SUBFAMILY
# CHIRONOMINAE 8

**DIAGNOSIS: Antennae** 4-8 segmented, rarely reduced. **Labrum** with S I simple, palmate or plumose; S II simple, apically fringed or plumose; S III simple; S IV normal or sometimes on pedicel. Labral lamellae usually well developed, but reduced or absent in some taxa. **Mentum** usually with 8-16 well sclerotized teeth; sometimes central teeth or entire mentum pale or poorly sclerotized; rarely teeth fewer than 8 or modified as seta-like projections. Ventromental plates well developed and usually striate, but striae reduced or vestigial in some taxa; beard absent. **Prementum** without dense brushes of setae. **Body** usually with anterior and posterior parapods and procerci well developed; setal fringe not present, but sometimes with bifurcate pectinate setae. Penultimate segment sometimes with 1-2 pairs of ventral tubules; antepenultimate segment sometimes with lateral tubules. Anal tubules usually present, reduced in brackish water and marine taxa.

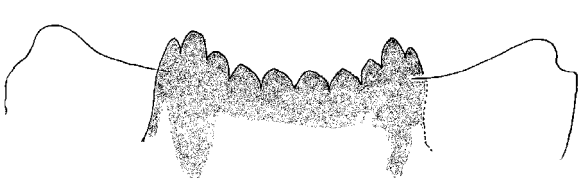
**NOTES**: Usually the most abundant subfamily (in terms of individuals and taxa) found on the Coastal Plain of the Southeast. Found in fresh, brackish and salt water (at least one truly marine genus). Most larvae build silken tubes in or on substrate; some mine in plants, dead wood or sediments; some are free-living; some build transportable cases. Many larvae feed by spinning silk catch-nets, allowing them to fill with detritus, etc., and then ingesting the net; some taxa are grazers; some are predacious. Larvae of several taxa (especially *Chironomus*) have haemoglobin that gives them a red color and the ability to live in low oxygen conditions.

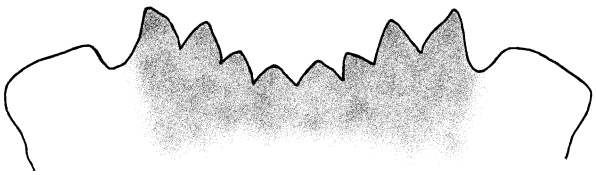
With only one exception (*Skutzia*), at the generic level the larvae of all described (as adults) southeastern Chironominae are known. There are several unplaceable larvae whose adult stages are unknown; these taxa are placed at the end of this chapter.

### Key to the genera of larval Chironominae of the southeastern United States

(larva unknown for *Skutzia*)

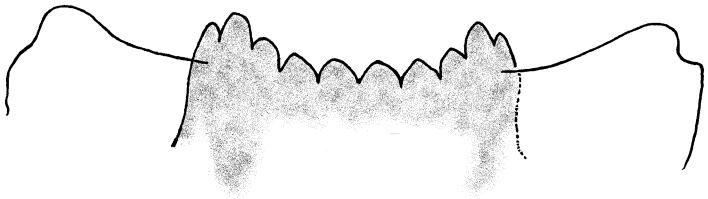
1 Ventromental plates fused to maxillae and without well defined striae so that the plates are inconspicuous; mentum concave; larvae mining in dead submerged wood and/or submerged leaves; may be common in Hester-Dendy samplers contructed of plant materials ..... 2

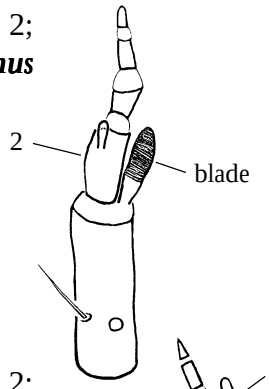




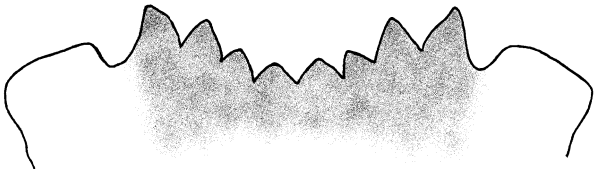
1' Ventromental plates well developed, usually with numerous striae; mentum variable; larvae in a variety of habitats (that may include mining in leaves, plant stems or dead submerged wood) .. 3

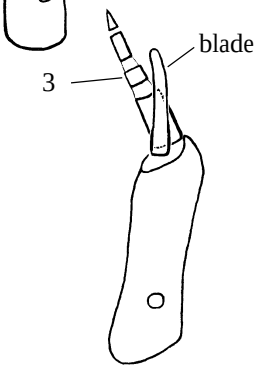
2(1) Mentum with 10-12 teeth; antennal blade extends to apex of segment 2; anal tubules with 0-2 constrictions ..... ***Stenochironomus***



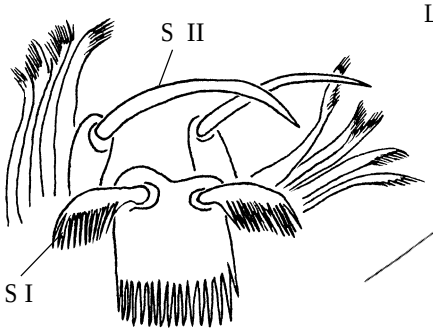


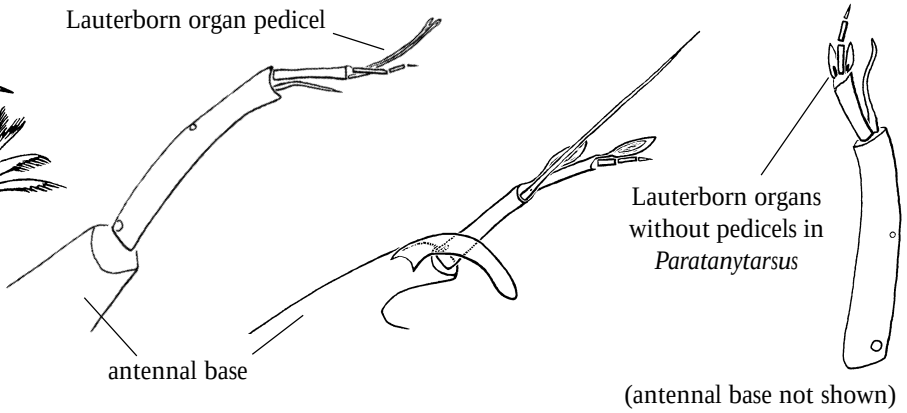

2' Mentum with 8-10 teeth; antennal blade extends past apex of segment 2; anal tubules with 4-5 constrictions ..... ***Xestochironomus***





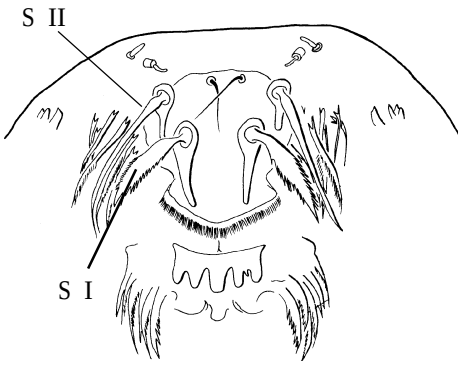

3(1') Bases of S I fused; S II on elongate pedestal; antennae with 5 segments, mounted on distinct elongate base (base squat in one marine genus, *Pontomyia*); Lauterborn organs usually well developed and often mounted on short to long pedicels ..... Tribe Tanytarsini ..... 4

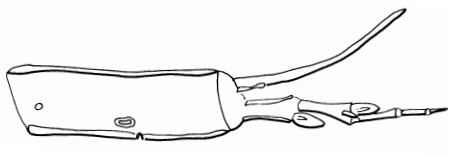



(antennal base not shown)

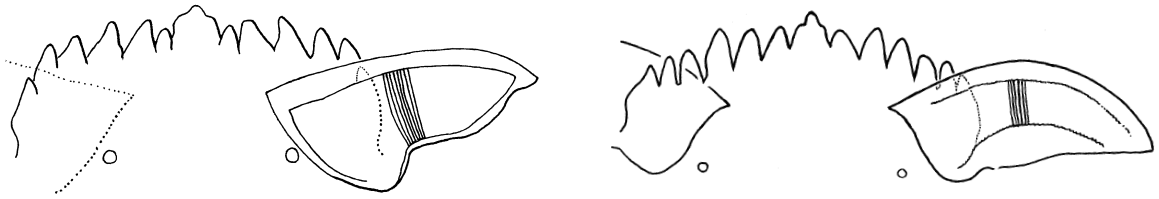
3' Bases of S I usually separate and S II usually not on pedestal (if S I fused and/or S II on pedestal, then antennae with 6 segments and alternate Lauterborn organs at apices of segments 2 and 3); antennae with 4-8 segments, Lauterborn organs not on long pedicels ..... 19



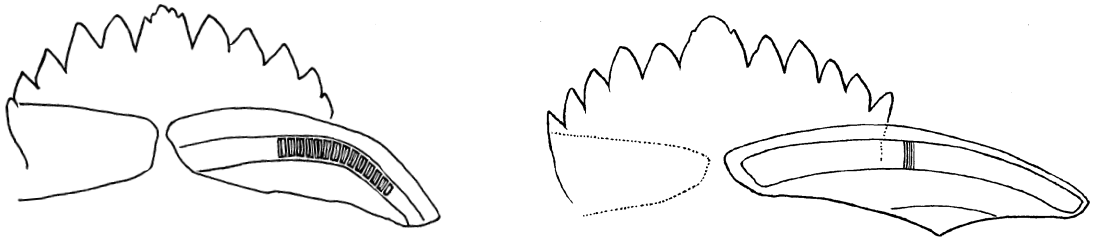



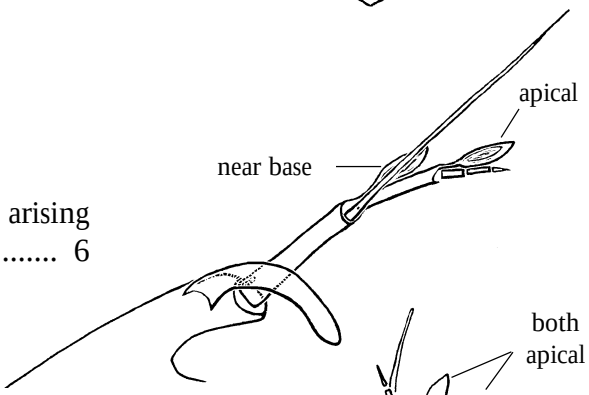
6 segmented antenna with alternate
Lauterborn organs on segments 2 and 3

4(3) Ventromental plates squat, separated by at least the width of the 3 median teeth; larvae in transportable cases ..... 5

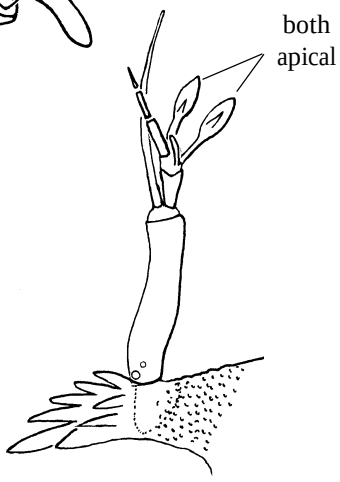


4' Ventromental plates wide, touching or almost touching medially; if larvae in cases, the cases are not transportable ..... 10

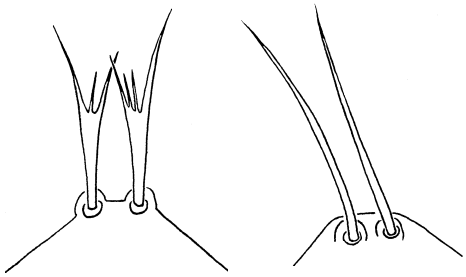





5(4) Antennal segment 2 with one Lauterborn organ arising apically, the other near the base ..... 6




5' Antennal segment 2 with both Lauterborn organs arising apically ..... 8

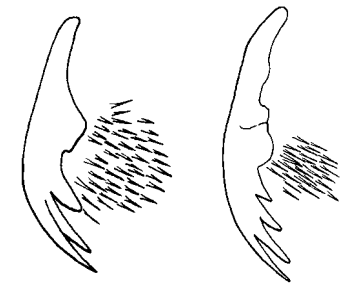


6(5) Clypeal (S 3) setae apically divided ..... ..... ***Stempellinella*** (in part)

6' Clypeal setae simple ..... 7

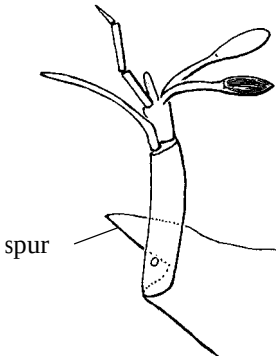
7(6') Premandible with 3 apical teeth ..... ***Stempellinella*** (in part)

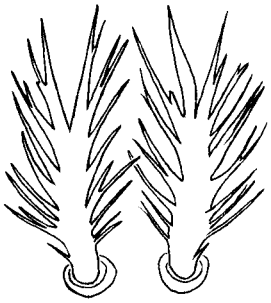
7' Premandible with 4 apical teeth ..... ***Zavrelia***

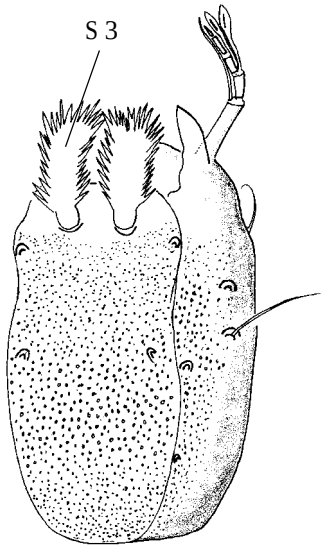


*Stempellinella* *Zavrelia*

8(5') Antennal base with apical spur only; clypeal (S 3) setae with numerous branches ..... ***Constempellina***

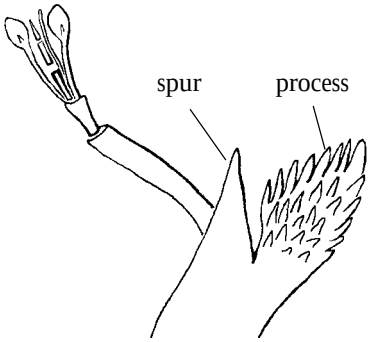


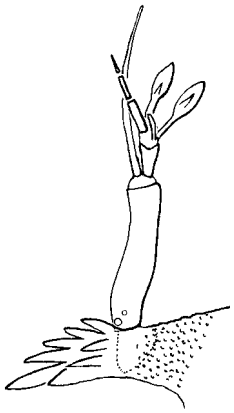


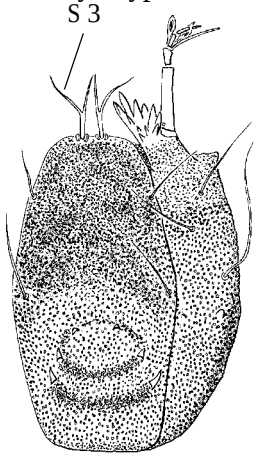

8' Antennal base with multispined process; clypeal setae simple or apically bifid (figures below) .. 9

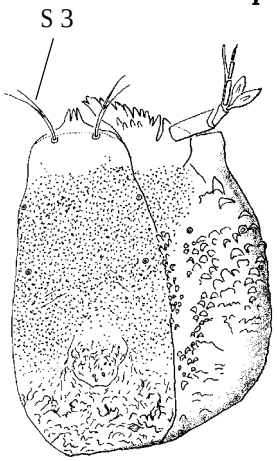
9(8') Antennal base with spur and multispined process; clypeal setae simple ..... ***Neostempellina***



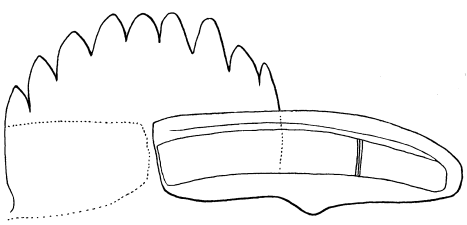

9' Antennal base with multispined process only; clypeal setae apically bifid ..... ***Stempellina***



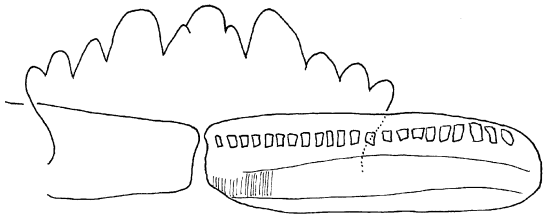


10(4') Mentum with 4 pairs of lateral teeth (some *Neozavrelia* may have a minute 5th pair) ..... 11

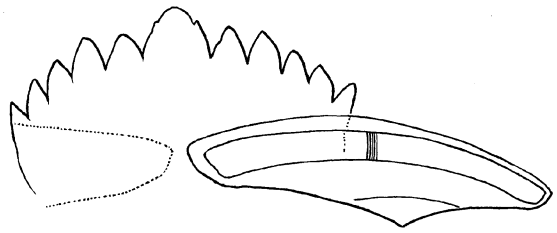


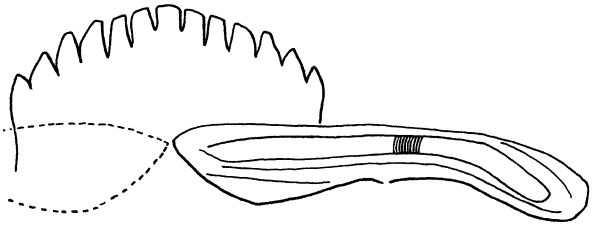
*Neozavrelia*



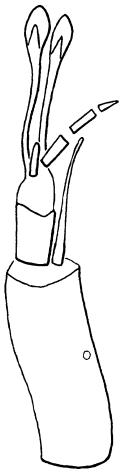
*Pontomyia*

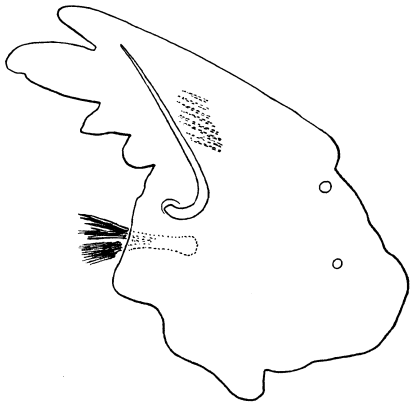
10' Mentum with 5 (or apparently more) pairs of lateral teeth ..... 13



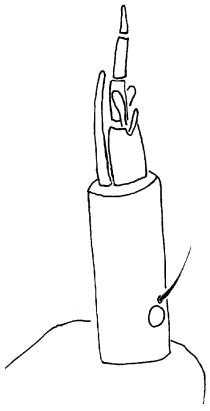


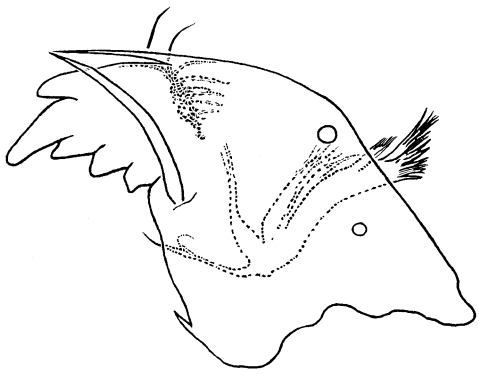
11(10) Antennae with Lauterborn organs on moderately long pedicels; premandible apically bifid; mandible with 2 inner teeth; found in freshwater ..... ***Neozavrelia***





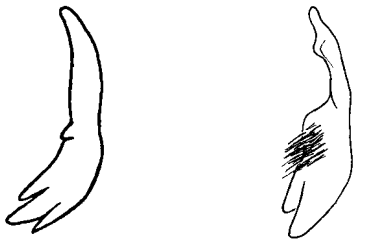
11' Antennae with sessile Lauterborn organs; premandible with numerous apical teeth; mandible with 3 inner teeth; exclusively marine, in the Southeast known only from Florida ..... ***Pontomyia***





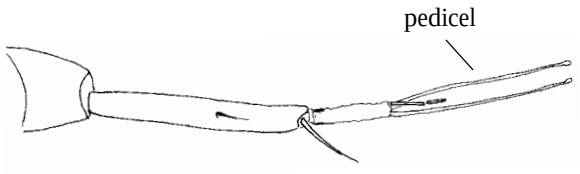
13(10') Premandible with 3 or more apical teeth ..... 14

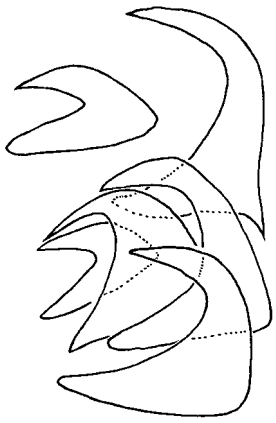
13' Premandible apically bifid ..... 16



3 or more apical teeth apically bifid

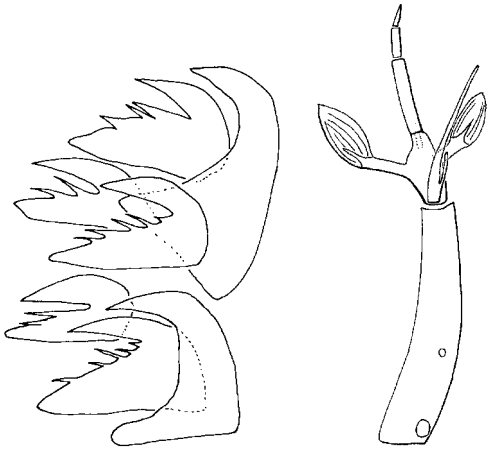
14(13) Claws of posterior parapods simple; pedicels of Lauterborn organs usually long ..... ***Tanytarsus***



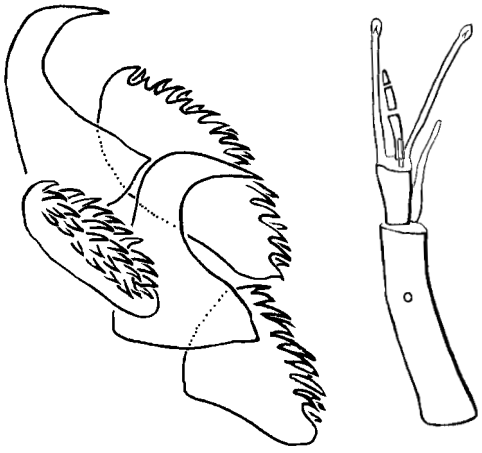



14' Claws of posterior parapods with one or more claws pectinate or with inner spines (figures below); pedicels of Lauterborn organs long or short ..... 15

15(14') Some claws of posterior parapods with single row of inner teeth; pedicels of Lauterborn organs usually short (moderately long in one species); common ..... ..... ***Cladotanytarsus***



15' Some claws of posterior parapods with multiple rows of inner teeth; pedicels of Lauterborn organs long; rare ..... ***Virgatanytarsus***

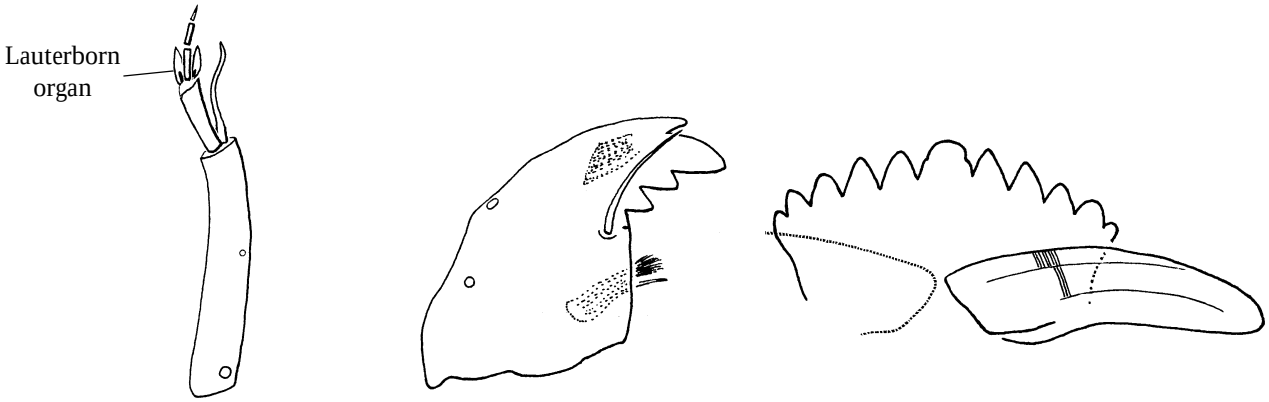


16(13') Pecten epipharyngis a 3-5 lobed plate ..... 17

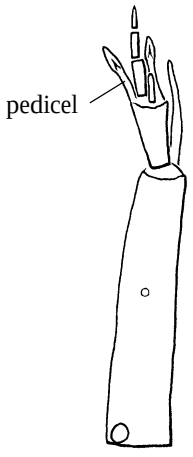
16' Pecten epipharyngis a single multitoothed comb or of 3 platelets with numerous apical teeth ..... 18

17(16) Lauterborn organs on pedicels that extend to or beyond antennal apex; mandible with pronounced outer hump; 3 central teeth of mentum usually projecting strongly above lateral teeth .... ***Sublettea***

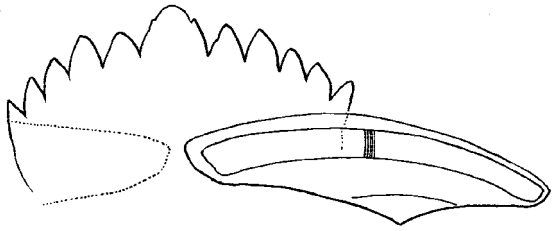
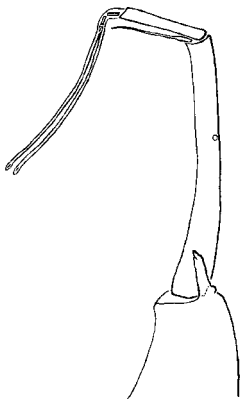

17' Lauterborn organs sessile or on very short pedicels; mandible without pronounced outer hump; 3 central teeth of mentum not projecting as above ..... ***Paratanytarsus***



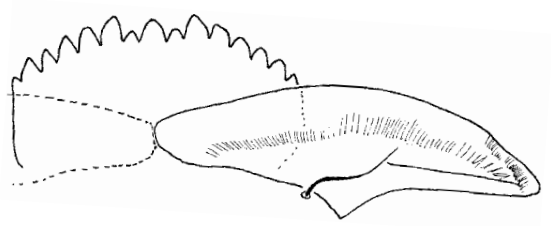
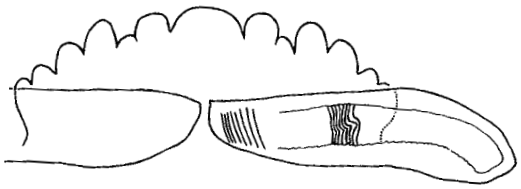
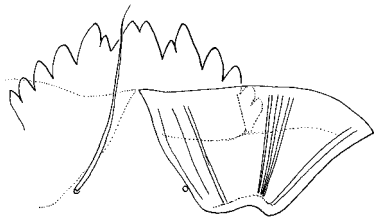
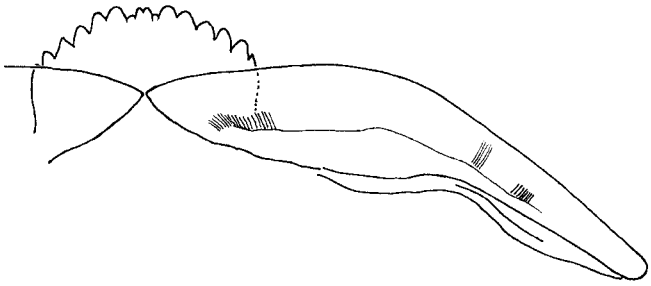

18(16') Lauterborn organs on short pedicels that are shorter than or subequal to length of flagellum; pecten epipharyngis a single multitoothed comb; ventromental plates with striae often appearing block-like ..... ***Rheotanytarsus***



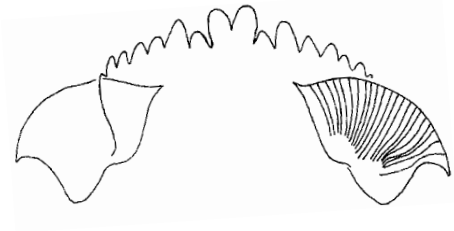
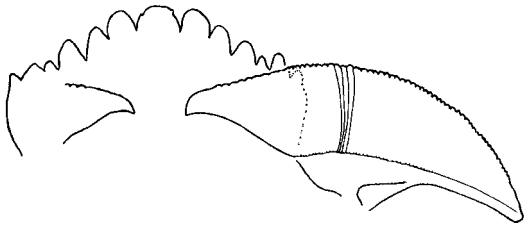

18' Lauterborn organs on long pedicels that extend beyond flagellum; pecten epipharyngis 3 multi-toothed platelets; ventromental plates with striae not appearing block-like ..... ***Micropsectra***

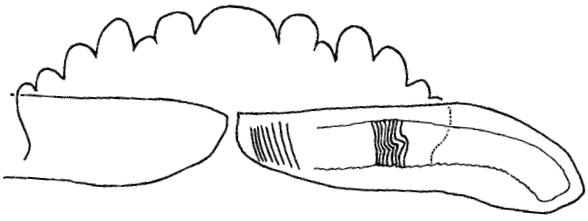
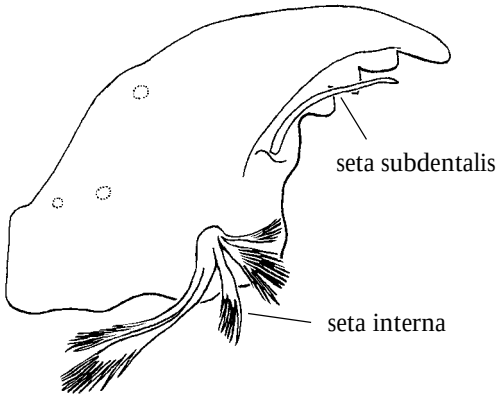
19(3') Ventromental plates touching or almost touching medially ..... 20

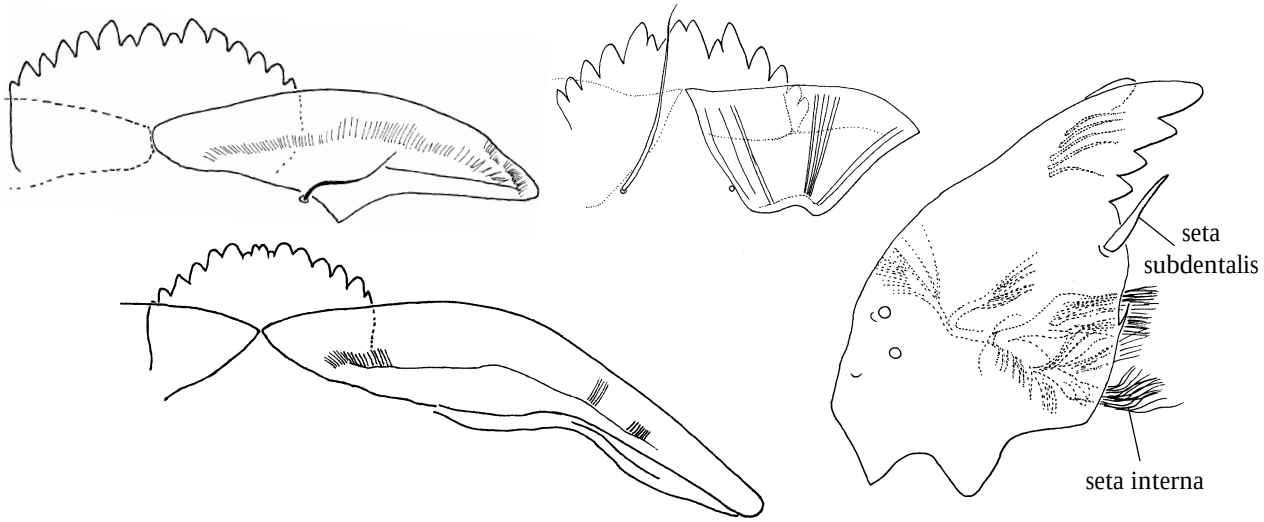
19' Ventromental plates separated medially by at least the width of the median tooth/teeth of the mentum ..... Tribe Chironomini (in part) ..... 27

20(19) Ventromental plates bar-like; seta subdentalis dorsal, on same side of mandible as seta interna ..... Tribe Pseudochironomini ..... 21

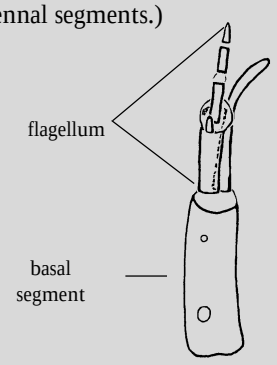



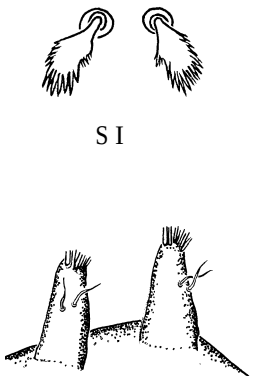
20' Ventromental plates crescent- or wedge-shaped or extremely broad; seta subdentalis ventral, on opposite side of mandible from seta interna (seta interna may be absent) ..... ..... Tribe Chironomini (in part) ..... 22



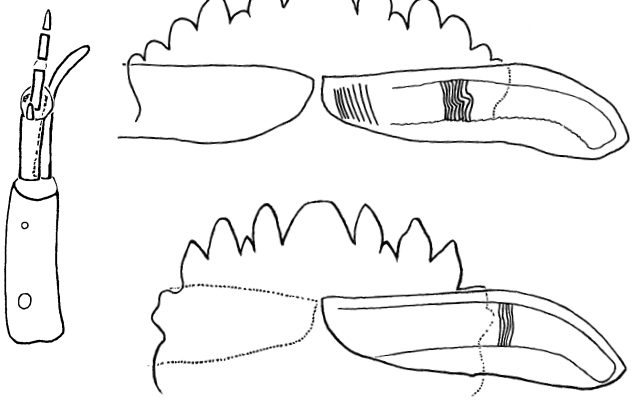

21(20) Procerci arising from separate bases; basal segment of antenna longer, AR about or more than 1.0; mentum with 2nd lateral tooth small, sometimes partially fused to 1st lateral tooth; S I arising from separate bases; common and widespread ..... ***Pseudochironomus***

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

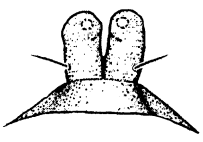


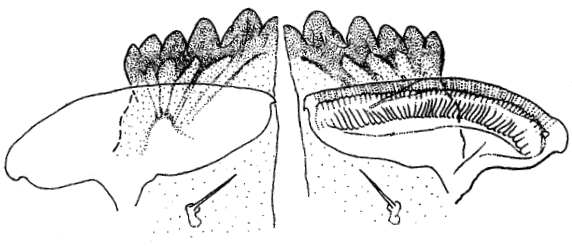

procerci



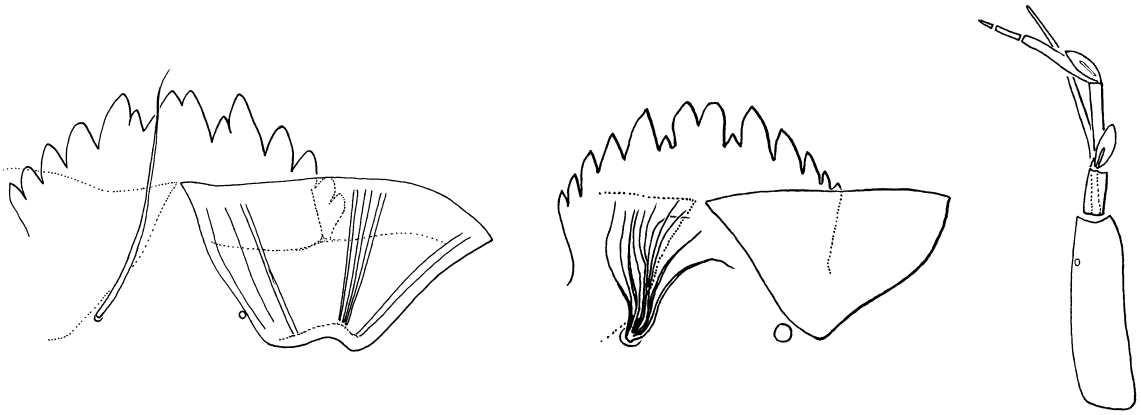
21' Procerci fused at base; basal segment of antenna shorter, AR < 1.0; mentum with 2nd lateral tooth minute and fused to 1st lateral tooth; S I setae arising from a common base; in the US known only from the Everglades in south Florida ..... ***Manoa***



procerci

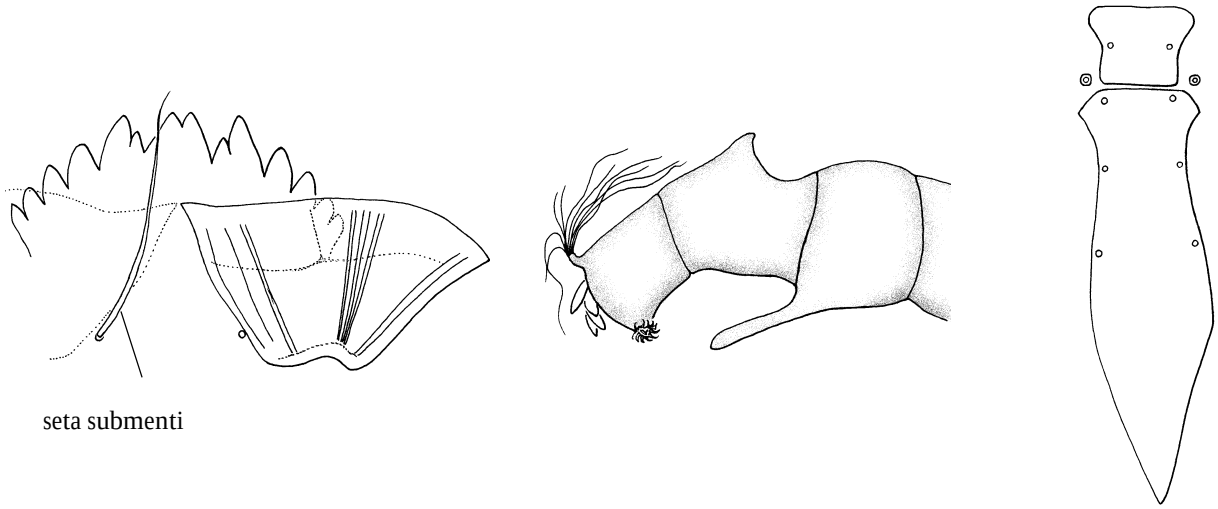


22(20') Ventromental plates wedge-shaped; antennae 6 segmented with alternate Lauterborn organs at apices of segments 2 and 3; larvae in transportable silken cases ..... 23



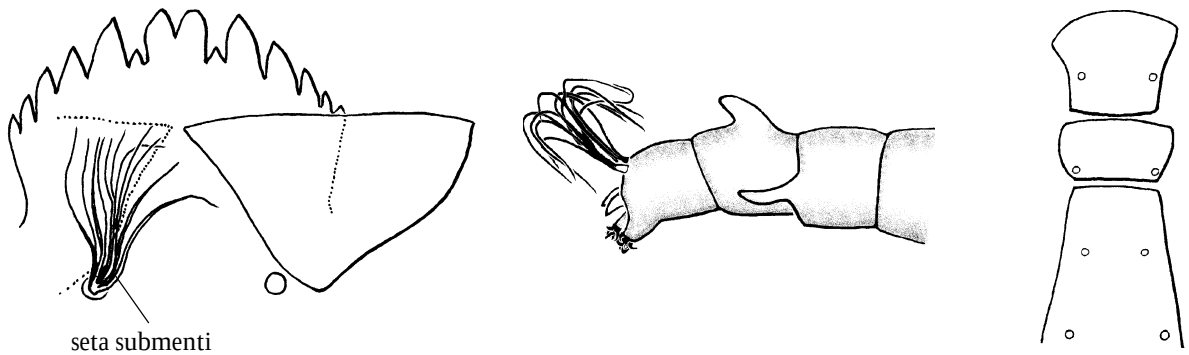
22' Ventromental plates wider; antennae 5 segmented, Lauterborn organs at apex of sgement 2 only; larvae not in transportable silken cases ..... 24

23(22) Setae submenti simple; frontoclypeal apotome present, with one medial labral sclerite anterior to it; anteriorly directed hump on body segment 11 ..... ***Zavreliella***



seta submenti

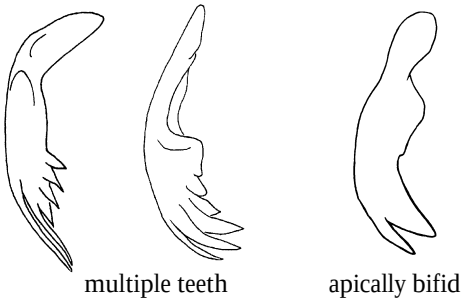
23' Setae submenti plumose; frontal apotome present, with 2 medial labral sclerites anterior to it; posteriorly directed hump on body segment 11 ..... ***Lauterborniella***



seta submenti

24(22') Premandibles with 3 or more apical/subapical teeth ..... 25

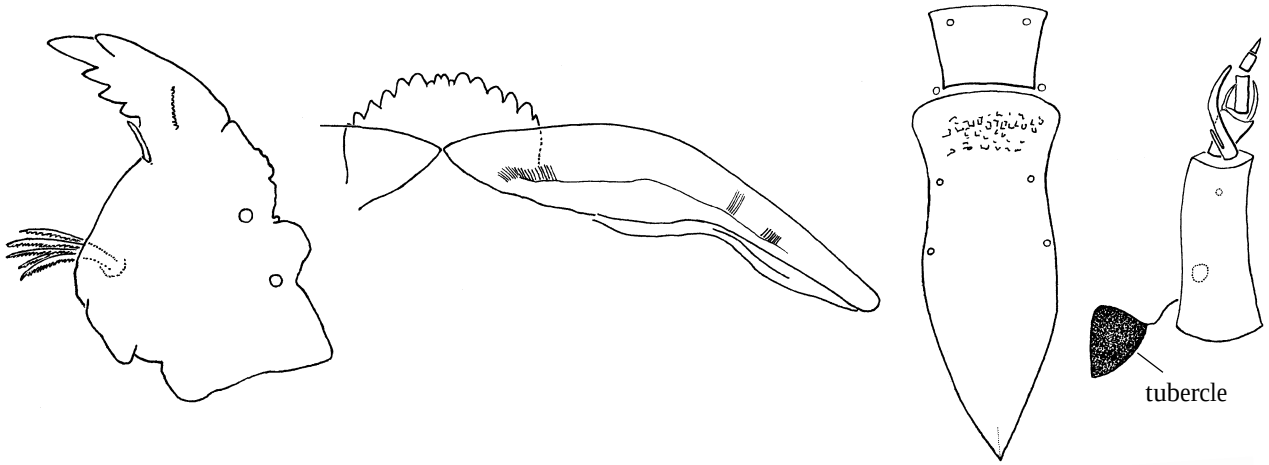
24' Premandibles apically bifid ..... 27



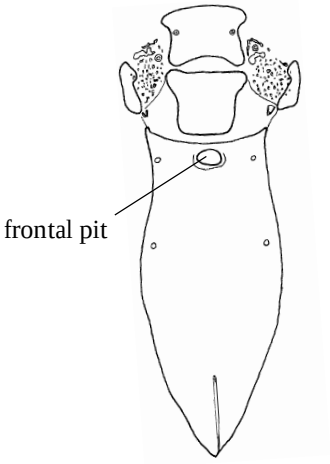

25(24) Mandible without dorsal tooth; inner teeth of mandible flattened (sometimes worn so that it appears no inner teeth are present) ..... ***Axarus***

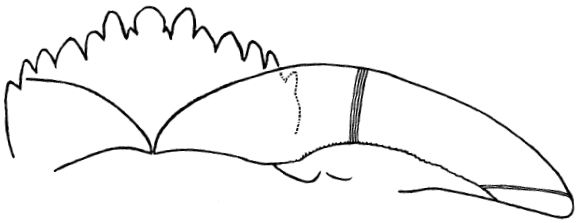
25' Mandible with dorsal tooth; inner teeth of mandible well defined ..... 26

26(25') Mandible with outer posterior hump; ventromental plates extremely broad; apotome with 1 medial labral sclerite anterior to it, without frontal pit; antenna with dark tubercle near base; not confined to south Florida ..... ***Lipiniella***

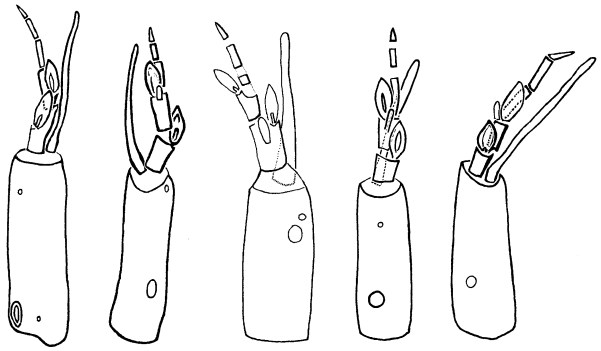



26' Mandible without outer posterior hump; ventromental plates not as broad; apotome with frontal pit and 2 medial labral sclerites anterior to it; antenna without tubercle near base; known only from south Florida ..... ***Kiefferulus*** (in part)

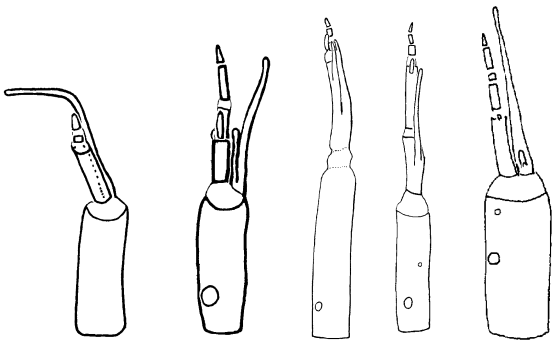


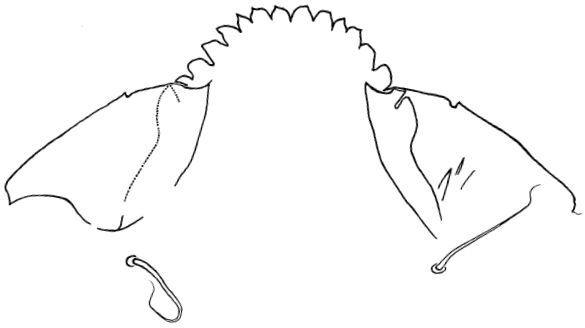
27(19', 24') Antennae with 6 well defined segments, with large Lauterborn organs at the apices of segments 2 and 3 ..... 28



27' Antennae with 4-7 segments, if 6 segments present then without alternate Lauterborn organs on segments 2 and 3 ..... 35

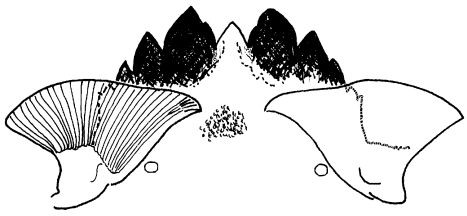


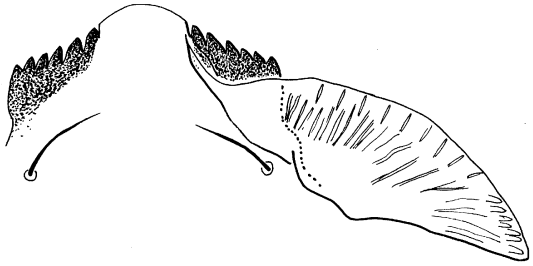
28(27) Mentum strongly arched, resembling a circular saw blade; mid-anterior margin of ventromental plate with notch ..... ..... ***Harnischia* complex genus A**



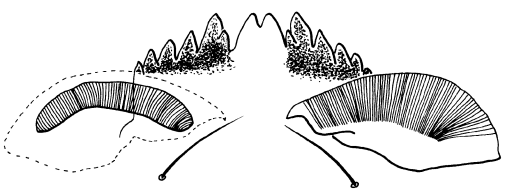
28' Mentum and ventromental plate not as above ..... 29

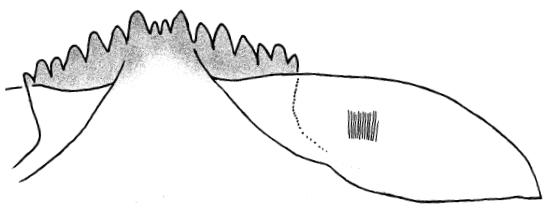
29(28') Mentum with single pale median tooth ..... 30



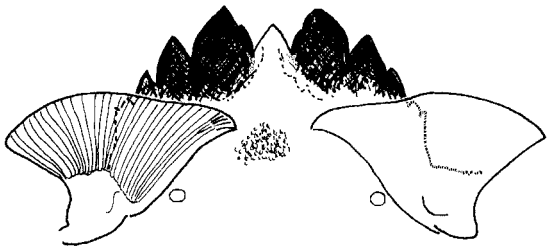


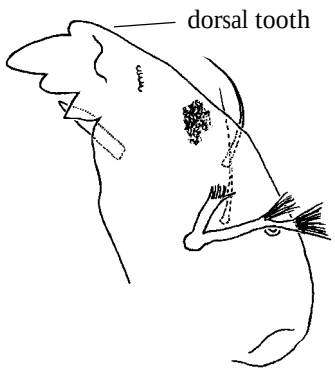
29' Mentum with 2 or more pale or dark median teeth ..... 31



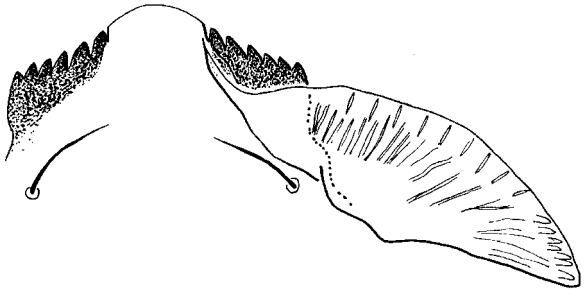


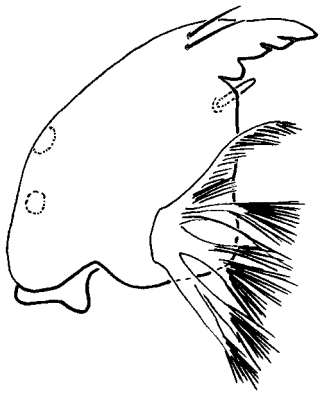
30(29) Median tooth of mentum lower than first lateral teeth; mandible with dorsal tooth ..... ..... ***Beardius*** (in part)



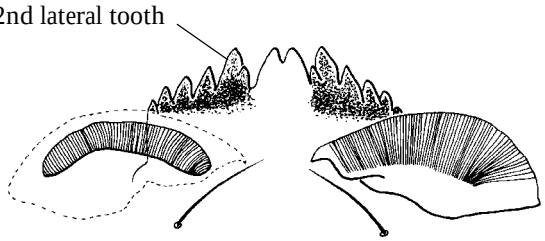



30' Median tooth of mentum higher than first lateral teeth; mandible without dorsal tooth ..... ..... ***Paralauterborniella***

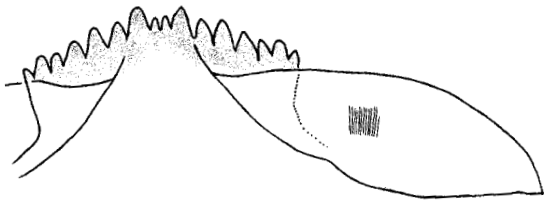


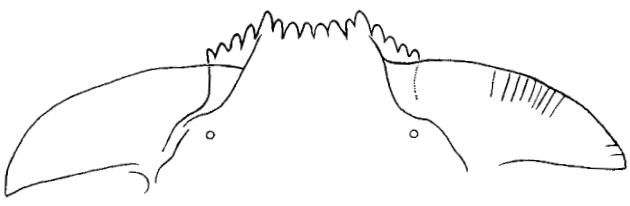


31(29') Mentum with 2-3 pale median teeth that are subequal to ***2nd*** lateral teeth ..... 32

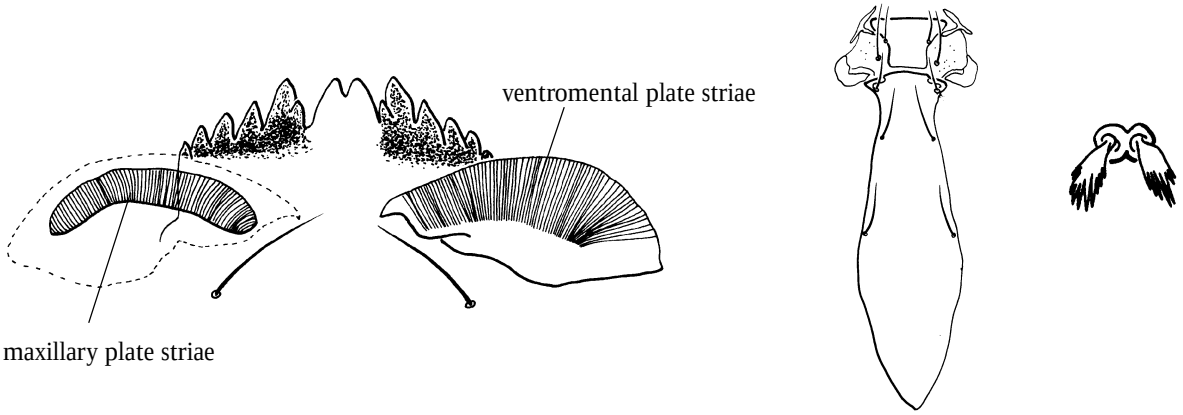



31' Mentum with dark median teeth **or** with 4 pale median teeth that are lower than 2nd lateral teeth ..... 33

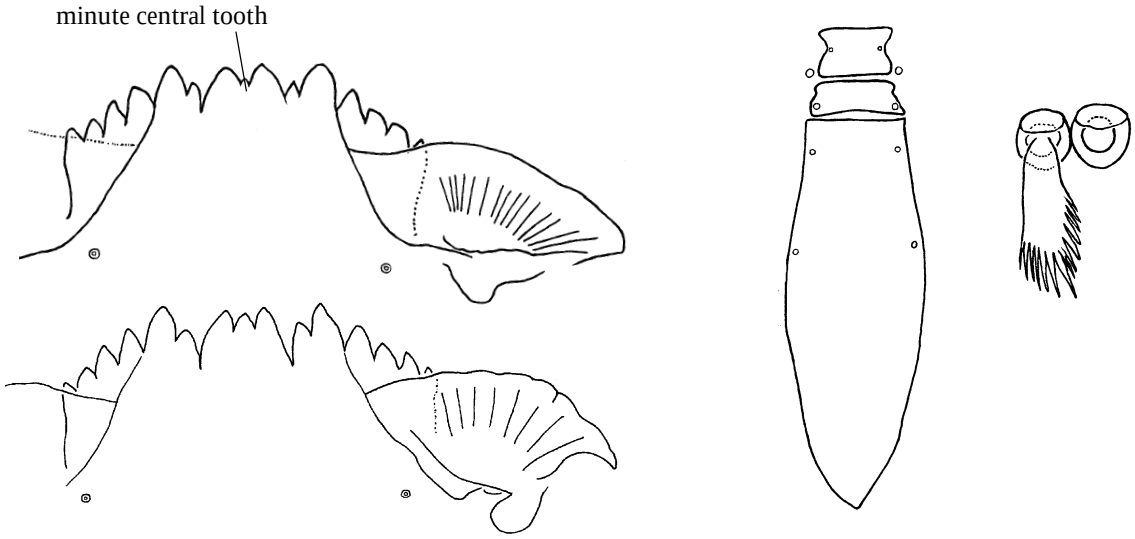




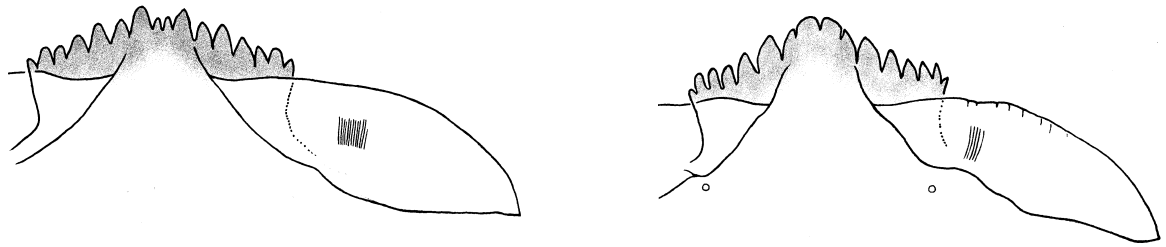
32(31) Mentum with 2 pale median teeth; maxillary plate striae well developed and more noticeable than ventromental plate striae; frontoclypeal apotome present; bases of S I fused ..... ***Apedilum***



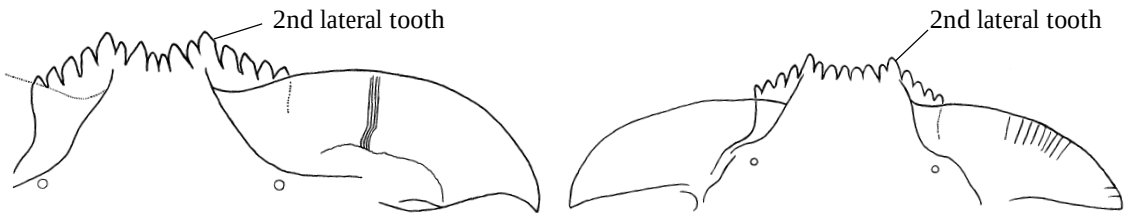

32' Mentum with 3 pale median teeth (central median tooth may be minute); ventromental plate striae coarse and distinct, maxillary plate striae difficult to discern; frontal apotome separated from clypeus by a straight suture; bases of S I separate or contiguous ..... ***Microtendipes***




