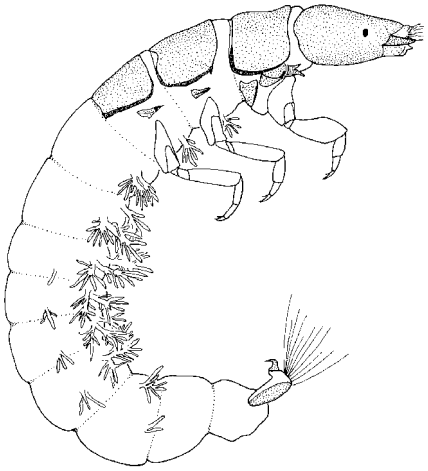

IDENTIFICATION MANUAL

FOR THE

CADDISFLY (TRICHOPTERA) LARVAE

OF

FLORIDA

2026 REVISED EDITION

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Department of Environmental Protection
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Tallahassee

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by

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This document is available at the following web site:
https://floridadep.gov/dear/bioassessment/content/macroinvertebrate-taxonomic-keys

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INTRODUCTION

Caddisflies (Trichoptera) are a diverse and vital biotic component of freshwater ecosystems, having been able to adapt and succeed in nearly every type of aquatic habitat. Although the greatest species diversity occurs in cool running waters, many species inhabit lakes and ponds, as well as specialized habitats such as marshes, swamps, springs, seeps, and intermittent streams. A few species live on marine shores and some in moist soil as well. The biological roles of caddisflies in freshwater ecosystems have been well documented (Scott and Crossman, 1973; Wallace et al., 1982; Merritt et al., 1984; Irons et al., 1988; Morse et al., 2019a), and their potential use as biological indicators of water quality is well known (Plafkin et al., 1989; Resh and Jackson, 1993; Johnson et al., 1993; Barbour et al., 1999; Mazor et al., 2019). Caddisflies are excellent indicators of water quality, and to appreciate fully the utility of the group as a bioassessment tool requires a good taxonomic knowledge of the fauna, particularly at the species level (Resh and Unzicker, 1975; Lenat, 1988). The ability to distinguish the larvae provides a better understanding of the patterns of population and production dynamics in freshwater ecosystems (Resh, 1976).

Caddisflies are one of the dominant aquatic insect groups in Florida. However, knowledge of the systematics of the caddisfly fauna in the state is still limited, most particularly for the larvae, the life stage that benthologists most often encounter in the field. Larval-adult associations have been made for only approximately 50% of the species found in Florida. Because of this knowledge gap, the outcome of larvae-only studies can be uncertain and low-resolution (family/genus level) taxonomic identifications in groups such as Trichoptera where larval taxonomy is still poorly known. To address this issue, species-level knowledge of Trichoptera based on adults can be leveraged to facilitate larval-adult associations through traditional approaches such as larval/adult rearings, the metamorphotype method, and newer approaches using DNA barcoding (Zhou et al., 2011, 2016). Additionally, we believe that comprehensive faunal surveys of Trichoptera adults by deploying collecting equipment (e.g., light traps, emergence and Malaise traps) within a prescribed area is a feasible way to develop species-level inventories that can be used to strengthen aquatic bioassessments and ecological studies.

Florida caddisflies have been the subject of investigation by entomologists since the mid-1900s. This has resulted in many new species descriptions, faunal surveys of various taxa throughout the state, and species checklists. Recently, Rasmussen et al. (2025) summarized the species diversity and distribution of the Trichoptera fauna of Florida, which comprises 220 species representing 46 genera and 19 families. These data served as important baseline data for tailoring a larval identification manual specific to Florida. The literature dealing with the larval taxonomy and ecology of the caddisflies of Florida is scattered in various publications, and it is a time-consuming exercise to search these references. This manual, as with the previous editions by Pescador et al. (1995, 2004) represents our attempt to consolidate the taxonomic and ecological information that is available on the aquatic larval stage of these fascinating insects. The manual is far from being a panacea to the problem of limited taxonomic knowledge of the group but rather serves as a reminder of how much work still needs to be done.

The Trichoptera fauna of Florida is largely a specialized subset of the caddisfly fauna of the southeastern states; therefore, we recommend that users of this manual also refer to the publication

by Morse et al. (2017) on the caddisfly larvae of the southeastern USA. The seminal work by Wiggins (1977, 1996) on the larvae of North American caddisfly genera has formed the foundation for North American larval systematics. The keys to families and genera presented in this manual, and the keys presented by Morse et al. (2017, 2019b), are all based on the work by Wiggins (1996). Therefore, Wiggins (1996) is a "must have" reference for anyone engaged in the taxonomy of caddisfly larvae collected within the United States or Canada. For a broader, more comprehensive overview of the order we also highly recommend Wiggins (2004) book titled, *Caddisflies: The Underwater Architects*.

About this Manual

Area covered: This manual was prepared to aid aquatic biologists in the identification of the caddisfly larvae of Florida. The manual should not be relied upon to aid in identification of caddisflies collected from outside the state. The manual provides larval keys to the families, genera, and species (where possible) for the taxa presently thought to occur in the state. In cases where the family is represented by a single genus, the generic names are included in the key to the families (e.g., Dipseudopsidae, Lepidostomatidae, Molannidae). Furthermore, in cases where the family is represented by a single species, the specific names are indicated (i.e., Helicopsychidae). Similarly, in the key to genera of a particular family, a genus may be represented by one species, the specific name is then indicated in the key [e.g., *Anisocentropus* (Calamoceratidae), *Cyrnellus* (Polycentropodidae)].

New to the 2026 revised edtion: This revised edition incorporates substantial amounts of new information published subsequent to the 2004 edition (Pescador et al., 2004), including many new state records, newly described species, as well as advancements in larval taxonomy. Many of the keys and all of the write-ups have been rewritten in one way or another. Previous editions were only illustrated with line drawings. To help increase identification accuracy, we have added 48 new line drawings and 126 color photographs, including habitus photographs of all 46 genera recorded in Florida. To also aid in identification, we have for the first time included county-level range maps for all of the Florida species. At the end of the manual (pp. 24-1, 24-2) are character matrices summarizing the family-level diagnostic characters within Annulipalpia and Integripalpia.

Illustrations: The line drawings and photographs in this manual are a combination of original illustrations based on Florida specimens, illustrations redrawn from figures in *An Introduction to the Aquatic Insects of North America*, and illustrations scanned from other sources. If the illustrations came directly from other publications, the source of each figure is cited in the caption. If there is no source given in the figure legend, then the figure is an original illustration produced for this manual. Diagnostic characters in the keys that a novice may have difficulty locating are indicated by arrows in the illustrations.

Classification: The checklist of Florida species (p. 23-1) lists taxa alphabetically under the currently accepted two suborder scheme: Annulipalipia (fixed-retreat makers) and Integripalpia (basal lineages and portable-tube-case makers). Taxonomic accounts (i.e., synonymies) of the genera and species are excluded in the text. Species that are presumably new to science are simply referred to as "n. sp." and their descriptions will be published elsewhere. Additionally, the checklist includes species (with

question marks) that have not been recorded in the state but may occur here, based on their present known geographic ranges.

Family chapters: The text for each family summarizes the genera represented in the state and provides a short diagnosis of the larva and larval case/retreat along with general habitat information. For families with more than one genus in the state, a key to genera is then provided. The text for each genus gives a brief morphological **Diagnosis** and a representative habitus photo; **Species notes** cover general information on the morphology, geographic distribution, life history, and ecology of the various species represented in the state; **Additional references** cite the significant literature regarding the larval taxonomy of that particular genus; **Range maps** illustrate from which 67 counties in Florida (Fig. 1.2) the species has been recorded; and finally, following the genus write-up, an illustrated **Key to species** is presented for that genus. The sources of information from which the keys are adapted are indicated at the beginning of each key.

Acknowledgements

This 2026 revised edition (3rd) was made possible by the support and involvement of many friends and colleagues. We gratefully acknowledge Wills Flowers, Raymond Hix, Michael Hubbard (deceased), Almando Morain, Jan Peters, and Bart Richard (deceased) for their support of caddisfly research at Florida A&M University (FAMU). We are also grateful to the following individuals for providing the specimens (either as gifts or loans) that were examined in the course of creating this manual: Rick Abad, Frank Butera, Rick Cantrell, John Epler, Donald Ray, Todd Risk, Bob Rutter, Matt Scripter, and Theresa Thom.

A major change in this manual from the previous editions is the inclusion of photographic images that represent all of the 46 genera of caddisflies known in Florida. For taxa comprising small specimens, photographs were generously provided by colleagues. We extend our special appreciation to John Morse and Mike Ferro (Clemson University Arthropod Collection) for working closely with us throughout the project and for providing the excellent images of specimens representing *Beraea*, *Helicopsyche*, *Leptocerus*, *Potamyia*, *Protoptila*, *Psychomyia*, and *Setodes*. Additionally, imagery in the Hydroptilidae chapter was generously provided by the following individuals: David Bowles, Bill Gerth, Bob Newell, Doug Post, and Todd Risk. We thank Skip Hodges, Jr. for providing photographs of various portable cases. We express our great appreciation to Rick Abad for his collaboration on developing the Florida *Hydropsyche* key and the superb images he provided.

The species keys presented here were in part produced by scanning illustrations from published work and inserting them into keys that we have tailored for identification of species likely to be found in Florida. Our appreciation is extended to Michael Floyd, James Glover, and Victoria Nations for permitting us to incorporate their line drawings into the keys adapted for Florida species of *Oecetis* (M. Floyd); *Setodes* (V. Nations); *Ceraclea*, *Triaenodes*, *Ceraclea*, and *Rhyacophila* (J. Glover). We also thank Matt Green for his expert advice on the *Pycnopsyche* key and for allowing us to use his incredible images.

The 3rd iteration of this manual would not have been possible without the efforts of Todd Risk to facilitate funding for the project from the Florida Department of Environmental Protection (FDEP). We also thank Todd for his thorough review and helpful notes on the chapter drafts. Finally, we thank Puja Jasrotia and Cheryl Swanson (FDEP), and Tashaundria Bush (FAMU), for their outstanding administrative assistance and project management.

Working with Specimens

Preservation and storage: Generally, caddisfly larvae preserve well in alcohol provided they are fixed and handled properly in the first place. Bulk benthic samples should be placed in strong (85–95%) ethyl alcohol or a formalin solution; if samples are put in alcohol it should be replaced within 24 hours if the samples are not processed or sorted immediately, or else the integrity of the insect tissues is destroyed. Once the specimens are sorted, they should be preserved in 75–80% ethyl alcohol. For museum quality specimens, particularly larger specimens, larvae should be placed in a special fixative upon collection. Wiggins (1996) recommended an initial preservation in Kahle's fluid for its superior fixing quality. Satisfactory alternative methods include heating the larva in water to a near boil, similar to how Lepidoptera larvae are fixed, or heating the larva in a water/alcohol mixture. We have experienced difficulty identifying specimens that were treated with Rose Bengal stain. The stain diffuses the cuticular coloration, thus making it difficult to discern the patterns of muscle scars. Small-sized species (e.g., *Oecetis* spp., *Hydroptila* spp.) are better stored in microvials inside 2 or 4-dram vials filled with alcohol. This procedure prevents or minimizes the mutilation of the larvae and breakage of the larval cases. Vials or any storage container with specimens must have complete locality labels. One of the pet peeves of systematists is identifying specimens that are not properly labeled or with field codes only. Locality, to some extent, may provide invaluable information for the identification of specimens.

Examining specimens: The morphological characters that are involved in identifying the larvae are adequately viewed using a quality stereomicroscope equipped with at least 50X magnification and proper lighting. Adjusting the intensity and angle of the lighting is extremely important in getting the best view possible. The magnification needed will depend on the size of the specimen and structure being examined. Specimens can be viewed by placing them in a Petri dish or Syracuse watch glass filled with alcohol. Fine-tip forceps, dissecting pins, and microdissecting scissors are useful for manipulating and removing structures for closer examination. Placing the structure in glycerin on a depression slide allows for excellent viewing. To store dissected structures they should be placed in microvials and kept with the specimens.

Identification suggestions: After running a specimen through the keys we recommend reading the diagnosis and identification notes before arriving at a final determination. Also we encourage consulting other taxonomic references referred to in the manual. If, after careful examination a question still remains as to the taxonomic identity, the identification should be left at the taxonomic level (e.g., family or genus) for which no doubt exists. Often questions concerning taxonomic identity can be answered through consulting a reference collection of correctly identified specimens. By having quality reference specimens one can compare the specimen in question with specimens of known identity. Another option is to consult a taxonomist specializing in the taxa of interest. In any case, for QA/QC purposes voucher specimens should be kept so that identifications can be checked later.

Morphology (Refer to Fig. 1.1)

A general knowledge of the morphological terms associated with caddisfly larvae is necessary for ease of identification. The head is dorsally divided by a Y-shaped ecdysial line also referred to as the frontoclypeal and coronal sutures; the frontoclypeus is bordered laterally by the frontoclypeal sutures; and the parietals extend posteromesally along the coronal suture. Ventrally, the parietals mostly occupy the venter of the head and are separated by the ecdysial line, and the anterior and posterior apotomes. On the anterolateral portion of the head is located the eyes and antennae, which vary in location from family to family. Mouthparts include the labrum and labium, between which are mandibles and maxillae. Closely associated with the labium is the opening of the silk gland. The posterior portion of the head often has a number of muscle scars which appear as dark or light spots.

The thorax is composed of three segments: the prothorax, mesothorax and metathorax, each of which bears a pair of legs and often a sclerotized notum. The prothorax often has a finger-like prosternal horn and a lateral pair of trochantins, which can be distinctive for several families. The prothorax is always covered by dorsal sclerotized plates, while the meso- and metathorax are variable both in presence or absence of notal plates, and in extent of notal subdivisions. Setae, if arising on the meso- or metanota, are located in distinct areas termed setal area 1 (sa1), setal area 2 (sa2) and setal area 3 (sa3). Arrangement of both setal areas and sclerites can be of taxonomic significance. Thoracic legs are subdivided into the basal coxa, followed by the trochanter, femur, tibia and tarsus, which bears a tarsal claw apically. Tarsal claws usually each have a basal seta, the size of which can be of taxonomic value.

The abdomen has ten segments that are usually membranous except for segment IX which has dorsal sclerites in some families and segment X which is modified into a pair of anal prolegs. The first abdominal segment often bears a dorsal hump and a pair of lateral humps which function in allowing circulation of water through the case, as well as in securing the larva in the case. Some families have abdominal segments with numerous tracheal gills which function in gaseous exchange. Chloride epithelia, seen as oval rings especially on the venter of the abdomen, are found in the Limnephilidae, Hydroptilidae and Molannidae, and function in osmoregulation. The anal prolegs vary from family to family in degree of separation from the body, in associated sclerites, and in extent and nature of setation. Anal prolegs each have an anal claw which may be simple or complex, and which may bear accessory spines.

Morphology

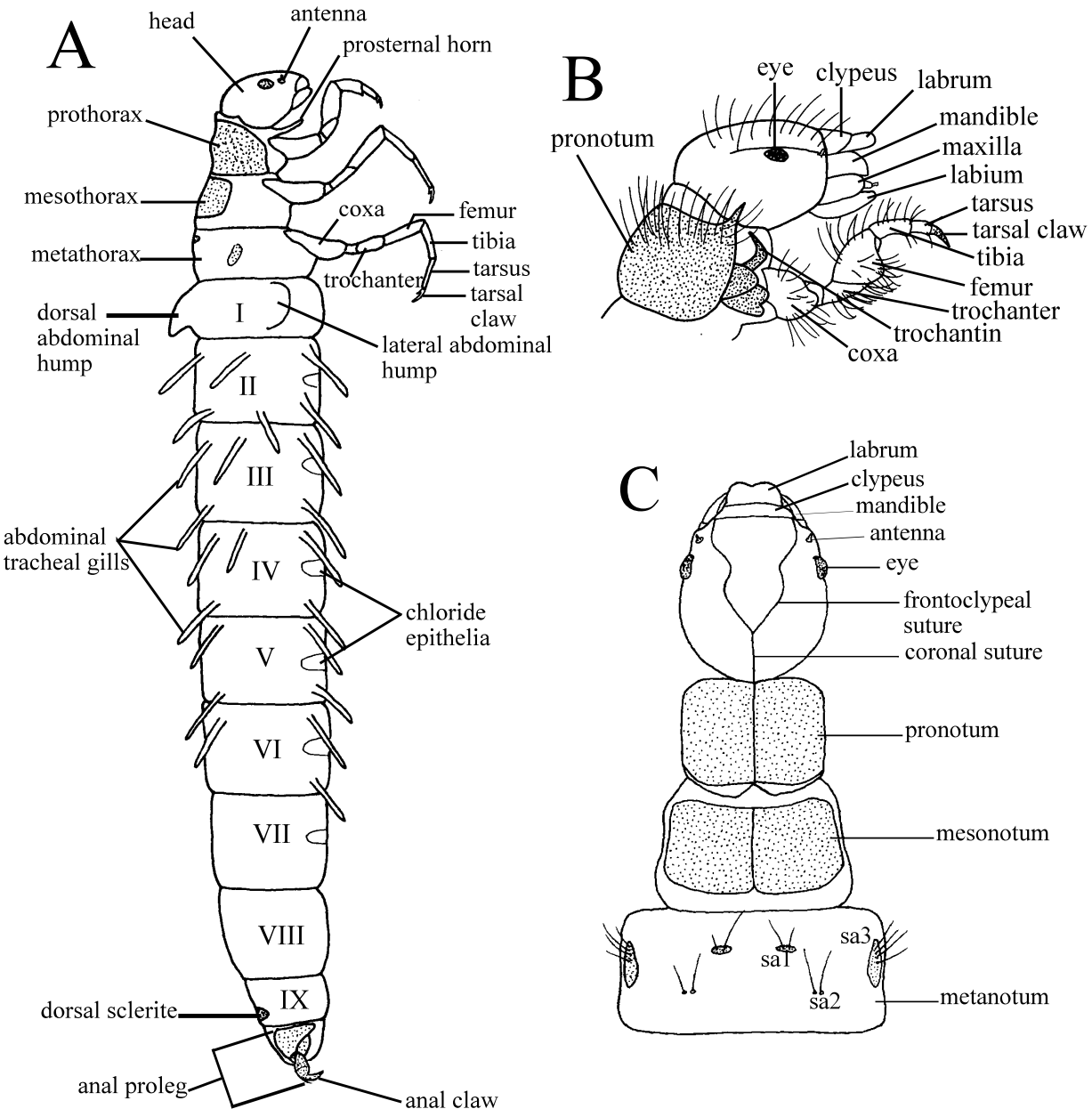


Fig. 1.1 Morphology of caddisfly larva; A. habitus, lateral; B. head and prothorax, lateral; C. head and thorax, dorsal.

Glossary of Morphological Terms

The following terms refer to larval Trichoptera unless otherwise noted.

abdominal gills: filamentous gills, in tufts, on a common stalk, or as single filaments, in dorsal, lateral, and ventral series on the abdomen

anal claspers: see **anal prolegs**

anal claw: a sclerotized hook at the end of an anal proleg, sometimes with one or more accessory hooks

anal papilla(e): elongate lobes arising from within the anal opening

anal processes: in many pupal Trichoptera, sclerotized projections (other than those containing developing genitalia) of various shapes at the apex of the abdomen

anal prolegs: paired prolegs of the last abdominal segment

carina(e): elevated ridge or keel

chloride epithelium: ovoid areas of modified cuticle each surrounded by a thin sclerotized line on the venter, dorsum, or pleural regions of certain abdominal segments, involved in ion absorption

chaetotaxy: arrangement and nomenclature of setae or bristles

cilia: long, thin hairs

cocoon: covering of the pupa constructed at least in part with silk

coronal suture: median unpaired part of epicranial suture on top of the head where the parietals meet

coxa(e): basal segment of leg

dorsal ecdysial line: in pupae, any dorsal preformed line of weakness along which the cuticle spits (usually) or bends during ecdysis

dorsal plate(s): the dorsal sclerite bridging the flexible membranous connection between the lateral sclerite and the anal claw of an anal proleg

dorsal sclerite: sclerite on the dorsum of segment IX

epicranial suture: Y-shaped line on the top of the head with two arms diverging anteriorly (frontal sutures)

episternum: anterior sclerite on the pleuron

exuvia(e): pupal skin

femur (femora): third leg segment, attached to trochanter and to the tibia

foretrochantin: prothoracic episternum, usually projecting and variously shaped

frons: face

frontoclypeal apotome: frontoclypeus

frontoclypeal: line between the frons and the clypeus

frontoclypeus: the combined frons and clypeus when the suture between them is absent

gena(e): cheek; side of head

Gilson's gland: certain metameric thoracic glands regarded functionally as organs of excretion, on the prothorax opening at the tip of the prosternal horn

hair: slender, flexible filament

head capsule: fused sclerites of the head region forming a hard compact case

heliciform: in the form of a spiral snail shell, as applied to cases of the family Helicopsychidae

hook plates: in pupal Trichoptera, paired hook-bearing sclerites near the anterior and/or posterior margins of abdominal terga III—VIII

hump: in Integripalpia, retractile protuberance on the lateral and dorsal side of the first abdominal segment

labial glands: see **silk glands**

labium: lower "lip"

lateral fringe: in Integripalpia, a line of setae extending along each side of most segments

lateral line: see **lateral fringe**

lateral plate(s): the principle lateral and dorsal sclerite of the distal portion of an anal proleg, separated from the anal claw by a dorsal plate and a ventral sole plate

lateral sclerite(s): basal part of anal proleg

lateral tubercle(s): in some Integripalpia, tiny forked and sclerotized processes on the lateralside of certain abdominal segments

maxilla(e): secondary pair of jaws; lateral mouth region

maxillary palp(i) or palpus: segmented palp originating from the ventral margin of the maxilla

mesonotum: upper surface of second thoracic segment

mesopleuron: pleuron of mesothorax

mesosternum: sternum of the mesothorax

metanotum: upper surface of third thoracic segment

metapleuron: pleuron of the metathorax

metasternum: sternum of the metathorax

metamorphotype method: a technique for associating larva, pupa, and adult of a given species, whereby the pharate adult is identifiable within its pupal exuviae and sclerites of its last larval instar are retained (except by Leptoceridae and Molannidae) in the posterior end of its pupal case

middorsal ecdysial line: see **dorsal ecdysial line**

muscle scars: attachment points for muscles of the head visible as spots from the exterior

notum (nota): dorsal sclerites of the thorax

notch: indentation on a margin

occipital foramen: opening on posterior surface of head opposed to a similar opening in prothorax

palp(s), palpus(i): elongated segmented structures on the maxillae and labium

parietals: sclerites of the head capsule, one on each side, in contact dorsally along the coronal suture

plate: broad, flattened surface

pleuron (pleura): lateral region of any segment

postementum: mentum plus submentum

process: projection or prominent appendage

pronotum: notum of the prothorax

prosternum: sternum of the prothorax

prothorax: first segment of the thorax which bears the forelegs

prosternal horn: in some Integripalpia, membranous, fingerlike projection of the prosternum bearing the opening of Gilson's gland

sa1: anteromedial setal area on mesonotum or metanotum

sa2: posteromedial setal area on mesonotum or metanotum

sa3: lateral setal area on mesonotum or metanotum

sclerite: hardened (sclerotized) portion of the body surrounded by sutures or membranous areas

seta(e): sclerotized hair-like projection

setose: covered in setae

setal area: one of 3 paired primary setal regions (sa1, sa2, and sa3) on the mesonotum or metanotum

silk glands: specialized labial glands opening at the apex of the labium, responsible for silk production

spicule: small spine

spine: thorn-like process

spinneret: tubular extension of the labium used to facilitate the application of silk

spur: large modified seta or spine

sternum: sclerite on ventral surface or lower portion of body segment

sulcus: groove or furrow

submentum: proximal division of the postmentum

suture: groove marking the line of fusion of two distinct plates

tarsal claw: claw at the apex of the tarsus

tarsus(i): jointed foot segment attached to the apex of the tibia

tergite: dorsal sclerite or part of a segment

tibia(e): fourth segment of leg

tooth: hardened growth of mandibles, maxillae, or claws

trochanter: structure between the coxa and femur of the leg

trochantin: sclerite in the thoracic wall immediately anterior to the base of the coxa

trochanteral brush: tuft of hairs on the distal part of trochanter

tooth: hardened growth of mandibles, maxillae, or claws

venter: under surface of the abdomen; belly

ventral apotome: gular sclerite of the head capsule, sometimes separated into anterior and posterior ventral apotomes

ventral sole plate: the ventral sclerite bridging the flexible membranous connection between the lateral sclerite and the anal claw of an anal proleg

Fig. 1.2 Counties of Florida

KEY TO FAMILIES FOR LARVAE OF THE CADDISFLIES (TRICHOPTERA) OF FLORIDA

[modified from Morse et al. (2019b); see also family character matrices (p. 24-1)]

1. Larva constructing portable case of sand grains or small rock fragments, coiled to resemble a snail shell (Fig. 2.1); anal claw comb-shaped (Fig. 2.2); . . . . . Helicopsychidae (p. 8-1), *Helicopsyche borealis*

Fig. 2.1 *Helicopsyche borealis*

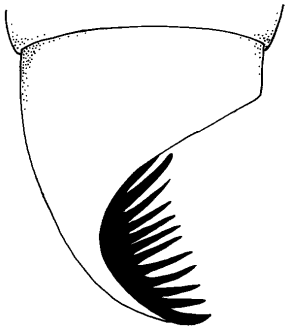


Fig. 2.2 *Helicopsyche borealis*

Larval case straight or nearly so, not resembling a snail shell, or larva not constructing a portable case; anal claw hook-shaped (Fig. 2.3) 2

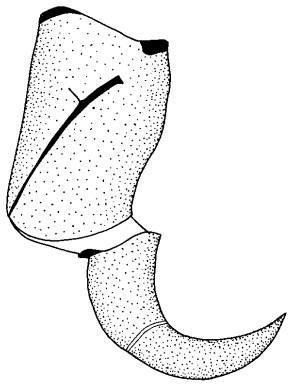


Fig. 2.3 *Rhyacophila* sp.

2(1) Top of each thoracic segment covered by plates, usually closely appressed along the middorsal line, sometimes subdivided with thin transverse sutures, or some sclerites undivided (Fig. 2.4) 3

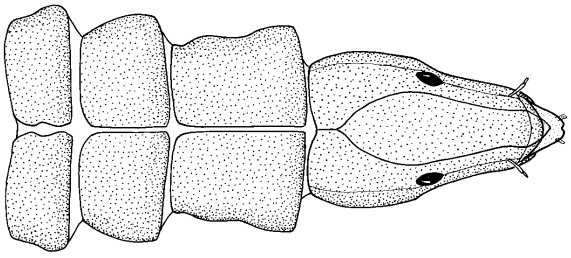


Fig. 2.4 *Mayatrichia* sp.

Metanotum and sometimes mesonotum entirely membranous, or largely so and bearing several pairs of smaller sclerites (Fig. 2.5) 4

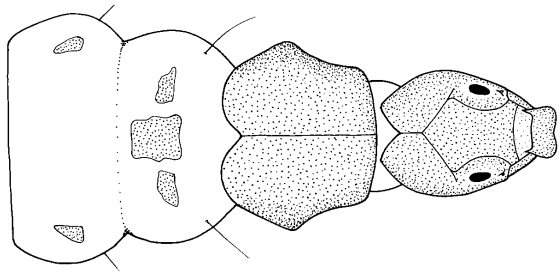


Fig. 2.5 *Protoptila* sp.

3(2) Abdomen with ventrolateral rows of branched gills, and with prominent tuft of long setae at base of anal claw (Fig. 2.6); larvae construct fixed retreats (Fig. 2.7) . . . . . Hydropsychidae (p. 9-1)

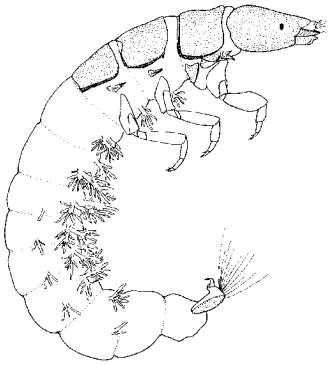


Fig. 2.6 *Cheumatopsyche* sp.

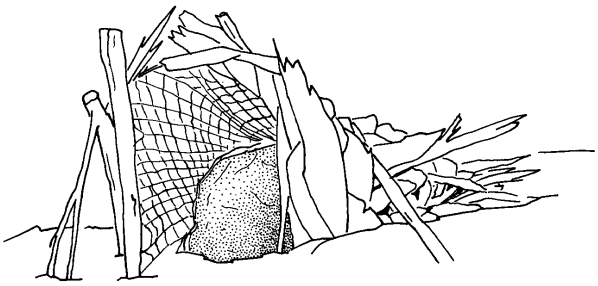


Fig. 2.7 *Hydropsyche* sp.

Abdomen without ventrolateral gills (Fig. 2.8), and with only 2 or 3 hairs at base of anal claw; larvae small, usually less than 6 mm long; final instars construct portable cases of sand, algae, and silk (Fig. 2.9) . . . . . Hydroptilidae (p. 10-1)

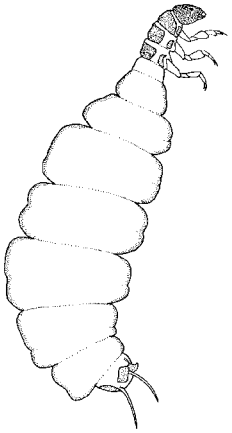


Fig. 2.8 *Hydroptila* sp.

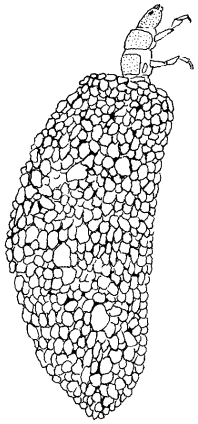


Fig. 2.9 *Hydroptila* sp.

4(2) Antennae very long and prominent, at least six times as long as wide (Fig. 2.10) and/or sclerites on mesonotum lightly pigmented except for a pair of dark curved lines on posterior half (Fig. 2.11); larvae construct portable cases of various materials . . . . . Leptoceridae (p. 12-1)

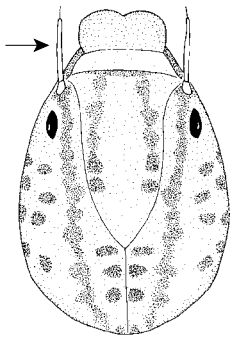


Fig. 2.10 *Triaenodes injustus*

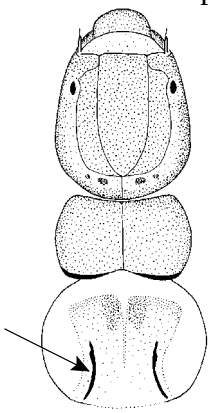


Fig. 2.11 *Ceraclea* sp.

Antennae of normal length, no more than three times as long as wide (Fig. 2.12), or not apparent; mesonotum without a pair of dark curved lines 5

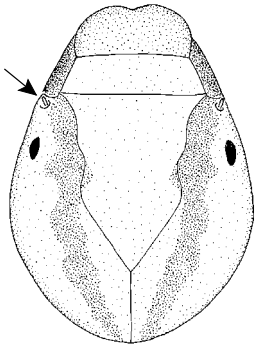


Fig. 2.12 *Agrypnia* sp.

5(4) Mesonotum largely or entirely membranous (Fig. 2.13), or with small sclerites covering not more than half of notum (Fig. 2.14); pronotum without anterolateral projections 6

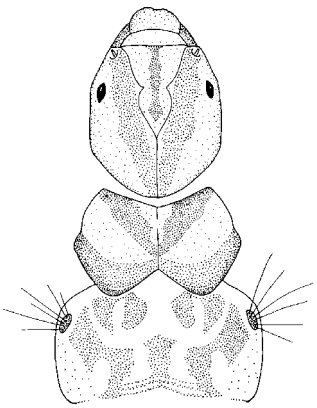


Fig. 2.13 *Agrypnia* sp.

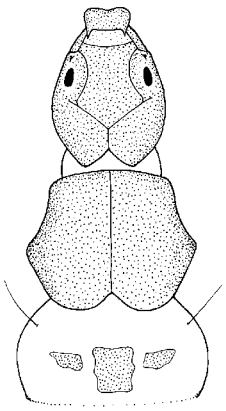


Fig. 2.14 *Protoptila* sp.

Mesonotum largely covered by variously subdivided sclerotized plates (Figs 2.15, 2.16); pronotum sometimes with prominent anterolateral projections or processes (Fig. 2.16) 12

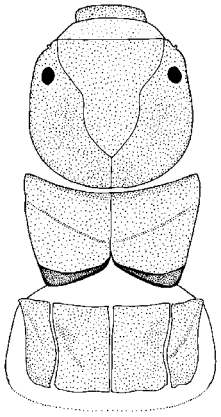


Fig. 2.15 *Brachycentrus* sp.

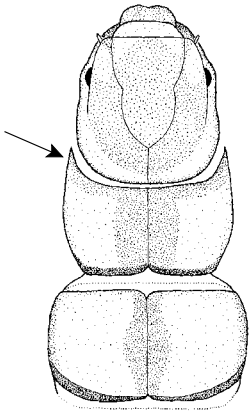


Fig. 2.16 *Psilotreta* sp.

6(5) Abdominal segment IX with sclerite on dorsum, sometimes difficult to see and detectable only by its shiny surface (Fig. 2.17) 7

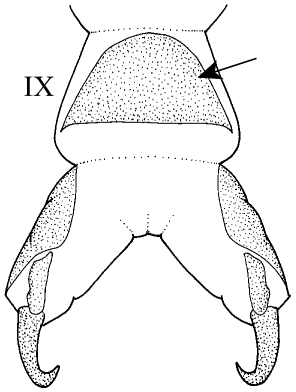


Fig. 2.17 *Rhyacophila* sp.

Abdominal segment IX with dorsum entirely membranous (Fig. 2.18) 9

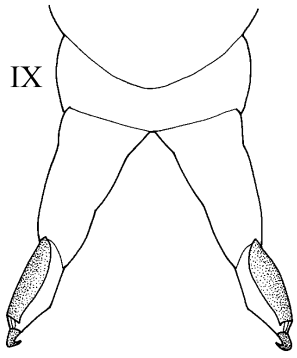


Fig. 2.18 *Chimarra* sp.

7(6) Metanotal sa3 usually consisting of a cluster of setae arising from a small rounded sclerite (Fig. 2.19); prosternal horn present (Fig. 2.20); larvae construct tubular portable cases, mainly of plant materials (Fig. 2.21) . . . . . Phryganeidae (p. 17-1)

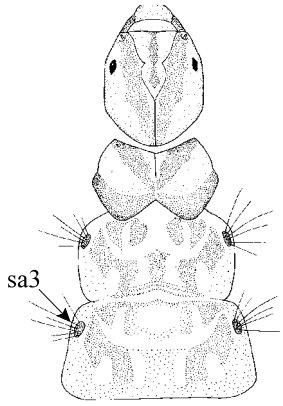


Fig. 2.19 *Agrypnia* sp.

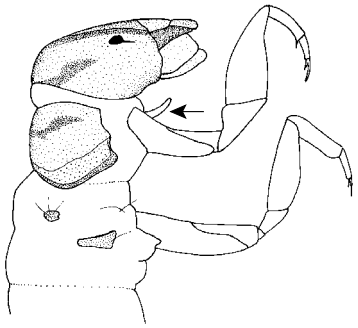


Fig. 2.20 *Ptilostomis* sp.

Fig. 2.21 *Ptilostomis* sp.

Metanotal sa3 consisting of a single seta not arising from a sclerite (Fig. 2.22); prosternal horn absent; larvae either constructing a tortoise-like case of stones (Fig. 2.25) or free living 8

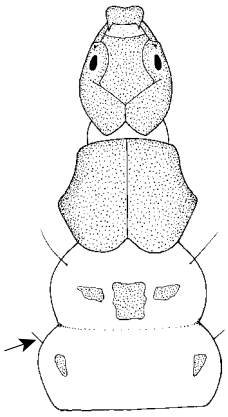


Fig. 2.22 *Protoptila* sp.

8(7) Anal claw with at least one dorsal accessory hook (Fig. 2.23); basal half of each anal proleg broadly joined with segment IX (Fig. 2.24); larvae construct tortoise-like portable cases of small stones (Fig. 2.25) . . . . . Glossosomatidae (p. 7-1), *Protoptila*

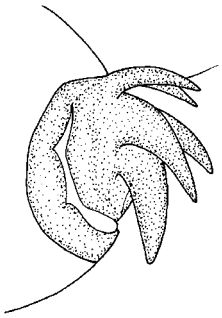


Fig. 2.23 *Protoptila* sp.

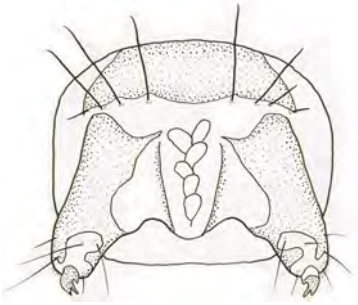


Fig. 2.24 *Glossosoma* sp.

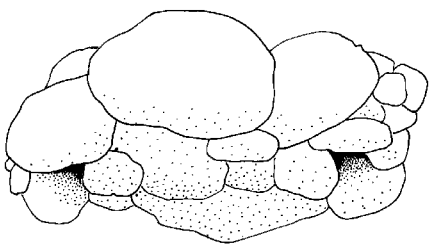


Fig. 2.25 *Protoptila* sp.

Anal claw without dorsal accessory hooks (Fig. 2.26); most of anal proleg free from segment IX (Fig. 2.27); larvae free living without cases . . . . . Rhyacophilidae (p. 20-1), *Rhyacophila* (key to species, p. 20-3)

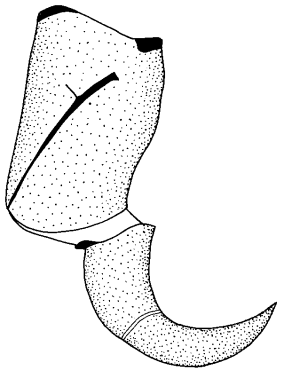


Fig. 2.26 *Rhyacophila* sp.

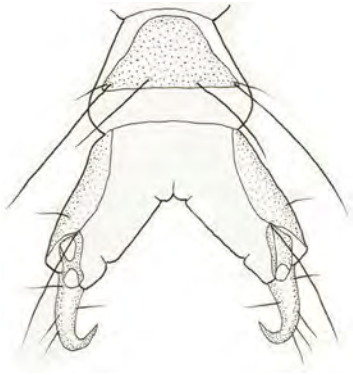


Fig. 2.27 *Rhyacophila* sp.

9(6) Labrum membranous and T-shaped (Fig. 2.28), often withdrawn from view in preserved specimens; larvae construct fixed sac-shaped nets of silk (Fig. 2.29) . . . . . Philopotamidae (p. 16-1)

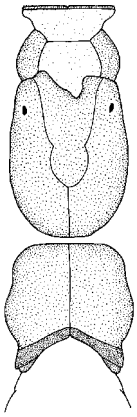


Fig. 2.28 *Chimarra* sp.

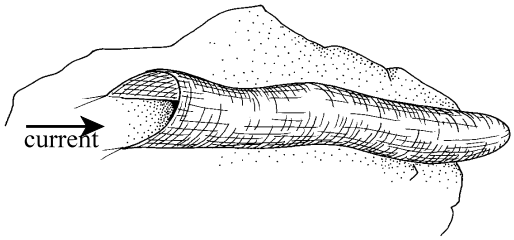


Fig. 2.29 *Dolophilodes* sp.

Labrum sclerotized, rounded and articulated in normal way (Fig. 2.30), always exposed 10

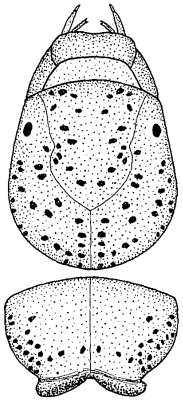


Fig. 2.30 *Polycentropus* sp.

10(9) Trochantin of prothorax with apex acute (Fig. 2.31); larvae construct exposed funnel-shaped capture nets, flattened retreats, or tubes buried in loose sediments 11

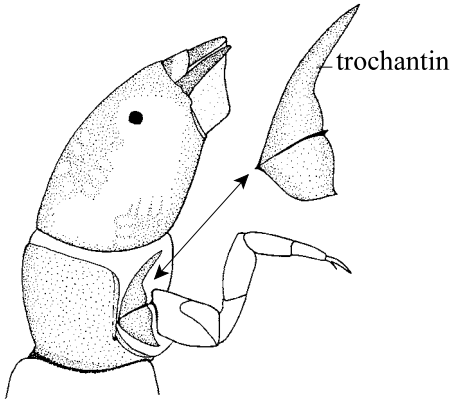


Fig. 2.31 *Cyrnellus fraternus*

Trochantin of prothorax broad and hatchet-shaped (Fig. 2.32); larvae construct tubular retreats on rocks and logs . . . . . Psychomyiidae (p. 19-1)

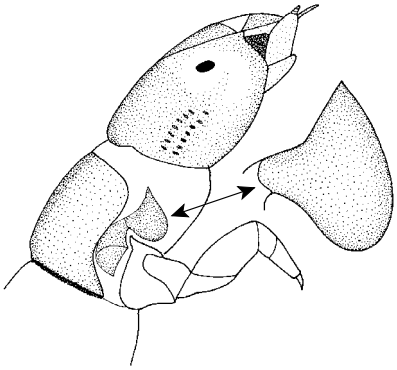


Fig. 2.32 *Lype diversa*

11(10) Tarsi of all legs broad and flat, tarsal claws reduced (Fig. 2.33); tip of labium extremely elongate (Fig. 2.33) . . . . . Dipseudopsidae (p. 6-1), *Phylocentropus* (key to species, p. 6-3)

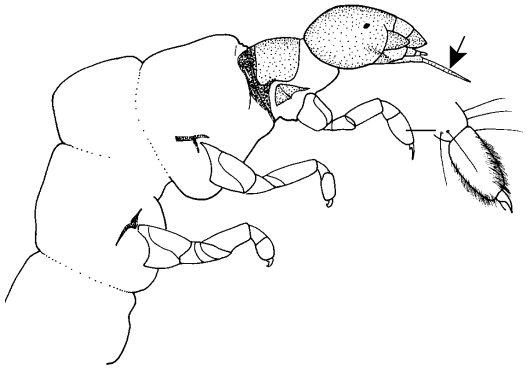


Fig. 2.33 *Phylocentropus* sp.

Tarsi of all legs elongate, not broad and flat, tarsal claws not reduced (Fig. 2.34); tip of labium not as elongate . . . . . Polycentropodidae (p. 18-1)

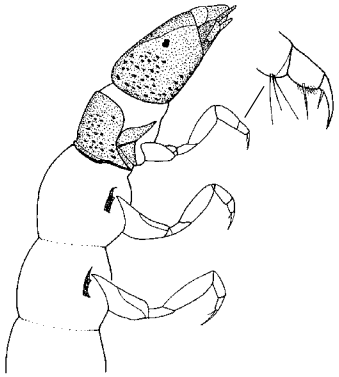


Fig. 2.34 *Polycentropus* sp.

12(5) Abdominal segment I lacking both dorsal and lateral humps (Fig. 2.35); metanotal sa1 usually lacking entirely, or, represented only by a single seta without a sclerite (Fig. 2.36); mesonotal sclerites subdivided (Fig. 2.36) . . . . . Brachycentridae (p. 4-1)

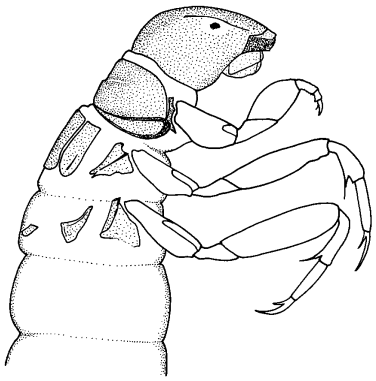


Fig. 2.35 *Brachycentrus* sp.

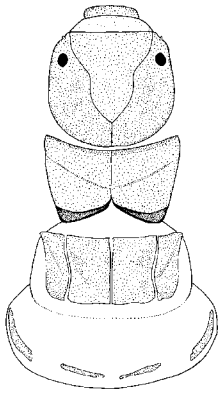


Fig. 2.36 *Brachycentrus* sp.

Abdominal segment I always with a lateral hump on each side although not always prominent, and with or without a median dorsal hump (Fig. 2.37); metanotal sa1 always present, usually represented by a sclerite bearing several setae, but with at least a single seta (Fig. 2.38); mesonotal sclerites not as above (Fig. 2.38) 13

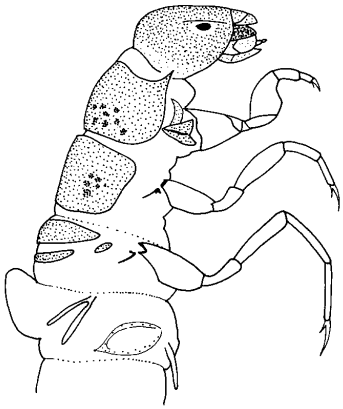


Fig. 2.37 *Agarodes* sp.

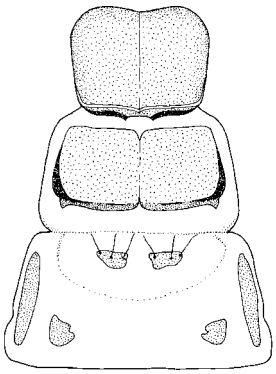


Fig. 2.38 *Pycnopsyche* sp.

13(12) Tarsal claw of hind leg modified to form a short setose stub (Fig. 2.39), larval case of sand grains with a dorsal cowl and lateral flanges (Fig. 2.40) . . . . . Molannidae (p. 14-1), *Molanna* (key to species, p. 14-3)

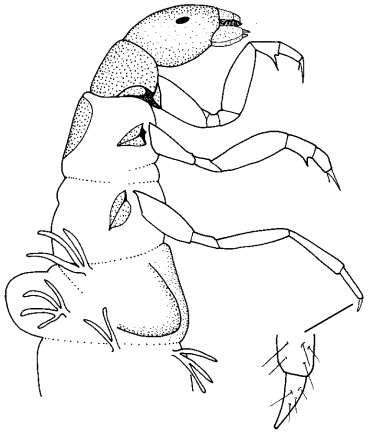


Fig. 2.39 *Molanna* sp.

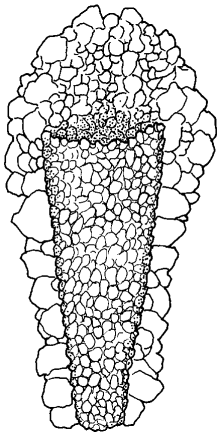


Fig. 2.40 *Molanna* sp.

Tarsal claw of hind legs no different in structure from those of other legs (Fig. 2.41); larval case not as above 14

Fig. 2.41 *Agarodes* sp.

14(13) Labrum with transverse row of approximately 16 long setae across central part (Fig. 2.42); larval case a hollowed twig (Fig. 2.43) or 2 leaf pieces (Fig. 2.44) . . . . . Calamoceratidae (p. 5-1)

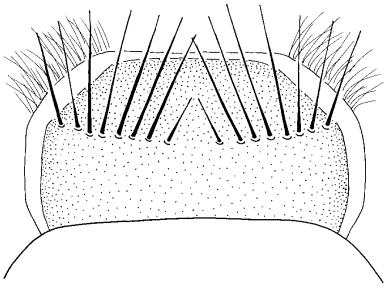


Fig. 2.42 *Anisocentropus pyraloides*

Fig. 2.43 *Heteroplectron* sp.

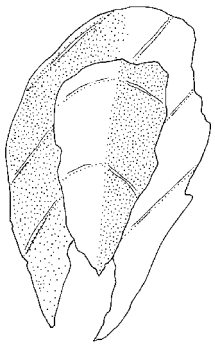


Fig. 2.44 *Anisocentropus pyraloides*

Labrum with no more than 6 long setae across central part (Fig. 2.45); larval case not as above 15

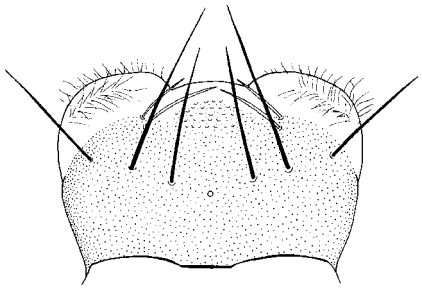


Fig. 2.45 *Neophylax* sp.

15(14) Transverse carina on pronotum extended into rounded anterolateral lobes (Fig. 2.46); anal proleg with lateral sclerite much reduced in size and produced posteriorly as a lobe from which a stout apical seta arises (Fig. 2.47); base of anal claw with ventromesal membranous surface bearing a prominent brush of 25-30 fine setae (Fig. 2.48); larval case of sand grains (Fig. 2.49) . . . . . Beraeidae (p. 3-1), *Beraea*

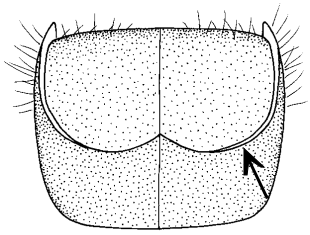


Fig. 2.46 *Beraea* sp.

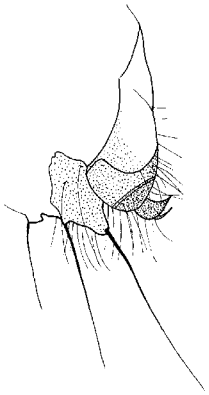


Fig. 2.47 *Beraea* sp., lateral

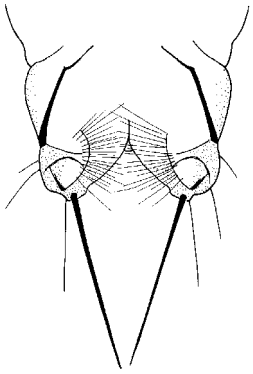


Fig. 2.48 *Beraea* sp., ventral

Fig. 2.49 *Beraea* sp.

Pronotum lacking transverse carina; anal proleg with lateral sclerite not produced posteriorly as a lobe around base of apical setae (Figs 2.50, 2.51); base of anal claw with ventromesal surface lacking prominent brush of fine setae, although cluster of setae may be present dorsally (Fig. 2.51); case of plant or mineral materials 16

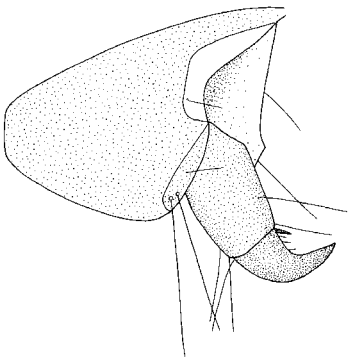


Fig. 2.50 *Psilotreta* sp., lateral

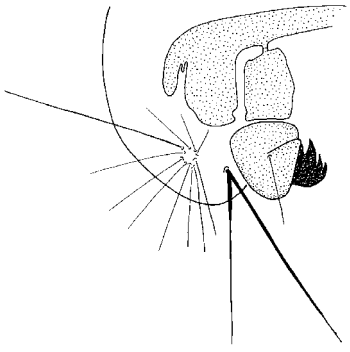


Fig. 2.51 *Agarodes* sp., lateral

16(15) Antennae situated at or very close to the anterior margin of the head capsule (Figs 2.52, 2.53); prosternal horn lacking; larval cases composed mainly of mineral materials 17

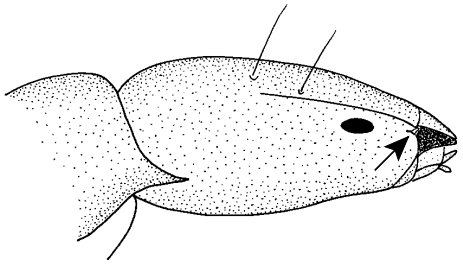


Fig. 2.52 *Psilotreta* sp.

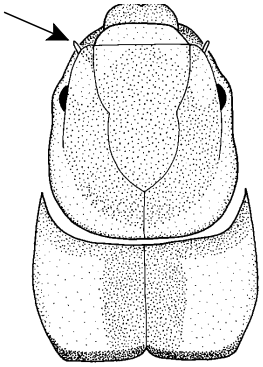


Fig. 2.53 *Psilotreta* sp.

Antennae removed from the anterior margin of the head capsule and approaching the eye (Fig. 2.54); prosternal horn present although sometimes short (Fig. 2.54); larval cases usually composed mainly of plant materials, sometimes mineral materials 18

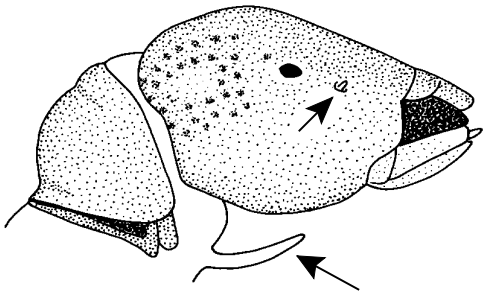


Fig. 2.54 *Ironoquia* sp.

17(16) Anal proleg with dorsal cluster of setae posteromesad of lateral sclerite (Figs 2.55, 2.56); foretrochantin relatively large, the apex hook-shaped (Fig. 2.57); head, pro- and mesonotum without dark mid-dorsal band; larval case mainly of sand (Fig. 21.1) . . . . . Sericostomatidae (p. 21-1), *Agarodes*

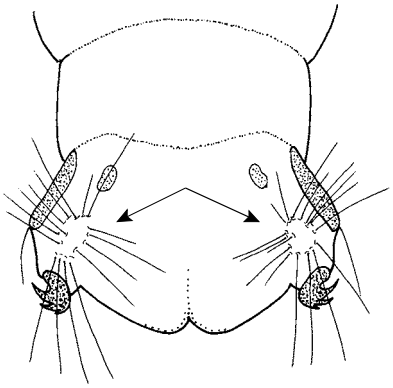


Fig. 2.55 *Agarodes* sp.

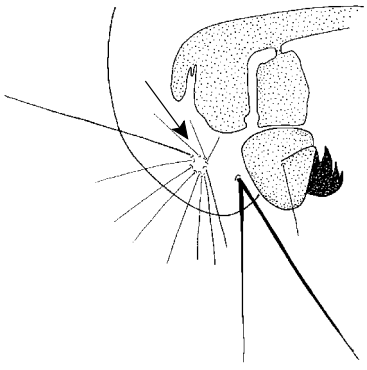


Fig. 2.56 *Agarodes* sp., lateral

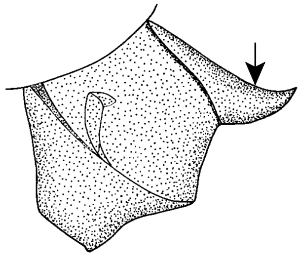


Fig. 2.57 *Agarodes* sp.

Anal proleg without cluster of dorsal setae posteromesad of lateral sclerite (Figs 2.58, 2.59); foretrochantin small, the apex not hook-shaped (Fig. 2.60); head, pro- and mesonotum with dark mid-dorsal band (Fig. 15.1); larval case mainly of coarse quartz fragments (Fig. 15.1) . . . . . Odontoceridae (p. 15-1), *Psilotreta* (key to species, p. 15-3)

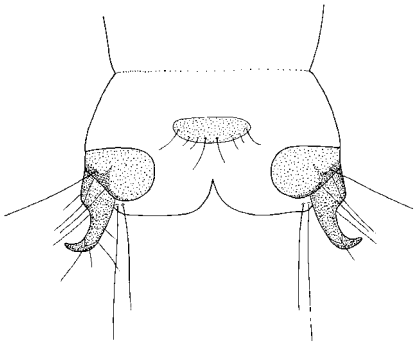


Fig. 2.58 *Psilotreta* sp.

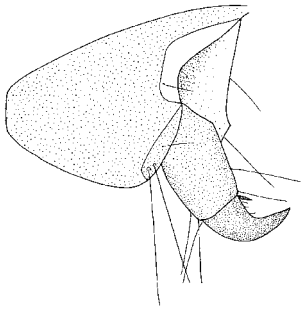


Fig. 2.59 *Psilotreta* sp., lateral

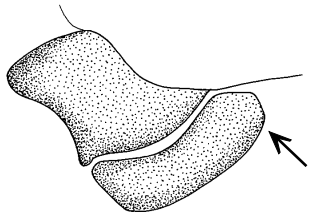


Fig. 2.60 *Psilotreta* sp.

18(16) Antennae close to the anterior margin of the eye (Fig. 2.61), median dorsal hump of segment I lacking (Fig. 2.61); larval case 4-sided, composed of small panels of bark or leaf (Fig. 11.2) . . . . . Lepidostomatidae (p. 11-1), *Lepidostoma*

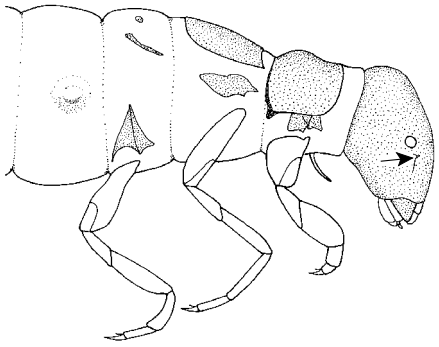


Fig. 2.61 *Lepidostoma* sp.

Antennae approximately halfway between the anterior margin of the head capsule and the eye (Fig. 2.62); median dorsal hump of segment I almost always present (Fig. 2.63); larval case not as above. . . . . Limnephilidae (p. 13-1)

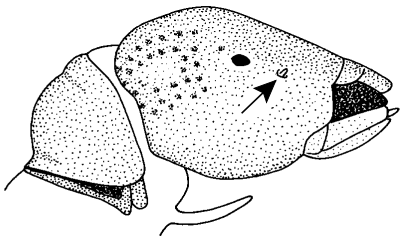


Fig. 2.62 *Ironoquia* sp.

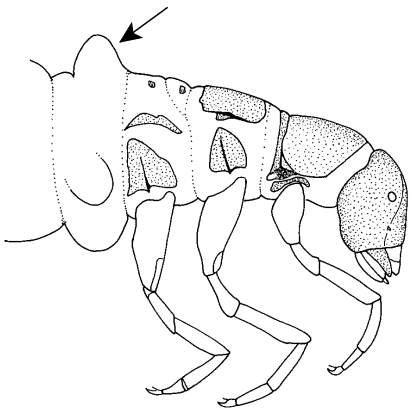


Fig. 2.63

FAMILY BERAEIDAE

(*spring-loving caddisflies*)

Beraeids are small, rarely encountered caddisflies, represented in eastern North America by several species within the genus *Beraea*. North American species are sparsely distributed, very localized and restricted to spring-seepage habitats. Larvae of this family are distinguished from the other families by the anal prolegs which each have a reduced lateral sclerite and prominent ventromesal brush of slender setae arising from the bulbous base of the anal claw (Fig. 2.48). The head has a ridge along each side with the antenna placed near the end at the anterior margin of the head. Larvae are detritivores and construct portable tube cases of sand that are slightly curved and tapered (Fig. 2.49). *Beraea jennyae*, the only species recorded in Florida, is globally known from a single locality in the western panhandle.

Genus ***Beraea*** Stephens

Diagnosis: Larvae of *Beraea* (Fig. 3.1) are characterized as follows: greatly reduced lateral sclerite of the anal prolegs, each with posteriorly produced lobe supporting a single stout seta (Fig. 2.47); setaceous ventromesal membranous base of the anal claw (Fig. 2.48); and pronotum with transverse carina (Fig. 2.46) terminating in a rounded lobe at each anterolateral corner (Figs 3.1, 3.2). The larval case closely resembles that of *Agarodes* (Sericostomatidae), and is curved, slightly tapered, and constructed mainly of sand grains (Fig. 3.1).

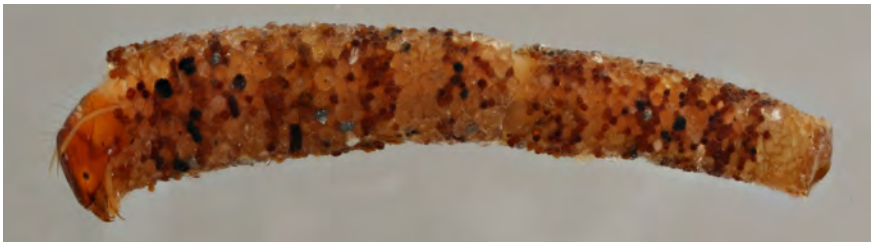
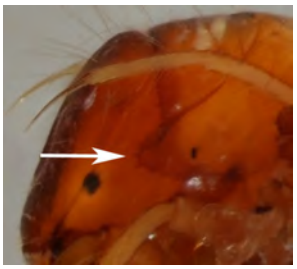


Fig. 3.1 *Beraea gorteba*, CUAC000002021
Photos courtesy of J.C. Morse & M.L. Ferro



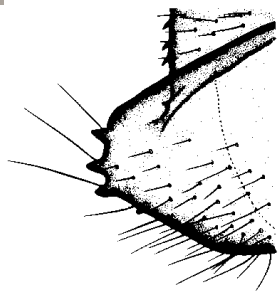


Fig. 3.2 [adapted from Hamilton (1985)] – *Beraea gorteba*, anterolateral process of pronotum

Species notes: The only beraeid known from Florida is *Beraea jennyae* (Map 3.1), a recently described new species, that was collected as adults from a steephead stream (Turkey Hen Ck., Okaloosa Co.) on Eglin Air Force Base (Rasmussen, 2004; Rasmussen et al., 2025). Adults were taken in April by both light trap and by beating riparian vegetation within the steephead that forms the east branch of the stream. Despite efforts, larvae of *B. jennyae* have yet to be collected and

described, but probably occur in the sediments of the seepage springs that are found at the head of this deep ravine.

