971; 1982b.



***Fittkauimyia*, larval structures**

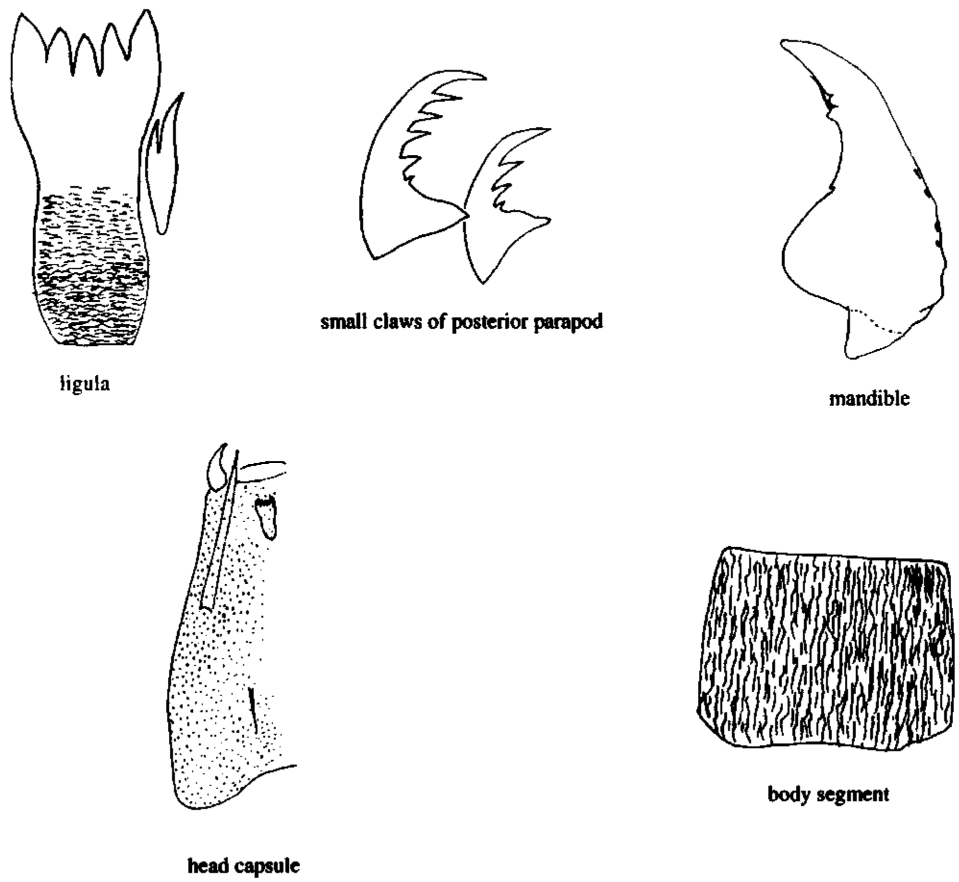
Genus ***Guttipelopia***

DIAGNOSIS: The granulose surface of the head capsule; longitudinally wrinkled body surface; posterior parapods with 2-3 small claws, each with 3 or more inner teeth; and at least 3 darker claws on the posterior parapods distinguish *Guttipelopia*.

NOTES: One species, *Guttipelopia guttipennis*, occurs in Florida. It was formerly considered a separate species, *G. currani*, but was synonymized by Bilyj (1988).

Larvae are most often found in sphagnum bogs, ditches, ponds and lakes, but may occur in streams.

ADDITIONAL REFERENCES: Beck & Beck 1966; Bilyj 1988; Roback 1971.



Guttipelopia, larval structures

Genus ***Hayesomyia***

DIAGNOSIS: Larvae of this genus are distinguished by the long scattered body setae; 2 segmented b "seta" of the maxillary palp; ring organ in distal third of maxillary palp; basal segment of maxillary palp equal to or longer than second antennal segment; length of basal antennal segment / mandible length less than or equal to 1.5; mandible with small basal and accessory teeth; and caudal margin of head capsule often with triangular dark area.

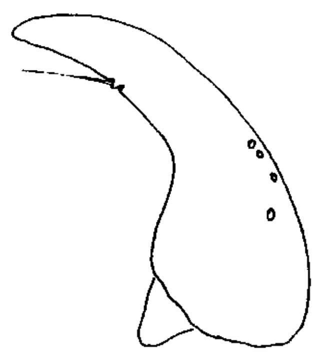
NOTES: One species, *Hayesomyia senata*, occurs in Florida. Another member of the *Thienemannimyia* group, *H. senata* was formerly placed in *Thienemannimyia* (which does not occur in Florida). *Hayesomyia* larvae are extremely difficult to separate from those of *Meropelopia*, and one may have to be content with an identification of "*Thienemannimyia* group sp." or "*Hayesomyia/Meropelopia* sp." for many specimens encountered. Late fourth instar larvae with an internally developed pupal thoracic horn may be positively identified; note the distinctive aeropyle and corona. The dark coloration on the caudal margin of the head capsule is variable.

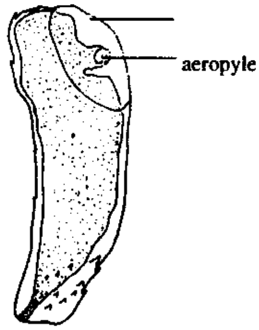
Hayesomyia senata larvae are found in rivers; I have seen larvae and pupae from the Suwannee and Perdido River systems. Roback (1981) gave the following water chemistry data: specific conductivity 301-400 µmhos @ 25°C; pH 7.1-8.0; total hardness 51-150 ppm; alkalinity 41-200 ppm; temperature 19-28°C.

ADDITIONAL REFERENCES: Murray & Fittkau 1985; Roback 1971; 1981.

maxillary palp (b "seta" shaded)

ligula





pupal thoracic horn

Hayesomyia, larval and pupal structures

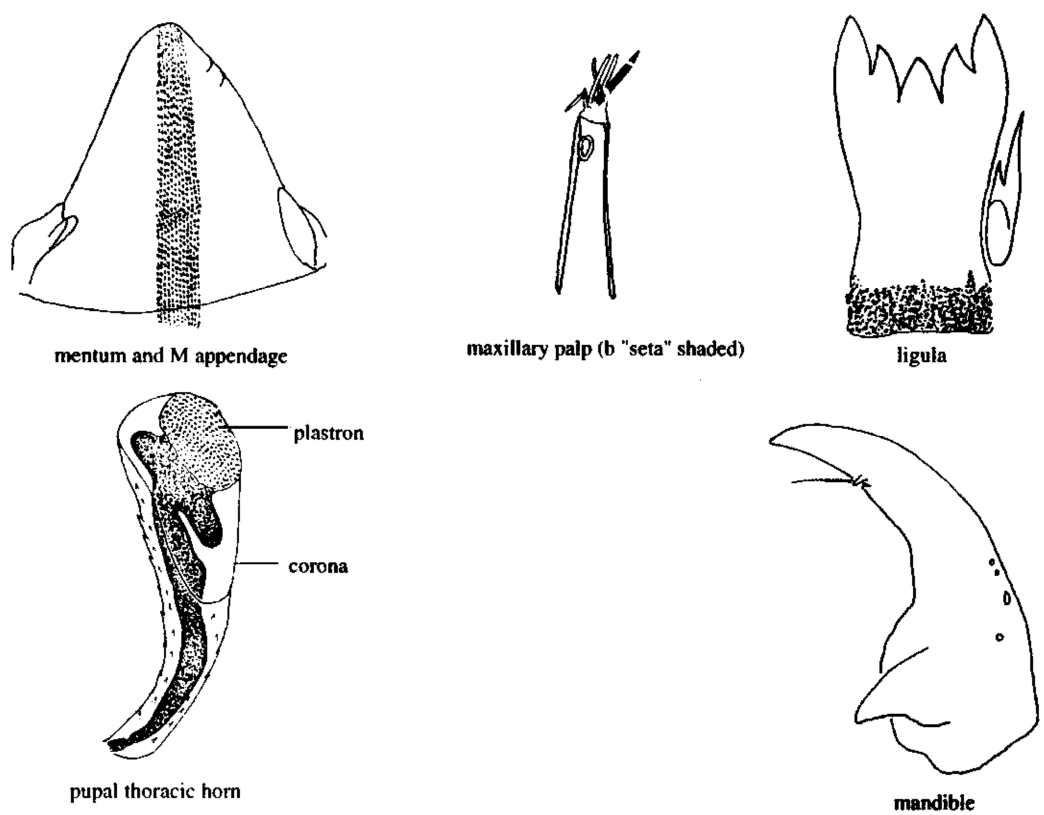
Genus ***Helopelopia***

DIAGNOSIS: *Helopelopia* is similar to *Conchapelopia* in having a 3 segmented b "seta" on the maxillary palp; ring organ in distal third of palp; and small basal and accessory teeth on the mandible. It may be separated by the smaller central tooth of the ligula (about as long as wide); ratio of length of maxillary palp/width at ring organ 4.6 or more; and pseudoradula with about 12 longitudinal rows of coarse granules.

NOTES: This genus was formerly included as a subgenus of *Conchapelopia*. Two species are known from Florida. Only *H. cornuticaudata* is described in the immature stages; I have seen a single adult male of *H. pilicaudata* from the FAMU Biological Station in Okaloosa Co. Positive separation of *Helopelopia* from *Conchapelopia* may be achieved with late 4th instar larvae; note that the developing pupal thoracic horn has a much smaller plastron plate. Note that the size of the corona in *Conchapelopia* is quite variable in size.

Helopelopia cornuticaudata larvae are found over a wide range of total hardness (0-250 ppm) and alkalinity factors (0-200 ppm); they are found in waters with a pH of 5.1-> 8.1 and at water temperatures from 14-28°C (Roback 1981). They are most often found in small streams to large shallow streams.

ADDITIONAL REFERENCES: Roback 1971; 1981.



Helopelopia, larval structures

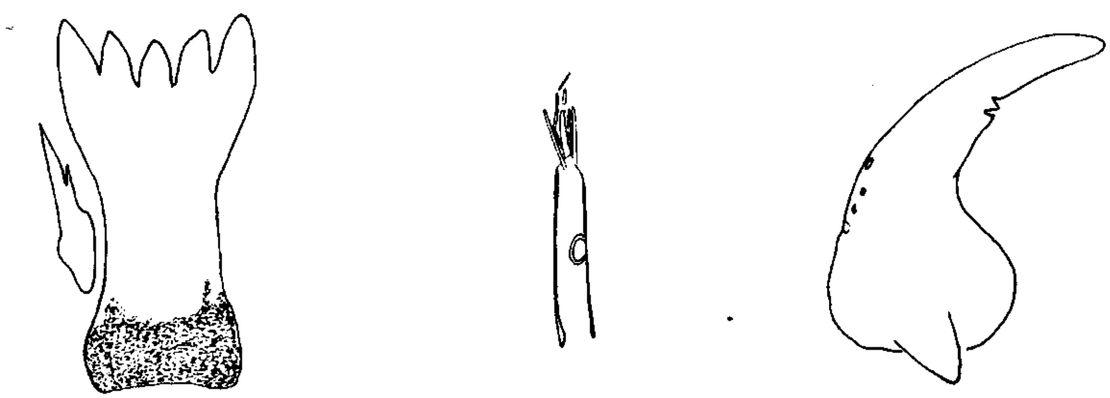
Genus *Hudsonimyia*

DIAGNOSIS: The lack of well developed dorsomental tooth plates; small accessory and basal teeth on the mandible; and maxillary palp with ring organ proximal to or at middle of segment will distinguish this genus.

NOTES: Two species are described from the Southeast, *H. karelena* from the Carolinas and GA and *H. parrishi* from northern GA. Larvae of *H. parrishi* were collected from shallow (1 cm) water flowing over granitic bedrock covered with moss, algae and detritus; *H. karelena* larvae collected in SC were found in a blue-green algae mat on steep granite outcrops with a low flow of water. An apparent third species, known only from larvae, has been collected in NW FL. This taxon is most similar to *H. parrishi*, but differs in having a shorter, stouter maxillary palp, shorter procerci and longer body setae (about 295 μm; *H. parrishi* setae are about 175 μm).

Sublette & Sasa (1994) relegated *Hudsonimyia* to subgeneric status under *Pentaneura*. Immature stages linked to adults of a new species described from Guatemala were only provisionally associated and present an apparent mix of characters. Given the substantial differences between the two taxa in the larval and pupal stages, for the present time the generic status of *Hudsonimyia* is maintained.

ADDITIONAL REFERENCES: Caldwell & Soponis 1982; Roback 1971; 1979; Sublette & Sasa 1994.



ligula | maxillary palp | mandible

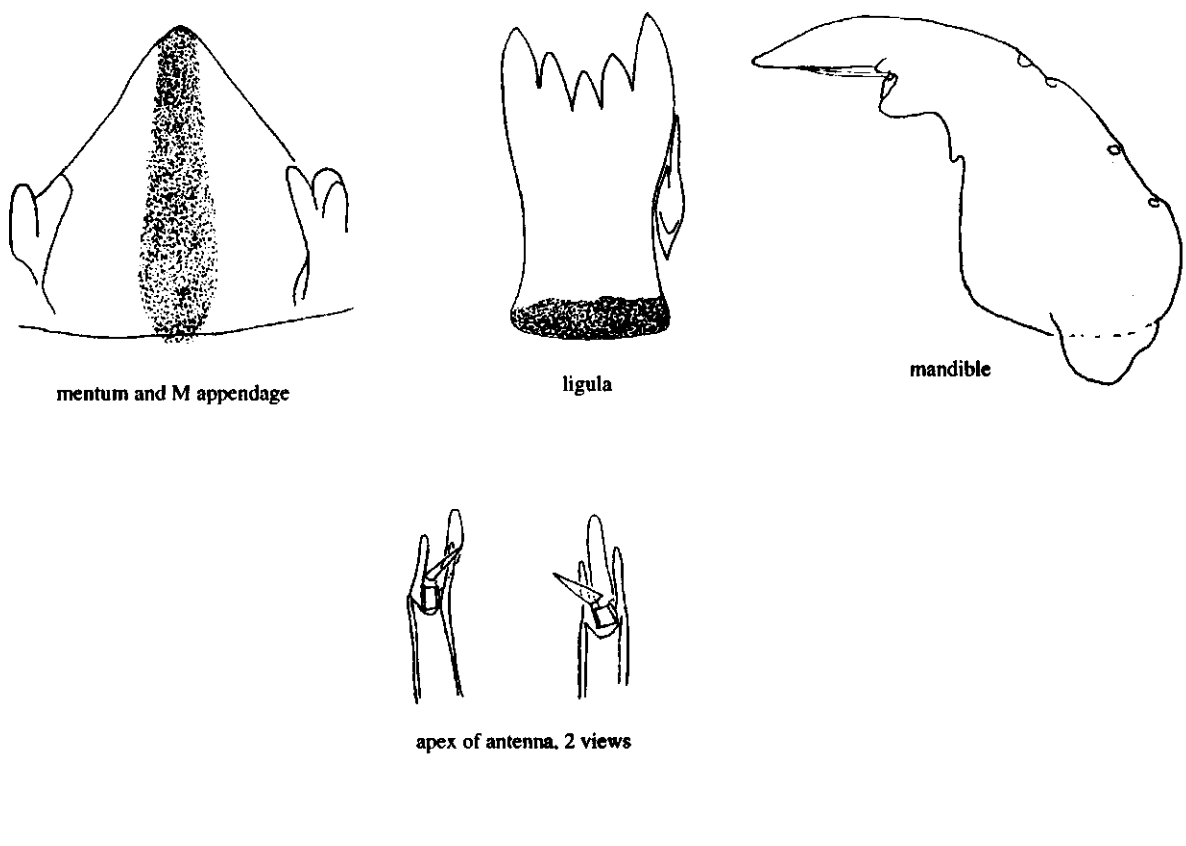
Hudsonimyia parrishi, larval structures

Genus ***Krenopelopia***

DIAGNOSIS: *Krenopelopia* larvae may be distinguished by the large Lauterborn organs on the apex of antenna segment 2, giving the appearance of a tuning fork; bifid paraligula; ligula with granulose area forming a basal band; lack of well developed dorsomental tooth plates; and large basal tooth on the mandible.

NOTES: Larvae of the only known SE species, *K. hudsoni*, were reported from SC living in muddy seeps along the borders of small springs or spring-fed streams (Roback 1983). I have seen a single larval specimen (illustrated below) from near Quincy, Gadsden Co., which fits the diagnosis for this genus. The specimen fits the description for *K. hudsoni* with one exception: the procerci are longer (about 5X as long as wide) as published accounts (3-3.8X as long as wide). Only reared specimens can determine whether the FL material represents *K. hudsoni* or another, undescribed, species.

ADDITIONAL REFERENCES: Roback 1983.



Krenopelopia, larval structures

Genus ***Labrundinia***

DIAGNOSIS: The genus is diagnosed by the median tooth of the ligula usually longer than the inner teeth (one species in S FL has the median tooth equal to or less than inner teeth); head capsule covered with spinules/nodules/granules **or** with small to large lateral spines near center of head, **or** with both head nodules and lateral spines; pseudoradula slightly broadened posteriorly; mandible with large basal tooth; one small bifid claw on posterior parapod; and anal tubules shorter than posterior parapods.

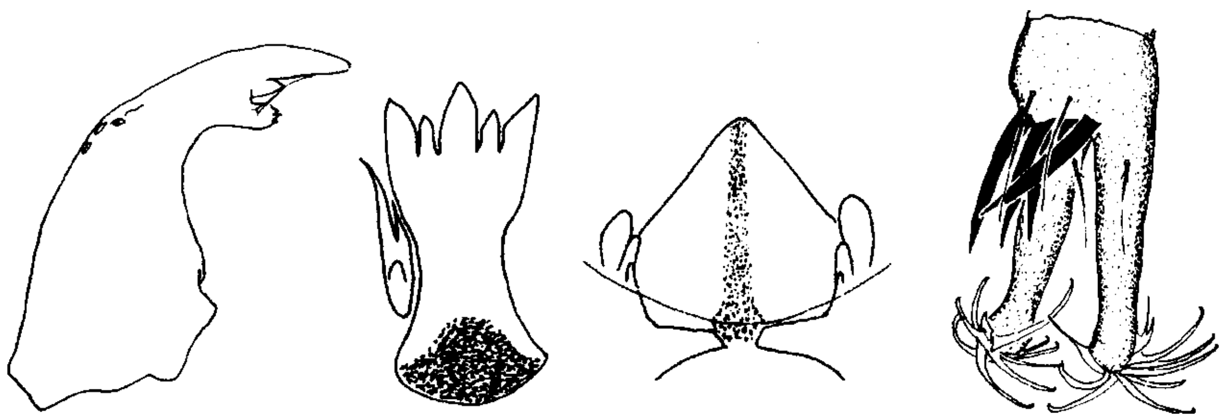
NOTES: *Labrundinia* larvae are found in herbacaeous marshes, ponds, lakes and the slower moving portions of streams and rivers. Roback (1987a) noted larvae occurring at the following water chemistry parameters: pH 4.5-7.2 (most around 7.0); total hardness 19-94 ppm; alkalinity 0-82 ppm; specific conductivity 48-197 µmhos @ 25°C; temperature 19-24°C.

Contrary to the diagnosis provided in Fittkau & Roback (1983), the pseudoradula is broadened posteriorly in many species, but not to the extent shown in *Nilotanypus*, a genus which may be confused with *Labrundinia.*

Note also that the characteristic shapes of the small bifid claw of the posterior parapod may not be evident until the fourth instar.

In his review of the genus, Roback (1987a) recorded 5 described species from Florida. Two additional larval species which he gave number designators (sp. 4 and sp. 6) occur in Florida. These two species and two additional unnamed taxa (sp. A and sp. B) from Florida are included in the following key, which is partially adapted from Roback (1987a). The existence of these four unassociated larval taxa indicates that more work on the genus is needed. Benthic workers can contribute greatly by attempting to rear these taxa.

ADDITIONAL REFERENCES: Beck & Beck 1966; Roback 1971; 1987a.



mandible | **typical ligula** | **mentum & M appendage** | **caudal segment (anal tubules shaded)**

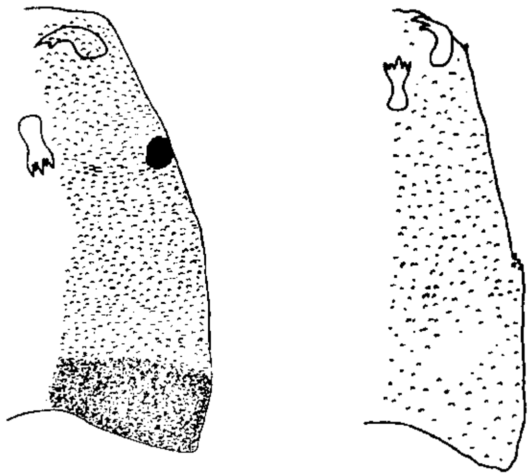
***Labrundinia*, larval structures**

Key to Florida *Labrundinia*

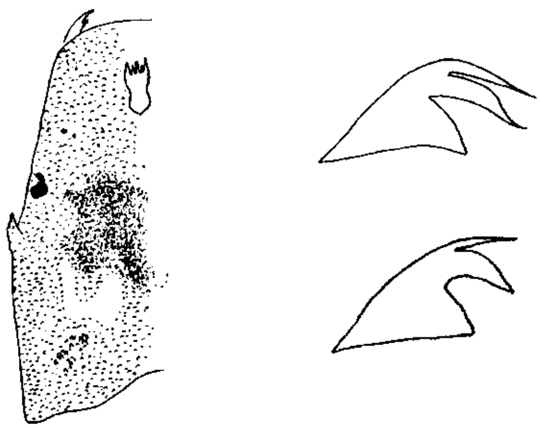
1 Surface of head capsule covered with small nodules/spinules; lateral spines present or absent near center of head 2

1' Surface of head capsule smooth; lateral spines or spurs usually present near center of head 6

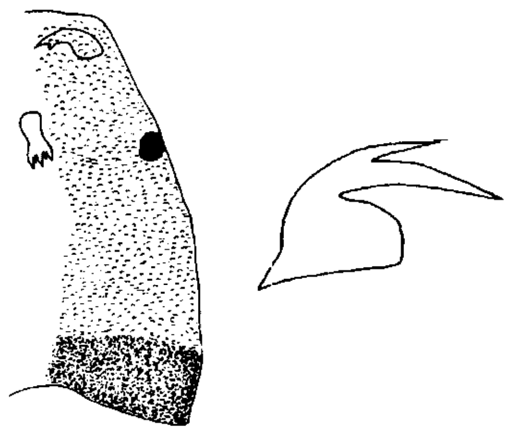
2 (1) Head without ventral darker area near center of head, although caudal margin of head may be darkened; lower spur of bifid posterior parapod claw longer than upper 3



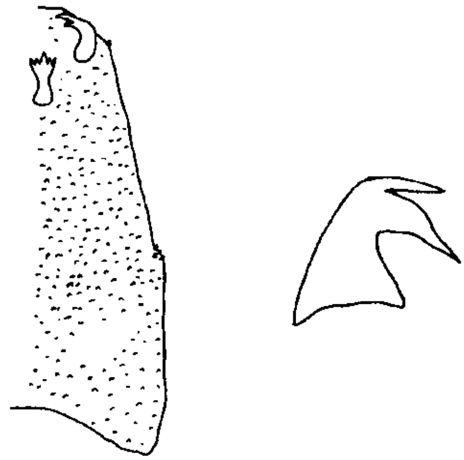
2' Head with ventral darker area near center of head; lower spur of bifid posterior parapod claw subequal to or shorter than upper 4



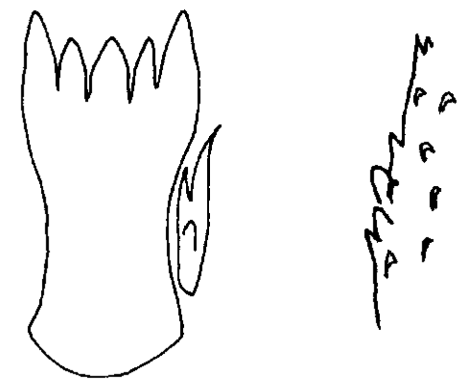
3 (2) Head without lateral spines; caudal margin of head may be darkened; lower groove of bifid posterior parapod claw forming an acute angle .... ***L. pilosella***



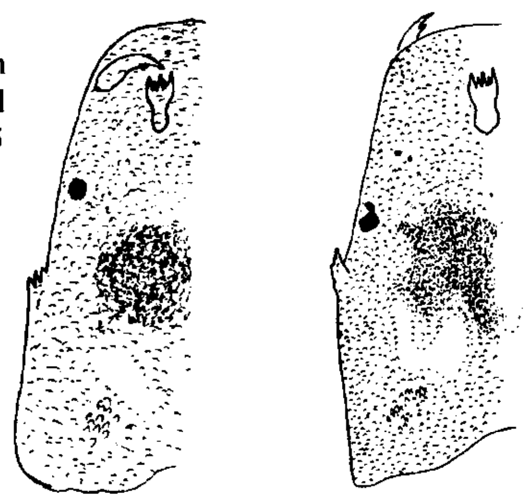
3' Head with small lateral spines; caudal margin not darkened; lower groove of bifid posterior claw forming a U-shaped angle .... ***L. maculata***



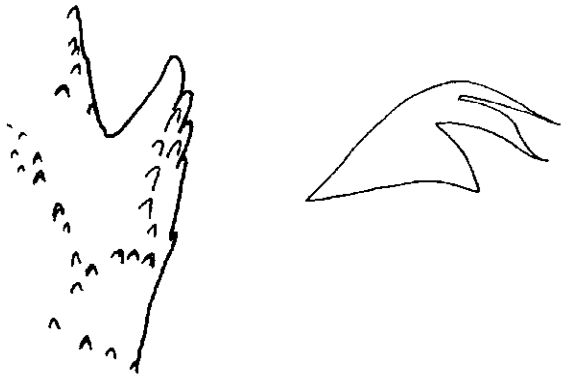
4 (2') Median tooth of ligula subequal to or shorter than inner teeth; lateral spines of head weakly developed .... **L. sp. A**



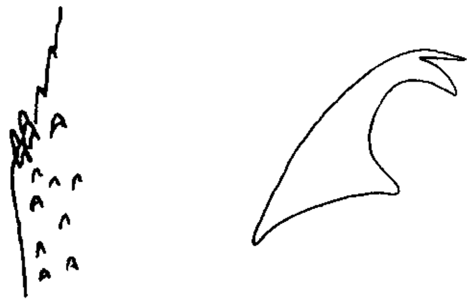
4' Median tooth of ligula much longer than inner teeth; lateral spines/spurs of head well developed 5



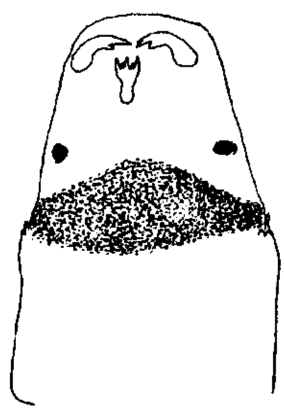
5 (4') Lateral spur group of head consists of a large spur; lower groove of bifid posterior parapod claw forming an acute angle .... *L.* **sp. B**



5' Lateral spur group consists of several smaller spines; lower groove of bifid posterior parapod claw wide .... *L.* **sp. 6**



6 (1') Head with medial brown transverse band .... ***L. johannseni***



6' Head without medial transverse band, although caudal margin may be darkened 7

7 (6') Bifid claw of posterior parapod with U-shaped lower groove .... *L. neopilosella*

NOTE that the characteristic shapes of the small bifid claw of the posterior parapod may not be evident until the fourth instar.

7' Bifid claw of posterior parapod with V-shaped lower groove 8

8 (7') Lateral spine group of head consists of a single large spur .... **L. sp. 4**

8' Lateral spine group of head consists of 2-7 small spines 9

9 (8') Lower spur of bifid posterior parapod claw short .... *L. becki*

9' Lower spur of bifid posterior parapod claw elongate .... *L. virescens*

Notes on species

L. becki - This relatively common species is keyed as *L. pilosella* in Beck & Beck (1966) and Beck (1976; 1979).

L. johannseni - A distinctly marked species distributed throughout the Southeast. It is closely related to *L. neopilosella*.

L. maculata - The nodules/spinules of the head capsule may be difficult to discern in some specimens. Bob Rutter has sent me a larval specimen from a marsh in Polk Co. and Broughton Caldwell has reared this species from St. Simon Island in SE Georgia.

L. neopilosella - Roback (1987a) described 5 forms of this species; the nominal species and one of his varieties (var. 4) occur in Florida. I have seen the single Florida specimen of var. 4 noted in Roback (1987a); it is difficult, if not impossible, to separate it from "typical" *neopilosella*. See Roback (1987a) for more information.

L. pilosella - This is the most ubiquitous species of the genus in Florida. It is keyed as *L. floridana*, a junior synonym, in Beck & Beck (1966) and Beck (1976; 1979).

L. virescens - The largest (in size) species of the genus in Florida; apparently uncommon.

L. sp. 4 and *L.* sp. 6 were described by Roback (1987a) and are known only as larvae.

L. sp. A has been found as far north as Hamilton Co. It is unusual in that the middle tooth of the ligula is subequal to or shorter than the inner teeth. I have seen similar larvae from northern Costa Rica.

L. sp. B is found throughout peninsular Florida.

Genus *Larsia*

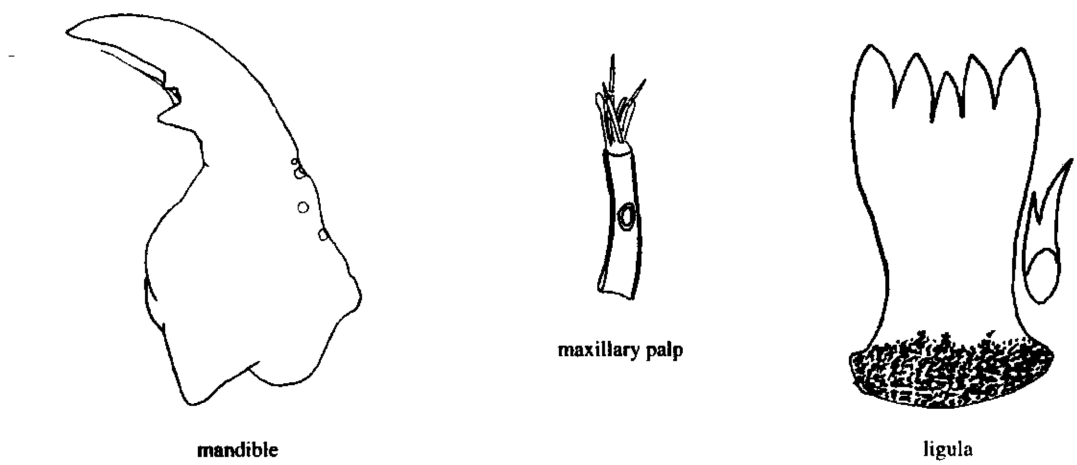
DIAGNOSIS: The lack of any setal fringe; basal segment of maxillary palp with ring organ near middle; large basal tooth of mandible; and long antennae (½ length of the head and at least 3X mandible length) will distinguish Florida species of *Larsia*.

NOTES: *Larsia* larvae are most often found in marshes and ponds in Florida.

Larsia is currently being revised by B. Bilyj, Etobicoke, Ontario, Canada. He has graciously provided me with much of the following information. I have adapted a key to species he has provided; head capsule figures are adapted from his illustrations. The placement of ventral head capsule setae and sensory pores are of importance in separating species; Kowalyk (1985) provides an in-depth study of the setae of the tanypod head.

Three species are known from Florida. *Larsia lurida*, described and keyed in Beck & Beck 1966, is a junior synonym of *L. decolorata.* Although Oliver, et al. (1990) list *L. indistincta* as a junior synonym of *L. decolorata*, Bilyj (pers. comm.) considers it a valid species.

ADDITIONAL REFERENCES: Beck & Beck 1966; Roback 1971.

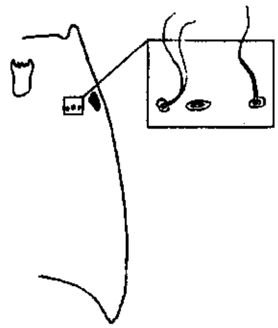


Larsia, larval structures

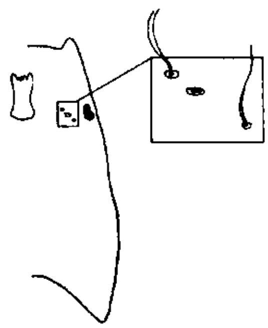
Key to Florida *Larsia*

(4th instars only: with mandible length > 75 µm; antenna length > 230 µm)

1 Ventral cephalic setae 9, 10 and ventral pore forming a more or less straight line perpendicular to longitudinal axis of head capsule .... ***L. berneri***



1' Ventral cephalic setae 9, 10 and ventral pore forming a more or less straight line diagonal to longitudinal axis of head capsule 2



(1') Ligula with inner lateral teeth subequal to outer teeth and turned slightly inward (ligula must be flat to observe this!) .... ***L. decolorata***

2' Ligula with inner lateral teeth distinctly shorter and parallel to outer teeth (ligula must be flat to observe this!) .... ***L. indistincta***

Genus ***Meropelopia***

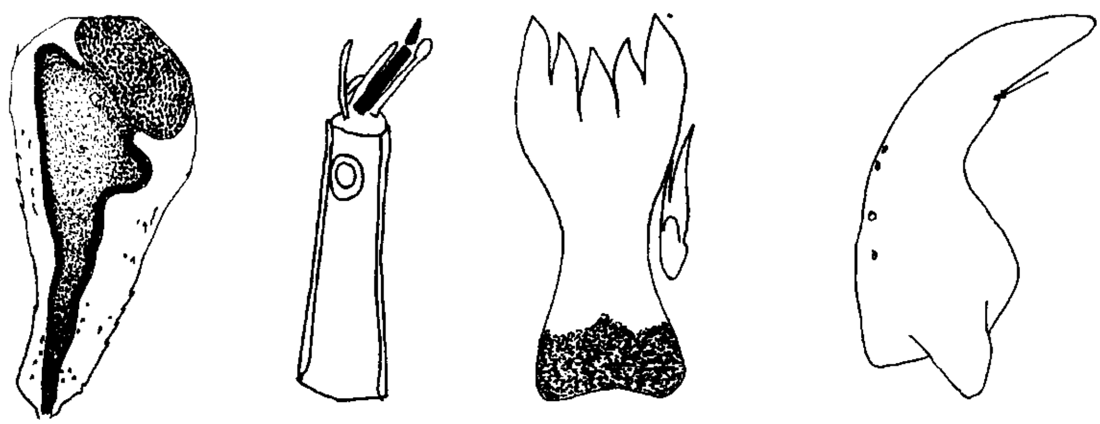
DIAGNOSIS: Larvae of this genus are distinguished by the long scattered body setae; 2 segmented b "seta" of the maxillary palp; ring organ in distal third of maxillary palp; basal segment of maxillary palp equal to or longer than second antennal segment; length of basal antennal segment/mandible length greater than 1.75; mandible with small basal and accessory teeth; and caudal margin of head capsule usually light, may be darkened.

NOTES: One species, *M. flavifrons*, occurs with certainty in Florida. It was called *Arctopelopia fittkaui* in Beck & Beck (1966) (true *Arctopelopia* do not occur in Florida). Another species, *M. americana,* was recorded for Florida by Hudson, et al. (1990). Larvae of the two species are separable only by size (data on *reared 4th instar* larvae from Roback (1981): *M. flavifrons* has basal segment of maxillary palp < 60 μm, first antennal segment < 300 μm; *M. americana* is larger); pupae and adults are more easily separated. Consider yourself lucky if you can identify these larvae to genus, let alone species!! Species level identification of larvae would be suspect without associated pupae or adults.

Meropelopia was formerly considered a subgenus of *Conchapelopia*, from which it is easily separated by the 2 segmented b "seta" of the maxillary palp (*Conchapelopia* has a 3 segmented b "seta"). It is more difficult to separate *Meropelopia* from *Hayesomyia*, and one may have to be content with an identification of "*Thienemannimyia* group sp." or "*Hayesomyia/Meropelopia* sp." for many specimens. As with other members of the *Thienemannimyia* group, mature 4th instar larvae may be identified to genus if the developing pupal thoracic horn is visible; note the lack of a corona.

Meropelopia flavifrons occurs in streams and rivers. Roback (1981) recorded the following water chemistry data for *Meropelopia*: total hardness 0-150 ppm, most < 50; alkalinity 0-80 ppm, most < 40; specific conductivity 0-300 μmhos @ 25°C, most < 100; pH 4.1-8.0, most from 6.1-7.0; temperature 9-28°C, most from 9-18.

ADDITIONAL REFERENCES: Roback 1971; 1981



pupal thoracic horn　　maxillary palp (b "seta" shaded)　　ligula　　mandible

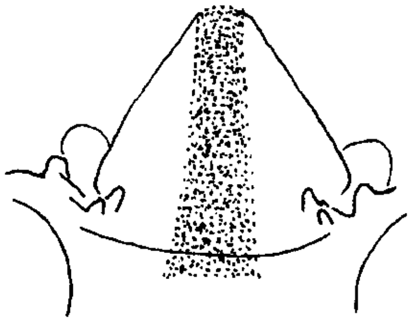
***Meropelopia flavifrons*, larval and pupal structures**

Genus *Monopelopia*

DIAGNOSIS: The tuning fork appearance of the large, well sclerotized Lauterborn organs at the apex of antennal segment 2; the triangular rugose area at the base of the ligula and the lack of well developed dorsomental teeth will distinguish this genus.

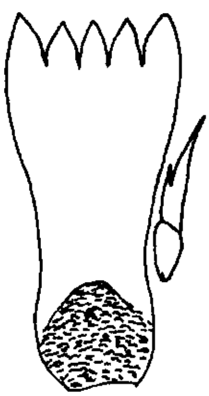
NOTES: *Monopelopia* larvae are found in small bodies of water such as ponds and marshes; one species is found in the water held by bromeliads.

ADDITIONAL REFERENCES: Beck & Beck 1966b; Roback 1986a; 1987c.

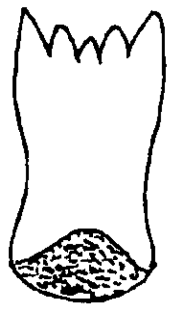


dorsomentum and M-appendage

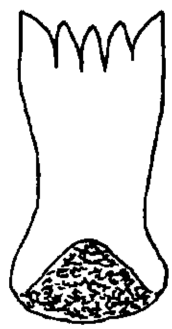
mandible



M. tillandsia, ligula



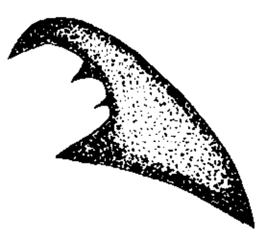
M. tenuicalcar, ligula (from Roback 1986a)



M. boliekae, ligula

antennal apex, lateral

antennal apex, dorsal



M. boliekae, dark small claw of posterior parapod

M. tillandsia, small claw of posterior parapod

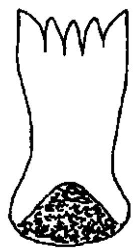
Monopelopia larval structures

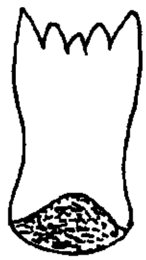
Key to Florida *Monopelopia*

1 All claws of posterior parapod pale yellow or clear; found in (limited to?) bromeliads .... ***M. tillandsia***

1' At least one dark claw on posterior parapod 2

2 (1') Teeth of ligula in relatively straight line; procercus length/width 3.0 or less; relatively common .... ***M. boliekae***





2' Teeth of ligula in concave arc; procercus length/width > 4.0; rare (?) .... ***M. tenuicalcar***

From Roback 1986a

Notes on species

M. boliekae - The most commonly encountered species of the genus in Florida; it occurs throughout the state.

M. tenuicalcar - I have not seen this species from Florida. Roback (1986a) recorded specimens from St. Johns Co.

M. tillandsia - To date, larvae of this species have been found only in the water retained by bromeliads. It was originally described from specimens reared from bromeliads at Vero Beach. I have reared this species from bromeliads at Donald MacDonald Park in Indian River Co., where they co-existed with psychodid and culicid larvae, and a *Metriocnemus* sp. The possibility of other (undescribed) species occurring in Florida bromeliads can not be discounted, for I have seen two additional, unassociated, larval types or variants from Jamaica.

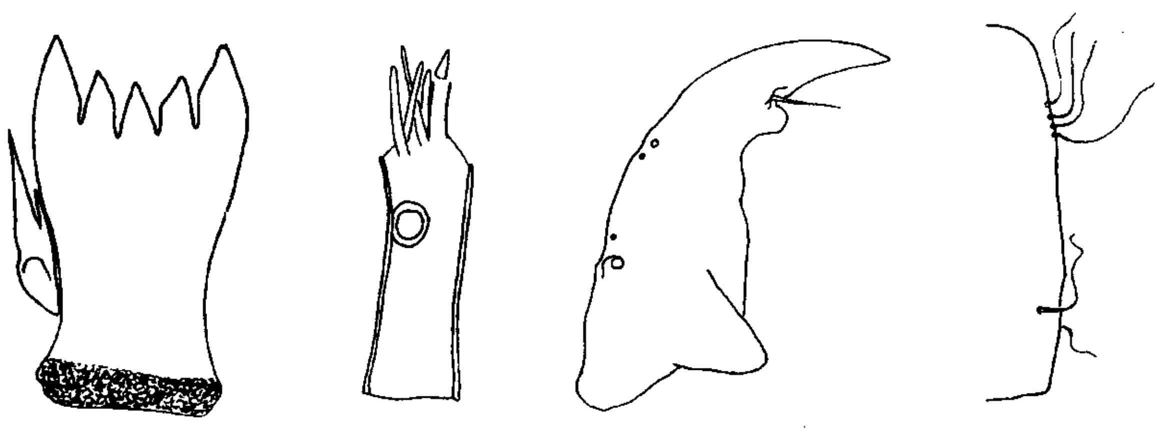
Genus ***Natarsia***

DIAGNOSIS: The large basal tooth of the mandible, absence of well developed dorsomental tooth plates; basal segment of maxillary palp with ring organ in apical third; the lateral fringe of 4 larger setae on body segments 4-10; and the short antennae (about 1/3 length of head and twice the length of the mandible) are distinctive.

NOTES: Two species are recorded from Florida. However, the taxonomy of the two species is unclear; it is probable that only one species occurs here. This is *Natarsia* sp. A; this taxon is unnamed because of taxonomic uncertainty. The other eastern species, *N. baltimoreus*, is recorded from Florida based on specimens of *Anatopynia fastuosa*, a junior synonym, in part, of *N. baltimorea* (Roback 1971). However, because of differences in the larvae Roback (1978) believed that some larger specimens of *N. baltimorea* represented another species previously misdetermined as *T. hirtipennis*; larger specimens of *N. baltimorea* were tentatively named *N.* sp. A. This is the only species of the genus I've seen from Florida. More reared material is needed before this taxon can be redescribed and, if it represents a new species, given a new name. Both species are keyed below. Roback (1978) also described variants of each species.

Natarsia larvae are found in streams and marshes; they can apparently withstand organic and toxic discharges, especially sewage (Hudson et al. 1990). Roback (1978) gave the following water chemistry data for *N.* sp. A: pH 5.1-7.0; total hardness 0-100 ppm; alkalinity 0-40; specific conductivity 0-300 µm @ 25°C; temperature 14-28°C.

ADDITIONAL REFERENCES: Roback 1971; 1978.



Natarsia sp. A, larval structures

Key to *Natarsia* of eastern U.S.

1 Ligula teeth apically concave .... ***N.* sp. A**

1' Ligula teeth approximately even .. ***N. baltimorea***

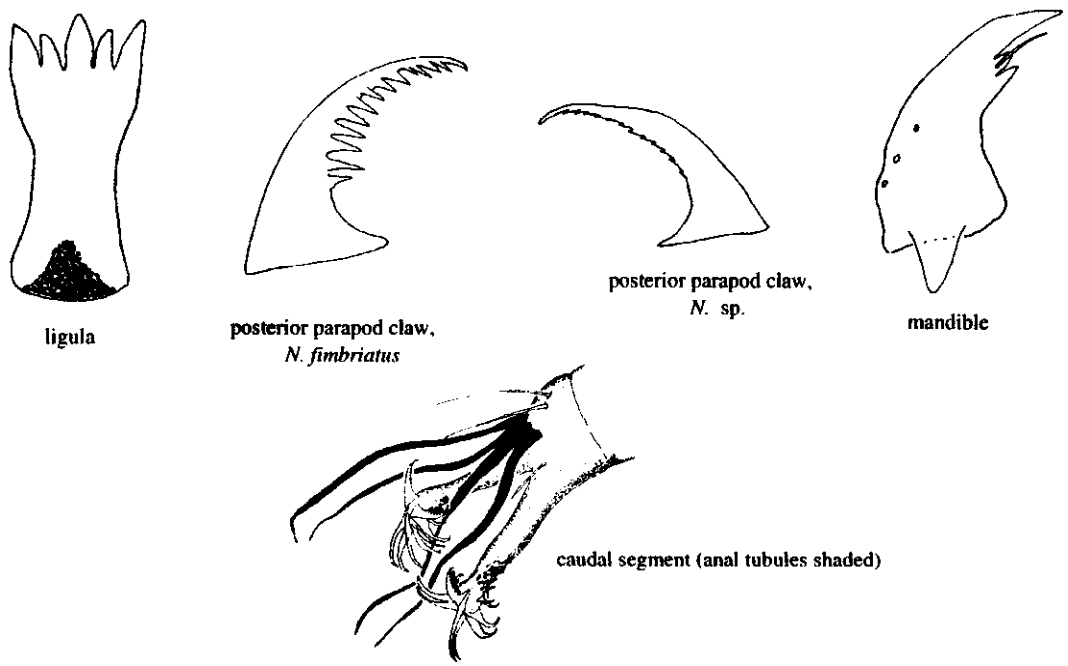
Genus ***Nilotanypus***

DIAGNOSIS: The small size; ligula with the median tooth longer than the inner teeth; at least one small or medium claw of the posterior parapod pectinate or with several small spines; pseudoradula with fine granules and greatly broadened posteriorly; anal tubules longer than posterior parapods; and head without nodules/spinules or lateral spines serve to separate this genus.

NOTES: Two species are recorded from Florida, *N. americanus* and *N. fimbriatus*. I have seen an adult male specimen from SE Alabama which fits the description for *N. kansensis*; this species may also occur here, or there is more variability than documented for the genus. Some taxonomic uncertainty exists, for the male of *N. americanus* remains undescribed. Roback (1986b) also described a larval type from Texas (incorrectly located on his map, fig. 91). Species separation of the larvae of *N. americanus* and *N. kansensis* is difficult and impossible without 4th instar larvae (which should be reared to confirm identification); the pectinate small claw on the posterior parapod of *N. fimbriatus* easily distinguishes that species. Specimens of *Nilotanypus* which are not clearly assignable to *fimbriatus* should be identified as "*Nilotanypus* sp."

Nilotanypus larvae are found in clean, shallow sand bottomed streams. They are apparently not tolerant of some forms of pollution, and may serve as indicators of good water quality. Roback (1986b) gave the following water chemistry data: pH 5.6-7.0; total hardness 16-44 ppm; alkalinity < 20 ppm; specific conductivity 32-92 µmhos @ 25°C.

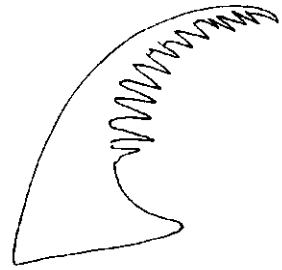
ADDITIONAL REFERENCES: Roback 1971; 1986b.



Nilotanypus larval structures

Key to *Nilotanypus* of eastern U.S.

1 One medium claw of posterior parapod pectinate .... ***N. fimbriatus***



1' One or more medium claws of posterior parapod with inner row of small spines/serrations 2
(4th instar larvae only beyond this point)

2 (1') Length of antenna segment 2 < 44 µm; head usually < 326 µm .... ***N. americanus***

2' Length of antenna segment 2 > 44 µm; head usually > 326 µm .... ***N. kansensis***

Genus ***Paramerina***

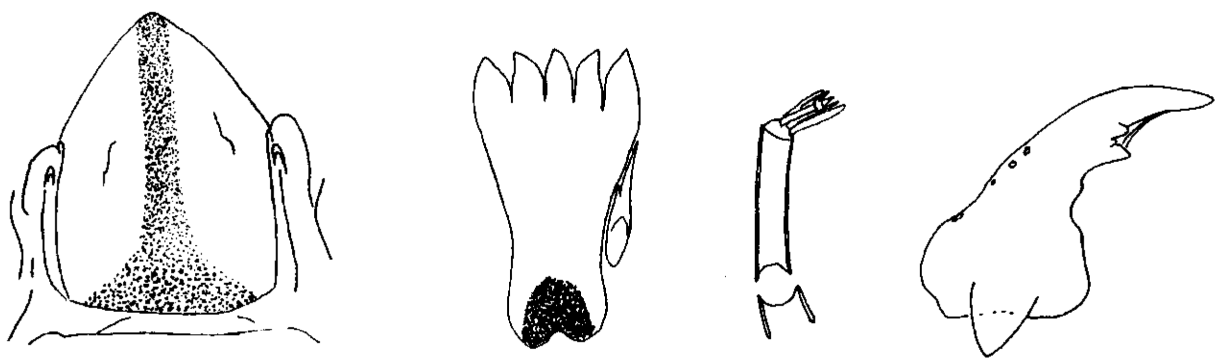
DIAGNOSIS: Larvae of this genus are distinguished by the large basal tooth of the mandible; the two segmented maxillary palp, with the proximal segment < ½ length of the distal segment; and the pseudoradula broadened posteriorly, appearing attached to a transverse bar and consisting of small granules not arranged in parallel rows.

NOTES: Two species are known from Florida: *P. anomala* and *P. testa*. A third species, *P. fragilis*, is recorded from SC and may occur here. The immature stages of the latter two species are undescribed. Through the kindness of M. Bolton, Ohio EPA, I have been able to examined reared specimens of *P. fragilis*; the larvae strongly resemble some *Paramerina* larvae I've seen from Florida. Without reared associations their identification can not be positive. It may be possible to distinguish *P. anomala* by the darkened caudal margin of the head capsule; however, specimens should be reared for correct identification. *P. testa* was previously known only from Texas; I have seen males from peninsular FL. Unless reared, larvae should be identified as "*Paramerina* sp."

Although Fittkau & Roback (1983) stated that the claws of the posterior parapods were simple, some species possess bifid small claws.

Larvae are found in marshes and streams.

ADDITIONAL REFERENCES: Beck & Beck 1966; Roback 1971.



mentum & M appendage **ligula** **maxillary palp** **mandible**

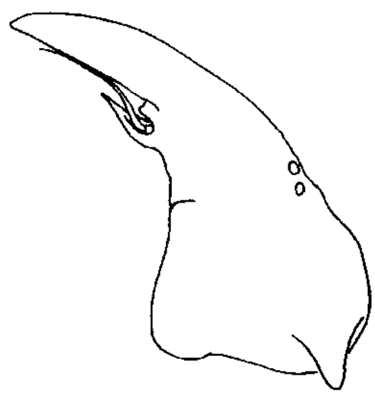
***Paramerina* sp., larval structures**

Genus *Pentaneura*

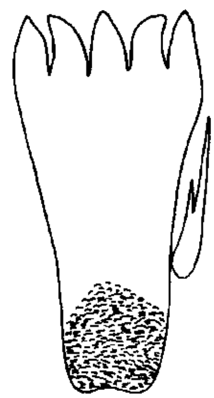
DIAGNOSIS: Larvae are distinguished by the large, pointed, apically directed basal tooth of the mandible; apices of ligula teeth even; lack of well developed dorsomental teeth; one dark claw on each posterior parapod; and anal tubules longer than posterior parapods.

NOTES: One species, *P. inconspicua*, is common in rivers and streams. The species *P. inculta* was synonymized with *P. inconspicua* by Roback (1971). An additional, undescribed species may be present in the Southeast (Hudson et al. 1990).

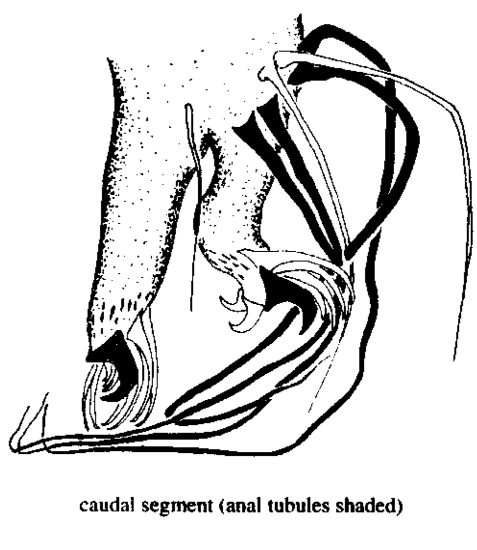
ADDITIONAL REFERENCES: Beck & Beck 1966; Roback 1971.



mandible



ligula



caudal segment (anal tubules shaded)

Pentaneura inconspicua, larval structures

Genus ***Procladius***

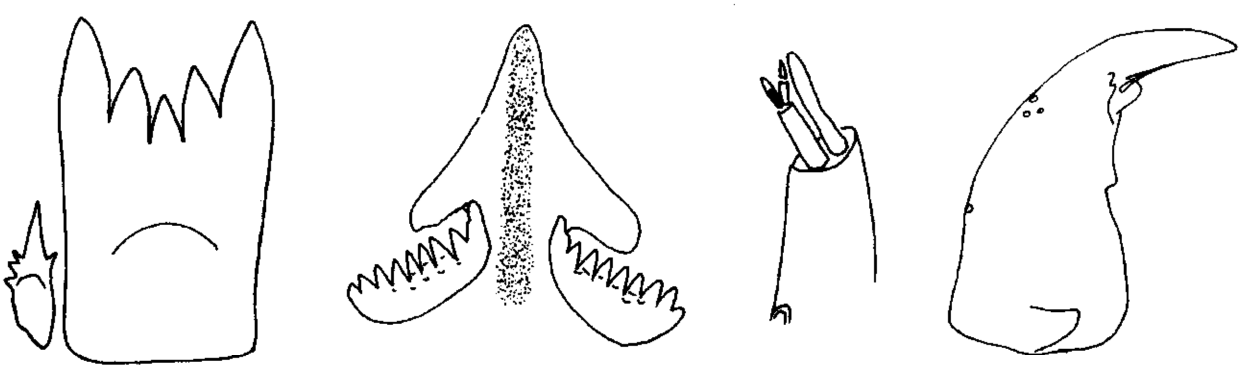
DIAGNOSIS: The well developed lateral setal fringe; well developed dorsomental tooth plates; mandible with large blunt basal tooth; black/dark brown five toothed ligula; and antennal blade subequal to the flagellum distinguish *Procladius*.

NOTES: Four species are recorded from Florida. Some larvae may be identified to subgenus, but with the exception of *P. bellus*, species identification of unreared larvae is not possible. Two subgenera occur in Florida: *P. (Psilotanypus)* with one species, *P. bellus;* and *P. (Holotanypus)* [referred to as *P. (Procladius)* in Roback (1980)] with three species, *P. curtus, P. freemani* and *P. sublettei*. *Procladius bellus* and *P. sublettei* are by far the most common species in Florida. Roback (1980) noted three varieties of *P. bellus*; some of these may represent different species (see Hudson et al. 1990). Earlier records of *P. culiciformis* from Florida are most likely referable to *P. freemani* or *P. sublettei.*

Procladius larvae are found in the bottom sediments of ponds, lakes and the slower moving portions of streams and rivers. Roback (1980) recorded the following water chemistry data: pH , 4.1-8.0; total hardness (ppm $CaCo_3$) < 50-260, with most records < 51; alkalinity < 40-200, with most < 41; specific conductivity < 100-500 µmhos @ 25°C, with most < 200; and water temperature < 8-28°C, with most records for 19-23°.

Larvae may be found in heavily polluted conditions, and are subject to numerous deformities (see Warwick 1989; 1990). Larvae with a 4 toothed ligula may be confused with *Djalmabatista*, but may be separated by the shorter antennal blade in *Procladius.* The length of the apical tooth of the paraligula is variable, and may not be useful as a character to separate the subgenera *P. (Psilotanypus)* and *P. (Holotanypus)*, contrary to the key in Fittkau & Roback (1983). The small claws of the posterior parapod do allow identification of some forms of *P. bellus;* other specimens are best identified as "*Procladius* sp." The key which follows is modified from Roback (1980).

ADDITIONAL REFERENCES: Roback 1971; 1980; Warwick 1989;1990.



ligula and paraligula | mentum and M appendage | apex of antenna | mandible

Procladius sp., larval structures

Key to Florida *Procladius*

1 Small claws of posterior parapod with 2 or more inner teeth .... ***P. bellus*** 2

1' Small claw of posterior parapod without inner teeth 3

2 (1) Each posterior parapod with one toothed claw .... ***P. bellus* var. 2**

2' Each posterior parapod with two toothed claws .... ***P. bellus* var. 3**

3 (1') **Fourth instar larvae only:** first antennal segment < 118 µm; ligula < 65 µm .... ***P. bellus* var. 1**

3' **Fourth instar larvae only:** first antennal segment > 118 µm; ligula > 65 µm .... ***P. (Holotanypus)* sp.**

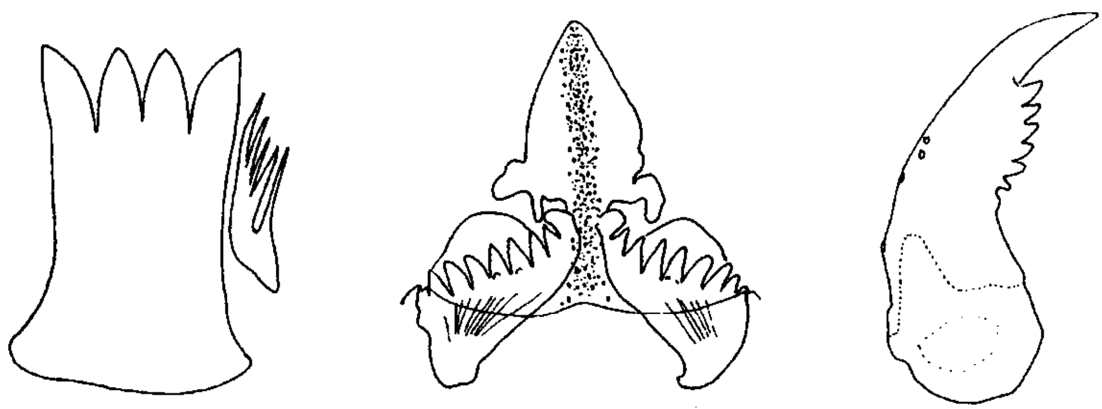
Genus ***Psectrotanypus***

DIAGNOSIS: Larvae possess a lateral setal fringe; well developed transverse dorsomental tooth plates; mandible with several large inner teeth; a pale ligula with 4 even teeth; and numerous long apicolateral branches on the paraligula.

NOTES: One species, *P. dyari*, is recorded from Florida. Another undescribed species has been reported from the Carolinas (Hudson et al. 1990). An additional described species is known from northern North America.

Larvae are found in ponds, springs, and streams. Roback (1978) noted that *P. dyari* appeared to be the only member of its tribe (the Macropelopiini) tolerant of high levels of organic pollution. He gave the following water chemistry parameters for the species: pH 6.1-8.0; total hardness 51-200 ppm; alkalinity < 40-200 ppm; specific conductivity < 100-400 μmhos @ 25°C; temperature 9-23°C.

ADDITIONAL REFERENCES: Roback 1971; 1978.



ligula and paraligula | mentum and M appendage | mandible

Psectrotanypus, larval structures

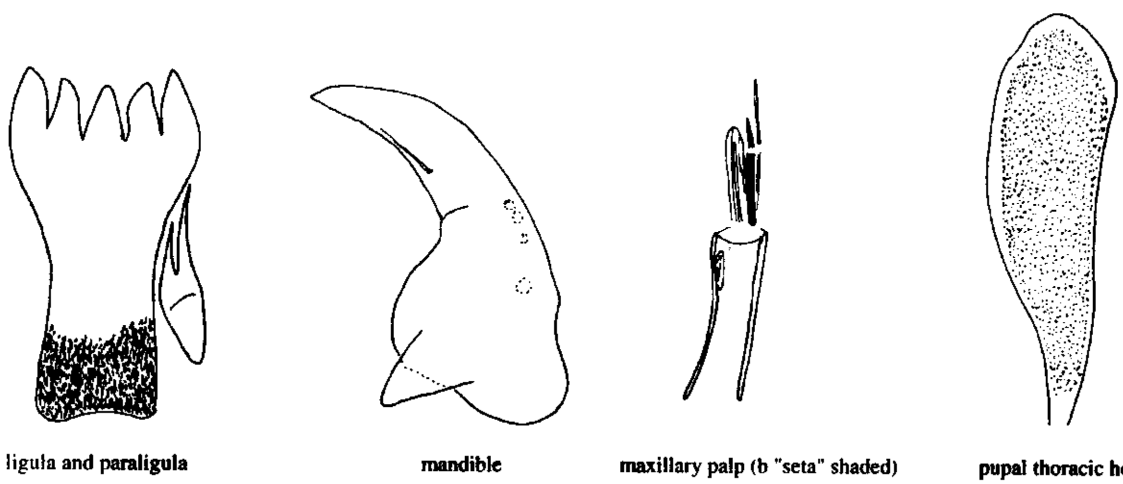
Genus *Rheopelopia*

DIAGNOSIS: The long, radially arranged body setae; lack of dorsomental teeth; 2 or 3 segmented b "seta" of the maxillary palp; maxillary palp shorter than antennal segment 2 and with ring organ in apical third; and the mandible with its basal and accessory teeth extremely reduced will distinguish *Rheopelopia* larvae in Florida.

NOTES: I have seen one species, based on larval/pupal/pharate female associations, from the Suwannee River basin, where at times it can be the dominant tanypod found on Hester-Dendy samplers. This larva, which I call *Rheopelopia* sp. A, may represent a southern population of *R. paramaculipennis*. Mike Bolton (Ohio EPA) has sent me reared *R. paramaculipennis*; the sp. A larvae apparently differ from his Ohio larvae only in the darkened head capsule of the Florida specimens. This taxon is easily confused with *Hayesomyia* or *Meropelopia*. Generic identification can be assured with late fourth instar larvae; the pharate pupa has an elongate saccoid thoracic horn without a distinct respiratory atrium.

The larvae of *Rheopelopia* sp. A (and the Ohio *R. paramaculipennis*) depart from the generic diagnosis given in Fittkau & Roback (1983) in that the b "seta" of the maxillary palp is 2 segmented rather than 3 segmented. In some specimens I've seen the basal portion of the b "seta" is partially divided. The exact taxonomic position of *Rheopelopia* sp. A will not be known until the larva is reared and compared type material of described species. I have not seen *Rheopelopia* larvae from Florida with a 3 segmented b "seta".

ADDITIONAL REFERENCES: Roback 1971; 1981.



Rheopelopia sp. A, larval and pupal structures

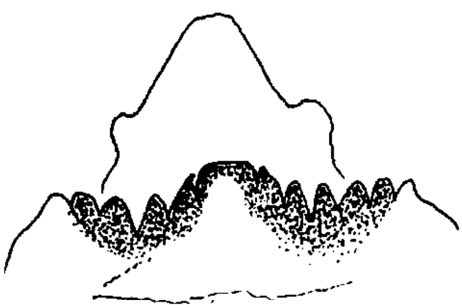
Genus ***Tanypus***

DIAGNOSIS: The well developed lateral setal fringe on the body, stout mandible (apical tooth appears small in relation to remainder of mandible), well developed transverse row of dorsomental teeth and the lack of a pseudoradula distinguish this genus.

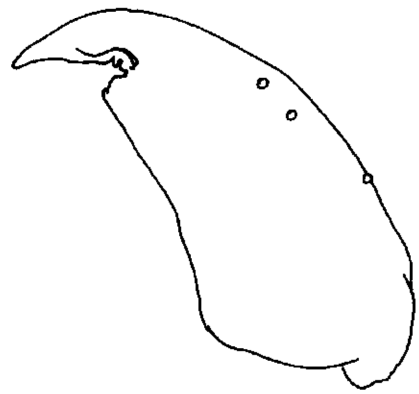
NOTES: *Tanypus* larvae are found in or on the soft sediments of marshes, ponds, lakes, bays and slower areas of streams/rivers. Data in Roback (1977) indicate that the larvae are found in a pH range of <4-8.0, an alkalinity range of <40-160 ppm, a total hardness range of <50-200 ppm and a specific conductivity range of <100-400 µmhos @ 25°C. The larvae feed on the soft parts of chironomid larvae (the head capsule is not engulfed as in many other Tanypodinae), diatoms and plant parts.

Six species are recorded from Florida; the larvae of five are known and are included in the following key, which is modified from that in Roback (1977).

ADDITIONAL REFERENCES: Roback 1969; 1971; 1977.



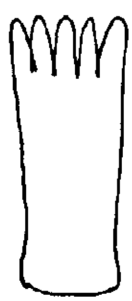
mentum and M-appendage



mandible

T. carinatus, ligula and paraligula

T. neopunctipennis, ligula



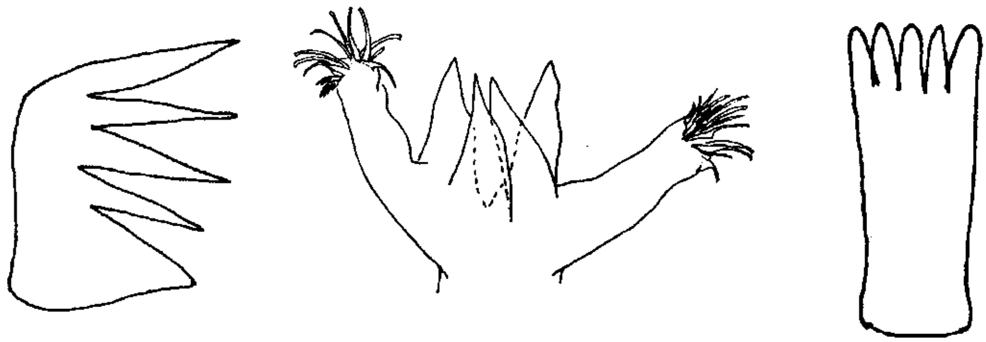
T. stellatus, ligula

Tanypus sp., larval structures

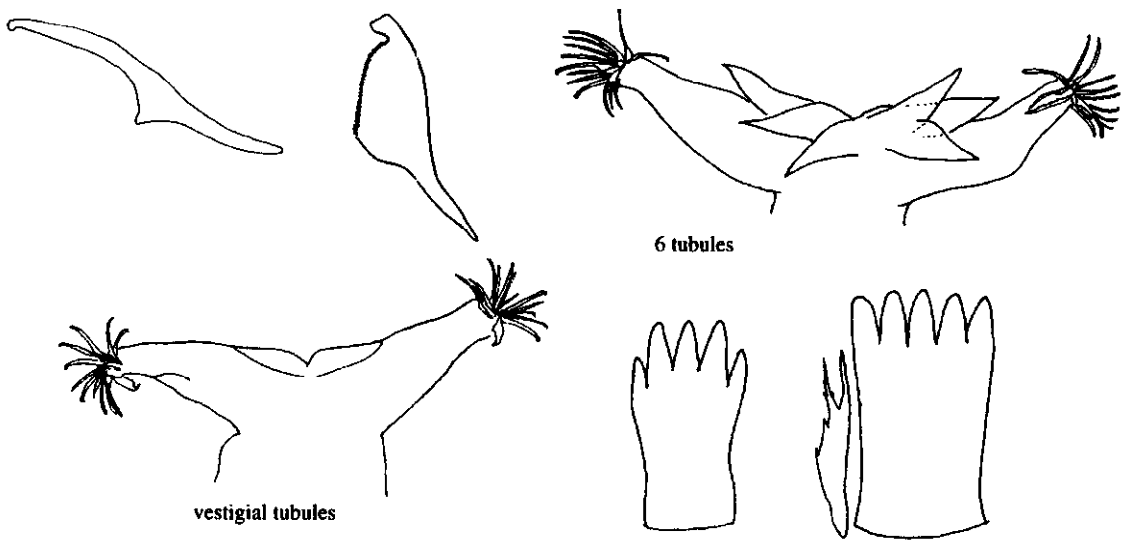
Key to Florida *Tanypus*

(One species, *T. telus*, is unknown in the larval stage)

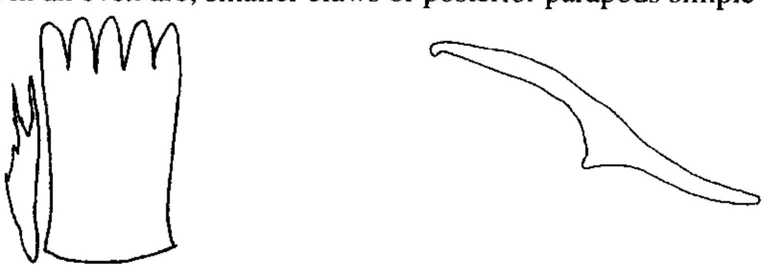
1 Smaller claws of posterior parapods pectinate; 4 anal tubules; ligula pale, relatively long and narrow .... ***T. stellatus***



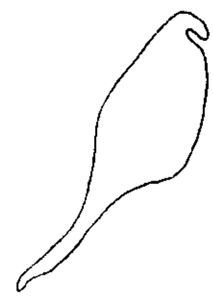
1' Smaller claws of posterior parapods simple or expanded, with at most a serrate inner margin; 6 anal tubules or tubules reduced or vestigial; ligula darker, shorter and wider 2



2 (1') Ligula with teeth in an even arc; smaller claws of posterior parapods simple 3



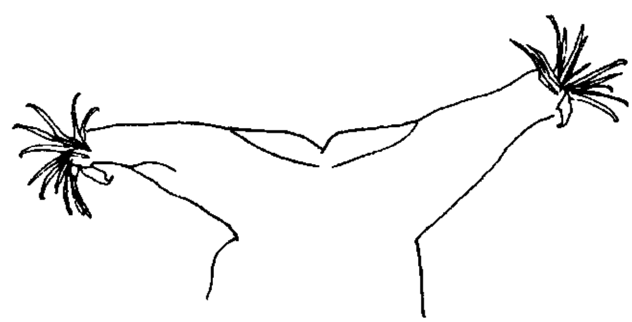
2' Ligula with 3 median teeth much longer than outer teeth; smaller claws of posterior parapods with expanded base 4



3 (2) Paraligula deeply divided to about ½ its length; head capsule pale.................... .... ***T. punctipennis***

3' Paraligula not as deeply divided, at most about 1/3 of its length; head capsule darkened .... ***T. carinatus***

4 (2') Smaller claws of posterior parapod with serrate inner margin; anal tubules reduced; found in brackish water .... ***T. clavatus***



4' Smaller claws of posterior parapod with smooth inner margin; anal tubules normal; not commonly found in brackish water .... ***T. neopunctipennis***

Notes on species

T. carinatus - This species exhibits the widest range of physico-chemical parameters in the genus (Roback 1977). In Florida, it often occurs with *T. neopunctipennis*.

T. clavatus - A species of brackish or salt water, apparently limited to the Gulf Coast. Roback (1977) gave a salinity range of 5-25 o/oo for this species. I have seen many larvae from Perdido Bay. As in many other species of brackish/salt water Chironomidae, the anal tubules are reduced/vestigial.

T. neopunctipennis - Often found with *T. carinatus* in Florida. Roback (1977) noted that it could apparently tolerate brackish water (4.45 o/oo) in the Escambia River.

T. punctipennis - I have seen adults of this species from peninsular Florida. Roback (1971) records it from Bay Co.

T. stellatus - I have reared this species from Lake Okeechobee. It is often found in deeper water (up to 14 meters in Tennessee [Roback 1977]) than other species of *Tanypus*, which tend to live in shallow (< 2 meters) water.

Genus ***Zavrelimyia***

DIAGNOSIS: Larvae are distinguished by smooth head capsule; lack of well developed dorsomental teeth; pseudoradula with broad base which appears to be connected to a transverse bar; large basal tooth on the mandible; and one small claw on each posterior parapod with an inner tooth.

NOTES: One species, *Z. sinuosa*, is recorded from Florida. However, the taxonomy of this genus is unsettled and B. Bilyj (pers. comm.) suggests that *Z. sinuosa* represents a species complex. Oliver et al. (1990) list *Z. carneosa*, as used by Beck & Beck (1966), as a junior synonym of *Z. sinuosa*. Larval specimens collected in Florida can not be identified at the species level and should be called " *Zavrelimyia* sp. ".

Larvae appear to be dwellers in sediments in springs and spring-fed streams. They are not common in Florida. I have found larvae in the gut contents of the One-toed Amphiuma (*Amphiuma pholeter*) collected by Bruce Means. Florida larvae I've examined have a distinctive "shoulder" near the base of the ligula.

ADDITIONAL REFERENCES: Roback 1971.

ligula and paraligula — mandible — small claw of posterior parapod

Zavrelimyia sp., larval structures

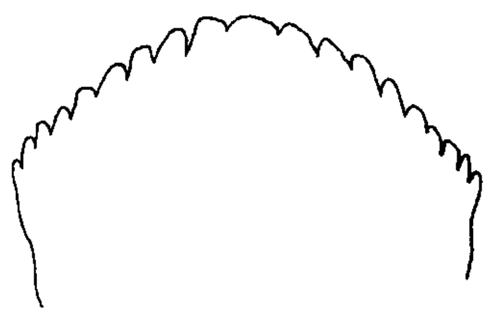
Subfamily DIAMESINAE

DIAGNOSIS: **Antennae** 5 segmented, 3rd segment annulated. **Labrum** with simple S setae (S III may be bifid). Labral lamellae present, may be obscure. **Mentum** with 0 to more than 15 teeth; ventromental plates present or absent; beard absent. **Prementum** with setae arranged in groups (brushes) or transverse rows. **Body** with well developed anterior and posterior parapods. Procerci present in Florida taxa. Anal tubules present.

NOTES: Most Diamesinae genera are cool adapted. Thus, only 2 "genera" are known from Florida. The genus *Diamesa* may eventually be found in northwest Florida. Specimens listed as *Pagastia* in Soponis (1980a) were misidentified; the specimens were *Xylotopus par*.

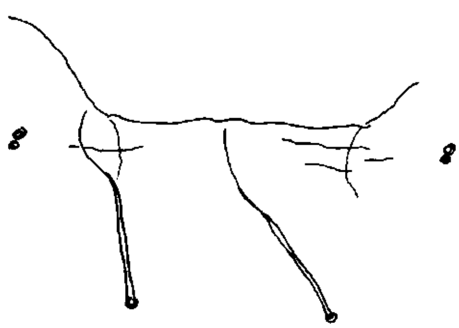
Key to the genera of Florida Diamesinae

1 Mentum with more than 15 teeth; ventromental plates absent .... ***Diamesa***
(this genus is not yet known from Florida)

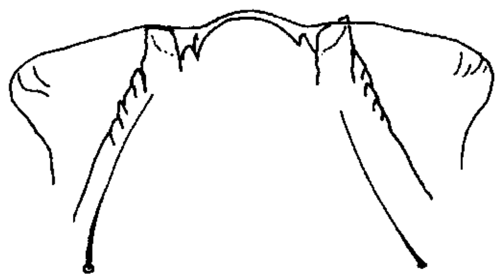


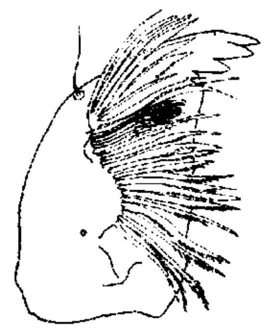
1' Mentum with 15 or fewer teeth or no teeth; ventromental plates present or apparently absent 2

2 (1') Mentum completely toothless; mandible without seta interna; no apparent ventromental plates .... ***Potthastia***
(one species group, the *P. longimana* group, is known from Florida)



2' Mentum with teeth visible below ventromentum; mandible with well developed seta interna; ventromentum forming apparent plates laterally .... **genus P**



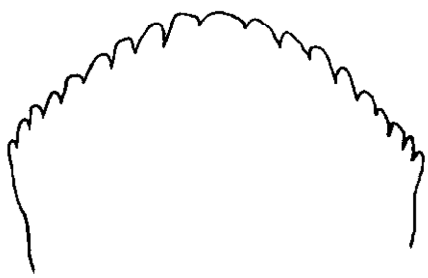


Genus ***Diamesa***

DIAGNOSIS: The mentum, with more than 15 teeth, will serve to distinguish this genus from other Florida Diamesinae.

NOTES: I have not seen specimens of this genus from Florida. It may eventually be found in northwestern Florida. Species keys offered by Doughman (1983) should be used with caution, and any larva should be reared before specific identification is attempted (using Hansen & Cook 1976). *Diamesa* larvae typically are found in cool running water.

ADDITIONAL REFERENCES: Doughman 1983; Hansen & Cook 1976.



mentum

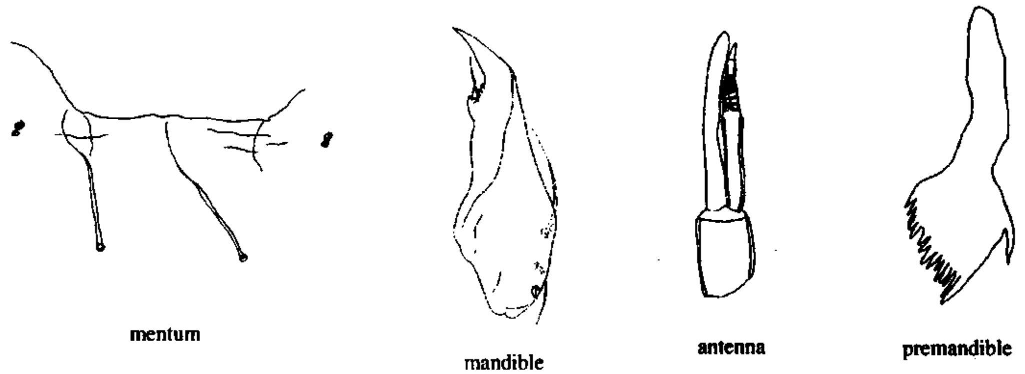
Diamesa sp., larval mentum
(Pennsylvania specimen)

Genus ***Potthastia***

DIAGNOSIS: The toothless mentum and lack of a seta interna on the mandible distinguish this member of the *P. longimana* group in Florida.

NOTES: To date, I have found only larval specimens of the *P. longimana* group in Florida, from the Suwannee and Perdido River systems; none have been associated with adults. I have seen adults of *P. longimana* from Alabama. As noted in Oliver (1983), the *P. gaedii* group also occurs in North America.

ADDITIONAL REFERENCES: Doughman 1985.

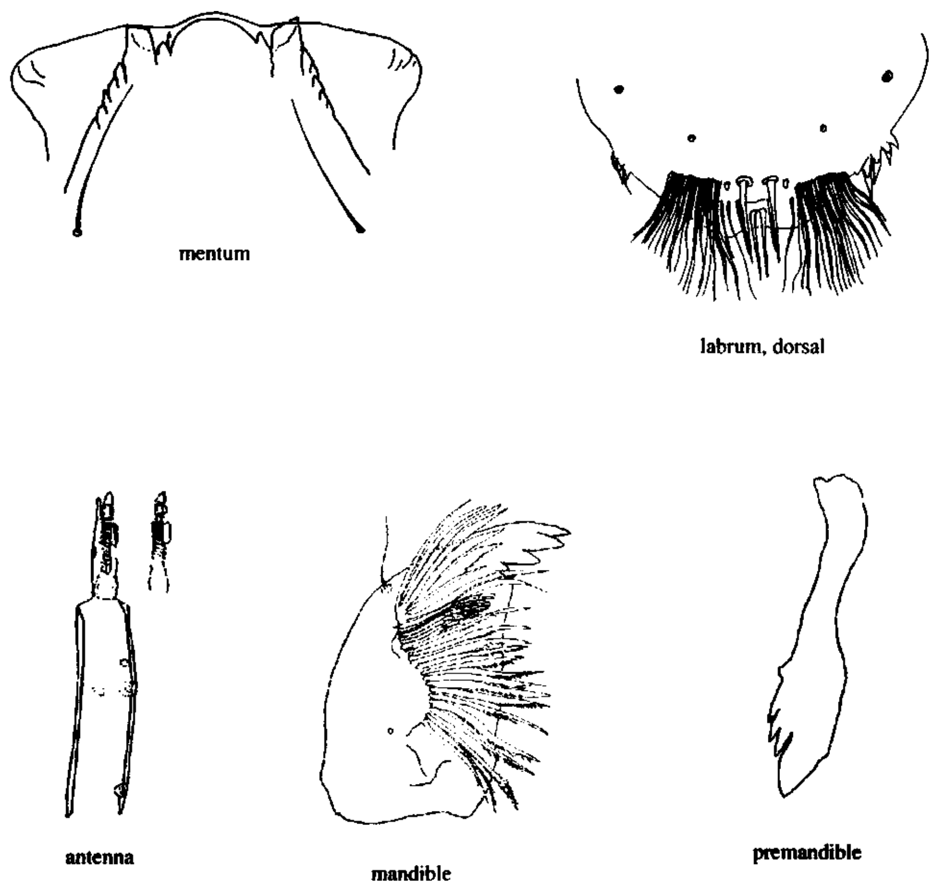


Potthastia longimana grp. sp., larval structures

Genus **P**

DIAGNOSIS: The unique dorsomentum with 6-7 lateral teeth on each side, large apparent ventromental plates and a well developed seta interna on the mandible will distinguish this genus.

NOTES: This unusual taxon was keyed and its mentum figured in Doughman (1985). Beck (1976) and Beck & Beck (1974) called it *Sympotthastia.* Its taxonomic status is uncertain. Hudson, et al. (1990) listed it as "undescribed genus" under the Diamesinae and speculated that it may represent the larva of *Compteromesa*, a Prodiamesinae. This is unlikely, for genus P has an annulate 3rd antennal segment; a redefinition of the Prodiamesinae would be necessary to include this genus. Larvae are found in sand bottomed streams. I have seen specimens from Juniper Creek in Calhoun Co. and the Perdido River system in extreme western Florida.



Genus P, larval structures

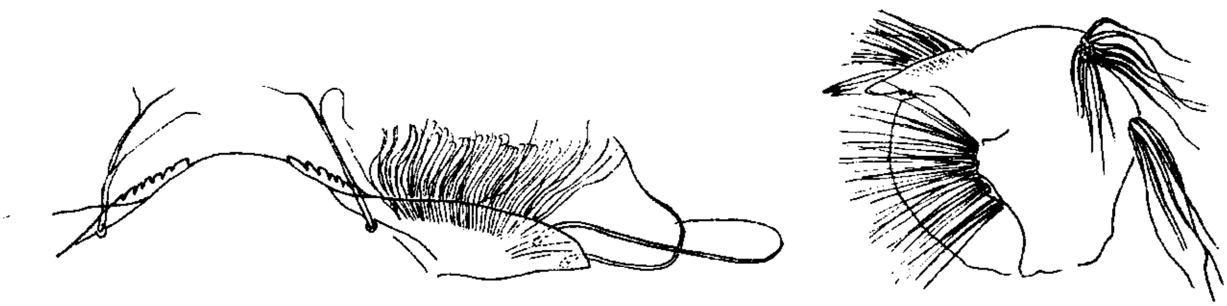
Subfamily PRODIAMESINAE

DIAGNOSIS: **Antennae** 4 segmented, not reduced. **Labrum** with S I apically toothed or apicolaterally fringed; S II and S III simple; S IV normal or S IV A with long fringed terminal element mounted on long pedicellate base . Labral lamellae present. **Mentum** with 15-18 teeth; ventromental plates large, with well developed beard. **Prementum** without dense brush(es) of setae. **Body** with well developed anterior and posterior paropods, procerci and anal tubules.