33(31') 4 median teeth of mentum dark and at least outer pair higher than remaining lateral teeth .. ..... ***Stictochironomus***

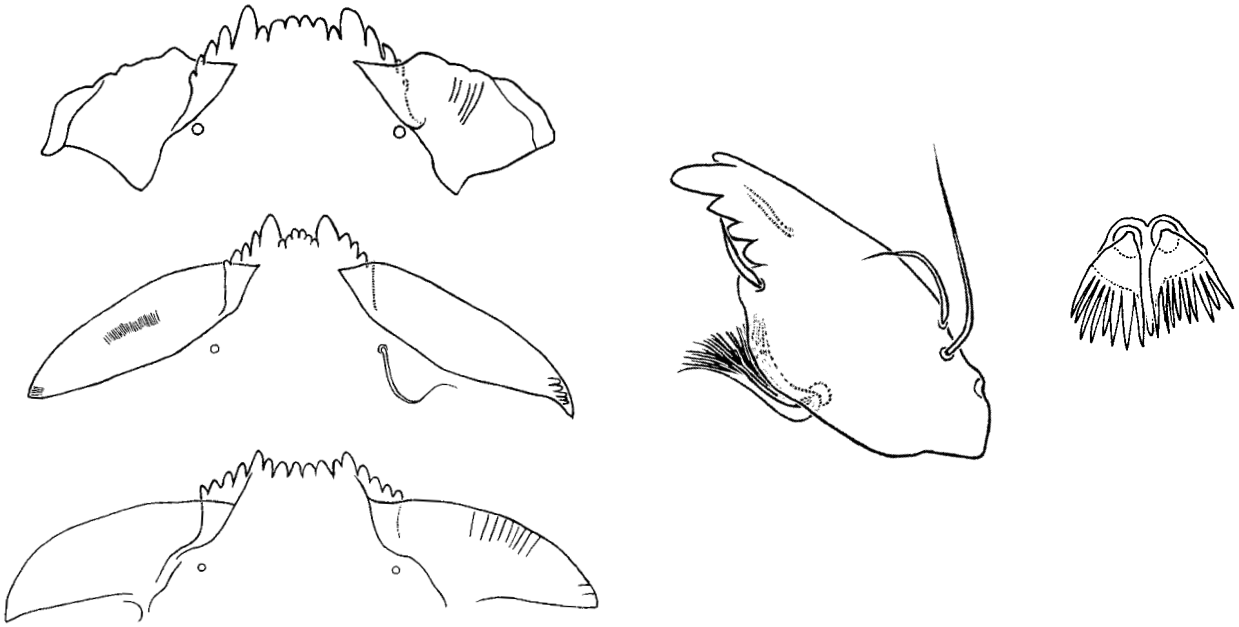


33' Median teeth of mentum pale or dark, lower than or subequal to 2nd lateral teeth ..... 34

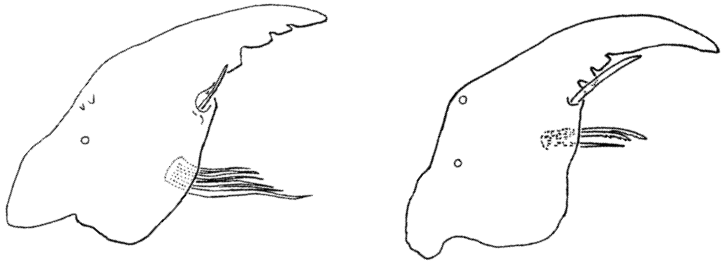


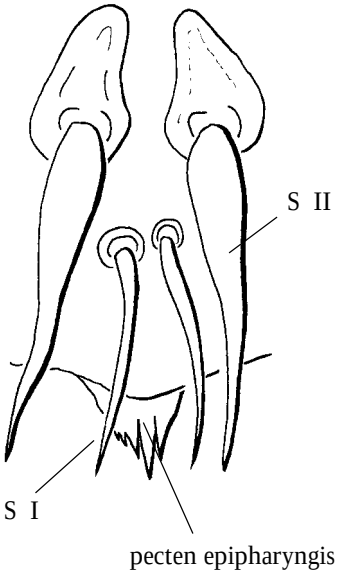
34(33') Central pair of the 4 median teeth lower and more slender than outer median teeth; bases of S I separate; mandible with 2 dorsal teeth ..... ***Omisus***

34' Central pair of the 4 median teeth equal to or higher than outer median teeth; bases of S I fused or located on common triangular plate; mandible with 1 dorsal tooth ..... ***Paratendipes***

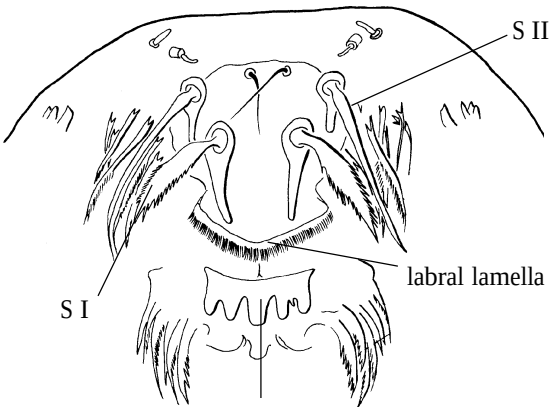


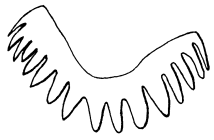
35(27') S I simple (with small accessory branches in some species of *Parachironomus*, but never plumose); S II often large and blade-like; mandible without dorsal tooth/teeth; labral lamella usually absent; pecten epipharyngis rounded or subtriangular, consisting of a single plate or scale that may be simple, serrated, notched or toothed ..... the *Harnischia* complex (in part) ..... 36



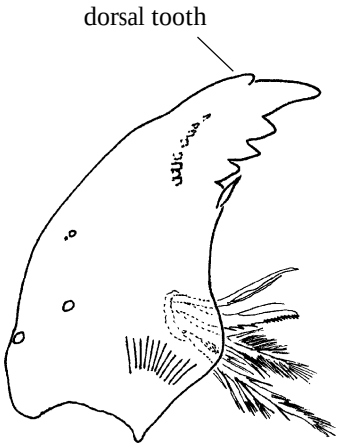


35’ S I plumose or fringed on at least one margin; S II usually not large and blade-like; labral lamella present; mandible usually with dorsal tooth/teeth; pecten epipharyngis a wide multitoothed comb **or** of 3 platelets that are usually apically toothed (but may be smooth) ..... 52

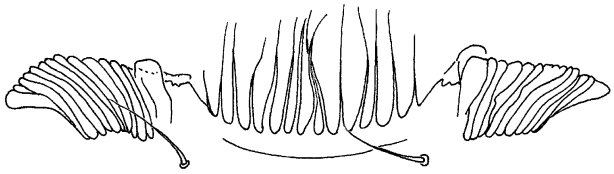


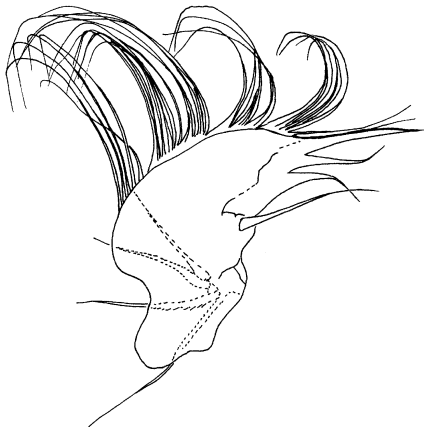


comb-like
pecten epipharyngis


3 platelet
pecten epipharyngis



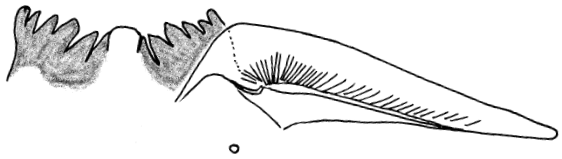

36(35) Mentum toothless, with about 15 anteriorly directed seta-like projections; mandible with dense fringe of setae on outer margin ..... ***Harnischia* complex genus B**



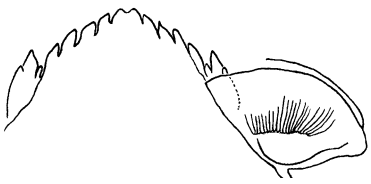


36’ Mentum and mandible not as above ..... 37

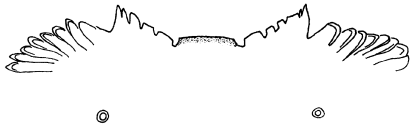
37(36’) Mentum concave, with broad pale median tooth flanked by dark well sclerotized teeth that point inward; ventromental plates at least 3X wider than long ..... 38



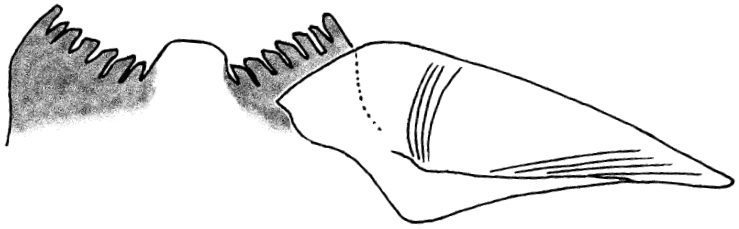
37’ Mentum convex (arched) or linear; or if concave than mentum completely pale; ventromental plates less than 2X as wide as long ..... 41

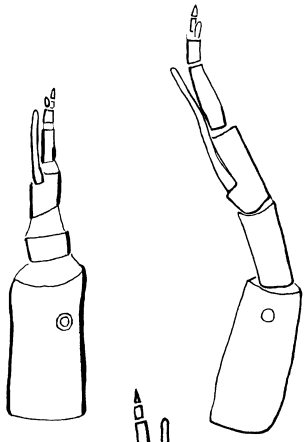

convex


linear

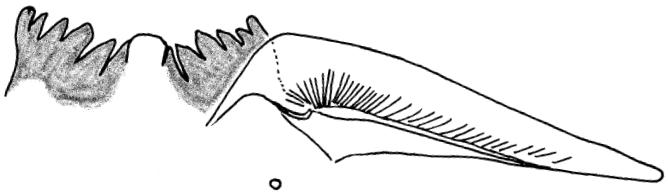

concave but pale

38(37) Antennae with 7 segments; mentum with 7 pairs of usually dark lateral teeth ..... ***Demicryptochironomus***

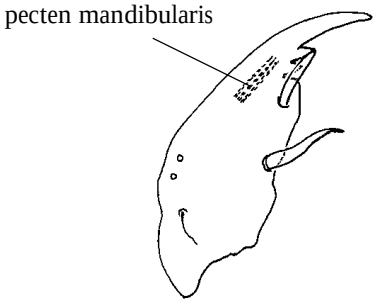




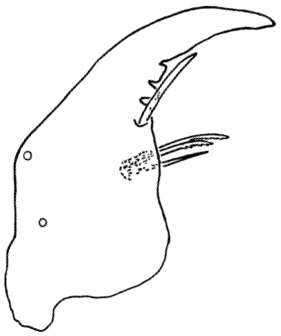
38' Antennae with 5 segments; mentum with 4-5 pairs of dark lateral teeth ..... 39

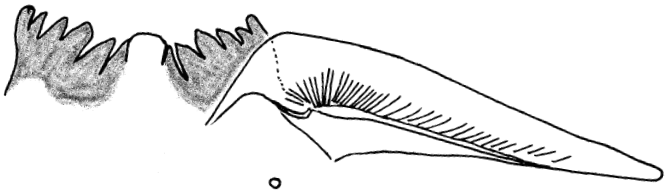


39(38') Antennal segment 3 weakly sclerotized; mandible with weak pecten mandibularis; ventromental plate about 3X as wide as long; known only from south Florida .... ***Harnischia*** **complex genus D**

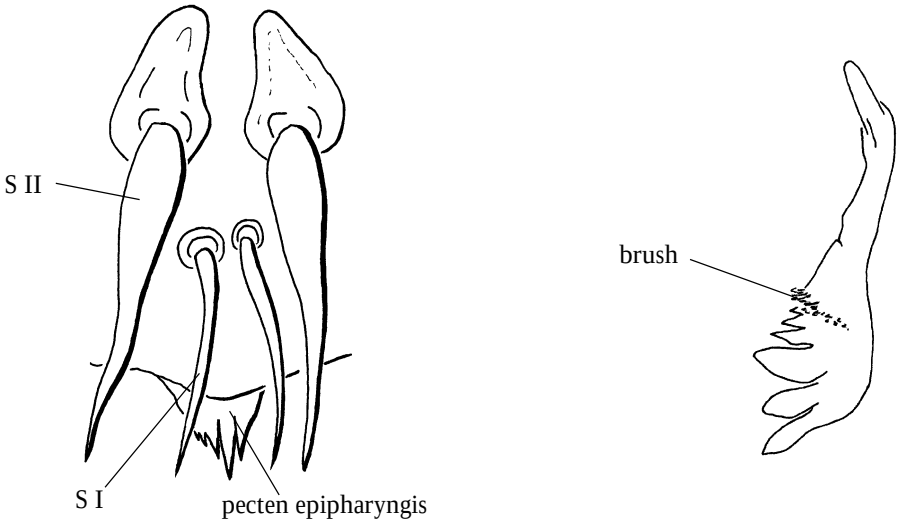



39' Antennal segment 3 well sclerotized; mandible without pecten mandibularis; ventromental plate frequently more than 3X as wide as long; widespread ..... 40

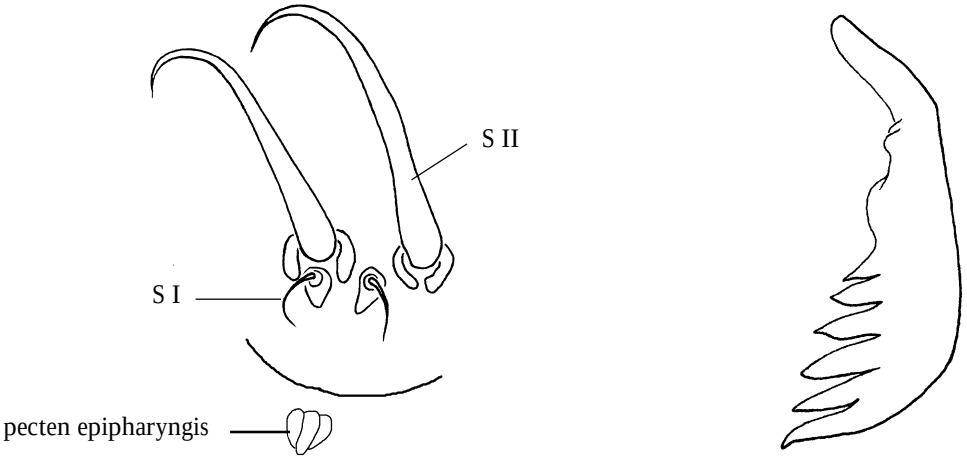




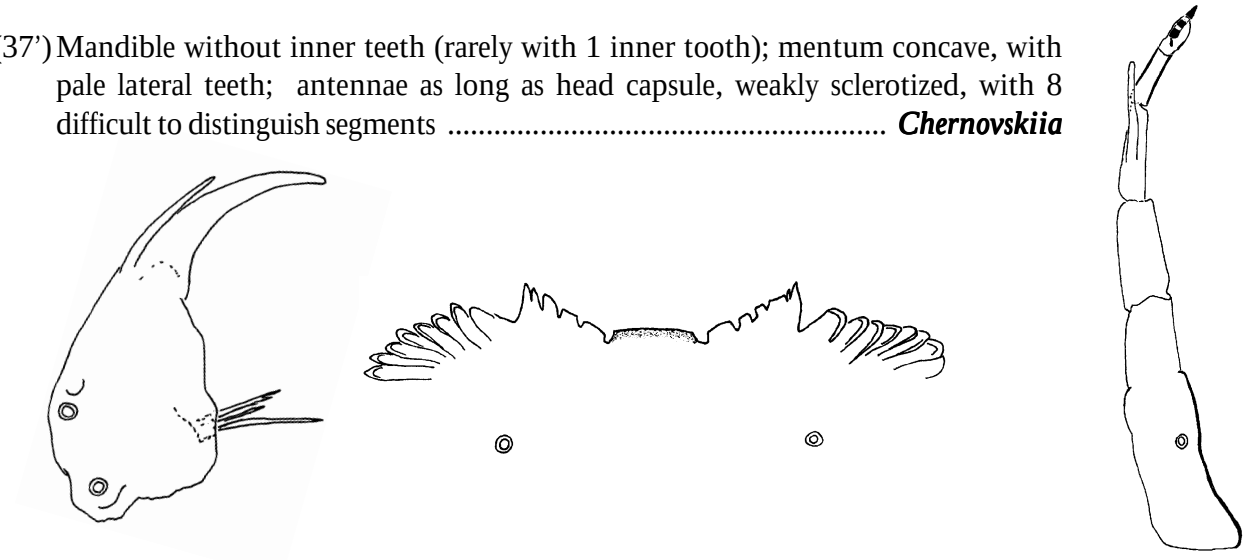
40(39') Pecten epipharyngis a deeply trilobed scale; S I well developed, at least 1/2 as long as S II; premandible with weak brush ..... ***Cryptochironomus***



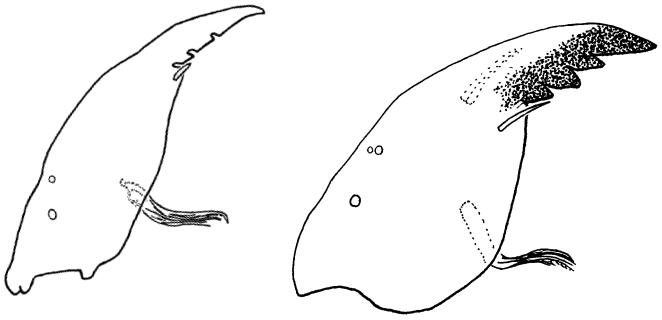

40' Pecten epipharyngis a weakly trilobed scale; S I minute, less than 1/5 length of S II; premandible without brush ..... ***Gillotia***

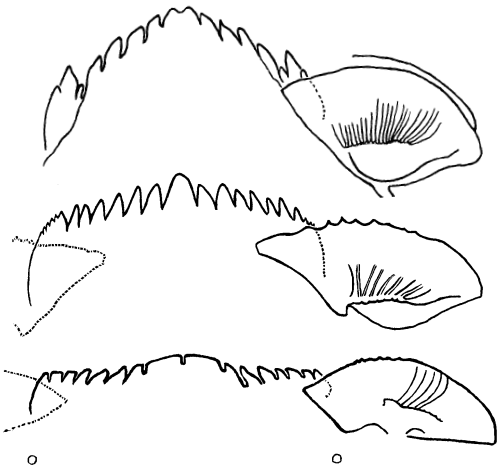



41(37') Mandible without inner teeth (rarely with 1 inner tooth); mentum concave, with pale lateral teeth; antennae as long as head capsule, weakly sclerotized, with 8 difficult to distinguish segments ..... ***Chernovskiia***



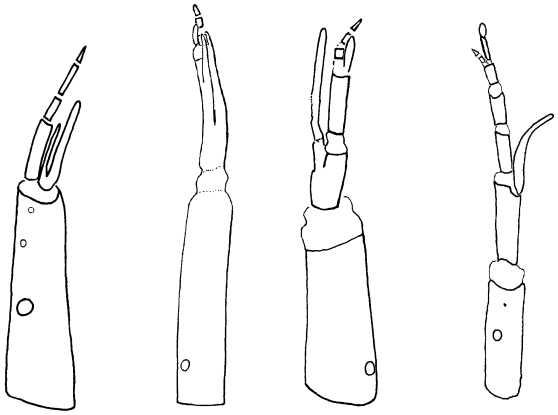
41' Mandible with at least 2 inner teeth or notches indicating teeth; mentum convex or linear; antennae with 5-7 variably sclerotized segments ..... 42





42(41') Antennae with 5 segments ..... 43

42' Antennae with 6-7 segments ..... 48

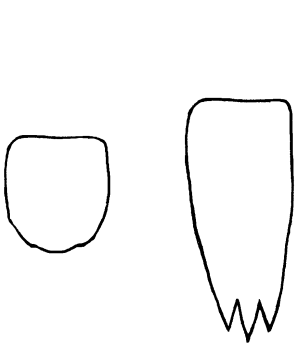


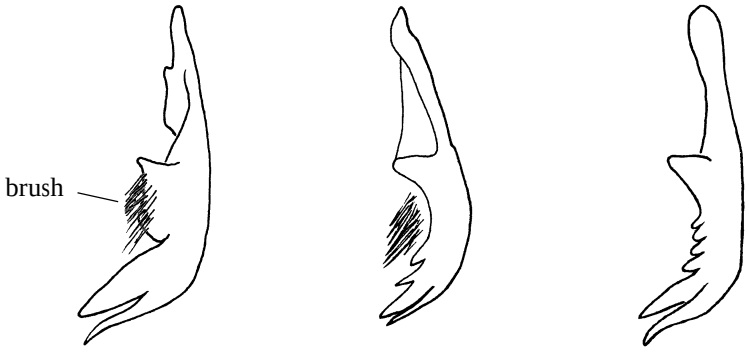
5 5 6 7

43(42) Pecten epipharyngis a wide plate with numerous apical teeth (deeply trifid in *P. alatus*); premandible with 2-4 teeth, without brush ..... ***Parachironomus***

*P. alatus*

43' Pecten epipharyngis a simple plate with or without weak distal lobes; premandible apically bifid, with brush **OR** pecten epipharyngis a shallowly trifid triangular scale (if deeply trifid then basal segment of maxillary palp almost as long as first antennal segment) and premandible with several small inner teeth and with or without brush ..... 44

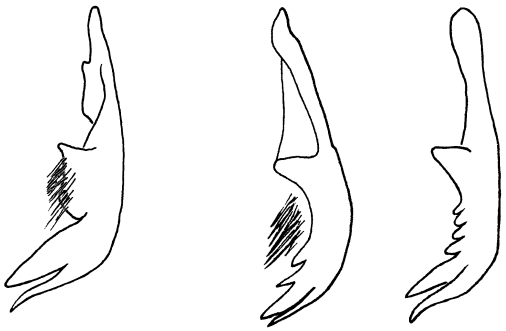





bifid with brush several teeth with brush several teeth without brush

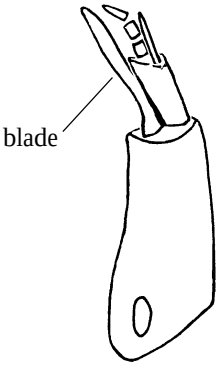
44(43') Premandible apically bifid ..... 45

44' Premandible with 3 or more teeth ..... 47



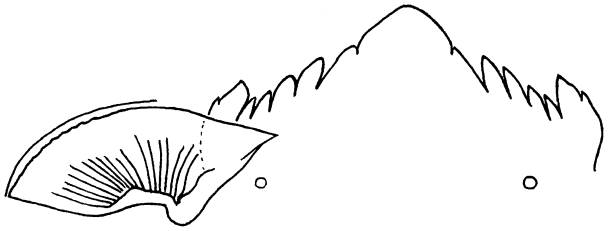
bifid 3 or more teeth

45(44) Outline of mentum nearly linear, median tooth trifid; antennal blade as long as or longer than flagellum (segments 2-5) ..... ***Microchironomus***

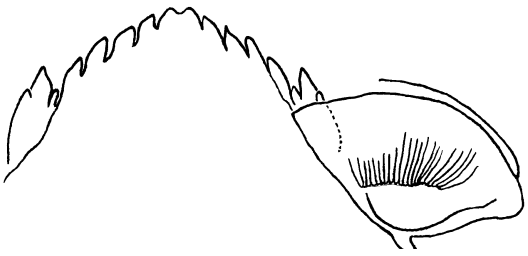


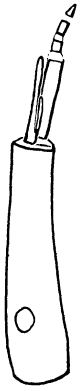

45' Outline of mentum convex (arched), with median tooth single (may be laterally notched and appear trifid), medially notched, or double; antennal blade shorter than flagellum (figures below) ..... 46

46(45') Median tooth of mentum broadly rounded or laterally notched to appear trifid, set well forward of lateral teeth so that outline of central mentum slopes sharply; basal segment of antenna about 2-2.5X longer than wide and subequal to length of flagellum ..... ***Cryptotendipes***



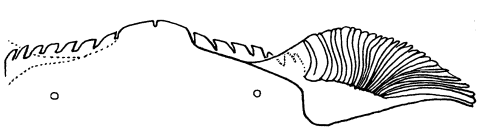
46' Median tooth of mentum usually double or notched medially, may be broadly rounded but not extending far forward of lateral teeth, thus mentum not appearing sharply sloped; basal segment of antenna about 2.8-4.0X longer than wide and longer than length of flagellum ..... ***Cladopelma***

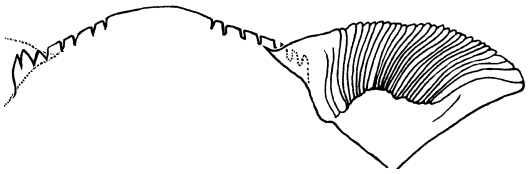


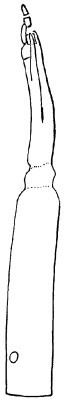


47(44') Antennal segments 2 and 3 subequal; ventromental plates weakly striated ..... ..... ***Harnischia***

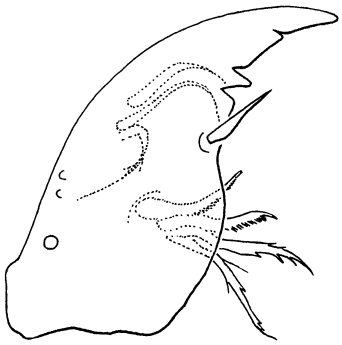
47' Antennal segment 2 much longer than 3; ventromental plates coarsely striated ..... ..... ***Paracladopelma***

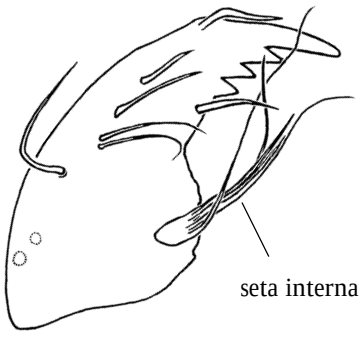


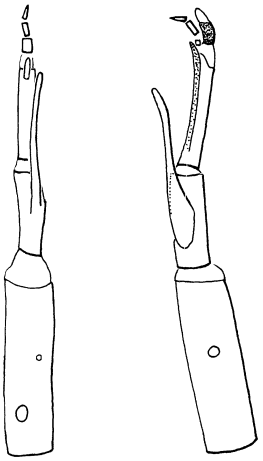




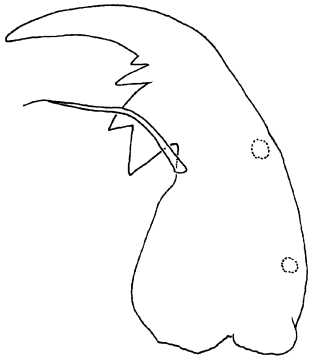
48(42') Antenna with 6 segments; mandible with seta interna ..... 49

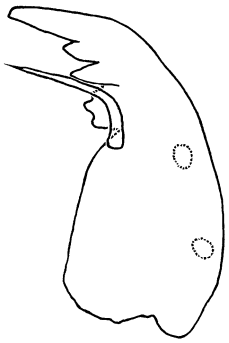


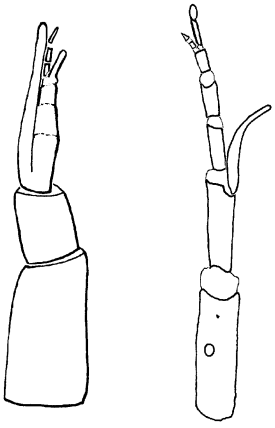


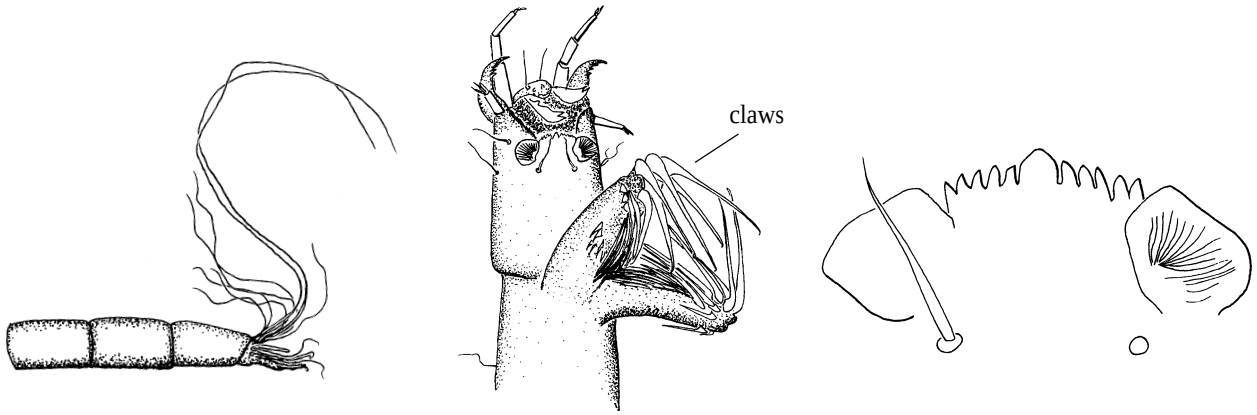
48' Antenna with 7 segments; mandible without seta interna ..... 51



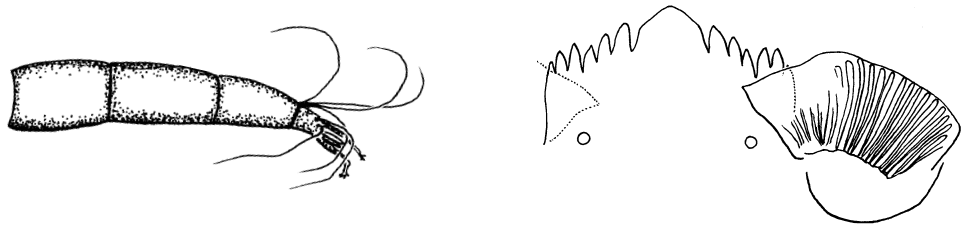




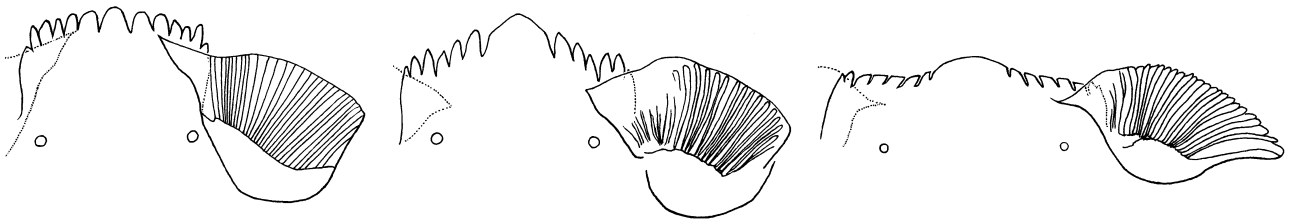
49(48) Each procercus with one very long anal seta that is about 4-5X as long as supraanal setae; anterior parapods with large claws that are about 2/3 length of head capsule; mentum with moderately broad median tooth and 5 pairs of lateral teeth ..... ***Harnischia* complex genus C**



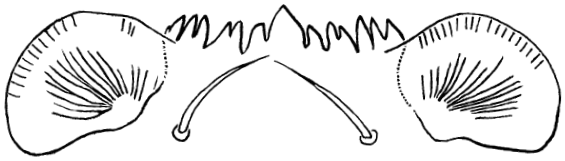

49' Anal setae not as long, slightly longer than supraanal setae; anterior parapod claws at most 0.4 length of head capsule; if mentum with broad median tooth, then with 6 or more pairs of lateral teeth ..... 50



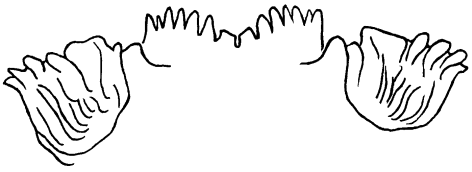
50(49') Ventromental plates with most striae complete to anterior margin; mentum as figured below ..... ***Saetheria***



50' Ventromental plates with striae not reaching anterior margin, a separate row of short striae present near anterior margin of plate; mentum as figured below ..... ***Kloosia***

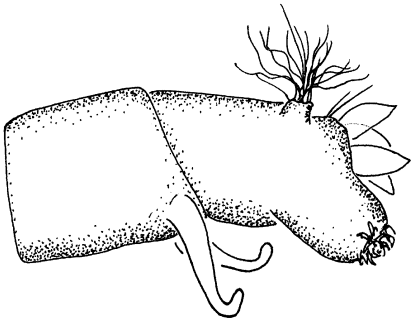


51(48') Mentum with an even number (14) of teeth ..... ***Robackia***

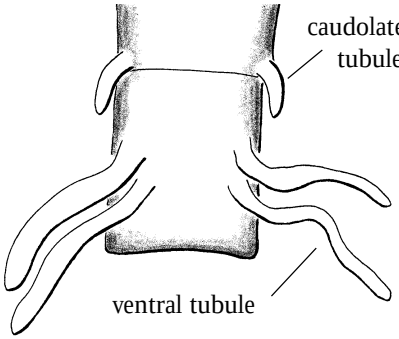


51' Mentum with odd number of teeth, median tooth trifid (if worn may appear simple) ..... ***Beckidia***

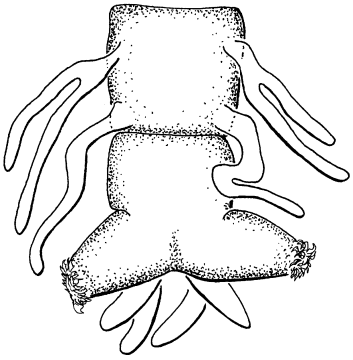
52(35') Penultimate body segment with 1-2 pairs of ventral tubules ..... 53



1 pair



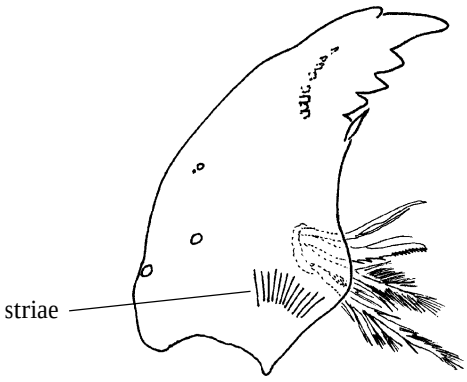

2 pairs

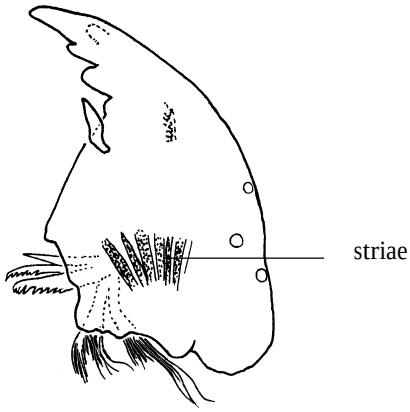


2 pairs, 1st pair bifid

52' Penultimate body segment without ventral tubules, although rudimentary knob-like swellings may be present ..... 60

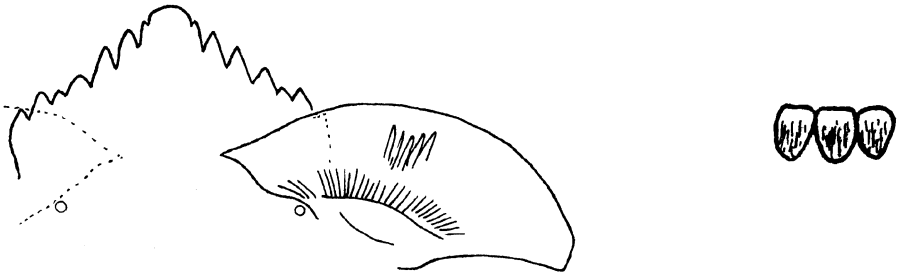
53(52) Mandible with a row of radially arranged striae near base ..... 54



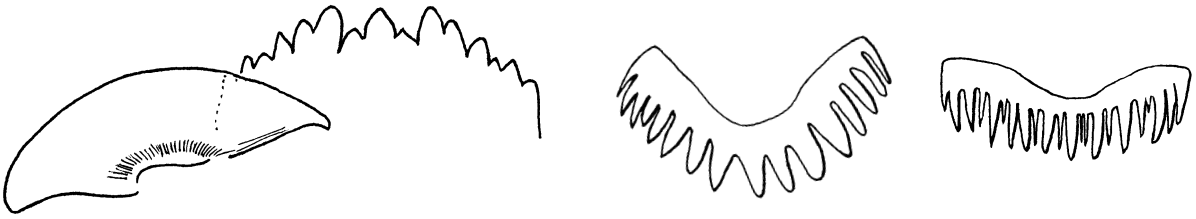




53' Mandible without a row of radially arranged striae near base ..... 55

54(53) Mentum with median tooth projecting far beyond lateral teeth and 5th lateral tooth larger than 4th or 6th; pecten epipharyngis of 3 scales covered with minute spinules; 1 pair of ventral tubules ..... ***Einfeldia*** (in part)

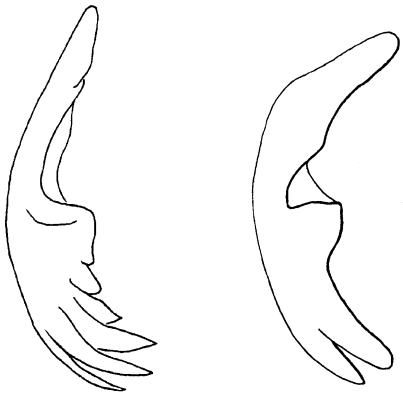


54' Median tooth of mentum not projecting far beyond lateral teeth; pecten epipharyngis a broad multitoothed comb; 1 or 2 pairs of ventral tubules ..... ***Chironomus*** (in part)



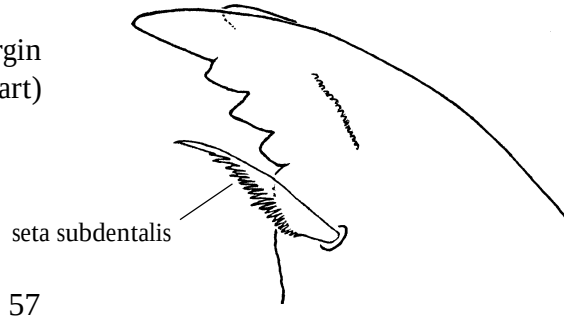
55(53') Premandible with 5 or more apical/subapical teeth ..... ***Kiefferulus*** (in part)

55' Premandible apically bifid ..... 56



*Kiefferulus*

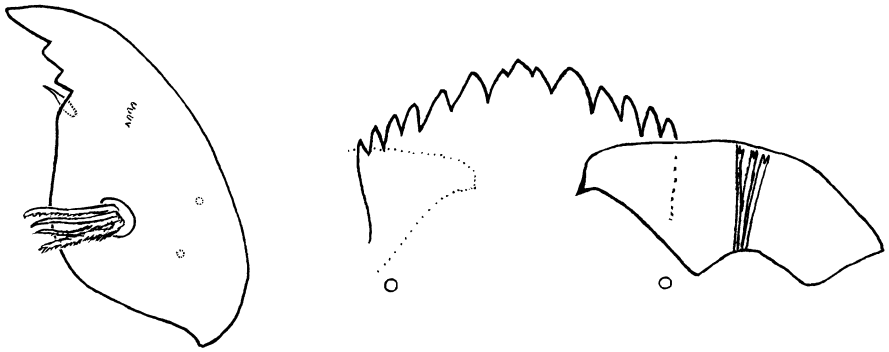
56(55) Seta subdentalis with toothed or fringed ventral margin ..... ***Goeldichironomus*** (in part)




56' Seta subdentalis simple ..... 57

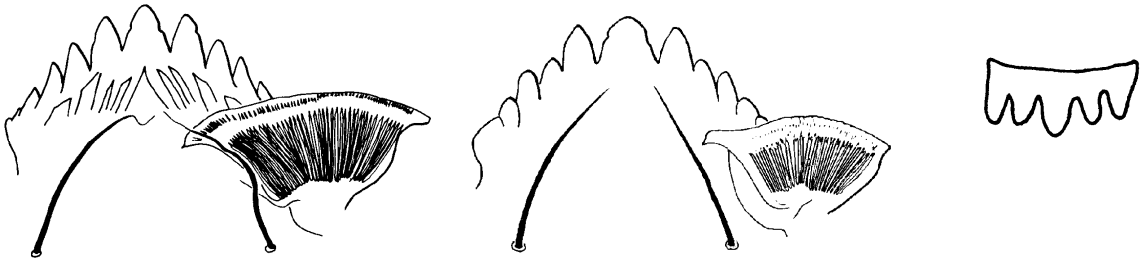
*Goeldichironomus*

57(56') Mandible with 2 inner teeth; larvae mining in sponges, bryozoans or plants ..... ***Demeijerea***

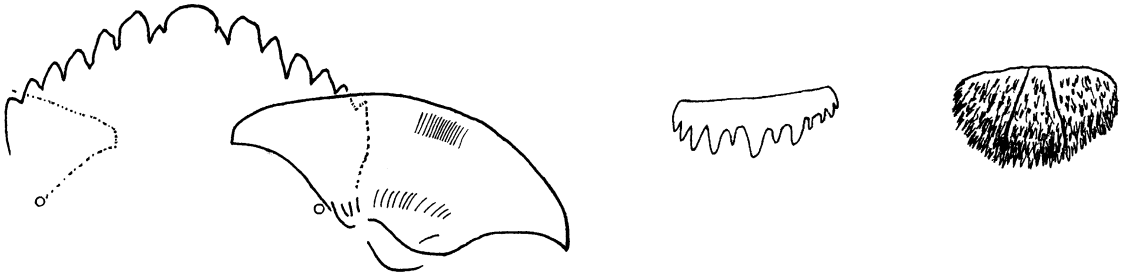


57' Mandible with 3 inner teeth; larvae free-living or mining in decaying wood or plants ..... 58

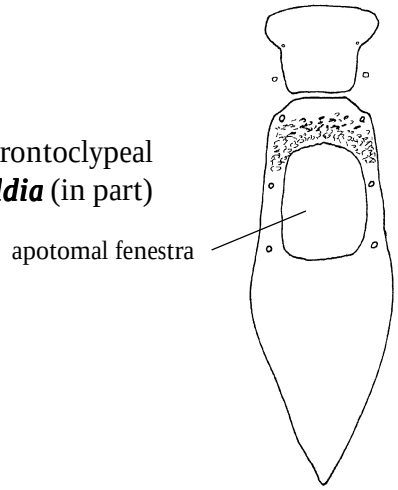
58(57') Width of ventromental plate less than width of mentum; pecten epipharyngis with fewer than 10 usually blunt lobes ..... ***Dicrotendipes*** (in part)

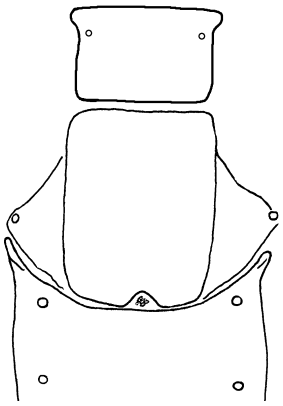


58' Width of ventromental plate greater than or subequal to width of mentum; pecten epipharyngis a comb with 10 or more teeth or weakly tripartite and covered with minute spinules ..... 59



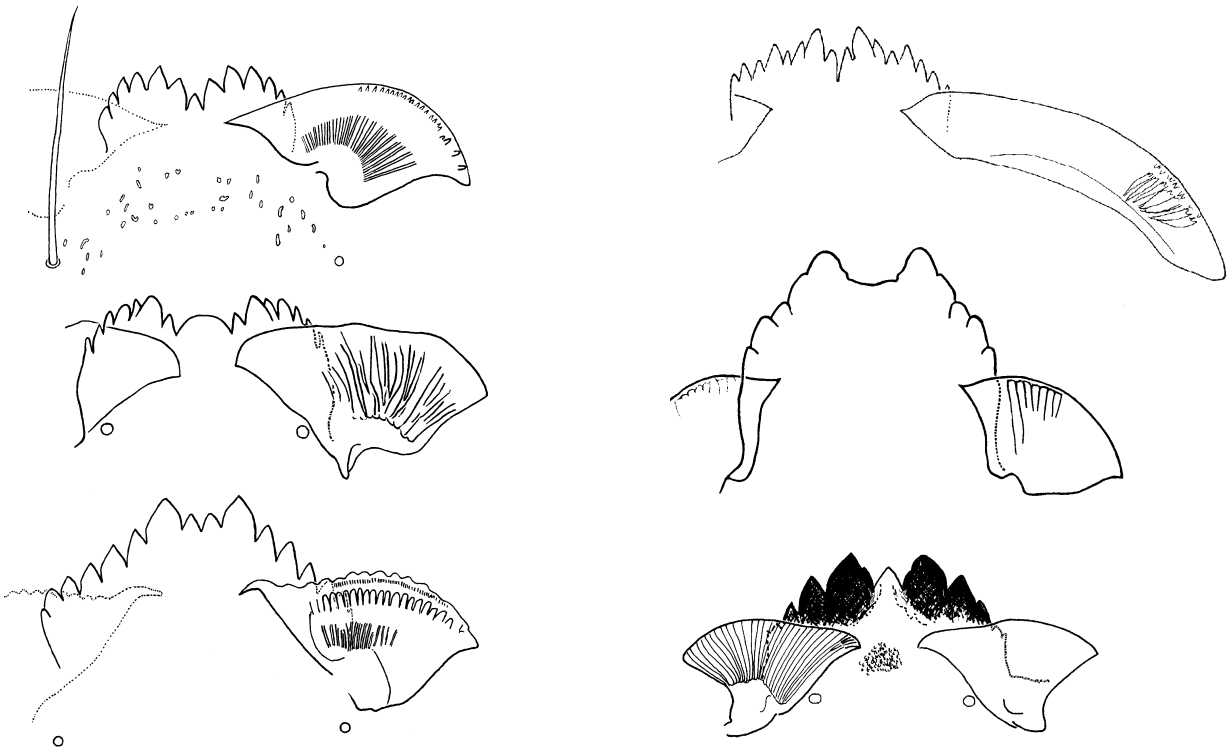
59(58') Dorsum of head with 1 medial labral sclerite anterior to frontoclypeal apotome; apotome with large apotomal fenestra ..... ***Einfeldia*** (in part)





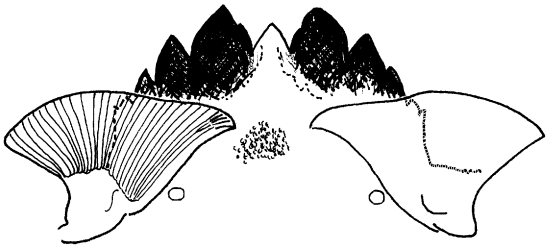
59’ Dorsum of head with 2 medial labral sclerites anterior to frontal apotome; apotome without apotomal fenestra ..... ***Glyptotendipes*** (in part)

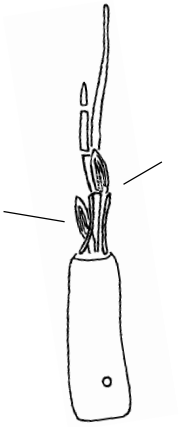
60(52’) Mentum with median tooth or teeth sunken, lower than 1st **or** 2nd lateral teeth ..... 61



60’ Mentum with median teeth higher than or subequal to 1st or 2nd lateral teeth ..... 67

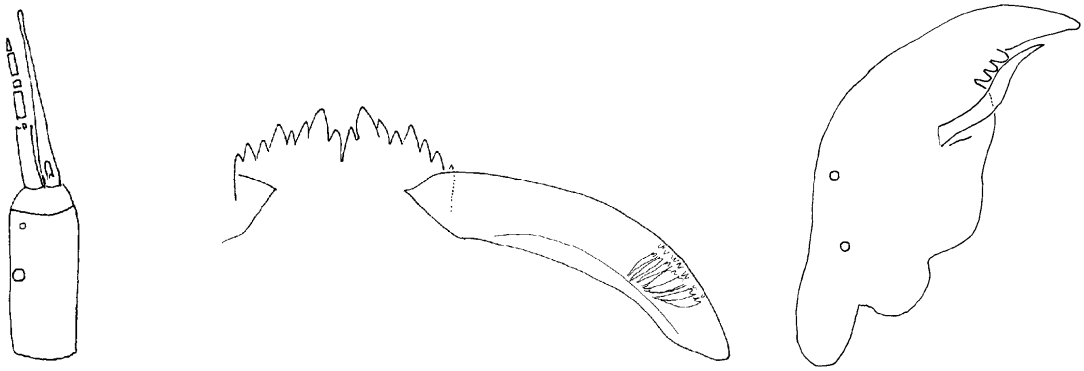
61(60) Median tooth pale; antennae with large Lauterborn organs at apices of segments 2 and 3 ..... ***Beardius*** (in part)





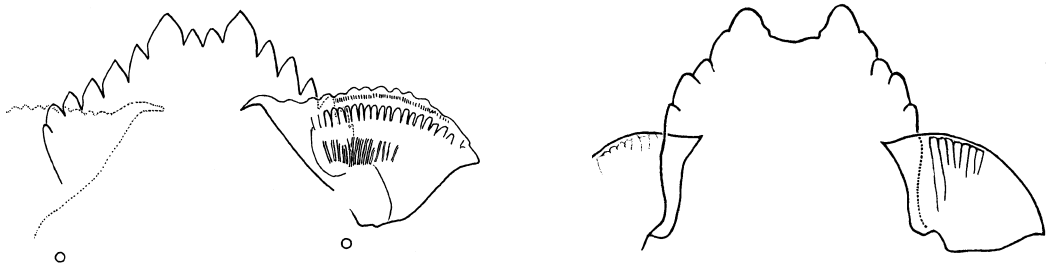
61’ Median tooth dark; antennae with Lauterborn organs at apex of segment 2 only ..... 62

62(61') Antennae 6 segmented (with minute 4th segment); ventromental plates very broad; mandible with enlarged seta subdentalis and without seta interna and pecten mandibularis ..... ***Fissimentum***



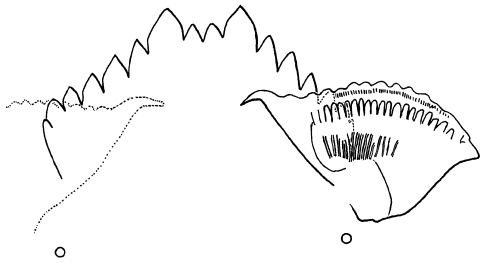
62' Antennae 5 segmented; mentum and mandible not as above ..... 63

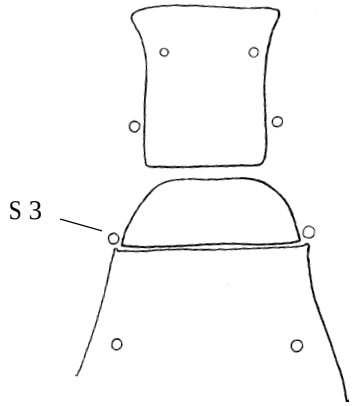
63(62') Mentum with 2 median teeth or teeth worn so that mentum has broad U-shaped median gap .. 64



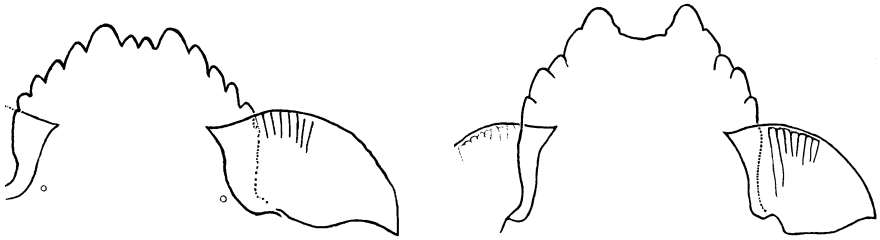
63' Mentum with single median tooth ..... 65

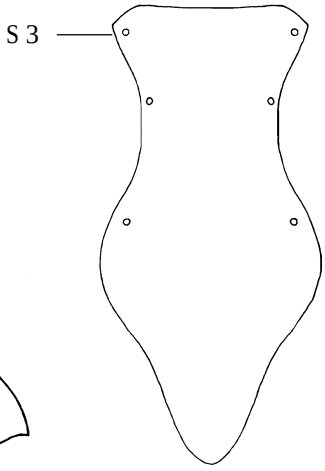
64(63) Anterior of frontal apotome narrowed, with 2 medial labral sclerites anterior to it; S 3 not placed on apotome ..... ***Hyporhygma***

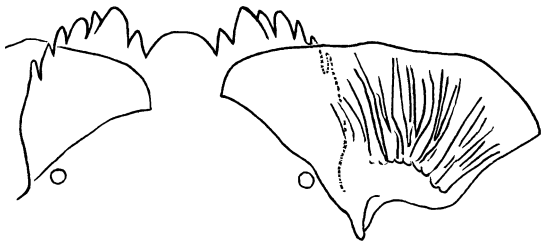


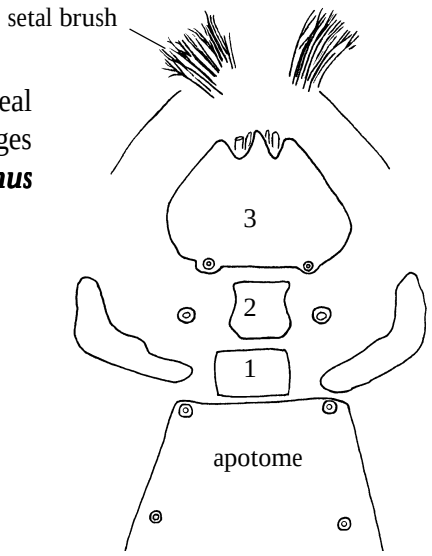



64' Anterior of frontoclypeal apotome broadened, with 1 labral sclerite anterior to it; S 3 placed anterolaterally on apotome ..... ..... ***Polypedilum*** (in part)



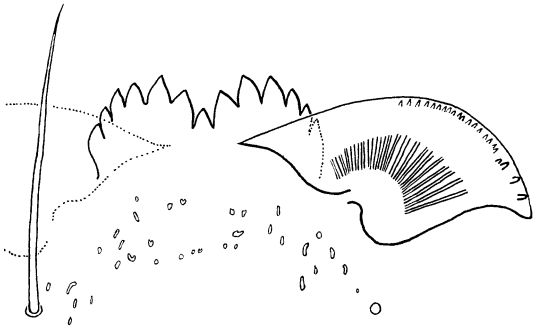


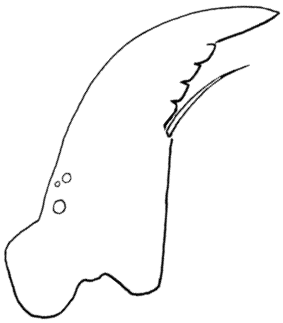


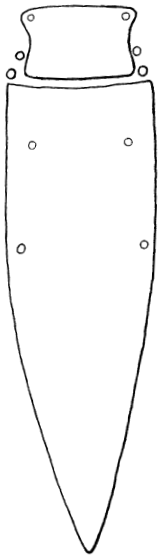



65(63') Labrum with large brush of setae on each side; frontoclypeal apotome with 3 medial sclerites anterior to it; mining in sponges ..... ***Xenochironomus***

65' Labrum without large anterolateral setal brushes; apotome with 1 or 2 medial labral sclerites anterior to it; not mining in sponges ..... 66

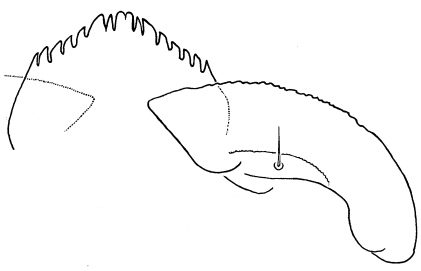


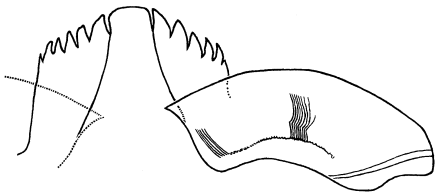




66(65') Head capsule rectangular; mentum with median tooth deeply sunken; mandible without seta interna or pecten mandibularis; frontal apotome with 1 medial labral sclerite anterior to it ..... ***Stelechomyia***

66' Head capsule more rounded; mentum with medial tooth not as deeply sunken; mandible with seta interna and pecten mandibularis; frontal apotome with 2 medial labral sclerites anterior to it ..... 67

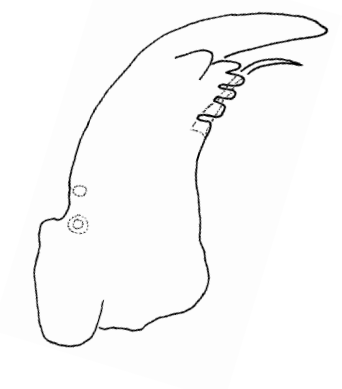


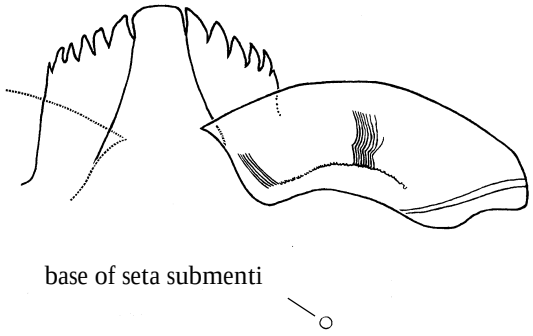


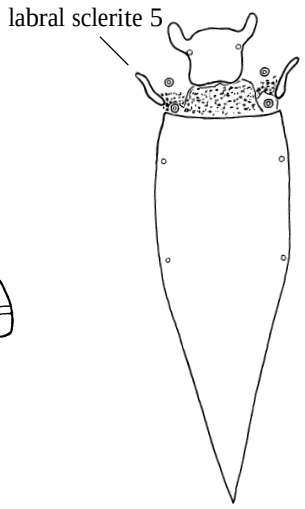
67 (60', 66') Mentum (or at least median tooth) and mandibular teeth pale; mandible with 4 or more inner teeth and 1-2 dorsal teeth ..... 68