Of the other three North American species of *Beraea*, *B*. *gorteba*, *B*. *fontana*, *B*. *nigritta*, only *B*. *gorteba* occurs in the Southeast. Although the species has never been collected in Florida, the proximity of the type locality in central Georgia suggests that the species could occur in the state. According to Hamilton (1985), the larvae and pupae were collected in a side channel of Spring Creek, a small, second order, blackwater stream near the town of Roberta (Crawford Co., Georgia). The side channel where the larvae were mostly collected receives ground water and seepage from hillside springs as the main source of water. Larvae were primarily found in the seepage areas where they burrow into the sand and organic sediments. Gut content analysis indicated that the larvae are primarily detritivores. According to Hamilton (1985), *B*. *gorteba* most likely overwinters as 5th instars, pupates in April and then emerges in May and early June. The larva of *B*. *gorteba* has 3 or 4 large spines on each anterolateral process of the pronotum (Fig. 3.2) compared to 5–7 smaller spines in *B*. *fontana* and *B*. *nigritta* (Hamilton, 1985).

Additional references: Ross (1944); Wiggins (1954, 1996); Hamilton (1985).

Map 3.1 *Beraea jennyae* ▲

FAMILY BRACHYCENTRIDAE

(*humpless caddisflies*)

Brachycentrids are represented in Florida by the genera *Brachycentrus* (4 spp.) and *Micrasema* (3 spp.). Both genera occur throughout much of North America. Larvae are morphologically distinguished from the other caddisfly families by the following combination of characters: absence of dorsal and lateral humps on abdominal segment I (Fig. 2.35); metanotal sa1 either entirely lacking (Fig. 2.36) or represented by a single seta without a sclerite; and mesonotal plates usually subdivided (Fig. 2.36). The portable larval cases are constructed of various materials and arrangements. The larvae are most abundant in cool lotic habitats such as springbrooks, creeks, and small rivers. Some species also inhabit the wave-washed shores of lakes in northern latitudes.

KEY TO GENERA FOR LARVAE OF FLORIDA BRACHYCENTRIDAE

[modified from Morse et al. (2019b)]

1. Mid- and hind legs long, femora about as long as head capsule, tibiae each produced distally into prominent process from which stout spur arises (Fig. 4.1); case square in cross section, composed of small pieces of plant materials fastened transversely (Figs 4.2, 4.5) . . . . . *Brachycentrus* (p. 4-4)

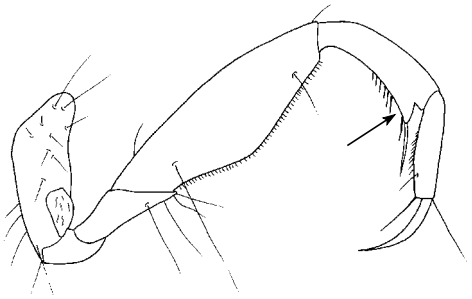


Fig. 4.1

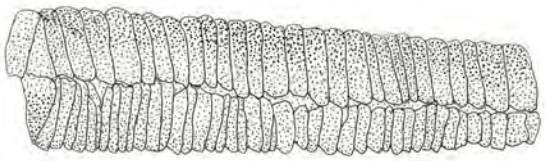


Fig. 4.2

Mid- and hind legs shorter, femora much shorter than head capsule, each tibia not produced distally into prominent process, although spur arises from about same point on unmodified tibia (Fig. 4.3); case cylindrical, composed of sand or of strips of plant material wound around circumference (Fig. 4.13) . . . . . *Micrasema* (p. 4-8)

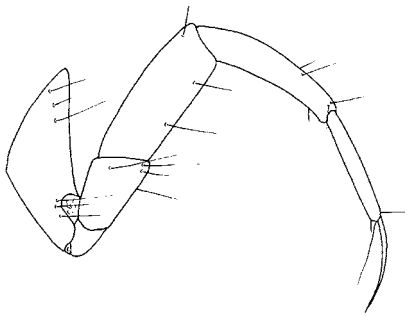


Fig. 4.3

Genus ***Brachycentrus*** Curtis

Diagnosis: Larvae of *Brachycentrus* (Fig. 4.4) are characterized as follows: mid- and hind legs unusually long with ventral margin of femora, tibiae, and tarsi each with row of modified, short spinous setae (Fig. 4.1); and tibiae each produced distally into prominent process with stout spur (Fig. 4.1). The larval cases of Florida species are 4-sided, tapered, and constructed of small rectangular pieces of plant material (Fig. 4.5).

Fig. 4.4 *Brachycentrus numerosus*

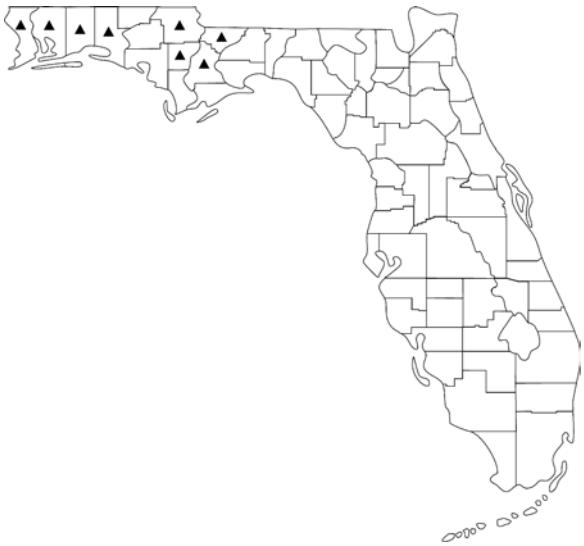
Fig. 4.5 cases, *Brachycentrus chelatus* (top)
Brachycentrus numerosus (bottom)
Photos courtesy of James C. (Skip) Hodges, Jr.

Species notes: There are four species of *Brachycentrus* known in Florida: *B. chelatus*, *B. lunatus, B. nigrosoma*, and *B. numerosus* (Maps 4.1–4.3). *Brachycentrus chelatus*, *B. lunatus*, and *B. numerosus* belong to the subgenus *Sphinctogaster*, a group that uniquely has 2 pairs of long submesal setae on the sternum of the first abdominal segment (Flint, 1984). Species of all other brachycentrid subgenera and genera have only one pair of long submesal setae on the sternum of the first abdominal segment. Larvae of *B. chelatus* have a uniformly dark brown or fuscous head, as compared to the banded (*B. lunatus*, *B. numerosus*) or spotted head of *B. nigrosoma. Brachycentus nigrosoma* (subgenus *Brachycentrus*) can be separated from all other *Brachycentrus* species by the presence of 2 major setae and fan-like arrays of shorter setae on the ventral margin of the mid- and hind femora (Fig. 4.6).

Brachycentrus species are sensitive, clean-water indicators restricted in Florida to healthy streams and rivers of the panhandle. Larvae of *Brachycentrus* attach the anterior end of the case to the substrate and extend the head and legs in a filtering posture to obtain food (Flint, 1984). Increases in sediment loads has been shown to negatively impact feeding efficiency and population levels of *Brachycentrus* (Mundahl and Mundahl, 2024). Adults in Florida have been taken during fall, winter and spring but are generally most abundant in early spring. For example, in mid-March, Donald Ray and colleagues netted numerous adults of *Brachycentrus chelatus* in the morning hours flying over the East Bay River in Okaloosa County.

Brachycentrus chelatus is the most widespread of the three species, extending across most of the Florida panhandle. *Brachycentrus numerosus* appears to be restricted to larger creeks and rivers (e.g., Yellow River) in the western portion of the panhandle. *Brachycentrus nigrosoma* is known in Florida only from larvae we collected from Crooked Creek, Gadsden County and adults we collected using a beating sheet in January along Sweetwater Creek, Liberty County. *Brachycentrus lunatus* is known in Florida based on a single adult male collected from Honey Creek, Eglin Air Force Base, Okaloosa County (Rasmussen et al., 2025). The species was previously thought to occur only from creeks and rivers of mountainous areas in North and South Carolina (Harrington and Morse, 2004).

Additional references: Ross (1944); Flint (1984); Wiggins (1996); Harrington and Morse (2004).



Map 4.1 *Brachycentrus chelatus* ▲

Map. 4.2 *Brachycentrus lunatus* ♦

Map 4.3 *Brachycentrus nigrosoma* ●
Brachycentrus numerosus ★

KEY TO SPECIES FOR LARVAE OF FLORIDA *BRACHYCENTRUS*

[adapted from Flint (1984) and Morse et al. (2017)]

1. Head with distinct pale yellow muscle scars (Fig. 4.5); mid- and hind femora with 2 major setae along ventral margin and fringe of fan-like arrays of shorter setae (Fig. 4.6) . . . . . *B. nigrosoma* (Banks)

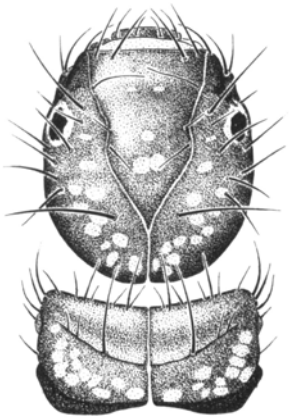


Fig. 4.5 [from Flint (1984)]

Fig. 4.6 [from Flint (1984)]

Head pattern without distinct pale yellow muscle scars (Figs 4.7, 4.9); mid- and hind femora with 1 major seta on ventral margin and fringe of short setae of uniform length (Figs 4.8, 4.10, 4.12) 2

2(1) Frontoclypeus uniformly brown or fuscous (Fig. 4.7); coloration of mid- and hind tarsi dark brown (Fig. 4.8) . . . . . *B. chelatus* Ross

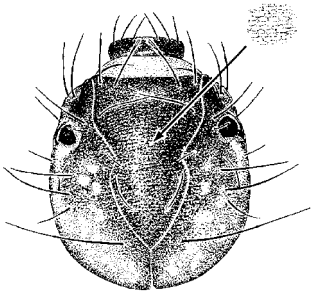


Fig. 4.7 [from Flint (1984)]

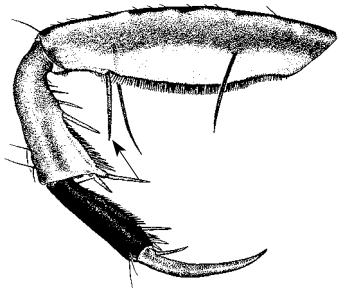


Fig. 4.8 [from Flint (1984)]

Frontoclypeus with pale bands anterolaterally (Figs 4.9, 4.11); coloration of mid- and hind tarsi dark brown or pale (Figs 4.10, 4.12) 3

3(2) Frontoclypeus with posterior cluster of pale muscle scars along midline (Fig. 4.9); mid- and hind tarsi pale (Fig. 4.10), femora generally pale, with dark dorsal and ventral margins . . . . . *B. numerosus* (Say)

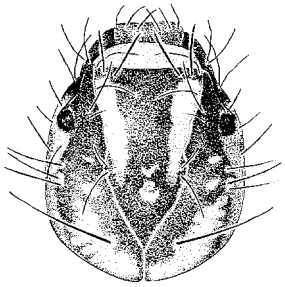


Fig. 4.9 [from Flint (1984)]

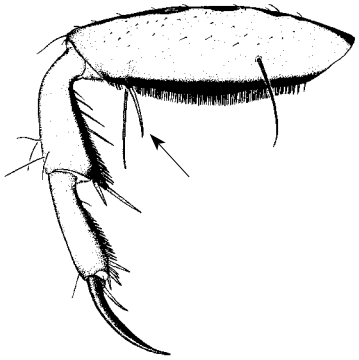


Fig. 4.10 [from Flint (1984)]

Frontoclypeus with single pale yellow spot posteriorly (Fig. 4.11); mid- and hind tarsi dark brown, femora with dorsal half brown (Fig. 4.12)
. . . . . *B. lunatus* Harrington and Morse

Fig. 4.11 [from Harrington and Morse (2004)]

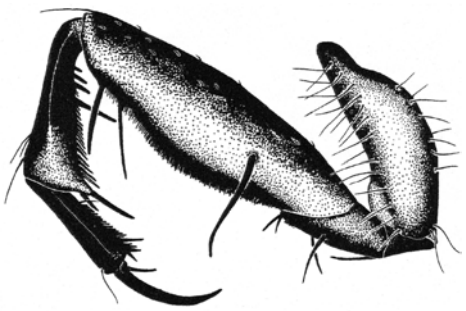


Fig. 4.12 [from Harrington and Morse (2004)]

Genus ***Micrasema*** MacLachlan

Diagnosis: Larvae of *Micrasema* (Fig. 4.13) are distinguished from *Brachycentrus* by the following: mid- and hind legs shorter, ventral margins of mid- and hind legs lacking specialized setal fringe (Fig. 4.3); and apex of each tibia unmodified but with one large seta (Fig. 4.3). Larval cases are cylindrical, either constructed of sand or small strips of plant material (Fig. 4.13), depending on the species.

Fig. 4.13 *Micrasema rusticum* (top), *Micrasema florida* (bottom)

Species notes: Three species of *Micrasema*, *M. florida*, *M. rusticum*, and *M. wataga* occur in Florida. All three species belong to the *M. rusticum* Group whose larvae have the mesonotal sclerite partially or completely divided into four plates. The larvae are easily separated by the pattern of muscle scars on the head, and the material and construction of their larval cases. *Micrasema rusticum* has a curved larval case constructed of sand, and a distinctly bold, regular pattern of muscle scars on the head. *Micrasema wataga* and *Micrasema florida* both have straight larval cases constructed of plant material, the latter, however, has more well-defined muscle scars on the head than the former.

Micrasema spp. mainly occur in cool spring-fed streams and rivers of northern Florida (Maps 4.4–4.6). Larvae are typically associated with aquatic plants including aquatic mosses, macroalgae, and vascular macrophytes. We have examined larvae of *Micrasema rusticum,* an uncommon species in Florida, collected from the Shoal River, Okaloosa Co. and the Econfina Creek, Bay Co. Additionally, we have collected adults from the Chipola River its tributaries (Denson et al., 2016). *Micrasema florida* is endemic to lower coastal plain Alabama and the far western Florida panhandle. The larva and adult of *Micrasema florida* were first described (as *Micrasema* n. sp.) in a dissertation by Chapin (1978) and later by Chapin and Morse (2013). The species is particularly abundant within the high-volume steephead springruns on Eglin Air Force Base. *Micrasema wataga* is widespread across northern Florida and appears to be the only *Micrasema* species to occur in peninsular Florida. Larvae can be found on aquatic plants (e.g., *Fontinalis*) and can be particularly abundant in river systems such as the Santa Fe having extensive beds of submerged macrophytes.

Additional references: Ross (1944); Wiggins (1965, 1996); Chapin (1978); Chapin and Morse (2013).

Map 4.4 *Micrasema florida* ▲

Map 4.5 *Micrasema rusticum* ●

Map 4.6 *Micrasema wataga* ★

KEY TO SPECIES FOR LARVAE OF FLORIDA *MICRASEMA*

[modified from Chapin (1978)]

1. Case constructed of sand (Fig. 4.14); head pale yellow to light brown, with bold, regular muscle scar pattern of dark spots (Fig. 4.15) . . . . . *M. rusticum* (Hagen)

Fig. 4.14 [from Chapin (1978)]

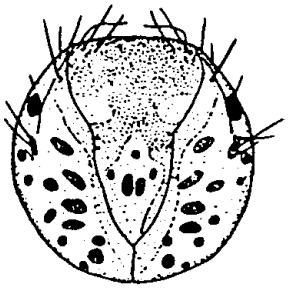


Fig. 4.15 [from Chapin (1978)]

Case constructed of strips of plant materials wound around the circumference (Fig. 4.16); head lacking pattern of bold, regular muscle scars, if evident, these appearing as indistinct blotches or rings or light brown spots (Figs 4.17, 4.18) 2

Fig. 4.16 [from Chapin (1978)]

2(1) Head pattern with very irregular or mottled appearance (Fig. 4.17), head sometimes darker with mottling difficult to see . . . . . *M. wataga* Ross

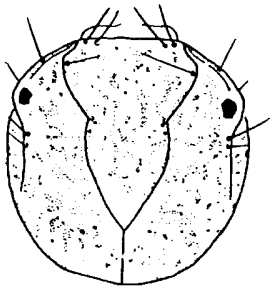


Fig. 4.17 [from Chapin (1978)]

Head pale yellow with posterior light brown muscle scars (Fig. 4.18)
. . . . . *M. florida* Chapin & Morse

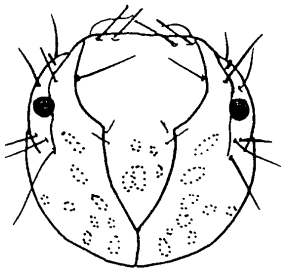


Fig. 4.18 [from Chapin (1978)]

FAMILY CALAMOCERATIDAE

(*comb-lipped caddisflies*)

The family Calamoceratidae includes three North America genera of which *Anisocentropus* (1 sp.) and *Heteroplectron* (1 sp.) are found in Florida. Larvae are morphologically recognized by a prominent midtransverse row of approximately 16 long setae on the labrum (Fig. 2.42). Larvae of both Florida genera are shredders, feeding upon decomposing vascular plant tissue (Unzicker et al., 1982). *Anisocentropus* larvae construct relatively flat cases of two fastened and overlapping leaf pieces (Fig. 5.2). *Heteroplectron* use twigs which are hollowed out and lined with silk for their cases (Fig. 5.4).

KEY TO THE GENERA AND SPECIES FOR LARVAE OF FLORIDA CALAMOCERATIDAE

[modified from Morse et al. (2019b)]

1. Anterolateral corners of pronotum each extended into prominent projection (Fig. 5.1); gills branched; larval case consists of two leaf pieces, larger dorsal piece overlapping smaller ventral one (Figs 5.2, 5.6) . . . . . *Anisocentropus*, *A. pyraloides* (Walker)

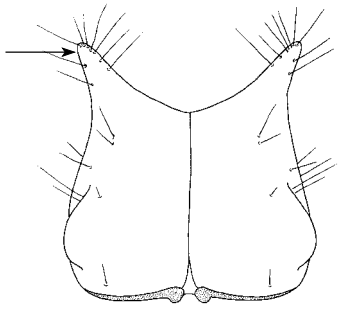


Fig. 5.1

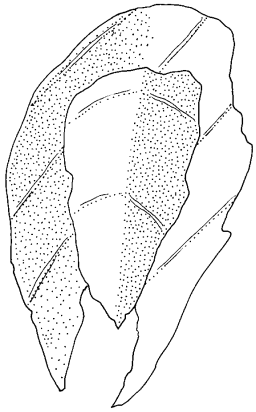


Fig. 5.2

Anterolateral corners of pronotum somewhat extended, but much less than above (Fig. 5.3); gill filaments single; larval case a hollowed twig (Figs 5.4, 5.8)
. . . . . *Heteroplectron*, *H. americanum* (Walker)

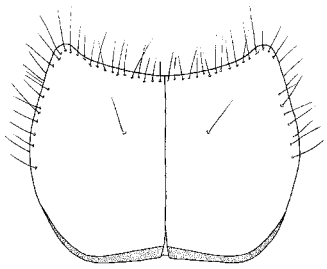


Fig. 5.3

Fig. 5.4

Genus ***Anisocentropus*** (MacLachlan)

Diagnosis: Larvae of *Anisocentropus* (Fig. 5.5) are characterized as follows: anterolateral corners of pronotum each produced into prominent projection (Fig. 5.1); and abdominal gill filaments branched. The larval case is constructed from 2 ovately cut leaf pieces with a larger dorsal piece fastened to smaller ventral piece (Figs 5.2, 5.6).

Fig. 5.5 *Anisocentropus pyraloides*

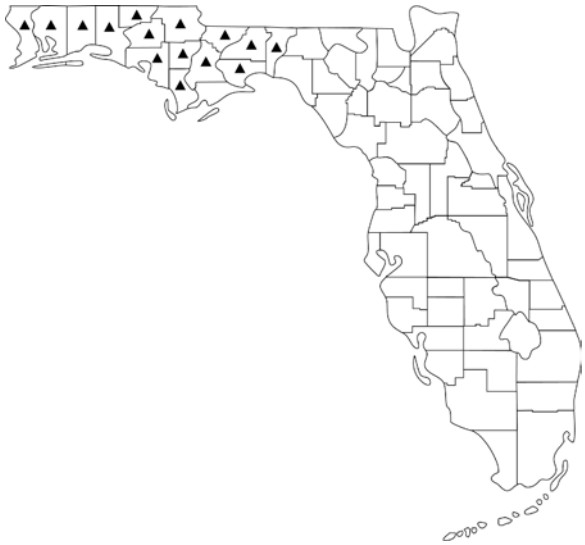
Fig. 5.6 *Anisocentropus pyraloides* case, ventral
Photo courtesy of James C. (Skip) Hodges Jr.

Species notes: Larvae are easily recognized by their distinctive cases and dorsoventrally flattened body form, spindly hind legs that are twice as long as the middle legs, and abdomen that is laterally fringed with dense setae. The head and thorax are yellowish brown.

Anisocentropus contains only a single species in North America (*A. pyraloides*). It is primarily restricted in distribution to the southeastern United States. Within the Florida panhandle, *A. pyraloides* occurs commonly in sand-bottomed streams flowing through intact deciduous forest.

Wallace and Sherberger (1970) observed the species to have multi-cohort populations, with early- and last-instar larvae occurring in both late winter and early spring in southern Georgia. Our collection records and results from emergence trapping in Florida also suggest a multi-cohort life history as indicated by nearly year round emergence and presence of a mixture of larval size-classes throughout the year. We have found that the larvae are commonly associated with trapped debris, snags and exposed roots where the stream undercuts the bank. Adults are day-active and can easily be seen when flying and ovipositing near larval habitats.

Additional references: Wallace and Sherberger (1970); Wiggins (1996).



Map 5.1 *Anisocentropus pyraloides* ▲

Genus ***Heteroplectron*** (MacLachlan)

Diagnosis: Larvae of *Heteroplectron* (Fig. 5.7) differ from *Anisocentropus* as follows: anterolateral corners of pronotum not extended into prominent projections (Fig. 5.3); and abdominal gills single. The larval case consists of a hollowed-out twig lined with silk (Figs 5.4, 5.8).

Fig. 5.7 *Heteroplectron americanum*

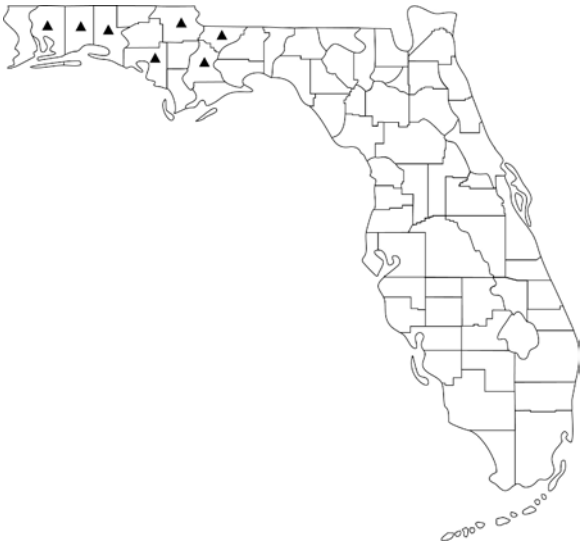
Fig. 5.8 *Heteroplectron americanum* cases
Photos courtesy of James C. (Skip) Hodges, Jr.

Species notes: Larvae of *Heteroplectron* differ greatly in general appearance from *Anisocentropus*. The abdomen of *Heteroplectron* is cylindrical and lacks the lateral fringe of dense setae of *Anisocentropus*. The head and thoracic sclerites are dark brown, and the hind and middle legs are subequal in length.

Heteroplectron contains two species (*H. americanum* and *H. californicum*), of which only *H. americanum* is known from Florida. *Heteroplectron americanum*, once thought to occur only as far south as the Appalachians of Georgia and Alabama, has been found in cool-water refugia in western panhandle counties (Map 5.2), primarily in spring-fed ravine streams. We have collected both larvae and adults from steephead ravines on Eglin Air Force Base, as well as from the Apalachicola Bluffs and Ravines region. Larvae of *H. americanum* are difficult to detect in the field because their hollow twig case provides excellent camouflage. On several occasions we have found the larvae of *H. americanum* using the cases of *Psilotreta frontalis* instead of the usual hollowed out twig case.

The life history of *H. americanum* in the Southeast has not been studied. However, a life history study of *H. americanum* from a coastal plain stream in Delaware by Patterson and Vannote (1979), established that *H. americanum* is univoltine and has a single population cohort.

Additional references: Wiggins (1996).



Map 5.2 *Heteroplectron americanum* ▲

FAMILY DIPSEUDOPSIDAE

(*pitot-tube caddisflies*)

Of the five dipseudopsid genera presently recognized worldwide, only the genus *Phylocentropus* is represented in the Nearctic Region; species are mostly found in eastern North America, with three species known from Florida. The dipseudopsid larvae are morphologically recognized by the flat tarsi which are broader than the tibiae (Fig. 2.33), the long tip of the labium (Fig. 2.33), and the short and basally broad mandibles, each with a thick mesal brush. These modifications of the legs and mandibles are adaptations to life in sand tubes which are buried deeply into sandy substrate and project a short distance up into the current of the stream (Ross and Gibbs, 1973; Wallace et al., 1976).

Genus ***Phylocentropus*** Banks

Diagnosis: Larvae of *Phylocentropus* (Fig. 6.1) are characterized as follows: broad and densely pilose tarsi (Fig. 2.33); and mandibles short and triangular with thick mesal brush. The larvae construct bi- and multibranched tubes of fine sand glued together with silk and buried into the substrate (Fig. 6.2).

Fig. 6.1 *Phylocentropus* sp.

Fig. 6.2 *Phylocentropus* sp. sand tube retreat

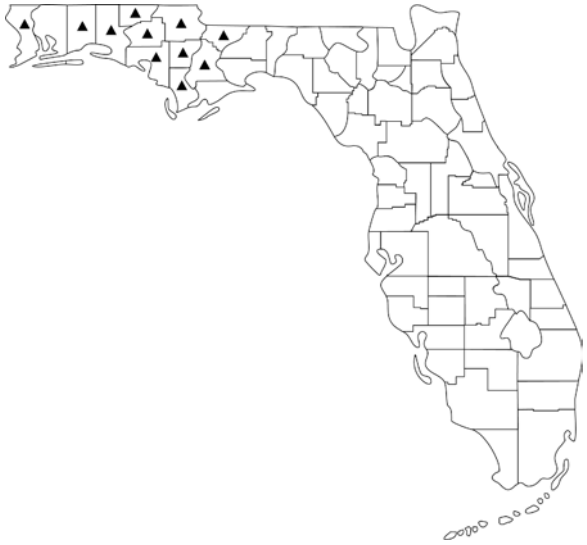
Species notes: Of the five presently recognized Nearctic species of *Phylocentropus*, three are represented in Florida (Maps 6.1–6.3), *P. carolinus*, *P. lucidus*, and *P. placidus.* One other species, *P. harrisi*, occurs in lower coastal plain streams of Alabama, and could possibly be found in the state (Harris and O'Neil, 2015).

Descriptions and a key to adults of all five species were provided by Schuster and Hamilton (1984). The paper by Sturkie and Morse (1998) provides larval descriptions and a key (presented below) to the three species known to occur in Florida. The larva of *P. harrisi* remains undescribed. Larvae of the three Florida species are separated based on a combination of body length, head coloration pattern, and number of spines on the hind tibia. Detecting and differentiating the spines and long hairs on the hind tibia requires close examination and is best done after removing the leg so that it can be more easily observed from all sides. Even then, we have found it to be difficult to identify larvae to species level with confidence using the Sturkie and Morse key; we recommend that larval identifications be corroborated with adult identifications when possible.

Phylocentropus placidus is widespread throughout the Florida panhandle and northern part of the peninsula. We have collected adults from a wide variety of streams and rivers. *Phylocentropus*

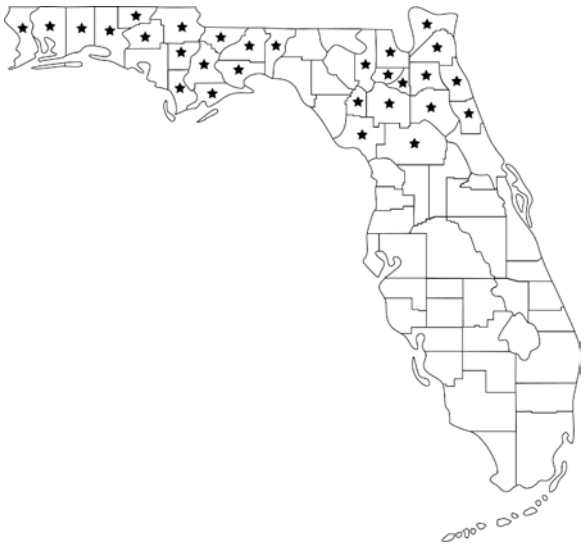
lucidus appears to be restricted in Florida to headwater seepage streams in the middle part of the panhandle. *Phylocentropus carolinus* is more widespread across the panhandle and tends to occur in higher order streams. Larvae of *Phylocentropus* are often detectable in the field along stream margins where their sand tubes (Fig. 6.2) can be seen projecting from sandy substrates.

Additional references: Ross (1944); Wells and Cartwright (1993); Wiggins (1996); Sturkie and Morse (1998).



Map 6.1 *Phylocentropus carolinus* ▲

Map 6.2 *Phylocentropus lucidus* ●



Map 6.3 *Phylocentropus placidus* ★

KEY TO SPECIES FOR LARVAE OF FLORIDA *PHYLOCENTROPUS*

[from Sturkie and Morse (1998)]

1. Head light yellowish brown, with posterior region of frontoclypeus darkened (Fig. 6.3); hind tibiae each with 2 stout spines and 3 long hairs (Fig. 6.4); body length of last instar 15–20 mm . . . . . *P. carolinus* Carpenter

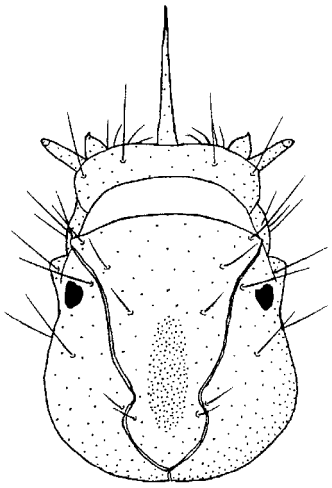


Fig. 6.3 *Phylocentropus carolinus*
[from Sturkey and Morse (1998)]

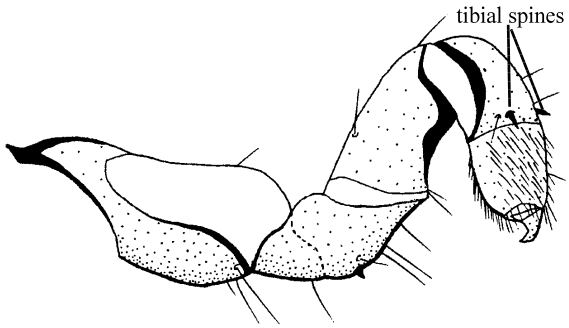


Fig. 6.4 *Phylocentropus carolinus*, right hind leg, caudal view
[from Sturkey and Morse (1998)]

Head uniformly brown with light spots, posterior region of frontoclypeus not darkened (Figs. 6.5, 6.6); hind tibiae each with 2 stout spines (Fig. 6.7) or 3 stout spines (Fig. 6.8); body length of last instar variable 2

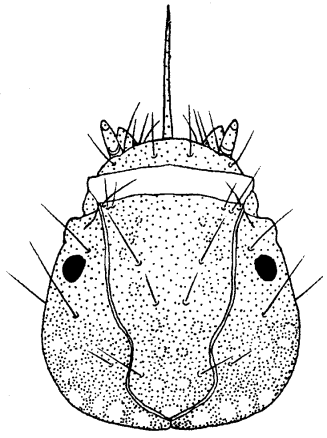


Fig. 6.5 *Phylocentropus lucidus*
[from Sturkie and Morse (1998)]

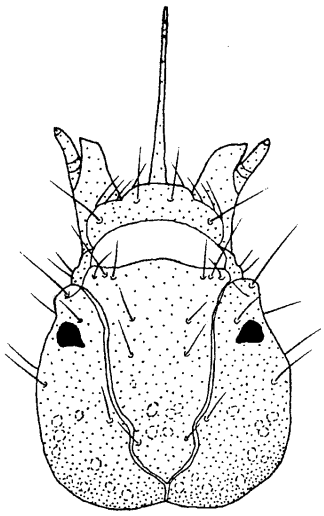


Fig. 6.6 *Phylocentropus placidus*
[from Sturkie and Morse (1998)]

2(1) Hind tibiae each with 2 stout spines (Fig. 6.7); body length no more than 15 mm . . . . . *P. lucidus* (Hagen)

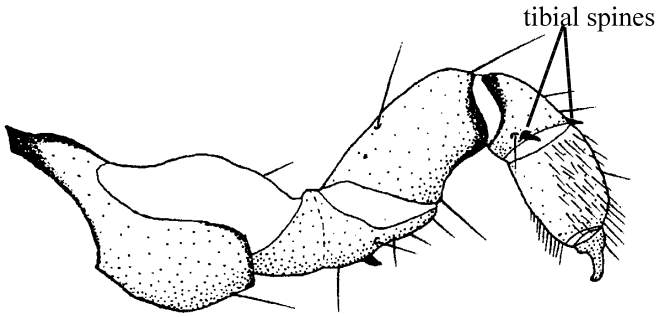


Fig. 6.7 *Phylocentropus lucidus*, right hind leg, caudal view [from Sturkie and Morse (1998)]

Hind tibiae each with 3 stout spines (Fig. 6.8); body length of last instar 15–19 mm . . . . . *P. placidus* Banks

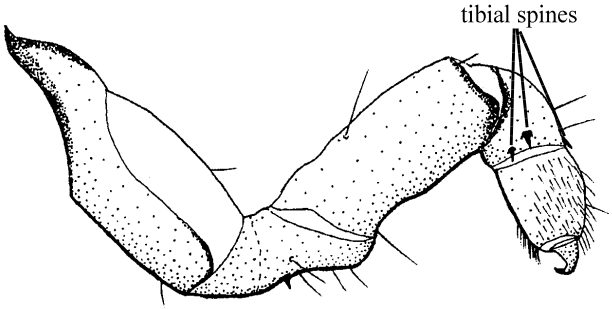


Fig. 6.8 *Phylocentropus placidus*, right hind leg, caudal view [from Sturkie and Morse (1998)]

FAMILY GLOSSOSOMATIDAE

(*saddle-case caddisflies*)

Protoptila is the only glossosomatid genus known in Florida. However, *Glossosoma nigrior* has been documented from spring-fed streams in the Buhrstone Hills of coastal plain Alabama in Clarke County (Harris et al., 1991), so it is possible that undetected populations of this species also occur in the western Florida panhandle. Glossosomatid larvae are distinguished by the distal half of the anal prolegs extended from the abdomen (Fig. 7.1), presence of anal claws with at least one dorsal accessory hook (Fig. 2.23), and the unique tortoise-like case constructed of small stones (Fig. 2.25).

Genus ***Protoptila*** Banks

Diagnosis: Larvae of *Protoptila* (Fig. 7.1) are tiny (≤ 4 mm) caddisflies characterized as follows: mesonotum with three sclerites, often barely visible, (Fig. 2.14); tarsal claws each with long, thin seta arising from side of stout process at base of claw (Fig. 7.2); and larval case made of relatively large stones (Fig. 7.1).

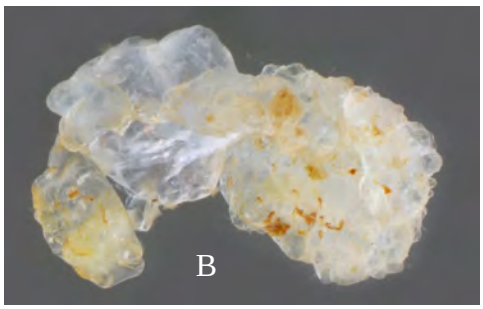


Fig. 7.1 *Protoptila chipolensis*, A) larva; B) case, lateral view
Photos courtesy of J.C. Morse & M.L. Ferro
Note: The case shown has had its ventral strap removed.

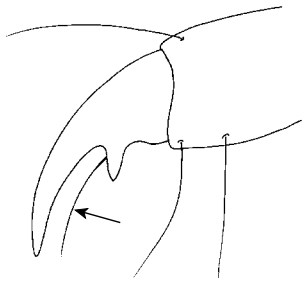


Fig. 7.2

Species notes: This New World genus has 14 species described from the United States and Canada. In Florida, *Protoptila* is known from only a three county area in the middle part of the panhandle (Maps 7.1, 7.2). Based on adult collections, the fauna comprises three species: *Protoptila chipolensis*, *P. palina*, and *Protoptila* n. sp. (Rasmussen et al., 2025). *Protoptila chipolensis* is endemic to and abundant within the Chipola River system in Jackson and Calhoun Counties (Denson et al., 2016), whereas *P. palina* is known based only on a single collection record from Holmes Creek and the undesribed *Protoptila* species is known only from Econfina Creek in Washington County (Rasmussen et al., 2025). Larvae presumed to be *P. chipolensis* collected from the Chipola River were associated with limestone outcroppings and were collected from the same locality as the larvae of *Setodes*. *Protoptila* are very small, length only up to about 4 mm. Of the *Protoptila* species found in the Southeastern US, only the larva of *P. maculata* (Hagen) has been described (Ross, 1944).

Additional references: Wiggins (1996).

Map 7.1 *Protoptila chipolensis* ▲
Protoptila palina ●

Map 7.2 *Protoptila* n. sp. ★

FAMILY HELICOPSYCHIDAE

(*snail-case caddisflies*)

The family Helicopsychidae is represented in North America by the geographically widespread genus *Helicopsyche.* Larvae are morphologically recognized by the comb-shaped anal claw (Fig. 2.2). Unique to the group is the heliciform, snail-like, larval case which is constructed of sand grains (Figs 2.1, 8.1).

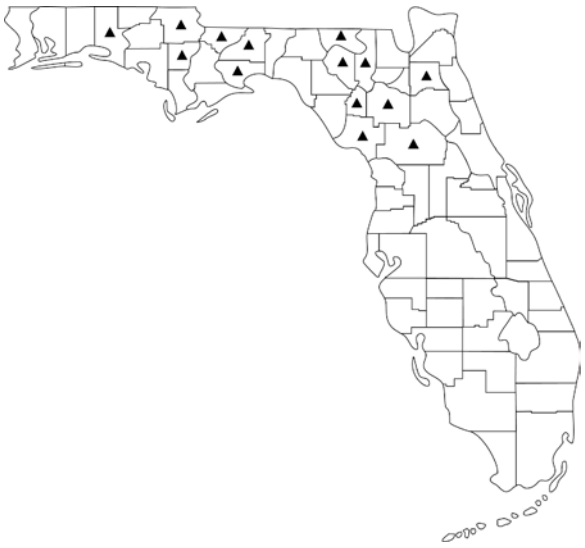
Genus ***Helicopsyche*** von Siebold

Diagnosis: Larvae of *Helicopsyche* (Fig. 8.2) are small (< 8 mm in length) and readily distinguished from all other North American caddisfly genera by the spiral, snail-like case (Fig. 8.1) and comb-like structure of the anal claws (Fig. 2.2).

Fig. 8.1 *Helicopsyche borealis* larval case
Photo courtesy of David Almquist

Fig. 8.2 *Helicopsyche borealis*
CUAC000088834
Photo courtesy of J.C. Morse & M.L. Ferro

Species notes: Of the seven species of *Helicopsyche* recorded from the United States, only *H. borealis* occurs in Florida. Although widespread across North American, *H. borealis* is restricted in Florida to the northern half of the state (Map 8.1) where it occurs primarily in calcareous systems such as the Chipola, Santa Fe, Suwannee, and St. Marks rivers. We have collected this species on the peninsula as far south as Juniper Creek and the Rainbow River in Marion County. Johanson (2002) revised adults of North American *Helicopsyche* and noted differences in *H. borealis* specimens from Florida, which raises the question as to whether the Florida populations represent a distinct species. A question which should be addressed, in part, through DNA analysis of specimens from across its geographic range. Larvae graze on periphyton, with the case providing protective cover from potential predators. Bishoff et al. (2023) suggested the larvae also use their case to adhere to hard substrates, as do snails, as a defensive behavior (cathaptosis).



Map 8.1 *Helicopsyche borealis* ▲

Additional references: Ross (1944); Wiggins (1996).

FAMILY HYDROPSYCHIDAE

The highly diverse hydrosychid caddisflies are represented in Florida by the genera *Cheumatopsyche* (10 spp.), *Diplectrona* (1 sp.), *Hydropsyche* (7 spp.), *Macrostemum* (1 sp.), and *Potamyia* (1 sp.). The heavily sclerotized plate of each thoracic notum, conspicuously branched ventral abdominal gills, and prominent tuft of long setae at the base of each anal claw (Fig. 2.6) easily separate the Hydropsychidae from the other caddisfly families. Note: first instar hydropsychids do not have gills. The larvae typically construct a fixed retreat where they live and spin a net for capturing food (Fig. 2.7). Larvae are mostly lotic dwellers and are quite common in streams and rivers of various sizes. Some larvae also live in lentic habitats, particularly along the wave-swept shores of lakes and impoundments, and lotic-depositional habitats as well.

KEY TO GENERA FOR LARVAE OF FLORIDA HYDROPSYCHIDAE

[modified from Morse et al. (2019b)]

1. Posterior ventral apotome at least one-half as long as median ecdysial line (Figs 9.1, 9.16) . . . . . (Subfamily Diplectroninae), *Diplectrona modesta* Banks

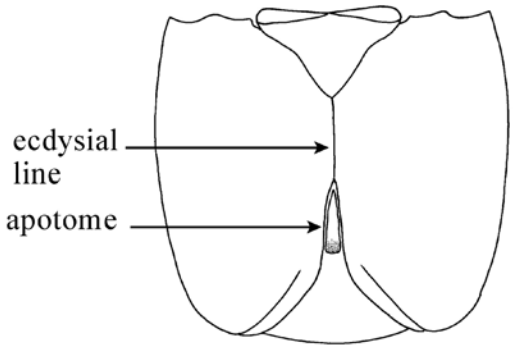


Fig. 9.1

Posterior ventral apotome much less than one-half as long as median ecdysial line or inconspicuous (Fig. 9.2) 2

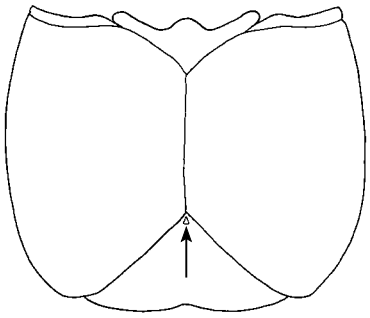


Fig. 9.2

2(1) Abdominal gills with up to 40 filaments arising fairly uniformly along central stalk (Fig. 9.3); foretrochantin never forked (Fig. 9.4); dorsum of head flattened and margined with sharp carina (Fig. 9.45)
. . . . . (Subfamily Macronematinae), *Macrostemum, M. carolina* (Banks)

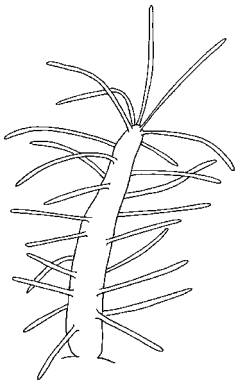


Fig. 9.3

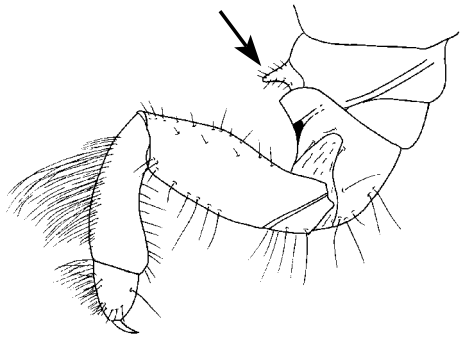


Fig. 9.4

Abdominal gills with up to 10 filaments arising mostly near apex of central stalk (Fig. 9.5); foretrochantin usually forked (Fig. 9.6); dorsum of head not as above
. . . . . (Subfamily Hydropsychinae)...3

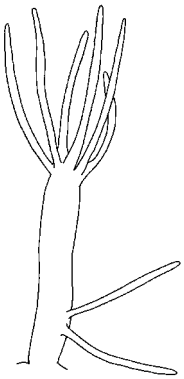


Fig. 9.5

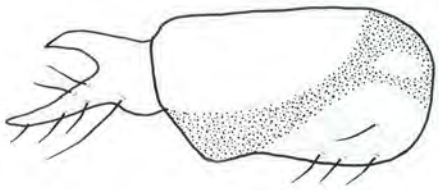


Fig. 9.6

3(2) Prosternum with a pair of large sclerites in intersegmental fold posterior to prosternal plate (Fig. 9.7); anterior margin of frontoclypeus entire (Fig. 9.8)
. . . . . *Hydropsyche* (p. 9-11)

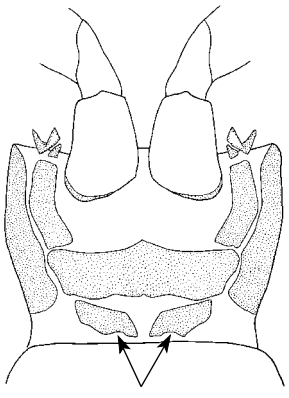


Fig. 9.7

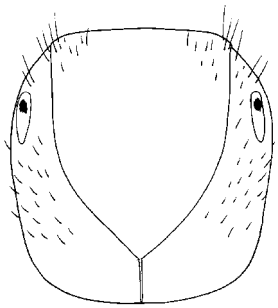


Fig. 9.8

Prosternum with 2 very small sclerites posterior to prosternal plate (Fig. 9.9); anterior margin of frontoclypeus usually with median notch (Fig. 9.10) 4

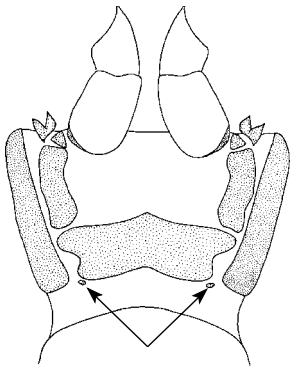


Fig. 9.9

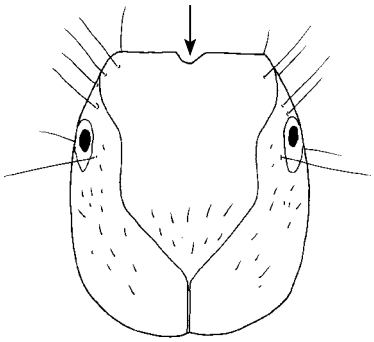


Fig. 9.10

4(3) Anterior ventral apotome of head with prominent anteromedian projection (Fig. 9.11); posterior margin of each sclerite on abdominal sternum IX entire (Fig. 9.12); lateral border of each mandible flanged (Fig. 9.13); foretrochantin forked or not . . . . . *Potamyia*, *P. flava* (Hagen)

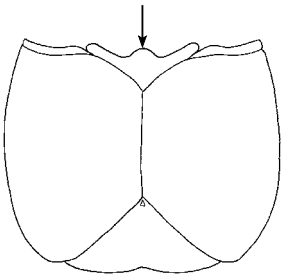


Fig. 9.11

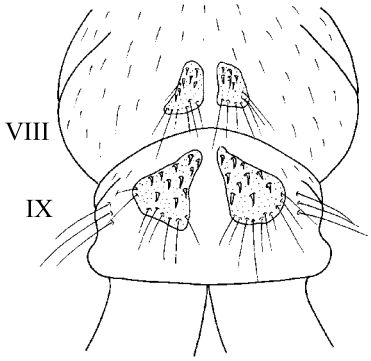


Fig. 9.12

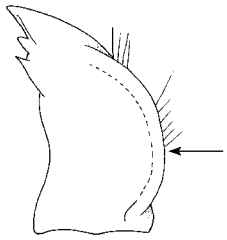


Fig. 9.13

Anterior ventral apotome without anteromedian projection; posterior margin of each sclerite on abdominal sternum IX notched (Fig. 9.14); mandible not flanged (Fig. 9.15); fore trochantin forked (Fig. 9.6) . . . . . *Cheumatopsyche*

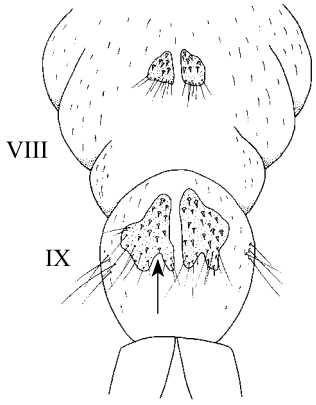


Fig. 9.14

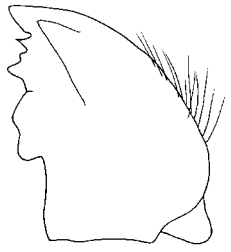


Fig. 9.15

Genus ***Cheumatopsyche*** Wallengren

Diagnosis: Larvae of *Cheumatopsyche* (Fig. 9.16) are distinguished from other hydropsychid genera by the following combination of characters: absence of anteromedian projection on anterior ventral apotome of head; notched posterior margin of each sclerite on abdominal sternum IX (Fig. 9.14); inconspicuous posterior ventral apotome (Fig. 9.2); tiny posterior sclerites on prosternum (Fig. 9.9); and forked foretrochantins. *Cheumatopsyche* larvae are generally smaller than *Hydropsyche* and tend to have uniformly dark heads, unlike the contrasting head color patterns of many *Hydropsyche* species. Most, but not all, *Cheumatopsyche* species have the frontoclypeus with a crenulated and notched anterior margin (Fig. 9.10).

Fig. 9.16 *Cheumatopsyche* probably *virginica*

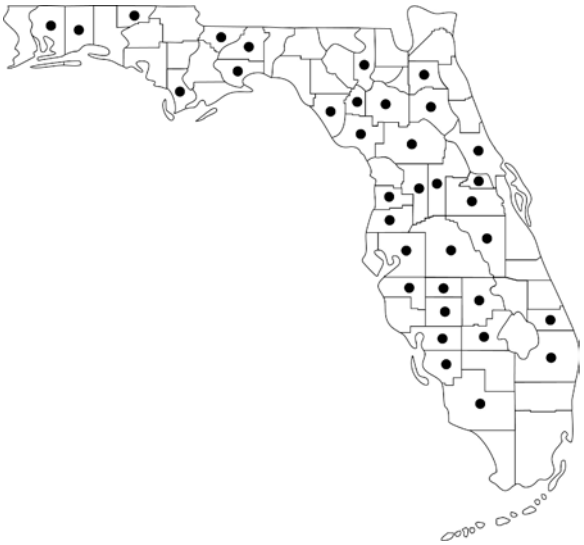
Species notes: *Cheumatopsyche* spp. are commonly encountered and often the most abundant caddisfly collected in streams and rivers of Florida, as well as the Southeast. The genus is not only geographically widespread in the state, but the larvae are found in a wide variety of habitats, ranging from small streams to large rivers, and pristine to seriously damaged systems. Although *Cheumatopsyche* is generally considered a pollution-tolerant group, the various species likely have different levels of tolerance to contamination.

Based solely on adult records, there are ten *Cheumatopsyche* species reported in Florida (Maps 9.1–9.8). Three other species, *C. geora*, *C. oxa*, and *C. sordida*, likely occur in the state. Harris et al. (1991) reported *C. geora* and *C. sordida* from streams and rivers near the Alabama-Florida state line, and *C. oxa* was identified based on DNA barcode data from samples collected within the Ochlockonee River Basin in Georgia (Morain and Rasmussen, unpublished). The Florida fauna includes species with wide geographic distributions, as well as a narrow-range endemic, *C. petersi*, that is restricted to parts of the western Florida panhandle and the lower coastal plain of Alabama and Mississippi.

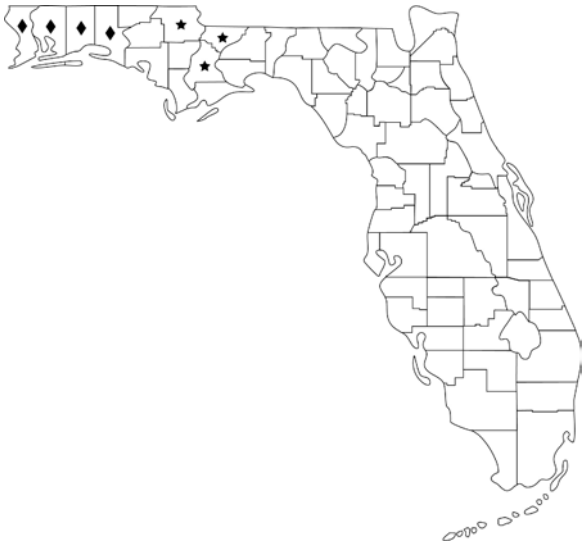
Unfortunately, identification of *Cheumatopsyche* to species level is not currently possible due to the lack of larval descriptions and diagnostic characters for most species. A key to larval morphotypes, with probable species associations, was presented by Morse et al. (2017) based on the thesis by Burington (2011). This research revealed that the presence/absence and shape of the frontoclypeal notch are useful for separating *Cheumatopsyche* into species groups. Florida species without a frontoclypeal notch (notchless) are *C. miniscula* and *C. virginica* (both members of the Sordida Group). Larvae we have examined from peninsular Florida that are notchless and with long hairs arising on the dorsum of the head and pronotum are probably *C. virginica* (Fig. 9.16). This species identification is supported by geographically-associated identifications of adults.

Additional references: Ross (1944); Wiggins (1996); Burington (2011); Morse et al. (2017).

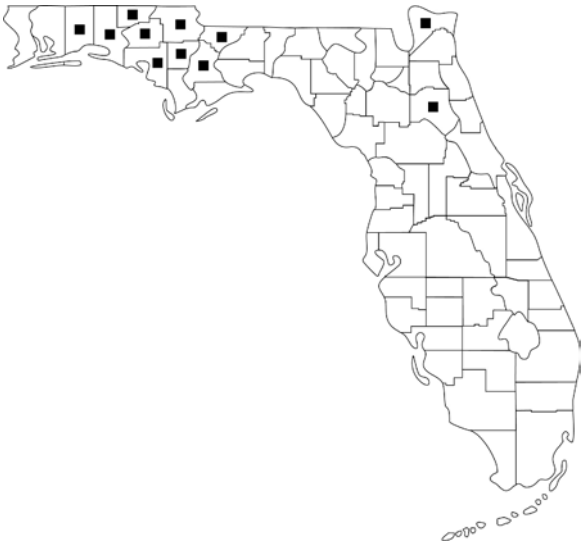
Map 9.1 *Cheumatopsyche analis* ▲



Map 9.2 *Cheumatopsyche burksi* ●

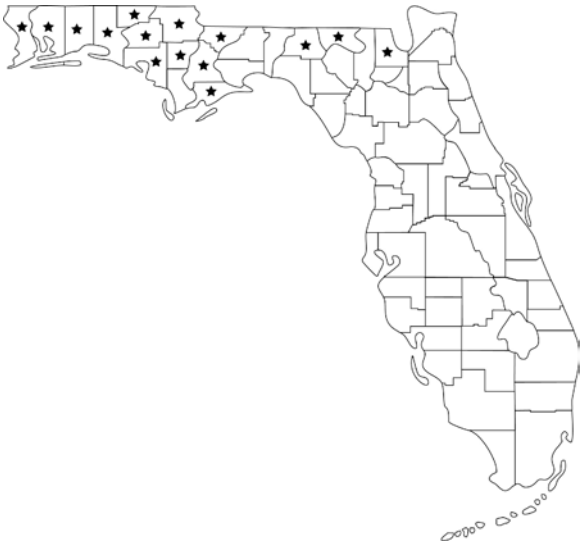


Map 9.3 *Cheumatopsyche campyla* ★
Cheumatopsyche petersi ♦

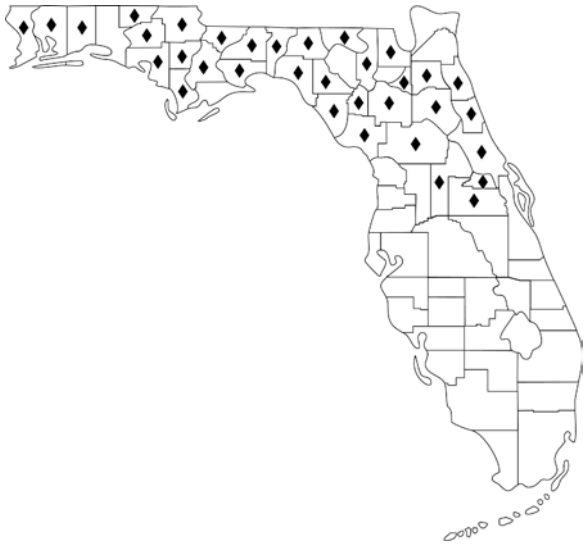


Map 9.4 *Cheumatopsyche edista* ■

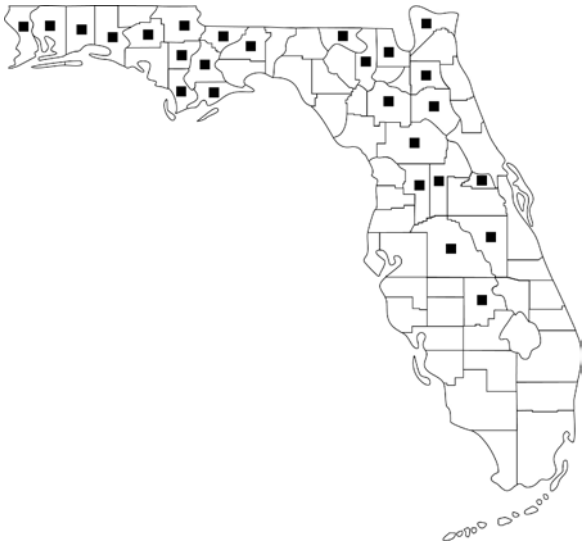
Map 9.5 *Cheumatopsyche gordonae* ▲
Cheumatopsyche miniscula ●



Map 9.6 *Cheumatopsyche pasella* ★



Map 9.7 *Cheumatopsyche pinaca* ♦



Map 9.8 *Cheumatopsyche virginica* ■

Genus ***Diplectrona*** Westwood

Diagnosis: Larvae of *Diplectrona* (Fig. 9.17) are distinguished from other Florida hydropsychid genera as follows: length of posterior ventral apotome at least one-half of median ecdysial line (Fig. 9.18). Larvae of *Diplectrona* are distinguished from the Diplectroninae genus *Homoplectra* by the lack of a transverse sulcus on the pronotum. The broad lateral angles near the midlength of the frontoclypeus (Fig. 9.19) are characteristic of *D. modesta*, as well as other species of this subfamily.