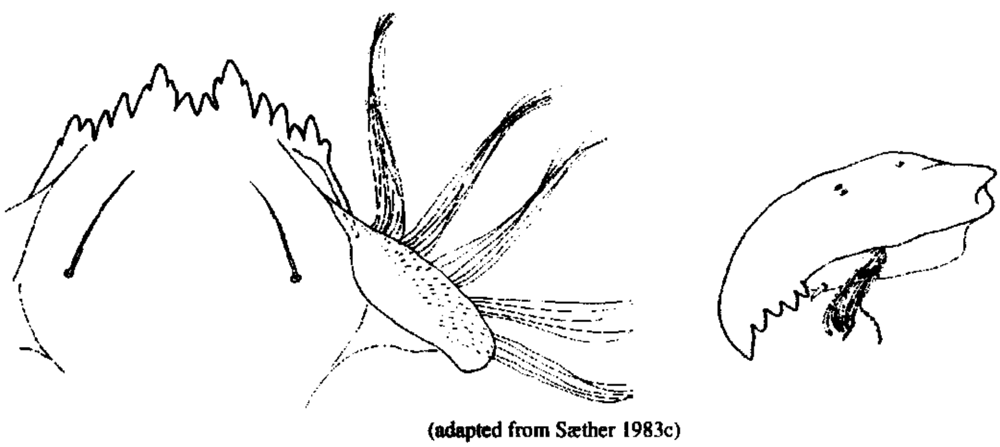
NOTES: Larvae are found in freshwater habitats such as springs, streams/rivers, ponds and the littoral zone of lakes. I know of only a single larval record from Florida for this subfamily. Pupal specimens recorded as *Odontomesa* (as Diamesinae) by Soponis (1980) were misidentified (see page 5.2). The genus *Compteromesa* may occur in Florida; it is known only in the adult stage.

Key to genera of Prodiamesinae that may occur in Florida

1 Mentum with odd number of teeth; mandible inflated .... ***Odontomesa***



1' Mentum with even number of teeth; mandible normal .... ***Prodiamesa***



(adapted from Sæther 1983c)

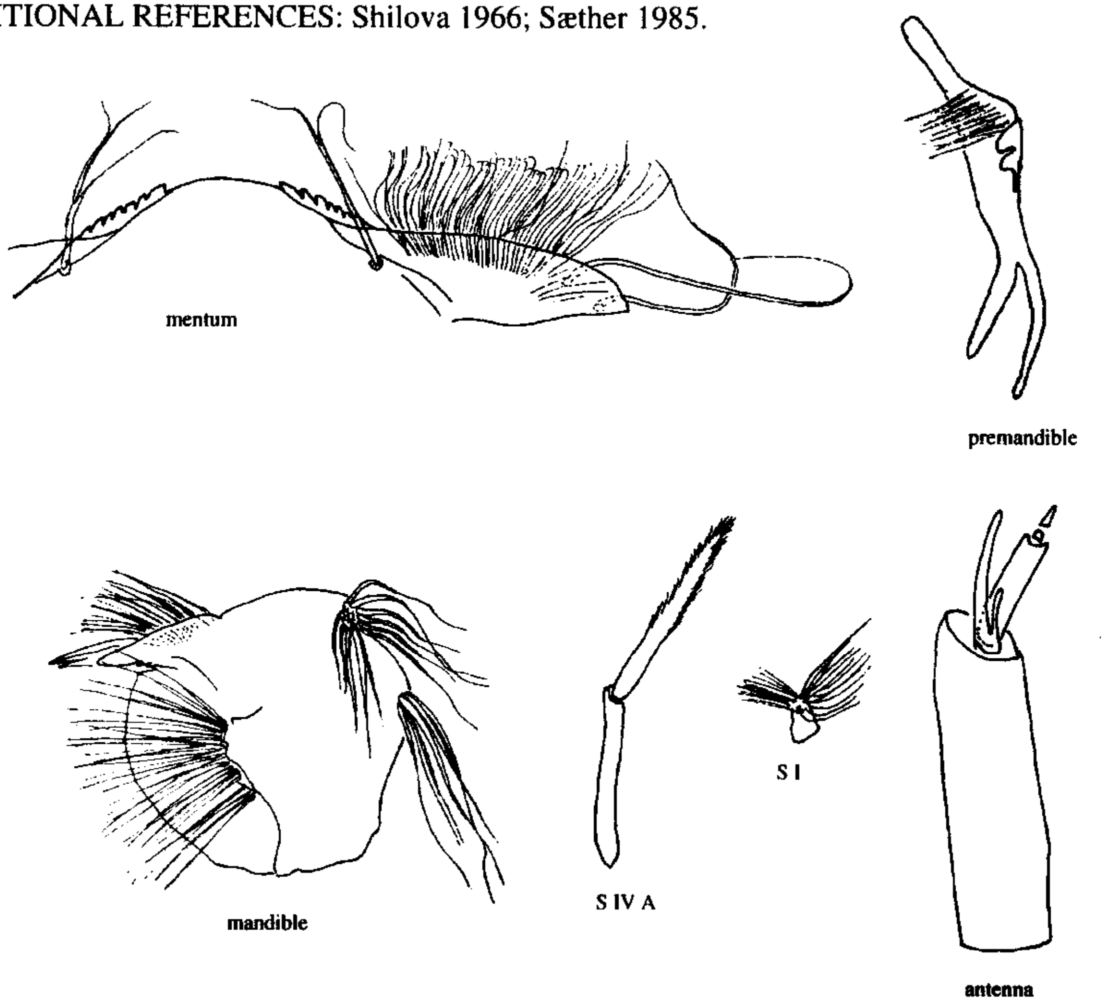
Genus ***Odontomesa***

DIAGNOSIS: The unique S setae of the labrum (see illustration below), odd number of teeth on the mentum, well developed ventromental beard and the inflated mandible will distinguish this genus.

NOTES: This genus is known from Florida by a larval record in Beck & Beck (1974), which probably represents *Odontomesa fulva*. Pupal *Odontomesa* specimens recorded from Turkey Creek, Gadsden Co., by Soponis (1980) were misidentified; I have determined the specimens as *Brillia flavifrons.*

The larvae are filter feeders (Shilova 1966).

ADDITIONAL REFERENCES: Shilova 1966; Sæther 1985.

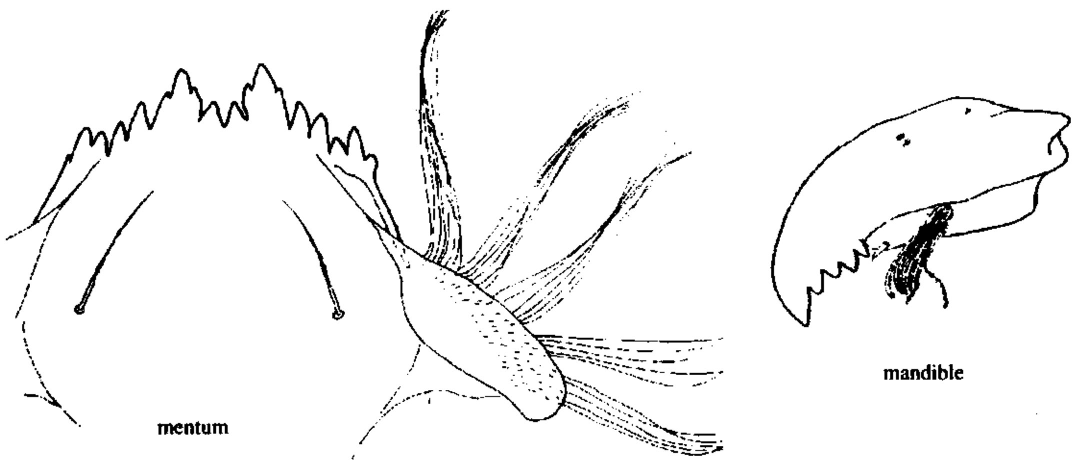


Odontomesa fulva **(specimen from South Carolina)**

Genus ***Prodiamesa***

DIAGNOSIS: The mentum with 14 teeth (18 apparent teeth if accessory teeth on first lateral teeth are counted) with the inner 2 deeply recessed, simple S setae and normal mandible will distinguish this genus from *Odontomesa*. As in *Odontomesa*, the ventromental beard is well developed.

NOTES: Not yet known from Florida. If eventually found in Florida, this genus will probably be represented by *Prodiamesa olivacea*.



Prodiamesa olivacea (adapted from Sæther 1983c)

Subfamily Orthocladiinae

DIAGNOSIS: **Antennae** with 4-7 segments; may be strongly reduced to much longer than head. **Labrum** with S I setae variable (simple, bifid, branched, plumose); S II usually simple but mat be bifid, branched, palmate or plumose; S III simple, rarely bifid; S IV normal.. Labral lamellae present or absent. **Mentum** usually well sclerotized, with 3 to more than 25 teeth; ventromental plates vestigial to well developed, usually without striae; beard present or absent. **Prementum** variably developed but never with dense well developed median brush of setae. **Body** with anterior parapods (sometimes fused); with posterior parapods well developed, separate or fused, or parapods reduced or absent. Procercus present or absent. Setal fringe, setal tufts or long setae sometimes present. Anal tubules normally present, may be reduced or vestigial.

NOTES: Larvae of this subfamily are found in an amazing variety of habitats, ranging from purely terrestrial (corn fields, leaf litter in hardwood forests) to seeps, springs, streams/rivers, ponds and lakes in freshwater, and coastal littoral marine areas. As wetlands studies and awareness increases, the importance of many of the terrestrial/semi-aquatic orthoclads may increase, for they may serve as indicators of hydrologic conditions as well as disturbed habitats.

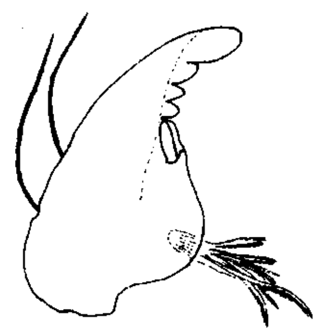
Key to the genera of Florida Orthocladiinae

(The larvae of *Compterosmittia, Diplosmittia, Lipurometriocnemus* and *Platysmittia*, which may occur in Florida, are unknown.)

1 Length of antennae at least ½ length of head 2

1' Length of antennae less than ½ length of head 8

2 (1) Mentum with wide, dome-like median tooth, second lateral tooth lower than median tooth and third lateral tooth; apical tooth of mandible long, rounded and slightly expanded .... ***Heterotrissocladius* species C**

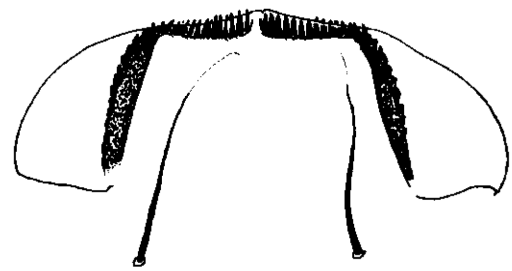


2' Mentum with bifid or trifid median tooth, or if single, not dome -like and second lateral tooth subequal to median and third lateral teeth; apical tooth of mandible not long, rounded and slightly expanded 3

3 (2') Well developed ventromental plates present; mandible with globose base 4

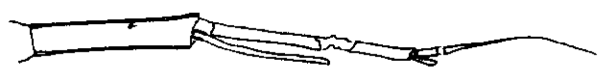
3' Ventromental plates weak or indistinguishable; mandible normal 5

4 (3) Dorsomentum with numerous fine anterior and lateral teeth .... **Orthocladiinae species C**



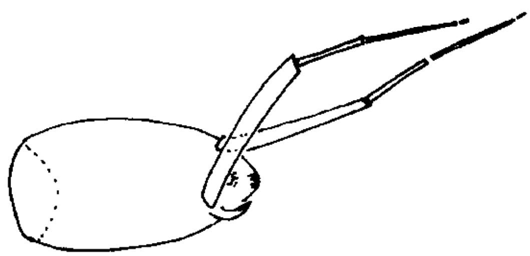
4' Dorsomentum with a few rudimentary medial teeth .... **Orthocladiinae genus D**

5 (3') Last segment of antenna long, thin, whiplike .... ***Lopescladius***



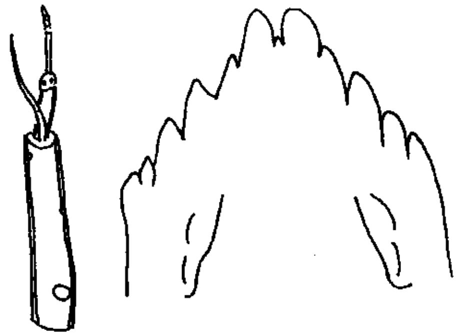
5' Last segment of antenna short, normal (but may have short hair-like extension) 6

6 (5') Antennae much longer than head, with 4 distinct segments; head capsule sometimes with surface sculpturing .... ***Corynoneura***

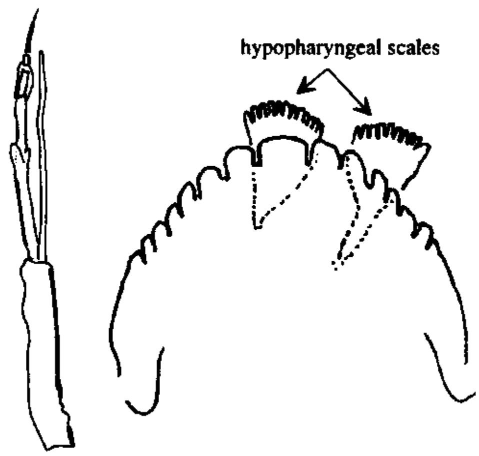


6' Antennae at most as long as head, usually shorter, with 5 distinct segments or 5-6 indistinct segments; head capsule without surface sculpturing 7

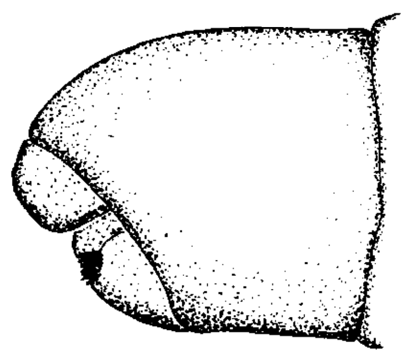
7 (6') Antennae with 5 distinct segments; small Lauterborn organs at apex of segment 2; without a pair of large hypopharyngeal scales; with simple, spine-like seta at base of posterior parapod ... ***Thienemanniella***



7' Antennae with segment 2 unevenly sclerotized (may appear 6 segmented) and with alternate Lauterborn organs; with a pair of large hypopharyngeal scales; no spine-like seta at base of posterior parapod .... ***Rheosmittia***



8 (1') Procerci absent, or at most a vestigial tubercle present 9
(most genera which will key here are marine, terrestrial/semi-terrestrial or parasitic.)



8' Procerci present, but may be reduced 19
(larvae found in a variety of habitats, but usually aquatic)

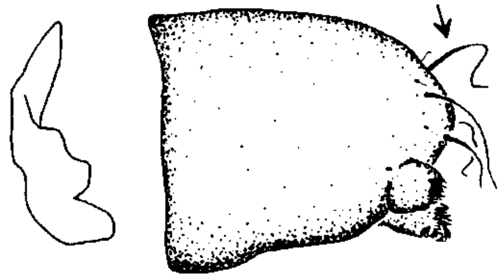
9 (8) S I plumose or fringed apically 10

9' S I simple or bifid (if simple, may be weakly serrate laterally) 12

10 (9) Antennal blade longer than flagellum; pecten epipharyngis with about 6-8 teeth .... ***Antillocladius***

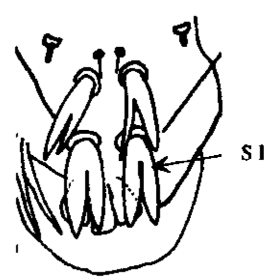
10' Antennal blade less than or equal to flagellum; pecten epipharyngis with at most 3 teeth or scales 11

11 (10') Marine; premandible apically simple; anal setae present .... ***Clunio***



11' Not marine, but terrestrial or semi-aquatic, occasionally found in fresh water; premandible apically bifid; no anal setae .... ***Smittia***

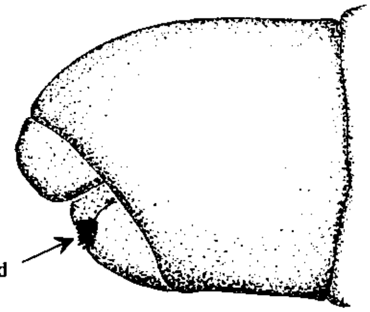
12 (9') S I bifid 13



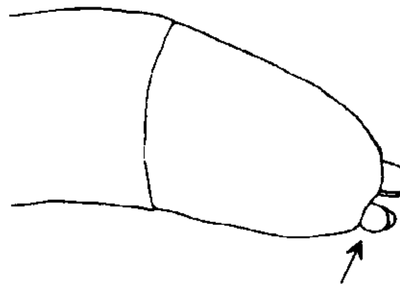
labral area

12' S I simple or weakly serrate laterally 14

13 (12) Anal claws and posterior parapods present .... ***Pseudosmittia***

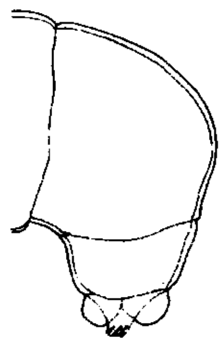


13' Anal claws and posterior parapods absent .... ***Camptocladius***



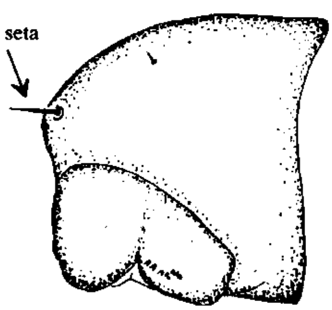
(adapted from Cranston et al. 1983)

14 (12') Posterior parapods and anal segment(s) bent at 90° angle to longitudinal axis of body 15



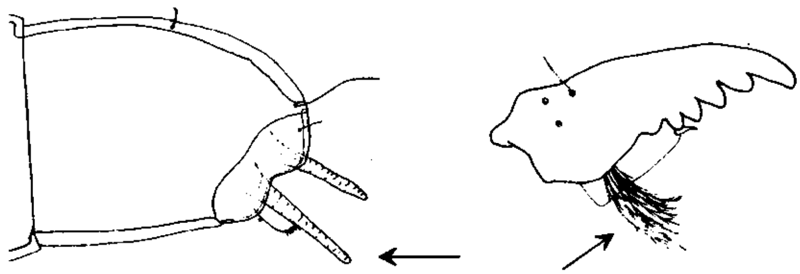
14' Posterior parapods and anal segment in straight line with body axis, or almost so 16

15 (14) Posterior parapods appearing divided, anterior portion with claws, posterior portion bare; anal setae usually present and well developed .... ***Gymnometriocnemus***



15' Posterior parapods not divided, but as in couplet 14; anal setae usually absent, but may be present .... ***Bryophaenocladius***

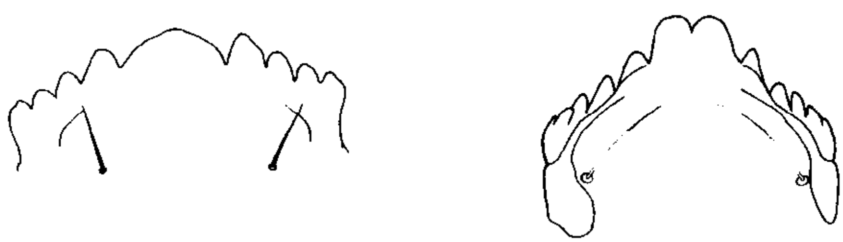
16 (14') Anal tubules long, with numerous constrictions; mandible with well developed seta interna 17



16' Anal tubules absent or short, squat; mandible without seta interna (or seta interna very weak?) 18

17 (16) Premandible apically bifid; mentum with weakly bifid median tooth; anal setae normal .... ***Doithrix***
(not recorded from Florida)

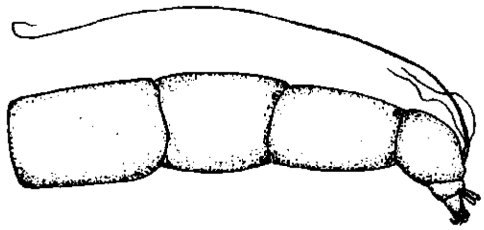
17' Premandible simple; mentum with single median tooth **or** if double, then anal setae reduced .... ***Georthocladius***



18 (16') Mentum without distinct medial teeth, with 4-5 lateral spine-like teeth; mandible with subapical cluster of sharply pointed teeth; ectoparasitic on mayflies .... ***Symbiocladius***
(not recorded from Florida)

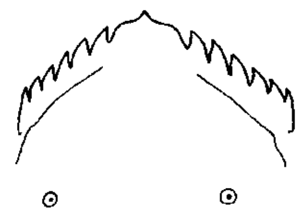
18' Mentum with distinct medial tooth/teeth, lateral teeth blunt or roundly pointed; mandible with bluntly pointed inner teeth; free-living or semi-terrestrial .... ***Mesosmittia***

19 (8') Procercus with one seta at least ¼ as long as body 20



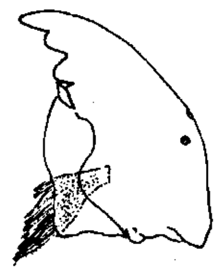
19' Procercus never with setae as long as ¼ body length 22

20 (19) Mentum with 6 pairs of sharply pointed lateral teeth and single median tooth with small median projection; premandible apically bifid .... ***Krenosmittia***

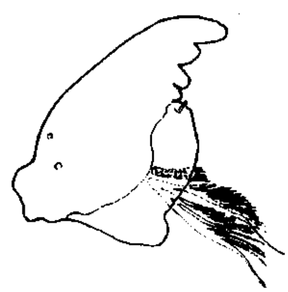


20' Mentum with 4 pairs of rounded teeth, median tooth bifid, weakly bifid or broad and simple without small median projection; premandible apically simple 21

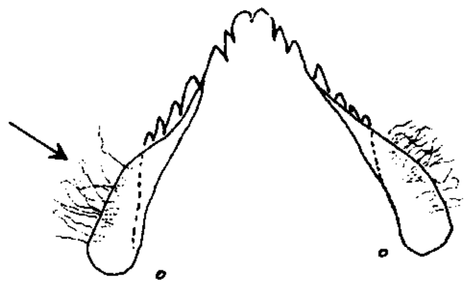
21 (20') Mandible with 1 or 2 inner teeth ... ***Parachaetocladius***



21' Mandible with 3 inner teeth .... ***Pseudorthocladius***

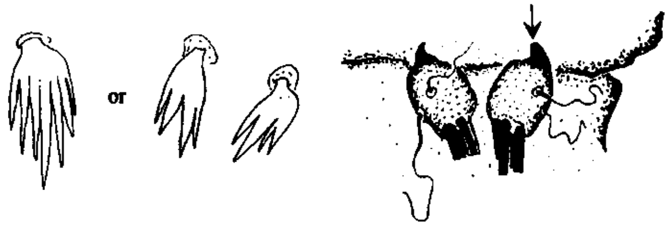


22 (19') Beard (group of setae) present beneath ventromental plates or immediately laterad to mentum (may be only a few setae and may require observation at 1000X) 23



22' Beard absent beneath ventromental plates or adjacent to mentum 31

23 (22) S I broadly palmate (usually with at least 3 stout teeth); procercus with chitinized spur .... ***Psectrocladius***

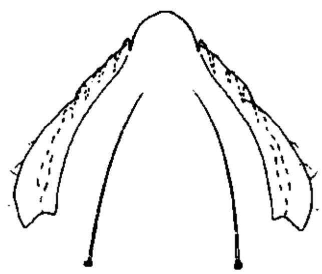


23' S I simple, bifid or plumose; if procercus bears a spur, then S I is bifid 24

24 (23') S I simple 25

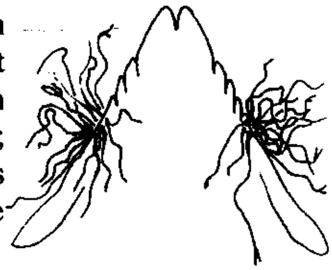
24' S I bifid, apically fringed or plumose 27

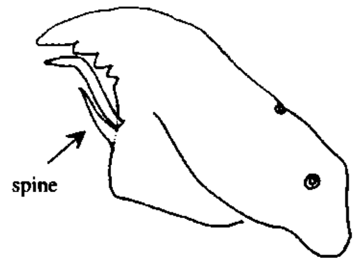
25 (24) Mentum with single median tooth; beard very weak, often only 2-6 setae .... ***Stilocladius***
(not recorded from Florida)



25' Mentum with 2 or more median teeth; beard well developed 26

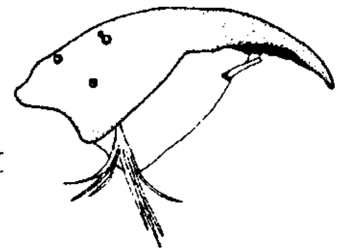
26 (25') Median teeth of mentum elongate; mandible without true seta interna but with large spine on inner margin; mid-abdominal segments with 2 pairs of plumose setae .... ***Synorthocladius***



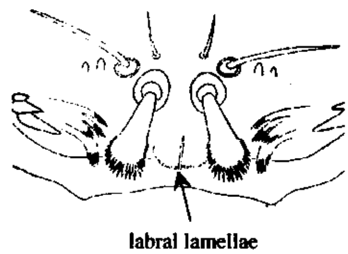


26' Median teeth of mentum not elongate; mandible with seta interna, no spine present on inner margin; body segments with simple setae .... ***Doncricotopus***

(Does not occur in Florida; see text)

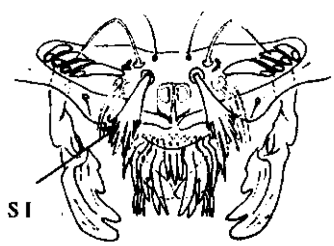


27 (24') Mandible with 4 inner teeth; labral lamellae present .... ***Diplocladius***
(not recorded from Florida)



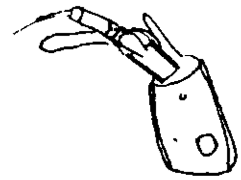
27' Mandible with 3 inner teeth; labral lamellae absent 28

28 (27') S I plumose; beard weakly developed .... ***Zalutschia***



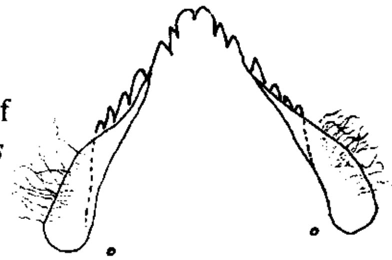
28' S I bifid; beard well developed or weak 29

29 (28') Antennae 6-segmented, last segment vestigial, hair-like .... ***Stilocladius*?**
(see *Stilocladius*)



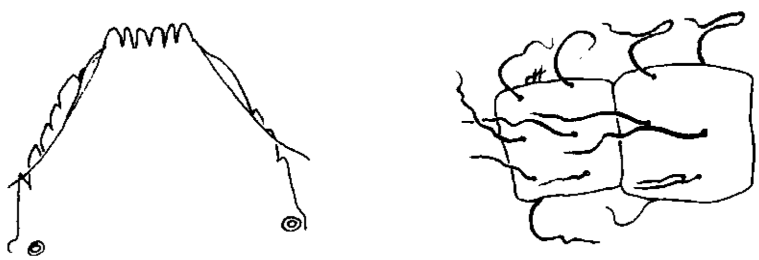
29' Antennae 5-segmented, last segment normal 30

30 (29') Ventromental plates extending beyond lateral margin of mentum; beard well developed .... ***Rheocricotopus***



30' Ventromental plates not extending beyond lateral margin of mentum; beard weak 51

31 (22') Mentum with 6 even median teeth and 5 pairs of lateral teeth (lateral teeth visible only if mentum is flattened); body with numerous long, stout setae; symphoretic on *Hexagenia* in Florida .... ***Epoicocladius***

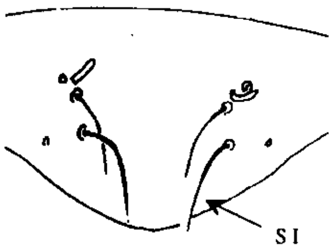


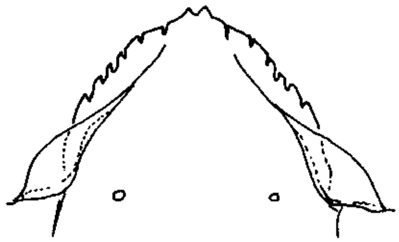
31' Mentum never with 6 even median teeth; body usually with sparse, simple setae but if long setae present, then mentum not as above; not symphoretic on *Hexagenia* (but one genus, *Nanocladius* [couplet 33], may be associated with aquatic insects) 32

32 (31') Ventromental plates extending beyond lateral margin of mentum (as in couplet 30 above) 33

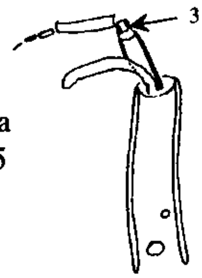
32' Ventromental plates absent/vestigial or, if present, do not extend beyond lateral margin of mentum 40

33(32) S I simple; mentum with a pair of small median teeth, often well separated from 0-6 pairs of lateral teeth which may be small and fused or closely appressed to each other .... ***Nanocladius***



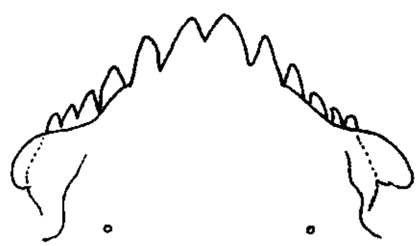


33' S I plumose or apically fringed; mentum not as above 34



34 (33') Third antennal segment 1/3 or less length of segment 4; antenna 6-7 segmented (last segment vestigial/hairlike) 35

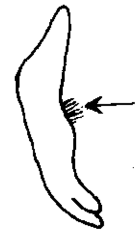
34' Third antennal segment greater than or subequal to segment 4; if shorter, then antenna with 5 segments 36



35 (34) Antenna 7-segmented; ventromental plates extend well beyond mentum; Lauterborn organs vestigial; pecten epipharyngis consists of 3 serrated spines .... ***Heterotrissocladius***

35' Antenna 6-segmented; ventromental plates do not reach or barely extend beyond mentum; Lauterborn organs longer than segment 3; pecten epipharyngis consists of 3 short simple spines 59

36 (34') Premandible with brush of setae .... ***Chaetocladius***
(not recorded from Florida)

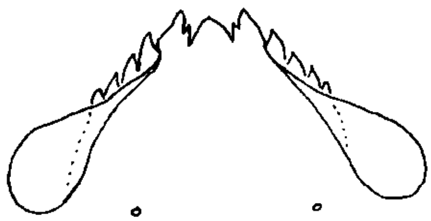


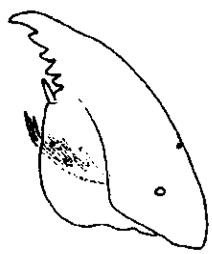
36' Premandible without brush of setae 37

37 (36') Mentum with a single median tooth 38

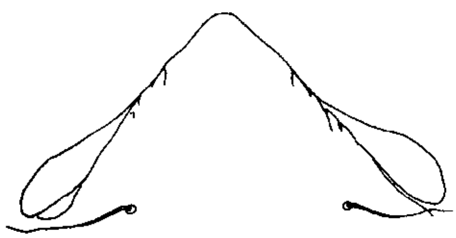
37' Mentum with 2 median teeth 39

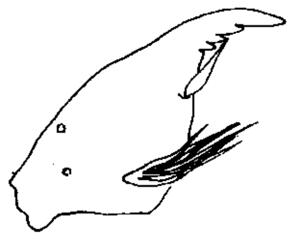
38 (37) Median tooth of mentum lower than second lateral teeth; first lateral tooth reduced and fused to second lateral tooth; mandible with 4 inner teeth .... ***Unniella***



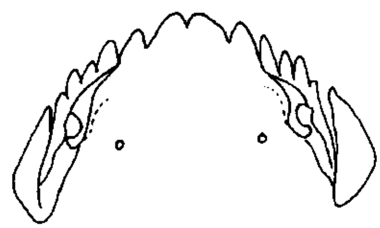


38' Median tooth of mentum higher than second lateral teeth; mandible with 3 inner teeth .... ***Parakiefferiella*** (in part)

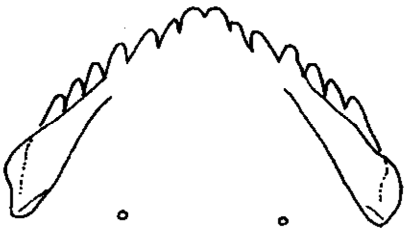


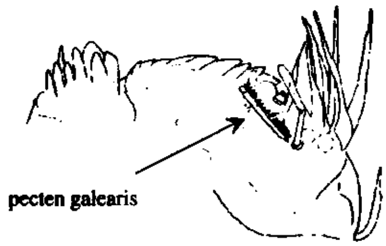


39 (37') Posterior margin of ventromental plates directed caudad, their lateral margin parallel to lateral margin of mentum; maxilla without pecten galearis . ***Parametriocnemus*** (in part)

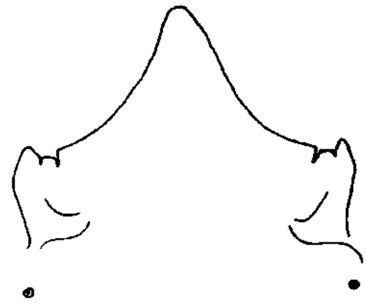


39' Posterior margin of ventromental plates directed laterad or at a 45° angle with respect to lateral margin of mentum; maxilla with pecten galearis .... ***Hydrobaenus***
(some *Zalutschia* may key here; check again for setae beneath ventromental plates at 1000X; *Hydrobaenus* lacks these setae)





40 (32') Mentum with large elongate single median tooth flanked by 0-2 pairs of much smaller lateral teeth; mines in wood but may "drift" into other habitats .... ***Orthocladius (Symposiocladius) lignicola***

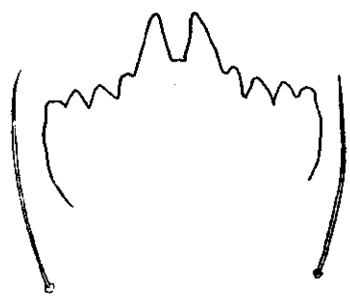


40' Mentum not as above; found in a variety of habitats 41

41 (40') Abdomen with lateral setal fringe **or** with long simple setae at least ½ length of segment bearing them 42

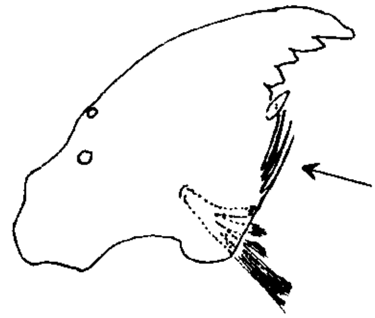
41' Abdomen without lateral setal fringe or long setae; 1-2 setal tufts may be present on some segments 45

42 (41) Abdomen with lateral fringe of setae on all but last 2 segments; mentum with 2 elongate median teeth .... ***Xylotopus***



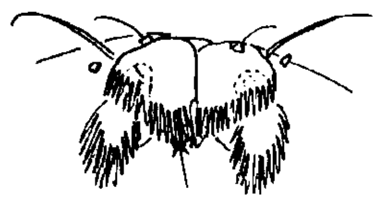
42' Abdomen without lateral fringe of setae; mentum without pair of elongate median teeth 43

43 (42') Inner margin of mandible with spines/serrations .... ***Tvetenia***

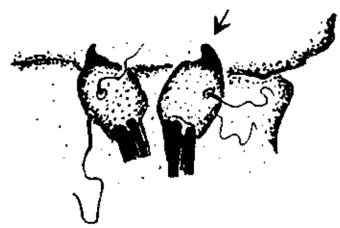


43' Inner margin of mandible without spines/serrations 44

44 (43') Labrum with well developed labral lamellae; procerci without spurs .... ***Metriocnemus*** (in part)



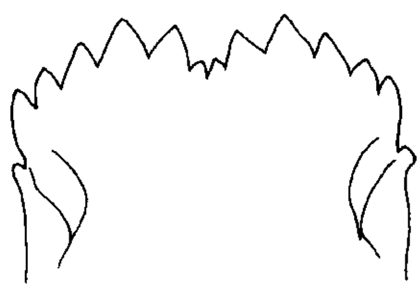
44' Labrum without well developed labral lamellae; procerci with spurs .... ***Paracricotopus***
(not recorded from Florida)



45 (41') S I simple 46

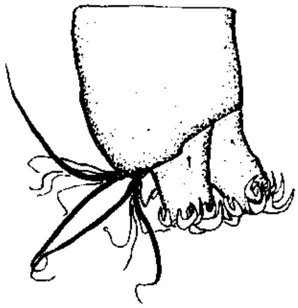
45' S I bifid, apically fringed, serrated or plumose 49
(serrations may be difficult to discern on some *Limnophyes* larvae)

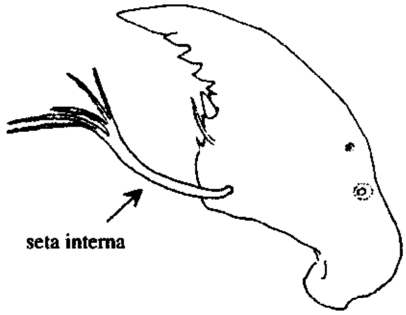
46 (45) Mentum with 2 median teeth deeply recessed .... ***Metriocnemus*** (in part)
(*M. fuscipes*: not recorded from Florida)



46' Mentum not as above 47

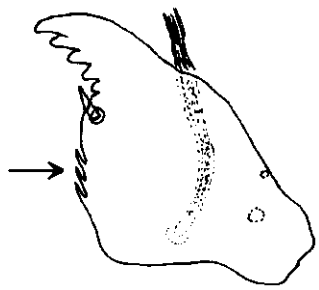
47 (46') Procercus reduced, with 2 setae thicker, longer than rest; seta interna of mandible with long single "stem", branching apically .... ***Cardiocladius***





47' Procercus not reduced, with all setae subequal; seta interna divided almost to base 48

48 (47') Inner margin of mandible with spines/serrations; body segments with simple setae only .... ***Eukiefferiella***



48' Inner margin of mandible without spines/serrations; body segments with setal tufts .... ***Cricotopus*** (in part)

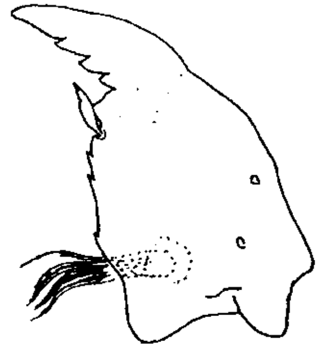
49 (45') S I bifid 50

49' S I apically fringed/toothed, serrated or plumose 55

50 (49) Antennae 6-segmented, last segment vestigial, hair-like .... ***Parakiefferiella*** (in part)

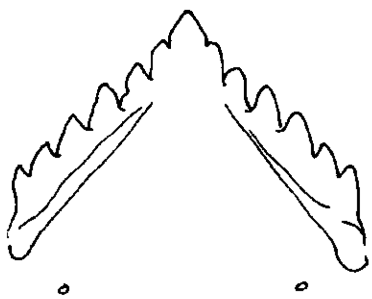
50' Antennae 5-segmented, last segment normal 51

51 (30'; 50') Inner margin of mandible with spines/serrations .... ***Cricotopus bicinctus* group**



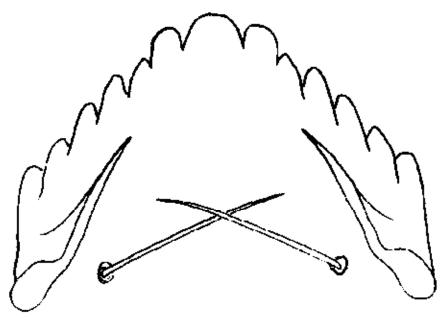
51' Inner margin of mandible smooth 52

52 (51') Median and appressed first lateral teeth projecting strongly forward from remainder of mentum; Lauterborn organs distinct, well developed .... ***Orthocladius (Orthocladius) annectens***

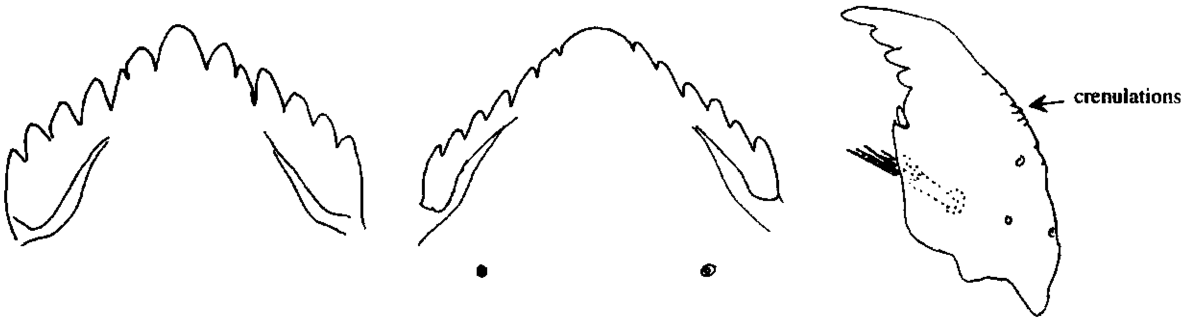


52' Mentum without strongly projecting median/first lateral teeth, **or**, if teeth project, then Lauterborn organs smaller or indistinct 53

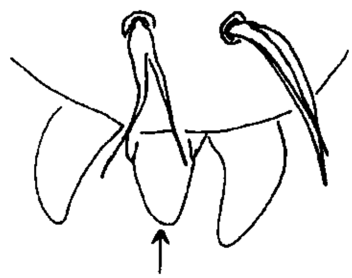
53 (52') First lateral tooth of mentum distinctly separated from median tooth and wider in middle than at base; setal tufts absent; outer margin of mandible smooth; *not known from Florida!* .... ***Paratrichocladius***
(not recorded from Florida; larvae *must* be associated with pupae/adults for accurate identification)



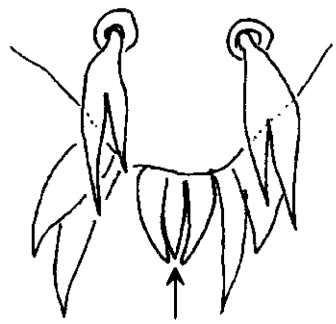
53' First lateral tooth appressed to median tooth or wider at base than at middle; setal tufts ***may*** be present; outer margin of mandible ***may*** be crenulated (wrinkled); *common in Florida* 54



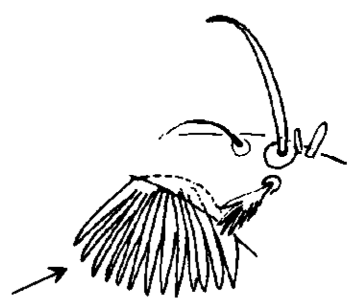
54 (53') Pecten epipharyngis a single cone shaped scale .... ***Cricotopus (Isocladius)***



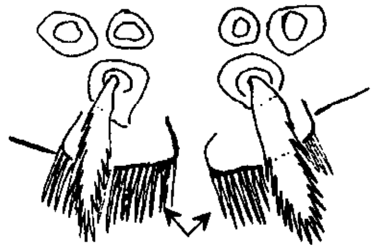
54' Pecten epipharyngis with 3 spines or scales .. .... ***Cricotopus*** or ***Orthocladius (Orthocladius)***
(These 2 genera can not be reliably distinguished in the larval stage, even at the generic level; pupal/adult associations are needed for accurate identifications)



55 (49') Pecten epipharyngis with 15-20 teeth .... **Orthocladiinae genus E**



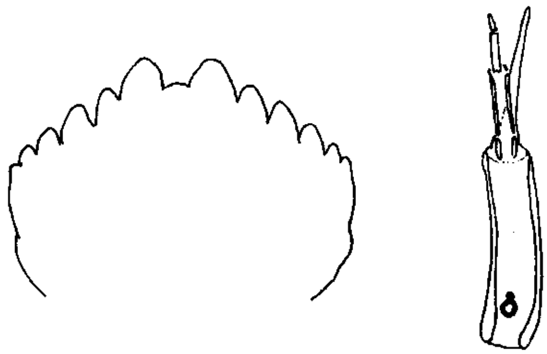
55' Pecten epipharyngis with at most 3 teeth 56



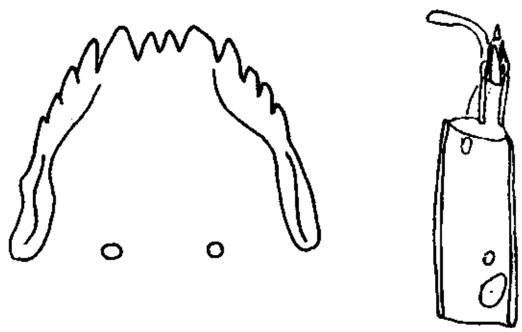
56 (50') Labral lamellae well developed 57

56' Labral lamellae absent or weakly developed 58

57 (56) Mentum with 2 elongate median teeth, usually with smaller tooth in between their bases; setae submenti displaced posteriorly; antennal segment 2 divided in basal 1/3 by weakly sclerotized area .... ***Brillia***
(*Euryhapsis*, not recorded from FL, will key here, but has an undivided antennal segment 2)



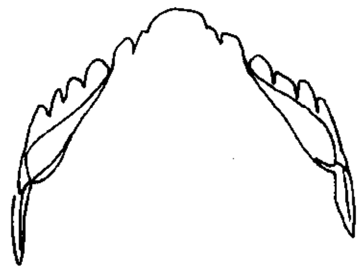
57' Mentum with 1-4 median teeth, not as above; setae submenti located near base of mentum; antennal segment 2 not divided by weakly sclerotized area .... ***Metriocnemus*** (in part)



58 (56') Antennae 5-segmented; usually a small rounded tooth near base of mentum .... ***Limnophyes***

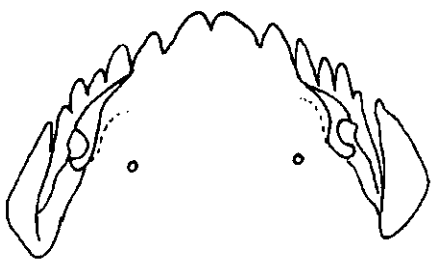
58' Antennae 6-segmented, last segment vestigial, hair-like; mentum without small rounded tooth at base 59

59 (35', 56') Median tooth of mentum single .... *Parakiefferiella* (in part)

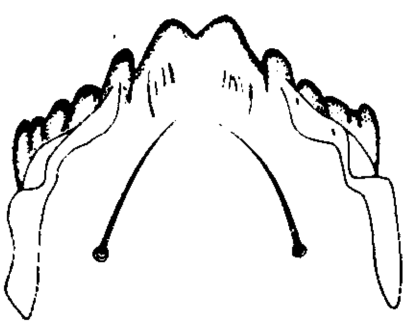


59' Median tooth bifid 60

60 (59') Mentum with last lateral tooth posterior to penultimate tooth; S I plumose .... *Parametriocnemus* (in part)



60' Mentum with last lateral tooth adjacent to penultimate tooth; S I apically toothed .... *Psilometriocnemus*
(not recorded from Florida)

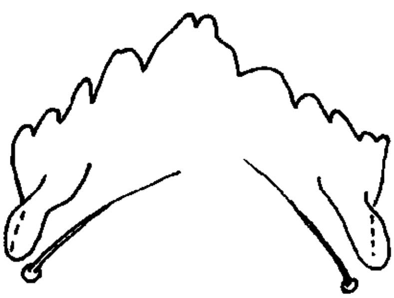


Genus ***Antillocladius***

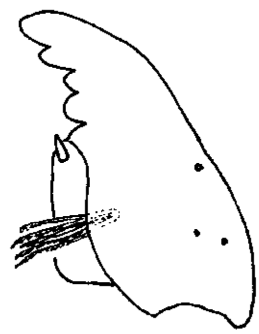
DIAGNOSIS: The palmate S I; pecten epipharyngis with around 6-8 teeth; antenna with blade longer than segments 2-5; and lack of procerci will distinguish this genus.

NOTES: Three species are known, two from the U.S. Larvae are found in seeps and around small streams, or are completely terrestrial; Florida specimens came from mixed hardwood leaf litter. The median tooth may be worn and thus appear simple.

ADDITIONAL REFERENCES: Sæther 1981b; 1982a; 1984.

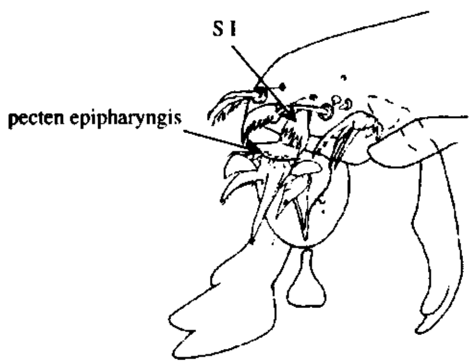


mentum



mandible

antenna



labro-epipharygngeal region

Antillocladius sp., larval structures
(adapted from Cranston et al. 1983)

Genus *Brillia*

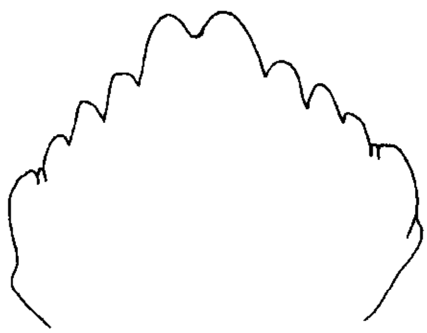
DIAGNOSIS: The well developed labral lamellae; plumose S I; antennae with segment 2 divided in basal 1/3 by a weakly sclerotized area; distinctive mentum; and the posteriorly displaced setae submenti (near posterior margin of head capsule) will distinguish *Brillia*.

NOTES: One species, *B. flavifrons*, is known from Florida; two other species are recorded from the SE. Larval specimens from Jackson and Okaloosa Cos. in the collection at FAMU identified by Beck as *B. sera* are *B. flavifrons*. The species "*Brillia par*" is now placed in the genus *Xylotopus*.

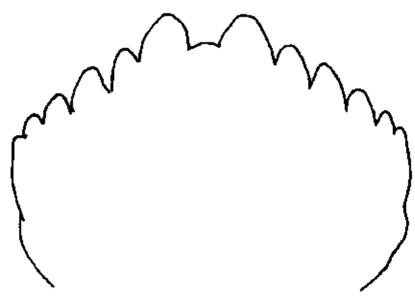
The genus *Euryhapsis*, which occurs in the Smoky Mountains in the SE, is similar to *Brillia* but has a completely sclerotized second antennal segment.

Brillia larvae are often associated with submerged allochthonous wood and leaves.

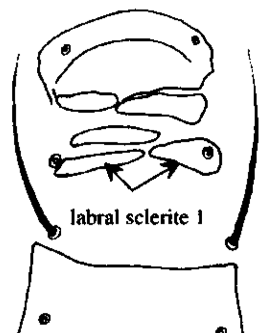
ADDITIONAL REFERENCES: Oliver & Roussel 1983.



B. parva, mentum

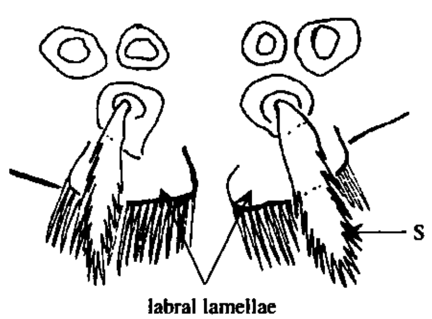


B. flavifrons, mentum



B. flavifrons, apotome and sclerites

antenna

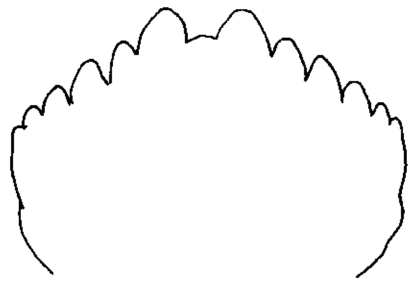


palatal surface of labrum

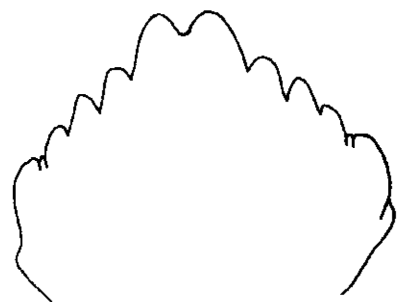
Brillia spp., larval structures

Key to *Brillia* of SE U.S.A.

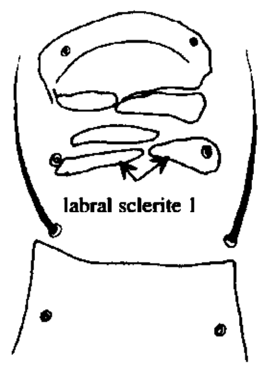
1 6th lateral tooth of mentum placed posterior to 5th lateral tooth 2



1' 6th lateral tooth even with or anterior to 5th lateral tooth .... ***B. parva***
(not known from Florida)



2 (1) Labral sclerite 1 entire or narrowly separated medially, separation < 8µm .... ***B. flavifrons***



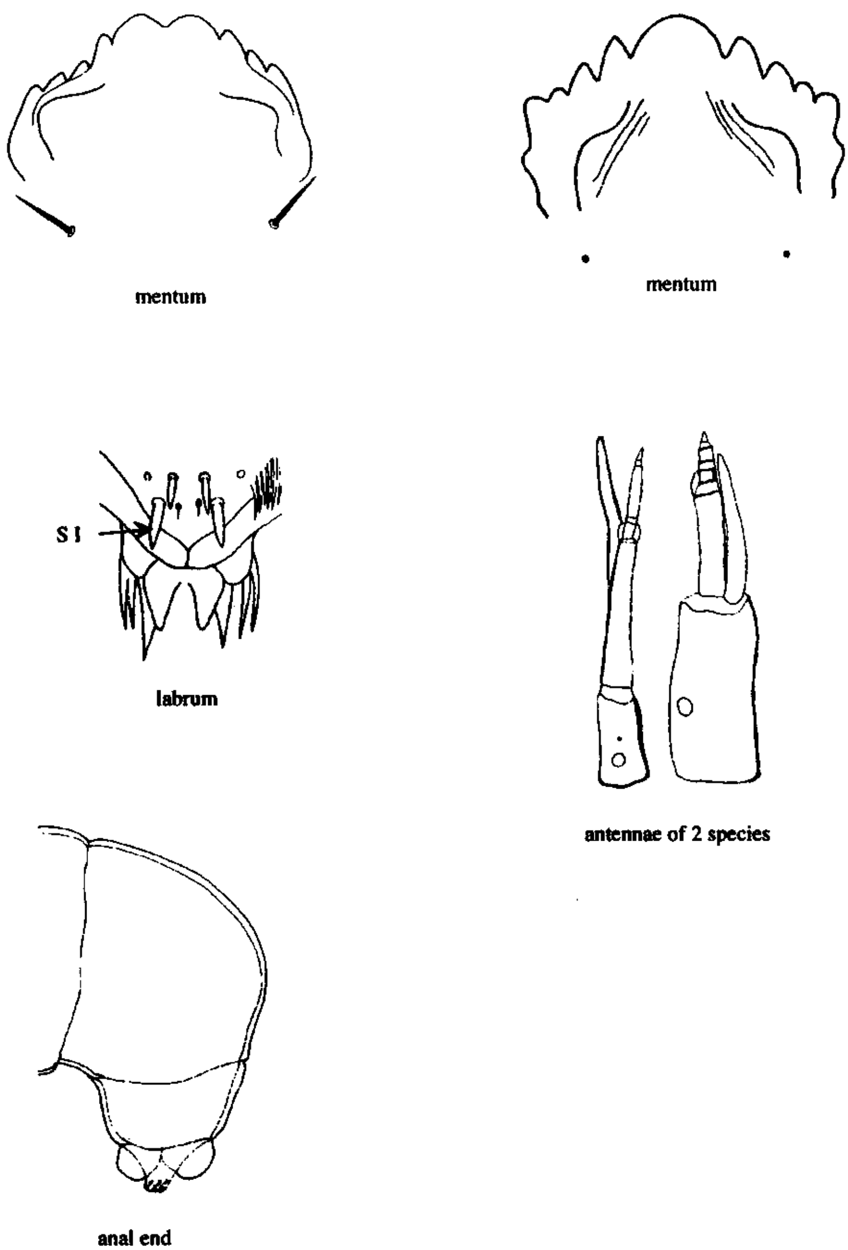
2' Labral sclerite 1 widely separated medially, separation > 10µm .... ***B. sera***
(not known from Florida)

Genus *Bryophaenocladius*

DIAGNOSIS: The simple S I; lack of procerci; and anal end usually without anal setae and bent at a 90° angle, with the posterior parapods undivided, will distinguish this genus.

NOTES: I have seen a single larval specimen assignable to this genus from northern Florida. Several species are recorded from SC.

Most species probably have terrestrial larvae, although larvae are sometimes found in stream collections. Larvae are very similar to *Gymnometriocnemus* (q.v.)



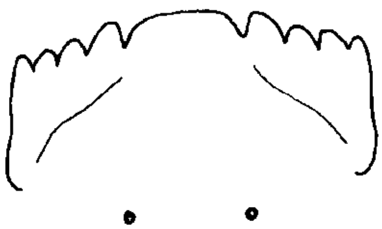
Bryophaenocladius sp., larval structures
(adapted from Cranston, et al. 1983)

Genus *Camptocladius*

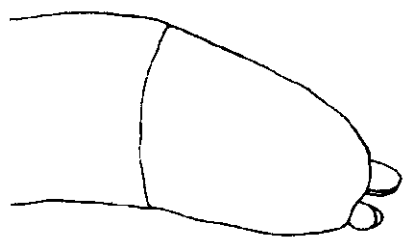
DIAGNOSIS: The bifid S I and S II; reduced, 3-segmented antennae (with 3rd segment shorter than 2nd); and absence of procerci and posterior parapods will separate this genus.

NOTES: Only one species, *C. stercorarius*, is known. David Evans has provided larval specimens from western Florida.

Larvae are terrestrial, and are recorded from cow dung.



mentum



anal end

labrum

antenna

Camptocladius stercorarius, larval structures
(adapted from Cranston, et al. 1983)

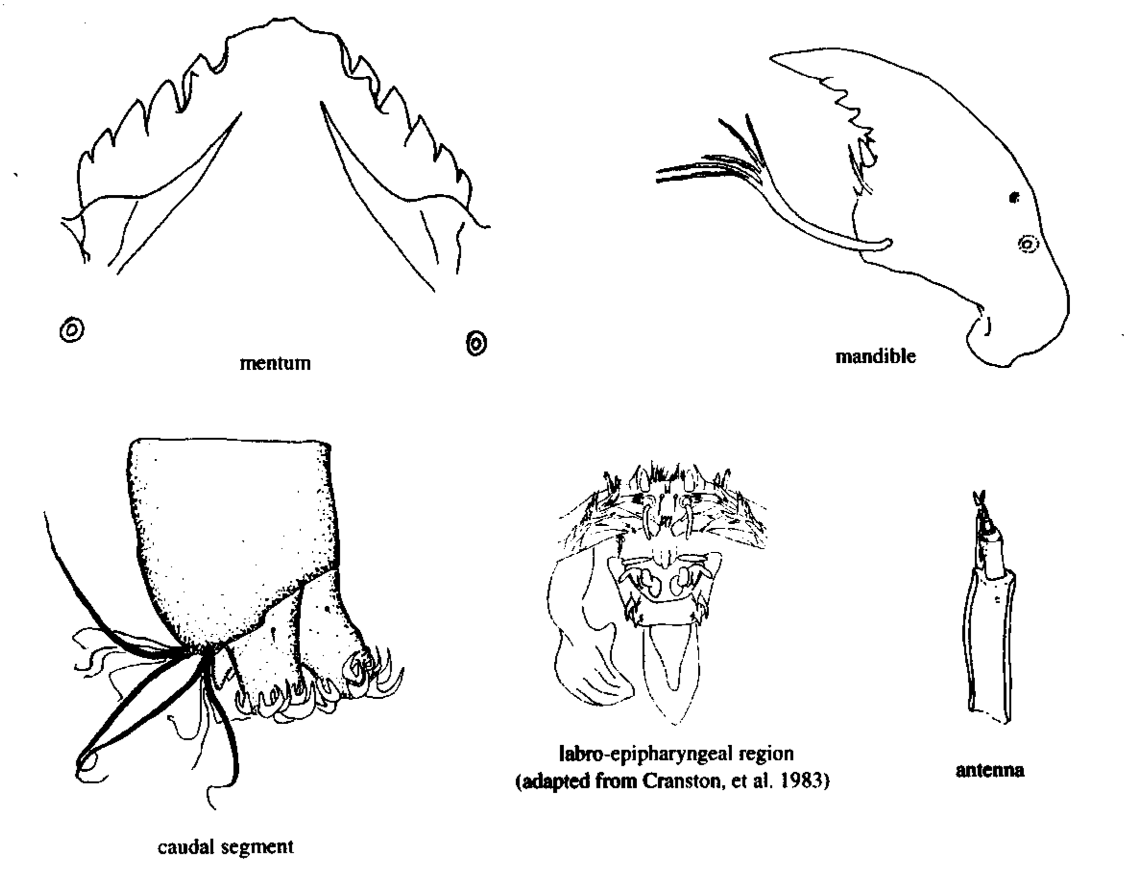
Genus *Cardiocladius*

DIAGNOSIS: This genus is distinguished by its simple but heavily sclerotized S I; premandible heavily sclerotized with a broad, usually simple, apex; seta interna of mandible with long single base, branching apically; and procercus with 2 setae thicker and longer than rest. This genus is easily confused with *Eukiefferiella*, which lacks a similar seta interna and usually has equally sized procercal setae.

NOTES: One species, *C. obscurus*, has been recorded from Florida, but at least one other species, *C. albiplumus*, occurs in the SE. The larva initially described as *Eukiefferiella similis* group by Bode (1983) was shown by Oliver & Bode (1985) to be *C. albiplumus*. In Florida, unreared larvae should be identified as "*Cardiocladius* sp."

Larvae are recorded as facultative predators/parasites on immature blackflies (Simuliidae) and hydropsychid caddisfly pupae; gut analysis of larvae not associated with caddisflies showed they fed on algae and detritus (Oliver & Bode 1985). Larvae prefer lotic conditions; Hudson et al. (1990) indicated that larvae may be "fairly tolerant of toxic pollution".

ADDITIONAL REFERENCES: Bode 1983; Oliver & Bode 1985; Parker & Voshell 1979.



Cardiocladius sp., larval structures

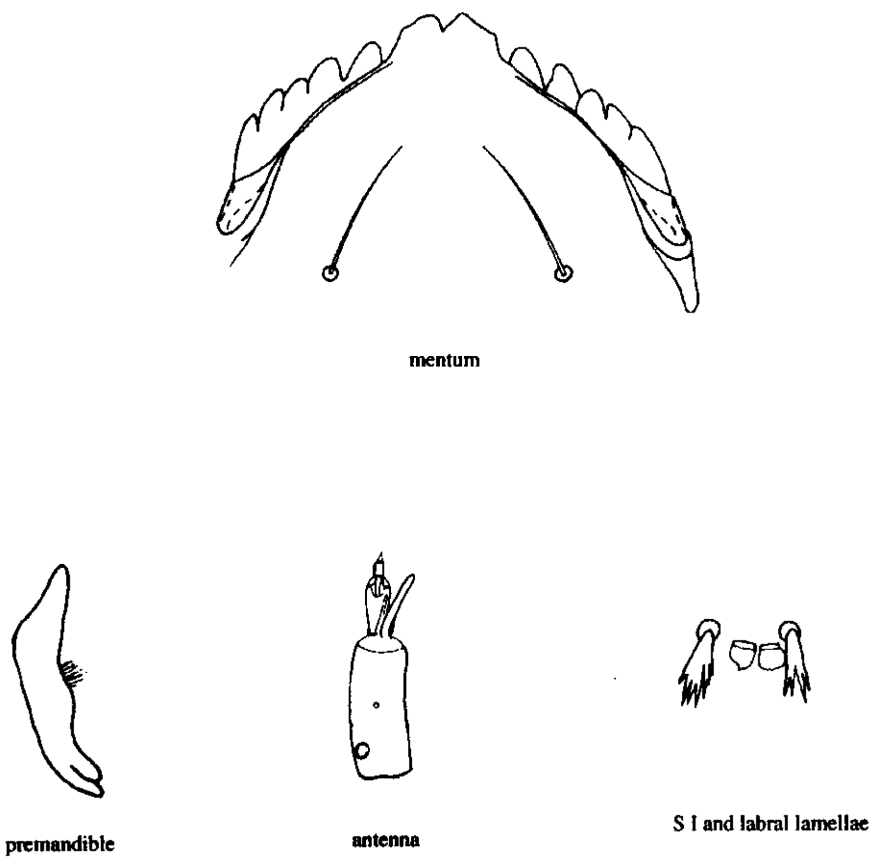
Genus *Chaetocladius*

DIAGNOSIS: Larvae are distinguished by the plumose/pectinate S I; labral lamellae (if present) located between S I and labral margin; well developed ventromental plates which extend beyond lateral margin of mentum (may be only slightly beyond); and premandible with weak to moderate brush.

NOTES: This genus has not yet been recorded from Florida, but may eventually be collected in the northern part of the state. Some *Limnophyes* may key to *Chaetocladius* in the generic key; however, *Limnophyes* lacks labral lamellae.

The larvae of many species are probably semi-aquatic, but true aquatic species are known. At least one species mines in submerged wood.

ADDITIONAL REFERENCES: Cranston & Oliver 1988b.



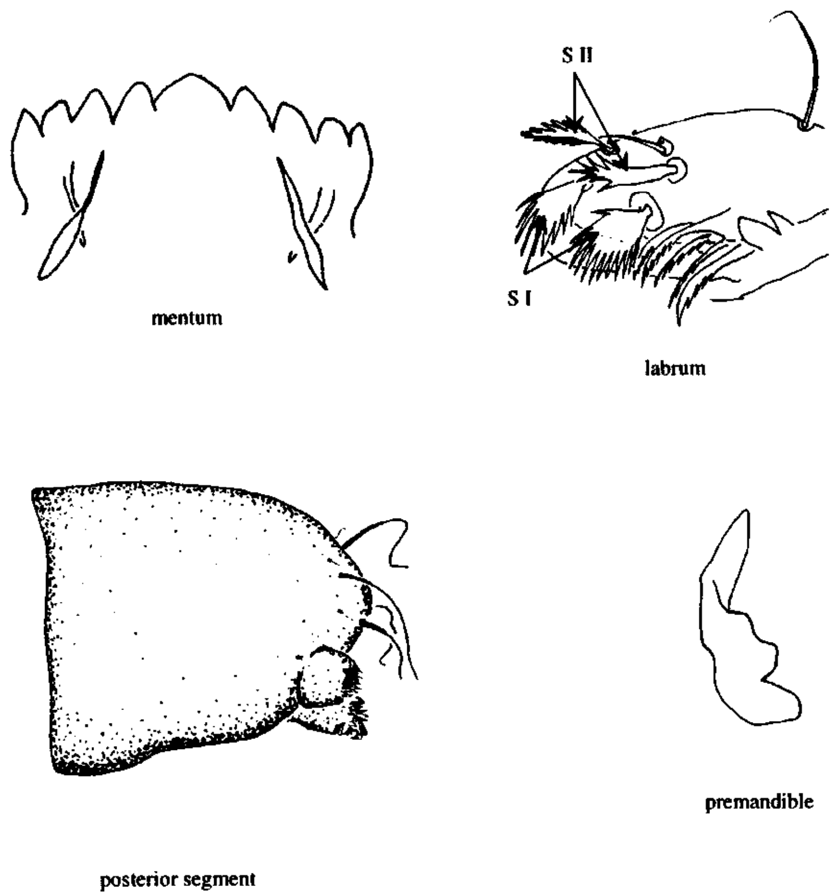
Chaetocladius sp., larval structures
(adapted from Cranston et al. 1983)

Genus ***Clunio***

DIAGNOSIS: The plumose S I and S II; premandible with simple apex; lack of procerci and anal tubules; and marine habitat will identify *Clunio*.

NOTES: One species, *C. marshalli*, is known from salt water habitats in Florida. I've collected larvae and pupae from algae on rocks in the Intracoastal Waterway at Pompano Beach, where they coexisted with *Thalassomya* larvae. The species is also known from Dade Co. and the Keys, and I've seen adults from Wakulla Co.

ADDITIONAL REFERENCES: Stone & Wirth 1947; Strenzke 1960; Wirth 1949.



Clunio marshalli, larval structures

Genus ***Corynoneura***

DIAGNOSIS: These larvae are identified by their small size and elongate (usually longer than head capsule) 4 segmented antennae.

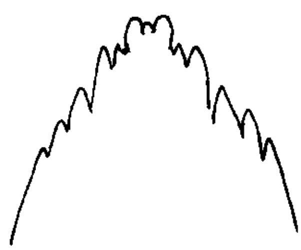
NOTES: Two species are recorded from Florida. However, it is obvious from larval data that many more species occur here. In a paper delivered at a past meeting of the North American Benthological Society, Dr. W.P. Coffman stated that, based on pupal data, at least 22 species of *Corynoneura* and the closely related *Thienemanniella* occur in the Nearctic, of which only nine are described (as adults); this manual keys 12 larval species in the two genera. It is not unusual to find two or three species from both genera in samples. Nearctic *Corynoneura* and *Thienemanniella* are in great need of a revisionary study utilizing all life stages. It is apparent that most records for these two genera must be viewed with extreme skepticism; records based on adults are unreliable and identifications based on larvae even more so. Matching a specimen's mentum with an illustration from the literature does not mean that it has been correctly identified.

Cranston et al. (1983) stated that *Corynoneura* has 5 pairs of lateral teeth plus a bifid or trifid median tooth; *C.* sp. D has a mentum with 6 pairs of lateral teeth plus a trifid median tooth.

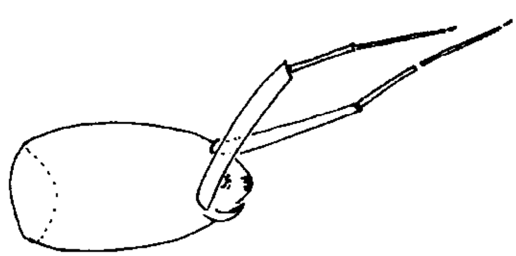
Larvae that have lost their antennae can be difficult to separate from *Thienemanniella*. Some *Corynoneura* have a "sculptured" head capsule integument; *Thienemanniella* (and some *Corynoneura*) do not. The head capsule tends to be more elongate-oval or apically pointed in *Corynoneura*. Many larvae can be separated by the form of the stout, spine-like subbasal seta on the posterior parapods: in *Corynoneura* these setae are usually (but not always!) plumose/spinose at their base; in *Thienemanniella* the subbasal setae are always (?) simple.

Corynoneura larvae are found in a variety of aquatic habitats, and may be common in "clean" water or organically enriched environments.

ADDITIONAL REFERENCES: Boesel & Winner 1980; Hirvenoja & Hirvenoja 1988; Schlee 1968.



mentum



head capsule

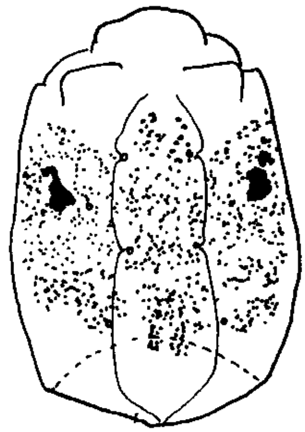
Corynoneura, larval structures

Preliminary key to Florida *Corynoneura*

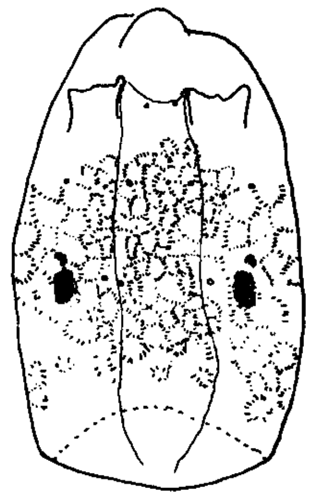
1 Head capsule integument with pustules/granules or sculpturing consisting of fine scratches, often in a reticulate pattern (sculpturing usually strongest dorsally, but may be faint on some specimens) (see figures in couplet 2) 2

1' Head capsule integument smooth, unpatterned 4

2 (1) Head capsule integument pustulate/granulate; median tooth of mentum bifid; south Florida only(?) .... ***C.* sp. F**

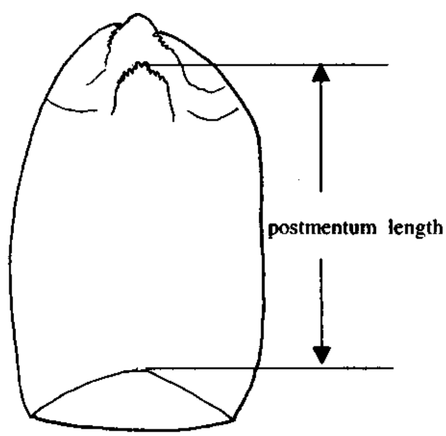


2' Head capsule integument with sculpturing that usually forms a reticulate pattern; median tooth of mentum trifid; widespread 3

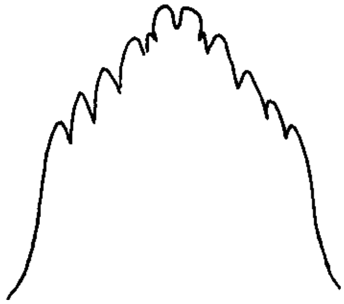


3(2') First antennal segment shorter than or subequal to postmentum length .... ***C. taris***

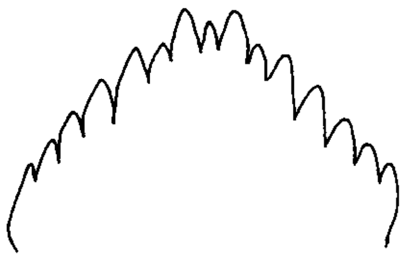
3' First antennal segment longer than postmentum length .... ***C.* sp. C**



4(1') Median tooth of mentum bifid; subbasal seta of posterior parapod with lateral spinules not confined to basal half .... ***C.* sp. B**



4' Median tooth of mentum trifid; subbasal seta of posterior parapod with lateral spinules confined to basal half or less 5



5(4') First antennal segment much greater than postmentum length; first antennal segment length about 300-325 (fourth instar only!) .... ***C.* sp. D**

5' First antennal segment much less than postmentum length; first antennal segment length about 80-100 µm (fourth instar only!) .... ***C.* sp. E**

Notes on species

C. taris - This species is easily recognized by the sculptured head capsule and its relatively "short" antennae (as compared to *C.* sp. C). It also usually has an ovoid darker area on the mid-dorsum of the head. The accessory spinules at the base of the subbasal seta of the posterior parapod are usually shorter, thinner and less numerous than those found on *C.* sp. C. *Corynoneura taris* is one of the most common species in Florida. However, many other taxa are often misidentified as this species; specimens in the Beck collection at FAMU identified as *C. taris* consisted of a mixture of this and three other species. I've compared Florida material with the type specimens.

C. sp. B - This species may be the same as the *C. celeripes* Winnertz of Simpson & Bode (1980); the mentum and subbasal setae of the posterior parapods are similar. I have reared this taxon from the Suwannee and Withlacoochee Rivers; it is **not** *C. celeripes*. The larva of *C. coronata* Edwards as illustrated by Cranston (1982) and Cranston et al. (1983) also has a similar mentum; *C.* sp. B is **not** that species either. This taxon appears to be an undescribed species; it is common in the Suwannee River basin and occurs at least as far north as South Carolina (and New York if conspecific with Simpson & Bode's "*celeripes*"). Hirvenoja & Hirvenoja (1988) separated some species as larvae by antennal length. Using such criteria, *C.* sp. B may consist of more than one species: in Florida and South Carolina material examined, there were two size classes based on basal antennal length/postmentum length. In specimens with basal antennal segment lengths of 150 μm or more, basal segment length was greater than postmentum length; in specimens with basal antennal lengths 125 μm or less, basal segment length was less than or subequal to postmentum length. Whether this is due to allometry, seasonal, or species differences will remain uncertain until adults of both varieties are associated with larvae (I have reared only the "short" antennal variety).

C. sp. C - This species and *C.* sp. D have extremely long antennae; note that sp. C has a sculptured head capsule integument. This sculpturing can be very faint in some specimens. See also *C. taris*.

C. sp. D - This taxon is unique in that most specimens have a mentum with 6 pairs of lateral teeth (plus a trifid median tooth); Cranston et al. (1983) stated that *Corynoneura* has 5 pairs of lateral teeth plus a bifid or trifid median tooth. The outermost sixth tooth may appear as only a notch on some specimens; the figure accompanying couplet 4' is of a considerably flattened mentum. Note also the smooth head capsule integument and the very long antennae.

C. sp. E - In this species, total antennal length is subequal to the length of the head capsule. I have seen specimens from as far north as South Carolina.

C. sp. F - This species is unique among the North American species I have seen in that the head capsule integument is pustulate (set with small granules). The median tooth of the mentum is bifid; the first antennal segment is longer than the postmental length. The head capsule is rather squat for a *Corynoneura*. It is known only from south Florida (Brevard and Palm Beach Counties) and may be restricted to marshes. Be aware that partially decomposed larvae of other species of *Corynoneura* may contain detritus, fungi, microsporidia, bacteria or other organisms that may give the appearance of a granular head capsule integument; however, in such specimens these organisms also occur on/in the body segments.

Genus ***Cricotopus***

DIAGNOSIS: Many larvae are difficult or impossible to separate from *Orthocladius (Orthocladius)* larvae. Note that *Cricotopus* larvae possess a simple or bifid S I; pecten epipharyngis a simple scale [*C. (Isocladius)*] or 3 scales [*C. (Cricotopus); C. (Nostococladius)*]; simple or bifid premandibles; weak ventromental plates; beard very weak or vestigial; mentum with odd number of teeth; and body with or without setal tufts.

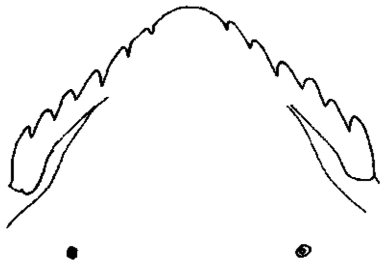
NOTES: Of the 4 subgenera found in North America, two occur in Florida: *C. (Cricotopus)* and *C. (Isocladius)*. The last subgenus is represented in Florida by the *C. sylvestris* group; the remaining Florida species probably fall in *C. (Cricotopus)*. *C. (Nostococladius)* is not recorded from Florida, but may occur here. Eight species of *Cricotopus* are recorded from Florida, but undoubtedly more occur. Several species which I've seen from SE Alabama (adult specimens) probably also occur in northern Florida.

Contrary to the diagnosis in Cranston et al. (1983), most *Cricotopus* larvae do possess a weak cardinal "beard" near the lateral margin of the mentum. [Hirvenoja (1973) gives beard length measurements.]

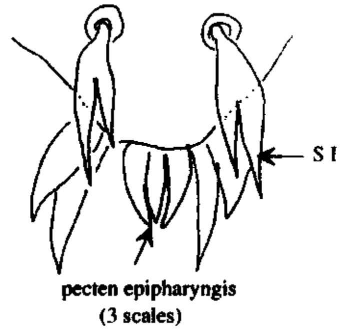
Separation of some *Cricotopus* from *Orthocladius (Orthocladius)* at the generic level is difficult, and species level identification of unassociated larvae, with a few exceptions, is not possible. Setal tufts, once thought to distinguish some *Cricotopus* larvae from *O. (Orthocladius)*, have been shown to occur in the two subgenera of *Orthocladius* which are known from Florida. Setal tuft bearing larvae with simple S I setae (excluding *O. (Symposiocladius)* with its distinctive mentum) are *Cricotopus*, but most specimens encountered may have to be listed as "*Cricotopus/Orthocladius* sp." Until this genus is revised for North America, utilizing all life stages, many species will remain unidentifiable. Benthic biologists can assist taxonomists greatly by rearing larvae!

Larvae are found in a variety of aquatic habitats, where they are often associated with plants. *C. (Isocladius)* species tend to more common in lentic conditions; *C. (Cricotopus)* species are more common in lotic situations. Some *Cricotopus* larvae may be economically important as pests in rice fields and as biocontrol agents for nuisance aquatic plants. One species, *C. bicinctus*, is tolerant of many types of water pollution.

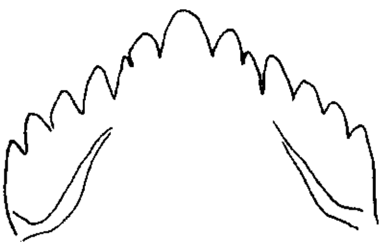
ADDITIONAL REFERENCES: Boesel 1983; Hirvenoja 1973; LeSage & Harrison 1980; Simpson & Bode 1980; Simpson et al. 1983 (translation of keys of Hirvenoja 1973).



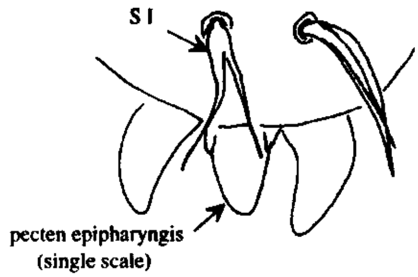
C. politus mentum



C. politus labrum



C. trifasciatus mentum



C. trifasciatus labrum

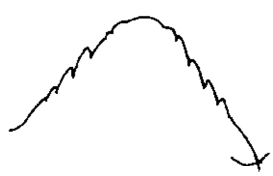
Cricotopus spp., larval structures

Key to Florida *Cricotopus*

(This key is based on literature and a limited amount of reared Florida material. You should have at least a pupal association that confirms your larval material as *Cricotopus* before using this key. Most identifications should be considered tentative.)