67' Mentum and mandibular teeth brown to black; mandible with 2-3 inner teeth and 1 dorsal tooth ..... 69

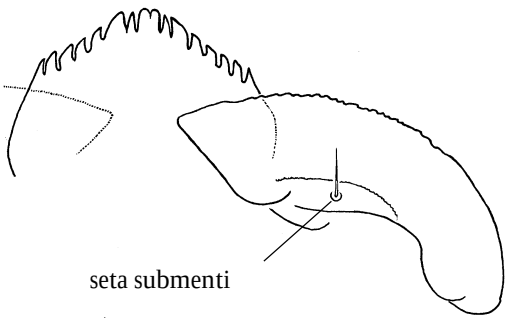
68(67) Inner mandibular teeth grouped closely together; basal antennal segment shorter than segments 2-5(6); setae submenti placed posterior to ventromental plates; labral sclerite 5 simple ..... ***Nilothauma***

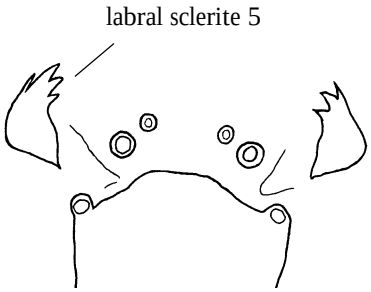





68' Inner mandibular teeth spread along inner margin; basal antennal segment longer than segments 2-5; setae submenti placed on ventromental plates; labral sclerite 5 toothed apically .. ***Pagastiella***



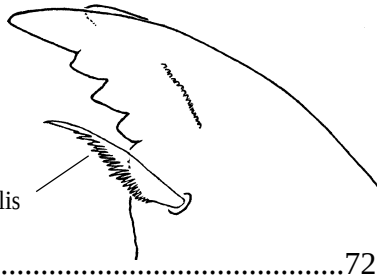

69(67') Mentum with an odd number of teeth ..... 70

69' Mentum with an even number of teeth or median tooth bifid ..... 77

70(69) Pecten epipharyngis a single plate with multiple lobes or teeth ..... 71

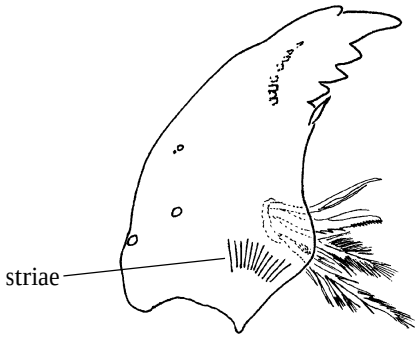
70' Pecten epipharyngis comprised of 3 apically toothed platelets ..... 75

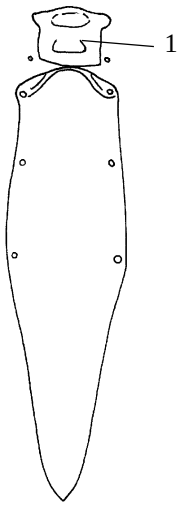
71(70) Seta subdentalis with toothed or fringed ventral margin ..... ***Goeldichironomus*** (in part)



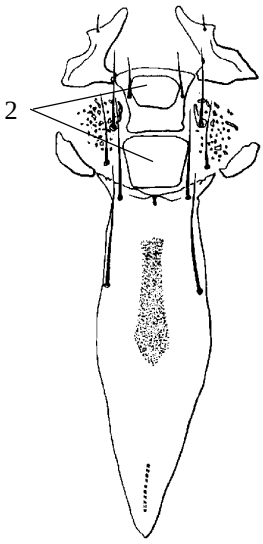

71' Seta subdentalis simple .....72

72(71') Mandible with basal row of radially arranged striae; frontoclypeal apotome with 1 medial labral sclerite anterior to it ..... ***Chironomus*** (in part)




frontoclypeal apotome with 1medial labral sclerite



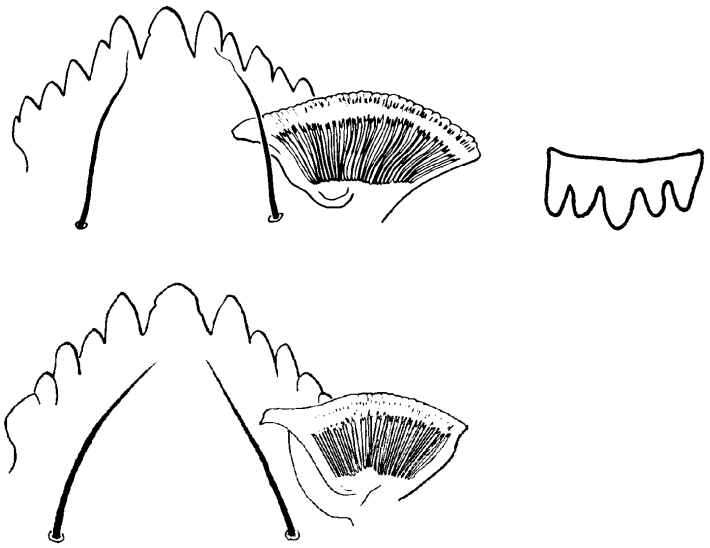

frontal apotome with 2 medial labral sclerites

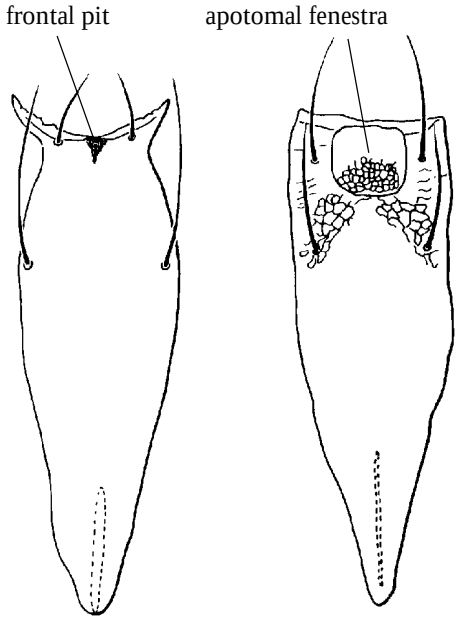
72' Mandible without basal row of radially arranged striae; apotome with 2 medial labral sclerites anterior to it ..... 73

73(72') Mandible with proximal inner tooth reduced and distal inner tooth appressed to apical tooth ..... ***Glyptotendipes*** (in part)

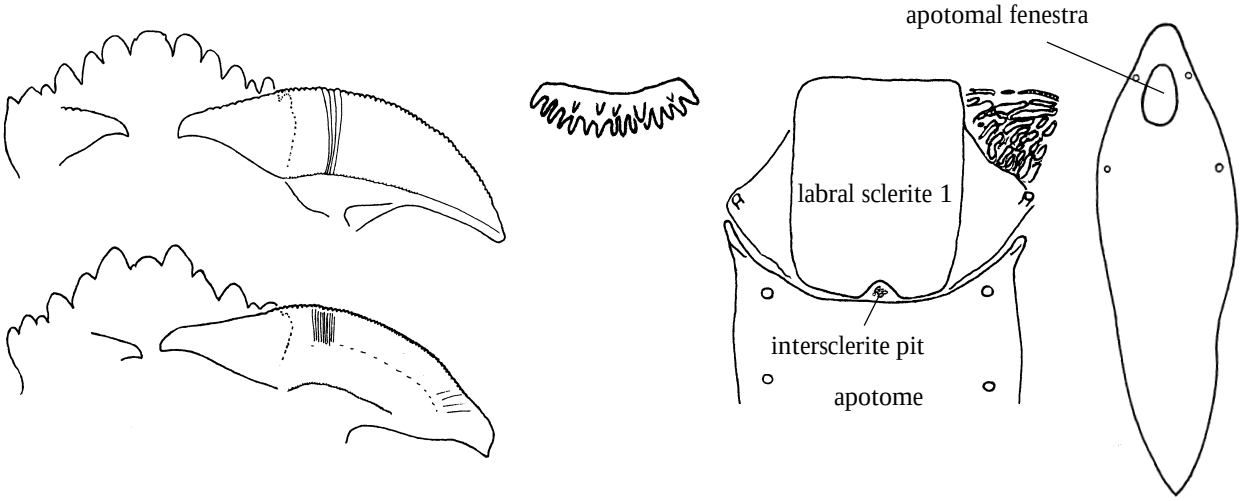
73' Mandible with inner teeth fully developed ..... 74

74(73') Width of ventromental plate less than width of mentum; pecten epipharyngis with fewer than 10 usually blunt lobes; frontal apotome usually with frontal pit (absent in 1 species) or semiquadrate apotomal fenestra ..... ***Dicrotendipes*** (in part)

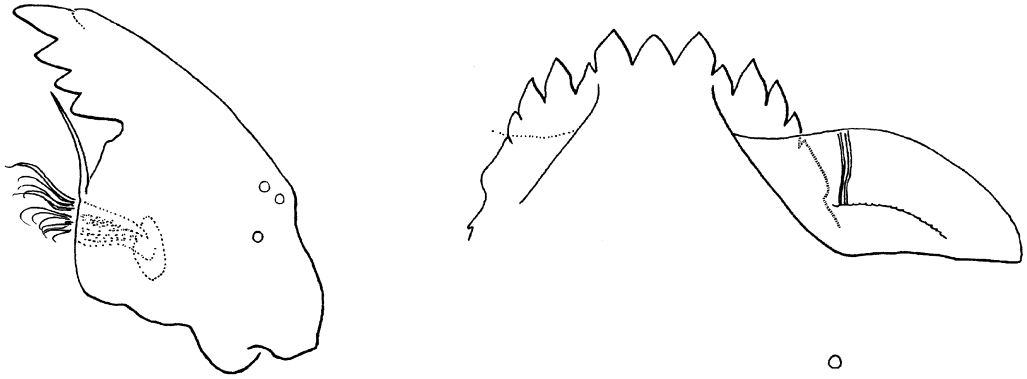




74' Width of ventromental plate greater than width of mentum; pecten epipharyngis with 10 or more pointed teeth; frontal apotome without frontal pit (posterior margin of labral sclerite 1 may have a small pit); if apotomal fenestra present it is elongate-oval ..... ***Glyptotendipes*** (in part)

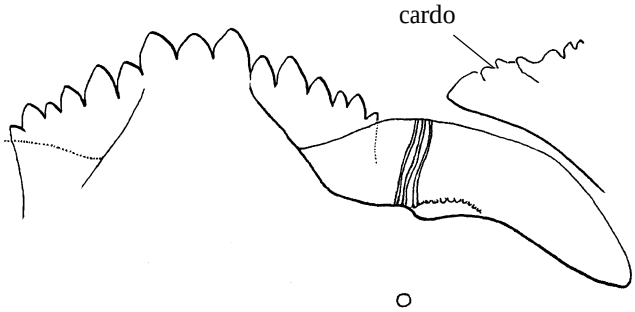



75(70') Mandible with deeply incised area at base of inner teeth; mentum strongly arched, with 11-13 teeth ..... ***Endotribelos***

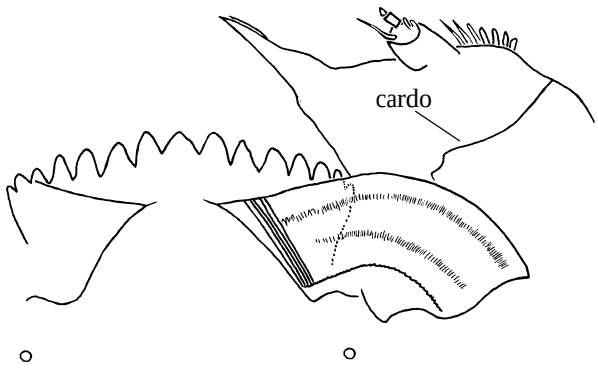


75' Mandible without incised area; mentum not strongly arched, with 15 teeth ..... 76

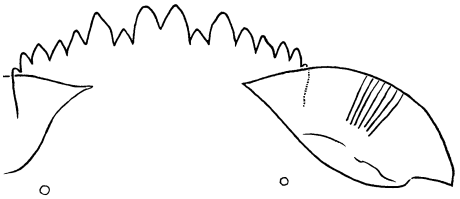
76(75') Ventromental plate thinner, more elongate; anterior margin of cardo tuberculate ..... ..... ***Endochironomus*** (in part)




76' Ventromental plate more squat; anterior margin of cardo smooth ..... ..... **Chironomini genus III**

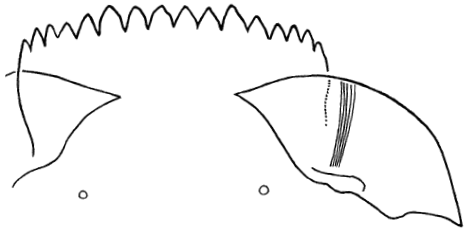


77(69') Mentum distinctive, with 1st lateral teeth much lower than median and 2nd lateral teeth ..... ..... ***Polypedilum*** (in part)



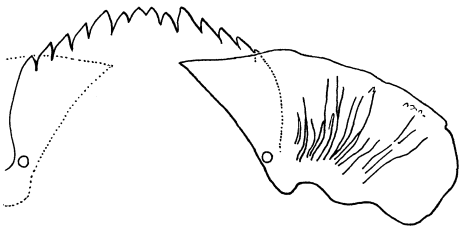
77' Mentum not as above ..... 78

78(77') Mentum with teeth mostly equal in size, gradually smaller laterally ..... ***Polypedilum*** (in part)



78' Mentum not as above ..... 79

79(78') Mentum rounded in outline; ventromental plates tear-drop shaped, with setae submenti placed on plates ..... ..... ***Polypedilum*** (in part)

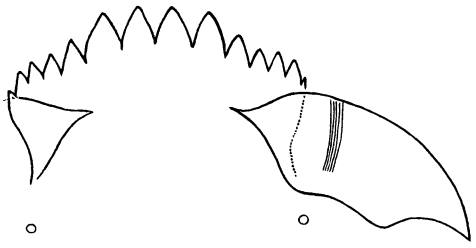


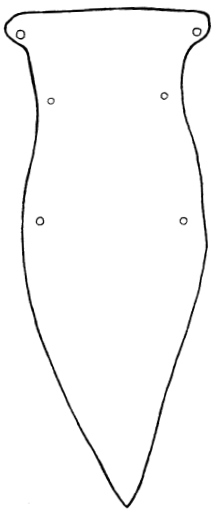
79' Mentum and ventromental plates more linear; setae submenti placed posterior to ventromental plates ..... 80

80(79') Ventromental plate with several strong crenulations on anterior margin; mentum with 14 teeth ..... **Chironomini genus IV**

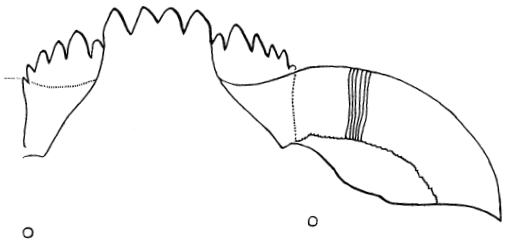
80' Ventromental plate with finely crenulated or smooth anterior margin; mentum with 14 or 16 teeth ..... 81

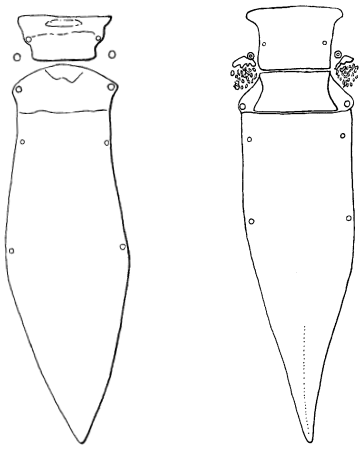
81(80') Mentum with 4 median teeth not separated by a line than runs posteriorly to the anteromedian corner of the ventromental plates; dorsum of head with a frontoclypeal apotome with a straight anterior margin; S 3 setae placed on anterolateral lobes ..... ***Polypedilum*** (in part)



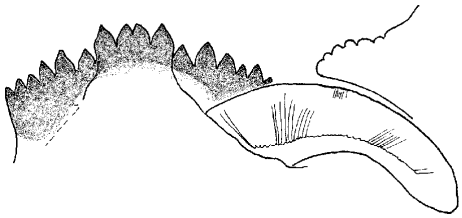


81' Mentum with 4 median teeth separated by a line than runs posteriorly to the anteromedian corner of the ventromental plates; dorsum of head with a frontal apotome with straight anterior margin or a frontoclypeal apotome with a convex anterior margin; S 3 setae not placed on anterolateral lobes ..... 82



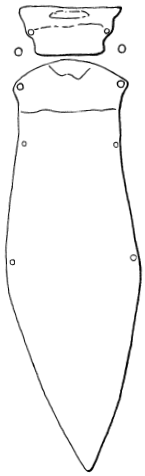


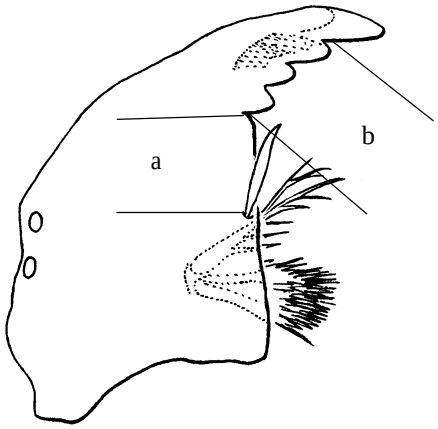
82(81') Ventromental plates 3 or more times wider than long, with posterolateral margin generally rounded; central 2 teeth of mentum may appear partially fused ..... ***Endochironomus*** (in part)

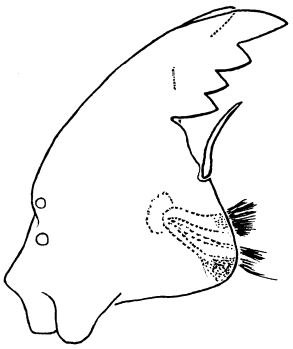


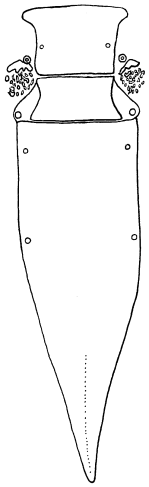
82' Ventromental plates not as long and narrow, with posterolateral margins pointed ..... 83

83(82') Anterior margin of frontoclypeal apotome convex, with 1 medial labral sclerite anterior to it; distance from basal notch of inner mandibular teeth to insertion of seta subdentalis (a) at least 3/4 distance from basal notch to apical notch (b), or mandible with deep incision proximal to basal inner tooth .. ***Phaenopsectra***







83' Anterior margin of frontal apotome straight, with 2 medial labral sclerites anterior to it; distance from basal notch of inner mandibular teeth to insertion of seta subdentalis usually less than 3/4 distance from basal notch to apical notch ..... ***Tribelos***

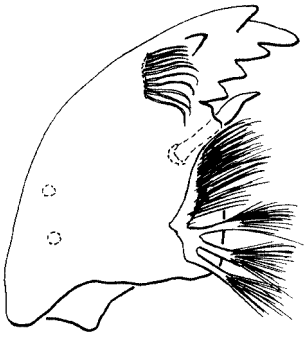
Genus ***Apedilum***

**DIAGNOSIS:** Distinguished by the frontoclypeal apotome; S I with bases fused medially; S II with short basal segment; pecten epipharyngis a single plate; 6 segmented antenna, with alternate Lauterborn organs; mentum with pale bifid median tooth, and first lateral teeth reduced and appressed to larger second lateral teeth; well developed maxillary plate striations; and mandible with dorsal teeth.

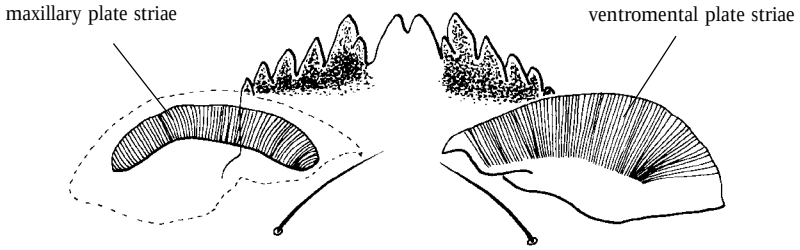
**NOTES:** Two species are described from the Nearctic; both are to be expected throughout eastern North America. Both species were formerly included in *Paralauterborniella* but were shown to be generically distinct by Epler (1988a). Larvae may be separated by maxillary plate striae counts. The maxillary plate lies dorsal to the ventromental plate; striae of the maxillary plate are particularly well developed in *Apedilum* larvae and are more noticeable than the striae of the ventromental plate. There are 90-105 striae in each plate in 4th instar *A. elachistum* larvae; 110-125 in *A. subcinctum*.

Larvae are found on submerged vegetation in ponds, canals and lakes, and the slowly moving portions of rivers; they can also be found in brackish water. Magy et al. (1970) reported *A. subcinctum* (as a *Paralauterborniella*) as a pest species due to mass emergences.

**ADDITIONAL REFERENCES:** Epler 1988a; Nolte 1995.



mandible

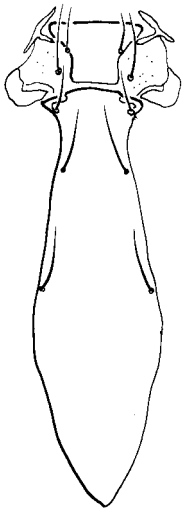



*A. elachistum* mentum

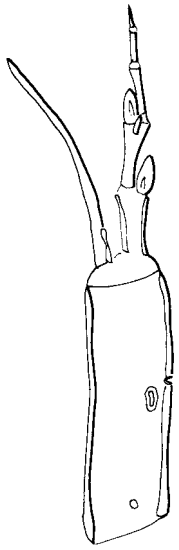
premandible

S I

pecten epipharyngis



apotome and labral sclerites



antenna

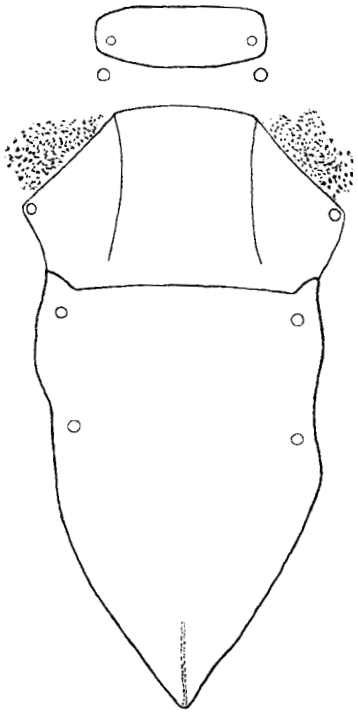
Genus ***Axarus***

**DIAGNOSIS:** Distinguished by the 2 anteromedial labral sclerites and frontal apotome; wide ventromental plates that touch medially; mandible with 4 flattened inner teeth, no dorsal tooth and an apically serrated seta subdentalis; and the premandible with brush and 6 teeth.

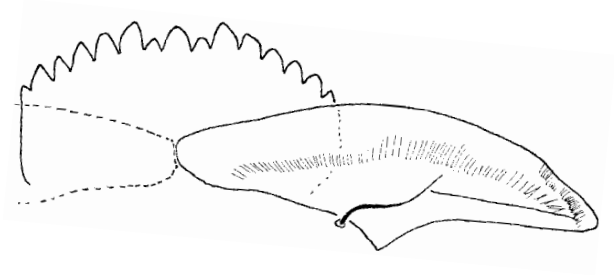
**NOTES:** *Axarus* is currently being revised by Dan Hansen (University of Minnesota). Three species of *Axarus* are recorded from the Carolinas by Caldwell et al. (1997). Although Roback (1963) offered a key for larvae (as *Xenochironomus (Anceus)*), it was based partially on unassociated specimens and relies mainly on antennal characters; in reality it is not possible to identify the larvae to species without associated reared adult males. The larva figured by Roback (1963) as "*Xenochironomus (Anceus) scopula* ? Townes" is probably a *Lipiniella*. Note that because larvae burrow through coarse sediments, the inner teeth of the mandible and the seta subdentalis are often worn; finding a larva with 4 inner teeth is an uncommon occurrence. It is more usual to find larvae with only 3 teeth (as figured below), 2 teeth or with no visible teeth. Larvae of the closely related *Lipiniella* almost always have 3 well defined, triangular inner teeth on the mandible, in addition to other characters, that make them easily separable from *Axarus*. All *Axarus* larvae I've examined have a dense brush of setae on the anterolateral margin of the maxilla, laterad of the maxillary palp.

Larvae are found in the bottom sediments of lakes and rivers. Ferrington (1992) found the larvae of *A. festivus* living in burrows in shale/clay sediments.

**ADDITIONAL REFERENCES:** Roback 1963; Ferrington 1992.

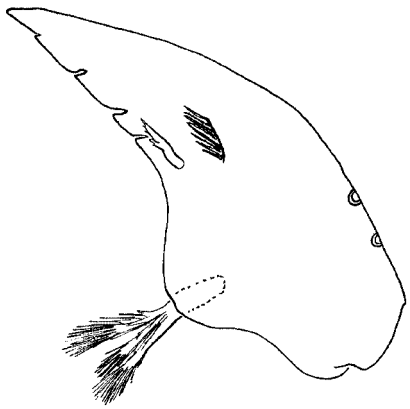


apotome and labral sclerites



mentum

premandible



mandible

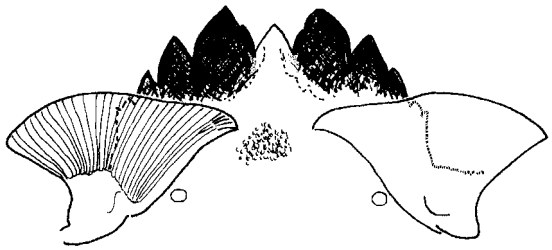
Genus ***Beardius***

**DIAGNOSIS:** Distinguished by the 5-6 (7 in described Neotropical species) segmented antennae, with alternate Lauterborn organs; mentum with pale median tooth that is lower than first lateral teeth; and mandible with 2 inner teeth and a dorsal tooth.

**NOTES:** *Beardius* has not been recorded from the Carolinas, but its presence in northern Florida indicates that it should eventually be found on the Coastal Plain. Three species are known from Florida, but apparently only *B. truncatus* Reiss & Sublette occurs in the northern portion of the state and is thus the most likely candidate to occur in the Carolinas. The antennae of *B. truncatus* are 5 segmented and its apotome has more extensive granulation; the antennae of *B. reissi* Jacobsen (*B.* sp. A in Epler 1995) have 6 segments and its apotome has less extensive granulation. The pupal *B.* sp. B of Jacobsen & Perry (2000) is *B. breviculus* Reiss & Sublette; tentatively associated larvae of this species appear to be identical to *B. truncatus*, but may be smaller (Jacobsen, pers. comm.). Thus, any *Beardius* larva from southern Florida with 5 segmented antennae may be either *B. truncatus* or *B. breviculus*; pupae or adult males are needed for accurate identification.

*Beardius* larvae occur in seasonally inundated wet prairie habitats and other intermittent wetlands, solution holes (Everglades), marshes, streams and rivers.

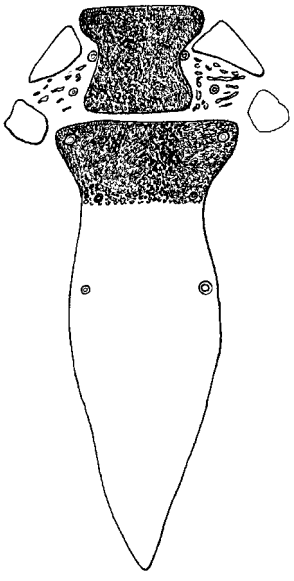
**ADDITIONAL REFERENCES:** Reiss & Sublette 1985; Jacobsen & Perry 2000.



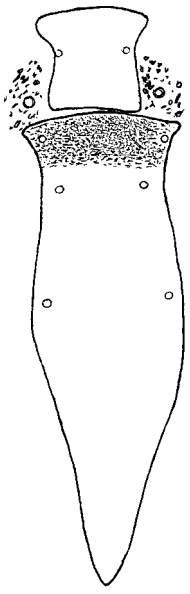
*B. truncatus* mentum

*B. truncatus* premandible

*B. truncatus* mandible



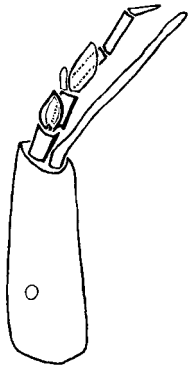
*B. truncatus*



*B. reissi*

apotome and labral sclerites

*B. truncatus*



*B. reissi*

antenna

Genus ***Beckidia***

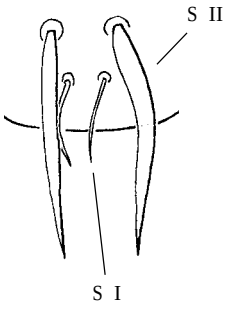
**DIAGNOSIS:** The small, thin S I and large, blade-like S II; 7 segmented antennae; mandible with 2 inner teeth and long seta subdentalis but without seta interna; and the mentum with an odd number of similarly colored brown teeth, with median tooth trifid, distinguish this genus.

**NOTES:** Although this genus has been reported from the Southeast (Hudson et al. 1990; Caldwell et al. 1997), I have not been able to examine those specimens or seen any other *Beckidia* material from this area. All putative *Beckidia* larvae I've seen from the Southeast have proven, upon my examination, to belong to other genera.

Because of weak sclerotization, the seven antennal segments are difficult to discern.

Larvae are recorded from the sandy bottoms of large rivers.

**ADDITIONAL REFERENCES:** Sæther 1977a.




labrum

antenna

apex of mandible

mentum

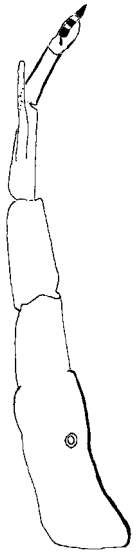
## Genus *Chernovskiia*

**DIAGNOSIS:** Distinguished by the 8 segmented, weakly sclerotized antennae, concave mentum with pale teeth; small, coarsely striated ventromental plates; mandible with single large apical tooth and thin dorsal spine (tooth or modified pecten mandibularis?); and some body segments with apparent subdivisions.

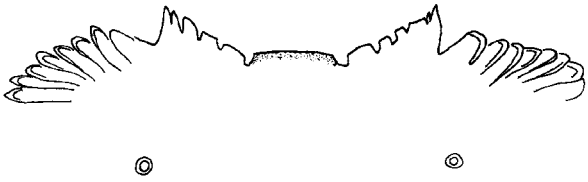
**NOTES:** Oliver et al. (1990) record two species from the North and South Carolina, but Caldwell et al. (1997) questioned the records of *Ch. amphitrite* (Townes) for the Carolinas. Sæther (1977a) listed *Ch. orbicus* for South Carolina based on an unassociated larva. Because the larva of *Ch. amphitrite* is unknown, no *Chernovskiia* larvae can realistically be identified at the species level without associated adults or pupae; unassociated larvae should be identified as "*Chernovskiia* sp.". Although Pinder & Reiss (1983) stated that the mandible lacked a seta interna, this structure is present in most larvae with clearly visible mandibles that I've examined from Florida and the Carolinas.

Larvae are found in sandy substrata in running water.

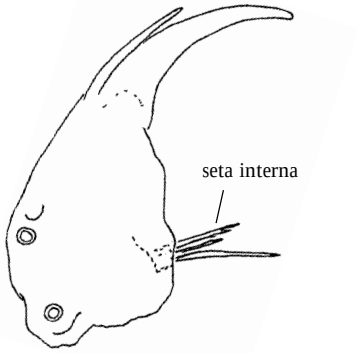
**ADDITIONAL REFERENCES:** Sæther 1977a.



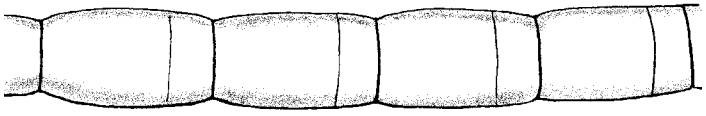
antenna



mentum




mandible



body segments

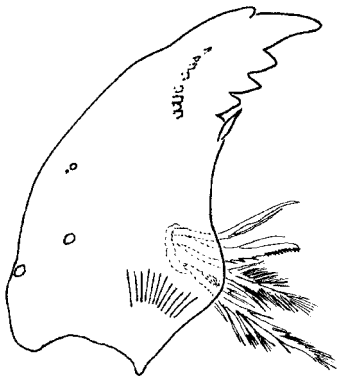
## Genus *Chironomus*

**DIAGNOSIS:** Larvae are distinguished by the presence of a frontoclypeal apotome and one medial labral sclerite; pecten epipharyngis a single multi-toothed comb; mandible with basal radially arranged grooves and simple seta subdentalis; 0-1 pairs of caudolateral tubules and 0, 1 or 2 pairs of ventral tubules.

**NOTES:** At least 8 species of *Chironomus* in three subgenera (the subgenus *Camptochironomus* is not known from the Southeast) are known from the Carolinas, but are often difficult to identify to species as larvae; it may be necessary to utilize chromosomes or biomolecular data to accurately identify taxa.

Larvae are usually found in sediments, and can occur in highly polluted conditions or in relatively clean water. Larvae subjected to environmental pollutants may display deformities, especially of the mentum, mandibles and antennae. Larvae of the *Ch. decorus* group, *Ch. riparius* and *Ch. stigmaterus* are most often associated with high nutrient/low oxygen conditions. *Chironomus* larvae are frequently grown in lab cultures; the common lab culture species previously referred to as *Ch. tentans* in the Nearctic has recently been described as a new species, *Ch. dilutus* (Shobanov et al. 1999); this taxon is not known from the Carolinas.

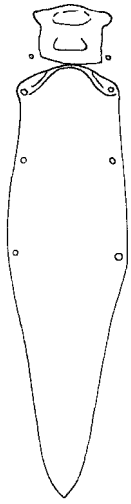
**ADDITIONAL REFERENCES:** Lenat 1993a; Lindeberg & Wiederholm 1979; Ryser et al. 1985; Sublette & Sasa 1994; Sublette & Sublette 1974a, 1974b; Shobanov et al. 1999; Townes 1945; Webb & Scholl 1985; Wülker & Butler 1983; Wülker & Morath 1989; Wülker et al. 1989; Wülker et al. 1971.



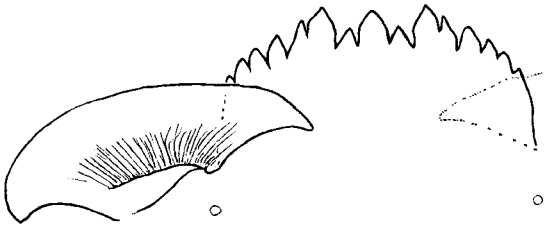
mandible

*Ch. decorus* group antenna

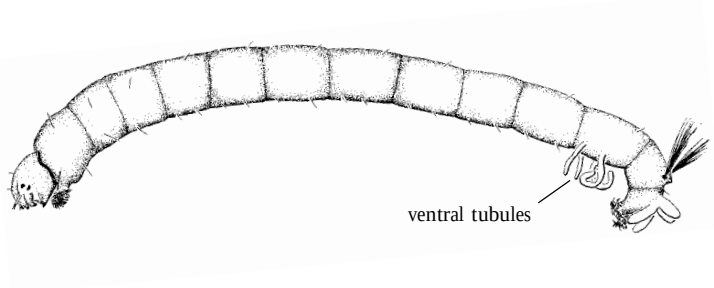
*Ch.* cf. *longipes* antenna



apotome & labral sclerite

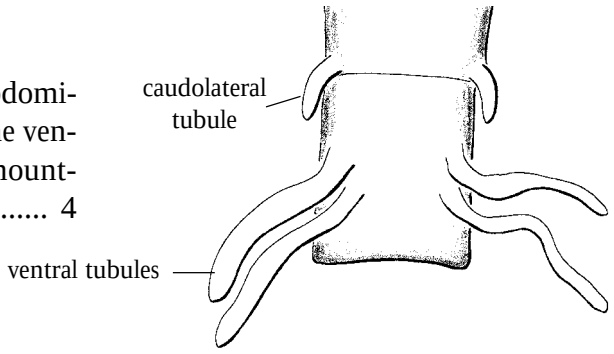


*Ch. riparius* mentum




larva

## Key to *Chironomus* larvae of the southeastern United States




1 A pair of caudolateral tubules present on the abdominal segment anterior to the segment bearing the ventral tubules (best seen on larvae *before* slide mounting) ..... 4

1' Caudolateral tubules not present; ventral tubules present or absent ..... 2

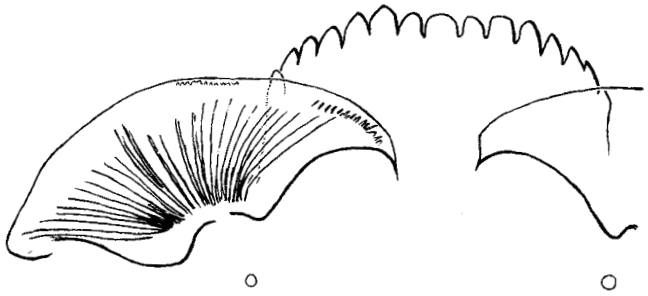
2(1') Length of antennal segment 1/segment 2 < 3.5 ..... ***Ch. ochreatus***

2' Length of antennal segment 1/segment 2 > 3.5 ..... 3

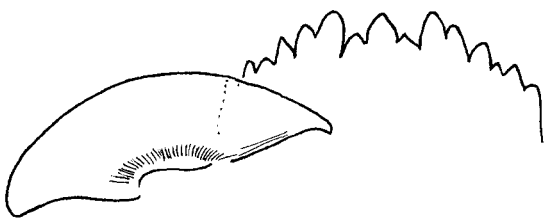
3(2') Mandible with 2 dark inner teeth; ventral tubules absent; last instar larvae huge, total length 30-55+ mm; in lakes ..... ***Ch. major***

3' Mandible with 3 dark inner teeth; 2 pairs of ventral tubules present; last instar larvae smaller, total length much less than 30 mm; in sewage treatment plants and streams downstream from them ..... ***Ch. riparius***

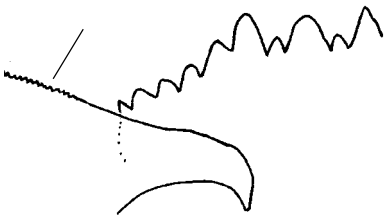
4(1) Mentum with simple median tooth and 14 lateral teeth; premandible with numerous teeth; known only from peninsular Florida ..... ..... ***Ch.* sp. "Florida"**



4' Mentum with trifid median tooth and 12 lateral teeth; premandible apically bifid with at most one additional small tooth near center; widespread ..... 5



5(4') Anteromedial margin of ventromental plate with fine teeth ..... 6

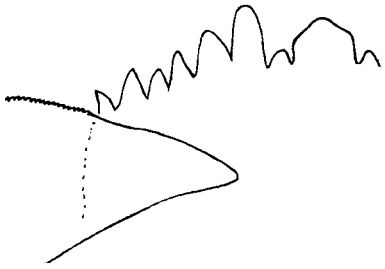


5' Anteromedian margin of ventromental plate smooth (minute teeth may be present beneath plate, but margin is smooth; or outer (lateral) margin of plate may be faintly crenulate) ..... 8

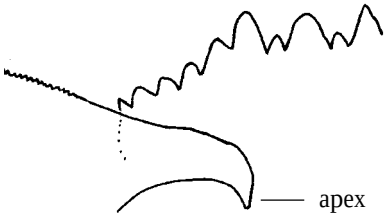
6(5) Mandible with 3 dark inner teeth ..... ***Ch. plumosus***

6' Mandible with 2 dark inner teeth (if 3rd inner tooth present, it is light in color) ..... 7

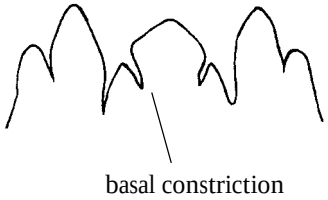
7(6') Inner apex of ventromental plate directed medially ..... ***Ch. staegeri***



7' Inner apex of ventromental plate directed caudad .. ..... ***Ch. crassicaudatus***



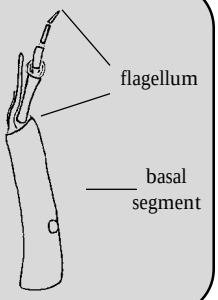

8(5') Head usually with central dark dorsal stripe (often not present on 2nd and 3rd instars); central tooth of mentum usually basally constricted ..... ..... ***Ch. stigmaterus***



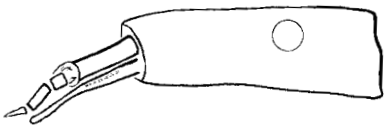

8' Head without central dark dorsal stripe; median tooth of mentum straight at base or slightly constricted ..... 9

9(8') Pecten epipharyngis with several thinner teeth interspersed among normal teeth; antenna appearing somewhat elongate, AR ≤ 1.5 ..... ..... ***Ch. (Lobochironomus)*** ..... 10

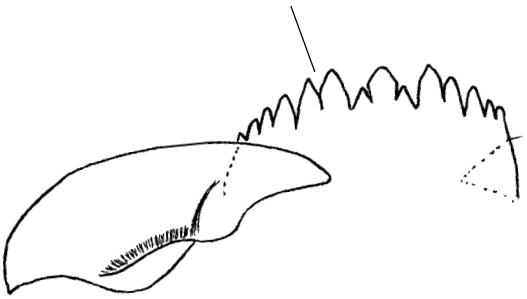
AR = antennal ratio. Calculated by dividing the length of the basal segment by the length of the flagellum (the remaining antennal segments.)



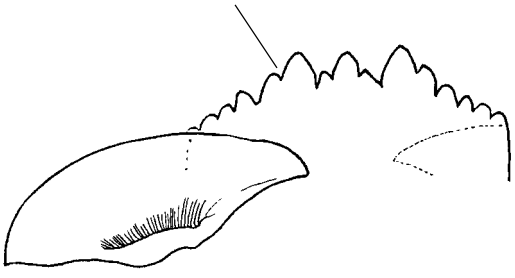

9' Pecten epipharyngis with central teeth approximately equal, gradually becoming smaller laterally; antennae usually not appearing elongate, AR > 1.5 ..... 11



10(9) Mentum with 1st and 2nd lateral teeth mostly separate ..... ***Ch.* cf. *longipes***
(see Notes!)



10' Mentum with 1st and 2nd lateral teeth mostly fused ..... ***Ch. austini***
(see Notes!)



11(9') Mandible with one light and 2 dark inner teeth; AR 1.6-2.0 ..... ***Ch. decorus* group**

11' Mandible with 2-3 inner teeth which are variably colored; AR variable ..... ***Chironomus* sp.**
(may include other specimens of *Ch. decorus* group as well as other species of *Chironomus*)

## Notes on species

*Ch. (Lobochironomus) austini* - This species was described from Florida as an *Einfeldia*, but I am now moving it to *Chironomus (Lobochironomus)* based on adult and larval characters. This species is very similar to *Ch*. cf. *longipes*. I have examined a single larva of *Ch. austini* from North Carolina, where it was collected from an acidic (pH 3.8-4.3) stream in Juniper Swamp, Onslow Co.; this is the only specimen I've seen of this taxon other than the type series from Florida. Adults of *Ch. austini* are brown; those of *Ch*. cf. *longipes* pale green. The pupa of *Ch. austini* is darker, the abdominal tergites marked with a pair of brown longitudinal lateral stripes not found on the pupa of *Ch*. cf. *longipes*. Larvae of the two taxa are very similar. The mentum tooth character used for separation from *Ch.* cf. *longipes* may not work on additional material; your most accurate identification of unassociated larvae may be simply "*Chironomus (Lobochironomus)* sp.". More work is needed to determine the apparent differences between these two taxa.

*Ch. (Ch.) crassicaudatus* - A large species of lakes and ponds, closely related to *Ch. staegeri*. In addition to the ventromental plate character used in the key, the pecten epipharyngis of *Ch. crassicaudatus* has numerous smaller teeth among the large teeth; in *Ch. staegeri* the teeth are more similarly sized. Considered a nuisance species due to large emergences by Beck & Beck (1969a).

*Ch. (Ch.) decorus* group - Probably the most widespread and common member of the genus in the eastern United States. Several species may be included in the group, apparently separable only by chromosomes or biomolecular means; specimens may key out to either part of couplet 11 in the key above. Often found in lotic situations as well as lentic habitats and usually indicative of low water quality. In older literature, this taxon was referred to as *Chironomus* (or *Tendipes*) *attenuatus*.

*Ch. (L.)* cf. *longipes* - The identity of this taxon remains unclear; it probably is *Ch. longipes* but more work is needed. This taxon has been called *Einfeldia dorsalis* but the application of that name to this taxon is incorrect; the true *dorsalis* Meigen is a different species, an *Einfeldia*. A Holarctic species, *Ch. longipes* has been recorded from the Carolinas by Caldwell et al. (1997) as well as from Ontario by Oliver et al. (1990), and I have examined reared material from Florida and Georgia. The pupae of this species and *Ch. austini* do not appear to have the median gap in the hooklet row of tergite II as described for pupae of other *Lobochironomus*. See also *Ch. austini* above.

*Ch. (Ch.) major* - Originally described only as a larva from Georgia. I have seen larvae from lakes in Georgia, Kentucky and Tennessee. Adults and pupae are similar to *Ch. plumosus*. A member of the *salinarius* group, it lacks caudolateral and ventral tubules. It is the largest chironomid larva in the Southeast (perhaps all of North America), reaching lengths of 55 mm or more (although lengths of about 30 mm may be more the norm). Note that the name *Chironomus major* is a junior homonym and will have to be replaced by an available name.

*Ch. (Chaetolabis) ochreatus* - The only member of the subgenus *Chaetolabis* known from the Southeast. I've examined specimens reared from a roadside pond in Georgia. Epler (1995) noted that some specimens in collections identified as *Chaetolabis* were *Dicrotendipes simpsoni*.

*Ch. (Ch.) plumosus* - A large species of lakes, apparently not common.

*Ch. (Ch.) riparius* - A species usually found in lotic, organically polluted conditions, such as streams below sewage treatment plants.

*Ch. (Ch.) staegeri* - This close relative of *Ch. crassicaudatus* is recorded from several localities throughout the Southeast but is apparently never common. See also *Ch. crassicaudatus* above.

*Ch. (Ch.) stigmaterus* - Usually easily recognized by the dark dorsal stripe on the head capsule and the basally constricted center tooth of the trifid median tooth; early instars may not have the dorsal stripe. It is tolerant of poor water conditions; I have reared it from sulfurous springs and small pools of water with mucky bottoms in Florida.

*Ch. (Ch.) tuxis* - Listed for Florida and South Carolina by Caldwell et al. (1997); I have not seen material of this taxon from the Southeast; the immature stages are undescribed.

*Ch.(Ch.)* sp. "Florida" - Known only from peninsular Florida, where the larvae inhabit the burrows made in *Nuphar* by the aquatic moth *Bellura* (Pyralidae)(Bob Rutter, pers. comm.); I've examined specimens from two localities. The species is unusual in that the median tooth is not trifid; it appears that the lateral teeth which are normally reduced and appressed to the median tooth to form the characteristic trifid median tooth of most *Chironomus* larvae have been separated and appear as normal lateral teeth. Note also the numerous smaller teeth on the premandible; a *Chironomus* larva (pupal and adult stages unknown) with a similar premandible has been described the Amazon (Reiss 1974b).

At least three additional *Chironomus* species are known from the Southeast. *Chironomus calligraphus* Goeldi is known from Florida (Spies & Reiss 1996), along with two additional undescribed species, based on chromosomal analysis (Wülker & Morath 1989). Although not recorded from the Southeast, *Ch. anonymus* Williston might occur in Florida; it and *Ch. calligraphus* are very similar to *Ch. decorus*.

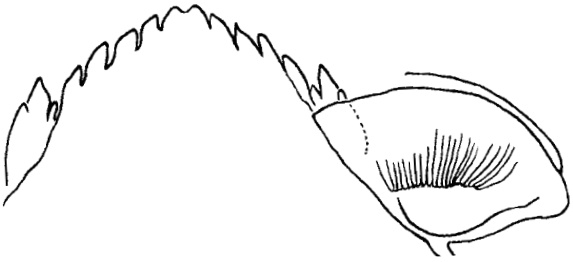
## Genus *Cladopelma*

**DIAGNOSIS:** Distinguished by the mentum with the outer teeth enlarged and with the median tooth simple, or more usually notched or bifid, and not projecting strongly forward from the remainder of the mentum; pecten epipharyngis a simple plate; premandible with brush; mandible without pecten mandibularis; and antennae with basal segment length about 2.8X to > 4X its width.

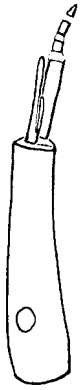
**NOTES:** All seven species described from the Nearctic have been collected in the Carolinas. Adults of *C. spectabile* have been collected recently in South Carolina at the Savannah River Plant site; note that this species may be a junior synonym of the Palaearctic *C. lateralis* (Goetghebuer). The descriptions of Beck & Beck (1969b) are inadequate to identify the larvae. I have examined rearings of four species and could not find characters to separate them. Note that *C. boydi* (Beck) is now considered a junior synonym of *C. forcipis* (Rempel). Also see *Parachironomus alatus*, a species whose larva closely resembles a *Cladopelma*.

Larvae are usually found on or in bottom sediments in lakes and rivers; some species are tolerant of low oxygen conditions.

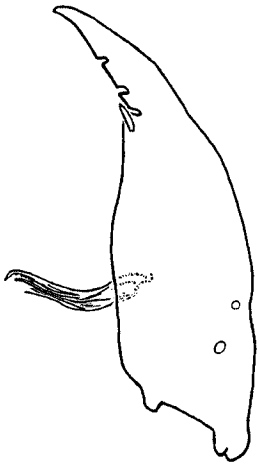
**ADDITIONAL REFERENCES:** Beck & Beck 1969b; Sæther 1977a; Townes 1945.



mentum



antenna



mandible

## Genus *Cladotanytarsus*

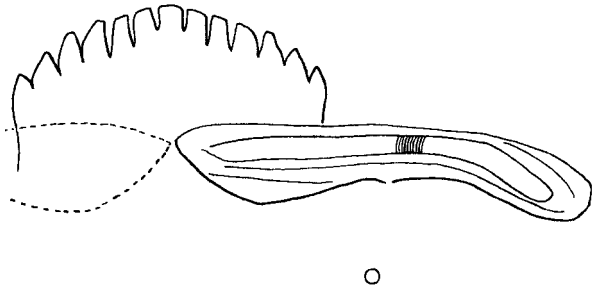
**DIAGNOSIS:** Distinguished by the pecten epipharyngis of 3 apically serrated scales; premandible with more than 3 apical teeth; ventromental plates touching or almost touching medially; antennae usually with 2nd segment short, wedge-shaped, with large Lauterborn organs on short pedicels (but at least one species with long pedicels); and some claws of posterior parapods with inner teeth.

**NOTES:** Based on the larval taxa I've examined, at least eleven species occur in the Southeast. Bilyj & Davies (1989) described seven new species from Canada, but included only adults and pupae. They found pupae to provide the best characters for species separation and provided identification keys for the pupae of 20 Holarctic species.

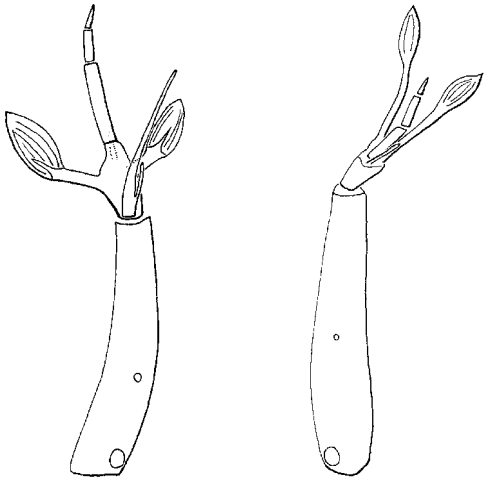
Because of the similarity of male genitalia among *Cladotanytarsus* species (see Bilyj & Davies 1989), all records of the supposedly widespread *C. viridiventris* must be treated with skepticism. The genus is currently being revised by Dr. J.E. Sublette.

Larvae are found in many types of water bodies, including brackish water and hot springs. Bilyj & Davies (1989) found that some species were intolerant to acidification, but noted that *C. aeiparthenus* was apparently acidophilic.