Fig. 9.17 *Diplectrona modesta*

Fig. 9.18 *Diplectrona modesta*

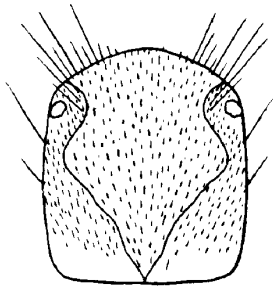
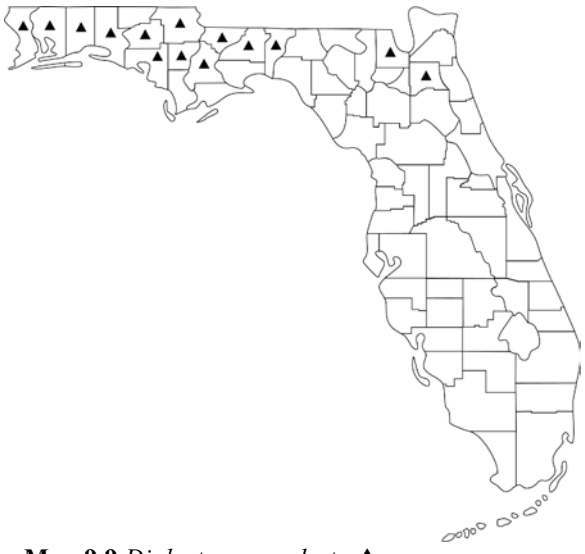


Fig. 9.19 *Diplectrona modesta* [from Ross (1944)]

Species notes: Five nominal species of *Diplectrona* are known in North America north of Mexico but of these, only the widespread eastern species *D. modesta* occurs in Florida (Map 9.9). Within eastern North America, *D. modesta* is represented by several genetically distinct larval morphotypes believed to represent cryptic species that remain undescribed due to the lack of distinguishing adult morphological characters (Harvey et al., 2012). Within Florida, *D. modesta* may also consist of more than one species. For example, a larval form with distinctive light-colored spots on the frontoclypeus was reported by Rasmussen (2004) within the steephead ravine in Gold Head Branch State Park (Clay County).

Diplectrona modesta is a specialist of spring-fed headwater streams and is abundant in ravine springruns within the Florida panhandle where it is typically the dominant hydropsychid. The filter-feeding larvae are commonly associated with areas of leaf accumulation in debris dams. It is univoltine in Florida, as well as across other parts of its range (Cushman et al., 1977; Benke and Wallace 1980). Results of an emergence study reported by Rasmussen (2004) showed that a population of *D. modesta* from a headwater stream in the central part of the western panhandle emerged throughout the year, exhibiting an emergence peak in the spring and a secondary peak in the fall.



Map 9.9 *Diplectrona modesta* ▲

Additional references: Ross (1944); Morse and Barr (1990); Wiggins (1996); Reeves and Paysen (1999); Harvey et al. (2012); Morse et al. (2017).

Genus ***Hydropsyche*** Pictet

Diagnosis: Larvae of *Hydropsyche* (Fig. 9.20) are distinguished from other hydropsychid genera by the pair of large sclerites in the intersegmental fold posterior to the prosternal plate (Fig. 9.7).

Fig. 9.20 *Hydropsyche simulans*

Species notes: As with *Cheumatopsyche*, *Hydropsyche* spp. are geographically widespread in Florida and occur in a wide variety of lotic habitats from relatively clean to heavily contaminated systems. Eight species of *Hydropsyche* are reported in Florida (Maps 9.10–9.16), and one more, *H. venularis*, is likely to occur in the state based on collection records from the lower coastal plain in Alabama (Harris et al., 1991).

The species checklist (p. 23-1) and key presented below follow the generic classification presented by Geraci et al. (2010) in which the genus *Hydropsyche* includes species previously placed within the genera *Symphitopsyche* and *Ceratopsyche*. Additionally, we are following the synonymies proposed by Korecki (2006) in which *H. alvata*, *H. bidens*, and *H. orris* were synonymized with *H. incommoda*, and *H. rossi* was synonymized with *H. simulans*. Of note, these synonymies are debateable and we recommend also consulting the *Hydropsyche* key presented by Morse et al. (2017) when attempting to identify these taxa. The species key that follows was adapted primarily from the key by Schuster and Etnier (1978). Larval collections of *Hydropsyche* from Florida were examined and photographs were taken by Rick Abad (FDEP) to replace existing line drawings. While the new Florida key is not perfect, we believe it represents a step in the right direction for confidently identifying *Hydropsyche* of Florida to species level.

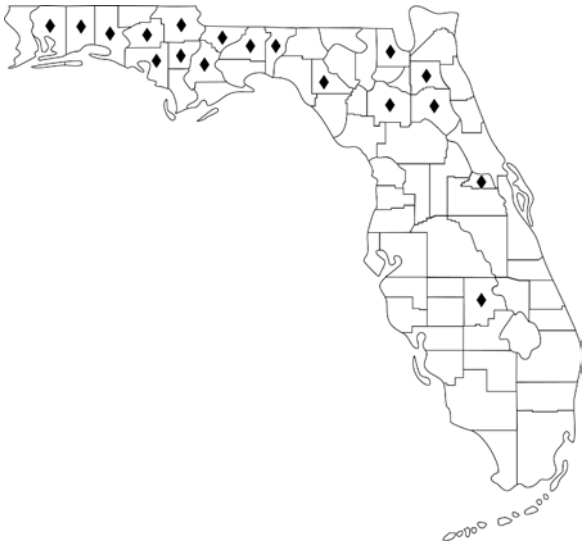
Based on the adult and larval specimens that we have examined, it appears that *H. decalda* and *H. simulans,* are the most common and widespread species of *Hydropsyche* in the state. *Hydropsyche alabama* is known only from southeastern Alabama and the Chipola River basin in the central panhandle of Florida. The larva of *H. alabama* has yet to be described but we have included it in the larval key based on the distinctive larva that we have geographically associated with adult collections. *Hydropsyche sparna* is only known in Florida from Brushy Creek, Escambia Co, in the western panhandle. *Hydropsyche betteni* is considered to be relatively pollution tolerant and has been recorded from streams in the central region of the panhandle, while *Hydropsyche elissoma* is primarily found in unpolluted spring-fed sandhill streams across parts of northern Florida. *Hydropsyche incommoda* and *H. mississippiensis* have been collected primarily from larger streams and rivers of the panhandle and parts of the peninsula.

Numerous studies on the ecology and general biology of *Hydropsyche* have been conducted (e.g., Gordon and Wallace, 1975; Wallace, 1975; Wallace et al. , 1977; Merritt and Wallace, 1981), but none have been from Florida. *Hydropsyche* larvae (e.g., *H. betteni*) feed primarily on fine particles collected in their nets, primarily animal remains and diatoms (Fuller and Mackay, 1981). A more recent study of *Hydropsyche* spp., including *H. betteni* and *H. sparna*, has indicated the importance of microhabitat flow on larval distribution (Osborne and Herricks, 1987). Furthermore, experimental evidence has shown that sympatric hydropsychid species alter near bed flows through their retreat construction in such a way that facilitates filtering success among species (Cardinale et al., 2002). This is strong evidence as to the importance of hydropsychid species diversity in the removal of suspended particles and overall ecosystem functioning of lotic systems.

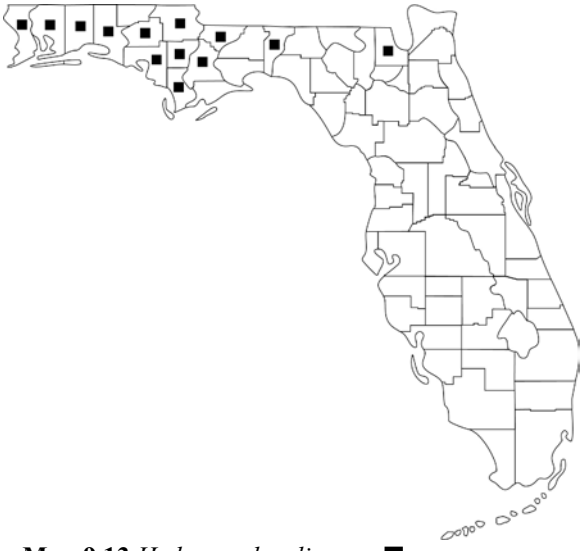
Additional references: Ross (1944); Schuster and Etnier (1978); Flint, Voshell, and Parker (1979); Schefter and Wiggins (1986); Wiggins (1996).

Map 9.10 *Hydropsyche alabama* ▲
Hydropsyche sparna ●

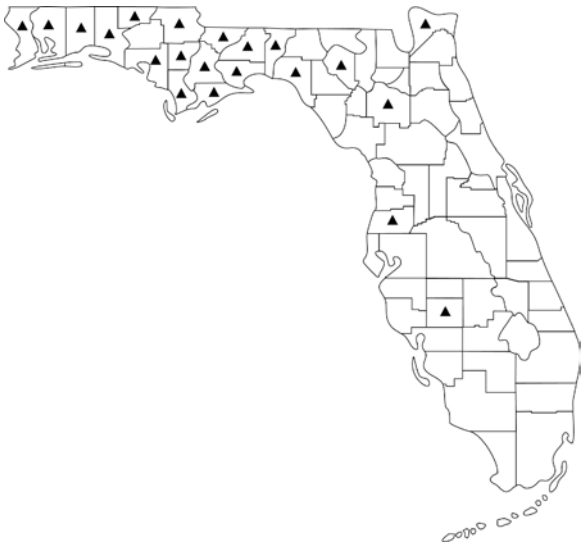
Map 9.11 *Hydropsyche betteni* ★



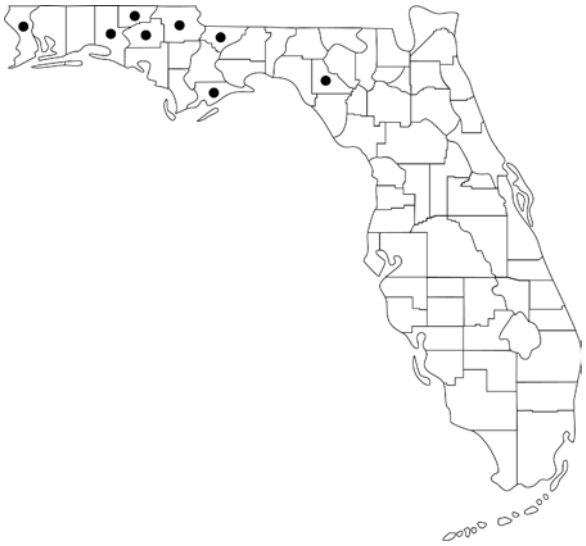
Map 9.12 *Hydropsyche decalda* ♦



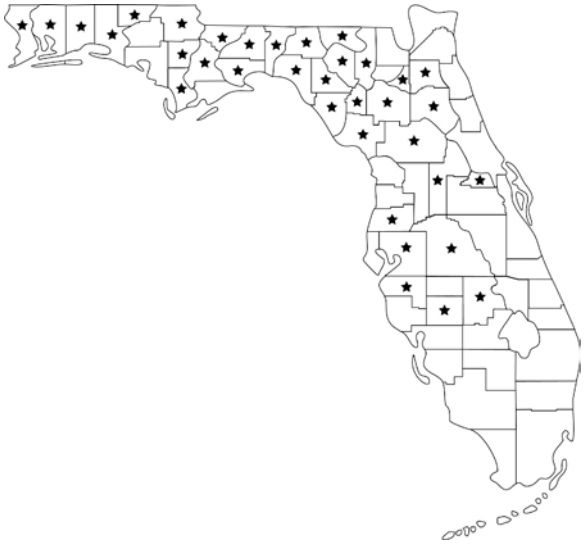
Map 9.13 *Hydropsyche elissoma* ■



Map 9.14 *Hydropsyche incommoda* ▲



Map 9.15 *Hydropsyche mississippiensis* ●



Map 9.16 *Hydropsyche simulans* ★

KEY TO SPECIES FOR LARVAE OF FLORIDA *HYDROPSYCHE*

[key adapted from Schuster and Etnier (1978); photos by Rick Abad]

1. Dorsum of abdominal segments with minute spines (visible at ≥60x) on at least segments I-III (Fig. 9.21); scale hairs present on at least the last 3 abdominal segments (Fig 9.22); parietals without dark stripes ventrally 2

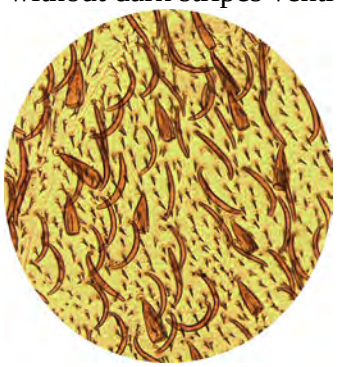


Fig. 9.21 Abdominal segment III showing triangular scale hairs and minute spines

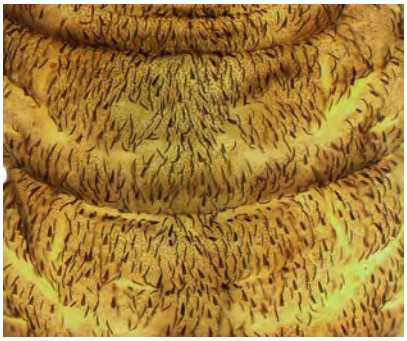


Fig. 9.22 Abdominal segments I-II

Dorsum of abdomen lacking minute spines; dorsum of abdomen lacking scale hairs, club hairs present (Figs. 9.23, 9.24); parietals each with dark stripe ventrally (Fig. 9.26) . . . . . *H. sparna* Hagen

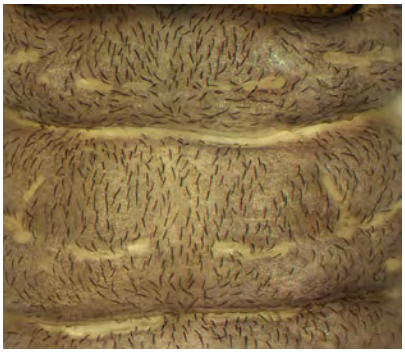


Fig. 9.23 Abdominal segments I-II

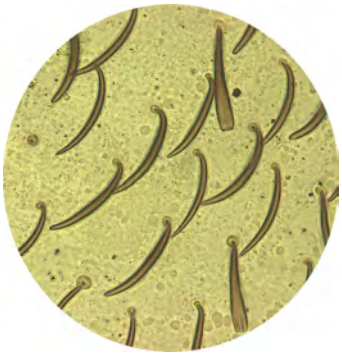


Fig. 9.24 Abdominal segment III

Fig. 9.25

Fig. 9.26

2(1) Anterior margin of frontoclypeus with 2 upturned tubercles (Figs 9.27, 9.28) . . . . . *H. incommoda* Hagen (= *H. bidens*, = *H. orris*)

Fig. 9.27

Fig. 9.28

Anterior margin of frontoclypeus without two upturned tubercles (Figs 9.29, 9.30) 3

Fig. 9.29

Fig. 9.30

3(2) Anterior margin of frontoclypeus with deep crenulations (Fig 9.31); restricted to the Chipola and Econfina Creek watersheds . . . . . *H. alabama* Lago & Harris

Fig. 9.31

Fig. 9.32

Anterior margin of frontoclypeus with shallow crenulations (Fig. 9.29) or smooth 4

4(3) Posterior angle of frontoclypeus with elevated mound (Fig. 9.33) or tubercle (Fig. 9.34) (best seen in lateral or posterior aspect of head) 5

Fig. 9.33 *Hydropsyche betteni*

Fig. 9.34 *Hydropsyche elissoma*

Posterior angle of frontoclypeus level with remaining posterior part of sclerite, mound or tubercle absent (Fig. 9.35). 6

Fig. 9.35

5(4) Sides of head evenly curved (Fig. 9.36); head typically unicolored dark brown to black except for light area around eye and occasionally behind eye (Figs 9.33, 9.36) . . . . . *H. betteni* Ross

Fig. 9.36

Sides of head widened anteriorly (in dorsal aspect), posterior area of head not as wide as anterior (Fig. 9.37); head mostly dark brown with pair of large, diagonal, tear-shaped spots (Fig. 9.37); sides and top of head near epicranial stem with several dark brown, oval muscle scars (Figs 9.37, 9.38). . . . . *H. elissoma* Ross

Fig. 9.37

Fig. 9.38

6(4) Frontoclypeus with many stout, bristle-like setae conspicuous on body of sclerite, most abundant on posterior half of sclerite (Figs 9.39, 9.40) . . . . . *H. mississippiensis* Flint

Fig. 9.39

Fig. 9.40

Bristle-like setae if present, restricted to anterolateral corners of frontoclypeus; posterior half of sclerite may have minute, clear, spine-like setae, but lacks larger bristle-like setae; [Note: *H. simulans* sometimes has a few bristles present on the posterior half of sclerite near the frontoclypeal sutures] 7

7(6) Scale hairs sparse on at least abdominal segments I-IV (Fig. 9.41); genae with numerous dorsolateral brown muscle scars (Fig. 9.42) . . . . . *H. decalda* Ross

Fig. 9.41 Abdominal segment IV, dorsum

Fig. 9.42

Scale hairs abundant on abdominal segments I-IV (Fig. 9.43); genae with dorsolateral pale yellow muscle scars (Fig 9.44) . . . . . *H. simulans* Ross (= *H. rossi*)

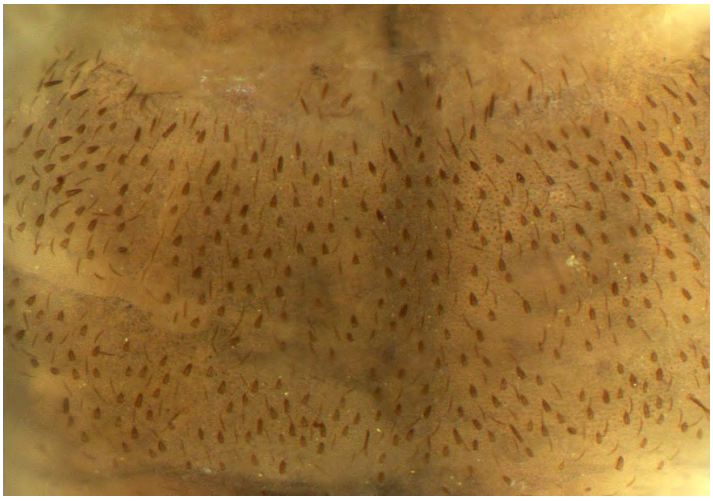


Fig. 9.43 Abdominal segment IV, dorsum

Fig. 9.44

Genus ***Macrostemum*** (Pictet)

Diagnosis: Larvae of *Macrostemum* (Fig. 9.45) are characterized as follows: distinctively flat head with U-shaped carina; pair of sclerites at base of labrum; and gills with up to 40 filaments attached to common stalk (Fig. 9.3). The larval retreat consists of a feeding chamber and retreat compartment.

Fig. 9.45 *Macrostemum carolina*

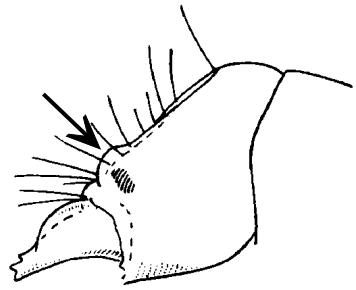


Fig. 9.46 *Macrostemum carolina* [from Ross (1944)]

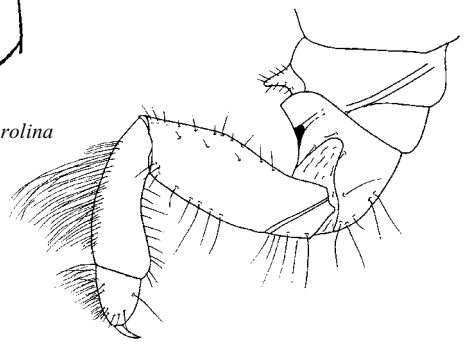
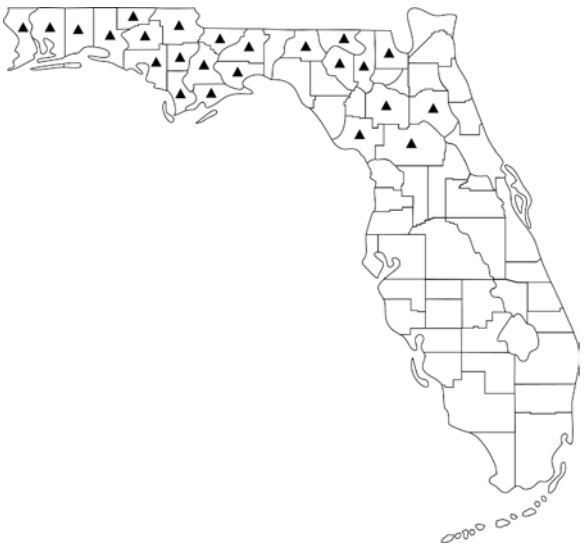


Fig. 9.47 *Macrostemum carolina*, foreleg

Species notes: *Macrostemum* includes three species in North America, but only *M. carolina* is represented in Florida. This species is widespread across northern Florida (Map 9.17). *Macrostemum carolina* is morphologically distinguished from the other North American *Macrostemum* species by having a large tubercle near each eye (Fig. 9.46). Larvae of the genus have dense brushes of setae on the fore- tibia and tarsus (Fig. 9.47), which are used to clean food from their capture net. Wallace and Sherberger (1974) aptly described the larval retreat of *M. carolina* and discussed the functions of the food and retreat chambers.

Like many hydropsychids found in Florida, *M. carolina* lives in a wide variety of lotic habitats, but are especially abundant in larger streams and rivers. We found the larvae of *M. carolina* to be most abundant in areas where snags and submerged tree limbs abound; such habitat preferences are related to their retreat construction behavior.



Map 9.17 *Macrostemum carolina* ▲

Additional references: Ross (1944); Wallace and Sherberger (1974); Wiggins (1996).

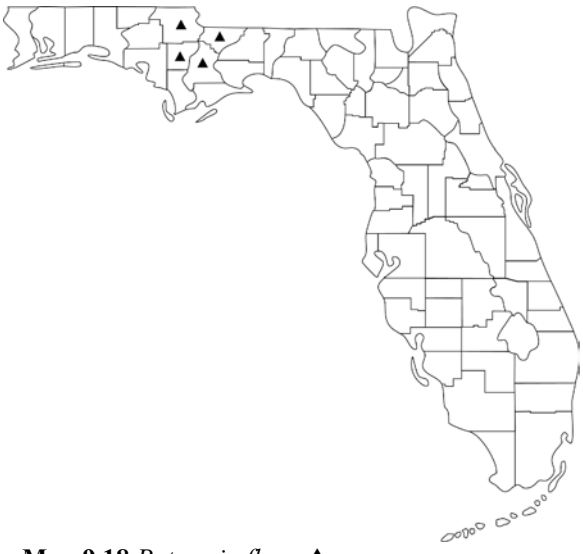
Genus ***Potamyia*** Banks

Diagnosis: Larvae of *Potamyia* (Fig. 9.48) are distinguished from other hydropsychid genera by the following: prominent anteromedian projection on ventral apotome of head (Fig. 9.11); entire posterior margin of each sclerite on abdominal sternum IX (Fig. 9.12); and prominently flanged lateral border of each mandible (Fig. 9.13).

Fig. 9.48 *Potamyia flava*, CUAC000001920
Photo courtesy of J. Morse & M. Ferro

Species notes: *Potamyia flava* is the only known species of *Potamyia* in North America. The species is uncommon in Florida; we have recorded the species (as adults) from a number of rivers and streams from only the Chipola and Apalachicola River basins (Map 9.18). The species, typically associated with large rivers, has probably dispersed into these streams from the Apalachicola-Chattahoochee-Flint river system. The life history of the species in Florida is unknown. Our adult collections were taken in spring, summer and fall months. *Potamyia flava* has been observed to have either a univoltine (Hilsenhoff, 1975) or bivoltine life cycle (Fremling, 1960). Houghton (2026) determined *P. flava* to be an indicator species of agriculturally-impacted streams.

Additional references: Ross (1944); Wiggins (1996).



Map 9.18 *Potamyia flava* ▲

FAMILY HYDROPTILIDAE

(*microcaddisflies*)

The Hydroptilidae, or microcaddisflies, include the smallest of the caddisflies, most members being 2–4 mm in length. In the United States and Canada there are 16 genera and over 300 species known. In Florida, the family is represented by at least seven genera and 77 species, making it the state's most speciose caddisfly family. Efforts to collect adults by light trapping has resulted in the recent discovery of many new species [see Harris and Armitage (1987); Harris (1991, 2002); Harris et al. (1998); Harris and Keth (2002); Harris et al. (2012); Rasmussen et al. (2025)].

In addition to their small size, hydroptilids are recognized by the presence of sclerotized plates on all thoracic nota (Figs 2.4, 10.37) and lack of gills on the abdominal segments, with the exception of larvae of *Hydroptila* which have three, very thin filamentous gills on the posterior end of the abdomen (Figs 2.8, 10.25, 10.35). Because the larvae of so few species of the various genera have been described and diagnosed, identifications must be left at genus level.

The life cycle of the Hydroptilidae is unusual among caddisflies in that the first four larval instars are free-living, with case construction taking place in the final (5^{th}) instar. Case type and construction material are variable and may be diagnostic for a genus.

Hydroptilids occur in a wide array of lotic environments from small springs and seeps to large streams and rivers. Many species are also found in standing waters, including ponds, marshes, lakes and reservoirs, with some genera being more predominant in such environments. Larvae occur on variety of substrates, including submerged vegetation and algae, root masses, as well as rocks, sand and gravel, but are easily overlooked because of their size. Most microcaddisfly larvae feed on algae, either by grazing on diatoms and periphyton or by piercing filamentous forms.

KEY TO GENERA FOR LARVAE (FINAL INSTAR) OF FLORIDA HYDROPTILIDAE

1. Abdomen compressed laterally with prominent dorsal and ventral lobes (Fig. 10.1); clump of anal papillae present (Fig. 10.2) . . . . . *Ithytrichia*

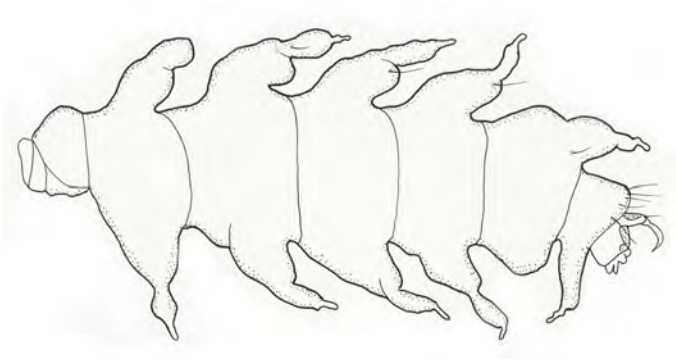


Fig. 10.1

Fig. 10.2

Abdomen not compressed laterally, without prominent dorsal and ventral lobes (Fig. 10.3; clump of anal papillae absent. 2

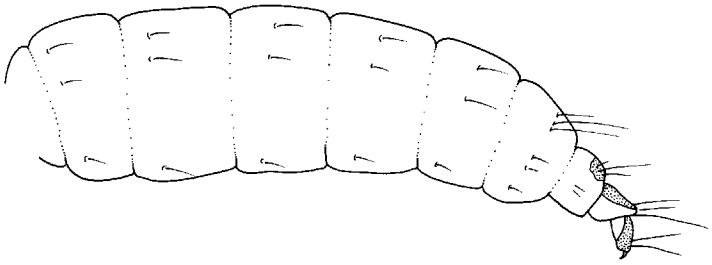


Fig. 10.3

2(1) Anal prolegs elongate and cylindrical, projecting well beyond abdomen (Fig. 10.4); head narrowing anteriorly in dorsal aspect (Fig. 10.5) 3

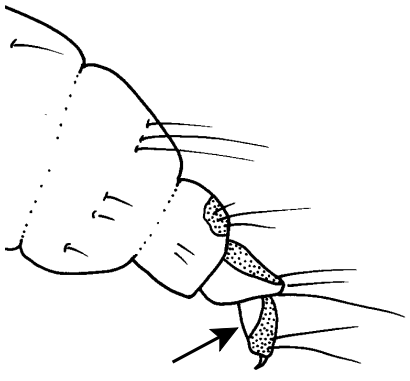


Fig. 10.4

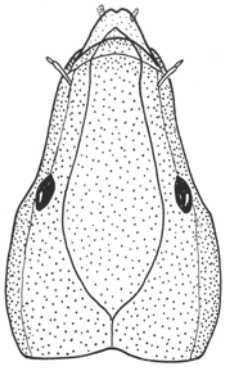


Fig. 10.5

Anal prolegs short, not projecting conspicuously beyond abdomen (Fig. 10.6); head not noticeably narrowing anteriorly in dorsal aspect (Fig. 10.7) 4

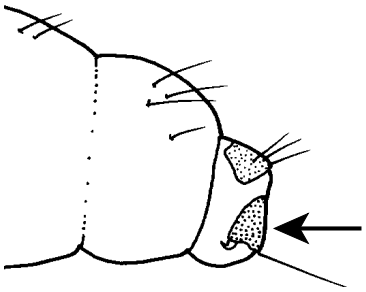


Fig. 10.6

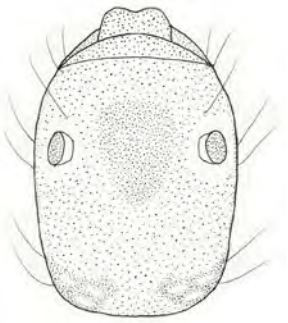


Fig. 10.7

3(2) Abdomen with lateral fringe of hair (Fig. 10.8); intersegmental grooves of abdomen prominent (Fig. 10.8); cylindrical case of sand or sometimes plant pieces (Fig. 10.9) . . . . . *Neotrichia*

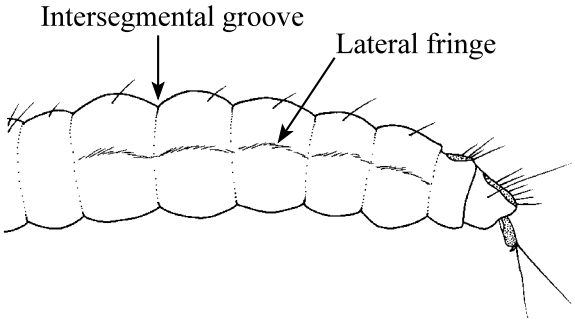


Fig. 10.8

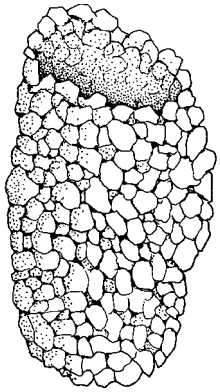


Fig. 10.9

Abdomen without lateral fringe of hair (Fig. 10.10); intersegmental grooves of abdomen not prominent (Fig. 10.10); case of silk, with longitudinal ridges (Fig. 10.11) . . . . . *Mayatrichia*, *M. ayama* Mosely

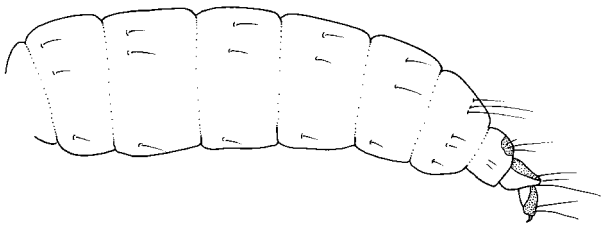


Fig. 10.10

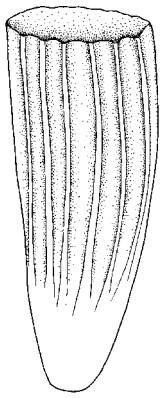


Fig. 10.11

4(2) Middle and hind legs over twice as long as foreleg (Fig. 10.12); bottle-like case constructed of silk (Fig. 10.13) . . . . . *Oxyethira*

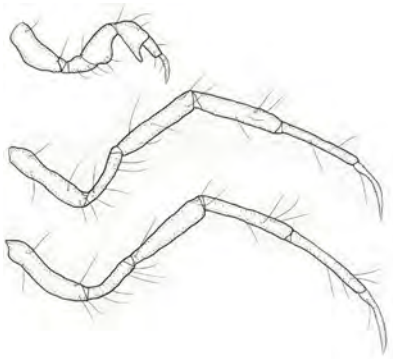


Fig. 10.12

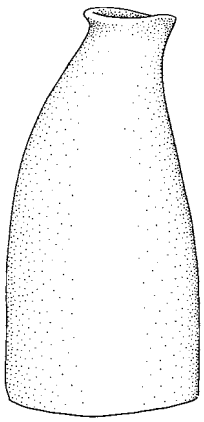


Fig. 10.13

Middle and hind legs only slightly longer than forelegs (Fig. 10.14); purse-like cases of sand or silk, sometimes mixed with plant material (Fig. 10.16) 5

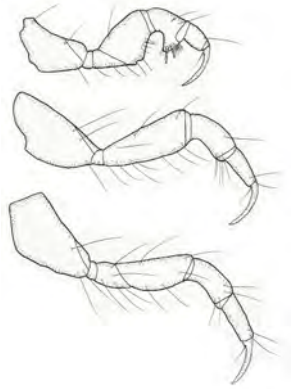


Fig. 10.14

5(4) Tarsal claws stout with thick, blunt spur at base (Fig. 10.15); case almost entirely of silk (Fig. 10.16) . . . . . *Stactobiella*

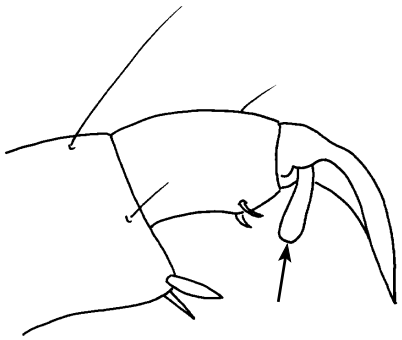


Fig. 10.15

Fig. 10.16

Tarsal claws slender with thin, pointed spur at base (Fig. 10.17); case of sand or silk, sometimes mixed with plant material 6

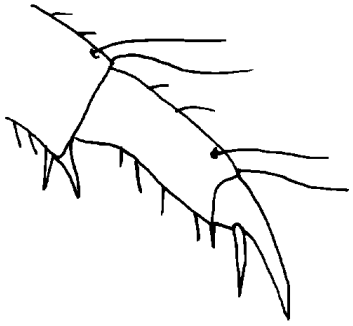


Fig. 10.17

6(5) Tibia of foreleg with prominent, posteroventral lobe (Fig. 10.18); middle and hind legs thickened (Fig. 10.19); labrum symmetrical (Fig. 10.20); case of sand, sometimes mixed with plant material 7

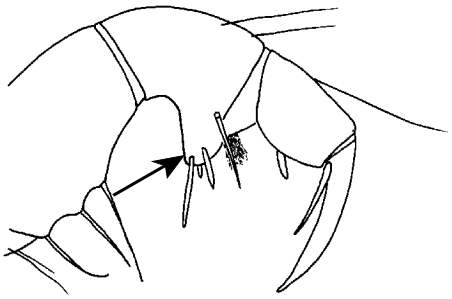


Fig. 10.18

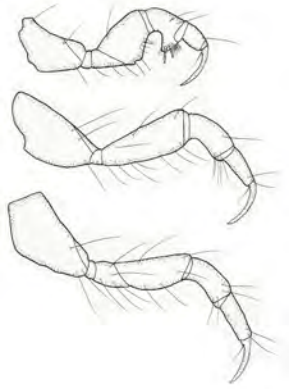


Fig. 10.19

Fig. 10.20

Tibia of foreleg without prominent, posteroventral lobe (Fig. 10.21); middle and hind legs slender (similar to Fig. 10.22); labrum asymmetrical (Fig. 10.23); case entirely of silk, with prominent longitudinal ridges (Fig. 10.24) . . . . . *Orthotrichia*

Fig. 10.21

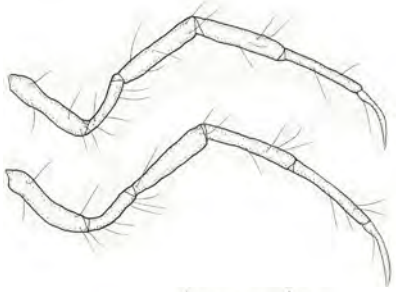


Fig. 10.22

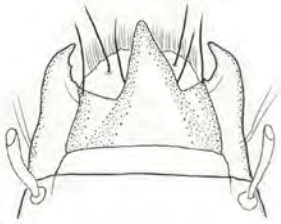


Fig. 10.23

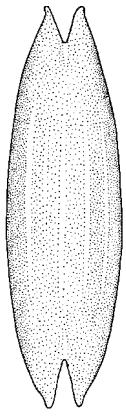


Fig. 10.24

7(6) Three filamentous gills arising from posterior end of abdomen (Fig. 10.25); anal claw divided (Fig. 10.26); anterior edge of meso- and metathoracic plates square at lateral edges (Fig. 10.27); foreleg with deep U-shaped emargination between tibia and femur (Fig. 10.28); hind tibia without prominent process (Fig. 10.29)
. . . . . *Hydroptila*

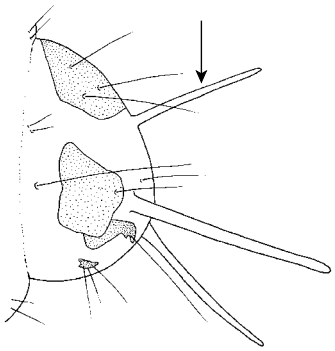


Fig. 10.25, lateral view

Fig. 10.26

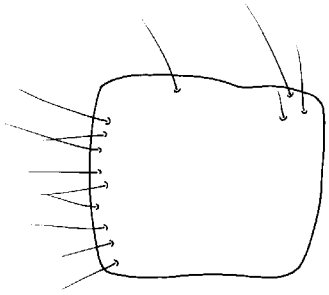


Fig. 10.27, left lateral view of metanotum

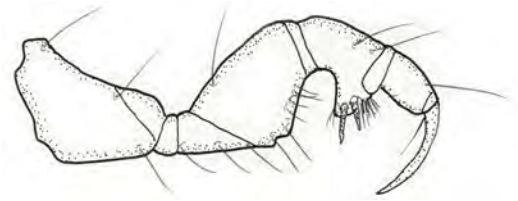


Fig. 10.28

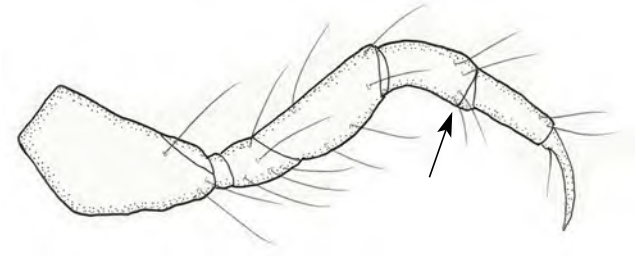


Fig. 10.29

Posterior end of abdomen without filamentous gills; anal claw undivided (Fig. 10.30); anterior edge of meso- and metathoracic plates lobate at lateral edges (Fig. 10.31); foreleg without deep U-shaped emargination between tibia and femur (Fig. 10.32); hind tibia with prominent process (Fig. 10.33) . . . . . *Ochrotrichia*

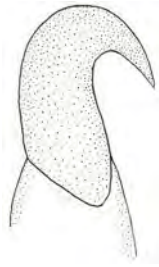


Fig. 10.30

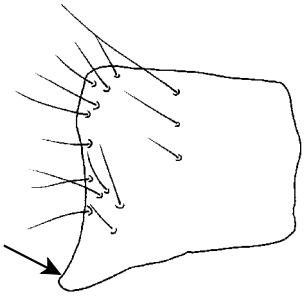


Fig. 10.31, left lateral view of metanotum

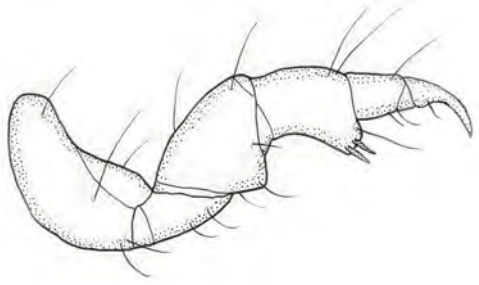


Fig. 10.32

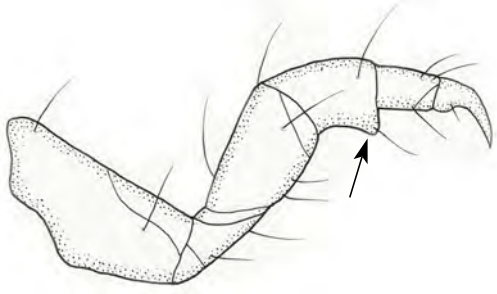


Fig. 10.33

Genus ***Hydroptila*** Dalman

Diagnosis: Larvae of *Hydroptila* (Fig. 10.34) are characterized by having three long, thin gills arising from posterior end of abdomen (Figs 10.25, 10.35). *Hydroptila* and *Ochrotrichia* are similar in overall appearance and in their construction of purse-like cases of sand (Fig. 10.34), sometimes with plant material mixed in. In addition to apical abdominal gills, *Hydroptila* are distinguished from *Ochrotrichia* by the lack of anterolateral lobes on meso- and metanota (Fig. 10.27), a multiple-toothed anal claw (Fig. 10.26), and a U-shaped emargination between the tibia and femur of the foreleg (Fig. 10.28). We have found several other characters, including a pair of heavy setae on the head of *Hydroptila* compared to multiple heavy setae on the head of *Ochrotrichia*. However, we are unsure if this character is species or genera-specific.

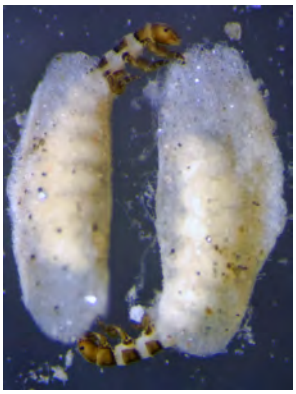
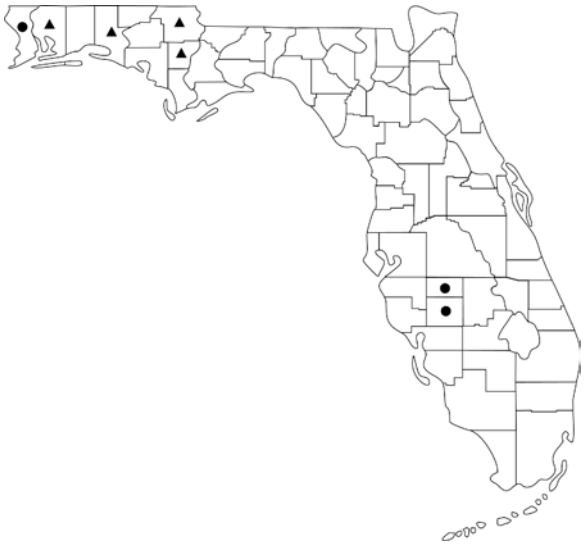


Fig. 10.34 Photo courtesy of Bob Newell

Fig. 10.35 Photo courtesy of Bill Gerth

Species notes: The genus *Hydroptila* is the most speciose (37 species) (Maps 10.1–10.24) genus of microcaddisflies in Florida, as is the case in North America. The genus inhabits a wide variety of habitats from small streams to large rivers and most lentic environments. All instars feed on filamentous algae (Nielsen, 1948), as well as diatoms and other algae (Wiggins, 1996). Most microcaddisflies complete development in a year or less.

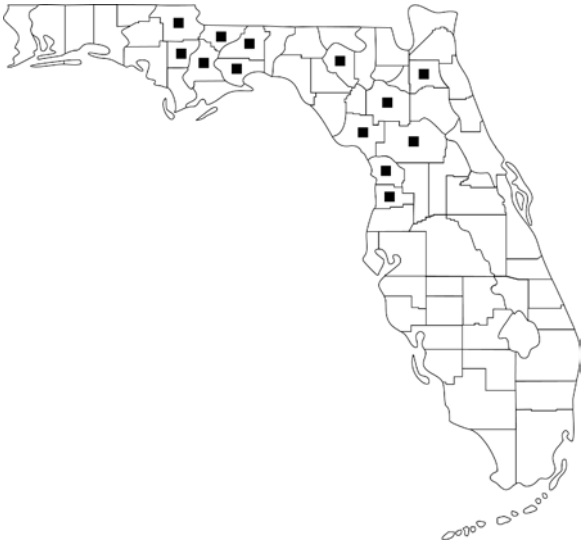
Additional references: Ross (1944); Nielson (1948); Wiggins (1996).



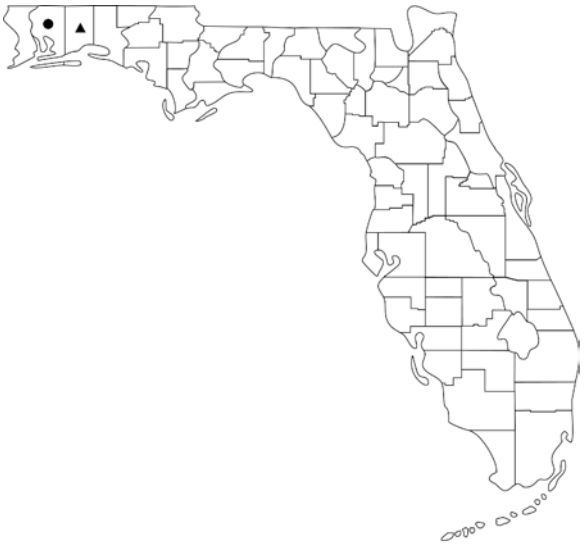
Map 10.1 *Hydroptila acadia* ▲
Hydroptila ajax ●

Map 10.2 *Hydroptila alabama* ★
Hydroptila icona ●

Map 10.3 *Hydroptila apalachicola* ♦
Hydroptila okaloosa ■



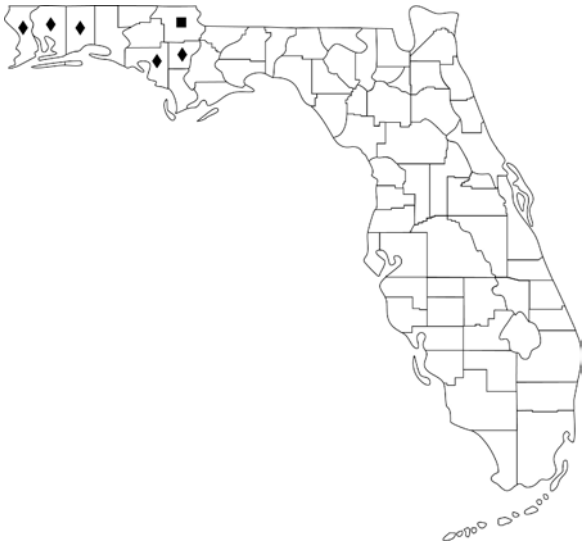
Map 10.4 *Hydroptila armata* ■



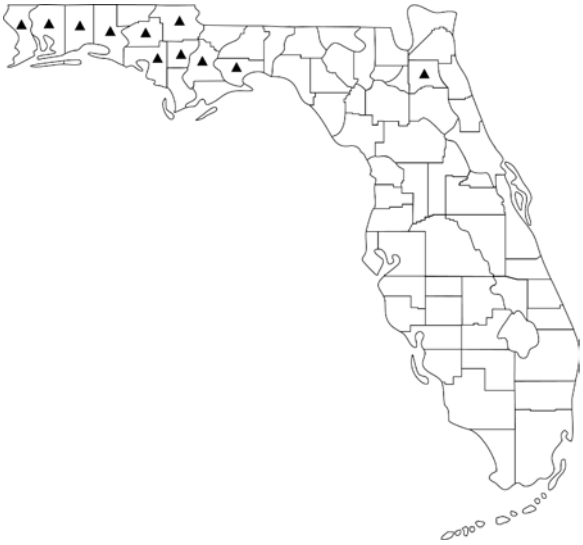
Map 10.5 *Hydroptila auriscuspa* ▲
Hydroptila santarosa ●

Map 10.6 *Hydroptila berneri* ●

Map 10.7 *Hydroptila bribriae* ★
Hydroptila criokera ■



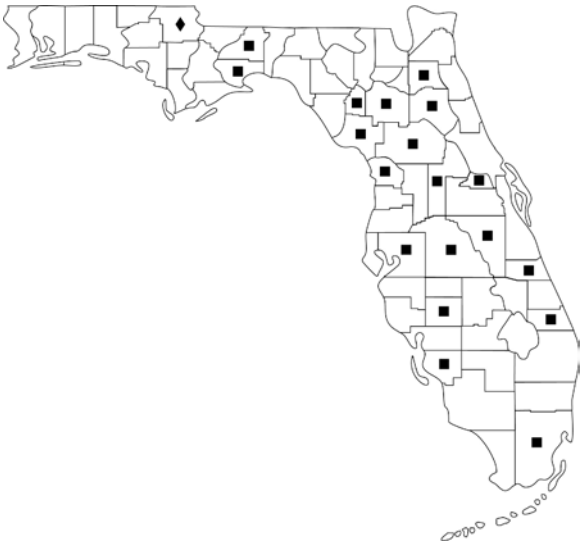
Map 10.8 *Hydroptila circangula* ♦
Hydroptila metteei ■



Map 10.9 *Hydroptila disgalera* ▲

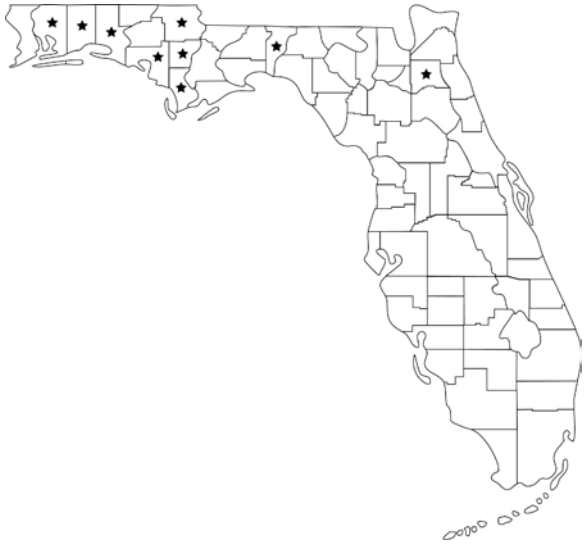
Map 10.10 *Hydroptila ebroensis* ●
Hydroptila hamiltoni ▲

Map 10.11 *Hydroptila eglinensis* ★
Hydroptila murtlei ♦

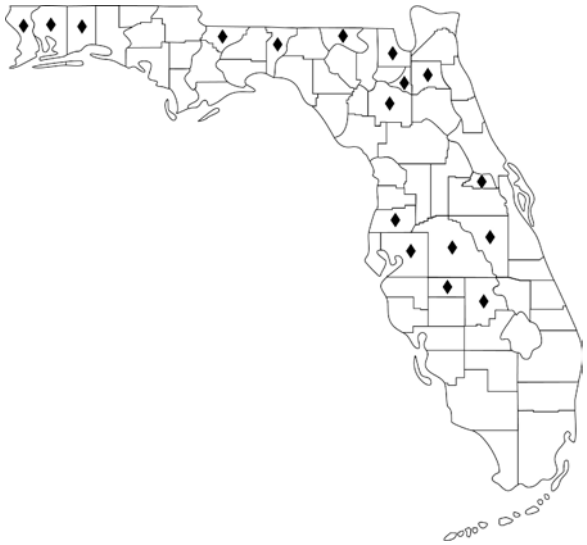


Map 10.12 *Hydroptila gunda* ♦
Hydroptila maculata ■

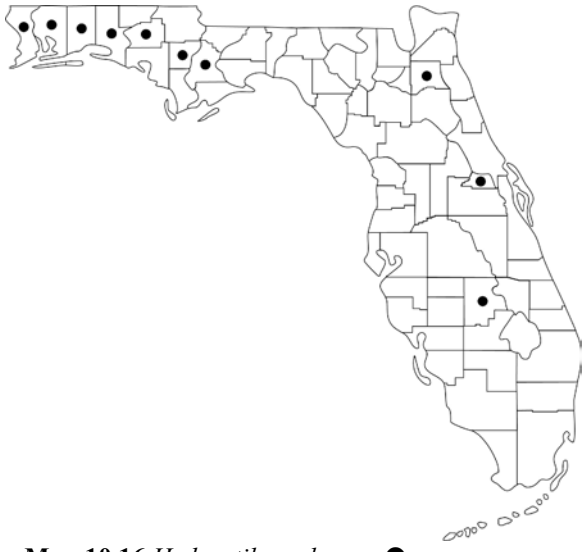
Map 10.13 *Hydroptila hamata* ■



Map 10.14 *Hydroptila latosa* ★

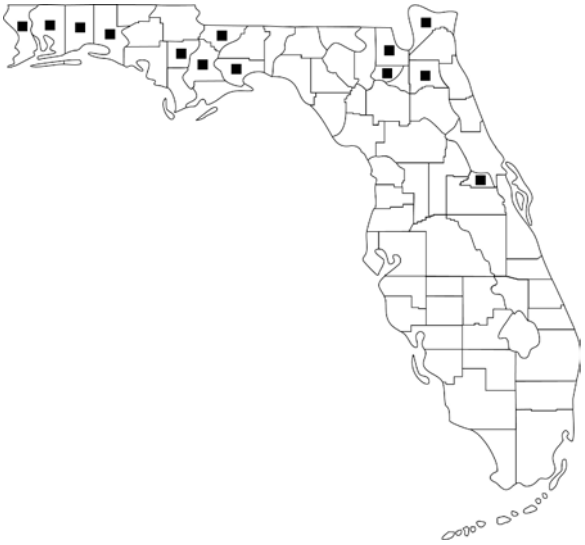


Map 10.15 *Hydroptila lloganae* ♦



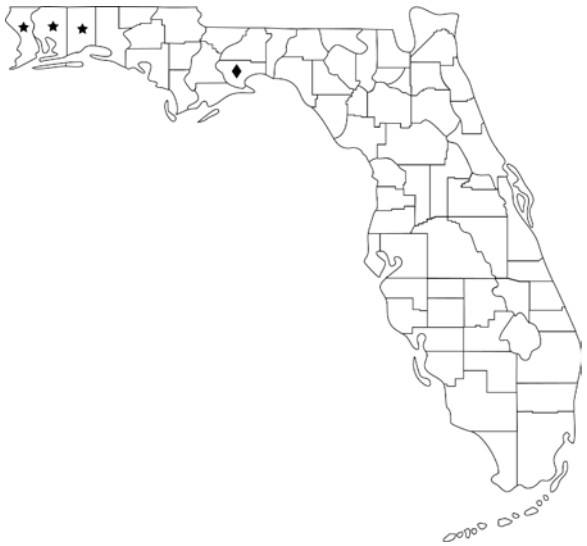
Map 10.16 *Hydroptila molsonae* ●

Map 10.17 *Hydroptila aviforma* ♦
Hydroptila sarahae ●

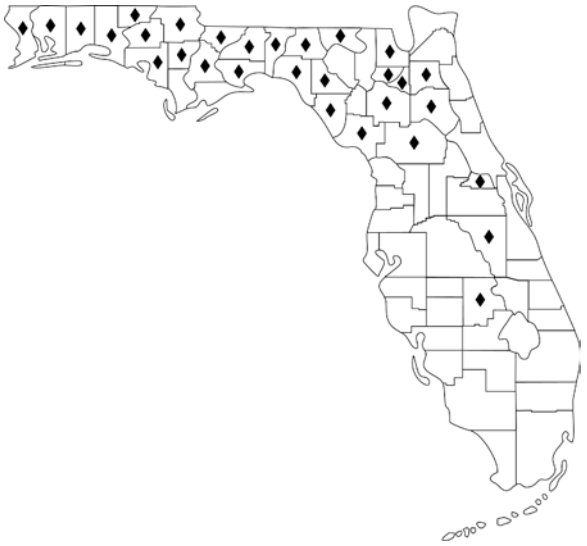


Map 10.18 *Hydroptila novicola* ■

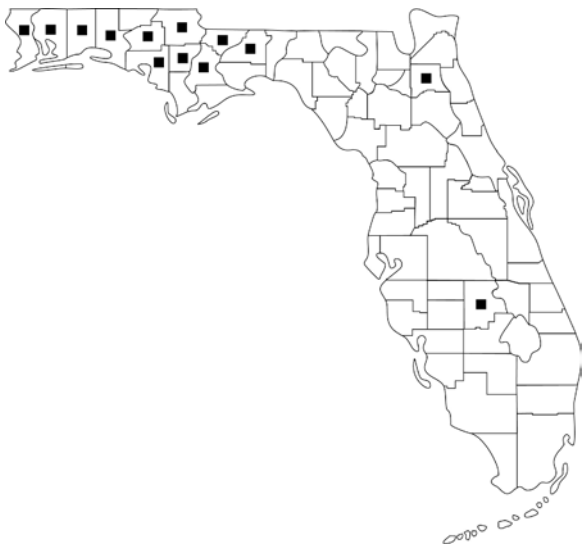
Map 10.19 *Hydroptila paralatosa* ▲
Hydroptila wetumpka ●



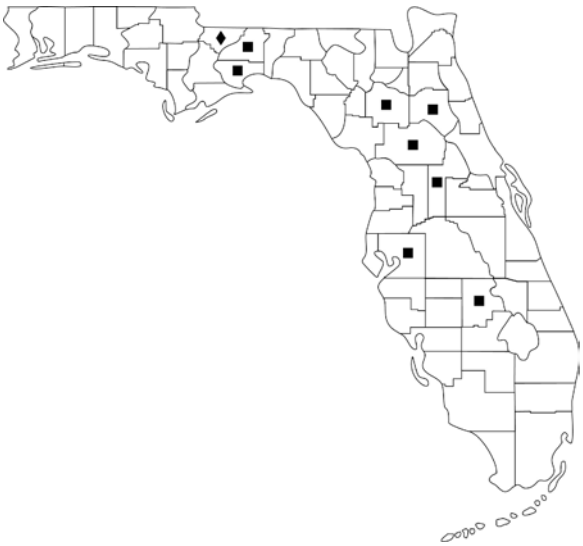
Map 10.20 *Hydroptila parastrepha* ★
Hydroptila scheiringi ♦



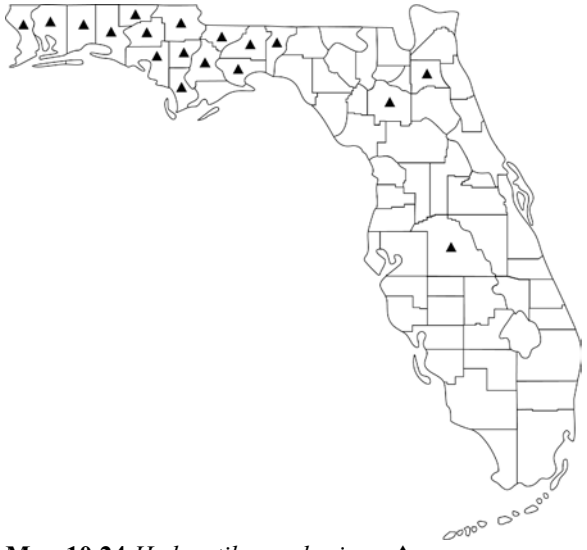
Map 10.21 *Hydroptila quinola* ♦



Map 10.22 *Hydroptila remita* ■



Map 10.23 *Hydroptila sykorai* ♦
Hydroptila wakulla ■



Map 10.24 *Hydroptila waubesiana* ▲

Genus ***Ithytrichia*** Eaton

Diagnosis: The larvae are distinguished by the laterally flattened abdomen which has distinctive dorsal and ventral protuberances (Figs 10.1, 10.36) and the presence of a single median gill filament and clump of anal papillae near the abdominal apex (Fig. 10.2). Cases of *Ithytrichia* are pouch-like and made of silk (Fig. 10.36).

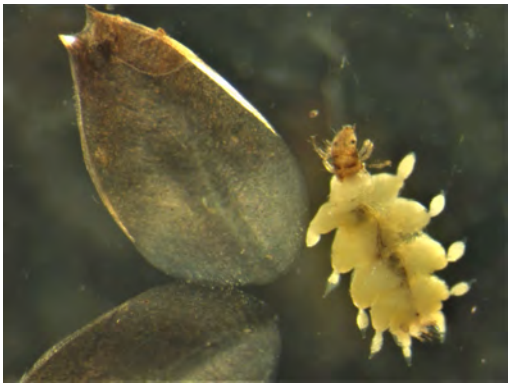


Fig. 10.36 Photo courtesy of Todd Risk

Species notes: *Ithytrichia* is a small genus of caddisflies with only three species known from North America. Based on collection of adults, the widespread *I. clavata* Morton, reported from Jackson County, Florida (Map 10.25), is the only *Ithytrichia* species documented in Florida (Harris et al., 2012). Additonally, larvae of *Ithytrichia* have been collected from Pringle Branch in Flagler County that are likely to be *I. clavata*, although it's possible they represent another species (Map 10.25). Larvae of *Ithytrichia* live on rocks and moss in running water and the flattening of the abdomen is thought to be an adaptation to adhere to the rocky substrate. Larvae feed on diatoms and algae scraped from the substrate. The genus was reviewed by Moulton, Harris, and Slusark (1999).

Additional references: Wiggins (1996).