1 Head capsule dark and heavily sclerotized; outer margin of mandible with 2 tooth-like projections; mentum distinctively elongate and sharply arched; living in *Nostoc* .... ***Cricotopus (Nostococladius)*** **sp.**

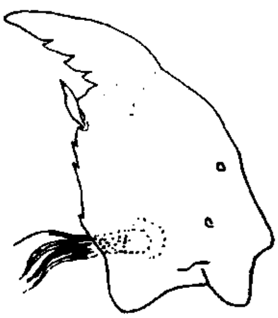
(not recorded from Florida)



1' Head capsule, mandible and mentum not as above; not confined to *Nostoc* 2

2 (1') Premandible apically simple 3

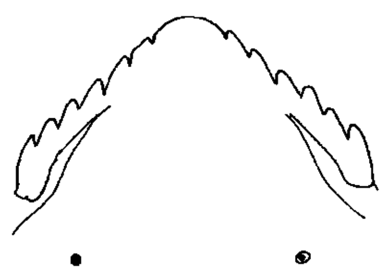
2' Premandible apically bifid .... ***C. sylvestris* group**
(*Orthocladius (O.) oliveri*, which may occur in N Florida, could key here. It may be distinguished by its 3-scaled pecten epipharyngis; *C. sylvestris* grp. species have a pecten epipharyngis of one scale [which may be notched laterally at base])



3 (2) Inner margin of mandible with serrations ... ***C. bicinctus***

3' Inner margin of mandible smooth 4

4 (3') Median tooth of mentum about 3X or more width of first lateral tooth 5



4' Median tooth usually < 2.5X width of first lateral tooth .... ***Cricotopus* sp.; *Orthocladius* sp.**

5 (4) First lateral tooth of mentum smaller than outer lateral teeth and almost fused to median tooth .... ***C. trifascia* group**

5' First lateral tooth of mentum subequal to other lateral teeth, not appearing fused to median tooth 6

6 (5') Outer margin of mandible smooth .... ***C. politus***

6' Outer margin of mandible crenulate .... ***Cricotopus* sp.; *Orthocladius* sp.**

Notes on species

C. (Cricotopus) bicinctus - Common and widespread in Florida. The distinctive serrate inner margin of the mandible makes this one of the few species reliably identified. (However, *C. bicinctus* may be a complex of morphologically similar species.) The species is tolerant of organic and other forms of pollution. Roback (1974) recorded it from a pH range of 6.3-8.8 and at high chloride levels (> 2600 ppm). In Canada, two species of the *C. bicinctus* group were shown to be more abundant on oiled rather than unoiled substrates (Rosenberg et al. 1977).

C. (C.) politus - Sometimes common in the Suwannee River basin, where it can occur with *C. bicinctus*. Identifications must be verified by an associated pupa or adult (see LeSage & Harrison (1980).

C. (C.) trifascia group - At least one species from this group has been recorded from Florida; two may occur.

C. (Isocladius) sylvestris group - There may be at least three species from this group present in Florida (*C. sylvestris, C. tricinctus, C. trifasciatus*). They are at present inseparable as larvae in Florida. *C. remus* is a junior synonym of *C. trifasciatus.*

C. (Nostococladius). sp. - Not yet recorded from Florida; immature stages live in the alga *Nostoc*.

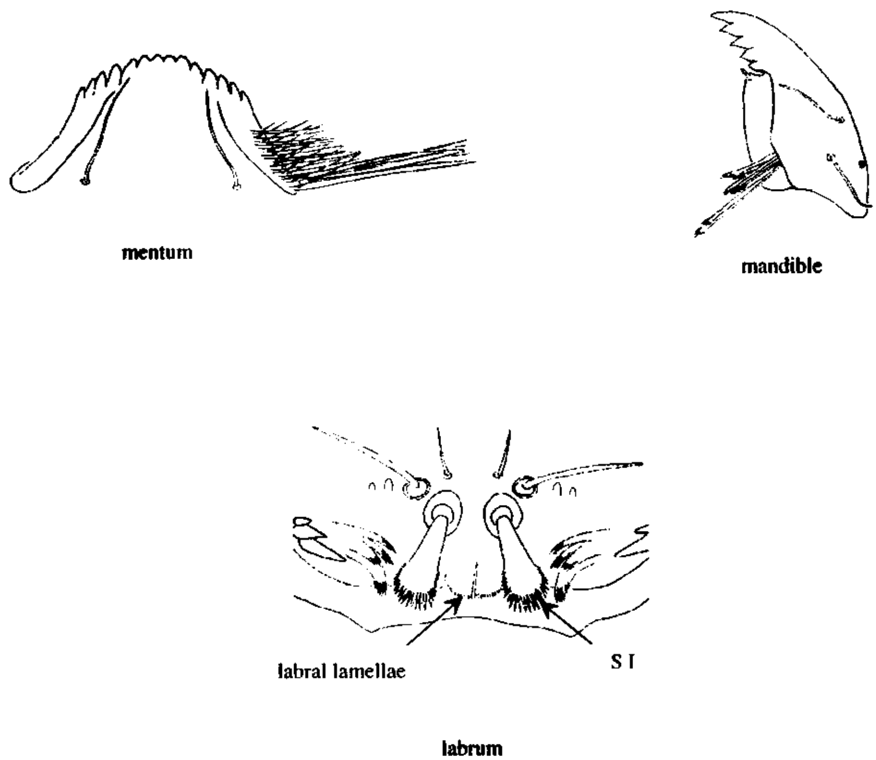
NOTE: The list above must be considered incomplete. Many *Cricotopus* may be encountered that will not fit in the preceeding key. In many cases, your most accurate identification will be "*Cricotopus/Orthocladius* sp."

Genus ***Diplocladius***

DIAGNOSIS: The plumose S I; apically pectinate labral lamellae; well developed beard and mandible with four inner teeth will distinguish this genus.

NOTES: This genus is not yet recorded from Florida, but may eventually be found in the northern and/or western part of the state. One Holarctic species, *D. cultriger*, is known, but there may be several undescribed species present in the Nearctic.

Larvae are most often found in cool streams.



***Diplocladius cultriger*, larval structures**
(adapted from Cranston et al. 1983)

Genus ***Doithrix***

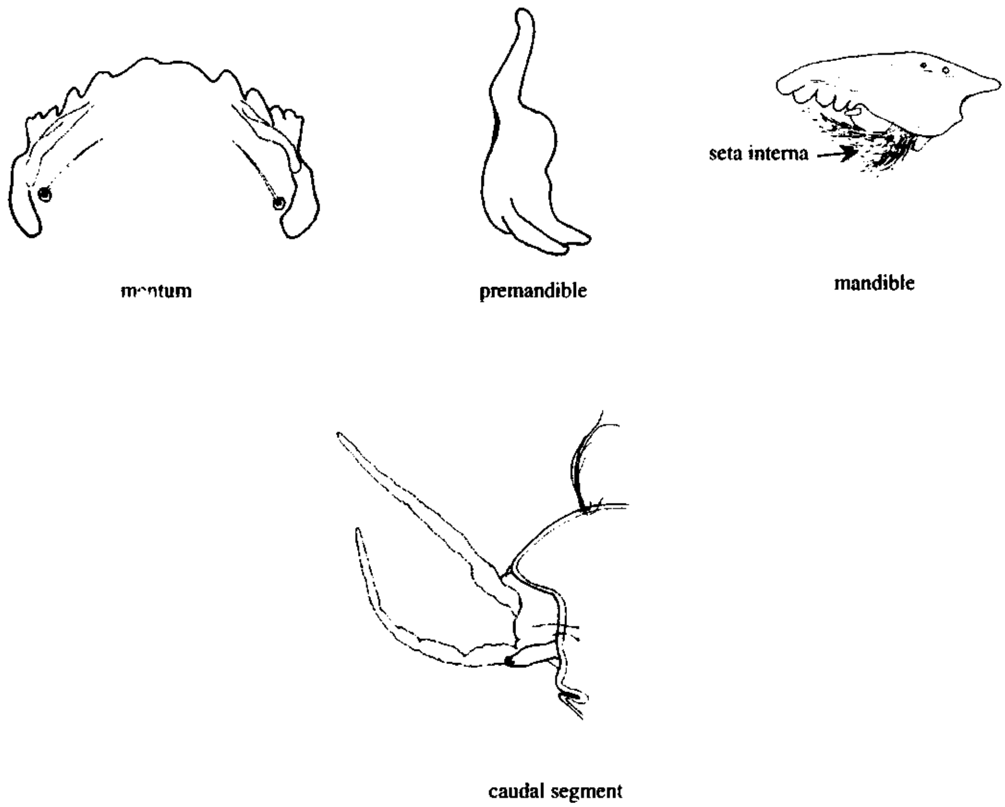
DIAGNOSIS: The S I with weak lateral serrations; apically bifid premandible; mandible with seta interna and four inner teeth; vestigial procerci; long anal tubules with numerous constrictions; and normal anal setae will distinguish *Doithrix* larvae.

NOTES: *Doithrix* has not been recorded from Florida, but it may eventually be found in the western part of the state. Two species are known from the SE.

The apical tooth is considered bifid; the mandible may appear to have five inner teeth.

Larvae have been reared from the vicinity of small streams and seeps; they may best be classified as semi-terrestrial. I've collected adults of *D. villosa* at a small seep with little visible running water in a heavily wooded area on the Appalachian Trail in Pennsylvania.

ADDITIONAL REFERENCES: Sæther & Sublette 1983.



Doithrix, larval structures
(adapted from Cranston et al. 1983)

Genus *Doncricotopus*

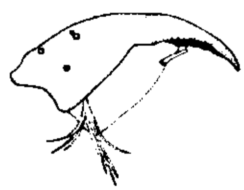
DIAGNOSIS: The simple labral setae; mentum with 6 pairs of lateral teeth; distinct beard setae; mandible with seta interna and with width of four inner teeth less than length of apical tooth; and body with simple setae will distinguish this genus.

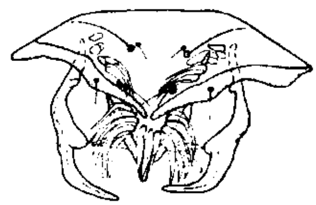
NOTES: Hudson et al. (1990) recorded this genus from Florida. However, specimens I have examined from Florida and Georgia identified as this taxon are *Rheocricotopus tuberculatus*. Thus, I consider records of *Doncricotopus* from the Southeast to be invalid. Bolton (1992) recorded the genus from Ohio. The only other records for this genus are from the Northwest Territories and Finland. Larvae closely resemble *Rheocricotopus, Psectrocladius* and *Nanocladius*.

Canadian larvae were reared from a stream.

ADDITIONAL REFERENCES: Sæther 1981a.


mentum


mandible


labro-epipharyngeal area

Doncricotopus bicaudatus, larval structures
(adapted from Sæther 1981a)

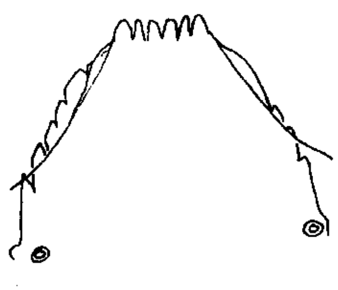
Genus ***Epoicocladius***

DIAGNOSIS: The distinctive mentum and mandible; long, thick body setae; single pair of anal tubules; and symphoretic life habit distinguish *Epoicocladius*.

NOTES: One species, *E. flavens*, has been recorded from Florida (Hudson et al. 1990; Oliver et al. 1990). The larva of this species has never been associated with the adult. Jacobsen (1992) provided a key that includes four larval types in the genus for North America. He believed his *E.* sp. 4 to be the best candidate as the larva of *E. flavens; E.* sp. 4 is the only species known to occur in Florida.

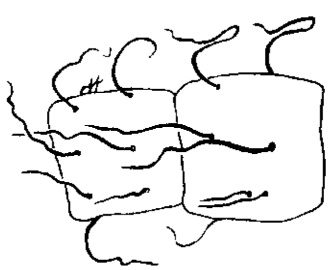
Larvae are symphoretic on the ephemerid mayfly *Hexagenia*, where they apparently graze on detritus on the mayfly's gills. Larvae are sometimes found loose in samples from bodies of water with *Hexagenia* populations. I have found a larva of *E.* sp. 4 (along with four *Hexagenia*) in the gut of the salamander *Amphiuma pholeter* collected in the Florida panhandle by Dr. Bruce Means.

ADDITIONAL REFERENCES: Jacobsen 1992.



mentum

mandible



body segments

Epoicocladius sp. 4, larval structures

Genus ***Eukiefferiella***

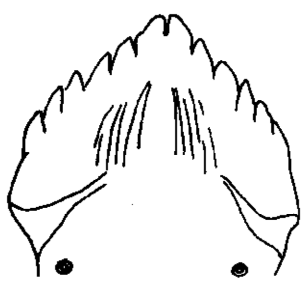
DIAGNOSIS: Larvae are distinguished by the simple S I; weak/vestigial ventromental plates; seta interna of mandible divided almost to base; inner margin of mandible with spines/serrations; 4- or 5-segmented antennae; well developed procerci; and body with simple setae that are less than ½ length of the body segment that bears them.

NOTES: The taxonomy of the Nearctic *Eukiefferiella* is in poor condition; a revision utilizing all life stages is essential before the North American fauna can be identified. Hudson et al. (1990) stated that six species groups (as recognized in Bode (1983)) have been found in the Southeast; I have seen representatives of two of these groups from Florida. I have seen four species (based on adult males) from SE Alabama; these taxa may also occur in Florida. Species level identification of larvae is not possible, even with reared material, because to date only one species has been described from North America and relationships to the described Palaearctic fauna are not clear.

Some earlier records of *Eukiefferiella* from Florida may refer to *Tvetenia*, recently split from *Eukiefferiella* (Sæther & Halvorsen 1981).

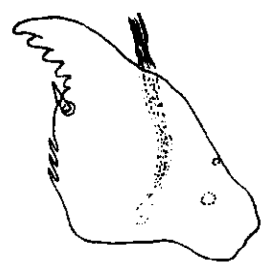
Larvae are found in running water; some species may be pollution tolerant.

ADDITIONAL REFERENCES: Bode 1983; Sæther & Halvorsen 1981.



E. claripennis grp. mentum

E. devonica grp. mentum



mandible

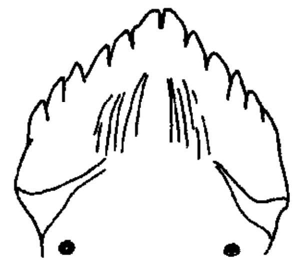
E. claripennis grp. antenna

Eukiefferiella spp., larval structures

Key to *Eukiefferiella* species groups of SE U.S.A.

1 Mentum with 4 pairs of lateral teeth ... ***E. devonica* group**

1' Mentum with 5 pairs of lateral teeth 2



2 (1') Antenna with 4 segments 3

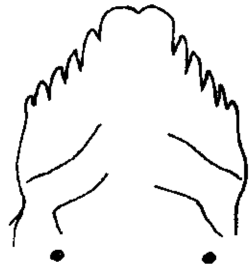
2' Antenna with 5 segments 5

3 (2) Mentum with a single median tooth .... ***E. brevicalcar* group**
(not recorded from Florida)

3' Median tooth of mentum bifid or notched at apex 4

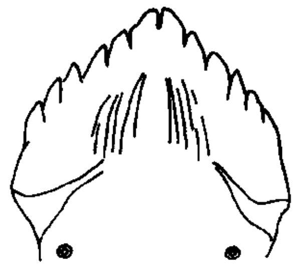
4 (3') Each median tooth about twice the width of first lateral tooth .... *E. pseudomontana* **group**

(not recorded from Florida)



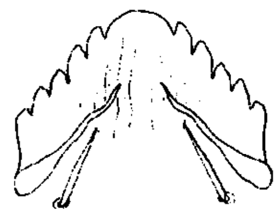
adapted from Bode 1983

4' Each median tooth about as wide as first lateral tooth .... *E. claripennis* **group**



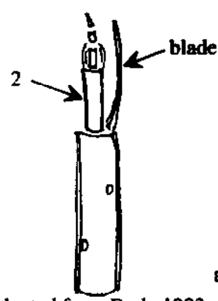
5 (2') Mentum with single median tooth .... *E. gracei* **group**

(not recorded from Florida)



adapted from Cranston et al. 1983

5' Mentum with bifid or notched median tooth 6

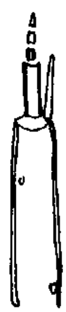


adapted from Bode 1983

adapted from Cranston et al. 1983

6 (5') Antennal blade longer than segment 2; each median tooth about as wide as first lateral tooth .... *E. brehmi* **group**

(not recorded from Florida)



adapted from Bode 1983

6' Antennal blade subequal to segment 2; each median tooth about twice as wide as first lateral tooth .... *E. brevicalcar* **group**

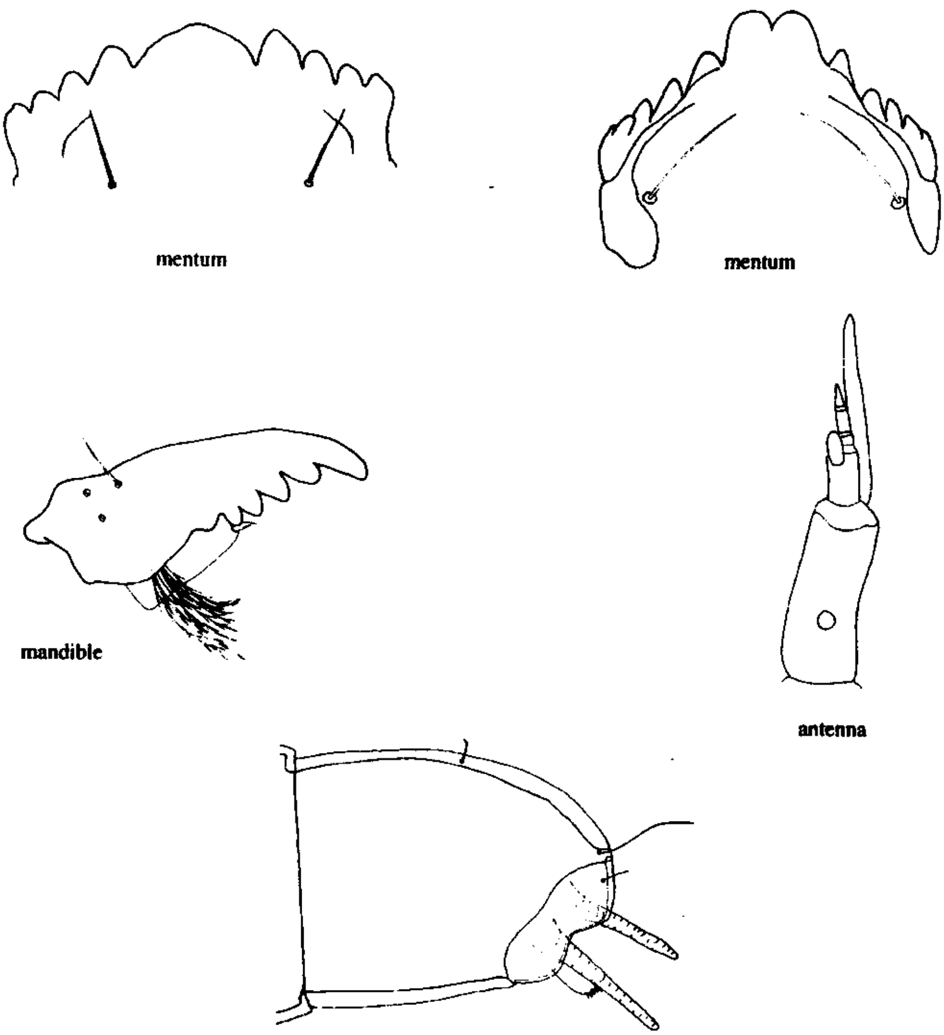
(not recorded from Florida)

Genus *Georthocladius*

DIAGNOSIS: The weakly serrate S I (may appear simple); apically simple premandible; mandible with seta interna; procerci absent or vestigial; and long anal tubules with numerous constrictions identify this genus. The mentum may have one or two median teeth, the mandible 2 or 3 inner teeth.

NOTES: Three species of *Georthocladius* have been recorded from the SE U.S. David Evans has supplied larvae collected in western Florida. These larvae apparently belong in the subgenus *G. (Atelopodella)*, but have a simple median tooth. The genus has been recorded from bogs, seeps, lotic habitats and forest litter.

ADDITIONAL REFERENCES: Sæther 1982; Sæther & Sublette 1983.



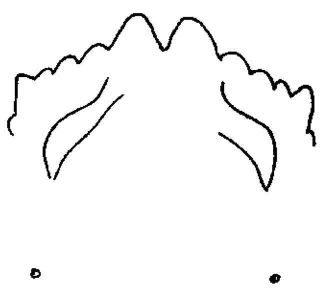
Georthocladius sp., larval structures
(adapted from Cranston et al. 1983)

Genus *Gymnometriocnemus*

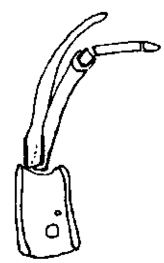
DIAGNOSIS: The simple S I; mandible without seta interna; posterior parapods at a right angle to body axis and divided, with claws on anterior portion; and lack of procerci will identify this genus. Florida larvae I've seen also possess distinctive antennae.

NOTES: I have seen only larvae of this genus from Florida. Specimens were terrestrial, collected from Live Oak litter in Jackson Co. There are two subgenera present in the SE U.S.: the immature stages of *G. (Gymnometriocnemus)* are mostly terrestrial; those of *G. (Rhaphidocladius)* have been recorded from seeps, springs and small streams.

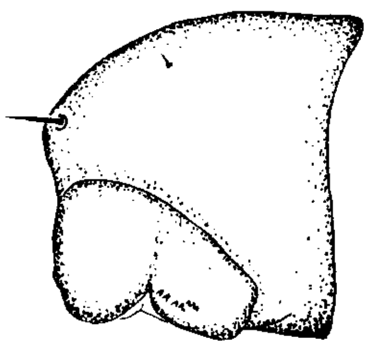
ADDITIONAL REFERENCES: Sæther 1983d.



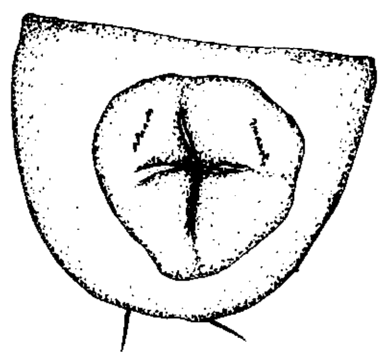
mentum



antenna



anal end, lateral



anal end, ventral

Gymnometriocnemus sp., larval structures

Genus *Heterotrissocladius*

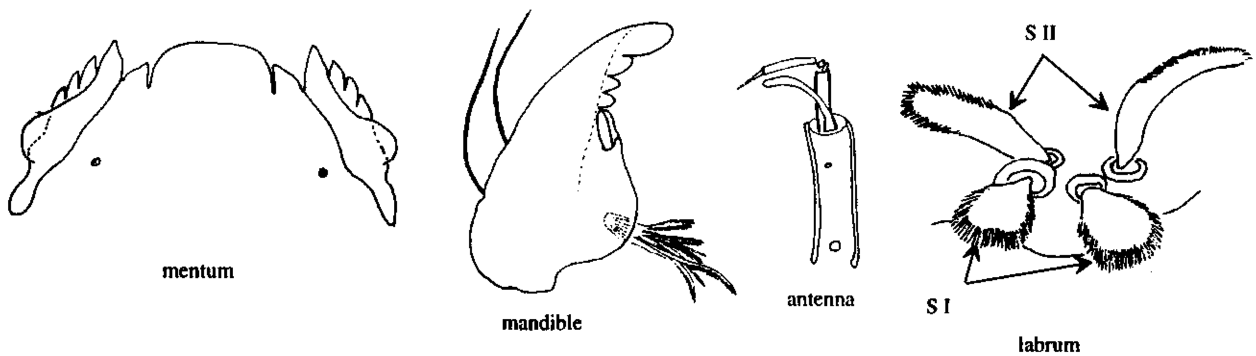
DIAGNOSIS: *Heterotrissocladius* larvae possess a plumose S I; pecten epipharyngis of 3 serrated scale-like spines; 7-segmented antennae with the third segment 1/3 or less the length of segment 4; and ventromental plates that extend beyond the lateral margin of the mentum.

NOTES: *Heterotrissocladius* is essentially a genus of northern climes. Two Florida taxa are placed in this genus; each will key out separately in the generic key. Both are found in streams.

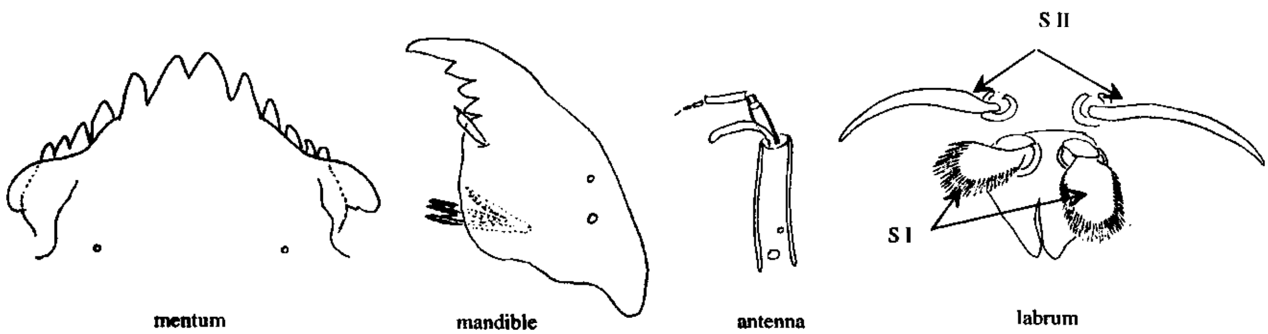
H. sp. C has a distinctive mentum and mandible and was placed tentatively in *Heterotrissocladius* by Sæther (1975). It is known only as a larva; I have seen specimens from Juniper Creek in Calhoun Co. and Lafayette Creek in Walton Co. Several characters (mentum, premandible with brush, large plumose S II) of *H.* sp. C are unusual for the genus; once reared, this species may be placed in its own genus.

The second Florida species is more representative of the genus and is a member of the *H. marcidus* group. Florida larvae have not been reared and it is uncertain whether Florida specimens are *H. marcidus* or a related species, perhaps undescribed.

ADDITIONAL REFERENCES: Sæther 1975, 1992.



Heterotrissocladius **sp. C, larval structures**



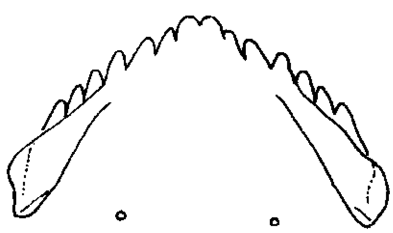
H. marcidus **group sp., larval structures**

Genus ***Hydrobaenus***

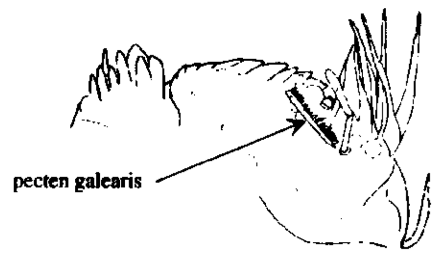
DIAGNOSIS: The double median teeth of the mentum; lack of a beard and premandibular brush; maxilla with a well developed pecten galearis; and ventromental plates which extend past the lateral margin of the mentum are characteristic for this genus. The very similar genus *Zalutschia* has a weak beard.

NOTES: One species, *H. pilipes,* is recorded from Florida based on a larval specimen from the Apalachicola River (Sæther 1976). I have seen additional larval material from the Escambia River. The genus is mostly northern in distribution; larvae are found in the littoral region in lentic and lotic situations. In Florida, larvae are collected in winter and early spring.

ADDITIONAL REFERENCES: Sæther 1976; 1989b.



mentum



maxilla
(adapted from Cranston et al. 1983)

Hydrobaenus sp., larval structures

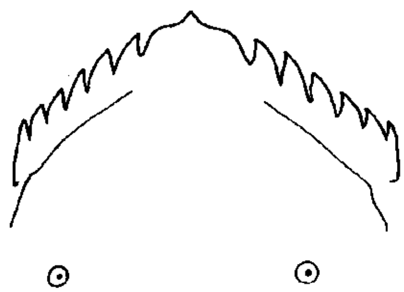
Genus ***Krenosmittia***

DIAGNOSIS: This genus is diagnosed by its small size (< 3.5 mm); apically bifid premandible; distinctive mentum; and elongate anal setae (about ½ body length).

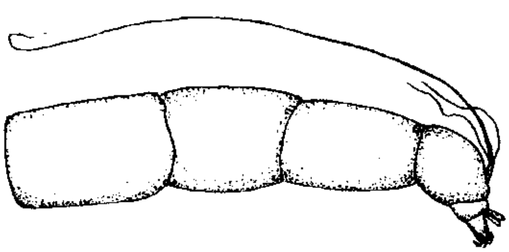
NOTES: I have seen a single larva from the Perdido River system in the northwestern portion of the state. Although Cranston et al. (1983) stated that the larva has a four segmented antenna, the Florida larva possesses a hair-like, vestigial fifth segment.

Krenosmittia larvae occur in sandy substrates; they are found in springs and streams. Their extremely small size (< 3.5 mm) and interstitial habitat no doubt contribute to the paucity of distribution records.

ADDITIONAL REFERENCES: Ferrington 1984.



mentum
(adapted from Cranston et al. 1983)



posterior segments

***Krenosmittia* sp., larval structures**

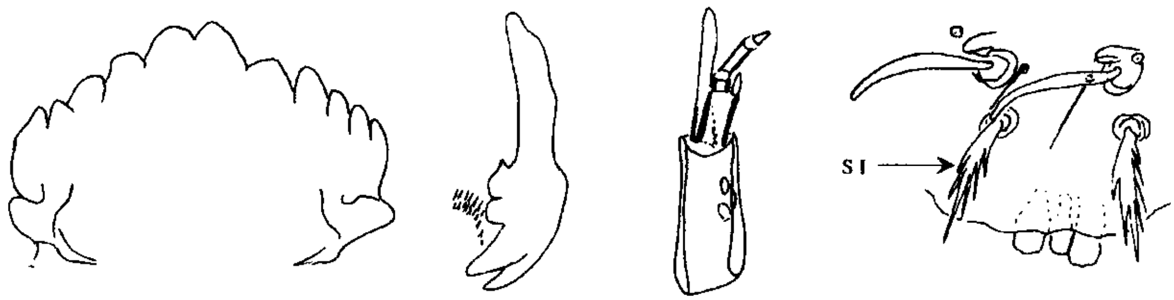
Genus ***Limnophyes***

DIAGNOSIS: Larvae of the genus are characterized by the absence of labral lamellae; S I serrate (but serrations sometimes reduced); antennae 5-segmented, with blade as long as flagellum or slightly longer; mentum with 2 median teeth and 5 lateral teeth; ventromental plates weak, with posterolateral portion appearing as rounded basal tooth of mentum; simple (occasionally bifid) body setae; and a well developed supraanal seta.

NOTES: Based on adult males, three species are known from Florida (the identification of one species remains uncertain). Although Sæther (1990) offered a key for some larvae, species identification of larvae is impossible without associated adult males.

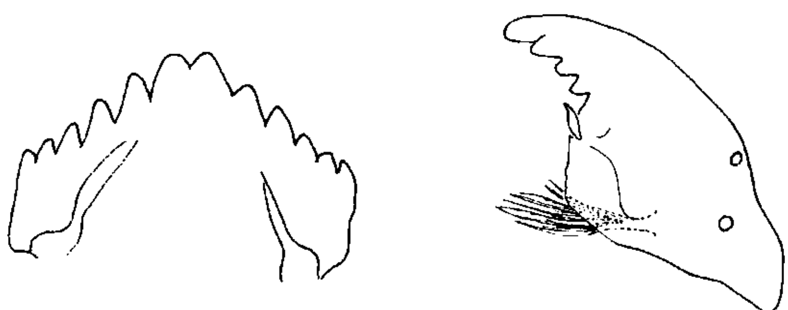
Contrary to information given in Hudson et al. (1990), larvae occur in rivers, streams, springs, seeps, and in moss on rock surfaces and stream margins, as well as terrestrial and semi-aquatic habitats.

ADDITIONAL REFERENCES: Cranston & Oliver 1988; Sæther 1990.



mentum   premandible   antenna   labro-epipharyngeal area

Limnophyes sp., larval structures



mentum   mandible

L. fumosus, larval structures

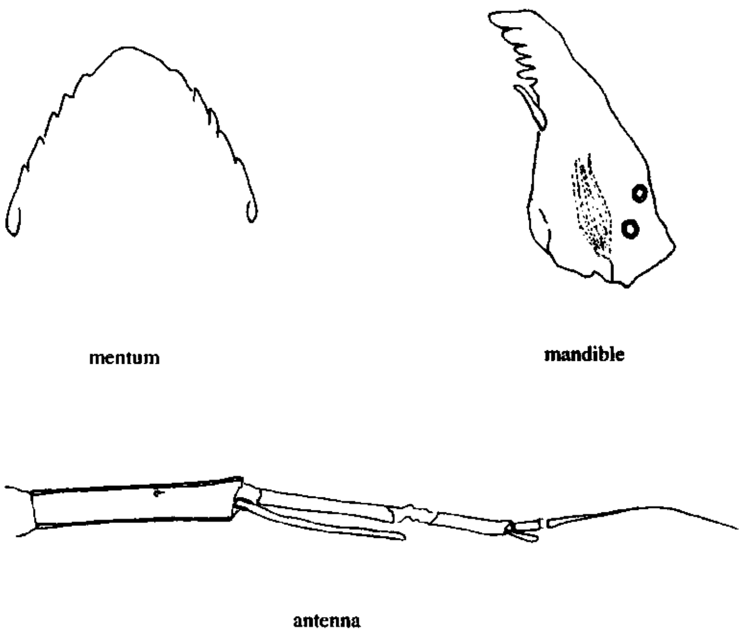
Genus ***Lopescladius***

DIAGNOSIS: *Lopescladius* is identified by its small size; simple, apically pointed premandible; and distinctive antennae, which are longer than the head capsule with segment 2 including a median unsclerotized area and the last segment long and whiplike. The seta submenti are displaced posteriorly, and Florida larvae possess 4 large hypopharyngeal scales.

NOTES: At present it is not possible to identify (at the species level) larval *Lopescladius* from Florida. I have not seen any Florida adult material. Pupae of this genus were formerly known as "*Cordites*".

Larvae are found in sand bottomed streams and rivers.

ADDITIONAL REFERENCES: Coffman & Roback 1984; Sæther 1983b.



Lopescladius **sp., larval structures**

Genus *Mesosmittia*

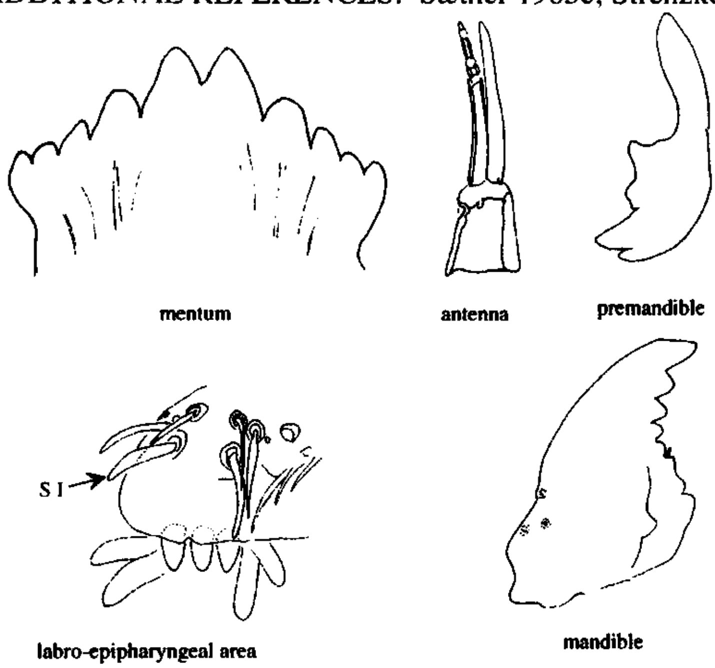
DIAGNOSIS: Larvae are distinguished by their simple labral setae; lack of a seta interna on the mandible; and lack of procerci, anal setae and anal tubules.

NOTES: Previous works (i.e., Cranston et al. 1983) indicated that only one species, *M. flexuella*, was present in North America. However, Sæther (1985c) demonstrated that *M. flexuella* is apparently not present in the Nearctic, and described several new species, three or four of which may occur in Florida. The larval diagnosis of this genus in Cranston et al. (1983) is based on *M. flexuella*, described from indirectly associated material by Strenzke (1950). Strenzke described the larval mandible as lacking a seta interna and *possibly* the seta subdentalis.

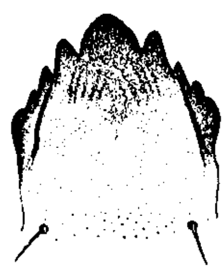
I have seen adults of *M. patrihortae* from Alabama and Florida; this species appears to be the most common member of the genus in the Southeast. Unassociated larval material I've seen from Florida which probably belongs to *Mesosmittia* matches most of the generic diagnosis of Cranston et al. (1983) except that the mentum has two median teeth, and the mandible bears a minute seta subdentalis (one of the larvae also appears to have a very weak, hyaline seta interna, but it is not clearly discernable). These specimens may represent an undescribed (as a larva) genus; reared material is necessary to accurately place these larvae.

Larvae are reported to be terrestrial, but may also occur in aquatic habitats. Florida "*Mesosmittia*" larvae came from an herbaceous marsh and other aquatic habitats.

ADDITIONAL REFERENCES: Sæther 1985c; Strenzke 1950.



"*Mesosmittia*" sp., larval structures



M. flexuella, mentum (from Strenzke 1950)

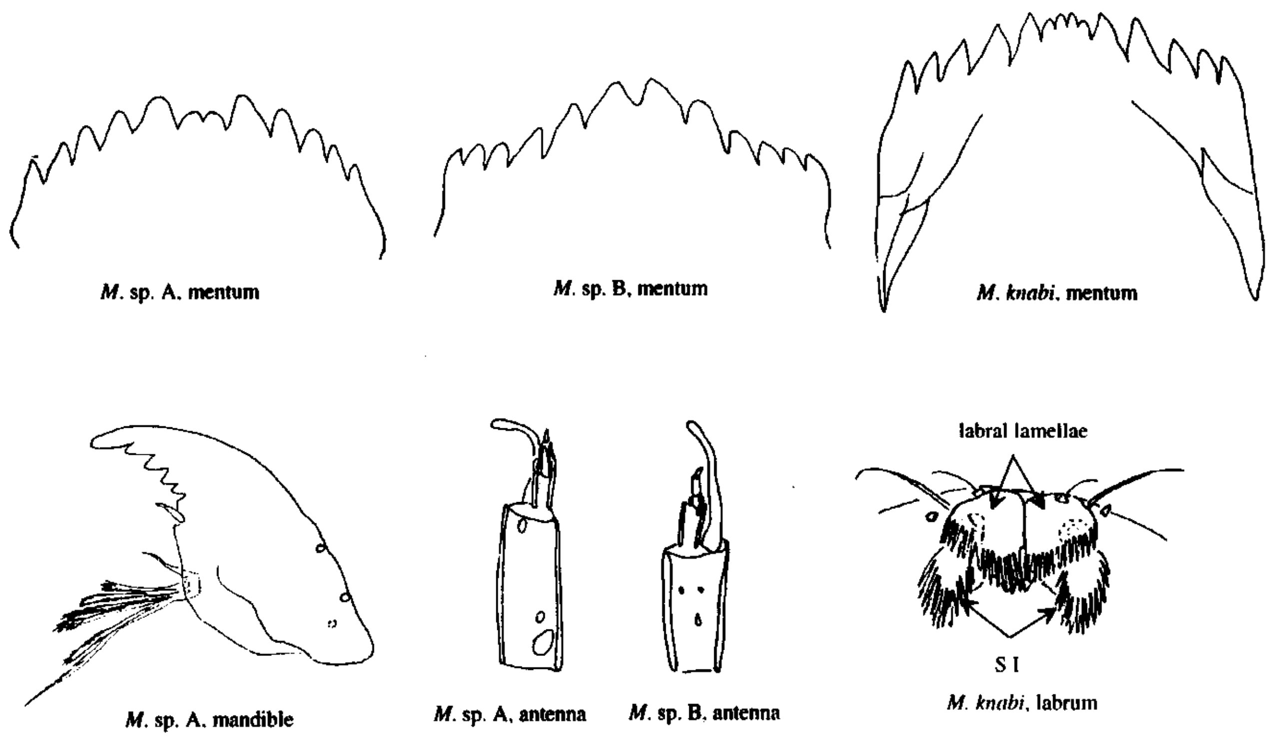
Genus *Metriocnemus*

DIAGNOSIS: The larvae are characterized by a plumose S I (simple in ***M. fuscipes***); well developed labral lamellae (reduced in *M. fuscipes*); absence of ventromental beard; and well developed procerci and short supraanal setae.

NOTES: *Metriocnemus* is currently being revised by O.A. Sæther. There is a large range of variation of larval characters. Two of the unreared species keyed below (*M.* sp. A & sp. B) possess long abdominal setae; this is contrary to the diagnosis given in Cranston et al. (1983). Two named species are recorded from Florida; however, the Beck & Beck (1959) record of *M. abdominoflavatus,* a bromeliad inhabitant, remains in doubt. This record may refer to either of the bromeliad dwellers *M.* sp. A or sp. B, but both possess 5 segmented antennae; according to Picado (1913), *M. abdominoflavatus* has a 4 segmented antenna. A review of type material is necessary.

Larvae are known from a variety of aquatic habitats, including the water held by the bromeliad *Tillandsia* and the pitcher plant *Sarracenia*, marine intertidal pools, sewage treatment beds, moss, tree holes, in damp soil and streams, rivers and lakes.

ADDITIONAL REFERENCES: Cranston & Judd 1987; Picado 1913; Sæther 1989a.



***Metriocnemus sp.*, larval structures**

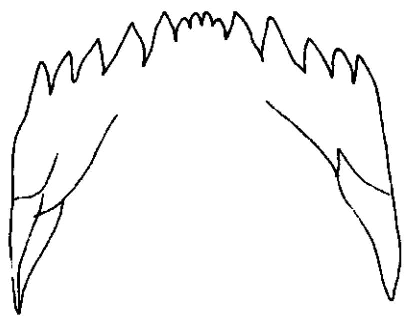
Key to some *Metriocnemus* of the SE U.S.A.

1 Body segments with long setae (at least ½ as long as segment) 2

1' Body segments without long setae 3

2 (1) Mentum with 2 median teeth lower than first lateral teeth .... ***M.* sp. A**

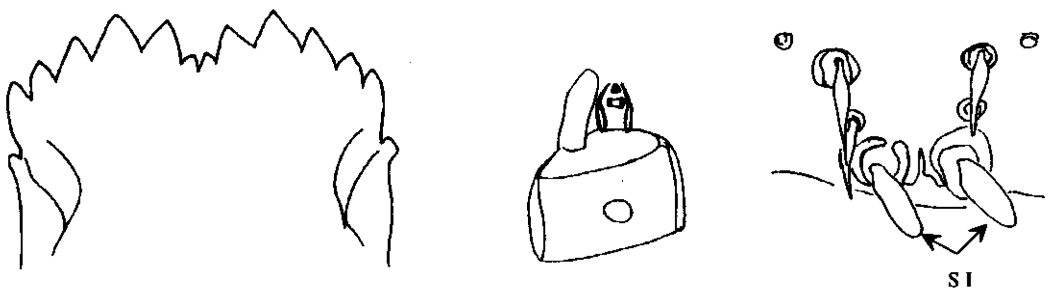
2' Mentum with 2 median teeth higher than first lateral teeth .... ***M.* sp. B**



3 (1') Mentum with 4 median teeth; restricted to water held by pitcher plant *Sarracenia* .... ***M. knabi***

3' Mentum with 2 median teeth, not restricted to *Sarracenia* 4

4 (3') Median teeth of mentum deeply recessed; antenna squat; S I simple .... ***M. fuscipes***
(not recorded from Florida)



4' Median teeth of mentum slightly lower than first lateral teeth; antenna normal; S I plumose .... ***M. obscuripes***
(not recorded from Florida)

adapted from Cranston et al. (1983)

Notes on species

M. fuscipes - I have not seen specimens of this species from Florida; it is recorded from GA and the Carolinas. This is the so called "Bungarus" of Bill Beck.

M. knabi - This species is apparently restricted to the water held by the pitcher plant *Sarracenia*.

M. obscuripes - Not recorded from Florida, but is known from SC. A senior synonym of *M. hygropetricus*, this species has been found in trickling filter sewage treatment plants.

M. sp. A and *M.* sp. B - I have collected larvae of both of these species, unassociated with adults, from water held by the bromeliad *Tillandsia* at Donald MacDonald Park in Indian River Co., where they co-existed with psychodid and culicid larvae, and with *Monopelopia tillandsia* and a *Tanytarsus* species. Both *Metriocnemus* taxa possess long abdominal setae, unknown in other described *Metriocnemus* larvae. Because my samples were pooled from several plants, I can not be certain that both *Metriocnemus* species occurred together in the same plant. R. Rutter has collected both taxa from bromeliads at Alligator Creek.

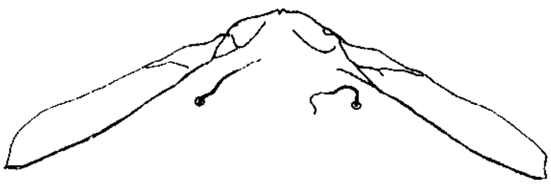
Genus ***Nanocladius***

DIAGNOSIS: The simple labral setae; large ventromental plates which extend past the lateral margin of the mentum; lack of beard; and distinctive mentum with wide median area, usually with 2 small central teeth, distinguish this genus.

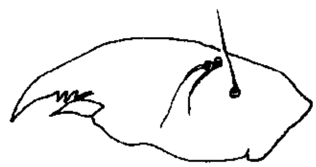
NOTES: *Nanocladius* is currently considered to consist of two subgenera: *N. (Plecopteracoluthus),* with three known species, all symphoretic on Corydalidae (Megaloptera), Perlidae and other Plecoptera, or Leptophlebiidae (Ephemeroptera); and *N. (Nanocladius),* with usually free-living larvae, although one species has been reported living on Corydalidae. Larvae live in lakes, rivers and streams; *N. distinctus* is apparently tolerant of high levels of organic nutrients.

Identification of *Nanocladius* species is difficult and determinations based on larvae alone are suspect; a pupal association is often necessary for proper identification. The genus requires a revision utilizing all life stages, and examination of type material is essential. Sæther (1977) offered keys for all stages, but the keys and descriptions are ambiguous and contain numerous errors. See Notes on Species following the key.

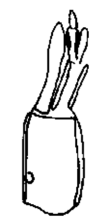
ADDITIONAL REFERENCES: Fittkau and Lehmann (1970); Epler 1986a; Sæther 1977; Simpson & Bode 1986; Steffan 1965.



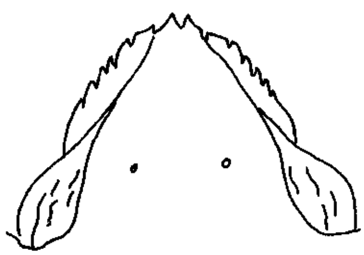
N. balticus grp. mentum



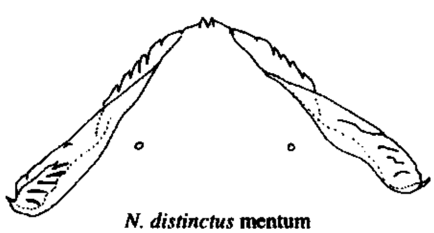
N. balticus grp. mandible



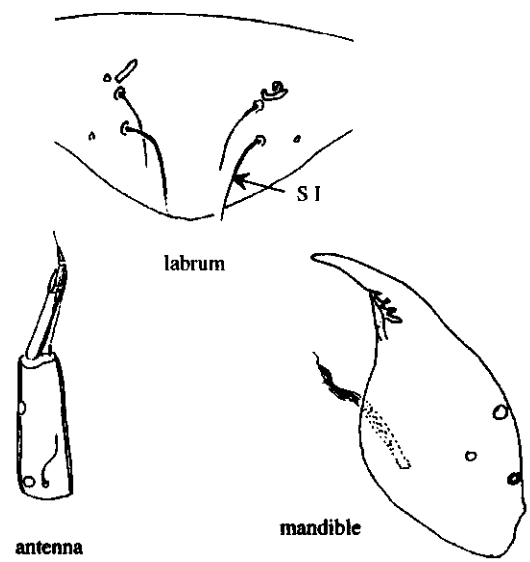
N. balticus grp. antenna



N. crassicornus mentum



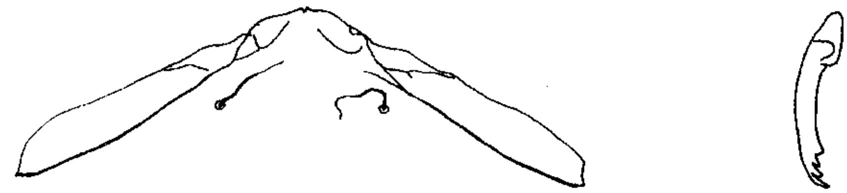
N. distinctus mentum



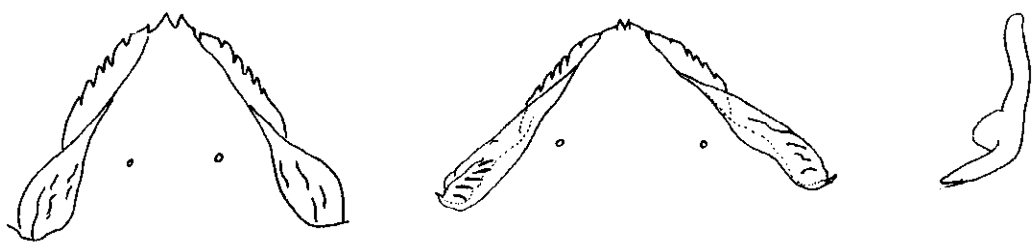
N. crassicornus structures

Key to Florida *Nanocladius*

1 Ventromental plates extremely broad; lateral teeth of mentum indistinct; **premandible** with 3-5 apical teeth 2



1' Ventromental plates not as long; lateral teeth of mentum distinct; premandible simple or bifid 3



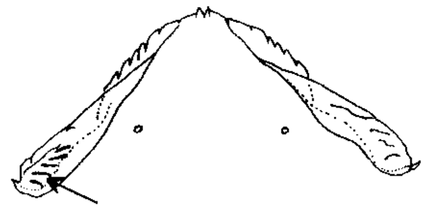
2 (1) **AR** less than or equal to 1.00; distance from distal notch of mentum to caudal margin of **head** capsule > 130 µm; ventromental plate with horizontal ridges near front margin, as in couplet 1 .... ***N. balticus* group**

2' AR 1.00 - 1.12; distance from distal notch of mentum to caudal margin of head capsule < 120 µm; ventromental plate apparently smooth .... ***N. incomptus***
(not recorded from Florida)

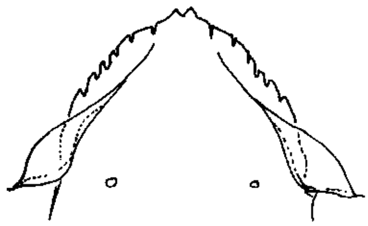
3 (1') AR < 0.90; symphoretic on Plecoptera .... ***N. (Plecopteracoluthus) branchicolus***
(not recorded from Florida)

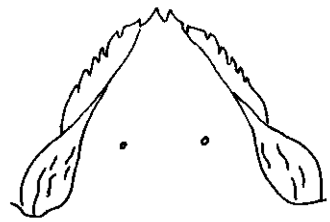
3' AR >1.00; free-living or (more rarely) phoretic on Plecoptera, Megaloptera, or Ephemeroptera 4

4 (3') **Ventromental plates with distinct horizontal ridges** .... ***N. distinctus***



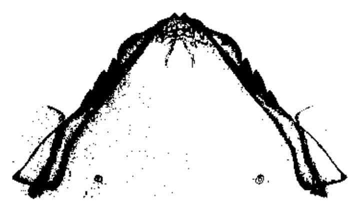
4' **Ventromental plates apparently smooth or with vertical ridges** 5





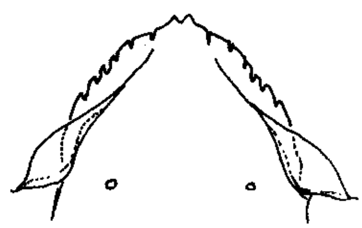
5 (4') **Mentum with 6th lateral tooth reduced/appressed; caudal margin of ventromental plates straight; symphoretic on Plecoptera** .... ***N. (Plecopteracoluthus) downesi***

(not recorded from Florida)



adapted from Steffan (1965)

5' **Mentum with 6th lateral tooth distinct; caudal margin of ventromental plates straight or rounded; free-living, rarely found on Megaloptera** 6

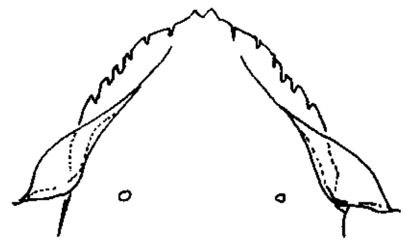


Beyond this point, larvae must be fourth instar and associated with pupae to identify to the species level!!

6 (5') **Basal antennal segment length 34-38 μm (4th instar larvae *only*; associate with pupa!)** .... ***N. spiniplenus***

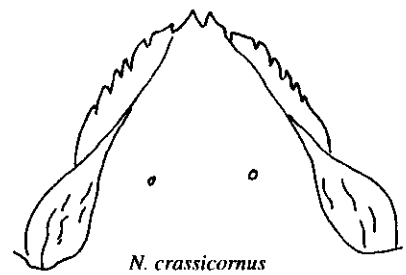
6' **Basal antennal segment length 40 μm or more (4th instar larvae *only*; associate with pupa!)** 7

7(6') Ventromental plates end near or just beyond a line drawn between the setae submenti; claws of anterior parapods usually pectinate .... ***N. rectinervis***



7' Ventromental plates extend well beyond a line drawn between the setae submenti; claws of anterior prolegs smooth or pectinate 8

N. minimus
adapted from Sæther (1977)



N. crassicornus

8 (7') Posterior portion of ventromental plate with vertical lines (figure to right above); claws of anterior prolegs usually pectinate (4th instar larvae *only*; ***must*** be associated with pupa!) .... ***N. crassicornus***

8' Posterior portion of ventromental plate without well defined vertical lines (figure to left above); claws of anterior prolegs mostly smooth (4th instar larvae *only*; ***must*** be associated with pupa!) .... ***N. minimus***

Notes on species

N. balticus group - I have seen mature larvae from the northwestern portion of the state, the Suwannee River basin, and as far south as the Orlando area. Specimens are similar to the *N. (N.)* cf. *balticus* described by Sæther (1977: 48). The FAMU collection has one reared male with pupal and larval exuviae, but more work is needed to ascertain the taxon's identity.

N. branchicolus- Not recorded from Florida, but recorded from N GA. This member of the subgenus *Plecopteracoluthus* lives on Plecoptera and Megaloptera.

N. crassicornus - I have associated material from the Suwannee River basin; this larva was also found in New York by Simpson & Bode (1980). Florida specimens are similar; however, Simpson & Bode did not mention the existence of the well defined longitudinal ridges on the caudal portion of the ventromental plates. This species is difficult to separate from *N. rectinervis* and several other species in the larval stage. However, with the limited material available to me, it appears they can be separated by the length of their ventromental plates and perhaps first antennal segment length. Specimens must be associated with pupae for proper identification; the pupa of *N.*

crassicornus has an oval shaped thoracic horn, while that of *N. rectinervis* is digitiform. The characters used by Simpson & Bode (1980) to separate these two species in New York do not apply well to Florida specimens, although the first antennal segment is shorter in the few *N. crassicornus* I have before me (44-50 µm for *N. crassicornus*; 52-72 µm for *N. rectinervis*). I have seen *N. crassicornus* only from the Suwannee and Withlacoochee Rivers; *N. rectinervis* also occurs in these rivers. See also notes on *N. rectinervis* and *N. minimus*.

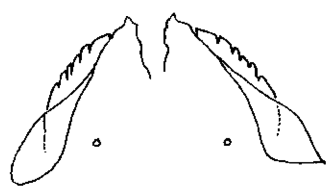
N. distinctus - This species can be a component of communities downstream from sources of organic enrichment, such as pulp mills. Because of the large variation observed in his material, Sæther (1977) stated that this taxon may represent a group of closely related species. Pupae from N FL are variable in shagreenation and lateral setation, and indicate that more study is needed.

N. downesi - Not recorded from Florida, but occurs in N GA. Sæther (1977) gives an incorrect AR for this species; as illustrated and measured by Steffan (1965), the AR is around 1.80, not "about 2.3" as in Sæther's (1977) key; Epler (1986a) repeated the erroneous data. This species is a member of the subgenus *N. (Plecopteracoluthus)*.

N. incomptus - Not recorded for Florida; a member of the *balticus* group.

N. minimus - Recorded for Florida by Hudson et al. (1990); I have not seen material of this species. The pupal thoracic horn is sharply pointed apically. Identifications based on isolated larvae must be regarded with extreme skepticism!

N. rectinervis - Sæther (1977) separated this species from *N. alternantherae* in the larval stage by the rounded caudal margin of the ventromental plate. However, the appearance of the plates is subject to mounting variations, etc. I have seen one specimen with rounded and straight caudal margins on its ventromental plates. Sæther's interpretation of *N. alternantherae* was apparently based solely on the description and figures in Dendy & Sublette (1959). My examination of paratype specimens of *N. alternantherae* indicates that some of their illustrations are inaccurate. Most importantly, the pupal thoracic horn is not smooth (Dendy & Sublette (1959): fig. 12) but bears spines. I can separate neither Florida adults, pupae or larvae nor *N. alternantherae* paratype material from Sæther's interpretation of *N. rectinervis*. I am therefore tentatively regarding *N. alternantherae* as a junior synonym of *N. rectinervis*. Sæther (1977) noted that, in North America, *N. rectinervis* was found in lentic and lotic situations, whereas Fittkau and Lehmann (1970) found it only in running waters. Because *N. alternantherae* was described from a lentic habitat, I investigated to see if Florida lentic specimens (which might equate with *alternantherae*) were different than specimens from lotic waters (which might equate with *rectinervis*). I could find no consistent differences between specimens from the two habitats. There is a wide range of size in Florida material. This may indicate more than one species, but the material available is not sufficient to draw any further conclusions. This is the most common *Nanocladius* I've seen from lakes in Florida.



mentum with straight *and* rounded ventromental plate margins

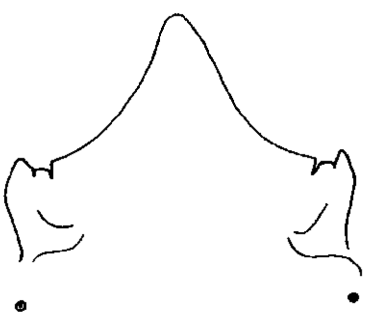
N. spiniplenus - Hudson et al. (1990) record this species from Florida but I have not seen Florida material of this taxon. Fourth instar larvae and a pupal association are necessary for proper identification.

Genus *Orthocladius*

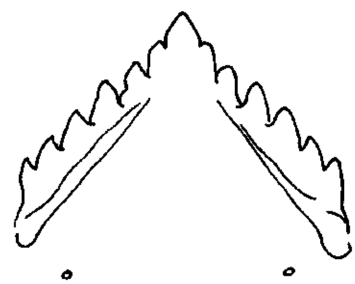
DIAGNOSIS: Many larvae are difficult or impossible to distinguish from *Cricotopus (Cricotopus)* larvae. Most *Orthocladius* possess a bifid S I (simple in *O. (Symposiocladius)*); pecten epipharyngis of 3 scales; premandible simple or bifid; weak ventromental plates; beard very weak or vestigial; mentum with odd number of teeth; and body with or without setal tufts.

NOTES: There are five subgenera in the genus; two occur in Florida, each with a distinctive species. The larva of *O. (Symposiocladius) lignicola* is a wood borer; it is easily identified by its characteristic mentum and simple S I setae. *O. (Orthocladius) annectens* also has a distinctive mentum, with the median and appressed first lateral teeth projecting strongly forward; most larvae examined also bear well developed, distinctive Lauterborn organs. Both species key out in the generic key. At least two other species of *O. (Orthocladius)* may occur in Florida. Material resembling *O. oliveri* has been collected in southern GA (B.A. Caldwell, pers. comm.), and *O. obumbratus* may occur in the Florida panhandle. Both of these species must be reared for correct identification. The discovery of setal tufts on *O. annectens* (Fagnani & Soponis 1988) negates the use of that character in separating many *Orthocladius* larvae from those of *Cricotopus*. *O. annectens* is a common species of the rivers of northern Florida.

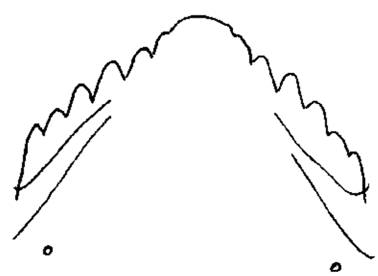
ADDITIONAL REFERENCES: Cranston & Oliver 1988b; Langton & Cranston 1991; Soponis 1977; 1990.



O. (Symposiocladius) lignicola mentum

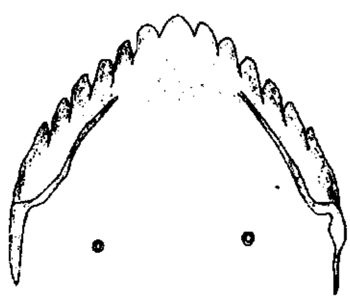


O. (O.) annectens, mentum

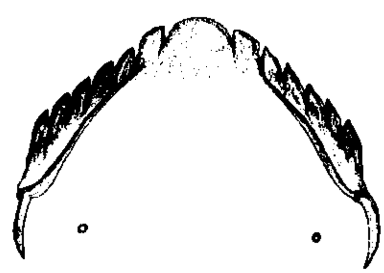


O. (O.) annectens, worn mentum

O. (O.) annectens, antenna



O. (O.) oliveri, mentum (from Soponis 1977)



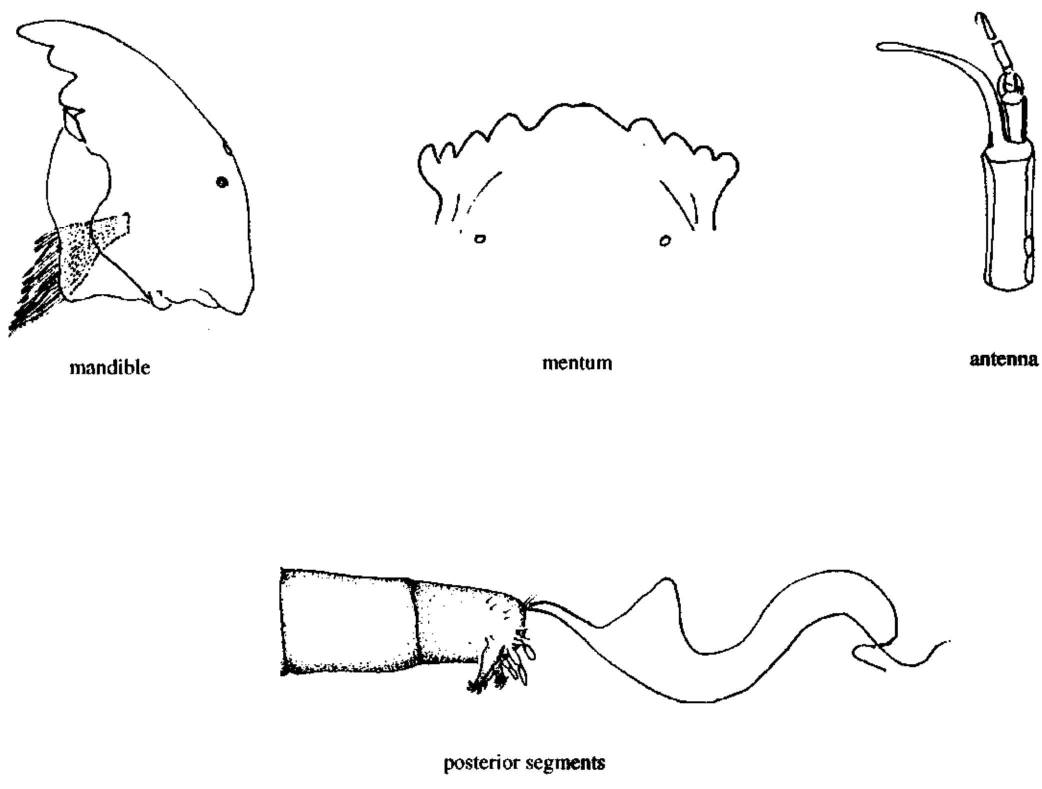
O. (O.) obumbratus, mentum (from Soponis 1977)

Genus ***Parachaetocladius***

DIAGNOSIS: Larvae are distinguished by the distinctive mentum; simple premandible; mandible with 1 or 2 inner teeth; and procercus with one seta at least ¼ as long as the body.

NOTES: One species, *P. abnobaeus*, is known from Florida and the SE U.S.A.; other species may occur. I have seen larval and pupal specimens from the Perdido River basin and other areas in Florida. Larvae are found in lotic conditions and are often associated with spring-fed streams.

ADDITIONAL REFERENCES: Sæther & Sublette 1983.



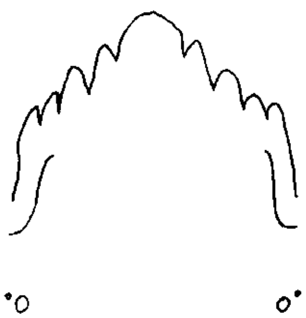
***Parachaetocladius* sp., larval structures**

Genus ***Paracricotopus***

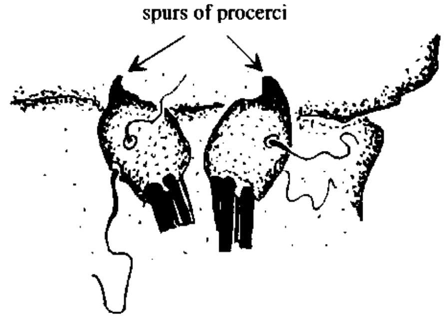
DIAGNOSIS: The apically serrated but almost simple S I seta; smooth inner margin of mandible; reduced ventromental plates; absence of beard; long, simple abdominal setae; and well developed procercal spurs separate this genus.

NOTES: This genus has not yet been recorded from Florida, but may eventually be found here. Three species are known from GA. Larvae are reported from algae and moss in bogs, streams and rivers.

ADDITIONAL REFERENCES: Caldwell 1985; Steiner 1983.



mentum



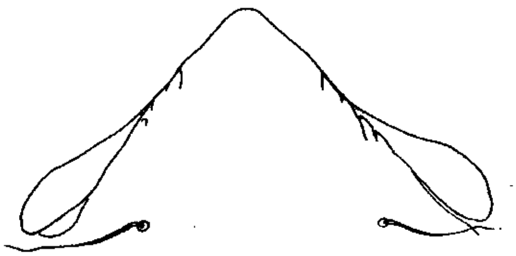
procerci
(anal setae not completely drawn)

P. millrockensis, larval structures

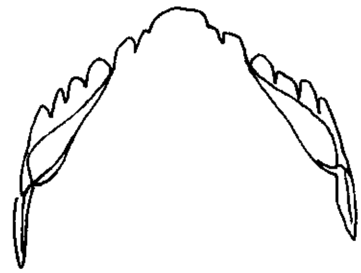
Genus ***Parakiefferiella***

DIAGNOSIS: *Parakiefferiella* larvae are characterized by their six-segmented antennae, with the last segment hairlike; well developed ventromental plates which may or may not extend past the lateral margin of the mentum; no ventromental beard; and S I plumose (rarely bifid/trifid).

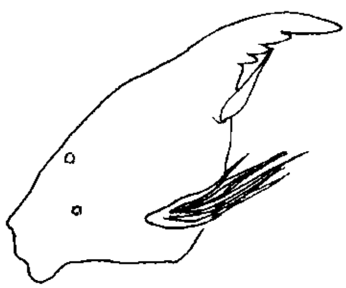
NOTES: *Parakiefferiella* is greatly in need of revision. Based on larvae, at least four species occur in Florida. Adults are difficult or impossible to identify; there are apparently several undescribed species in the SE. Larvae are found in lotic and lentic conditions. See also *Stilocladius*.



sp. A, mentum

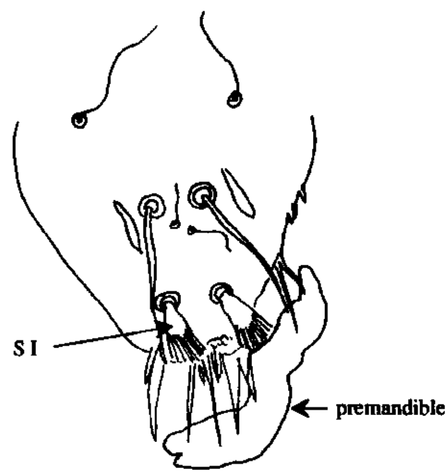


sp. B, mentum



sp. A, mandible

sp. B, antenna



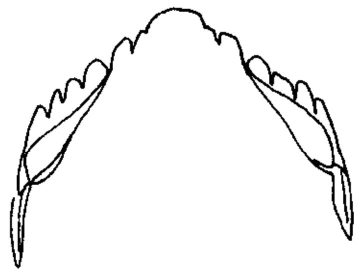
sp. A, labro-epipharyngeal area

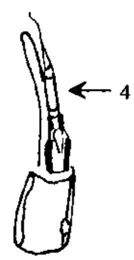
Parakiefferiella, larval structures

Key to Florida *Parakiefferiella*

1 Mentum with pale, dome-shaped median tooth; ventromental plates cover most of lateral teeth .... ***P.* sp. A**

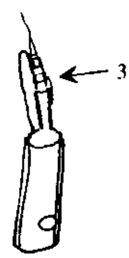
1' Median tooth of mentum not as above; ventromental plates may extend past lateral margin of mentum, but do not cover most of lateral teeth 2





2 Fourth antennal segment about twice the length of segment 3, or more ...... ***P.* sp. C**

2' Fourth antennal segment subequal to third 3



3 (2') Third antennal segment less than ½ length of 2 .. ***P.* sp. B**

3' Third antennal segment subequal to 2 .... ***P.* sp. D**

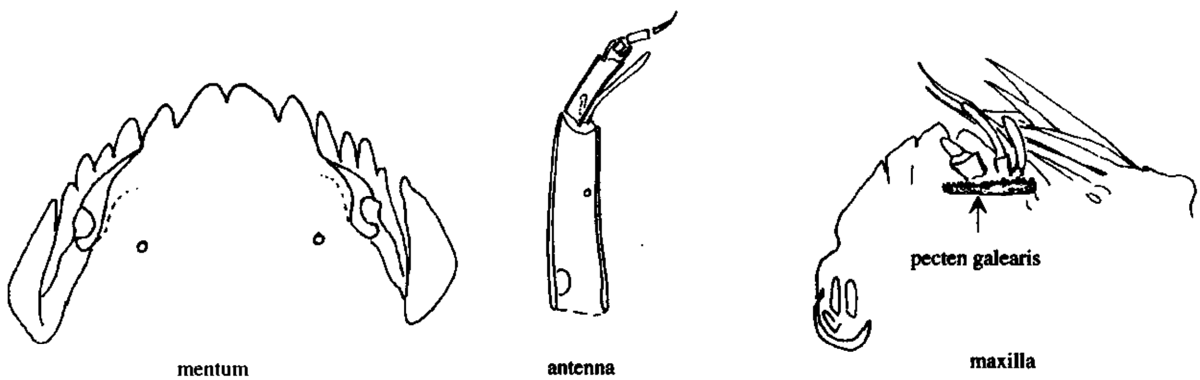
Genus ***Parametriocnemus***

DIAGNOSIS: This genus is characterized by the plumose S I; 5-segmented antenna; mentum with 2 median teeth; beard absent; large, distinctive ventromental plates; and lack of a pecten galearis on the maxilla.

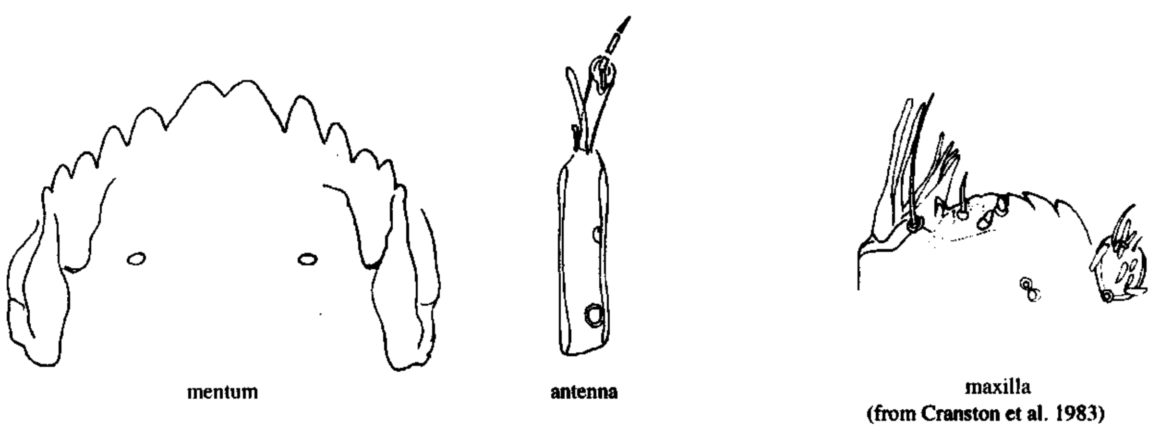
NOTES: One species, *P. lundbeckii*, has been recorded from Florida, and apparently is the species most often collected. [*P. lundbeckii* is the correct spelling; see Article 33(d) of the International Code Of Zoological Nomenclature (1985).] However, other species may also occur here. The taxon referred to as Orthocladiinae genus F in Epler (1992) belongs in *Parametriocnemus*, based on reared material from Costa Rica. This species, now called *P.* sp. F, is easily separated from other known U.S. *Parametriocnemus* by its distinctive mentum, the six-segmented antennae and the presence of a pecten galearis on the maxilla.

Larvae are found in springs, streams and rivers. I have reared *Parametriocnemus* larvae from a small bayhead stream which occasionally dries completely. Larvae of *P. lundbeckii* are apparently sensitive to organic pollution, but better empirical data, based on correct identification, are needed.

ADDITIONAL REFERENCES: Sæther 1969.



Parametriocnemus sp. F, larval structures



Parametriocnemus sp., larval structures

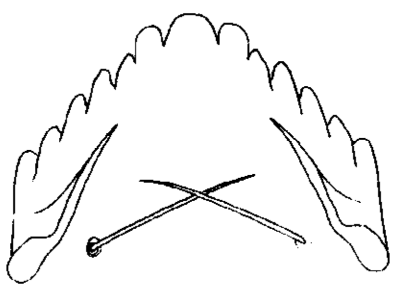
Genus ***Paratrichocladius***

DIAGNOSIS: Larvae of this genus are difficult, if not impossible, to separate from some *Cricotopus (Cricotopus)* or *Orthocladius (Orthocladius)* larvae. *Paratrichocladius* larvae have a pecten epipharyngis of 3 scales; outer margin of mandible mostly smooth; first lateral tooth of mentum distinctly separated from median tooth and wider in middle that at its base; and lack setal tufts on the body. These characters also fit many *Cricotopus/Orthocladius* larvae.

NOTES: This genus has not yet been recorded from Florida. Because of the close resemblance of the larva to many *Cricotopus* or *Orthocladius* larvae, it may be overlooked. However, based on adult collections I've seen, it does not appear to be a common taxon. Isolated larvae of this genus can not be accurately identified at the generic level; an association with a pupa or an adult is necessary.

Larvae are known to occur in many aquatic habitats, including brackish water.

ADDITIONAL REFERENCES: Rossaro 1979; 1990.



mentum

antenna

Paratrichocladius sp, larval structures
(adapted from Cranston et al. 1983)

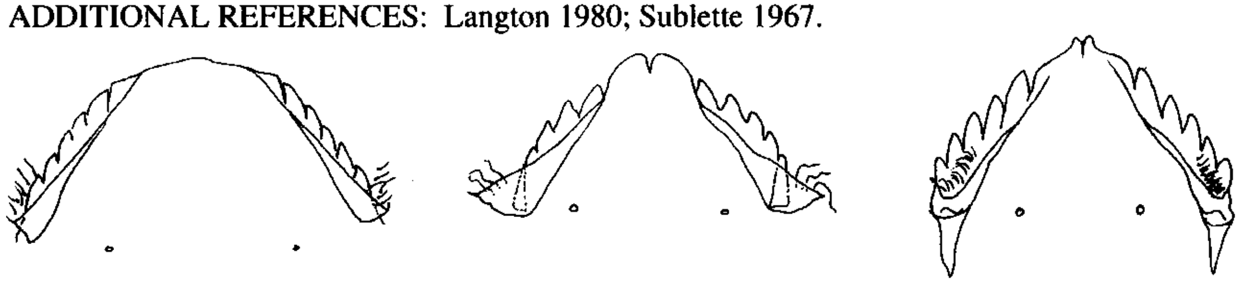
Genus ***Psectrocladius***

DIAGNOSIS: The palmate S I, with 3 (rarely 2) to many sharply pointed lobes; simple premandible; and well developed ventromental plates and beard distinguish larvae.

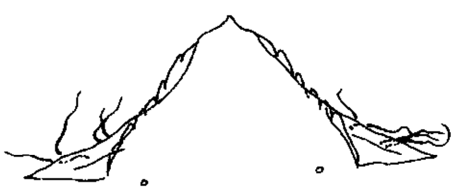
NOTES: Of the four subgenera, *P. (Psectrocladius)* and *P. (Monopsectrocladius)* occur in Florida. Three species are recorded, but several unidentified species exist. Our knowledge of the genus is poor. It is not possible to identify some adult males; the genus requires revision. Larvae have been confused with *Nanocladius* in some earlier works (Mason 1973; Roback 1957), but are easily separated by the palmate S I and bearded ventromental area. The S I is usually palmate with several deeply cut lobes, but on some larvae of an undetermined *P. (Monopsectrocladius)* species, the S I may be bifid or only slightly trifid (see figures below).

Larvae are found in lentic and lotic situations, and seem to prefer acidic conditions.

ADDITIONAL REFERENCES: Langton 1980; Sublette 1967.



menta of several species



mentum

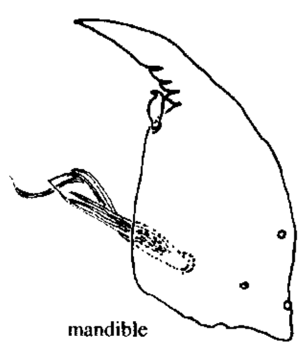
"normal" S I

unusual S I

P. (Monopsectrocladius) sp., larval structures

typical S I

antenna



mandible

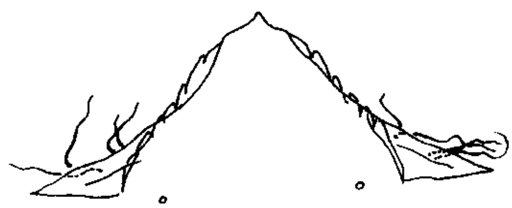
Psectrocladius sp., larval structures

Key to some *Psectrocladius* of Florida

1 **Mentum with** 2 large, distinctly separated **median teeth** .... ***P. vernalis***

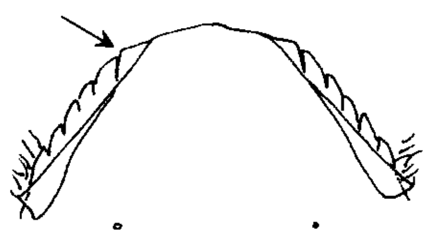
1' Mentum with single broad or pointed median tooth; or medially **notched; or** with 2 small, **nipple-like** median projections on closely set median tooth/teeth 2

2 (1') **Mentum with** single nipple-like median **tooth; ventromental** plates greatly **extended laterally;** S I may appear bifid or **trifid** .... ***P. (Monopsectrocladius)*** **sp.**

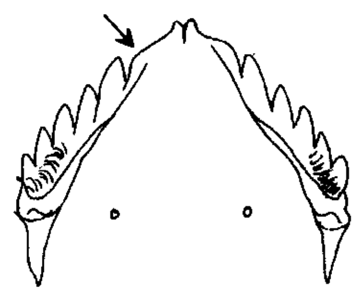


2' **Mentum not** as **above**; ventromental plates **not** greatly extended; S I deeply palmate 3

3 (2') Mentum with single broad tooth (may appear notched medially); median "tooth" with lateral margins squared off .... ***P. elatus***



3' Mentum with 2 small, nipple-like median projections on closely set median tooth/teeth; lateral margin of median tooth/teeth rounded .... other ***Psectrocladius*** **sp.**



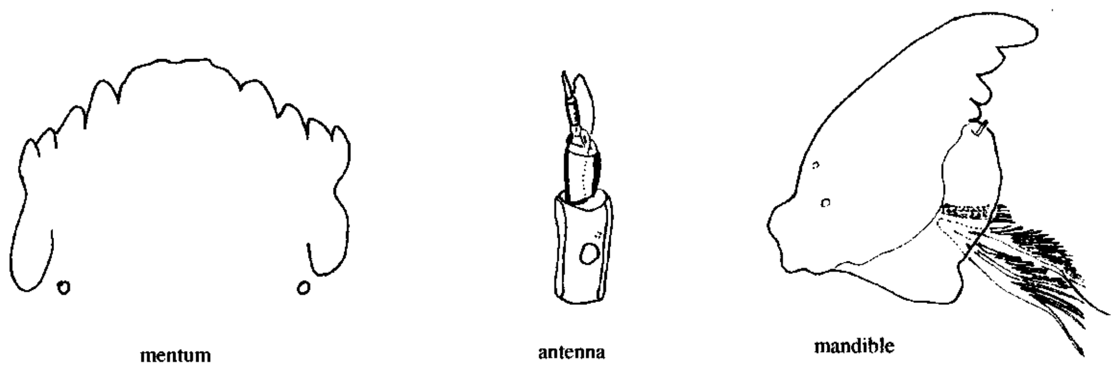
Genus ***Pseudorthocladius***

DIAGNOSIS: The 3 inner teeth of the mandible; simple premandible; and long anal setae serve to distinguish this genus.

NOTES: Based on adults, two species are known from Florida. Larvae can not be identified to species.

Larvae are found in moss, bogs, springs and along streams

ADDITIONAL REFERENCES: Cranston & Oliver 1988; Sæther & Sublette 1983; Soponis 1980b.



Pseudorthocladius **sp., larval structures**

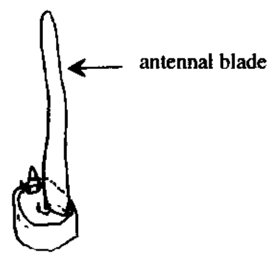
Genus ***Pseudosmittia***

DIAGNOSIS: This genus is identified by the bifid S I; antennae with the antennal blade greatly exceeding the flagellum and with last segment longer than that preceding; lack of procerci; and posterior parapods developed and with claws.

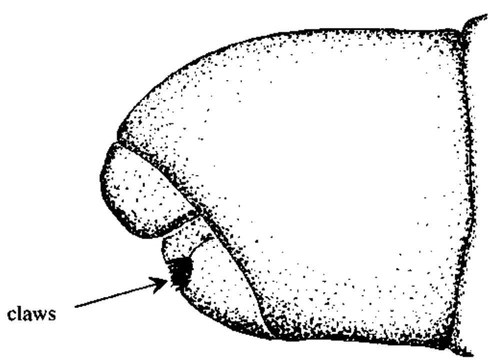
NOTES: Based on adults, two species are known from Florida. Dr. L.C. Ferrington, Jr., is currently revising this genus. At present, species identification of the larvae is not possible.