**ADDITIONAL REFERENCES:** Bilyj & Davies 1989.

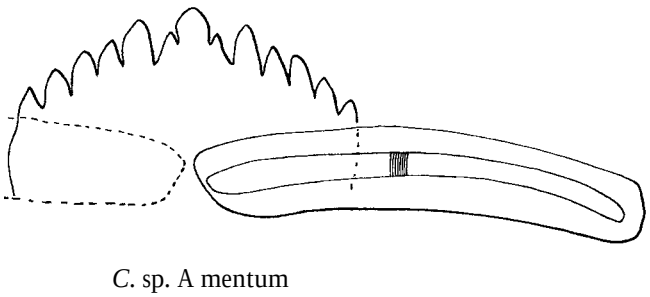


*C.* cf. *daviesi* mentum

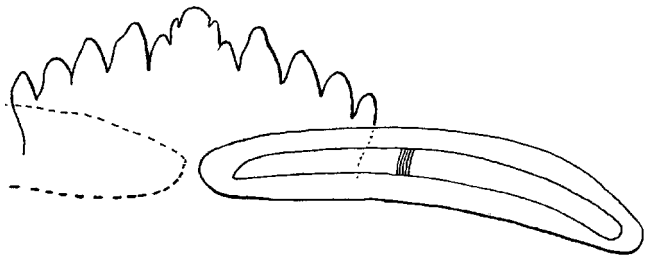


*C.* sp. A antenna

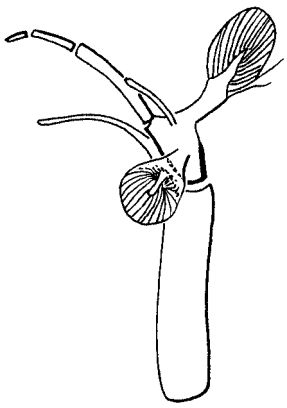
*C.* sp. C antenna



*C.* sp. A mentum



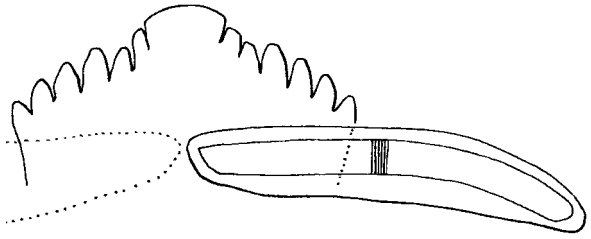
*C.* sp. F mentum



*C.* sp. G antenna

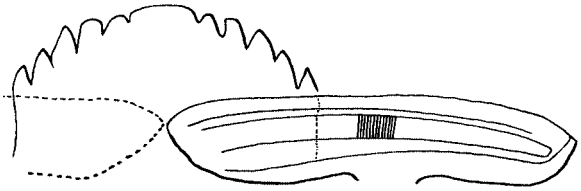
## Key to *Cladotanytarsus* larvae of the southeastern United States

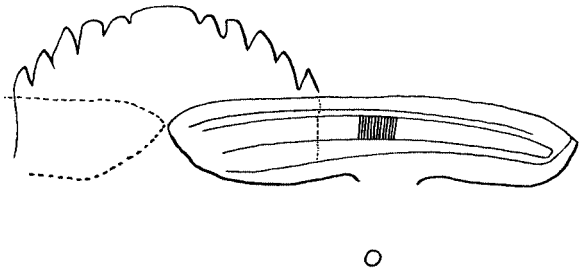
1 Mentum with large, domed median tooth that extends anteriorly far past lateral teeth ... ..... ***C.* sp. I**

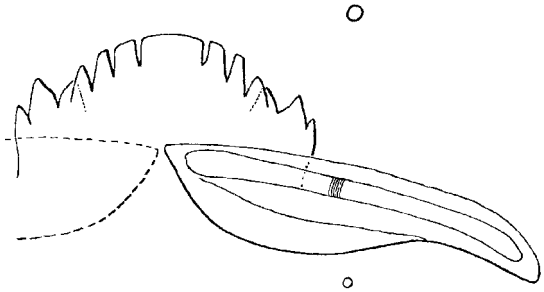


1' Median tooth of mentum not dome-like (see figures below) ..... 2

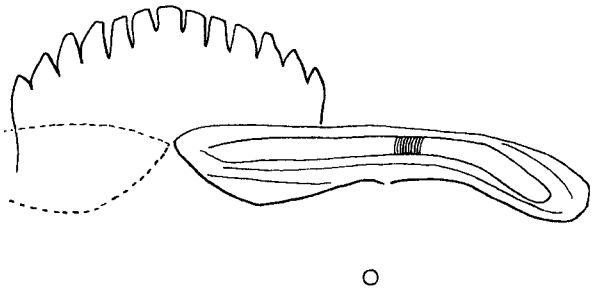
2(1') Mentum with broad median tooth ..... 3

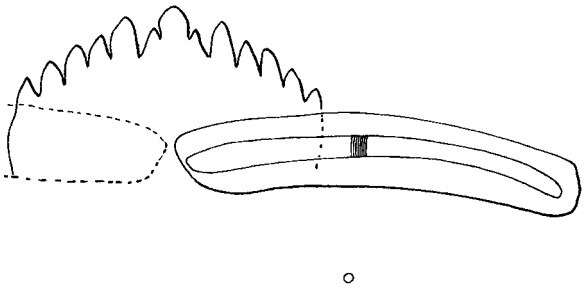




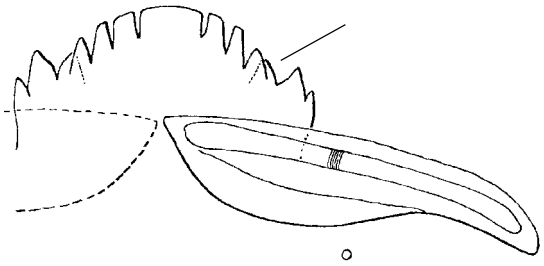


2' Mentum with 3 subequal central teeth or trifid median tooth ..... 5

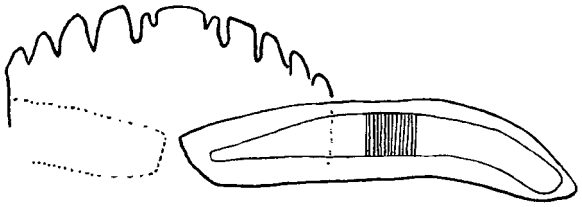




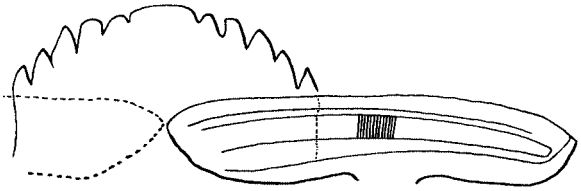
3(2) Mentum with 4th-6th lateral teeth displaced dorsally ..... ***C.* sp. D**



3’ Mentum without displaced lateral teeth ..... 4



*C. aeiparthenus*



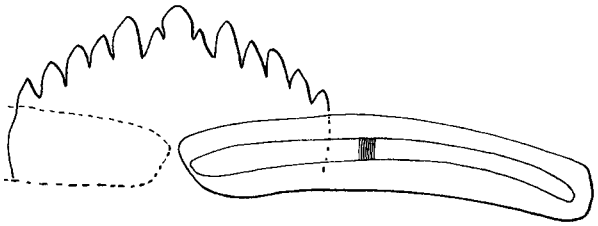
*C.* sp. G

4(3’) Mentum width about 75 µm; postmentum length about 130 µm ..... ***C. aeiparthenus***

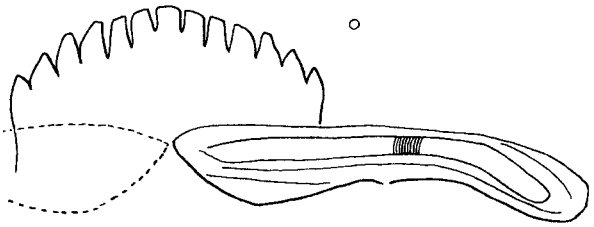
4’ Mentum width about 45 µm; postmentum length about 85 µm ..... ***C.* sp. G**

**NOTE**: 4th instar larvae are necessary for accurate measurements!!

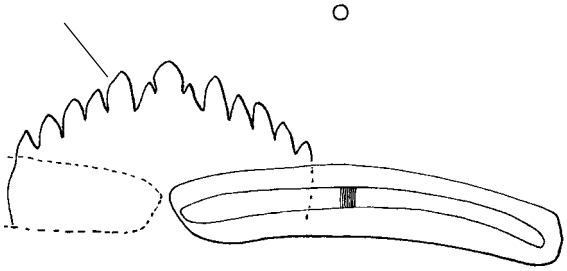
5(2’) Mentum with trifid median tooth ..... 6



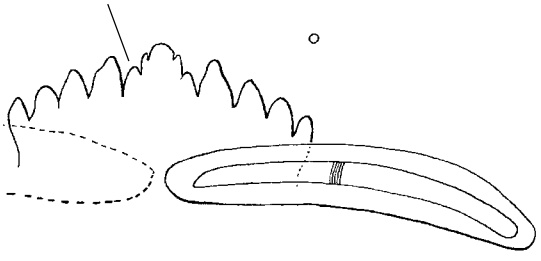
5’ Mentum with 3 teeth at center subequal ..... 9



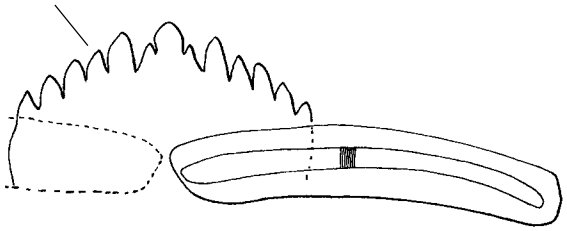
6(5) Mentum with large 1st lateral tooth ..... 7



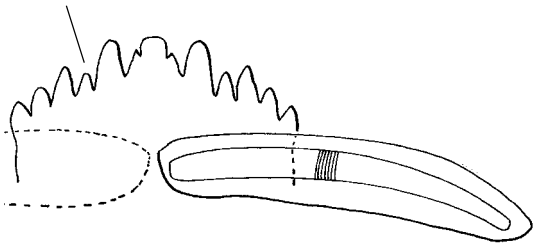
6’ Mentum with reduced 1st lateral tooth ..... 8



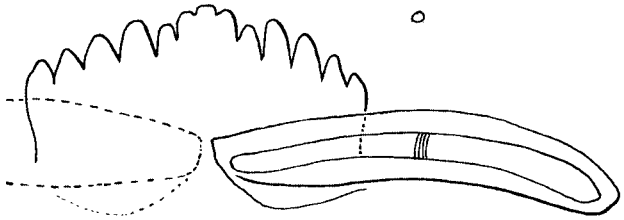
7(6) Mentum with 2nd lateral tooth subequal to 3rd ..... ***C.* sp. A**



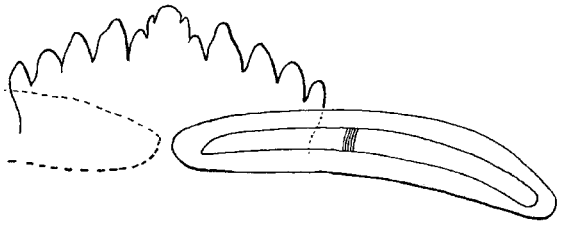
7' Mentum with 2nd lateral tooth reduced ..... ***C.* sp. B**



8(6') Apical tooth of mandible rounded ..... ***C.* sp. E**

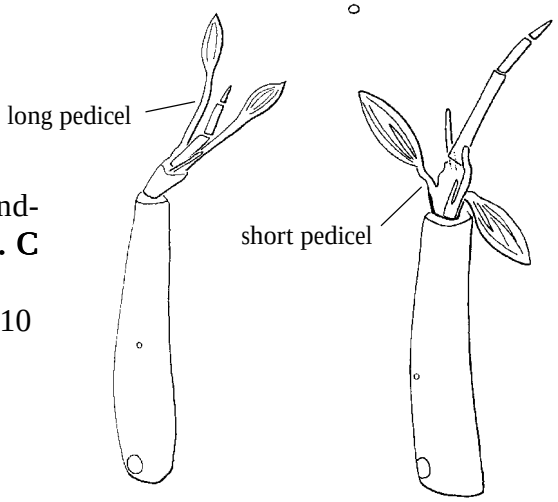


8' Apical tooth of mandible pointed ..... ***C.* sp. F**

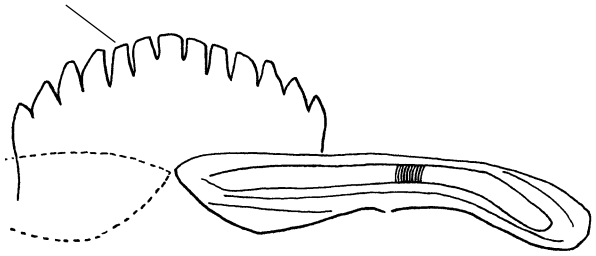


9(5') Lauterborn organs on long pedicels, organs extending beyond last antennal segment ..... ***C.* sp. C**

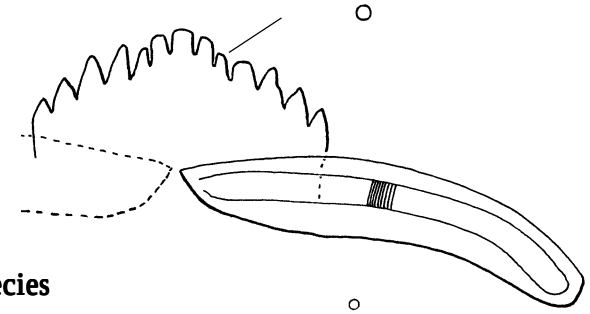
9' Lauterborn organs on short pedicels ..... 10



10(9') Mentum with 2nd lateral tooth subequal to 1st ..... ***C.* cf. *daviesi***



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



## Notes on species

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

*C. aeiparthenus* - I have reared this species, originally described from Ontario, Canada, from peninsular Florida. It is apparently parthenogenetic; only females and female pupae are known.

*C.* cf. *daviesi* - I have reared larvae from Florida which appear to be *C. daviesi*, but some pupae differ in having a higher number of taeniate setae on the anal lobes (20-21, instead of the 16-19 noted in the original description). Dr. Sublette (pers. comm.) considers this taxon to be an undescribed species. I've seen material from Florida (reared), North Carolina and South Carolina. The apical tooth of the mandible is broadly rounded.

*C.* sp. A - Usually a lentic species, usually with a darkened postmentum. I've seen material from Florida, North Carolina and South Carolina. The apical tooth of the mandible is pointed.

*C.* sp. B - The trifid median tooth and reduced second lateral tooth are distinctive for this species. I've examined reared material from a small pond in North Carolina and a river discharge into a lake in South Carolina. Also known from Alabama and Florida. The apical tooth of the mandible is pointed.

*C.* sp. C - This species is unusual in that the Lauterborn organs are placed on long pedicels; otherwise it appears to be a typical *Cladotanytarsus*. I've seen material only from Alabama streams. The apical tooth of the mandible is broadly rounded.

*C.* sp. D - The displaced 4th, 5th and 6th lateral teeth of the mentum are distinctive, but may represent a deformity, although I've seen material from three sites in North Carolina and the taxon is also known from Florida. The apical tooth of the mandible is broadly rounded.

*C.* sp. E - I've examined material of this taxon from North and South Carolina.

*C.* sp. F - I've seen material from Kentucky and North Carolina; also known from Florida.

*C.* sp. G - This taxon is known from a single larval-pupal association from a stream in northern Florida. Although the larva strongly resembles that of *C. aeiparthenus*, and apparently differs from it only in size, the pupa is entirely different from *C. aeiparthenus* and definitely represents another species.

*C.* sp. H - Very similar to *C.* cf. *daviesi*, but with a smaller, thinner second lateral tooth on the mentum; it may represent a variant of that species. I've seen material from North and South Carolina.

*C.* sp. I - The distinctive domed median tooth of the mentum will identify this taxon, known from Florida and North Carolina. The apical tooth of the mandible is rounded.

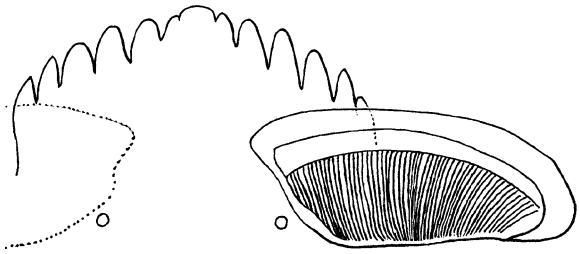
## Genus *Constempellina*

**DIAGNOSIS:** Distinguished by the simple or plumose frontoclypeal setae; coarsely granulate frontoclypeal apotome, without tubercles; antennal base with simple spur; Lauterborn organs on pedicels arising from apex of antennal segment 2; widely separated, squat ventromental plates; procerci without spurs; and portable sand case.

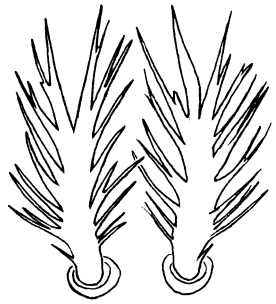
**NOTES:** Only one Nearctic species, *C. brevicosta*, is listed for the genus by Oliver et al. (1990). *Stempellina ranota* Webb, described from Ontario (Webb 1969), is a junior synonym of *C. brevicosta* (Sublette, pers. comm.). The taxonomy of *Constempellina*, *Neostempellina* and *Stempellina* in North America remains confused. Based on larval characters, two larval taxa from the eastern US can be tentatively placed in *Constempellina*; *C.* sp. A is known from North Carolina. It is characterized by thick, plumose frontoclypeal setae. *Constempellina* sp. B, known to me only from reared material from Ohio and a single larva from Alabama, has thinner plumose frontoclypeal setae, similar to those illustrated for *C.* sp. 2 in Oliver et al. (1978: fig. 97). However, the pupa of *C.* sp. B does not fit any described Holarctic genus (it appears closest to *Neostempellina* or *Zavrelia*) and the adult appears to be closest to *Stempellinella*! A revision of Holarctic *Constempellina*, *Neostempellina* and *Stempellina*, utilizing all life stages, is necessary to solve the problems of the taxonomy of this group. Larvae identified as *Constempellina* from Florida by Epler (1995) belong with *Stempellina* sp. C; the mesal palmate processes on the antennal bases were obscured by detritus. See *Stempellina* for information on this enigmatic taxon.

Larvae are stream dwellers; they construct portable sand cases similar to those of *Stempellina*.

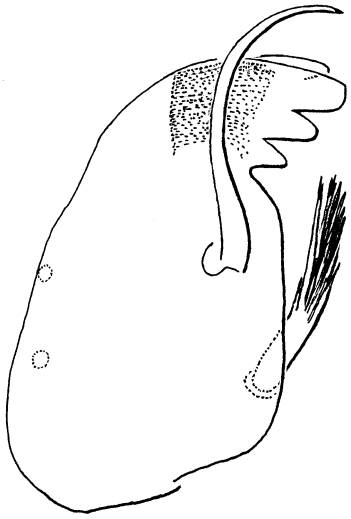
**ADDITIONAL REFERENCES:** Brundin 1948; Ferrington 1995; Webb 1969.



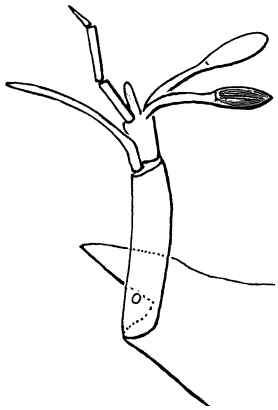
*C.* sp. A mentum



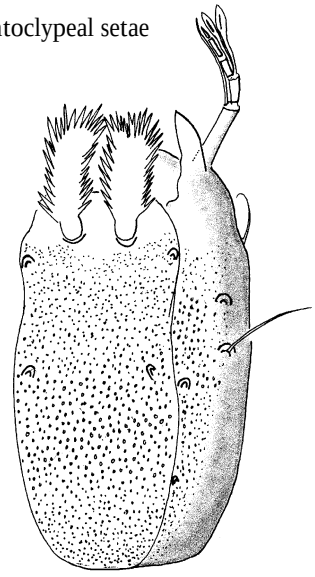
*C.* sp. B frontoclypeal setae



*C.* sp. A mandible



*C.* sp. A antenna



*C.* sp. A partial head capsule, dorsal

## Genus *Cryptochironomus*

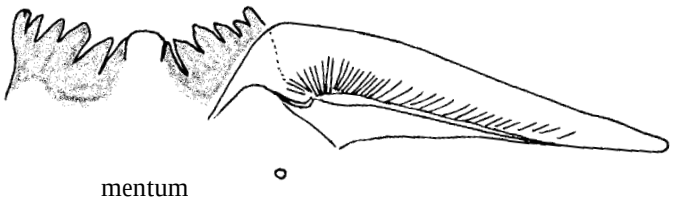
**DIAGNOSIS:** Distinguished by the 5 segmented antennae; well developed S I; trifid pecten epipharyngis; premandible with weak to moderate brush and several apical teeth; mandible without pecten mandibularis; mentum with clear rounded median tooth flanked by dark, pointed lateral teeth that are angled inward; and wide, laterally tapered ventromental plates.

**NOTES:** The genus is badly in need of a revision utilizing all life stages. It is not possible to identify *Cryptochironomus* larvae to species without an associated pupa or adult male; thus any records based solely on larvae must be regarded with skepticism. Curry (1958) offered a key to larvae, but some of his material was misidentified and more species are present than were keyed; Roback's (1957) key to larvae is also not reliable. Caldwell et al. (1997) list 11 described species for the Southeast, six of which are recorded for the Carolinas. With the exception of identifications based upon pupae, many of those records should be discounted. Identifications of "*C. fulvus*" mean little; Mason (1985b) found four species, based mainly on pupal characters, within the *C. fulvus* complex (or group) of species. Larvae of several species (*blarina, eminentia, ponderosus*) have a very long apical tooth on the mandible. Larvae from the Carolinas I've examined identified as *C. blarina* are most likely *C. ponderosus*, but pupae are required for verification; it is easy to mistake scales of the hypopharynx for the small "teeth" supposedly located on the median tooth of the mentum as described by Curry (1958).

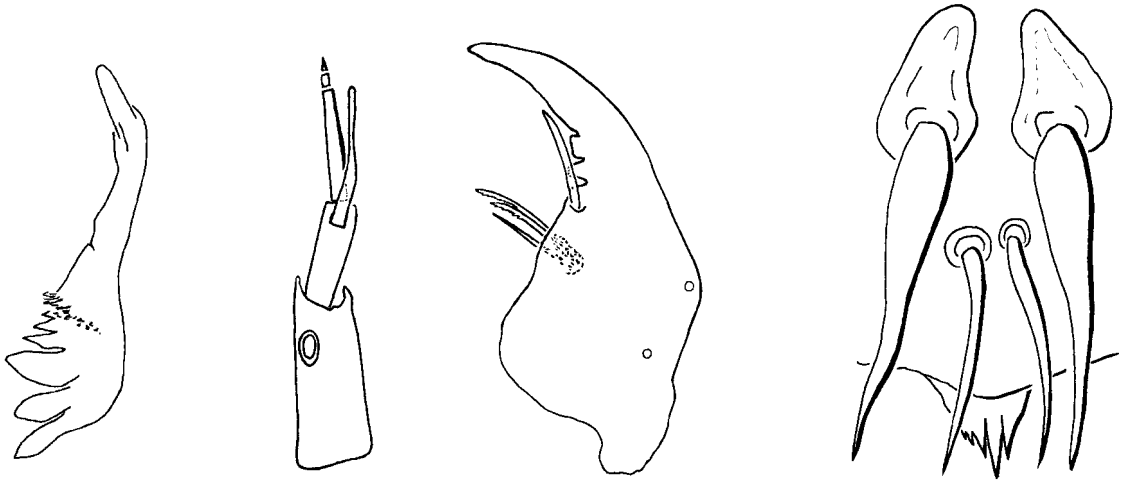
Two other taxa referred to as "*Cryptochironomus*" by Caldwell et al. (1997) do not belong there: "*Cryptochironomus*" Pagast is *Kloosia* and "*C*. nr. *macropodus* Lyakhov" is *Harnischia* complex genus C. See also *Harnischia* complex genus D.

*Cryptochironomus* larvae are mostly benthic and seem to prefer sandy substrata.

**ADDITIONAL REFERENCES:** Curry 1958; Mason 1985b; Sublette 1964; Townes 1945.



mentum



premandible antenna mandible labrum

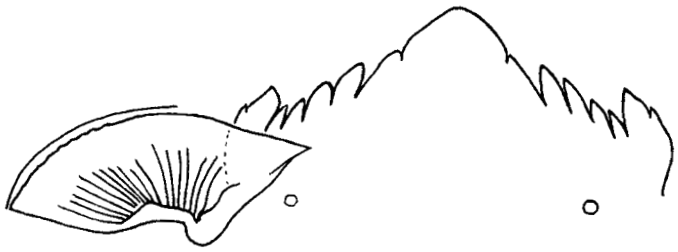
## Genus *Cryptotendipes*

**DIAGNOSIS:** Distinguished by the distinctive mentum, with outer lateral teeth enlarged and with median tooth simple or notched laterally and projecting strongly forward from remainder of mentum; pecten epipharyngis a plate with 3 shallow rounded lobes; premandible with brush; mandible without pecten mandibularis; and antenna with length of basal segment about 2-2.5X its width.

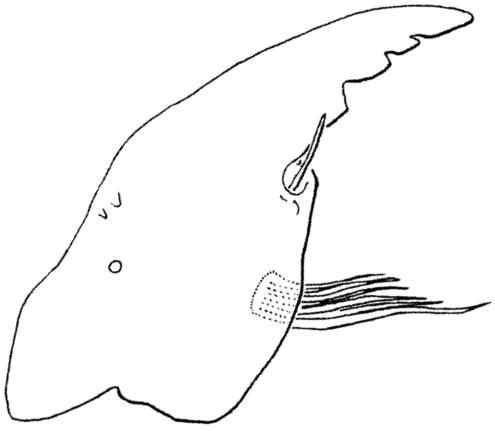
**NOTES:** Three species are recorded for the Southeast and from the Carolinas. In addition, I have reared an undescribed species from Lake Okeechobee, Florida, in which the male resembles *C. emorsus* but the pupa is radically different, bearing huge setae on the abdominal tergites and sternites. Confusion exists over separating *C. casuarius* from *C. emorsus* in the adult stage; the material described as *C. casuarius* by Beck & Beck (1969b) appears to be *C. emorsus*. Sæther (1977) offered a key to known Holarctic adults but his Fig. 34B of the genitalia of *C. emorsus* appears to be inaccurate or the specimen illustrated is misidentified. *Cryptotendipes* larvae are not identifiable at the species level.

*Cryptotendipes* larvae are found in lentic and lotic situations; they are usually benthic and appear to tolerate organically enriched habitats.

**ADDITIONAL REFERENCES:** Sæther 1977a; Townes 1945.



mentum



mandible

antenna

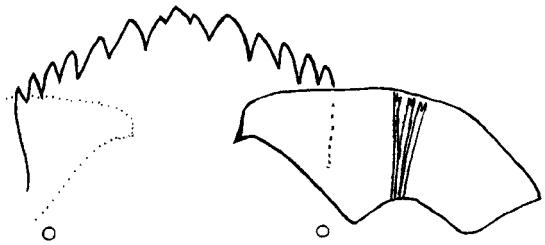
## Genus *Demeijerea*

**DIAGNOSIS:** Distinguished by the frontoclypeal apotome with apotomal fenestra; pecten epipharyngis a single plate with multiple teeth; bifid premandible; mandible with 2 inner teeth, without basal striae; and a single pair of ventral tubules.

**NOTES:** Of the four species placed in the genus in the Nearctic, three species are recorded for the Southeast and from the Carolinas. Heyn (1992) noted that of the four species placed in the genus by Townes (1945) (as a subgenus of *Glyptotendipes*), only two, *D. brachialis* and *D. atrimana* are true *Demeijerea*; the other two species, *D. abrupta* (Townes) and *D. obrepta* (Townes), do not appear to belong to *Demeijerea* or *Glyptotendipes*.

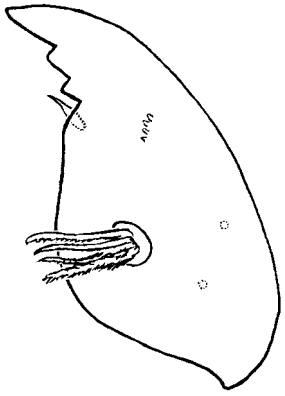
Larvae are not often encountered because they mine in freshwater sponges, bryozoans and plants such as Bur-reed, *Sparganium americanum* (Nuttall), habitats not usually collected by benthologists. Note that mouthparts may be quite worn due to mining activities. At present it is not possible to identify larvae to species.

**ADDITIONAL REFERENCES:** Heyn 1992; Townes 1945.

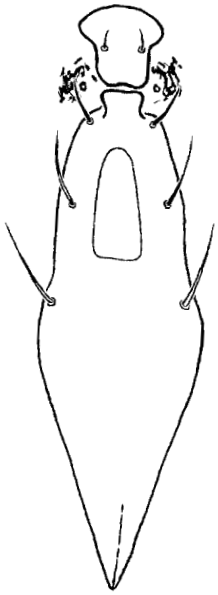


mentum

pecten epipharyngis



mandible



frontoclypeal apotome

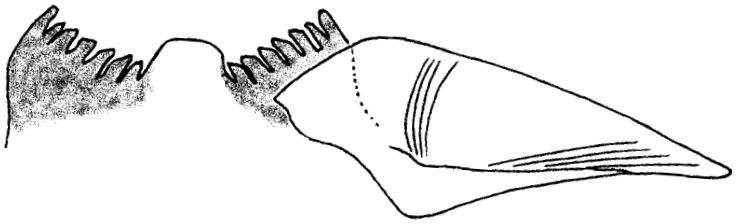
## Genus *Demicryptochironomus*

**DIAGNOSIS:** Distinguished by the small, thin S I; 7 segmented antennae; premandible without a brush; mentum with mostly clear, apically round median tooth flanked by 7 pairs of usually dark, pointed lateral teeth that are angled inward; wide, laterally tapered ventromental plates; and mandible with pecten mandibularis.

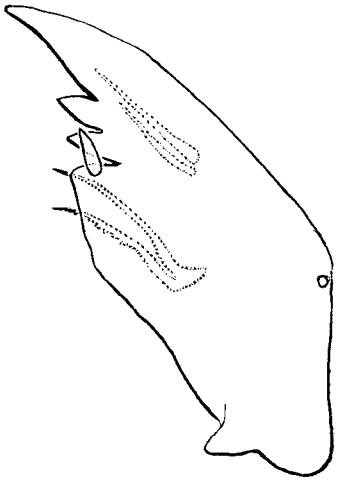
**NOTES:** Two described species are known from North America; *D. cuneatus* is recorded from the Carolinas. I have examined what appear to be four larval types from the eastern US; they are keyed below.

Larvae are recorded as predators on oligochaetes; most guts I've examined were filled with sandy detritus. Larvae occur in sandy substrata in lakes, rivers and streams.

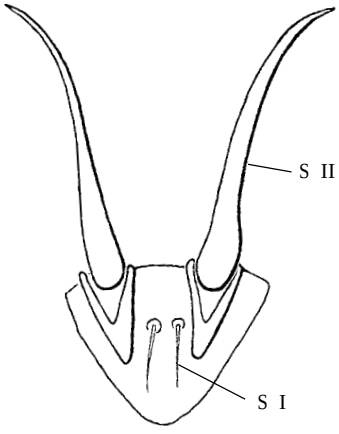
**ADDITIONAL REFERENCES:** Reiss 1988a; Sæther 1977a; Townes 1945.



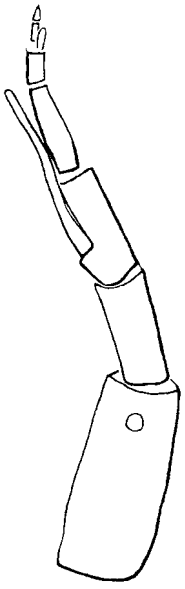
*D. cuneatus* mentum



*D. cuneatus* mandible




*D.* sp. A labrum

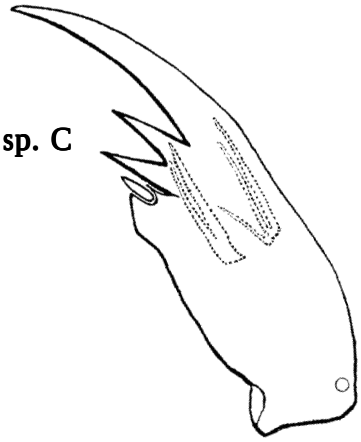


*D.* sp. A antenna

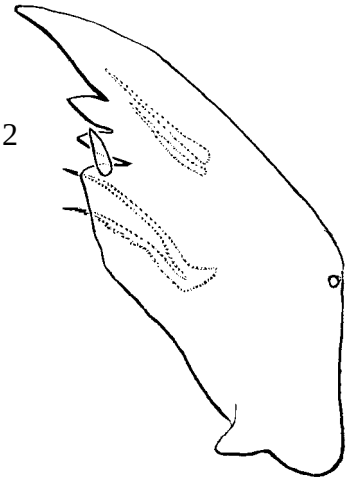
*D. cuneatus* antenna

## Key to *Demicryptochironomus* larvae of the southeastern United States

1 Mandible with apical tooth and inner teeth long and thin ..... ***D.* sp. C**

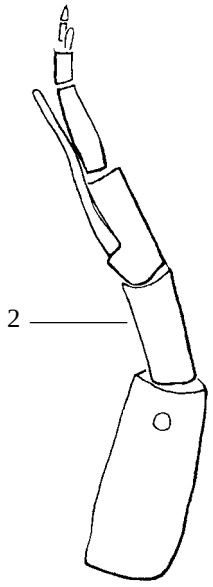


1' Mandible with apical tooth and inner teeth shorter and squatter ... 2



2(1') Antennal segment 2-2.25 times as long as wide ..... ***D.* sp. A**

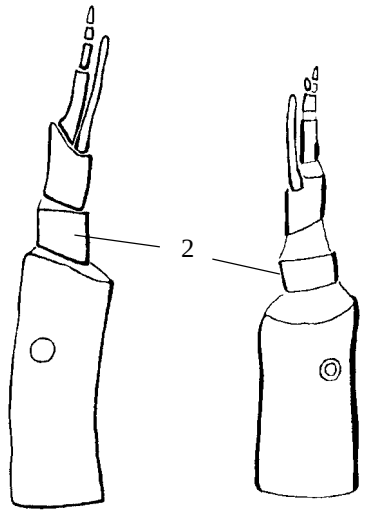
2' Antennal segment 2 as long as wide or wider than long ..... 3




*D.* sp. A

3(2') Antennal segment 2 as long as wide ..... ***D.* sp. B**

3' Antennal segment 2 wider than long ..... ***D. cuneatus***




*D.* sp. B *D. cuneatus*

## Notes on species

*D. cuneatus* - The only described species known from the Southeast, but because it was the only species described as a larva (Sæther 1977a), many records may apply to one or several of the other taxa keyed here. Hudson et al. (1990) posited that this was the only species of *Demicryptochironomus* to occur in lakes; all material I've examined has come from rivers and streams. I've examined larval material from North Carolina and Pennsylvania, and have adults from Alabama.

*D.* sp. A - I've examined larvae of this taxon from streams in North Carolina.

*D.* sp. B - This taxon may be a variant of *D. cuneatus*; reared material is necessary to determine its true status. I've seen material from streams in Florida, North Carolina and Pennsylvania.

*D.* sp. C - This taxon is easily recognizable by its distinctive mandible, with its long, thin and sharply pointed apical and inner teeth. A river and stream species, I've examined material from Georgia, North Carolina and Ohio.

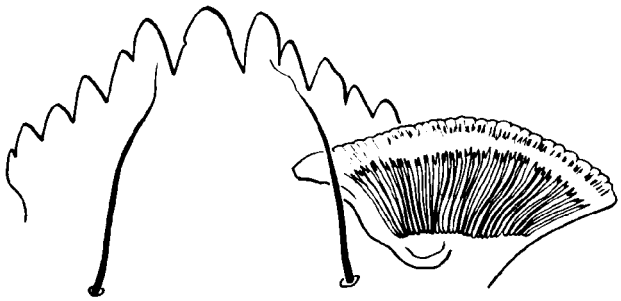
## Genus *Dicrotendipes*

**DIAGNOSIS:** Southeastern larvae are distinguished by the frontal apotome which usually has a frontal pit (sometimes absent) or an apotomal fenestra (one species), with 2 median labral sclerites anterior to the apotome (an extralimital species, *D. lobiger* (Kieffer), has a frontoclypeal apotome); pecten epipharyngis with fewer than 12 teeth/lobes (usually 3-6); mentum with an odd number of teeth; ventromental plate width less than width of mentum; and narrow triangulum occipitale. Two southeastern species may have a single pair of ventral tubules.

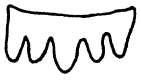
**NOTES:** Eleven described species are known from the Southeast (including Tennessee); ten species are recorded from the Carolinas. There are two undescribed species in Florida, one of which, *D*. sp. A, will probably eventually be found on the Coastal Plain in the Carolinas. Larvae of some *Dicrotendipes* species have often been misidentified due to incorrect keys (Beck 1976, 1979; Webb & Brigham 1982); thus older literature records must be veiwed with skepticism. Several species are distinctive as larvae, but others must be associated with pupae or adult males for correct identification.

Larvae are found in brackish and fresh water, in lotic and lentic conditions, in pristine or degraded habitats. Larvae occur in sediments but are most often encountered on vegetation.

**ADDITIONAL REFERENCES:** Epler 1987, 1988b.

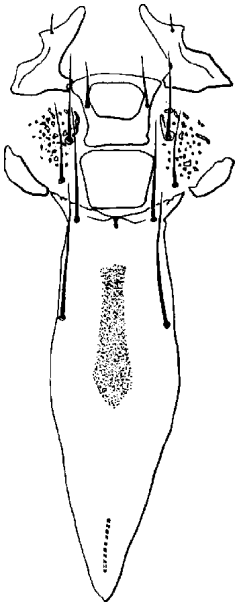


*D. modestus* mentum

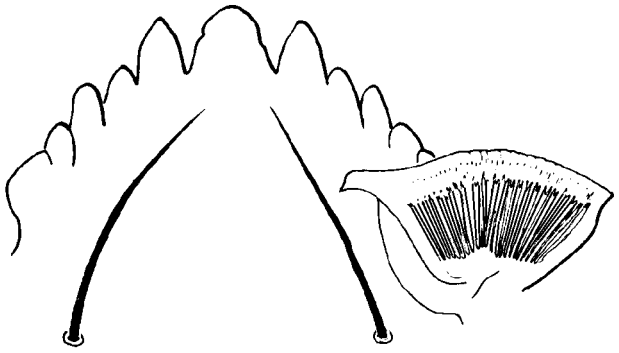


pecten epipharyngis

*D. neomodestus* antenna



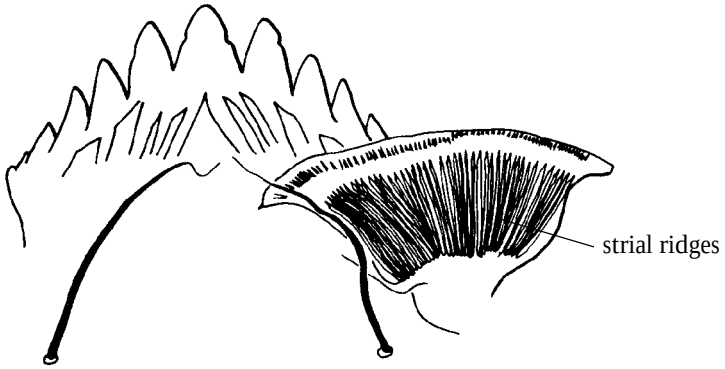
*D. neomodestus* apotome and labral sclerites

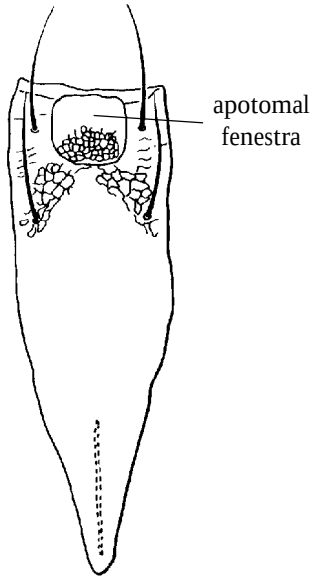


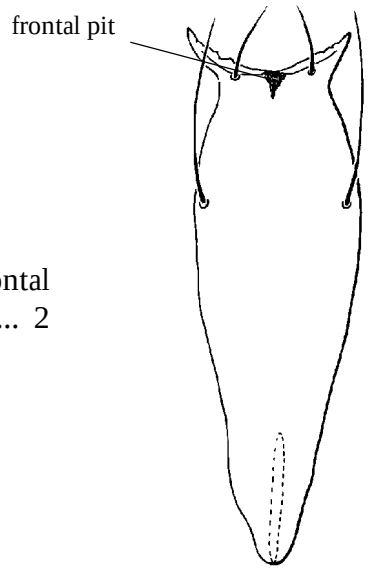
*D. simpsoni* mentum

## Key to *Dicrotendipes* larvae of the southeastern United States

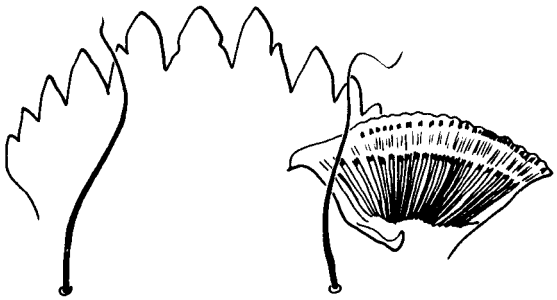
1 Apotome with large oval-quadrate apotomal fenestra near anterior margin; ventromental plates usually with more than 40 strial ridges ..... ***D. leucoscelis***



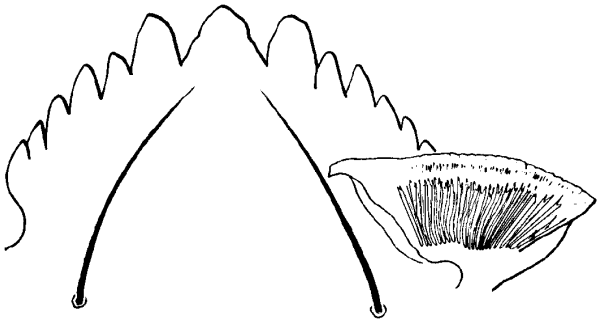




1' Apotome without apotomal fenestra, but usually with frontal pit; ventromental plates with less than 40 strial ridges ..... 2

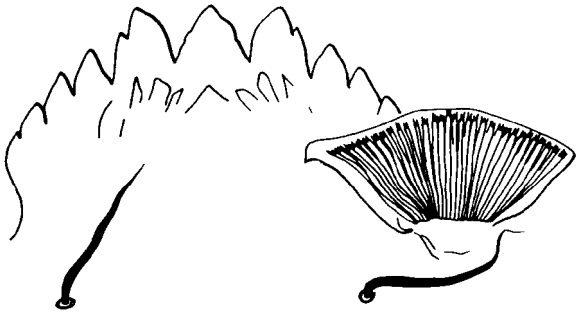


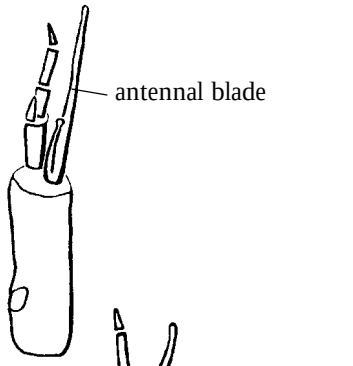
2(1') Mentum with second lateral tooth fused or closely appressed to first lateral tooth for most of its length ..... 3
(see Notes on *D. neomodestus* and *D. modestus*)

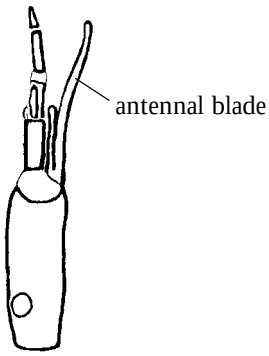


2' Mentum with second lateral tooth not fused or cloesly appressed to first lateral tooth for most of its length ..... 6

3(2) Anterior margin of ventromental plate smooth; antennal blade longer than flagellum; anal tubules reduced; brackish water/estuarine species ..... ***D. lobus***





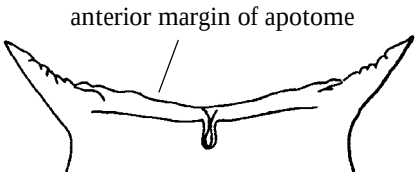



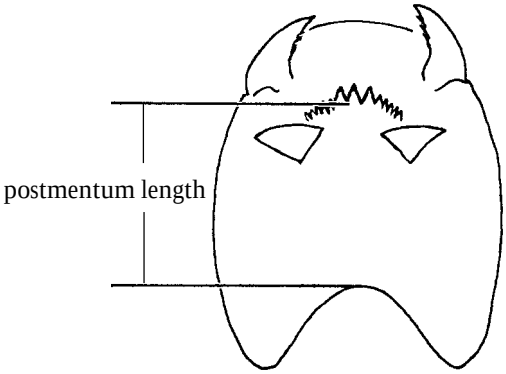

3’ Anterior margin of ventromental plate at least partially crenulated; antennal blade subequal to or shorter than flagellum; anal tubules not reduced; mostly freshwater species (but some may occur in brackish water) ..... 4

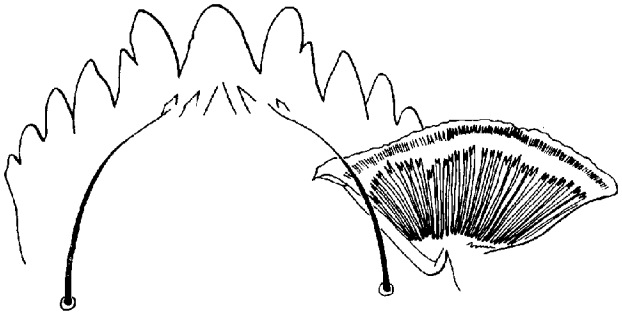
4(3’) 6th lateral tooth of mentum rounded and fused/appressed to 5th lateral tooth; at present known only from Florida ..... ***D.* sp. A**

4’ 6th lateral tooth of mentum distinct, not fused/appressed to 5th lateral tooth ..... 5

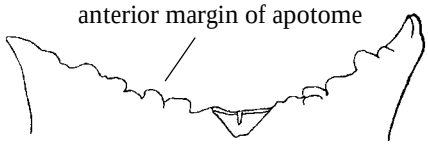
5(4’) Large species (4th instar only!): postmentum length > 250 µm; mentum width > 150 µm; anterior margin of frontal apotome mostly smooth; pecten mandibularis with more than 12 setae (usually 14); head capsule integument appears coarsely granular at 400X; first lateral teeth of mentum turn out slightly; uncommon ..... ***D. fumidus*** (in part)

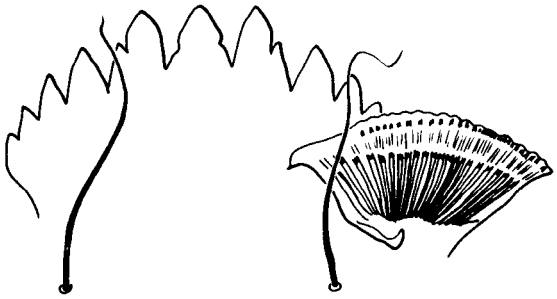


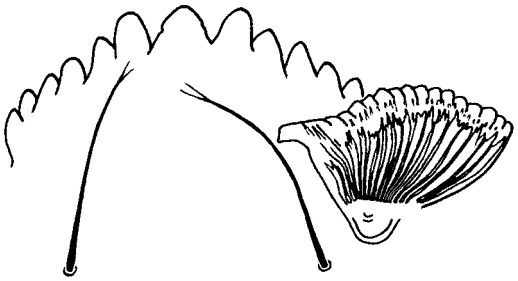



5’ Smaller species (4th instar only!): postmentum length < 250 µm; mentum width < 150 µm; pecten mandibularis with 12 or fewer setae (usually 9); anterior margin of frontal apotome tuberculate; head capsule integument usually not coarsely granulate, or if so, then granulation restricted to roughly longitudinal bands/spots; first lateral teeth not directed outward; common in running water ..... ***D. neomodestus***



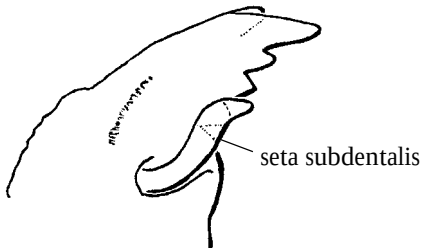
6(2’) Anterior margin of ventromental plates coarsely scalloped, plate with < 22 strial ridges; head capsule usually pale yellow with strong reticulation ..... ***D. thanatogratus***



6’ Anterior margin of ventromental plates not as scalloped, plate with > 22 strial ridges; head capsule color variable, if pale yellow then without strong reticulation ..... 7

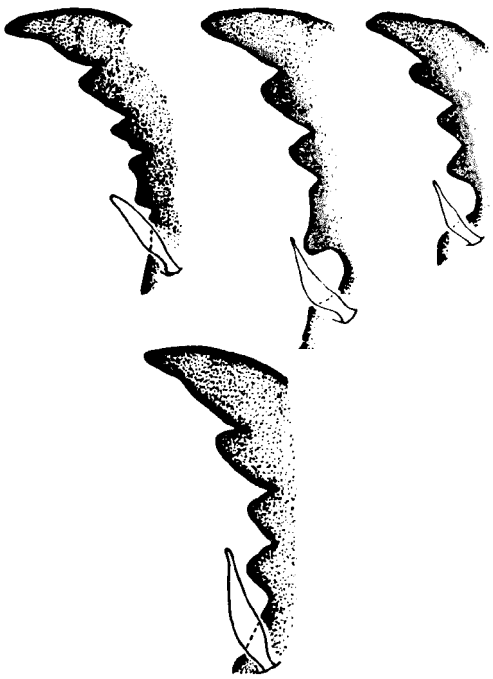
7(6’) Mandible with giant seta subdentalis; known only from peninsular Florida ..... ***D.* sp. B**

7’ Mandible with normal seta subdentalis ..... 8

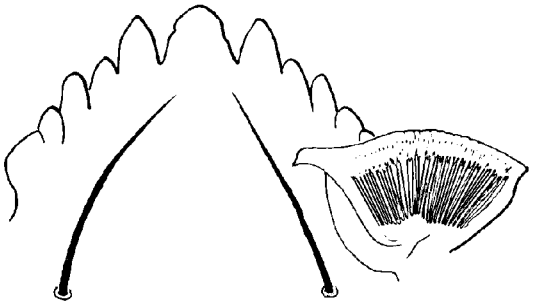



8(7’) Proximal tooth of mandible saddle-shaped or with 2 points OR with inner surface of mandible adjacent to proximal tooth with deep semicircular incision ..... 9

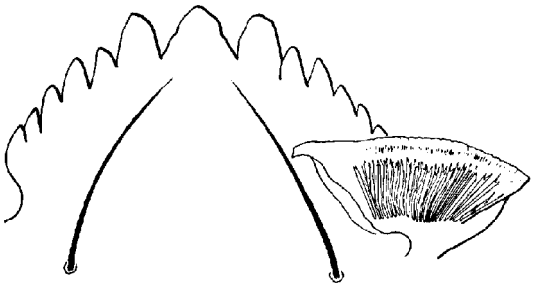
8’ Proximal tooth of mandible mostly triangular in outline; no deep semicircular incision present ..... 10



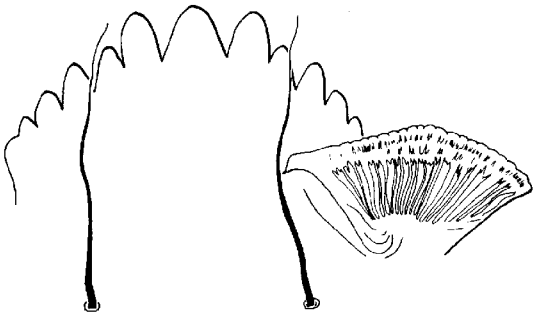
9(8) 6th lateral tooth of mentum rounded and fused/appressed to 5th lateral tooth; inner surfcae of mandible adjacent to proximal tooth with deep semicircular incision ..... ***D. simpsoni***



9' 6th lateral tooth of mentum distinct, pointed; mandible without deep incision ..... ***D. lucifer***



10(8') 6th lateral tooth of mentum rounded and fused/ appressed to 5th lateral tooth ..... ***D. nervosus***
(some 3rd instar *D. simpsoni* will key here)

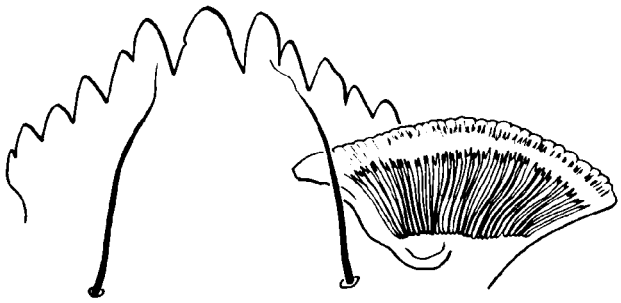


10' 6th lateral tooth of mentum distinct, pointed, not appressed to 5th lateral tooth ..... 11

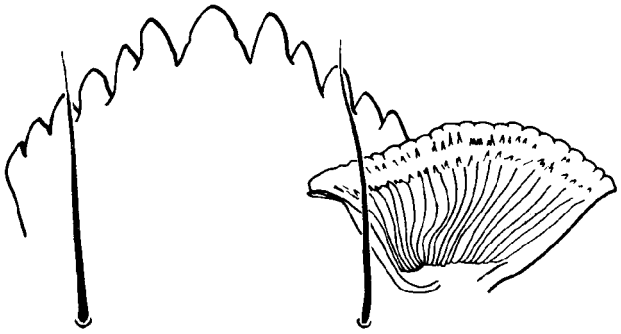
11(10') Large species (4th instar only!): postmentum length > 250 µm; mentum width > 150 µm; pecten mandibularis with more than 12 setae (usually 14); head capsule integument appears coarsely granular at 400X; first lateral teeth of mentum turn out slightly; uncommon ..... ***D. fumidus*** (in part)
(some *D. fumidus* will key here; see couplet 5 and Notes)

11' Smaller species (4th instar only!): postmentum length < 250 µm; mentum width < 150 µm; pecten mandibularis with 12 or fewer setae (usually 9); head capsule integument usually not coarsely granulate, or if so, then granulation restricted to roughly longitudinal bands/spots; first lateral teeth not directed outward; common ..... 12

12(11') Ventromental plate with 28-36, mean 32, strial ridges; postmentum usually darkened, but occasionally pale ..... ***D. modestus***



12' Ventromental plate with 23-29, mean 25, strial ridges; postmentum usually pale, occasionally slightly darkened near posterior margin ..... ..... ***D. tritomus***



## Notes on species

*D. fumidus* - An uncommon species that is sometimes difficult to identify without associated pupae or adult males. This species is keyed twice in the key due to variation of the first and second lateral teeth of the mentum. The head capsule of *D. fumidus* usually has a yellowish-reddish-brown cast, unlike most other southeastern species which are usually much paler and, with the exception of *D. leucoscelis* and some members of the *D. nervosus* group, do not show much reddish-brown. The head capsule integument appears coarsely granular; this is best seen on a phase contrast scope using the lowest power objective lens (on my scope 4X) but with the phase device set to match a higher power objective (on my scope 400X); the granularity "fluoresces". Although Epler (1987) recorded the species from the Carolinas based on adults and pupae, all larvae I've seen identified as *D. fumidus* in the NCDENR collection have been either *D. modestus* or *D. neomodestus*.

*D. leucoscelis* - An uncommon species, often found in enriched habitats, most often ditches, ponds, marshes and slow flowing streams. I've also seen a Florida specimen reared from a bromeliad. The head capsule is light reddish brown with a yellowish cast. This is the only known North American species with an apotomal fenestra. The larva sometimes has a single pair of ventral tubules. It is not keyed correctly in Beck (1976, 1979).

*D. lobus* - A brackish water/estuarine species, I have found it to be most abundant in salt marshes, coastal swamps and near the mouths of rivers. The second lateral teeth are very small, much smaller than those of *D. neomodestus*, and the antennal blade is longer than the flagellum. The species is not keyed correctly in Beck (1976, 1979). the taxon referred to in that key as *D. lobus* is most probably *D. thanatogratus*.

*D. lucifer* - A member of the *D. nervosus* group that is usually not common. As with the closely related *D. simpsoni*, *D. lucifer* is tolerant of organic wastes. This species was referred to as *D. nervosus* Type I in Simpson & Bode (1980).

*D. modestus* - The most common species of the genus throughout most of North America, but sometimes difficult to identify correctly in any life stage. The larval stage can easily be confused with *D. neomodestus* (with which it may hybridize?) and *D. tritomus*. Many specimens of *D. modestus* have dark markings on the dorsum of the head and postmentum, but these markings are often absent.

Note that several other *Dicrotendipes* species may have dark markings on the head capsule. Larvae of *D. tritomus* are difficult to separate from *D. modestus* larvae without dark markings; you will have to resort to associated pupae for accurate identifications of such specimens. See also *D. neomodestus*. Larvae of *D. modestus* are found in a wide variety of (usually) lentic habitats, including brackish water, and can tolerate moderate levels of organic pollution.

*D. neomodestus* - A common species of rivers and streams, somewhat tolerant of high nutrients/organic wastes. Although most specimens have a dark dorsal head stripe and darkened postmentum, occasional populations occur without such markings. The roughly tuberculate anterior margin of the frontal apotome is a good character for separation from some other species, especially *D. modestus* larvae in which the second lateral tooth of the mentum may appear to be fused to the first lateral tooth; some *D. modestus* may have tubercles on the anterior margin of the apotome, but rarely as large and numerous as those on *D. neomodestus*.

*D. nervosus* - An uncommon species in the Southeast, sometimes not clearly separable from *D. simpsoni*, especially in earlier instar larvae. Records of *D. nervosus* prior to my revision of the Nearctic *Dicrotendipes* (Epler 1987) must be viewed with skepticism, since at least two other species (*D. lucifer* and *D. simpsoni*) have been mistakenly identified as *D. nervosus*. Note that second or third instar larvae of *D. lucifer* and *D. simpsoni* usually lack the modifications of the proximal inner mandibular teeth and will key to *D. nervosus*. Fourth instar larvae are necessary for an accurate identification, which should ideally be backed up by associated adult males. Head capsule coloration of most *D. nervosus* group members is usually a darker yellow-brown than species such as *D. modestus* and *D. tritomus*.

*D. simpsoni* - A common species normally associated with high nutrient levels or low dissolved oxygen. Note that second or third instar larvae usually lack the modifications of the proximal inner mandibular teeth and will key to *D. nervosus* (q.v.). Larvae sometimes have a single pair of ventral tubules. This species was called *Einfeldia* by Mason (1973) and *D. nervosus* Type II in Simpson & Bode (1980).

*D. thanatogratus* - This uncommon species of rivers and streams is recorded from South Carolina by Caldwell et al. (1997), but I have not seen any material of this species from anywhere but Florida. Since it was described from northern Florida (Epler 1987), it probably does occur throughout the Southeast, but all larval specimens I've examined that were identified as *D. thanatogratus* by benthologists from sites in the Southeast were *D. modestus* or *D. tritomus*.

*D. tritomus* - Epler (1988: 12) considered *D. incurvus* (Sublette) a junior synonym of *D. tritomus*. Larvae of *D. tritomus* are difficult to separate from *D. modestus* larvae without dark markings; you will have to resort to associated pupae or adult males for accurate identifications of such specimens.

*D.* sp. A - An undescribed species that I originally reared from Lake Okeechobee in southern Florida, I have since found it in the Suwannee River basin in northern Florida. In general, any midge found in the Suwannee River basin should also occur on the Coastal Plain in the Carolinas, so I expect that *D.* sp. A will eventually be found there. Adult males are very similar to *D. modestus*, separable only by the reduced number of dorsocentral and squamal setae. This species will be described in a forthcoming publication.

*D.* sp. B - Apparently an undescribed species, known only as a larva from peninsular Florida.

Webb & Brigham (1982) keyed *D. aethiops* in their key to *Dicrotendipes*, but this was based on a misidentification of *D. fumidus* in Webb (1972) (see Epler (1987). *Dicrotendipes botaurus* was recorded for Tennessee by Epler (1987) based on an adult; the immature stages are undescribed.

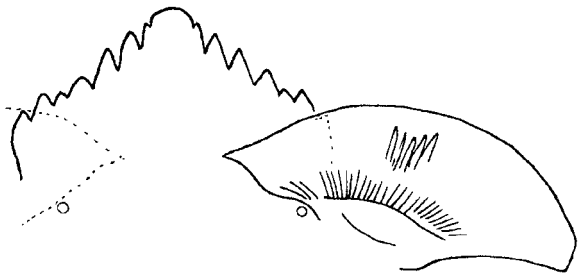
Genus ***Einfeldia***

**DIAGNOSIS:** Southeastern larvae are distinguished by the frontoclypeal apotome, which may have an apotomal fenestra; pecten epipharyngis either a simple comb, 3 separate scales bearing minute spinules, or weakly tripartite and bearing minute spinules; and usually one pair of ventral tubules.

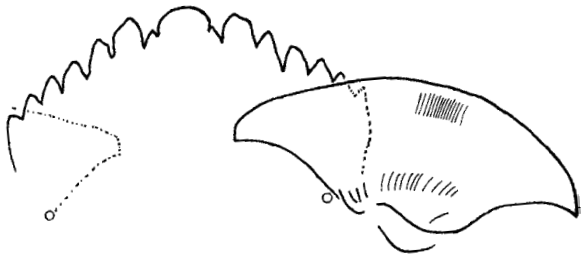
**NOTES:** *Einfeldia* is in need of revision; generic limits are unclear. Note that *Einfeldia* species groups B and C of Pinder & Reiss (1983) are now placed in *Chironomus.* One southeastern species formerly placed in *Einfeldia*, *E. austini*, is now moved (in this manual) to *Chironomus (Lobochironomus).* I have seen only two species of *Einfeldia* from the Southeast; prior records of *E. pagana* probably refer to *E.* sp. A.

Larvae are found most often in eutrophic standing water, but can occur in lotic situations.

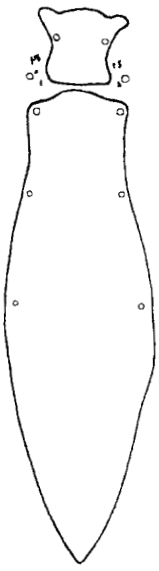
**ADDITIONAL REFERENCES:** Oliver 1971; Sublette 1964.