Map 10.25 *Ithytrichia clavata* ▲
Ithytrichia sp. ●

Genus ***Mayatrichia*** Mosely

Diagnosis: Overall, larvae of *Mayatrichia* (Fig. 10.37) are similar to those of *Neotrichia*. However, the anterior narrowing of head is more acute in *Mayatrichia* (Fig. 10.5) and the legs are shorter and less slender (Fig. 10.38). *Mayatrichia* larvae also lack the lateral hair fringe found on the abdomen of *Neotrichia* and the intersegmental grooves are less well-defined (Fig. 10.10). Cases of *Mayatrichia* are cylindrical, tapered, and made entirely of silk with narrrow ridges externally (Figs 10.11. 10.37) that are sometimes restricted to the posterior third of the case.

Fig. 10.37
Photo courtesy of Doug Post

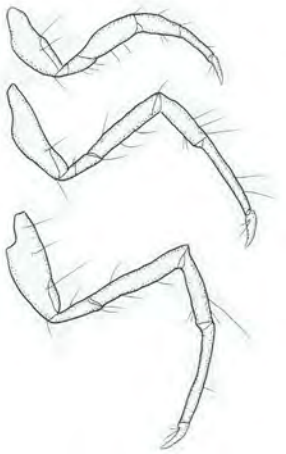
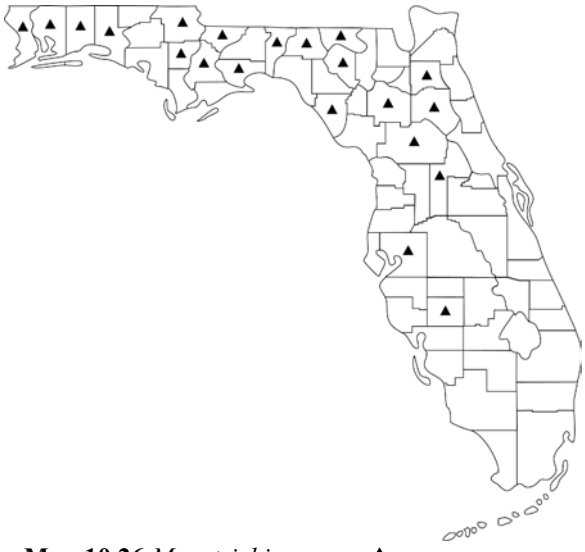


Fig. 10.38

Species notes: Larvae of *Mayatrichia* occur in a variety of streams and large rivers, often on rocks and gravel. Only a single species, *Mayatrichia ayama*, is reported from Florida (Map 10.26). We have recorded it from streams and river throughout much of north Florida and as far south as the Peace River in De Soto County. In Alabama, this species occurred in small sandy streams and large rivers on the Coastal Plain and emerged from May through October (Harris et al., 1991). Larvae are characterized as scrapers by Morse et al. (2019); gut contents examined by Wiggins (1996) consisted of fine organic particles.

Additional references: Ross (1944); Wiggins (1996).



Map 10.26 *Mayatrichia ayama* ▲

Genus ***Neotrichia*** Morton

Diagnosis: *Neotrichia* larvae (Fig. 10.39), as with *Mayatrichia*, are recognized as follows: distal narrowing of head; long, slender mid- and hind tarsi (Fig. 10.40); and anal prolegs projecting free of body (Fig. 10.4). Among the smallest of hydroptilids, larvae of *Neotrichia* are separated from *Mayatrichia* as follows: lateral fringe of hair on the abdomen (not always obvious); and well-defined intersegmental grooves of abdomen (Fig. 10.8). Cases of *Neotrichia* are cylindrically compressed and composed of sand grains (Figs 10.9, 10.39) or sometimes plant material.

Fig. 10.39 Photo courtesy of Doug Post

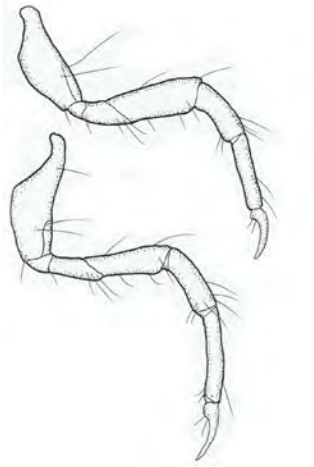


Fig. 10.40, mid- and hind legs

Species notes: Larvae occur in a variety of lotic habitats, including swift, rocky streams and slow-moving rivers. Five species are known from Florida (Maps 10.27–10.30). *Neotrichia* immatures are classified as algal scrapers on rocks and fixed substrates (Morse et al., 2019).

Interestingly, *Neotrichia* larvae sent to us by Dr. Matt Scripter (Ecological Associates, Jenson Beach, FL) that were collected from streams in Hardee and Orange counties in Florida have lateral horns on the head (Fig. 10.41), similar to those found on *Neotrichia canixa* from Texas and *Neotrichia iridescens* from Puerto Rico. Based on geographic association with adult records and identification of a completely developed pharate adult male pupa of *N. vibrans*, we are confident the larvae in question are *N. vibrans*, the most widespread and common species in the state. The significance of such horns is unknown, although since the larvae are frequently found among rocks in rapid sections of streams and rivers (Wiggins, 1996), perhaps they function in stability.

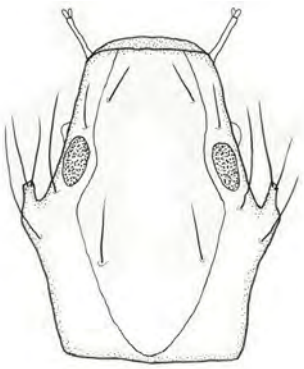
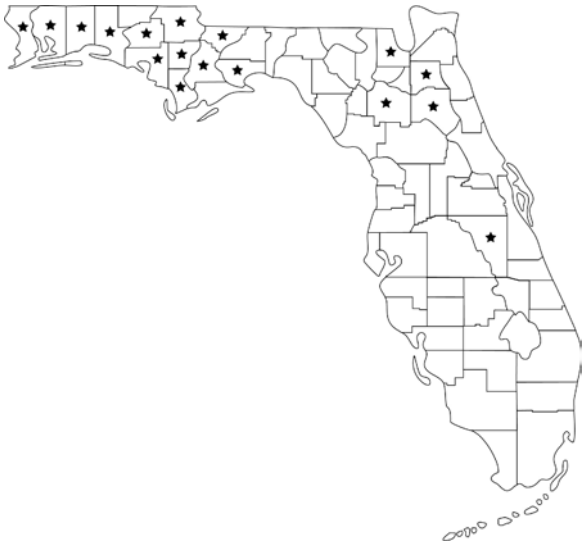


Fig. 10.41 *Neotrichia vibrans*, head, dorsal

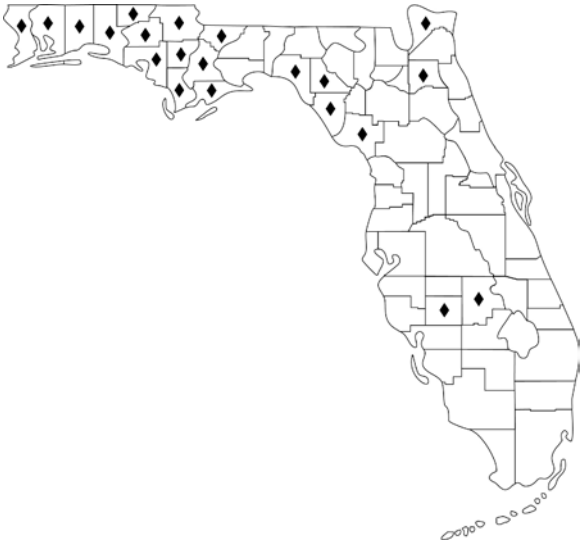
Many of the *Neotrichia* species occurring in Alabama appeared to be multivoltine (Harris et al., 1991). The adults of *Neotrichia caxima* Group in the southeastern United States were reviewed by Harris and Rasmussen (2010), and Keth, Harris and Armitage (2015) provided a revision of North American, Mexican, and Caribbean island species of *Neotrichia*.

Additional references: Ross (1944); Wiggins (1996).

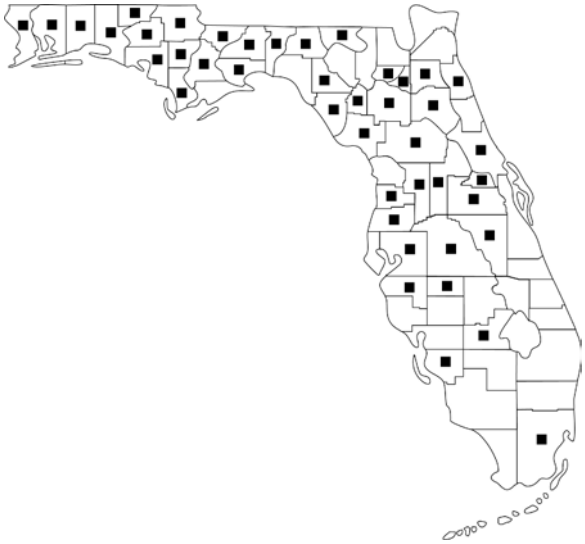
Map 10.27 *Neotrichia alabamensis* ▲
Neotrichia rasmusseni ●



Map 10.28 *Neotrichia armitagei* ★



Map 10.29 *Neotrichia minutisimella* ♦



Map 10.30 *Neotrichia vibrans* ■

Genus ***Ochrotrichia*** Mosely

Diagnosis: Larvae of *Ochrotrichia* (Fig. 10.42), in overall appearance, are similar to those of *Hydroptila*. Larvae of both genera have short, rather thick legs, with foretibiae each bearing a posteroventral lobe (Figs 10.32). *Ochrotrichia* larvae are distinguished from those of *Hydroptila* by the lack of apical, abdominal gills (Fig. 10.43) and the presence of anterolateral lobes on meso- and metanota (Figs 10.31, 10.44), which are sometimes poorly sclerotized and difficult to see; in some cases the anterolateral corner of these segments has a circular cluster of five setae not seen in *Hydroptila*. However, this latter character may be specific rather than generic. We have found several additional characters which will separate *Ochrotrichia* from *Hydroptila*, including an undivided anal claw (Fig. 10.30) and a triangular process from the hind tibia (Fig. 10.33). Cases of *Ochrotrichia* (Fig. 10.42) are similar to those of *Hydroptila*, being purse-shaped and constructed of sand, sometimes with plant material mixed in. Although in some larger streams and rivers, the cases are composed entirely of silk and sometimes plant material, without sand.

Fig. 10.42 Photo courtesy of Bill Gerth

Fig. 10.43 Photo courtesy of Bill Gerth

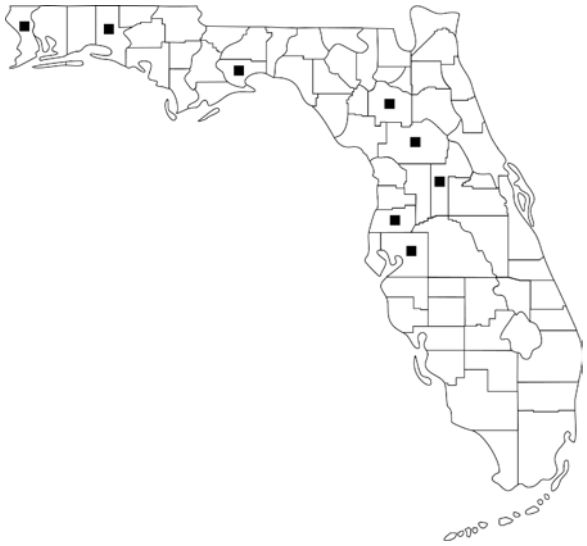
Fig. 10.44 Photo courtesy of Bill Gerth

Species notes: Larvae are characterized by Morse et al. (2019) as piercing herbivores and facultative collectors; Vaillant (1965) suggested some species are diatom scrapers on rock surfaces. Five species of *Ochrotrichia* have been reported from Florida (Maps 10.31–10.33). *Ochrotrichia tarsalis*, the only widespread species, occurs in a wide variety of streams and rivers. *Ochrotrichia confusa*, *O. okaloosa*, and *O. apalachicola* are known from only spring-fed panhandle streams (Harris et al., 2012), and *O. provosti* is known from only the type locality in Hillsborough County (Rasmussen et al., 2008a).

Additional references: Ross (1944); Vaillant (1965); Wiggins (1996).

Map 10.31 *Ochrotrichia apalachicola* ▲
Ochrotrichia provosti ●

Map 10.32 *Ochrotrichia confusa*★
Ochrotrichia okaloosa ♦



Map 10.33 *Ochrotrichia tarsalis* ■

Genus ***Orthotrichia*** Eaton

Diagnosis: Larvae of *Orthotrichia* (Fig. 10.45) are distinguished as follows: slender mid- and hind legs (Fig. 10.22); patches of spines on each fore coxa (10.46); and asymmetrical labrum (Fig. 10.23). The purse-like, silken larval case with longitudinal ridges is distinctive for the genus (Figs 10.24, 10.45).

Fig. 10.45
Photo courtesy of Bill Gerth

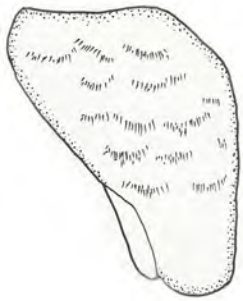
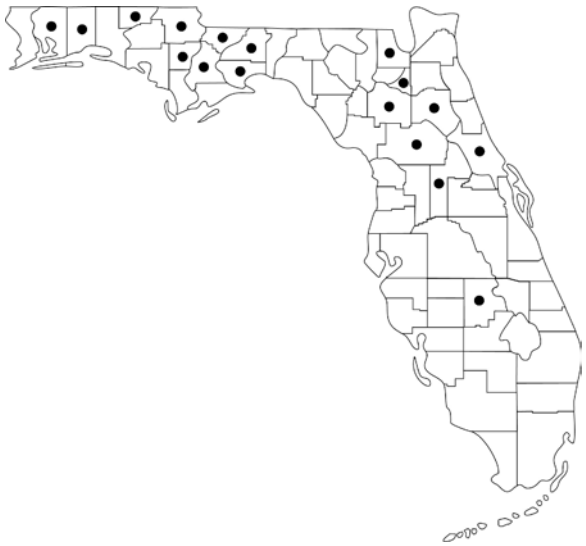


Fig. 10.46 fore coxa, ventral

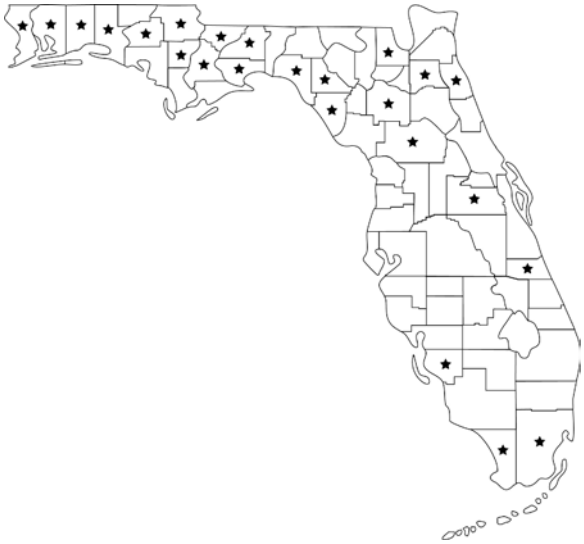
Species notes: Only six species of *Orthotrichia* are known from North America and all are reported from Florida (Maps 10.34–10.38). Larvae are abundant on submerged vegetation along the littoral zones of lakes and other standing waters. The larvae also occur on vegetation along the margins of slow-moving rivers and streams. Nielson (1948) observed *Orthotrichia* larvae feeding on the contents of large algal filaments. In Alabama, *Orthotrichia* species had long emergence patterns suggesting multiple generations each year (Harris et al., 1991). Adults of *Orthotrichia* were reviewed by Harris and Rasmussen (2019).

Additional references: Ross (1944); Kingsolver and Ross (1961); Wiggins (1996); Keiper (2002).

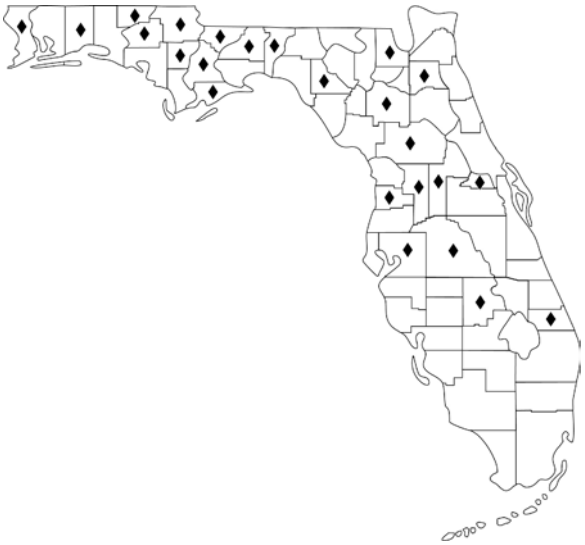
Map 10.34 *Orthotrichia aegerfasciella* ▲



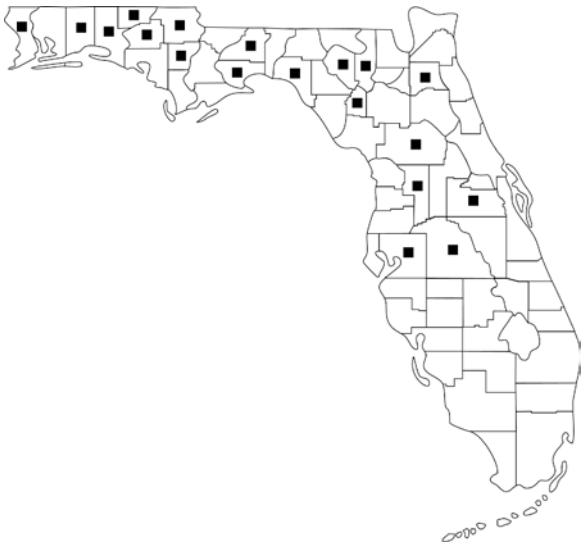
Map 10.35 *Orthotrichia balduf*i ●



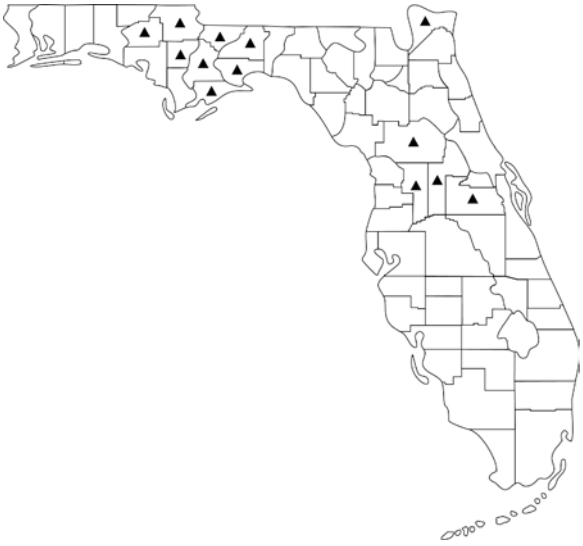
Map 10.36 *Orthotrichia cristata* ★



Map 10.37 *Orthotrichia curta* ♦



Map 10.38 *Orthotrichia dentata* ■



Map 10.38 *Orthotrichia instabilis* ▲

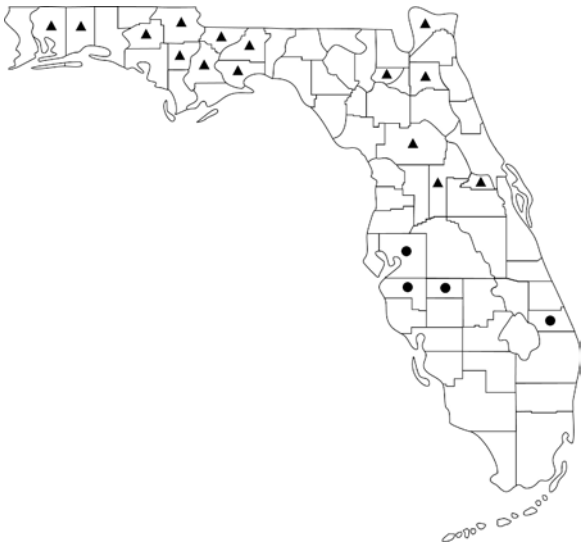
Genus ***Oxyethira*** Eaton

Diagnosis: *Oxyethira* larvae (Fig. 10.47) are easily identified by their long, thin mid- and hind legs (Fig. 10.12). Fore tibiae each possess an elongate posteroventral process (Fig. 10.12) similar to that found in *Hydroptila* and *Ochrotrichia*. *Oxyethira* spp. are also readily recognized by their bottle-shaped, silken cases (Figs 10.13, 10.47).

Fig. 10.47 Photo courtesy of David Bowles

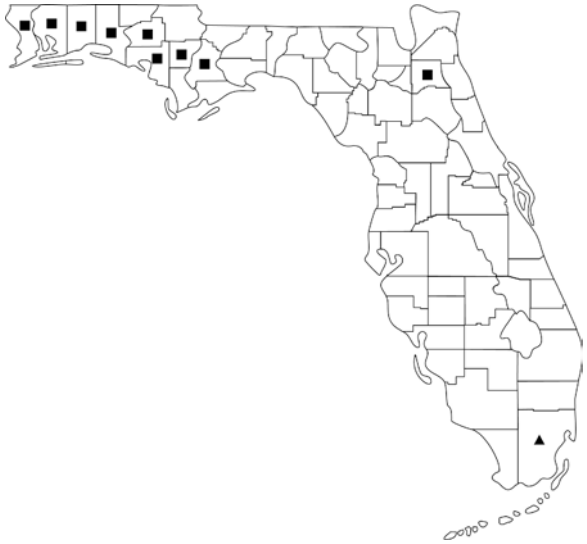
Species notes: Larvae of *Oxyethira* are often abundant in lakes and other lentic environments, but they also occur in slower stretches of streams and rivers, particularly in beds of submerged vegetation. Among microcaddisfly genera, *Oxyethira* (22 species) is second only to *Hydroptila* in number of species reported in Florida (Maps 10.39–10.55).

Additional references: Ross (1944); Kelley (1982); Wiggins (1996); Keiper (2002).



Map 10.39 *Oxyethira abacatia* ▲
Oxyethira arizona ●

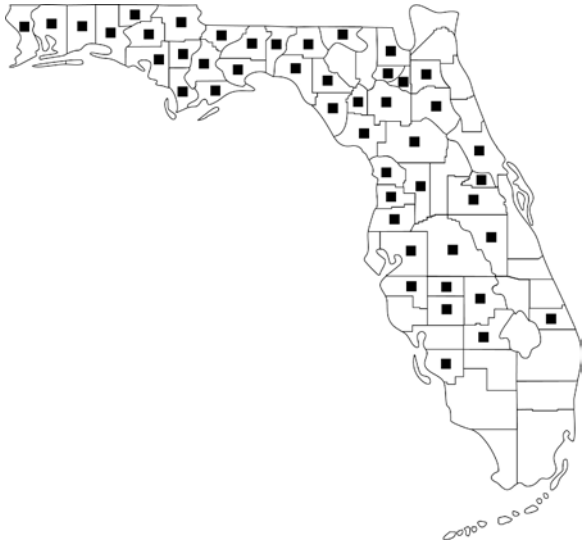
Map 10.40 *Oxyethira chysocara* ★
Oxyethira kelleyi ♦



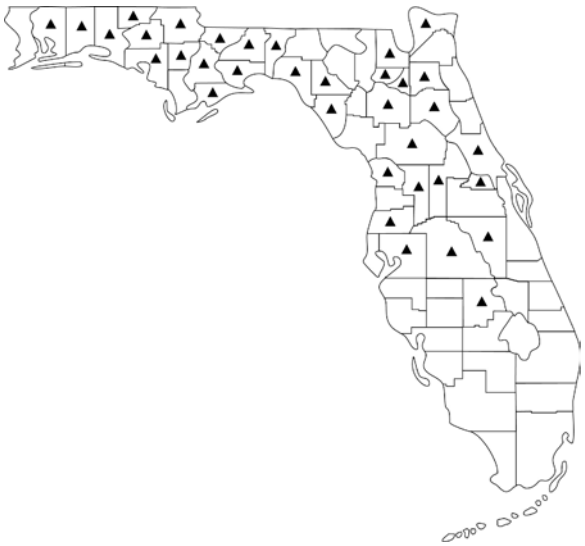
Map 10.41 *Oxyethira elerobi* ■
Oxyethira kingi ▲

Map 10.42 *Oxyethira florida* ●
Oxyethira grisea ★

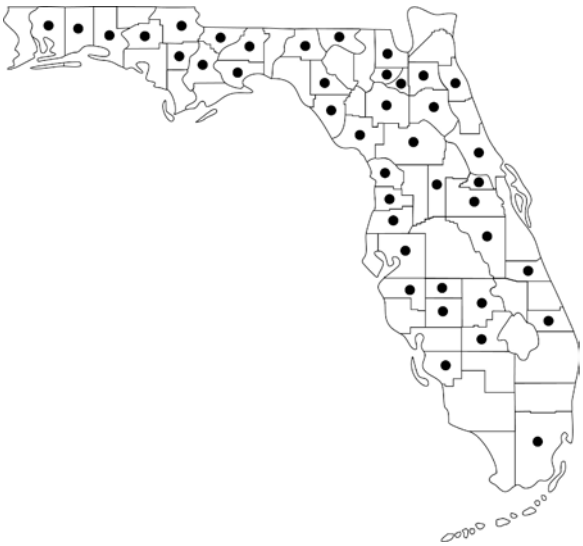
Map 10.43 *Oxyethira glasa* ♦



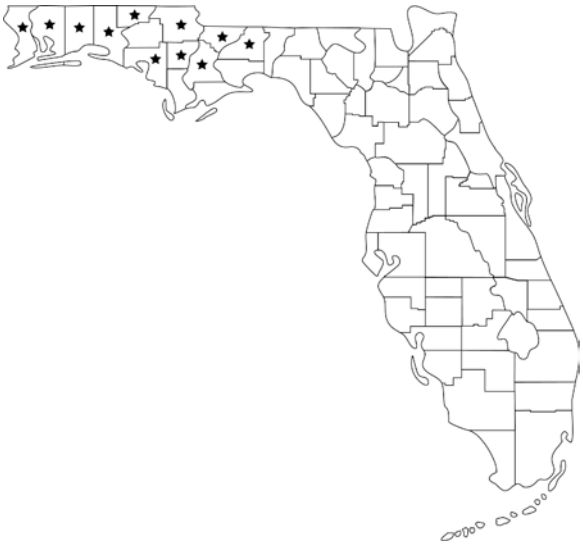
Map 10.44 *Oxyethira janella* ■



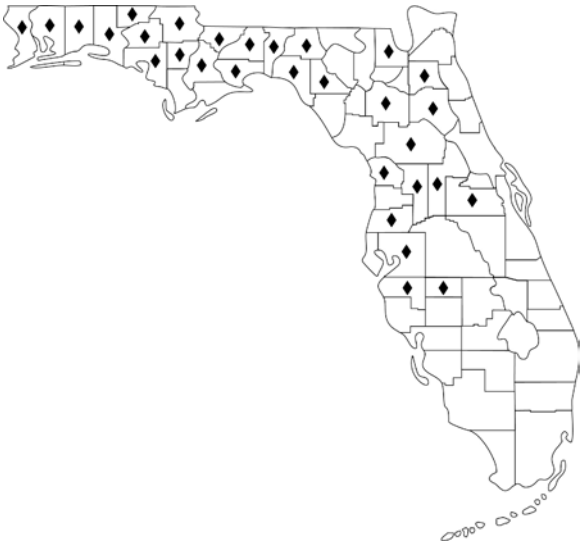
Map 10.45 *Oxyethira lumosa* ▲



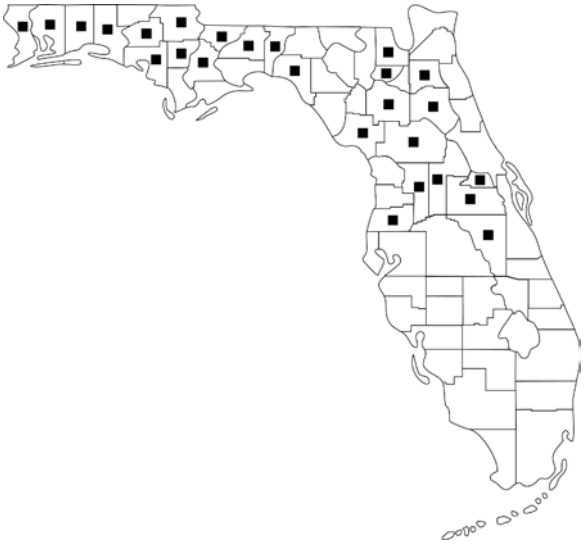
Map 10.46 *Oxyethira maya* ●



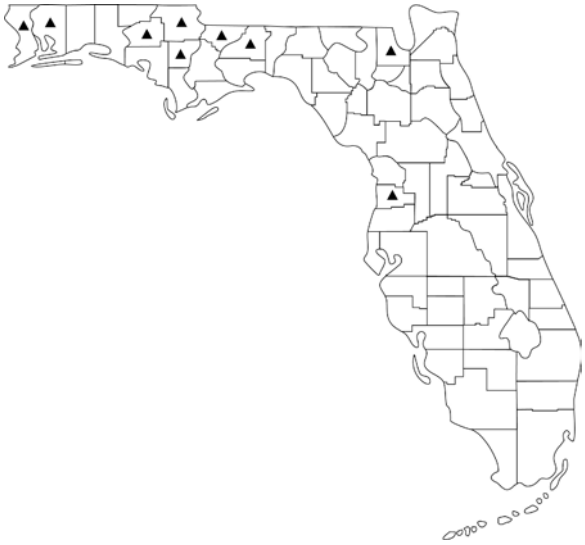
Map 10.47 *Oxyethira novasota* ★



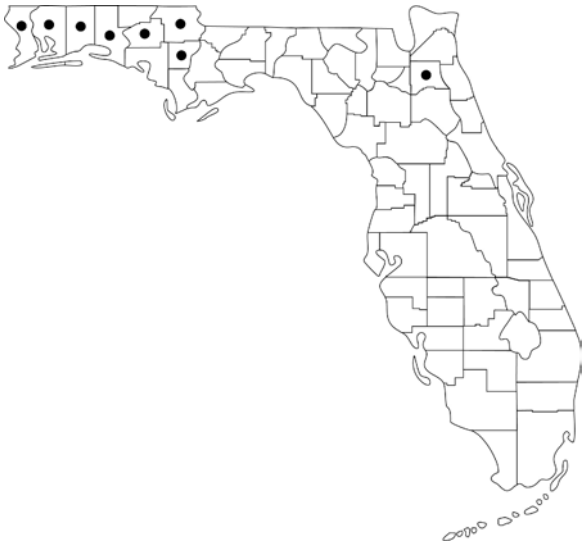
Map 10.48 *Oxyethira pallida* ♦



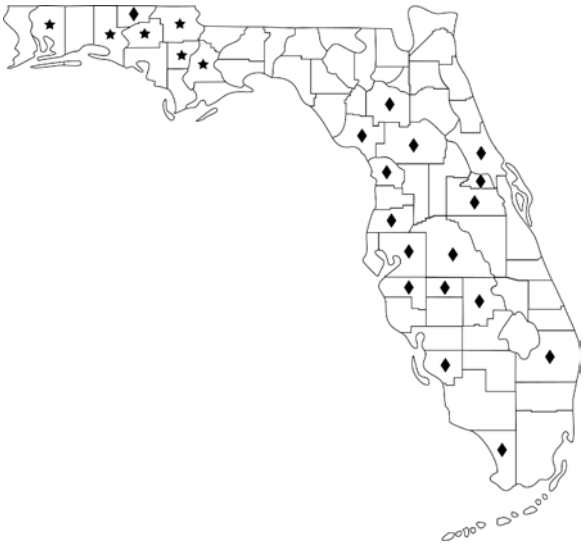
Map 10.49 *Oxyethira pescadori* ■



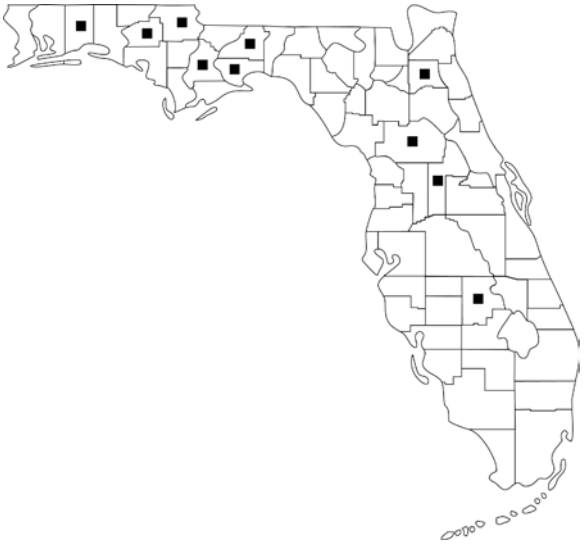
Map 10.50 *Oxyethira roberti* ▲



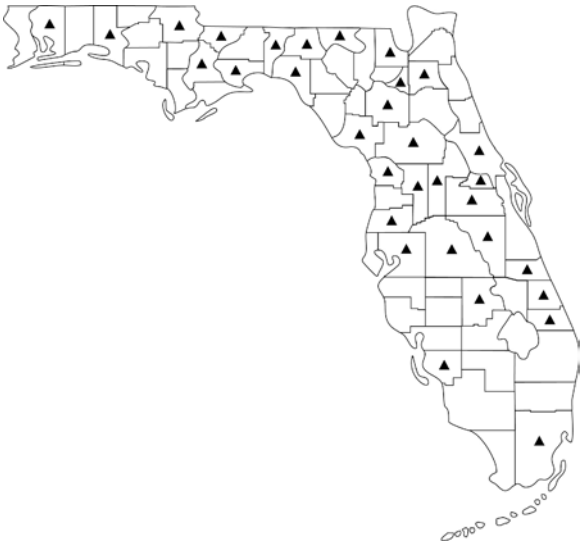
Map 10.51 *Oxyethira savanniensis* ●



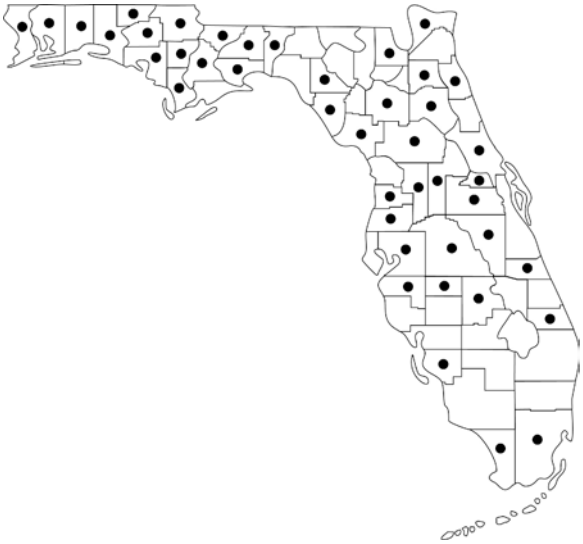
Map 10.52 *Oxyethira setosa* ★
Oxyethira simulatrix ♦



Map 10.53 *Oxyethira sininsigne* ■



Map 10.54 *Oxyethira verna* ▲



Map 10.55 *Oxyethira zeronia* ●

Genus ***Stactobiella*** Martynov

Diagnosis: Larvae of *Stactobiella* (Fig. 10.48) are recognized among hydroptilids in Florida by the thick tarsal claws each having a large, blunt basal spur (Figs 10.15, 10.49). The blunt spurs are easily discerned, being nearly as long as the claws. The larval case is purse-like and composed nearly entirely of silk (Figs 10.16, 10.48).

Fig. 10.48
Photo courtesy of Doug Post

Fig. 10.49
Photo courtesy of Doug Post

Species notes: The genus *Stactobiella* has not been reported from Florida, but both *S. palmata* and *S. martynovi* have been documented from nearby coastal Alabama counties (Harris et al., 1991). The genus would be expected to occur in the cool, spring-fed streams of the western Florida panhandle. Harris et al. (1991) reported *Stactobiella* spp. emerging early in spring through late summer.

Additional references: Ross (1944); Wiggins (1996).

FAMILY LEPIDOSTOMATIDAE

(*bizarre caddisflies*)

The family Lepidostomatidae has two North American genera, *Lepidostoma* and *Theliopsyche*, but only *Lepidostoma* (4 spp.) is represented in Florida. Lepidostomatid larvae are morphologically distinguished from the other caddisfly families by the placement of the antenna close to the anterior margin of the eye (Fig. 2.61), and the lack of a median dorsal hump on abdominal segment I (Fig. 2.61). Late-instar larvae of *Lepidostoma* typically construct four-sided panel cases of plant materials, and the early instars of some species build cylindrical cases of sand (Wiggins, 1996); larvae of *Theliopsyche* build cylindrical cases using mineral materials.

Genus ***Lepidostoma*** Banks

Diagnosis: Larvae of *Lepidostoma* (Fig. 11.1) are distinguished from *Theliopsyche* as follows: longer body length (approximately 10 mm); rounded dorsal profile of head; and ventral apotome of head as long as, or longer than, median-ecdysial line. The distinctive larval case of most species is four-sided and constructed of wood (bark or leaves) panels (Fig. 11.2).

Fig. 11.1 *Lepidostoma* sp.

Fig. 11.2 *Lepidostoma flinti* case, ventral
Photo courtesy of James C. (Skip) Hodges, Jr.

Species notes: The four species of *Lepidostoma* (*L. carrolli*, *L. latipenne*, *L. morsei*, *L. wigginsi*) presently known to occur in Florida (Maps 11.1, 11.2) can be determined only from the adult stage. *Lepidostoma latipenne* appears to be restricted in Florida to spring-fed streams within the Apalachicola ravines, whereas *Lepidostoma morsei* and *L. wigginsi* (= *L. serratum* Flint & Wiggins) occur in ravine-head springruns across much of the panhandle (Rasmussen, 2004). Previous reports of *L. griseum* from Florida are erroneous (Rasmussen and Harris, 2016) and were misidentifications of *Lepidostoma morsei*. Described by Weaver (1988), *L. morsei* was described based, in part, on adult paratypes collected in Walton Co., (Portland, Little Alaqua Ck). *Lepidostoma carrolli* is known in Florida from only single stream in Calhoun County (Denson et al., 2016). In North America the larvae of *Lepidostoma* have been collected from a wide variety of habitats ranging from small cool springs and streams, intermittent streams, backwater areas of rivers to wave-washed shores of lakes (Clifford, 1966; Anderson, 1976; Barton and Hynes, 1978; Unzicker et al., 1982). In Florida we collected larvae of the genus only from small spring-fed streams. All of our collections are from the panhandle with the exception of one *Lepidostoma* larva collected from a tributary of the South Fork of Black Creek in Clay County (Map 11.2), indicating the genus is represented in the northern portion of the peninsula.

Additional references: Ross (1944); Weaver (1988); Wiggins (1996).

Map 11.1 *Lepidostoma carrolli* ▲
Lepidstoma latipenne ●

Map 11.2 *Lepidostoma morsei* ★
Lepidostoma wigginsi ♦
Lepidostoma sp. ■

FAMILY LEPTOCERIDAE

(*long-horned caddisflies*)

The Leptoceridae, a cosmopolitan and highly diverse family, are represented in Florida by six genera: *Ceraclea* (13 spp.), *Leptocerus* (1 sp.), *Nectopsyche* (6 spp.), *Oecetis* (15 spp.), *Setodes* (2 spp.), and *Triaenodes* (17 spp.). The larval taxonomy of the leptocerids is the most well known among the large caddis families in the state. Several taxonomic publications on North American larvae make it possible to identify most of the 54 Florida leptocerids to species level.

The larvae of Leptoceridae, commonly known as "long-horned caddisflies", can be distinguished from the other caddis families by the relatively long antennae, which are at least six times as long as wide (Fig. 2.10). The exception is *Ceraclea*, which have short antennae in some species, but may be identified by the dark curved lines on the posterior half of the mesonotum (Fig. 2.11).

This family, along with Hydroptilidae, is the most geographically widespread and speciose in Florida due to the wide range of environmental tolerances its species exhibit in both lotic and lentic habitats. Many species are well adapted to inhabiting the warm waters so prevalent in the state. Leptocerids occupy a number of trophic groups depending on the genus, including carnivore, herbivore, detritivore, and grazer. Larvae construct portable cases which are generally cylindrical and tapered. Case materials and structures differ among genera and species, and are often used as diagnostic characters.

KEY TO GENERA FOR LARVAE OF FLORIDA LEPTOCERIDAE

[adapted from Morse et al. (2019b)]

1. Tarsal claws of each middle leg hooked and stout (Fig. 12.1); tarsus curved; slender case of transparent silk (Figs 12.2, 12.55) . . . . . *Leptocerus*, *L. americanus* (Banks)

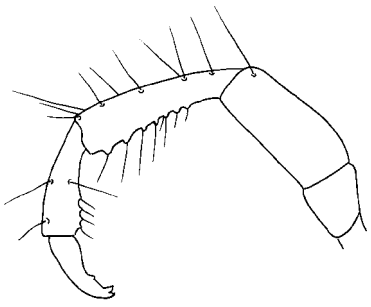


Fig. 12.1

Fig. 12.2

Tarsal claws of each middle leg slightly curved and slender (Fig. 12.3); tarsus straight 2

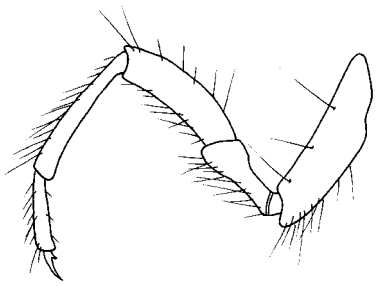


Fig. 12.3

2(1) Sclerotized, concave plate with marginal spines on each side of anal opening and exiting onto ventral lobe (Figs 12.4, 12.101C); cylindrical case of stones . . . . *Setodes* (p. 12-33)

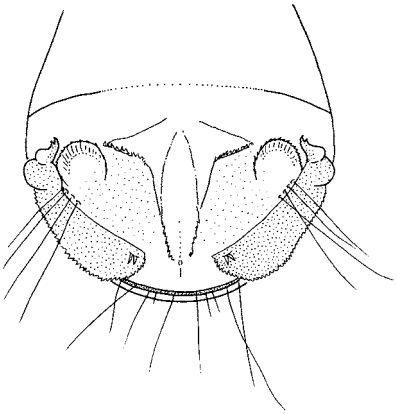


Fig. 12.4

Sclerotized, spiny plates absent, although patches of spines or setae may be present (Fig. 12.5) 3

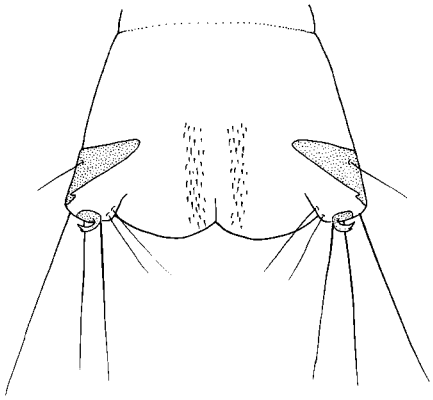


Fig. 12.5

3(2) Maxillary palpi extending far beyond labrum (Fig. 12.6); mandibles long and bladelike, with sharp apical tooth separated from remainder of teeth (Fig. 12.7); cases of various types and materials . . . . . *Oecetis* (p. 12-25)

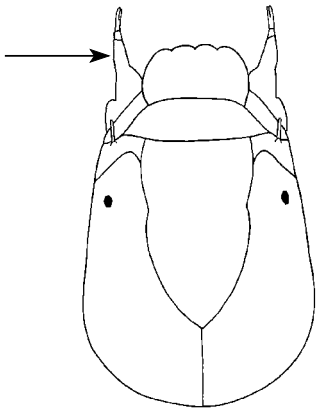


Fig. 12.6

Fig. 12.7

Maxillary palpi extending little, if any, beyond labrum (Fig. 12.8); mandibles short, wide, with teeth grouped close to apex around central concavity (Fig. 12.9) 4

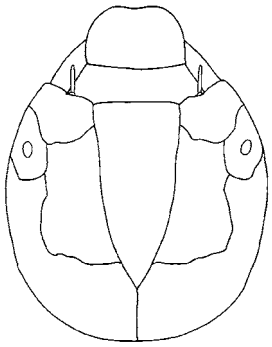


Fig. 12.8

Fig. 12.9

4(3) Mesonotum with pair of dark, curved bars on weakly sclerotized plates (Fig. 12.10); abdomen broad basally, tapering posteriorly, with gills usually in clusters of 2 or more (Fig. 12.11); cases of various shapes and materials, sometimes including spicules and pieces of freshwater sponges . . . . . *Ceraclea* (p. 12-8)

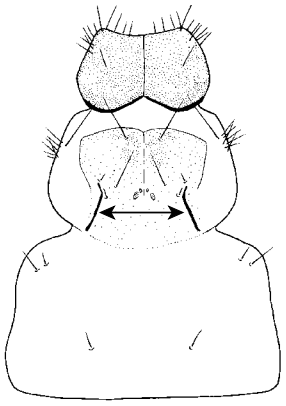


Fig. 12.10

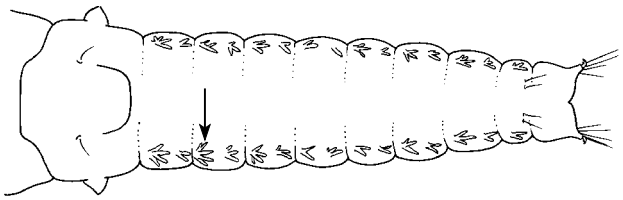


Fig. 12.11

Mesonotum without pair of dark bars (Fig. 12.12); abdominal segments I-VII more slender anteriorly, nearly parallel-sided, with gills single or absent (Fig. 12.13) 5

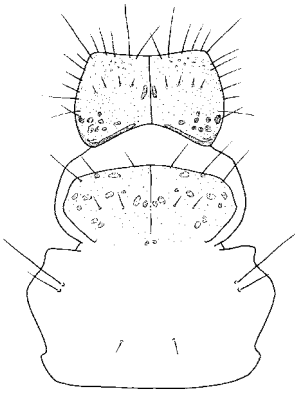


Fig. 12.12

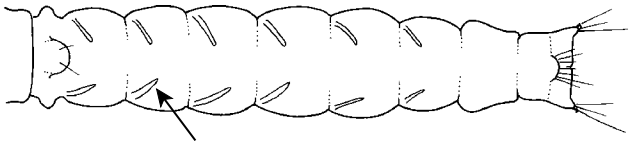


Fig. 12.13

5(4) Ventral apotome of head triangular (Fig. 12.14); tibia of each hind leg usually without apparent constriction; pair of ventral bands of uniformly small spines beside anal opening or spines absent in this position, but no lateral patches of longer spines (Fig. 12.15); slender case (except *N. pavida*, Fig. 12.58) of plant fragments, fine sand, and/or diatoms with usually twigs or conifer needles extending length of case and beyond at one or both ends (Fig. 12.16) . . . . . *Nectopsyche* (p. 12-17)

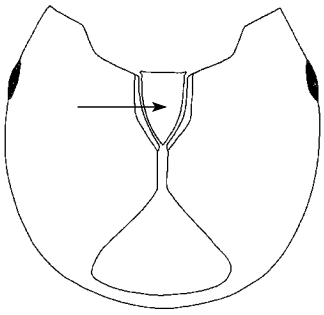


Fig. 12.14

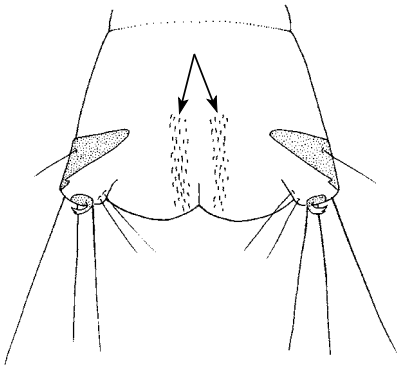


Fig. 12.15

Fig. 12.16

Ventral apotome of head rectangular (Fig. 12.17); tibia of each hind leg with translucent constriction, apparently dividing it into 2 subequal parts (Fig. 12.18); patch of longer spines laterad of each band of short anal spines (Fig. 12.19); case a spiral of plant pieces (Fig. 12.20) . . . . . *Triaenodes* (p. 12-40)

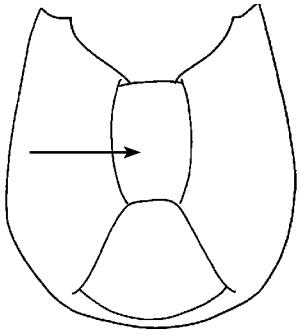


Fig. 12.17

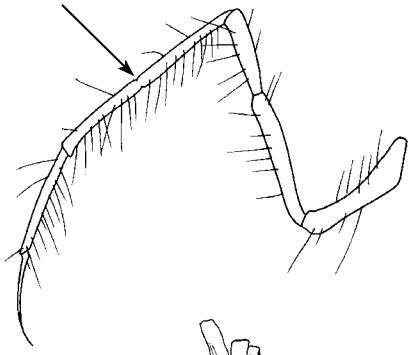


Fig. 12.18

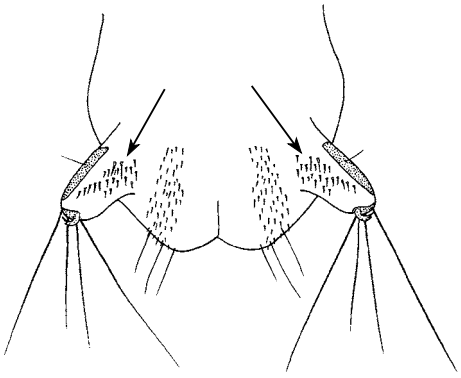


Fig. 12.19

Fig. 12.20

Genus ***Ceraclea*** Stephens

Diagnosis: Larvae of *Ceraclea* (Fig. 12.21) are distinguished from other leptocerid genera by the presence of a pair of dark curved bars on the mesonotum (Fig. 12.10). Larvae are stout bodied, widest at first abdominal segment and tapering posteriorly (Fig. 12.11). Abdominal gills are usually in clusters of two or more (Fig. 12.11).

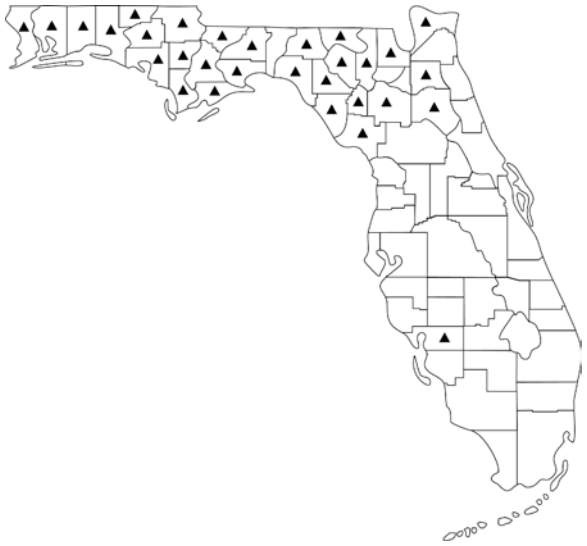
Fig. 12.21 *Ceraclea* prob. *maculata*

Species notes: Of the approximately 40 species of *Ceraclea* known from North America, we know of at least 13 species (Maps 12.1–12.12) in Florida based primarily on adult collections. *Ceraclea* spp. occur throughout the panhandle and much of the peninsula. Larvae live in a wide array of lotic and lentic habitats, although some species are restricted in habitat and geographic range, including *Ceraclea limnetes* and *C. pescadori*, which are believed to be endemic to lakes of the Florida panhandle (Rasmussen et al., 2008b; Rasmussen et al., 2025). *Ceraclea pescadori* was first collected from Lucas Lake in the Florida panhandle by James Glover. Based on larvae and reared adults, Glover determined it to be a new species. The larva was described (unpublished) and illustrated (Fig. 12.32) by Glover, and the female was described by Glover, Carnagey, and Morse in Carnagey and Morse (2006). Subsequently, adults of the same species were collected from Lucas Lake and another site and were described and named *Ceraclea pescadori* (Rasmussen et al., 2025).

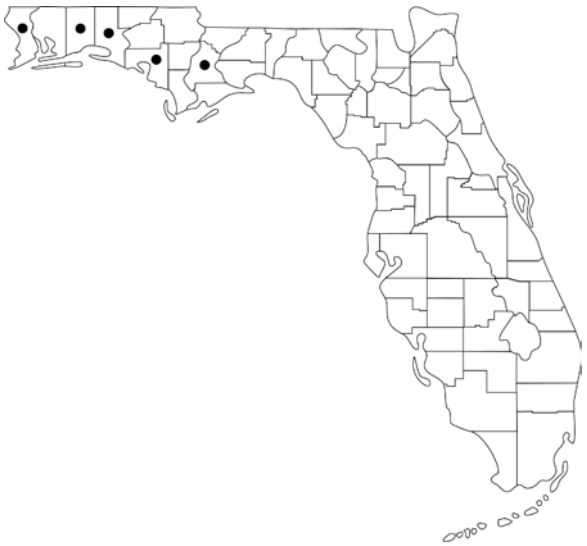
Larval feeding habits range from detritus and algal grazing to species within the *Ceraclea fulva* Group (e.g., *C. resurgens*, *C. transversa*, *C. limnetes*) which are considered obligate sponge-feeders (Resh et al., 1976). Case construction varies among species as to materials and architecture. Certain sponge-feeding species construct cases almost entirely of silk secretions, while other species incorporate mineral and plant materials to varying degrees into the silk matrix. Some species construct cornucopia-shaped cases while others construct cases which are stout and cylindrical. *Ceraclea flava* constructs a case with lateral expansions which form a dorsal awning.

Larvae of 10 of the 13 Florida species are known and identifiable to species level using the key presented below; however it should be noted that the key has not been thoroughly tested due to scarcity of larval material. *Ceraclea limnetes, C. ophioderus*, and *C. protonepha* are still unknown as larvae. Due to these taxonomic challenges, species-level identifications of *Ceraclea* larvae should be corroborated, when possible, with identifications based on the adults. *Ceraclea enodis*, included in the key below, has not been recorded from the state but is likely to occur. Adults and larvae are morphologically similar to *C. cancellata* and *C. maculata* (Whitlock and Morse, 1994).

Additional references: Resh (1976); Whitlock and Morse (1994); Morse et al. (2017).



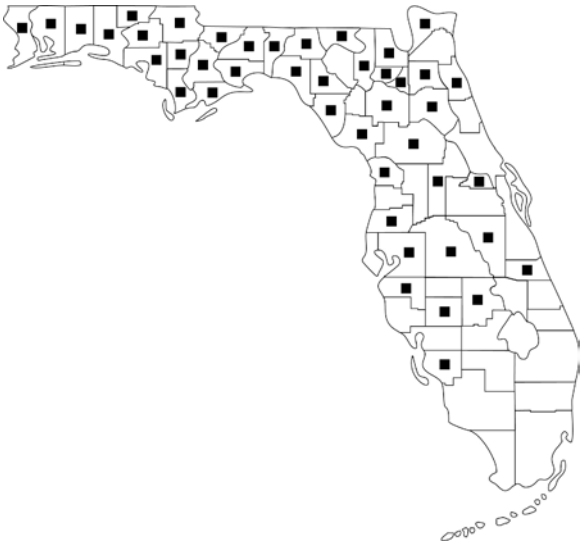
Map 12.1 *Ceraclea cancellata* ▲



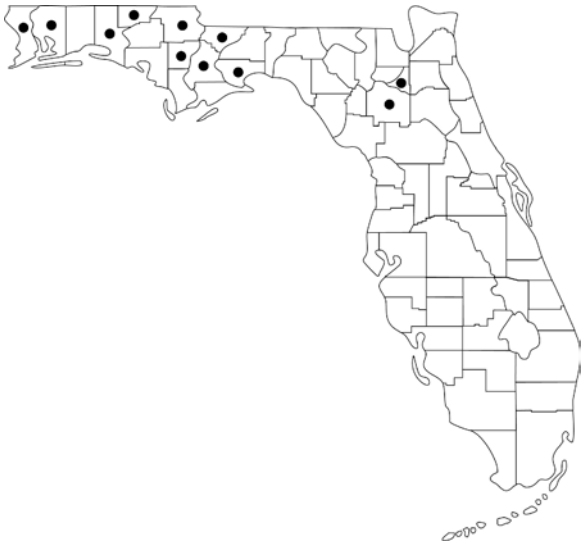
Map 12.2 *Ceraclea diluta* ●

Map 12.3 *Ceraclea flava* ★

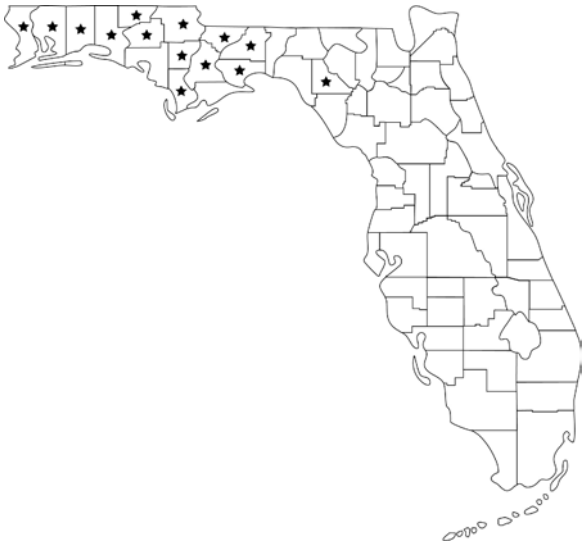
Map 12.4 *Ceraclea limnetes* ♦



Map 12.5 *Ceraclea maculata* ■

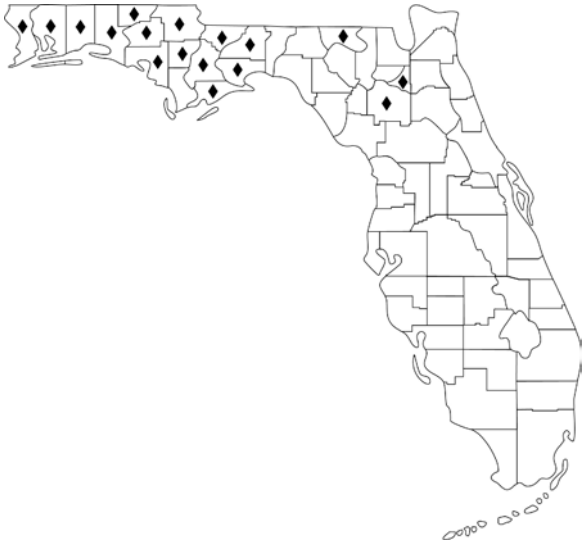


Map 12.6 *Ceraclea nepha* ●

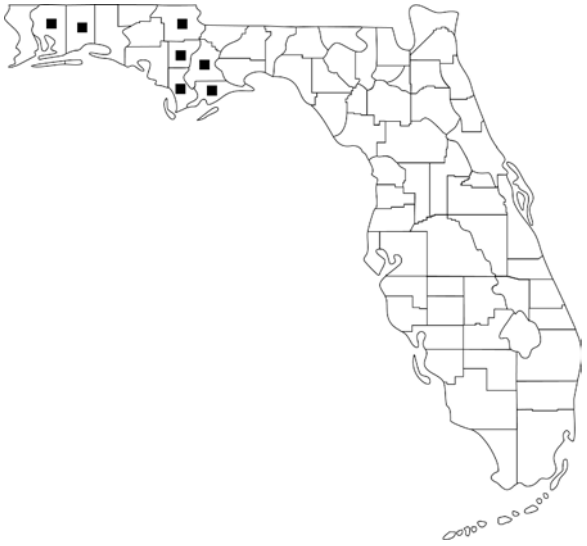


Map 12.7 *Ceraclea ophioderus* ★

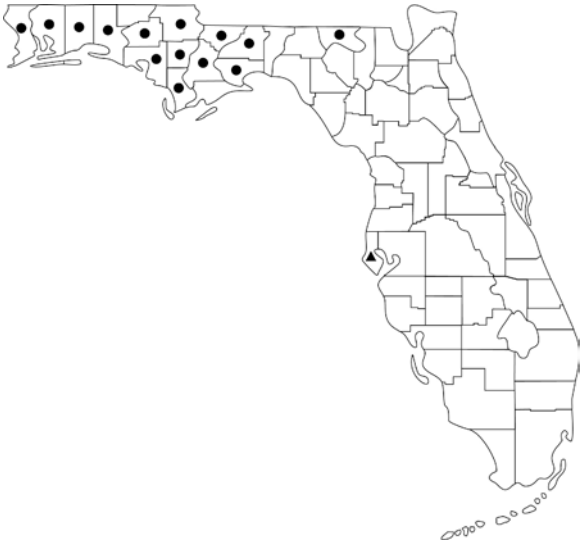
Map 12.8 *Ceraclea pescadori* ▲



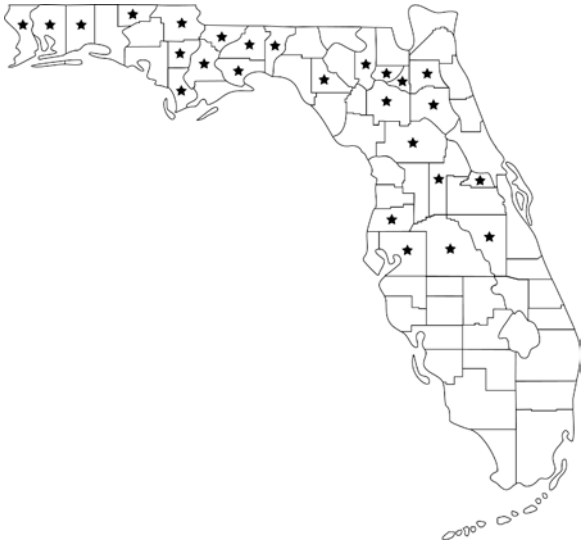
Map 12.9 *Ceraclea protonepha* ♦



Map 12.10 *Cerclea resurgens* ■



Map 12.11 *Ceraclea slossonae* ▲
Ceraclea tarsipunctata ●



Map 12.12 *Ceraclea transversa* ★

KEY TO SPECIES FOR MATURE LARVAE OF FLORIDA *CERACLEA*

[modified from Resh (1976)]

Note: Larvae of *C. limnetes*, *C. ophioderus*, and *C. protonepha* are unknown and not included in the key.