Larvae are found in vegetated marshy areas, pond and stream borders, and can also be found in semi-terrestrial or terrestrial conditions.

mentum



antenna



anal end

Pseudosmittia sp., larval structures

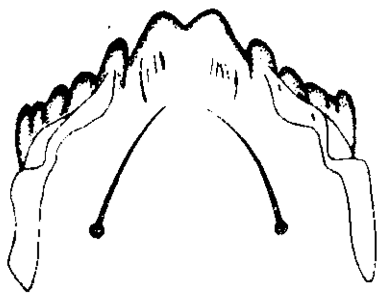
Genus *Psilometriocnemus*

DIAGNOSIS: The apically toothed (not plumose) S I; 6-segmented antenna (last segment vestigial/hairlike) with well developed Lauterborn organs; pecten epipharyngis of 3 short, simple spines; maxilla with pecten galearis; and mentum with bifid median tooth and with last lateral tooth adjacent to penultimate lateral tooth identify this genus.

NOTES: One species, *P. triannulatus*, is known from the Southeast; it has not yet been recorded from Florida. See also Orthocladiinae genus F.

Larvae are found in damp soil, seeps, springs and small streams.

ADDITIONAL REFERENCES: Sæther 1982.



mentum

antenna

labro-epipharyngeal region

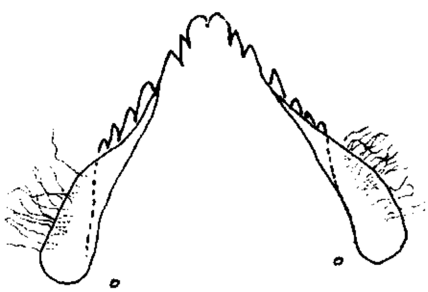
Psilometriocnemus sp., larval structures
(adapted from Sæther 1982)

Genus ***Rheocricotopus***

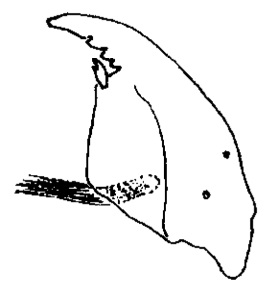
DIAGNOSIS: Larvae possess a bifid (usually) S I; mentum with median tooth bifid, notched or simple; and well developed beard and ventromental plates.

NOTES: Two species are known from Florida. *R. robacki*, with deeply bifid median tooth, apically rounded ventromental plates and no ventral tubercules on the head capsule, is a common, sometimes abundant species of the rivers and streams of northern Florida. *R. tuberculatus* is found in similar habitats, but is much less common. Larvae have a mentum with a single or slightly notched median tooth; elongate triangular ventromental plates; and a pair of well developed postero-ventral tubercules. All associated pupae of *R. tuberculatus* from Florida bear 4 lateral lamellar setae on tergite VII; type material bears only 3 setae on tergite VII. Some larvae also possess a slightly notched median tooth; others have a simple median tooth as originally described. This may indicate morphological variability, or another, cryptic, species may be involved. More reared material is needed. An unknown *Psectrocladius (Monopsectrocladius)* species may be confused with *R. tuberculatus*, but it lacks the ventral tubercules. See also *Doncricotopus*.

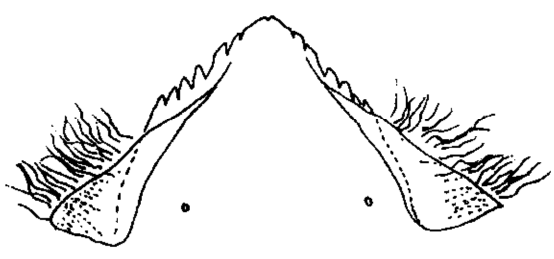
ADDITIONAL REFERENCES: Caldwell 1984; Sæther 1985b.



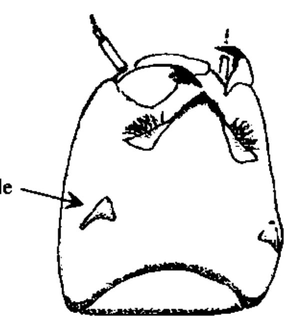
R. robacki, mentum



mandible



R. tuberculatus, mentum



R. tuberculatus, head capsule (ventral)

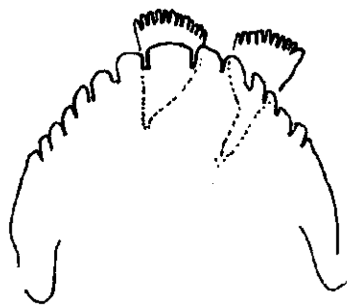
Genus ***Rheosmittia***

DIAGNOSIS: The distinctive antennae, at least ½ length of head capsule and with second segment (and sometimes the first segment) unevenly sclerotized; alternate Lauterborn organs along antennal segment 2; and the mentum semi-circular in outline and usually with 2 large hypopharyngeal scales dorsal to it will distinguish the genus.

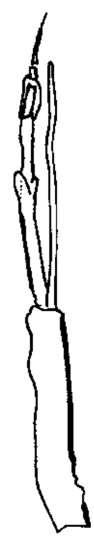
NOTES: Several species of *Rheosmittia* may occur in the Southeast. Although larvae are known from Florida, I have not seen adults, necessary for species-level identification, from the state.

Larvae inhabit the shifting sand substrates of streams and rivers, and are difficult to rear.

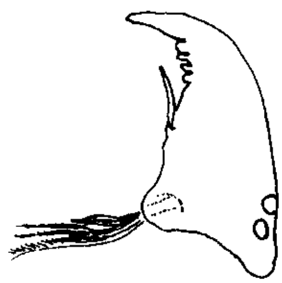
ADDITIONAL REFERENCES: Cranston & Sæther 1986.



mentum, with hypopharyngeal scales



premandible



mandible

antenna

Rheosmittia, larval structures

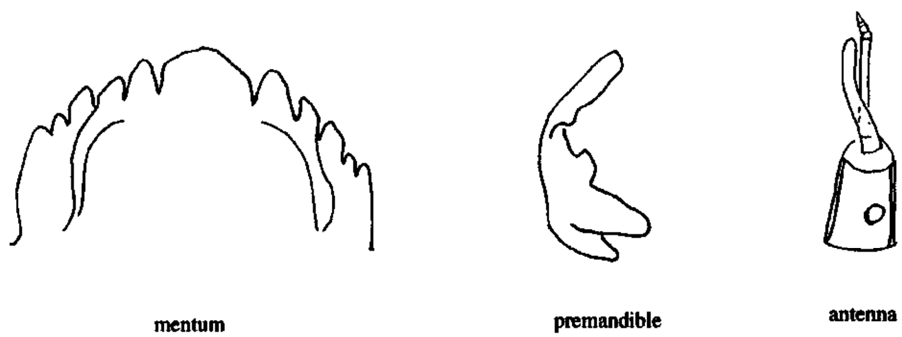
Genus *Smittia*

DIAGNOSIS: Larvae of this genus have a plumose S I; apically bifid premandible; antennal blade less than or equal to flagellum; and lack procerci and anal setae.

NOTES: Based on adults, two species are known from Florida. I have seen two larval taxa from Florida (figured below); neither are associated with adults. Larval species B is unusual because of the trifid median tooth of the mentum (unreported for the genus; the mentum usually bears a single domed tooth, as in larval sp. A); all other characters place this taxon in *Smittia*. Larval sp. A resembles *S. lasiops* as described by Webb (1982), but without associated adults identification is not possible.

Larvae are usually terrestrial, although aquatic species do exist. Webb (1982) found *S. lasiops* larvae in soil from corn fields in Illinois. Both of the Florida larval species have been collected from leaf litter in hardwood forests.

ADDITIONAL REFERENCES: Webb 1982.



Smittia sp. A, larval structures

Smittia sp. B, mentum

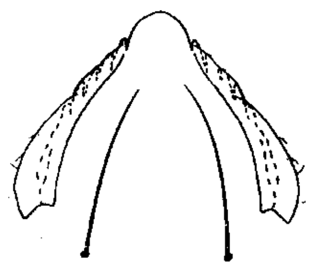
Genus ***Stilocladius***

DIAGNOSIS: The simple or apically toothed (bifid?) S I; weakly bearded ventromental plates; and 6-segmented antenna, with last segment hairlike, identify this genus. Distinctions between this genus and *Parakiefferiella* are not clear.

NOTES: One species, *S. clinopecten*, is described from the Southeast; I have not seen this species in Florida material.

A species, known only as a larva, occurs in Florida which may belong to *Stilocladius*. Specimens, partially illustrated below, possess a weak ventromental beard, bifid S I, and six-segmented antennae. However, the species has the general appearance, especially the mentum (which is dissimilar to *S. clinopecten*), of a *Parakiefferiella*, and may belong in an emended *Parakiefferiella*. I have tentatively identified this taxon as "*Stilocladius*? sp.".

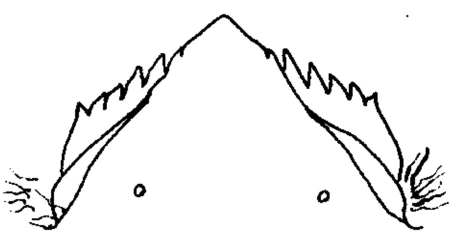
ADDITIONAL REFERENCES: Rossaro 1984; Sæther 1982.



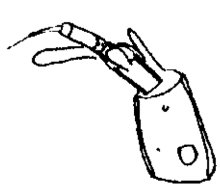
mentum

antenna

S. clinopecten, larval structures



mentum



antenna

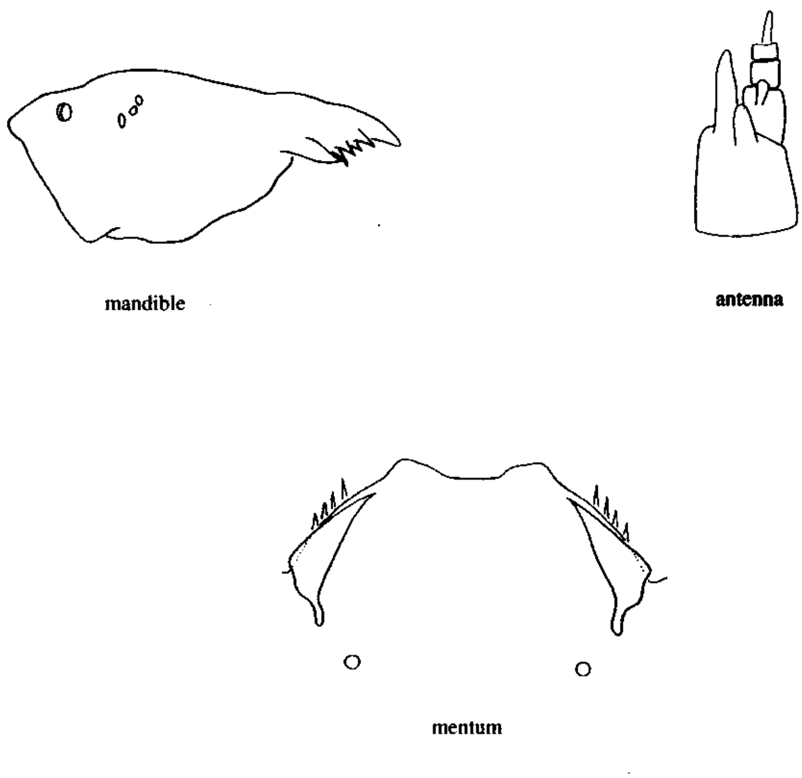
Stilocladius ? sp., larval structures

Genus *Symbiocladius*

DIAGNOSIS: The distinctive mentum, without median teeth and lateral teeth spine-like; vestigial procerci; and ectoparasitic habit distinguish this genus.

NOTES: *Symbiocladius* has not been reported from Florida; two species are known from the Southeast. Larvae are parasitic on mayflies.

ADDITIONAL REFERENCES: Caldwell 1984.



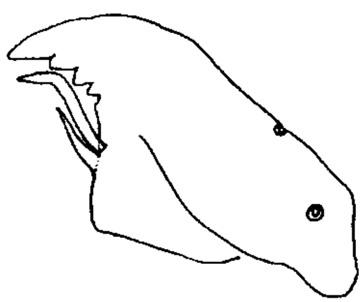
Symbiocladius sp., larval structures
(adapted from Cranston et al. 1983)

Genus *Synorthocladius*

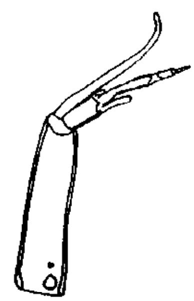
DIAGNOSIS: The simple S I; distinctive mentum with well developed ventromental beard bearing apically branched filaments; mandible without seta interna but bearing a large spine on inner margin; large seta subdentalis; and middle body segments with 2 pairs of plumose setae identify this genus.

NOTES: One species has been recorded from Florida, but conspecificity of Florida material with the one described Holarctic species might be considered doubtful. More than one species may be present in the Southeast; more work is needed on the genus. Larval specimens should be identified as *Synorthocladius* sp. The extent of sclerotization of the third antennal segment is variable; antennae may appear to be four- or five-segmented. Larvae were called "*Parorthocladius*" by Beck (1976;1979).

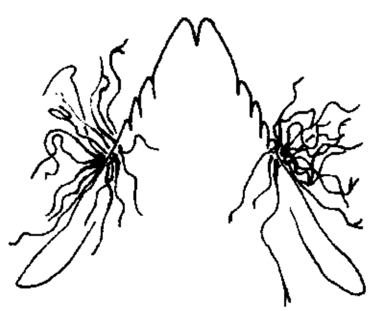
Larvae are most often found in running water, but also occur in springs and lentic situations.



mandible



antenna



mentum

***Synorthocladius* sp., larval structures**

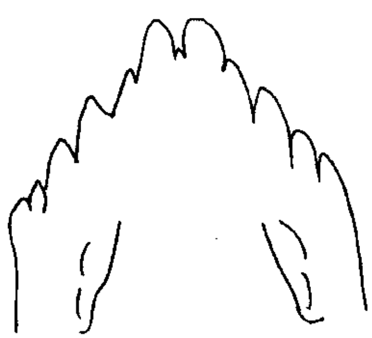
Genus ***Thienemanniella***

DIAGNOSIS: The long (greater than ½ head length), well-sclerotized 5-segmented antennae; and simple subbasal setae of the posterior parapods identify this genus. The mentum may have 2 or 3 median teeth. See also *Corynoneura*.

NOTES: Based on adults, one species, *T. xena*, has been recorded from Florida. Many other species occur in the eastern U.S., many of which (at least three) are probably undescribed. Many specimens have been identified as "*T. xena*" because of the darkened antennal segment 2. However, at least three species with a darkened antennal segment 2, one undescribed, occur in the eastern U.S. (M. Bolton, pers. comm.). Thus, any previous identifications of *T. xena* based solely on larvae are suspect. It is not possible to identify a species solely by matching the specimen's mentum to an illustration. There are no published keys that will correctly identify Nearctic larvae. Thus, any species-level identifications based on unassociated larvae should be treated with a great deal of skepticism. The key that follows must be considered preliminary; to date I have reared only *T. xena* from Florida.

Larvae are found in streams and rivers, and may be found in "clean" or enriched habitats. A revision of the Holarctic members of the genus, utilizing all life stages, is necessary to determine which species, if any, might be useful as indicator species.

ADDITIONAL REFERENCES: Boesel & Winner 1980; Schlee 1968.



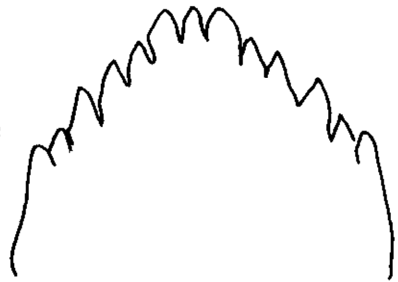
mentum

antenna

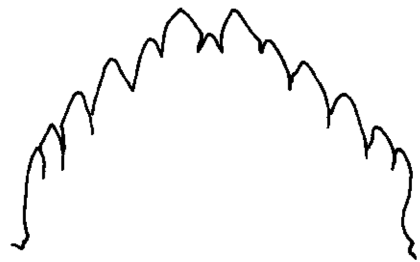
***Thienemanniella* sp., larval structures**

Preliminary Key to Florida *Thienemanniella*

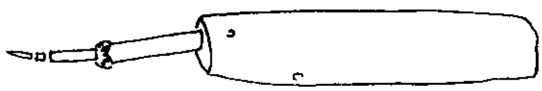
1 **Mentum with 3 large median teeth, central tooth more than ½ as long as outer median teeth** 2

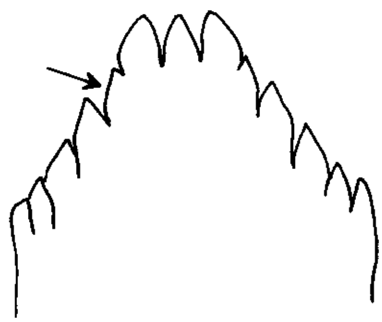


1' Mentum with 2 large median teeth, central tooth absent, minute or ½ or less as long as outer median teeth 3

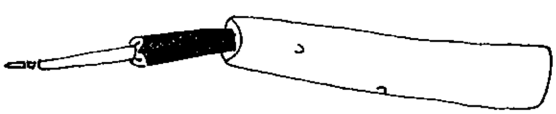


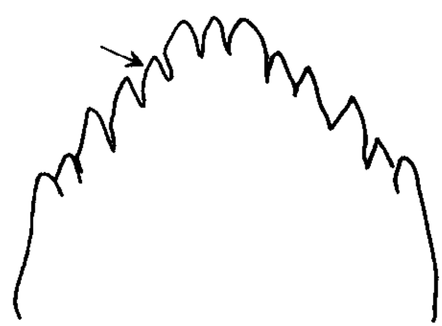
2(1) Antennal segment 3 ½ to ¾ as long as segment 2; first lateral tooth of mentum partially fused to median tooth; antennal segment 2 usually pale (see Notes!) .... ***T.* cf. *similis***



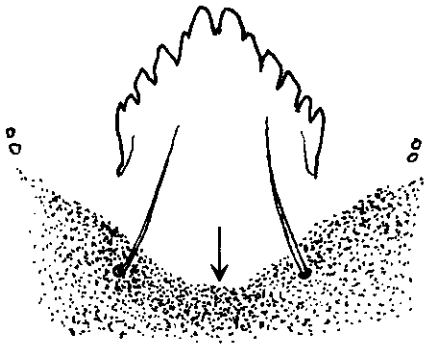


2' Antennal segment 3 equal to or longer than segment 2; first lateral tooth of mentum not partially fused to median tooth; antennal segment 2 usually dark brown (see Notes!) .... ***T. xena***

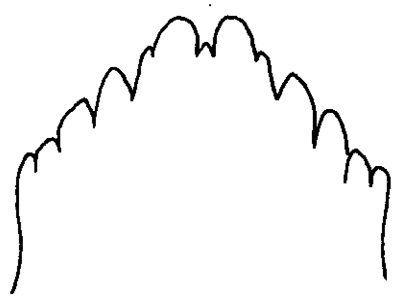




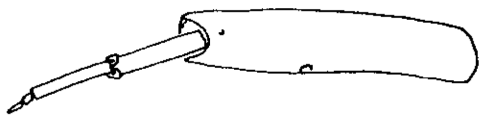
3(1') Central tooth of mentum absent or minute; granular appearance of integument of postmentum ends anteriorly in a concave line near setae submenti (visible with phase-contrast optics)(see Notes) .... *T.* **sp. A**



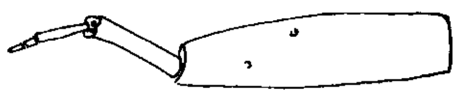
3' **A small central tooth present between median teeth; integument of postmentum not granular or granularity extends on to mentum** 4



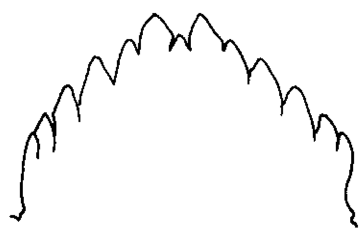
4(3') **Antennal segment 3 subequal to segment 2** .... *T.* **sp. B**



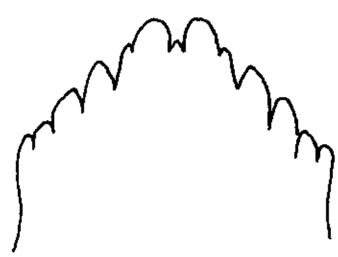
4' Antennal segment 3 ½ to ¾ as long as segment 2 5



5(4') First lateral tooth of mentum not partially fused to median tooth; longest seta on second body (thoracic) segment about 100 µm long .... *T.* **sp. C**



5' First lateral tooth of mentum partially fused to median tooth; longest seta on second body (thoracic) segment about 150 - 180+ µm long .... *T.* **sp. D**



Notes on species

T. cf. *similis* - This species was the second most abundant in the collections I examined. My determination of this species is based on data from an unpublished manuscript key by M. Bolton, Ohio EPA. I have not seen adults of *T. similis* from Florida.

T. xena - This was the most abundant species, along with *T.* cf. *similis* and *T.* sp. A, that I found in collections I examined. Note that *T. xena* is not the only species known from the eastern U.S. with a darkened antennal segment 2; *T. partita*, recorded from South Carolina by Hudson, et al. (1990), has a brown second antennal segment. I have compared Florida material with the type specimens.

T. sp. A - This species is common in Florida and is easily recognized by its large bifid median teeth (the minute central tooth is often worn down) and by the granular appearance of the postmentum integument that ends anteriorly in a concave line near the setae submenti. This character is easily visible with phase-contrast optics. The length of the third antennal segment of this "species" varies from ½ to equal to the length of segment 2. This may indicate that more than one species is present. I have not reared this species. It may be the same as the "*Thienemanniella* nr. *fusca* (Kieffer)" of Simpson & Bode (1980); *T. fusca* is a junior synonym of *T. acuticornis* (Kieffer); it is not known from the Nearctic. *T.* sp. A has long (125+ µm) body setae (*T.* spp. C and D also have long body setae).

T. sp. B - This taxon is uncommon and was seen only from streams in northern Florida.

T. spp. C and D - These two taxa were rare in the material I examined.

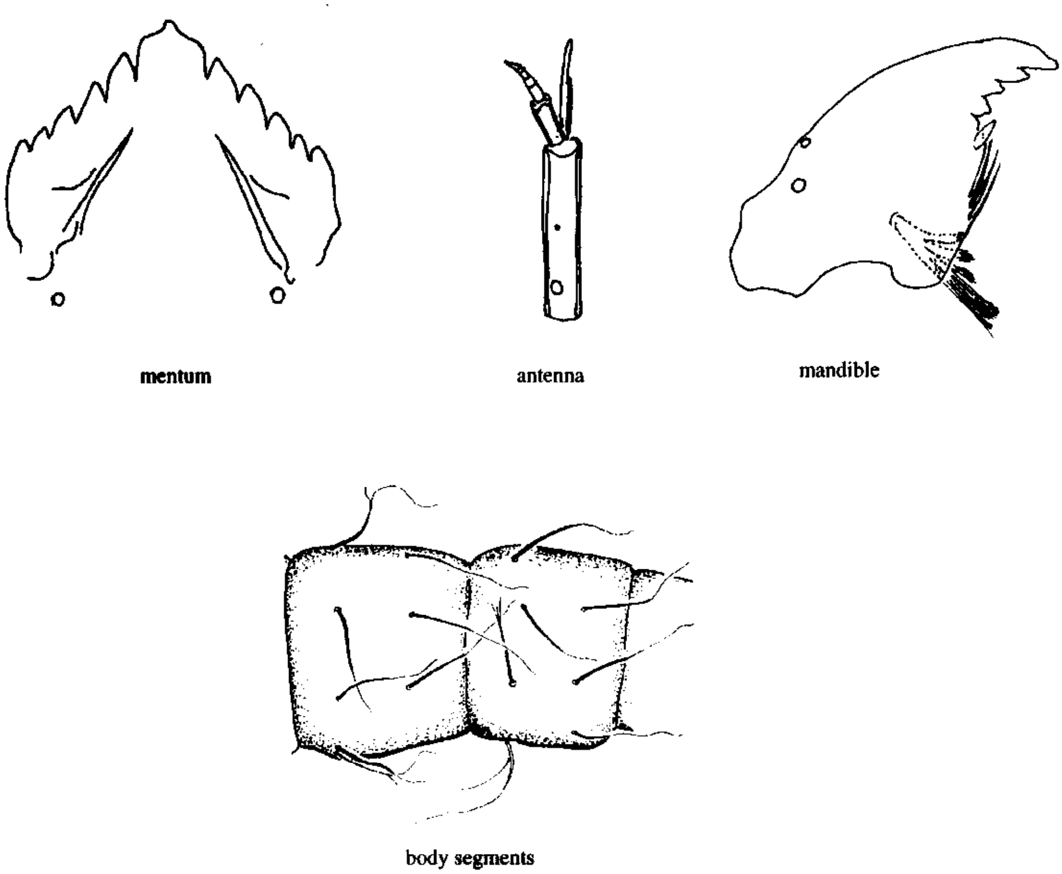
Genus ***Tvetenia***

DIAGNOSIS: The coarsely toothed or plumose S I; mandible with inner spines/serrations; narrow ventromental plates and lack of a beard; and the long, strong body setae (at least ½ length of segment) distinguish larvae of this genus.

NOTES: Larvae of this genus were formerly placed in *Eukiefferiella,* and will key to that genus in Beck (1976;1979). At least one species, unknown as an adult, occurs in Florida. Bode (1983) divided Nearctic larvae into two groups; the Florida larvae fit in the *T. discoloripes* group. However, data from all life stages indicate that the groups may have to be redefined (see Mason 1985c).

Larvae are found in rivers, and are apparently tolerant of high organic nutrient levels.

ADDITIONAL REFERENCES: Bode 1983; Mason 1985c.



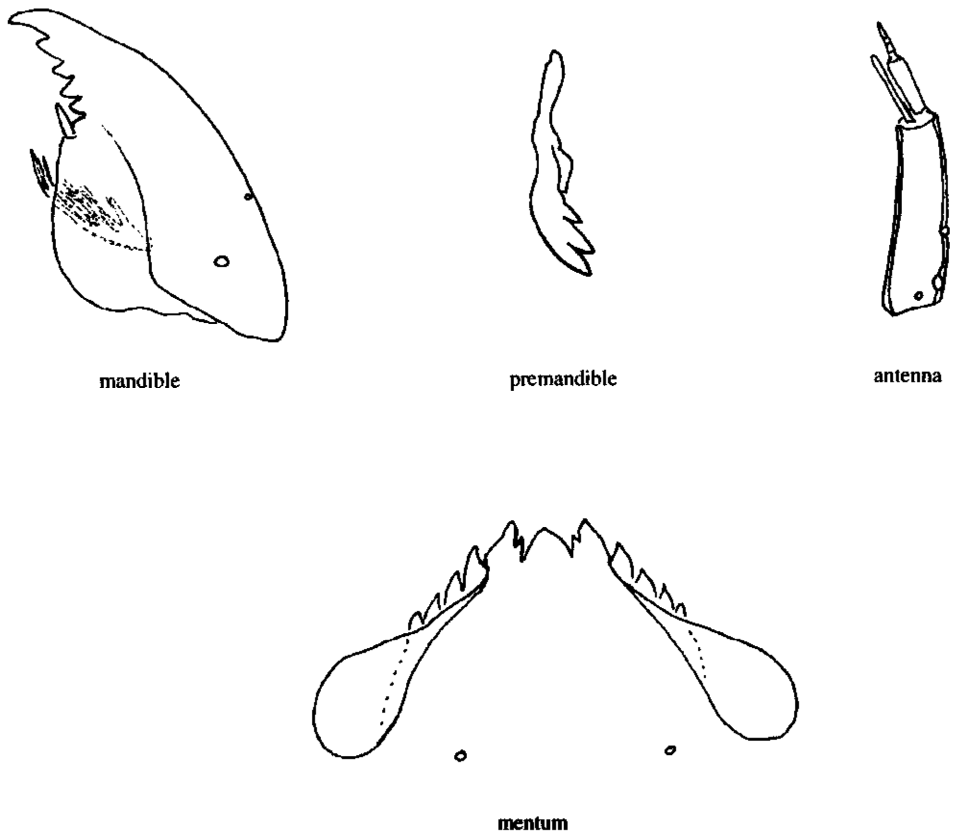
Tvetenia sp., larval structures

Genus ***Unniella***

DIAGNOSIS: The plumose S I; mentum with median tooth lower than second lateral tooth, and first lateral tooth reduced and fused to second; well developed ventromental plates which extend past the lateral margin of the mentum; and mandible with 4 inner teeth will identify *Unniella.*

NOTES: One species, *U. multivirga*, is known. Beck (1976;1979) called these larvae "*Trissocladius*". Larvae occur in streams and rivers.

ADDITIONAL REFERENCES: Caldwell 1986.



Unniella multivirga, larval structures

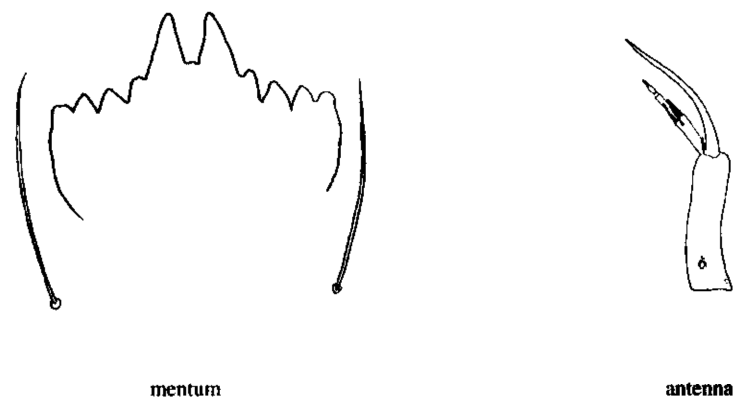
Genus ***Xylotopus***

DIAGNOSIS: The heavily sclerotized, dark head capsule; distinctive mentum with 2 elongate median teeth; and lateral abdominal fringe of setal tufts characterize this genus.

NOTES: One species, *X. par*, is known from North America. The species was formerly placed in the genus *Brillia*.

Larvae mine in submerged, partially decomposed wood.

ADDITIONAL REFERENCES: Oliver 1982; 1985.



X. par, larval structures
(adapted from Cranston et al. 1983)

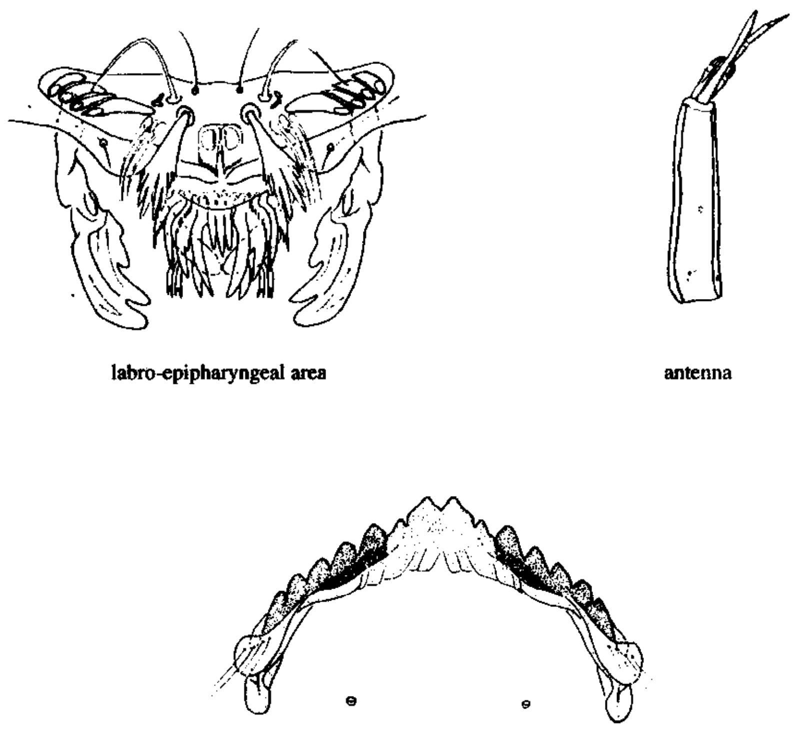
Genus ***Zalutschia***

DIAGNOSIS: Larvae possess a plumose S I (sometimes coarsely plumose); mentum with first lateral tooth reduced; ventromental plates well developed, with a weak beard beneath; and mandible with 3 inner teeth.

NOTES: One species, *Z. briani,* is described from Florida. In addition, at least one undescribed species (sp. A), known from a pharate male pupa and unassociated, but probably conspecific, larvae, occurs here. A third species, *Z. zalutschicola*, may also be found here.

Larvae of *Z. briani* are found on aquatic vegetation in lakes. Other species are also found in lentic habitats, but may be found in streams and rivers.

ADDITIONAL REFERENCES: Sæther 1976; Soponis 1979.



Z. briani, larval structures
(adapted from Soponis 1979)

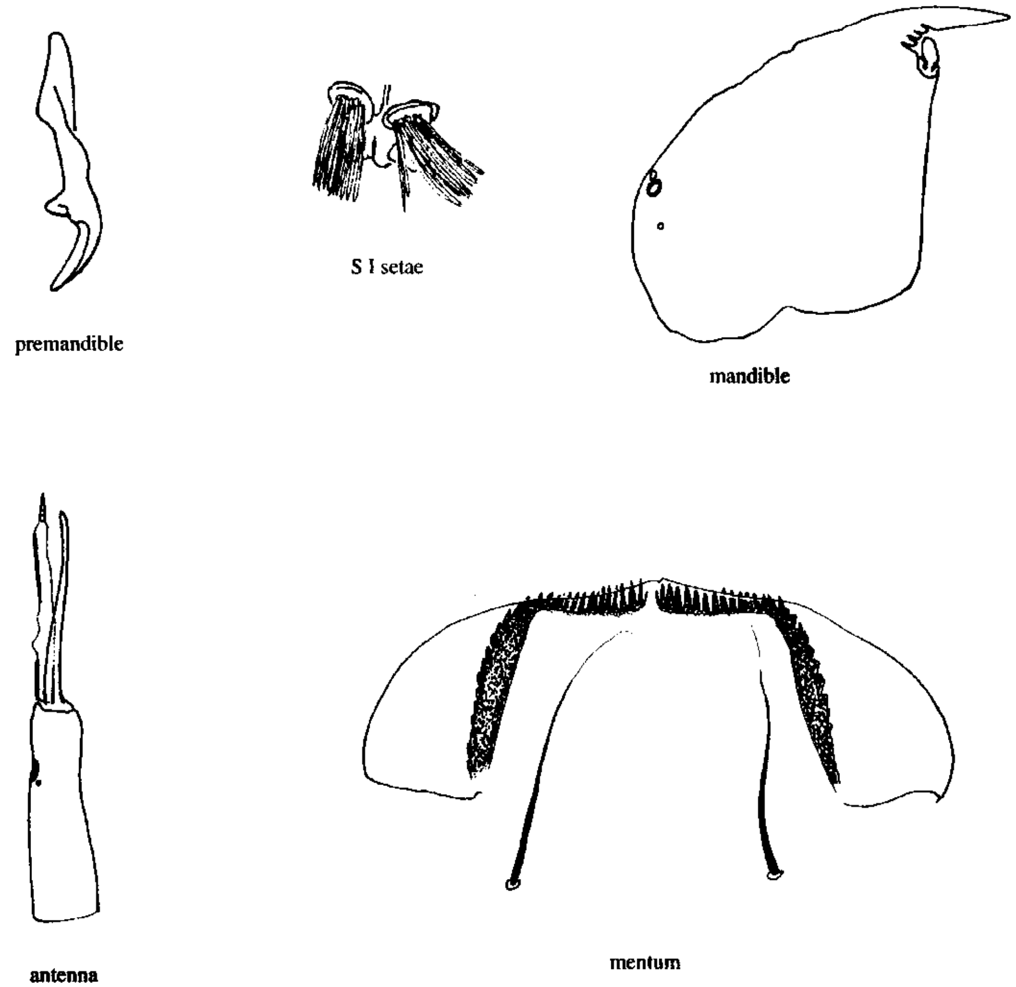
Orthocladiinae species C

DIAGNOSIS: The "mop-like" S I; mandible with inflated base; and distinctive mentum serve to distinguish this taxon.

NOTES: This taxon was briefly described by Sæther (1982). The S I setae appear to be constructed of several thickened filaments, similar to the head of a mop. The distinctive mentum resembles that of *Acamptocladius*. Associated pupae (in poor condition) are similar to *Parakiefferiella*, but apparently lack a thoracic horn. Reared material will be necessary to discover this taxon's identity.

Larvae are found in sand-bottomed streams.

ADDITIONAL REFERENCES: Sæther 1982.

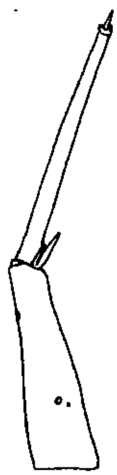


Orthocladiinae sp. C, larval structures

Orthocladiinae genus D

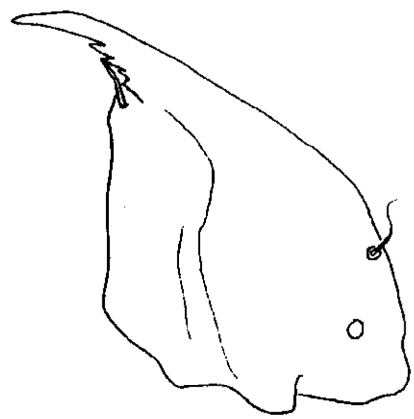
DIAGNOSIS: The long (greater than ½ length of head capsule), apparently 3-segmented antennae and distinctive mentum distinguish this taxon.

NOTES: I have seen larvae from two streams in extreme western Florida. This taxon is probably a *Nanocladius*, and may be a member of the *balticus* group. Reared material is necessary to solve this issue.

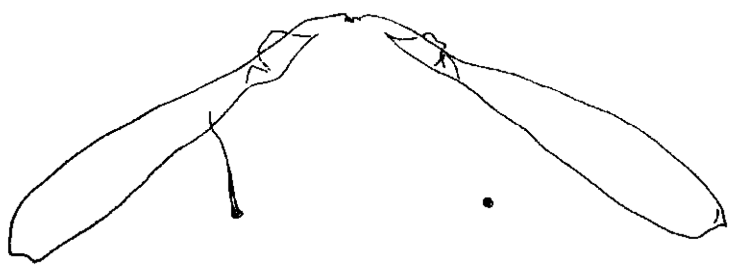


antenna

premandible



mandible



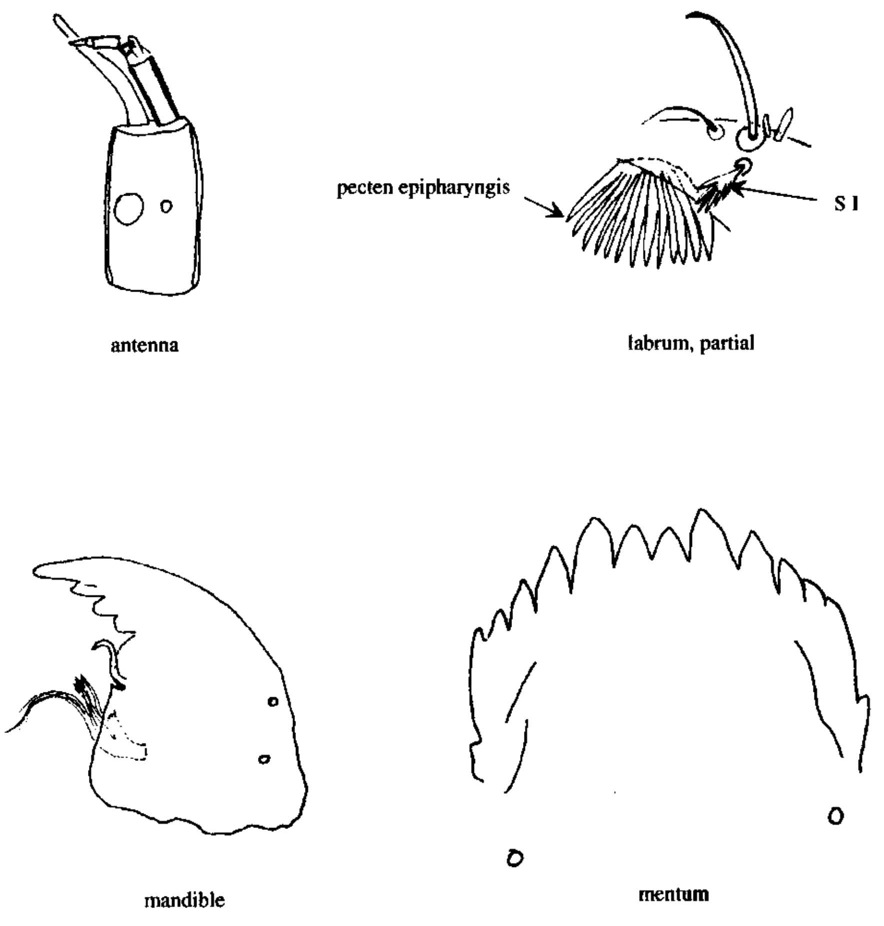
mentum

Orthocladiinae genus D. larval structures

Orthocladiinae genus E

DIAGNOSIS: The coarsely plumose S I; mentum with 4 median teeth; lack of beard; reduced ventromental plates; pecten epipharyngis with more than 12 teeth; well developed posterior parapods (with well developed claws); and the presence of procerci and anal tubules distinguish this taxon.

NOTES: This apparently terrestrial taxon is known from larvae collected from mixed hardwood leaf litter in Tallahassee, but I've recently seen a larva from the Santa Fe River, where it was probably washed in. The multi-toothed pecten epipharyngis is distinctive. One other orthoclad, *Antillocladius*, possesses a multi-toothed pecten epipharyngis, but lacks procerci and anal tubules. These structures are present in Orthocladiinae genus E.



Orthocladiinae genus E, larval structures

Subfamily Chironominae

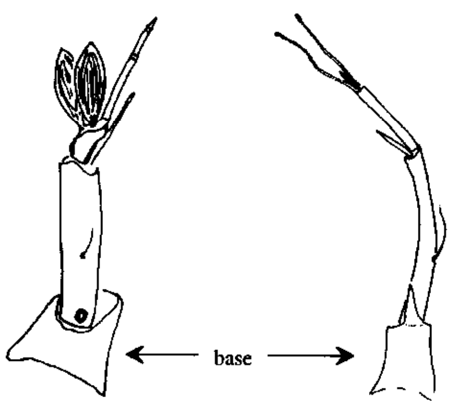
DIAGNOSIS: Antennae 4-8 segmented, never reduced. **Labrum** with S I simple, palmate or plumose; S II simple or plumose; S III simple; S IV normal or sometimes pedicellate. Labral lamellae usually well developed, reduced or absent in some taxa. **Mentum** usually with 8-16 well sclerotized teeth; sometimes central teeth or entire mentum pale or poorly sclerotized; rarely teeth fewer than 8 or modified as setal-like projections. Ventromental plates usually well developed and striated, but may be vestigial or smooth; beard absent. **Prementum** without dense brushes of setae. **Body** usually with procerci, anterior and posterior parapods well developed; sometimes with setal tufts. Penultimate segment sometimes with 1-2 pairs ventral tubules; antepenultimate segment sometimes with lateral tubules. Anal tubules usually present, reduced in brackish water and marine taxa.

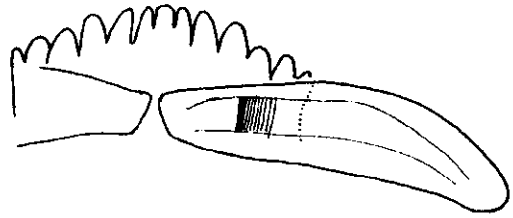
NOTES: Usually the most abundant (in numbers of individuals and taxa) Chironomidae in most aquatic habitats in Florida. Found in fresh, brackish and salt water. Most larvae build silken tubes in or on substrate; some mine in plants and sediments; some are free-living; some build transportable cases. Many larvae feed by spinning silk catch-nets, allow them to fill with detritus, etc., and then ingest the net; some taxa are grazers; some are predacious.

Key to Florida Chironominae genera

(The larva of *Kloosia*, which may occur in Florida, is undescribed)

1 Antennae mounted on distinct elongate base (at least as high as wide); Lauterborn organs well developed, may be sessile or on short or long pedicels; antennae with 5 segments; bases of S I fused; ventromental plates usually bar-like and almost touching medially (except in *Constempellina, Stempellina, Stempellinella*) .... Tribe Tanytarsini 2

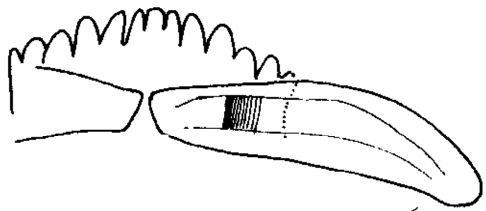




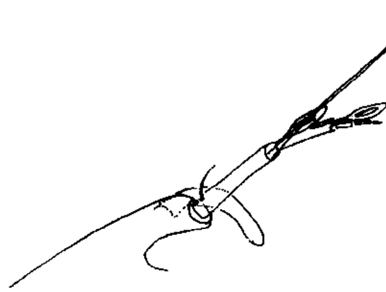
1' Antennae not mounted on elongate base; Lauterborn organs weak or well developed but never on long pedicels; antennae with 4-8 segments; if bases of S I fused, then antennae with 6 segments and alternate Lauterborn organs at apex of segments 2 and 3; ventromental plates bar-like in *Pseudochironomus* .... Tribes Pseudochironomini and Chironomini 11

2 (1) Ventromental plates squat, about twice as wide as long and separated by at least width of 3 median mental teeth; larvae with portable sand cases 3

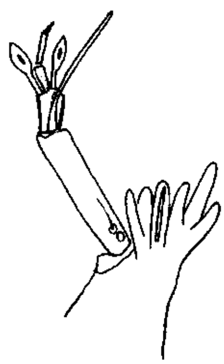
2' Ventromental plates wide, at least 3 times wider than long and narrowly separated medially; if larvae are in sand cases, they are not portable 5



3 (2) Antennal segment 2 with one Lauterborn organ arising apically, the other preapically .... *Stempellinella*

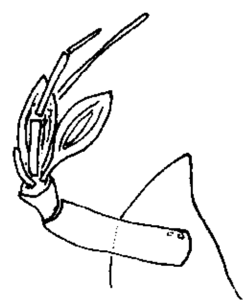


3' Antennal segment 2 with both Lauterborn organs arising apically 4

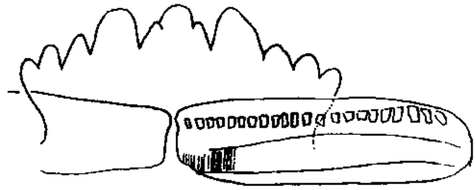


4 (3') Antennal base with large palmate process on inner side .... *Stempellina*

4' Antennal base with simple, non-palmate spur .... *Constempellina*



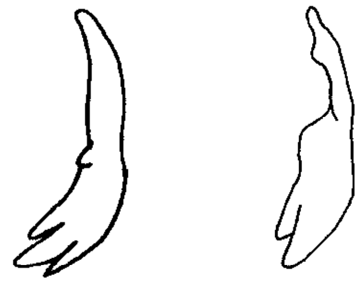
5 (2') Mentum with 4 pairs of lateral teeth; exclusively marine .... ***Pontomyia***



5' Mentum with 5 (or sometimes apparently more) pairs of lateral teeth; usually in fresh water but may occur in estuarine habitats 6

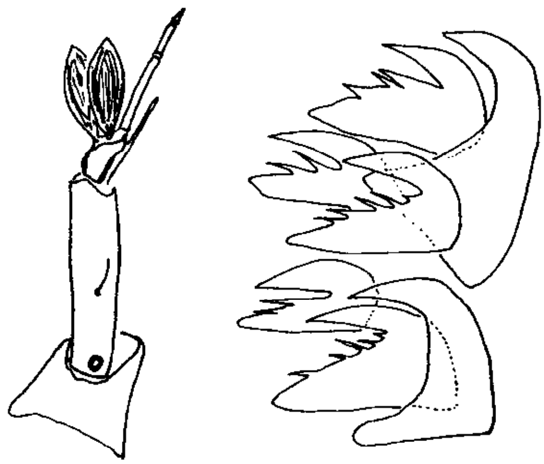
6 (5') Premandible with 3 or more apical teeth 7

6' Premandible apically bifid 8

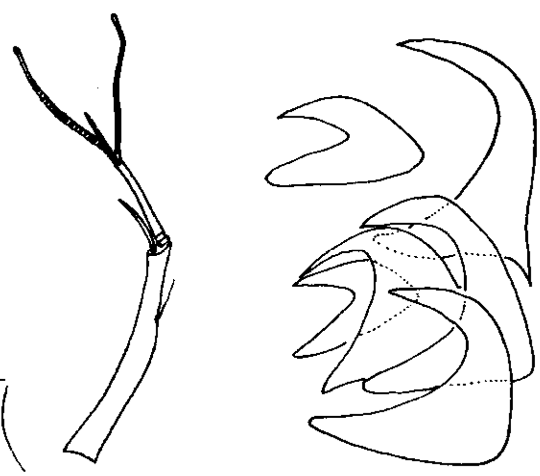


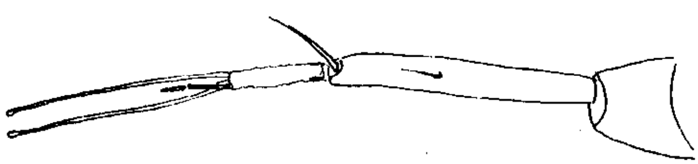
3 or more   bifid

7 (6) Antennal segment 2 usually short, wedge-shaped, ≤ segment 3; Lauterborn organs large and placed on short (less than length of Lauterborn organ) pedicels; some claws of posterior parapods with inner comb of teeth .... ***Cladotanytarsus***



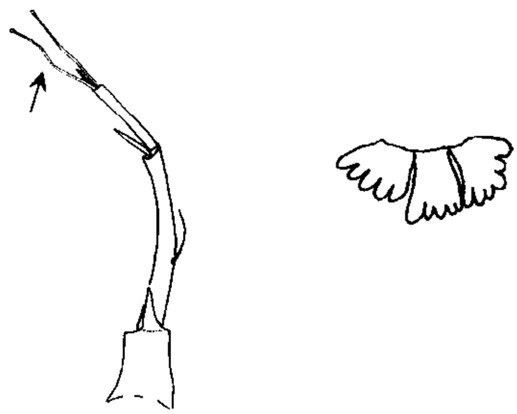
7' Antennal segment 2 cylindrical (may be poorly sclerotized or annulated), longer than segment 3; Lauterborn organs small and placed on long pedicels (pedicels may be annulated); claws of posterior parapods simple .... ***Tanytarsus***
(includes *Nimbocera*)





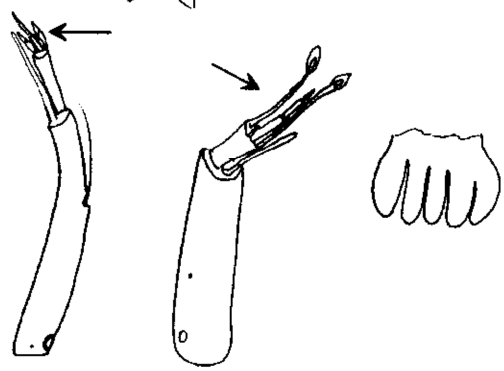
8 (6') Pecten epipharyngis a single broad multitoothed comb; ventromental plates often with row of block-like striae .... ***Rheotanytarsus***

8' Pecten epipharyngis consisting of 3 or more teeth or scales; ventromental plates without row of block-like striae 9



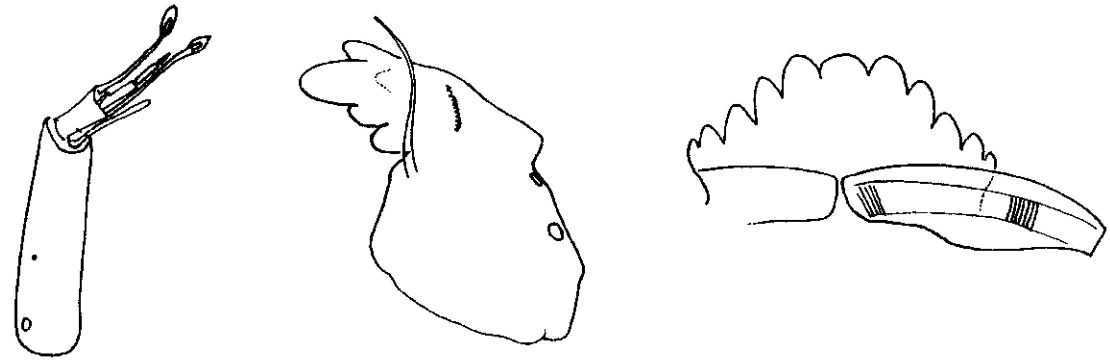
9 (8') Lauterborn organs on pedicels which greatly exceed antennal segments 3-5; pecten epipharyngis of 3 distally serrated/toothed scales .. ***Micropsectra***

9' Lauterborn organs sessile or on pedicels which do not greatly exceed antennal segments 3-5; pecten epipharyngis consists of 3-5 simple lobes 10

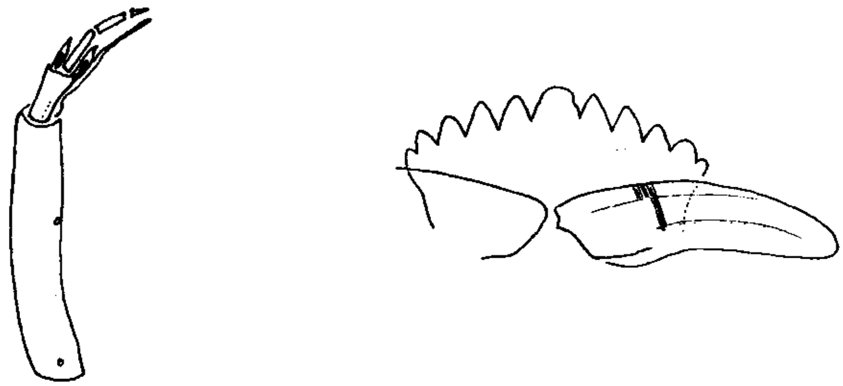


10 (9') Lauterborn organs extending to or beyond antennal apex; mandible with pronounced hump on outer margin; mentum with 3 median teeth which project strongly forward .... ***Sublettea***

(not recorded from Florida)

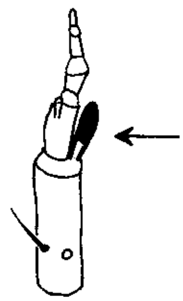


10' Lauterborn organs sessile or on short pedicels which do not extend to antennal apex; mandible with normal outer margin; mentum without strongly projecting median teeth .... ***Paratanytarsus***



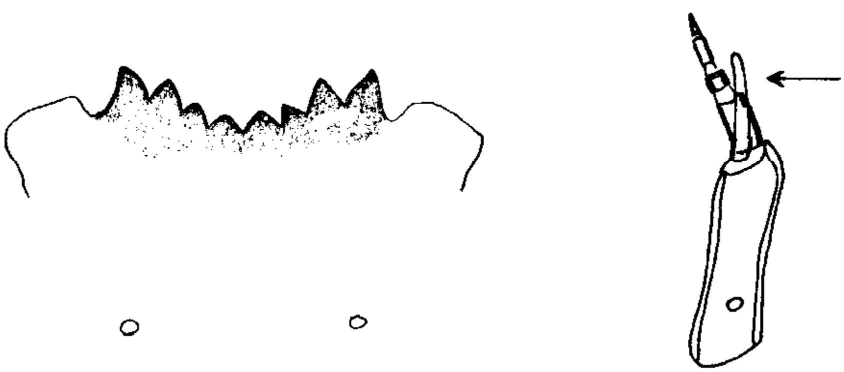
11 (1') Ventromental plates absent/vestigial; mentum strongly concave and well sclerotized 12

11' Ventromental plates well developed; if mentum concave, then not well sclerotized 13

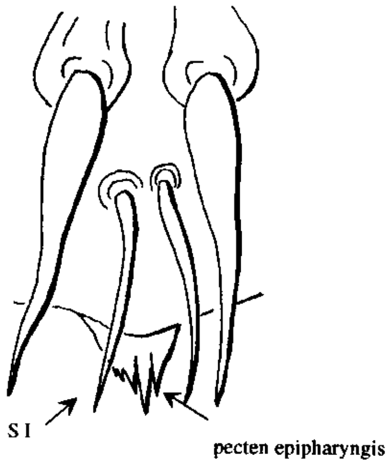


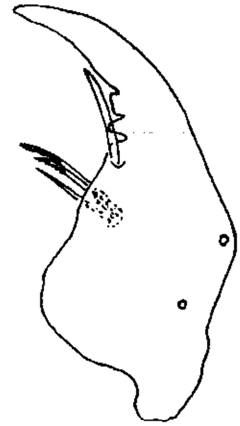
12 (11) Mentum with 10-12 teeth (see couplet 11); antennal blade extends to apex of segment 2; anal tubules with 0-2 constrictions .... ***Stenochironomus***

12' Mentum with 8 teeth; antennal blade extends past apex of segment 3; anal tubules with 4-5 constrictions .... ***Xestochironomus***

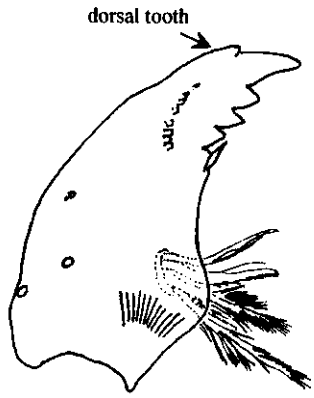


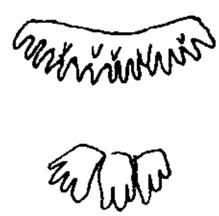
13 (11') S I simple (deeply dissected in some *Parachironomus,* couplet 21); mandible without dorsal tooth/teeth; pecten epipharyngis rounded or subtriangular, consisting of a single plate or scale which may be simple, serrated, notched or toothed 14



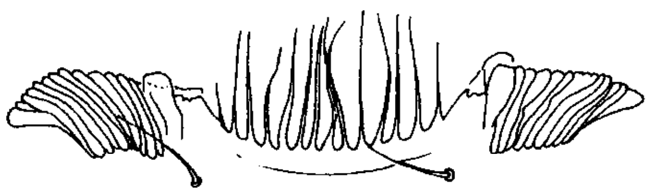


13' S I plumose or fringed on at least 1 margin; mandible usually with dorsal tooth/teeth; pecten epipharyngis a wide multitoothed comb or of 3 plates which are usually apically toothed (but may be simple) 29



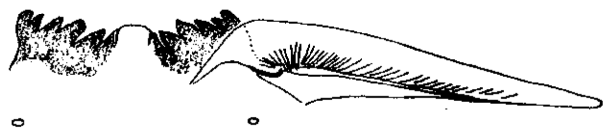


14 (13) Mentum toothless, with about 15 anteriorly directed seta-like projections; mandible with dense fringe of setae on outer margin .... ***Harnischia* complex genus B**



14' Mentum with teeth; mandible without dense fringe of setae on outer margin 15

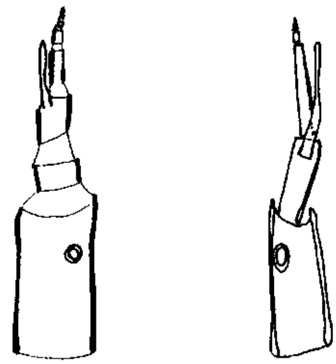
15 (14') Mentum concave, with broad pale median tooth flanked by dark well sclerotized teeth which point inward; ventromental plates at least 3X wider than long 16



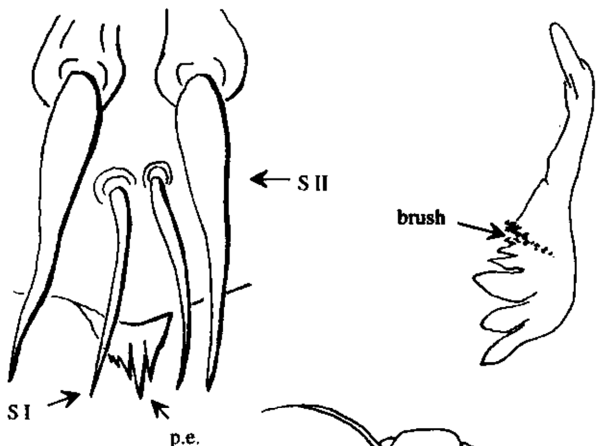
15' Mentum convex or linear, or if concave then mentum completely pale; ventromental plates less than 2x as wide as long 18

16 (15) Antennae with 7 segments .... ***Demicryptochironomus***

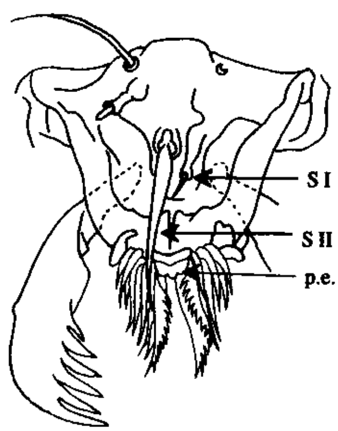
16' Antennae with 5 segments 17



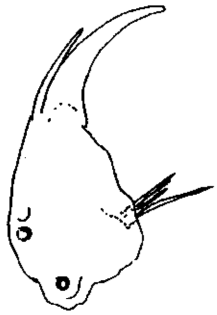
17 (16') Pecten epipharyngis a large, deeply trilobed triangular scale with serrated margins; S I well developed, at least half as long as S II; premandible with weak brush .... ***Cryptochironomus***

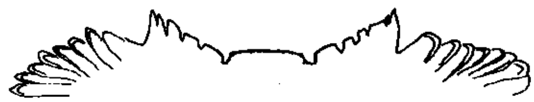


17' Pecten epipharyngis a small, weakly trilobed rounded plate with entire margins; S I minute, less than 1/5 length of S II; premandible without brush .... ***Gillotia***
(not recorded from Florida)



18 (15') Mandible without inner teeth (or rarely with 1 inner tooth); mentum pale, concave; 7 anterior body segments apparently subdivided, giving appearance of a 20 segmented body .... ***Chernovskiia***





18' Mandible with at least 2 inner teeth or notches indicating teeth; mentum convex or linear; anterior body segments not appearing subdivided 19

19 (18') Antennae with 5 segments 20

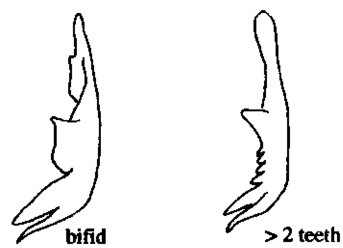
19' Antennae with 6-7 segments 25

20 (19) Pecten epipharyngis a wide plate with numerous teeth (trifid in 1 sp.); premandible without brush .... ***Parachironomus***

20' Pecten epipharyngis a simple plate with or without weak distal lobes, **or** triangular, distally trifid or laterally serrate; premandible with brush 21

21 (20') Premandible bifid 22

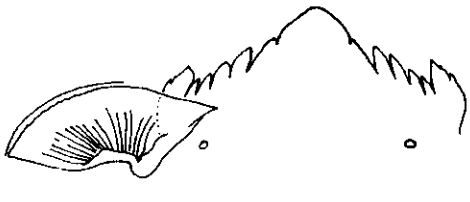
21' Premandible with more than 2 teeth 24



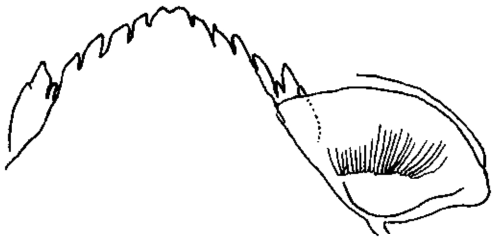
22 (21) General outline of mentum linear, median tooth trifid; **antennal blade as long** as or longer than flagellum (segments 2-5) .... ***Microchironomus***

22' General outline of mentum strongly arched, with median tooth single or medially notched, double, or broad and laterally notched (may appear trifid) (see below); antennal blade shorter than flagellum, extending at most to apex of segment 4 23

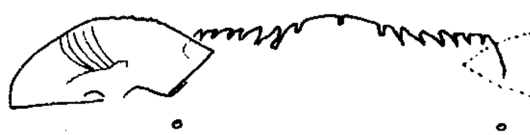
23 (22') Median tooth broadly rounded or laterally notched to appear trifid, set well forward from remaining teeth so that outline of central mentum slopes sharply; basal segment of antenna about 2-2.5X longer than wide .... ***Cryptotendipes***



23' Median tooth usually double or notched medially, may be broadly rounded but not extending well forward of remaining teeth, not appearing sharply sloped; basal segment of antenna about 2.8-4.0X longer than wide .... ***Cladopelma***

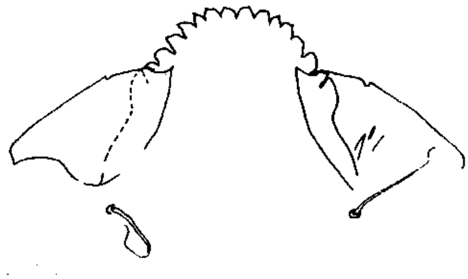


24 (21') Antennal segments 2 and 3 subequal; ventromental plates weakly striated .... ***Harnischia***



24' Antennal segment 2 much longer than 3; ventromental plates coarsely striated .... ***Paracladopelma***

25 (19') **Mentum strongly arched, resembling a circular saw blade; ventromental plates with notch on anterior margin .... *Harnischia* complex genus A**



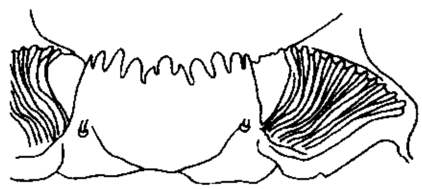
25' Mentum and ventromental plates not as above 26

26 (25') Antenna 7 segmented; mandible without seta interna 27

26' Antenna 6 segmented; mandible with seta interna 28

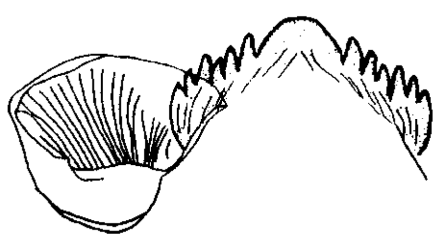
27 (26) Mentum with odd number of teeth; median tooth broad or trifid, with 4 pairs of lateral teeth .... ***Beckidia***

(not recorded from Florida)

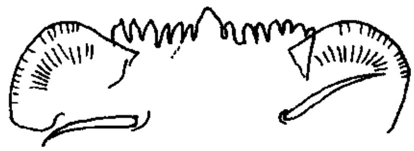


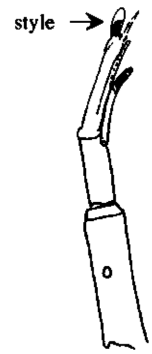
27' Mentum with even number of teeth (14) .... ***Robackia***

28 (26') Mentum with rounded median tooth; style at apex of antennal segment 3 < 4+5+6; ventromental plates coarsely striated .... ***Saetheria***



28' Mentum with pointed median tooth; style at apex of segment 3 subequal to 4+5+6; ventromental plates finely striated .... ***Harnischia*** **complex genus C**





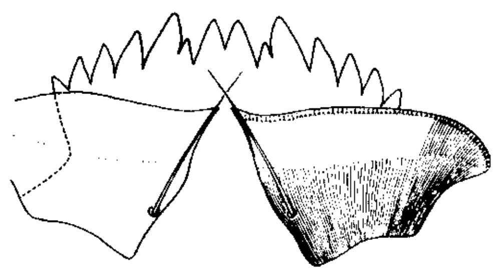
29 (13') Antennae with 6 segments 30

29' Antennae with 5 segments 39

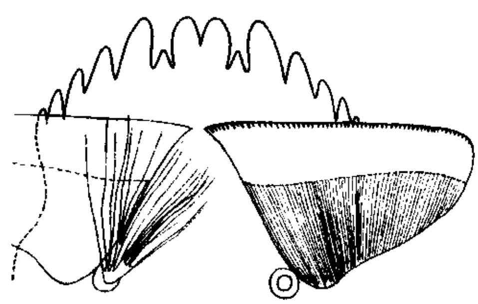
30 (29) Ventromental plates separated medially by less than width of medial teeth; with transportable case 31

30' Ventromental plates separated medially by width of median tooth/teeth or more; without transportable case 32

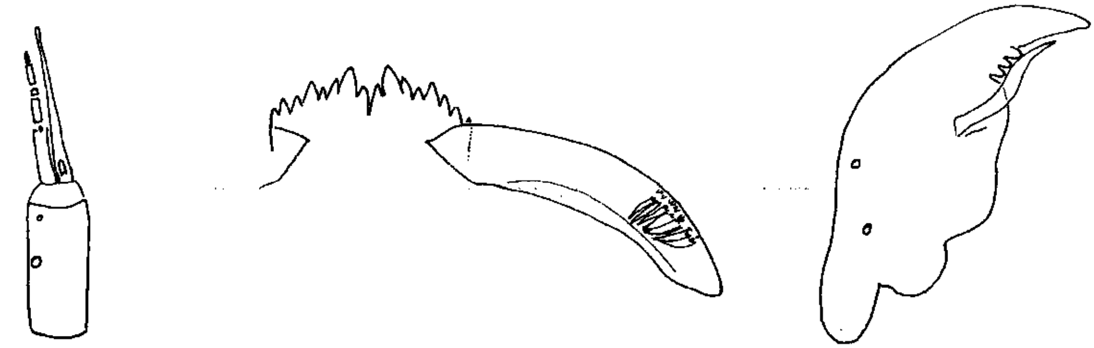
31 (30) Setae submenti simple and apparently placed on ventromental plates; frontoclypeal apotome present; lateral tubules long and broad; hump on penultimate body segment directed anteriorly .... *Zavreliella*



31' Setae submenti plumose and placed posteromedially to ventromental plates; frontal apotome and clypeus present; lateral tubules short and pointed; hump on penultimate body segment directed posteriorly .... *Lauterborniella*



32 (30') Lauterborn organs small and located at apex of segment 2 only; mentum with 2 deeply sunken median teeth; seta subdentalis long and broad .... **Chironomini genus A**

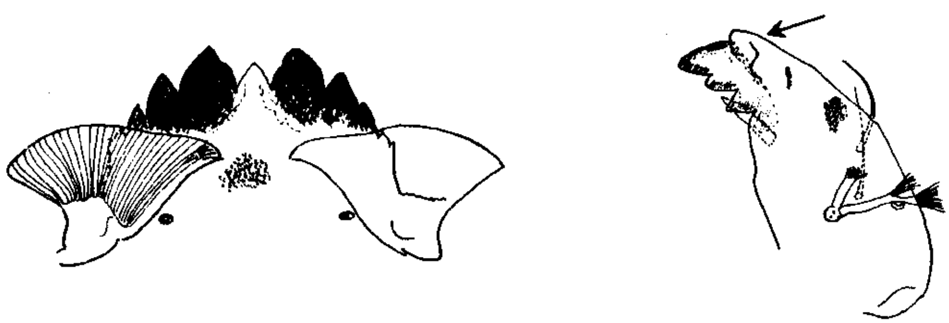


32' Lauterborn organs well developed, placed alternately on segments 2 and 3; mentum and seta subdentalis not as above 33

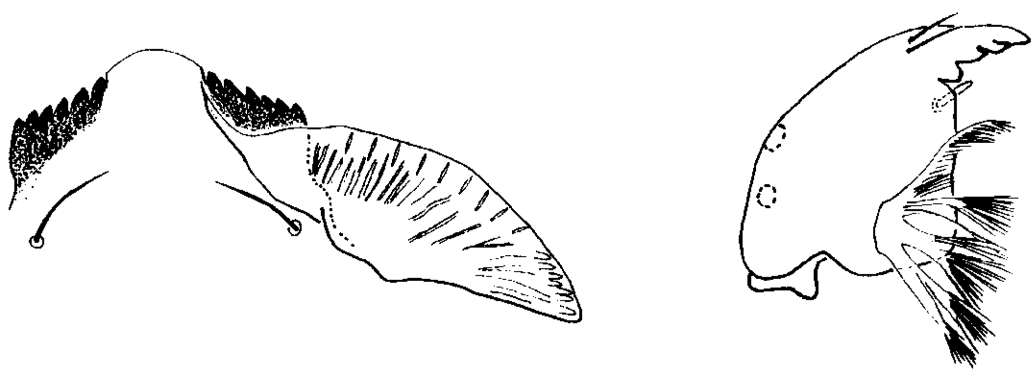
33 (32') Mentum with single pale median tooth 34

33' Mentum with 2 or more pale or dark median teeth 35

34 (33) Median tooth lower than first lateral teeth; mandible with dorsal tooth .... ***Beardius*** (in part)



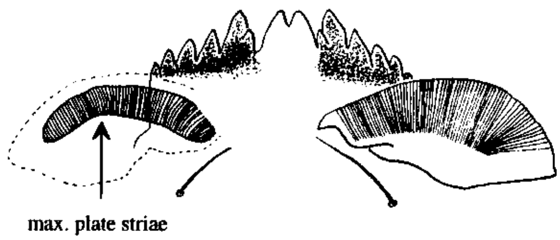
34' Median tooth higher than first lateral teeth; mandible without dorsal tooth .... ***Paralauterborniella***



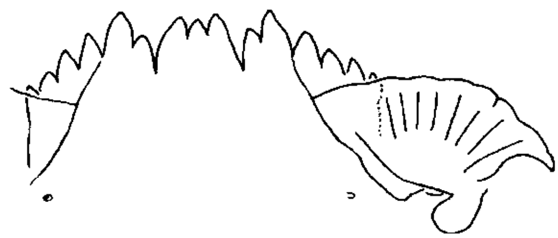
35 (33') Mentum with 2-3 pale median teeth which are subequal to 2nd lateral teeth 36

35' Mentum with dark median teeth **or** with 4 pale median teeth which are **lower than 2nd** lateral teeth 37

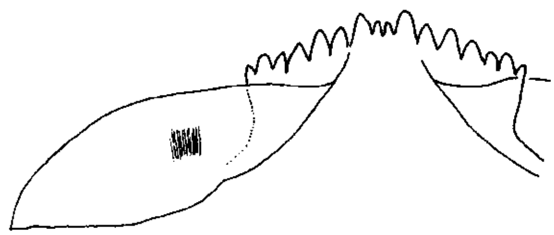
36 (35) Mentum with 2 pale median teeth; maxillary plate striae usually well developed and more noticeable than ventromental plate striae; frontoclypeal apotome present; bases of S I fused .... ***Apedilum***



36' Mentum with 3 pale median teeth (central tooth may be minute, as in couplet 35); ventromental plate striae coarse, maxillary plate striae difficult to discern; frontal apotome separated from clypeus by straight suture; bases of S I separate or contiguous .... ***Microtendipes***

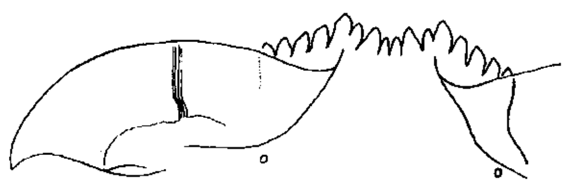


37 (35') 4 median teeth of mentum dark and at least outer pair higher than remaining mental teeth .... ***Stictochironomus***

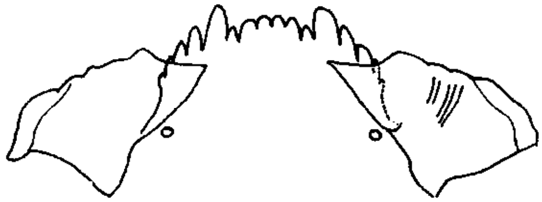


37' Median teeth of mentum pale or dark, lower than 2nd lateral teeth 38

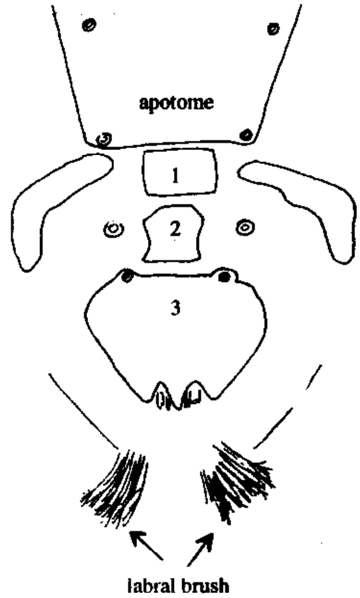
38 (37') Central pair of the 4 median teeth lower and more slender than outer median teeth; bases of S I separate; 2 dorsal teeth on mandible .... ***Omisus***

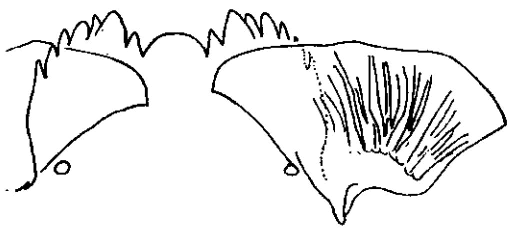


38' Central pair of the 4 median teeth equal to or higher than outer median teeth; bases of S I fused or located on a common triangular plate; 1 dorsal tooth on mandible .... ***Paratendipes***



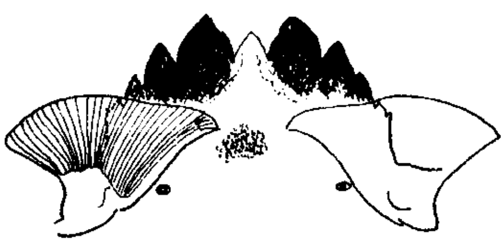
39 (29') Mentum with broad median tooth and 1st lateral teeth lower than 2nd laterals; labrum with large brush of setae on each side; dorsum of head with 3 median labral sclerites anterior to frontoclypeal apotome; mines in freshwater sponges .... ***Xenochironomus***





39' Mentum not as above; labrum without large brush of setae on each side; dorsum of head with at most 2 median labral sclerites anterior to frontal or frontoclypeal apotome; not restricted to freshwater sponges 40

40 (39') Antennae with large alternating Lauterborn organs, one at base of segment 2, other at apex; mentum with pale median tooth much lower than adjacent lateral teeth .... ***Beardius*** (in part)

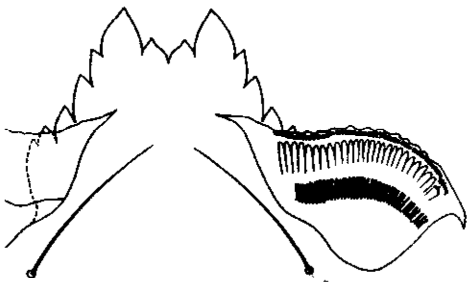


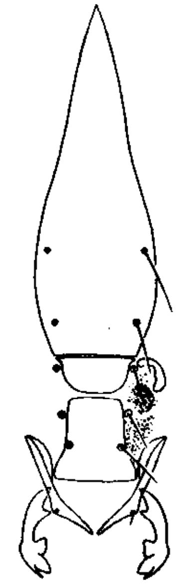
40' Antennae with small Lauterborn organs at apex of segment 2; mentum not as above . 41

41 (40') Median tooth/teeth of mentum deeply sunken (Note: median teeth may be worn, creating a U-shaped central portion of mentum) 42

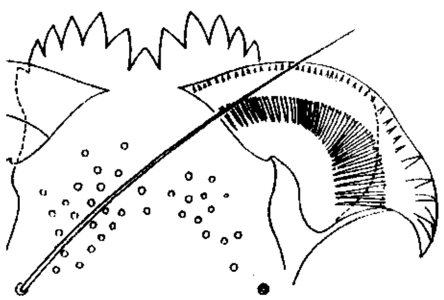
41' Median tooth/teeth of mentum not deeply sunken 43

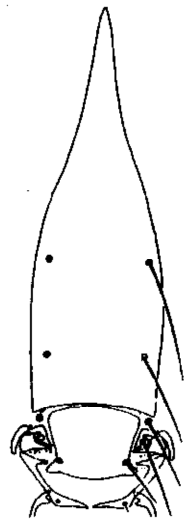
42 (41) Mentum with 2 median teeth, first lateral tooth strongly projecting (median teeth may be worn); dorsum of head with 2 medial labral sclerites anterior to frontal apotome (some specimens of *Polypedilum braseniae* could key here; note the apotome) .... ***Hyporhygma***





42' Mentum with single median tooth, first lateral tooth lower than 2nd; dorsum of head with 1 medial labral sclerite anterior to frontal apotome .... ***Stelechomyia***

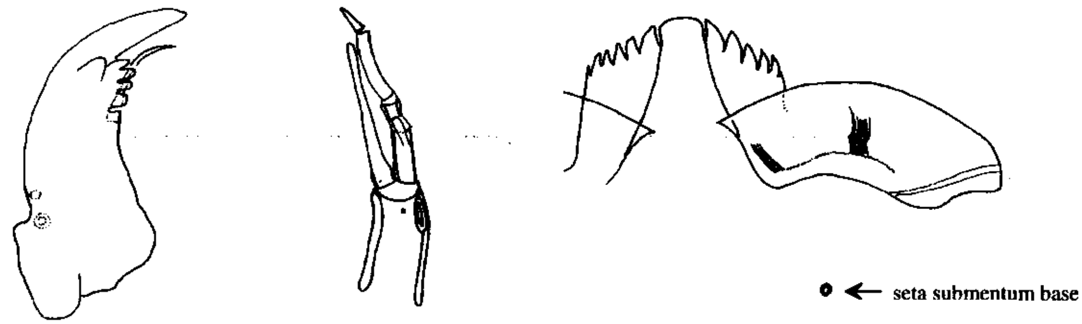




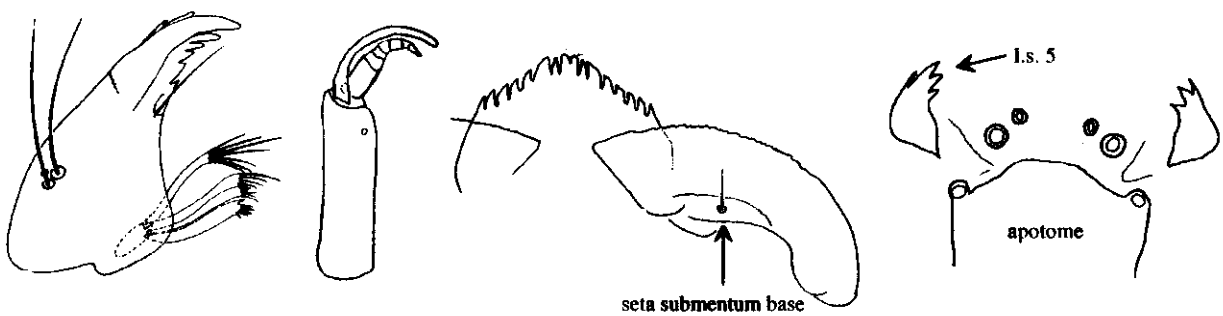
43 (41') Mentum (or at least median tooth) and mandibular teeth pale; mandible with 4 or more inner teeth and 1-2 dorsal teeth 44

43' Mentum and mandibular teeth brown to black; mandible usually with 2-3 inner teeth and 0-2 dorsal teeth; if mandible with 4 inner teeth, then dorsal tooth absent and ventromental plates touching medially 45