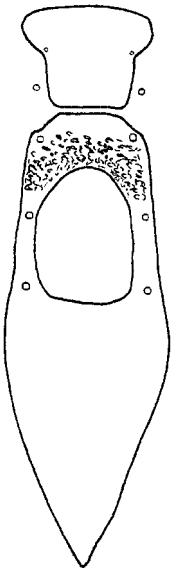
*E. natchitocheae* mentum



*E.* sp. A mentum

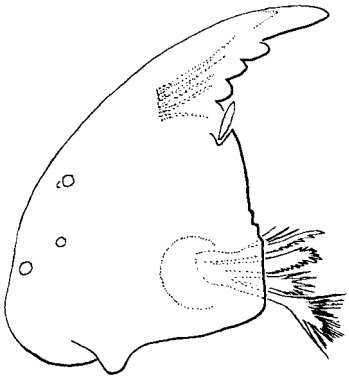


*E. natchitocheae*

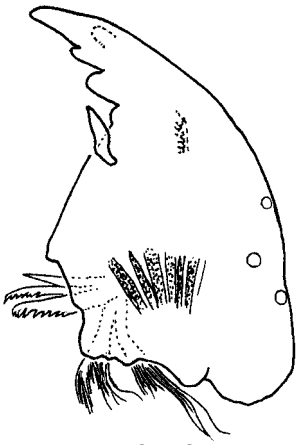


*E.* sp. A

frontoclypeal apotomes and labral sclerites



*E.* sp. A

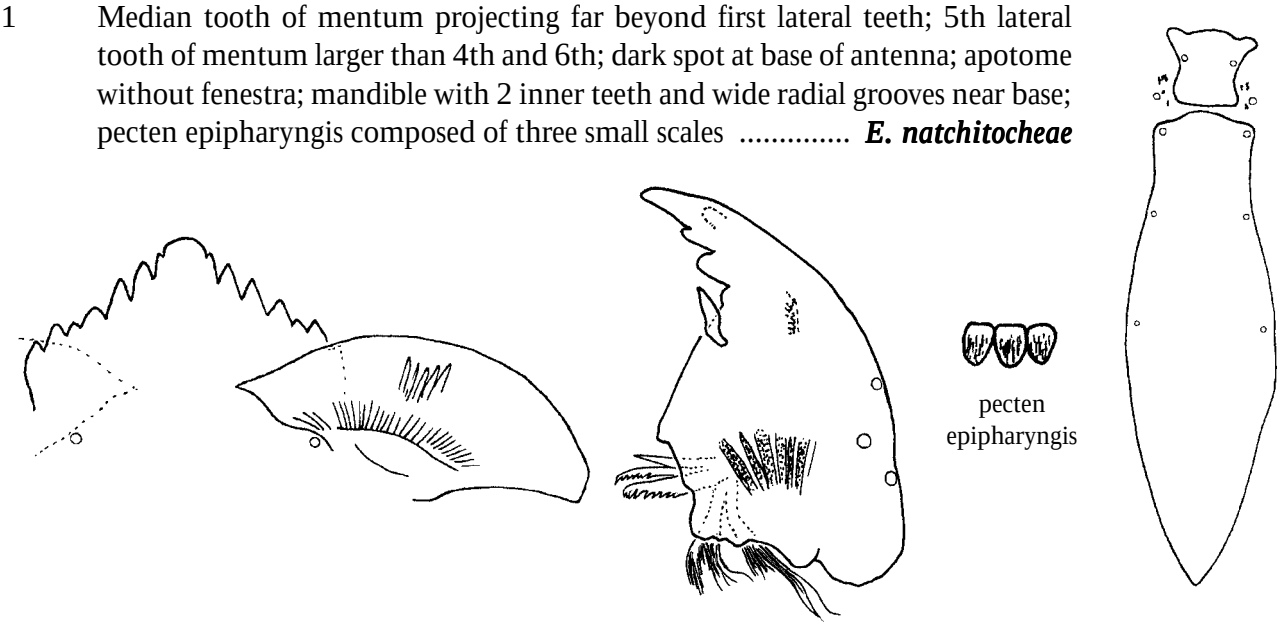


*E. natchitocheae*

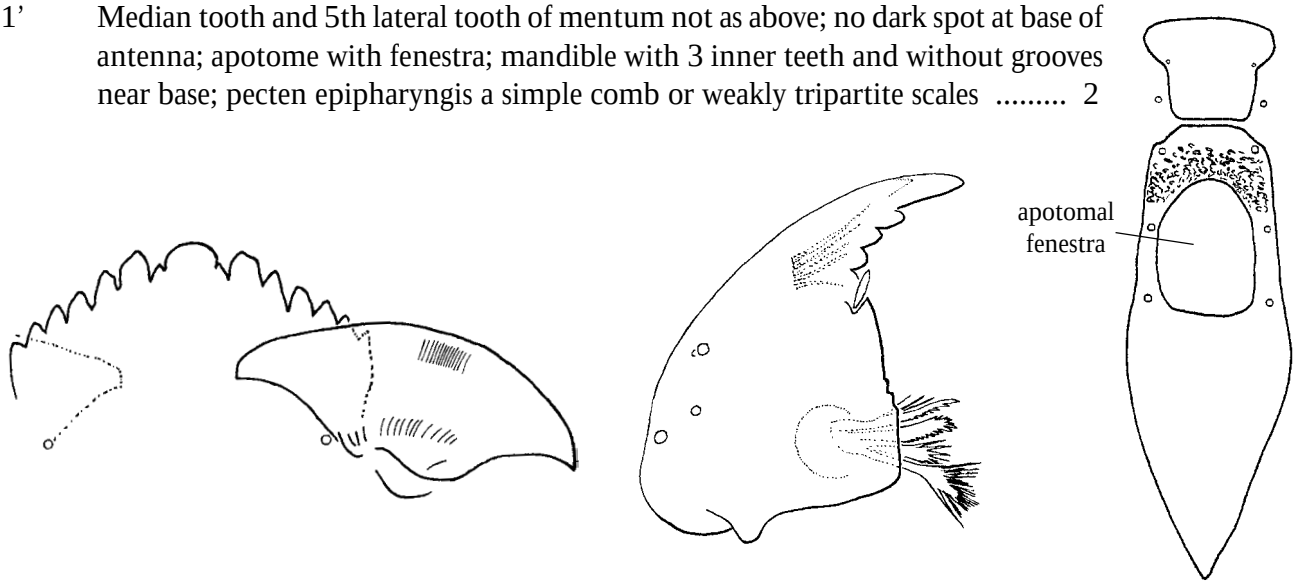
mandibles

## Key to *Einfeldia* larvae of the southeastern United States

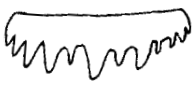
1 Median tooth of mentum projecting far beyond first lateral teeth; 5th lateral tooth of mentum larger than 4th and 6th; dark spot at base of antenna; apotome without fenestra; mandible with 2 inner teeth and wide radial grooves near base; pecten epipharyngis composed of three small scales ..... ***E. natchitocheae***




1' Median tooth and 5th lateral tooth of mentum not as above; no dark spot at base of antenna; apotome with fenestra; mandible with 3 inner teeth and without grooves near base; pecten epipharyngis a simple comb or weakly tripartite scales ..... 2




2(1') Pecten epipharyngis a simple multitoothed comb ..... ***E. pagana***
(see Notes)



2' Pecten epipharyngis weakly tripartite and covered with minute spinules ..... ***E.* sp. A**

## Notes on species

*E. natchitocheae* - A common and widespread species of eutrophic lakes and ponds on the Coastal Plain, but it also occurs in streams and rivers. This is a species that is easily identified while still in fluid preservative or alive; the darkened postmentum, spots at the base of the antennae and the single pair of ventral tubules are distinctive.

*E. pagana* - This species is recorded for North Carolina by Hudson et al. (1990) and Caldwell et al. (1997), apparently based on an adult male with pupal exuviae from a pond, determined by J.E. Sublette. However, my examination of this specimen indicates that it is an *Einfeldia* sp. A; the pupal exuviae and adult are similar to reared material of *E.* sp. A from Georgia and differ from reared material of *E. pagana* I've examined. I have not seen any material of *E. pagana* from the Southeast.

*E.* sp. A - An undescribed species that I've seen from Florida, Georgia and North Carolina. I've examined material from wetlands, lakes and streams. Broughton Caldwell has provided complete rearings of this taxon from Georgia; it will be described in a forthcoming publication.

*Einfeldia brunneipennis* and *E. chelonia* also occur in the Southeast; their immature stages are undescribed.

## Genus *Endochironomus*

**DIAGNOSIS:** Distinguished by the mentum with the 3 (rare) or 4 (usual) median teeth separated from the lateral portion of the mentum by a distinctive line which runs posteriorly from the median teeth to the anteromedial corner of the ventromental plates; ventromental plates with anterior and posterior margins parallel for most of their length, and lateral apex rounded; and the tuberculate anterior margin of the cardo.

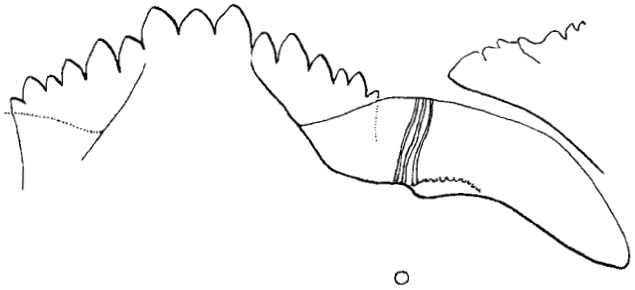
**NOTES:** Grodhaus (1987a) reviewed the genus for North America. Three species of *Endochironomus* occur in the Carolinas; one, *E. nigricans*, is common; the other two are uncommon to rare. The three species can be separated by their menta.

A single specimen of *E.* sp. A has been found in brackish water in North Carolina (Eaton 1994); it is identified by its three median teeth. I have also examined a specimen of *E.* sp. A from northeastern Florida. Grodhaus (1987a) described a taxon from Oregon with 3 median teeth from larvae only, and noted that it could be placed in the *E. signaticornis* group, a group established by Lenz (1921), not Grodhaus (1987a) as alluded to in Eaton (1994). Grodhaus's record is the only other record of this formerly Palaearctic group in North America. Note that the name "*signaticornis*" is now considered a *nomen dubium* and should not be used.

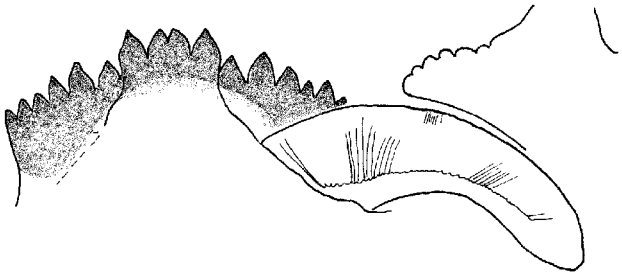
The other two species are members of Lenz's *E. nymphoides* group; they are separated by the amount of dark coloring of the mentum: in *E. nigricans* the coloring is more extensive and extends more posteriorly; in *E. subtendens* the dark coloring is restricted mostly to the teeth.

Larvae are often associated with moderate eutrophic conditions and occur in lentic and lotic situations.

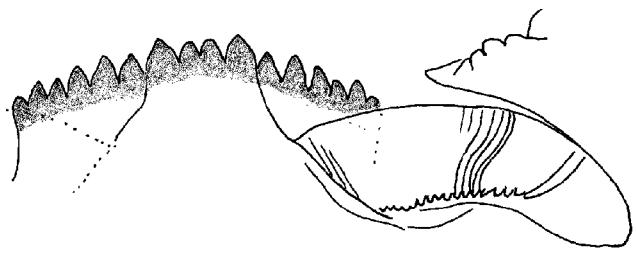
**ADDITIONAL REFERENCES:** Grodhaus 1987a.



*E.* sp. A, mentum and cardo



*E. nigricans*, mentum and cardo



*E. subtendens*, mentum and cardo

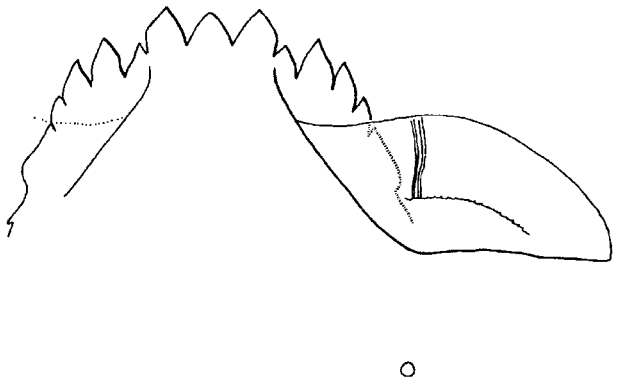
## Genus *Endotribelos*

**DIAGNOSIS:** Distinguished by the strongly arched mentum, with 3 large central teeth; with second lateral teeth of mentum very small and mostly fused to first lateral teeth (following Grodhaus's (1987a) terminology for the mental teeth); and the mandible with large incised area at the base of the inner teeth.

**NOTES:** A single species, *E. hesperium*, is known from the Southeast. Caldwell et al. (1997) record this species from South Carolina in addition to previous records from Florida. Grodhaus (1987a) established *Endotribelos* as a new genus and included the previous described *Tribelos hesperium* in it. It has been assumed (by Grodhaus 1987a and others) that southeastern US larvae are *E. hesperium* but I have never seen a reared/associated specimen of this taxon from the Southeast. Several other species are known from Central America (Sublette & Sasa (1994) and my unpublished data and specimens), including one that has a mentum with an even number of teeth and a mandible that lacks the deep incision of *E. hesperium.* I have specimens of another undescribed species from Costa Rica that closely resembles *E. hesperium*.

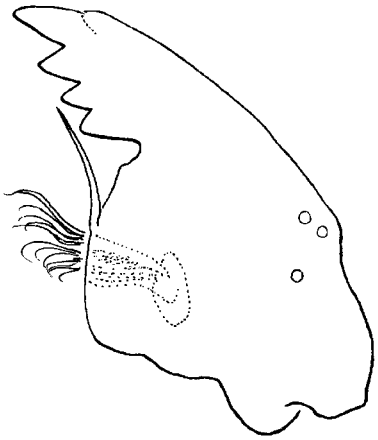
Larvae are associated with aquatic macrophytes; Grodhaus (1987a) found larvae inside the leaves of *Sagittaria* and *Typha* in California.

**ADDITIONAL REFERENCES:** Grodhaus 1987a; Sublette & Sasa 1994.



*E. hesperium* mentum

*E. hesperium* antenna



*E. hesperium* mandible

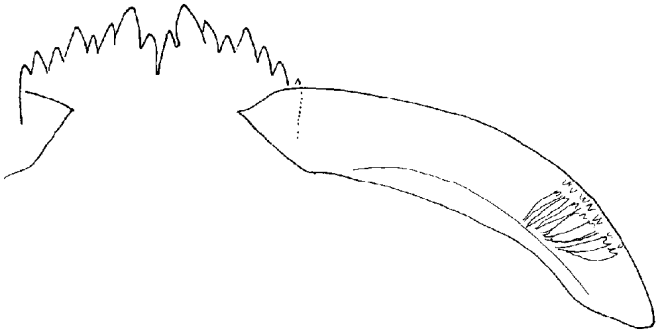
## Genus *Fissimentum*

**DIAGNOSIS:** Distinguished by the 6 segmented antenna, with Lauterborn organs at apex of segment 2 only; mentum with deeply sunken pair of median teeth; long setae submenti that extend anteriorly past the mentum; and mandible with large seta subdentalis but without pecten mandibularis and seta interna.

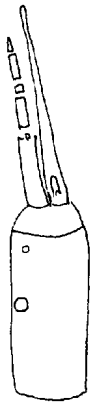
**NOTES:** *Fissimentum* was established as a new genus by Cranston & Nolte (1996) for some South American and Australian taxa. One southeastern US larva can be placed in *Fissimentum*, originally referred to as Tendipedini genus A by Roback (1966c). Note that Roback's first reference to a Tendipedini sp. A (Roback 1953: 99, 120; fig. 27) refers to *Stelechomyia perpulchra*; the mentum has a single median tooth. *Fissimentum* was referred to as Chironominae genus A in Epler (1995); in this manual the taxon is now called *Fissimentum* sp. A. The pupa and adult of *F*. sp. A remain unknown. There is nothing similar to the adult described by Cranston & Nolte (1996) as *F. dessicatum* known from the United States; the identity of *F.* sp. A remains a mystery.

Larvae are reported from sediments of rivers and lakes; Cranston & Nolte (1996) noted that some larvae were drought tolerant.

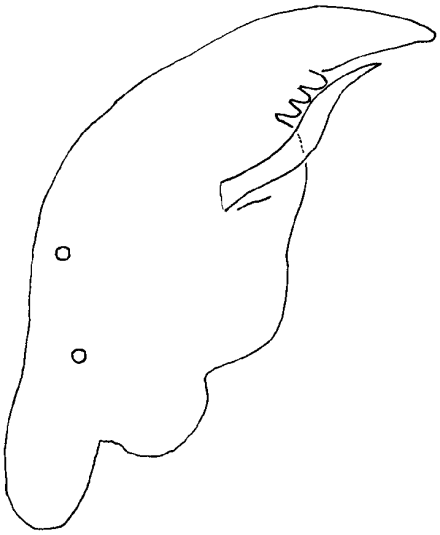
**ADDITIONAL REFERENCES:** Cranston & Nolte 1996.



mentum



antenna



mandible

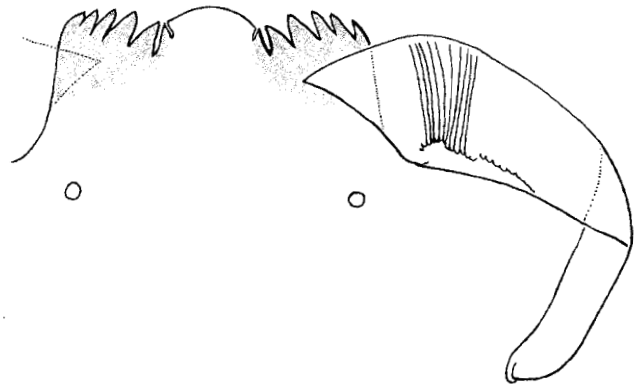
Genus ***Gillotia***

**DIAGNOSIS:** The thin S I; small, weakly trilobed pecten epipharyngis; 5 segmented antenna; premandible with 6 teeth and without brush; mandible without pecten mandibularis; mentum with pale median tooth and obliquely arranged lateral teeth; and extremely wide ventromental plates distinguish this genus.

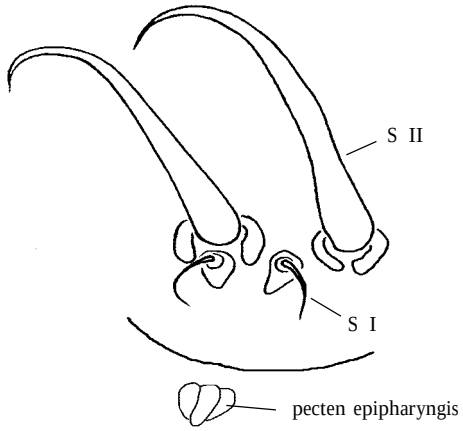
**NOTES:** The single southeastern US record of the single Nearctic species, *G. alboviridis*, is based on a pupal exuviae from South Carolina. The specimen illustrated below was collected in Ohio. Note that its ventromental plates are much wider than those illustrated for *Gillotia* in Sæther (1977a) and Pinder & Reiss (1983); the plates curve around the lateral margin of the head capsule.

Nothing is published on the ecology of *Gillotia.*

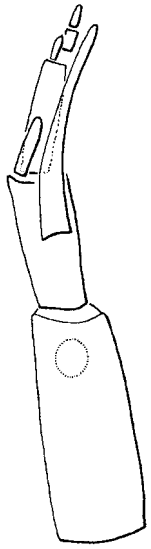
**ADDITIONAL REFERENCES:** Sæther 1977a.



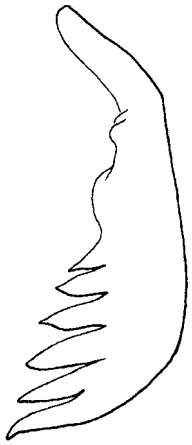
mentum with ventromental plates curling around head capsule




labrum



antenna



premandible

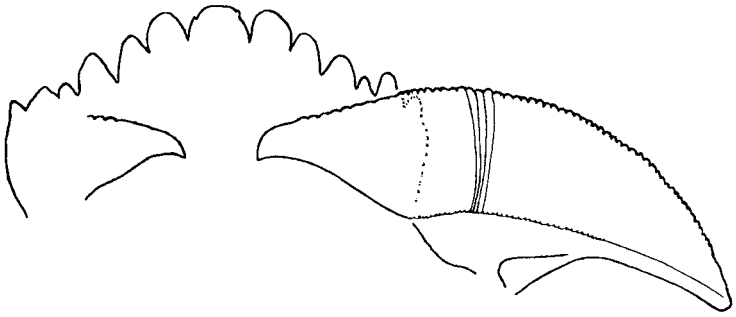
## Genus *Glyptotendipes*

**DIAGNOSIS:** Distinguished by the frontal apotome (thus having two labral sclerites anterior to it); pecten epipharyngis a comb with 10 or more sharp teeth; usually simple seta subdentalis (may be notched or roughly serrated, but never fringed with small teeth as in *Goeldichironomus*); mentum with 13 teeth, width usually less than width of one ventromental plate, wide triangulum occipitale; and no, rudimentary, or one pair of ventral tubules.

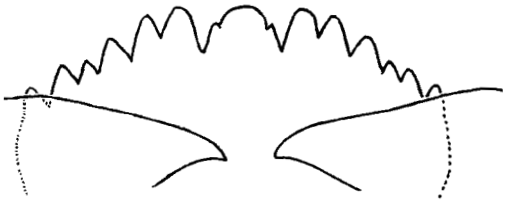
**NOTES:** *Glyptotendipes* is being revised by Michael Heyn (FDEP, Tallahassee, FL); hopefully his revision will be published soon. He has graciously provided material and comments regarding this genus. Note that due to taxonomic confusion and variation among species, many earlier records of several species (especially *G. lobiferus*) must be viewed with skepticism. Heyn (1992) established three subgenera that replaced the subgenera used by Townes (1945) and species groups A-C of Pinder & Reiss (1983). All three subgenera occur in the Southeast; the majority of southeastern taxa are members of the subgenus *G. (Glyptotendipes)*; one species, *G. amplus*, is placed in the subgenus *G. (Trichotendipes)* and two species, *G. dreisbachi* and *G. seminole* are placed in the subgenus *G. (Caulochironomus)*.

Larvae occur in usually eutrophic standing and slow moving water, where they are found in or on sediments and aquatic plants; several species are miners in plants or decaying wood (or they live in burrows in plant material made by other organisms). At least one common species, *G. paripes*, is considered a nuisance in the Southeast because of mass emergences from eutrophic ponds and lakes near human habitations.

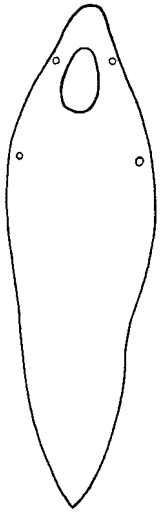
**ADDITIONAL REFERENCES:** Heyn 1992; Sublette & Sublette 1973; Townes 1945.



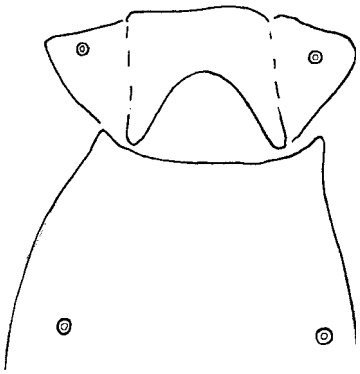
*G.* sp. B mentum



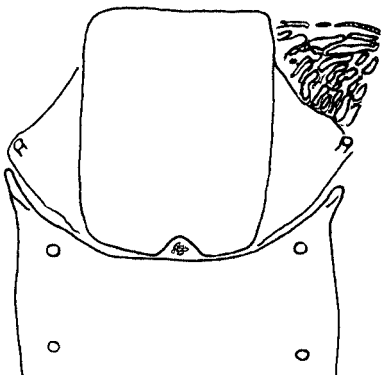
*G. paripes* mentum



*G. (Trichotendipes) amplus* apotome



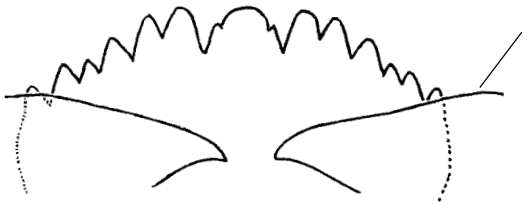
*G. (Caulochironomus) seminole* apotome and labral sclerite 1



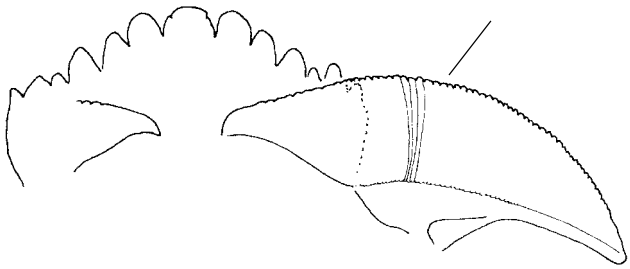
*G.(Glytptotendipes)* sp. B apotome and labral sclerite 1

## Key to *Glyptotendipes* larvae of the southeastern United States

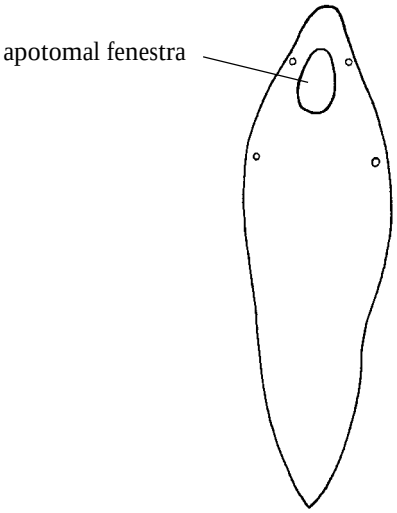
1 Anterior margin of ventromental plate smooth or almost so (tiny points may be visible near margin at high magnification) ..... 2

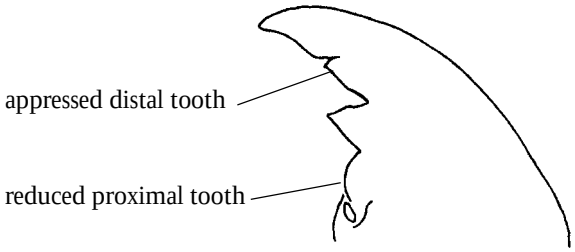


1' Anterior margin of ventromental plate noticeably crenulated ..... 4

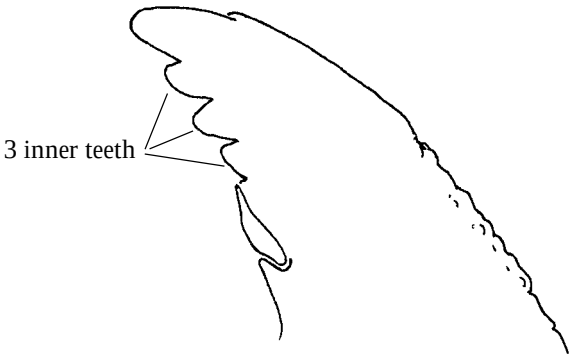


2(1) Mandible with proximal inner tooth reduced/vestigial and distal tooth appressed to apical tooth; apotome with oval apotomal fenestra ..... ***G. amplus***

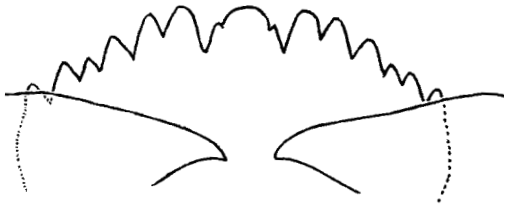


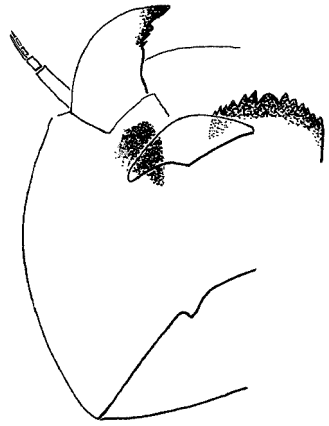




2' Mandible with 3 well developed inner teeth; apotome without fenestra ..... 3

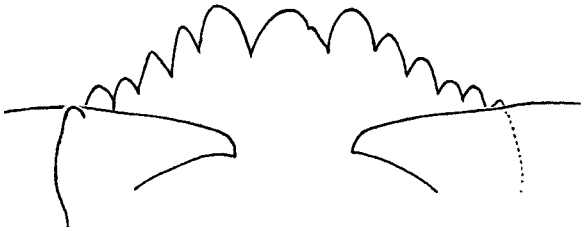


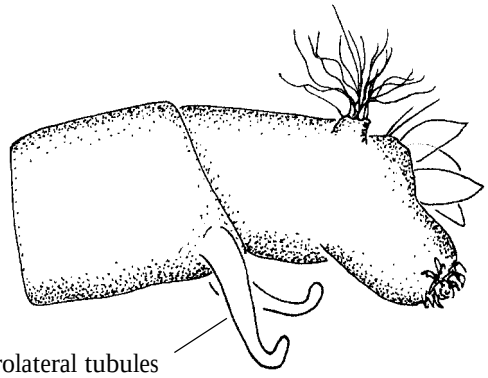
3(2') Ventromental plates separated by less than the width of the median tooth of the mentum; at most rudimentary ventrolateral tubules present; head capsule with dark mark below mandible ..... ..... ***G. paripes***



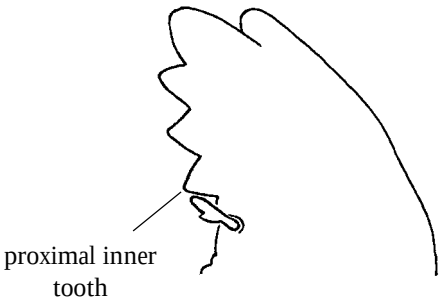


3' Ventromental plates separated by width of median tooth of mentum (or more); well developed ventrolateral tubules present; head capsule without dark mark below mandible ..... ***G. barbipes***



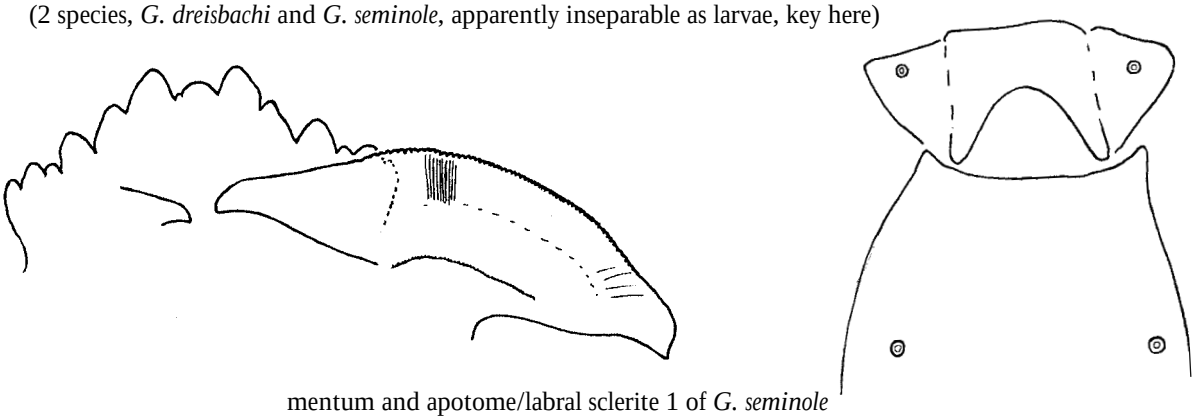



4(1') Proximal inner tooth of mandible subequal to middle tooth; pecten epipharyngis with blunt teeth and may appear weakly tripartite; known only from south peninsular Florida ..... ***G.* sp. E**



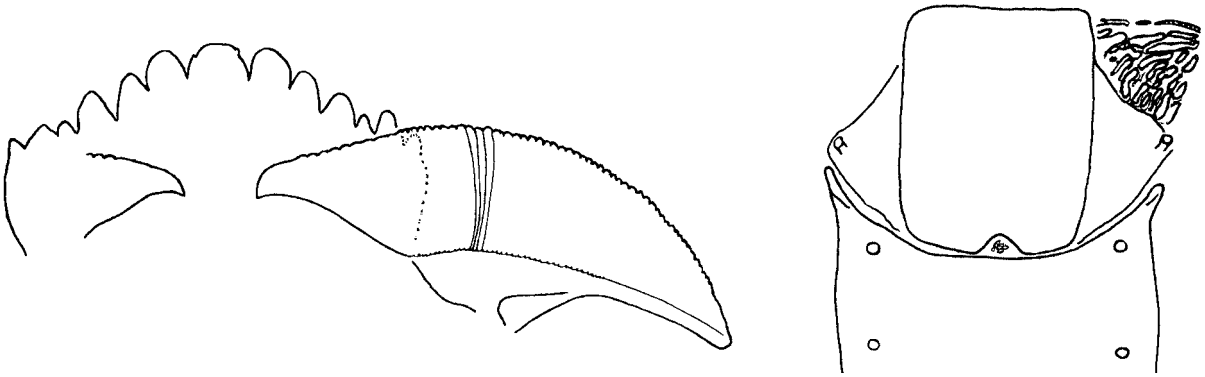

4' Proximal inner tooth of mandible smaller than middle tooth; pecten epipharyngis a comb with irregular or sharp teeth; more widespread distribution ..... 5

5(4') 3 central teeth of mentum project forward from other lateral teeth; posterior margin of labral sclerite 1 deeply concave ..... ***G. (Caulochironomus)* sp.**
(2 species, *G. dreisbachi* and *G. seminole*, apparently inseparable as larvae, key here)

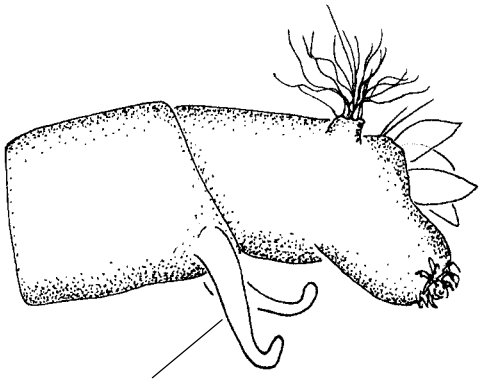


mentum and apotome/labral sclerite 1 of *G. seminole*

5' Mentum with teeth in an even arch; posterior margin of labral sclerite 1 with small concave notch ..... 6



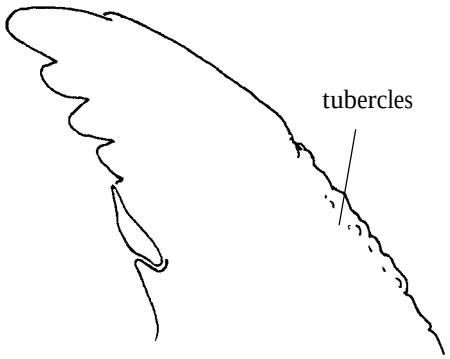
6(5') Well developed ventrolateral tubules present (at least twice as long as wide) ..... 7



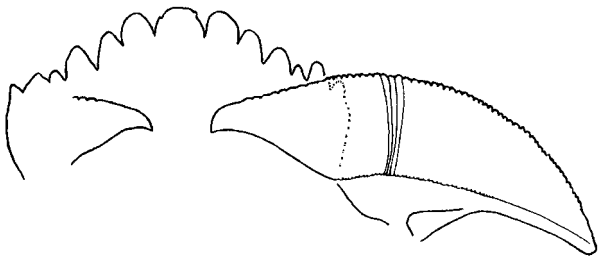
ventrolateral tubules

6' Ventrolaterla tubules absent or rudimentary ..... 8

7(6) Subapical lateral outer lateral margin and dorsal surface of mandible smooth; ventrolateral tubules at least 2X length of anal tubules; mines in decaying wood ..... ***G. testaceus***

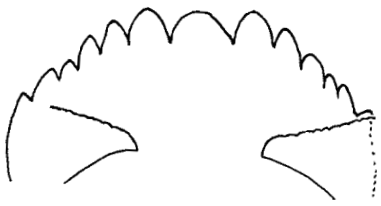



7' Subapical lateral margin and dorsal surface of mandible rugose or adorned with low, mound-like tubercles; ventrolateral tubules subequal to length of anal tubules; not restricted to decaying wood ..... ***G.* sp. F**

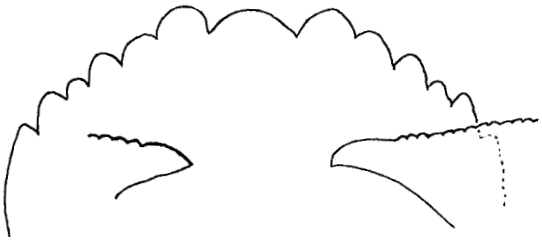


8(6') Width of median tooth of mentum subequal to distance between ventromental plates ..... ..... ***G.* sp. B**

8' Width of median tooth of mentum about 0.5-0.7 distance between ventromental plates ..... 9



*G. meridionalis*



*G.* sp. G

9(8') 4th instar only: mentum width < 200 µm; postmentum length about 300 µm ..... ***G. meridionalis***

**NOTE**: 4th instar larvae are necessary for accurate measure-ments!!

9' 4th instar only: mentum width > 200 µm; postmentum length about 400 µm ..... ***G.* sp. G**

## Notes on species

*G. amplus* - I've seen larvae of *G. amplus* from North Carolina (where they were misidentified as *Einfeldia* sp.), Florida and Mississippi (where they were misidentified as *Dicrotendipes* sp.); Heyn (pers. comm.) has seen specimens from South Carolina. This species occurs in rivers and streams as well as the usual lentic habitats of other *Glyptotendipes*.

*G. barbipes* - A species of extremely nutrient rich water bodies, such as sewage lagoons. Although recorded for North and South Carolina, I have only seen southeastern specimens from Georgia.

*G. dreisbachi* - The larva of this species is apparently inseparable from that of *G. seminole*; associated adult males would be necessary for species level identification. Townes (1945) noted that the larvae were burrowers in the stems of *Potamogeton*.

*G. lobiferus* - This species has been recorded for the Carolinas by Hudson et al. (1990) and Caldwell et al. (1997). However, Heyn (pers. comm.) believes *G. lobiferus* to be a more northern species that probably does not occur in the Southeast. Records of *G. lobiferus* probably refer to *G. meridionalis*, *G.* spp. B, F or G.

*G. meridionalis* - A difficult species to identify; fourth instar larvae are needed because it appears that only size separates it from similar taxa. The larvae described as *G. meridionalis* by Manual (1976) are *G.* sp. F.

*G. paripes* - A common species of lakes and ponds on the Coastal Plain, often abundant enough in eutrophic lakes and ponds near human habitation to be a nuisance when large numbers of adults emerge. The dark spot below the mandible may not be apparent in second or third instar larvae.

*G. seminole* - The larva of this species is apparently inseparable from that of *G. dreisbachi*; associated adult males would be necessary for species level identification. Heyn (pers. comm.) noted that the larvae were burrowers in the stems of Bur-reed, *Sparganium.*

*G. testaceus* - A large species with elongate ventrolateral tubules. It apparently is an obligate miner of decaying wood (Heyn, pers. comm.).

*G.* sp. B - A common and widespread species throughout the Coastal Plain of the Southeast; I've seen material from North Carolina in addition to Florida. This species has been confused with *G. lobiferus* and *G. meridionalis.*

*G.* sp. E - A distinctive undescribed species known only from Lake Annie in Highlands County in southern Florida. I have reared larvae collected from tunnels in decaying submerged wood. Epler (1995) figured the pecten epipharyngis as weakly tripartite. However, additional material indicates that such a pecten is probably abnormal or broken; more recently collected specimens have a typical *Glyptotendipes* single-piece comb-like pecten epipharyngis. The adults of this species have very short palpi compared to other *Glyptotendipes*.

*G.* sp. F - This taxon is what Manuel (1976) called *G. meridionalis*. Heyn (pers. comm.) believes it represents a separate, undescribed species.

*G.* sp. G - This species was called *G. lobiferus* by Beck & Beck (1969a). Heyn (pers. comm.) believes it represents an undescribed species. It is difficult or impossible to separate unassociated larvae of this species from unassociated larvae of *G. meridionalis*.

It is difficult to confirm many of the records of *Glyptotendipes* species, described or letter-designated, from the Carolinas. With the possible exception of *G.* sp. E, all the letter designated species above probably occur throughout the Southeast. Heyn's revision, when published, will help immensely in the identification of this common genus.

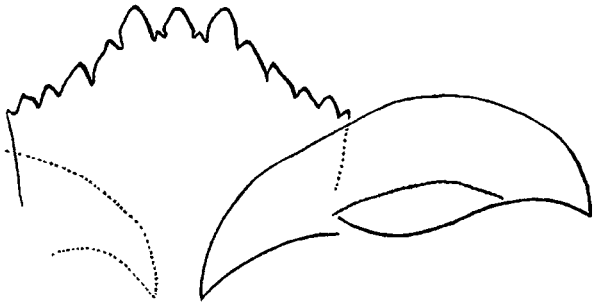
## Genus *Goeldichironomus*

**DIAGNOSIS:** Distinguished by the frontoclypeal apotome (S 3 setae are on apotome, with 2 median labral sclerites anterior to it); ventromental plates with median (inner) margin angled posteriorly; elongate seta subdentalis with toothed or fringed lower margin; and 0, 1 or 2 pairs of ventral tubules.

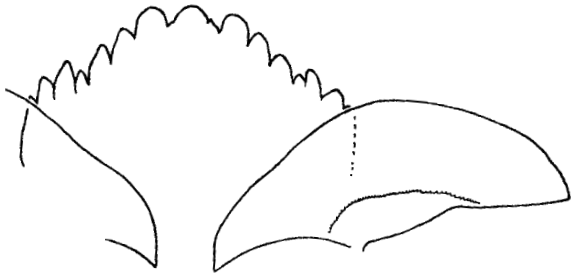
**NOTES:** Six species are known from the Southeast; four species are known to occur in the Carolinas. The genus is mostly Neotropical, but many species now appear to reach their northern limit in Florida or South Carolina. The species most often encountered, usually in eutrophic standing water, are *G. carus* and the widespread *G. holoprasinus*.

Larvae are found mostly in lentic habitats, and may occur in sediments, in or on plants and in floating mats of vegetation and wood, under conditions ranging from oligotrophic to hypereutrophic.

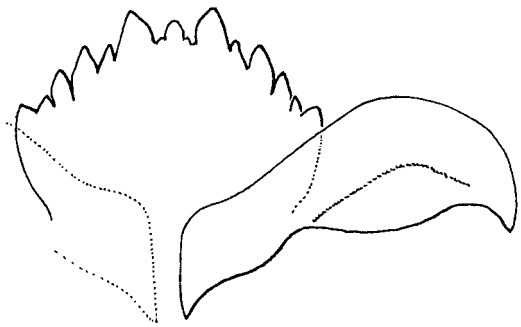
**ADDITIONAL REFERENCES:** Reiss 1974; Wirth 1979.



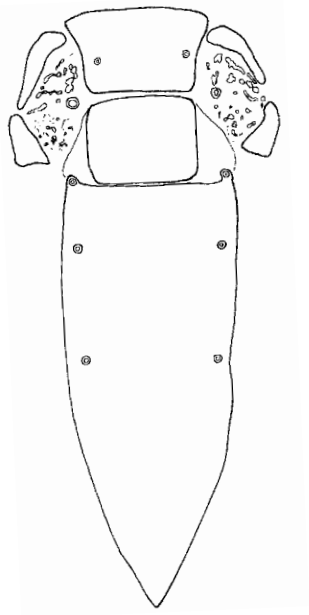
*G. holoprasinus* mentum



*G. carus* mentum



*G. fluctuans* mentum



*G. devineyae*, apotome and labral sclerites

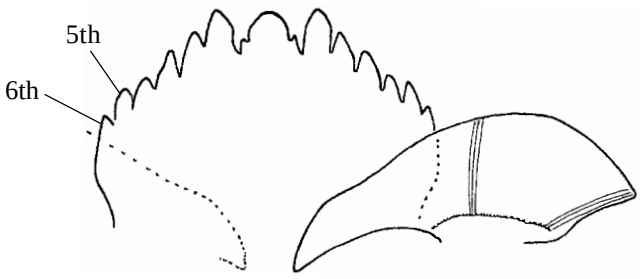
*G. carus*, apex of mandible

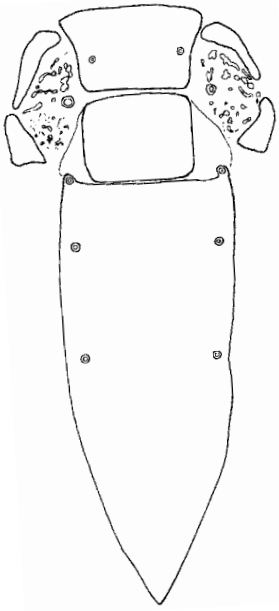
## Key to *Goeldichironomus* larvae of the southeastern United States

1 Ventral tubules absent or rudimentary (length < 5X width) ..... 2

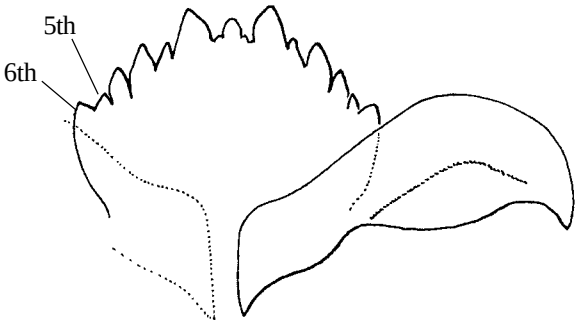
1' At least one pair of ventral tubules present (length > 5X width) ..... 3

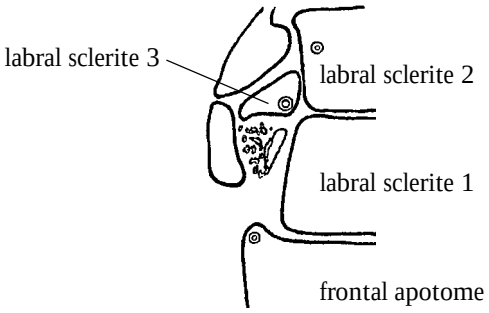
2(1) 6th lateral tooth of mentum smaller than 5th; labral sclerites 3 and 4 unconsolidated; anal tubules reduced; usually brackish water/salt marsh/estuarine species ..... ***G. devineyae***
(some *G. holoprasinus* may key here; see Notes on species)



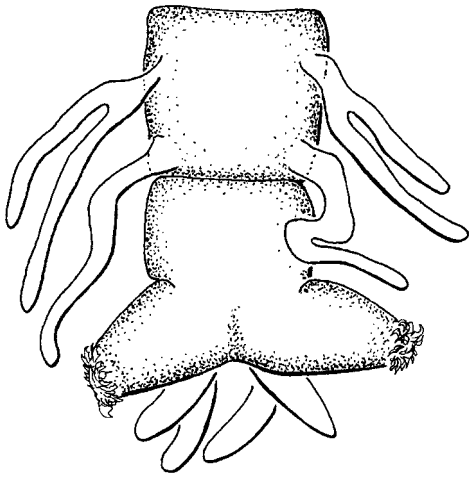



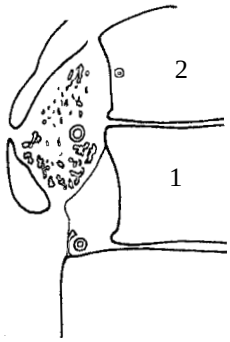
2' 6th lateral tooth of mentum larger than 5th; labral sclerite 3 present; anal tubules normal; usually freshwater species (but may occur in estuaries) ..... ***G. fluctuans***



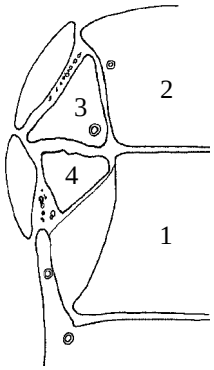



3(1') Anterior pair of ventral tubules forked; labral sclerites 3 and 4 unconsolidated ..... ***G. holoprasinus***

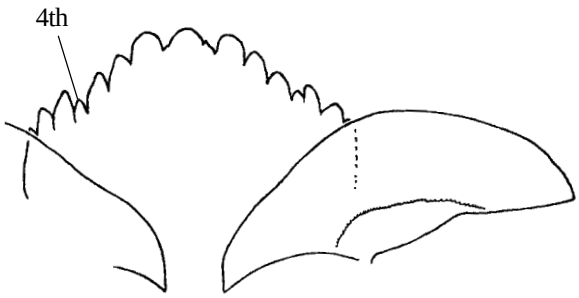




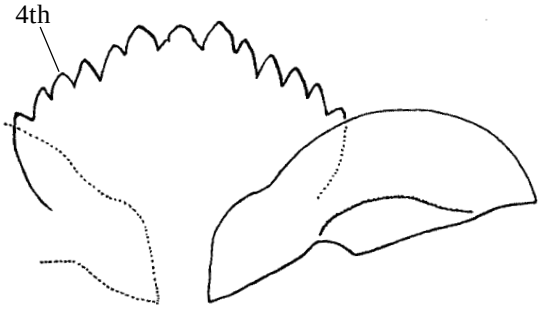

3' Anterior pair of ventral tubules simple; labral sclerite 3 **or** labral sclerites 3 and 4 present ..... 4



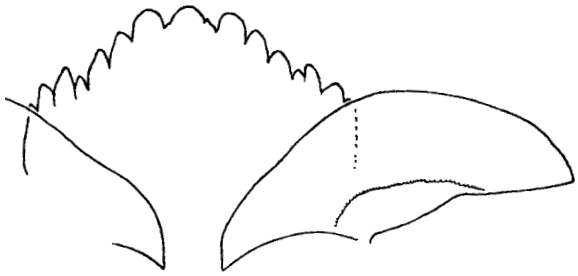

4(3') 4th lateral tooth of mentum smaller than 3rd or 6th ..... 5

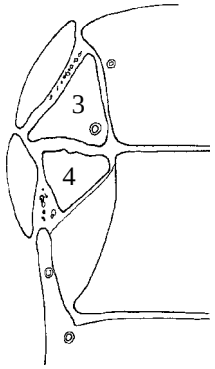



4' 4th lateral tooth of mentum subequal to 3rd and 5th ..... 6

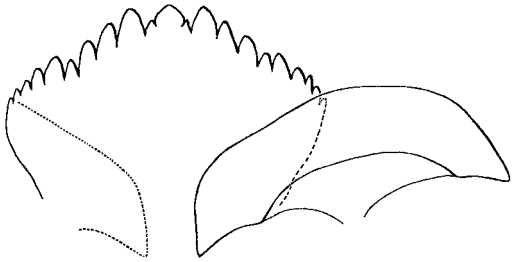


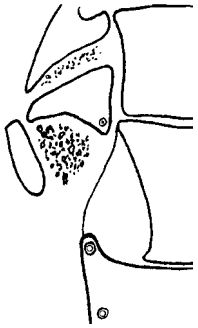
5(4) Mentum with 15-17 teeth; labral sclerites 3 and 4 present; postmentum without tubercles; common in organically enriched habitats ..... ***G. carus***



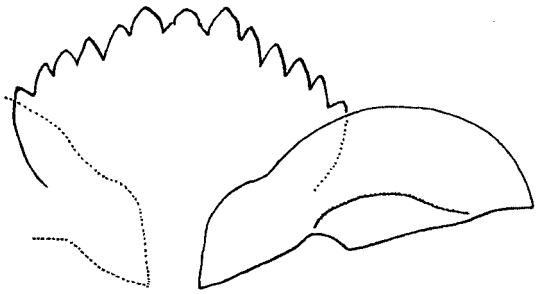


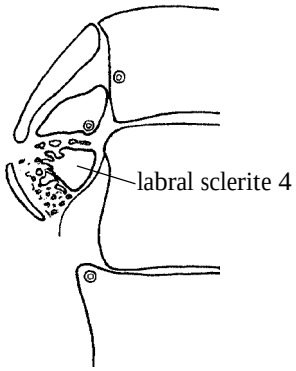

5' Mentum with more than 17 teeth (outer margin of mentum may appear serrated); labral sclerite 3 present but 4 unconsolidated; postmentum with pair of tubercles near hind margin (best seen in lateral view); more common in floating vegetation ..... ***G. pictus***
(not known from the Southeast; see Notes on species)



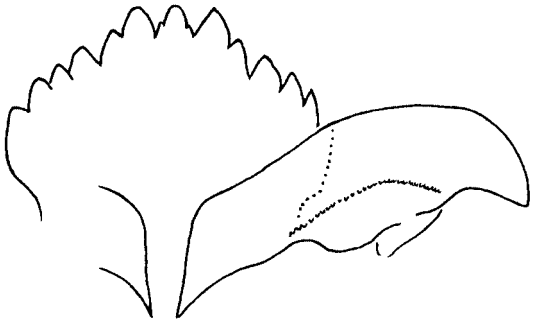


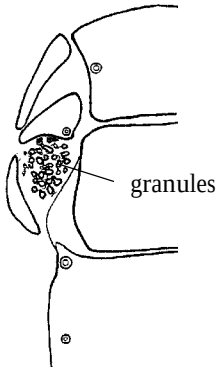
6(4') Labral sclerite 4 partially consolidated on inner side ..... ***G. amazonicus***






6' Labral sclerite 4 completely unconsolidated, consisting of rounded granules ..... ***G.* cf. *natans***





## Notes on species

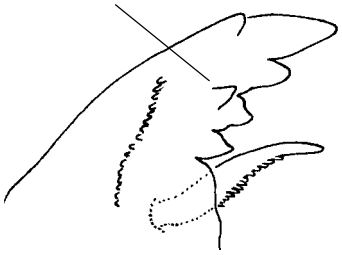
*G. amazonicus* - To date, this taxon is only known from Florida in the Southeast. However, since it does occur in northern Florida, it will probably eventually be found on the Coastal Plain in South Carolina. This benthic species can be easily confused with *G.* cf. *natans*; be sure to observe the labral sclerites. Formerly referred to as *Siolimyia amazonica*.

*G. carus* - Once placed in *Chironomus* (originally in *Tendipes* in Townes (1945)), this widespread species was considered a nuisance species by Beck & Beck (1969a); Caldwell et al. (1997) record it form North Carolina and Georgia. The species may be abundant below pulp mills, where it frequently occurs with *G. holoprasinus*. I've also collected it from small pools in an estuarine swamp in Florida.

*G. devineyae* - Originally placed in *Nilodorum*, this species is usually restricted to salt marshes or estuaries. However, Caldwell (pers. comm.) has found an adult in inland Georgia. Larvae can be confused with *G. holoprasinus*, which also may occur in salt marshes, especially if the posterior body segments have been lost. Both species have labral sclerites 3 and 4 unconsolidated, but note the additional dorsal mandibular tooth on *G. holoprasinus* (see below).

*G. fluctuans* - Formerly known only from Florida in the Southeast, I have seen a series of larvae from the Savannah River Plant area in South Carolina. I've also seen a single larva from near the mouth of the Suwannee River in Florida, indicating some tolerance for brackish water.

*G. holoprasinus* - A common to abundant, widespread species, especially in organically enriched habitats. It is a pioneer species, often invading temporary water bodies. Specimens with damaged or lost posterior body segments may be confused with *G. devineyae*. However, *G. holoprasinus* larvae have an additional dorsal tooth near the inner teeth of the mandible. Also, early instar larvae may have only simple ventral tubules; rely on the absence of labral sclerites 3 and 4 and the additional dorsal tooth of the mandible to identify such specimens. It was formerly known as *Chironomus fulvipilus* Rempel.



*G. holoprasinus* mandible showing 4th inner tooth

*G.* cf. *natans* - I've only seen larvae of this taxon; hence its identity is unclear. Its presence in northern Florida (the Fenholloway and Santa Fe Rivers) indicates that it might be found on the Costal Plain in the Carolinas. It is uncommon in the oligotrophic saw grass (*Cladium*) stands of the northern Everglades.

*G. pictus* - This species is not known from the Southeast, but was reported by Hudson et al. (1990) for Florida. I have not seen any specimens from Florida.

Several other species of *Goeldichironomus* occur in the Neotropics; some of these may eventually be found in the US, especially in southern Florida. See Reiss (1974) and Strixino and Strixino (1991) for more information.

Genus ***Harnischia***

**DIAGNOSIS:** Distinguished by the premandible with more than 3 teeth; the scale-like, distally trifid pecten epipharyngis; antennal segment 2 subequal to 3; outermost lateral teeth of mentum not larger than inner teeth; and the weakly striated ventromental plates.

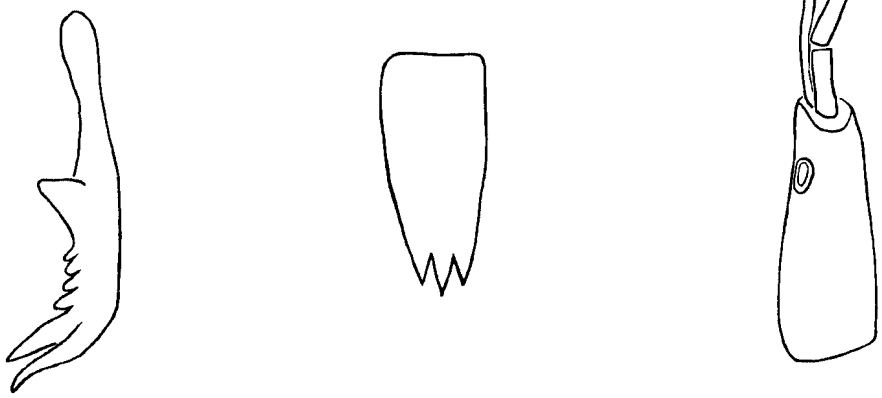
**NOTES:** Two species of *Harnischia*, *H. curtilamellata* and *H. incidata*, occur in the Southeast; only the larva of *H. curtilamellata* is described. Thus, *Harnischia* larvae can only be identifed as "*Harnischia* sp.".

*Harnischia* forms the center of a group of closely related genera known as the *Harnischia* complex. Several "genera" are known only as larvae and can be found at the end of this chapter. Beck and Beck (1969b) and Sæther (1977) have published synopses on this complex.