1. Parafrontal areas absent (Fig. 12.22); mesonotal bars with anterior portion yellow (Fig. 12.23); case made primarily of silk secretion, occasionally adorned with sand or pieces of freshwater sponge (Fig. 12.24); sponge feeders 2

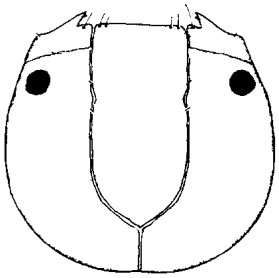


Fig. 12.22 [from Resh (1976)]

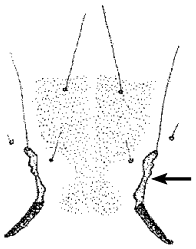


Fig. 12.23 [from Resh (1976)]

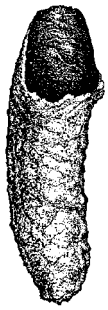


Fig. 12.24 [from Resh (1976)]

Parafrontal areas present (Fig. 12.25); mesonotal bars unicolored (Fig. 12.26); case made of silk or of sand (Fig. 12.27), pebbles, or plant material; usually detritus or algae feeders 3

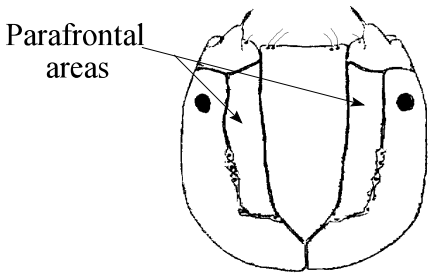


Fig. 12.25 [from Resh (1976)]

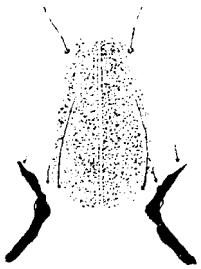


Fig. 12.26 [from Resh (1976)]

Fig. 12.27 [from Resh (1976)]

2(1) Pronotum lacking contrasting spots (Fig. 12.28); head with spots pale yellow on a yellow background (Fig. 12.29); length of last instar larva, 5–7 mm . . . . . *C. transversa* (Hagen)

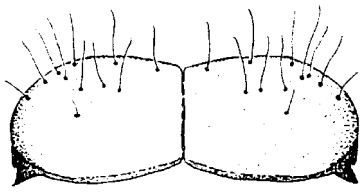


Fig. 12.28 [from Resh (1976)]

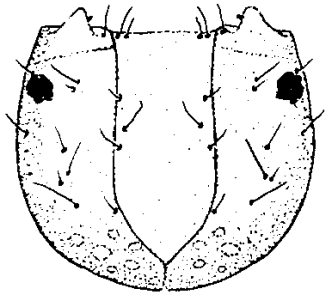


Fig. 12.29 [from Resh (197

Pronotum with some contrasting spots (Fig. 12.30); head with brown spots on yellow background (Fig. 12.31); length of last instar larva, 11–12 mm
. . . . . *C. resurgens* (Walker)

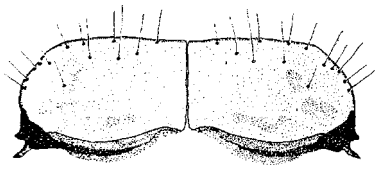


Fig. 12.30 [from Resh (1976)]

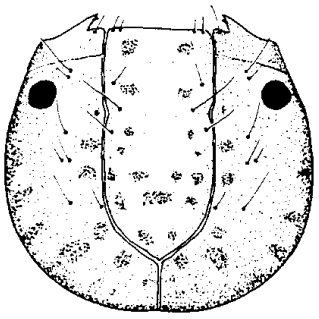


Fig. 12.31 [from Resh (1976)]

3(1) Pronotoum with distinct dark band along anterior margin (Fig. 12.32); antennae short, only about 2 times longer than wide; head, pro- and mesonotum as in Figure 12.32
. . . . . *Ceraclea pescadori* Rasmussen and Harris

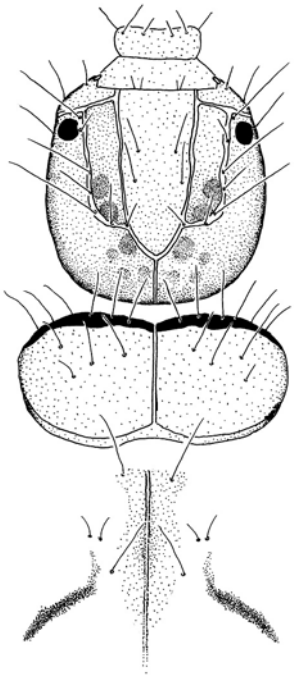


Fig. 12.32 [by J.B. Glover]

Pronotum without distinct dark band along anterior margin; antennae usually more than 2 times longer than wide 4

4(3) Mesonotum with at least 20 setae along middorsal groove (Fig. 12.33); head with longitudinal stripes (Fig. 12.34); trochantin with 2 or more dorsal setae . . . . . *C. slossonae* (Banks)

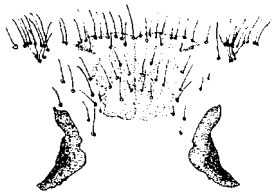


Fig. 12.33 [from Resh (1976)]

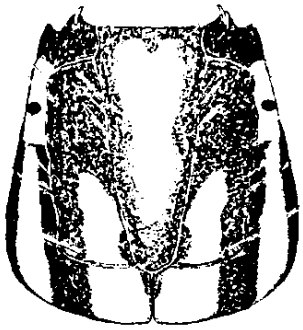


Fig. 12.34 [from Resh (1976)]

Mesonotum with only a few setae along middorsal groove (Fig. 12.35); head lacking longitudinal stripes (Fig. 12.36); trochantin with 1 dorsal seta 5

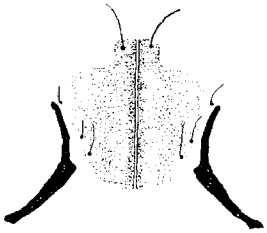


Fig. 12.35 [from Resh (1976)]

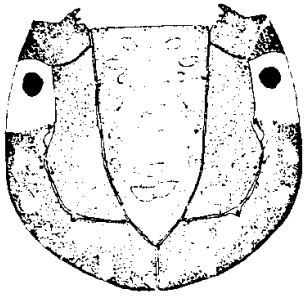


Fig. 12.36 [from Resh (1976)]

5(4) Two pairs of long setae on 9th abdominal tergite 6

One pair of long setae or setae lacking entirely on 9th abdominal tergite 10

6(5) Dorsolateral sclerite on anal leg long and rodlike (Fig. 12.37) 7

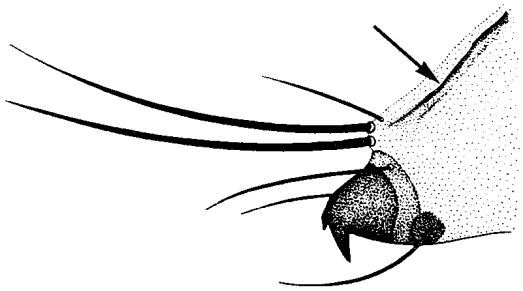


Fig. 12.37 [from Resh (1976)]

Dorsolateral sclerite not rodlike, or absent entirely (Fig. 12.38) 9

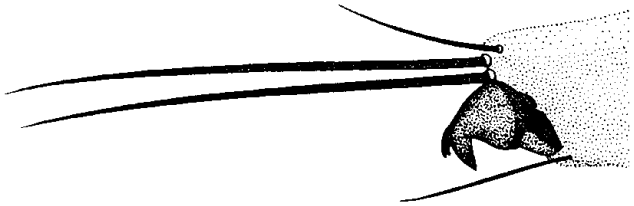


Fig. 12.38 [from Resh (1976)]

7(6) Mesonotal bars gently curved (Fig. 12.39); head lacking contrasting spots posteriorly (Fig. 12.40) . . . . . *C. cancellata* (Betten)

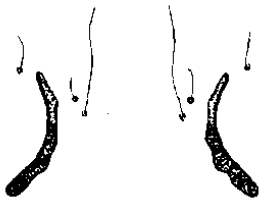


Fig. 12.39 [from Resh (1976)]

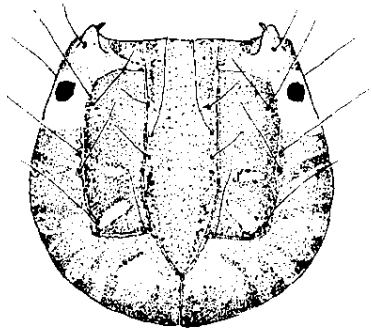


Fig. 12.40 [from Resh (1976)]

Mesonotal bars sharply angled (Fig. 12.41); head with contrasting spots posteriorly (Fig. 12.42) 8

Fig. 12.41 [from Resh (1976)]

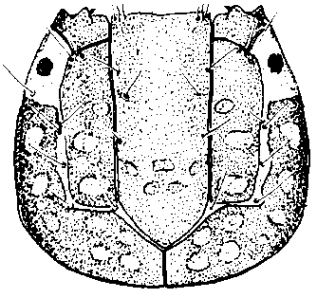


Fig. 12.42 [from Resh (1976)]

8(7) Antennae long, about 6 times longer than wide (Fig. 12.43); white region on side of head with 2 dark spots (Fig. 12.44); pronotum with about 22 setae along anterior margin (Fig. 12.45); larvae found in association with freshwater sponge . . . . . *C. enodis* Whitlock and Morse

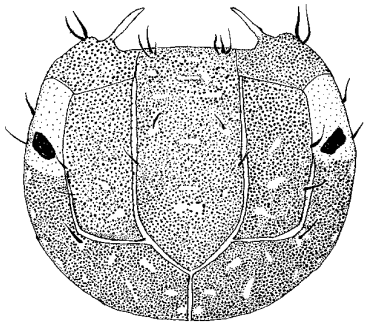


Fig. 12.43 [from Whitlock and Morse (1994)]

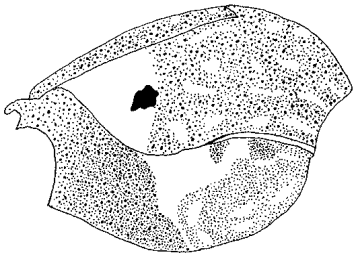


Fig. 12.44 [from Whitlock and Morse (1994)]

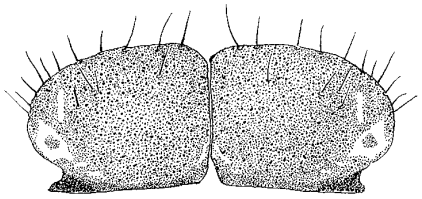


Fig. 12.45 [from Whitlock and Morse (1994)]

Antennae short, about 2 times longer than wide (Fig. 12.46); white region on side of head with 3 dark spots (Fig. 12.47); pronotum with about 28 setae along anterior margin (Fig. 12.48); larvae not found with freshwater sponge . . . . . *C. maculata* (Banks)

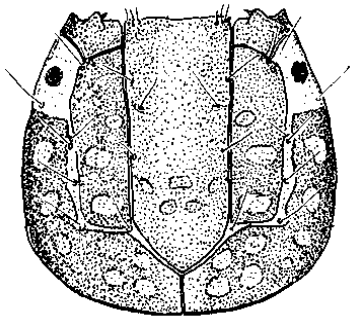


Fig. 12.46 [from Resh (1976)]

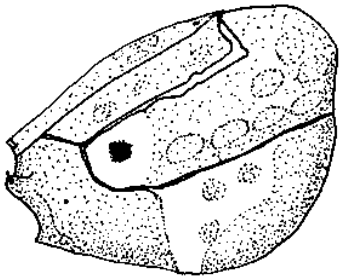


Fig. 12.47 [from Resh (1976)]

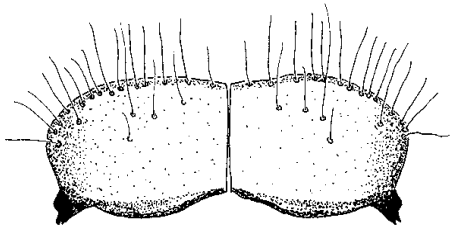


Fig. 12.48 [from Resh (1976)]

9(6) Case made of plant material (Fig. 12.49) . . . . . *C. tarsipunctata* (Vorhies)

Fig. 12.49 [from Resh (1976)]

Case made entirely of sand grains (Fig. 12.50)
. . . . . *C. nepha* (Ross)

Fig. 12.50 [from Resh (1976)]

10(5) Case with lateral expansions (Fig. 12.51); pronotum with single lateral spot surrounded by a light corona (Fig. 12.52) . . . . . *C. flava* (Banks)

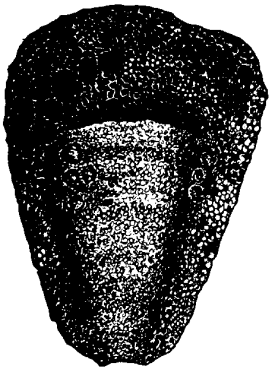


Fig. 12.51 [from Resh (1976)]

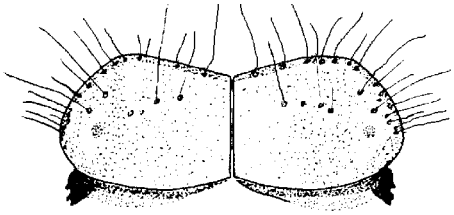


Fig. 12.52 [from Resh (1976)]

Case cornucopia-shaped, without lateral expansions (Fig. 12.53); pronotum usually lacking a lateral spot (Fig. 12.54) . . . . . *C. diluta* (Hagen)

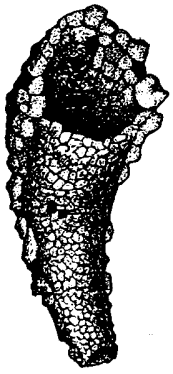


Fig. 12.53 [from Resh (1976)]

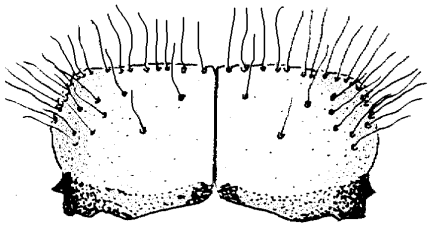


Fig. 12.54 [from Resh (1976)]

Genus ***Leptocerus*** Leach

Diagnosis: Larvae of *Leptocerus* (Fig. 12.55) are distinguishable from other leptocerid genera as follows: tarsal claw of middle leg hooked with two apical points (Fig. 12.1); and curved middle tarsi (Fig. 12.1). The middle tibiae and tarsi are each thickened and bear a ventral row of teeth with stout setae (Fig. 12.1). Larval cases are long and slender, constructed of light-weight translucent silk (Fig. 12.55).

Species notes: Only a single species, *Leptocerus americanus*, occurs in North America. Ross (1944) provided a larval description for this species. The head and pronotum have many black spots (Fig. 12.56); the hind legs have dense swimming hairs; and abdominal gills are absent.

Fig. 12.55 *Leptocerus americanus*
Photos courtesy of J.C. Morse & M.L. Ferro

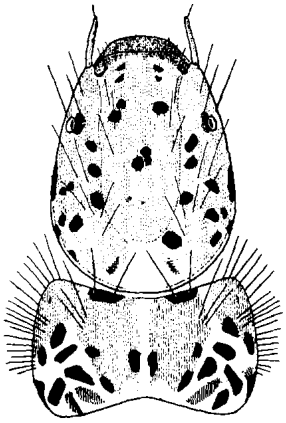


Fig. 12.56 *Leptocerus americanus*
[from Ross (1944)]

Leptocerus americanus is widespread across eastern North America and is known to occur in lakes and marshes, as well as in slow stretches of river among aquatic macrophytes (Unzicker et al., 1982). Larvae are able to swim among aquatic plants, and the modified middle tibiae and tarsi are believed to enable the larva to hold firmly in a resting position on plants (Wiggins, 1996). The species has been recorded from panhandle counties and on the peninsula as far south as Collier County (Map 12.13). These records are based primarily on collections of adults; we have examined larvae from Lake Rowell (Bradford Co.); Orange Lake (Alachua Co.); Oklawaha River (Putnam Co.) (Fig. 12.55); and Bay Lake, Orange County.

Map 12.13 *Leptocerus americanus* ▲

Additional references: Ross (1944); Wiggins (1996).

Genus ***Nectopsyche*** Müller

Diagnosis: Larvae of *Nectopsyche* (Figs 12.57, 12.58) are distinguished from other leptocerid genera as follows: hind tibiae not secondarily subdivided as in *Triaenodes* and *Setodes*; sclerotized bar and circular roughened area on each lateral hump (Fig. 12.57); unpigmented lines delimiting anterolateral corners of pronotum (Fig. 12.61); and ventral apotome triangular (Fig. 12.14).

Fig. 12.57 *Nectopsyche tavara*

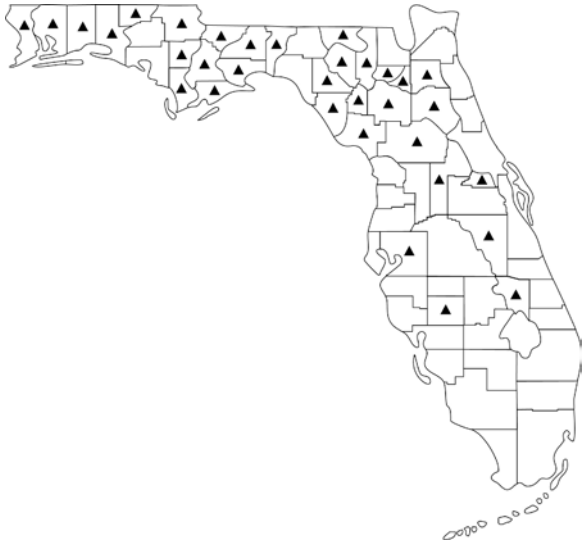
Fig. 12.58 *Nectopsyche pavida*

Species notes: Six species of *Nectopsyche* are recorded in Florida (Maps 12.14–12.19), five of which are known as larvae and presented in the key below. *Nectopsyche* larvae occur in lentic and lotic habitats throughout the state and, like most leptocerids, have a very broad range of environmental tolerances. In lentic habitats they are often associated with aquatic macrophytes. In lotic habitats they can be collected along the margins of slowly moving sections of streams and rivers.

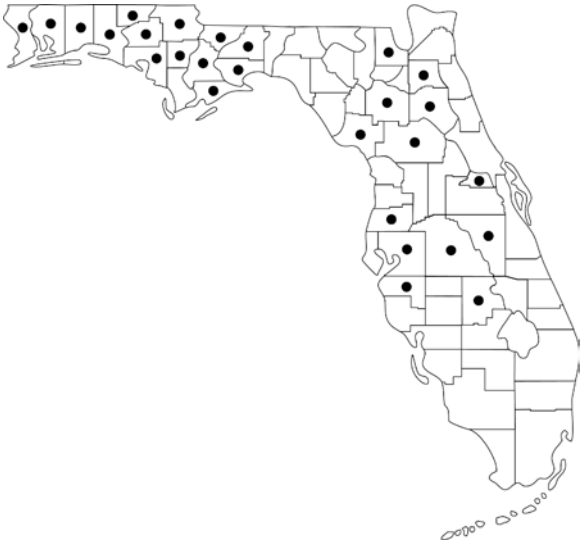
Nectopsyche pavida is widely distributed and common in lotic and lentic habitats throughout much of Florida. The relatively small larva builds a non-tapering case of plant material which is dorsoventrally compressed with uneven sides (Fig. 12.58). This is unlike larval cases of other *Nectopsyche* species that are typically long and slender, made with sand grains and/or plant materials incorporated into the matrix, sometimes with stems or pine needles extending beyond either end (Fig. 12.16).

Nectopsyche candida and *N. exquisita* are larger and closely related species that may be difficult to separate. Adult records indicate that *N. candida* is the more common of the two species, while larval records of *N. exquisita* on the peninsula based on the dark banding of the legs provide contradictory evidence. Studies involving larval/adult associations are needed of peninsular populations to better understand variabilty in leg banding of these two species. *Nectopsyche tavara* is endemic to lakes of peninsular Florida and is widespread over most of the peninsula. We have examined larvae collected from several lakes in Highlands County, Lake Samson, Bradford County, as well as larvae associated with *Najas* sp., collected from Lake Okeechobee, Glades County. Adults of *N. tavara* have been reported to emerge from March to October, with peak emergence occurring in early July (Daigle and Haddock, 1981). The larva of *Nectopsyche paludicola* was described by Glover and Floyd (2004). Harris et al. (1991) reported that this species is endemic to small coastal streams of Alabama and the western portion of the Florida panhandle. *Nectopsyche paludicola* is especially abundant in sandhill streams on Eglin Air Force Base. *Nectopsyche spiloma*, unknown as larvae, has been infrequently collected as adults primarily from rivers in the panhandle.

Additonal references: Ross (1944); Haddock (1977); Daigle and Haddock (1981); Glover and Floyd (2004).

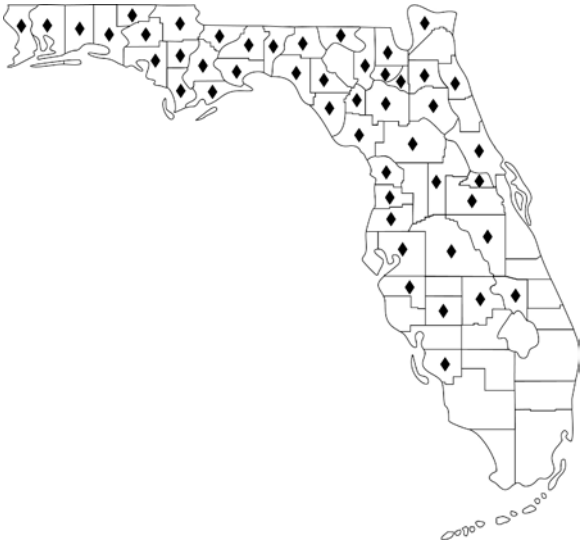


Map 12.14 *Nectopsyche candida* ▲

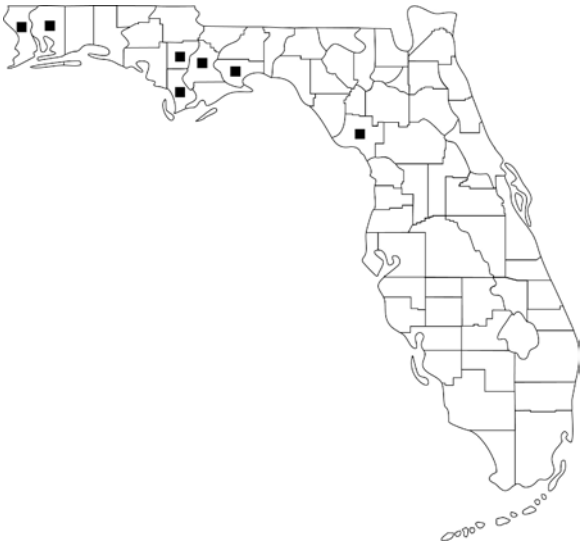


Map 12.15 *Nectopsyche exquisita* ●

Map 12.16 *Nectopsyche paludicola* ★



Map 12.17 *Nectopsyche pavida* ♦



Map 12.18 *Nectopsyche spiloma* ■

Map 12.19 *Nectopsyche tavara* ▲

KEY TO SPECIES FOR LARVAE OF FLORIDA *NECTOPSYCHE*

[adapted from Glover and Floyd (2004)]

Note: The larva of *N. spiloma* is unknown and not included in the key.

1. Metasternum with 2 setae (Fig. 12.59); case sometimes dorsoventrally compressed 2

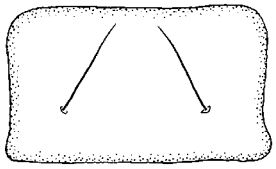


Fig. 12.59

Metasternum with more than 2 setae; case never dorsoventrally compressed 3

2(1) Head with pattern of dark pigmentation (Fig. 12.60); case dorsoventrally compressed, with uneven sides, made entirely of plant materials, such as leaf fragments (Fig. 20.58) . . . . . *N. pavida* (Hagen)

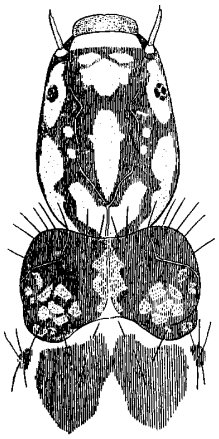


Fig. 12.60 [from Ross (1944)]

Head only slightly pigmented, patterned with small dark spots (Fig. 12.61); case tubular, often with twigs extending from end . . . . . *N. paludicola* Harris

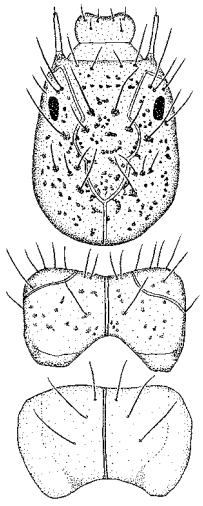


Fig. 12.61

3(1) Metasternum with more than 20 setae (Fig 12.62); head with sharply contrasting light muscle scars against a darker background (Fig. 12.63) . . . . . *N. tavara* (Ross)

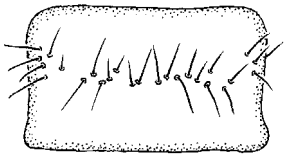


Fig. 12.62

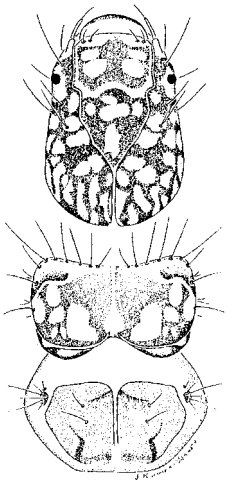


Fig. 12.63 [from Daigle and Haddock (1981)]

Metasternum with less than 15 setae, usually 8-10; head pattern variable but usually appearing reticulate, without well-defined muscle scars 4

4(3) Mid- and hind legs with conspicuous dark bands at joints (Fig. 12.64) . . . . . *N. exquisita* (Walker)

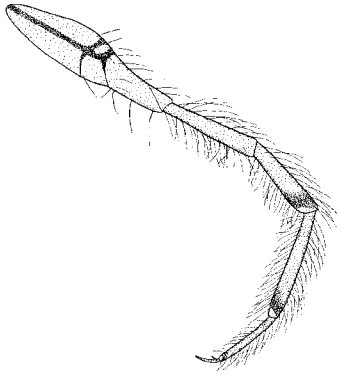


Fig. 12.64

Legs without dark banding (Fig. 12.65) . . . . . *N. candida* (Hagen)

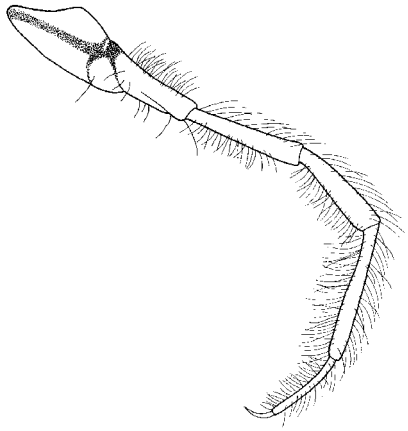


Fig. 12.65

Genus ***Oecetis*** MacLachlan

Diagnosis: Larvae of *Oecetis* (Fig. 12.66) are easily distinguished from other leptocerid genera as follows: maxillary palpi which extend beyond labrum (Fig. 12.6); and long knife-like mandibles with sharp apical tooth separated from remainder of teeth (Fig. 12.7).

Fig. 12.66 *Oecetis cinerascens*

Species notes: Of the approximately 30 species of *Oecetis* in North America, north of Mexico, 15 nominal species and several larval morphospecies are known to occur in Florida (Maps 12.20–12.37). The publication by Floyd (1995) provided descriptions and a larval key for 22 North American species, along with notes on biology and distribution. Floyd's key covered 14 of the 19 Florida species, including four morphospecies belonging to the *Oecetis inconspicua* Complex.

Larvae of *Oecetis* are predatory, as evidenced by their elongate bladelike mandibles (Fig. 12.7), making them unique among Leptoceridae. Along with the leptocerid genera *Nectopsyche* and *Triaenodes*, *Oecetis* larvae are commonly collected in benthic samples from diverse lotic and lentic freshwater habitats. Additionally, adults have been frequently collected in coastal areas, suggestive that larvae of some species may be tolerant of brackish water (Floyd, 1995). Case construction is highly variable among species in terms of materials and architecture.

Oecetis avara - A widespread species across North America; within Florida, it occurs primarily in large spring runs and calcareous rivers of northern Florida such as the Chipola, Wakulla, Aucilla, Santa Fe, Suwannee, Silver, and Rainbow rivers. *Oecetis avara* is easily distinguished by the two groups of micro-hooks present on abdominal segment I (Fig. 12.67).

Oecetis cinerascens (Fig. 12.66) - One of the most commonly collected *Oecetis* species in Florida. It is widepread throughout the state and can be found in lentic and lotic environments including canals. Larvae are often associated with aquatic macrophytes. The brown head with pale muscle scars is distinctive and makes identification easy (Figs 12.72, 12.73).

Oecetis daytona - Larvae are unknown. This rare species is endemic to the Southeastern Coastal Plain. Adults are recorded in Florida from lotic habitats scattered across Florida as far south as Lee County. Larvae are likely to show similarities with other Florida species (*O. avara*, *O. osteni*, *O. parva*) that belong to the same subgenus (*Pseudosetodes*).

Oecetis densoni - Larvae are unknown. The adult stage was described by Rasmussen and Harris in Rasmussen et al. (2025). Adults were collected from clear lakes in several localities across northern Florida from the Ocala National Forest to Washington County in the western panhandle. Morphology and genetic sequencing indicate that *O. densoni* is a sister species to *O. cinerascens*. Association (molecular and/or rearing) of the larvae with adults is necessary before the larval stage can be identified, described, and diagnosed.

Oecetis ditissa - Larvae are unknown. Adults have been recorded from many streams and rivers across northern Florida into central Florida. It has a similar distribution to *O. nocturna* and populations of the two species are often sympatric.

Oecetis georgia - Endemic to the southeastern United States. According to Floyd (1995), this species is strictly lotic, usually found on root mats and snags. Larvae are common in blackwater streams in northern Florida. Larvae most resemble *Oecetis persimilis* but, unlike *O. persimilis*, *O. georgia* larvae lack dark muscle scars on the head (Fig. 12.78).

Oecetis inconspicua Complex - Floyd (1995) presented substantial evidence to support the notion that *Oecetis inconspicua* represents a complex of cryptic species, which as adults are very difficult to distinguish but as larvae are morphologically distinct. Floyd (1995) associated seven different species with distinctive larvae, which as adults fit the description of *Oecetis inconspicua*. The species complex hypothesis is further supported by the fact that *Oecetis* spp. are widespread throughout North America and vary genetically and morphologically in terms of genitalic structure and overall size of the adults.

Oecetis inconspicua - The actual larval identity of *O. inconspicua* is unknown until further investigations and taxonomic revisions of member species are completed.

Oecetis sp. A - Floyd (1995) reported this species from only Alabama and South Carolina; however the species appears to be widespread in Florida. We have examined specimens from Escambia and Walton counties in North Florida, as well as Desoto, Glades, and Hendry counties in South Florida. Larvae were collected from small to medium-size rivers.

Oecetis sp. C - Floyd's (1995) larval associations were made from specimens collected from two small ponds in Clay Co. We have examined specimens collected from Lake Placid and Lake Grassy, Highlands Co., and Santa Fe Lake, Alachua County. The species has not been reported from any states other than Florida. Larvae are easily distinguished by the dense patch of setae on the meso- and metasterna.

Oecetis sp. E - Jain et al. (2020) reported this species from two ponds within the Munson Sandhills (Leon Co.), and we have an additional record from Taylor County. Floyd (1995) reported this species from emergent grasses in two Carolina Bay lakes in South Carolina.

Oecetis sp. F - The larval association made by Floyd (1995) is based on specimens collected from Lake Tohopekaliga (Osceola Co.). Our records are from the Blackwater River (Okaloosa Co.) and several southern Florida records from canals, a wet marsh, and Lake Okeechobee.

Oecetis nocturna - This species is widespread across northern Florida into central Florida. Our adult collections were all taken from streams and rivers, although Floyd (1995) reports the species also occurs in lentic habitats. The larval case is easily recognized by the laterally attached ballast stones (Figs 12.87, 12.88).

Oecetis osteni - Widespread throughout Florida, inhabiting both lentic and lotic habitats, often in association with aquatic vegetation. Larvae are easily recognized by the irregular darkened areas on the mesonotum (Fig. 12.79).

Oecetis parva - This tiny species is endemic to the southeastern coastal plain and has been recorded from Alabama, Florida, Georgia, and South Carolina (Burington et al., 2011). Floyd's (1995) larval-adult association is based on larvae collected from Lucas Lake, Washington County that were found attached to *Myriophylum laxum*. Our adult collection records indicate that *Oecetis parva* occurs in healthy lakes and ponds across northern and central Florida. Larvae can be recognized by their small size, long antennae, and case structure (Figs 12.82–12.84).

Oecetis persimilis - Widespread and common throughout much of Florida as well as the eastern United States. Larvae occur in a wide array of lotic habitats. This species is morphologically similar to *O. georgia* but can be distinguished by the presence of dark muscle scars on the head (Fig. 12.77).

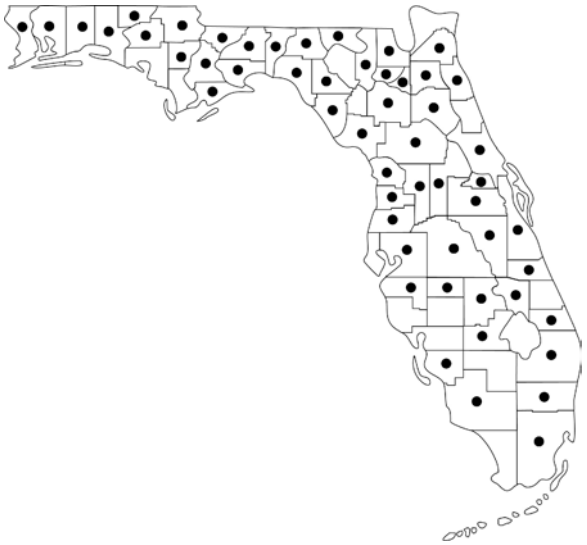
Oecetis porteri - Endemic to the southeastern United States, this species has been recorded from Florida, Alabama, and North Carolina. Floyd (1995) reported this species from numerous natural sand-bottomed lakes throughout much of Florida. We have examined specimens collected from Lake Josephine, Lake Clay, and Lake Annie in Highlands Co.; Santa Fe Lake, Alachua Co.; as well as specimens associated with *Eleocharis* sp. and *Utricularia* sp. collected from Lake Okeechoobee. Larvae are immediately recognizable by the reddish brown reticulations on the head and pronotum (Figs 12.89, 12.90).

Oecetis pratelia - Larvae are unknown. This species is known only from the holotype specimen collected from Hendry Co., and described by Denning (1948). The species may be extinct.

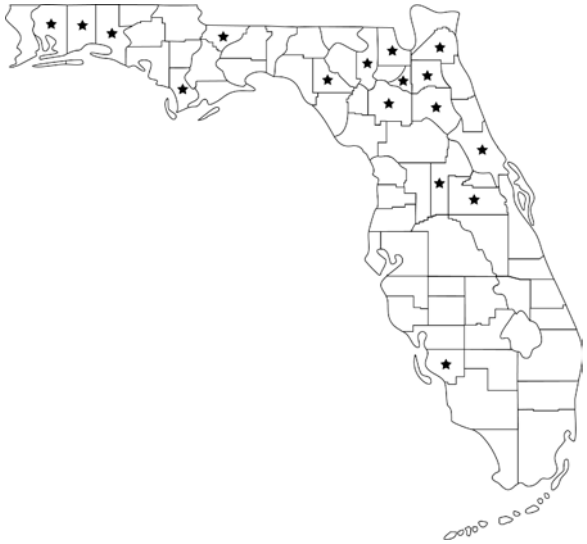
Oecetis sphyra/*morsei* - The head coloration pattern and the elongate dark sclerite on the lateral humps (Figs 12.68, 12.69) allow for easy identification of these two species. However, unlike the adults, larvae of the two species cannot be distinguished Floyd (1995). We have collected adults of *O. morsei* from Brushy and Pine Barren creeks in Escambia Co., as well as Turkey Creek in Okaloosa County. These records were based on single specimens within samples containing large numbers of *O. sphyra*, suggestive to us that the Florida specimens of *O. morsei* may in fact be a morphological variant of *O. sphyra* (Rasmussen et al., 2025). Previously, *O. morsei* was recorded (as *Oecetis* n. sp.) from Ramer Branch on Eglin Air Force Base, Okaloosa Co. (Harris et al., 1982). The Liberty and Putnam county records of *O. morsei* are unconfirmed accounts listed as *Oecetis* n. sp. by Gordon (1984). In contrast, the adult records for *O. sphyra* indicate this species is widespread and common across the Florida panhandle, occurring in creeks and medium-size rivers. Given that *O. sphyra* adults are far more commonly collected than *O. morsei*, larvae collected from the panhandle that key out to *O. sphyra*/*morsei* are most likely to be *O. sphyra*.

Additional references: Ross (1944); Floyd (1995).

Map 12.20 *Oecetis avara* ▲

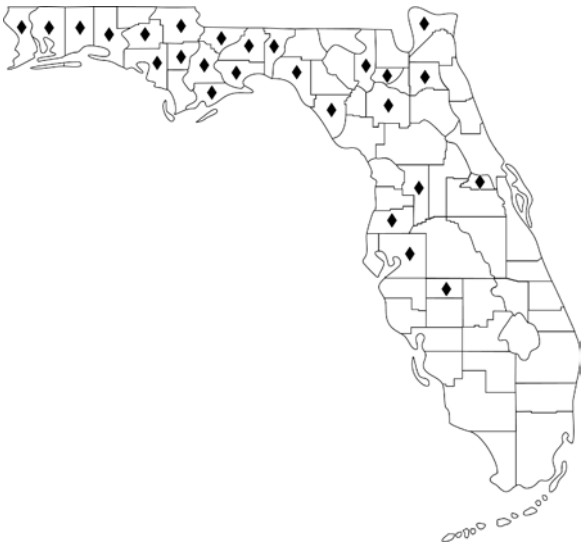


Map 12.21 *Oecetis cinerascens* ●

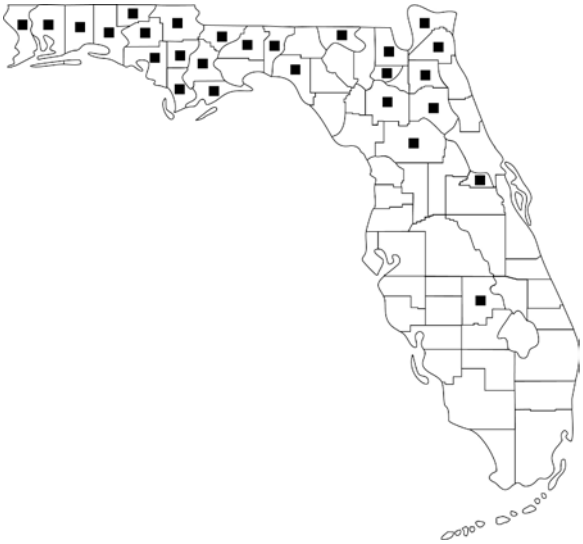


Map 12.22 *Oecetis daytona* ★

Map 12.23 *Oecetis densoni* ▲

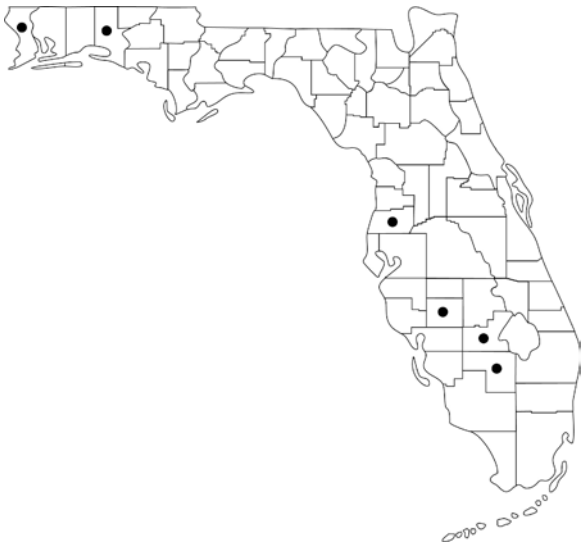


Map 12.24 *Oecetis ditissa* ♦



Map 12.25 *Oecetis georgia* ■

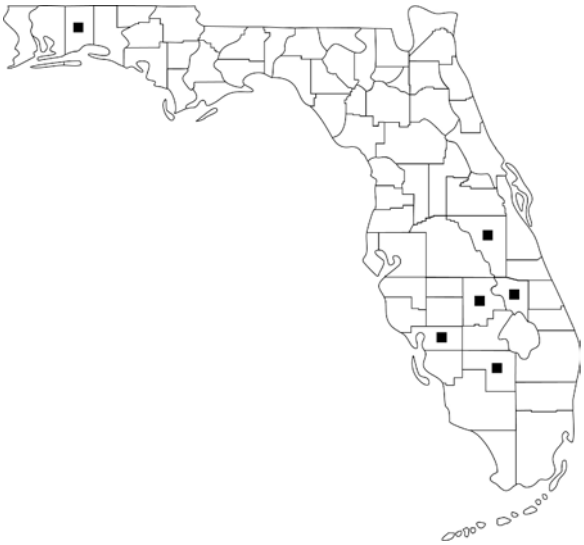
Map 12.26 *Oecetis inconspicua* ▲



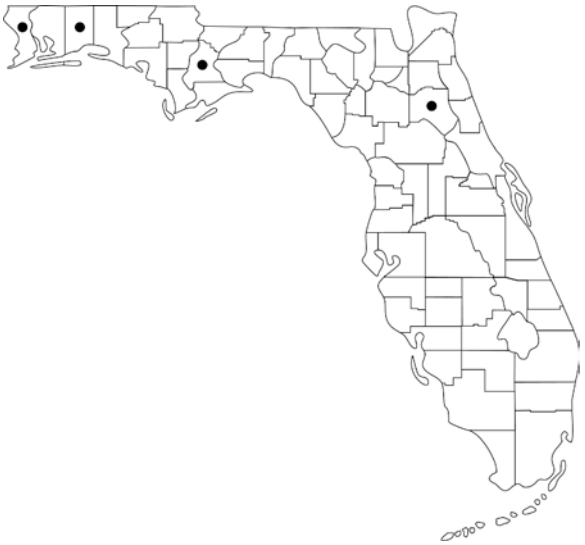
Map 12.27 *Oecetis inconspicua* Complex sp. A

Map 12.28 *Oecetis inconspicua* Complex sp. C

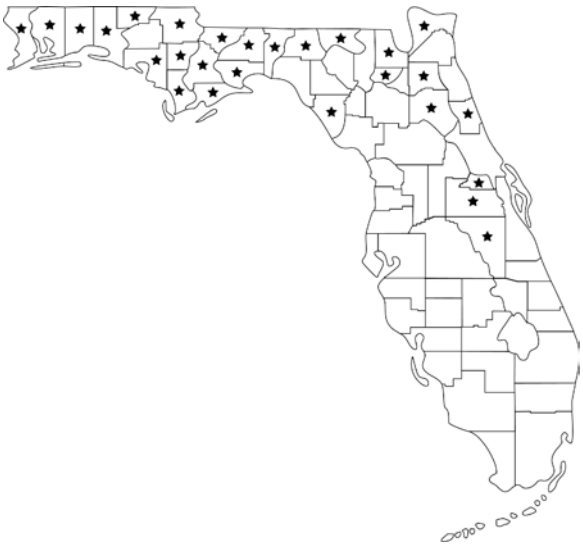
Map 12.29 *Oecetis inconspicua* Complex sp. E



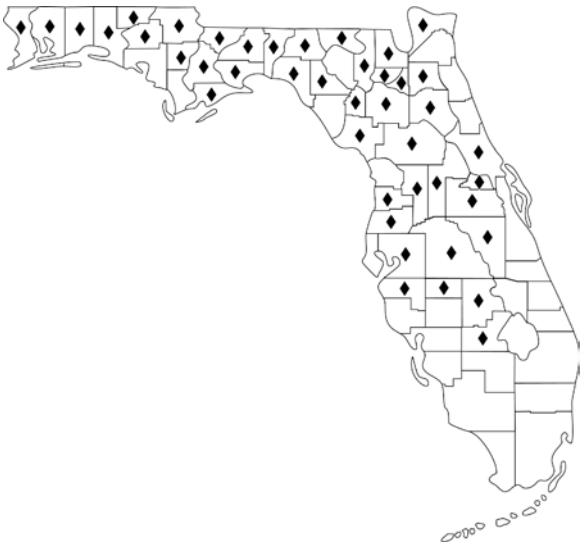
Map 12.30 *Oecetis inconspicua* Complex sp. F



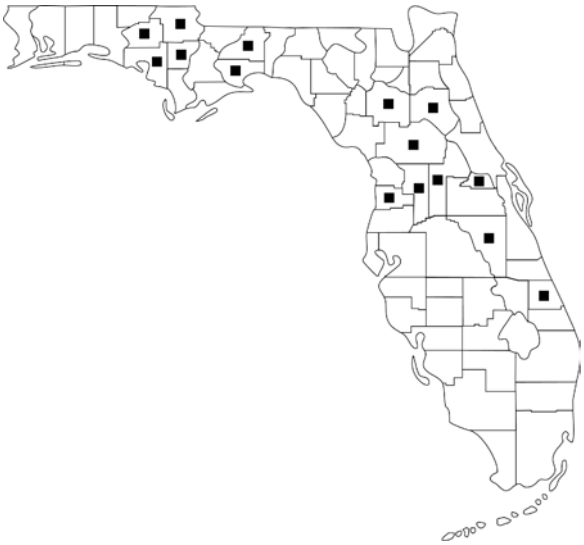
Map 12.31 *Oecetis morsei* ●



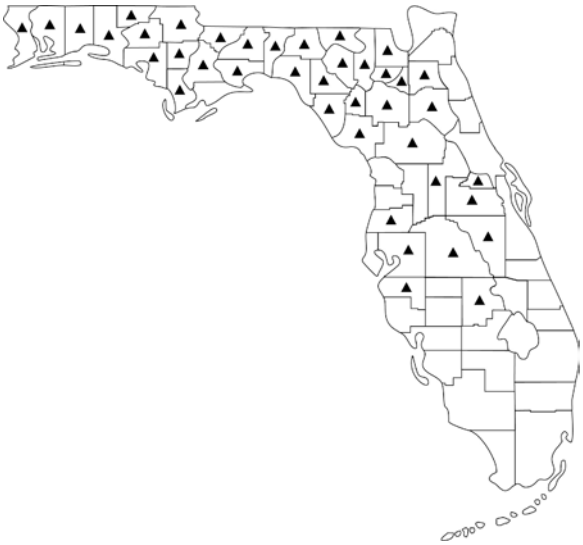
Map 12.32 *Oecetis nocturna* ★



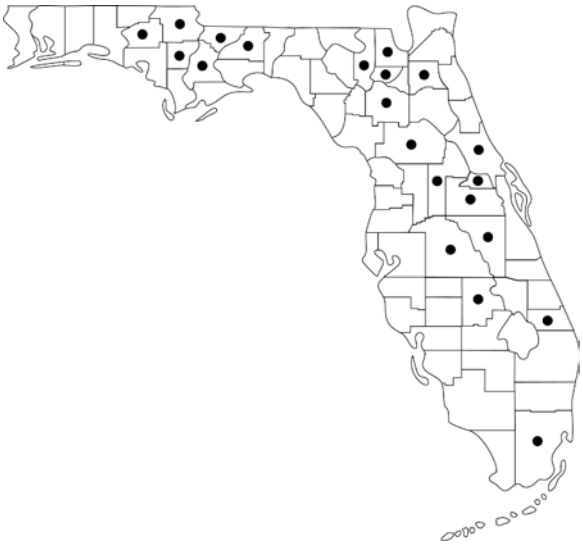
Map 12.33 *Oecetis osteni* ♦



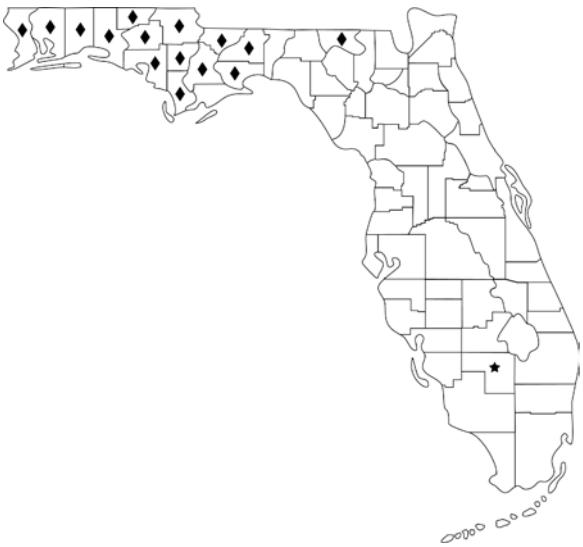
Map 12.34 *Oecetis parva* ■



Map 12.35 *Oecetis persmilis* ▲



Map 12.36 *Oecetis porteri* ●



Map 12.37 *Oecetis pratelia* ★
Oecetis sphyra ♦

KEY TO SPECIES FOR LARVAE OF FLORIDA *OECETIS*

[modified from Floyd (1994, 1995)]

Note: Larvae of *O. daytona*, *O. densoni*, *O. ditissa*, *O. inconspicua*, *O. pratelia* are unknown.

1. Dorsal hump of abdominal segment I with 4–6 rows of micro-hooks within sclerotized areas on each side (Fig. 12.67) . . . . . *O. avara* (Banks)

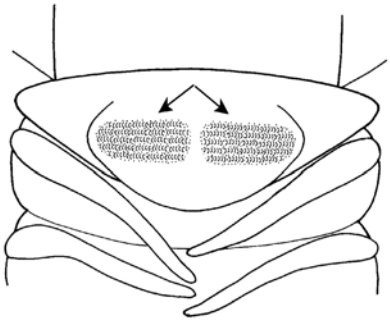


Fig. 12.67

Dorsal hump of abdominal segment I without micro-hooks. 2

2(1) Postgenal sclerites demarcated by distinctive brown and pale areas (Fig. 12.68); lateral hump of abdominal segment I with dark, elongate sclerite (LS) (Fig. 12.69) . . . . . *O. sphyra*/*morsei*

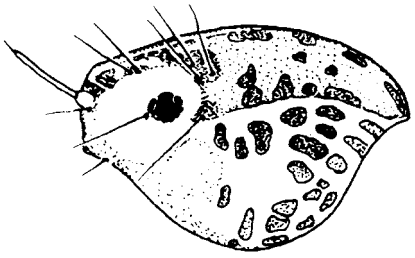


Fig. 12.68 [from Floyd (1994)]

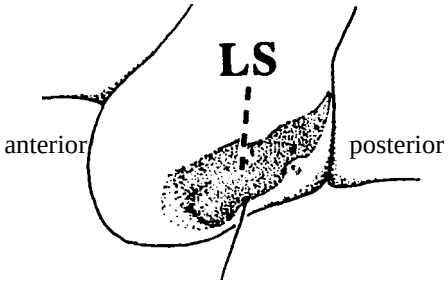


Fig. 12.69 [from Floyd (1994)]

Postgenal sclerites not demarcated by dark and pale areas, shape of lateral sclerite of abdominal segment I variable 3

3(2) Metasternum with 2 setae; swimming hairs present on hind tibiae (Fig. 12.70); hind tarsi longer than tarsal claws (Fig. 12.70); case constructed of root or plant fragments placed transversely 4

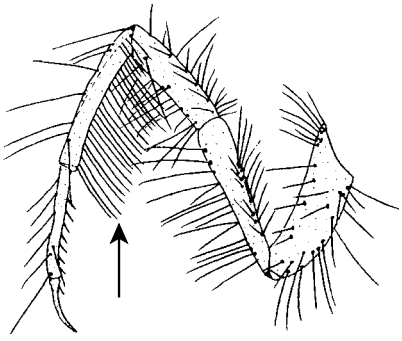


Fig. 12.70 [from Floyd (1994)]

Metasternum with more than 2 setae (except *O. osteni* which may have only 2), often with row of 10 or more; swimming hairs absent on hind tibiae (Fig. 12.71); hind tarsi each as short as or shorter than its tarsal claw (Fig. 12.71); case constructed of sand grains or irregularly placed plant or detrital pieces 6

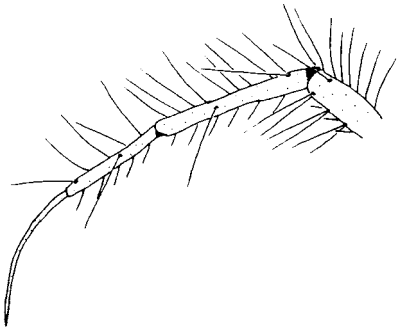


Fig. 12.71 [from Floyd (1994)]

4(3) Head brown with light muscle scars (Figs 12.72, 12.73); case constructed either of short twigs or roots (angled "log cabin" appearance) (Figs 12.66, 12.74) or thin, flat, quadrate, plant fragments (Fig. 12.75); on vegetation in lakes, some slow-moving streams . . . . . *O. cinerascens* (Hagen)

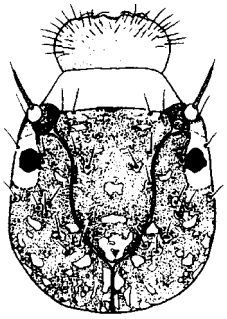


Fig. 12.72 [from Floyd (1994)]

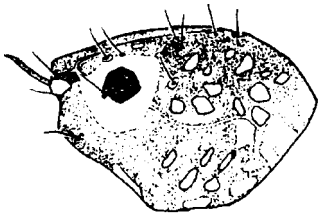


Fig. 12.73 [from Floyd (1994)]

Fig. 12.74 [from Floyd (1994)]

Fig. 12.75 [from Floyd (1994)]

Head yellow with dark muscle scars or pale; case exterior more rounded and often curved, especially in early instars (Fig. 12.76); on roots, woody debris, and vegetation in streams 5

Fig. 12.76 [from Floyd (1994)]

5(4) Head with scattered, well-defined muscle scars (Fig. 12.77); antennae short, reaching posterior edge of labrum (Fig. 12.77) . . . . . *O. persimilis* (Banks)

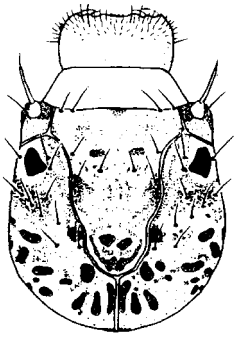


Fig. 12.77 [from Floyd (1994)]

Head without dark, well-defined muscle scars (Fig. 12.78); antennae longer, reaching to middle of labrum (Fig. 12.78) . . . . . *O. georgia* Ross

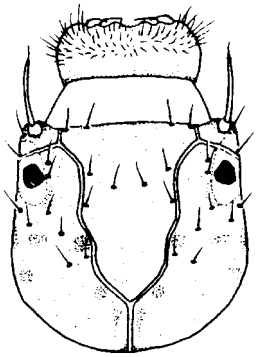


Fig. 12.78 [from Floyd (1994)]

6(3) Mesonotum with pair of irregular dark areas on each side of meson (Fig. 12.79); coronal suture bordered by row of 3 or 4 dark muscle scars on each side (Fig. 12.80); left mandible with deep crease running from apical tooth (Fig. 12.81); case constructed of sand grains . . . . . *O. osteni* Milne

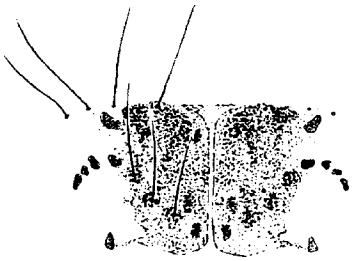


Fig. 12.79 [from Floyd (1994)]

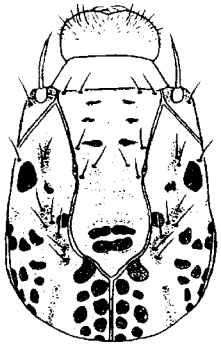


Fig. 12.80 [f rom Floyd (1994)]

Fig. 12.81 [from Floyd (1994)]

Mesonotum without distinct pair of irregular dark areas; coronal suture bordered by 0–2 muscle scars; left mandible without crease; case constructed of plant or sand grains 7

7(6) Antennae long, reaching at least to anterior edge of labrum (Fig. 12.82); case as shown in Figs 12.83, 12.84; on vegetation in natural lakes . . . . . *O. parva* (Banks)

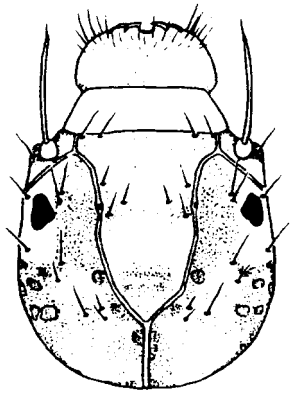


Fig. 12.82 [from Floyd (1994)]

Fig. 12.83 [from Floyd (1994)]

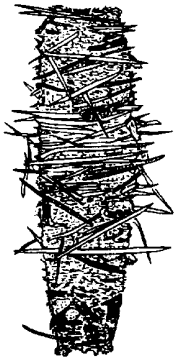


Fig. 12.84 [from Floyd (1994)]

Antennae short, reaching only to posterior edge of labrum 8

8(7) Head and pronotum usually with several light brown muscle scars (Figs 12.85, 12.86); case constucted of sand or rock pieces with larger ballast stones attached to the sides (Figs 12.87, 12.88) . . . . . *O. nocturna* Ross

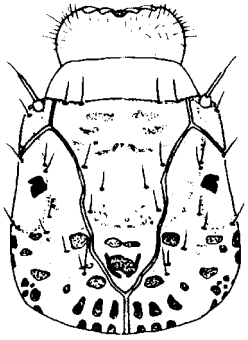


Fig. 12.85 [from Floyd (1994)]

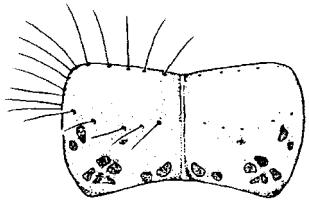


Fig. 12.86 [from Floyd (1994)]

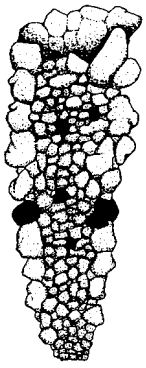


Fig. 12.87 [from Floyd (1994)]

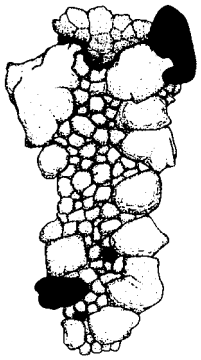


Fig. 12.88 [from Floyd (1994)]

Head and pronotum pale or with various combinations of dark muscle scars, spots, or stripes; case constructed of variety of materials 9

9(8) Head and pronotum covered with dense, brown markings in addition to well-defined muscle scars (Figs 12.89, 12.90); ventral apotome reddish-brown, subrectangular (Fig. 12.91); case constructed of sand, curved, and with a very smooth exterior (Fig. 12.92); sand-bottomed lakes . . . . . *O. porteri* Ross

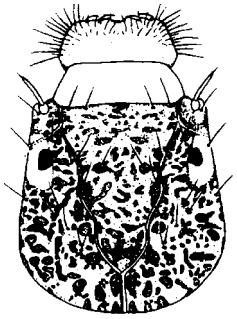


Fig. 12.89 [from Floyd (1994)]

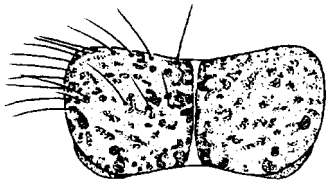


Fig. 12.90 [from Floyd (1994)]

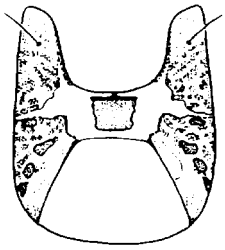


Fig. 12.91 [from Floyd (1994)]

Fig. 12.92 [from Floyd (1994)]

Head and pronotum with variable markings; ventral apotome variable; case constructed of sand or plant/detrital pieces; diverse habitats . . . . . *O. inconspicua* Complex 10

10(9) Mesosternum with irregular patch of 80–100 setae; case somewhat flattened dorsoventrally, composed of sand; dorsum of hind legs dark brown; head and pronotum dark brown with pattern as shown in Figs 12.93, 12.94 . . . . . *Oecetis* sp. C Floyd

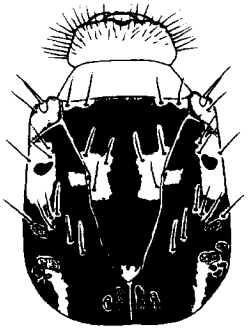


Fig. 12.93 [from Floyd (1994)]

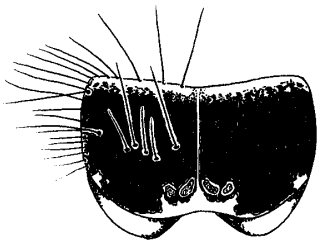


Fig. 12.94 [from Floyd (1994)]

Mesosternum with no more than 6 setae; case tubular, composed of sand or woody debris; dorsum of hind legs same color as rest of leg; head and pronotum pattern not as above 11

11(10) Head with dark longitudinal stripe on middle of frontoclypeus (Fig. 12.95); ventral apotome dark brown; metasternum with 4–7 setae . . . . . *Oecetis* sp. E Floyd

Fig. 12.95 [from Floyd (1994)]

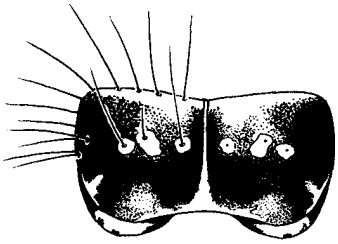


Fig. 12.96 [from Floyd (1994)]

Head without dark longitudinal stripe on frontoclypeus; ventral apotome light brown or yellow; metasternum with more than 7 setae 12

12(11) Metanotum with no more than 4 sa3 setae; metasternum with row of 8–15 setae; head and pronotum as shown in Figs 12.97, 12.98; case constructed of sand . . . . . *Oecetis* sp. F Floyd

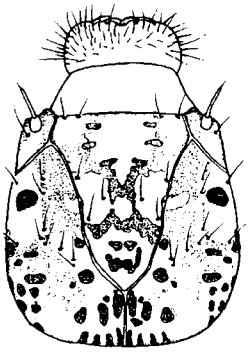


Fig. 12.97 [from Floyd (1994)]

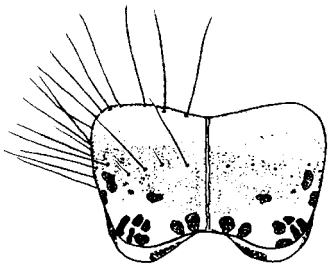


Fig. 12.98 [from Floyd (1994)]

Metanotum with 8 or 9 sa3 setae; metasternum with 30–36 setae; head and pronotum as shown in Figs 12.99, 12.100; case constructed of wood and bits of detritus or sand . . . . . *Oecetis* sp. A Floyd

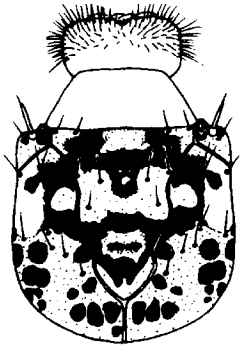


Fig. 12.99 [from Floyd (1994)]

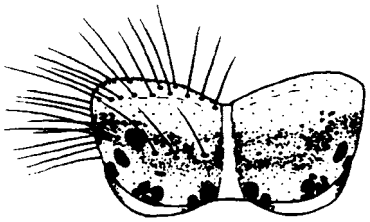


Fig. 12.100 [from Floyd (1994)]

Genus ***Setodes*** Rambur

Diagnosis: Larvae of *Setodes* (Fig. 12.101B) are distinguished from other leptocerid genera by the presence of sclerotized concave plates with marginal spines on each side of anal opening (Figs 12.4, 12.101C). The hind tibiae are secondarily subdivided, similar to *Triaenodes* spp.