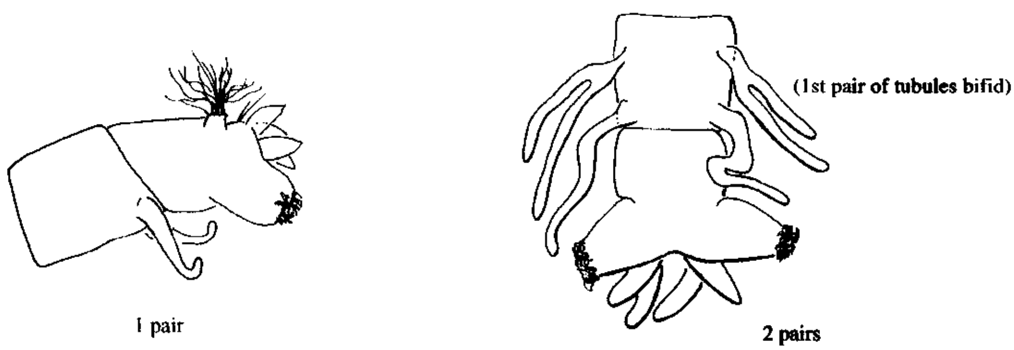
44 (43) Inner mandibular teeth grouped closely together; basal antennal segment shorter than segments 2-5; setae submenti placed posteriorly to ventromental plates; labral sclerite 5 simple .... ***Nilothauma***



44' Inner mandibular teeth spread along inner margin of apical tooth; basal antennal segment longer than segments 2-5; setae submenti placed on ventromental plates; labral sclerite 5 toothed apically .... ***Pagastiella***



45 (43') Penultimate body segment with 1-2 pairs of well developed ventral tubules 46

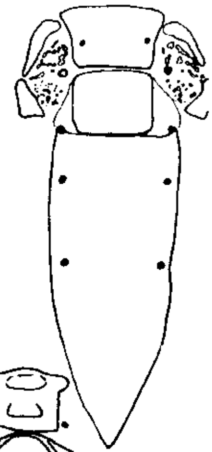


45' Penultimate body segment without ventral tubules, although rudimentary knob-like swellings may be present 53

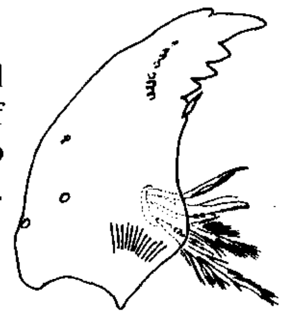
46 (45) With 2 pairs of ventral tubules 47

46' With 1 pair of ventral tubules 48

47 (46) Seta subdentalis with toothed/fringed inner margin; mandible without basal row of radially arranged striae; dorsum of head with 2 medial labral sclerites anterior to frontoclypeal apotome .... ***Goeldichironomus*** (in part)



47' Seta subdentalis simple; mandible with basal row of radially arranged striae; dorsum of head with 1 medial labral sclerite anterior to frontoclypeal apotome .... ***Chironomus*** (in part)



48 (46') Premandible with 5 or more teeth .... ***Kiefferulus***

(*Lipiniella*, not known from Florida, may key here. It can be distinguished by its lack of a frontal pit on the apotome)

48' Premandible with 2-4 teeth, apically bifid 49

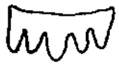
49 (48') Mandible with 2 inner teeth 50

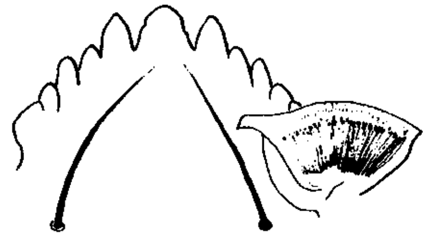
49' Mandible with 3 inner teeth 51

50 (49) Mandible with basal row of radially arranged striae; pecten epipharyngis of 3 scales covered with minute spinules; benthic, usually in sediments/muck ... . ***Einfeldia*** (in part)

50' Mandible without basal row of radial striae; pecten epipharyngis a single plate with multiple teeth; mining in Bryozoa, sponges, *Sparganium* .... ***Demeijerea***

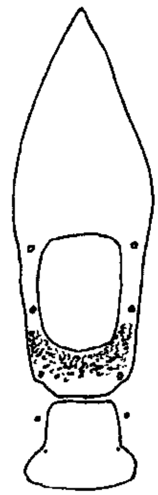
51 (49') Pecten epipharyngis with fewer than 10 usually blunt lobes (most often 3-6 lobes are present); width of 1 ventromental plate less than width of mentum .... ***Dicrotendipes*** (in part)





51' Pecten epipharyngis with more than 10 usually sharply pointed teeth; width of ventromental plate greater than or equal to width of mentum 52

52 (51') Dorsum of head with 1 median labral sclerite anterior to apotome; frontoclypeal apotome usually with large oval-cordate anteromedian depression .... ***Einfeldia*** (in part)



52' Dorsum of head with 2 median labral sclerites anterior to apotome; frontal apotome without anteromedian depression .... ***Glyptotendipes*** (in part)

53 (45') Mentum distinctive, with first lateral teeth lower than median teeth and 2nd lateral teeth .... ***Polypedilum*** (in part)

53' Mentum not as above 54

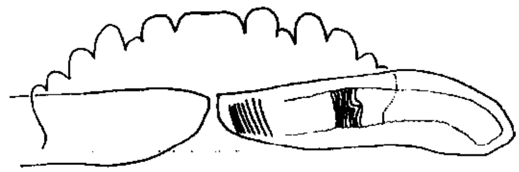
54 (53') Ventromental plates wide, contiguous medially or separated by less than width of median tooth/teeth 55

54' Ventromental plates not contiguous medially, separated by more than width of median tooth/teeth 59

55 (54) Ventromental plates narrowly separated medially; premandible with 2-3 teeth 56

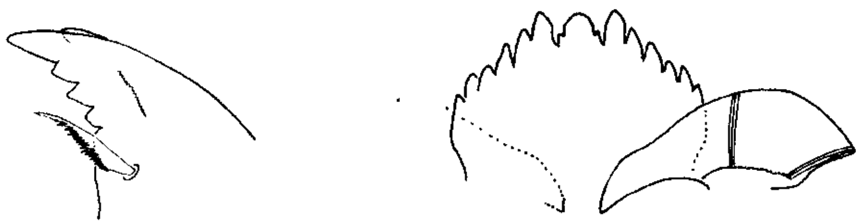
55' Ventromental plates contiguous medially; premandible with more than 4 teeth 58

56 (55) Ventromental plates short and wide, bar-like .... *Pseudochironomus*



56' Ventromental plates not as above 57

57 (56') Seta subdentalis elongate with toothed or fringed inner margin; ventromental plates with inner angle directed caudad .... *Goeldichironomus* (in part)



57' Seta subdentalis short, mostly simple; ventromental plates not directed caudad .... *Glyptotendipes* (in part)

58 (55') Mandible with 4 flattened inner teeth, dorsal tooth lacking; premandible with 6 teeth; dorsum of head with 2 medial labral sclerites anterior to frontal apotome .... *Axarus*

58' Mandible with 3 triangular inner teeth, dorsal tooth present; premandible with 5 teeth; dorsum of head with 1 medial labral sclerite anterior to frontoclypeal apotome .... ***Lipiniella***

(not recorded from Florida)

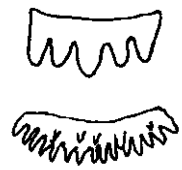
59 (54') Mentum with odd number of teeth 60

59' Mentum with even number of teeth **or** median tooth bifid 65

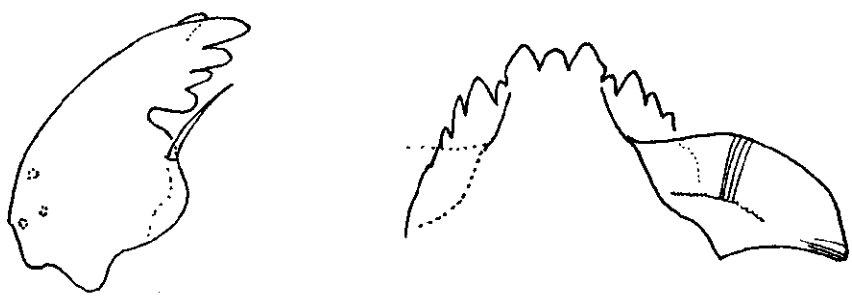
60 (59) Pecten epipharyngis of 3 toothed plates 61

(1 species of *Glyptotendipes* has tripartite p.e. with apical notches)

60' Pecten epipharyngis a single plate with multiple lobes or teeth 63

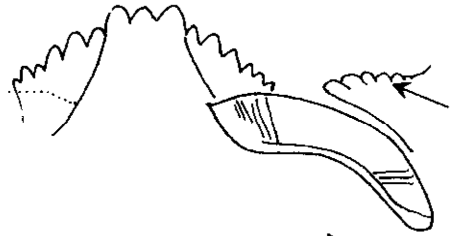


61 (60) Mandible with deep concavity along inner margin between basal tooth and seta subdentalis; mentum strongly arched, with 11-13 teeth .... ***Endotribelos***

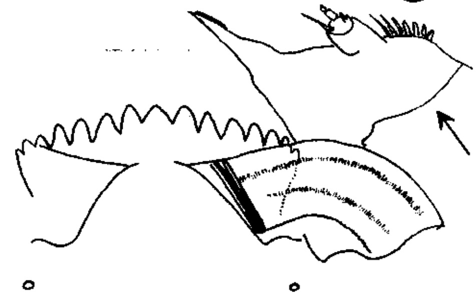


61' Mandible without deep concavity; mentum not strongly arched, with 15 teeth 62

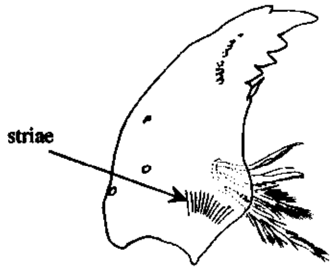
62 (61') Anterior margin of cardo tuberculate .... *Endochironomus* (in part)

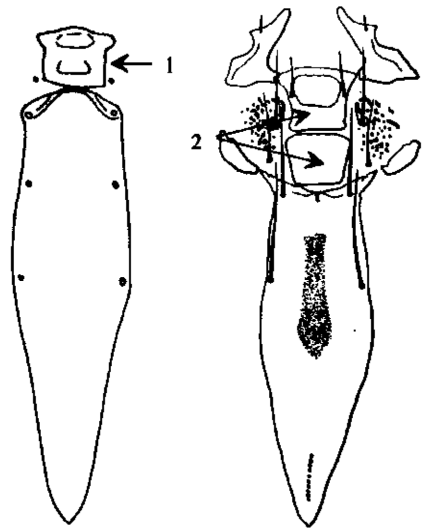


62' Anterior margin of cardo smooth .... **Chironomini genus III**



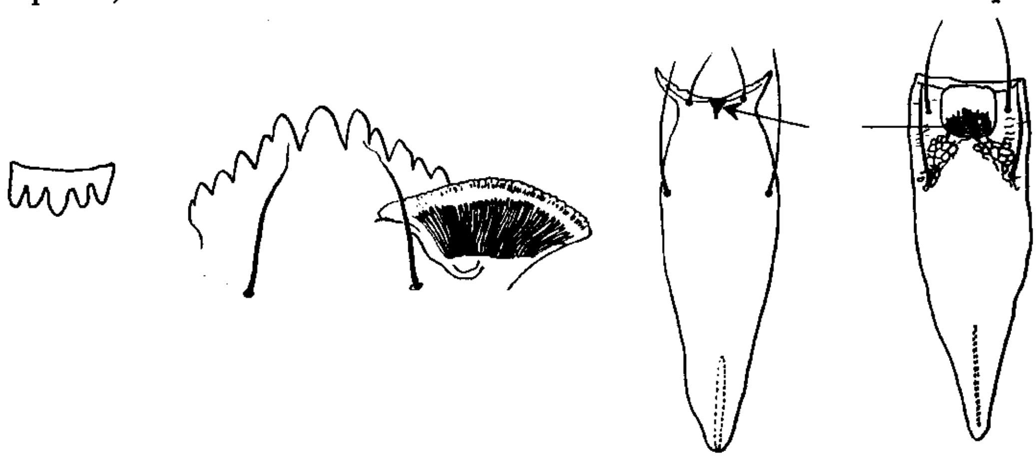
63 (60') Dorsum of head with 1 median labral sclerite anterior to frontoclypeal apotome; mandible with basal row of radially arranged striae .... ***Chironomus*** **(in part)**



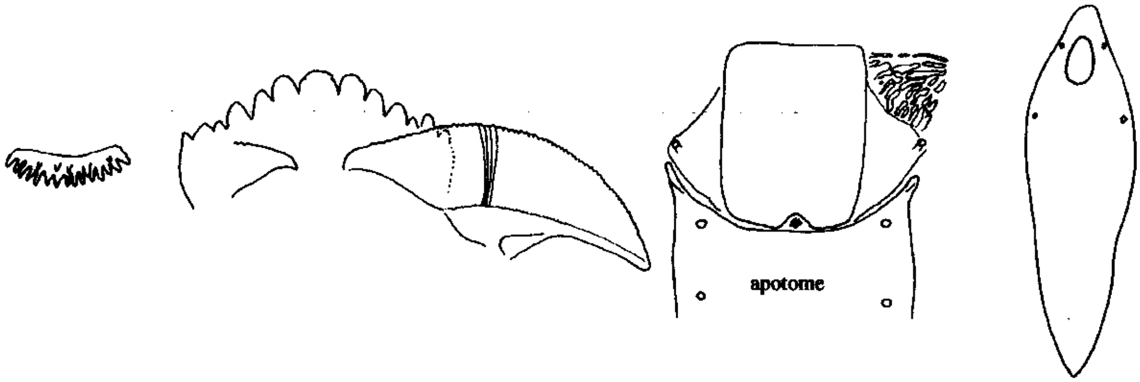


63' **Dorsum of head with 2 median labral sclerites anterior to frontal apotome; mandible without basal row of radially arranged striae** **64**

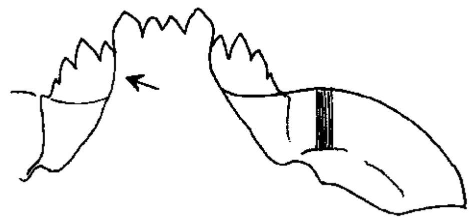
64 (63') Pecten epipharyngis with fewer than 10 usually blunt lobes (most often 3-6 lobes present); width of 1 ventromental plate less than width of mentum; frontal apotome usually with frontal pit or large quadrate anteromedian depression (pit is absent in 1 species) .... ***Dicrotendipes*** (in part)



64' Pecten epipharyngis usually with 10 or more teeth (1 sp. with tripartite p.e.); width of ventromental plate greater than width of mentum; frontal apotome without frontal pit (posterior margin of labral sclerite 1 may have small semicircular pit) or if a depression is present, it is elongate-oval .... ***Glyptotendipes*** (in part)

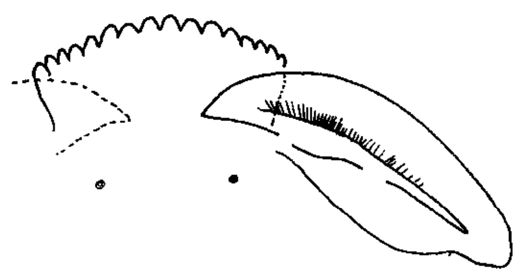


65 (59') Four median teeth of mentum separated from remainder of mentum by a line which runs posteriorly to the anteriorly produced median ends of the ventromental plates 69

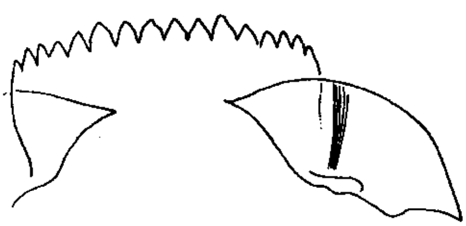


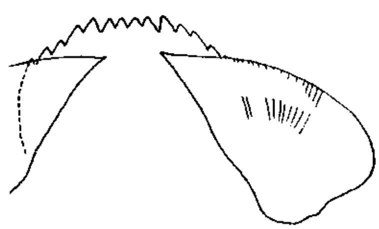
65' Four median teeth of mentum not separated from rest of mentum; ventromental plates not as above 66

66 (65') Ventromental plates 3X or more wider than long and rounded laterally .... ***Asheum***

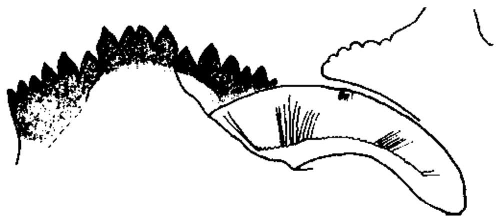


66' Ventromental plates less than 3X as wide as long and pointed laterally, **or** tear drop shaped .... ***Polypedilum*** (in part)

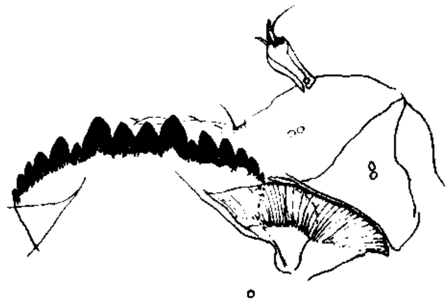




67 (65) Ventromental plates about 3+ times wider than long, the anterior and posterior margins of each plate more or less parallel until meeting at lateral margin; central 2 teeth of mentum may appear partially fused .... ***Endochironomus*** (in part)



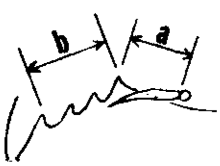
67' Ventromental plates less than 3x as wide as long, appearing broadly triangular laterally; central teeth of mentum never appearing fused 68

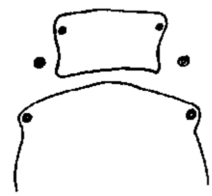


68 (67') With 1 median labral sclerite anterior to apotome .... ***Phaenopsectra*** (in part)

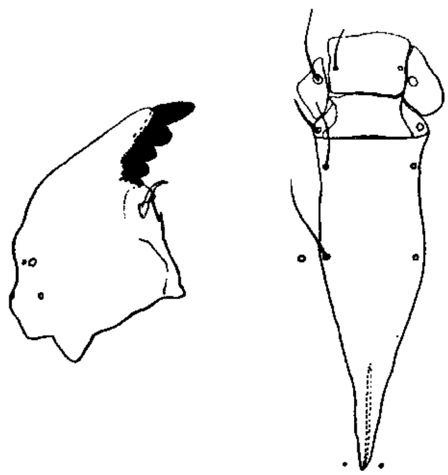
68' With 2 median labral sclerites anterior to apotome 69

69 (68') Distance from basal notch of inner mandibular teeth to insertion of seta subdentalis (a) usually at least 3/4 distance from basal notch to apical notch (b); molar area of mandible usually without serrations, except sometimes 1 near seta subdentalis; anterior margin of apotome or clypeus (labral sclerite) convex .... ***Phaenopsectra*** (in part)





69' Distance from basal notch of inner mandibular teeth to insertion of seta subdentalis usually less than 3/4 distance from basal notch to apical notch; molar area of mandible with 1 or 2 serrations separated from seta subdentalis; anterior margin of labral sclerite mostly straight ...... ***Tribelos***



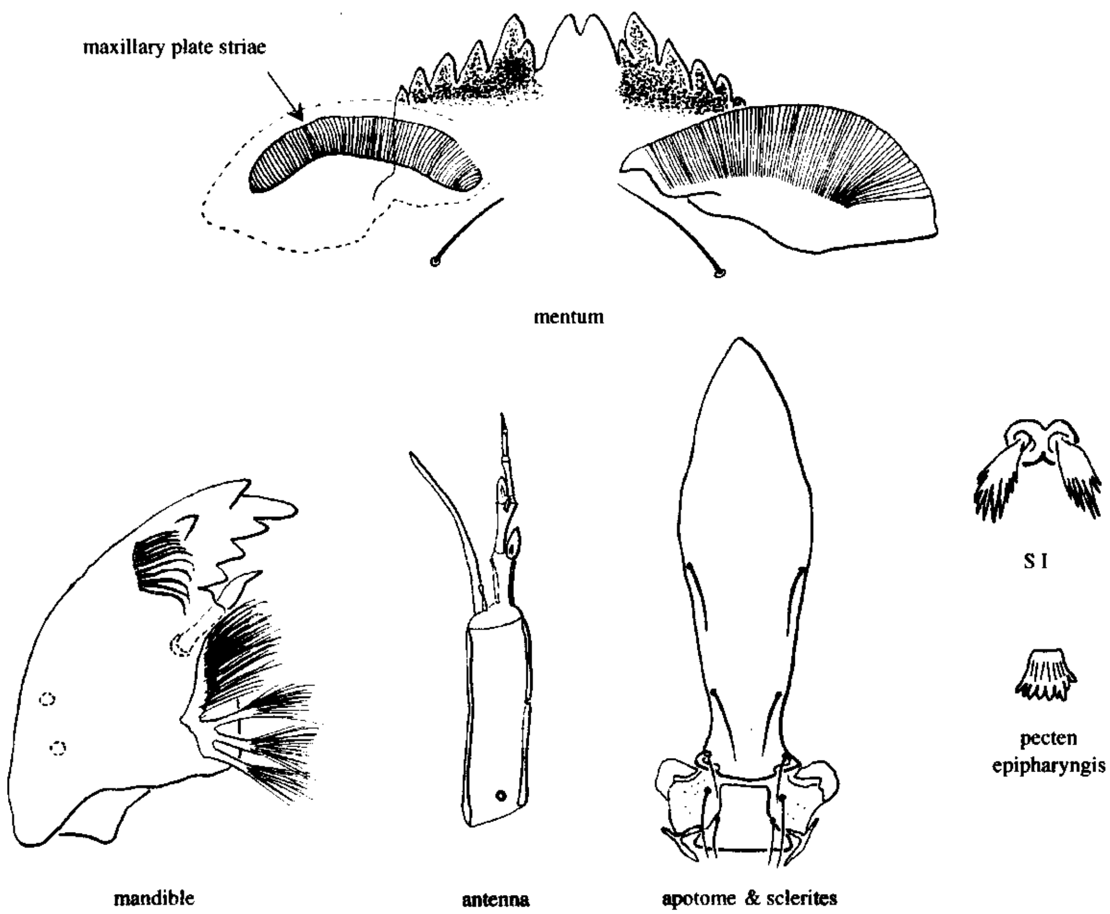
Genus *Apedilum*

DIAGNOSIS: The frontoclypeal apotome; S I with bases fused; six-segmented antennae, with alternate Lauterborn organs; pale bifid median tooth of the mentum; well developed maxillary plate striations; and mandible with dorsal teeth distinguish this genus.

NOTES: Two species are recorded from Florida; *A. elachistus* is the species most often encountered in Florida. Both species were formerly included in *Paralauterborniella*, but were demonstrated to be generically distinct by Epler (1988a). Fourth instar larvae can be separated by *maxillary* plate strial counts: 90-105 in *A. elachistus*; 110-125 in *A. subcinctum*. (When viewed from a ventral aspect, the maxillary plate lies below the ventromental plate.)

Larvae are found in fresh and brackish water where they occur on submerged vegetation. Magy et al. (1970) reported *A. subcinctum* as a pest species due to mass emergences.

ADDITIONAL REFERENCES: Epler 1988a.



A. elachistus, **larval structures**

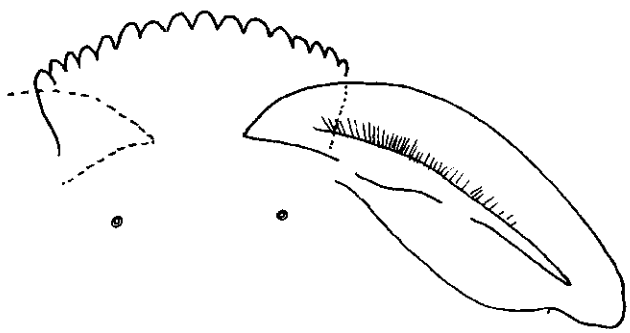
Genus *Asheum*

DIAGNOSIS: The even teeth of the mentum and the wide ventromental plates with rounded lateral margins distinguish this genus in Florida.

NOTES: One species, *A. beckae*, is described from the Nearctic; it was formerly called *Pedionomus beckae*. Other species occur in the Neotropics. The genus is closely related to *Polypedilum;* Florida species of *Polypedilum* with even teeth on the mentum have ventromental plates with pointed lateral margins.

Larvae are found in lentic and lotic situations. *A. beckae* can occur in water with high organic nutrient levels (i.e., below pulp mill plants) as well as in oligotrophic areas such as the Everglades.

ADDITIONAL REFERENCES: Sublette 1964.



A. beckae, mentum

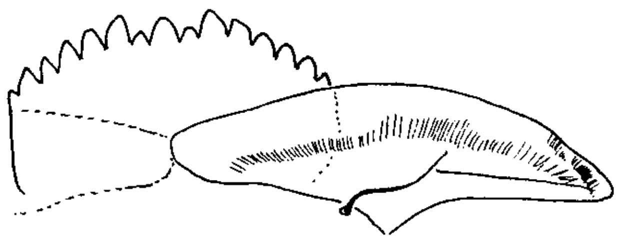
Genus ***Axarus***

DIAGNOSIS: The frontal apotome with 2 anteromedial labral sclerites; contiguous ventromental plates; mandible with 4 flattened inner teeth and no dorsal tooth; premandible with 6 teeth identify this genus.

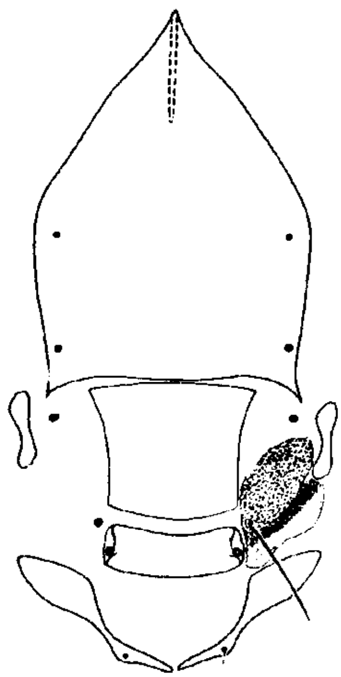
NOTES: Based on adult records, three species are known from Florida. Members of this genus were formerly placed in *Xenochironomus (Anceus)*; they are closely related to the genus *Lipiniella*, which is not recorded from Florida. Although Roback (1963) offered a key for larvae, it was based on unassociated specimens and relies mainly on antennal measurements. Species identification of larvae is possible only with associated reared adults.

Larvae are found in bottom sediments of lakes and rivers.

ADDITIONAL REFERENCES: Roback 1963; Ferrington 1992.



mentum



apotome & sclerites
(adapted from Pinder & Reiss

mandible

premandible

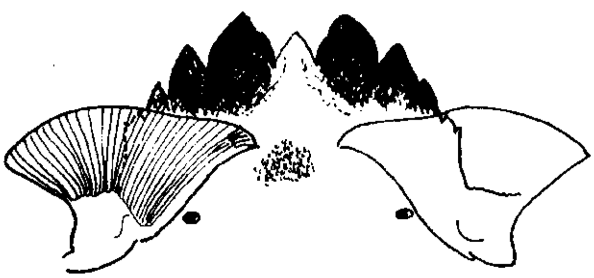
Axarus sp., larval structures

Genus ***Beardius***

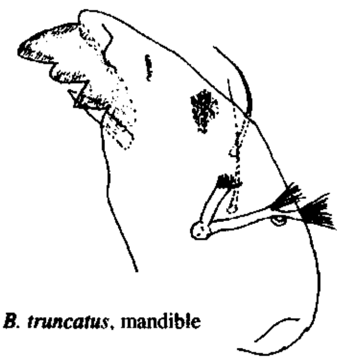
DIAGNOSIS: The larvae are distinguished by the 5-6 (7 in described Neotropical species) segmented antennae, with alternate Lauterborn organs; mentum with pale median tooth lower than first lateral teeth; and mandible with two inner teeth and a dorsal tooth.

NOTES: Based on adults, two species of *Beardius* occur in Florida. Associated larvae/pharate pupae of *B. truncatus*, which occurs throughout Florida, have been collected from the Suwannee River basin. I have a male specimen of *B. breviculus* from the northern Everglades; this represents a significant range extension for this species, originally described from Panamá. The larva of *B.* sp. A, illustrated below, is probably this species. Larvae of the two species are separated by the number of antennal segments: *B. truncatus* has 5 segments; *B.* sp. A has six. Note also the differences in the frontal apotome illustrated below.

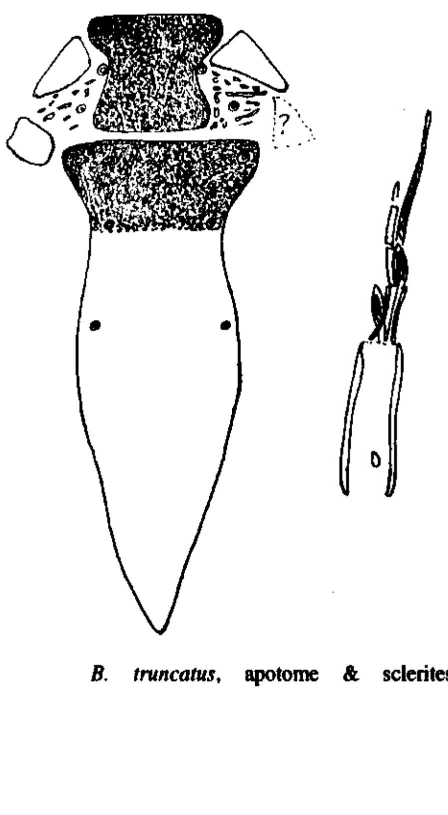
ADDITIONAL REFERENCES: Reiss & Sublette 1985.



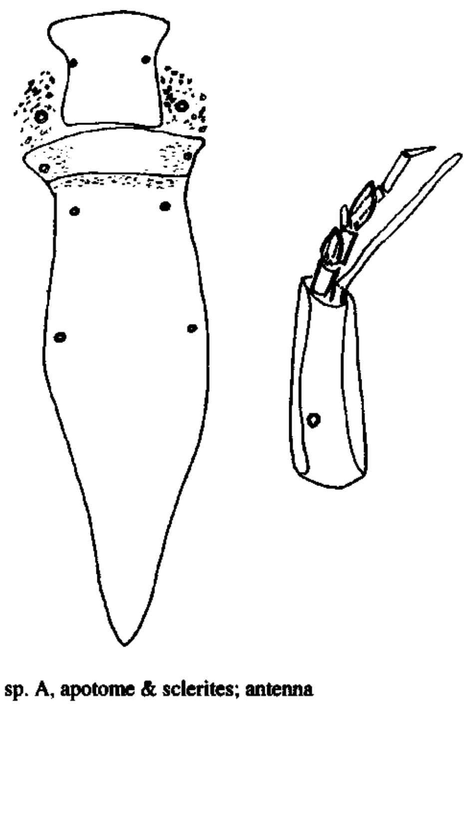
B. truncatus, mentum



B. truncatus, mandible



B. truncatus, apotome & sclerites;



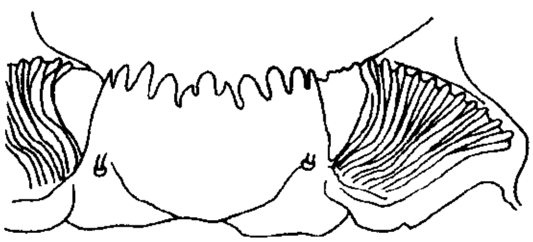
B. sp. A, apotome & sclerites; antenna

Genus ***Beckidia***

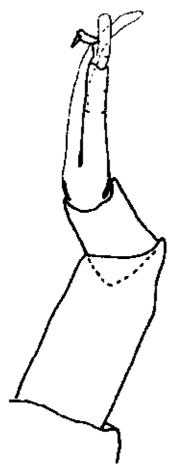
DIAGNOSIS: The 7 segmented antennae; mandible without seta interna; and distinctive mentum with odd number of teeth, median tooth broad or trifid identify this genus.

NOTES: Not recorded from Florida, but may eventually be found here. Larvae are recorded from the sand bottoms of large rivers.

ADDITIONAL REFERENCES: Sæther 1977.



mentum



antenna

Beckidia sp., larval structures
(adapted from Pinder & Reiss 1983)

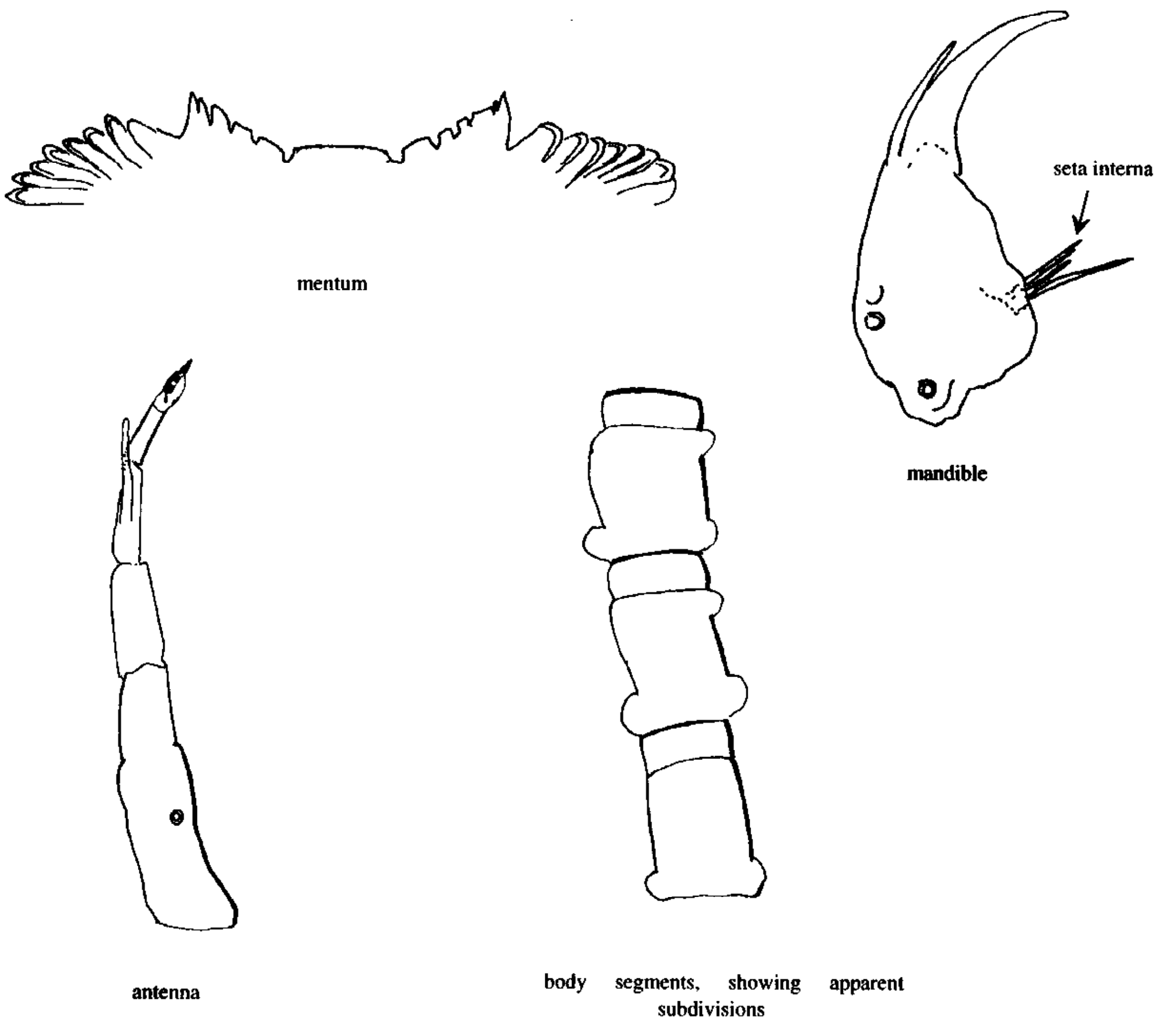
Genus *Chernovskiia*

DIAGNOSIS: The 8 segmented, weakly sclerotized antennae; concave, pale mentum; distinctive coarse ventromental plates; mandible with single large apical tooth; and some body segments with apparent subdivisions distinguish this genus.

NOTES: Although larvae occur in Florida, adults have not yet been identified; it is not known which species is/are represented. Although Pinder & Reiss (1983) state that the mandible lacks a seta interna, this organ is well developed in larvae assignable to this genus collected from the Suwannee River.

Larvae are found in sand substrates in running water.

ADDITIONAL REFERENCES: Sæther 1977.



Chernovskiia sp., larval structures

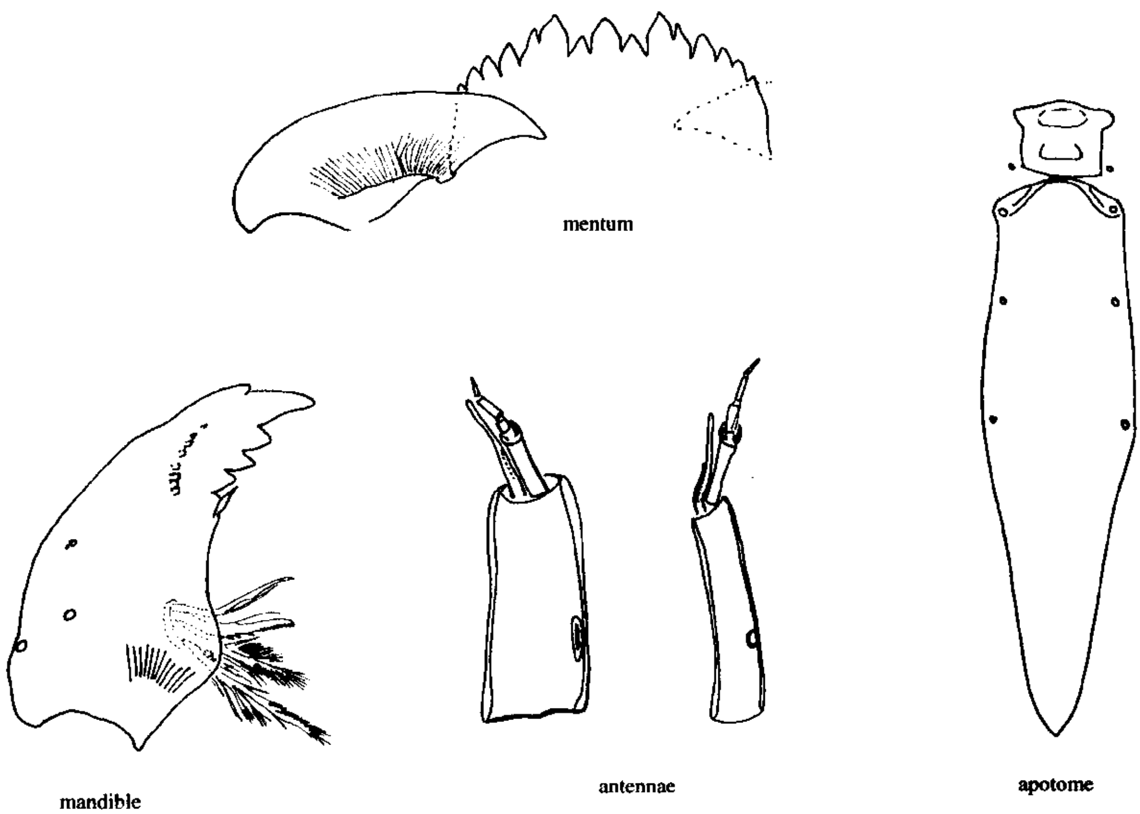
Genus *Chironomus*

DIAGNOSIS: Larvae can usually be diagnosed by the following characters: frontoclypeal apotome and 1 medial labral sclerite present; mandible with basal radially arranged striae and simple seta subdentalis; 0, 1 or (usually) 2 pairs of ventral tubules.

NOTES: Four subgenera are present in the Nearctic; three are found in Florida (there are no records for the subgenus *Camptochironomus*). Larvae are very difficult to distinguish and much work remains to be done with the genus. European workers utilize both morphological and karyological characters to identify species (see Webb & Scholl 1985). Larvae formerly placed in *Einfeldia* species groups B and C in Pinder & Reiss (1983) are now considered members of *Chironomus*.

Larvae are usually found in sediments, and may occur in extremely polluted conditions or relatively pristine habitats. Larvae of *C. riparius, C. stigmaterus* and the *C. decorus* group are most often associated with high nutrient and/or low oxygen levels.

ADDITIONAL REFERENCES: Ryser et al. 1985; Sublette & Sublette 1974a, 1974b; Townes 1945; Webb & Scholl 1985; Wülker & Butler 1983; Wülker et al. 1971; Wülker et al. 1989.

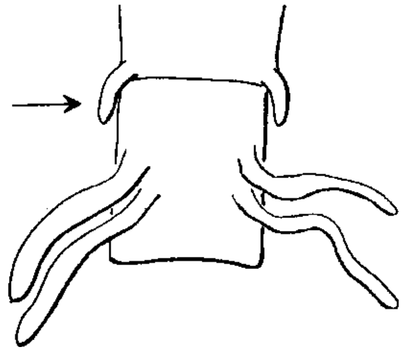


Chironomus sp., larval structures

Key to *Chironomus* of SE U.S.A.

(several Florida species are undescribed as larvae)

1 A pair of caudolateral tubules present on segment anterior to ventral tubules (best seen on larvae *before* mounting) 4



1' Caudolateral tubules not present 2

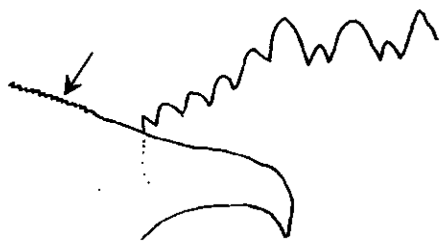
2 (1') Length of antennal segment 1/ segment 2 < 3.5 .... ***C. ochreatus***

2' Length of antennal segment 1/ segment 2 > 3.5 3

3 (2') Length of antennal segment 1/segment 2 < 4.5; body length about 30 mm; in lakes .... ***C. major***

3' Length of antennal segment 1/segment 2 > 4.5; body length much less than 30 mm; in sewage treatment plants and streams below them .... ***C. riparius***

4 (1) Anteromedial margin of ventromental plate with fine teeth 5



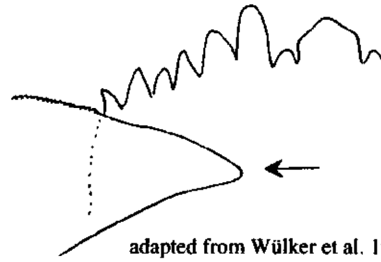
4' Anteromedial margin of ventromental plates smooth (minute teeth *may* be present beneath plate, but margin is smooth; outer (lateral) margin of plate may be faintly crenulated) 7

5 (4) Mandible with 3 dark inner teeth .... ***C. plumosus***

5' Mandible with 2 dark inner teeth (third tooth is light or not present) 6

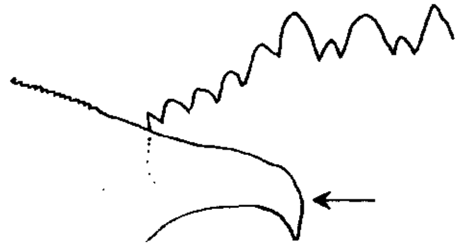
6 (5') Inner apex of ventromental plate directed medially .... *C. staegeri*

(occurrence in FL uncertain)



adapted from Wülker et al. 1971

6' Inner apex of ventromental plate directed caudad .... *C. crassicaudatus*



7 (4') **Head** usually with dark dorsal stripe; basal **portion** of median mental tooth usually **constricted**; length of antennal segment 1 about **5X** length of segment 2 .... ***C. stigmaterus***

7' Head without dorsal stripe; basal portion of median mental tooth straight or constricted; length of antennal segment 1 at most 4X length of segment 2 7

8 (7') Length of antennal segment 1 < 2.5X its width; length of segment 2 slightly less than 2X combined lengths of segments 3 & 4 .... *C. decorus* group

8' Length of antennal segment 1 > 2.5X its width; length of segment 2 slightly more than combined lengths of segments 3 & 4 .... ***Chironomus* sp.**

(includes *C. (Lobochironomus)* sp., some *C. decorus* grp. sp. and other *Chironomus*)

Be aware that any specimen not fitting the couplets above will key to this point. **You must have a 4th instar larva associated with an adult or pupa to identify *C. (Lobochironomus)* and some *C. decorus* grp. specimens**! Antennal characters may be environmentally influenced and may vary greatly from instar to instar: reared material is your only resort. **Otherwise, identify your specimens as "*Chironomus sp.*"!!**

Notes on species

C. crassicaudatus - A large species of lakes, it can be confused with *C. plumosus*. Larvae may have two or three inner teeth. It was considered a nuisance species by Beck & Beck (1969a).

C. decorus group - A common and widespread taxon, this group may include several species (*C. anonymus*, *C. decorus* and maybe others) which are difficult to separate in any life stage. Note that *C. decorus* grp. larvae may key to either part of couplet 8. Specimens of *C. anonymus*, not recorded from Florida but known from Texas and the West Indies, may *possibly* be separated from *C. decorus* by their three dark inner mandibular teeth. *C. decorus* supposedly has 2 dark and 1 light teeth, but without reared associations, any identification beyond "*C. decorus* group" is unwise. Some larvae may have only two inner teeth. Larvae are often found in "polluted" habitats; some body parts (antennae, mentum) may be abnormal due to toxins and/or stressed conditions. *C. decorus* was previously known as *C. attenuatus*.

C. major- This large species was described from Georgia (Wülker & Butler 1983); it is not known from Florida.

C. ochreatus - A member of the subgenus *C. (Chaetolabis)*. Specimens in the Beck collection at FAMU identified as *Chaetolabis* are *Dicrotendipes simpsoni*.

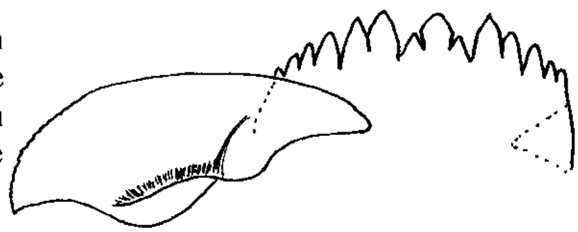
C. plumosus - Another large species of lakes; common in Lake Munson near Tallahassee.

C. riparius - This species is often associated with sewage treatment plants and/or enriched streams below such plants or other sources of high organic nutrients.

C. staegeri - A map in Sublette & Sublette (1971: fig. 59) indicates that this species has been recorded from the state, but no concise records were given. I can find no specimens or other published accounts of this species for Florida.

C. stigmaterus - A common species of organically enriched or low oxygen habitats. I have reared larvae of *C. stigmaterus* from sulfurous Newport Springs in Wakulla Co. Specimens which lack the dorsal head stripe may key to *Chironomus* sp. Most larvae possess a basally constricted median tooth on the mentum, but this is not always apparent.

C. (Lobochironomus) sp. - Larvae can not be placed in this taxon without associated adults. I have seen several associations of this taxon from Georgia to the northern Everglades. The identity of the species is unknown.



C. (Lobochironomus) sp., mentum

Additional species: Two other species, described only as adults, are also recorded from Florida (see Appendix A). Also, Wülker & Morath (1989) record two additional undescribed species, based on chromosomal analysis, from Winter Haven. Based upon new reared material, the species *C. pungens* is moved to *Kiefferulus*.

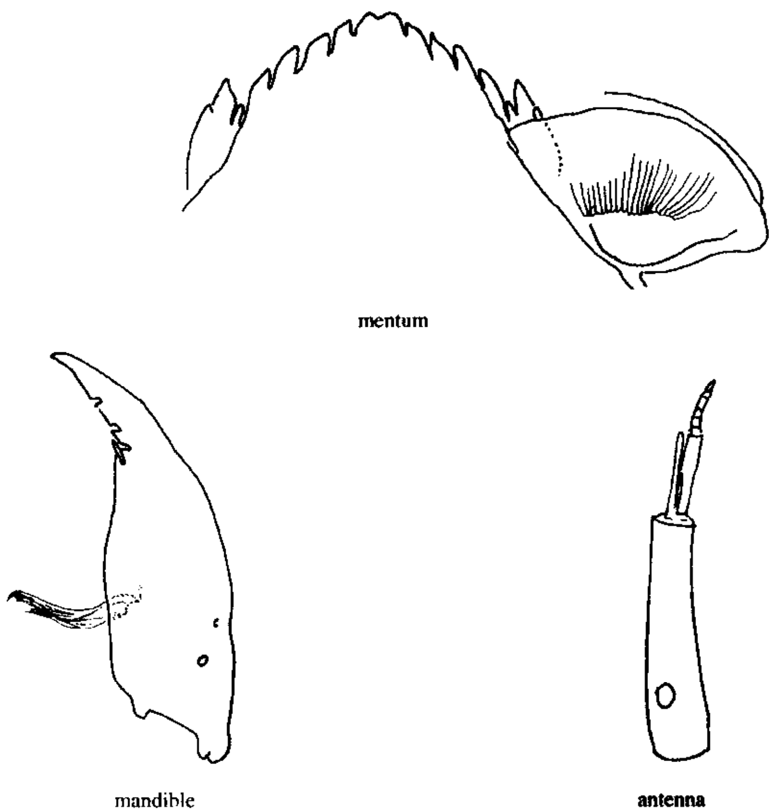
Genus *Cladopelma*

DIAGNOSIS: The mentum, with outer lateral teeth enlarged and with median tooth simple, notched or bifid, and not projecting strongly forward from remainder of mentum; premandible with brush; and antennae with basal segment length usually 2.8X to > 4X width will distinguish Florida members of this genus.

NOTES: Six species of *Cladopelma* are recorded from Florida, based on adult males. Although Beck & Beck (1969b) described the immature stages of five species (as *Harnischia*), the descriptions and illustrations are not sufficient to identify the species, and I have been unable to locate much of their reared material. Species identifications are possible with reared material; *C. galeator* appears to be a common species in Florida. Note that *C. boydi* is now considered a junior synonym of *C. forcipis* (cf. Sublette & Sasa 1994). Also, see *Parachironomus alatus,* a species which closely resembles a *Cladopelma.*

Larvae are usually found in bottom sediments in lakes and rivers; some species are tolerant of low oxygen conditions.

ADDITIONAL REFERENCES: Beck & Beck 1969b; Sæther 1977; Townes 1945.



***Cladopelma* sp., larval structures**

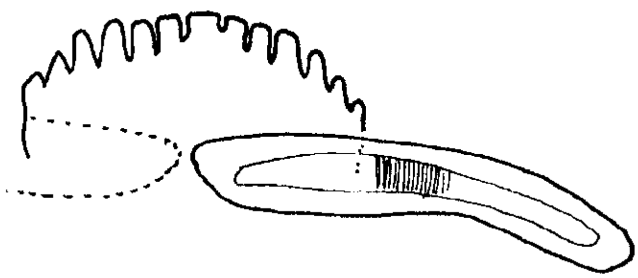
Genus *Cladotanytarsus*

DIAGNOSIS: The multi-toothed premandible; antennae with segment 2 usually wedge-shaped and bearing large Lauterborn organs on very short pedicels; and the presence of pectinate claws on the posterior parapods will identify this genus.

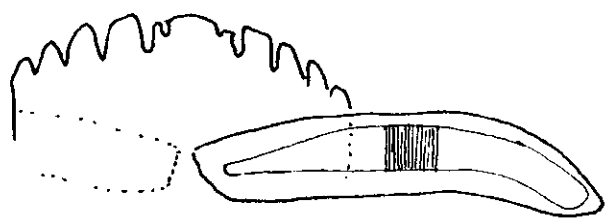
NOTES: Based on adults and pupae, two species are recorded from Florida. However, it is certain that many more species occur here. Bilyj & Davies (1989) described seven new species from Canada; they found that the pupae provided the best characters for species separation and provided identification keys for the pupae of 20 Holarctic species. The larva of *C. aeiparthenus*, which I have reared from southern Florida, will key to the "*mancus* group" in Pinder & Reiss (1983). However, the pupa does not key there and represents an additional "type" not keyed in Pinder & Reiss (1986). The genus *Lenziella* (used in Coffman & Ferrington (1984)) is a subgenus of *Cladotanytarsus,* following Sublette & Sublette (1979).

Larvae are found in many types of water bodies, including brackish water and hot springs. Bilyj & Davies (1989) found that some species were intolerant to acidification, but noted that *C. aeiparthenus* was apparently acidophilic.

ADDITIONAL REFERENCES: Bilyj & Davies 1989.



mentum



mentum

antenna & base

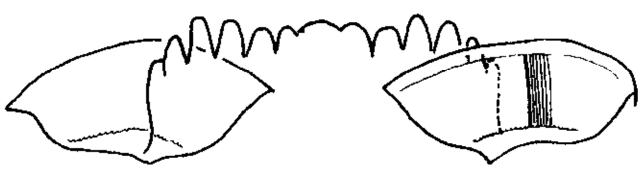
Cladotanytarsus sp., larval structures

Genus *Constempellina*

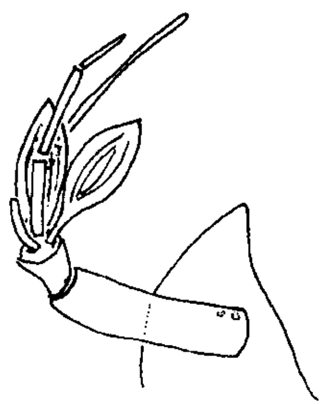
DIAGNOSIS: The granulose head capsule; widely separated, squat ventromental plates; Lauterborn organs arising from apex of antennal segment 2; and antennal base with simple spur serve to distinguish the genus.

NOTES: I have seen a single larval specimen from northwestern Florida, where it occurred in a drift sample with specimens of *Stempellina* and *Stempellinella*. The specimen bears moderately large tubercles anterolaterally on the head capsule.

Larvae are stream dwellers; they construct portable sand cases, similar to those of *Stempellina*.



mentum



antenna

Constempellina sp., larval structures

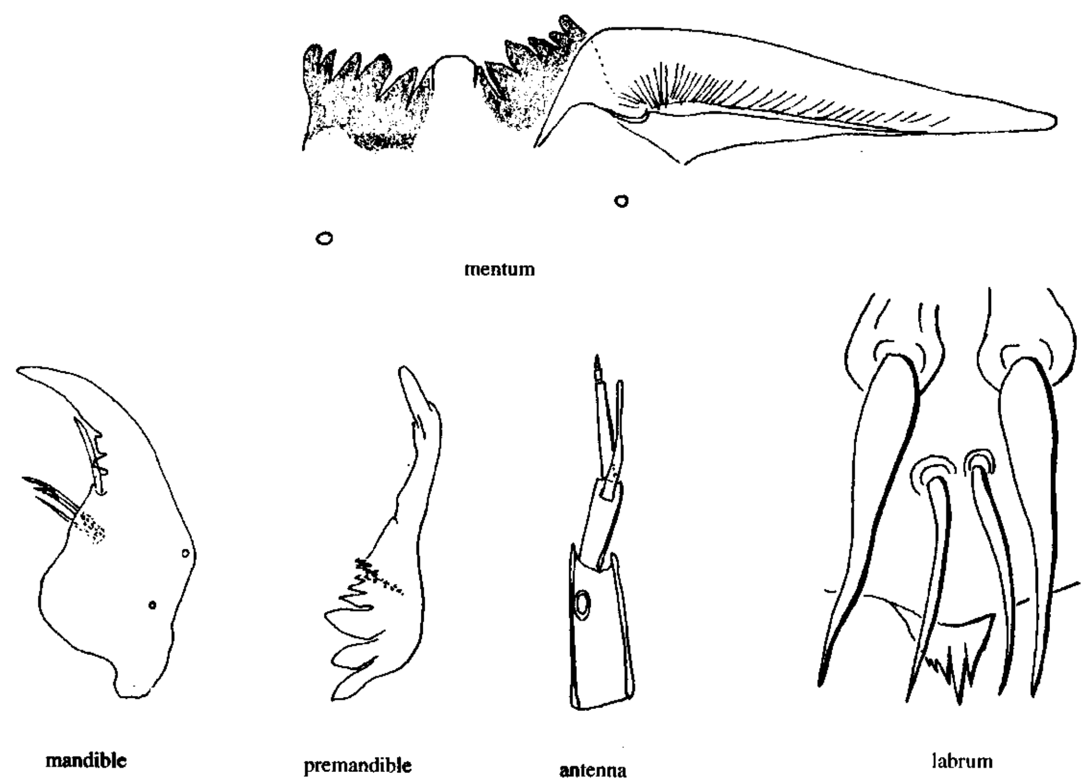
Genus *Cryptochironomus*

DIAGNOSIS: The five segmented antennae; well developed S I; trifid pecten epipharyngis; premandible with weak brush; and mentum with clear rounded median tooth flanked by dark, pointed lateral teeth which point inward identify the genus.

NOTES: Eight species are recorded from Florida, based on adults. It is not possible at this time to identify most larvae; a revision of the genus is greatly needed. Adults are difficult to separate; the pupae may provide the best characters for species recognition. Although Curry (1958) provided keys to separate some larvae and pupae, identifications of Florida larvae made with those keys can only be considered tentative (some the taxa used by Curry may consist of more than one species). Members of the *C. fulvus* group are most often encountered; the group currently consists of at least seven described species (Mason 1985b).

Larvae are usually found in bottom sediments.

ADDITIONAL REFERENCES: Curry 1958; Mason 1985b; Townes 1945.



Cryptochironomus sp., larval structures

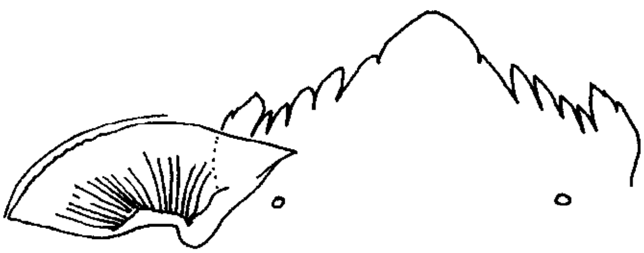
Genus *Cryptotendipes*

DIAGNOSIS: The mentum, with outer lateral teeth enlarged and with median tooth simple or notched laterally and projecting strongly forward from remainder of mentum; premandible with brush; and antennae with length of the basal segment usually about 2-2.5 X its width, will identify the larvae.

NOTES: Two species are recorded from Florida. Preliminary investigation indicates that the *C. casuarius* of Beck & Beck (1969b) is probably *C. emorsus*; separating these two species is difficult unless specimens are prepared correctly. Insufficient material is available to construct a key.

Larvae are found in lentic and lotic conditions where they are apparently most often found in sediments.

ADDITIONAL REFERENCES: Beck & Beck 1969b; Sæther 1977; Townes 1945.



mentum

antenna

Cryptotendipes sp., larval structures

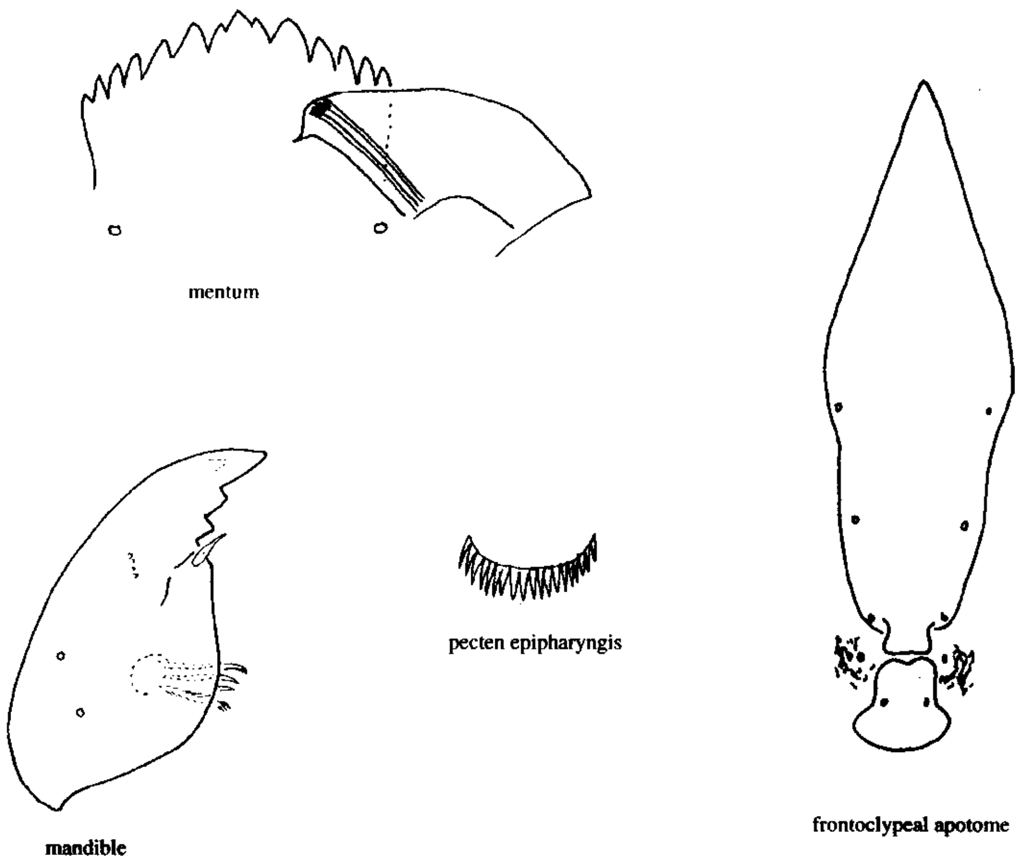
Genus ***Demeijerea***

DIAGNOSIS: The mandible, with 2 inner teeth and lacking basal row of striae; bifid premandible; pecten epipharyngis a single plate with multiple teeth; and single pair of ventral tubules identify this genus.

NOTES: One species is recorded from Florida. Species were formerly placed in *Glyptotendipes*. There is some uncertainty in the literature regarding the morphology of Nearctic *Demeijerea* larvae. Pinder & Reiss (1983) stated that the frontoclypeal apotome had a large long to oval depression, but it is not illustrated as such for two Nearctic species (figs. 10.15D, E); and that the mandible lacks a dorsal tooth, yet one is illustrated in fig. 10.15C.

Larvae are reported to mine in Bryozoa and sponges; M. Heyn (pers. comm.) has found the larvae of *D. atrimanus* mining in the stems of Bur-reed, *Sparganium americanum.*

ADDITIONAL REFERENCES: Townes 1945.



D. atrimanus, larval structures
(from Pinder & Reiss 1983)

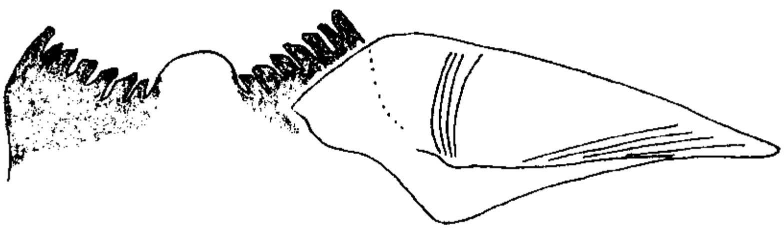
Genus ***Demicryptochironomus***

DIAGNOSIS: The 7 segmented antennae; and mentum with clear rounded median tooth flanked by dark, pointed lateral teeth which point inward will separate larvae of this genus.

NOTES: Two species are known from the eastern U.S. I have seen Florida larvae, but adults are necessary for species identification.

Larvae are found in sediments, and are predators.

ADDITIONAL REFERENCES: Sæther 1977; Townes 1945.



mentum

antenna

Demicryptochironomus sp., larval structures
(Pennsylvania specimen)

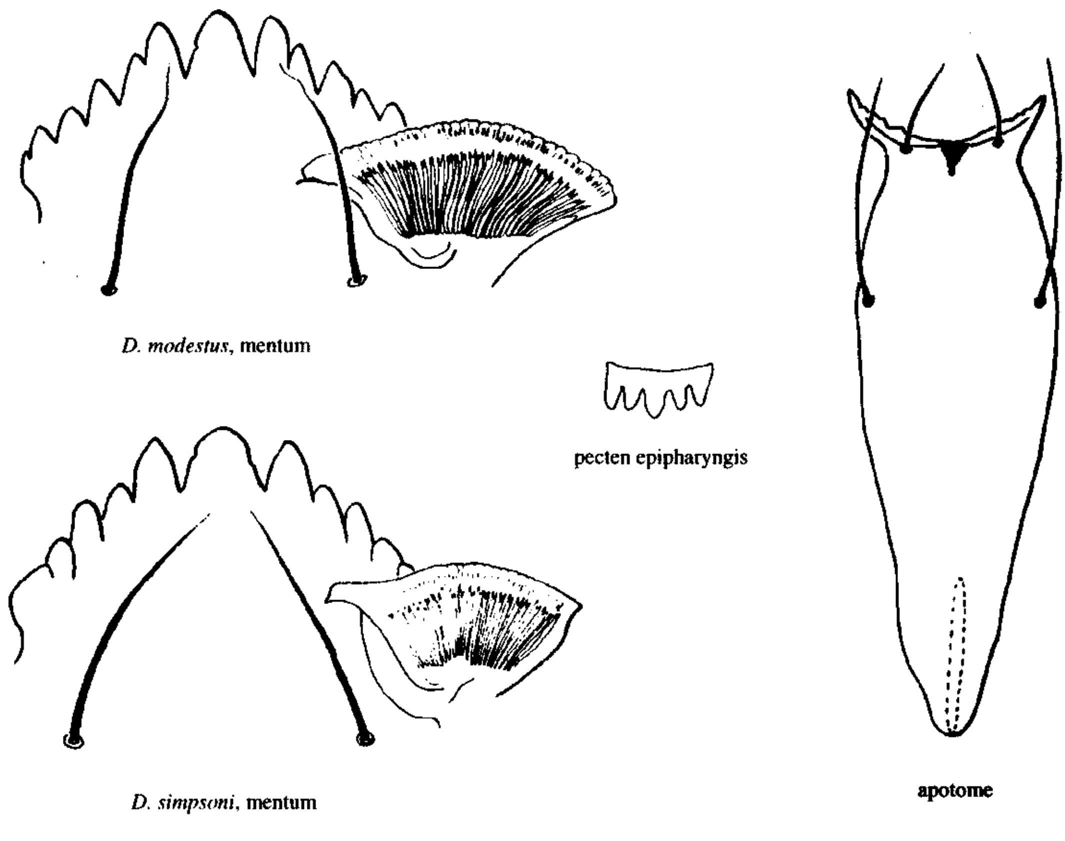
Genus *Dicrotendipes*

DIAGNOSIS: Florida *Dicrotendipes* larvae possess a frontal apotome with an anteromedian pit or large depression and with 2 medial labral sclerites anterior to it; pecten epipharyngis with fewer than 12 teeth/lobes (usually 3-6); narrow triangulum occipitale; and the ventromental plate width is less than the width of mentum.

NOTES: Ten described species are recorded from Florida; one additional undescribed species (sp. A) has been reared and another probably new species also occurs in south FL. Species of this genus have often been misidentified due to incorrect keys in the literature (Beck 1976,1979; Webb & Brigham 1982). Several species are distinctive, but others must be associated with pupae or adult males for correct identification.

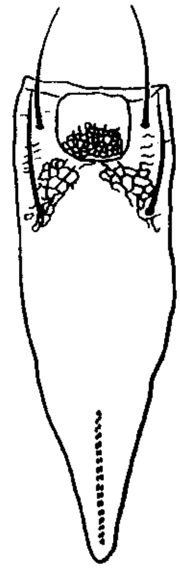
Larvae are found in brackish and fresh water, in lotic and lentic conditions, in pristine or degraded habitats. Larvae occur in sediments but are most often encountered on vegetation.

ADDITIONAL REFERENCES: Epler 1987, 1988b.



Dicrotendipes spp., larval structures

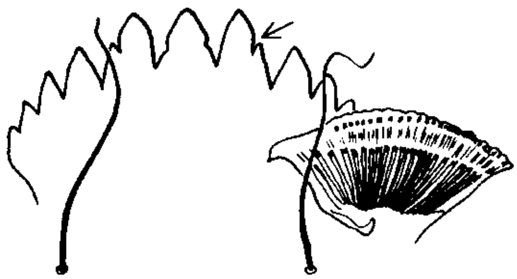
Key to Florida *Dicrotendipes*



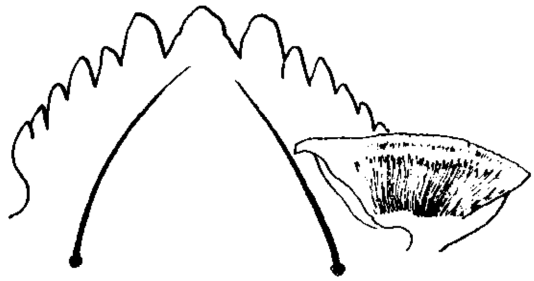
1 Apotome with large oval-quadrate area on anterior portion; ventromental plates usually with more than 40 strial ridges .... ***D. leucoscelis***

1' Apotome without large oval-quadrate area, but with anteromedian pit; ventromental plates usually with less than 40 strial ridges 2

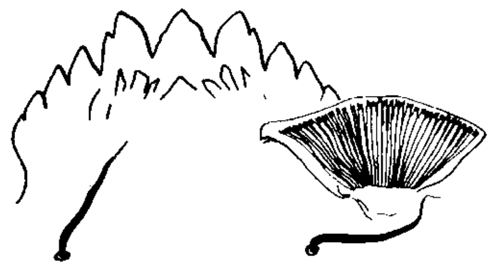
2 (1') Mentum with second lateral tooth fused or closely appressed to first lateral tooth for most of its length 3



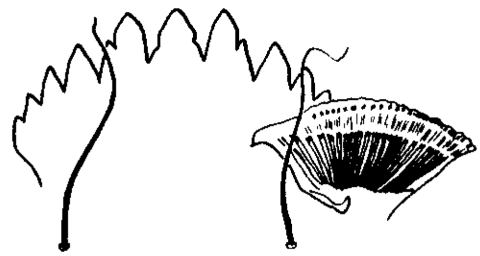
2' Mentum with second lateral tooth **not** fused or closely appressed to first lateral tooth for most of its length 6



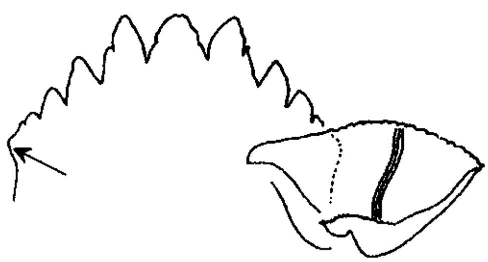
3 (2) Anterior margin of ventromental plate smooth; anal tubules reduced; brackish water/estuarine species .... ***D. lobus***



3' Anterior margin of ventromental plate at least partially crenulated; anal tubules normal; mostly freshwater species 4

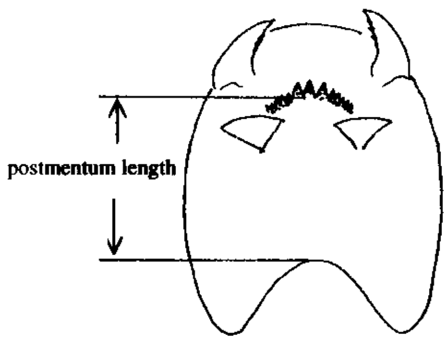


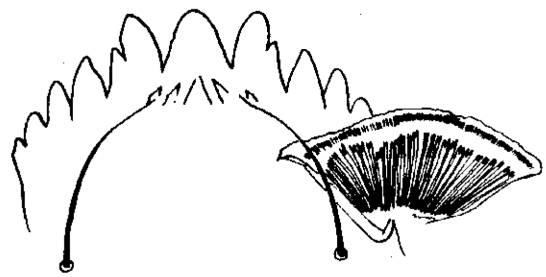
4 (3') 6th lateral tooth of mentum rounded and fused/appressed to 5th lateral tooth; central and south FL .... ***D.* sp. A**



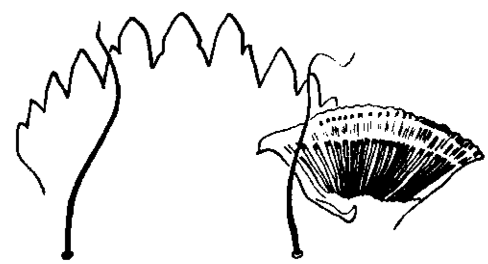
4' 6th lateral tooth distinct, not fused/appressed to 5th lateral tooth 5

5 (4') Large species (4th instar only!: postmentum length > 250 µm; mentum width > 150 µm); pecten mandibularis with more than 12 setae (usually 14); head capsule integument appears coarsely granular at 400X; first lateral teeth turn out slightly; uncommon/rare in FL .... ***D. fumidus***

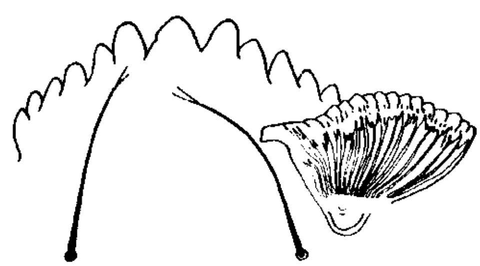




5' Smaller species (4th instar only!: postmentum length < 250 µm; mentum width < 150 µm); pecten mandibularis with 12 or fewer setae (usually 9); head capsule integument usually not coarsely granulated or granularity restricted to bands/spots; first lateral teeth usually not directed outward; common in running water . ***D. neomodestus***

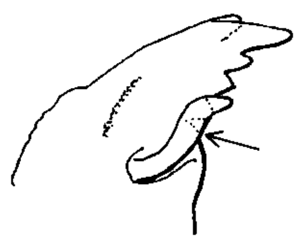


6 (2') Ventromental plates coarsely scalloped and with less than 22 strial ridges; head capsule usually pale yellow with strong reticulations .... ***D. thanatogratus***



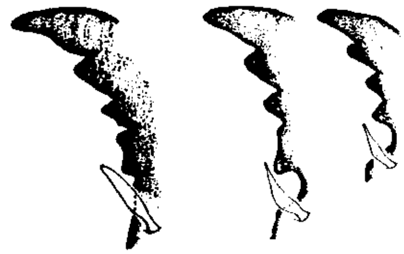
6' Ventromental plates not as coarsely scalloped, with more than 22 strial ridges; head capsule color variable, if pale yellow then without strong reticulations 7

7 (6') Mandible with giant seta subdentalis .. ***D.* sp. B**



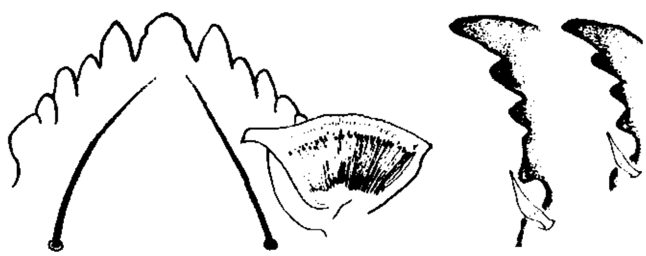
7' Mandible with normal seta subdentalis 8

8 (7') Proximal tooth of mandible saddle-shaped or with 2 points OR with inner surface of mandible adjacent to proximal tooth with deep semicircular incision 9

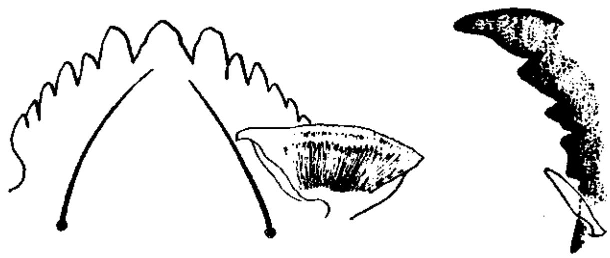


8' Proximal tooth of mandible mostly triangular in outline 10

9 (8) 6th lateral tooth of mentum rounded and fused/appressed to 5th lateral tooth; inner surface of mandible adjacent to proximal tooth with deep semicircular incision .... ***D. simpsoni***

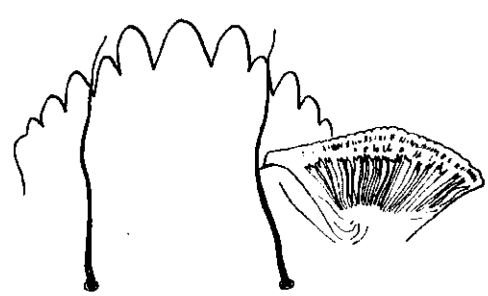


9' 6th lateral tooth of mentum pointed; mandible without deep incision .... ***D. lucifer***



10 (8') 6th lateral tooth of mentum rounded and fused/appressed to 5th lateral tooth .... ***D. nervosus***

(**3rd instar** *D. simpsoni* will key here)

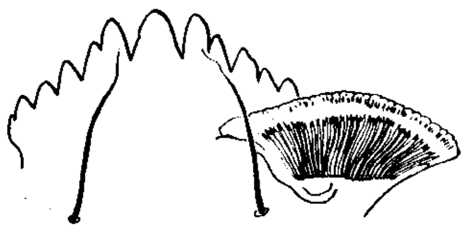


10' **6th lateral tooth of mentum pointed, not appressed to 5th** 11

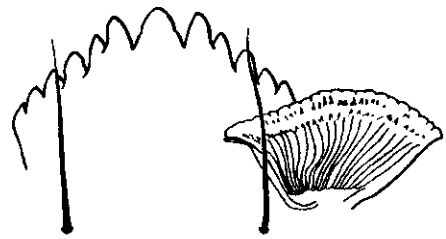
11 (10') Large species (4th instar only!: postmentum length > 250 μm; mentum width > 150 μm); pecten mandibularis with more than 12 setae (usually 14); head capsule integument appears coarsely granular at 400X; first lateral teeth turn out slightly; uncommon/rare in FL .... ***D. fumidus***
(see couplet 5)

11' Smaller species (4th instar only!: postmentum length < 250 μm; mentum width < 150 μm); pecten mandibularis with 10-15 setae (usually 10-11); head capsule integument usually not coarsely granulated or granularity restricted to bands/spots; first lateral teeth usually not directed outward; common in FL 12

12 (11') Ventromental plate with 28-36, mean 32, strial ridges; postmentum often darkened, *occasionally pale* .... ***D. modestus***



12' Ventromental plate with 23-29, mean 25, strial ridges; postmentum usually pale, occasionally darkened near posterior margin .... ***D. tritomus***



Notes on species

D. fumidus - I have not seen this species from Florida; it was recorded by Beck & Beck (1959).

D. leucoscelis - Uncommon. This species sometimes develops a pair of ventral tubules. I have seen a specimen that, according to collection data, was reared from water held by a bromeliad. It is not keyed correctly in Beck (1976,1979); identifications of this species made using those keys are most probably incorrect.

D. lobus - A brackish water-estuarine species. It is not keyed correctly in Beck (1976,1979); the taxon referred to as *D. lobus* in that key is probably *D. thanatogratus*.

D. lucifer - A member of the *nervosus* group. Usually not common. This is *D. nervosus* Type I of Simpson & Bode (1980)

D. modestus - Probably the most common *Dicrotendipes* in Florida. Many specimens bear dark markings on the postmentum and/or the dorsum of the head, but this species is often found without any dark markings. Note that many other species of *Dicrotendipes* often have dark markings on the postmentum and head. Specimens are sometimes encountered which appear to be intermediate between this species and *D. neomodestus*.

Larval *D. modestus* are difficult to separate from *D. tritomus*; specimens from populations with pale submenta should be reared for proper identification. Larvae are found in a variety of lentic (usually) water habitats, including brackish water, and can tolerate moderate levels of organic pollution.

D. neomodestus - A common species of rivers, often abundant on Hester-Dendy samplers. It is often found in areas with high nutrients/organic wastes. Although most specimens bear darkened areas on the postmentum and the dorsum of the head, specimens are sometimes encountered (as in the Apalachicola River) without the dark dorsal stripe.

D. nervosus - A rare species in Florida. Most previous records for this species refer to *D. simpsoni* or *D. lucifer*. Note that some second and third instar larvae of these two species lack the modifications of the proximal mandibular teeth, and will key to *D. nervosus*. Identification of this species *must* be confirmed with reared adult males!

D. simpsoni - A common species almost always associated with high nutrient levels or low dissolved oxygen. Early instar larvae sometimes do not display the modifications of the proximal mandibular teeth, and will key to *D. nervosus*. Some larvae develop ventral tubules. This species was called *Einfeldia* in Mason (1973) and *D. nervosus* Type II in Simpson & Bode (1980).

D. thanatogratus - An uncommon species of rivers and streams; most specimens I have examined are from the Panhandle. It will key to *D. lobus* in Beck (1976,1979).

D. tritomus - Formerly called *D. incurvus*; it was also misidentified as *D. aethiops* in Beck & Beck (1959). Specimens are difficult to separate from some *D. modestus*. Identification should be confirmed by rearing!

D. sp. A - An undescribed species common in Lake Okeechobee. I have reared this species; it will be described in all life stages in a forthcoming publication.

D. sp. B - This may represent another undescribed species; only larvae are known. It has been found in central and southern FL.

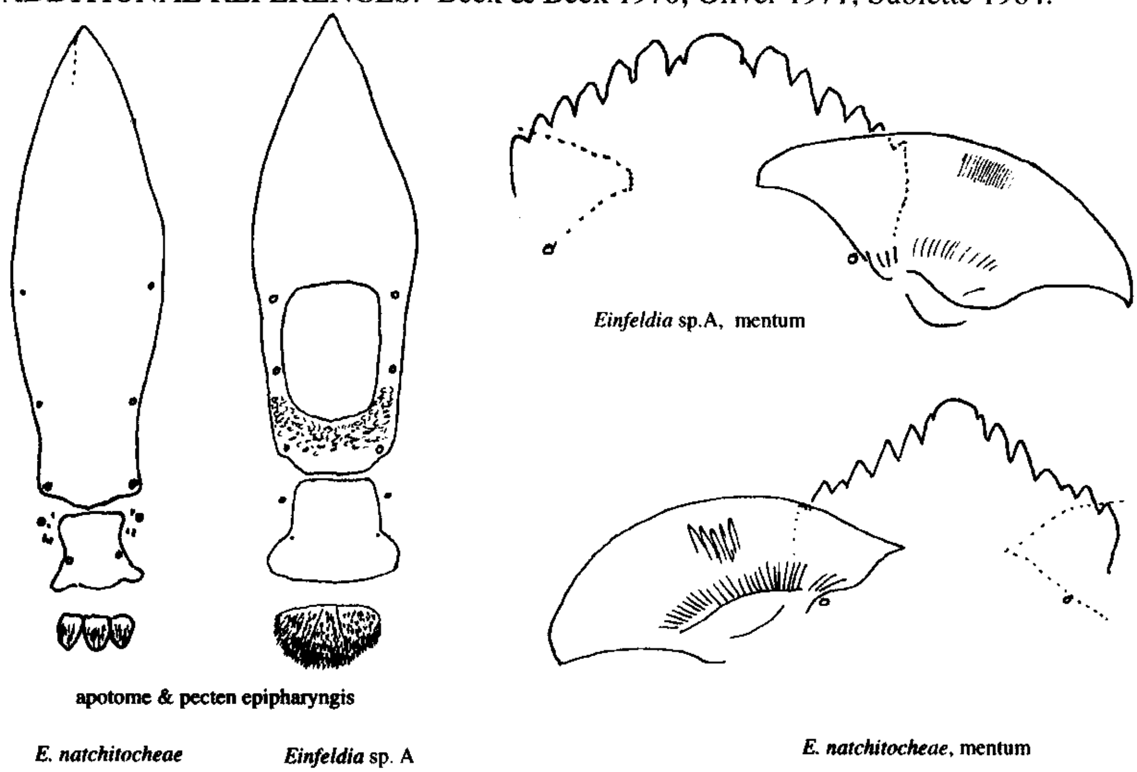
Genus *Einfeldia*

DIAGNOSIS: A difficult genus to diagnose. Larvae may or may not have radial striae near the base of the mandible; a frontoclypeal apotome with or without an anteromedian oval to subquadrate area; a pecten epipharyngis of three spinule covered plates, or a simple comb, or a weakly trifid comb with minute spinules; and none, one or two pairs of ventral tubules.