Larvae occur in rivers and streams; they may be limited to relatively clean waters (Simpson & Bode 1980).

**ADDITIONAL REFERENCES:** Sæther 1977a; Townes 1945.

mentum



premandible pecten epipharyngis antenna

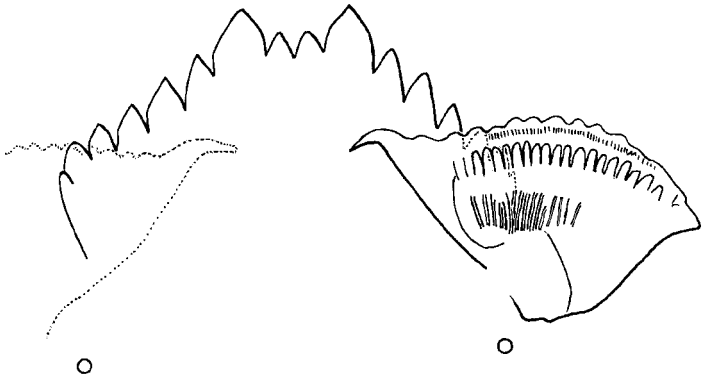
Genus ***Hyporhygma***

**DIAGNOSIS:** Distinguished by the frontal apotome, with 2 median labral sclerites anterior to it; pecten epipharyngis of three scales, each with 46 smaller teeth on surface; mentum with 2 median teeth lower and smaller than first lateral teeth; ventromental plates with scalloped anterior margin and strong striae and sculpturing; and leaf-mining habit.

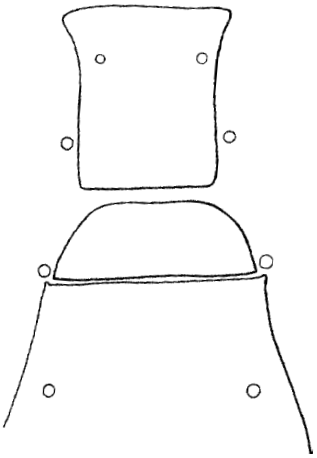
**NOTES:** One species, *H. quadripunctatum*, is known from North America. It was previously placed in *Tribelos* and *Endochironomus* until Reiss (1982) placed it in its own genus.

Larvae mine in the leaves and stems of *Nuphar* and *Nymphaea*.

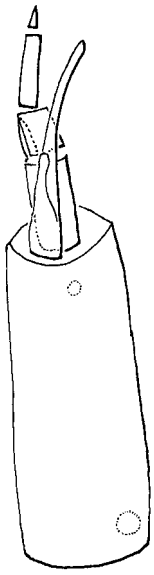
**ADDITIONAL REFERENCES:** Reiss 1982.



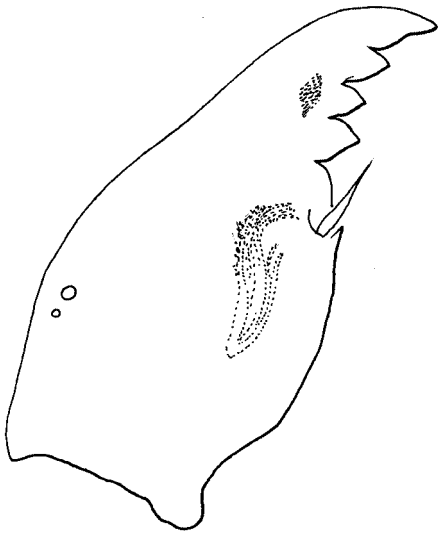
mentum



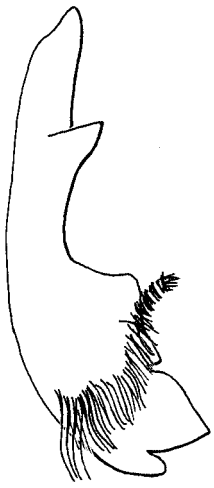
apotome and median labral sclerites



antenna



mandible



premandible

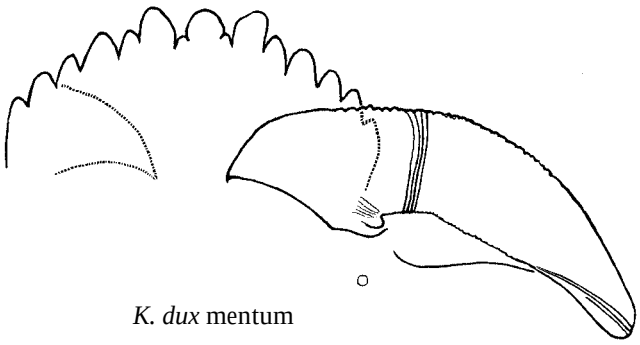
Genus ***Kiefferulus***

**DIAGNOSIS:** Distinguished by the frontal apotome (thus with 2 median labral sclerites anterior to it); apotome with small, oval, anteromedian fenestra; premandible with 5 or more teeth; mandible without basal radial striae or grooves; and body with single pair of ventral tubules.

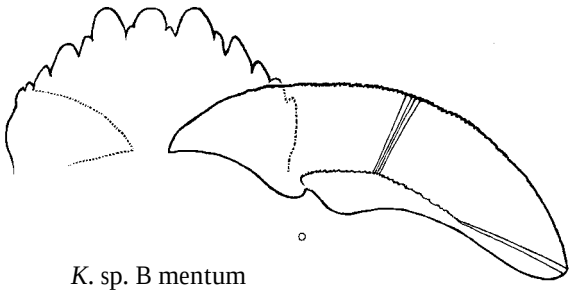
**NOTES:** Four species are known from the Southeast, two of which are undescribed; Caldwell et al. (1997) record three species from the Carolinas. Note that many records of the common species, *K. dux*, must be veiwed with skepticism, since it was earlier thought that only this one species of *Kiefferulus* was present in the eastern United States. Two subgenera are present, *K. (Kiefferulus)* and *K. (Wirthiella)*, each with two species in the Southeast. These subgenera can only be identified using pupae: *K. (Wirthiella)* pupae have rows of needle-like spines on sternites I-III; *K. (Kiefferulus)* pupae lack these spines. Characters used to sepaarte the adults of the subgenera used in Cranston et al. (1989) do not appear to work with material from the Southeast.

Larvae are found in or on sediments and vegetation; they can tolerate low dissolved oxygen conditions.

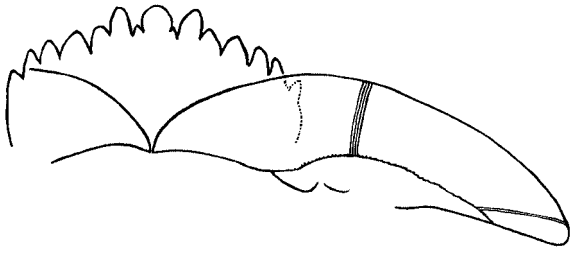
**ADDITIONAL REFERENCES:** Townes 1945.



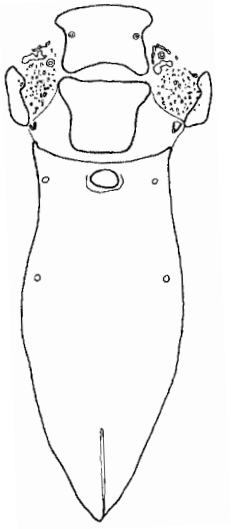
*K. dux* mentum



*K.* sp. B mentum



*K.* sp. A mentum

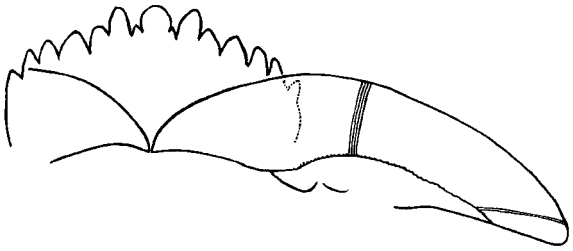


apotome and labral sclerites

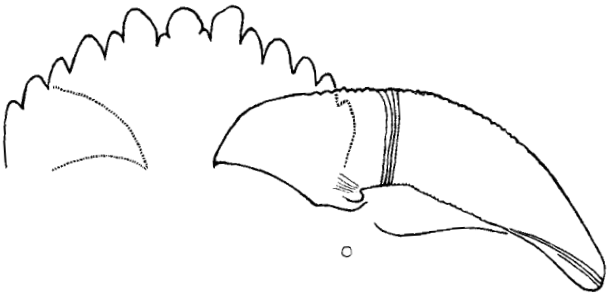
premandible

## Key to *Kiefferulus* larvae of the southeastern United States

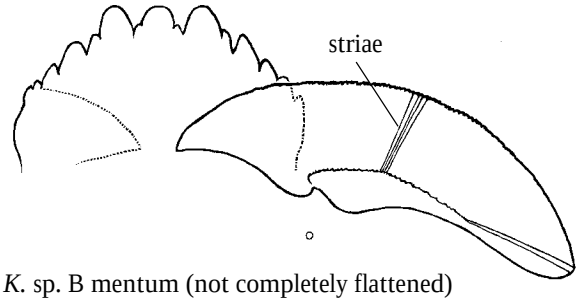
1 Ventromental plates touching medially or nearly so; anterior margin of ventromental plates smooth; peninsular Florida only (?) ..... ***K.* sp. A**



1' Ventromental plates separated medially; anterior margin of plates finely scalloped; widespread ..... 2



2(1') Ventromental plate with about 100 striae .. ..... ***K.* sp. B**

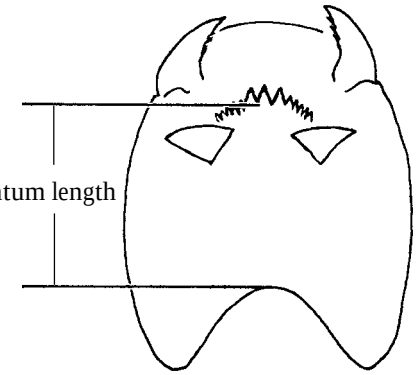



*K.* sp. B mentum (not completely flattened)

2' Ventromental plate with fewer than 75 striae ..... 3

3(2') 4th instar larvae only: postmentum length 255-290, mean 270 µm; basal antennal segment length 75-98, mean 88 µm ..... ***K. pungens***

**NOTE**: 4th instar larvae are necessary for accurate measurements!!




3' 4th instar larvae only: postmentum length 275-380, mean 335 µm; basal antennal segment length 95-145, mean 113 µm ..... ***K. dux***

## Notes on species

*K. dux* - A common and widespread species, but possibly confused with *K.* sp. A as an adult and *K. pungens* and *K.* sp. B as a larva (see below). I measured larvae of 18 reared *K. pungens* and 15 reared *K. dux* to obtain the numbers in the key used for separating the larvae of these two taxa; there is some overlap and the species are best identified with associated pupae. Adults and pupae of *K. dux* are very similar to those of *K.* sp. A but larvae are easily separable using the above key.

*K. pungens* - Formerly placed in *Chironomus*, reared material indicates that this species belongs with *K. (Wirthiella)*. The larva is very similar to *K. dux* and is separable only by its smaller size (see key); larvae are best identified with associated pupae or adults. Pupae of *K. pungens* have needle-like spines on sternites I-III and a massive caudolateral comb on tergite VIII; pupae of *K. dux* lack the ventral spines and have a reduced caudolateral comb. Adults of *K. pungens* are distinctive from other Nearctic species of the genus (see Townes 1945).

*K.* sp. A - In the Southeast known only from peninsular Florida; I have reared this undescribed species from the northern Everglades (description in preparation). This unusual species is similar to larvae of the closely related African genus *Acinoretracus* (Epler et al. 1999), but differs in the simple ventromental plate striae; those of *Acinoretracus* are forked. The pupa and adult of *K.* sp. A are very similar to those of *K. dux*; more work is needed to ascertain characters that may separate the two taxa.

*K.* sp. B - Known only from larvae and one pupa; Caldwell et al. (1997) report this species from South Carolina but I have not examined material from there. All material I've seen came from peninsular Florida; adults are unknown. The presence of needle-like spines on sternites I-III of the pupa place this species in *K. (Wirthiella)*.

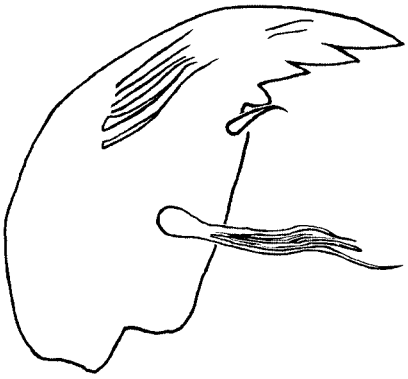
Genus ***Kloosia***

**DIAGNOSIS:** Distinguished by the small, thin S I setae, much smaller than large, blade-like S II; 6 segmented antennae; premandible with 3 apical teeth; mandible without dorsal spine; mentum with 6 pairs of lateral teeth; rounded ventromental plates; large claws of anterior parapods at most about 0.4 length of head capsule; body segments appearing subdivided; and anal setae short, slightly longer than supraanal setae.

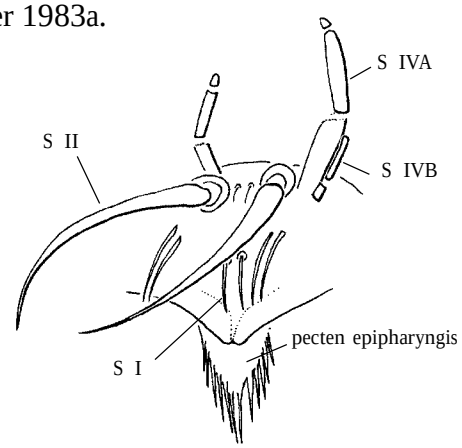
**NOTES:** One species, *K. dorsenna* (originally described in the genus *Oschia*), is known from the Southeast. Larvae are very similar to those of *Harnischia* complex genus C, but can be differentiated by the characters listed above. The median tooth of the mentum might be considered deeply trifid in *Kloosia*; if viewed in this manner, the first pair of lateral teeth are partially fused to the second (i.e., the division between the first and second lateral teeth is shallow).

Larvae are found in sandy substrata of running waters.

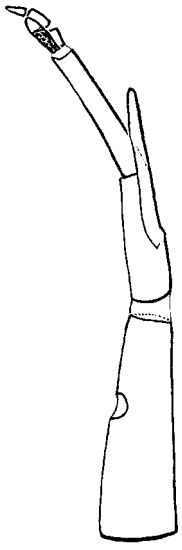
**ADDITIONAL REFERENCES:** Reiss 1988b; Sæther 1983a.



mandible



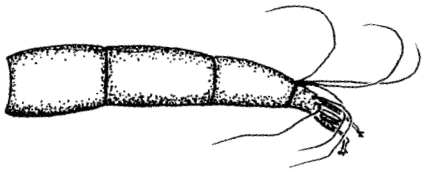

labrum



antenna

mentum

premandible



posterior end

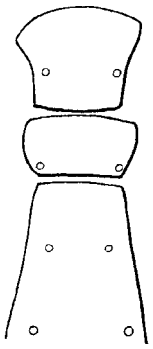
## Genus *Lauterborniella*

**DIAGNOSIS:** Distinguished by the frontal apotome, with 2 median sclerites anterior to it (clypeus and labral sclerite 2); 6 segmented antennae with alternate Lauterborn organs at the apex of segments 2 and 3; plumose setae submenti placed posteromedially to ventromental plates; short lateral tubules on body segment 10; and body segment 11 with a posteriorly directed hump.

**NOTES:** One species, *L. agrayloides*, is known from North America. Other Nearctic species formerly placed in *Lauterborniella* are now placed in *Stelechomyia* or *Zavreliella*.

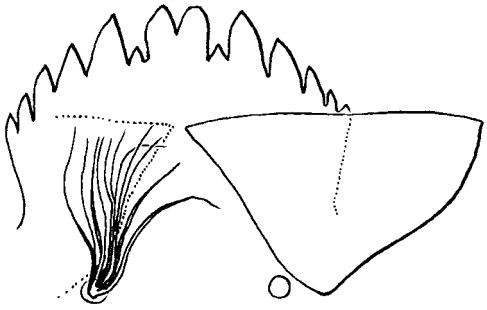
Larvae live in transportable cases resembling those of the caddisfly *Hydroptila*. Larvae are found among vegetation in ponds and slow moving areas of streams.

**ADDITIONAL REFERENCES:** None.

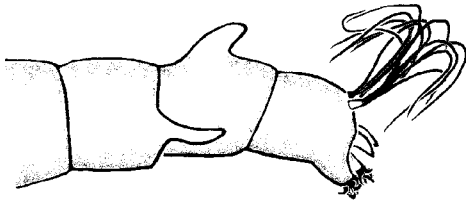


apotome and median labral sclerites

antenna



mentum



posterior end

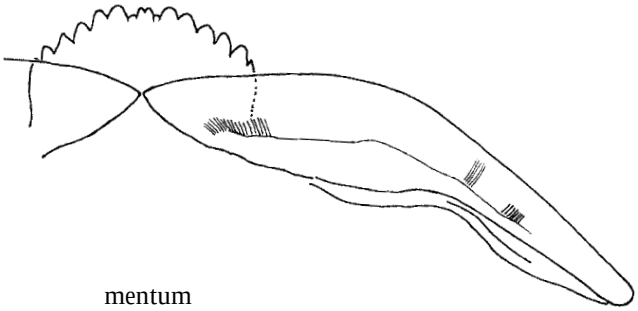
Genus ***Lipiniella***

**DIAGNOSIS:** Distinguished by the frontoclypeal apotome with 1 labral sclerite anterior to it; a dark, blunt tubercle present mediad to antennal base; mandible with a dorsal tooth, 3 triangular inner teeth, a short, simple seta subdentalis and an outer, posterior hump; mentum with bifid median tooth; wide ventromental plates that touch medially; premandible with brush and 5-6 teeth; and a pair of short ventral tubules on abdominal segment 8.

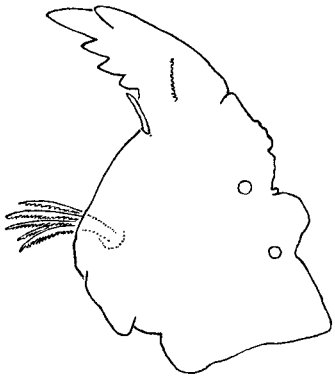
**NOTES:** No described species are recorded from the Nearctic, but at least one species does occur in the Southeast. The larva figured by Roback (1963) as "*Xenochironomus (Anceus) scopula* ? Townes" is probably a *Lipiniella*; his figure 14 of the mentum of a "juvenile labial plate" of *X. festivus* may also be a *Lipiniella*. The maxillae of *Lipiniella* larvae I've examined have a brush of setae near the base of the maxillary palp, but the setae are not as long as those observed on *Axarus* larvae maxillae.

Larvae are found in sandy sediments in lotic and lentic habitats.

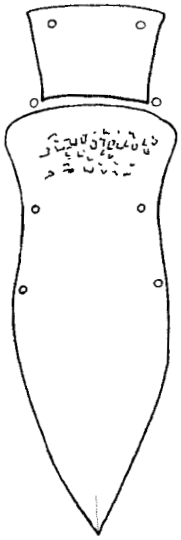
**ADDITIONAL REFERENCES:** Shilova 1961, 1963; Shilova et al. 1992.



mentum

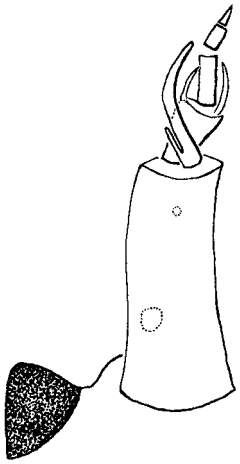


mandible



apotome and labral sclerite

premandible



antenna and tubercle

Genus ***Manoa***

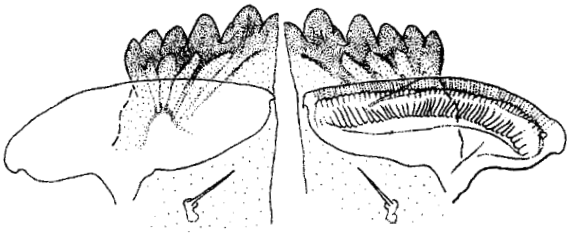
**DIAGNOSIS:** Distinguished by the S I setae arising from a common base; antennae not mounted on elongate pedestal; mandible without dorsal tooth and with seta subdentalis on dorsal side; mentum with second lateral tooth reduced and mostly fused with first lateral tooth; large bar-like ventromental plates that touch or almost touch medially; mandible with proximal inner tooth pointed; and procerci that arise from a common base that overhangs the last body segment.

**NOTES:** Rick Jacobsen (pers. comm.) has recently found an undescribed species of this tropical genus in Everglades National Park, Florida. He has graciously sent figures and information from a manuscript describing this new species. *Manoa* is only the second representative genus of the tribe Pseudochironomini in continental North America (the other genus being *Pseudochironomus*). *Manoa* is not known from the Carolinas.

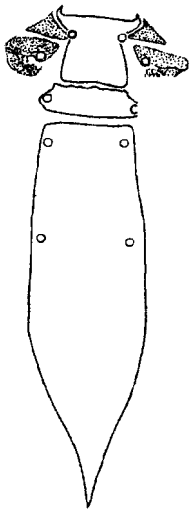
Fittkau (1963) originally described *Manoa* with one species, *M. obscura*, from the Amazon. The larva of *M. obscura* has very long procerci and anal tubules. Jacobsen's new species from the Everglades has normal anal tubules but does have long procerci that arise from a common base; the procerci of *Pseudochironomus* are shorter and arise separately.

Florida *Manoa* are found in shallow water areas subject to fluctuating water levels and seasonal drying.

**ADDITIONAL REFERENCES:** Fittkau 1963; Jacobsen & Perry (in press).

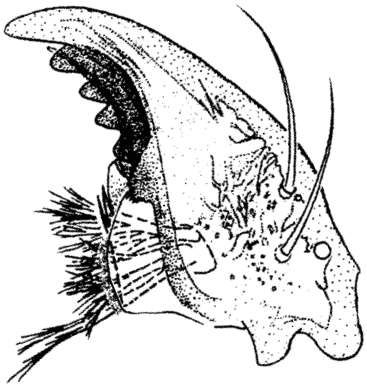


mentum

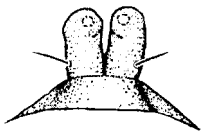


apotome and labral sclerites

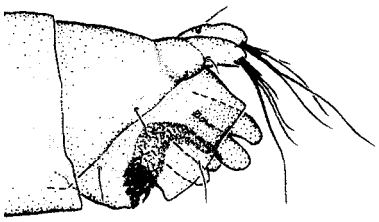
antenna



mandible



procerci, dorsal



body posterior, lateral

(all figures by R.E. Jacobsen)

## Genus *Microchironomus*

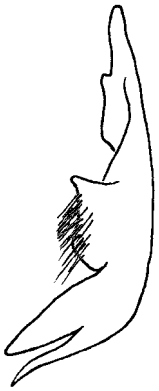
**DIAGNOSIS:** Distinguished by the linear mentum (not arched) with outer teeth enlarged and trifid median tooth; pecten epipharyngis a simple plate or with 3 apical lobes; bifid premandible with brush; mandible without dorsal tooth or pecten mandibularis; and antennal blade as long as or longer than the flagellum.

**NOTES:** A member of the *Harnischia* complex of genera, *Microchironomus* appears to be represented by at least two species in the Southeast; only one, *M. nigrovittatus*, is described. Any unassociated larva should be indentified as "*Microchironomus* sp. ". The genus was formerly referred to as *Leptochironomus*.

Larvae have been found in lakes, large rivers and ditches; little is known of their ecology.

**ADDITIONAL REFERENCES:** Sæther 1977a.

mentum



premandible

antenna

## Genus *Micropsectra*

**DIAGNOSIS:** This tanytarsine is distinguished by its pecten epipharyngis with 3 lobes, each lobe with numerous distal teeth/serrations; bifid premandible; ventromental plates touching or almost touching medially; and antenna with Lauterborn organs on pedicels that greatly exceed the antennal flagellum (segments 2-5), and with antennal blade about as long as segment 2.

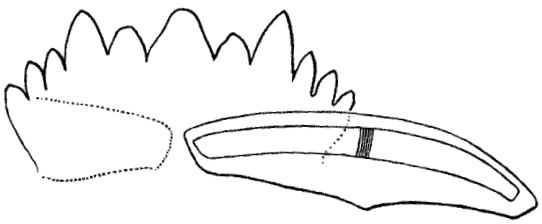
**NOTES:** Caldwell et al. (1997) listed two described and more than four undescribed species of *Micropsectra* for the Carolinas; the key that follows deals with eight taxa. Like all tanytarsine genera in North America, *Micropsectra* is in need of revision. The Tanytarsini are being revised by Dr. J.E. Sublette and it is anticipated that revisions of some genera will be published in the future.

*Micropsectra* and *Tanytarsus*, as well as other tanytarsine genera, have been confused in the past because it was erroneously believed that tanytarsines with long Lauterborn organ pedicels, medially touching ventromental plates and a spur on the antennal pedestal were *Micropsectra*. However, many *Tanytarsus* have such a spur and some *Micropsectra* lack one.

The larva of *Parapsectra* is known only from a single European species, *P. uliginosa* Reiss, that has a hump on the outer margin of the mandible, similar to *M*. sp. B, C and E in the following key. The antennal blade of *P. uliginosa* is short and squat, not long as in *M*. sp. B, C and E. The true placement of *M*. sp. B and C will be unclear until the larvae are associated with pupae; *M*. sp. E has been reared and is a true *Micropsectra*.

*Micropsectra* larvae are found in a wide range of lentic and lotic habitats, but in the Carolinas are usually most abundant in mountain streams; the genus is uncommon to rare on the Coastal Plain.

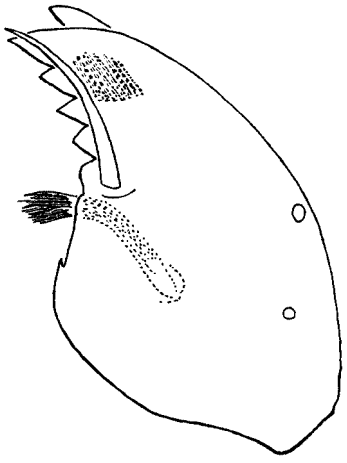
**ADDITIONAL REFERENCES:** Oliver & Dillon 1994a; Säwedal 1982; Webb 1981.

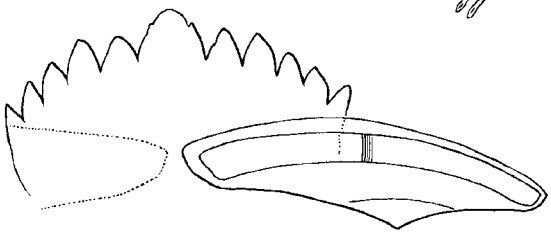


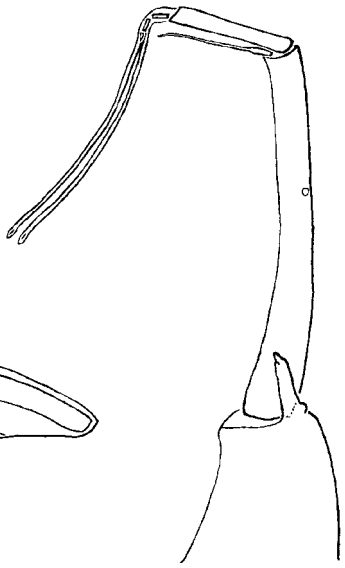
*M*. sp. B mentum

premandible

pecten epipharyngis



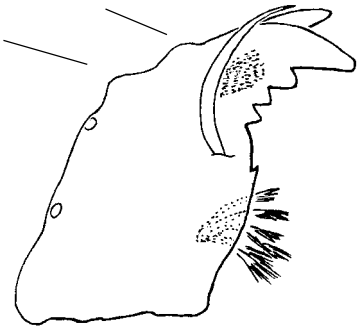




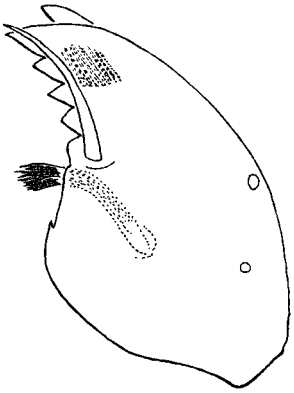
*M*. sp. A mandible, mentum and antenna

## Key to *Micropsectra* larvae of the southeastern United States

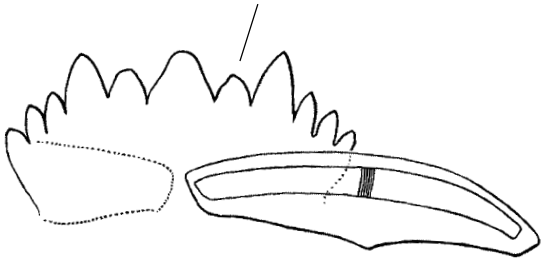
1 Outer margin of mandible with 1 or 2 small humps ..... 2

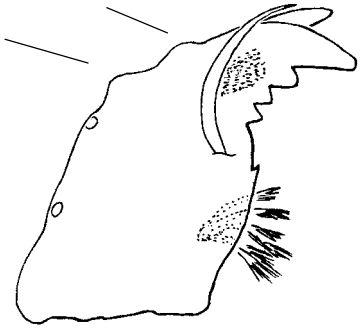


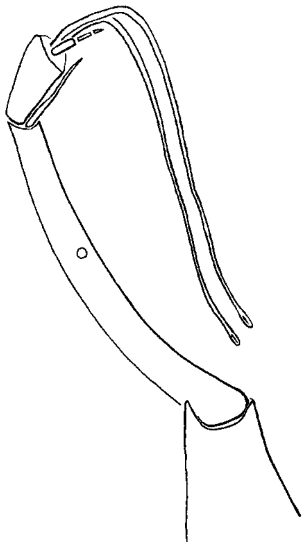
1' Outer margin of mandble smooth or nearly so ..... 4



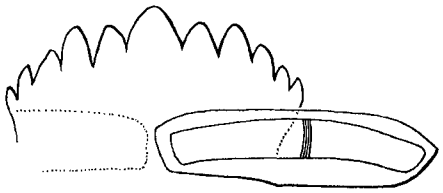
2(1) Mentum with reduced first lateral tooth; outer margin of mandible with 2 humps; antenna with second segment wider at apex than at base; first antennal segment 4-6X as long as second segment ..... ***M.* sp. B**



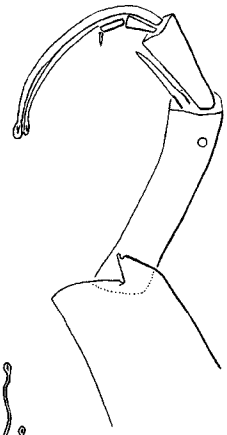


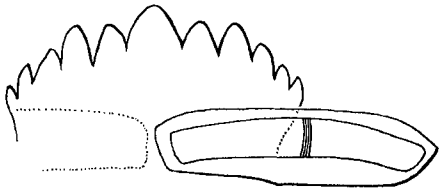


2' Mentum with first and second lateral teeth subequal (first may appear slightly lower than second); outer margin of mandible with 1 hump; antenna not as above ..... 3

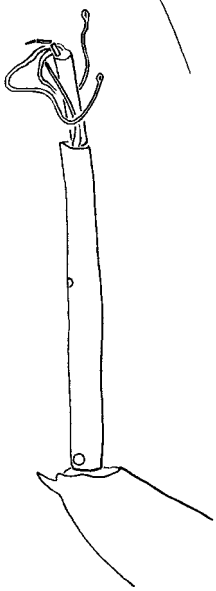


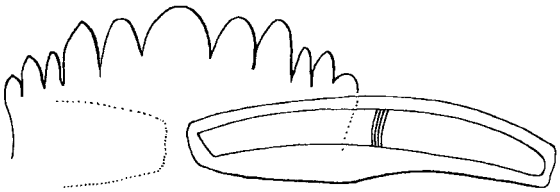
3(2') First antennal segment 2-2.5X as long as second; second antennal segment wider at apex than at base ..... ***M.* sp. C**



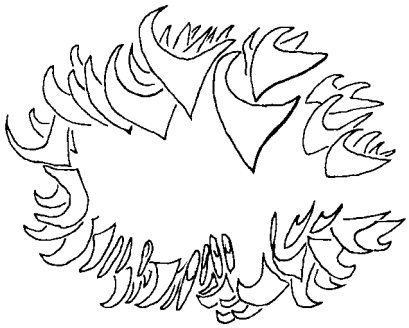


3' First antennal segment about 4X as long as second; second antennal segment about as wide at apex as at base ..... ***M.* sp. E**



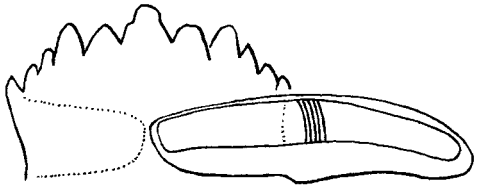


4(1') Each hind parapod with 40 or more claws ..... 5

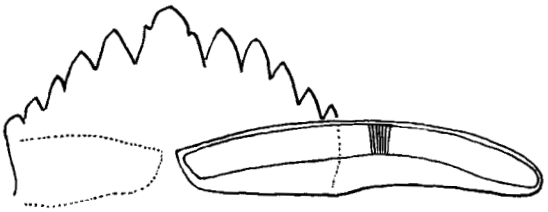


4' Each hind parapod with 25 or fewer claws (usually around 15) ..... 6

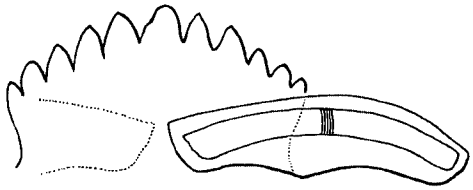
5(4) Mentum with first lateral tooth lower than or even with second so that mentum appears straight across median and first 2 pairs of lateral teeth ..... ..... ***M. dives*** and ***M. geminata***
(identify larvae that key to here as "*M. dives/geminata*")

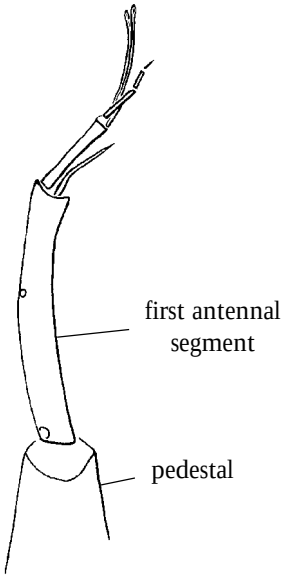


5' Mentum with teeth more in an even arch ..... ..... ***M. polita***
(see Notes on species)

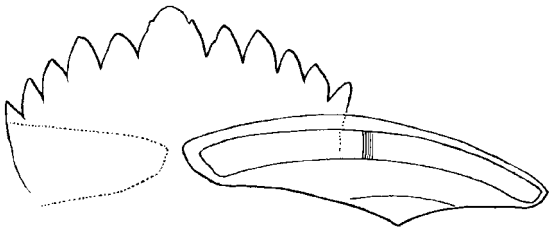


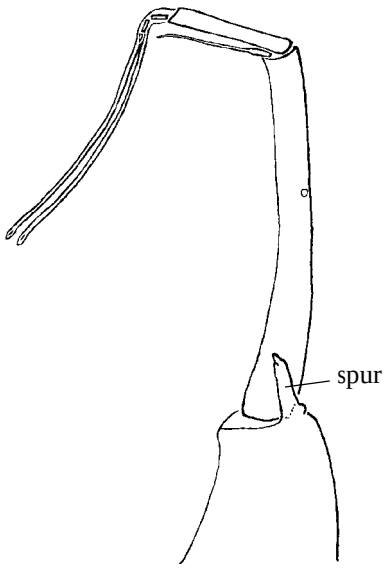
6(4') Antenna pedestal without spur ..... ***M.* sp. D**






6' Antenna pedestal with spur ..... ***M.* sp. A**





## Notes on species

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

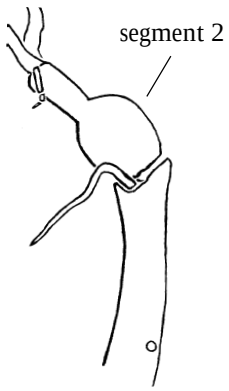
*M. geminata* - Oliver & Dillon (1994) described this species, which is very similar to *M. dives*. I have seen adults from North and South Carolina. The mentum width character used by Oliver & Dillon (1994:204) to separate the larvae of *M. dives* and *M. geminata* (that of *M. dives* > 100 µm, of *M. geminata* < 95 µm) will not work, based on reared material of *M. geminata* from the Canadian National Collection in which the mentum widths of two larvae were 124 and 134 µm. Unassociated larvae that key to couplet 5 should be identified as "*M. dives/geminata*".

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

*M. recurvata* - Listed for North and South Carolina by Oliver et al. (1990); I have not seen any material of this species; the larva is undescribed. It is possible that records of this species may actually refer to *M. dives* or *M. geminata*.

*M. xantha* - Listed for the Southeast by Oliver et al. (1990); I have not seen any material of this species; the larva is undescribed. The adult of *M. xantha* is also similar to *M. dives*, *polita* and *recurvata*.

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



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

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

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

*M*. sp. D - An unusual larva; it has a trifid pecten epipharyngis with numerous apical toothlets and long pedicels bearing the Lauterborn organs, which should place it as a *Micropsectra*. However, a pharate pupa within a larva has an abdominal spine pattern similar to *Paratanytarsus penicillatus* (Goetghebuer), an arctic/boreal species, except that it lacks the anterior round spine patches on tergite VI. *Paratanytarsus* is closely related to *Micropsectra*; a series of reared specimens of *M*. sp. D will be necessary to determine its true generic placement. Note also the long third antennal segment.

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

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

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

## Genus *Microtendipes*

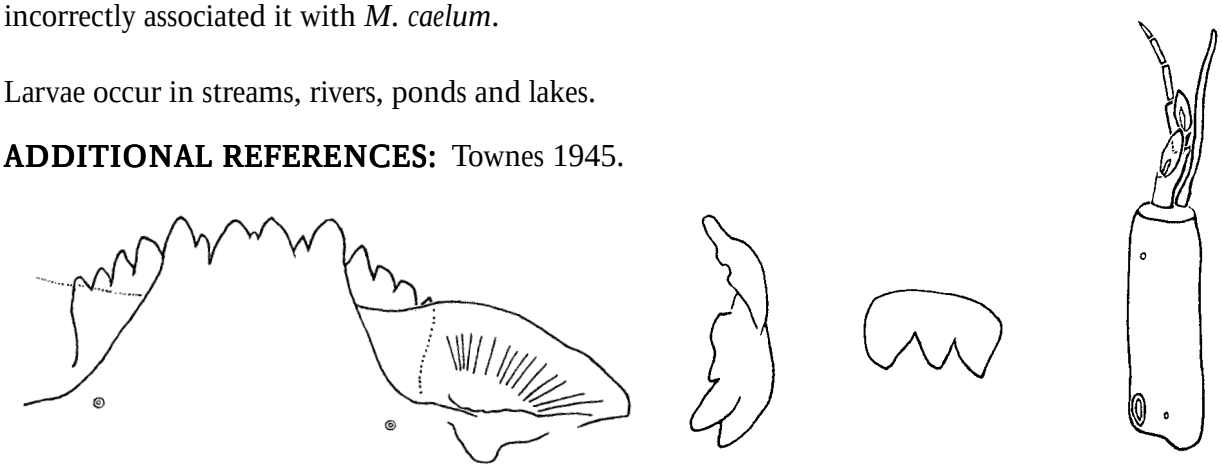
**DIAGNOSIS:** Distinguished by the frontal apotome with straight anterior margin separating it from the clypeus; bases of S I separate or contiguous; 6 segmented antenna with alternate Lauterborn organs at the apices of segments 2 and 3; mentum with 3 pale median teeth (median tooth may be minute); and the coarsely striated ventromental plates.

**NOTES:** Four described species are known from the Southeast; three of these occur in the Carolinas. There are probably at least two undescribed species present here. Larvae can not be identified to species without associated males and even then the possibility of an identification is low. Correct identification of males requires a revision of the genus utilizing type material from Europe; an attempt at a revision of the Nearctic *Microtendipes* by a graduate student was abandoned several years ago.

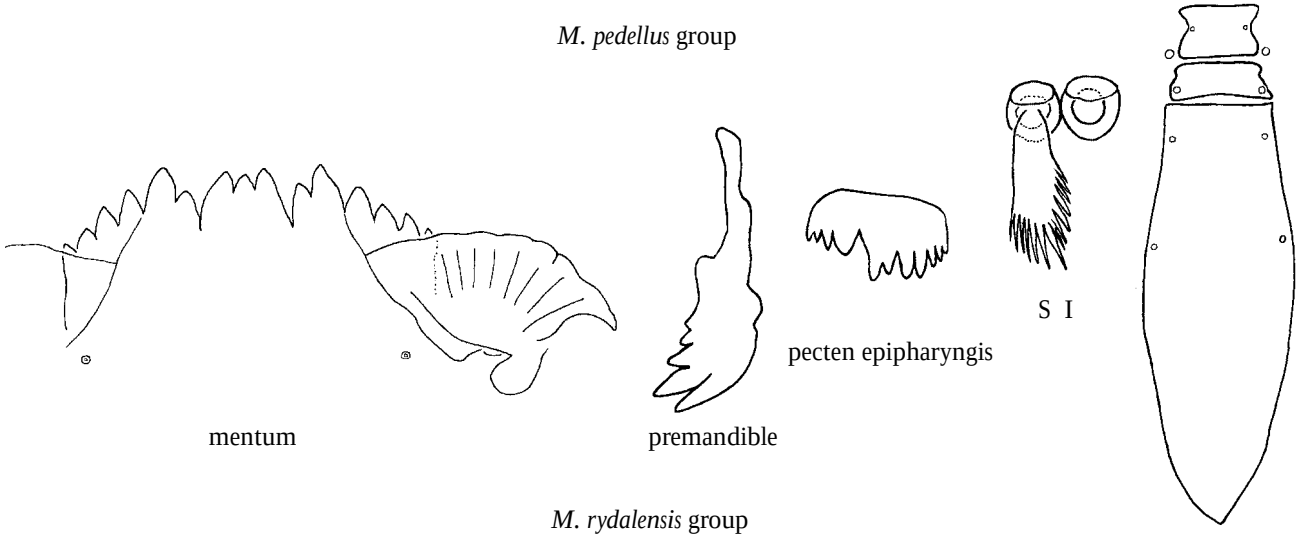
Larvae can be separated into two groups, named after European species: 1) the *rydalensis* group is distinguished by 3 large median teeth on the mentum, premandible with 5 inner teeth and pecten epipharyngis with numerous apical teeth; 2) the *pedellus* group, with 2 large median teeth and a much smaller (sometimes vestigial or absent) central tooth on the mentum, a 3 toothed premandible (proximal tooth very small) and pecten epipharyngis with 3-4 coarse teeth. I have associations of *M. caelum*; it is a member of the *rydalensis* group. Simpson & Bode (1980) figured a *pedellus* group larva but misidentified it as or incorrectly associated it with *M. caelum*.

Larvae occur in streams, rivers, ponds and lakes.

**ADDITIONAL REFERENCES:** Townes 1945.




*M. pedellus* group




*M. rydalensis* group

apotome and labral sclerites

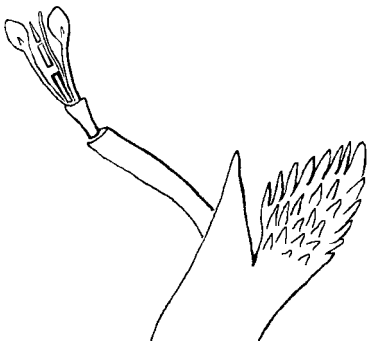
## Genus *Neostempellina*

**DIAGNOSIS:** Distinguished by the simple frontoclypeal setae; finely granulate frontoclypeal apotome, without tubercles; antennal base with spur and mesal palmate process; Lauterborn organs on pedicels arising from the apex of antennal segment 2; widely separated, squat ventromental plates; procerci with dark, simple apical spurs; and portable sand case.

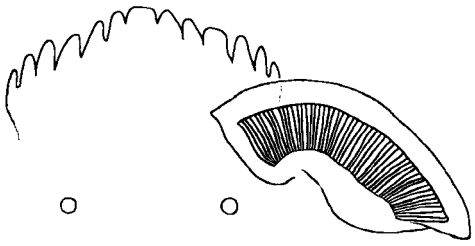
**NOTES:** One species, *N. reissi* Caldwell, has been described from the eastern US (Maine); this species has not been recorded from the Carolinas. B.A. Caldwell (pers. comm.) has collected a *Neostempellina* adult from a stream near the Apalachicola River in northern Florida. I have not seen any Nearctic larvae of *Neostempellina*; the diagnosis above and figures below are based on a European species, *N. thienemanni* Reiss. Note that *N. thienemanni* is the species whose larvae and pupae were erroneously identified as *Stempellina montivaga* in many previous works, such as Pinder & Reiss (1983: figs. 10.71 A,C, E and F); see Reiss (1984) for a full listing of those publications. Also note that the "real" *S. montivaga* is a junior synonym of *S. bausei* (Kieffer), a species not known to occur in the Nearctic. See also *Stempellina*.

Larvae of the Palaearctic species *N. thienemanni* occur in moss in cold springs and spring-fed streams.

**ADDITIONAL REFERENCES:** Caldwell 2000b; Reiss 1984.



*N. thienemanni* antenna



*N. thienemanni* mentum

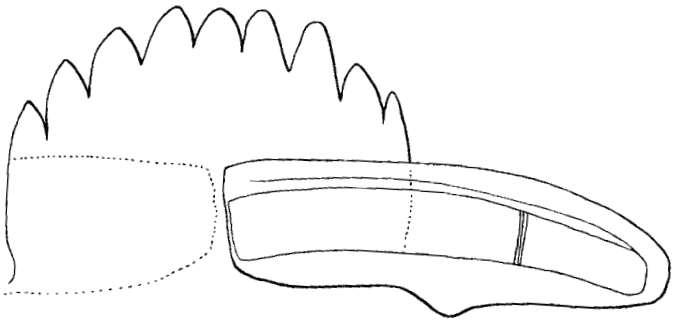
Genus ***Neozavrelia***

**DIAGNOSIS:** This tanytarsine genus is distinguished by the pecten epipharyngis of 3 scales with numerous fine apical teeth; bifid premandible; antennae with well developed Lauterborn organs on moderately long pedicels; mandible with 1 dorsal tooth and 2 inner teeth; mentum with 4 pairs of lateral teeth (a minute 5th pair is sometimes evident); and ventromental plates almost touching medially.

**NOTES:** *Neozavrelia* has only recently been found in North America; I've seen putative unassociated larvae from Ohio and North Carolina, and Caldwell et al. (1997) recorded a pupal exuviae from Georgia. Larvae are similar to *Sublettea* but have one less pair of teeth on the mentum, only one dorsal tooth on the mandible and a pecten epipharygnis with numerous fine apical teeth. Pinder & Reiss (1983) noted that *Neozavrelia* may have 5 pairs of lateral teeth on the mentum, but I have not seen such material from the Southeast. North American larvae I've examined have a distinct hump on the outer margin of the mandible that is not illustrated for European species.

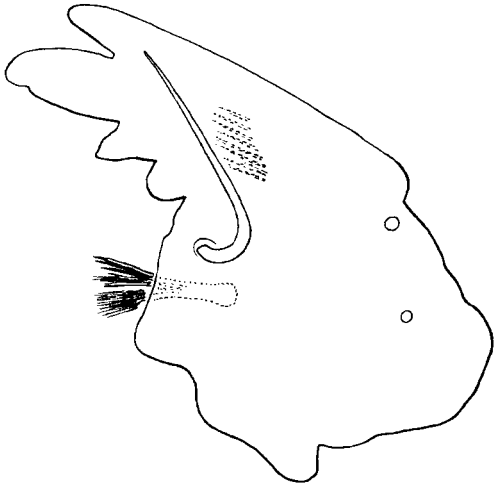
Larvae are recorded from hygropetric habitats as well as streams, rivers and lakes.

**ADDITIONAL REFERENCES:** Thienemann 1942.

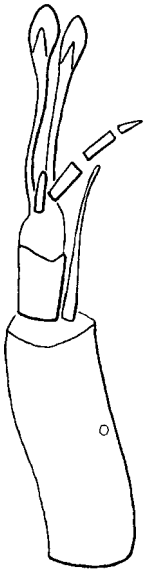


mentum

pecten epipharyngis



mandible



antenna

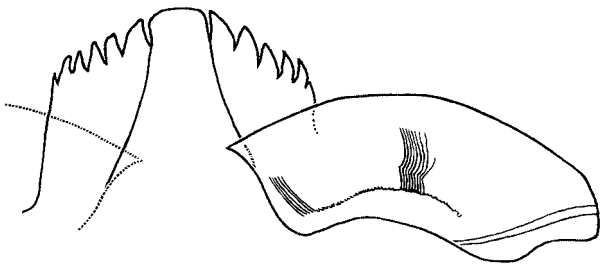
Genus ***Nilothauma***

**DIAGNOSIS:** Distinguished by the simple labral sclerite 5; antenna with basal segment shorter than flagellum (segments 2-6; 6th segment is vestigial and usually not apparent); mandible with inner teeth grouped closely together and a single dorsal tooth; mentum with pale, usually rounded median tooth; and setae submenti placed posterior to ventromental plates.

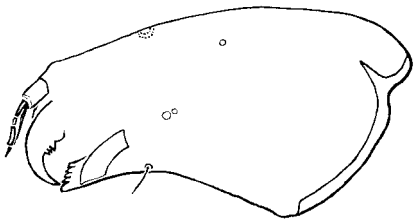
**NOTES:** Three described species are known from the Southeast; I have specimens of an additional undescribed species, known only as an adult, from Alabama, Florida and North Carolina. Although Adam & Sæther (1999) offered a key to larvae, in reality it is not possible to identify isolated larvae to species. They tentatively associated a larva with *N. mirabile*, but their measurement of its postmental length (246 µm) is far in excess of a reared specimen of this species in my collection with a postmentum length of only 108 µm. Their specimen may belong with the undescribed species, which has a large adult; I have in my collection an unassociated large larva from a lake in north Florida that is probably this same species. In "perfect" larvae, the median tooth is composed of 4-6 tiny teeth; however, these are invariably worn in most specimens so that the mentum appears to have a simple, dome-like tooth. The 6th antennal segment noted by Adam & Sæther (1999) is very small and difficult to observe. In lateral view, the head capsule is flattened anteriorly, appearing "bean-like"; note also that the 4th antennal segment is usually slightly curved.

Larvae are found most often in rivers and streams, but also occur in lakes.

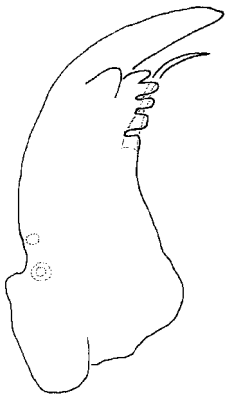
**ADDITIONAL REFERENCES:** Adam & Sæther 1999; Townes 1945 (as *Kribioxenus*).



*N. bicorne* mentum

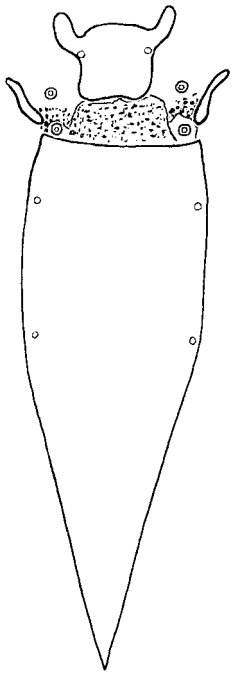


head, lateral



mandible

*N. bicorne* antenna



apotome and labral sclerites

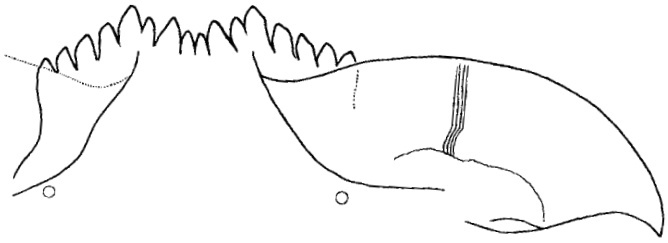
Genus ***Omisus***

**DIAGNOSIS:** Distinguished by the broad plumose S I setae with separate bases; 6 segmented antenna with Lauterborn organs at the apices of segments 2 and 3; mandible with 2 dorsal teeth; and mentum with central pair of median teeth lower and more slender than outer median teeth.

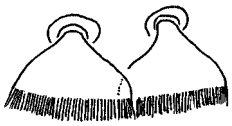
**NOTES:** Two species of *Omisus* are found in the Southeast; the larvae of the two species are inseparable at this time. The larva figured as *O.* sp. A in Epler (1995) was described, along with its adult and pupal stages, as *O. browni* by Caldwell (2000a). He noted that the Beck's (Beck & Beck 1970) larval material of *O. pica* was aberrant in having only 14 teeth on the mentum. Most *O. pica* larvae have a 16 toothed mentum, but the number of mental teeth may be 14, 15 or 16. Because only one species of *Omisus* was supposed to occur in the Southeast before Hudson et al. (1990), Epler (1995) and Caldwell (2000a), there is little doubt that some previous records of *O. pica*, in any life stage, refer to *O. browni*. Unassociated larvae of *Omisus* must be identified as "*Omisus* sp."

Larvae are known from seeps, small streams, ponds, marshes and peat bogs; Caldwell (2000a) also reported *Omisus* larvae from soil core samples in cypress domes in Florida.

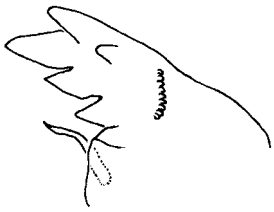
**ADDITIONAL REFERENCES:** Beck & Beck 1970; Caldwell 2000a.



mentum



S I



apex of mandible

antenna

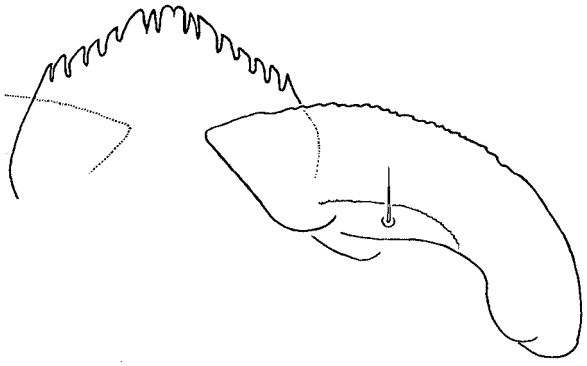
Genus ***Pagastiella***

**DIAGNOSIS:** Distinguished by the apically toothed labral sclerite 5; antenna with basal segment longer than flagellum; mandible 2 dorsal teeth and with inner teeth spread along inner margin; distinctively shaped pale mentum; and setae submenti placed near the posterior margin of the ventromental plates.

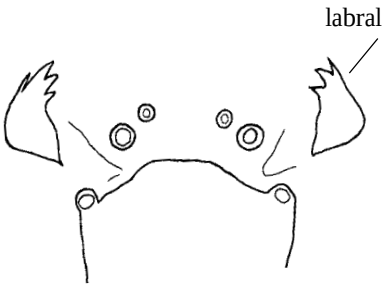
**NOTES:** The status of which species of *Pagastiella* occur in the Nearctic is uncertain. The species described from the Nearctic, *P. ostansa* (Webb), is probably the same as (and thus a junior synonym of) the European species *P. orophila* (Edwards). Examination of type material of the two taxa is necessary to determine the true identity of the Nearctic species. Hudson et al. (1990) stated that "an undescribed species has been collected in coastal streams", but nothing else is known of this taxon. *Pagastiella* larvae should be identified as "*Pagastiella* sp.".

Larvae are found in littoral sediments of ponds, lakes and the slower reaches of streams and rivers.

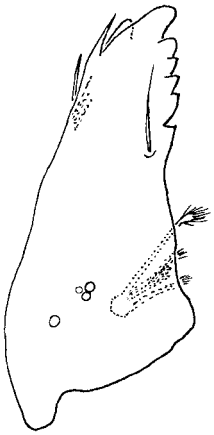
**ADDITIONAL REFERENCES:** Webb 1969.



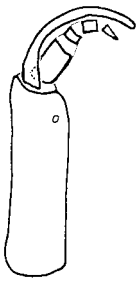
mentum




apex of apotome and labral sclerite 5



mandible



antenna

## Genus *Parachironomus*

**DIAGNOSIS:** Distinguished by the simple S I (with small accessory branches in *P. frequens*); pecten epipharyngis a wide, transparent plate with 5 or more apical teeth (only 3 in *P. alatus*); 5 segmented antenna; absence of premandible brush; and mandible without dorsal tooth.

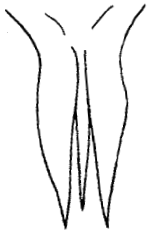
**NOTES:** At least 16 species of *Parachironomus* are known from the Southeast; at least one of those species, *P. abortivus*, may not actually occur in the area. At least eight other species occur in the Nearctic that have not been recorded from the Southeast (Spies 2000). Spies (2000) has shown that one commonly recorded species, *P. monochromus*, does not occur in the Nearctic (in the Southeast the species referred to as *P. monochromus* is *P. hazelriggi*). At least two species complexes occur in Nearctic members of the genus, the larvae of which are inseparable (see key). Contrary to Pinder & Reiss (1983), the mandible may have two or three inner teeth, and a pecten mandibularis is present in several species as two to three large setae dorsally on the mandible that run from midway to near the apex. The most accurate method for identifying *Parachironomus* is to rear the larvae and identify the adult males with Spies (2000).

Larvae are found in lentic and lotic water bodies under a wide range of conditions.

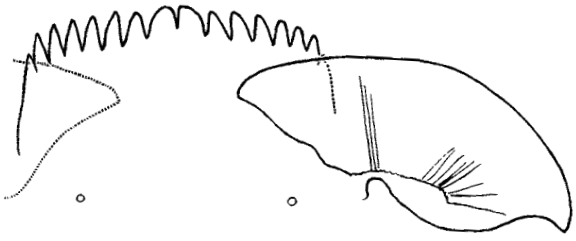
**ADDITIONAL REFERENCES:** Beck & Beck 1969b; Lehmann 1970a; Spies 2000; Spies et al. 1994; Townes 1945.