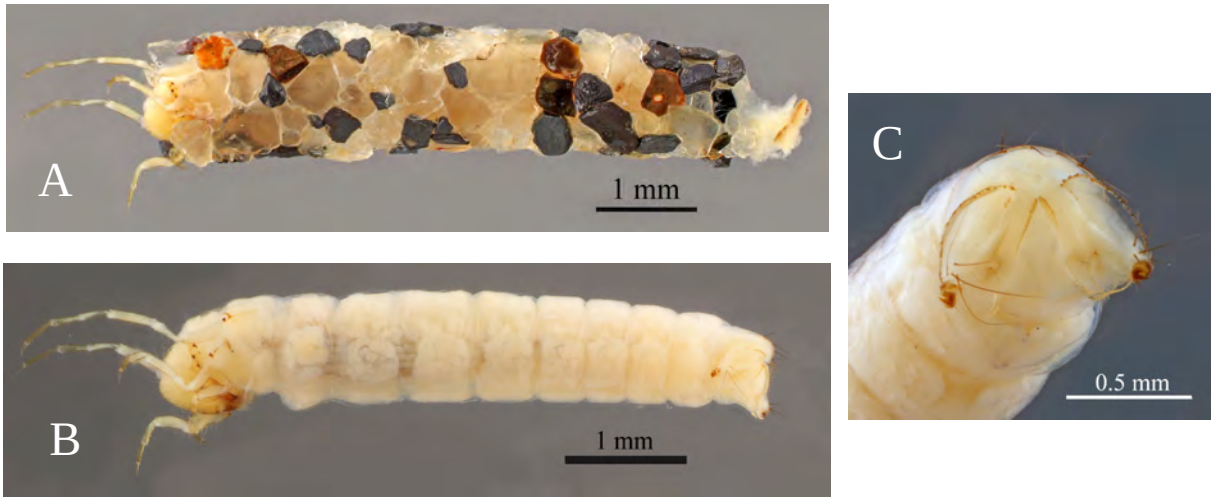


Fig. 12.101 *Setodes* sp., CUAC0000184286
Photos courtesy of J.C. Morse & M.L. Ferro

Species notes: Ten species of *Setodes* are known to occur in North America. The genus is represented in the state by two species: *Setodes chipolanus* and *S. guttatus*, both of which appear to be restricted in Florida to streams within the Chipola River Basin (Maps 12.38, 12.39). *Setodes guttatus* is distributed across eastern North American and *S. chipolanus* is endemic to the Chipola River Basin. All adult and larval specimens of both species that we have examined were either collected in the main river stem of the Chipola or from tributaries. The adult male and female of *S. chipolanus* were described by Rasmussen and Harris in Rasmussen et al. (2008b). We have examined larvae that we believe are *S. chipolanus*, but a detailed description of the larva remains to be done. Additional adult collection records of *S. guttatus* and *S. chipolanus* from the Chipola River basin were provided by Denson et al. (2016). Adults of both species have been collected May through October.

Larvae of eight North American species of *Setodes* were described and keyed by Nations (1994). Prior to that, only the larva of *S. incertus* was known (Merrill and Wiggins, 1971). Nations (1994) found that larval morphology is conservative; however differences in head coloration and gill structure and arrangement were deemed suitable characters for differentiating the species. Larval cases of *Setodes* are cylindrical, generally straight, with little or no taper, and constructed of quartz fragments and flat pieces of other minerals fitted tightly together (Fig. 12.101A). The posterior end of the larval case is open and without a sieve plate or other obstruction. Larvae are known to burrow into sand and are able to reverse their position within the case, hence the advantage of a non-tapering case which is open and essentially the same at both ends (Merrill and Wiggins, 1971).

Setodes spp. are primarily rheophilics and can be collected in pockets of sand on limestone shoals or from sand deposited on the leeward side of rocks in riffle areas. Larvae may also be found with their cases attached to stones by thick cords of silk (Nations, 1994). Nations (1994) surmised

that this adaptation allows the larva to graze the surface of the stone effectively in the 360º area around the point of attachment, while maintaining its position in rapid current via the anchor line.

Presented below is a key to the two Florida species that has been modified from the key presented in the 1995 and 2004 editions of the Florida manual. Because the extensive adult surveys in the Chipola River basin did not recover *S. dixiensis*, we now believe that larvae from the Chipola previously examined by Nations that were found to be similar to *S. dixiensis* in Alabama likely represent variation in gill arrangement within *S. chipolanus*. Modifications to the previous key were also made based on the examination of additional larvae and the incorporation of size differences in the two species that are presumed for the larvae based on observed significant size differences of the adults. The key should be considered provisional until detailed comparative descriptions of the larvae are produced for the two Florida species. That said, *Setodes* larvae from Florida longer than 6 mm and with many dorsal gills are almost certainly *S. guttatus*. Of note, it appears that both *S. guttatus* and *S. chipolanus* have variable head coloration that includes a light and dark morph. The light-head morph appears to be more common than the dark-head morph.

Additional references: Merrill and Wiggins (1971); Nations (1994); Wiggins (1996).

Map 12.38 *Setodes chipolanus* ▲

Map 12.39 *Setodes guttatus* ●

PROVISIONAL KEY TO SPECIES FOR MATURE LARVAE OF FLORIDA *SETODES*

[figures prepared by Victoria C. Nations]

1. More than one abdominal tergum with gills (Fig. 12.102); abdominal sterna with forked and single gills (Fig. 12.102); head light tan with darker muscle scars (Fig. 12.103) or completely dark brown with ring of lighter color around each eye spot (Fig. 12.104); body length > 6 mm . . . . . *S. guttatus* (Banks)

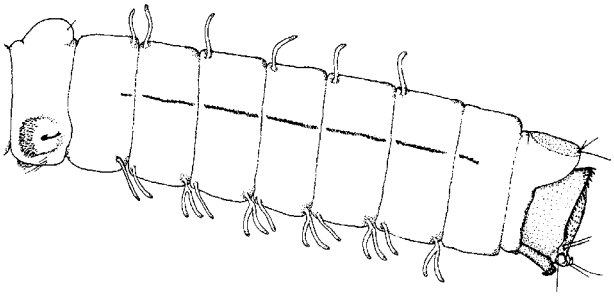


Fig. 12.102

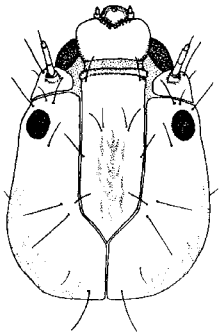


Fig. 12.103

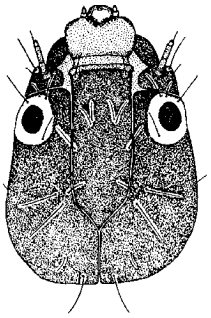


Fig. 12.104

No more than one abdominal tergum with gills (Figs 12.105, 12.106); abdominal sterna with only single gills (Fig. 12.105), except for abdominal segment II gills which may be forked (Fig. 12.106); head light tan with darker muscle scars (as in Fig. 12.103) or completely dark brown with ring of lighter color around each eye spot (as in Fig. 12.104); body length < 5 mm . . . . . *S. chipolanus* Rasmussen and Harris

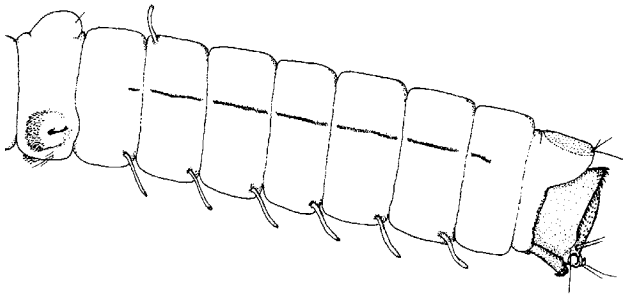


Fig. 12.105

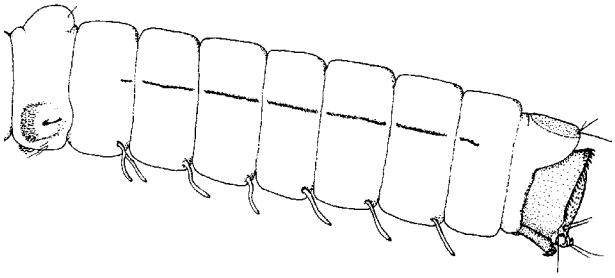


Fig. 12.106

Genus ***Triaenodes*** MacLachlan

Diagnosis: Larvae of *Triaenodes* (Fig. 12.107) are characterized as follows: ventral apotome of head rectangular (Fig. 12.17), except in early instars where it may appear triangular; tibia of each hind leg with constriction near center (Fig. 12.18); hind legs usually with dense fringes of long setae (swimming hairs), except in *T. perna*/*helo*/*milnei* and *T. taenia* in which setae are not nearly as dense. Larval cases of *Triaenodes*, unusual among North American trichopteran genera, are constructed of spirally arranged plant pieces (Figs 12.20, 12.107); the cases are usually long and tapered with the exception of *T. perna /helo*/*milnei*, which have cases only slightly longer than the larvae and tapered only slightly.

Fig. 12.107 *Triaenodes furcella*

Species notes: Within the United States and Canada there are 30 *Triaenodes* species reported, and in Florida we have documented 17 species (Maps 12.40–12.55). Manual (2010) revised the North American fauna and provided descriptions of adult males and females. The publication by Glover (1996) on larval taxonomy and biology of *Triaenodes* provided a key to species that includes 14 of the 17 Florida species. Of the *Triaenodes* species known or likely to occur in Florida, only the larvae of *T. lagarto*, *T. smithi*, and *T. tridonta* are unknown.

Triaenodes larvae occur in two basic habitats: submerged roots of riparian vegetation and aquatic macrophytes. They inhabit the full range of lotic and lentic environments. Successful collecting can be done by vigorously shaking or kicking root mats into a collecting net or hand screen. Aquatic plants can be sampled by sweeping a dipnet through the plants. Glover (1996) reported that species found predominately in lotic roots show a tendency for parallel stripes on the dorsum of the head, reduced swimming hairs on the hind legs, and reduced abdominal gills. Lentic species occurring in macrophytes usually have spotted heads or heads with light brown lines, well developed swimming hairs, and well developed abdominal gills. Patterns of muscle scars and other pigmentation of the head and pro- and mesothorax, and chaetotaxy of the hind legs are the most useful characters for species identification (Glover, 1996). Case structure, while distinctive to the genus, varies little among different species. The case is constructed of spirally arranged pieces of aquatic macrophytes or the tips of roots from riparian vegetation.

Triaenodes aba - Widespread in eastern North America, Glover (1996) considers it to be a macrophyte species. We have collected adults near both lentic and lotic habitats from scattered localities in the panhandle and across the peninsula.

Triaenodes bicornus (= *Triaenodes* new sp. A Glover) - Endemic to the southeastern United States.

According to Glover (1996), larval identification should be considered tentative until there have been additional associations. Adults of *T. bicornis* have been collected in small numbers from creeks across northern Florida, including streams on Eglin Air Force Base, ravine streams in the Apalachicola River Basin, and the South Fork of Black Creek (Clay Co.).

Triaenodes dendyi (= *Triaenodes* new sp. C Glover) - Endemic to the southeast, this species has been reported from Alabama, Florida, Georgia, North Carolina, and South Carolina. We have examined larvae collected from a wet prairie pond in Clay County; and an unnamed pond in the Ocala National Forest (Lake Co.) when in May, mature larvae were abundant in emergent sedges inundated by the pond. A study by Jain et al. (2020) of temporary ponds in the Munson Sandhills near Tallahassee found this to be the most abundant caddisfly. We also documented adults from these lentic habitats, although Manual (2010) reported it from a variety of lentic and lotic habitats.

Triaenodes flavescens - A widespread eastern species associated with macrophyte species found in both lentic and lotic habitats. The species was first reported from Florida (no specific location) in the original species description by Banks (1900). Glover (1996) reported larvae from the St. Marks River (Wakulla Co.), and we have several other larval records from the lower St. Marks.

Triaenodes florida - Widespread in lakes throughout Florida, occurring among macrophytes. Glover (1996) reported collecting large numbers in emergent sedges and coontail (*Myriopyllum*) from Lucas Lake,Washington Co. Identification of this species is quite easy, as the black bands surrounding leg segments are distinctive. The case is light, long and tapered making this species an especially proficient swimmer (Glover, 1996).

Triaenodes furcella (Fig. 12.107) - Endemic to Florida where it is widespread in both lakes and streams. We have examined larvae of this species collected from North Prong Alligator Ck., Charlotte Co.; Fisheating Ck., Glades Co.; Lake Placid and Arbuckle Ck., Highlands Co., and Sweetwater Ck., Putnam County. The larva described by Glover (1996) was collected from Lake Tohopekaliga in Osceola County. Adults have been recorded across the peninsula and as far West as Washington County in the panhandle. Larvae and adults are morphologically similar to *T. injustus*.

Triaenodes ignitus - A widespread and common species in Florida, as well as eastern North America. It is mainly a lotic root species which can occur in large numbers. Tolerant of a wide range of water quality conditions, this species has been collected in a wide array of lotic habitats, from small spring-fed streams to larger rivers such as the Suwannee and Apalachicola.

Triaenodes injustus - Widely distributed in the eastern U.S. and transcontinentally in Canada, Glover (1996) reported this common species occurs in a wider array of lentic and lotic habitats than any other *Triaenodes* species. However in Florida, it is rare and has been only recorded as adults from streams within the Chipola River Basin (Denson et al., 2016) and from unspecified locations in Gulf and Orange counties by Manual (2010). Larvae and adults are morphologically similar to *T. furcella*.

Triaenodes lagarto - Larvae are unknown. The male and females were described by Rasmussen and Harris in Manual (2010) based on specimens collected from Lowry Lake Run on Camp Blanding Training Center (Clay Co.). Males are morphological similar to *T. taenia*. The species has not been

reported from any other locations.

Triaenodes marginatus - Not reported in Florida but somewhat likely to occur in northern Florida. It has been collected to a limited extent in southern Alabama, Apalachicola River Basin (Harris et al., 1991).

Triaenodes melaca - Another species that has not been reported in Florida but is somewhat likely to occur. The closest records of it are from southern Alabama where it occurs in cool, gravel-bottom streams and rivers (Harris et al., 1991).

Triaenodes nox - A widespread northern North American species with isolated populations in the Southeast. In Florida, larvae were collected in aquatic macrophytes from Lake Miccosukee (Jefferson Co.) and we have collected adults from Lake Iamonia (Leon Co.) and a single male from the Sopchoppy River (Wakulla Co.).

Triaenodes ochraceus - Within Florida, this species has been recorded primarily from blackwater streams of the panhandle and northern part of the peninsula. We have collected larvae from the upper Aucilla River (Jefferson/Madison Co.) and Attapulgus Creek (Gadsden Co.). It was reported by Glover (1996) from an unnamed tributary of Six Mile Creek (Duval Co.). Cypress roots are probably its preferred microhabitat.

Triaenodes perna/*helo*/*milnei* - *Triaenodes perna* and *T. milnei* are closely related species that are relatively common in lotic systems of the panhandle and in the northern and central parts of the peninsula; we also have a few records of adult *T. milnei* from tannic lakes on the peninsula. Larvae are often found in association with root mats. *Triaenodes helo* was determined by Manuel (2010) to be a hybrid of the two species. Most previous records of *T. helo* most likely apply to *T. milnei*, including those in Glover (2010). Positive identification of the larvae of these three closely related species is still considered unresolved. However, Glover (1996) indicated that the head of *T. helo* [and probably *T. milnei*] usually has a strong mesal indentation along the posterior edge of dark pigmentation near the occipital foramen, while in *T. perna* the line of dark pigmentation is nearly straight. These species lack the dense fringe of swimming hairs, and the dorsum of the head is very black.

Triaenodes smithi - Larvae are unknown. Rare in Florida, this species occurs from Texas to as far north as southern Illinois and Virginia. In Florida, it is known only from single adult males collected from Marshal Ck. (Jackson Co.) and Buckhorn Ck. (Wakulla Co.), and it was reported from Liberty Co. (unspecified location) by Manual (2010).

Triaenodes taenia - A southern Appalachian species that Rasmussen (2004) reported has isolated populations in spring-fed headwater ravine systems in the central part of the panhandle where he collected adults from several localities in Apalachicola and Ochlockonee river basins.

Triaenodes tardus - Widespread and common across much of the United States and Canada, the species occurs in both lentic and lotic habitats of the panhandle and on the peninsula as far south as Hernando County. The larval association, made by Glover (1996), is based on larvae collected along

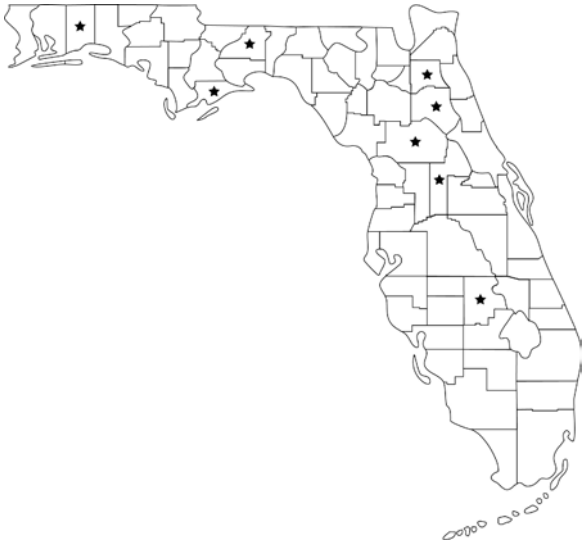
with a pharate male pupa from Lake Jackson, Leon County.

Triaenodes tridonta - Larvae are unknown. Known in Florida from only one specimen collected from the Dead Lakes in Gulf County in April 1927. The most recent collections of this species were in 1991 from the Cahaba River (Perry Co., Alabama) and in 1985 from two streams in Clarke Co., Alabama (Rasmussen and Harris, 2016). The species is considered Globally Imperiled and is currently undergoing review for federal listing.

Additional references: Ross (1944); Manuel and Braatz (1984); Glover (1996); Wiggins (1996).

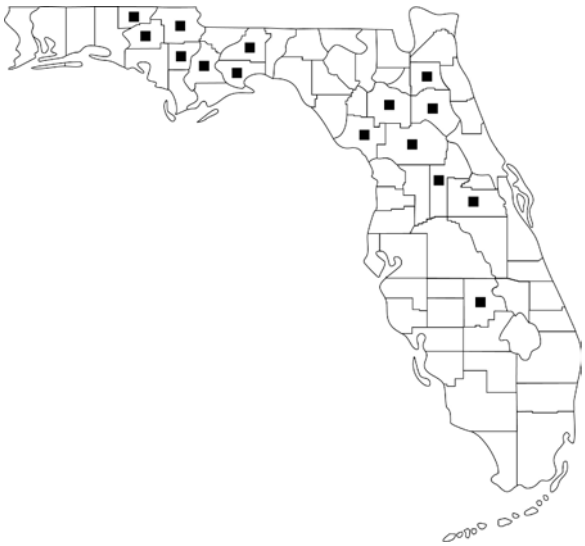
Map 12.40 *Triaenodes aba* ▲

Map 12.41 *Triaenodes bicornus* ●



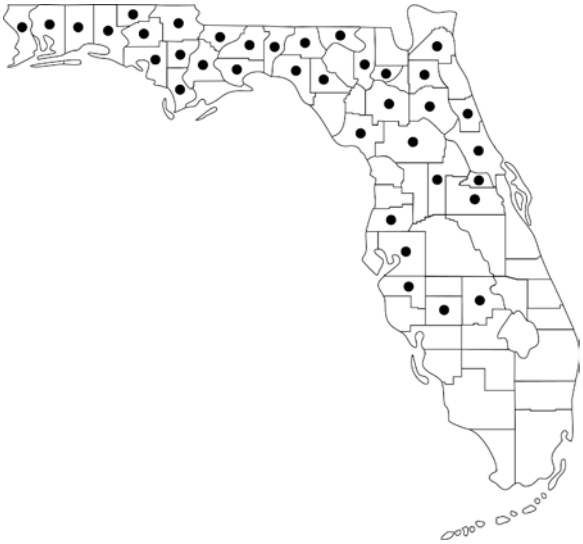
Map 12.42 *Triaenodes dendyi* ★

Map 12.43 *Triaenodes flavescens* ♦



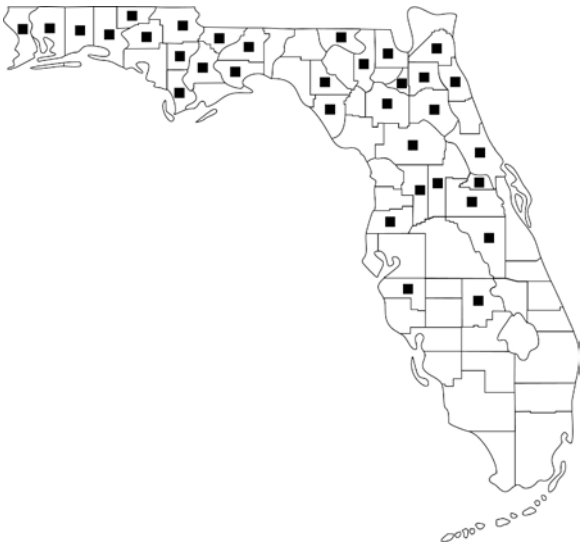
Map 12.44 *Triaenodes florida* ■

Map 12.45 *Triaenodes furcella* ▲



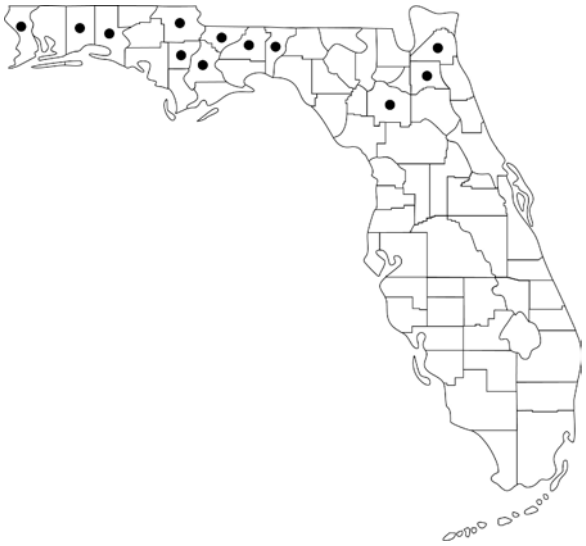
Map 12.46 *Triaenodes ignitus* ●

Map 12.47 *Triaenodes injustus* ★

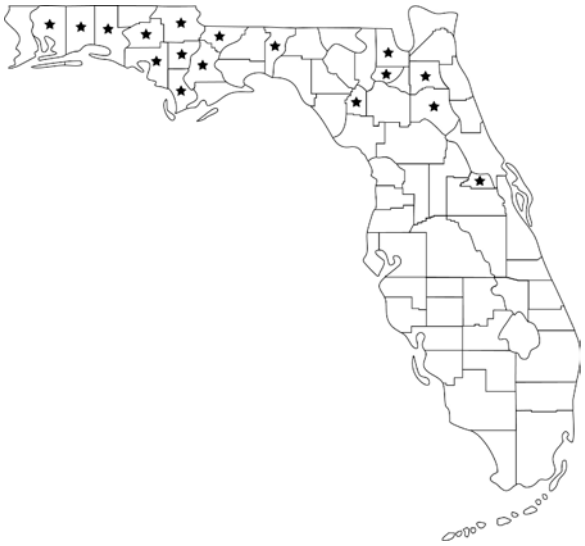


Map 12.48 *Triaenodes milnei* ■

Map 12.49 *Triaenodes nox* ▲



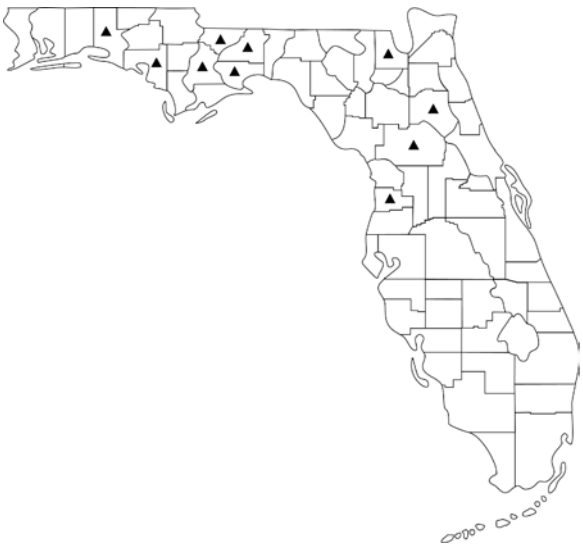
Map 12.50 *Triaenodes ochraceus* ●



Map 12.51 *Triaenodes perna* ★

Map 12.52 *Triaenodes smithi* ♦

Map 12.53 *Triaenodes taenia* ■
Triaenodes lagarto ♦



Map 12.54 *Triaenodes tardus* ▲

Map 12.55 *Triaenodes tridonta* ★

KEY TO SPECIES FOR MATURE LARVAE OF FLORIDA *TRIAENODES*

[modified from Glover (1993, 1996)]

Note: Larvae of *T. lagarto*, *T. smithi*, and *T. tridonta* are unknown and not included in the key.

1. Dorsum of head almost completely black (Fig. 12.108); swimming hairs on hind legs reduced (Fig. 12.109); antennae unpigmented (Fig. 12.108); case usually only slightly longer than larva and composed of tips of rootlets of riparian vegetation . . . . . *T. perna/helo/milnei*

Fig. 12.108 [from Glover (1993)]

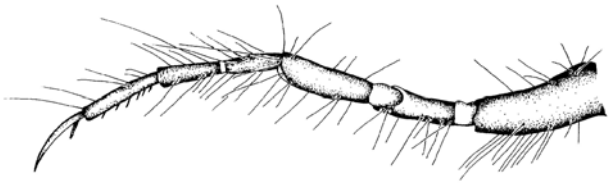


Fig. 12.109 [from Glover (1993)]

Dorsum of head not as above, marked with dark parallel stripes, muscle scars, or combination of both; swimming hairs usually well developed (Fig. 12.110); antennae pigmented or unpigmented; case usually long and tapered, composed of rootlets or aquatic macrophytes 2

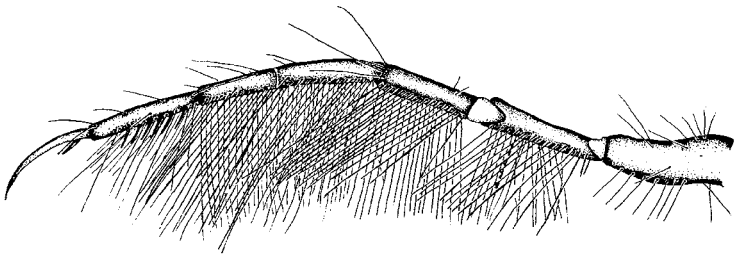


Fig. 12.110 [from Glover (1993)]

2(1) Conspicuous pattern of four inner muscle scars from occipital foramen to base of frontoclypeal suture on either side of coronal suture (Fig. 12.111); other dorsal muscle scars often present 3

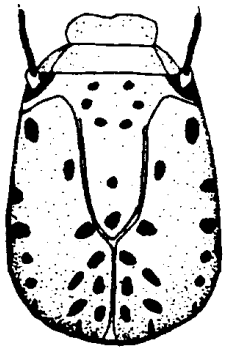


Fig. 12.111 [from Glover (1993)]

Dorsum of head capsule with inner muscle scars connected by dark pigment forming brown or black lines parallel with frontoclypeal and coronal sutures from subocular lines to occipital foramen (Figs 12.112, 12.113); at most two inner muscle scars parallel to coronal suture but usually appearing light brown or lighter than background color 12

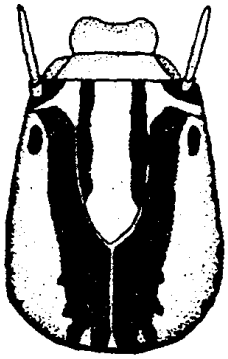


Fig. 12.112 [from Glover (1993)]

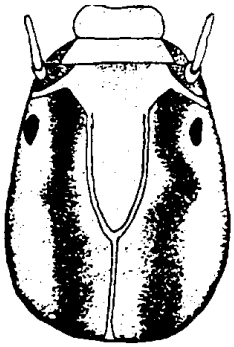


Fig. 12.113 [from Glover (1993)]

3(2) Dorsum of head with parallel black lines extending from subocular line posteriorly and parallelling at least part of coronal suture, gradually broken into muscle scars near occipital foramen (Fig. 12.114); longitudinal black lines on frontoclypeal apotome well developed; antennae black, sometimes tipped in white 4

Fig. 12.114 [from Glover (1993)]

Dorsum of head without such black lines, although sometimes diffuse dark lines along outside of frontoclypeal sutures present but not encompassing coronal suture scars (Fig. 12.115); head with pattern of muscle scars; without thick black longitudinal lines on frontoclypeus, although thin broken lines sometimes present (Fig. 12.116); antennae pale, brown or black 5

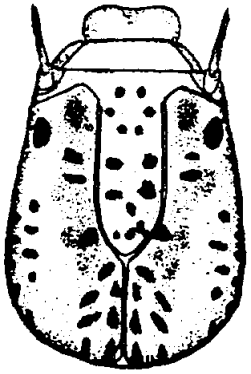


Fig. 12.115 [from Glover (1993)]

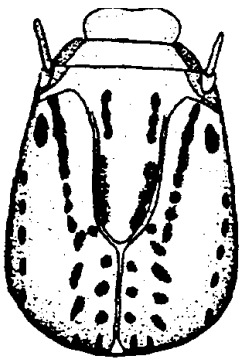


Fig. 12.116 [from Glover (1993)]

4(3) Ventral apotome appearing brown in places; anterior portion of pronotum also slightly pigmented (Fig. 12.117) . . . . . *T. furcellus* Ross

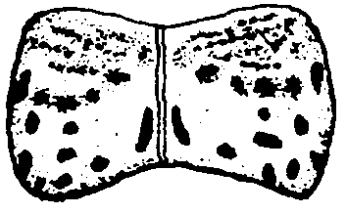


Fig. 12.117 [from Glover (1993)]

Ventral apotome pale, without pigmentation; anterior portion of pronotum pale (Fig. 12.118) . . . . . *T. injustus* (Hagen)

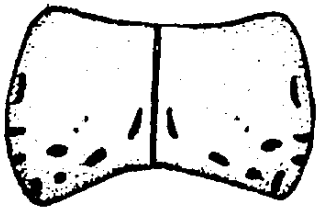


Fig. 12.118 [from Glover (1993)]

5(3) Legs with conspicuous black bands at joints; antennae black (Fig. 12.119); case long and tapering, constructed of aquatic macrophytes
. . . . . *T. florida* Ross

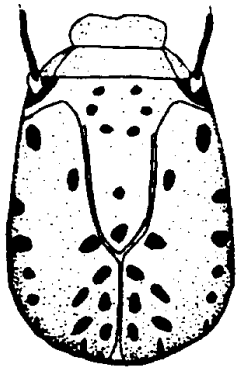


Fig. 12.119 [from Glover (1993)]

Legs without conspicuous black bands at joints; antennae black or pale
. 6

6(5) Swimming hairs on hind legs much reduced as in Figure 12.109; head pattern as in Figure 12.120 . . . . . *T. taenia* Ross

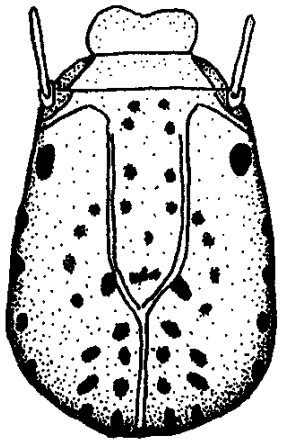


Fig. 12.120 [from Glover (1993)]

Swimming hairs on hind legs well developed (Fig. 12.110); head pattern may be similar to Figure 12.120 or otherwise 7

7(6) Muscle scars reduced on pronotum and mesonotum (Fig. 12.121); antennae usually pale . . . . . *T. tardus* Milne

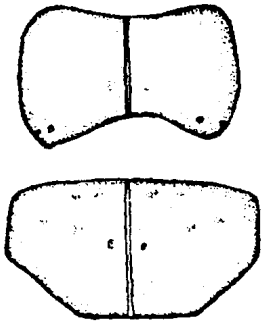


Fig. 12.121 [from Glover (1993)]

Muscle scars well developed on pronotum and mesonotum (Fig. 12.122); antennae pale or dark 8

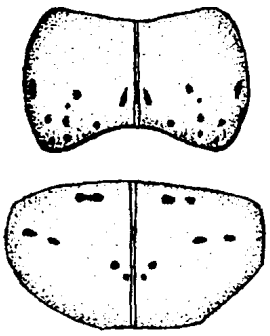


Fig. 12.122 [from Glover (1993)]

8(7) Head in dorsal view with parallel dark stripes or diffuse shading along outer portion of frontoclypeal suture (Figs 12.123, 12.124); scars never present at base of ventral apotome; antennae brown or sometimes black, base usually lighter than tip 9

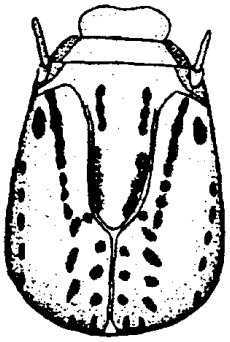


Fig. 12.123 [from Glover (1993)]

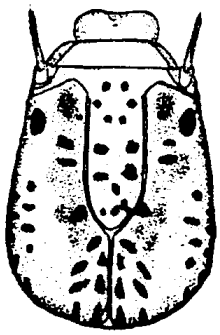


Fig. 12.124 [from Glover (1993)]

Head in dorsal view not as above (Fig. 12.125); scars sometimes present at base of ventral apotome (Fig. 12.126); pigmentation of antennae variable 10

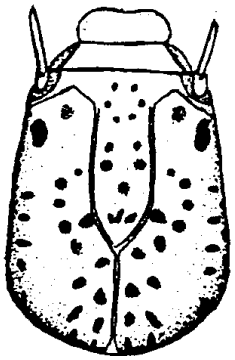


Fig. 12.125 [from Glover (1993)]

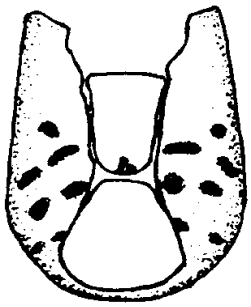


Fig. 12.126 [from Glover (1993)]

9(8) Parallel lines outside frontoclypeal sutures thin (Fig. 12.127); frontoclypeal muscle scars usually coalesced to form thin parallel lines; pronotum background color uniform . . . . . *T. flavescens* Banks, in part

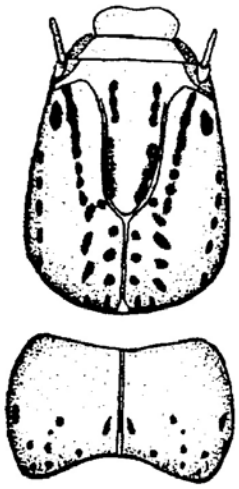


Fig. 12.127 [from Glover (1993)]

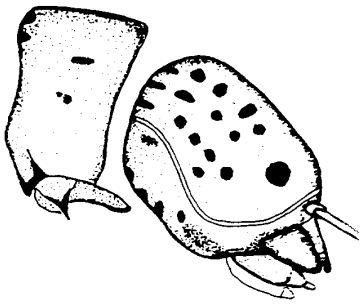


Fig. 12.128 [from Glover (1993)]

Parallel lines outside frontoclypeal sutures usually wide and diffuse (Fig. 12.129); frontoclypeal muscle scars not coalesced; anterior portion of pronotum loosely pigmented . . . . . *T. ochraceus* (Betten and Mosely)

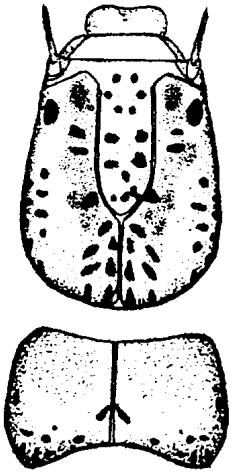


Fig. 12.129 [from Glover (1993)]

10(8) Head in dorsal view with series of five or six muscle scars in semicircle on each side of ecdysial line, first at midpoint of frontoclypeal suture and last where frontoclypeal suture joins coronal suture (Fig. 12.130); antennae without pigmentation; muscle scars usually present at base of ventral apotome (Fig. 12.131) 11

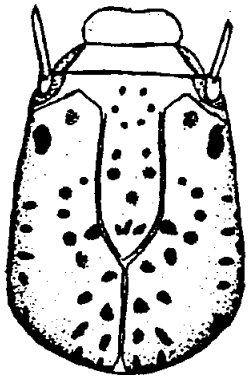


Fig. 12.130 [from Glover (1993)]

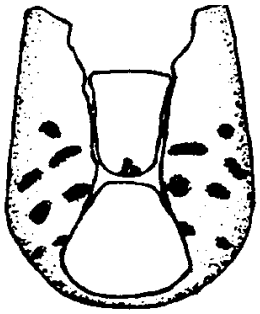


Fig. 12.131 [from Glover (1993)]

Head without semicircle of muscle scars (Fig. 12.132); antennae usually lightly pigmented to black; muscle scars absent from base of ventral apotome . . . . . *T. flavescens* Banks, in part

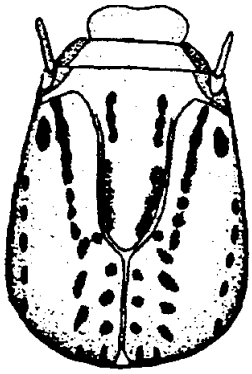


Fig. 12.132 [from Glover (1993)]

11(10) Muscle scars present on ventral apotome (Fig. 12.133); head pattern as in Figure 12.134; anterior fringe of tarsal swimming hairs absent from hind legs
. . . . . *T. ignitus* (Walker)

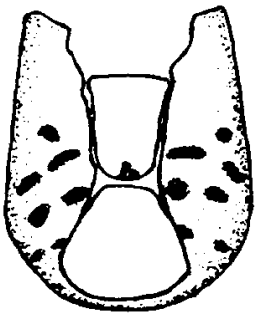


Fig. 12.133 [from Glover (1993)]

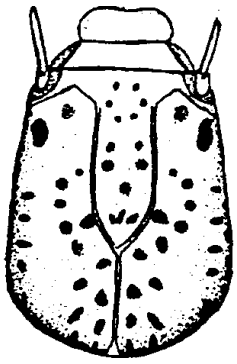


Fig. 12.134 [from Glover (1993)]

Muscle scars absent from ventral apotome; head pattern as in Figure 12.135; anterior fringe of tarsal swimming hairs present on each hind leg
. . . . . *Triaenodes bicornus* Manuel ?

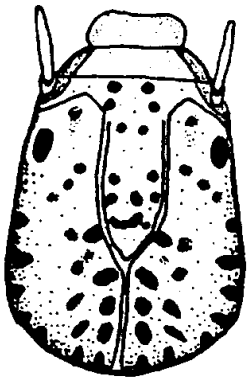


Fig. 12.135 [from Glover (1993)]

12(2) Dorsal head stripes diffuse, not appearing to be sharply delineated, often appearing brown and having muscle scars parallel to coronal suture lighter than background color (Figs 12.136, 12.137); pronotum often with pair of complete or incomplete longitudinal stripes; antennae usually pale 13

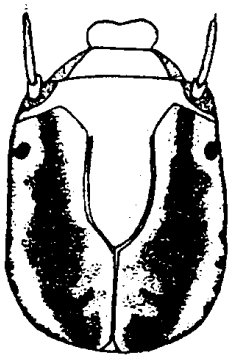


Fig. 12.136 [from Glover (1993)]

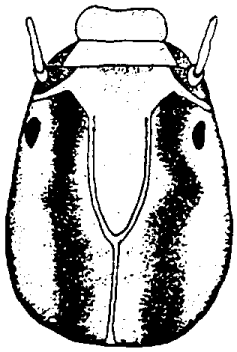


Fig. 12.137 [from Glover (1993)]

Dorsal head stripes black and well defined, without light muscle scars parallel to coronal suture (Fig. 12.138); pronotum without longitudinal stripes; antennae usually black 14

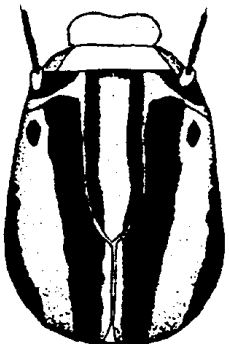


Fig. 12.138 [from Glover (1993)]

13(12) Dark stripes often covering most of dorsum of head (Fig. 12.139); pronotum with pair of triangular patches of pigmentation anteriorly (Fig. 12.140); mesonotum with large mesal region darkened (Fig. 12.140). . . . . *Triaenodes dendyi* Manuel

Fig. 12.139 [from Glover (1993)]

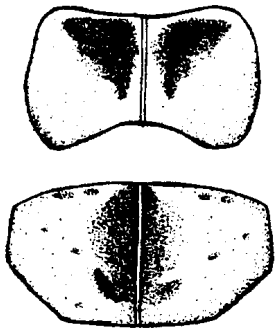


Fig. 12.140 [from Glover (1993)]

Dark stripes of dorsum of head narrower than above (Fig. 12.141); pronotum usually with pair of complete longitudinal stripes (Fig. 12.142); mesonotum without large region of pigmentation (Fig. 12.142) . . . . . *T. nox* Ross

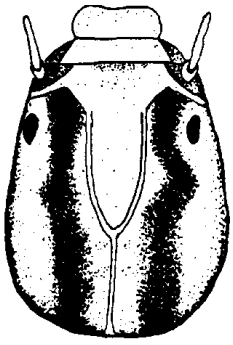


Fig. 12.141 [from Glover (1993)]

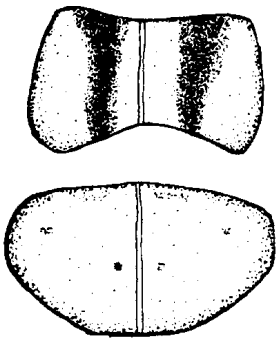


Fig. 12.142 [from Glover (1993)]

14(12) Pronotum nearly completely black, sometimes with small unpigmented area posteromesally (Fig. 12.143) . . . . . *T. melacus* Ross

Fig. 12.143 [from Glover (1993)]

Pronotum light with muscle scars and sometimes small patches of pigmentation near anterior margin (Figs. 12.144, 12.145) 15

Fig. 12.144 [from Glover (1993)]

Fig. 12.145 [from Glover (1993)]

15(14) Postgenae with distinct muscle scars present (Fig. 12.146); antennae pale or black . . . . . *T. abus* Milne

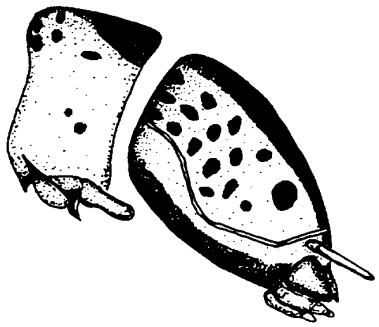


Fig. 12.146 [from Glover (1993)]

Postgenal muscle scars coalesced to form stripes (Fig. 12.147); antennae black
. . . . . *T. marginatus* Sibley

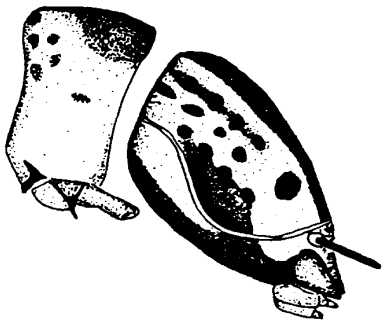


Fig. 12.147 [from Glover (1993)]

FAMILY LIMNEPHILIDAE

(*northern caddisflies*)

Considered the second largest caddisfly family in North America, with more than 250 species assigned to 42 genera, the Limnephilidae are represented in Florida by only two genera, *Ironoquia* (2 spp.) and *Pycnopsyche* (2 spp.). Limnephilid larvae are distinguished morphologically by the following combination of characters: antennae located halfway between anterior margin of head capsule and eye (Fig. 2.54); anterior margin of pronotum straight (Fig. 13.4); prosternal horn not reduced (Fig. 2.54); and basal seta of tarsal claw short, not extending to tip of claw. The larval cases are constructed of plant materials or rock fragments with rough or irregular texture. Limnephilid larvae live in a wide variety of lotic habitats ranging from temporary or permanent streams, springs, spring seeps, rivers, and lentic environments which include pools, ponds, marshes, swamps, and lakes (Unzicker et al., 1982).

KEY TO GENERA FOR LARVAE OF FLORIDA LIMNEPHILIDAE

1. Abdominal gills single or unbranched; lateral hump of abdominal segment I with one long sclerite adjacent to base, the sclerite sometimes only lightly pigmented but distinguishable by the smooth and relatively shinier surface (Fig. 13.1)
. . . . . *Pycnopsyche* (p. 13-6)

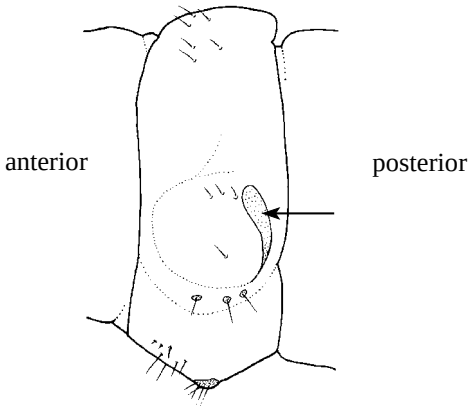


Fig. 13.1

Most abdominal gills with multiple branching of up to 10-15 filaments; sclerite absent from area adjacent to base of lateral hump
. . . . . *Ironoquia*

Genus ***Ironoquia*** Banks

Diagnosis: Larvae of *Ironoquia* (Fig. 13.2) are characterized as follows: multi-branched abdominal gills; lack of sclerite adjacent to base of lateral hump; and mid- and hind femora each with 5-7 major setae along ventral edge. The cylindrical larval cases are slightly tapered and curved, and constructed of either sand grains or pieces of plant materials (Fig. 13.3).

Fig. 13.2 *Ironoquia* sp.

Fig. 13.3 *Ironoquia* cases, photo courtesy of James C. (Skip) Hodges, Jr.

Species notes: Our field surveys of adult caddisflies have documented two species of *Ironoquia* in Florida (*I. kaskaskia* and *I. punctatissima*). The larva of *Ironoquia punctatissima* was first described by Flint (1960), and the larvae are characterized by the distinct dark spots and infuscations of the head and thoracic nota. The larva of *I. kaskaskia* remains undescribed.

Ironoquia kaskaskia and *I. punctatissima* are both uncommon in Florida (Maps 13.1, 13.2). The single occurrence of *I. kaskaskia* in Florida was reported by Denson et al. (2016) from the Chipola River. *Ironoquia punctatissima* has been collected as adults across a number of sites within the Chipola, Ochlockonee, and St. Marks river basins. We have examined *Ironoquia* larvae from three localities in the state: Ochlockonee River, near State Road 12; and St. Marks River, and Black Creek at Baum Road, Leon County. Late instars of *Ironoquia* (prob. *punctatissima*) were collected in February and adults of both species were collected primarily in late October.

Ironoquia punctatssima has been reported to have a univoltine life cycle in temporary streams (Unzicker et al., 1982), and adults have been collected in September in the Northeast (Flint, 1960) and in July to early October in North and South Carolina (Unzicker et al., 1982). *Ironoquia punctatissima* and other species in this genus are known to migrate as larvae from drying streams in late spring to bankside leaf litter where they aestivate and pupate terrestrially (Flint, 1958; Williams and Williams, 1975; Alexander and Whiles, 2000).

Additional references: Flint (1960); Wiggins (1996).

Map 13.2 *Ironoquia punctatissima* ●

Map 13.1 *Ironoquia kaskaskia* ▲

Genus ***Pycnopsyche*** Banks

Diagnosis: Larvae of *Pycnopsyche* (Fig. 13.3) are characterized as follows: single and unbranched abdominal gills; presence of long sclerite adjacent to base of lateral hump on abdominal segment I (Fig. 13.1); and metanotal sa1 sclerites not fused (although often close together) along midline (Fig. 13.4) as in *Hydatophylax*. The variously shaped, occasionally 3-sided, larval cases are usually constructed from twigs, bark, and leaves.

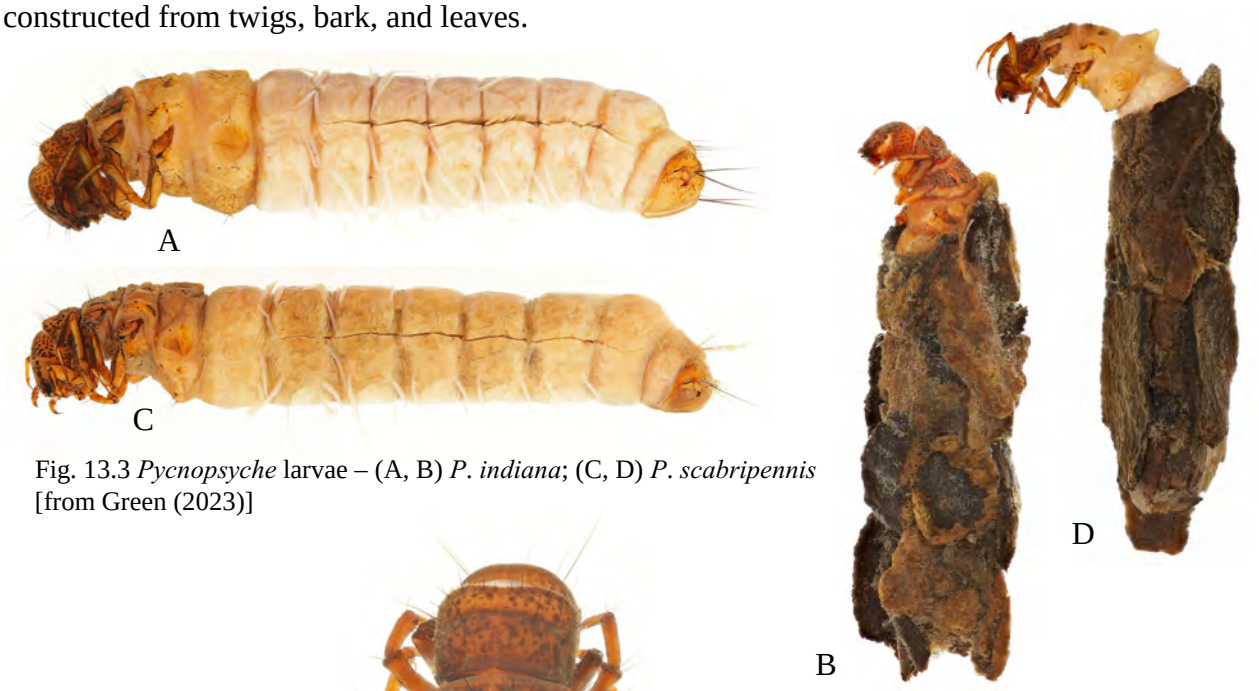


Fig. 13.3 *Pycnopsyche* larvae – (A, B) *P. indiana*; (C, D) *P. scabripennis* [from Green (2023)]

Fig. 13.4 [from Green (2023)]

Species notes: Recently the genus *Pycnopsyche* was revised by Green (2023) in a doctoral dissertation that provided a comprehensive revision of the genus, including descriptions and diagnoses of the adult and larval stages. His analysis of morpholgical and molecular data led to some synonymies, including *P. antica* (Walker) being synonymized with *P. scabripennis*. Green's descriptions and diagnoses of *Pycnopsyche* spp. larvae allows for separation and species-level identification of most *Pycnopsyche* species.

Based on adult collections, two species of *Pycnopsyche* are known to occur in Florida (*P. indiana* and *P. scabripennis*). *Pycnopsyche scabripennis* is the most common of the two and has been recorded across many clear, spring-fed streams across northern Florida (Map 13.4); Rasmussen (2004) reported *P. scabripennis* (as *P. antica*) was common and abundant in ravine streams of northern Florida. *Pycnopsyche indiana* has been reported from five Florida counties widely scattered in the panhandle and peninsula as far south as Seminole County (Map 13.3; Rasmussen and Denson, 2000; Rasmussen et al., 2025).

Larvae of *Pycnopsyche* have been collected from a wide variety of stream types across North Florida. *Pycnopsyche indiana* occurs mainly in tannic lowland streams, whereas *P. scabripennis* is most common and abundant in spring-fed sandhill streams. Larvae of the two species are most easily distinguished based on the size, color, and pattern of muscle scars on the head. In term of body length, measurements of Florida specimens showed that final instars (16–21 mm in length) of *P. indiana* are 5–10 mm shorter than those of *P. scabripennis* (Rasmussen and Denson, 2000).

The case structure of *P. scabripennis* and *P. indiana* is variable. *Pycnopsyche scabripennis* constructs a case either of firmly attached wood pieces, often with small twigs extended posteriorly (Fig. 13.5), or of leaf fragments arranged to form a 3-sided case in early instars, or a combination of both. Likewise, the case structure of *P. indiana* is variable, but the cases generally incorporate more large flat bark pieces and are without trailing sticks, as in the example on the right side of Figure 13.5.

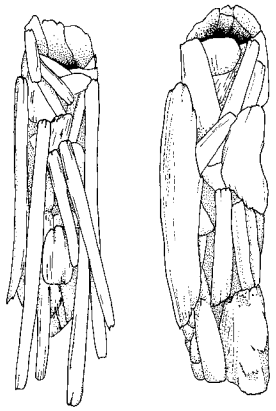
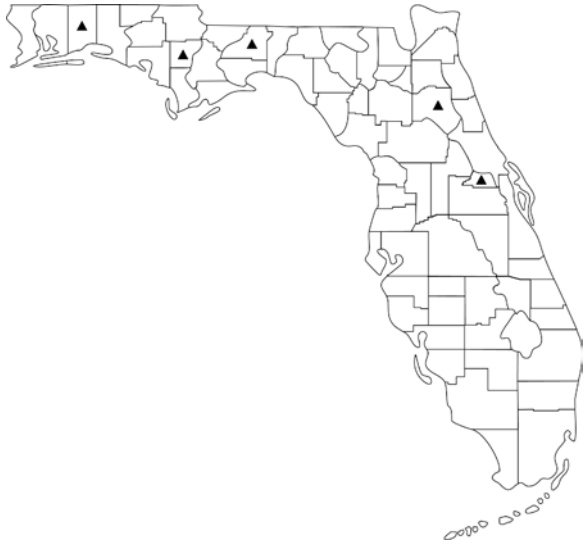
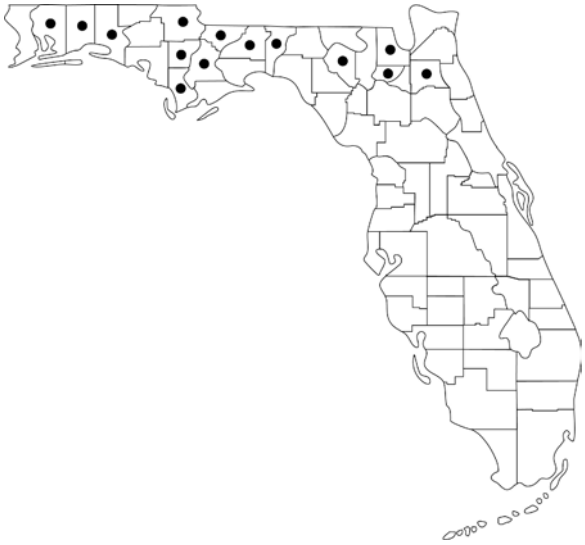


Fig. 13.5 *Pycnopsyche* larval cases

Additional references: Ross (1944); Flint (1960); Wojtowicz (1982); Wiggins (1996); Green (2023).