NOTES: *Einfeldia* is a taxonomic mess, and is in drastic need of revision. Of the three species recorded from the state, two may not belong in the genus: *E. austini* may be a *Chironomus*, and *E. natchitocheae* may deserve separate generic status. Note that some *E. austini* may key to *Glyptotendipes* in the generic key, but *Glyptotendipes* larvae possess two medial labral sclerites; *E. austini* has one. *Einfeldia* species groups B and C of Pinder & Reiss (1983) are now placed in *Chironomus*. The undescribed *Einfeldia* sp. A illustrated below has a weakly tripartite pecten epipharyngis covered with minute spinules; this taxon may be confused with "*E.*" species group B (= *Chironomus*), but it has a frontoclypeal apotome with a large anteromedian oval/quadrate area, the pecten epipharyngis is weakly trifid and radially arranged striae near the base of the mandible are lacking. This new species will be described in a forthcoming publication.

Larvae are most often found in eutrophic lentic habitats, but can occur in flowing water.

ADDITIONAL REFERENCES: Beck & Beck 1970; Oliver 1971; Sublette 1964.

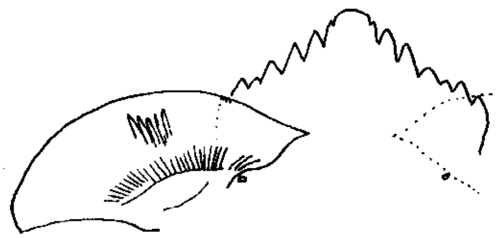


Einfeldia spp., larval structures

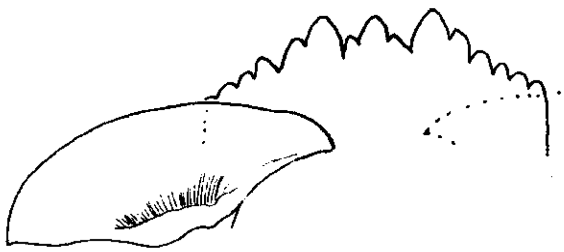
Key to Florida *Einfeldia*

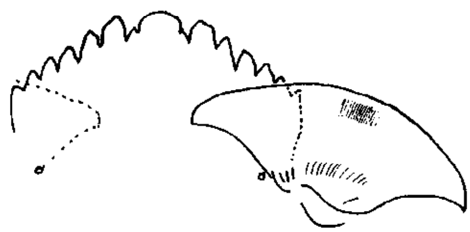
(the larva of *E. brunneipennis* is unknown)

1 **Median tooth of mentum strongly projects beyond lateral teeth; pecten epipharyngis of 3 plates bearing spinules .... *E. natchitocheae***



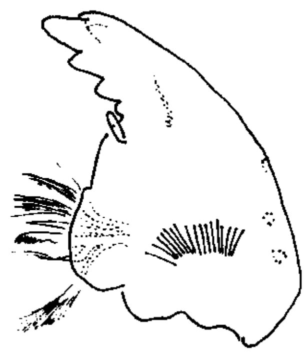
1' **Median tooth of mentum subequal to first pair of lateral teeth; pecten epipharyngis consists of single plate or comb, or weakly tripartite** 2



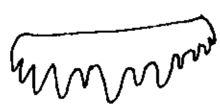


2 (1') Mandible with radially arranged striae near base .... ***E. austini***

2' Mandible without basal striae 3



3(2') Pecten epipharyngis a simple multitoothed comb .... ***E. pagana***
(not recorded from Florida)



3' Pecten epipharyngis weakly tripartite and covered with minute spinules .... ***E.* sp. A**

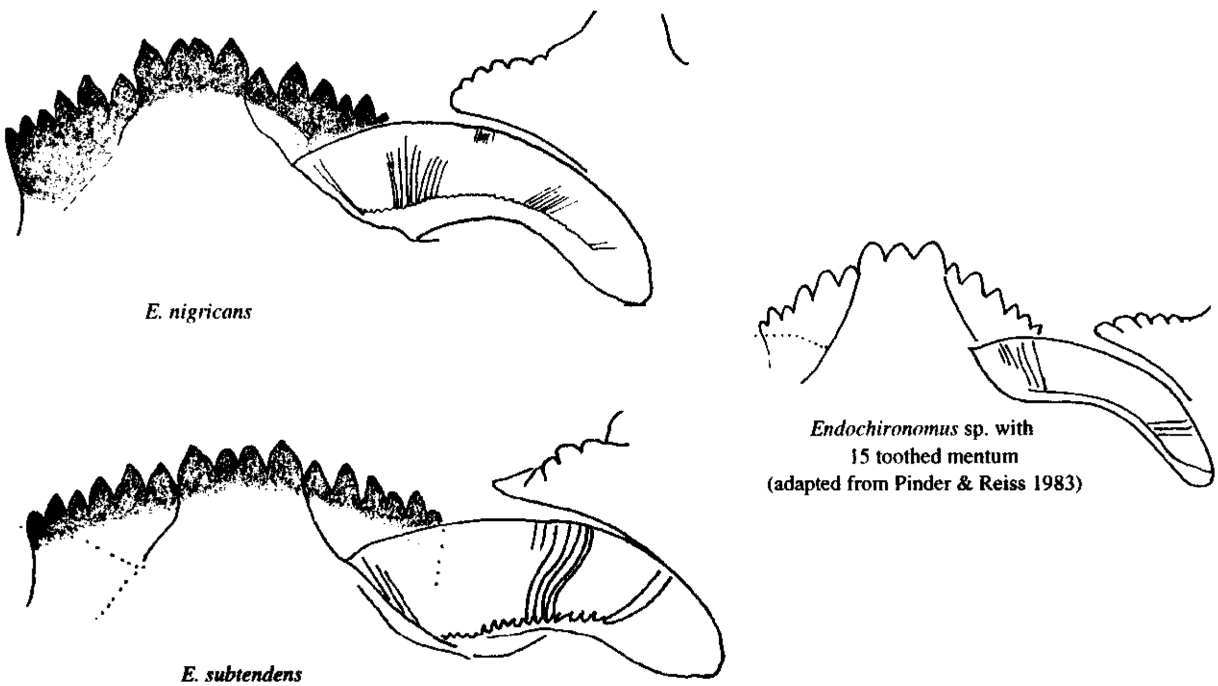
Genus ***Endochironomus***

DIAGNOSIS: Florida larvae are diagnosed by the mentum with an even number of teeth (some species, not recorded from Florida, have an odd number of teeth on the mentum), with the median teeth separated from remainder of mentum by a line which runs posteriorly to the anteromedial margin of the ventromental plates; ventromental plates with anterior and posterior margins parallel for most of their length; and anterior margin of cardo tuberculate.

NOTES: Two species are known from Florida; *E. nigricans* is by far more common. The two species may be separated by the amount of darkened area on the mentum: in *E. subtendens* only the teeth and the area near them are darkened; in *E. nigricans* the darkened area is much larger. Also, the first lateral tooth of the mentum may appear larger and the second lateral tooth appear lower (in relation to its neighbors) in *E. nigricans*. *Endochironomus* species with an odd number of teeth on the mentum have not been recorded from Florida.

Both Florida *Endochironomus* species are often found in eutrophic conditions, most often in running water; I've seen larvae of *E. nigricans* from the northern Everglades.

ADDITIONAL REFERENCES: Grodhaus 1987a.



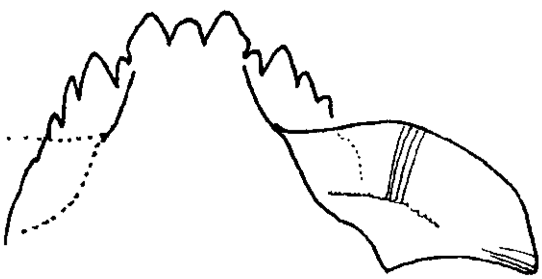
Endochironomus **spp.**, mentum and anterior margin of cardo

Genus *Endotribelos*

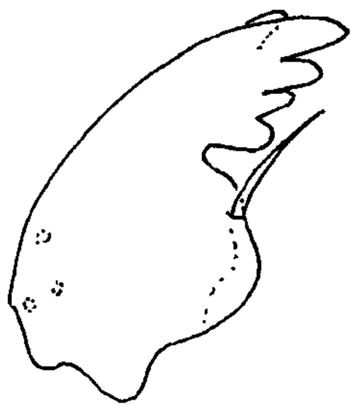
DIAGNOSIS: The distinctive strongly arched mentum, with 3 large central teeth, and with second lateral teeth very small and mostly fused to first; and the mandible, with large incised area at base of inner teeth, will distinguish this genus in Florida.

NOTES: One species, *E. hesperium*, is recorded from Florida. Larvae are associated with aquatic macrophytes; Grodhaus (1987a) found larvae inside the leaves of *Sagittaria* and *Typha* in California. Several other species are known from Central America (Sublette & Sasa 1994), including one that has a mentum with an even number of teeth and a mandible that lacks the deep incision; and another, undescribed species that closely resembles *E. hesperium*.

ADDITIONAL REFERENCES: Grodhaus 1987a; Sublette & Sasa 1994.



mentum



mandible

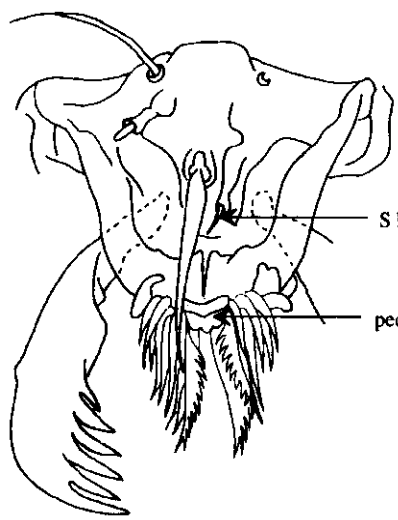
E. hesperium, larval structures
(adapted from Grodhaus 1987a)

Genus ***Gillotia***

DIAGNOSIS: The minute S I; small, weakly trilobed, plate-like pecten epipharyngis; brushless premandible; and mentum with pale median area and obliquely arranged dark lateral teeth will identify this genus.

NOTES: This genus has not been recorded from Florida; it may eventually be found here.

ADDITIONAL REFERENCES : Sæther 1977.



labro-epipharyngeal area

mentum

G. alboviridis, larval structures
(adapted from Pinder & Reiss 1983)

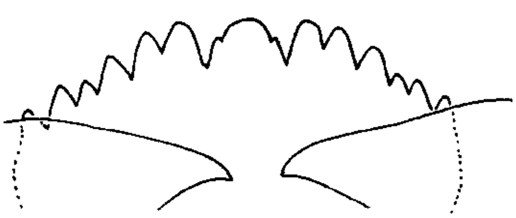
Genus *Glyptotendipes*

DIAGNOSIS: Florida larvae are identified by the frontal apotome (with 2 medial labral sclerites anterior to it); usually simple seta subdentalis (may be notched or roughly serrate, but never fringed with small teeth); mentum with 13 teeth, width usually less than width of one ventromental plate; wide triangulum occipitale; ventral (ventrolateral) tubules absent, rudimentary or one pair.

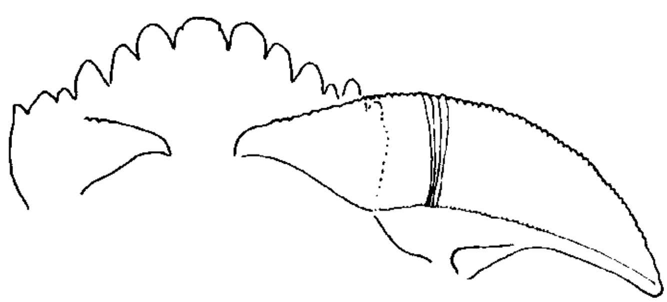
NOTES: *Glyptotendipes* is currently being revised by Michael Heyn, Clemson University. He has graciously provided material and comments regarding the genus. Heyn (1992) established three subgenera within *Glyptotendipes*. With the exception of *G. amplus* and *G. seminole*, all Florida species are placed in the subgenus *G. (Glyptotendipes)* (see Notes). Several undescribed species occur in Florida; records of *G. lobiferus* and *G. meridionalis* based solely on larvae probably refer to undescribed species. Larvae and adults are confusingly similar; pupae provide the best characters for species identification. The key which follows must be considered tentative, pending the publication of Heyn's study. Material should be reared to confirm species level identifications for many taxa!

Larvae occur in standing and running water and are found in or on sediments and aquatic plants. Several species are miners in plants or decaying wood. At least one species, *G. paripes*, is considered a nuisance because of large emergences.

ADDITIONAL REFERENCES: Townes 1945; Heyn 1992.

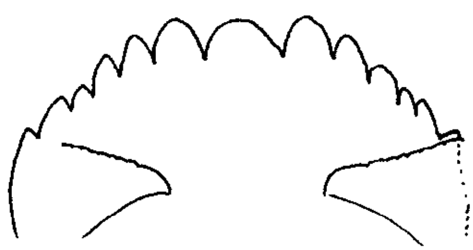


G. paripes



G. sp. B

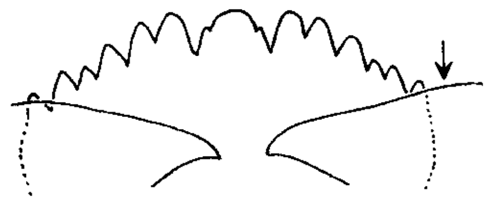
G. sp. G



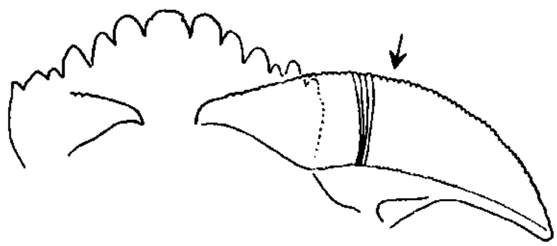
G. meridionalis

Glyptotendipes sp., larval menta

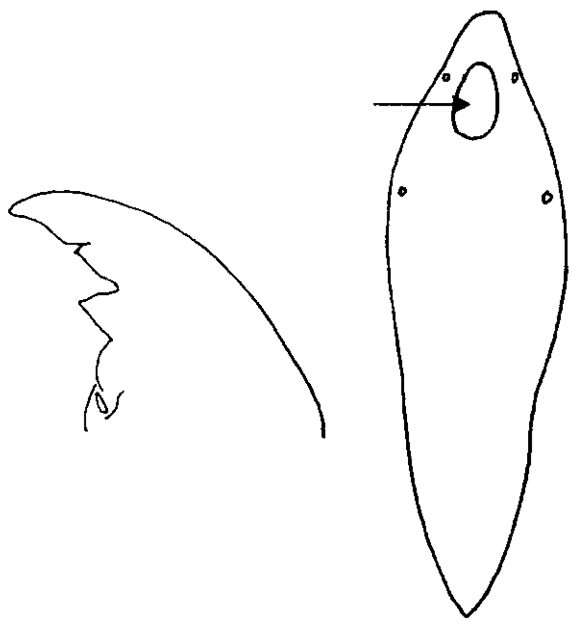
Key to Florida *Glyptotendipes*



1 Anterior margin of ventromental plate smooth or almost so (tiny points may be visible near margin at high magnification) 2



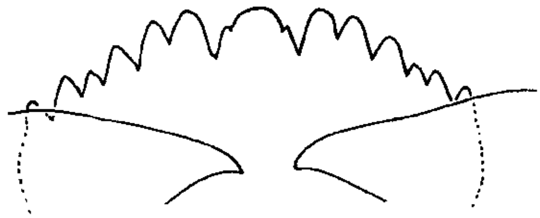
1' Anterior margin of ventromental plate noticeably crenulate 4



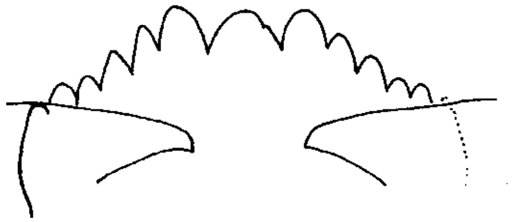
2 (1) Mandible with proximal inner tooth reduced/vestigial and distal tooth appressed to apical tooth; frontal apotome with subapical elongate oval area .... ***G. amplus***

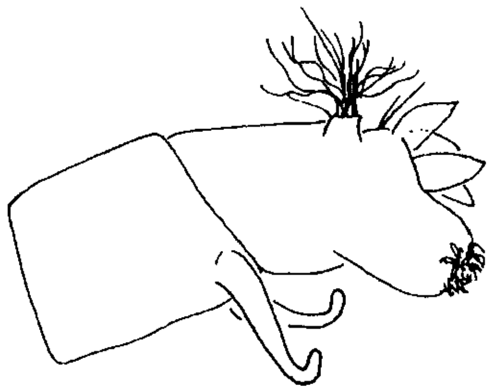
2' **Mandible with 3 well developed inner teeth; apotome without subapical elongate oval area** 3

3 (2') Ventromental plates separated by less than width of median tooth of mentum; at most only rudimentary ventrolateral tubules present; with internal dark structure posterolaterad to ventromental plate; common in FL lakes .... ***G. paripes***



3' Ventromental plates separated by width of median tooth (or more); well developed ventrolateral tubules present; without internal dark structure; not recorded from FL .... ***G. barbipes***

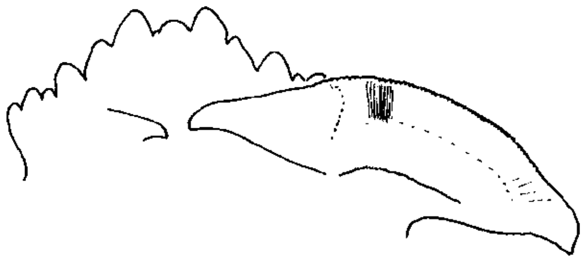


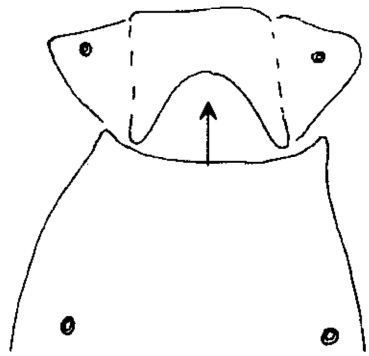


4 (1') Proximal inner tooth of mandible larger than middle tooth; pecten epipharyngis with blunt teeth and apparently tripartite; S FL .... ***G.* sp. E**

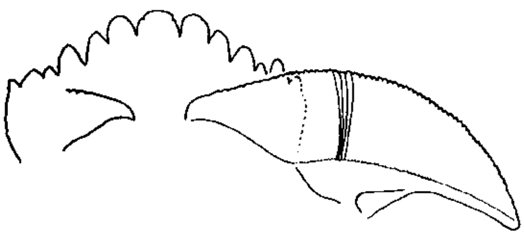
4' Proximal inner tooth of mandible smaller than middle tooth; pecten epipharyngis a comb with irregular or sharply pointed teeth; widespread ... 5

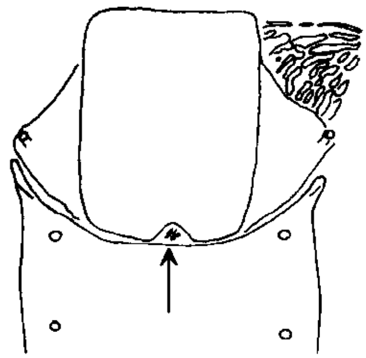
5 (4') 3 central teeth of mentum project forward from other lateral teeth; posterior margin of labral sclerite 1 deeply concave .... *G. seminole*



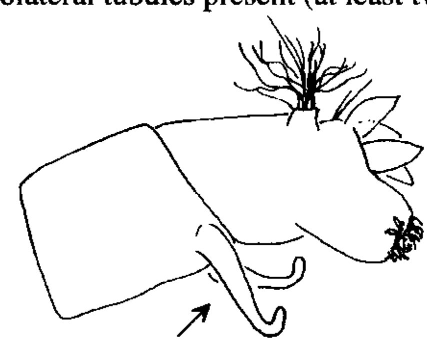


5' Mentum with teeth in even arch; posterior margin of labral sclerite 1 with small concave notch 6





6 (5') Well developed ventrolateral tubules present (at least twice as long as wide) 7

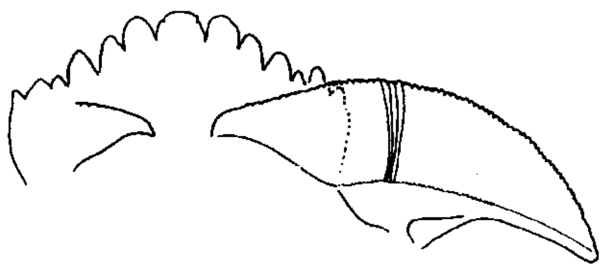


6' Ventrolateral tubules absent or rudimentary 8

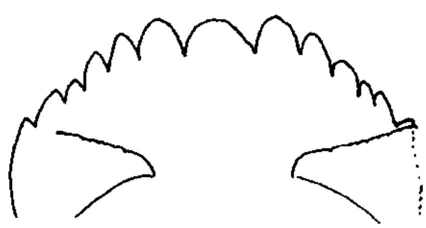
7 (6) Subapical lateral margin and dorsal surface of mandible smooth; ventrolateral tubules at least 2X length of anal tubules; mines in decaying wood .... ***G. testaceus***

7' Subapical lateral margin and dorsal surface of mandible wrinkled or set with low, mound-like tubercules; ventrolateral tubules subequal to length of anal tubules; not restricted to decaying wood .... ***G.* sp. F**

8 (6') Width of median tooth of mentum subequal to distance between ventromental plates .... ***G.* sp. B**



8' Width of median tooth of mentum about 0.5 - 0.7 distance between ventromental plates 9



9 (8') 4th instar only: mentum width < 200 µm; postmentum length about 300 µm .... ***G. meridionalis***

9' 4th instar only: mentum width > 200 µm; postmentum length about 400 µm .... ***G.* sp. G**

Notes on species

G. amplus - I have seen a single Florida larva which is indistinguishable from reared Ohio material of this species. Following Heyn's (1992) paper on the subgenera of the genus, this taxon is a member of the subgenus *G. (Trichotendipes).* This equates with Pinder & Reiss' (1983) species group C.

G. barbipes - This species has not been recorded from FL, but may be found here. I have seen material from a sewage lagoon in GA.

G. meridionalis - Unassociated larvae of this species are difficult to separate from *G.* sp. G. Pupae provide better separation characters, but are undescribed. Heyn's revision, when published, should make separation of these species possible.

G. paripes - A large, common species of many lakes in FL.

G. seminole- An unusual species; it belongs to the subgenus *G. (Caulochironomus)*; this equates with species group B of Pinder & Reiss (1983).

G. testaceus - A large species with elongate ventrolateral tubules. It is an apparently obligate miner of decaying wood (Heyn, pers. comm.).

G. sp. B - An undescribed species; it is common.

G. sp. E - An undescribed species known from Highlands Co.

G. sp. F - This taxon is what Manuel (1976) called *G. meridionalis.* Heyn (pers. comm.) believes it represents an undescribed species.

G. sp. G - This species was called *G. lobiferus* by Beck & Beck (1969a). Heyn (pers. comm.) believes it represents an undescribed species. It is difficult or impossible to separate unassociated larvae of this species from *G. meridionalis.*

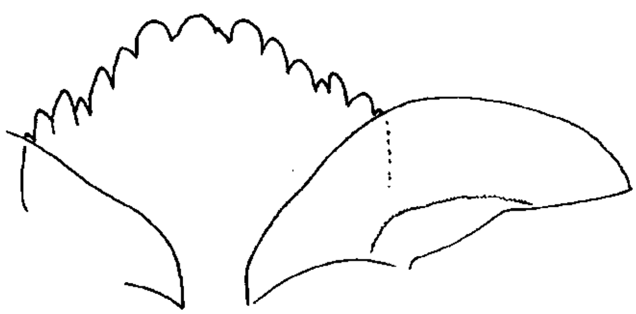
Genus *Goeldichironomus*

DIAGNOSIS: The frontal apotome (with 2 medial labral sclerites anterior to it); ventromental plates with inner angle directed caudad; elongate seta subdentalis with toothed or fringed lower margin; and 0, 1 or 2 pairs of ventral tubules will identify this genus.

NOTES: Seven taxa are recorded in this genus from Florida. The genus is mostly Neotropical, but many species apparently reach their northern limit in Florida. The species most often encountered are *G. carus* and *G. holoprasinus*.

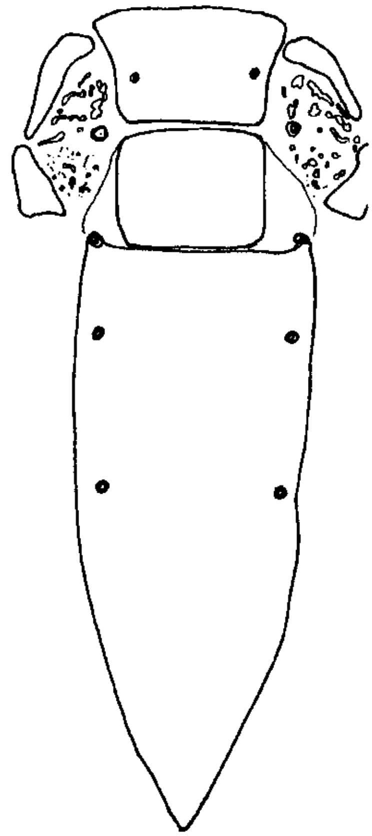
Larvae are found mostly in lentic habitats, and may occur in sediments, in or on plants and in floating mats of vegetation and wood, under conditions ranging from oligotrophic to hypereutrophic.

ADDITIONAL REFERENCES: Reiss 1974; Wirth 1979.



mentum

apex of mandible



apotome & sclerites

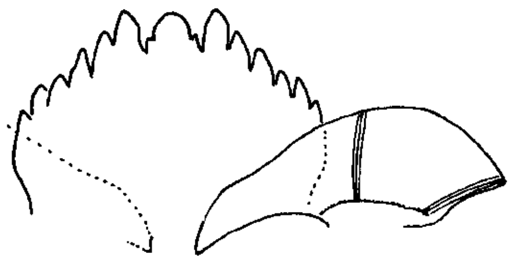
Goeldichironomus sp., larval structures

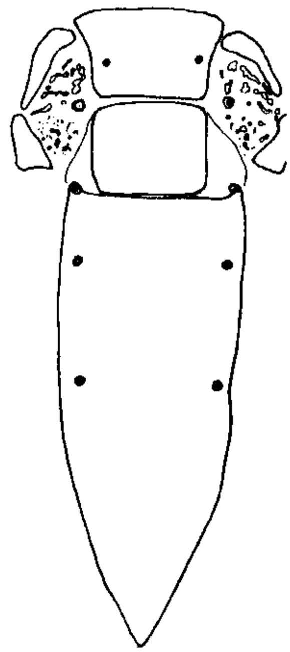
Key to Florida *Goeldichironomus*

1 Ventral tubules absent or rudimentary (length usually < 5X width) 2

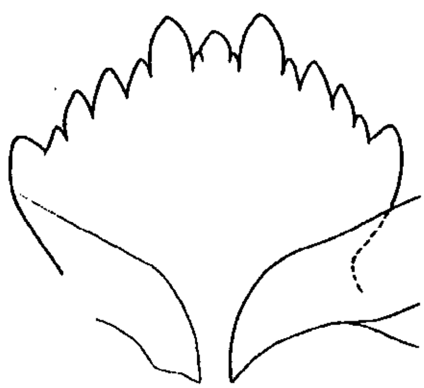
1' At least 1 pair of well developed ventral tubules present (length > 5X width) 3

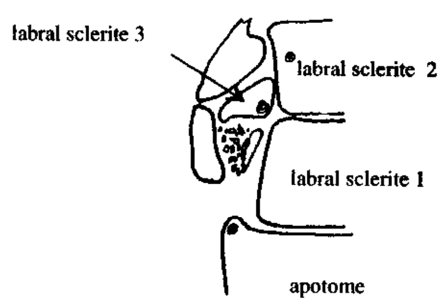
2 (1) Sixth lateral tooth of mentum small; labral sclerites 3 & 4 unconsolidated; anal tubules reduced; usually brackish water/salt marsh/estuarine species .... ***G. devineyae***
(some *G. holoprasinus* may key here; see Notes)





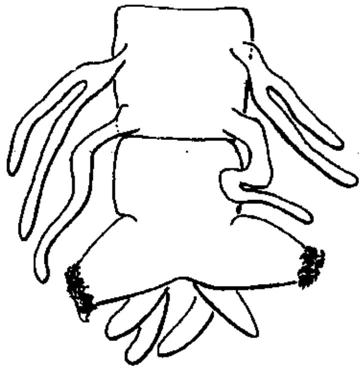
2' Sixth lateral tooth of mentum large; labral sclerite 3 present; anal tubules normal; usually freshwater species .... ***G. fluctuans***

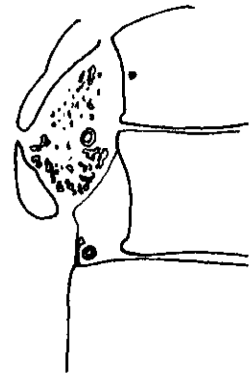


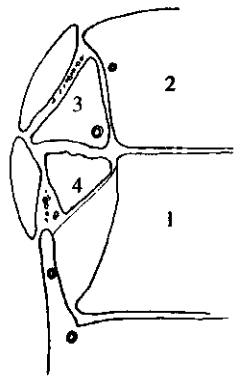


adapted from Reiss (1974)

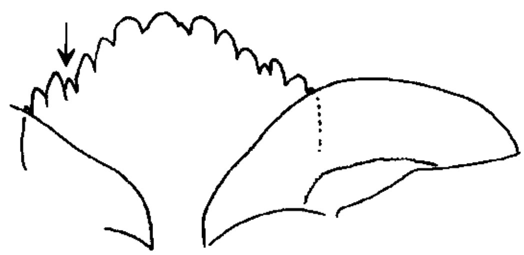
3 (1') Anterior pair of ventral tubules forked; labral sclerites 3 & 4 unconsolidated .... *G. holoprasinus*



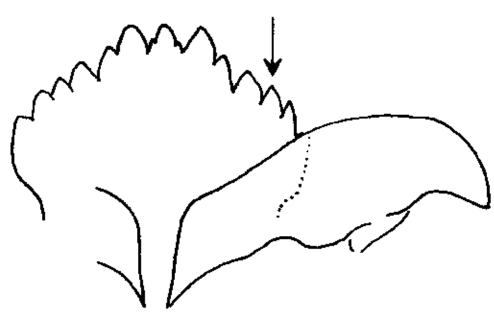




3' Anterior pair of ventral tubules simple; labral sclerite 3 **or** sclerites 3 & 4 present 4

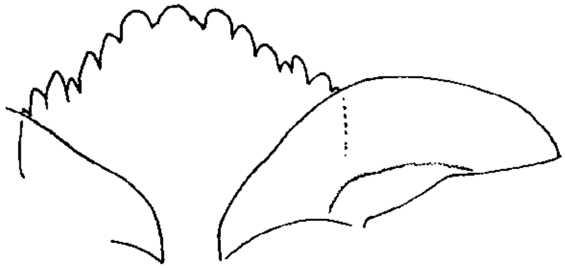


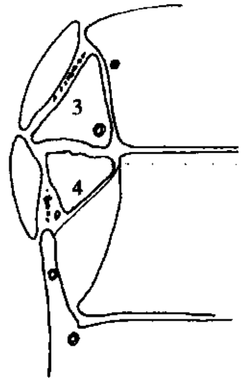
4 (3') 4th lateral tooth of mentum smaller than its neighbors 5



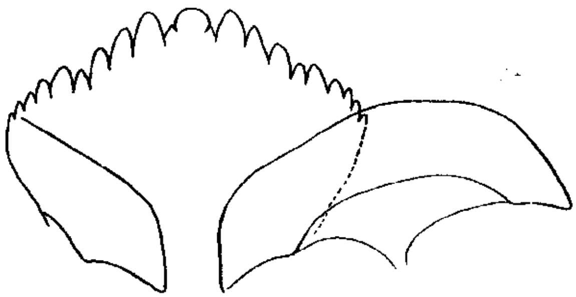
4' 4th lateral tooth subequal 6

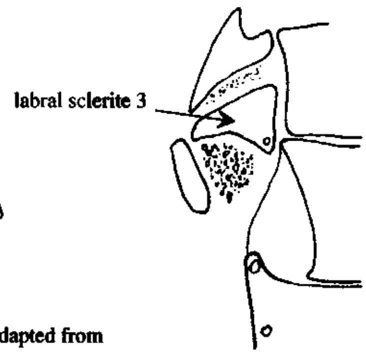
5 (4') Mentum with 15-17 teeth; labral sclerites 3 & 4 present; postmentum without tubercles; common in organically enriched habitats .... *G. carus*



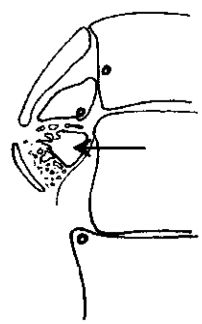


5' Mentum with more than 17 apparent teeth; labral sclerite 3 present, 4 unconsolidated; postmentum with pair of tubercles near hind margin (best seen in lateral view); more common in floating vegetation .... *G. pictus*

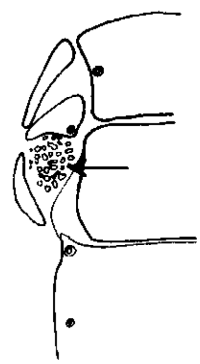




figures adapted from Reiss (1974)



6 (4') **Labral sclerite 4 partially consolidated on inner side** .... ***G. amazonicus***



6' Labral sclerite 4 unconsolidated, composed of rounded granules .... **G. cf.** ***natans***

Notes on species

G. amazonicus - Found in peninsular Florida, this benthic species can easily be confused with *G.* cf. *natans*. Be sure to observe the labral sclerites. Formerly called *Siolimyia amazonica*.

G. carus - Formerly placed in *Chironomus*, this widespread species was considered a nuisance species by Beck & Beck (1969a). Larvae are indicative of low dissolved oxygen, organically enriched habitats. I have collected larvae from small pools of water in an estuarine swamp.

G. devineyae - Formerly placed in *Nilodorum*, this species is apparently restricted to salt marshes/estuaries. However, B.A. Caldwell has collected an adult in inland GA. Larvae of *G. holoprasinus* may be confused with this species, especially if the posterior body segments have been lost or damaged. See below.

G. fluctuans - This uncommon species' presence in Florida has been confirmed by Dr. F Reiss (pers. comm.).

G. holoprasinus - A common to abundant species, especially in organically enriched habitats, it was considered a nuisance species by Beck & Beck (1969a). It is a pioneer species, often invading temporary water bodies. Specimens with lost or damaged posterior body segments may be confused with *G. devineyae*, a species which also lacks consolidated labral sclerites 3 & 4. However, *G. holoprasinus* larvae bear an additional dorsal tooth near the inner teeth of the mandible. Also, earlier instar larvae may bear two pairs of simple gills; rely on the absence of labral sclerites 3 & 4 and the dorsal "fourth inner" tooth of the mandible to identify this species. Formerly called *Chironomus fulvipilus*.

G. holoprasinus mandible; note "fourth inner" tooth

G. cf. *natans* - The identity of this taxon is unsure; only larvae have been seen. It is an uncommon species I have seen from the northern Everglades north to the Fenholloway River.

G. pictus - Hudson et al. (1990) list this species for Florida; I have not seen specimens.

At least three additional species occur in the Neotropics. See Reiss (1974) and Strixino & Strixino (1991) for more information.

Genus ***Harnischia***

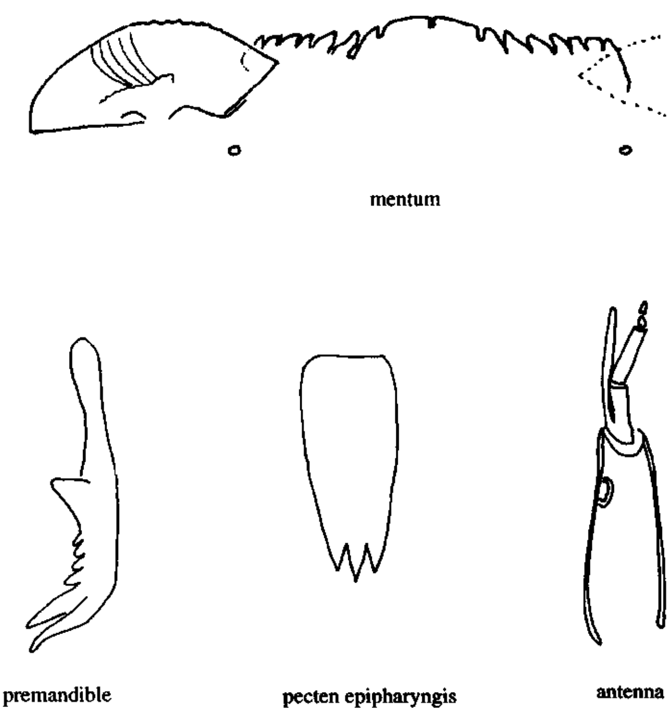
DIAGNOSIS: This member of the *Harnischia* complex is distinguished by the premandible with more than 3 teeth; the scale-like, distally trifid pecten epipharyngis; antennal segment 2 subequal to segment 3; and the weakly striated ventromental plates.

NOTES: One species, *H. curtilamellata*, is recorded from Florida. However, this does not mean that any *Harnischia* larva encountered in the state is that species. At least one other species, *H. incidata* occurs in the Southeast; I have seen adult specimens from SE Alabama; the larva is undescribed.

The *Harnischia* complex is a group of closely related genera initially proposed by Beck & Beck (1969b); further work was done on the group by Sæther (1977). The genera, which comprise couplets 14-28 in the generic key, are linked by several morphological characters in all life stages. All species placed in *Harnischia* by Beck & Beck (1969b) are now placed in *Cladopelma*.

Larvae occur in lakes, rivers and streams; they may be limited to relatively clean waters (Simpson & Bode 1980)

ADDITIONAL REFERENCES: Sæther 1977; Townes 1945.



Harnischia sp., larval structures

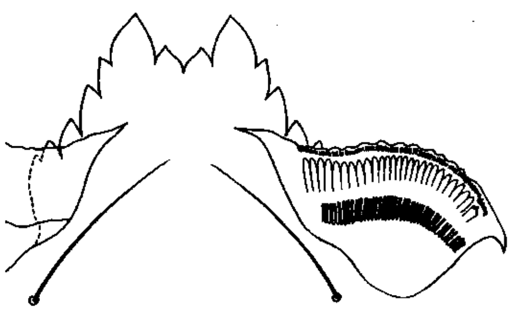
Genus ***Hyporhygma***

DIAGNOSIS: The mentum, with glossy blackish-brown teeth and distinctive shape; frontal apotome with 2 medial labral sclerites anterior to it; and the leaf-mining habit will distinguish the genus.

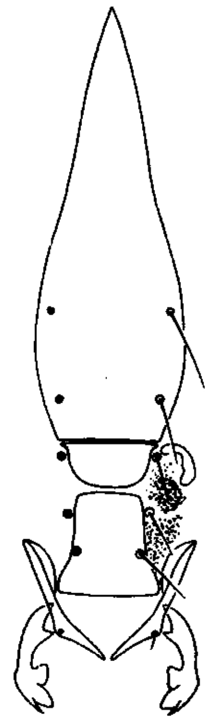
NOTES: One species, *H. quadripunctatum,* is known. It was formerly placed in *Tribelos* and *Endochironomus.*

Larvae mine in the leaves and stems of *Nuphar* and *Nymphaea.*

ADDITIONAL REFERENCES: Reiss 1982.



mentum



apotome & sclerites

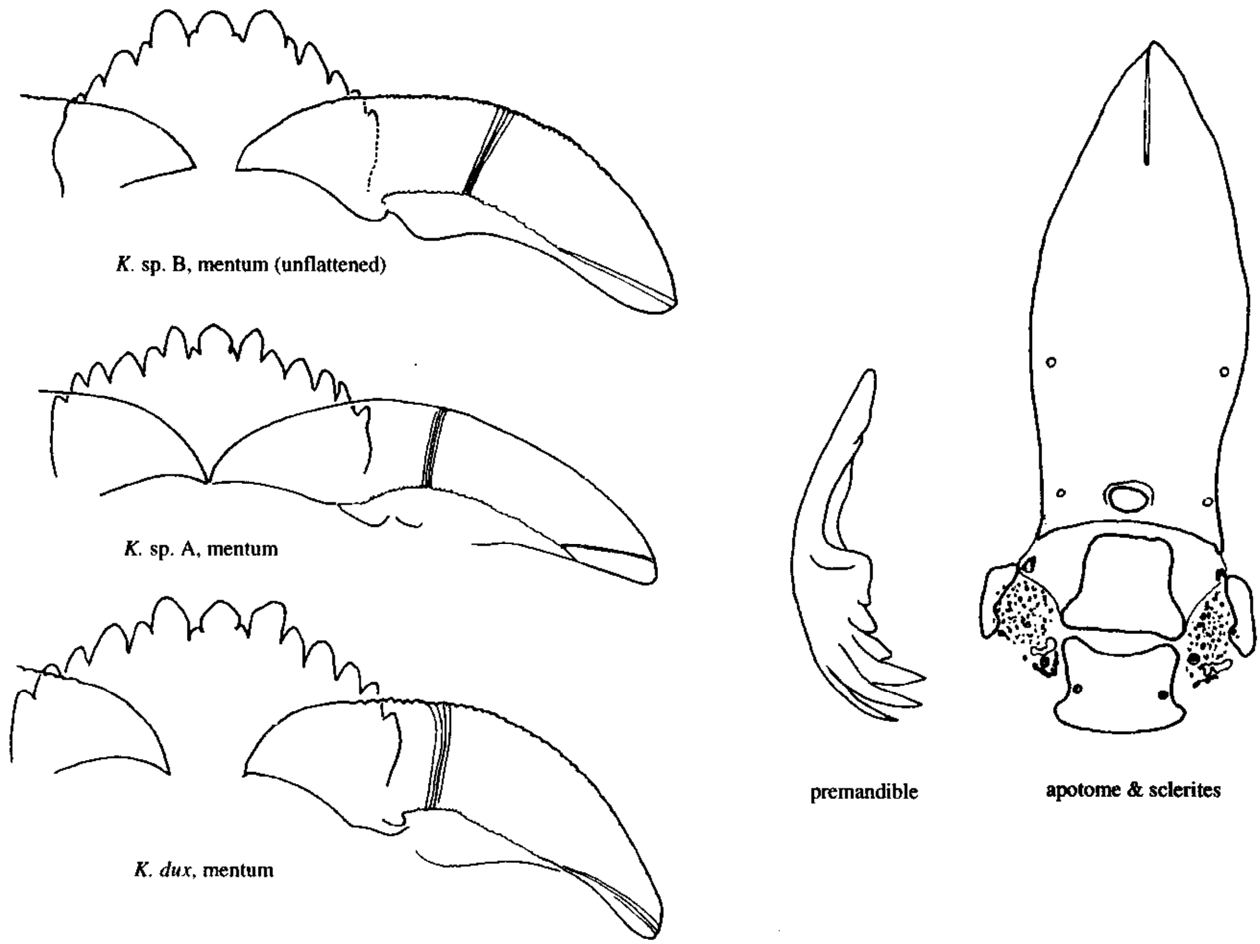
Hyporhygma quadripunctatum, larval structures
(adapted from Pinder & Reiss 1983)

Genus ***Kiefferulus***

DIAGNOSIS: The anteromedian oval-circular pit on the apotome; premandible with 5 or more teeth; and single pair of ventral tubules identify this genus in Florida.

NOTES: Four species are known from Florida; two of these, *K. dux* and *K. pungens*, are described. A confusing blend of character states makes it necessary to have associated material to distinguish species. *Kiefferulus dux* is widespread and belongs in the nominotypical subgenus, as does *K.* sp. A, which is apparently restricted to south Florida. *Kiefferulus pungens* and *K.* sp. B are members of the subgenus *K. (Wirthiella).* The pupae of *K. (Wirthiella)* species bear groups of needle-like spinules on sternites I-III; *K. (Kiefferulus)* pupae lack these spinules (see Pinder & Reiss 1986). Characters in the adults used to separate these subgenera (Cranston et al. 1989) do not appear to be substantiated by material from the southeast U.S.

Larvae are found in or on sediments and vegetation; they can tolerate low dissolved oxygen conditions.

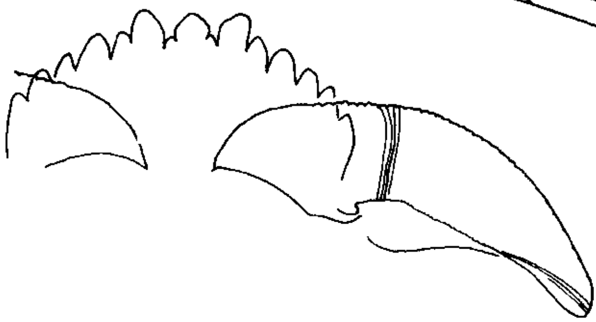


Kiefferulus sp., larval structures

Key to Florida *Kiefferulus*

1 Ventromental plates touching medially or nearly so; anterior margin of plates smooth .... ***K.* sp. A**

1' Ventromental plates well separated medially; anterior margin of plate crenulate 2



2(1) Ventromental plate with about 100 striae .... ***K.* sp. B**

2' Ventromental plate with fewer than 75 striae .... ***K. dux*; *K. pungens***
(At present, these two species can not be separated in the larval stage without associated pupae or adult males)

Notes on species

K. dux - Although often recorded in studies, at present this species can not be separated from *K. pungens* without an associated pupa or adult male. Size may play a role in separating the larvae of the two species, but a larger database of reared material will be necessary to ascertain this. Adults and pupae of *K. dux* are very similar to those of *K.* sp. A.

K. pungens - Formerly placed in *Chironomus*, reared material indicates that this taxon belongs with *Kiefferulus (Wirthiella).* Larvae are apparently inseparable from *K. dux*, but the distinctive pupa of *K. pungens*, with its massive caudolateral comb on tergite VIII and needle-like spinules on sterna I-III, is easily separated from that of *K. dux,* which possesses a much smaller comb and lacks the sternal spinules. The species ranges at least from the Everglades to Washington, D.C.

K. sp. A - This species is known from Indian River Co. and southward; it is common in the northern Everglades, where it occurs with *K. pungens* and probably *K. dux.* I have reared this species; it will be described in a forthcoming publication. It is the only known *Kiefferulus* with ventromental plates that touch medially. Adults and pupae of this species are very similar to those of *K. dux*.

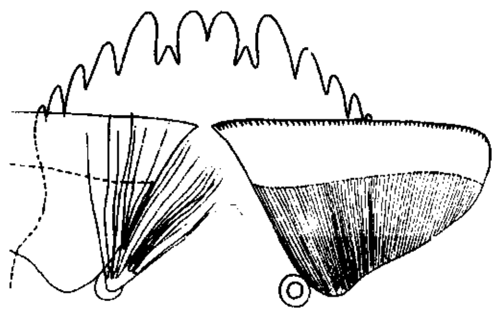
K. sp. B - This taxon is known from a single larval/pupal exuviae association collected from Lake Annie, Highlands Co. The adult stages are unknown. The presence of needle-like spinules on sterna I-III of the pupa places it in the subgenus *K. (Wirthiella).* The pupa differs from that of *K. pungens* in having much smaller caudolateral spurs on tergite VIII.

Genus ***Lauterborniella***

DIAGNOSIS: The frontal apotome, with 2 medial sclerites (clypeus and labral sclerite 2) anterior to it; 6-segmented antennae with alternating Lauterborn organs on 2 & 3; plumose setae submenti placed posteromedially to ventromental plates; short pointed lateral tubules on body segment 10; and segment 11 with posteriorly directed hump will distinguish this genus.

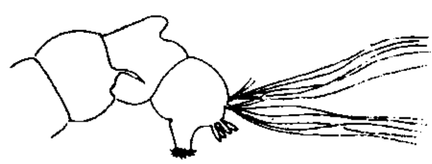
NOTES: One species, *L. agrayloides*, is known from North America. Other species formerly placed in *Lauterborniella* are now placed in *Stelechomyia* or *Zavreliella.*

Larvae live in transportable cases resembling those of the caddisfly *Hydroptila*; they are found among aquatic vegetation.

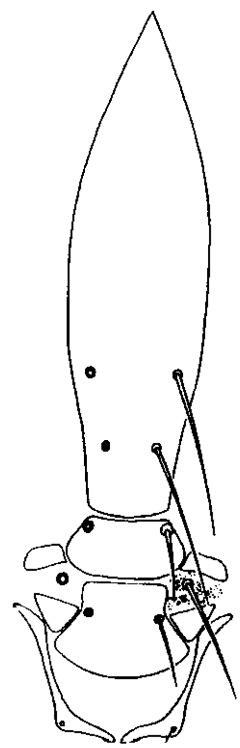


mentum

antenna



posterior body segments



apotome & sclerites

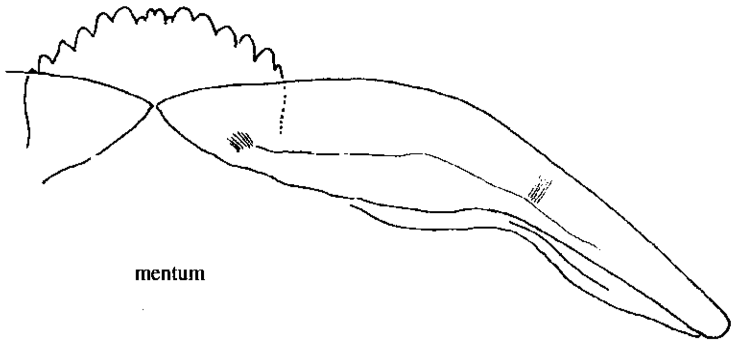
L. agrayloides, larval structures
(adapted from Pinder & Reiss 1983)

Genus *Lipiniella*

DIAGNOSIS: The frontoclypeal apotome, with 1 medial sclerite anterior to it; contiguous ventromental plates; mandible with 3 normal inner teeth and a dorsal tooth; and premandible with 5 teeth identify this genus.

NOTES: The genus *Lipiniella* has not been recorded from Florida; drawings below are of a North Carolina specimen. Species of this genus were formerly placed in *Xenochironomus*; see Pinder & Reiss (1983).

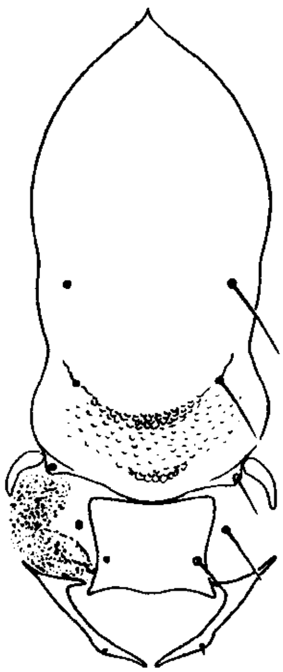
Larvae occur in sandy sediments.



mentum

premandible

apex of mandible



apotome & sclerites
(adapted from Pinder & Reiss 1983)

Lipiniella sp., larval structures

Genus *Microchironomus*

DIAGNOSIS: The linear mentum, with outer teeth enlarged and trifid median tooth; bifid premandible with brush; and antennal blade as long as or longer than the flagellum identify the larvae of this member of the *Harnischia* complex.

NOTES: One species, *M. nigrovittatus*, is recorded from the Southeast. Hudson et al. (1990) believed another species may be present in the Southeast; hence, unassociated larvae should be identified as "*Microchironomus* sp." This genus was referred to as *Leptochironomus* in Beck (1976, 1979).

Little is known of the larval habitat of *M. nigrovittatus*. Larvae occur in lakes, large rivers and ditches.

ADDITIONAL REFERENCES: Sæther 1977.

mentum

premandible

antenna

Microchironomus sp., larval structures

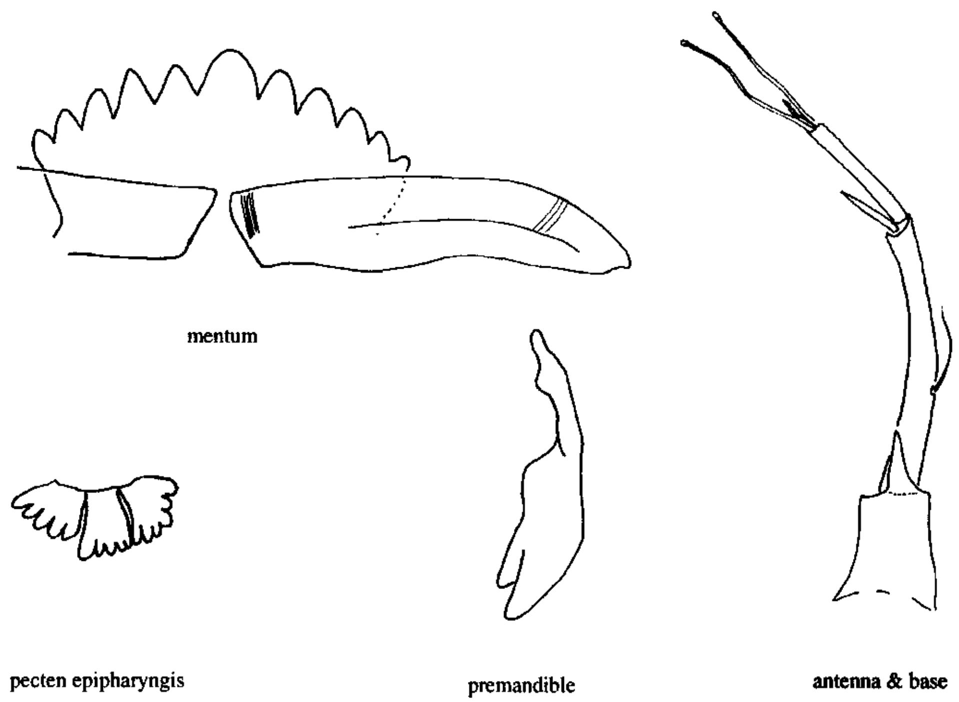
Genus ***Micropsectra***

DIAGNOSIS: The tripartite pecten epipharyngis, with numerous distal teeth/serrations; bifid premandible; and antenna with Lauterborn organs on pedicels which greatly exceed the flagellum (segments 3-5) will identify this member of the tribe Tanytarsini.

NOTES: Oliver et al. (1990) record one species of this genus from Florida. There are probably at least two additional species in the state. Larvae can not be identified to species. The spur of the antennal base is not always developed in *Micropsectra*; this structure is also found on some *Tanytarsus* and can not be used as a character to separate the two genera.

Larvae occur in a wide range of aquatic habitats.

ADDITIONAL REFERENCES: Oliver & Dillon 1994a; Säwedal 1982.



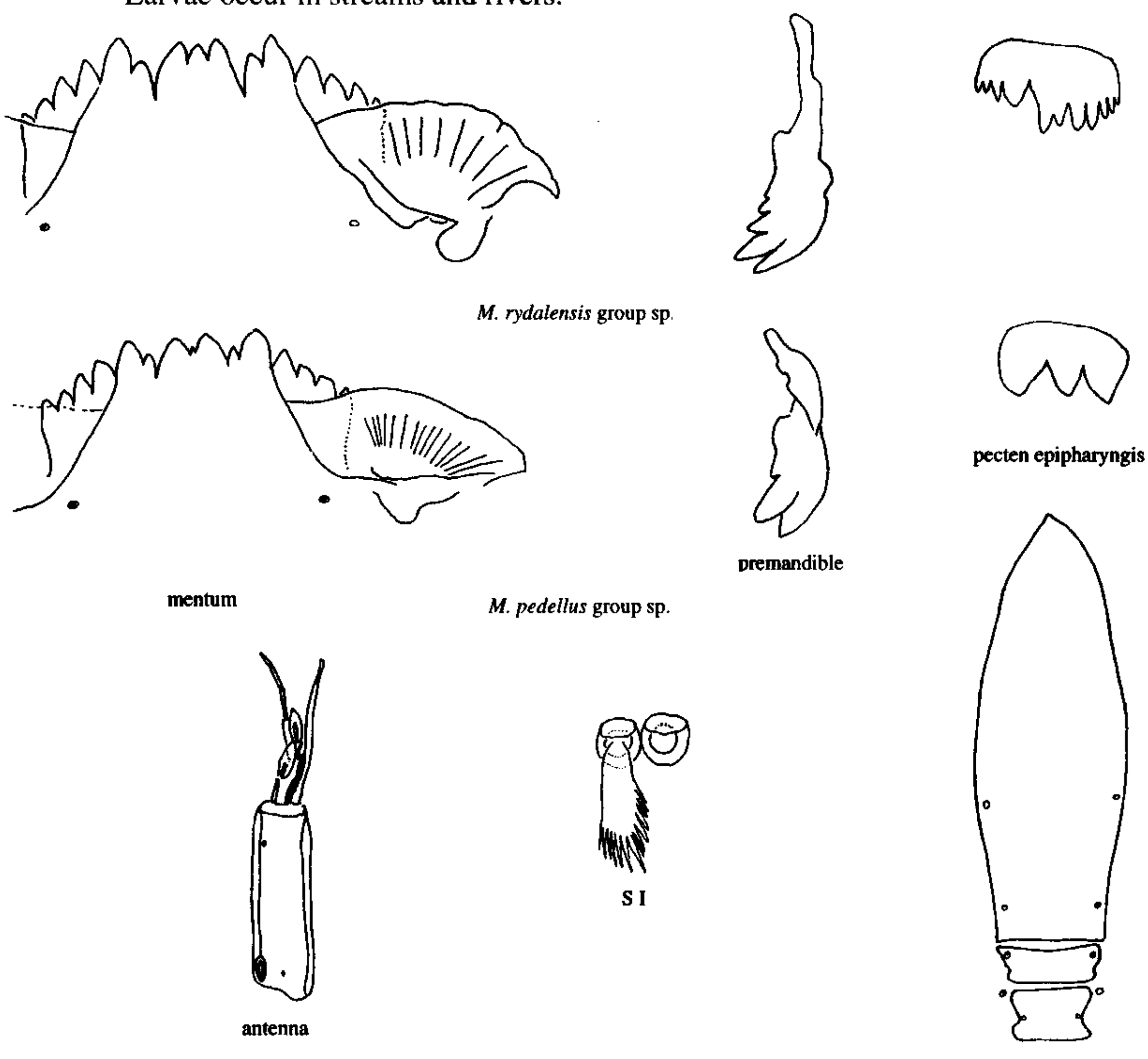
Micropsectra sp., larval structures

Genus ***Microtendipes***

DIAGNOSIS: This genus is identified by the frontal apotome with straight anterior border separating it from the clypeus; bases of S I separate or contiguous; antennae 6-segmented with alternate Lauterborn organs on 2 & 3; mentum with 3 pale median teeth (middle tooth may be minute); and the coarsely striated ventromental plates.

NOTES: Although *Microtendipes* had been undergoing revision by a graduate student at the U. of Minnesota, this revision has been abandoned. There are several undescribed species in the Southeast; larvae can not be identified to species. Larvae can be separated into two groups, named after European species: 1) the *rydalensis* group is distinguished by 3 large median teeth on the mentum, premandible with 5 teeth and pecten epipharyngis with numerous apical teeth; 2) the *pedellus* group has a minute median tooth, and a 3-toothed premandible and pecten epipharyngis.

Larvae occur in streams and rivers.



Microtendipes spp., larval structures

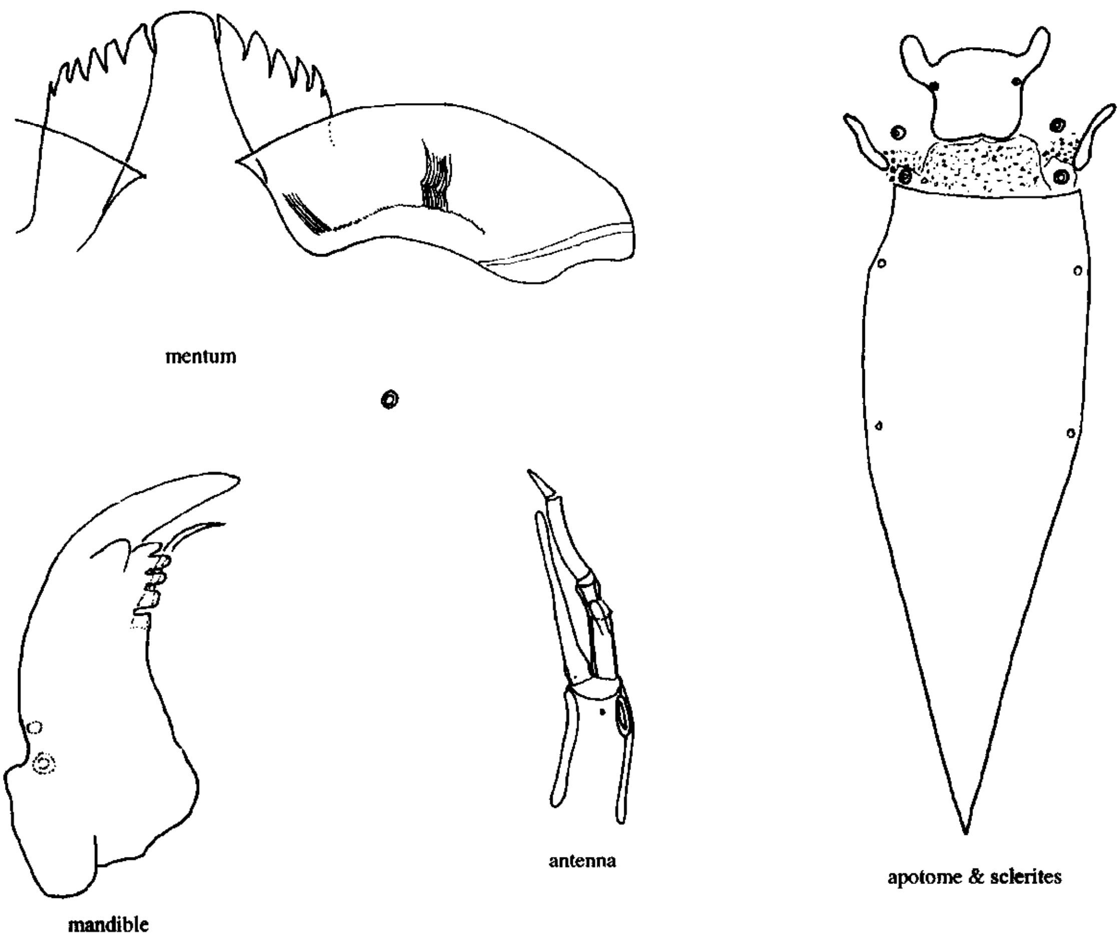
Genus *Nilothauma*

DIAGNOSIS: The simple labral sclerite 5; antenna with basal segment shorter than segments 2-5; mandible with inner teeth grouped closely together and single dorsal tooth; mentum with pale usually rounded median tooth; and setae submenti placed posterior to ventromental plates (as in most Chironomini) will distinguish larvae of this genus.

NOTES: *Nilothauma* is represented by at least four species in Florida; only three are described. I have associated larvae of the three described species and an unassociated fourth larval type; however, available material is too limited to separate species based only on larvae. Nearctic *Nilothauma* larvae differ somewhat from the European species illustrated and diagnosed in Pinder & Reiss (1983). Most larvae I've seen possess a rounded median tooth not divided into four parts; labral lamellae are better developed in some Nearctic species; and one larva reaches 8 mm in length (most *Nilothauma* larvae are less than 5 mm).

Larvae occur in standing and flowing water.

ADDITIONAL REFERENCES: Townes 1945 (as *Kribioxenus*).



Nilothauma spp., larval structures

Genus ***Omisus***

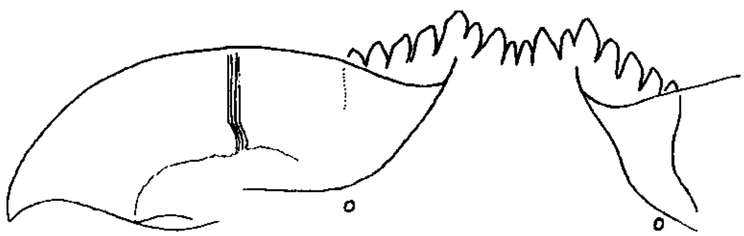
DIAGNOSIS: Larvae are identified by the broad plumose S I setae with separate bases; 6-segmented antennae with Lauterborn organs on segments 2 & 3; mandible with 2 dorsal teeth; and mentum with central pair of median teeth lower and more slender than outer median teeth.

NOTES: One species, *O. pica*, has been recorded from Florida. However, B.A. Caldwell has reared a second species from Georgia that also occurs in Florida. This species (*O.* sp. A) is most easily distinguished from *O. pica* by its 16-toothed mentum; following Beck & Beck (1970), *O. pica* has a 14-toothed mentum. I have been unable to locate the Beck's reared material of *O. pica*.

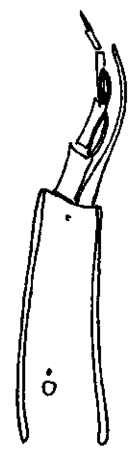
Larvae are found in humic (peat) water habitats.

ADDITIONAL REFERENCES: Beck & Beck 1970.

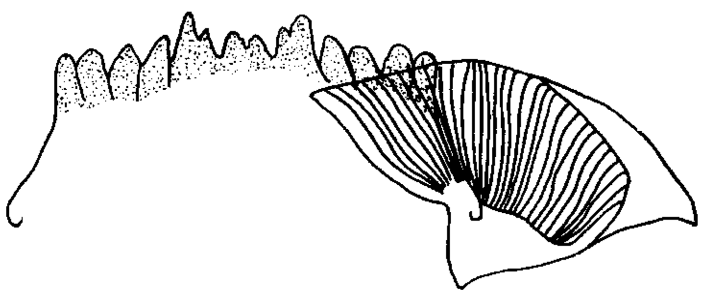
S I



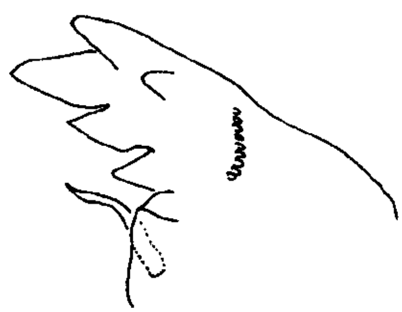
O sp. A, mentum



antenna



O. *pica*, mentum
(adapted from Beck & Beck 1970)



apex of mandible

Omisus sp., larval structures

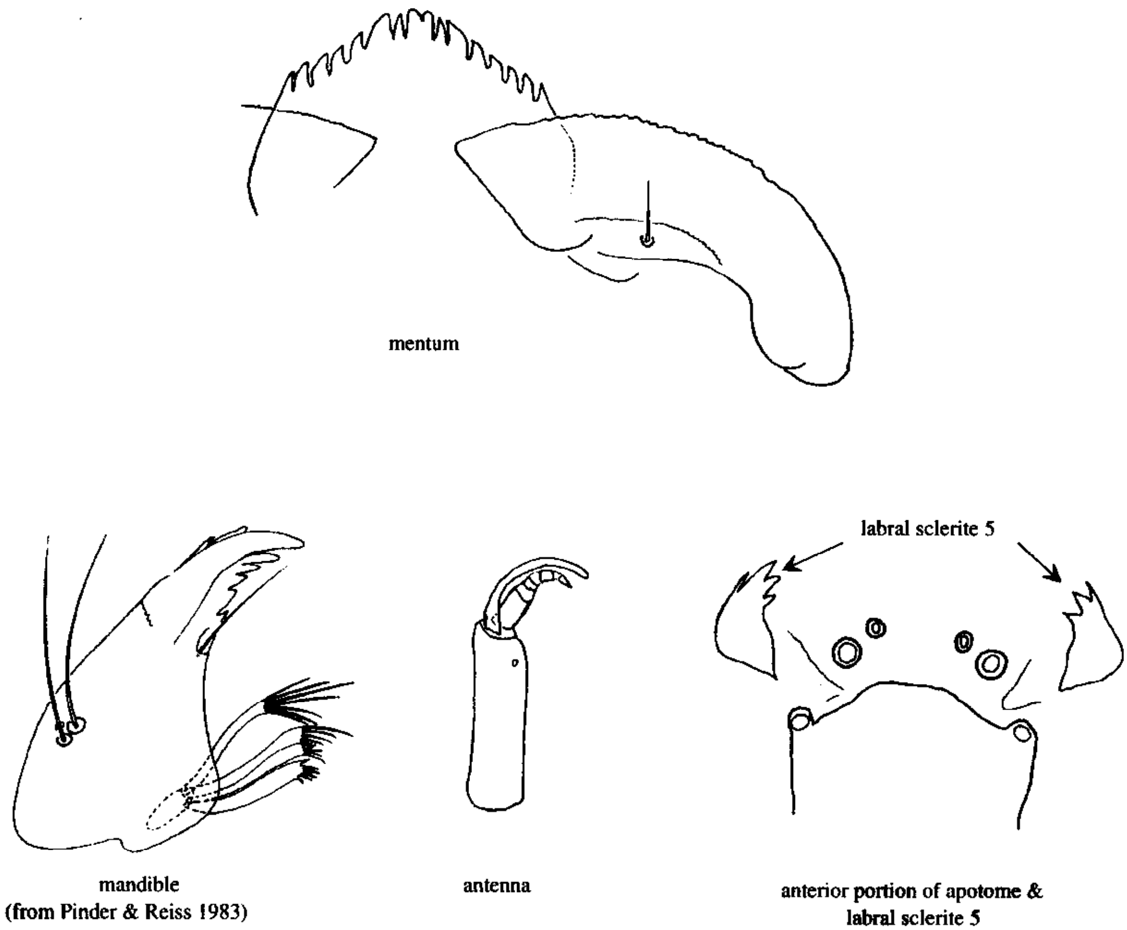
Genus *Pagastiella*

DIAGNOSIS: The apically toothed labral sclerite 5; antenna with basal segment longer than segments 2-5; mandible with inner teeth spread along inner margin of apical tooth; distinctively shaped pale mentum; and setae submenti placed on the ventromental plates distinguish this genus.

NOTES: The identity of larvae from Florida is uncertain. Oliver et al. (1990) recorded *P. orophila* (Edwards) from FL; Hudson et al. (1990) recorded *P. ostansa* (Webb) from FL. These two species may be identical, in which case the name *P. orophila* has precedence. Hudson et al. (1990) also stated that an undescribed species occurs in the SE. Florida larvae should be identified as "*Pagastiella* sp".

Larvae are found in sediments of lakes, ponds and slower reaches of streams and rivers.

ADDITIONAL REFERENCES: Webb 1969.



Pagastiella sp., larval structures

Genus ***Parachironomus***

DIAGNOSIS: The simple or, in a few species, multitoothed S I; 5-segmented antenna; lack of a premandibular brush; and multitoothed pecten epipharyngis will distinguish most members of this genus in Florida.

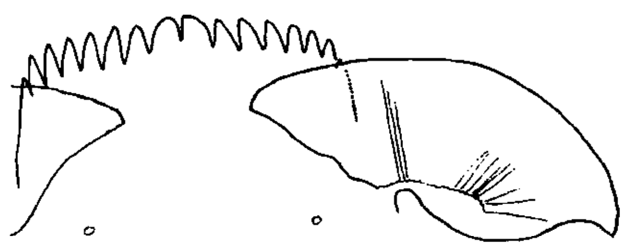
NOTES: Fifteen species are known from Florida: one (*P. potamogeti*) is apparently unknown as a larva; another two (sp. B and sp. C) are undescribed; and two (*P. monochromus* and *P. tenuicaudatus*) are inseparable as larvae, based on material at hand. A problem also exists with the species *P. chaetolaus* and *P. hirtalatus* (see Notes below). Although Beck & Beck (1969b) produced a workable key to species known to them, many specimens I've examined from several collections (including the Beck collection of larvae at FAMU) are misidentified. An excellent study on the Neotropical species has recently been published (Spies, et al. 1994).

Larvae are found in variety of water bodies under a wide range of conditions.

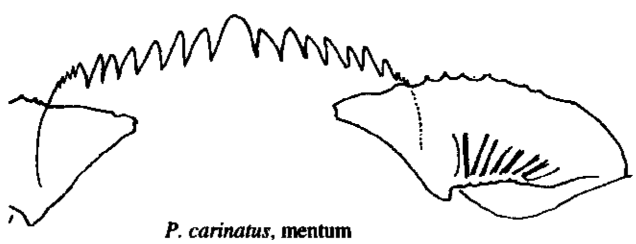
ADDITIONAL REFERENCES: Beck & Beck 1969b; Spies, et. al. 1994; Townes 1945.

P. alatus *P. monochromus*

pecten epipharyngis



P. frequens, mentum



P. carinatus, mentum

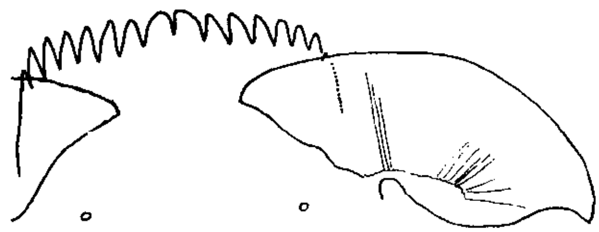
Parachironomus sp., larval structures

Key to Florida *Parachironomus*

(the larva of *P. potamogeti* is unknown)

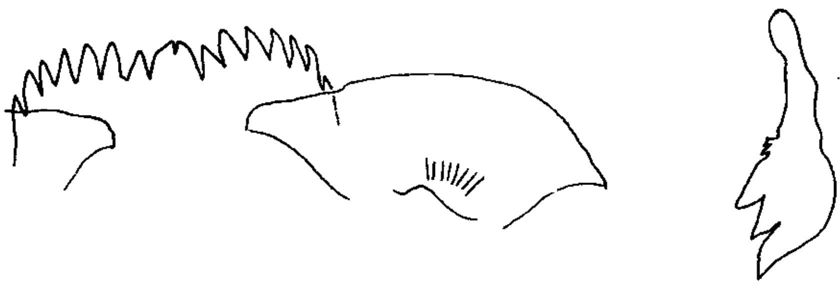
1 Median tooth of mentum simple 3

1' Median tooth of mentum bifid 2

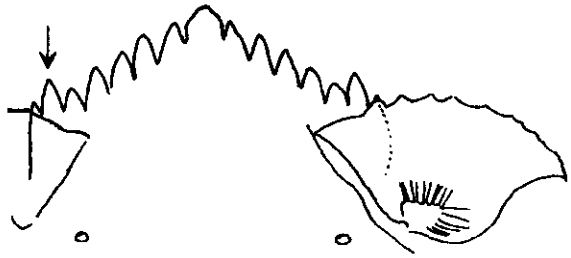


2 (1') First lateral tooth of mentum equal to 2nd lateral (see 1' above); premandible with 4 large teeth .... ***P. frequens***

2' First lateral tooth of mentum lower than 2nd lateral; premandible with 3 large teeth .... ***P. pectinatellae***

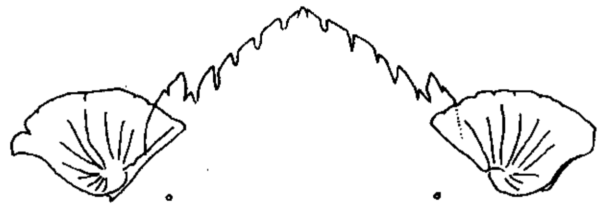


3 (1) Penultimate tooth of mentum longer than tooth at each side 4

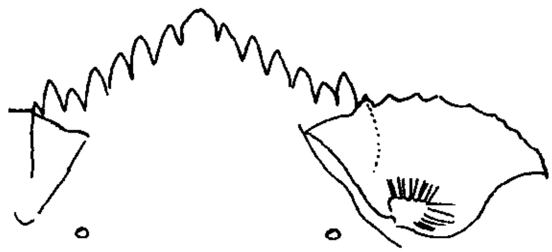


3' Penultimate tooth of mentum not longer than teeth to each side 5

4 (3) Mentum outline strongly convex; anterior margin of ventromental plates smoothly scalloped .... ***P. alatus***



4' Mentum outline not as arched; anterior margin of ventromental plates with blunt points .... ***P. hirtalatus*** (see Notes)



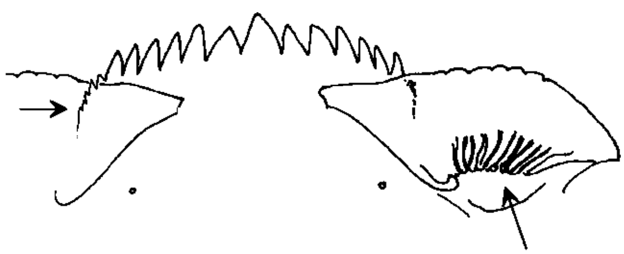
5 (3') Mandible with 3 well developed, dark inner teeth 6

5' Mandible with 2 well developed inner teeth (if third inner tooth is present it is small and pale) 7

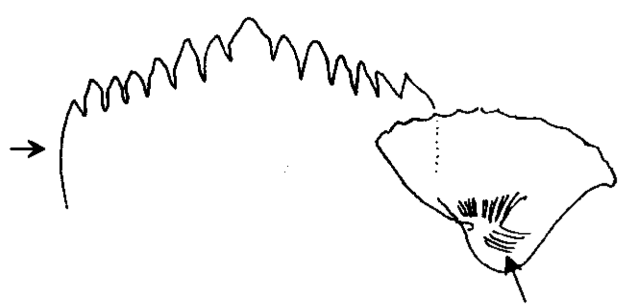
6 (5) Third antennal segment longer than fourth .... ***P. sublettei***

6' Fourth antennal segment longer than third .... ***P. supparilis***

7 (5') Outer margin of mentum serrate; ventromental plates without apparent recurved striae or transverse ridges posterolaterally 8

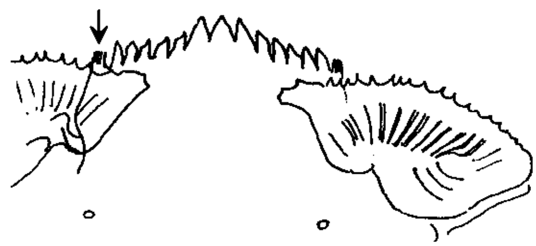


7' Outer margin of mentum smooth (last tooth may be finely dissected); ventromental plates with apparent recurved striae or transverse ridges posterolaterally 9



8 (7) Anterior margin of ventromental plate smoothly crenulated; antennal segment 3 and 4 approximately equal .... ***P. directus***

8' Anterior margin of ventromental plate with blunt points; antennal segment 4 longer than 3 .... ***P. carinatus***



9 (7') Anterior margin of ventromental plate with long sharp points; outer tooth of mentum dissected into fine points .... ***P.* sp. B**
(see Notes)

9' Anterior margin of ventromental plate with blunt points; outer tooth of mentum simple (see couplet 7' figure on opposite page) 10

10 (9') Premandible dark; antennal segments 1-3 usually brown; antennal segment 1 about 5X length of 2 .... ***P. schneideri***

10' Premandible light; antennal segment 1 may be dark yellow; antennal segment 1 about 4X length of 2 .... ***P. monochromus, P. tenuicaudatus*** (These 2 species are inseparable as larvae; they must be associated with adult males for correct identification.)

Notes on species

P. alatus - An unusual species, for the mentum appears to be that of a *Cladopelma*. However, the premandible lacks a brush, and the pecten epipharyngis is trifid; also note the antennae with long 4th segment and recurved striae on the ventromental plates (lacking in *Cladopelma*). The pupa and adult male also fit the concept of *Parachironomus*, but more work is needed to assess this taxon's position.

P. carinatus - A common species, but often misidentified.

P. chaetoalus - Epler (1992) was mistaken when he stated that the larva of this species was unknown; it was figured and keyed by Darby (1962). I have seen Florida and Indiana material identified as this species by Dr. J.E. Sublette, who originally described this species from California (Sublette 1960); the adults are not clearly separable from *P. hirtalatus*. A single pupal exuviae from Indiana is inseparable from *P. hirtalatus* paratype specimens I've examined; both Indiana and Florida specimens possess a long, dark, horn-shaped prealar tubercle. The mentum of *P. chaetoalus* from California as illustrated by Darby (1962: fig. 84) is similar to that of Florida *P. hirtalatus*. If the species are synonymous, the name *P. chaetoalus* would take precedence. However, until reared California material is compared against reared Florida specimens, it may be best to consider these as separate species and to consider larvae that key to couplet 4' as *P. hirtalatus*.

P. directus - A relatively common species.

P. frequens - This species may be more common in Florida than previously thought; many specimens I've examined were misidentified as *P. pectinatellae*.

P. hirtalatus - A common species. This may be a junior synonym of *P. chaetoalus* (see above).

P. monochromus - Apparently uncommon. The larva is inseparable from *P. tenuicaudatus* as recognized in this manual.

P. pectinatellae - This species was originally described by Dendy & Sublette (1959) from material taken from the bryozoan *Pectinatella magnifica*.

P. potamogeti - Adults of this species are very similar to *P. chaetoalus* and *P. hirtalatus*; all these species (along with *P.* spp. B and C) possess wings with apical setae on the membrane in cells r_{4+5} and m_{1+2}. With the exception of the apex of the gonostylus, which in *P. potamogeti* is slightly enlarged and straight at the medial apex, the genitalia of this species are very similar to those of *P. chaetoalus* and *P. hirtalatus*. The immature stages of *P. potamogeti* were described by Hamilton (1965), but the description and figures provided are not sufficient to allow identification. It will take comparison of reared material of all five of these species to determine specific limits and any synonymies.

P. schneideri - The brown antennae and dark premandible are the only characters found which may separate this species from *P. monochromus* and *P. tenuicaudatus*. Teneral (recently molted) specimens would be unidentifiable.

P. sublettei - A species with pale mentum and ventromental plates. Although Beck & Beck (1969b) stated that "recurved striae" were not present, such structures are visible on the ventromental plates under high magnification. This species can also be found in brackish water.

P. supparilis - This taxon was called *P.* sp. A in Epler (1992). Martin Spies has confirmed that this species, originally described from Argentina, occurs in the U.S. In North America it is found at least as far north as Georgia. Spies et al. (1994) consider this taxon to be a "superspecies". It is widespread in the Neotropics, being found from the Amazon basin to high Andean Bolivia, to Tierra del Fuego. Florida specimens fit the *centralis* form.

P. tenuicaudatus - Beck & Beck (1969b) recorded this species for Florida based on a Miami specimen and a reared male from Lake St. Clair in Polk Co. However, the Polk Co. specimen is a *P. monochromus*. I have seen only one reared specimen of *P. tenuicaudatus*, from Ohio. It does not resemble the larva as described by Johannsen

(1937) or Roback (1957); those descriptions may be based on missassociated specimens, or more than one taxon may be involved. Based on material I've examined, the larva is not separable from *P. monochromus*.

P. sp. B - This is a new species which will be described in a future publication. It was included in Epler (1992) as "*P. chaetoalus*". I have seen a single reared male from Ohio and numerous Florida adult specimens that may be conspecific. I have not seen this larva from Florida.