*P. carinatus* mentum

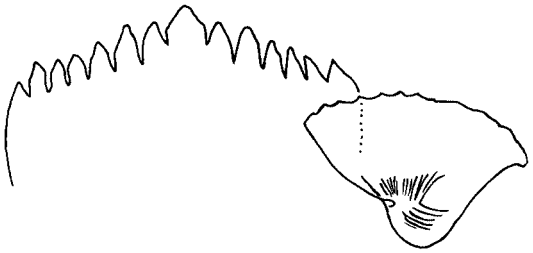
*P. hazelriggi* pecten epipharyngis



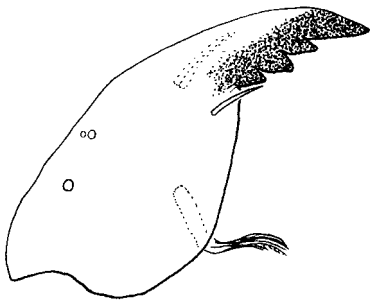
*P. alatus* pecten epipharyngis



*P. frequens* mentum



*P. hazelriggi* mentum



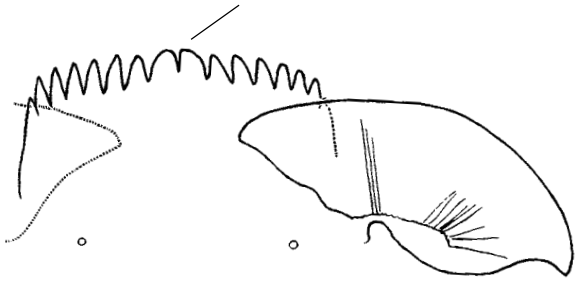
*P. supparilis* mandible

*P. carinatus* antenna

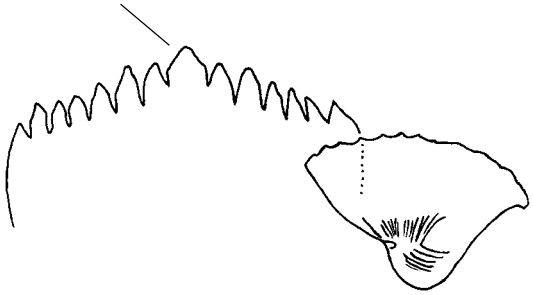
## Key to *Parachironomus* larvae of the southeastern United States

(the larvae of *P. digitalis* and *P. guarani* are unknown)

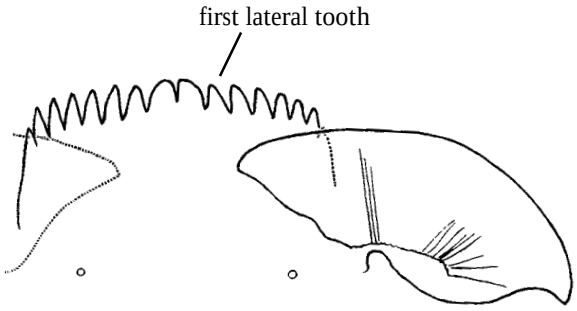
1 Median tooth of mentum bifid ..... 2



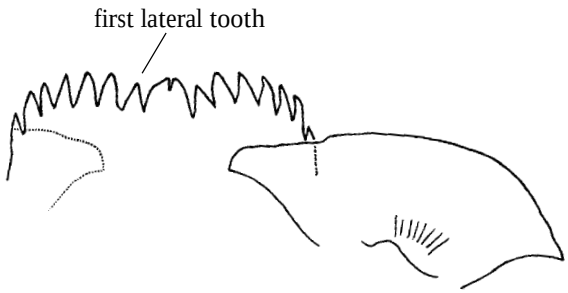
1' Median tooth of mentum simple ..... 3

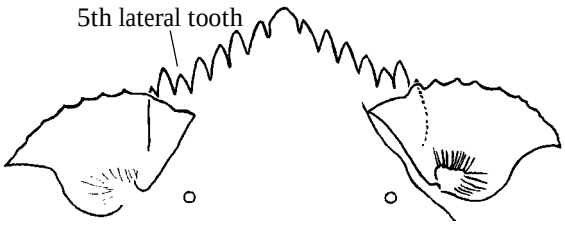


2(1) First lateral tooth of mentum equal to second lateral tooth; premandible with 4 large teeth ..... ..... ***P. frequens***



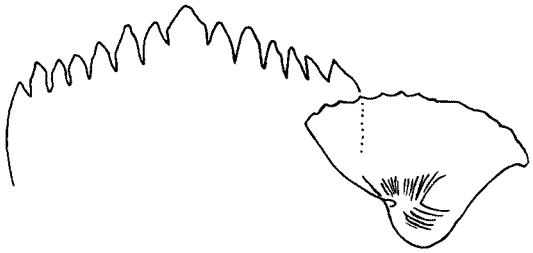

2' First lateral tooth of mentum smaller than second lateral tooth; premandible with 3 large teeth .. ..... ***P. pectinatellae***

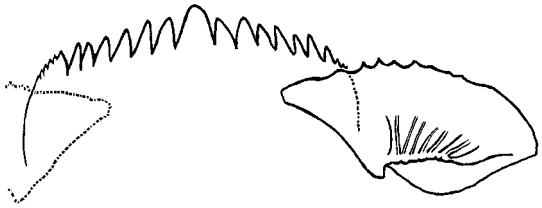


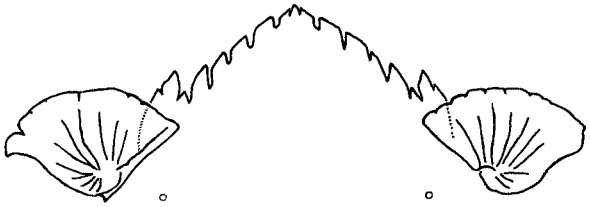




3(1') 5th lateral tooth of mentum distinctly smaller than its neighbors ..... 4

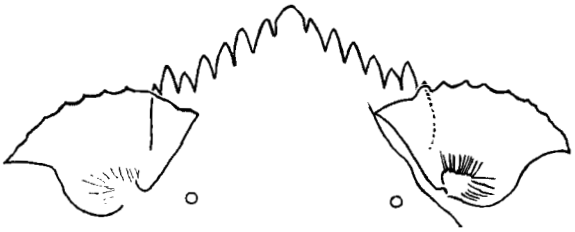
3' 5th lateral tooth of mentum subequal to 6th ..... 5



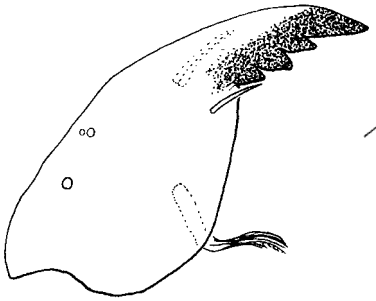


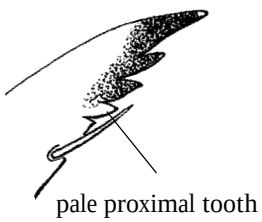


4(3) Mentum outline strongly arched; anterior margin of ventromental plate smoothly scalloped ..... ***P. alatus***



4' Mentum not as strongly arched; anterior margin of ventromental plate with blunt points ..... ***P. chaetoalus* complex** (includes *P. chaetoalus*, *P. hirtalatus* and some "unresolved" material; see Notes on species)






5(3') Mandible with 3 well developed, dark inner teeth ..... 6

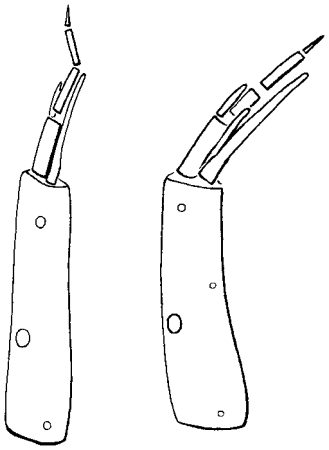
with 3 dark inner teeth

5' Mandible with 2 well developed inner teeth or with 3 inner teeth, the proximal tooth smaller and pale ..... 7

6(5) 3rd antennal segment longer than or subequal to 4th .... ***P. sublettei***

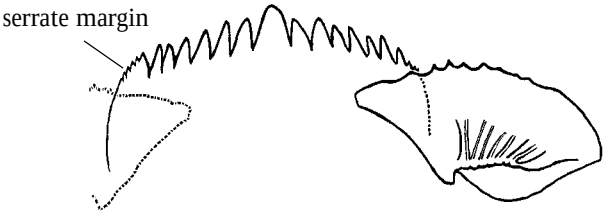
6' 4th antennal segment longer than 3rd ..... ***P. supparilis***

*P. supparilis* mentum

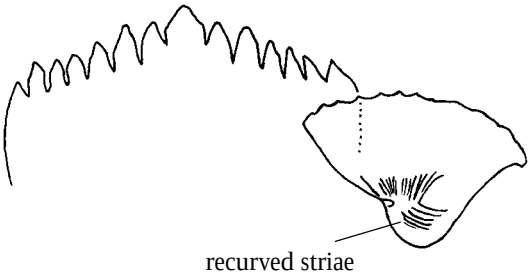


*P. sublettei* *P. supparilis*

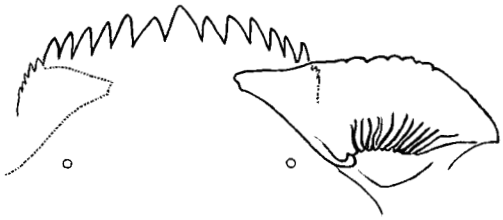
7(5') Outer margin of mentum serrate (may require observation at 1000X); ventromental plate without recurved striae or transverse ridges posterolaterally ..... 8



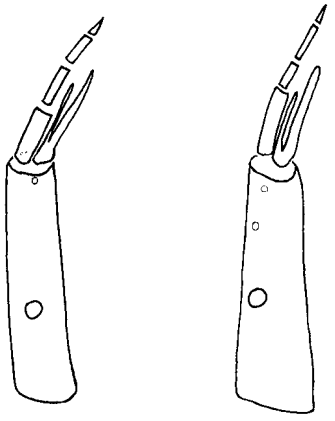

7' Outer margin of mentum not serrated (last lateral tooth may be finely dissected or notched); ventromental plate with recurved striae or transverse ridges posterolaterallly ..... 9




8(7) Antennal segments 3 and 4 subequal; anterior margin of ventromental plate smoothly crenulated ..... ***P. directus***

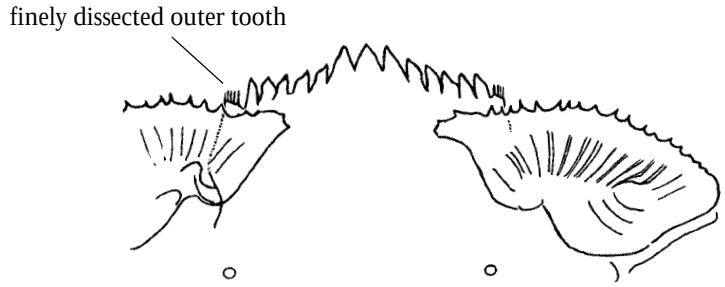


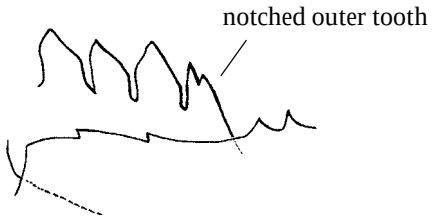
8' Antennal segment 4 longer than 3; anterior margin of ventromental plate with blunt points ..... ***P. carinatus***



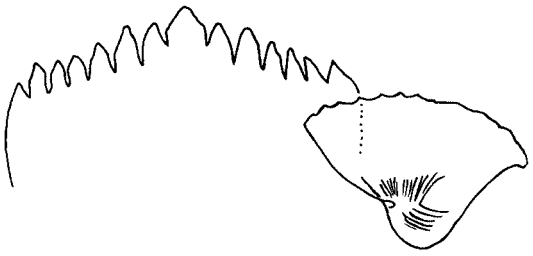
*P. directus* *P. carinatus*

9(7') Mentum with 3 middle teeth subequal; outer tooth of mentum often finely dissected or notched (but may be simple); anterior margin of ventromental plate with sharp points ..... ***P. potamogeti***




9' Mentum with median tooth wider than 1st lateral teeth; outer tooth of mentum simple; anterior margin of ventromental plate with blunt points ..... 10



10(9') Premandible dark; antennal segments 1-3 usually brown; 1st antennal segment about 5X length of 2nd ..... ***P. schneideri***

10' Premandible light; antennal segment 1 may be dark yellow, remaining segments pale; 1st antennal segment about 4X length of 2nd ..... ***P. tenuicaudatus* complex**
( includes *P. abortivus, P. hazelriggi, P. tenuicaudatus*; see Notes on species)

## Notes on species

*P. abortivus* - Recorded for the Carolinas by Hudson et al. (1990) and Caldwell et al. (1997). However, only the adult male can be identified with certainty; larvae are inseparable from *P. hazelriggi* and *P. tenuicaudatus*. If the records in the two publications above were based only on larvae, they must be considered dubious. Note that inclusion of *P. abortivus* in the "*tenuicaudatus* group" does not indicate a close phylogenetic relationship between it and the other two species.

*P. alatus* - An unusual species that may deserve separate subgeneric or generic placement, for its larva and pupa are atypical for *Parachironomus*. This larva of this species may be mistaken for a *Cladopelma* because of the similar mentum, but note that in *P. alatus* the premandible lacks a brush, the pecten epipharyngis is trifid, the antennae have a long fourth segment and there are recurved striae on the posterior portion of the ventromental plates.

*P. carinatus* - A common species in the eastern US, but often misidentified, probably because the serrated outer margin of the mentum is not noted.

*P. chaetoalus* - Larvae of *P. chaetoalus* are inseparable from those of *P. hirtalatus* and specimens I've examined that, as adults, key to "Unresolved" in Spies (2000). Adult males are necessary for correct identification; larvae are best identified as "*P. chaetoalus* complex". Although Epler (1995) noted that *P. chaetoalus* and *P. hirtalatus* might be synonymous, Spies (2000) treated them as separate species; adult males are separable by the structure of the superior volsella. *Parachironomus chaetoalus* occurs throughout the Southeast; both species occur in Florida (adults listed as *P*. sp. C in Epler

(1995) are *P. chaetoalus*, determined by Martin Spies). See also "Unresolved" below.

*P. digitalis* - The larva of this species is undescribed; I've seen adult males from the Savannah River Plant area in South Carolina and from Alabama. These records constitute, along with records from Georgia, the first reports of this European species from the Nearctic (Spies 2000).

*P. directus* - This species, described from Alabama, has been reported from North Carolina as well as Florida and Georgia. There appears to be some variation in the anterior points of the ventromental plate; separation of the larvae of this species from *P. carinatus* can only be done if the antennae are flat, otherwise the difference in length of segments 3 and 4 can not be accurately measured.

*P. frequens* - Epler (1995) noted that *P. frequens* may be more common that previously thought because larvae had been confused with *P. pectinatellae*. Simpson & Bode (1980) considered it to be uncommon and noted that it often occurred with *P. abortivus*. Note, however, that larvae identified as *P. abortivus* may actually belong to *P. hazelriggi* or *P. tenuicaudatus*. The larva of *P. frequens* differs from most other *Parachironomus* in that the S I has small accessory branches ("split ends").

*P. guarani* Spies, Fittkau & Reiss - Not known from the Carolinas; I have an adult from Alabama, identified by Martin Spies, in my collection. The larva is unknown. See Spies et al. (1994) for more information on this Neotropical species.

*P. hazelriggi* - For many years this species has been misidentified as *P. monochromus*, a European species that apparently does not occur in the United States. See Spies (2000) for a detailed account including past erroneous records. The larva is not separable from those of *P. abortivus* (but see comments under that name), *P. tenuicaudatus* and the true *P. monochromus*.

*P. hirtalatus* - Not recorded from the Carolinas, but may occur there. I have seen a reared male from Ohio and Oliver et al. (1990) record it from Illinois south to Mississippi and Florida. Larvae are inseparable from those of *P. chaetoalus* and specimens I've examined that, as adults, key to "Unresolved" in Spies (2000). Adult males are necessary for correct identification; larvae are best identified as "*P. chaetoalus* complex". See also *P. chaetoalus* and "Unresolved".

*P. pectinatellae* - This species was originally described by Dendy & Sublette (1959) from larvae taken from the freshwater bryozoan *Pectinatella magnifica*. It has often been confused with *P. frequens* but can be separated by the characters given in the key above.

*P. potamogeti* - Larvae I've placed here may have the last lateral tooth of the mentum finely dissected (like a fork), notched or entire. Referred to as *P.* sp. B in Epler (1995), the identity of *P. potamogeti* and apparently related taxa is confused. In Spies (2000), adults with *potamogeti*-like genitalia but without setae in apical wing cells (present on the holotype of *P. potamogeti*) key to "Unresolved" (see below).

*P. schneideri* - Known from Florida, Georgia and North Carolina in the Southeast (Caldwell et al. 1997). Oliver et al. (1990) also record it from Kentucky, but some of their records from Kentucky (such as records of the marine genera *Clunio* and *Thalassomya*) are dubious. Identifications based solely on larvae are suspect; an associated male is necessary for accurate identification. Do not assume that any *Parachironomus* larva with a darkened premandible is *P. schneideri*; other species, such as *P. supparilis*, may have darkened premandibles.

*P. sublettei* - Not recorded from the Carolinas; to date known only from Florida and Georgia. The mentum and ventromental plates of this species are paler than those of most other *Parachironomus* species. Note that although Beck & Beck (1969b) stated that recurved striae were not present on the ventromental plates, such striae are visible under high magnification. I've reared this species from a tidally influenced, brackish water habitat in peninsular Florida.

*P. supparilis* - A widespread species in the Neotropics, this taxon was referred to as *P.* sp. A in Epler (1992). Spies et al. (1994) considered this taxon to be a superspecies and described four varieties; the form found in the US is the variety *centralis*. Not yet found in the Carolinas, it will probably eventually

be found there; known from Florida and Georgia.

*P. tenuicaudatus* - A species confused with "*P. monochromus*" by Beck & Beck (1969b). Their reared male of "*P. tenuicaudatus*" from Lake St. Clair in Polk County, Florida, is a *P. hazelriggi*, noted in Epler (1995) as a "*P. monochromus*". The larva of *P. tenuicaudatus* is inseparable from those of *P. abortivus* (but see comments under that name), *P. hazelriggi* and the true *P. monochromus* (a European species; see *P. hazelriggi* above). Identifications of *P. abortivus* and *P. tenuicaudatus* in the literature based on larvae are suspect.

"Unresolved" - Spies (2000: 141) noted a complex of species with partially intergrading character states that includes some specimens with genitalia close to *P. potamogeti* (q.v.). I have examined one reared specimen from Ohio with such male genitalia but without wing cell setae; the larva appears to be inseparable from those of *P. chaetoalus* and *P. hirtalatus* (species in which the adults have wing cell setae, as does the holotype of *P. potamogeti*). This may indicate that the presence or absence of wing cell setae is a variable character that may not be useful in phylogenetic analysis or as a character to define and/or identify species in *Parachironomus*.

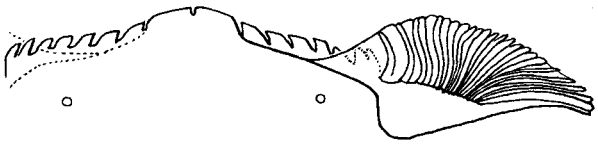
Genus ***Paracladopelma***

**DIAGNOSIS:** Distinguished by the small, seta-like S I and large S II; 5 segmented antennae with second segment much longer than third; mandible without dorsal tooth; premandible with 4 or more teeth, with brush; coarsely striated ventromental plates; and pale mentum or mentum with at least a broad, pale median tooth/teeth.

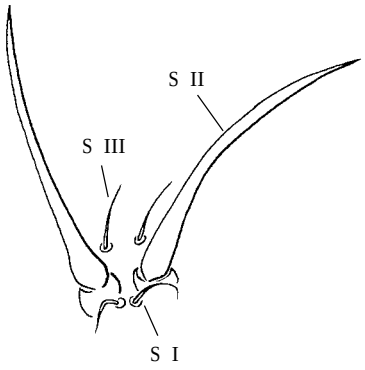
**NOTES:** Six species are known from the Carolinas, but only four have described adults and available names; an additional species known only from larvae is included in this manual. Contrary to the diagnosis in Pinder & Reiss (1983), a brush is present on the premandible, although it is hyaline and easily overlooked.

Larvae are found in sand substrata in lentic and (usually) lotic conditions. Some species may be sensitive to eutrophication (Pinder & Reiss 1983).

**ADDITIONAL REFERENCES:** Jackson 1977; Sæther 1977a.

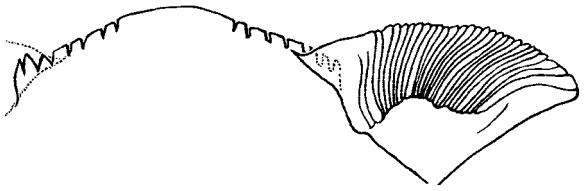


*P. undine* mentum

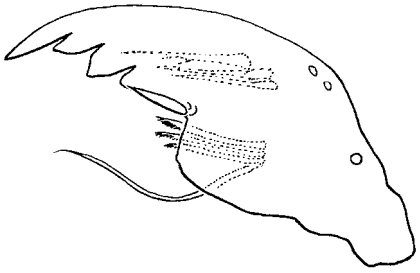



*P. doris* labrum

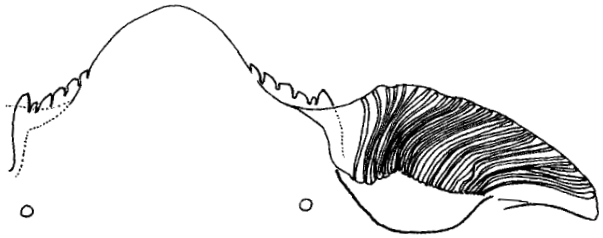
*P. undine* premandible



*P. nereis* mentum



*P. undine* mandible

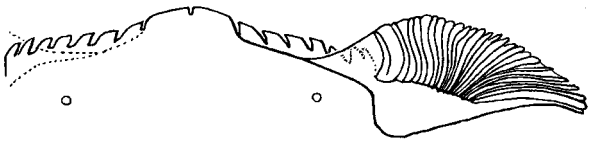


*P. loganae* mentum

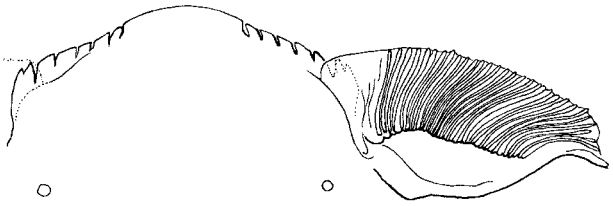
*P.* sp. 1 antenna

## Key to *Paracladopelma* larvae of the southeastern United States

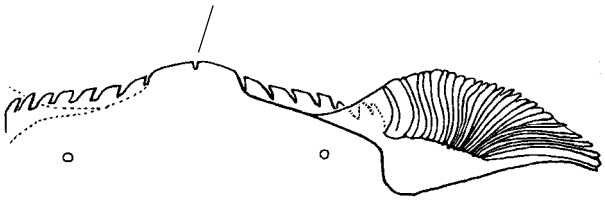
1 Ventromental plate with 25 or fewer full length striae ..... 2



1' Ventromental plate with more than 25 full length striae ..... 4

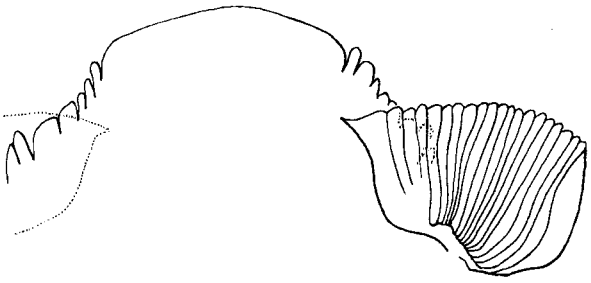


2(1) Median tooth of mentum bifid (may require observation at 1000X) ..... ***P. undine***



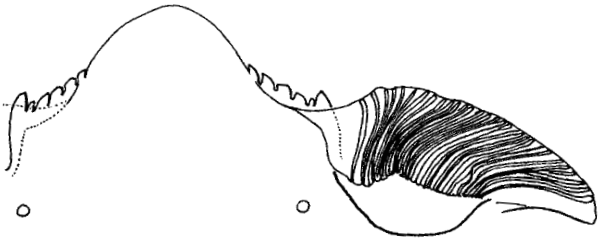
2' Median tooth simple (figures below) ..... 3

3(2') Mentum strongly arched, with broad median tooth and 7 pairs of lateral teeth ..... ***P.* sp. 2**



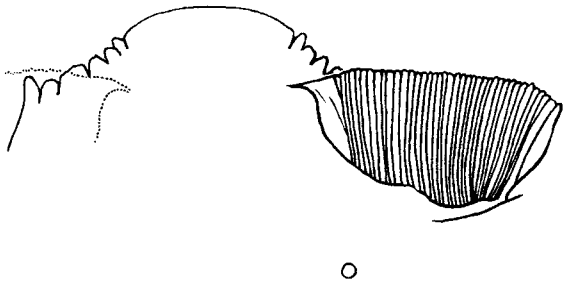
3' Mentum more linear, with median tooth not as broad, not dome-like, and with 3 pairs of poorly defined lateral teeth ..... ***P. doris***

4(1') Mentum with broad, dome-shaped median tooth that projects strongly forward ..... ***P. loganae***



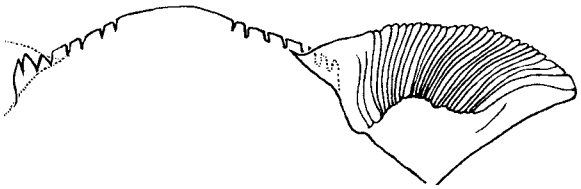
4' Median tooth of mentum not projecting strongly forward (figures below) ..... 5

5(4') Ventromental plate squat; median tooth of mentum very broad and bulging forward .. ..... ***P.* sp. A**

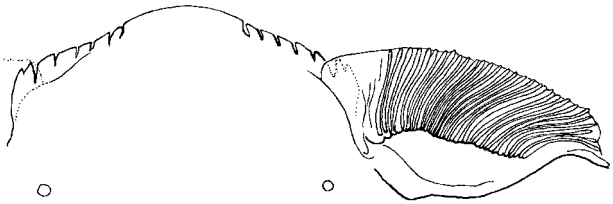


5' Ventromental plate wider; median tooth of mentum not as broad and not bulging forward .... 6

6(5') Ventromental plate with about 30 full length striae ..... ***P. nereis***



6' Ventromental plate with about 38-40 striae ..... ***P.* sp. 1**



## Notes on species

*P. doris* - Known from Florida and both Carolinas. Note the low mental teeth and squat ventromental plates. This species was described as "*Cryptochironomus* near *rolli* Kirp." in Sæther (1977).

*P. loganae* - The broad ventromental plates, with about 30 full length striae, and the strongly projecting median tooth (often difficult to observe unless high power is used) distinguish this larva. Caldwell et al. (1997) record this species from all of the states in the Southeast.

*P. nereis* - Caldwell et al. (1997) record this species for the entire Southeast, but it appears to be rather uncommon. Many specimens I've seen identified as *P. nereis* have been *P. undine*. Following Jackson (1977), the median tooth and first lateral teeth of the mentum are clear. However, this character state is often difficult to see because many menta are so translucent overall. The count of full length ventromental plate striae, about 30, is perhaps a better identifying character.

*P. undine* - The most common species in the Southeast, often misidentified as one of several other species. The broad ventromental plate with only about 25 full length striae is distinctive; it may require observation at 1000X to see the cleft median tooth of the mentum. I've seen some larvae without a cleft in the middle tooth that I'm assigning to this taxon, until reared material proves otherwise.

*P.* sp. 1 - Known from North Carolina and northern Florida (Suwannee River basin). The wide ventromental plates have about 38-40 full length striae, which separates this species from specimens I've assigned to *P. undine*, which has only about 25 full length striae.

*P.* sp. 2 - The broad median tooth and the squat ventromental plates, with only about 18-19 full length striae, distinguish this taxon, known from Georgia and North Carolina. Jackson (1977) hypothesized that this taxon, based on a single larva from Georgia, might have been a 3$^{rd}$ instar larva. It is possible that *P.* sp. A below is the 4$^{th}$ instar of this same species.

*P.* sp. A - I've seen one larva of this taxon from North Carolina. It is similar to *P.* sp. 2, with a broad, bulging median tooth and squat ventromental plates, but this taxon has about 35 full length striae and is much larger (width of ventromental plate of *P.* sp. 2 is around 34 µm; that of *P.* sp. A around 53 µm). This taxon may represent the 4$^{th}$ instar of *P.* sp. 2. If so, this would mean that the number of ventromental plate striae doubles from instar 3 to instar 4.

Several additional species, including *P. galaptera* (Townes), *P. nais* (Townes) and *P. winnelli* Jackson, occur in the eastern Nearctic but have not been recorded from the Southeast. If you have specimens that do not fit in the key above, see Jackson (1977).

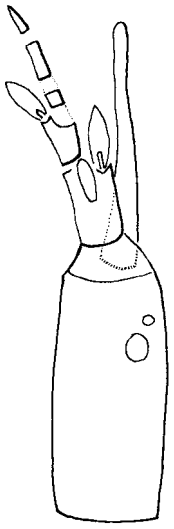
## Genus *Paralauterborniella*

**DIAGNOSIS:** Distinguished by the long basal segment of S II; pecten epipharyngis of 2 plates; 6 segmented antennae, with alternate Lauterborn organs on the apices of segments 2 and 3; distinctive mentum with broad, pale median tooth; wide ventromental plates with coarse striae; and mandible without a dorsal tooth.

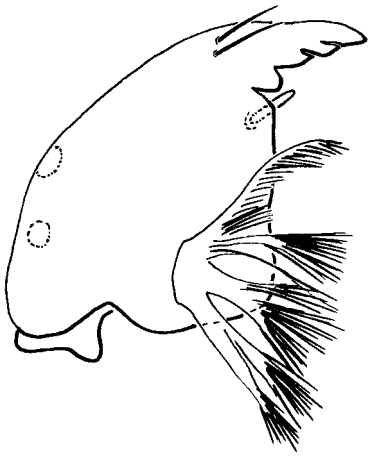
**NOTES:** One species, *P. nigrohalteralis*, is known from North America. Hudson et al. (1990) noted an undescribed species based on an adult collected from Lake Norman in North Carolina, but the specimen was not available for examination. Note that *Paralauterborniella* in Pinder & Reiss (1983, 1986) includes two species that were returned to *Apedilum* by Epler (1988a), the genus in which they were originally described by Townes (1945). Although Pinder & Reiss (1983) described the S II as simple, it is fringed.

Larvae usually occur in streams and rivers, but have been found in lakes.

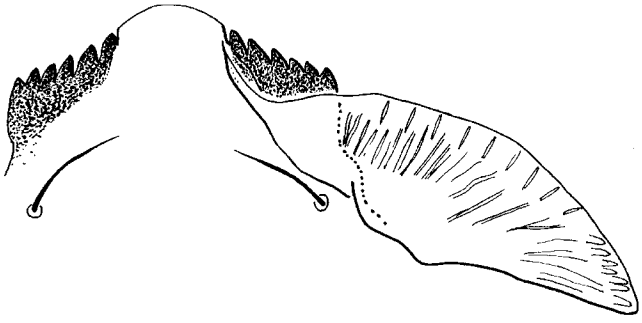
**ADDITIONAL REFERENCES:** Epler 1988a.



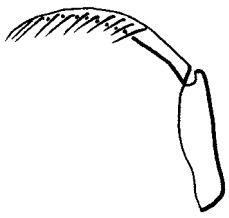
antenna



mandible



mentum



S II

Genus ***Parapsectra***

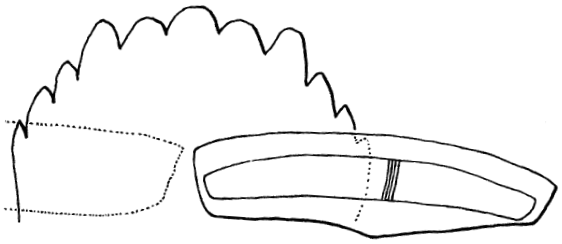
**DIAGNOSIS:** Distinguished by the pecten epipharyngis of 3 scales with apical teeth; bifid premandible; antennae with Lauterborn organs on long pedicels and short, squat antennal blade; and ventromental plates almost touching medially.

**NOTES:** *Parapsectra* is known from the Southeast from a male reported from North Carolina by Hudson et al. (1990) and from males and pupae I've examined from the Smoky Mountains of North Carolina and Tennessee. The diagnosis above and figures below are based on the only described larva of the genus, the European *P. uliginosa* Reiss.

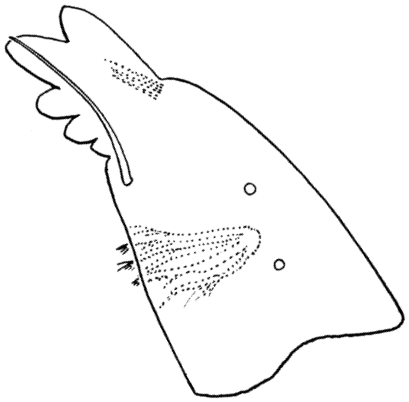
The larva of *P. uliginosa* has a hump on the outer margin of the mandible, similar to *M*. spp. B, C and E. The antennal blade of *P. uliginosa* is short and squat, not long as in *M*. spp. B, C and E. However, correct placement of *M*. spp. B and C will be unclear until the larvae are associated with pupae.

Larvae are reported from cold mountain streams and pools in bogs ("moors").

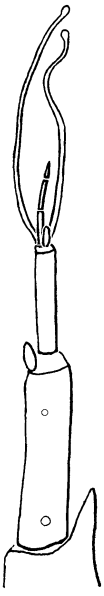
**ADDITIONAL REFERENCES:** Reiss 1969.



mentum



mandible



antenna

## Genus *Paratanytarsus*

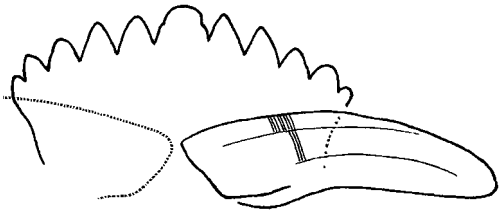
**DIAGNOSIS:** This tanytarsine genus is distinguished by the single plate pecten epipharyngis with 3-5 apical lobes; bifid premandible; sessile, or nearly so, Lauterborn organs at the apex of antennal segment 2; ventromental plates touching or almost touching medially; and the mandible without a pronounced hump on the outer margin.

**NOTES:** Caldwell et al. (1997) list four described species for the Southeast, three of which occur in the Carolinas (see checklist); to this can be added *P. quadratus* and *P.* cf. *laccophilus*, both known from North Carolina. *Paratanytarsus*, like most tanytarsine genera, is in need of revision. The key below can only be considered tentative; it is quite possible that some of the taxa keyed may represent more than one species, and it is almost certain that more species are present.

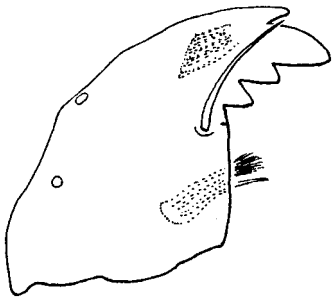
The mandible of most larvae has two inner teeth, although the molar area is darkly sclerotized and is sometimes notched to give the appearance of a small third inner tooth.

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

**ADDITIONAL REFERENCES:** Langton et al. 1988; Reiss and Säwedal 1981.



*P. dissimilis* mentum



*P. quadratus* mandible

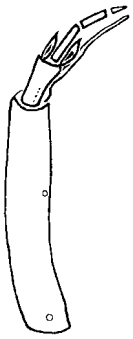
*P. quadratus* antenna

*P. dissimilis* antenna

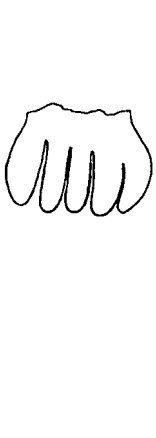
*P. dissimilis* pecten epipharyngis

## Key to the *Paratanytarsus* larvae of the southeastern United States

1 Second antennal segment longer than combined segments 3-5 ..... 2



1' Second antennal segment equal to or shorter than combined segments 3-5 ..... 3

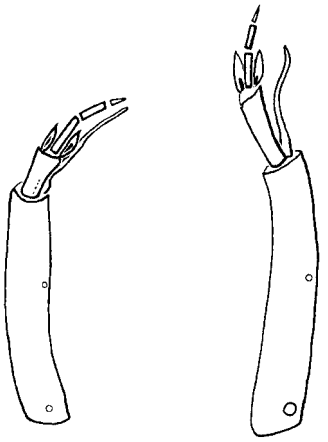


2(1) Pecten epipharyngis with 5 lobes ..... ***P. dissimilis***

2' Pecten epipharyngis with 3 lobes ..... ***P.* sp. D**

3(1') Second antennal segment shorter than combined segments 3-5 ..... 4

3' Second antennal segment subequal to combined segments 3-5 ..... ***P. quadratus*, *P. grimmii*, *P.* sp. E** ..... 5
(these taxa can not be separated as larvae, but can be identified by pupal structures)



*P.* sp. B
shorter

*P. quadratus*
subequal

4(3') First antennal segment about 65-75 µm long ..... ***P.* sp. B**

**NOTE**: 4th instar larvae are necessary for accurate measurements!!

**NOTE**: this couplet must be considered very tentative!

4' First antennal segment about 108 µm long ..... ***P.* cf. *laccophilus***

The larvae of the following 3 species are inseparable. However, if you have a late 4th instar larva with developing pupal characters visible, it may be keyed below.

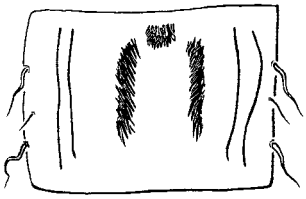
5(3') A well developed thoracic horn present, covered with numerous fine spines ..... ***P. quadratus***

5' Pupal thoracic horn absent or vestigial ..... 6

*P. quadratus* thoracic horn

6(5') Pupal abdominal tergite IV with longitudinal bands of spines; often found in drinking water systems ..... ..... ***P. grimmii***

6' Pupal abdominal tergite IV without longitudinal bands of spines; found in ponds ..... ***P.* sp. E**



*P. grimmii* tergite IV

## Notes on species

*P. dissimilis* - This species was recorded from Florida by Epler as *P*. sp. A.; it has also been recorded from both Carolinas.

*P. dubius* - The larva of this species is undescribed; records for the Southeast are based on adult males.

*P. grimmii* - A parthenogenetic species that is sometimes a pest in drinking water supplies; Caldwell et al. (1997) recorded it from Georgia. The larva is apparently inseparable from *P. quadratus* and *P.* sp. E. See Langton et al. (1988) for more information on this unusual species, found world-wide in drinking water systems.

*P*. cf. *laccophilus* - The North Carolina record for this species is based on a larval exuviae/pupa association from Lake Norman. This may be the same taxon as *P.* sp. B, the only apparent difference in the larvae being size.

*P. quadratus* - Originally described in *Tanytarsus* (Sublette 1964), this species belongs with *Paratanytarsus*. It was called *P*. sp. C in Epler (1995). I have associated material from northern Florida, where it is very common in the Suwannee River basin. Caldwell et al. (1997) record *P. quadratus* from North Carolina. The larva is apparently inseparable from those of *P. grimmii* and *P.* sp. E

*P. recens* - As an adult, this species is very similar to *P. quadratus* and like it, was originally described in *Tanytarsus* (Sublette 1964). The larva is unknown.

*P*. sp. B - Known only as a larva from Florida; not known from the Carolinas. Larvae are apparently separable only by size from *P*. cf. *laccophilus*; the two taxa may represent the same species.

*P*. sp. D - Known from a single larva from North Carolina that is similar to *P. dissimilis*, but has a 3 lobed pecten epipharyngis.

*P.* sp. E - Known from a single reared female from a beaver pond in central Georgia. It is possible that it represents *P. recens*.

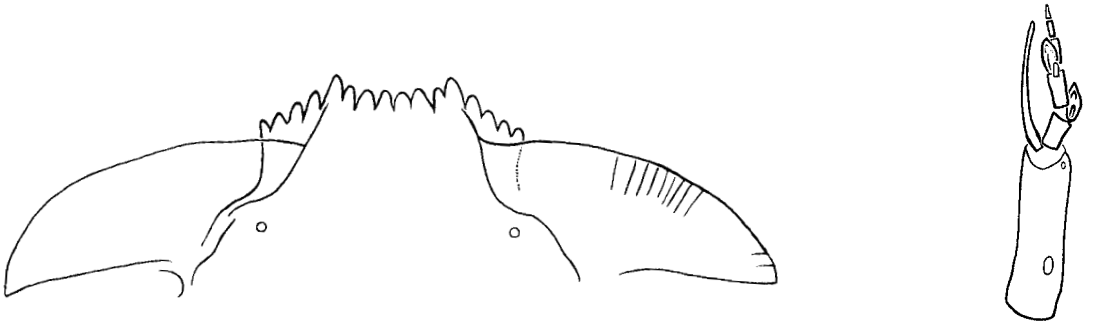
## Genus *Paratendipes*

**DIAGNOSIS:** Distinguished by the S I setae with bases fused or located on a common triangular plate; 6 segmented antennae, with alternate Lauterborn organs at the apex of segments 2 and 3; mentum with median teeth often lighter in color than remaining lateral teeth and central pair of median teeth equal to or higher than outer median teeth; and mandible with one dorsal tooth.

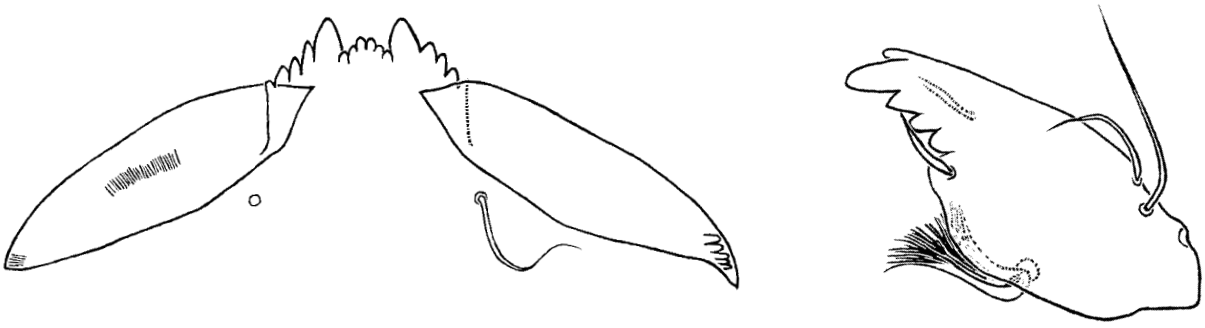
**NOTES:** *Paratendipes* was recently revised by Barbara Hayford (now at Wayne State College, NE); her revision should be published some time in 2002. Caldwell et al. (1997) reported five species from the Southeast; only the larvae of *P. albimanus*, *P. basidens* and *P. subaequalis* are known. I have not seen any material of the two other species; the Carolinas records of *P. duplicatus*, based on Oliver et al. (1990), might be considered dubious. The three known species can be separated by their menta and ventromental plates, although note that the larva of *P. thermophilus* Townes, not known from the Southeast, is very similar to *P. subaequalis*. It can be separated by its pecten epipharyngis of three apically toothed platelets; that of *P. subaequalis* appears to be of three simple spines. The larva of *P. basidens* has been known as "*Paratendipes connectens* group" (see Epler & Ferrington 1994).

Larvae occur in a variety of habitats; *P. basidens* prefers sandy bottoms of streams and rivers.

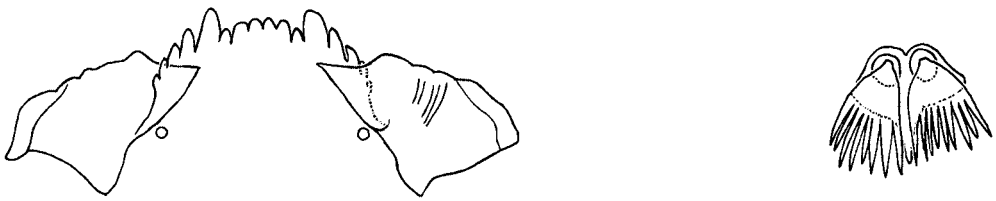
**ADDITIONAL REFERENCES:** Epler & Ferrington 1994; Townes 1945.



*P. albimanus* mentum and antenna



*P. basidens* mentum and mandible



*P. subaequalis* mentum and S I

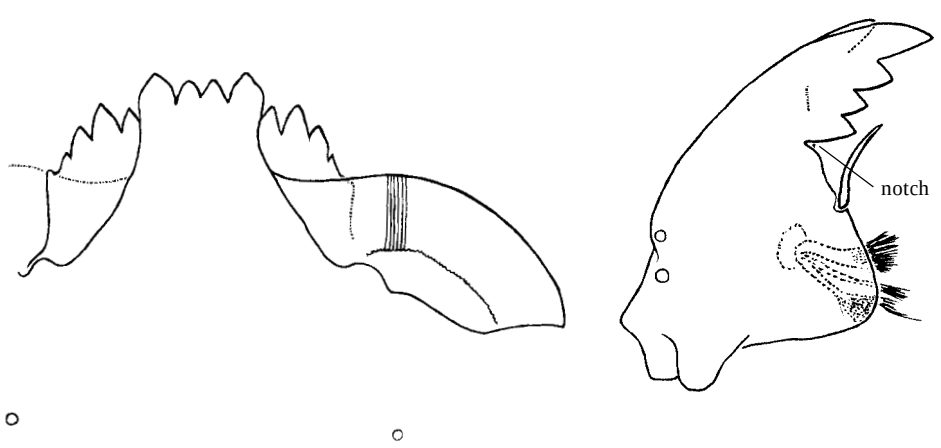
Genus ***Phaenopsectra***

**DIAGNOSIS:** Distinguished by the frontoclypeal apotome with 1 medial labral sclerite anterior to it (may appear to be a frontal apotome with clypeus and labral sclerite 1 anterior to it); mentum with a distinct line running from the posterior margin of the outer median teeth to the anteromedial margin of the ventromental plate; mandible with 3 inner teeth and with distance from basal notch of proximal inner tooth to insertion of seta subdentalis at least 3/4 distance from the basal notch to apical notch of distal inner tooth.

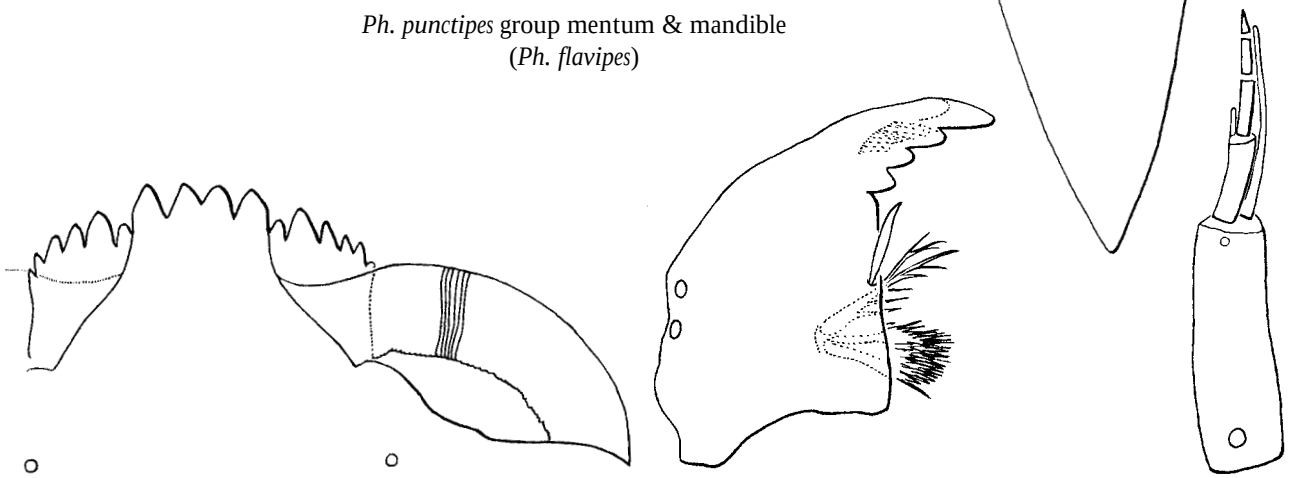
**NOTES:** Five species are recorded from the Southeast (but see Notes); four species are recorded from the Carolinas. *Phaenopsectra* requires revision utilizing all life stages; it is not possible to identify larvae to the species level without an adult male. Larvae can be identifed to species groups: the *punctipes* group, with a mandible with a large notch at the base of the inner teeth and apparently 14 toothed mentum (subject to wear); and the *obediens* group, with normal mandible and 16 toothed mentum.

Larvae usually occur in streams; some western US species are resistant to drought and can withstand drying by remaining in silk and silt cocoons.

**ADDITIONAL REFERENCES:** Grodhaus 1976, 1987b; Townes 1945.




*Ph. punctipes* group mentum & mandible
(*Ph. flavipes*)



*Ph. obediens* group mentum, mandible, apotome and antenna
(*Ph. obediens*)

## Notes on species

*Ph. dyari* - This species was recorded from Florida by Beck & Beck (1959). I have not seen any material of this species from the Southeast and consider the Beck & Beck record dubious. Simpson & Bode (1980: 78) included a larva they identified as "*Phaenopsectra* prob. *dyari*"; I have examined their material and consider it to be *Ph. obediens*. This would settle Grodhaus's (1987: 144) concern that if Simpson & Bode's (1980) identification were correct, it would be the first instance in which the larva of a species belonged to the *obediens* group while the adult belonged to the *punctipes* group. Hudson et al. (1990: 36) speculated that a species with four equal median teeth, known only as a larva (referred to in NCDENR collections as "*Phaenopsectra* sp. 4") from Mountain and Piedmont areas appeared to be equivalent to Simpson & Bode's *Ph.* prob. *dyari* (which it is not, the menta are different) and Roback's *Tanytarsus* sp. 2 (which does appear to be the same taxon); this larva was called *Polypedilum* sp. C in Epler (1995), and is found on the Coastal Plain as well. It has the distinctive frontoclypeal apotome of a *Polypedilum* (q.v.) and is identified as *P. laetum* in this manual.

*Ph. flavipes* - Townes (1945) recorded this species from South Carolina; I've seen one male reared from a larva from Florida. The outer lateral teeth of the mentum are frequently worn so that the mentum appears to have only 14 teeth. The larva is inseparable from that of *Ph. punctipes*; unassociated larvae should be referred to as "*Ph. punctipes* group sp.". There appear to be no structural characters that separate the adults of *Ph. flavipes* from *Ph. punctipes*, the only difference being abdominal coloration (dark brown-blackish in *Ph. flavipes*; green in *Ph. punctipes*). Because color in insects can be environmentally influenced, perhaps the two taxa should be synonymized.

*Ph. obediens* - A common species, and probably the only member of the *Ph. obediens* group in the Southeast. Grodhaus (1987b) was incorrect in stating that this species had a frontal apotome and clypeus; the larva has a frontoclypeal apotome (S 3 is located at the anterolateral corner of the apotome). On reared specimens from North Carolina, the clypeus is fused to the frontal apotome, but is considerably lighter and/or thinner. The clypeus may appear as a separate sclerite, apparently depending on the specimen and the mounting medium used.

*Ph. punctipes* - Recorded from the same locality in South Carolina as *Ph. flavipes* by Townes (1945). I've examined associated material from New York. The larva is inseparable from that of *Ph. flavipes*; unassociated larvae should be referred to as "*Ph. punctipes* group sp.".

*Ph. vittata* - The larva of this species is unknown. Townes (1945) placed the adult in the *punctipes* group; the larva probably resembles those of *Ph. flavipes* and *Ph. punctipes*.

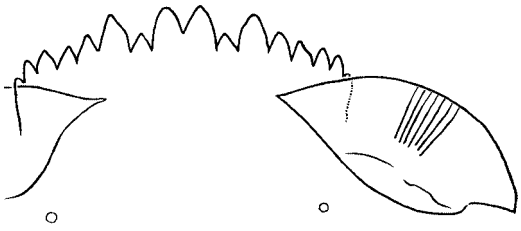
## Genus *Polypedilum*

**DIAGNOSIS:** The distinctive mentum, with median and second lateral teeth longer than first lateral teeth, will distinguish most members of the genus. Other larvae may be identified by the frontoclypeal apotome with straight anterior margin expanded laterally into lobes in which the S 3 setae are located (except in *P. ontario*); 5 segmented antennae (4 segmented in 2 species); and the 4 median teeth of the mentum not separated from the rest of mentum by a distinct line.

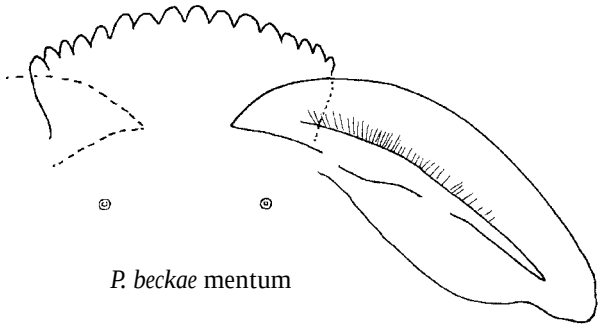
**NOTES:** A speciose genus, with over 30 species in the Southeast, *Polypedilum* has received attention from several workers recently, the most important being the long overdue publication of Maschwitz & Cook (2000). Where once there were three subgenera, there are now six (see Notes); the former genus *Asheum* is now considered a subgenus of *Polypedilum*. The larvae of many *Polypedilum* species are known, but it is still not possible to identify to species larvae of the *fallax*, *halterale*, *illinoense* and *scalaenum* groups without associated pupae or adult males (see Notes on species); much work remains to be done.

Larvae are found in a wide range of habitats under a variety of environmental conditions, ranging from pristine to heavily degraded.

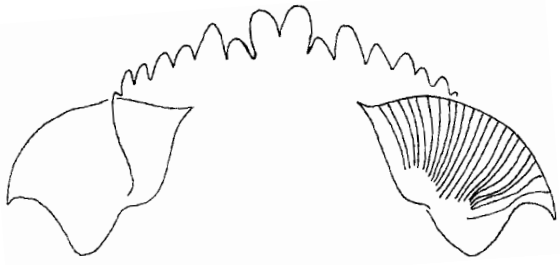
**ADDITIONAL REFERENCES:** Boesel 1985; Bjørlo et al. 2000; Maschwitz & Cook 2000; Rossaro 1985; Sæther & Sundal 1999; Soponis 1983; Soponis & Russell 1982; Soponis & Simpson 1992; Townes 1945.