Map 13.3 *Pycnopsyche indiana* ▲



Map 13.4 *Pycnopsyche scabripennis* ●

KEY TO SPECIES FOR LARVAE OF FLORIDA *PYCNOPSYCHE*

[based on Green (2023); all photos by M.W. Green]

1. Genal muscle scars of head small, brown, and typically in rows (Fig. 13.6); ventral apotome of head extended posteriorly, much longer than wide (Fig. 13.7); abdominal segment I sternum with mesal pair of large, dark sclerites with 3-5 dark setae (Fig. 13.8) . . . . . *Pycnopsyche scabripennis* (Rambur)

Fig. 13.6

Fig. 13.7

Fig. 13.8

Genal muscle scars of head larger and paler, not typically arranged in rows (Fig. 13.9); ventral apotome of head less extended posteriorly and not much longer than wide (Fig. 13.10); abdominal segment I sternum mesal sclerites small with tufts of dark setae (Fig. 13.11) . . . . . *Pycnopsyche indiana* (Ross)

Fig. 13.9

Fig. 13.10

Fig. 13 11

FAMILY MOLANNIDAE

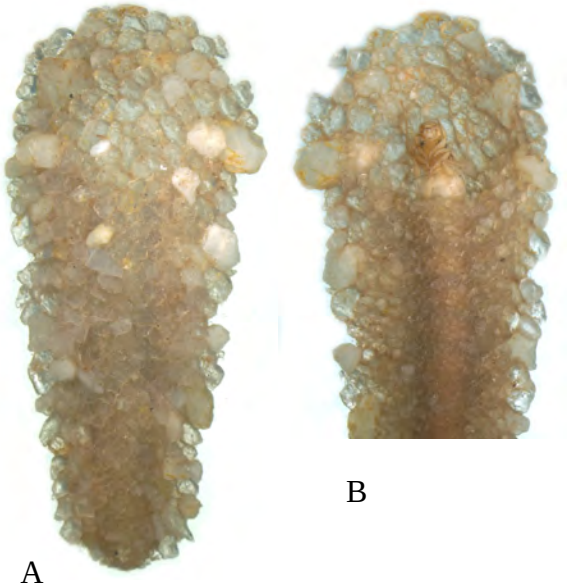
(*hood caddisflies*)

The family Molannidae is represented in the Nearctic Region by two genera, *Molanna* and *Molannodes*. The Florida fauna includes only the genus *Molanna* (3 spp.). Late instar molannids can be distinguished from other caddis families by the presence of reduced hind tarsal claws (Fig. 2.39) and case constructed of quartz pieces with a dorsal hood and lateral flanges (Figs 2.40, 14.2). Molannids occur in a wide range of lotic habitats throughout North Florida extending into central Florida.

Genus ***Molanna*** Curtis

Diagnosis: Larvae of *Molanna* (Fig. 14.1) are characterized as follows: tarsal claw of each hind leg setose, and greatly reduced compared to those on fore- and middle legs (Fig. 2.39); and abdominal gill filaments with two to four branches (Fig. 2.39). The larval case is composed of coarse sand and features a prominent lateral flange and dorsal hood over the anterior end, giving the case a flattened appearance (Figs 2.40, 14.2).

Fig. 14.1 *Molanna tryphena*



A B

Fig. 14.2 *Molanna ulmerina* case – A) dorsal, B) ventral, with larva

Species notes: Three of the five North American species of *Molanna* are found in Florida (*M. blenda*, *M. tryphena*, and *M. ulmerina*). Sherberger and Wallace (1971) described the larvae of *M. blenda* and *M. tryphena*, and discussed their ecology and biology as well. The larvae of these species are distinguished morphologically by the development of the foretibial spine and the shape of the membranous frontal constrictions, as indicated in the following key to species. Larva/adult associations of *Molanna ulmerina* by D. Denson revealed that *M. ulmerina* can be easily separated from the other two species by the much narrower black banding on the dorsum of the head.

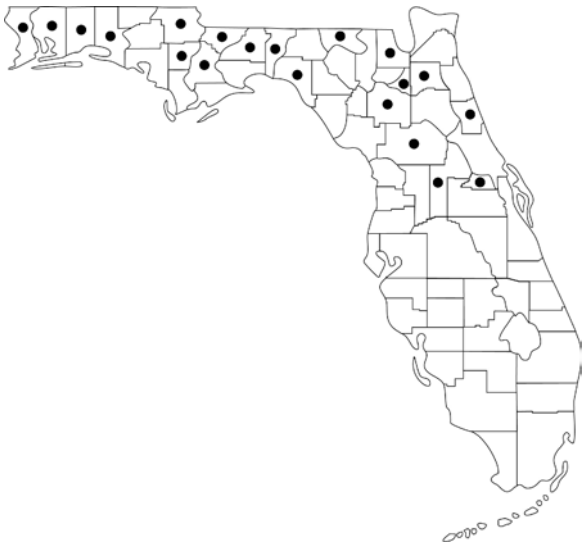
Molanna blenda, *M. tryphena*, and *M. ulmerina* are lotic dwellers. Sherberger and Wallace (1971) indicated that larvae of *M. blenda* have been collected only in spring seeps and spring-fed

streams with waters uniformly cool throughout the year, and larvae of *M. tryphena* occur in larger streams. In Florida, larvae and adults of *M. blenda* were reported from small spring-fed ravine streams in the panhandle (Rasmussen, 2004). *Molanna tryphena* and *M. ulmerina* are both widespread in streams and creeks across the north central peninsula and panhandle of Florida, the former, however, is far more common.

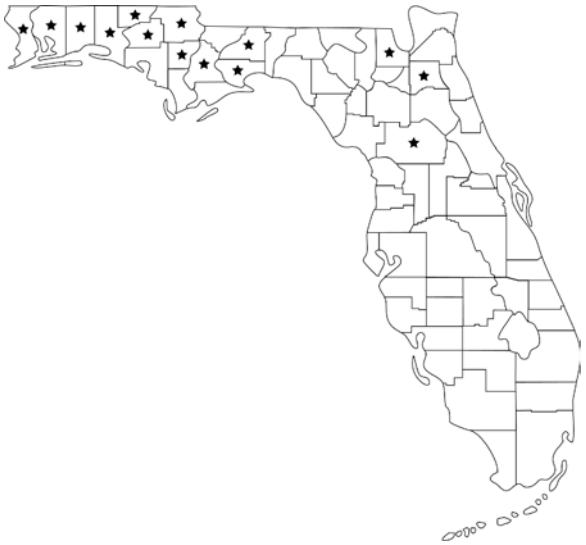
Molanna tryphena was found to be univoltine with an extended adult emergence in two East Texas spring-fed streams (Gupta and Stewart, 2000). Our adult collection records of *Molanna* species also suggest an extended adult emergence throughout most of the year.

Additional references: Ross (1944); Sherberger and Wallace (1971); Wiggins (1996).

Map 14.1 *Molanna blenda* ▲



Map 14.2 *Molanna tryphena* ●



Map 14.3 *Molanna ulmerina* ★

KEY TO SPECIES FOR LARVAE OF FLORIDA *MOLANNA*

[modified from Sherberger and Wallace (1971)]

1. Apex of base of spine on fore tibia extending well past tibiotarsal joint (Fig. 14.2); membranous area at constriction of frons capitate (Fig. 14.3) . . . . . *M. blenda* Sibley

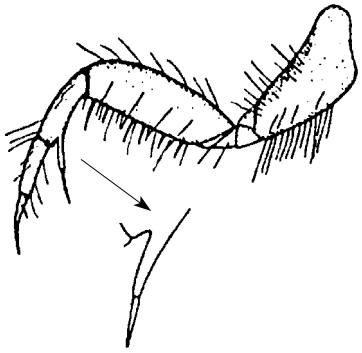


Fig. 14.2 [from Sherberger and Wallace (1971)]

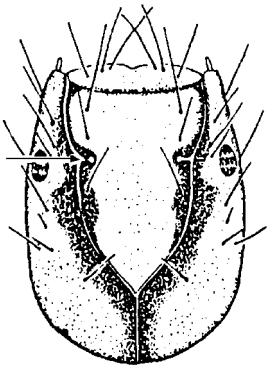


Fig. 14.3 [from Sherberger and Wallace (1971)]

Apex of base of spine on fore tibia not extending well past tibiotarsal joint (Figs. 14.4, 14.5); membranous area at constriction of frons quadrate to triangular (Figs 14.6, 14.7) 2

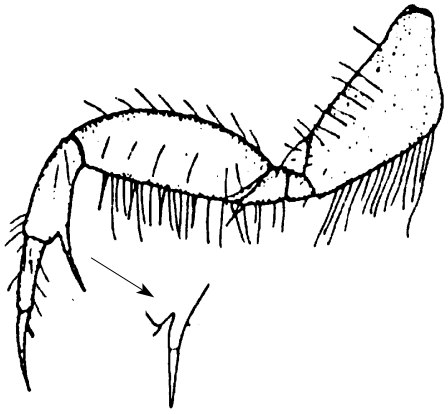


Fig. 14.4 *Molanna tryphena* [from Sherberger and Wallace (1971)]

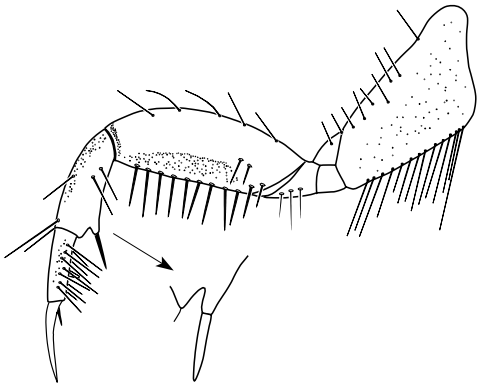


Fig. 14.5 *Molanna ulmerina*

2(1) Head with dark banding along frontoclypeal and coronal sutures relatively wide (Fig. 14.6); apex of base of spine on fore tibia extending slightly past tibiotarsal joint (Fig. 14.4) . . . . . *M. tryphena* Betten

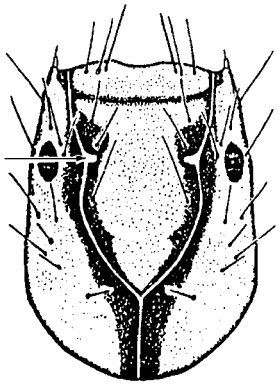


Fig. 14.6 [from Sherberger and Wallace (1971)]

Head with dark banding along frontoclypeal and coronal sutures narrow (Fig. 14.7); apex of base of spine on fore tibia extending to tibiotarsal joint (Fig. 14.5) . . . . . *M. ulmerina* Navás

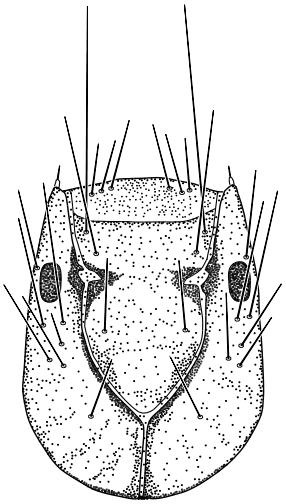


Fig. 14.7

FAMILY ODONTOCERIDAE

(mortarjoint caddisflies)

The family Odontoceridae is represented in the Nearctic by six genera but only the genus *Psilotreta* (2 spp.) extends its geographic range to Florida. The larvae are morphologically recognized by the following: anal proleg without cluster of dorsal setae posteromesad of lateral sclerite (Fig. 2.58); and foretrochantin small, apex not hook-shaped (Fig. 2.60). The larval case is constructed of coarse sand or small rock fragments tightly glued together. Larvae are generally lotic dwellers but are most common in springbrooks to medium-sized streams with substrates made up of mixtures of sand and gravel.

Genus ***Psilotreta*** Banks

Diagnosis: Larvae of *Psilotreta* (Fig. 15.1) are distinguished from other odontocerid genera in eastern North America as follows: metanotum with fusion of sa1 sclerites into broad, undivided rectangular plate (Fig. 15.1). The cylindrical larval cases are slightly tapered and constructed of coarse quartz fragments (Fig. 15.1).

Fig. 15.1 *Psilotreta frontalis* larva and case

Species notes: Two of the six Nearctic species of *Psilotreta*, *P. frontalis* and *P. labida*, are found in Florida (Maps 15.1, 15.2). The larvae of these species are distinguished by the development of the anterolateral corner of the pronotum, and the coloration on the dorsum of the head and pro- and mesonotum (Parker and Wiggins, 1987). These two species share a similar geographic distribution spanning the Appalachian Highland states.

The larvae of *P. frontalis* are primarily found in well shaded spring-fed streams. In Florida, this species appears to be restricted to small spring-fed streams in the panhandle (Map 15.1) (Denson et al., 2016) and is especially abundant in ravine streams associated with the Apalachicola River (Rasmussen, 2004). We have observed aggregations of numerous *Psilotreta* cases on hard substrates where larvae shelter in preparation to pupate. Knowledge of the life history of *P. frontalis* is limited. In Florida, adults are present primarily in the spring. A study of insect emergence in a ravine stream in the central part of the panhandle by Rasmussen (2004) found that *P. frontalis* adult emergence was limited to April and May. The population appeared to develop as a single cohort over a one-year time period.

Psilotreta labida, previously unknown in Florida, was recently reported in Florida by Rasmussen et al. (2025) based on a larval collection from Mill Creek, Jackson County (Map 15.2).

We have also identified larvae of *P. labida* from TiTi Branch in Thomas County, Georgia just north of the Florida state line.

Additional references: Parker and Wiggins (1987).

Map 15.1 *Psilotreta frontalis* ★

Map 15.2 *Psilotreta labida* ●

KEY TO SPECIES FOR LARVAE OF FLORIDA *PSILOTRETA*

[adapted from Parker and Wiggins (1987)]

1. Anterolateral corners of pronotum long and acute (Fig. 15.2); head and pro- and mesonotum with wide black band (Fig. 15.3); frontoclypeus uniformly black (Fig. 15.3) . . . . . *P. labida* Ross

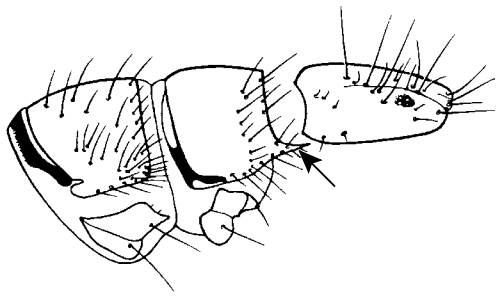


Fig. 15.2 [from Parker and Wiggins (1987)]

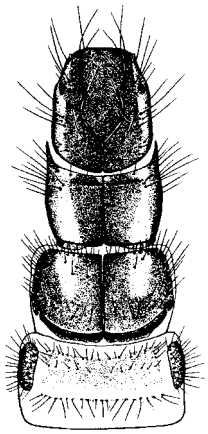


Fig. 15.3 [from Parker and Wiggins (1987)]

Anterolateral corners of pronotum shorter than above (Fig. 15.4); head, pro- and mesonotum with black band narrower than above (Fig. 15.5); frontoclypeus with anterolateral light areas (Fig. 15.5) . . . . . *P. frontalis* Banks

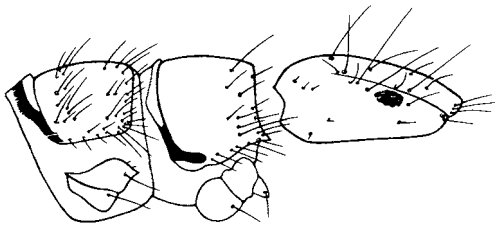


Fig. 15.4 [from Parker and Wiggins (1987)]

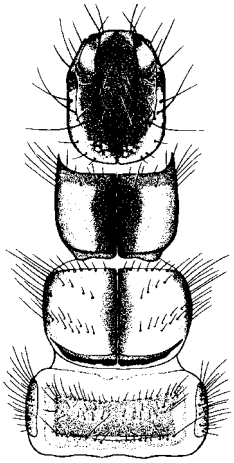


Fig. 15.5 [from Parker and Wiggins (1987)]

FAMILY PHILOPOTAMIDAE

(*finger-net caddisflies*)

Two of the five Nearctic genera of Philopotamidae, *Chimarra* (5 spp.) and *Wormaldia* (1 sp.), are represented in Florida, the former a widespread genus in the state. Philopotamid larvae have a unique membranous and T-shaped labrum (Fig. 2.28). The strictly lotic dwelling larvae spin tubular, sac-like, capture nets with fine mesh to filter particulate organic matter. The larvae have the distinction of constructing capture nets with the smallest known mesh openings of any net-spinning caddisflies (Wallace and Malas, 1976).

KEY TO GENERA FOR LARVAE OF FLORIDA PHILOPOTAMIDAE

[adapted from Morse et al. (2019b)]

1. Anterior margin of frontoclypeus with prominent notch asymmetrically right of midline (Fig. 16.1); fore coxa with long, slender, subapical seta-bearing process (Fig. 16.2) . . . . . *Chimarra* (p. 16-4)

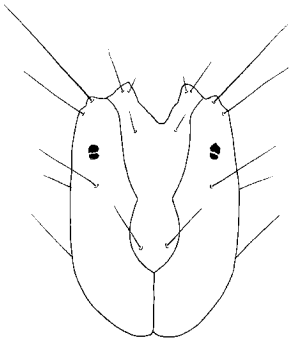


Fig. 16.1

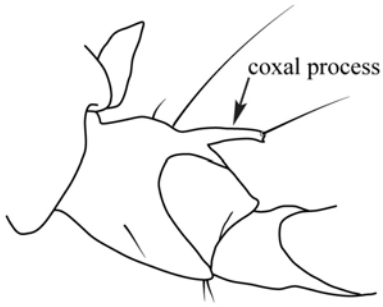


Fig. 16.2

Anterior margin of frontoclypeus evenly convex, symmetrical (Fig. 16.3); fore coxa without long subapical process (Fig. 16.4) . . . . . *Wormaldia*, *W. moesta* (Banks)

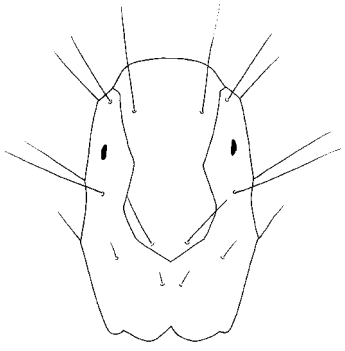


Fig. 16.3

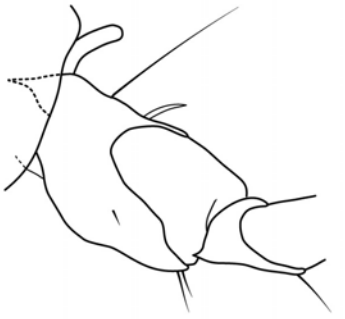


Fig. 16.4

Genus ***Chimarra*** Stephens

Diagnosis: Larvae of *Chimarra* (Fig. 16.5) are characterized as follows: anterior margin of frontoclypeus with prominent notch asymmetrically right of midline (Fig. 16.1); and each fore coxa with long slender seta-bearing process (Fig. 16.2).

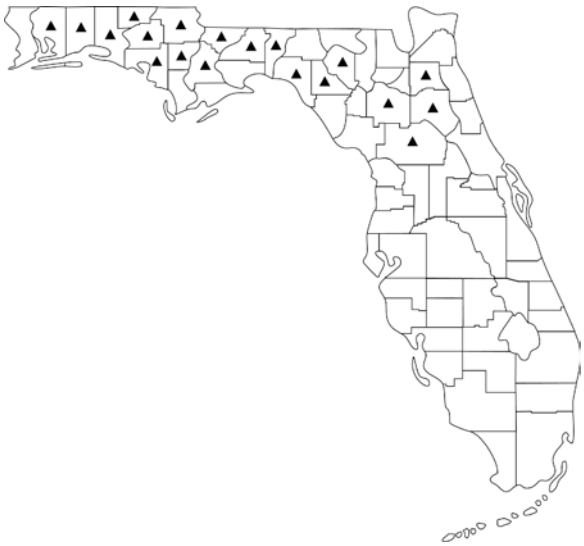
Fig. 16.5 *Chimarra* sp.

Species notes: We have documented five species of *Chimarra* in Florida (*C. aterrima*, *C. falculata*, *C. florida*, *C. moselyi*, *C. obscura*) (Maps 16.1–16.5). *Chimarra parasocia* has not been recorded in Florida but has been reported from nearby coastal eastern Louisiana and Alabama (Lago and Harris, 1987). Of the five species known from Florida, *C. aterrima, C. florida,* and *C. moselyi* are widely distributed across the panhandle and northern half of the peninsula. *Chimarra moselyi* is typically found at calcareous habitats, whereas *C. aterrima* and *C. florida* are known from a variety of lotic habitats in Florida. *Chimarra falculata* and *C. obscura* are more restricted in range within the state, the former is endemic to the Southeastern Gulf Coastal Plain and is restricted in Florida to the western panhandle, and the latter is known from scattered collections across northern Florida as far east as Alachua County.

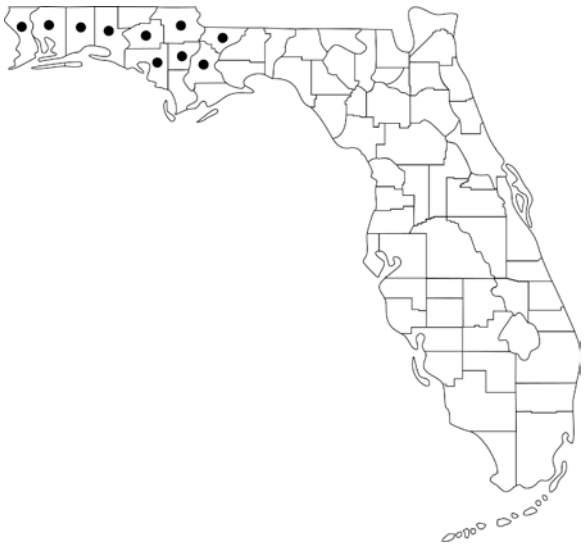
As previously stated, *Chimarra* is geographically widespread in the state, and we found that the larvae are very common in relatively clean, small and clear sand-bottomed streams in northern and central Florida. We have collected larvae of various sizes throughout the year. Light-trap and emergence trap collections indicate that adults emerge almost all year except in December-February. Whether *Chimarra* spp. have univoltine or multivoltine life cycles in Florida remains to be investigated. Elsewhere, species such as *C. aterrima* and *C. moselyi* are bivoltine (Unzicker et al., 1982; Wallace and Anderson, 1996). Typical *Chimarra* larval habitats include the underside of rocks near their upstream edge, sunken snags, and submerged root masses.

Larvae of *Chimarra* species can be differentiated based on the characteristics of the asymmetrical excision in the anterior margin of the frontoclypeus. These differences are subtle in some cases, and consideration of habitat and known geographic ranges might be helpful in separating the species at times. The provisional key below is based on Ross (1944), figures of J.S. Gosnell presented by Morse et al. (2017), larval-adult associations based on rearings done by D.R. Denson, and geographic associations where all adults collected from a given location include only a single species.

Additional references: Ross (1944); Wiggins (1996); Morse et al. (2017).

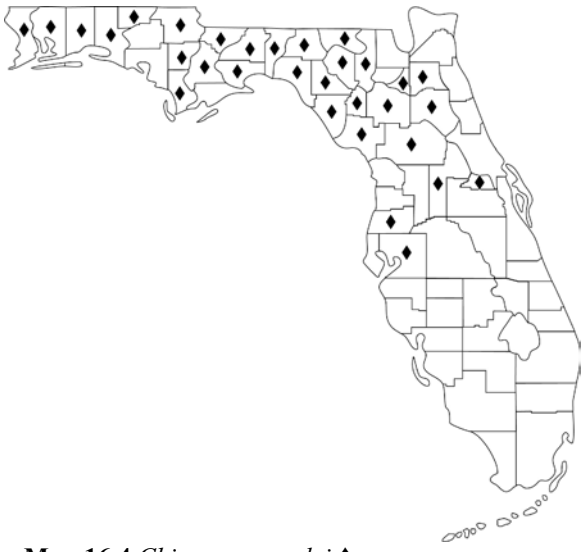


Map 16.1 *Chimarra aterrima* ▲

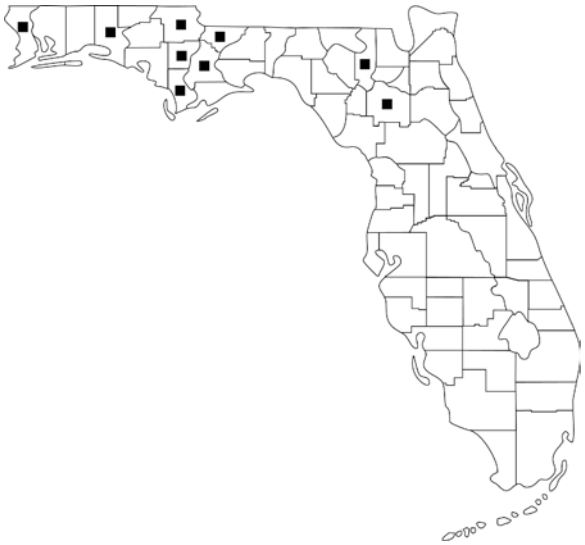


Map 16.2 *Chimarra falculata* ●

Map 16.3 *Chimarra florida* ★



Map 16.4 *Chimarra moselyi* ♦



Map 16.5 *Chimarra obscura* ■

PROVISIONAL KEY TO SPECIES FOR LARVAE OF FLORIDA *CHIMARRA*

[based on Ross (1944), Morse et al. (2017), D. Denson (unpublished)]

Note: *Chimarra parasocia* possibly occurs in the Florida panhandle, however the larva is undescribed and is not included in the key below.

1. Anterior margin of frontoclypeus with deep, narrow, thumb-like, rounded right-slanted excision right of midline, and without small serrations or bumps (Figs 16.6, 16.7) . . . . . *C. obscura* (Walker)

Fig. 16.6

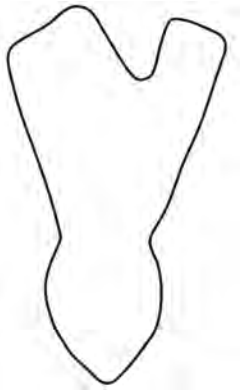


Fig. 16.7

Not as above; excision wider and not narrowly thumb-like in appearance 2

2(1) Depth of excision at anterior margin of frontoclypeus approximately ¼ its width; two wide, shallow blunt humps right of midline (Figs 16.8, 16.9) . . . . . *C. moselyi* Denning

Fig. 16.8

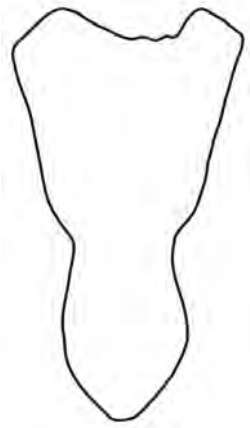


Fig. 16.9

Depth of excision at anterior margin of frontoclypeus appoximately ½ its width 3

3(2) Excision with deepest point well right of midline (Figs 16.10, 16.11); restricted in Florida to the panhandle . . . . . *C. falculata* Lago & Harris

Fig. 16.10

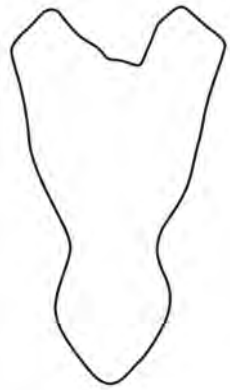


Fig. 16.11

Excision deepest near midline 4

4(2) Excision broadly rounded posteriorly (Figs 16.12, 16.13) . . . . . *C. florida* Ross

Fig. 16.12

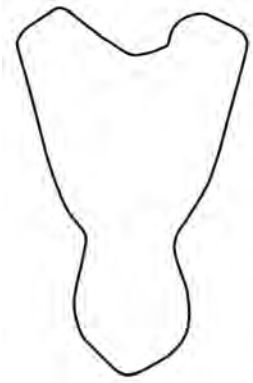


Fig. 16.13

Excision with posterior flat-bottom depression right of midline (Figs 16.14, 16.15) . . . . . *C. aterrima* Hagen

Fig. 16.14

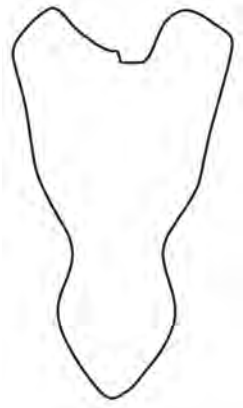


Fig. 16.15

Genus ***Wormaldia*** MacLachlan

Diagnosis: Larvae of *Wormaldia* (Fig. 16.16) are distinguished from *Chimarra* spp. by the evenly convex and symmetrical anterior margin of frontoclypeus (Fig. 16.3); and absence of subapical process on each prothoracic coxa (Fig. 16.4). The capture net consists of several layers of mesh, each layer having elongate openings of variable sizes (Unzicker et al., 1982).

Fig. 16.16 *Wormaldia moesta*

Species notes: Of the five southeastern species of *Wormaldia*, only *W. moesta*, which is widespread across eastern North America, is represented in Florida (Map 16.6). Ross (1944) briefly described the larva and distinguished *W. moesta* from *W. shawnee* (Ross) by the slender coxal spine on each foreleg and inconspicuous transverse bars on the frons. The species is restricted in Florida to the western panhandle. Larval collections have come from several streams in the Blackwater, Chipola, and Escambia river basins. Adults have been collected with light traps beside Rocky Creek on Eglin Air Force Base in Walton County (Harris et al., 1982) and from Mare Creek in the Blackwater River State Forest, Okaloosa County (Rasmussen et al., 2008a).

Additional references: Ross (1944); Wiggins (1996).

Map 16.6 *Wormaldia moesta* ▲

FAMILY PHRYGANEIDAE

(*giant caddisflies*)

The phryganeid caddisflies comprise ten genera in North America and three of the genera, *Agrypnia* (1 sp.), *Banksiola* (1 sp.), and *Ptilostomis* (2 spp.), are represented in Florida. The larvae are morphologically defined by the presence of a cluster of setae arising from a small rounded sclerite on metanotal sa3 (Fig. 2.19) and a well-developed prosternal horn (Fig. 2.20). The larval cases are constructed primarily of plant materials in which the pieces are either fastened together to produce a continuous, spirally wound case (Fig. 17.8), or fitted together to form discrete ring-like sections (Fig. 2.21). Larvae inhabit an array of lentic and lotic habitats and are among the largest caddisflies, hence the common name.

KEY TO GENERA FOR LARVAE OF FLORIDA PHRYGANEIDAE

[modified from Morse et al. (2019b)]

1. Pronotum with dark band along anterior margin, lacking dark markings across mid-section (Fig. 17.1); ventral combs of fore coxae conspicuous, their teeth evident at 50X magnification (Fig. 17.2) . . . . . *Agrypnia*, *A. vestita* (Walker)

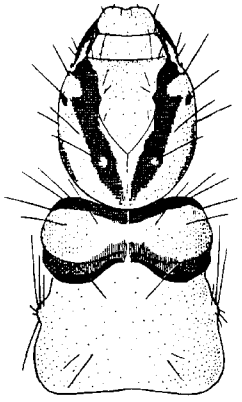


Fig. 17.1 [from Ross (1944)]

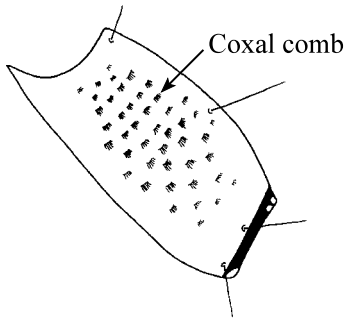


Fig. 17.2

Pronotum without dark band along anterior margin, diagonal or transverse markings present across each side (Figs. 17.4, 17.5); ventral combs of fore coxae small, each comb appearing as a tiny raised point at 50X magnification (Fig. 17.3); 2

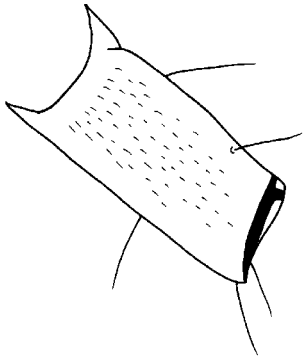


Fig. 17.3

2(1) Pronotum with dark bands extending diagonally across each side (Fig. 17.4); case constructed of small plant pieces arranged in spiral pattern (Fig. 17.9B) . . . . . *Banksiola*, *B. concatenata* (Walker)

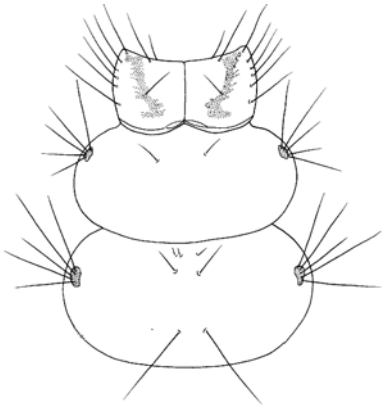


Fig. 17.4

Pronotum with dark bands extending transversely across anterior portion only (Fig. 17.5); case constructed of large rectangular plant pieces arranged in ring-like sections that fit end-to-end (Fig. 17.6) . . . . . *Ptilostomis*

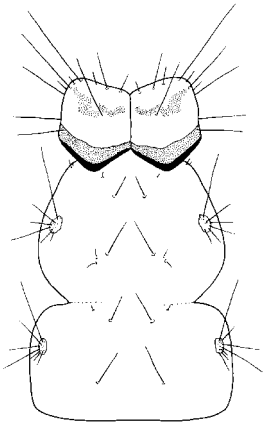


Fig. 17.5

Fig. 17.6

Genus ***Agrypnia*** Curtis

Diagnosis: Larvae of *Agrypnia* (Fig. 17.7) are morphologically characterized by the following: fore coxae with conspicuous ventral combs (Fig. 17.2) [**note:** prothoracic coxal combs of *A. vestita* are smaller than those of other *Agrypnia* species]; and coxal combs of the middle legs each with basal axis both transverse and parallel to long axis of coxa. The larval case is constructed of leaf and bark pieces arranged in a spiral pattern (Fig. 17.8).

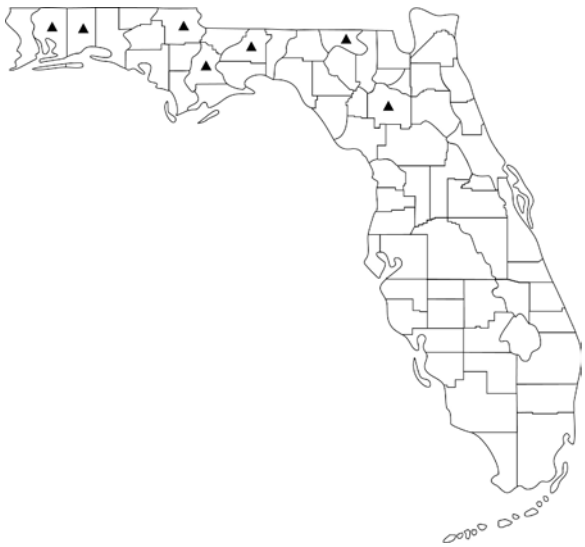
Fig. 17.7 *Agrypia vestita*

Fig. 17.8 *Agrypnia improba* case. Photo courtesy of James C. (Skip) Hodges, Jr.

Species notes: Only one species of *Agrypnia*, *A. vestita*, is represented in Florida. The larva, described by Ross (1944) and Wiggins (1960, 1998), is characterized by the absence of diagonal dark brown bandings on the pronotum; the relatively narrow dorsal banding on the head (Fig. 294); and the frontoclypeus which is usually without markings.

Agrypnia vestita is quite uncommon in Florida. The species has only been collected from scattered localities from dissimilar sites across northern Florida. We have examined larvae collected from a forested wetland near Panama City and from Roaring Creek, a tributary of the Suwannee River in Hamilton Co. The creek is medium-sized, and has a moderate flow and mostly sandy substrate with plenty of snags and leaf packs in some reaches (R. Frydenborg, pers. comm.). The life history of *A. vestita* in Florida is unknown. Most of our adult collections in Florida were made in the fall. The species has been reported to emerge in May to October in North and South Carolina (Unzicker et al., 1982).

Additional references: Ross (1944); Wiggins (1960, 1996, 1998).



Map 17.1 *Agrypnia vestita* ▲

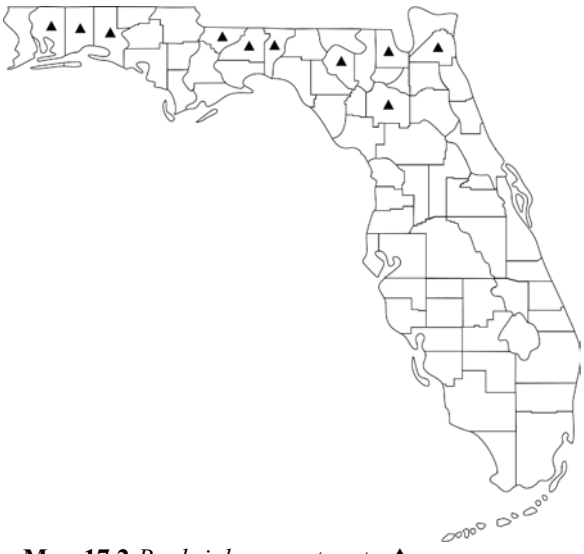
Genus ***Banksiola*** Martynov

Diagnosis: Larvae of *Banksiola* (Fig. 17.9A) are distinguished from *Agrypnia* and *Ptilostomis* by the following combination of characters: ventral combs of the forecoxae inconspicuous; and dark banding of pronotum extending diagonally across pronotum (Fig. 17.4). The larval case, similar to *Agrypnia*, is arranged in a spiral fashion (Fig. 17.9B).

Fig. 17.9 *Banksiola concatenata* – A) larva, B) case

Species notes: *Banksiola* is represented in Florida by the species *B. concatenata* (Map 17.2). The species has been recorded from scattered localities across northern Florida. The larva of this species is undescribed. We have seen only one larva of *Banksiola* collected in Florida (Hamilton County). We presume this to be *B*. *concatenata* because it is the only *Banksiola* species known to occur in Florida, Georgia, and Alabama. This specimen lacks the dark banding on the meso- and metanotum that is characteristic of other *Banksiola* species.

Additional references: Wiggins (1960, 1996, 1998).



Map 17.2 *Banksiola concatenata* ▲

Genus ***Ptilostomis*** Koslenati

Diagnosis: Similar to larvae of the genus *Banksiola*, larvae of *Ptilostomis* (Fig. 17.10) have inconspicuous ventral combs on the prothoracic coxae. Unlike *Banksiola*, larvae of *Ptilostomis* have: pronotal transverse bands limited to anterior half (Fig. 17.5); and larval case consisting of 4-6 rings of large rectangular pieces of plant material attached end-to-end (Figs 17.6, 17.11).

Fig. 17.10 *Ptilostomis* sp.

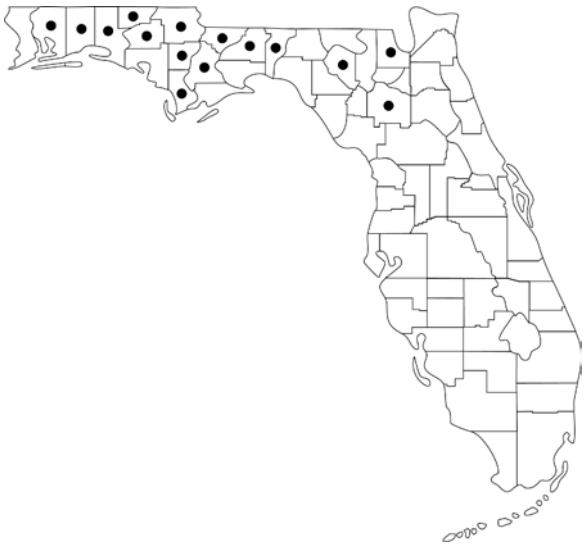
Fig. 17.11 *Ptilostomis* sp., case

Species notes: Two (*P. postica* and *P. ocellifera*) of the four known North American species of *Ptilostomis* occur in Florida (Maps 17.3, 17.4). Distinguishing larval characteristics for these two species are unknown (Wiggins, 1998). We have examined larvae of *Ptilostomis* collected in a backwater area of the Blackwater River (Okaloosa Co), Wilson Mill Creek (Calhoun Co.), Dry Creek (Jackson Co.), and the Econfina River (Taylor County). We have collected adults of both species from a variety of stream types across the panhandle and northern parts of the peninsula.

Like the other Florida phryganeid caddisflies, information on the life histories of *Ptilostomis* spp. is limited. The adults of *P. postica* appear to emerge almost throughout the year, as light-trap collections indicate their flight in March through November. Adults of *P. ocellifera* were collected April through June. Larvae of *Ptilostomis* examined during this study were collected from January through April.

Additional references: Wiggins (1960, 1996, 1998).

Map 17.3 *Ptilostomis ocellifera* ▲



Map 17.4 *Ptilostomis postica* ●

FAMILY POLYCENTROPODIDAE

(*trumpet-net caddisflies*)

The diverse and cosmopolitan polycentropodids are represented in Florida by the genera *Cernotina* (3 spp.), *Cyrnellus* (1 sp.), *Neureclipsis* (2 spp.), *Nyctiophylax* (4 spp.), *Plectrocnemia* (4 spp.), and *Polycentropus* (4 spp.). Mirroring global patterns of biodiversity of the family, Polycentropodidae are diverse and broadly distributed throughout Florida. Occurring in a variety of lentic and lotic habitats, the larvae of this family construct variously shaped fixed silken retreats where they are filter feeders or predators.

Polycentropodid larvae are easily recognized by the pointed foretrochantin fused to the episternum without a separating suture and by the elongate tarsi (Figs 2.31, 2.34), which distinguish this family from the Dipseudopsidae. Larvae of this family primarily occur in lotic habitats, although larvae of some *Cernotina*, *Cyrnellus*, and *Plectrocnemia* species can also be common in lentic habitats. The family is geographically widespread throughout the state. Larvae construct a variety of fixed retreats and capture nets with the materials, architecture, and placement of the retreats varying among genera.

KEY TO GENERA FOR LARVAE OF FLORIDA POLYCENTROPODIDAE

[adapted from Morse et al. (2019b) and Orfinger et al. (2022)]

1. Anal claw with 6 or fewer ventral teeth (Fig. 18.1); pronotum with short, stout bristle arising near each ventrolateral margin (Fig. 18.2) . . . . . *Nyctiophylax*

Fig. 18.1

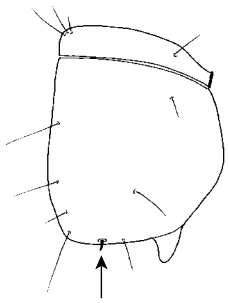


Fig. 18.2

Anal claw without ventral teeth (Fig. 18.3) *or* with 10 or more tiny ventral spines (Fig. 18.4); pronotum without short, stout bristle near each ventrolateral margin 2

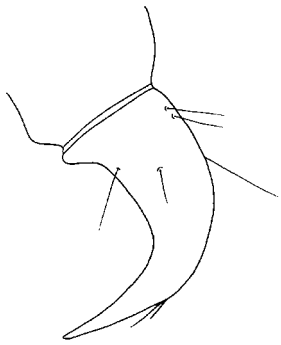


Fig. 18.3

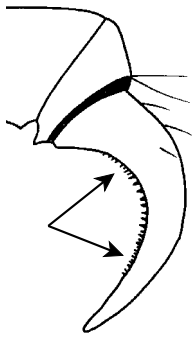


Fig. 18.4

2(1) Basal segment of anal proleg about as long as distal segment and with only 2 or 3 apicoventral setae (Fig. 18.5); anal claw with many tiny ventral spines visible at 40X magnification (Fig. 18.5) . . . . . *Neureclipsis* (p. 18-9)

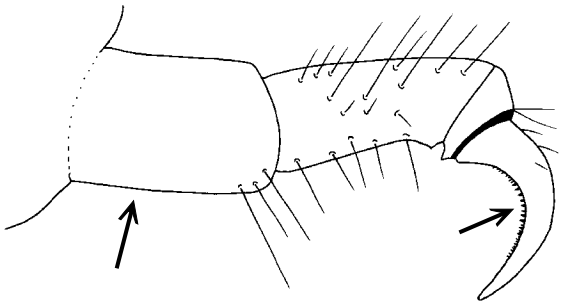


Fig. 18.5

Basal segment of anal proleg usually longer than distal segment in late instar larvae and with many setae scattered over most of its surface (Fig. 18.6); anal claw without tiny ventral spines visible at 40X magnification (Fig. 18.6) 3

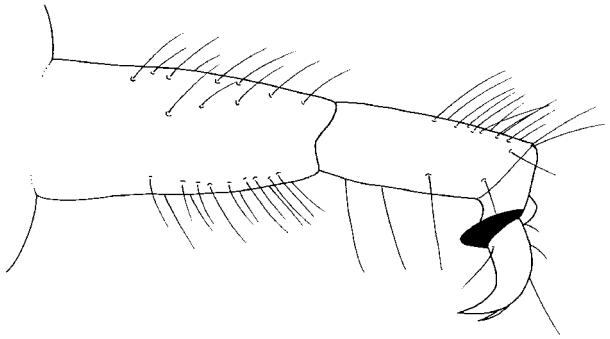


Fig. 18.6

3(2) Dorsal region between anal claw and sclerite of distal segment of anal proleg with 2 mesally contiguous dark bands (Fig. 18.7); meso- and metanotal sa1 setae short, not more than one-third as long as longest sa2 setae (Fig. 18.8) 4

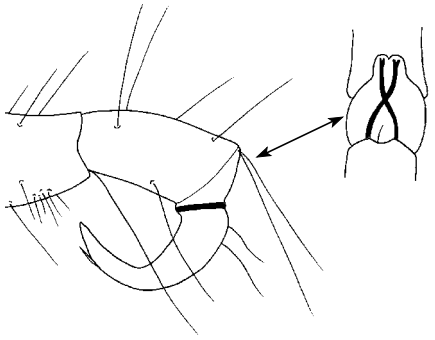


Fig. 18.7

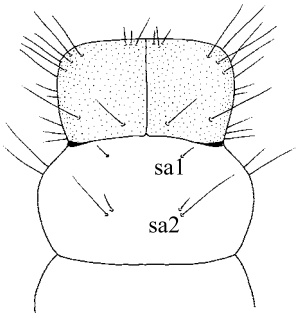


Fig. 18.8

Dorsal region between anal claw and sclerite of distal segment of anal proleg with 2 mesally non-contiguous dark bands (Fig. 18.9); meso- and metanotal sa1 setae about as long as longest sa2 setae (Fig. 18.10) . . . . . *Cyrnellus*, *C. fraternus* (Banks)

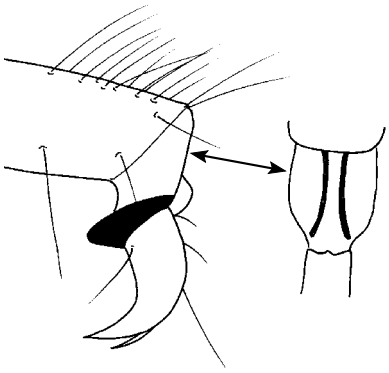


Fig. 18.9

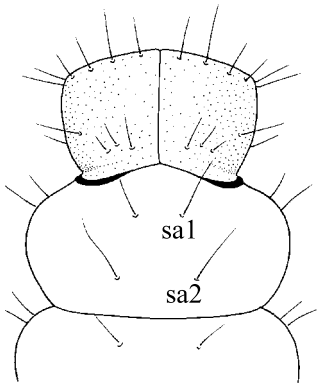


Fig. 18.10

4(3) 5th instar larvae ≤8 mm long; anal claw right angled (Fig. 18.11), with minute spines visible along concave margin at higher magnifications (Fig. 18.17)
. . . . . *Cernotina* (p. 18-6)

Fig. 18.11

5th instar larvae ≥10 mm long; anal claw right-angled (Fig. 18.12) or obtusely curved (Fig. 18.13), minute spines absent along concave margin
. . . . . *Polycentropus sensu lato*, in part (*Polycentropus*, *Plectrocnemia*) (p. 18-16)

Fig. 18.12

Fig. 18.13

Genus ***Cernotina*** Ross

Diagnosis: Larvae of Florida *Cernotina* (Fig. 18.14) are distinguished from other polycentropodid genera as follows: mesally contiguous dark bands on dorsal region between anal claw and distal segment of anal proleg (Fig. 18.7); narrow protarsi at least two-thirds as long as protibiae (Fig. 18.15); anal claw right-angled (Fig. 18.16); 5th instar larva less than 8 mm in length; and minute spines visible on concave margin of anal claw at ≥200X magnification (Fig. 18.17). Slide mounting the anal claws and viewing them on a compound microscope is recommended.

Fig. 18.14 *Cernotina truncona*
[from Orfinger and Bui (2024)]

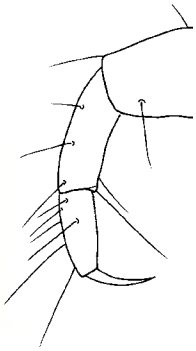


Fig. 18.15

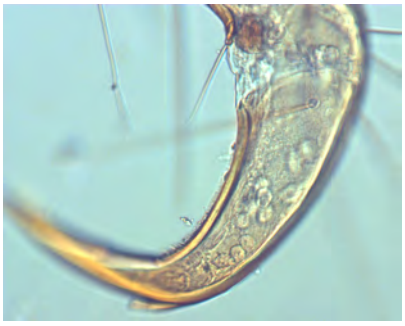


Fig. 18.17
[photo courtesy of Todd Risk]

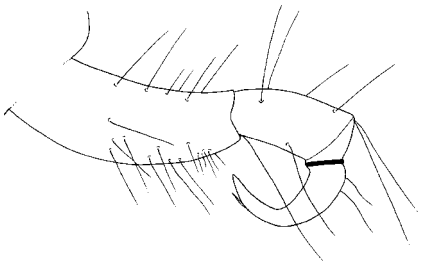
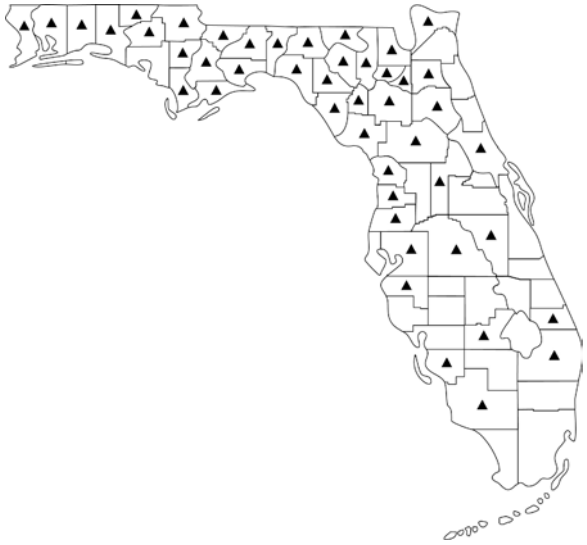


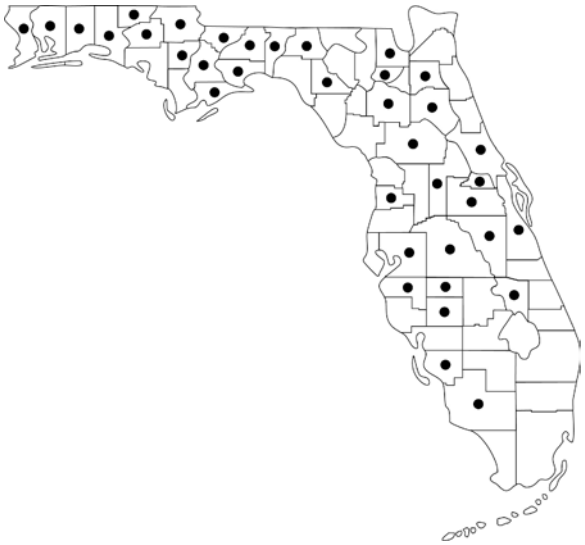
Fig. 18.16

Species notes: Represented by three species in Florida, the genus *Cernotina* has been recorded throughout the state (Maps 18.1–18.3). Members of this genus are small (≤8 mm length) in all life stages. Immature stages occur in lentic or lotic habitats depending on the species, where larvae construct retreats covering small depressions in the hard substrata, with flared openings leading to flaps of silken threads (Hudson et al., 1981). Two of the species are described, *C. spicata* by Hudson et al. (1981) and Wiggins (1996), and *C. truncona* by Orfinger and Bui (2024). The concave margin of the anal claw of *C. truncona* and *C. spicata* possesses minute spines visible at 200X magnification, which is diagnostic from the *Polycentropus sensu lato*. The larva of *C. calcea* remains unknown.

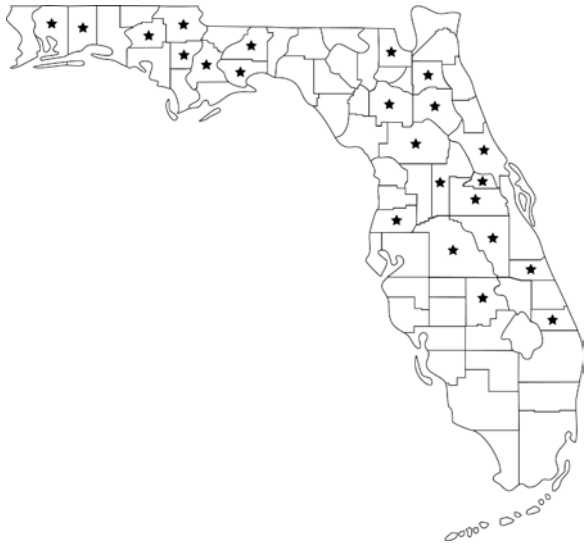
Additional references: Hudson et al. (1981); Wiggins (1996); Orfinger and Bui (2024).



Map 18.1 *Cernotina calcea* ▲



Map 18.2 *Cernotina spicata* ●



Map 18.3 *Cernotina truncona* ★

KEY TO SPECIES FOR LARVAE OF FLORIDA *CERNOTINA*

[modified from Orfinger and Bui (2024)]

Note: The larva of *Cernotina calcea* is unknown. The species occurs in lotic systems.

1. Mesonotum and metanotum with short sa1 setae (Fig. 18.18); mesonotum with paired sa2 setae and three-grouped sa3 setae; metanotum with paired sa3 setae; tarsi with distal broad, fringed setae (Fig. 18.19); head width < 0.77 mm; occurring in lentic and lotic habitats . . . . . *C. spicata* Ross

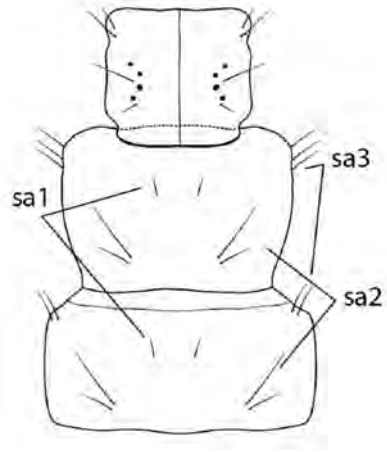


Fig. 18.18

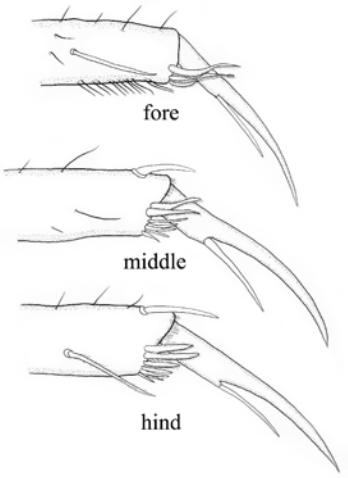


Fig. 18.19 [redrawn from Wiggins (1996]

Mesonotum and metanotum lacking sa1 setae (Fig. 18.20); mesonotum with single sa2 setae and with single sa3 setae; metanotum lacking sa3 setae; tarsi lacking distal, broad fringed setae; head width > 0.77 mm; known only from lentic habitats . . . . . *C. truncona* Ross

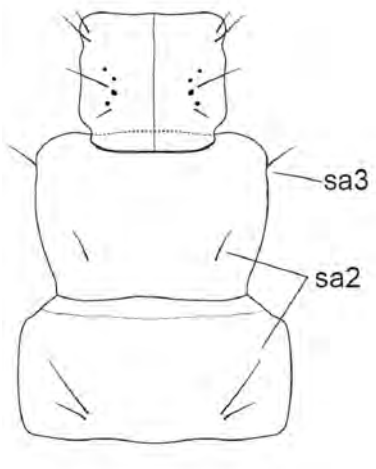


Fig. 18.20

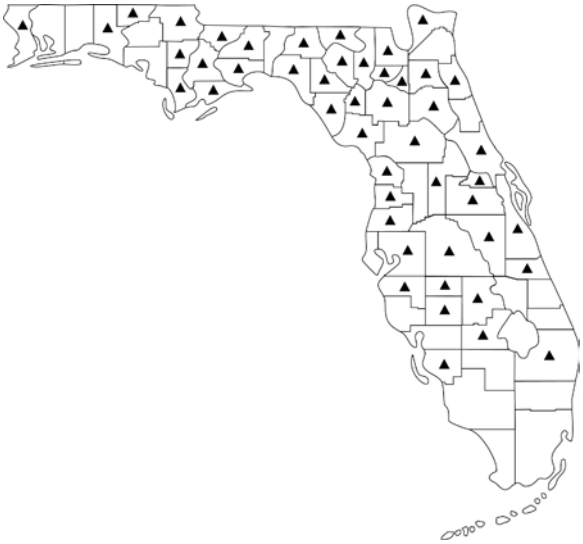
Genus ***Cyrnellus*** Banks

Diagnosis: Larvae of *Cyrnellus* (Fig. 18.21) are easily distinguished from other polycentropodid genera as follows: presence of 2 non-contiguous dark bands on dorsal region between anal claw and lateral sclerite of distal segment of anal proleg (Fig. 18.9); and meso- and metanotal sa1 setae as long as sa2 setae (Fig. 18.10).

Fig. 18.21 *Cyrnellus fraternus*

Species notes: The primarily Neotropical genus *Cyrnellus* has only a single widespread species recorded from Florida, *Cyrnellus fraternus*. The larva of *C. fraternus* was first described in the larval stage by Flint (1964) and is widespread throughout the eastern US and throughout Florida (Map 18.4). This species occurs in both lentic and lotic habitats where larvae construct a bag-like net retreat and appear to consume both microinvertebrates and fine particulate organic matter (Flint, 1964; Wiggins, 1996).

Additional references: Flint (1964); Wiggins (1996).



Map 18.4 *Cyrnellus fraternus* ▲

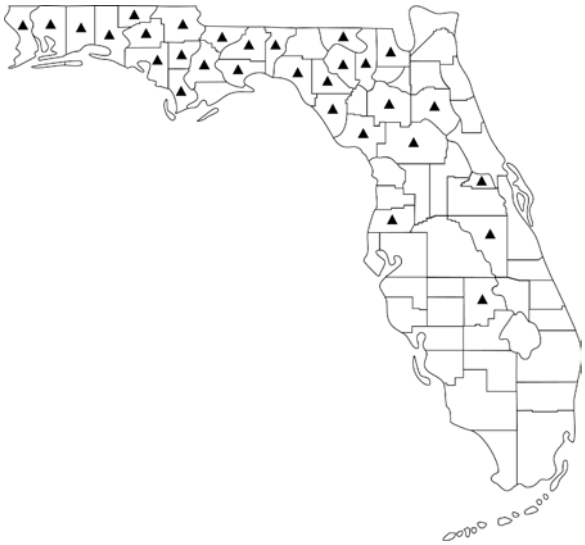
Genus ***Neureclipsis*** McLachlan

Diagnosis: Larvae of *Neureclipsis* (Fig. 18.22) are distinguished from other polycentropodid genera as follows: basal segment of anal proleg about equal in length to distal segment with only few setae arising from basal segment (Fig. 18.5); and anal claw with row of many tiny spines along ventral margin (Fig. 18.5). The row of tiny spines along the ventral margin of the anal claw are apparent at 40X magnification viewed from a lateral aspect. It is helpful to use illuminated base lighting as the light will transmit through the spines making them more apparent. The distinctive cornucopia-shaped retreat can be up to 12 cm in length (Fig. 18.23).