P. sp. C - Another new species which will be described in a future publication; the immature stages are unknown.

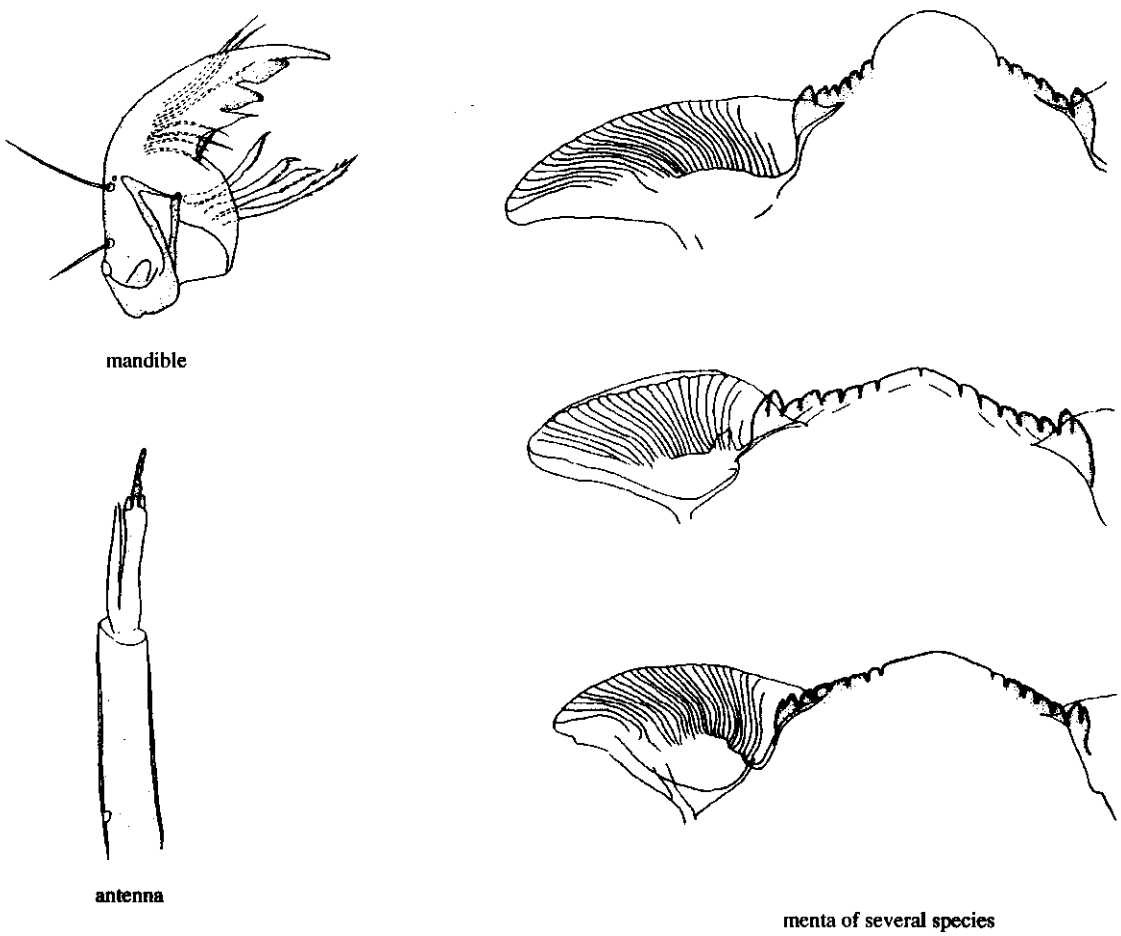
Genus ***Paracladopelma***

DIAGNOSIS: Larvae are distinguished by the 5-segmented antennae with second segment much longer than third; premandible with 4 or more teeth; coarsely striated ventromental plates; and mentum pale or with at least a broad, pale median tooth/teeth.

NOTES: Four species are recorded from Florida; an additional two species, described only as larvae, may also occur here. Other species may also be present; *Harnischia* complex genus B may be a *Paracladopelma.*

Larvae are found in sand substrata, usually in running water. Some species may be sensitive to eutrophication (Pinder & Reiss 1983).

ADDITIONAL REFERENCES: Jackson 1977; Sæther 1977.



Paracladopelma sp., larval structures
(adapted from Jackson 1977)

Key to Florida *Paracladopelma*

1 Ventromental plates with 25 or fewer full length striae 2

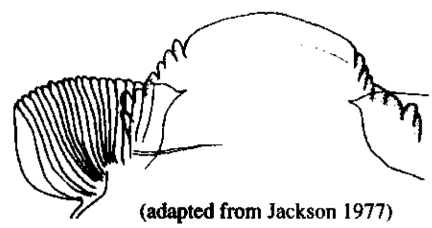
1' Ventromental plates with more than 25 full length striae 4

2 (1) Median tooth of mentum bifid (may require observation at 1000X) .... ***P. undine***

(adapted from Jackson 1977)

2' Median tooth simple 3

3 (2') Mentum strongly arched, median tooth broad and dome-like .... ***P. sp. 2***
(not recorded from Florida)

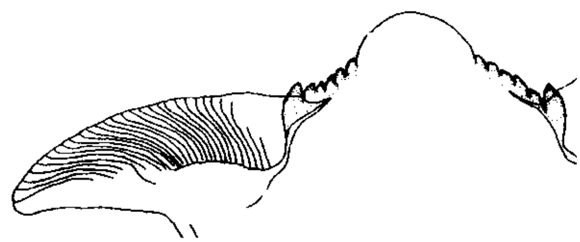


(adapted from Jackson 1977)

3' Mentum more linear, median tooth not as broad .... ***P. doris***

(adapted from Sæther 1977)

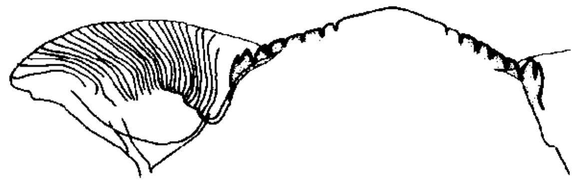
4 (1') Mentum with dome-shaped median tooth which projects strongly forward .... ***P. loganae***



(adapted from Jackson 1977)

4' Mentum without dome-shaped median tooth 5

5 (4') Median tooth and first lateral teeth clear; ventromental plates with about 30 striae .... ***P. nereis***



5' Median tooth only clear, first lateral tooth darkened; ventromental plates with about 38 striae .... ***P. sp. 1***
(not recorded from Florida)

(both figs. adapted from Jackson 1977)

Notes on species

P. doris - Recorded for Florida by Hudson et al. (1990). I have not seen material of this species from Florida; it should be considered rare. This taxon was described as *"Cryptochironomus"* near *rolli* Kirp. in Sæther (1977:117).

P. loganae - One of the more common species of *Paracladopelma* in Florida. It often requires observation at 1000X to see the outline of the lightly sclerotized mentum.

P. nereis - An apparently uncommon species in Florida.

P. undine - A common species. It may require observation at 1000X to see the bifid median tooth of the lightly sclerotized mentum. This species may be confused with *P. nais* (Townes), a species which is not known from Florida. *P. nais* has about 40 full length striae on each ventromental plate; *P. undine* about 20.

Paracladopelma spp. 1 and 2 were described from larvae only by Jackson (1977); they may occur in Florida. *P.* sp. 2 was described from a GA specimen.

Genus *Paralauterborniella*

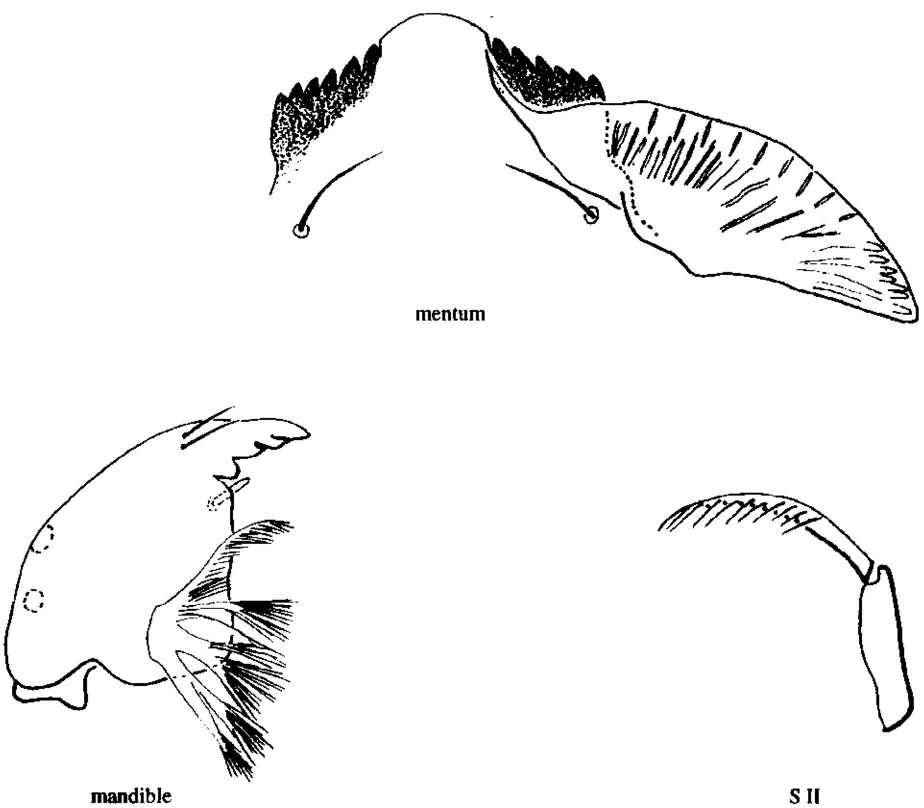
DIAGNOSIS: The 6-segmented antennae, with alternate Lauterborn organs on segments 2 & 3; distinctive mentum, with broad pale median tooth; and mandible without a dorsal tooth will distinguish this genus.

NOTES: One species, *P. nigrohalteralis*, is known from North America, although Hudson et al. (1990) reported an undescribed species from North Carolina. Other Nearctic species formerly placed in this genus have recently been transferred back to the genus in which they were originally described, *Apedilum* (see Epler 1988a).

Although Pinder & Reiss (1983) describe the S II as simple, it is fringed.

Larvae occur in streams and rivers.

ADDITIONAL REFERENCES: Epler 1988a.



P. nigrohalteralis, larval structures

Genus *Paratanytarsus*

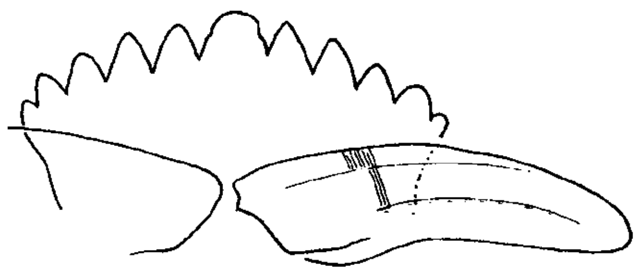
DIAGNOSIS: This tanytarsine is identified by the pecten epipharyngis with 3-5 lobes; apically bifid premandible; sessile, or nearly so, Lauterborn organs at the apex of segment 2; and "normal" mandible, without pronounced hump on outer margin.

NOTES: Oliver et al. (1990) listed one species, *P. dubius*, as occurring in Florida; nine other species are listed for North America (mostly Canadian records). The Nearctic fauna is poorly known. Palaearctic species (as in most other Tanytarsini genera) are much better known; some may occur in Florida. Based on larvae, apparently three species (*P.* sp. A, B and C) are present in Florida. I have reared *P.* sp. A, but without examination of type material, it can not be ascertained if it is *P. dubius*.

Larvae of the three Florida "species" are separated by the length of antennal segment 2: in *P.* sp. A antennal segment 2 is longer than segments 3-5; in *P.* sp. B segment 2 is shorter than segments 3-5; in *P.* sp. C segments 3-5 are subequal to segment 2. These taxa do not appear to be a series in which the antennal segment lengths are a continuous variable.

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

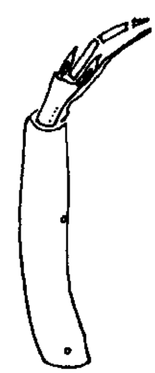
ADDITIONAL REFERENCES: Langton et al. 1988; Reiss & Säwedal 1981.



sp. A mentum

sp. A pecten epipharyngis

sp. A antenna



sp. B antenna

Paratanytarsus spp., larval structures

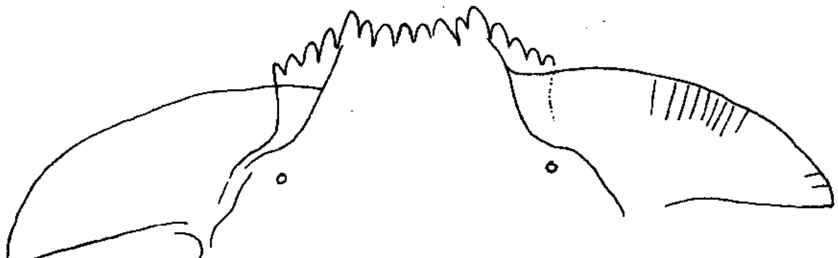
Genus ***Paratendipes***

DIAGNOSIS: The S I setae with bases fused or located on a common triangular plate; 6-segmented antenna, with alternate Lauterborn organs on segments 2 & 3; mentum with central pair of median teeth equal to or higher than outer median teeth; and mandible with 1 dorsal tooth will distinguish the larvae in Florida.

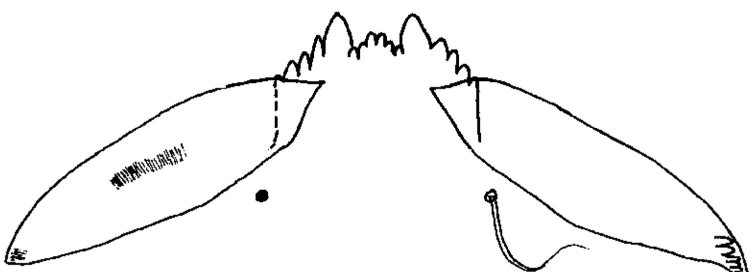
NOTES: Three species are known from Florida. If one assumes that *only* these three species occur here, all are easily separated by their distinctive menta and ventromental plates illustrated below, although I have seen unassociated, early instar specimens somewhat intermediate between *P. albimanus* and *P. basidens*. Dr. L. C. Ferrington, Jr., provided associated material of *P. basidens*; this species has been known as "*Paratendipes connectens* group". *P. subaequalis* appears to be the most commonly collected species in Florida.

Larvae occur in a wide variety of aquatic habitats.

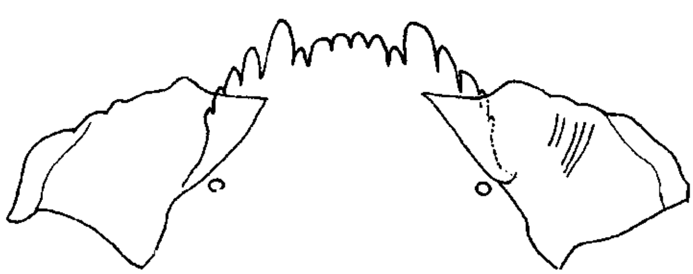
ADDITIONAL REFERENCES: Epler & Ferrington 1994; Townes 1945.




P. albimanus, mentum & antenna




P. basidens, mentum & mandible




P. subaequalis, mentum and S I

Paratendipes spp., larval structures

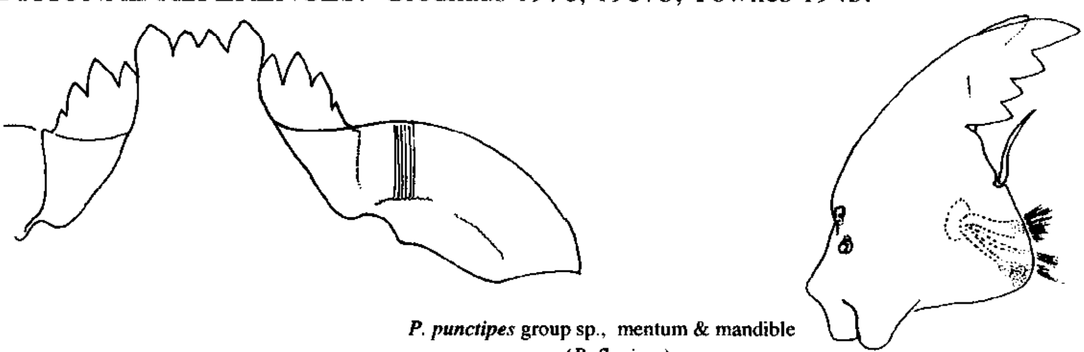
Genus *Phaenopsectra*

DIAGNOSIS: Larvae possess an apotome with 1 or 2 medial sclerites anterior to it; mentum with a line running from the posterior margin of the outermost median tooth back to the anteromedial corner of the ventromental plate; molar area of mandible usually without spines, except sometimes 1 present near seta subdentalis; and distance from basal notch of inner mandibular teeth to insertion of seta subdentalis usually at least 3/4 the distance from the basal notch to the apical notch.

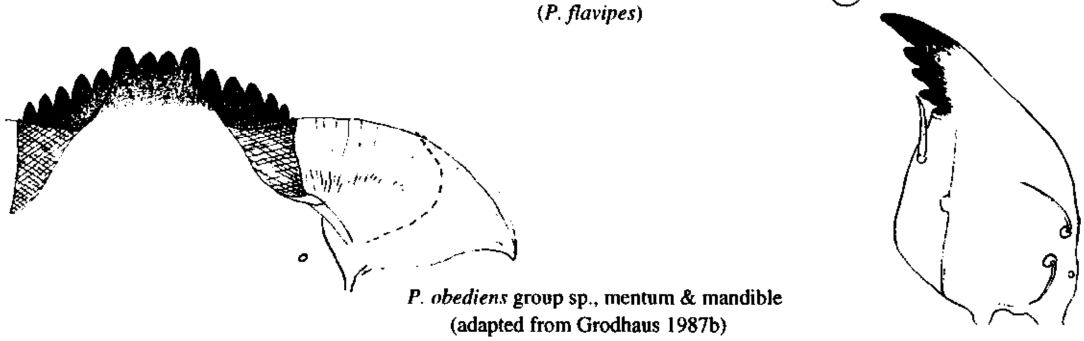
NOTES: A difficult genus taxonomically, *Phaenopsectra* is in need of revision. Distinguishing larvae from some *Tribelos* is difficult. One species, *P. flavipes*, was considered to be identifiable as a larva (Simpson & Bode 1980), but it is apparently inseparable from the larva of *P. punctipes*, a species which has not been recorded from Florida (but *may* occur here). *Phaenopsectra* larvae may be identified as species groups: the *punctipes* group, with 14-toothed mentum (usually, but subject to wear, especially on outermost teeth) and mandible with large notch at base of inner teeth (species in this group resemble *Endotribelos hesperium*); and the *obediens* group, with 16-toothed mentum and normal mandible. Reliable identifications are possible only with associated adults; however, Hudson et al. (1990) reported that additional undescribed adults occur in the Southeast. Note that the *P. dyari* of Simpson & Bode (1980) may not be correctly identified (Grodhaus 1987b).

Larvae are usually found in streams; some western U.S. species are resistant to drought and can withstand drying by remaining in silk and silt cocoons.

ADDITIONAL REFERENCES: Grodhaus 1976, 1987b; Townes 1945.



P. punctipes group sp., mentum & mandible
(*P. flavipes*)



P. obediens group sp., mentum & mandible
(adapted from Grodhaus 1987b)

Phaenopsectra spp., larval structures

Genus ***Polypedilum***

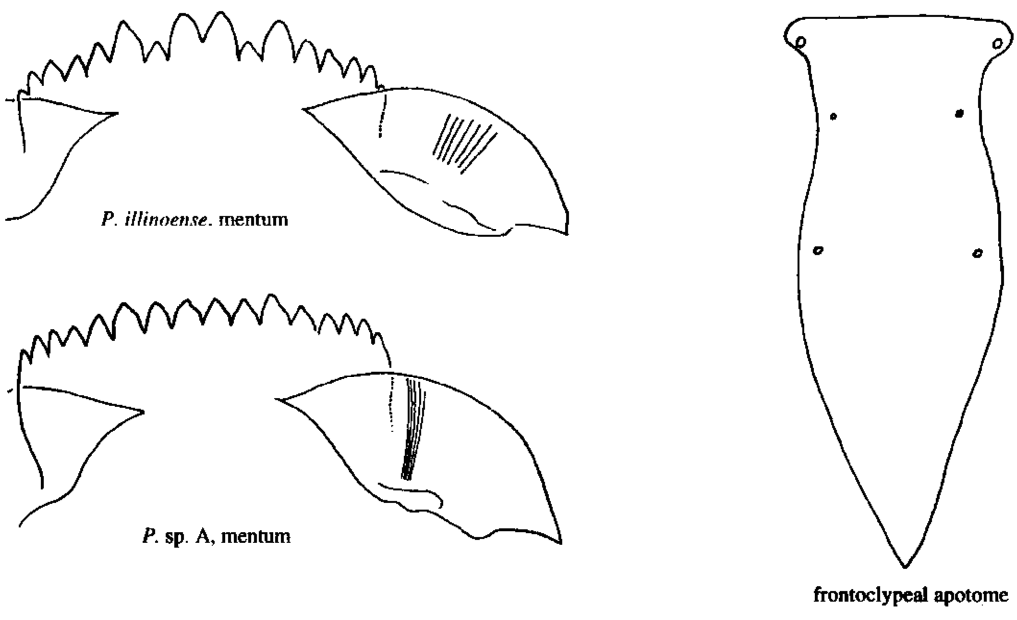
DIAGNOSIS: The distinctive mentum, with median and second lateral teeth longer than first lateral teeth, will distinguish most members of the genus. Other Florida larvae may be identified by the frontoclypeal apotome with straight anterior margin expanded laterally to include S3 setae; 5-segmented antennae (4-segmented in 2 taxa); and ventromental plates teardrop shaped or less than 3X as wide as long and with pointed lateral margins.

NOTES: A heterogeneous genus as currently defined, at least 23 described species of *Polypedilum* occur in Florida. In addition, about six undescribed taxa also occur. Three Nearctic subgenera have been established, based on adult morphology. Maschwitz (1976), in an unpublished Ph.D. thesis, revised the subgenus *P. (Polypedilum)*. He described several new species, two or three of which occur in Florida. However, his work has not been officially published and the new species names are not available (ICZN 1985: Articles 8 and 9).

The taxonomy of the genus remains in an unsatisfactory state. Larvae of many species groups are currently not separable to species, but can be differentiated in the adult stage. Boesel (1985) placed several species in synonymy, but these have not been accepted by most workers (see Hudson et al. (1990) and Notes on species). Rossaro (1985) has begun a revision of the European species, which may help settle some matters for the Nearctic fauna.

Larvae are found in a wide range of habitats under a variety of environmental conditions.

ADDITIONAL REFERENCES: Boesel 1985; Maschwitz 1976; Rossaro 1985; Soponis 1983; Soponis & Russell 1982; Soponis & Simpson 1992; Townes 1945.

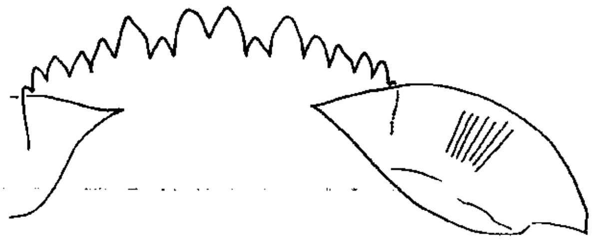


Polypedilum sp., larval structures

Key to Florida *Polypedilum*

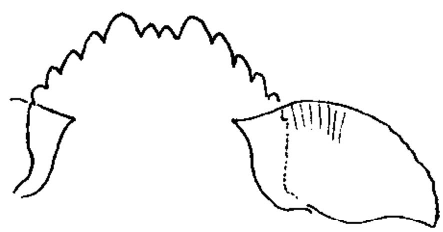
(several FL species are known only as adults)

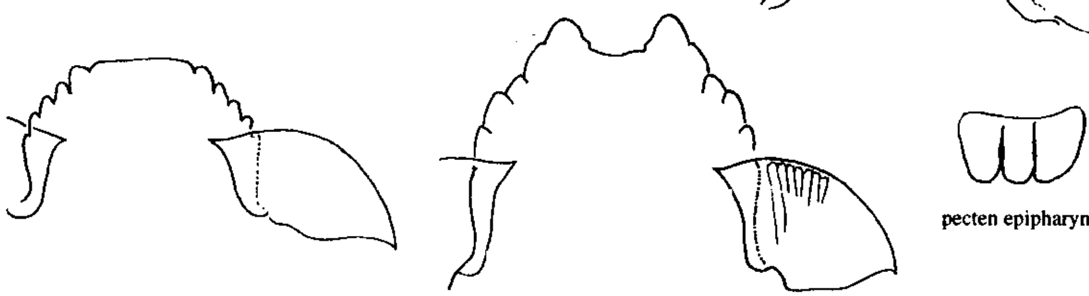
1 Mentum with median and second lateral teeth higher than first lateral teeth 8



1' Mentum with median teeth lower than lateral teeth, or subequal, or apparently missing 2

2 (1') Mentum with median teeth lower than lateral teeth, or missing; pecten epipharyngis with 3 blunt teeth; mining in *Brasenia* or *Nymphaea* .... ***P. braseniae***



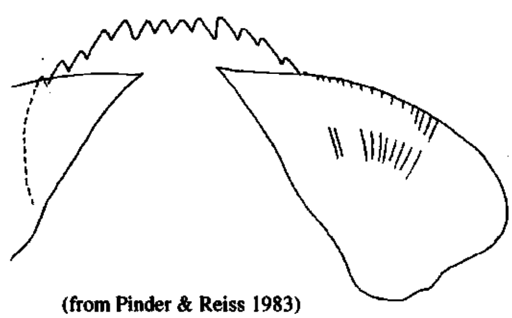


mentum variations

2' Mentum with median teeth subequal or higher than lateral teeth; pecten epipharyngis with 3 lobes, with at least the outer 2 with apical teeth; not restricted to ***Brasenia*** or *Nymphaea* 3

3 (2') Mentum somewhat round in outline; ventromental plates teardrop shaped, with posterolateral margin broadly rounded .... ***P. ontario***

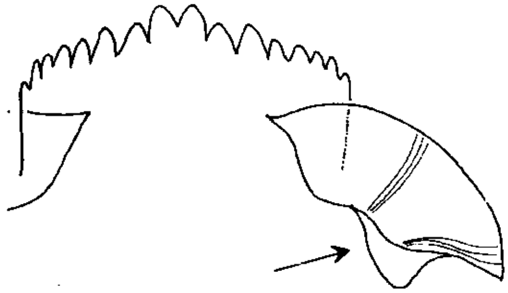
(not recorded from Florida)



(from Pinder & Reiss 1983)

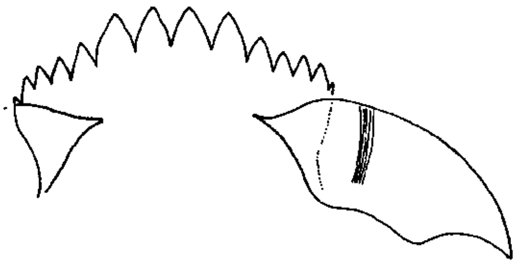
3' Mentum more linear; ventromental plates semi-circular, posterolateral margins pointed 4

4 (3') Ventromental plates with well developed posterior lobes 9

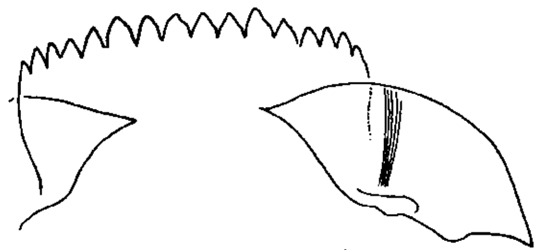


4' Ventromental plates without well developed posterior lobes 5

5 (4') Mentum with 14 teeth; central 4 teeth distinctly higher than lateral teeth .... ***P.* sp. C**



5' Mentum with 16 teeth; 6 central teeth slightly higher, or all teeth subequal 6

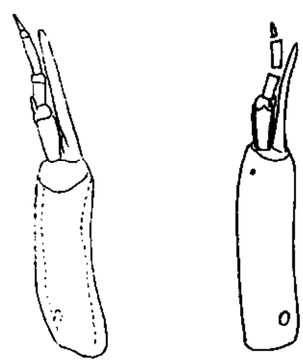


6 (5') Antennal segment 2 subequal to segments 3 + 4 + 5; head capsule usually dark yellow-brown .... ***P. fallax***

6' Antennal segment 2 shorter than segments 3 + 4 + 5; head capsule usually yellow ... 7

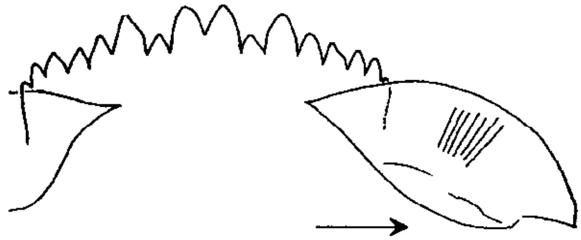
7 (6') Antennal segment 4 > 3; N. FL only (?) .. ***P. laetum***

7' Antennal segment 3 and 4 subequal; central to southern FL .... ***P.* sp. A**

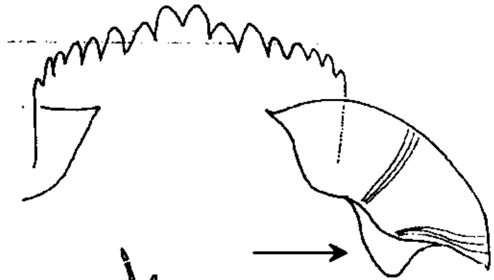


P. laetum **(after Rossaro 1985)** ***P.* sp. A**

8 (1) **Ventromental plate without well developed posterior lobe** 10

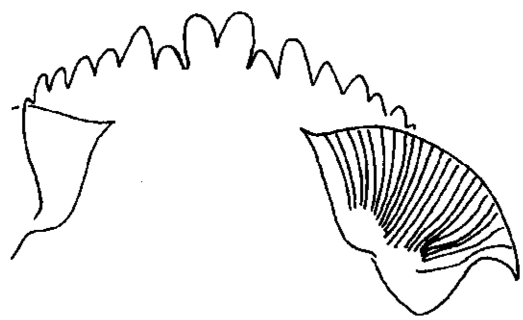


8' Ventromental plate with well developed posterior lobe 9



9 (4, 8') Antennal segment 2 about twice as long as segments 3, 4 & 5 combined; first lateral tooth of mentum may be slightly shorter or equal to second lateral (see couplet 8'); median teeth not basally constricted .... ***P. aviceps***

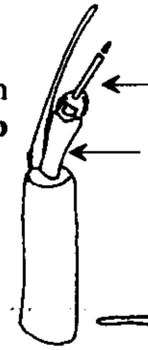
9' Antennal segment 2 no more than 1.5X segments 3, 4 & 5 combined; first lateral tooth of mentum always shorter than second lateral; median teeth usually basally constricted .... ***P. convictum* group**
(includes 2 species in FL)



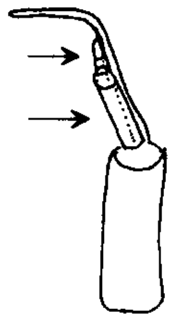
10 (8) Third antennal segment 1/3 or less the length of the second segment 11

10' Third antennal segment at least 1/2 or more the length of the second segment 12

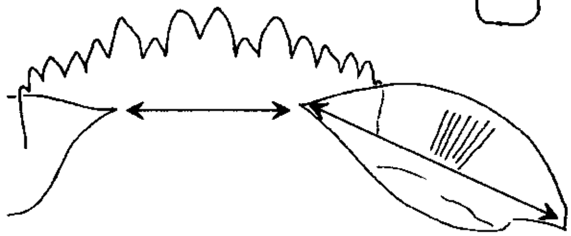
11 (10) Antennal segment 4 subequal to segment 2; antennae always with 5 segments .... *P. halterale* **group**
(includes 4 species in Florida)



11' Antennal segment 2 much longer than 4; antennae with 4 or 5 segments .... *P. scalaenum* **group**
(includes 2 species in Florida)

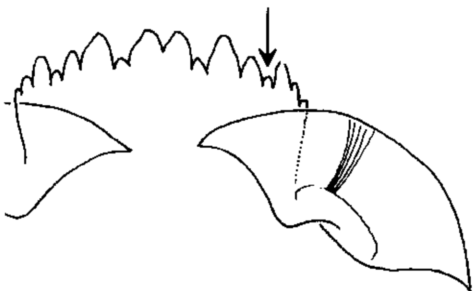


12 (10') Width of 1 ventromental plate 2.5X or less the distance between the plates ... 14

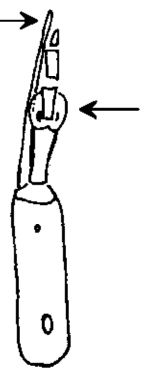


12' Width of 1 ventromental plate more than 2.5X the distance between the plates (see below) 13

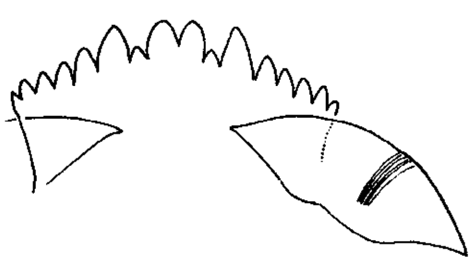
13 (12') Mentum usually with 4th lateral tooth lower than 3rd and 5th; antennal segment 2 usually about twice as long as 3; antennal blade longer than flagellum; Lauterborn organs large and distinct .... ***P. trigonus***

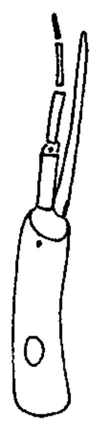


antennal blade



13' Mentum with 4th tooth subequal to 3 and 5; antennal segment 2 subequal to 3; antennal blade shorter than flagellum; Lauterborn organs minute .... ***P. tritum***





14 (12) Lauterborn organs indistinct (as in couplet 13') .... ***P. tritum***

14' Lauterborn organs well developed (as in couplet 13) .... ***P. illinoense* group**
(includes about 5 taxa in Florida)

Notes on species

P. aviceps - Generally a stream species, it often occurs in leaf packs, snags etc. The height of the first lateral tooth of the mentum is variable: in some specimens it is slightly lower than the median teeth and second laterals; in others it may be subequal. See Soponis & Russell (1982) for more information.

P. braseniae - Larvae mine in the leaves of several aquatic plants, but are usually associated with *Brasenia* and *Nymphaea.* Differences in the mentum have been attributed to wear associated with mining. Contrary to Maschwitz (1976), the premandibles ("tormae") were bifid in 8 of 9 specimens examined.

P. convictum group - This group consists of 2 species in FL: *P. convictum* and *P. obtusum.* The larvae are apparently inseparable. Maschwitz (1976) indicated that they may be separated by the length of the Lauterborn organs; however, this character is untested and I have not seen any reared material of *P. obtusum.* Boesel (1985) considered the two synonymous. And just to complicate matters further, the taxon called *P. convictum* in North America is probably *not* that species. Note the illustrations of larvae in Rossaro (1985) and Pinder & Reiss (1983). The correct name for the species in this country *probably* is *P. flavus* (Johannsen).

P. fallax - Relatively common in some N FL streams. Best identified by antennal morphology and the darkish yellow-brown head capsule, this species has no doubt been confused with several other taxa with subequal mental teeth.

P. halterale group - A complex of 4 species in FL: *P. digitifer, P. griseopunctatum, P. halterale* and *P. simulans.* At present, the larvae must be considered inseparable; only adult males may be identified. Boesel (1985) considered all these species as synonyms of *P. halterale,* but his study was limited and did not make extensive use of reared material. Soponis & Simpson (1992) described all stages of *P. digitifer* and *P. griseopunctatum* and refuted Boesel's (1985) synonymies. Although they could separate larvae of the two species from each other, they did not offer methods to separate all four species of this group. Benthic biologists can contribute greatly by attempting rearings of these taxa. Based on reared material, I have found *P. simulans* to be the most commonly encountered member of this group throughout most of Florida; it is common in Lake Okeechobee.

P. illinoense group - A common and apparently extremely variable taxon, this group includes 1 described species and 2 "undescribed" species in Florida, plus 2 other species (1 "undescribed") not recorded from the state but which will probably be found here. The "undescribed" taxa are species named in Maschwitz's (1976) thesis: *P. "angulum"* and *P. "nymphaeorum"* were described from Florida material; in addition, B.A. Caldwell has reared specimens similar to *P. "falciforme"* from GA. These "species" are only tentatively separable as adult males. Unfortunately, these names can not be used because they were never officially published. Use of these names will create *nomina* *nuda* - "naked names"; species names must be published with descriptions. Another described species, *P. ophioides*, probably occurs in FL; I've seen adults from AL. Although Maschwitz (1976) separated larvae of *P. ophioides* and *P. illinoense* by antennal characters, these differences have not held with the examination of additional specimens. In addition, larvae of this group have been confused with *P. trigonus* and *P. tritum*. All this has led to a confused taxonomy for the "species" *P. illinoense*. Are these differences attributable to species level distinctions, or are they merely reflections of the larva's environment? Will subtle changes in an environment produce different "species"? Much work may be required to produce a satisfactory answer. Larvae of the *P. illinoense* group are found in a wide variety of environmental conditions, including the high organic loading associated with pulp mills.

P. laetum - I have seen 2 adults of this species from northwestern FL; I have not seen reared material from FL and characters utilized in the key were derived from the descriptions of Maschwitz (1976) and Rossaro (1985). This species has been confused with *P.* sp. A (Rudolph & Strom 1990) in southern FL, where it apparently does not occur.

P. ontario - This species has not been recorded from FL, but its occurrence in AL and GA indicates that it will eventually be found here. Bolton (1991) showed that pupal Chironomini genus C of Pinder & Reiss (1986) is this species; larvae were collected from the pupal retreats of the hydropsychid caddisfly *Cheumatopsyche*. This taxon probably deserves separate generic status.

P. scalaenum group - In FL, this group consists of 2 species identifiable only as adults: *P. parascalaenum* and *P. scalaenum*. Although Beck & Beck (1964) hypothesized that antennal characters might separate the 2 taxa, these characters have not proven to be reliable. Most reared specimens of FL *P. scalaenum* I've examined had 4-segmented antennae with the blade much longer than the flagellum. Larvae are also found with 5-segmented antennae. This group seems to be common in areas of lower water quality.

P. trigonus - This species is found throughout the state; it is one of the more common species (along with *P.* sp. A) of the northern Everglades. Most specimens can be identified by the distinctive mentum; however, not all specimens have the distinctive small 4th lateral tooth. Antennal characters given in the key will separate most specimens. More than one species maybe involved, but there is insufficient reared material to come to a conclusion.

P. tritum - A common species of the Southeast; this species and *P. trigonus* have often been misidentified as *P. illinoense*.

P. sp. A - A common species of S FL, it has been misidentified as *P. laetum*. Associated pupae do not resemble that species. *P.* sp. A has not yet been reared; it may be the larva of one of the several species known only as adults.

P. sp. B - This taxon is a new species; I have seen one pharate male pupa with distinctive male genitalia; larvae are unknown.

P. sp. C - Known only as a larva, this taxon has been found to date only in extreme western FL. The larva resembles a *Phaenopsectra*, but possesses the anteriorly widened fronto-clypeal apotome attributed to *Polypedilum* (but also found in *Asheum*).

Additional species, known only as adults, are recorded from FL; see Appendix A.

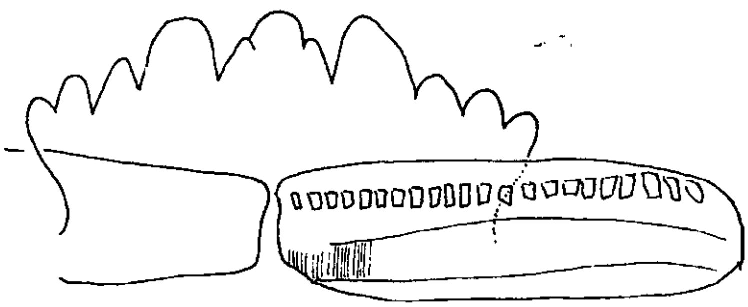
Genus ***Pontomyia***

DIAGNOSIS: This tanytarsine is easily distinguished by the premandibles with more than 3 teeth; mentum with only 4 pairs of lateral teeth; and its marine habitat.

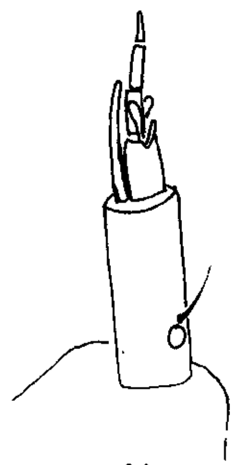
NOTES: Larvae of *Pontomyia* are truly marine; they have been found at depths of 30 meters (Bretschko 1981). I have seen specimens from the Florida Keys. The species' identity is unknown.

Little is known of the ecology of *Pontomyia* other than that they occur in tidal rock pools and offshore sediments

ADDITIONAL REFERENCES: Bretschko 1981.



mentum



antenna & base

Pontomyia sp., larval structures

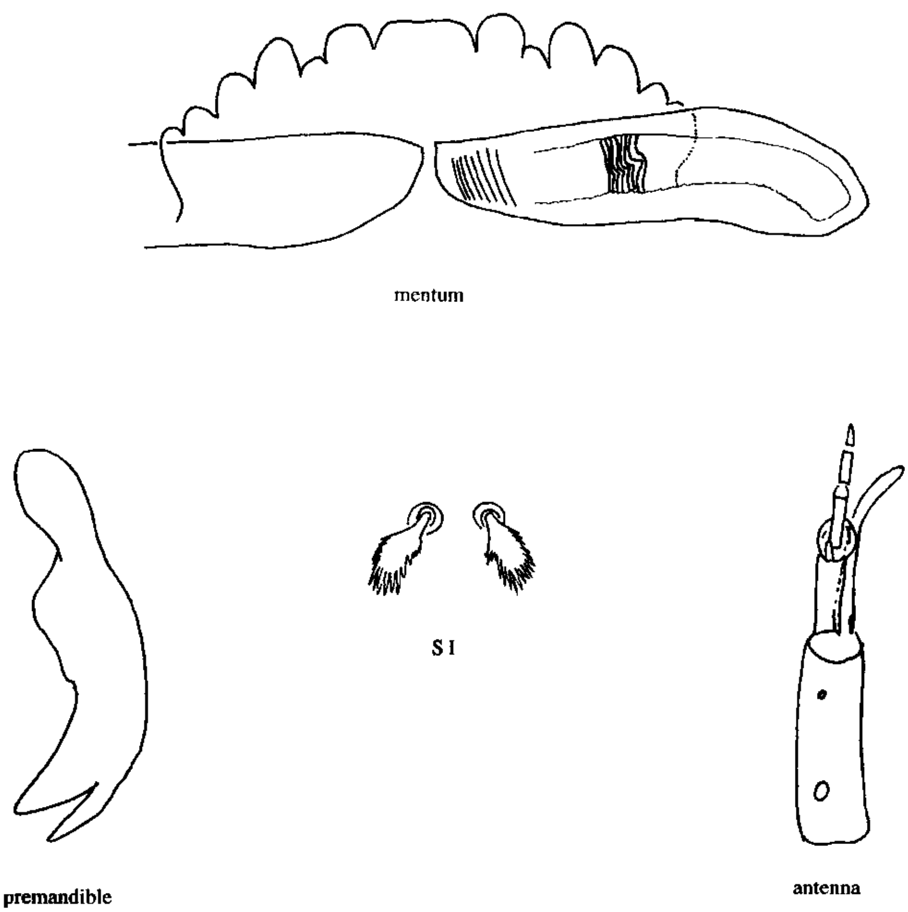
Genus ***Pseudochironomus***

DIAGNOSIS: The S I setae with separate bases; antennae not mounted on elongate bases; apically bifid premandible; and bar-like ventromental plates which almost touch medially will distinguish this genus.

NOTES: *Pseudochironomus* is the only member of the tribe Pseudochironomini in the Nearctic. Three species are recorded from Florida; an additional four species may also occur. Although Sæther (1977) provided a key to larvae, the key fails to identify the majority of larvae encountered in Florida. Larvae must be reared for correct identification. One apparently new species (with a pupal stage similar to that of *P. richardsoni*) is common throughout Florida.

Larvae are found in sandy substrates of lakes and rivers, and can occur in brackish/estuarine water.

ADDITIONAL REFERENCES: Sæther 1977.



Pseudochironomus sp., larval structures

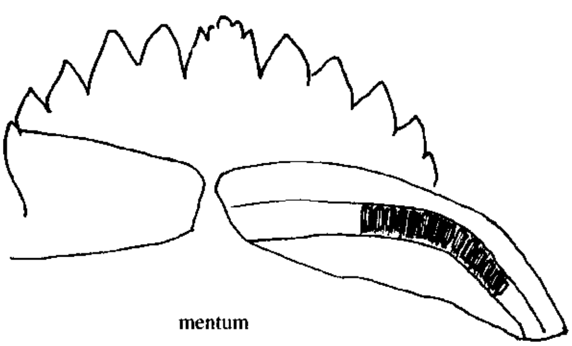
Genus ***Rheotanytarsus***

DIAGNOSIS: This tanytarsine is distinguished by the pecten epipharyngis being a single, broad multitoothed comb (rarely deeply trisected); Lauterborn organs on short pedicels; apically bifid premandible; and ventromental plates often with apparent block-like strial markings.

NOTES: A common and often abundant tanytarsine, *Rheotanytarsus* species are poorly known. As with other Tanytarsini, our knowledge of the taxonomy of this genus lags far behind that of the Palaearctic members. Simpson & Bode (1980) placed larvae known to them in two groups: the *R. distinctissimus* group with AR < 2.0 and the larval case attached to the substrate by a long petiole; and the *R. exiguus* group with AR > 2.0 and the larval case attached to the substrate lengthwise along one side. Although both of these groups occur in FL, some specimens encountered appear to be intermediate. There are probably several undescribed species in Florida. Note that specimens are easily confused with *Paratanytarsus* and *Sublettea.*

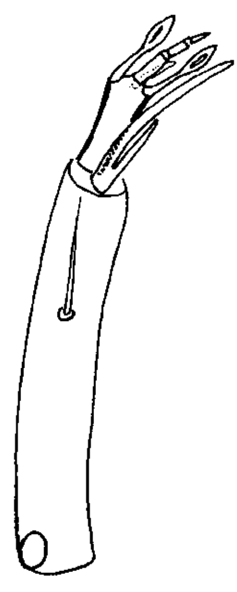
Larvae are usually found in streams and rivers, and are often associated with aquatic plant communities. Larvae can also be found in lakes, where wave action near shore can simulate flowing water conditions. Larvae attach their cases to a number of surfaces including plants, boats, and alligators; I have seen a case on the barbel of a catfish.

ADDITIONAL REFERENCES: Kullberg 1980; Lehmann 1971; Simpson & Bode 1980.



mentum

pecten epipharyngis



antenna

Rheotanytarsus sp., larval structures

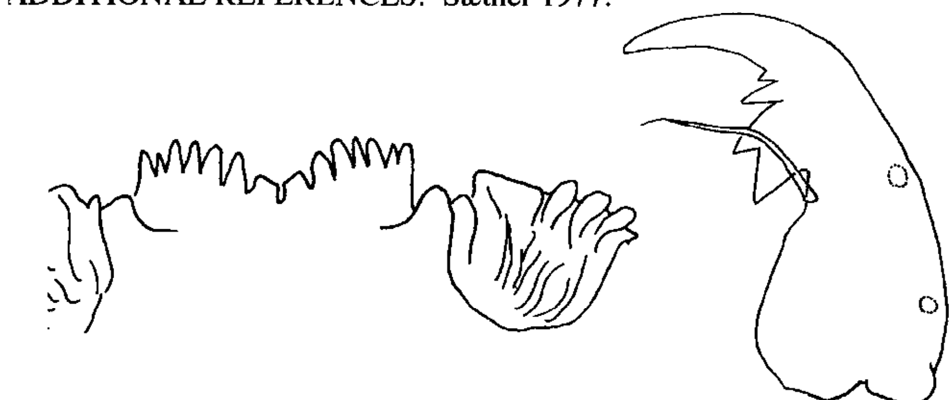
Genus *Robackia*

DIAGNOSIS: The 7-segmented antennae; mandible without seta interna and with modified proximal inner teeth; 14-toothed mentum; and coarsely sculptured ventromental plates will distinguish *Robackia* larvae.

NOTES: Two species are known from Florida: *R. claviger* is identified by the enlarged proximal inner teeth of the mandible and in most specimens the median teeth of the mentum are somewhat truncate and distinctly lower than most of the median teeth; *R. demeijerei* has smaller proximal inner teeth on the mandible and the median mental teeth are more pointed and subequal to remaining teeth. Contrary to the key in Sæther (1977), the menta of both species have 14 teeth. The genus is currently being revised by Dr. F. Reiss (Zoologische Staatssammlung, Munich, Germany).

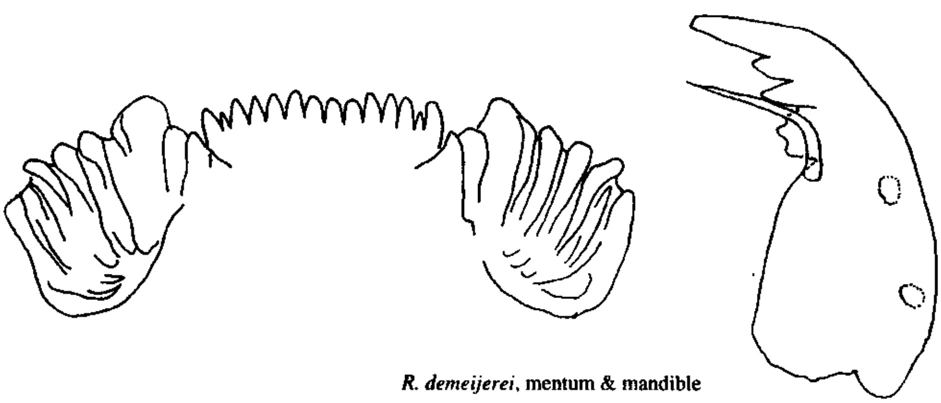
Larvae are found in sand substrates of streams and rivers. Note that the mandibles of early instars may not display the modifications of the inner proximal teeth. Do not confuse the enlarged style for an antennal segment!

ADDITIONAL REFERENCES: Sæther 1977.



R. claviger, mentum & mandible

antenna



R. demeijerei, mentum & mandible

Robackia spp., larval structures

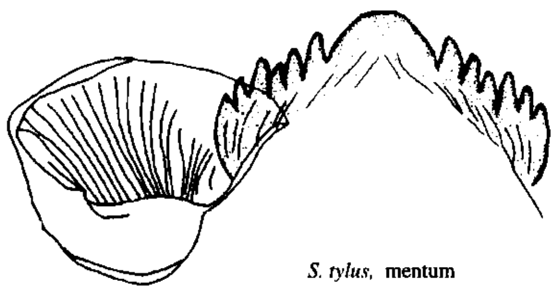
Genus *Saetheria*

DIAGNOSIS: This member of the *Harnischia* complex has 6-segmented antennae with small style at apex of segment 3 not exceeding apex of segment 5; mandible with seta interna; and coarsely striated ventromental plates.

NOTES: One species, *S. tylus,* has been found in Florida. Two other species, known only from their immature stages, occur in the South. All can be distinguished by their menta, illustrated below. *Saetheria* is very close to *Paracladopelma,* which has 5-segmented antennae. Separation of the two genera may not be justified; more work is needed. An expanded *Paracladopelma* would include *Saetheria* and probably *Harnischia* complex genera B and C.

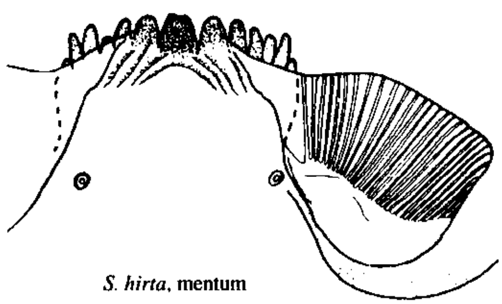
Larvae are found in sandy substrata, usually in running water.

ADDITIONAL REFERENCES: Jackson 1977; Sæther 1983a.



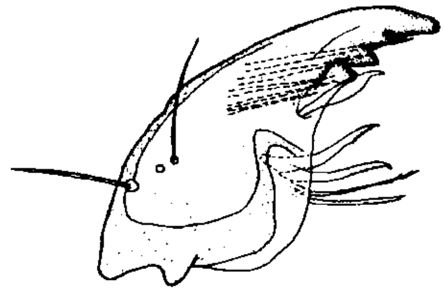
S. tylus, mentum

antenna



S. hirta, mentum

S. sp. 1, mentum



mandible

Saetheria **spp., larval structures**
(*S. hirta* mentum & antenna from Sæther 1983a;
other figures from Jackson 1977)

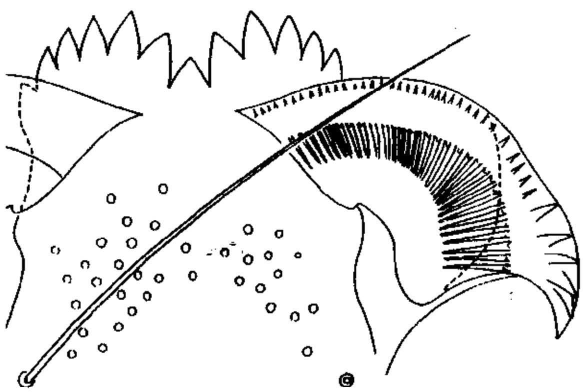
Genus ***Stelechomyia***

DIAGNOSIS: The frontal apotome, with 1 medial labral sclerite anterior to it; distinctive mentum, with deeply sunken single median tooth; long seta submenti; and rectangular, dark yellow-brown head capsule will distinguish this genus.

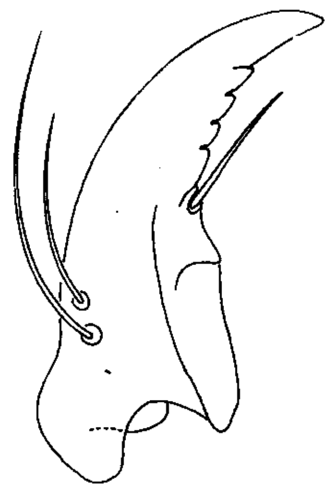
NOTES: One species, *S. perpulchra*, is known. It was formerly placed in *Lauterborniella.*

Larvae occur on dead wood in streams and rivers; they are often found on Hester-Dendy samplers.

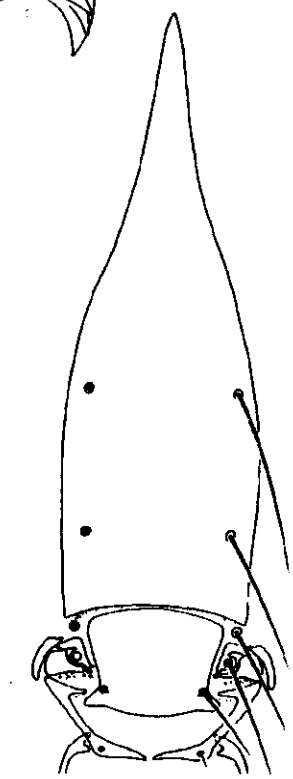
ADDITIONAL REFERENCES: Reiss 1982.



mentum



mandible



apotome & sclerites

Stelechomyia perpulchra, larval structures
(adapted from Pinder & Reiss 1983)

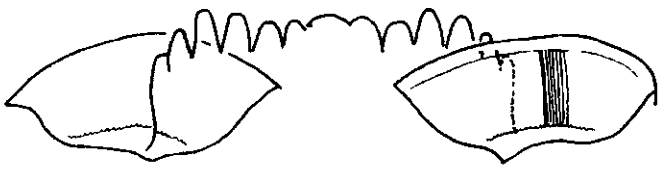
Genus ***Stempellina***

DIAGNOSIS: This tanytarsine is identified by the palmate spur on the inner side of the antennal base; both Lauterborn organs arising at the apex of antennal segment 2; the squat ventromental plates, separated medially by at least the width of the 3 median mental teeth; and its portable sand case.

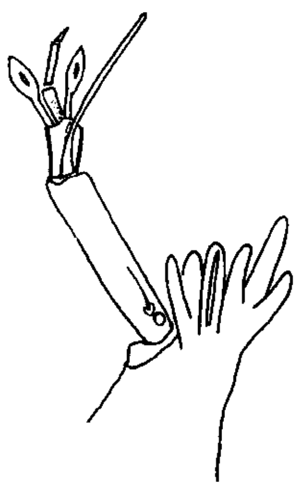
NOTES: This genus is very similar to *Constempellina*, with which it may occur (as well as with *Stempellinella*). The most apparent difference between the two genera is the palmate spur of the antennal base. At least one species, apparently undescribed, occurs in Florida.

Larvae live in portable sand cases, and can be found in lentic and lotic situations.

ADDITIONAL REFERENCES: Webb 1969.



mentum



antenna & base

Stempellina sp., larval structures

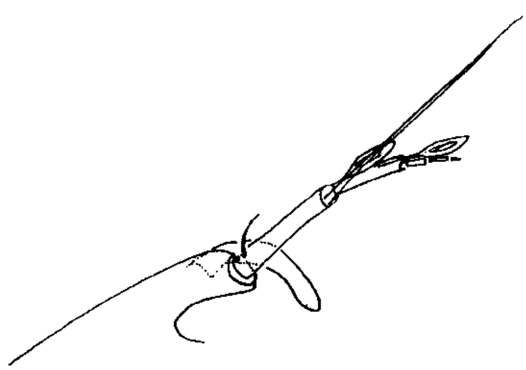
Genus *Stempellinella*

DIAGNOSIS: This tanytarsine is distinguished by its antennae, with one set of Lauterborn organs arising apically, and the other near the base of segment 2; pecten epipharyngis of three long, thin spines; premandible with 2-4 teeth; squat ventromental plates separated medially by at least the width of the 3 median mental teeth; and its portable sand case.

NOTES: At least one species occurs in Florida. Larvae are similar to those of *Zavrelia*, a taxon which apparently does not occur in Florida. Differences between the two genera are slight. Pinder & Reiss (1983) pointed out that antennal characters previously used to separate the genera were invalid, and used characters of the premandible and pecten epipharyngis to distinguish them. Florida larvae (confirmed as *Stempellinella* by associated pupae and adults) possess four teeth on the premandible, and have a pecten epipharyngis of three long, slender spines. *Zavrelia* larvae have five teeth on the premandible, arranged at almost a right angle to the long axis of the structure, and a pecten epipharyngis of three short spines (see Pinder & Reiss 1983: fig. 10.81). Maintaining the two as separate genera may not be justified.

Larvae construct portable cases of sand, and are found in streams, rivers and lakes.

mentum



antenna & base

premandible

Stempellinella sp., larval structures

Genus *Stenochironomus*

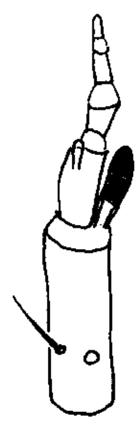
DIAGNOSIS: The dorsoventrally flattened and apically tapered head capsule; antennae with blade extending to apex of segment 2; concave mentum with 10-12 teeth; vestigial ventromental plates; and anal tubules with 0-2 constrictions will identify the larvae of this genus.

NOTES: Seven species are recorded from Florida, based on adults. The genus was recently revised by Borkent (1984), who provided a preliminary key to Nearctic fourth instar larvae and established two subgenera. However, the key relies on size (larvae *must* be fourth instar) and exact habitat location of the larvae, and identifications need to be confirmed by reared adults. Borkent (1984) also noted that the differences between *S. aestivalis* and *S. cinctus* larvae described by Beck & Beck (1970) were not recognizable.

Larvae mine in submerged dead leaves (subgenus *Petalopholeus*) or in submerged dead wood (subgenus *Stenochironomus*).

ADDITIONAL REFERENCES: Borkent 1984.

mentum



antenna

Stenochironomus sp., larval structures

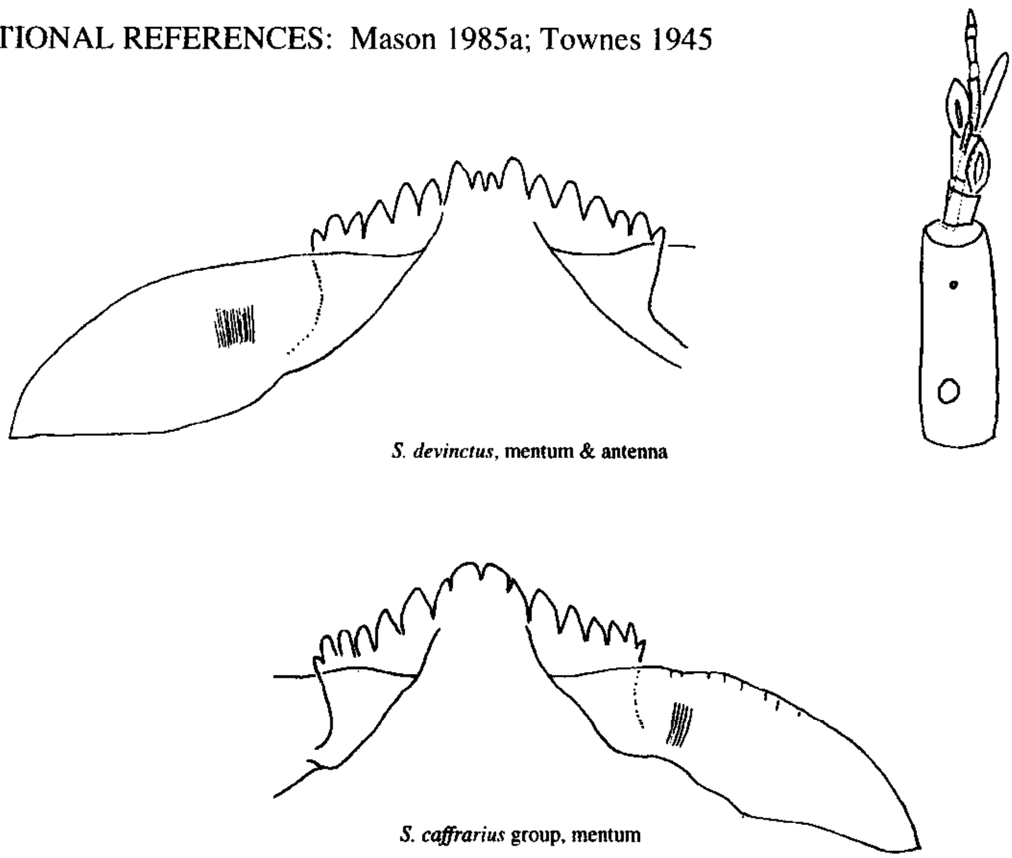
Genus ***Stictochironomus***

DIAGNOSIS: The 6-segmented antennae, with alternate Lauterborn organs on segments 2 and 3; and mentum with at least the outer pair of 4 median teeth higher than remaining lateral teeth will distinguish this genus.

NOTES: Based on adults, two species are known from Florida; *S. devinctus* is by far the more common; the larva of *S. palliatus* is undescribed. However, it is incorrect to identify any *Stictochironomus* larvae collected as *S. devinctus*; I have seen adults of another species in Alabama that also may occur here. The Chironominae genus B larva of Pinder & Reiss (1983) and pupal Chironominae genus F of Pinder & Reiss (1986) has been shown to be *S. caffrarius* (Reiss, pers. comm.), a Palaearctic and Afrotropical species. A similar larva occurs in the Southeast; this may be the larva of *S. palliatus*. Specimens can be called "*S. caffrarius* group" until an association is made. Mason (1985a) offered a larval key for several species, but of Florida species, only *S. devinctus* was included.

Larvae are generally found in sand sediments of streams, rivers and lakes. Many larvae bear menta and mandibles which have been worn by sand abrasion.

ADDITIONAL REFERENCES: Mason 1985a; Townes 1945



S. devinctus, mentum & antenna

S. caffrarius group, mentum

Stictochironomus spp., larval structures

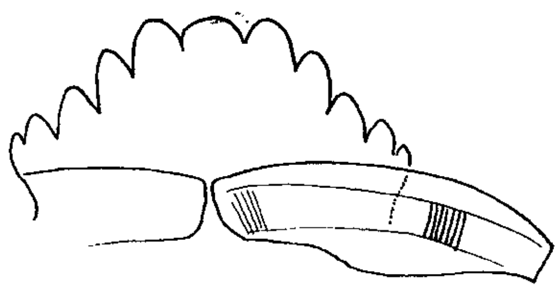
Genus *Sublettea*

DIAGNOSIS: This tanytarsine is identified by the pecten epipharyngis of 3 simple lobes; bifid premandible; antennae with Lauterborn organs extending to or beyond antennal apex; mandible with pronounced hump on outer margin; and mentum with 3 median teeth strongly projecting.

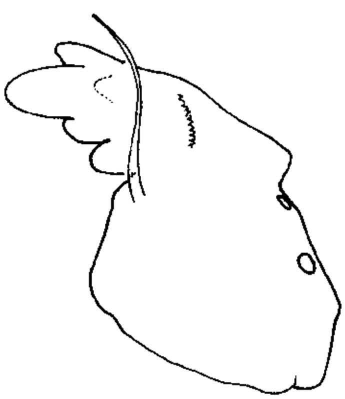
NOTES: One species, *S. coffmani* (Roback), is described from North America. It has not yet been recorded from Florida, but may eventually be found here. Pinder & Reiss (1983) stated that the Lauterborn organs did not extend beyond the antennal apex. However, on a Pennsylvania specimen I've examined and figured below, the Lauterborn organs clearly extend beyond the apex.

Larvae are recorded from lotic habitats.

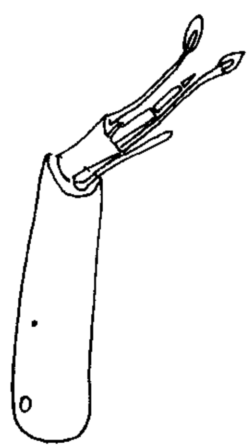
ADDITIONAL REFERENCES: Roback 1975.



mentum



mandible



antenna

***Sublettea* sp., larval structures**

Genus *Tanytarsus*

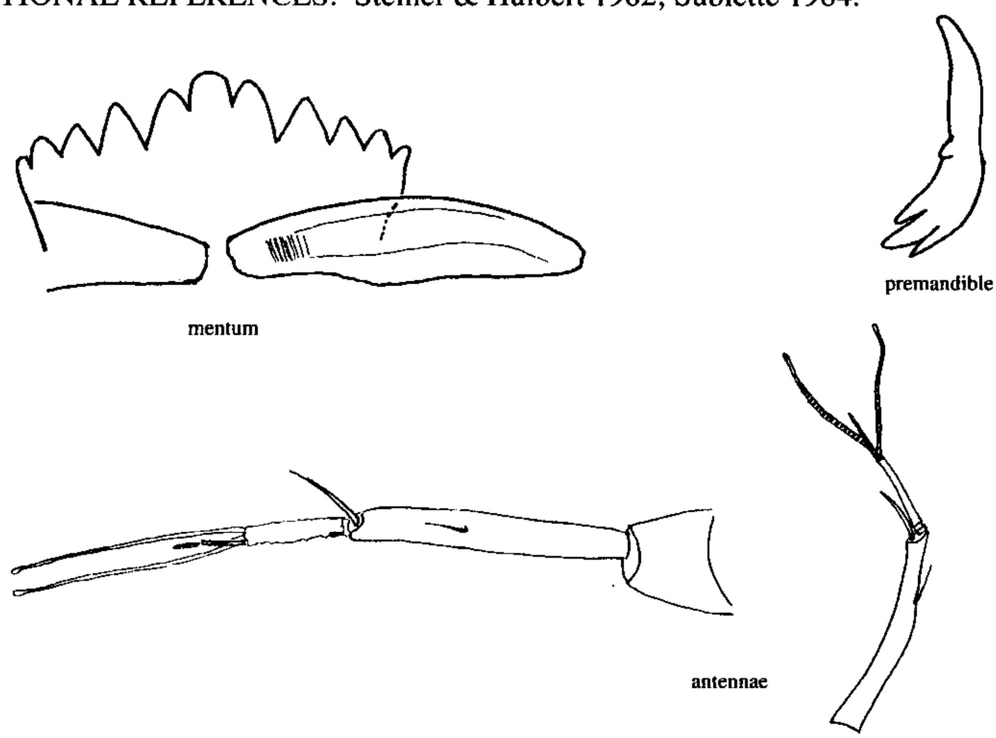
DIAGNOSIS: This tanytarsine is distinguished by the premandible with 3 or more teeth; antennal segment 2 cylindrical (when sclerotized); Lauterborn organs small and placed on long pedicels; and simple claws on the posterior parapods.

NOTES: A very common and widespread genus, the taxonomy of *Tanytarsus* is poorly known. Dr. J.E. Sublette has been working on the Tanytarsini for over thirty years; one paper (Sublette 1964) has been published to date with descriptions of a few *Tanytarsus*. Thus, even if specimens are reared, most do not yet have published names. Based on described adults, at least nine species are known from the state. There are more than twice that many recognizable larval taxa. Based on associations from Florida and Costa Rica, the species formerly placed in *Nimbocera* are now considered to be members of *Tanytarsus* (see Notes).

Larvae are found in varied aquatic habitats, including brackish water.

Using a broad definition of the genus, 20 taxa are presented in the key beginning on the following page. Some of these taxa may represent undescribed genera (*T.* sp. F) or may consist of several species (spp. A, C, G, and L). Bear in mind that there are no doubt several taxa that I have not seen, but will key out anyway! If you are not sure, identify your specimens as "*Tanytarsus* sp." Rearing larvae will greatly assist systematists to solve the taxonomic complexities of this genus.

ADDITIONAL REFERENCES: Steiner & Hulbert 1982; Sublette 1964.



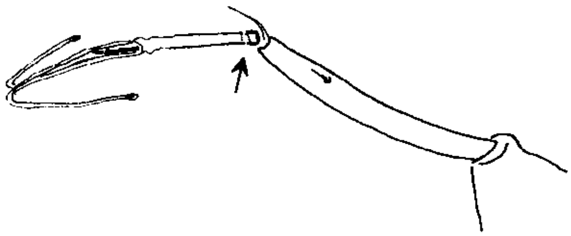
Tanytarsus spp., larval structures

Key to Florida *Tanytarsus*

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

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

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

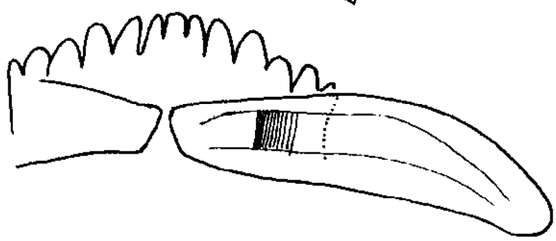


2' Antennal segment 2 with base solidly sclerotized, or entire segment poorly sclerotized 5

3(2) Pedicels of Lauterborn organs annulated; 3 inner teeth on mandible .... ***T. limneticus***
(Formerly placed in *Nimbocera*)

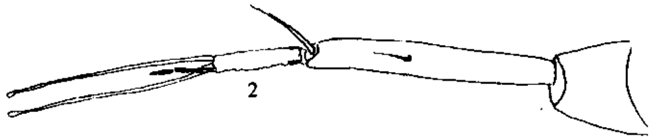
3' Pedicels not annulated; 2 inner teeth on mandible 4

4(3') Median tooth of mentum deeply trifid .... ***T.* sp. O**



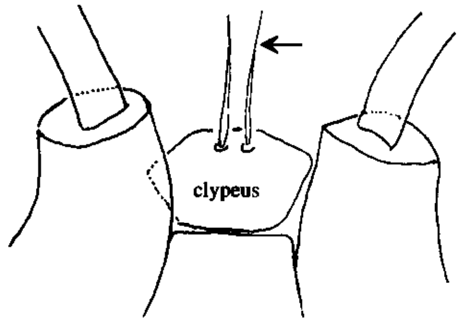
4' Median tooth of mentum simple .... ***T.* sp. B**

5(2') Antennal segment 2 for the most part unsclerotized (at most a small section near the base may be sclerotized) 6



5' Antennal segment 2 for the most part (at least 60%) sclerotized 9

6 (5) Clypeus (sclerite anterior to bases of antennae) with a pair of simple setae (there may be one or more fine lateral "hairs" present) 7



6' Clypeus with coarsely branched or plumose setae 8

7(6) Mandible with 3 inner teeth .... ***T.* sp. L**

7' Mandible with 2 inner teeth .... ***T.* sp. V**
(some *T.* sp. O may key here, but note the deeply trifid median tooth)

8 (6') Clypeal setae plumose, finely dissected .... ***T.* sp. A**

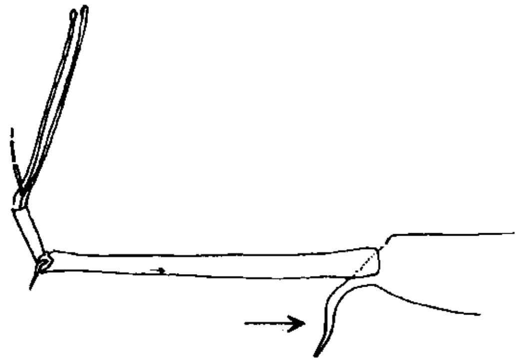
8' Clypeal setae with coarse, flattened branches .... ***T.* sp. S**

9 (5') Mandible with 2 inner teeth 10

9' Mandible with 3 inner teeth 14

10 (9) Antennal base with long spur .... *T.* **sp. M**

(Note that the long spur may be difficult to discern if it is pointed directly at the observer.)

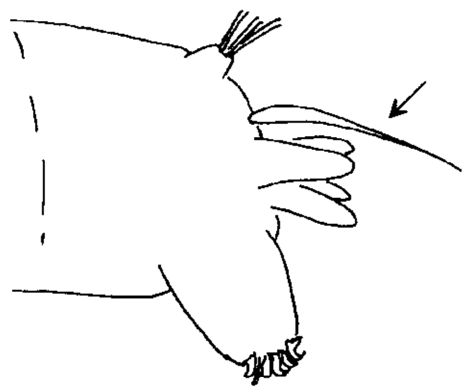


10' Antennal base without long spur 11

11(10') Clypeal setae branched .... ***T.* sp. W**

11' Clypeal setae simple 12

12(11') Median tooth margined; supraanal setae longer than anal tubules 13

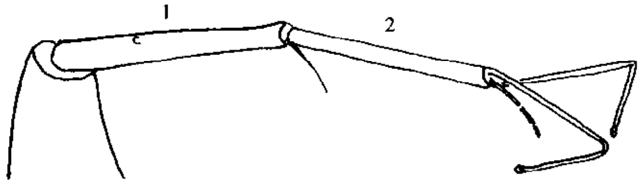


12' Median tooth simple; supraanal setae less than or equal to anal tubules .... ***T.* sp. J**

13 (12) Clypeal setae arise from pointed pedestals .... ***T.* sp. K**

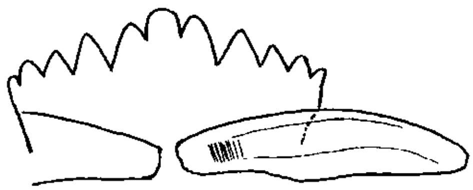
13' Clypeal setae do not arise from pedestals (there may be a raised area near base of seta) .... ***T.* sp. R**

14(9') **Antennal** segment 2 more than ½ length of segment 1 .... ***T.* sp. P**



14' Antennal segment 2 less than ½ length of segment 1 15

15(14') Mentum with 3 dark central teeth which project forward 16



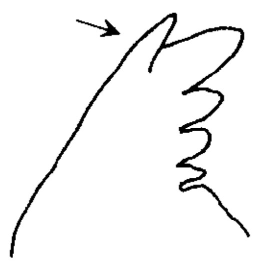
15' Mentum not as above 18

16 (15) Clypeal setae simple .... ***T.* sp. C**

16' Clypeal setae branched 17

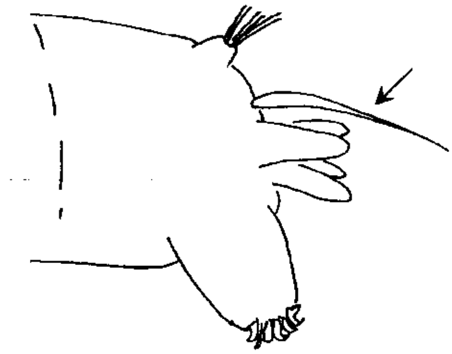
17 (16') Mandible with 2 or more dorsal teeth .. ***T.* sp. D**

17' Mandible with 1 dorsal tooth .... ***T.* sp. U**



18(15') Supraanal setae shorter than anal tubules; premandibles usually darkened apically .... ***T.* sp. G**

18' Supraanal setae much longer than anal tubules; premandibles usually light 19



19(18') Antennal base usually with a small spur; sclerotized portion of antennal segment 2 less than 0.3 length of segment 1 .... ***T.* sp. T**

19' Antennal base without a small spur; sclerotized portion of antennal segment 2 more than 0.3 length of segment 1 .... ***T.* sp. E**

Notes on species

T. limneticus - This species, originally described only from adults, was formerly (Epler 1992) considered a member of the genus *Nimbocera*. However, rearings of this species and a Central American species, *T. pandus* Sublette & Sasa, and associations of some other Florida taxa (e.g. *T.* sp. A), indicate that the taxon *Nimbocera* can not be considered a valid genus. A mix of supposedly generic-defining characters, such as the distinctive larval antennae and the forward directed spines on pupal tergite IV, occur in several species in different combinations throughout the genus *Tanytarsus*. Thus "*Nimbocera limnetica*" is returned to *Tanytarsus;* its correct name now is *Tanytarsus limneticus*; it remains a senior synonym of *N. pinderi* Steiner & Hulbert. Other species placed in *Nimbocera* (see Trivinho-Strixino & Strixino 1991) may also deserve placement in *Tanytarsus*.

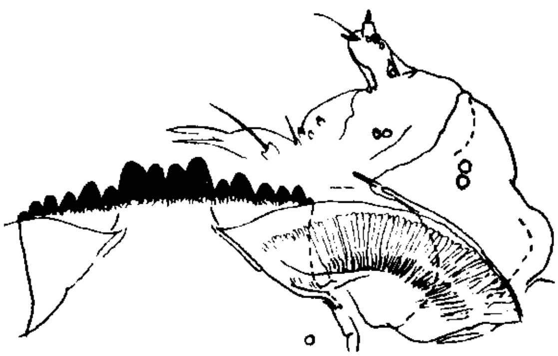
Genus *Tribelos*

DIAGNOSIS: The frontal apotome with 2 medial labral sclerites anterior to it; anterior margin of labral sclerite 1 mostly straight; mentum with a line running from the posterior margin of the outermost median tooth back to the anteromedial corner of the ventromental plates; mandible with distance from basal notch of inner tooth to insertion of seta subdentalis usually less than 3/4 distance from basal notch to apical notch; and molar area of mandible with 1 or 2 serrations separated from the seta subdentalis should identify members of this genus. See also *Phaenopsectra*.

NOTES: Three species are known from Florida; Hudson et al. (1990) noted an undescribed species from South Carolina. This genus is sometimes difficult to separate from *Phaenopsectra*; however, the two common species in Florida, *T. fuscicorne* and *T. jucundum*, are usually easily recognized. Grodhaus (1987a) recently revised *Tribelos* and other genera; the key on the following page is modified from his paper.

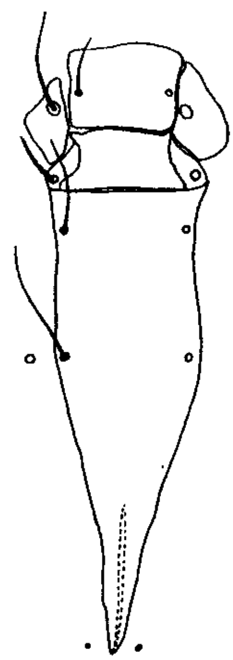
Larvae are most often found in streams and rivers, where they may be abundant on vegetation and Hester-Dendy samplers. They appear to be tolerant of organically enriched conditions.

ADDITIONAL REFERENCES: Grodhaus 1987a.



T. jucundum, mentum & maxilla

mandible



apotome & sclerites

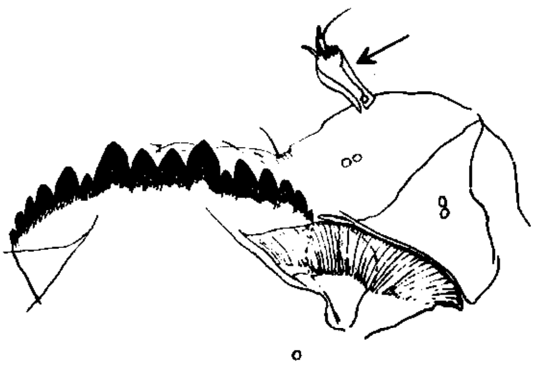
Tribelos spp., larval structures
(adapted from Grodhaus 1987a)

Key to Florida *Tribelos*

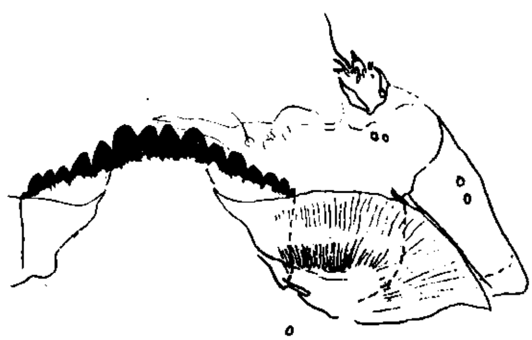
1 Blade of antenna much longer than flagellum .. *T. jucundum*

1' Blade of antenna subequal to flagellum 2

2 (1') Length of basal segment of maxillary palp at least 2X width; ventromental plate striae distinct .... *T. fuscicorne*



2' Length of basal segment of maxillary palp less than 2X width; ventromental plate striae indistinct .... *T. atrum*



(All figs. adapted from Grodhaus 1987a)

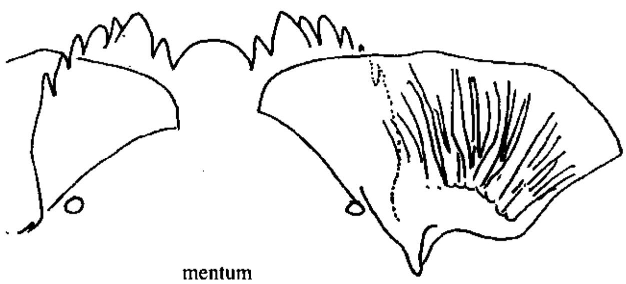
Genus *Xenochironomus*

DIAGNOSIS: The large setal brush on the labrum; dorsum of head with 3 labral sclerites anterior to the apotome; distinctive mentum; and freshwater sponge mining habit will identify this genus.

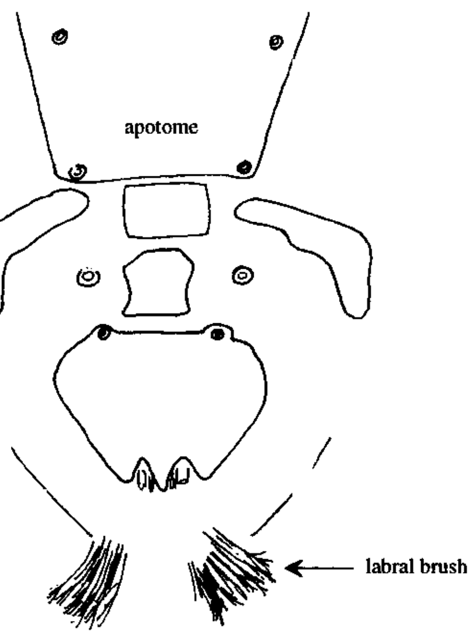
NOTES: One Holarctic species is known, *X. xenolabis*. Other Nearctic species formerly placed in the genus are now in *Axarus* or *Lipiniella*.

The larvae are obligate miners of freshwater sponges. The larva illustrated below was collected from sponge on the case of the leptocerid caddisfly *Ceraclea*.

ADDITIONAL REFERENCES: Roback 1963.



mentum



apotome, sclerites and labral area

Xenochironomus, larval structures

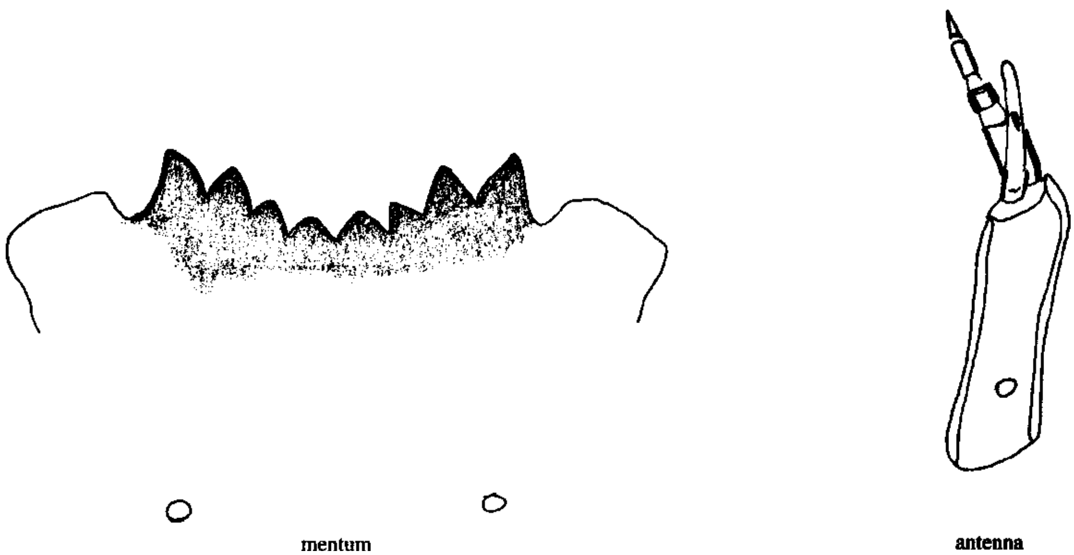
Genus *Xestochironomus*

DIAGNOSIS: The dorsoventrally flattened and apically tapered head capsule; antennae with blade extending past the apex of segment 3; concave mentum with 8 teeth; vestigial ventromental plates; and anal tubules with 4-5 constrictions will identify the larvae of this genus.

NOTES: Borkent (1984) revised *Xestochironomus* and described the larva. One species, *X. subletti,* is known from Florida. However, the genus has many Neotropical species; it would not be surprising to find additional species in south Florida. Unassociated larvae should be identified as "*Xestochironomus* sp."

Larvae mine in dead, submerged wood in lotic habitats.

ADDITIONAL REFERENCES: Borkent 1984.



Xestochironomus subletti, larval structures

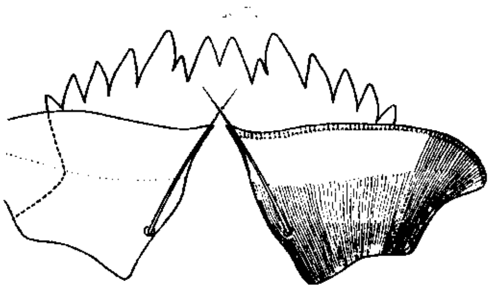
Genus *Zavreliella*

DIAGNOSIS: The frontoclypeal apotome, with 1 medial labral sclerite anterior to it; 6-segmented antennae with alternate Lauterborn organs on segments 2 & 3; simple setae submenti placed on the ventromental plates; long ventrolateral tubules on body segment 10; and segment 11 with anteriorly directed hump will distinguish this genus

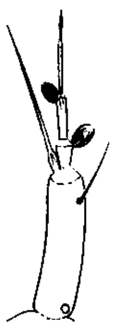
NOTES: One species, *Z. marmorata*, is known from the Nearctic. Reiss (1990) recently revised the genus; an additional 12 species are known from northern South America. *Z. marmorata*, formerly called *Lauterborniella varipennis*, is found throughout most of the world; some European populations are parthenogenetic.

Z. marmorata larvae are found in marshes and vegetation choked, eutrophic ponds and lakes, where they swim around in their hydroptilid caddisfly-like cases. The case differs from that of *Lauterborniella* in that it has a circular opening; the case of *Lauterborniella* has a slit-like opening.

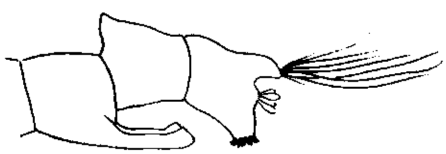
ADDITIONAL REFERENCES: Reiss 1990.



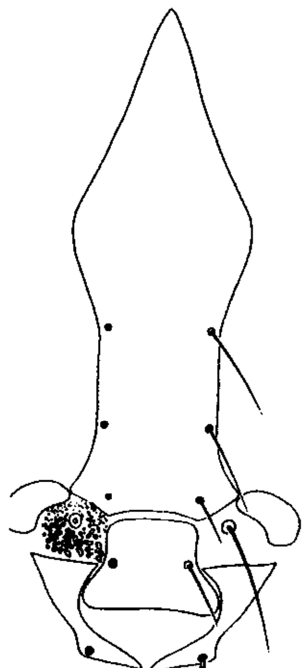
mentum



antenna



posterior body segments



apotome & sclerites

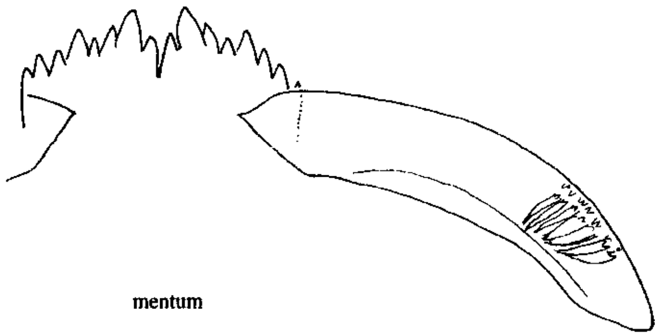
Z. marmorata, larval structures

Chironomini genus A

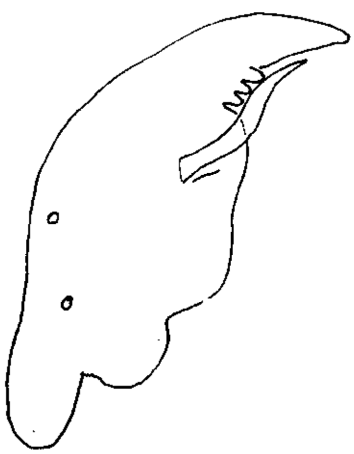
DIAGNOSIS: The 6-segmented antennae, with Lauterborn organs at apex of segment 2 only; mentum with deeply sunken pair of median teeth; long setae submenti which extend beyond the mentum; and mandible with large seta subdentalis, but without pecten mandibularis and seta interna distinguish this taxon in Florida.

NOTES: The pupa and adult of this taxon are undescribed. I have seen specimens from the Suwannee River and Escambia Co. in Florida. Other species occur in Central and South America.

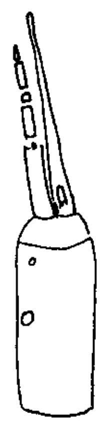
Larvae are reported from sediments of rivers and lakes. Although I have collected a larva, apparently a different species from Florida specimens, from near the mouth of a river in Costa Rica, further collecting in the same area indicated that the larva was washed in from riverside streams.



mentum



mandible



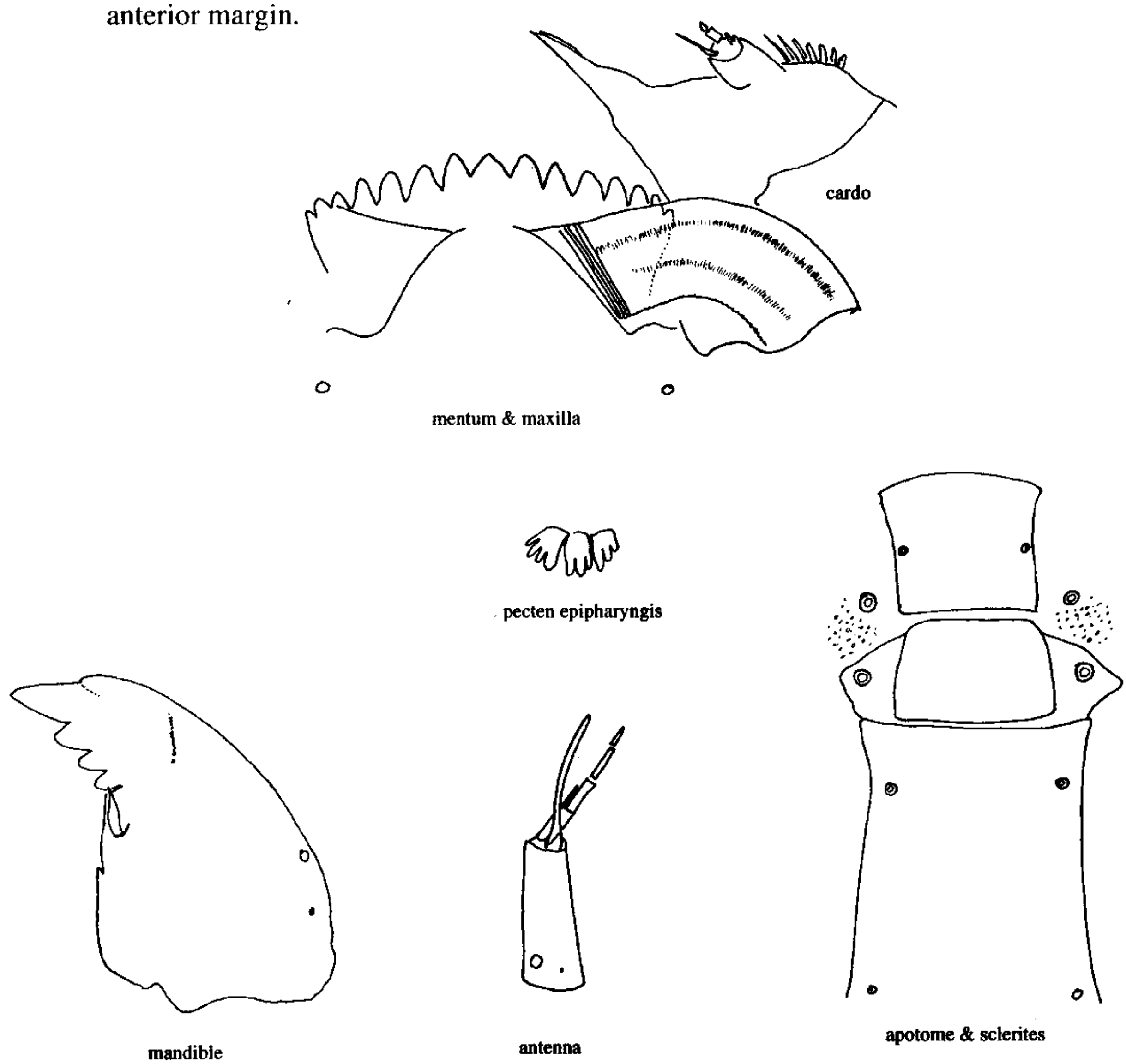
antenna

Chironomini genus A, larval structures

Chironomini genus III

DIAGNOSIS: The 15-toothed mentum; and cardo with smooth anterior margin will separate this taxon from its apparent relatives *Endochironomus, Phaenopsectra* and *Tribelos*.

NOTES: I have seen specimens of this taxon, known only as a larva, from sites throughout peninsular and northern Florida, including a bayhead in St. Johns Co., a roadside ditch in Flagler Co. and a canal in Highlands Co. It appears to be closely related to *Tribelos*, but without associated life stages it is not possible to place this larva. Some *Endochironomus* larvae have a 15-toothed mentum, but have a cardo with a tuberculate anterior margin.

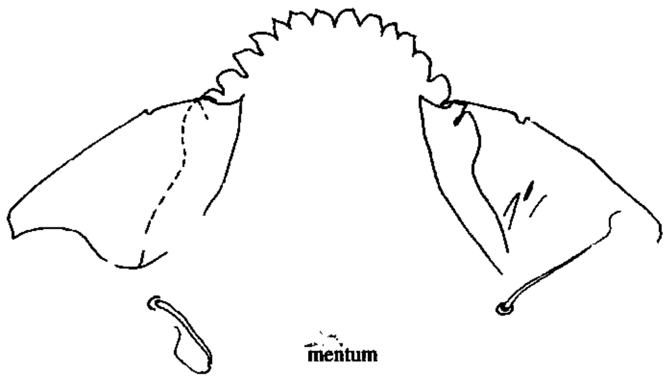


Chironomini genus III, larval structures

Harnischia complex genus A

DIAGNOSIS: The 6-segmented antennae, with alternate Lauterborn organs on segments 2 & 3; ventromental plates with notch on anterior margin; and distinctive mentum, which resembles a circular saw blade, will distinguish this taxon.

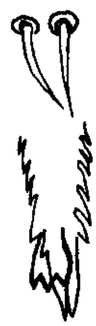
NOTES: I have seen specimens of this larva in core samples from the Chipola River system. It is apparently the same larva Roback (1953) called "unknown gen. & sp. near *Microtendipes*".



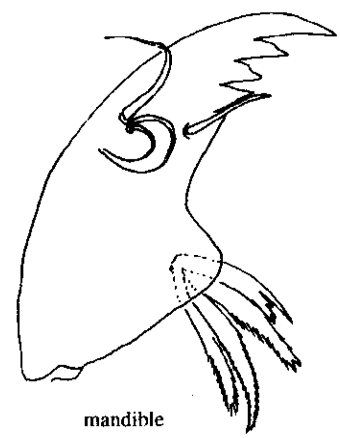
mentum

antenna

premandible



S I & pecten epipharyngis



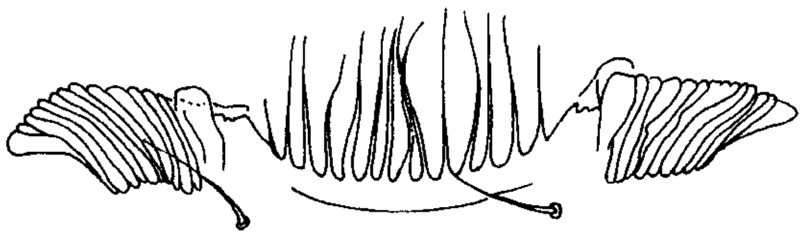
mandible

Harnischia complex genus A, larval structures

***Harnischia* complex genus B**

DIAGNOSIS: The 6-segmented antennae; mandible with extensive lateral fringe of setae and poorly sclerotized, lamellar teeth; and mentum bearing long, anteriorly directed seta-like projections distinguish this taxon.

NOTES: This bizarre larva has been collected in core samples from northwestern Florida. It may be an aberrant *Paracladopelma*.



mentum

mandible

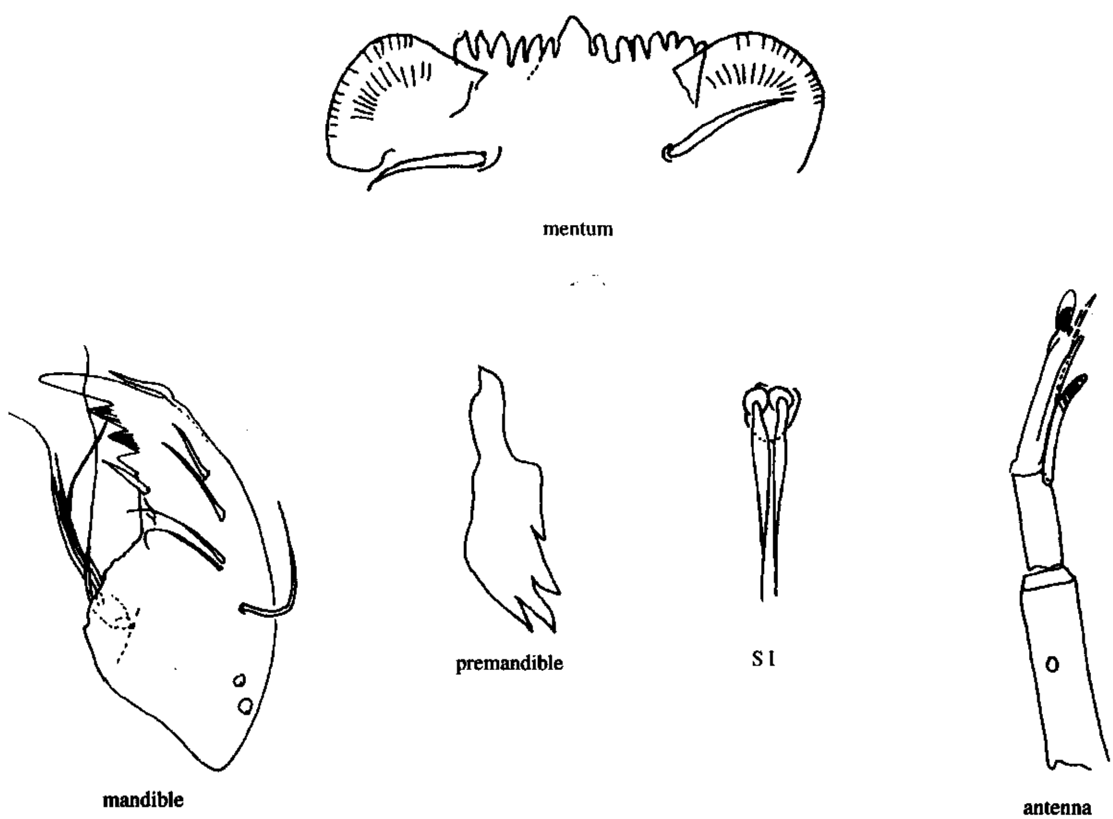
antenna

Harnischia complex genus B, larval structures

Harnischia complex genus C

DIAGNOSIS: The 6-segmented antennae, with style at apex of segment 3 subequal to 4-6; mentum with pointed middle tooth; and semi-circular ventromental plates with fine striae distinguish this taxon.

NOTES: I have seen this taxon in core and drift samples from northwestern Florida. It may belong in *Saetheria* (it somewhat resembles *S. hirta*) or an expanded concept of *Paracladopelma.*



Harnischia complex genus C, larval structures

BIBLIOGRAPHY OF FLORIDA CHIRONOMIDAE

Ali, A. 1991. Perspectives on management of pestiferous Chironomidae (Diptera), an emerging global problem. J. Am. Mosq. Control Assoc. 7: 260-281.

Armitage, P., P.S. Cranston & L.C.V. Pinder (eds). 1995. The Chironomidae. Biology and ecology of non-biting midges. Chapman & Hall, London. 572 pp.

Ashe, P. 1983. A catalogue of chironomid genera and subgenera of the world including synonyms (Diptera: Chironomidae). Ent. scand. Suppl. 17: 1-68.

Beck, E.C. 1961. Two new Chironomidae (Diptera) and additional state records from Florida. Fla. Ent. 44:125-128.

Beck, E.C. 1962. Five new Chironomidae (Diptera) from Florida. Fla. Ent. 45:89-92.

Beck, E.C. & W.M. Beck, Jr. 1959. A checklist of the Chironomidae (Insecta) of Florida (Diptera: Chironomidae). Bull. Fla. St. Mus. 4:85-96.

Beck, E.C. & W.M. Beck, Jr. 1969a. The Chironomidae of Florida II. The nuisance species. Fla. Ent. 52:1-11.

Beck, E.C. & W.M. Beck, Jr. 1969b. Chironomidae (Diptera) of Florida III. The *Harnischia* complex (Chironominae). Bull. Fla. St. Mus. Biol. Sci. 13:277-313.

Beck, W.M., Jr. 1976. Biology of the larval chironomids. Fla. State Dept. Environ. Reg. Tech. Ser. 2:1-58

Beck, W.M., Jr. 1977. Environmental requirements and pollution tolerance of common freshwater Chironomidae. U.S. Environmental Protection Agency, EPA 600/4-77-024. 260 pp.

Beck, W.M., Jr. 1979. Biology of the larval chironomids. Revised edition. Fla. State Dept. Environ. Reg. Tech. Ser. 2:1-58

Beck, W.M., Jr. 1980. Interesting new chironomid records for the southern United States (Diptera: Chironomidae). J. Ga. Ent. Soc. 15:69-73.

Beck, W.M., Jr. & E.C. Beck. 1958. A new species of *Xenochironomus* from Florida. Fla. Ent. 41: 27-28.

Beck, W.M., Jr. & E.C. Beck. 1964. New Chironomidae from Florida (Diptera). Fla. Ent. 47:201-207.

Beck, W.M., Jr. & E.C. Beck. 1966a. The Chironomidae of Florida: A problem in international taxonomy. Gewäss. Abwäss. 41/42: 129-135.

Beck. W.M., Jr. & E.C. Beck. 1966b Chironomidae (Diptera) of Florida - I. Pentaneurini (Tanypodinae). Bull. Fla. St. Mus. Biol. Sci. 10:305-379.

Beck, W.M., Jr., & E.C. Beck. 1970. The immature stages of some Chironomini (Chironomidae). Q.J. Fla. Acad. Sci. 33:29-42.

Beck, W.M., Jr. & E.C. Beck. 1974. The Blackwater River Basin and the Chironomidae of Florida. Ent. Tidskr. Suppl. 95: 18-20.

Bilyj, B. 1988. A taxonomic review of *Guttipelopia* (Diptera: Chironomidae). Ent. scand. 19:1-26.

Bilyj, B. & Davies, I.J. 1989. Descriptions and ecological notes on seven new species of *Cladotanytarsus* (Chironomidae: Diptera) collected from an experimentally acidified lake. Can. J. Zool. 67:948-962.

Bode, R.W. 1983. Larvae of North American *Eukiefferiella* and *Tvetenia* (Diptera: Chironomidae). Bull. N.Y. St. Mus. No. 452:1-40.

Boesel, M.W. 1974. Observations on the Coelotanypodini of the northeastern states, with keys to the known stages. (Diptera: Chironomidae: Tanypodinae). J. Kans. Ent. Soc. 47: 417-432.

Boesel, M.W. 1983. A review of the genus *Cricotopus* in Ohio, with a key to the species of the northeastern United States (Diptera: Chironomidae). Ohio J. Sci. 83: 74-90.

Boesel, M.W. 1985. A brief review of the genus *Polypedilum* in Ohio, with keys to the known stages of species occurring in northeastern United States (Diptera: Chironomidae). Ohio J. Sci. 85:245-262.

Boesel, M.W. & R.W. Winner. 1980. Corynoneurinae of northeastern United States, with a key to adults and observations on their occurrence in Ohio (Diptera: Chironomidae). J. Kans. Ent. Soc. 53: 501-508.

Bolton, M.J. 1991. The identity of Chironomini Genus C (Diptera: Chironomidae) in Pinder and Reiss (1986). Ent. News 102: 125-126.

Bolton, M.J. 1992. Chironomidae (Diptera) of Cedar Bog, Champaign County, Ohio. Ohio J. Sci. 92: 147-152.

Borkent, A. 1984. The systematics and phylogeny of the *Stenochironomus* complex (*Xestochironomus, Harrisius,* and *Stenochironomus*). (Diptera: Chironomidae). Mem. ent. Soc. Canada 128:1-269.

Bretschko, G. 1981. *Pontomyia* Edwards (Diptera: Chironomidae), a member of the coral reef community at Carrie Bow Cay, Belize, pp. 381-385 *in* Rätzler, K. & I.G. Macintyre (eds.):

The Atlantic Barrier Reef Ecosystem at Carrie Bow Cay, Belize, 1: Structure and Communities. Smithsonian Contr. Mar. Sci. 12:539 pp.

Caldwell, B.A. 1984. Two new species and records of other chironomids from Georgia (Diptera: Chironomidae) with some observations on ecology. Georgia J. Sci. 42:81-96.

Caldwell, B.A. 1985. *Paracricotopus millrockensis*, a new species of Orthocladiinae (Diptera: Chironomidae) from the southeastern United States. Brimleyana 11:161-168.

Caldwell, B.A. 1986. Description of the immature stages and adult female of *Unniella multivirga* Sæther (Diptera: Chironomidae) with comments on phylogeny. Aquatic Insects 8: 217-222.

Caldwell, B.A. 1993. The immature stages of *Ablabesmyia cinctipes* (Johannsen) with comments on ecology (Insecta, Diptera, Chironomidae). Spixiana 16: 49-52.

Caldwell, B.A. & A.R. Soponis. 1982. *Hudsonimyia parrishi*, a new species of Tanypodinae (Diptera: Chironomidae) from Georgia. Fla. Ent. 65: 506-513.

Coffman, W.P. & L.C. Ferrington, Jr. 1984. Chironomidae. Pp. 551-652 *in* Merritt, R.W. & K.W. Cummins (eds.). An introduction to the aquatic insects of North America. 2nd ed. Kendall/Hunt Publishing Co., Dubuque, IA.

Coffman, W.P. & S.S. Roback. 1984. *Lopescladius (Cordiella) hyporheicus*, a new subgenus and species (Diptera: Chironomidae: Orthocladiinae). Proc. Acad. Nat. Sci. Philad. 136: 130-144.

Contreras-Lichtenberg, R. 1982. Ein Beitrag zur Kenntnis von *Goeldichironomus (Chironomus) carus* (Townes) 1945. Spixiana 5: 175-180.

Cranston, P.S. 1982. A key to the larvae of the British Orthocladiinae (Chironomidae). Scient. Publs Freshwat. biol. Ass. 45: 1-152.

Cranston, P.S., M.E. Dillon, L.C.V. Pinder & F. Reiss. 1989. The adult males of the Chironominae (Diptera: Chironomidae) of the Holarctic region - Keys and diagnoses. Ent. scand. Suppl. 34: 353-502.

Cranston, P.S. & D.D. Judd. 1987. *Metriocnemus* (Diptera: Chironomidae) - an ecological survey and description of an new species. J. New York Ent. Soc. 95: 534-546.

Cranston, P.S. & D.R. Oliver. 1988a. Additions and corrections to the Nearctic Orthocladiinae (Diptera: Chironomidae). Can. Ent. 120: 425-462.

Cranston, P.S. & D.R. Oliver. 1988b. Aquatic xylophagous Orthocladiinae - systematics and ecology. Spixiana Suppl. 14:143-154.

Cranston, P.S., D.R. Oliver, & O.A. Sæther. 1983. The larvae of Orthocladiinae (Diptera: Chironomidae) of the Holarctic region. Keys and diagnoses. Ent. scand. Suppl. 19:149-291.

Cranston, P.S. & O.A. Sæther. 1986. *Rheosmittia* (Diptera: Chironomidae): a generic validation and revision of the western Palaearctic species. J. nat. Hist. 20:31-51.

Curry, L.L. 1958. Larvae and pupae of the species of *Cryptochironomus* (Diptera) in Michigan. Limnol. Oceanogr. 3:427-442.

Darby, R.E. 1962. Midges associated with California rice fields, with special reference to their ecology (Diptera: Chironomidae). Hilgardia 32: 1-206.

Dendy, J.S. & J.E. Sublette. 1959. The Chironomidae (=Tendipedidae: Diptera) of Alabama with descriptions of six new species. Ann. Ent. Soc. Am. 52: 506-519.

Doughman, J.S. 1983. A guide to the larvae of the Nearctic Diamesinae (Diptera: Chironomidae). The genera *Boreoheptagyia, Protanypus, Diamesa* and *Pseudokiefferiella*. U.S. Geological Survey, Water-Resources Investigations Report 83-4006: 1-58.

Doughman, J.S. 1985. Annotated key to the genera of the tribe Diamesini (Diptera: Chironomidae). Description of the female and immature of *Potthastia iberica* Tosio, and keys to the known species of *Potthastia*. Univ. Alsk. IWR (Inst. Water Resour.) Ser. IWR-107. 49 pp.

Epler, J.H. 1986a. A novel new Neotropical *Nanocladius* (Diptera: Chironomidae), symphoretic on *Traverella* (Ephemeroptera: Leptophlebiidae). Fla. Ent. 69:319-327.

Epler, J.H. 1986b. The larva of *Radotanypus submarginella* (Sublette) (Diptera, Chironomidae). Spixiana 9:285-287.

Epler, J.H. 1987. Revision of the Nearctic *Dicrotendipes* Kieffer, 1913 (Diptera: Chironomidae). Evol. Monogr. 9:102 pp + 37 plates.

Epler, J.H. 1988a. A reconsideration of the genus *Apedilum* Townes, 1945 (Diptera: Chironomidae: Chironominae). Spixiana Suppl. 14: 105-116.

Epler, J.H. 1988b. Biosystematics of the genus *Dicrotendipes* Kieffer, 1913 (Diptera: Chironomidae: Chironominae) of the world. Mem. Am. Ent. Soc. 36: 1-214.

Epler, J.H. 1992. Identification Manual for the Larval Chironomidae (Diptera) of Florida. FL Dept. Environ. Reg., Orlando, FL. 302 pp.

Epler, J.H. & L.C. Ferrington, Jr. 1994. The immature stages of *Paratendipes basidens* Townes (Diptera: Chironomidae: Chironominae). J. Kans. Ent. Soc. 67: 311-317.

Fagnani, J.P. , & A.R. Soponis. 1988. The occurrence of setal tufts on larvae of *Orthocladius* (*Orthocladius*) *annectens* Sæther. Spixiana Suppl. 14: 139-142.

Ferrington, L.C., Jr. 1984. Evidence for the hyporheic zone as a microhabitat of *Krenosmittia* spp. larvae (Diptera: Chironomidae). J. Freshwater Ecol. 2: 353-358.

Ferrington, L.C., Jr. 1987. Microhabitat preferences of larvae of three Orthocladiinae species (Diptera: Chironomidae) in Big Springs, a sandbottom spring in the high plains of western Kansas. Ent. scand. Suppl. 29: 361-368.

Ferrington, L.C., Jr. 1992. Habitat and sediment preferences of *Axarus festivus* larvae. Neth. J. Aquat. Ecol. 26: 347-354.

Fittkau, E.J. 1962. Die Tanypodinae (Diptera: Chironomidae). (Die Tribus Anatopyniini, Macropelopiini und Pentaneurini). Abh. Larval-syst. Insekten 6: 1-453.

Fittkau, E.J. & J. Lehmann. 1970. Revision der Gattung *Microcricotopus* Thien. u. Harn. (Dipt., Chironomidae). Int. Rev. ges. Hydrobiol. 55: 391-402.

Fittkau, E.J., & D.A. Murray. 1986. The pupae of Tanypodinae (Diptera: Chironomidae) of the Holarctic region: Keys and Diagnoses. Ent. scand. Suppl. 28: 31-113.

Fittkau, E.J. & D.A. Murray. 1988. *Bethbilbeckia floridensis*: a new genus and species of Macropelopiini from the South Eastern Nearctic. Spixiana Suppl. 14: 253-259.

Fittkau, E.J., F. Reiss & O. Hoffrichter. 1976. A bibliography of the Chironomidae. Gunneria 26: 1-177.

Fittkau, E.J. & S.S. Roback. 1983. The larvae of Tanypodinae (Diptera: Chironomidae) of the Holarctic region: Keys and diagnoses. Ent. scand. Suppl. 19:33-110.

Grodhaus, G. 1976. Two species of *Phaenopsectra* with drought-resistant larvae (Diptera: Chironomidae). J. Kans. Ent. Soc. 49: 405-418.

Grodhaus, G. 1987a. *Endochironomus* Kieffer, *Tribelos* Townes, *Synendotendipes*, n. gen., and *Endotribelos*, n. gen. (Diptera: Chironomidae) of the Nearctic region. J. Kansas Ent. Soc. 60:167-247.

Grodhaus, G. 1987b. *Phaenopsectra mortensoni* n. sp. and its relationship to other Chironomidae (Diptera) of temporary pools. Ent. scand. Suppl. 29:137-145.

Hamilton, A.L. 1965. An analysis of a freshwater benthic community with special reference to the Chironomidae. Ph.D. thesis, Univ. of British Columbia. 94 + 216 pp.

Hauber, U.A. 1944. Life histories and ecology of Iowa midges (Tendipedidae). I. The genus *Tanytarsus*. Proc. Iowa Acad. Sci. 51:451-461.

Heyn, M.W. 1992. A review of the systematic position of the North American species of the genus *Glyptotendipes*. Neth. J. Aquat. Ecol. 26: 129-137.

Hirvenoja, M. 1973. Revision der Gattung *Cricotopus* van der Wulp und ihrer Verwandten (Diptera, Chironomidae). Ann. Zool. Fennici 10:1-363.

Hirvenoja, M. & E. Hirvenoja. 1988. *Corynoneura brundini* spec. nov. Ein Beitrag zur Systematik der Gattung *Corynoneura*. Spixiana Suppl. 14:213-238.

Hoffrichter, O. & F. Reiss. 1981. Supplement 1 to "A bibliography of the Chironomidae". Gunneria 37:1-68.

Hudson, P.L., D.R. Lenat, B.A. Caldwell & D. Smith. 1990. Chironomidae of the Southeastern United States: A checklist of species and notes on biology, distribution, and habitat. U.S. Fish Wildl. Ser., Fish. Wildl. Res. 7:1-46.

International Code of Zoological Nomenclature. 1985. Third Edition adopted by the XX General Assembly of the International Union of Biological Sciences. Ride, W.D.L., C.W. Sabrosky, G. Bernardi & R.V. Melville (eds.) International Trust for Zoological Nomenclature, London. xx + 338 pp.

Jackson, G.A. 1977. Nearctic and Palaearctic *Paracladopelma* Harnisch and *Saetheria* n. gen. (Diptera: Chironomidae). J. Fish. Res. Bd. Canada 34:1321-1359.

Jacobsen, R.E. 1992. Descriptions of the larvae of four Nearctic species of *Epoicocladius* (Diptera: Chironomidae) with a redescription of *Epoicocladius ephemerae* (Kieffer). Neth. J. Aquat. Ecol. 26: 145-155.

Johannsen, O.A. 1937. Aquatic Diptera. Part IV. Chironomidae: Subfamily Chironominae. Mem. Cornell Univ. Agric. Exp. Stn. 210: 3-56.

Kowalyk, H.E. 1985. The larval cephalic setae in the Tanypodinae (Diptera: Chironomidae) and their importance in generic determinations. Can. Ent. 117: 67-106.

Kullberg, A. 1988. The case, mouthparts, silk and silk formation of *Rheotanytarsus muscicola* Kieffer (Chironomidae: Tanytarsini). Aquatic Insects 10: 249-255.

Langton, P.H. 1980. The genus *Psectrocladius* Kieffer (Diptera: Chironomidae) in Britain. Ent. Gaz. 31: 75-88.

Langton, P.H. 1984. A key to pupal exuviae of British Chironomidae. P.H. Langton, March, Cambridgeshire, 324 pp.

Langton, P.H. & P.S. Cranston. 1991. Pupae in nomenclature and identification: West Palaearctic *Orthocladius* s.str. (Diptera: Chironomidae) revised. Sys. Ent. 16: 239-252.

Langton, P.H., P.S. Cranston & P. Armitage. 1988. The parthenogenetic midge of water supply systems, *Paratanytarsus grimmii* (Schneider) (Diptera: Chironomidae). Bull. Ent. Res. 78: 317-328.

Lehmann, J. 1971. Revision der europäischen Arten (Imagines und Puppen) der Gattung *Rheotanytarsus* Bause (Diptera, Chironomidae). Zool. Anz. 185: 344-378.

LeSage, L. & A.D. Harrison. 1980. Taxonomy of *Cricotopus* species (Diptera: Chironomidae) from Salem Creek, Ontario. Proc. Ent. Soc. Ont. 111:57-114.

Lindeberg, B. & T. Wiederholm. 1979. Notes on the taxonomy of European species of *Chironomus* (Diptera: Chironomidae). Ent. scand. Suppl. 10:99-116.

Magy, H.I., G. Grodhaus, J.D. Gates & J.Montez. 1970. Pondweed - a substrate for chironomids, especially *Paralauterborniella subcincta*. Calif. Mosq. Control. Assoc. 37: 115-119.

Manuel, K.L. 1976. Description of immature stages of *Glyptotendipes (Phytotendipes) meridionalis* Dendy and Sublette (Diptera: Chironomidae). Unpub. M.S. thesis, Auburn Univ., Auburn, AL. 37 pp.

Maschwitz, D.E. 1976. Revision of the Nearctic species of the subgenus *Polypedilum*, (Chironomidae: Diptera). Ph.D. thesis, University of Minnesota, 325 pp.

Mason, P.G. 1985a. The larvae and pupae of *Stictochironomus marmoreus* and *S. quagga* (Diptera: Chironomidae). Can. Ent. 117:43-48.

Mason, P.G. 1985b. Four new species of the *Cryptochironomus fulvus* (Johannsen) species complex (Diptera: Chironomidae). Ent. scand. 16: 399-413.

Mason, P.G. 1985c. The larva of *Tvetenia vitracies* (Sæther) (Diptera: Chironomidae). Proc. Ent. Soc. Wash. 87: 418-420.

Mason, W.T., Jr. 1973. An introduction to the identification of chironomid larvae (revised edition). Analytical Quality Control Lab., National Environmental Research Center, U.S.E.P.A., Cincinnati, OH, 90 pp.

Murray, D.A. & E.J. Fittkau. 1985. *Hayesomyia*, a new genus of Tanypodinae from the Holarctic (Diptera: Chironomidae). Spixiana Suppl. 11: 195-207.

Oliver, D.R. 1971. Description of *Einfeldia synchrona* n. sp. (Diptera: Chironomidae). Can .Ent. 103: 1591-1595.

Oliver, D.R. 1981. Chironomidae. Pp 423-458 *in* McAlpine, J.F., et. al. (coordinators): Manual of Nearctic Diptera, Vol. 1. Agric. Can. Monogr. 27, 674 pp.

Oliver, D.R. 1982. *Xylotopus*, a new genus of Orthocladiinae (Diptera: Chironomidae). Can. Ent. 114:167-168.

Oliver, D.R. 1983. The larvae of Diamesinae (Diptera: Chironomdae) of the Holarctic region. Keys and diagnoses. Ent. scand. Suppl. 19:115-138.

Oliver, D.R. 1985. Review of *Xylòtopus* Oliver and description of *Irisobrillia* n. gen. (Diptera: Chironomidae). Can. Ent. 117: 1093-1110.

Oliver, D.R. & R.W. Bode. 1985. Description of the larva and pupa of *Cardiocladius albiplumus* Sæther (Diptera: Chironomidae). Can. Ent. 117:803-809.

Oliver, D.R. & M.E. Dillon. 1994a. Systematics of some species of *Micropsectra* (Diptera: Chironomidae) living in low-order streams in southern Ontario, Canada. Can. Ent. 126: 199-217.

Oliver, D.R. & M.E. Dillon. 1994b. Corrections and additions to "A catalog of Nearctic Chironomidae". Proc. Ent. Soc. Wash. 96: 8-10.

Oliver, D.R., M.E. Dillon & P.S. Cranston. 1990. A catalog of Nearctic Chironomidae. Research Branch Agriculture Can. Pub. 1857/B. 89 pp.

Oliver, D.R. & M.E. Roussel. 1982. The larvae of *Pagastia* Oliver (Diptera: Chironomidae) with descriptions of three Nearctic species. Can. Ent. 114:849-854.

Oliver, D.R. & M.E. Roussel. 1983. Redescription of *Brillia* Kieffer (Diptera: Chironomidae) with descriptions of Nearctic species. Can. Ent. 115:257-279.

Parker, C.R. & J.R. Voshell, Jr. 1979. *Cardiocladius*

(Diptera: Chironomidae) larvae ectoparasitic on pupae of Hydropsychidae (Trichoptera). Environ. Ent. 8:808-809.

Picado, C. 1913. Les Broméliacées épiphytes considerées comme milieu biologique. Bull. Sci. Fr. Belg. (Ser. 7) 47: 215-360 + 24 plates.

Pinder, L.C.V. 1978. A key to the adult males of the British Chironomidae (Diptera). Scient. Publs Freshwat. biol. Ass. 37:1-169, 189 figs.

Pinder, L.C.V., & F. Reiss. 1983. The larvae of Chironominae (Diptera: Chironomidae) of the Holarctic region. Keys and diagnoses. Ent. scand. Suppl. 19:293-435.

Pinder, L.C.V. & F. Reiss. 1986. The pupae of Chironominae (Diptera: Chironomidae) of the Holarctic region. Keys and diagnoses. Ent. scand. Suppl. 28:299-456.

Reiss, F. 1974. Die in stehenden Gewässern der Neotropis verbreitete Chironomidengattung *Goeldichironomus* Fittkau (Diptera, Insecta). Stud. neotrop. Fauna 9:95-122.

Reiss, F. 1982. *Hyporhygma* n. gen. und *Stelechomyia* n. gen. aus Nordamerika (Diptera, Chironomidae). Spixiana 5:289-302.

Reiss, F. 1988. Die Gattung *Kloosia* Kruseman, 1933 mit der Neubeschreibung zweier Arten. Spixiana Suppl. 14:35-44.

Reiss, F. 1990. Revision der Gattung *Zavreliella* Kieffer, 1920. (Diptera, Chironomidae). Spixiana 13: 83-115.

Reiss, F. & L. Säwedal. 1981. Keys to males and pupae of the Palaearctic (excl. Japan) *Paratanytarsus* Thienemann & Bause, 1913, n. comb., with descriptions of three new species (Diptera: Chironomidae). Ent. scand. Suppl. 15: 73-104.

Reiss, F. & J.E. Sublette. 1985. *Beardius* new genus with notes on additional Pan-American taxa. (Diptera: Chironomidae). Spixiana Suppl. 11:179-193.

Roback, S.S. 1953. Savannah River tendipedid larvae (Diptera: Tendipedidae (=Chironomidae)). Proc. Acad. Nat. Sci. Philad. 105:91-132.

Roback, S.S. 1957. The immature tendipedids of the Philadelphia area (Diptera: Tendipedidae). Monogr. Acad. nat. Sci. Philad. 9:1-152.

Roback, S.S. 1963. The genus *Xenochironomus* (Diptera: Tendipedidae) Kieffer, taxonomy and immature stages. Trans. Am. ent. Soc. 88: 235-245.

Roback, S.S. 1969. The immature stages of the genus *Tanypus* Meigen (Diptera: Chironomidae: Tanypodinae). Trans. Am. Ent. Soc. 94: 407-428.

Roback, S.S. 1971. The adults of the subfamily Tanypodinae (= Pelopiinae) in North America (Diptera: Chironomidae). Monogr. Acad. nat. Sci. Philad. 17:1-410.

Roback, S.S. 1974a. The immature stages of the genus *Coelotanypus* (Chironomidae: Tanypodinae: Coelotanypodinae) in North America. Proc. Acad. Nat. Sci. Philad. 126:9-19.

Roback, S.S. 1974b. Insects (Arthropoda: Insecta). Pp 313-376 *in* Hart, C.W. & S.L.H. Fuller (eds.): Pollution Ecology of Freshwater Invertebrates. Academic Press, New York.

Roback, S.S. 1975. A new subgenus and species of the genus *Tanytarsus* Chironomidae: Chironominae: Tanytarsini). Proc. Acad. Nat. Sci. Philad. 127:71-80.

Roback, S.S. 1976. The immature chironomids of the eastern United States I. Introduction and Tanypodinae-Coelotanypodinae. Proc. Acad. Nat. Sci. Philad. 127:147-201.

Roback, S.S. 1977. The immature chironomids of the eastern United States II. Tanypodinae -Tanypodini. Proc. Acad. Nat. Sci. Philad. 128:55-87.

Roback, S.S. 1978. The immature chironomids of the eastern United States III. Tanypodinae-Anatopyniini, Macropelopiini, and Natarsiini. Proc. Acad. Nat. Sci. Philad. 129:151-202.

Roback, S.S. 1979. *Hudsonimyia karelena*, a new genus and species of Tanypodinae, Pentaneurini. Proc. Acad. Nat. Sci. Philad. 131: 1-8.

Roback, S.S. 1980. The immature chironomids of the eastern United States IV. Tanypodinae-Procladiini. Proc. Acad. Nat. Sci. Philad. 132:1-63.

Roback, S.S. 1981. The immature chironomids of the eastern United States V. Pentaneurini-*Thienemannimyia* group. Proc. Acad. Nat. Sci. Philad. 133:73-128.

Roback, S.S. 1982a. Identity of *Ablabesmyia* sp., Roback, Bereza and Vidrine (1980) (Diptera: Chironomidae). Ent. News 93:13-15.

Roback, S.S. 1982b. The Tanypodinae (Diptera: Chironomidae) of Australia II. Proc. Acad. Nat. Sci. Philad. 134: 80-112.

Roback, S.S. 1983. *Krenopelopia hudsoni*: a new species from the eastern United States (Diptera: Chironomidae: Tanypodinae). Proc. Acad. Nat. Sci. Philad. 135:254-260.

Roback, S.S. 1985. The immature chironomids of the eastern United States VI. Pentaneurini-Genus *Ablabesmyia*. Proc. Acad. Nat. Sci. Philad. 137:153-212.

Roback, S.S. 1986a. The immature chironomids of the eastern United States VII. Pentaneurini-Genus *Monopelopia*, with redescription of the male adults and description of some Neotropical material. Proc. Acad. Nat. Sci. Philad. 138:350-365.

Roback, S.S. 1986b. The immature chironomids of the eastern United States VIII. Pentaneurini-Genus *Nilotanypus*, with the description of a new species from Kansas. Proc. Acad. Nat. Sci. Philad. 138:443-465.

Roback, S.S. 1987a. The immature chironomids of the eastern United States. IX. Pentaneurini - Genus *Labrundinia* with the description of some Neotropical material. Proc. Acad. Nat. Sci. Philad. 139: 159-209.

Roback, S.S. 1987b. The immature stages and female adult of *Alotanypus aris* Roback with a redescription of the male adult (Diptera: Chironomidae: Macropelopiini). Not. Nat. 466: 1-8.

Roback, S.S. 1987c. The larval stage of *Monopelopia tillandsia* Beck and Beck (Diptera: Chironomidae: Tanypodinae). Not. Nat. 467: 1-3.

Roback, S.S. 1989. The larval development of *Djalmabatista pulcher* (Joh.) (Diptera: Chironomidae: Tanypodinae). Proc. Acad. Nat. Sci. Philad. 141: 73-74.

Roback, S.S., D.J. Bereza & M.F. Vidrine. 1980. Description of an *Ablabesmyia* [Diptera: Chironomidae: Tanypodinae] symbiont of unionid fresh-water mussels [Mollusca: Bivalvia: Unionacea], with notes on its biology and zoogeography. Trans. Am. Ent. Soc. 105: 577-619.

Roback, S.S. & R.P. Rutter. 1988. *Denopelopia atria*, a new genus and species of Pentaneurini (Diptera: Chironomidae: Tanypodinae) from Florida. Spixiana Suppl. 14:117-127.

Roback, S.S. & K.J. Tennessen. 1978. The immature stages of *Djalmabatista pulcher* [= *Procladius (Calotanypus) pulcher* (Joh.)]. Proc. Acad. Nat. Sci. Philad. 130: 11-20.

Rosenberg, D.M., A.P. Wiens & O.A. Sæther. 1977. Responses to crude oil contamination by *Cricotopus (Cricotopus) bicinctus* and *C. (C.) mackenziensis* (Diptera: Chironomidae) in the Fort Simpson area, Northwest Territories. J. Fish. Res. Bd. Can. 34: 254-261.

Rossaro, B. 1979. Description of the larva of *Paratrichocladius rufiventris* (Diptera: Chironomidae). Not. Ent. 59: 75-78.

Rossaro, B. 1984. *Stilocladius* Rossaro, 1979 reconsidered, with descriptions of the female and larva of *S. montanus* Rossaro (Diptera: Chironomidae, Orthocladiinae). Ent. scand. 15: 185-191.

Rossaro, B. 1990. Revision of the genus *Paratrichocladius* Santos-Abreu. 2nd Note: Description of 4 new species (Diptera Chironomidae Orthocladiinae). Boll. Soc. Ent. Ital., Gen., 122: 58-66.

Rudolph, H.D. & D.G. Strom. 1990. Macroinvertebrates associated with macrophytes in Lake Okeechobee, Florida. Biological Basin Assessment Survey, 1986-1987. Fla. Dept. Environ. Reg., 301 pp.

Ryser, H.M., W. Wülker & A. Scholl. Revision der Gattung *Chironomus* Meigen (Diptera). X. *Lobochironomus* n. subg. (*C. montuosus* n. sp., *C. storai* Goetgh., *C. mendax* Storå). Rev. Suisse Zool. 92: 385-404.

Sæther, O.A. 1969. Some Nearctic Podonominae, Diamesinae, and Orthocladiinae (Diptera: Chironomidae). Bull. Fish. Rs. Bd. Can. 170: 1-154.

Sæther, O.A. 1975. Nearctic and Palaearctic *Heterotrissocladius* (Diptera: Chironomidae). Bull. Fish. Res. Bd. Canada 193:1-67.

Sæther, O.A. 1976. Revision of *Hydrobaenus, Trissocladius, Zalutschia, Paratrissocladius*, and some related genera. Bull. Fish. Res. Bd. Canada 195:1-287.

Sæther, O.A. 1977. Taxonomic studies on Chironomidae: *Nanocladius, Pseudochironomus*, and the *Harnischia* complex. Bull. Fish. Res. Bd. Canada 196:1-143.

Sæther, O.A. 1980. Glossary of chironomid morphology terminology (Diptera: Chironomidae). Ent. scand. Suppl. 14:1-51.

Sæther, O.A. 1981a. *Doncricotopus bicaudatus* n. gen., n. sp. (Diptera: Chironomidae, Orthocladiinae) from the Northwest Territories, Canada. Ent. scand. 12:223-229.

Sæther, O.A. 1981b. Orthocladiinae (Chironomidae: Diptera) from the British West Indies with descriptions of *Antillocladius* n. gen., *Lipurometriocnemus* n. gen., and *Diplosmittia* n. gen. Ent. scand. Suppl. 16:1-46.

Sæther, O.A. 1982. Orthocladiinae (Diptera: Chironomidae) from SE U.S.A., with descriptions of *Plhudsonia, Unniella* and *Platysmittia* n. genera and *Atelopodella* n. subgen. Ent. scand. 13:465-510.

Sæther, O.A. 1983a. *Oschia dorsenna* n. gen. n. sp. and *Saetheria hirta* n. sp., two members of the *Harnischia* complex (Diptera: Chironomidae).

Ent. scand. 14:395-404.

Sæther, O.A. 1983b. Three new species of *Lopescladius* Oliveira, 1967 (syn. "*Cordites*" Brundin, 1966, n. syn.), with a phylogeny of the *Parakiefferiella* group. Mem. Am. Ent. Soc. 34:279-298.

Sæther, O.A. 1983c. The larvae of Prodiamesinae (Diptera: Chironomidae) of the Holarctic region - Keys and diagnoses. Ent. scand. Suppl. 19:141-147.

Sæther, O.A. 1983d. A review of Holarctic *Gymnometriocnemus* Goetghebuer, 1932, with the description of *Rhaphidocladius* subgen. n. and *Sublettiella* gen. n. (Diptera: Chironomidae). Aquatic Insects 5: 209-226.

Sæther, O.A. 1984. The immatures of *Antillocladius* Sæther, 1981 (Diptera: Chironomidae). Aquat. Insects 6:1-6.

Sæther, O.A. 1985a. A review of *Odontomesa* Pagast, 1947 (Diptera, Chironomidae, Prodiamesinae). Spixiana Suppl. 11:15-29.

Sæther, O.A. 1985b. A review of the genus *Rheocricotopus* Thienemann & Harnisch, 1932, with the description of three new species (Diptera, Chironomidae). Spixiana Suppl. 11:59-108.

Sæther, O.A. 1985c. The imagines of *Mesosmittia* Brundin, 1956, with description of seven new species. Spixiana 11:37-54.

Sæther, O.A. 1989a. *Metriocnemus* van der Wulp: a new species and revision of species described by Meigen, Zetterstedt, Stæger, Holmgren, Lundström and Strenzke (Diptera: Chironomidae). Ent. scand. 19: 393-430.

Sæther, O.A. 1989b. Two new species of *Hydrobaenus* Fries from Massachusetts, U.S.A., and Japan (Diptera: Chironomidae). Ent. scand. 20: 55-63.

Sæther, O.A. 1990. A review of the genus *Limnophyes* Eaton from the Holarctic and Afrotropical regions (Diptera: Chironomidae, Orthocladiinae). Ent. scand. Suppl. 35:1-139.

Sæther, O.A. 1992. *Heterotrissocladius boltoni* sp. n., a new orthoclad from vernal pools and streams in Ohio, U.S.A. (Diptera: Chironomidae). Neth. J. Aquat. Ecol. 26: 191-196.

Sæther, O.A. & G.A. Halvorsen. 1981. Diagnoses of *Tvetenia* Kieff. emend., *Dratnalia* n. gen., and *Eukiefferiella* Thien. emend., with a phylogeny of the *Cardiocladius* group (Diptera: Chironomidae). Ent. scand. Suppl. 15: 269-285.

Sæther, O.A. & J.E. Sublette. 1983. A review of the genera *Doithrix* n. gen., *Georthocladius* Strenzke, *Parachaetocladius* Wülker, and *Pseudorthocladius* Goetghebuer (Diptera: Chironomidae, Orthocladiinae). Ent. scand. Suppl. 20:1-100.

Säwedal, L. 1982. Taxonomy, morphology, phylogenetic relationships and distribution of *Micropsectra* Kieffer, 1909 (Diptera: Chironomidae). Ent. scand. 13: 371-400.

Schlee, D. 1968. Vergleichende Merkmalsanalyze zur Morphologie und Phylogenie der *Corynoneura* -Gruppe (Diptera: Chironomidae). Zugleich eine allgemeine Morphologie der Chironomiden-Imago. Stuttg. Beitr. Naturk. 180:1-150.

Shilova, A.I. 1966. Lichinka *Odontomesa fulva* Kieff. (Diptera, Chironomidae, Orthocladiinae) [The larva of *Odontomesa fulva* Kieff. (Diptera, Chironomidae, Orthocladiinae)]. Trudy Inst. Biol. vnutrenn. Vod 12:239-250.

Simpson, K.W. 1982. A guide to basic chironomid literature for the genera of North American Chironomidae (Diptera) - adults, pupae, and larvae. Bull. N.Y. State Mus. No. 447.

Simpson, K.W. & R.W. Bode. 1980. Common larvae of Chironomidae (Diptera) from New York State streams and rivers with particular reference to the fauna of artificial substrates. Bull. N.Y. St. Mus. No. 439:1-105 pp.

Simpson, K.W., R.W. Bode & P. Albu. 1982. Keys for the genus *Cricotopus* adapted from "Revision der Gattung *Cricotopus* van der Wulp und ihrer Verwandten (Diptera, Chironomidae)" by M. Hirvenoja. Bull. N.Y. St. Mus. 450:1-133.

Soponis, A.R. 1977. A revision of the Nearctic species of *Orthocladius (Orthocladius)* van der Wulp (Diptera: Chironomidae). Mem. Ent. Soc. Canada 102:1-187.

Soponis, A.R. 1979. *Zalutschia briani* n. sp. from Florida (Diptera: Chironomidae). Ent. scand. Suppl. 10:125-131.

Soponis, A.R. 1980a. Taxonomic composition of Chironomidae (Diptera) in a sand-bottomed stream of northern Florida. Pp 163-169 *in* Murray, D.A. (ed.): Chironomidae - Ecology, Systematics, Cytology and Physiology. Pergamon Press, Oxford & New York.

Soponis, A.R. 1980b. *Pseudorthocladius macrostomus*, a new species of chironomid (Diptera) with a long proboscis. Fla. Ent. 63:486-490.

Soponis, A.R. 1983. Emergence of *Polypedilum* (Chironomidae) in a sand-bottomed stream of northern Florida. Mem. Am. Ent. Soc.

34:309-313.

Soponis, A.R. 1990. A revision of the Holarctic species of *Orthocladius (Euorthocladius)* (Diptera: Chironomidae). Spixiana Suppl. 13:1-56.

Soponis, A.R. & C.L. Russell. 1982. Identification of instars and species in some larval *Polypedilum (Polypedilum)* (Diptera: Chironomidae). Hydrobiol. 94: 25-32.

Soponis, A.R. & C.L. Russell. 1984. Larval drift of Chironomidae (Diptera) in a North Florida stream. Aquatic Insects 6: 191-199.

Soponis, A.R. & K.W. Simpson. 1992. *Polypedilum digitifer* Townes and *Polypedilum griseopunctatum* (Malloch) (Diptera: Chironomidae): redescription of adult males with a description and separation of the immature stages. Neth. J. Aquat. Ecol. 26: 203-213.

Spies, M., E.J Fittkau & F. Reiss. 1994. The adult males of *Parachironomus* Lenz, 1921, from the Neotropical faunal region (Insecta, Diptera, Chironomidae). Spixiana Suppl. 20: 61-98.

Steffan, A.W. 1965. *Plecopteracoluthus downesi* gen. et sp. nov. (Diptera: Chironomidae), a species whose larvae live phoretically on larvae of Plecoptera. Can. Ent. 97: 1323-1344.

Steiner, B. 1983. *Paracricotopus mozleyi* n. sp. from Georgia (Diptera: Chironomidae). Mem. Am. Ent. Soc. 34:329-335.

Steiner, J.W. & J.L. Hulbert. 1982. *Nimbocera pinderi*, a new species (Diptera: Chironomidae) from the southeastern United States. Fla. Ent. 65: 228-233.

Stone, A. & W.W. Wirth. 1947. On the marine midges of the genus *Clunio* Haliday (Diptera, Tendipedidae). Proc. Ent. Soc. Wash. 49: 201-224.

Strenzke, K. 1950. Terrestrische Chironomiden XIV. "*Limnophyes*" *flexuellus* Edw. Zool. Anz. 145:101-111.

Strenzke, K. 1960. Metamorphose und Verwandtschaftsbeziehungen der Gattung *Clunio* Hal. (Dipt.) (Terrestrische Chironomiden XXIV). Suol. eläin-ja kasvit. Seur. Van. kasvit. Julk. 22: 1-30.

Strixino, S.T. & G. Strixino. 1991. Nova espécie de *Goeldichironomus* Fittkau (Diptera, Chironomidae) do Brasil. Rev. Bras. Ent. 35: 593-602.

Sublette, J.E. 1960. Chironomid midges of California. I. Chironominae, exclusive of Tanytarsini (= Calopsectrini). Proc. U.S. Nat. Mus. 112: 197-226.

Sublette, J.E. 1964. Chironomidae (Diptera) of Louisiana. I. Systematics and immature stages of some lentic chironomids of west-central Louisiana. Tulane Stud. Zool. 11:109-150.

Sublette, J.E. 1967. Type specimens of Chironomidae (Diptera) in the Cornell University collection. J. Kans. Ent. Soc. 4: 477-564.

Sublette, J.E. & M. Sasa. 1994. Chironomidae collected in Onchocerciasis endemic areas of Guatemala (Insecta, Diptera). Spixiana Suppl. 20: 1-60.

Sublette, J.E. & M.F. Sublette. 1974a. A review of the genus *Chironomus* (Diptera: Chironomidae) V. The *maturus*-complex. Stud. Nat. Sci. 8: 1-41.

Sublette, J.E. & M.F. Sublette. 1974b. A review of the genus *Chironomus* (Diptera: Chironomidae) VII. The morphology of *Chironomus stigmaterus* Say. Stud. Nat. Sci. 10: 1-65.

Sublette, J.E. & M. Sublette. 1979. A synopsis of the Chironomidae of New Mexico. Pp. 53-128 *in* Sublette, J.E (P.I.): Evaluation of long term effects of thermal effluents on stream biota. Technical Report: "Utilization of Chironomidae (Diptera) as a water quality indicator group in New Mexico". New Mexico Energy Institute 32, 172 pp.

Tennessen, K.J. & P.K. Gottfried. 1983. Variation in structure of ligula of Tanypodinae larvae (Diptera: Chironomidae). Ent. News 94: 109-116.

Townes, H.K. 1945. The nearctic species of Tendipedini (Diptera: Tendipedidae (=Chironomidae)). Am. Midl. Nat. 34:1-206.

Trivinho-Strixino, S. & G. Strixino. 1991. Duas novas espécies de *Nimbocera* Reiss (Diptera, Chironomidae) do Estado de São Paulo, Brasil. Rev. Bras. Ent. 35: 173-178.

Warwick, W.F. 1989. Morphological deformities in larvae of *Procladius* Skuse (Diptera: Chironomidae) and their biomonitoring potential. Can. J. Fish. Aquat. Sci. 46: 1255-1270.

Warwick, W.F. 1990. Morphological deformities in Chironomidae (Diptera) larvae from the Lac St. Louise and Laprairie basins of the St. Lawrence River. J. Great Lakes Res. 16: 185-208.

Webb, C. J. & A. Scholl. 1985. Identification of larvae of European species of *Chironomus* Meigen (Diptera: Chironomidae) by morphological characters. Sys. Ent. 10: 353-372.

Webb, D.W. 1969. New species of chironomids from Costello Lake, Ontario (Diptera: Chironomidae). J. Kans. ent. Soc. 42:91-108.

Webb, D.W. 1972. The immature stages of *Chironomus aethiops* (Townes) with keys to the species of the subgenus *Dicrotendipes* (Chironomidae: Diptera). Trans. Illinois St. Acad. Sci. 65: 74-76.

Webb, D.W. 1982. *Smittia lasiops* (Malloch): a redescription of the adults with a description of the immature stages (Diptera: Chironomidae). Proc. Ent. Soc. Wash. 84: 468-474.

Webb, D.W. & W.U. Brigham. 1982. Aquatic Diptera. Pp. 11.1-11.111 *in* Brigham, A.R., W.U. Brigham & A. Gnilka (eds.). Aquatic Insects and Oligochaetes of North and South Carolina. Midwest Aquatic Enterprises, Mahomet, IL. 837 pp.

Wiederholm, T. (ed.) 1983. Chironomidae of the Holarctic region. Keys and diagnoses. Part 1. Larvae. Ent. scand. Suppl. 19:1-457.

Wiederholm, T. (ed.) 1986. Chironomidae of the Holarctic region. Keys and diagnoses. Part 2. Pupae. Ent. scand. Suppl. 28:1-482.

Wiederholm, T. (ed.) 1989. Chironomidae of the Holarctic region. Keys and diagnoses. Part 3. Adult males. Ent. scand. Suppl. 34: 1-524.

Wirth, W.W. 1949. A revision of the clunionine midges with descriptions of a new genus and four new species (Diptera: Tendipedidae). Univ. Calif. Publs. Ent. 8:151-182.

Wirth, W.W. 1952. Notes on marine midges from the eastern United States (Diptera, Tendipedidae [=Chironomidae]). Bull. Mar. Sci. Gulf Caribb. 2:307-312.

Wirth, W.W. 1979. *Siolimyia amazonica* Fittkau, an aquatic midge new to Florida with nuisance potential. Fla. Ent. 62: 134-135.

Wülker, W.F. & M.G. Butler. 1983. Karyosystematics and morphology of Northern *Chironomus* (Diptera: Chironomidae): Freshwater species with larvae of the *salinarius* type. Ent. scand. 14: 121-136.

Wülker, W.F. & E. Morath. 1989. South American *Chironomus* (Dipt.) - Karyotypes and their relations to North America. Acta Biol. Debr. Oecol. Hung. 2: 389-397.

Wülker, W.F., J.E. Sublette, E. Morath & J. Martin. 1989. *Chironomus columbiensis* n.sp. in South America and *Chironomus anonymus* Williston in North America - closely related species. Stud. Neotrop. Fauna Environ. 3: 121-136.

Wülker, W.F., J.E. Sublette, M.F. Sublette & J. Martin. 1971. A review of the genus *Chironomus* (Diptera: Chironomidae) I. The *staegeri* group. Stud. Nat. Sci. 1: 1-89.

APPENDIX A: CHECKLIST OF FLORIDA CHIRONOMIDAE

This checklist registers species known to occur in Florida, based on literature citations and material examined by the author. It also includes species which may occur in Florida; many of these species occur on the Southeastern Coastal Plain but have not been positively identified from Florida. Note also that some literature records may be considered doubtful; some species recorded in earlier literature but misidentified are not listed. Only important synonyms pertaining to Florida Chironomidae are listed. Genera and species are arranged in alphabetical order; for tribes and subgenera see Oliver et al. (1990), Hudson et al. (1990) or text.

KEY: [ ] = synonym * = may occur in FL ¿= recorded from FL, but identification doubtful, not confirmed or incorrect + = additional, probably undescribed species L = larva known A = larva unknown LU = larva cannot be identified to a described species without associated life stages

TELMATOGETONINAE	
Telmatogeton Schiner	
japonicus Tokunaga	L
Thalassomya Schiner	
bureni Wirth	L
TANYPODINAE	
Ablabesmyia Johannsen	
annulata (Say)	L
aspera (Roback)	L
cinctipes (Johannsen)	L
hauberi Beck & Beck	L
janta (Roback)	LU
mallochi (Walley)	L
[*auriensis* Roback]	
[*ornata* Beck & Beck]	
[*tarella* Roback]	
parajanta Roback	LU
peleensis (Walley)	L
philosphagnos Beck & Beck	L
rhamphe Sublette	LU
sp. A Epler	LU
sp. B Epler	LU
Alotanypus Roback	
aris Roback	L
Apsectrotanypus Fittkau	
johnsoni (Coquillett)	L
Bethbilbeckia Fittkau & Murray	
floridensis Fittkau & Murray	L
Cantopelopia Roback	
gesta Roback	A
Clinotanypus Kieffer	
aureus Roback	A
pinguis (Loew)	L
[*thoracicus* (Loew)]	
planus Roback	A
wirthi Roback	A
Coelotanypus Kieffer	
concinnus (Coquillett)	L
scapularis (Loew)	L
tricolor (Loew)	L
Conchapelopia Fittkau	
**aleta* Roback	*LU
currani Walley	LU
fasciata Beck & Beck	LU
[*dusena* Roback]	
pallens (Coquillett)	LU
rurika (Roback)	LU
Denopelopia Roback & Rutter	
atria Roback & Rutter	L
Djalmabatista Fittkau	
pulchra (Johannsen)	L
[*maculatus* Roback]	
Fittkauimyia Karunakaran	
serta (Roback)	LU
Guttipelopia Fittkau	
guttipennis Wulp	L
[*currani* Beck & Beck]	
Hayesomyia Murray & Fittkau	
senata (Walley)	L
Helopelopia Roback	
cornuticaudata (Walley)	LU
[*gigas* (Beck & Beck)]	
pilicaudata (Walley)	LU
Hudsonimyia Roback	
sp. A Epler	LU
Krenopelopia Fittkau	
hudsoni Roback ?	LU
Labrundinia Fittkau	
becki Roback	L
johannseni Beck & Beck	L
maculata Roback	L
neopilosella Beck & Beck	L

Labrundinia	
pilosella (Loew)	L
[*floridana* Beck & Beck]	
virescens Beck & Beck	L
sp. 4 Roback	LU
sp. 6 Roback	LU
sp. A Epler	LU
sp. B Epler	LU
Larsia Fittkau	
berneri Beck & Beck	L
decolorata (Malloch)	L
[*lurida* Beck & Beck]	
indistincta Beck & Beck	L
Meropelopia Roback	
americana (Fittkau)	L
flavifrons (Johannsen)	L
[*fittkaui* Beck & Beck]	
Monopelopia Fittkau	
boliekae Beck & Beck	L
tenuicalcar (Kieffer)	L
tillandsia Beck & Beck	L
Natarsia Fittkau	
¿*baltimorea* (Macquart)	¿L
sp. A Roback	L
Nilotanypus Kieffer	
americanus Beck & Beck	L
fimbriatus (Walker)	L
Paramerina Fittkau	
anomala Beck & Beck	LU
**fragilis* (Walley)	*LU
testa Roback	LU
Pentaneura Philippi	
inconspicua (Malloch)	L
[*inculta* Beck & Beck]	
Procladius Skuse	
bellus (Loew)	LU
[*pusillus* Loew]	
curtus Roback	A
freemani Sublette	LU
sublettei Roback	LU
Psectrotanypus Kieffer	
dyari (Coquillett)	L
Rheopelopia Fittkau	
**paramaculipennis* (Roback)	*LU
**perda* (Roback)	*LU
sp. A Epler	LU
Tanypus Meigen	
carinatus Sublette	L
clavatus Beck	L
neopunctipennis Sublette	L
punctipennis Meigen	L
stellatus Coquillet	L
telus Roback	A
Zavrelimyia Fittkau	
sinuosa (Coquillett) complex	LU
[*carneosa* Fittkau]	
DIAMESINAE	
**Diamesa* Meigen	*LU
Potthastia Kieffer	
longimana Kieffer group	LU
genus "P" Doughman	LU
PRODIAMESINAE	
**Compteromesa* Sæther	*A
Odontomesa Pagast	
fulva (Kieffer)	L
**Prodiamesa* Kieffer	*
**olivacea* (Meigen)	*L
ORTHOCLADIINAE	
Antillocladius Sæther	LU
Brillia Kieffer	
flavifrons (Johannsen)	L
Bryophaenocladius Thienemann	LU
Camptocladius Wulp	
stercorarius (De Geer)	L
Cardiocladius Kieffer	
obscurus (Johannsen)	L
**Chaetocladius* Kieffer	*LU
Clunio Haliday	
marshalli Stone & Wirth	L
**Compterosmittia* Sæther	*A
Corynoneura Winnertz	
**fittkaui* Schlee	*LU
**lobata* Edwards	*LU
¿*scutellata* Winnertz	LU
taris Roback	L
sp. B Epler	LU
sp. C Epler	LU
sp. D Epler	LU
sp. E Epler	LU
sp. F Epler	LU
Cricotopus Wulp	
**belkini* Sublette	*A
bicinctus Meigen	L
**festivellus* (Kieffer)	*LU
**fugax* (Johannsen)	*LU
**luciae* LeSage & Harrison	*LU
**nostocicola* Wirth	*L
politus (Coquillet)	LU
**slossonae* Malloch	*LU
sylvestris (Fabricius)	LU
triannulatus (Macquart)	LU
[*exilis* Johannsen]	
**tricinctus* (Meigen)	*LU
[*lebetis* Sublette]	
trifascia Edwards	LU

Cricotopus	
trifasciatus Meigen	LU
[*remus* Sublette]	
varipes Coquillett	LU
vierriensis Goetghebuer	LU
+	
**Diplocladius* Kieffer	*L
**Diplosmittia* Sæther	*A
**Doithrix* Sæther & Sublette	*LU
Epoicocladius Zavrel	
flavens (Malloch)	LU
Eukiefferiella Thienemann	
claripennis (Lundbeck) group	LU
devonica (Edwards) group	LU
Georthocladius Strenzke	LU
Gymnometriocnemus Goetghebuer	LU
Heterotrissocladius Spärck	
marcidus (Walker) group	LU
sp. C Sæther	LU
Hydrobaenus Fries	
pilipes (Malloch)	L
Krenosmittia Thienemann & Krüger	LU
Limnophyes Eaton	
fumosus (Johannsen)	LU
minimus (Meigen)	LU
natalensis (Kieffer)	LU
**Lipurometriocnemus* Sæther	*A
Lopescladius Oliveira	LU
Mesosmittia Brundin	
**mina* Sæther	*A
patrihortae Sæther	A
**prolixa* Sæther	*A
Metriocnemus Wulp	
¿*abdominoflavatus* Picado	¿LU
knabi Coquillet	L
sp. A Epler	LU
sp. B Epler	LU
Nanocladius Kieffer	
balticus (Palmén) group	LU
crassicornus Sæther	LU
distinctus (Malloch)	L
**downesi* (Steffan)	*L
minimus Sæther	LU
rectinervis (Kieffer)	LU
[*alternantherae* Dendy & Sublette]	
spiniplenus Sæther	LU
Orthocladius Wulp	
annectens Sæther	L
lignicola (Kieffer)	L
**obumbratus* Johannsen	*LU
**oliveri* Soponis	*L
Parachaetocladius Wülker	
abnobaeus (Wülker)	LU

**Paracricotopus* Thien. & Harnisch	*LU
Parakiefferiella Thienemann	
sp. A Epler	
sp. B Epler	LU
sp. C Epler	LU
sp. D Epler	LU
Parametriocnemus Goetghebuer	
lundbeckii (Johannsen)	LU
sp. F Epler	LU
+?	
**Paratrichocladius* Santos Abreu	*LU
**Platysmittia* Sæther	*A
Psectrocladius Kieffer	
elatus Roback	L
simulans (Johannsen)	LU
vernalis (Malloch)	L
+	
Pseudorthocladius Goetghebuer	
macrostomus Soponis	A
uniserratus Sæther & Sublette	A
**virgatus* Sæther & Sublette	*A
Pseudosmittia Goetghebuer	
digitata Sæther	A
forcipata (Goetghebuer)	A
**Psilometriocnemus* Sæther	
**triannulatus* Sæther	*LU
Rheocricotopus Thien. & Harnisch	
robacki (Beck & Beck)	L
tuberculatus Caldwell	L
Rheosmittia Brundin	LU
Smittia Holmgren	
aterrima (Meigen)	LU
lasiops (Malloch)	LU
**Stilocladius* Rossaro	*LU
**Symbiocladius* Kieffer	*L
Synorthocladius Thienemann	
semivirens (Kieffer)	LU
+?	
Thienemanniella Kieffer	
cf. *similis* (Malloch)	LU
xena (Roback)	L
sp. A Epler	LU
sp. B Epler	LU
sp. C Epler	LU
sp. D Epler	LU
Tvetenia Kieffer	
discoloripes (Goetghebuer) group	LU
Unniella Sæther	
multivirga Sæther	L
Xylotopus Oliver	
par (Coquillett)	L
Zalutschia Lipina	
briani Soponis	LU

Zalutschia	
sp. A Epler	A
Orthocladiinae sp. C Sæther	LU
Orthocladiinae genus D Epler	LU
Orthocladiinae genus E Epler	LU
CHIRONOMINAE	
Apedilum Townes	
elachistus Townes	L
subcinctum Townes	L
Asheum Sublette & Sublette	
beckae (Sublette)	L
Axarus Roback	
dorneri (Malloch)	A
Axarus	
**festivus* (Say)	*LU
rogersi (Beck & Beck)	LU
taenionotus (Say)	LU
Beardius Reiss & Sublette	
breviculus Reiss & Sublette	LU
truncatus Reiss & Sublette	L
**Beckidia* Sæther	*LU
Chernovskiia Sæther	LU
Chironomus Meigen	
**anonymus* Williston	*LU
crassicaudatus Malloch	L
decorus Johannsen group	LU
[*attenuatus* Walker]	
longipes Staeger	LU
[*dorsalis* auct.]	
**major* Wülker & Butler	L
ochreatus (Townes)	L
plumosus (Linnaeus)	L
riparius Meigen	L
¿*staegeri* Lundbeck	¿L
stigmaterus Say	L
tuxis Curran	A
+	
Cladopelma Kieffer	
amachaerum (Townes)	LU
forcipis (Rempel)	LU
[*boydi* Beck]	
collator (Townes)	LU
edwardsi (Kruseman)	LU
galeator (Townes)	LU
virudulum (Linnaeus)	LU
Cladotanytarsus Kieffer	
aeiparthenus Bilyj	LU
viridiventris (Malloch)	LU
+	
Constempellina Brundin	LU
Cryptochironomus Kieffer	
blarina Townes	LU
digitatus (Malloch)	LU
fulvus (Johannsen)	LU
parafulvus (Beck & Beck)	LU
ponderosus (Sublette)	LU
psittacinus (Meigen)	A
[*styliferus* (Johannsen)]	
scimitarus Townes	A
sorex Townes	LU
Cryptotendipes Lenz	
casuarius (Townes)	LU
emorsus (Townes)	LU
Demeijerea Kruseman	
atrimana (Coquillett)	A
**brachialis* (Coquillett)	*A
Demicryptochironomus Lenz	
**cuneatus* (Townes)	*LU
Dicrotendipes Kieffer	
fumidus (Johannsen)	L
leucoscelis (Townes)	L
lobus (Beck)	L
lucifer (Johannsen)	L
modestus (Say)	L
neomodestus (Malloch)	L
nervosus (Staeger)	L
simpsoni Epler	L
thanatogratus Epler	L
tritomus (Kieffer)	L
[*incurvus* Sublette]	
sp. A Epler	L
sp. B Epler	LU
Einfeldia Kieffer	
austini Beck & Beck	L
brunneipennis (Johannsen)	A
natchitocheae (Sublette)	L
**pagana* (Meigen)	*LU
sp. A Epler	L
Endochironomus Kieffer	
nigricans (Johannsen)	L
subtendens (Townes)	L
Endotribelos Grodhaus	
hesperium (Sublette)	L
**Gillotia* Kieffer	*
Glyptotendipes Kieffer	
amplus Townes	L
**barbipes* (Staeger)	*L
¿*lobiferus* (Say)	¿LU
meridionalis Dendy & Sublette	LU
paripes Edwards	L
seminole Townes	L
testaceus	L
sp. B Epler	LU
sp. E Epler	LU
sp. F Epler	LU
sp. G Epler	LU

Goeldichironomus Fittkau	
amazonicus (Fittkau)	L
carus (Townes)	L
devineyae (Beck & Beck)	L
fluctuans Reiss	L
holoprasinus (Goeldi)	L
[*fulvipilus* (Rempel)]	
cf. *natans* Reiss	LU
pictus Reiss	L
Harnischia Kieffer	
curtilamellata (Malloch)	L
**incidata* Townes	*LU
Hyporhygma Reiss	
quadripunctatum (Malloch)	L
Kiefferulus Goetghebuer	
dux (Johannsen)	LU
pungens (Townes)	LU
sp. A Epler	LU
sp. B Epler	LU
**Kloosia* Kruseman	*A
Lauterborniella Bause	
agrayloides (Kieffer)	L
Microchironomus Kieffer	
nigrovittatus (Malloch)	LU
Micropsectra Kieffer	
xantha (Roback)	LU
+	
Microtendipes Kieffer	
caducus Townes	LU
pedellus (De Geer)	LU
+	
Nilothauma Kieffer	
babiyi (Rempel)	LU
bicorne (Townes)	LU
mirabile (Townes)	LU
sp. A Epler	A
Omisus Townes	
pica Townes	LU
sp. A Epler	LU
Pagastiella Brundin	
orophila (Edwards)?	LU
Parachironomus Lenz	
alatus (Beck)	L
carinatus (Townes)	L
chaetoalus (Sublette)	LU
directus (Dendy & Sublette)	L
frequens (Johannsen)	L
hirtalatus (Beck & Beck)	LU
monochromus (Wulp)	LU
pectinatellae (Dendy & Sublette)	L
potamogeti (Townes)	A
schneideri Beck & Beck	L
sublettei (Beck)	L
supparilis (Edwards)	L
[sp. A Epler]	
tenuicaudatus (Malloch)	LU
sp. B Epler	LU
sp. C Epler	A
Paracladopelma Harnisch	
doris (Townes)	L
loganae Beck & Beck	L
nereis (Townes)	L
undine (Townes)	L
+	
Paralauterborniella Lenz	
nigrohalteralis (Malloch)	L
Paratanytarsus Thienemann & Bause	
dubius (Malloch)	A
sp. A Epler	LU
sp. B Epler	LU
sp. C Epler	LU
Paratendipes Kieffer	
albimanus (Meigen)	L
basidens Townes	L
subaequalis (Malloch)	L
Phaenopsectra Kieffer	
dyari (Townes)	LU
flavipes (Meigen)	LU
obediens (Johannsen)	LU
**punctipes* (Wiedemann)	LU
**vittata* (Townes)	*A
Polypedilum Kieffer	
albicorne (Meigen)	A
acifer Townes	A
angustum Townes	A
aviceps Townes	L
braseniae (Leathers)	L
convictum (Walker)	LU
digitifer Townes	LU
fallax (Johannsen)	L
floridense Townes	A
gomphus Townes	A
griseopunctatum (Malloch)	LU
halterale (Coquillett)	LU
illinoense (Malloch)	LU
laetum (Meigen)	L
obtusum Townes	LU
**ontario* (Walley)	*L
**ophioides* Townes	*LU
parascalaenum Beck	LU
parvum Townes	A
pterospilus Townes	A
scalaenum (Schrank)	LU
simulans Townes	LU
trigonus Townes	L
tritum (Walker)	L

Polypedilum	
vibex Townes	A
sp. A Epler	LU
sp. B Epler	A
sp. C Epler	LU
+	
Pontomyia Edwards	LU
Pseudochironomus Malloch	
*_articaudus_ Sæther	*A
*_banksi_ Townes	*A
fulviventris (Johannsen)	LU
*_julia_ (Curran)	*A
middlekaufi Townes	A
*_rex_ (Hauber)	*A
Pseudochironomus	
richardsoni Malloch	LU
Rheotanytarsus Thienemann & Bause	
distinctissimus (Brundin) group	LU
exiguus (Johannsen)	LU
+	
Robackia Sæther	
claviger (Townes)	L
demeijerei (Kruseman)	L
Saetheria Jackson	
*_hirta_ Sæther	*L
tylus (Townes)	L
Stelechomyia Reiss	
perpulchra (Mitchell)	L
Stempellina Thienemann & Bause	LU
Stempellinella Brundin	LU
Stenochironomus Kieffer	
aestivalis Townes	LU
browni Townes	A
cinctus Townes	LU
hilaris (Walker)	LU
macateei (Malloch)	LU
poecilopterus (Mitchell)	LU
unictus Townes	LU
Stictochironomus Kieffer	
caffrarius group sp. [Chironomini genus B Pinder & Reiss]	LU
devinctus (Say)	LU
palliatus (Coquillett)	A
*_varius_ (Townes)	*A
*_Sublettea_ Roback	*LU
Tanytarsus Wulp	
buckleyi Sublette	A
confusus Malloch	A
dendyi Sublette	A
guerlus (Roback)	A
limneticus Sublette [_pinderi_ Steiner & Hulbert]	L
mendax Kieffer [_xanthus_ Sublette]	A
neoflavellus Malloch	A
quadratus Sublette	A
recens Sublette	A
sp. A Epler	LU
sp. B Epler	LU
sp. C Epler	LU
sp. D Epler	LU
sp. E Epler	LU
sp. F Epler	LU
sp. G Epler	LU
sp. J Epler	LU
sp. K Epler	LU
sp. L Epler	LU
sp. M Epler	LU
sp. O Epler	LU
sp. P Epler	LU
sp. R Epler	LU
sp. S Epler	LU
sp. T Epler	LU
sp. U Epler	LU
sp. V Epler	LU
sp. W Epler	LU
+?	
Tribelos Townes	
atrum (Townes)	L
fuscicorne (Malloch)	L
jucundum (Walker)	L
Xenochironomus Kieffer	
xenolabis (Kieffer)	L
Xestochironomus Sublette & Wirth	
subletti Borkent	L
Zavreliella Kieffer	
marmorata (Wulp) [_varipennis_ Coquillet]	L
Chironomini genus A Roback	LU
Chironomini genus III Epler	LU
Harnischia complex genus A Epler	LU
Harnischia complex genus B Epler	LU
Harnischia complex genus C Epler	LU