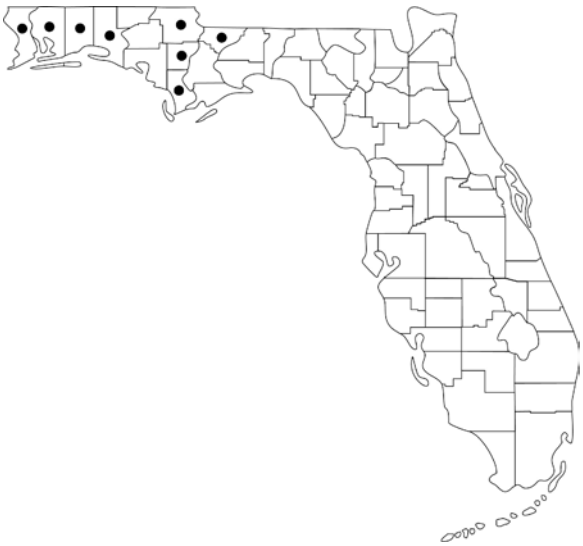
Fig. 18.22 *Neureclipsis crepuscularis*

Fig. 18.23 *Neureclipsis crepuscularis*, retreat

Species notes: Two of the five Nearctic species of *Neureclipsis*, *N. crepuscularis* and *N. melco*, are known in Florida (Maps 18.5, 18.6). Of these two species, only *N. crepuscularis* was previously described in the larval stage by Ross (1944). *Neureclipsis crepuscularis* is geographically widespread in the state, occurring in streams and rivers from the western panhandle to as far south as Highlands County. *Neureclipsis melco* is more restricted, having been reported based on adults collected from only in the panhandle. Our examinations of larvae collected in the state revealed that the two species exhibit distinct differences in the pigmentation pattern on the dorsal and lateral portions of the meso- and metathorax, and abdominal segments. Based on the larval description of *N. crepuscularis* by Ross (1944) and the geographic distribution of the specimens we examined, we feel confident larvae of the two species can be differentiated using the following key. The assignment of *N. melco* in the key, while not based on a larval/adult rearing, is consistent with the geographic distribution of adults. The larvae we base this circumstantial association on were collected from the Escambia River in



Map 18.5 *Neureclipsis crepuscularis* ▲



Map 18.6 *Neureclipsis melco* ●

northern Escambia County. Larvae of *Neureclipsis* live in flowing water where they are filter feeders constructing cornucopia-shaped retreats (Fig. 18.23), sometimes found in abundance, and attaining sizes of up to 12 cm.

Additional references: Ross (1944); Wiggins (1996).

KEY TO SPECIES FOR LARVAE OF FLORIDA *NEURECLIPSIS*

1. Areas of purplish pigmentation along dorsal and lateral margins of meso- and metathorax and abdominal segments broken into distinctly separate patches with unpigmented areas between patches (Fig. 18.24) . . . . . *N. melco* Ross

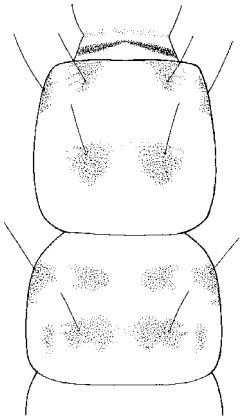


Fig. 18.24

Areas of purplish pigmentation along dorsal and lateral margins of meso- and metathorax and abdominal segments not broken into distinctly separate patches but appear as more continuous bands across dorsum (Fig. 18.25)
. . . . . *N. crepuscularis* (Walker)

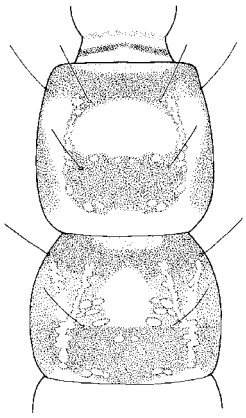


Fig. 18.25

Genus ***Nyctiophylax*** Brauer

Diagnosis: Larvae of *Nyctiophylax* (Fig. 18.26) are easily distinguished from other polycentropodid genera as follows: presence of 6 or fewer conspicuous teeth on ventral margin of anal claw (Fig. 18.1); and presence of stout bristle arising near ventrolateral margin of pronotum (Fig. 18.2).

Fig. 18.26 *Nyctiophylax* sp.

Species notes: Represented by four species in Florida (Maps 18.7–18.10), the genus *Nyctiophylax* is predominantly encountered in the northern half of the state, though one species, *N. serratus*, extends to south Florida north of Lake Okeechobee. The larvae of this genus are predators in slow flowing water, constructing fixed tubular retreats over depressions of hard substrates, with silk strands radiating outwards to detect vibrations of potential prey (Noyes, 1914; Flint, 1964; Wiggins, 1996). All Florida species belong to the subgenus *Paranyctiophylax*.

To date, the larva of only one out of these four Florida species has been described. Flint (1964) described the larvae of *N. celta* (as *Nyctiophylax vestitus*). We have examined larvae collected from the Suwannee River closely matching Flint's descriptions and illustrations of this species (Fig. 18.27), but we feel that our species determinations remain questionable until additional associations for other *Nyctiophylax* species have been done. We have examined numerous larvae collected from widespread localities in the state closely resembling Flint's description of *N. moestus* (*Nyctiophylax* sp. A) (Fig. 18.28). However, it is very possible that these larvae are *N. affinis*, since this species is considered closely related to *N. moestus* (Armitage and Hamilton, 1990) and adult collections indicate it occurs in Florida.

Additional references: Flint (1964); Wiggins (1996).

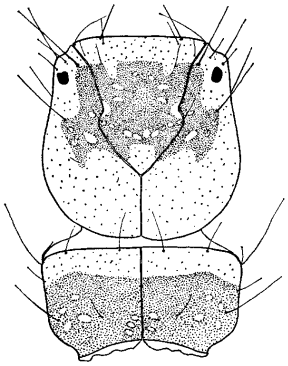


Fig. 18.27 *Nyctiophylax celta* [from Flint (1964)]

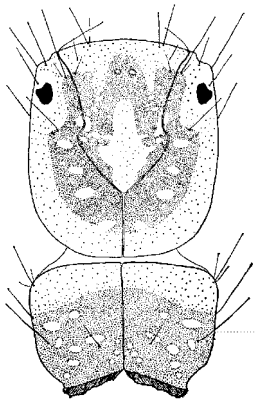
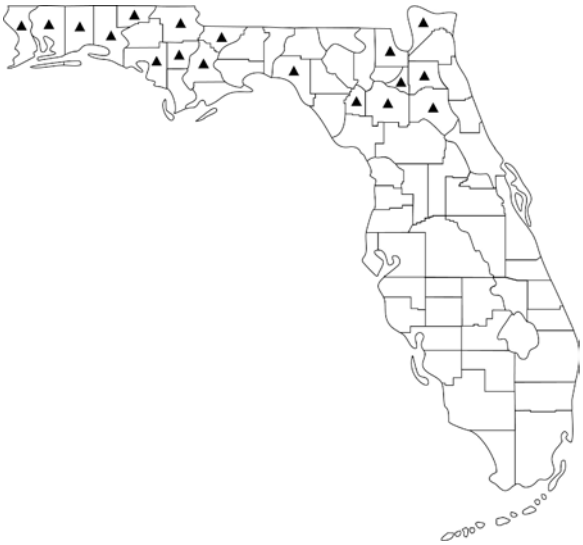
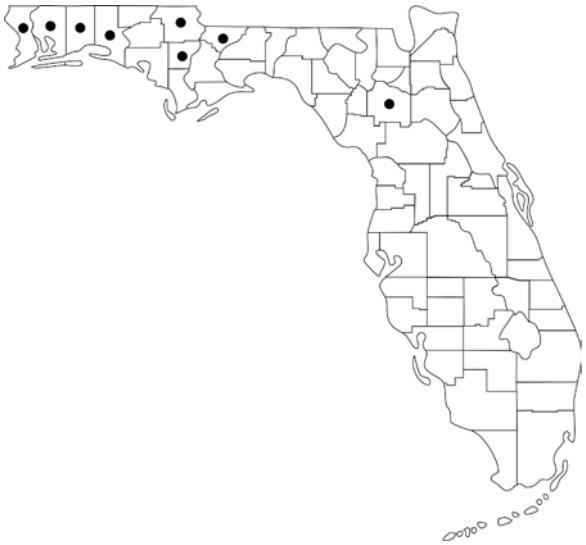


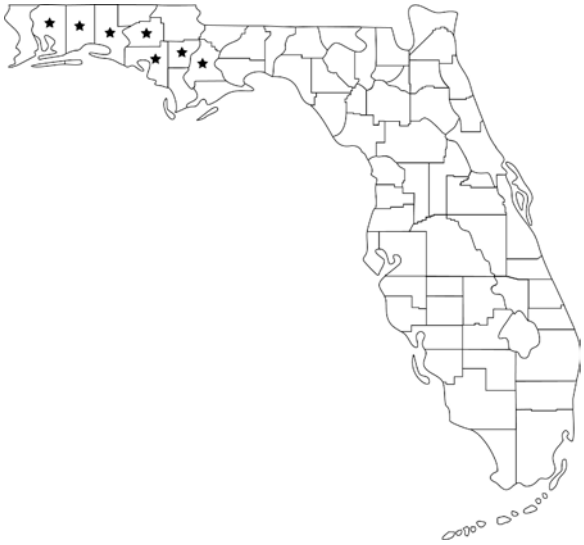
Fig. 18.28 *Nyctiophylax moestus* [from Flint (1964)]



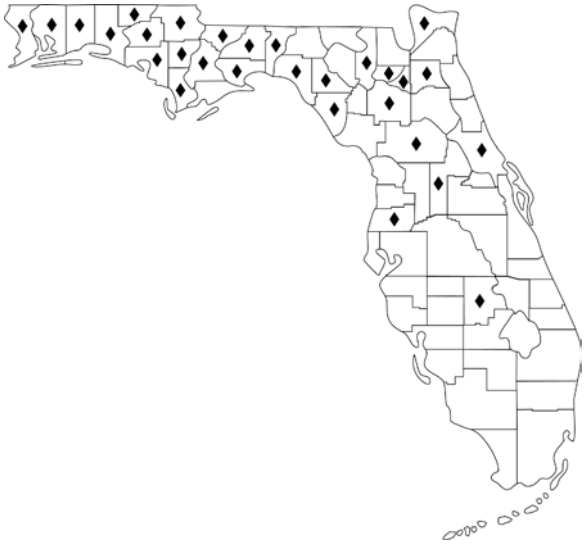
Map 18.7 *Nyctiophylax affinis* ▲



Map 18.8 *Nyctiophylax celta* ●



Map 18.9 *Nyctiophylax morsei* ★



Map 18.10 *Nyctiophylax serratus* ♦

Genera ***Plectrocnemia, Polycentropus = Polycentropus sensu lato***, in part

Diagnosis: Larvae of Florida *Polycentropus sensu lato* are distinguished from other polycentropodid genera as follows: anal claw with concave margin smooth (Fig. 18.3); basal segment of anal proleg usually longer than distal segment in late instar larvae and with many setae scattered over most of its surface (Fig. 18.6); dorsal region between anal claw and sclerite of distal segment of anal proleg with 2 mesally contiguous dark bands (Fig. 18.7); meso- and metanotal sa1 setae short, not more than one-third as long as longest sa2 setae when present (Fig. 18.8); 5th instar larvae at least 10 mm long.

Generic notes: Though taxonomically distinct genera, Orfinger et al. (2022) determined that the larvae of *Holocentropus*, *Plectrocnemia*, and *Polycentropus* in North America are currently not morphologically distinguishable at the generic level. *Holocentropus* and *Plectrocnemia* were previously synonymized with *Polycentropus* by Ross (1944) before being reinstated by Chamorro and Holzenthal (2011) [see Orfinger (2019) for discussion]. Collectively, these three genera are often referred to as the *Polycentropus sensu lato*. Two of the three genera are represented in Florida and are discussed independently below, but for identification purposes the provisional key treats the described Florida larvae from the genera all together as species-level characteristics appear sufficient to separate the taxa.

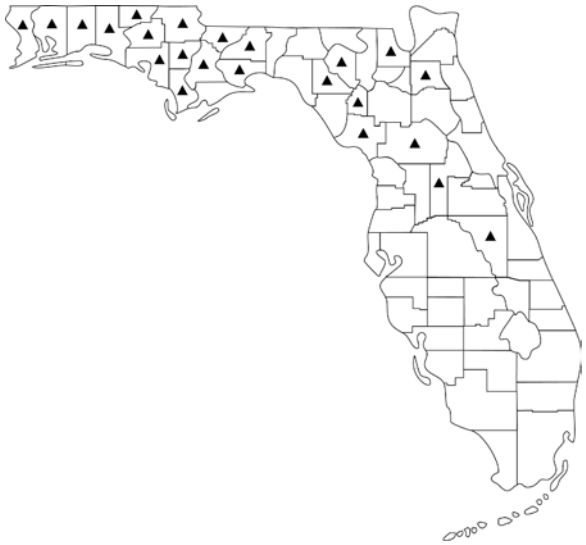
Genus ***Plectrocnemia*** Stephens

Fig. 18.29 *Plectrocnemia* sp.

Fig. 18.30 *Plectrocnemia cinerea*

Species notes: Four members of the genus *Plectrocnemia* are recorded from Florida (Maps 18.11–18.14), with *Plectrocnemia cinerea* being the most common. The genus is restricted to the northern half of the state. Immature stages most often occur in flowing water, with larvae (Fig. 18.29) making small, tubular retreats where they are both predators and filter feeders (Wiggins, 1996). The larva of *Plectrocnemia crassicornis* was described by Moulton and Stewart (1996), and later discussed by Gerth et al. (2020) who indicated that the anal claw is obtusely curved in many specimens, opposing Moulton and Stewart's description. This variation in anal claw curvature renders it not always possible to separate the larvae of *P. crassicornis* and *Polycentropus blicklei*. The larva of *Plectrocnemia cinerea* (Fig. 18.30) was described briefly by Ross (1944) and its mandibles illustrated by Flint (1964). One species, *Plectrocnemia nascotia*, is associated with lentic habitats, which may be useful in larval association of this species for which the larva is currently unknown.

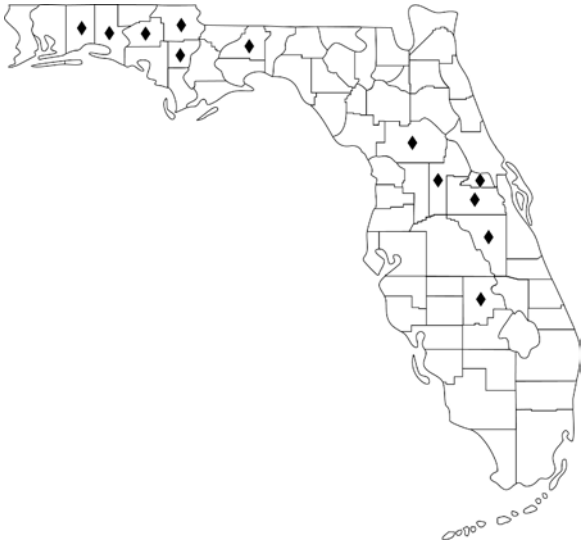
Additional references: Ross (1944); Moulton and Stewart (1996); Wiggins (1996); Gerth et al. (2020).



Map 18.11 *Plectrocnemia cinerea* ▲

Map 18.12 *Plectrocnemia clinei* ●

Map 18.13 *Plectrocnemia crassicornis* ★



Map 18.14 *Plectrocnemia nascotia*

Genus ***Polycentropus*** Curtis

Fig. 18.31 *Polycentropus confusus*

Species notes: Caddisflies of the genus *Polycentropus sensu stricto* are restricted to the northern half of the state from which four species are known (Map 18.15–18.18). Orfinger et al. (2023) treated the larvae of this genus from the eastern US, including a diagnostic matrix for identification purposes. These predatory larvae (Fig. 18.31) construct bag-like structures expanded by currents of the flowing waters which they inhabit (Wiggins, 1996; A. Orfinger, personal observation). One of these, *P. floridensis*, is a narrow-range endemic found in spring-fed streams of the western panhandle of Florida and in far southern Alabama and is considered imperiled (Rasmussen et al., 2008a). Orfinger and Moulton (2021) reported the only known occurrences in Florida of *Polycentropus elarus*, based on a single male collected with specimens of *P. blicklei* from a ravine stream in Washington County, and of *P. confusus*, based on two males collected from Natural Bridge Creek in Walton County.


Fig. 18.32
Polycentropus blicklei


Fig. 18.33
Polycentropus confusus


Fig. 18.34
Polycentropus elarus


Fig. 18.35
Polycentropus floridensis

Additional references: Ross (1944); Wiggins (1996); Orfinger et al. (2022); Orfinger et al. (2023).

Map 18.15 *Polycentropus blicklei* ▲

Map 18.16 *Polycentropus confusus* ●

Map 18.17 *Polycentropus elarus* ★

Map 18.18 *Polycentropus floridensis* ♦

PROVISIONAL KEY TO SPECIES FOR LARVAE OF FLORIDA *POLYCENTROPUS SENSU LATO*

[based on Orfinger et al. (2023)]

Note: Larvae of *Plectrocnemia clinei* and *P. nascotia* are unknown and not included in this key.

1. Arrangement of posterior scars on frontoclypeal apotome forming shallow arc (Fig. 18.36) 2

Fig. 18.36

Arrangement of posterior scars on frontoclypeal apotome not forming shallow arc 4

2(1) Head color orangeish tan (Fig. 18.35); anal claws right-angled (Fig. 18.37) . . . . . *Polycentropus floridensis* Lago & Harris

Fig. 18.37

Head color yellowish tan (Figs 18.30, 18.32); anal claws right-angled (Fig. 18.38) or obtusely curved (Fig 18.39) 3

Fig. 18.38

Fig. 18.39

3(2) Anal claws right-angled (Fig. 18.38) . . . . . *Polycentropus blicklei* Ross & Yamamoto

Anal claws usually obtusely curved (Fig. 18.39), though sometimes approach right-angled . . . . . *Plectrocnemia crassicornis* (Walker)

4(1) Arrangement of posterior scars on frontoclypeus linear (Fig. 18.40); head tan (Fig. 18.33) . . . . . *Polycentropus confusus* Hagen

Fig. 18.40 [from Orfinger et al. (2023)]

Arrangement of posterior scars on frontoclypeus trapezoidal (Fig. 18.41); head yellowish tan (Figs 18.30, 18.34) 5

Fig. 18.41 [from Orfinger et al. (2023)]

5(4) Anal claws right-angled (Fig. 18.38) . . . . . *Plectrocnemia cinerea* (Hagen)

Anal claws obtusely curved (Fig. 18.39) . . . . . *Polycentropus elarus* Ross

FAMILY PSYCHOMYIIDAE

(*net-tube caddisflies*)

This family is least common among the net-spinning caddisflies, within Florida as well as North America. The psychomyiids are represented in Florida by two genera: *Lype* (*Lype diversa*) and *Psychomyia* (*Psychomyia flavida*).

Psychomyiid larvae are readily distinguished from the other caddis families by the presence of a broad hatchet-shaped foretrochantin separated from the proepisternum by a basal suture (Fig. 2.32). The labium, with the opening of the silk gland (spinneret), extends beyond the anterior margin of the head (Figs 2.32, 19.7), facilitating the application of silk within the retreats. Larvae occur in lotic habitats where they construct and live in fixed silken tubes or tunnels attached to rock and wood substrates.

KEY TO GENERA AND SPECIES FOR LARVAE OF FLORIDA PSYCHOMYIIDAE

[adapted from Morse et al. (2019b)]

1. Anal claw with 3 or 4 conspicuous teeth along ventral, concave margin (Fig. 19.1); paired submental sclerites on ventral surface of labium longer than broad (Fig. 19.2) . . . . . *Psychomyia*, *P. flavida* Hagen

Fig. 19.1

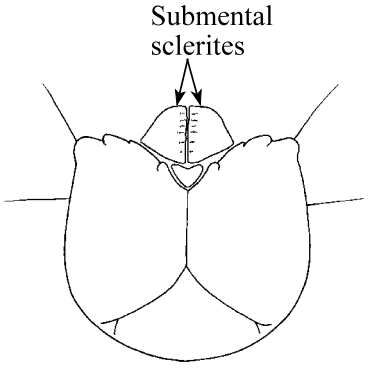


Fig. 19.2

Anal claw without teeth on ventral concave margin (Fig. 19.3); paired submental sclerites on ventral surface of labium broader than long (Fig. 19.4) . . . . . *Lype*, *L. diversa* (Banks)

Fig. 19.3

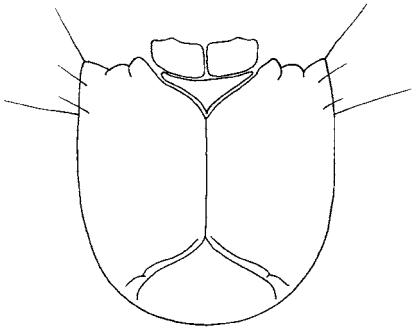


Fig. 19.4

Genus ***Lype*** MacLachlan

Dignosis: Larvae of *Lype* (Fig. 19.5) are easily distinguished from *Psychomyia* as follows: absence of teeth on ventral margin of anal claw; and paired submental sclerites of labium broader than long (Fig. 19.4). Late instars are > 5 mm in length.

Fig. 19.5 *Lype diversa*

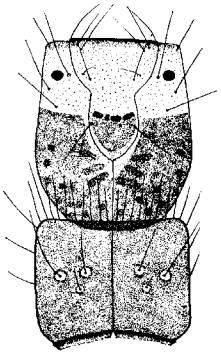


Fig. 19.6 *Lype diversa* [from Flint (1959)]

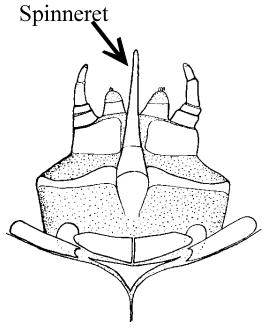
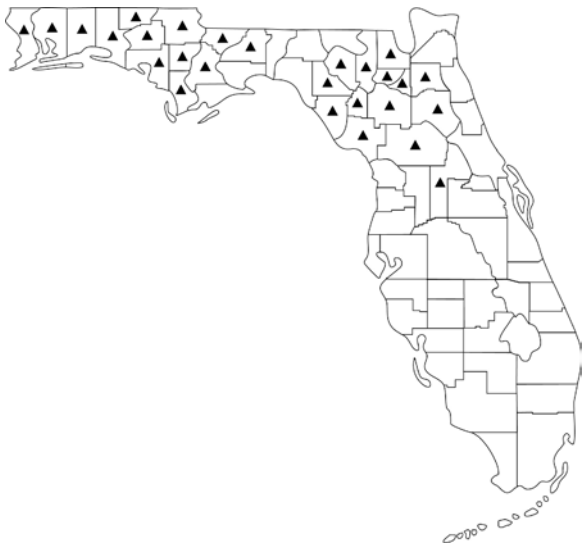


Fig. 19.7 *Lype diversa*, maxillo-labium, ventral [from Flint (1959)]

Species notes: The genus *Lype* contains a single North American species, *L. diversa*. The immature stages of this species were described by Flint (1959). The mature larva is 7–8 mm in length. The head coloration pattern is distinctive, especially so in fresh specimens, with the anterior third yellowish and posterior two-thirds brown in color (Fig. 19.6). Also noteworthy is the long central spinneret on the maxillo-labium (Fig. 19.7) which is characteristic of Dipseudopsidae and this family. *Lype diversa* is geographically widespread across the northern half of the state (Map 19.1) and occurs in a wide range of lotic habitats where they construct well-camouflaged retreats in the grooves of submerged wood. Specimens can be collected either by careful examination of wood substrate or by using artificial substrates such as Hester-Dendy multiplate samplers. Little is known of the life history for this species in Florida. In more northern areas of the United States the species is univoltine.

Additional references: Flint (1959); Wiggins (1996).



Map 19.1 *Lype diversa* ▲

Genus ***Psychomyia*** Latreille

Diagnosis: Larvae of *Psychomyia* (Fig. 19.8) are distinguished from *Lype* as follows: presence of 3 or 4 conspicuous teeth on concave margin of anal claw (Fig. 19.1); and submental sclerites on ventral surface of labium longer than broad (Fig. 19.2). Larvae are < 5 mm in length.

Fig. 19.8 *Psychomyia flavida*, CUAC000070277
Photo courtesy of J. Morse & M. Ferro

Species notes: The genus *Psychomyia* contains three North American species of which only *P. flavida* occurs in Florida (Map 19.2). The larva of this species was first described by Ross (1944) and then later by Flint (1964). Gordon (1984) reported *P. flavida* from Jackson Co. (no specific locality provided); we examined larval specimens collected from the Chipola River, Calhoun Co. and collected adults from the Chipola River and a number of its tributaries (Denson et al., 2016). This species is not known to occur anywhere else in the state and is quite possibly restricted to the Chipola River basin. Larvae construct silk tubes covered with sand on rocks (Wiggins, 1996) and feed on organic particles which they collect. *Psychomyia flavida* is believed to reproduce parthenogenetically, and light trap collections usually consist of large numbers of females with very few males (Swegman, 1978; Unzicker et al., 1982).

Additional references: Ross (1944); Flint (1964); Wiggins (1996).

Map 19.2 *Psychomyia flavida* ▲

FAMILY RHYACOPHILIDAE

(*free-living caddisflies*)

The family Rhyacophilidae is represented in North America by two genera, but only the genus *Rhyacophila* occurs in the eastern United States, extending its geographic range from the Northeast to Florida where two species are reported. With about 130 nominal species, *Rhyacophila* is the most speciose genus of Trichoptera in North America (Rasmussen and Morse, 2023).

Rhyacophilid larvae are morphologically recognized by the presence of a dorsal sclerite on abdominal segment IX (Fig. 2.17), anal proleg which is almost entirely free from abdominal segment IX (Fig. 2.27), and the lack of dorsal accessory hooks on the anal claw (Fig. 2.26).

Unlike other caddisflies, which construct larval cases or retreats, rhyacophilid larvae are basically free living, and attachment to the substrate is facilitated by the secretion of a silk thread anchor line. The larvae are generally found in fast-flowing streams, and many species are predaceous while a few are herbivorous, feeding on living or dead plant tissues.

Genus ***Rhyacophila*** Pictet

Diagnosis: Larvae of eastern Nearctic *Rhyacophila* species lack the dense gill tufts (Fig. 20.1) that larvae of the western genus *Himalopsyche* possess. Final instars are less than 30 mm long.

Fig. 20.1 *Rhyacophila* n. sp., Leon Co., Florida

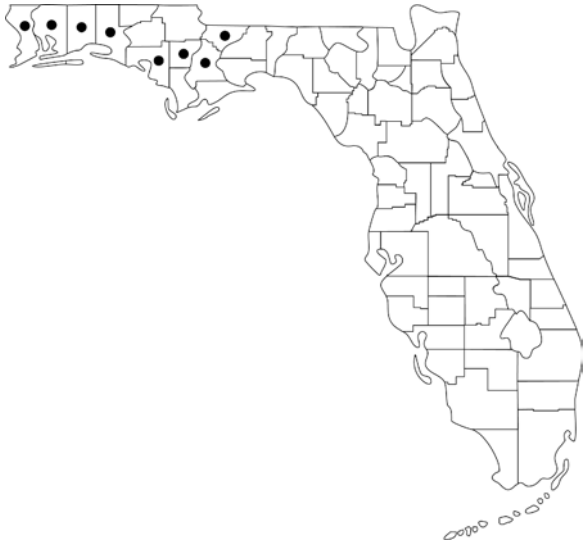
Species notes: Of the approximately 130 species of *Rhyacophila* known in North America, only two species are known in Florida, *R. carolina* (Map 20.1) and *Rhyacophila* n. sp. (Map 20.2). Another species, *R. ledra*, may eventually appear in the state because it known to occur near the Alabama-Florida line (Harris et al., 1991). Both *R. ledra* and *R. carolina* belong to the *R. carolina* species group, having larvae with edentate anal claws. The larva of *R. carolina*, however, can be distinguished from that of *R. ledra* by its more or less unicolorous golden yellow head, compared to the distinctive pattern of infuscation and muscle scars in the latter. *Rhyacophila carolina* is widespread in the Florida panhandle but is primarily confined to unpolluted spring-fed streams. It is particularly abundant in ravine streams.

The larva of *Rhyacophila* n. sp. is very close to that of *R. lobifera* and will key to it using Flint (1962). We collected last instar larval specimens in the month of February from Black Creek at Baum Road in Leon County and originally identified them as *R. lobifera*. We later learned that Jim Glover also had larval specimens from South Carolina closely matching *R. lobifera* but that larval/adult rearings he had conducted showed the adult to be of an undescribed species different

from that of *R. lobifera.* His comparative examination of the new species with larvae known to be *R. lobifera* revealed differences in pronotal setation. Specimens we sent to Glover confirmed the Florida material was of the same new species. We have collected adults of the new species from the Black Creek site, as well as from Fisher Creek, a blackwater stream in southwestern Leon County. The description of the adult and larva of the new species based on material from across its range is currently underway.

Some species of *Rhyacophila* have been shown to have univoltine life cycles (Manuel and Folsom, 1982; Singh et al., 1984; Martin, 1985), and one species, *R. vofixa* from an Alaskan stream, appears to require several years to complete a life cycle (Irons, 1987). When ready to pupate, the larvae characteristically construct a silken cocoon inside a dome-like shelter of small stones, but no case or retreat is constructed before then. *Rhyacophila carolina* has been observed to fly in late April to October in North and South Carolina (Unzicker et al., 1982). In Florida we collected adults of *R. carolina* from March to December and *Rhyacophila* n. sp. from early March to early April.

Additional references: Flint (1962); Weaver and Sykora (1979); Prather and Morse (2001).



Map 20.1 *Rhyacophila carolina* ●

Map 20.2 *Rhyacophila* n. sp. ▲

KEY TO SPECIES FOR LARVAE OF FLORIDA *RHYACOPHILA*

[including *R. ledra*, which is likely to occur in Florida]

1. Anal claw with 1 large and usually 1 small ventral tooth (Fig. 20.2); anal proleg with a baso-ventral hook (Fig. 20.2); head with distinct pattern of infuscations and muscle scars (Fig. 20.3) . . . . . *Rhyacophila* n. sp.

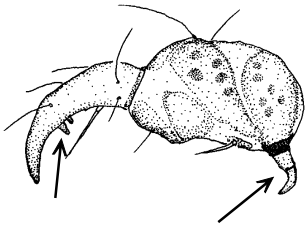


Fig. 20.2 [by J. Glover]

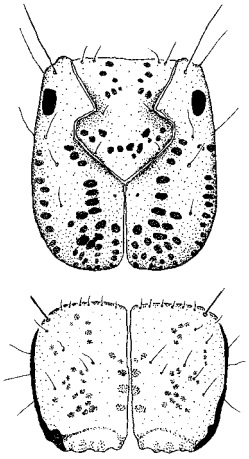


Fig. 20.3 [by J. Glover]

Anal claw without ventral teeth (Fig. 20.4); anal proleg without baso-ventral hook (Fig. 20.4); head with or without distinct pattern of infuscations and muscle scares 2

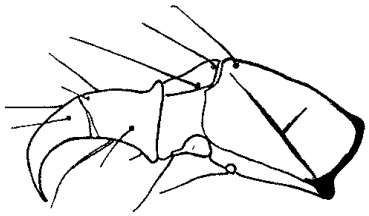


Fig. 20.4 [from Flint (1962)]

2(1) Head near unicolorously golden yellow (Fig. 20.5) . . . . . *R. carolina* Banks

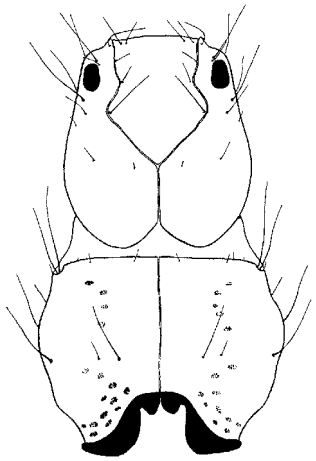


Fig. 20.5 [from Flint (1962)]

Head with distinct pattern of infuscations and muscle scars (Fig. 20.6)
. . . . . *R. ledra* Ross

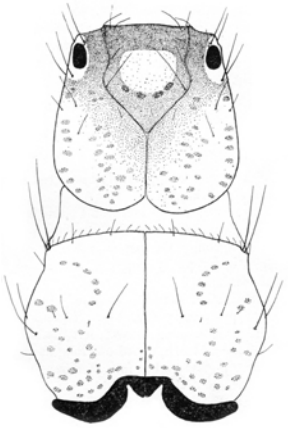


Fig. 20.6 [from Flint (1962)]

FAMILY SERICOSTOMATIDAE

(*bush-tail caddisflies*)

The family Sericostomatidae is represented in North America by the genera *Agarodes*, *Fattigia*, and *Gumaga.* Only the genus *Agarodes*, the most widespread of the three genera, extends its geographic range to Florida where six species are reported. Twelve species are assigned to this genus with greatest diversity occurring in the southeastern United States.

Sericostomatid larvae are morphologically recognized by the anterolateral corner of the pronotum extended into a sharp point, a cluster of setae (approximately 30 or more) posteromesad of the lateral sclerite of the anal proleg (Figs 2.55, 2.56), and the large, and apically hooked foretrochantin (Fig. 2.57).

Genus ***Agarodes*** Banks

Diagnosis: Larvae of *Agarodes* (Fig. 21.1) are briefly defined as follows: pronotum with sharp-pointed anterolateral corners (Fig. 2.37); dorsum of abdominal segment IX with about 4 major setae and about 10 shorter ones along posterior edge (Fig. 21.2); and head rounded dorsally with inconspicuous lateral carina. The larva constructs a curved and slightly tapered case, usually composed of medium to coarse sand with some plant pieces mixed in (Fig. 21.1).

Fig. 21.1 *Agarodes ziczac*

Fig. 21.2

Species notes: Six *Agarodes* species are known from Florida: *A. crassicornis*, *A. griseus, A. libalis*, *A. logani*, *A. wallacei*, and *A. ziczac* (Maps 21.1–21.6). Florida *Agarodes* species are all geographically restricted to the northern region of the state. *Agarodes ziczac*, is endemic to the western panhandle and is considered to be imperiled (Rasmussen et al., 2008a). This species was found to be abundant in the spring-fed streams on Eglin Air Force Base (Rasmussen, 2004). *Agarodes logani* was described by Keth and Harris (1999). It is only known from the type locality, a spring-fed headwater tributary of Quincy Creek in Gadsden County and is considered globally critically imperiled (Rasmussen and Harris, 2016). Adult females of *A. griseus* have also been recorded from this stream, suggesting that both species are restricted to spring seeps and small spring-runs. We have collected adults of *A. crassicornis* and *A. libalis* from widespread localities across northern Florida. *A*garodes *wallacei* is known in Florida from only adults collected along the Blackwater River. Outside of Florida, this species has typically also been collected from blackwater streams and rivers.

Larvae of the six *Agarodes* species known from Florida have all been at least tentatively associated with their adult stages [see Keth and Harris (2008), Morse et al. (2017)]. Larval morphology for this genus is very conservative, making the differentiation of larvae difficult at the species level. *Agarodes crassicornis* and *A. libalis* have brown to black heads with a uniformly dark frontoclypeus (Fig. 21.3). The other Florida *Agarodes* species appear to have golden brown heads with contrasting lighter muscle scars (Figs 21.4, 21.5).

Except for the collection records, information on the life history of *Agarodes* in Florida is non-existent. We have collected adults of all species in Florida at various times of year.

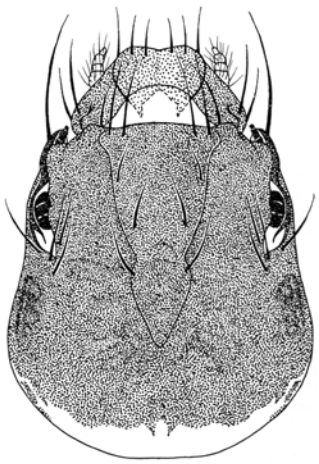


Fig. 21.3 *Agarodes libalis*
[from Keth and Harris (2008)]

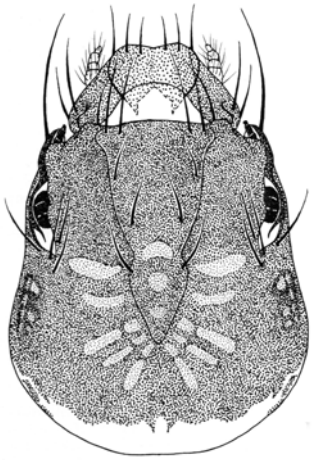


Fig. 21.4 *Agarodes griseus*
[from Keth and Harris (2008)]

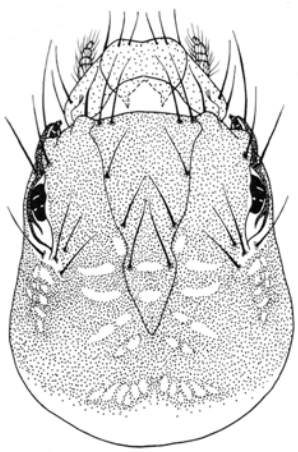
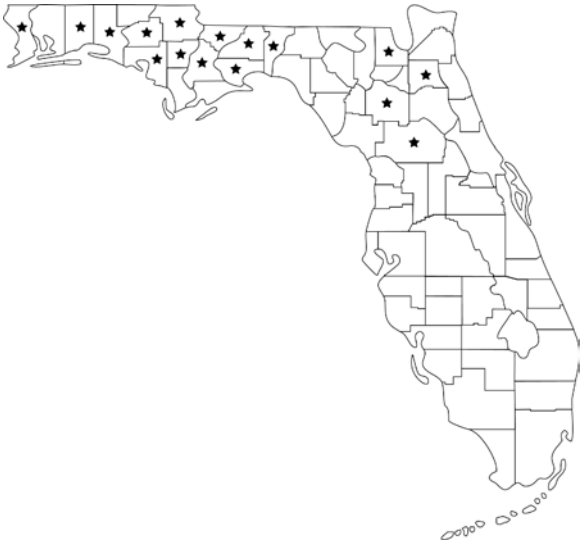


Fig. 21.5 *Agarodes wallacei/ziczac*
[from Keth and Harrris (2008)]

Additional references: Ross and Wallace (1974); Ross and Scott (1974); McEwan (1980); Keth and Harris (2008); Morse et al. (2017).

Map 21.1 *Agarodes crassicornis* ▲

Map 21.2 *Agarodes griseus* ●



Map 21.3 *Agarodes libalis* ★

Map 21.4 *Agarodes logani* ♦

Map 21.5 *Agarodes wallacei* ■

Map 21.6 *Agarodes ziczac* ▲

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CHECKLIST OF FLORIDA CADDISFLIES

This checklist includes both species that have been recorded in Florida and species that are somewhat likely to be found in the state based on their geographic distributions. A complete list of literature reporting Trichoptera species within Florida is provided in the online distributional checklist of the Nearctic Trichoptera maintained by A.K. Rasmussen and J.C. Morse available at: https://trichoptera.org/nearctic-checklist. The species documented as occurring in Florida, along with the county distribution maps for each species, are based on the summary of trichopteran diversity of Florida presented by Rasmussen et al. (2025).

Taxa are arranged alphabetically within their respective subordinal groupings.
? = at least somewhat likely to occur in Florida; ⌂ = Endemic to Florida; **L** = larva known, at least tentatively; **LU** = larva unknown; ***** = species included in the keys; **WPan** = western panhandle (counties 1–18); **NPen** = northern peninsula (counties 19–36); **CPen** = central peninsula (counties 37–57); **SPen** = southern peninsula (counties 58–67). See numbered county map (p. 1-11, Fig. 1.2).

Taxa	Larval Identity	Florida Distribution
Annulipalpia (fixed retreat makers)		
Dipseudopsidae		
Phylocentropus carolinus Carpenter	L*	WPan
? *P. harrisi* Schuster & Hamilton	LU	
P. lucidus (Hagen)	L*	WPan
P. placidus (Banks)	L*	WPan NPen
Hydropsychidae		
Cheumatopsyche analis (Banks)	L	WPan NPen CPen
Cheumatopsyche burksi Ross	LU	WPan NPen CPen SPen
C. campyla Ross	L	WPan
C. edista Gordon	L	WPan NPen
? *C. geora* Denning	LU	
C. gordonae Lago & Harris	LU	WPan
C. miniscula (Banks)	L	WPan
? *C. oxa* Ross	LU	
C. pasella Ross	LU	WPan NPen
C. petersi Ross, Morse, & Gordon	LU	WPan
C. pinaca Ross	L	WPan NPen CPen
? *C. sordida* (Hagen)	L	
C. virginica Denning	L	WPan NPen CPen
Diplectrona modesta Banks	L*	WPan NPen
Hydropsyche alabama Lago & Harris	L*	WPan
H. betteni Ross	L*	WPan
H. decalda Ross	L*	WPan NPen CPen
H. elissoma Ross	L*	WPan NPen
H. incommoda Hagen	L*	WPan NPen CPen
H. mississippiensis Flint	L*	WPan NPen
H simulans Ross	L*	WPan NPen CPen

H. sparna Ross	L*	WPan			
? *H. venularis* Banks	L				
Macrostemum carolina (Banks)	L*	WPan	NPen		
Potamyia flava (Hagen)	L*	WPan			
Philopotamidae					
C. aterrima Hagen	L*	WPan	NPen		
C. falculata Lago & Harris	L*	WPan			
C. florida Ross	L*	WPan	NPen	CPen	
C. moselyi Denning	L*	WPan	NPen	CPen	
C. obscura (Walker)	L*	WPan	NPen		
? *C. parasocia* Lago & Harris	LU				
Wormaldia moesta (Banks)	L*	WPan			
Polycentropodidae					
Cernotina calcea Ross	LU	WPan	NPen	CPen	SPen
C. spicata Ross	L*	WPan	NPen	CPen	SPen
C. truncona Ross	L*	WPan	NPen	CPen	SPen
Cyrnellus fraternus (Banks)	L*	WPan	NPen	CPen	SPen
Neureclipsis crepuscularis (Walker)	L*	WPan	NPen	CPen	
N. melco Ross	L*	WPan			
Nyctiophylax affinis (Banks)	LU	WPan	NPen		
N. celta Denning	L	WPan	NPen		
? *N. denningi* Morse	LU				
N. morsei Lago & Harris	LU	WPan			
N. serratus Lago & Harris	LU	WPan	NPen	CPen	
Plectrocnemia cinerea (Hagen)	L*	WPan	NPen	CPen	
P. clinei Milne	LU	WPan	NPen		
P. crassicornis (Walker)	L*	WPan	NPen		
P. nascotia (Ross)	LU	WPan	NPen	CPen	
Polycentropus blicklei Ross & Yamamoto	L*	WPan	NPen		
P. confusus Hagen	L*	WPan			
P. elarus Ross	L*	WPan			
P. floridensis Lago & Harris	L*	WPan			
Psychomyiidae					
Lype diversa (Banks)	L*	WPan	NPen	CPen	
Psychomyia flavida Hagen	L*	WPan			
Integripalpia (basal lineages)					
Glossosomatidae					
⌂ *Protoptila chipolensis* Rasmussen & Harris	L	WPan			
⌂ *Protoptila* n. sp. (nr. *palina*)	LU	WPan			
P. palina Ross	LU	WPan			
Hydroptilidae					
Hydroptila acadia Ross	LU	WPan			
H. ajax Ross	LU	WPan		CPen	
H. alabama Harris & Kelley	LU	WPan			
⌂ *H. apalachicola* Harris et al.	LU	WPan			

H. armata Ross	L	WPan	NPen	CPen	
⌂ *H. auriscuspa* Harris et al.	LU	WPan			
⌂ *H. aviforma* Rasmussen & Harris	LU	WPan			
H. berneri Ross	LU	WPan	NPen	CPen	
⌂ *H. bribriae* Harris	LU	WPan			
H. circangula Harris	LU	WPan			
⌂ *H. criokera* Harris et al.	LU	WPan			
H. disgalera Holzenthal & Kelley	LU	WPan	NPen		
⌂ *H. ebroensis* Harris et al.	LU	WPan			
⌂ *H. eglinensis* Harris	LU	WPan			
H. gunda Milne	LU	WPan			
H. hamata Morton	L	WPan			
⌂ *H. hamiltoni* Harris	LU	WPan			
H. icona Mosely	LU	WPan			
H. latosa Ross	LU	WPan	NPen		
H. lloganae Blickle	LU	WPan	NPen	CPen	
H. maculata Banks	LU	WPan	NPen	CPen	SPen
H. metteei Harris	LU	WPan			
H. molsonae Blickle	LU	WPan	NPen	CPen	
⌂ *H. murtlei* Harris et al.	LU	WPan			
H. novicola Blickle & Morse	LU	WPan	NPen	CPen	
⌂ *H. okaloosa* Harris	LU	WPan			
H. parastrepha Kelley & Harris	LU	WPan			
H. quinola Ross	LU	WPan	NPen	CPen	
H. remita Blickle & Morse	LU	WPan	NPen	CPen	
⌂ *H. santarosa* Harris et al.	LU	WPan			
⌂ *H. sarahae* Harris	LU	WPan			
H. scheiringi Harris	LU	WPan			
⌂ *H. sykorai* Harris	LU	WPan			
⌂ *H. wakulla* Denning	LU	WPan	NPen	CPen	
H. waubesiana Betten	L	WPan	NPen	CPen	
H. wetumpka Harris	LU	WPan			
Ithytrichia clavata Morton	L*	WPan			
Ithytrichia sp.	LU		NPen		
Mayatrichia ayama Mosely	L*	WPan	NPen	CPen	
Neotrichia alabamensis Kelley & Harris	LU	WPan			
N. armitagei Harris	LU	WPan	NPen	CPen	
N. minutisimella (Chambers)	LU	WPan	NPen	CPen	
? *N. mobilensis* Harris	LU				
⌂ *N. rasmusseni* Harris & Keth	LU	WPan	NPen	CPen	
N. vibrans Ross	LU	WPan	NPen	CPen	SPen
⌂ *Ochrotrichia apalachicola* Harris et al.	LU	WPan			
O. confusa (Morton)	L	WPan			
⌂ *O. okaloosa* Harris	LU	WPan			
⌂ *O. provosti* Blickle	LU			CPen	
O. tarsalis (Hagen)	LU	WPan	NPen	CPen	

Orthotrichia aegerfasciella (Chambers)	L	WPan	NPen	CPen	SPen
O. baldufi Kingsolver & Ross	LU	WPan	NPen		
O. cristata Morton	LU	WPan	NPen	CPen	SPen
O. curta Kingsolver & Ross	LU	WPan	NPen	CPen	SPen
O. dentata Kingsolver & Ross	LU	WPan	NPen	CPen	
O. instabilis Denning	LU	WPan	NPen	CPen	
Oxyethira abacatia Denning	LU	WPan	NPen	CPen	
? *O. anabola* Blickle	LU				
O. arizona	LU			CPen	SPen
⌂ *O. chrysocara* Harris	LU	WPan	NPen		
O. elerobi (Blickle)	LU	WPan	NPen		
O. florida Denning	LU	WPan	NPen	CPen	SPen
O. glasa (Ross)	LU	WPan	NPen	CPen	SPen
O. grisea Betten	LU	WPan			
O. janella Denning	LU	WPan	NPen	CPen	SPen
⌂ *O. kelleyi* Harris	LU	WPan			
⌂ *O. kingi* Holzenthal & Kelley	LU				SPen
? *O. lumipollex* Kelley & Harris	LU				
O. lumosa Ross	LU	WPan	NPen	CPen	
O. maya Denning	LU	WPan	NPen	CPen	SPen
O. novasota Ross	LU	WPan			
O. pallida (Banks)	L	WPan	NPen	CPen	
O. pescadori Harris & Keth	LU	WPan	NPen	CPen	
O. roberti Roy & Harper	L	WPan	NPen	CPen	
O. savanniensis Kelley & Harris	LU	WPan	NPen		
O. setosa Denning	LU	WPan			
O. simulatrix	LU	WPan	NPen	CPen	SPen
O. sininsigne Kelley	LU	WPan	NPen	CPen	
O. verna Ross	LU	WPan	NPen	CPen	SPen
O. zeronia Ross	LU	WPan	NPen	CPen	SPen
? *Stactobiella martynovi* Blickle & Denning	LU				
? *S. palmata* (Ross)	L				
Rhyacophilidae					
Rhyacophila carolina Banks	L*	WPan			
? *R. ledra* Ross	L*				
Rhyacophila n. sp.	L*	WPan			
Integripalpia (portable tube-case makers)					
Beraeidae					
? *Beraea gorteba* Ross	L				
⌂ *Beraea jennyae* Rasmussen & Harris	LU	WPan			
Brachycentridae					
Brachycentrus chelatus Ross	L*	WPan			
B. lunatus Harrington & Morse	L*	WPan			
B. nigrosoma (Banks)	L*	WPan			
B. numerosus (Say)	L*	WPan			

Micrasema florida Chapin & Morse	L*	WPan			
M. rusticum (Hagen)	L*	WPan			
M. wataga Ross	L*	WPan	NPen		
Calamoceratidae					
Anisocentropus pyraloides (Walker)	L*	WPan			
Heteroplectron americanum (Walker)	L*	WPan			
Helicopsychidae					
Helicopsyche borealis Hagen	L*	WPan	NPen		
Lepidostomatidae					
Lepidostoma carrolli Flint	LU	WPan			
? *L. griseum* (Banks)	L				
L. latipenne (Banks)	LU	WPan			
L. morsei Weaver	LU	WPan			
? *L. togatum* (Hagen)	LU				
L. wigginsi Weaver	LU	WPan			
Leptoceridae					
Ceraclea cancellata (Betten)	L*	WPan	NPen		SPen
C. diluta (Hagen)	L*	WPan			
? *C. enodis* Whitlock & Morse	L*				
C. flava (Banks)	L*	WPan	NPen		
⌂ *C. limnetes* Rasmussen & Harris	LU	WPan			
C. maculata (Banks)	L*	WPan	NPen	CPen	SPen
C. nepha (Ross)	L*	WPan	NPen		
C. ophioderus (Ross)	LU	WPan	NPen		
⌂ *C. pescadori* Rasmussen & Harris	LU	WPan			
C. protonepha Morse & Ross	LU	WPan	NPen		
C. resurgens (Walker)	L*	WPan			
C. slossonae (Banks)	L*			CPen	
C. tarsipunctata (Vorhies)	L*	WPan	NPen		
C. transversa (Hagen)	L*	WPan	NPen	CPen	
Leptocerus americanus (Banks)	L*	WPan	NPen	CPen	SPen
Nectopsyche candida (Hagen)	L*	WPan	NPen	CPen	
N. exquisita (Walker)	L*	WPan	NPen	CPen	
N. paludicola Harris	L*	WPan			
N. pavida (Hagen)	L*	WPan	NPen	CPen	SPen
N. spiloma (Ross)	LU	WPan	NPen		
⌂ *N. tavara* (Ross)	L*		NPen	CPen	SPen
Oecetis avara (Banks)	L*	WPan	NPen		
O. cinerascens (Hagen)	L*	WPan	NPen	CPen	SPen
O. daytona Ross	LU	WPan	NPen	CPen	SPen
⌂ *O. densoni* Rasmussen & Harris	LU	WPan	NPen	CPen	
O. ditissa Ross	LU	WPan	NPen	CPen	
O. georgia Ross	L*	WPan	NPen	CPen	
O. inconspicua (Walker) Complex	L*	WPan	NPen	CPen	SPen
Oecetis sp. A Floyd	L*	WPan		CPen	SPen
Oecetis sp. C Floyd	L*	WPan	NPen	CPen	

Oecetis sp. E Floyd	L*	WPan			
Oecetis sp. F Floyd	L*	WPan		CPen	SPen
O. morsei Bueno-Soria	L*	WPan	NPen		
O. nocturna Ross	L*	WPan	NPen	CPen	
O. osteni Milne	L*	WPan	NPen	CPen	SPen
O. parva (Banks)	L*	WPan	NPen	CPen	
O. persimilis (Banks)	L*	WPan	NPen	CPen	
O. porteri Ross	L*	WPan	NPen	CPen	SPen
⌂ *O. pratelia* Denning	LU				SPen
O. sphyra Ross	L*	WPan	NPen		
⌂ *Setodes chipolanus* Rasmussen & Harris	L*	WPan			
S. guttatus (Banks)	L*	WPan			
Triaenodes aba Milne	L*	WPan	NPen	CPen	
T. bicornis Manuel	L*	WPan	NPen		
T. dendyi Manuel	L*	WPan	NPen	CPen	
T. flavescens Banks	L*	WPan	NPen		
T. florida Ross	L*	WPan	NPen	CPen	
⌂ *T. furcella* Ross	L*	WPan	NPen	CPen	SPen
? *T. helo* Milne	L*				
T. ignitus (Walker)	L*	WPan	NPen	CPen	
T. injustus (Hagen)	L*	WPan		CPen	
⌂ *T. lagarto* Rasmussen & Harris	LU		NPen		
? *T. marginatus* Sibley	L*				
? *T. melaca* Ross	L*				
T. milnei Manuel	L*	WPan	NPen	CPen	
T. nox Ross	L*	WPan			
T. ochraceus (Betten & Mosely)	L*	WPan	NPen		
T. perna Ross	L*	WPan	NPen	CPen	
T. smithi Ross	LU	WPan			
T. taenia Ross	L*	WPan			
T. tardus Milne	L*	WPan	NPen	CPen	
T. tridonta Ross	LU	WPan			
Limnephilidae					
Ironoquia kaskaskia (Ross)	LU	WPan			
I. punctatissima (Walker)	L	WPan			
Pycnopsyche indiana (Ross)	L*	WPan	NPen	CPen	
P. scabripennis (Rambur)	L*	WPan	NPen		
Molannidae					
Molanna blenda Sibley	L*	WPan			
M. tryphena Betten	L*	WPan	NPen	CPen	
M. ulmerina Navás	L*	WPan	NPen		
Odontoceridae					
Psilotreta frontalis Banks	L*	WPan			
P. labida Ross	L*	WPan			
Phryganeidae					
Agrypnia vestita (Walker)	L*	WPan	NPen		

Banksiola concatenata (Walker)	LU*	WPan	NPen
Ptilostomis ocellifera (Walker)	L	WPan	NPen
P. postica (Walker)	LU	WPan	NPen
Sericostomatidae			
Agarodes crassicornis (Walker)	L	WPan	NPen
A. griseus Banks	L	WPan	
A. libalis Ross & Scott	L	WPan	NPen
⌂ *A. logani* Keth & Harris	L	WPan	
A. wallacei Ross & Scott	L	WPan	
⌂ *A. ziczac* Ross & Scott	L	WPan	

Character Matrix for Florida Caddisfly Larvae: Annulipalpia & Basal Integripalpia

		Annulipalpia – Fixed Retreat Makers					Basal Integripalpia		
		Philopotamidae	**Psychomyiidae**	**Dipseudopsidae** *Phylocentropus*	**Polycentropodidae**	**Hydropsychidae**	**Rhyacophilidae** *Rhyacophila*	**Hydroptilidae**	**Glossosomatidae** *Protoptila*
Head	**Mouthparts**	Labrum membranous, T-shaped; head elongate	Long spinneret	Very long spinneret	Maxillary lobes elongate; fused submental sclerites	Setal brushes on sides of labrum	Prognathous	Adapted for feeding on algae	Adapted for grazing
Thorax	**Sclerotization**	Pronotum only, orange w/posterior black band	Pronotum only; hatchet-shaped foretrochantin	Pronotum only	Pronotum only; pointed foretrochantin	Sclerotized plates on all nota	Pronotum only	Sclerotized plates on all nota	Pronotal plates; mesonotum w/3 sclerites
	Legs	Subequal in size, slender	Subequal in length; forelegs stouter	Short subequal in size; tarsi broad and flat	Subequal in size	Subequal in length; forelegs stouter	Short, subequal in length	Variable according to genus	Subequal in length; tarsal claw each w/long thin seta
Abdomen	**Gills**	Absent	Absent	Absent	Absent	Ventrolateral rows of branched gills	Absent	Absent, except *Hydroptila* w/3 filamentous gills at apex	Absent
	Anal prolegs	Elongate	Short basal segment; anal claw toothed or untoothed	Elongate; claws prominent	Elongate; morphology variable according to genus	Elongate; brush of long hairs at base of each claw	Elongate; prominent claws toothed or untoothed	Short or somewhat elongate	Distal half free from body; claw w/accessory hooks
	Size/Body form	Up to 13mm, unsclerotized areas whitish	Up to 9mm, unsclerotized areas whitish	Up to 20mm, unsclerotized areas whitish	Small to medium sized; often with purplish pigmentation	Size variable according to genus; densely covered w/short setae	Up to 20mm; some purplish pigmentation	Very small 2–5mm; often laterally compressed	Very small, up to 4 mm
	Portable case/Fixed retreat	Fixed retreat–elongate sac	Fixed retreat–short tube on wood or rock	Fixed retreat–long tubes of sand buried in sand bottom	Fixed retreat–variable according to genus	Fixed retreat–with capture net	None, free living	Case (last instar), variable according to genus	Tortoise shell case with larger stones on sides
	Habitat	Lotic–diverse habitats	Lotic–diverse habitats	Lotic diverse habitats	Lotic & lentic–diverse habitats	Lotic–diverse habitats	Lotic–spring runs and fast-flowing streams	Lotic & lentic, diverse habitats	Lotic, limestone shoals

Character Matrix for Florida Caddisfly Larvae: Integripalpia (Portable Tube-Case Makers)

	Phryganeidae	**Brachycentridae**	**Lepidostomatidae** *Lepidostoma*	**Limnephilidae**	**Leptoceridae**	**Molannidae** *Molanna*	**Calamoceratidae**	**Odontoceridae** *Psilotreta*	**Sericostomatidae** *Agarodes*	**Beraeidae** *Beraea*	**Helicopsychidae** *Helicopsyche*
Head	Dark V-shaped band on dorsum	Small, globose, coloration variable according to species	Antennae near eyes	Antennae midway; brownish orange w/many dark spots	Antennae long, except for some *Ceraclea*	Dark bands along dorsal ecdysial lines	Labrum with transverse row of about 16 stout setae	Dark dorsal and lateral bands	Dorsolateral ridge on each side	Dorsolateral ridge on each side	Somewhat flattened dorsally
Thorax	Meso-metanotal sa3, cluster of long setae on circular sclerite	Pronotum w/central transverse ridge; mesonotal plates subdivided	Well developed prosternal horn	Well developed prosternal horn; anterior margin pronotum straight	Mesonotum lightly sclerotized	Mesonotum lightly sclerotized	Mesonotal sa3 separate from main plates	Dark median band on pro- & mesonotum	Many long fine hairs on dorsal sclerotized areas	Pronotum w/U shaped carina	Very long foretrochantin
Legs	Specialized spines on coxae (coxal combs)	Structure variable according to genus	Hind coxae w/dense patch of spines	Basal seta of tarsal claw not extending to tip of claw	Hindlegs much longer than others, often w/swimming hairs	Hind leg w/short setose claw	Length of hind legs variable according to genus				
Abdomen	Prominent humps; gills prominent and single	Dorsal and lateral humps absent	Dorsal hump absent	Gills single or multiple branched, according to genus	Humps present but usually not prominent	Well developed humps, gills 2–4 filaments	Gills and lateral fringe variable according to genus	Short tufts of gill filaments	Anal proleg w/dorsal cluster of 30 or more long setae	Anal proleg w/ventral cluster of 25–30 long setae	Anal claw w/comb-like structure
Size/ Body form	Large (up to 35mm), size variable according to genus	Small to medium sized, up to 12mm	Up to 13mm	Large and stout up to 30mm	Small to medium sized, up to 17mm	Up to 17mm	Medium to large sized, up to 25mm; body form variable according to genus	Up to 15mm	Up to 15mm	Up to 7mm	Up to 6mm
Case	Spiral or ring case of plant material	4-sided or cylindrical	4-sided panel case of plant material	Usually cylindrical of coarse plant material	Variable according to genus	Flattened case of sand, w/dorsal hood	Unique, either 2 leaf pieces or hollowed twig	Cylindrical, slightly curved of quartz fragments	Slightly curved and tapered, made mostly of coarse sand	Slightly curved and tapered, made mostly of sand grains	Snail shell case of coarse sand
Habitat	Lotic & lentic	Lotic–diverse habitats	Small spring-fed streams	Lotic & lentic	Lotic & lentic –diverse habitats	Lotic–diverse habitats	Shaded spring-fed streams	Spring-fed headwater streams	Spring-fed headwater streams	Mucky spring seepage areas	Lotic–calcareous rivers