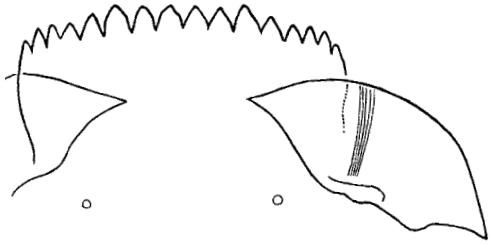
*P. illinoense* mentum



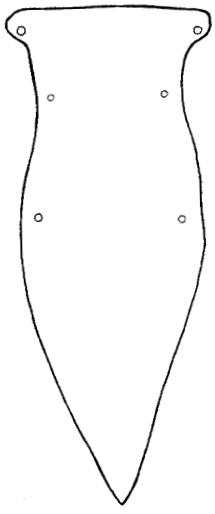
*P. beckae* mentum



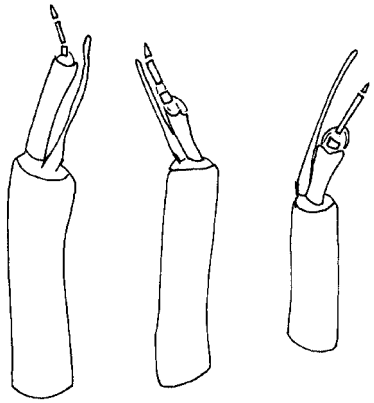
*P. flavum* mentum



*P.* sp. A mentum



apotome



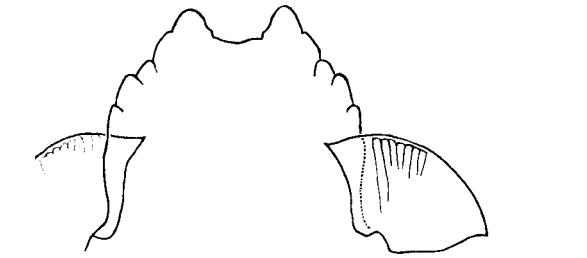
*P. aviceps* *P. flavum* *P. halterale*

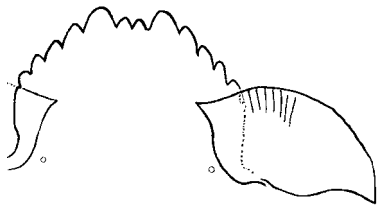
antennae

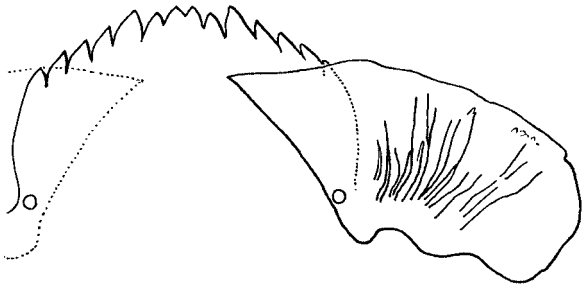
## Key to *Polypedilum* larvae of the southeastern United States

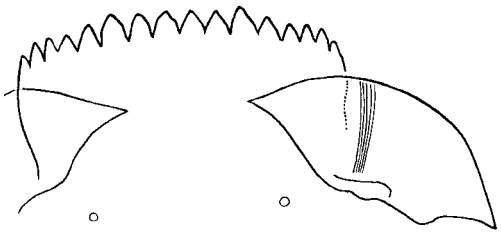
(the larvae of many species are unknown)

1 Mentum with median teeth lower than lateral teeth, or teeth subequal, or apparently missing .. 2



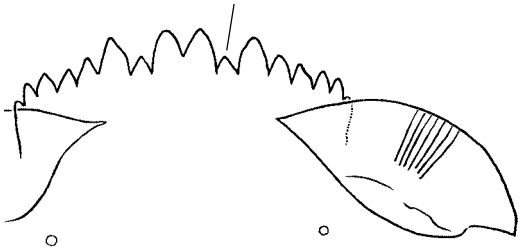




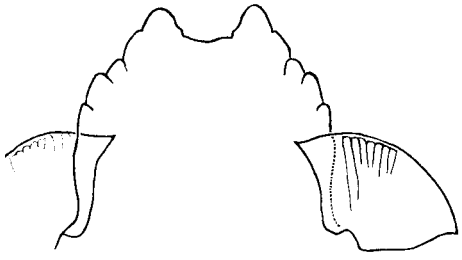


first lateral tooth

1' Mentum with median and second lateral teeth much higher than first lateral teeth ..... 8

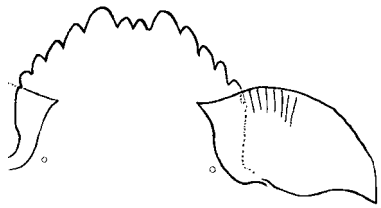


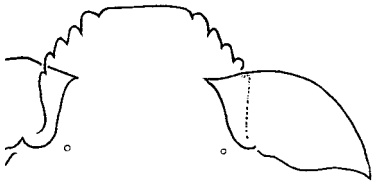
2(1) Mentum with median teeth lower than lateral teeth, or with 1 apparent broad median tooth, or with deep, wide median notch; pecten epipharyngis with 3 blunt teeth; mining in floating leaves of *Brasenia*, *Nymphaea* or other aquatic plants ..... ***P. braseniae***



mentum from larva in *Nymphaea*

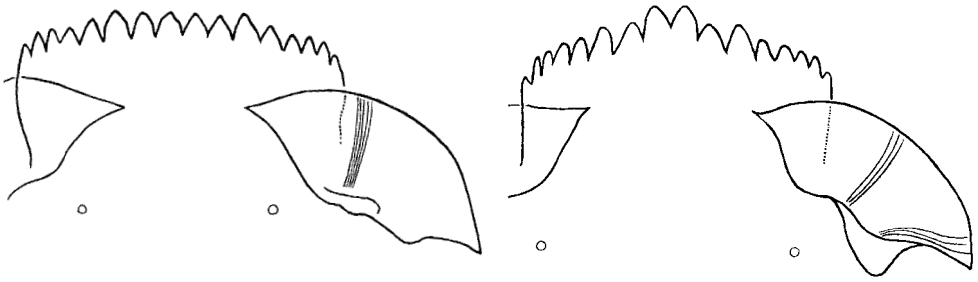
pecten epipharyngis



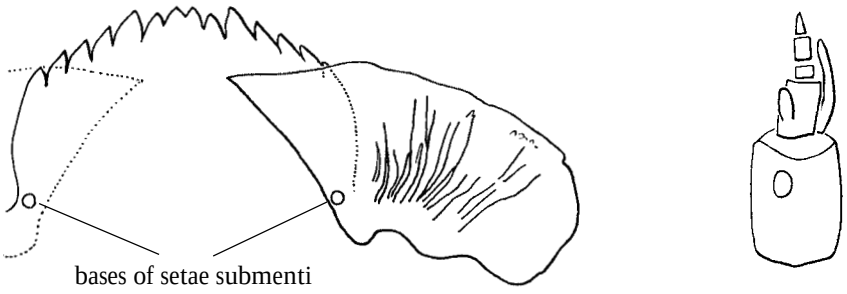


menta from larvae in *Brasenia*

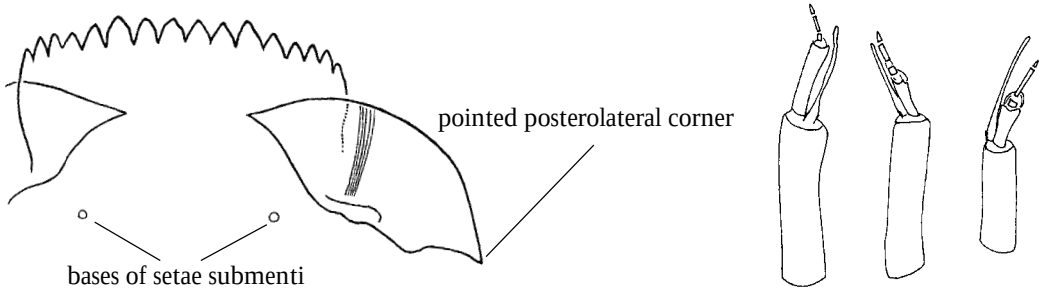
2' Mentum with median teeth subequal to or higher than lateral teeth; pecten epipharyngis with 3 scales, with at least the outer 2 scales with apical teeth; usually not mining in *Brasenia* or *Nymphaea* leaves (but may be associated with either plant or other aquatic plants) ..... 3



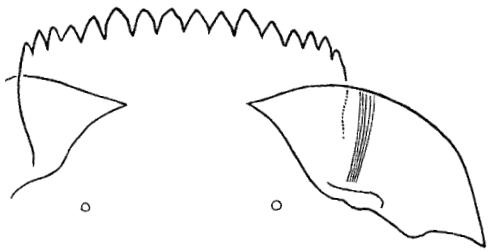

3(2') Mentum somewhat rounded in outline; ventromental plates teardrop-shaped, with rounded posterolateral margins; setae submenti placed on ventromental plates; antenna short and squat; larvae often found in pupal cases of hydropsychid caddisflies ..... ***P. ontario***



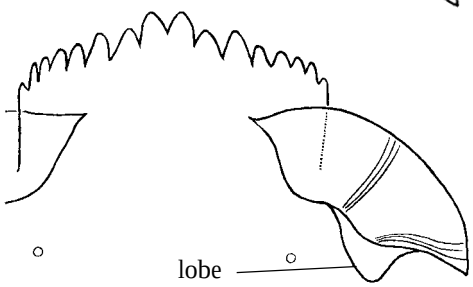

3' Mentum more linear in outline; ventromental plates with pointed posterolateral margins; setae submenti placed adjacent to ventromental plates; antennae normal, slender; usually not found associated with caddisflies (but some *P. fallax* group larvae have been found with *Psilotreta*) ..... 4



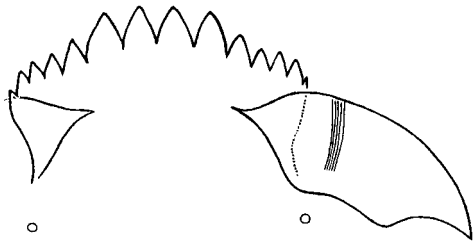

4(3') Ventromental plate without well developed posterior lobe ..... 5

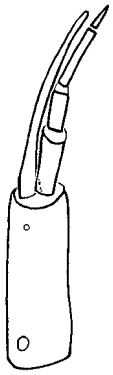


4' Ventromental plate with well developed posterior lobe ..... 9

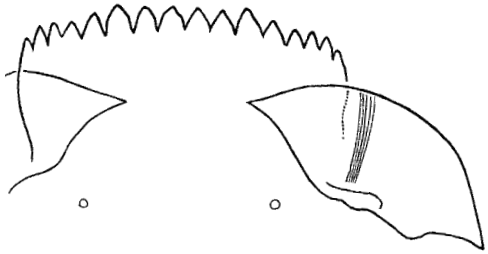


5(4) Mentum with central 4 teeth higher than remaining lateral teeth; mentum with 14 teeth or 16 teeth (if 16, outermost tooth may be very small); antenna with 4th segment longer than 3rd ..... ***P. laetum***

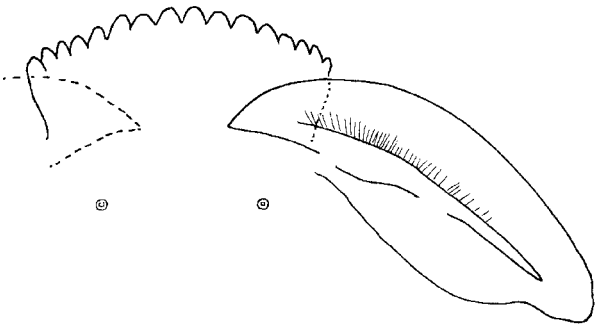




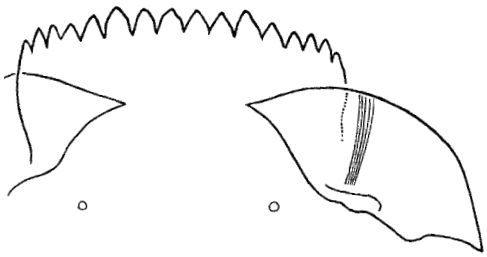
5' Mentum with 16 teeth, with 6 central teeth slightly higher or all teeth subequal; antenna with 4th segment subequal to 3rd (figures below) ..... 6



6(5') Ventromental plates very wide ..... ***P. beckae***
(*P. sordens* will key here; see Notes)

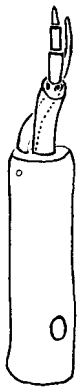


6' Ventromental plates not as wide ..... 7



7(6') Antennal segment 2 about as long as combined lengths of segments 3-5; head capsule often dark yellow-brown ..... ***P. fallax* group**

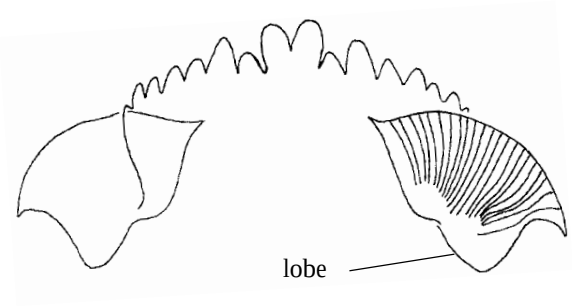
7' Antennal segment 2 shorter than combined lengths of segments 3-5; head capsule yellowish .... ***P.* sp. A**



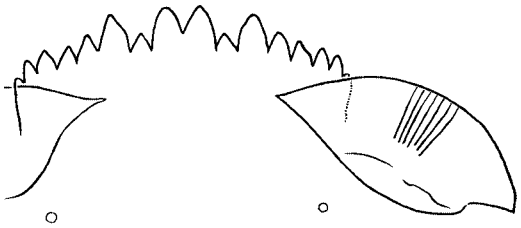
*P. fallax*

*P.* sp. A

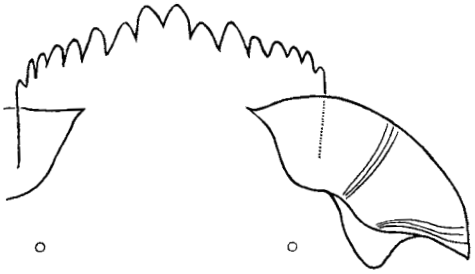
8(1') Ventromental plate with well developed posterior lobe ..... 9



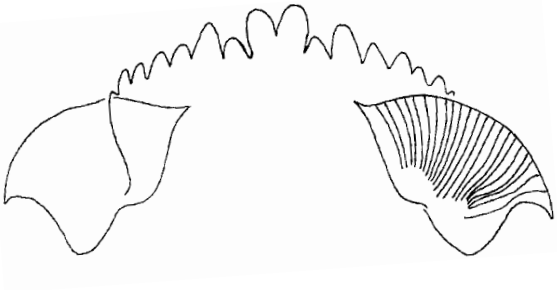

8' Ventromental plate without well developed posterior lobe ..... 10



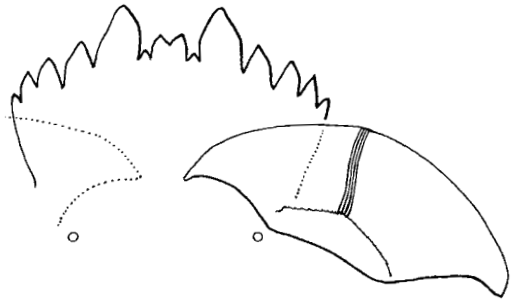
9(4', 8) Antennal segment 2 about twice as long as segments 3-5 combined; first lateral tooth of mentum may be slightly shorter than or equal to second lateral; median teeth of mentum not basally constricted ..... ***P. aviceps***



9' Antennal segment 2 no more than 1.5X segments 3-5 combined; first lateral tooth of mentum always shorter than second lateral; median teeth of mentum constricted basally ..... ***P. flavum***

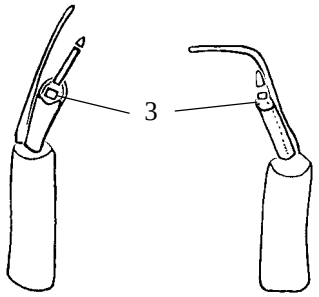


10(8') Mentum with second lateral teeth higher than median teeth ..... ***P. bergi***

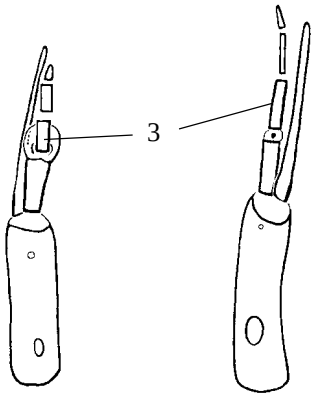


10' Mentum with second lateral teeth about as high as median teeth ..... 11

11(10') Third antennal segment 1/3 or less the length of the second segment ..... 12

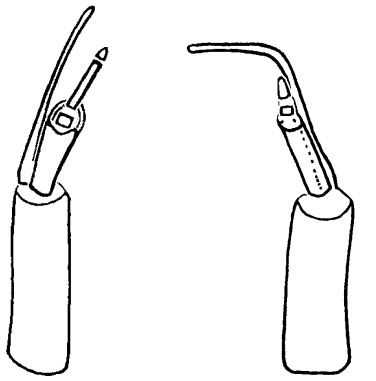



11' Third antennal segment at least 1/2 or more the length of the second segment ..... 13



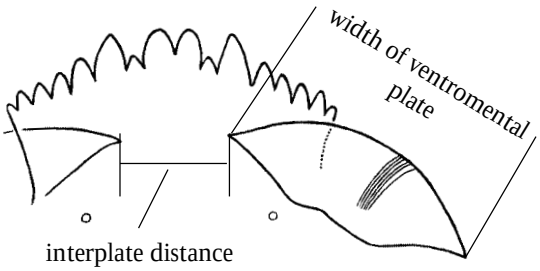

12(11) Antennal segment 4 about as long as segment 2; antennae always with 5 segments ..... ***P. halterale* group**

12' Antennal segment 2 much longer than 4; antennae with 4 or 5 segments ..... ***P. scalaenum* group**

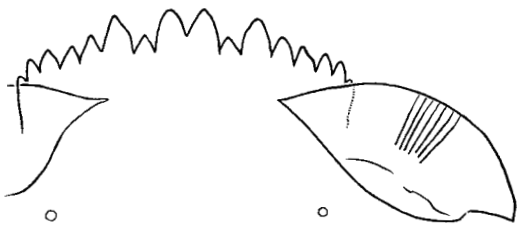


*P. halterale* *P. scalaenum*

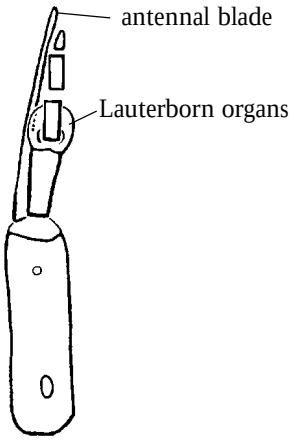
13(11') Width of 1 ventromental plate more than 2.5X the distance between the plates ..... 14

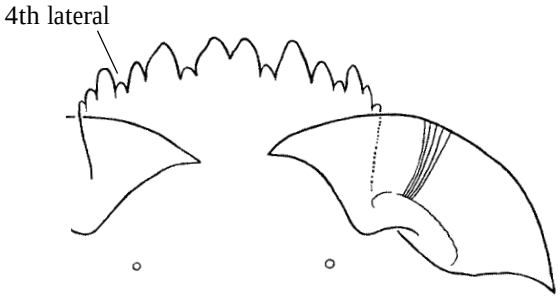



13' Width of 1 ventromental plate 2.5X or less the distance between the plates ..... 15

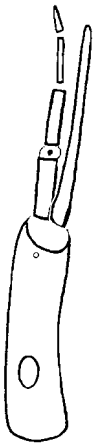


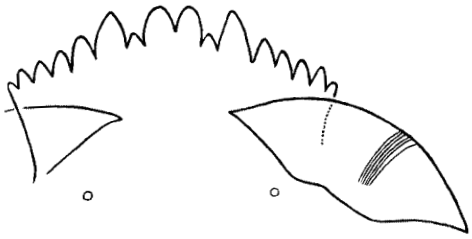
14(13) Mentum usually with 4th lateral tooth lower than 3rd and 5th; antennal segment 2 usually about twice as long as 3; antennal blade longer than flagellum; Lauterborn organs large and distinct ..... ***P. trigonus***



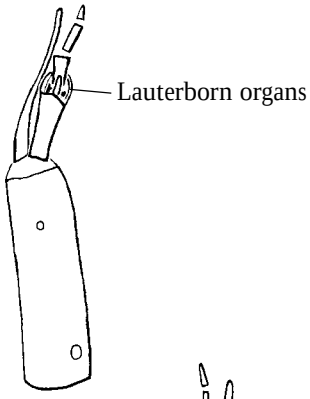




14' Mentum with 4th lateral tooth subequal to 3rd and 5th; antennal segment 2 subequal to 3; antennal blade shorter than flagellum; Lauterborn organs minute ..... ***P. tritum*** (in part)





15(13') Lauterborn organs well developed ..... ***P. illinoense* group**




15' Lauterborn organs minute ..... ***P. tritum*** (in part)

## Notes on species

North American *Polypedilum* are now divided into six subgenera, which are abbreviated below as follows: *A.* = *Asheum*; *C.* = *Cerobregma*; *Pent.* = *Pentapedilum*; *P.* = *Polypedilum*; *T.* = *Tripodura*; *U.* = *Uresipedilum*. Only those species recorded from or expected to occur in the Carolinas are listed below; for a more complete listing of *Polypedilum* species of the Southeast see Caldwell et al. (1997) and Maschwitz & Cook (2000).

*P. (T.) acifer* - Originally described from Michigan (Townes 1945), this species is known from Florida and Alabama in the Southeast and should eventually be found in the Carolinas. The immature stages are undescribed.

*P. (P.) albicorne* - The immature stages of this species were described by Rossaro (1985). I have not seen any larvae from the Southeast and the species is not included in the key. It would probably key to *P. illinoense* group.

*P. (T.) albinodus* - The immature stages of this species are undescribed.

*P. (P.) angulum* - In many collections from North and South Carolina I've seen this name erroneously applied to *P. tritum*. A member of the *P. illinoense* group, *P. angulum* is not easily separable from *P. illinoense* as a larva or pupa; adult males are needed for accurate identification. In a series of Florida specimens of *P. angulum* in the FAMU collection determined by Maschwitz, none of the larvae had the long 4th antennal segment as illustrated in Maschwitz & Cook (2000: fig. 45); these larvae are impossible to separate from those of *P. illinoense*. Unless you have good male specimens associated with your larvae, you can not identify this species as a larva! I've seen adults of this species from the Savannah River Plant area in South Carolina; it is to be expected throughout the Southeast.

*P. (P.) artifer* - The immature stages of this species are undescribed. I've seen adults from Noland Creek in Great Smoky Mountains National Park, North Carolina.

*P. (U.) aviceps* - A relatively common stream and river species that is easily identified by the posterior lobe on the ventromental plates, large first lateral tooth of the mentum and the short antennal segments 3-5. It has frequently been misidentified as *P. convictum* (a name that has been incorrectly applied to *P. flavum*; see *P. flavum*).

*P. (A.) beckae* - This species was formerly placed in its own genus, *Asheum* (a replacement name for *Pedionomus*), but was placed as a subgenus of *Polypedilum* by Sæther & Sundal (1999). See *P. sordens*.

*P. (P.) bergi* - I've seen adult males from the Savannah River Plant area of South Carolina and larvae from northern Florida. Larvae have been associated with the leaves of *Potamogeton natans* in Minnesota. The species probably occurs throughout the Southeast.

*P. (P.) braseniae* - Larvae are usually found mining in the top surface of the floating leaves of the aquatic plants *Brasenia schreberi* and *Nymphaea odorata*. The mentum and premandibles are subject to wear. Maschwitz & Cook (2000) described the premandibles as simple, but many (unassociated) specimens I've seen have two or even three teeth on the premandible. Maschwitz & Cook (2000) also noted the differences in larvae reared from different plants, especially the mentum, but similar adults came from all their rearings.

*P. (P.) calopterus* - Not known from the Carolinas; recorded from Georgia in the Southeast. This species was considered a synonym of *P. fallax* by Townes, but recent authors disagree (Boesel 1985; Caldwell et al. 1997). Maschwitz & Cook (2000) could not find any differences in the immature stages of *P. calopterus* and *P. fallax*. Larvae that are not associated with adults are best called "*P. fallax* group". See also *P. fallax* and *P. walleyi* below.

*P. (P.) cinctum* - The immature stages of this species are undescribed.

*P. (T.) digitifer* - A member of the *P. halterale* group; larvae are not reliably separated from other members of this group. Soponis & Simpson (1992) described and compared the larvae, pupae and adult males of *P. digitifer* and *P. griseopunctatum*. They found differences in the number of teeth in the outer scale of the pecten epipharyngis (9 teeth for *digitifer*; 7 for *griseopunctatum*); however, reared material of *P. digitifer* from South Carolina had only 6 teeth on the outer scale. Adult males are needed for accurate identification of most species of the *P. halterale* group.

*P. (P.) falciforme* - Recorded from Florida in the Southeast, but this species' range extends northward to New Jersey and Minnesota. A member of the *P. illinoense* group, it is not reliably separated from the other members as a larva; a pupa or an adult male is needed for accurate identification.

*P. (P.) fallax* - A common species whose identification as a larva is uncertain; Maschwitz & Cook (2000) could not find any differences in the immature stages of *P. calopterus* and *P. fallax*. Larvae that are not associated with adults are best called "*P. fallax* group". I've examined larvae from the Smoky Mountains that were collected within the cases of the odontocerid caddisfly *Psilotreta*; the midge larvae were not associated with pupae or adults so it is not clear to which species they belong. See also *P. walleyi* below.

*P. (U.) flavum* - A very common species of streams and rivers, this species was formerly called *P. convictum* in North America. The adults of *P. flavum* and *P. convictum* are very similar, leading Townes (1945) to erroneously synonymize the two. The immature stages of the two species are quite different. It is not known if the true *P. convictum* occurs in North America. As used in this manual, *P. flavum* includes *P. obtusum* (considered a valid species by Maschwitz & Cook (2000)).

*P. (T.) griseopunctatum* - A member of the *P. halterale* group; larvae are not reliably separated from other members of this group. Soponis & Simpson (1992) described and compared the larvae, pupae and adult males of *P. digitifer* and *P. griseopunctatum*; see *P. digitifer* above.

*P. (T.) halterale* - Obviously a member of the *P. halterale* group. This group, as used in the key above, consists of *P. digitifer*, *P. griseopunctatum*, *P. halterale* and *P. simulans*. The larvae of this group can not be identified to species level without an associated adult male. Boesel (1985) considered all these species as synonyms of *P. halterale*, but his study was limited and did not make use of reared material; his synonymies have been rejected by most workers.

*P. (P.) illinoense* - One of the most common and ubiquitous species of the genus, but basically impossible to identify as a larva without an associated adult male because of the similarities between the larvae of the *P. illinoense* group. The *P. illinoense* group, as used in the key above, consists of *P. angulum*, *P. falciforme*, *P. illinoense*, *P. nymphaeorum* and *P. ophioides*. Maschwitz & Cook (2000: 30) offered a key to these larvae with the warning that "The following species are difficult to separate in the larval stage". In the "real world", these larvae are basically impossible to separate unless they have been associated with an adult! Note that even the adult males of this group are difficult to separate without comparative material and experience. As an example, a rearing of *P. falciforme* from Georgia (based mostly on pupal morphology) has a larva that keys to *P. nymphaeorum*, while the adult looks more like a *P. angulum*. Records in the literature may refer to any of the *illinoense* group species and in some cases refer to other species altogether. Larvae of *P. illinoense* occur under a wide range of conditions, including the high organic loading and low dissolved oxygen associated with pulp mills.

*P. (P.) laetum* - The larva of this species has been mistaken for a *Phaenopsectra* (*Phaenopsectra* sp. 4 in NCDENR collections), but has the typical *Polypedilum* frontoclypeal apotome; Epler (1995) referred to it as *P.* sp. C. Although I have not seen associated material of this species from the Southeast, it is obvious from the description in Maschwitz & Cook (200) and Rossaro (1985) that this distinctive larva belongs here. Apparently the mentum may have the outermost tooth worn or vestigial, so that many menta appear to have only 14 teeth.

*P. (P.) nymphaeorum* - A member of the *P. illinoense* group, and not reliably separated from the other members as a larva; adult males are needed. This species has not yet been recorded from the Carolinas but probably occurs there; it has been recorded from Florida, Illinois, Kentucky, Louisiana, Michigan, Minnesota, New Jersey and Ontario.

*P. (C.) ontario* - I've seen larvae of this species from North Carolina. Sæther & Sundal (1998) established a new subgenus, *Cerobregma*, and included *P. ontario*, the only Nearctic member of the subgenus. *Polypedilum ontario* is the only species of *Polypedilum* in North America in which the frontoclypeal apotome does not widen apically, apparently a subgeneric character state. It is also the only Nearctic *Polypedilum* known to me in which the setae submenti are placed on the ventromental plates, rather than adjacent to them. Sæther & Sundal (1998: 354) stated that the pecten epipharyngis consisted of three platelets, the lateral platelets unserrated. On a North Carolina larva, the lateral platelets of the pecten epipharyngis have two to three teeth. Bolton (1991) showed that pupal Chironomini genus C of Pinder & Reiss (1986) is this species; larvae were collected from the pupal retreats of the hydropsychid caddisfly *Cheumatopsyche*.

*P. (P.) ophioides* - I've seen a male from the Savannah River Plant area of South Carolina. The larva is very similar to *P. illinoense* and probably can not be reliably separated from it. Unless you have good male specimens associated with your larvae, you can not realistically identify this species as a larva!

*P. (T.) parascalaenum* - Originally described from Florida, but now recorded from Georgia and both Carolinas by Hudson et al. (1990). However, unless their identifications were based on adults, they must be considered dubious at best. It has been mistakenly assumed that the larval antenna of *P. parascalaenum* has 4 segments, while that of *P. scalaenum* has 5. The antennae of both species may appear to have a vestigial fifth segment; the larvae of the two species are apparently inseparable and should be referred to as "*P. scalaenum* group sp.". Judging from the numbers of adults I've seen, *P. parascalaenum* is quite rare, while *P. scalaenum* is very common. The adult of *P. parascalaenum* is unusual for a *Tripodura* in that it does not have the spine-like lateral processes at the base of the anal point, but other members of the subgenus also lack these spines (Bjørlo et al. 2000).

*P. (T.) pardus* - The immature stages of this species are undescribed.

*P. (U.) pedatum* - The immature stages of this species are undescribed.

*P. (T.) scalaenum* - As a larva, apparently inseparable from *P. parascalaenum* (see above). Larvae should be identified as "*P. scalaenum* group sp.". As noted above, the larval antenna usually has 4 segments, but may have a vestigial fifth segment. There is also variation in the length of the fourth segment, some appearing longer than "normal". It will take study of numerous rearings of both species to determine if it is possible to separate the larvae.

P. *(T.) simulans* - A member of the *P. halterale* group. The larvae of this group can not be identified to species level without an associated adult male. Judging from pupae and adults I've examined, *P. simulans* is one of the commoner members of the *halterale* group in the Southeast.

*P. (Pent.) sordens* - This species has been recorded from Florida and South Carolina in the Southeast; I have not seen any material of this species from the Southeast. Larvae are very similar to those of *P. beckae*. The larva of *P. sordens* is not included in the key. Judging from illustrations in other works (e.g. Pinder & Reiss 1983: fig. 10.63A), it ***may*** be separable from *P. beckae* by the apparently lower first lateral teeth of the mentum.

*P. (P.) trigonus* - A relatively common species, usually easily recognized by the reduced fourth lateral tooth on the mentum. More than one species may be included under this name in the Southeast, but extensive rearings are necessary to elucidate their identities.

*P. (Pent.) tritum* - A common species in the Southeast, the larvae are often misidentified as *P. illinoense* or *P. angulum*. The antenna, with the long segments 3 and 4, and vestigial Lauterborn organs, are distinctive. More than one species may be included under this name in the Southeast.

*P. (P.) vibex* - The immature stages of this species are undescribed. In the Southeast, recorded from Alabama, Florida and both Carolinas.

*P. (P.) walleyi* - Recorded for South Carolina by Hudson et al. (1990), but I've seen no material from the Southeast. I have seen reared specimens of *P. trigonus* from North Carolina misidentified as *P. walleyi*. The status of *P. walleyi* is unclear; it has been considered a synonym of *P. calopterus*, and *P. calopterus* has been considered a synonym of *P. fallax*. Caldwell et al. (1997) gave *P. calopterus* and *P. walleyi* valid species status. Maschwitz & Cook (2000) could not find any differences in the immature stages of *P. calopterus* and *P. fallax* (adult female *P. calopterus* have a broad dark band through the middle of the wing not present in *P. fallax* or *P. walleyi*). It is best to consider larvae of all three taxa not associated with adults as members of a "*P. fallax* group".

*P. (Pent.)* sp. A - First keyed by Epler (1992, 1995), this species has been reared and although it has a mentum very similar to *P. fallax*, is a member of the subgenus *Pentapedilum* (the adult has setae on the wing membrane). It is known from the Florida Everglades northward to at least Ohio.

*P. (T.)* sp. B - This taxon is based on a single male pupa with well developed pharate male genitalia from the Perdido River in northwest Florida. The superior volsella is similar to that of *P. griseopunctatum*, but has an apical extension (past the point of insertion of the medially directed setae) bearing a large, posteriorly directed seta.

Genus ***Pontomyia***

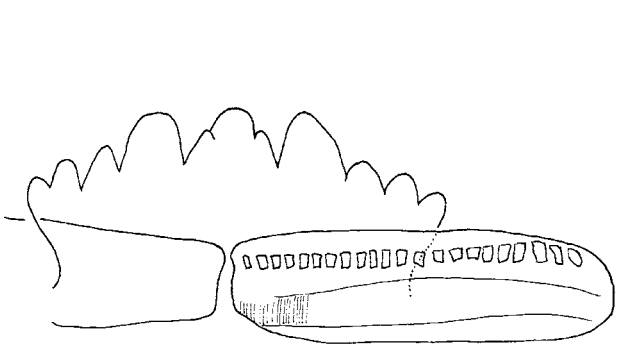
**DIAGNOSIS:** This tanytarsine genus is distinguished by the pecten epipharyngis of 3 scales with numerous apical teeth; antennae with sessile Lauterborn organs; premandibles with more than 3 teeth; mandible with 3 inner teeth; mentum with 4 pairs of lateral teeth; ventromental plates touching medially (or almost so); and marine habitat.

**NOTES:** In North America, *Pontomyia* is known only from Florida. A truly marine insect, larvae have been found at depths of 30 meters (Bretschko 1981). I've recently examined larvae that were collected from the algae-laden backs of sea turtles offshore of Puerto Rico. The Puerto Rican larvae appear to be the same species that is found in Florida, but until associated with adults, their specific identity remains unknown.

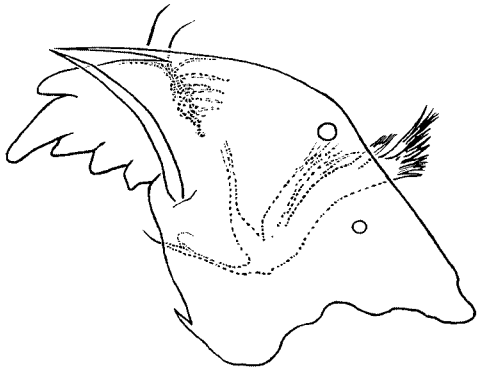
Contrary to the diagnosis in Pinder & Reiss (1983), some of the claws of the parapods are bifid.

Larvae have been found in sand, coral and algae (including those found on the backs of sea turtles).

**ADDITIONAL REFERENCES:** Bretschko 1981; Soong et al. 1999.

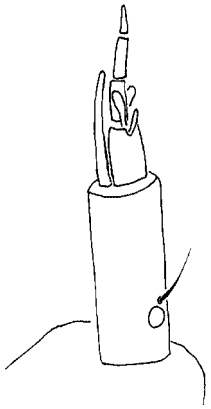


mentum

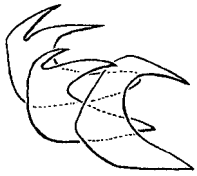


mandible

premandible



antenna and base



posterior parapod claws

## Genus *Pseudochironomus*

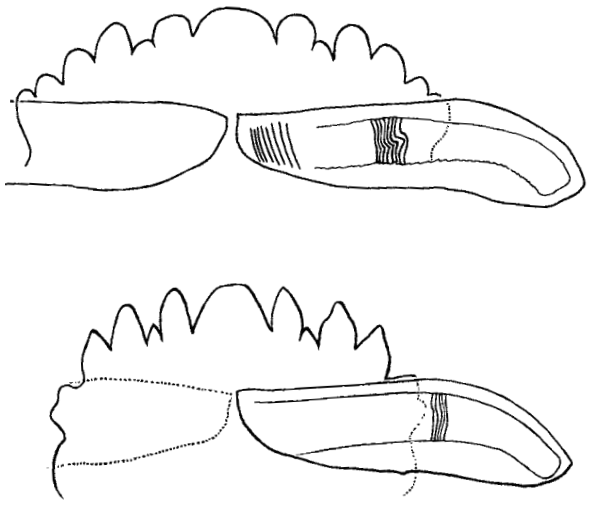
**DIAGNOSIS:** Distinguished by the S I setae arising from separate bases; antenna not mounted on elongate pedestal; mandible without dorsal tooth and with seta subdentalis on dorsal side; large bar-like ventromental plates that touch or almost touch medially; and procerci not fused at the base.

**NOTES:** Although reviewed by Sæther (1977a), the taxonomy of *Pseudochironomus* is in an unsatisfactory state. Judging from pupae and adults I've examined, *Ps. richardsoni* is common in the Southeast, but I have not seen larvae similar to that described by Sæther (1977a) for this species. Sæther's (1977a) key depends on dubious literature descriptions and a meager amount of material, and is basically unusable for southeastern larvae. Records of the Palaearctic *Ps. prasinatus* from the US must be considered with extreme skepticism; there is at least one southeastern larva that will key to *Ps. prasinatus* in Sæther's (1977a) key. However, I have a larva/pupa/pharate adult association of this taxon; it is not *Ps. prasinatus*.

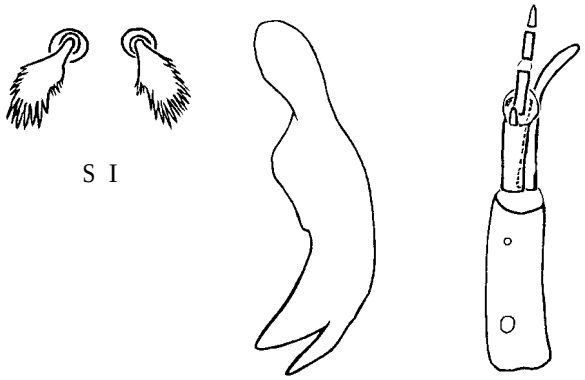
Due to a paucity of material, it is not possible to construct a species key for larvae. There are two major types of larvae: those with a definite 13 toothed mentum that is basically linear, and those with an 11-13 toothed mentum that is more arcuate, with the last tooth or pair of teeth vestigial or fused. Unless accompanied by associated adults, larvae should be identified as "*Pseudochironomus* sp.".

Larvae are found in sandy substrata of lakes and rivers; they may also be found in brackish/estuarine water.

**ADDITIONAL REFERENCES:** Sæther 1977a; Sublette 1964; Townes 1945.



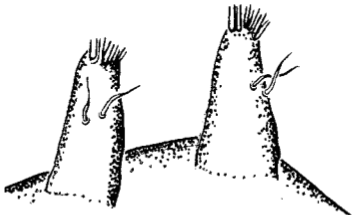
menta



S I

premandible

antenna



procerci (setae abbreviated)

mandible

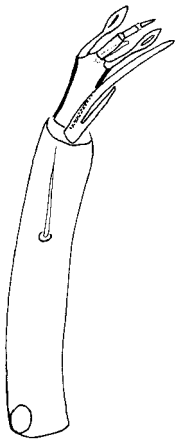
## Genus *Rheotanytarsus*

**DIAGNOSIS:** This tanytarsine is distinguished by the single, broad, multitoothed, comb-like pecten epipharyngis (rarely deeply trisected, but this not seen in southeastern larvae); Lauterborn organs on short pedicels; apically bifid premandible; and ventromental plates touching medially (or almost so), often with apparent block-like strial ridge markings.

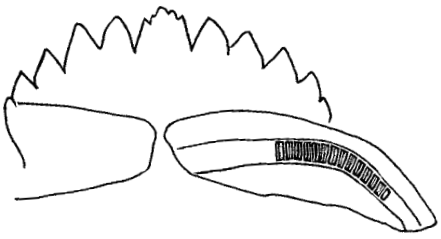
**NOTES:** A common and often abundant midge, but poorly known on the species level. About eight species occur in the Southeast (J.E. Sublette, pers. comm.); two are described but only one, *Rh. pellucidus*, is identifiable to species as a larva. The genus has been undergoing revison by Kyerematen, but no work has been published on the Nearctic fauna.

Larvae are usually found in streams and rivers, and are often associated with aquatic plant communities, where they build tubes on leaves and stems. Larvae may also be found in the littoral area of lakes, where wave action simulates flowing water conditions. Larvae attach their cases to a number of surfaces, including plants, rocks, boats and aquatic animals (in Florida, alligators, and I have found a tube on the barbel of a madtom catfish), and insects, such as dragonfly larvae (*Macromia* and *Neurocordulia*) and the megalopteran *Corydalus*.

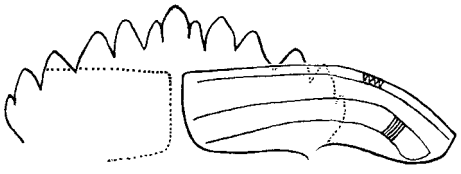
**ADDITIONAL REFERENCES:** Kyerematen et al. 2000; Kullberg 1988; Lehmann 1971; Simpson & Bode 1980.



pecten epipharyngis



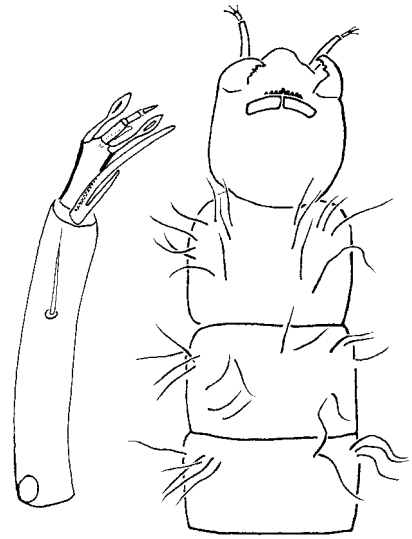
*Rh. exiguus* group antenna and mentum



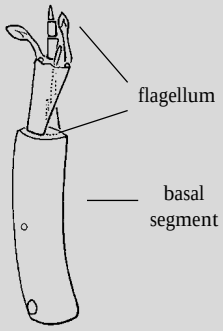
*Rh. pellucidus* antenna and mentum

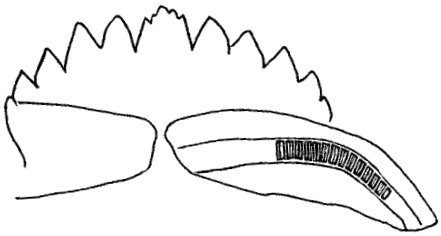
## Key to *Rheotanytarsus* larvae of the southeastern United States

1 AR 2.0 or more; head capsule yellow-brown to pale brown; median tooth of mentum usually shallowly trifid; first 3 body segments with long setae ..... ***Rh. exiguus* group**



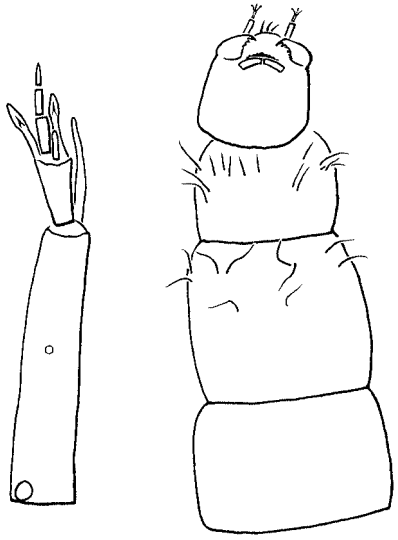
AR = antennal ratio.
Calculated by dividing the length of the basal segment by the length of the flagellum (the remaining antennal segments.)

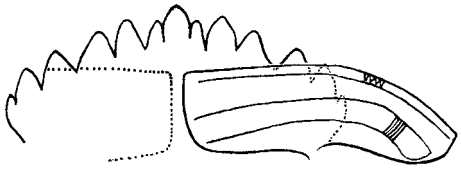


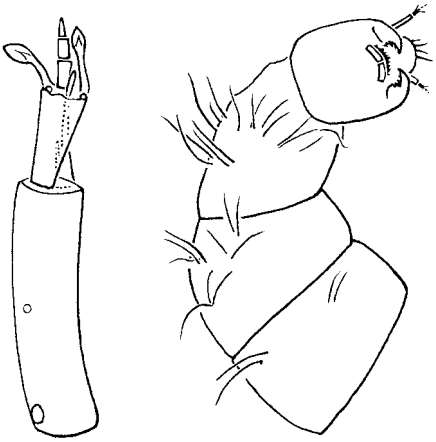
1' AR < 2.0; head capsule pale brown to dark red-brown; median tooth of mentum shallowly to deeply trifid; first 3 body segments with long setae OR 3rd body segment with short setae ..... 2

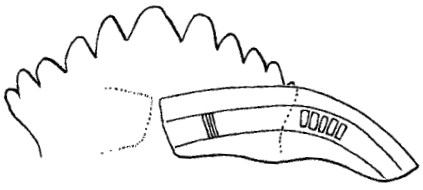
2(1') Median tooth of mentum deeply trifid; head capsule usually pale brown; 3rd body segment with setae shorter than those on segments 1 and 2 ..... ***Rh. pellucidus***





2' Median tooth of mentum at most slightly notched; head capsule brown to dark reddish-brown; 3rd body segment with long setae ..... ***Rh.* sp. A**





## Notes on species

*Rh. exiguus* group - A species group that consists of several species, none of which are reliably separated as larvae (except perhaps *Rh*. sp. A; see below). The most common species of the group is the ubiquitous *Rh. exiguus*. Larvae of this group construct tubes that are attached to the substrate lengthwise along one side. Although the median tooth of the mentum is usually shallowly trifid, I have seen some larvae with a deeply trifid median tooth. Do these represent a different species or are the differences due to wear? Without associated pupae and adults this will remain a good question! Other characters that may help separate *Rh. exiguus* group larvae from those of *Rh. pellucidus* are the smaller body size (see *Rh. pellucidus* below), wider ventromental plates in most *Rh. exiguus* (3-5 times broader than long; only about 2-3 times as broad as long in *Rh. pellucidus*); the lighter head capsule color of *Rh. exiguus* group members; and the longer Lauterborn organ petioles in *Rh. exiguus* group species, in which the organs extend past the apex of antennal segment 4; in most *Rh. pellucidus* larvae the organs do not extend beyond antennal segment 4 (observation of this depends on how flat the antennae are mounted!). A good pupal character, observable on prepupal larvae with well developed pupa within, is the presence of two small posteromedian groups of spinules on a darker background on tergite II of *Rh. pellucidus*; in *Rh. exiguus* group pupae only a single posteromedian group of spinules, not on a darker background, may be present.

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

*Rh*. sp. A - A species with a brown to dark reddish-brown head capsule, known from streams in North and South Carolina. It is probably a member of the *Rh. exiguus* group, but without full rearings and a clear definition for this group in North America its placement remains uncertain. There may be two species included in this taxon. In the small sample available to me, I noted one larva with a longest seta on the first segment that was over 230 µm long; on the other specimens, longest setae ranged in length from 105-125 µm. A different species, or just a variant? All larvae available to me were not associated with larval tubes, so the manner in which the tubes are attached to a substrate is unknown.

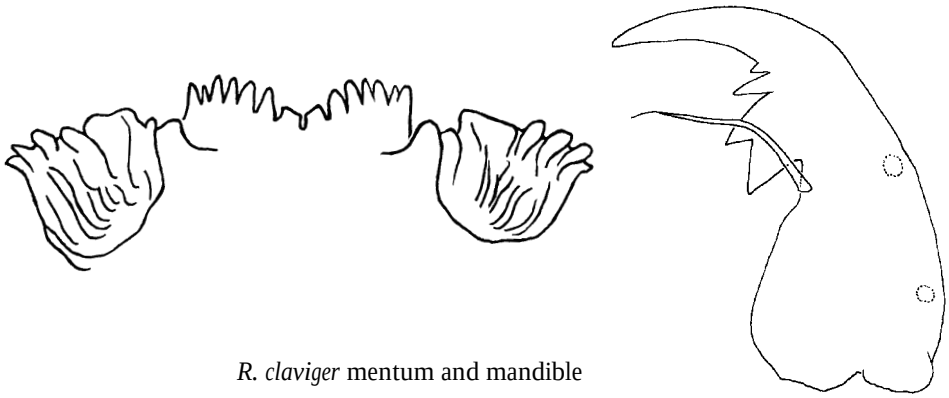
Genus ***Robackia***

**DIAGNOSIS:** Distinguished by the 7 segmented antennae; mandible with modifed inner teeth and without seta interna; 14 toothed mentum; and coarsely sculptured ventromental plates.

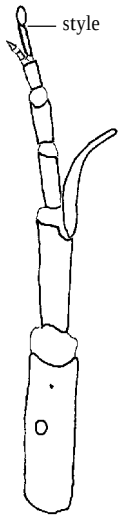
**NOTES:** Based on adults, three species have been collected in the Southeast, but the third species, *R. pilicauda* Sæther, collected in Alabama and Georgia, is probably a junior synonym of *R. claviger*. Larvae of the other two species, *R. claviger* and *R. demeijerei*, are separable by their mandibles and menta (see figures below). The proximal inner mandibular teeth of *R. claviger* are enlarged and directed backwards, and in most *R. claviger* the median teeth of the mentum are somewhat truncate and distinctly lower than the lateral teeth; *R. demeijerei* has smaller proximal inner mandibular teeth and the median teeth of the mentum are more pointed and subequal to the lateral teeth. Contrary to the key in Sæther (1977a), the menta of both species have 14 teeth. Note that the mandibles of early instars may not have the modified inner teeth of 4th instar larvae. Also note that it is easy to mistake the enlarged style for an antennal segment!

Larvae are found in sandy substrata of streams and rivers.

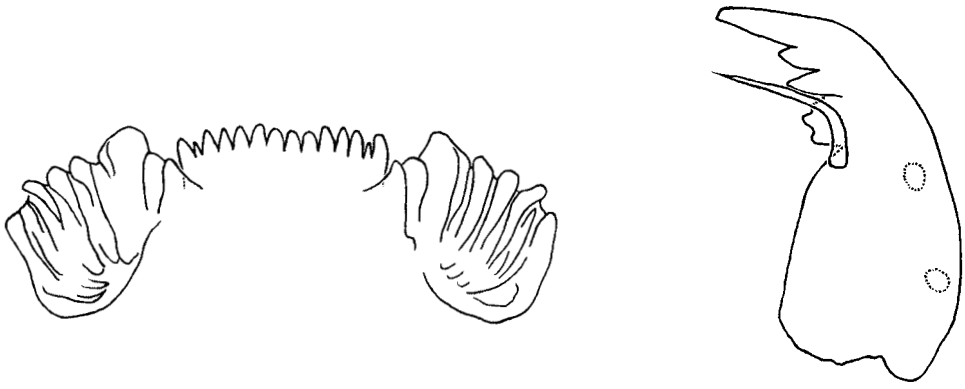
**ADDITIONAL REFERENCES:** Sæther 1977a.



*R. claviger* mentum and mandible




antenna



*R. demeijerei* mentum and mandible

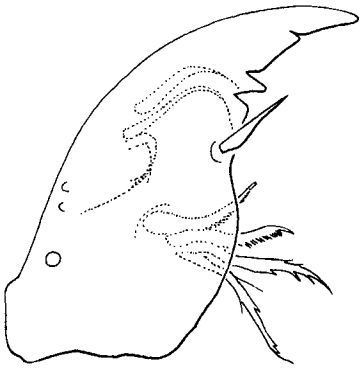
## Genus *Saetheria*

**DIAGNOSIS:** Distinguished by the small seta-like S I and large S II; 6 segmented antennae, with second segment not as long as third and style at apex of segment 3 not exceeding apex of segment 5; mandible without dorsal tooth; premandible with 3 large inner teeth and brush present; and the coarsely striated ventromental plates.

**NOTES:** Three species are known from the Southeast; only two have been formerly described with complete names. *Saetheria* is very close to *Paracladopelma*, but can be distinguished by the 6 segmented antenna with the relatively shorter second segment (in *Paracladopelma* the second antennal segment is longer than the third). Contrary to the diagnoses in Jackson (1977) and Pinder & Reiss (1983), the premandible does have a brush, although it is hyaline and not easily observed.

Larvae are found in sandy substrata, usually in running water.

**ADDITIONAL REFERENCES:** Jackson 1977; Sæther 1983a.

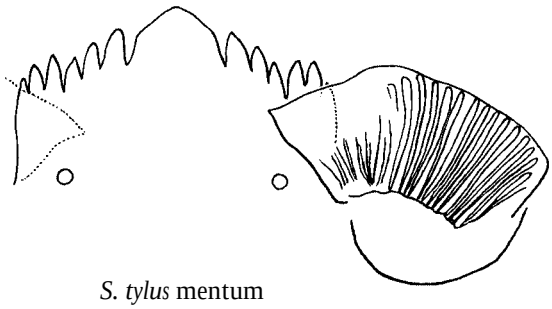


*S.* sp. 1 mandible

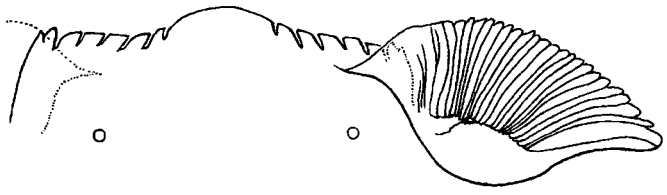
*S.* sp. 1 premandible

*S.* sp. 1 antenna

*S. hirta* antenna



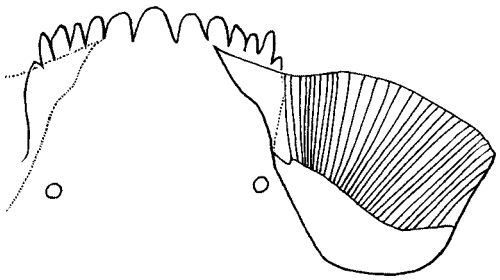
*S. tylus* mentum



*S.* sp. 1 mentum

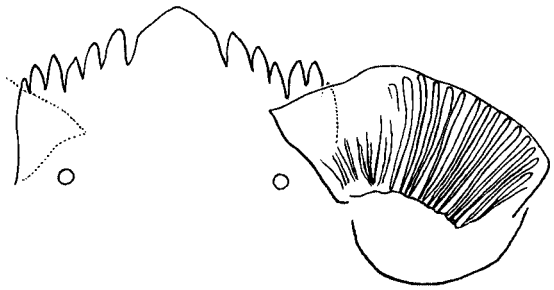
## Key to *Saetheria* larvae of the southeastern United States

1 Mentum with narrow median tooth .. ***S. hirta***

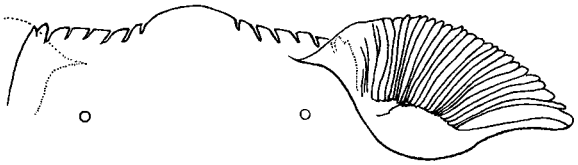


1' Median tooth of mentum broader (figures below) ..... 2

2(1') Mentum more arched, with lateral teeth straight and pointing forward; ventromental plate with about 15 full length striae ..... ***S. tylus***



2' Mentum more linear, with lateral teeth lower and pointing medially; ventromental plate with about 26 full length striae ..... **S. sp. 1**



## Notes on species

*S. hirta* - Known only from North and South Carolina. The adult male is undescribed; Sæther (1983a) described the larva and pupa, and the female from a mature pupa. I have seen a male from the Savannah River Plant area in South Carolina that may be the male of this species or *S.* sp. 1.

*S. tylus* - The most commonly encountered member of the genus in the Southeast.

*S.* sp. 1 - Originally described from larval-pupal association from Mississippi, I have also examined material from Alabama. I have not seen material of this taxon from the Carolinas, but it probably occurs there.

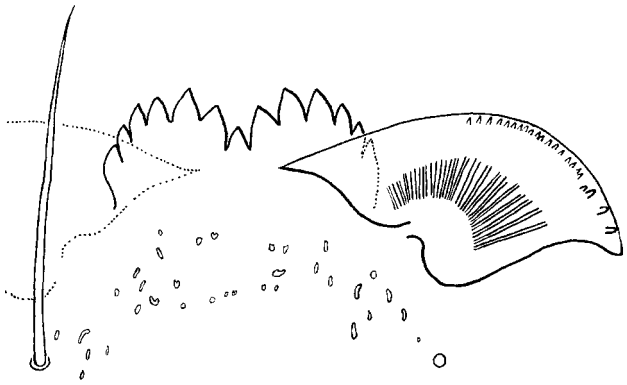
## Genus *Stelechomyia*

**DIAGNOSIS:** Distinguished by the frontal apotome, with one median labral sclerite anterior to it (S 3 setae are not placed on the sclerite); distinctive mentum, with deeply sunken single middle tooth; long setae submenti; lack of seta interna and pecten mandibularis on mandible; and rectangular, dark yellow reddish-brown head capsule.

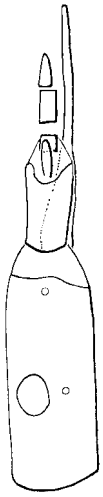
**NOTES:** One species, *S. perpulchra*, is known. It was formerly placed in *Lauterborniella* but given full generic status by Reiss (1982). Roback (1953) referred to this species as Tendipedini sp. A.

Larvae occur on dead wood in streams and rivers; they are often found on Hester-Dendy samplers produced from wood products.

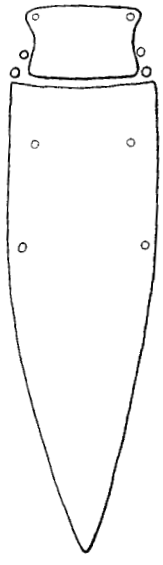
**ADDITIONAL REFERENCES:** Reiss 1982.



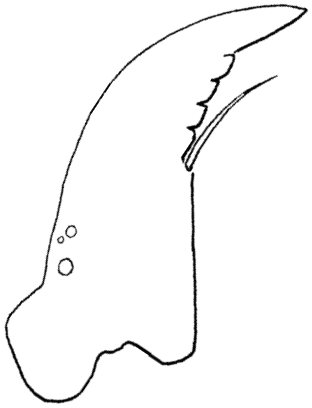
mentum



antenna



frontal apotome and labral sclerite 1



mandible

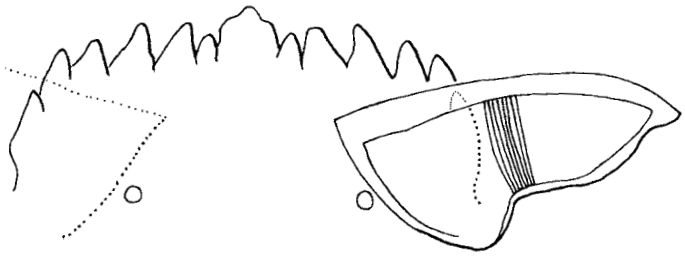
Genus ***Stempellina***

**DIAGNOSIS:** Larvae are distinguished by the apically bifid frontoclypeal setae; granulate frontoclypeal apotome, with none to several pairs of tubercles; antennal base without apical spur but with mesal palmate process; Lauterborn organs on pedicels arising from the apex of antennal segment 2; widely separated, squat ventromental plates; procerci with dark, simple or forked apical spurs or without spurs; and portable sand case.

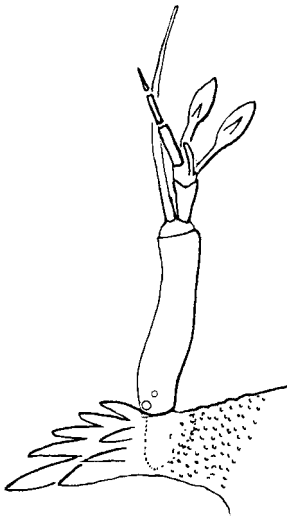
**NOTES:** Three described species are listed from the Carolinas by Caldwell et al. (1997); I have not seen any material of the three species listed. I have seen material of what appear to be at least 3 species based on larvae (two of these associated with pupae and adults).

*Stempellina* larvae live in portable cases and may occur in lotic and lentic situations.

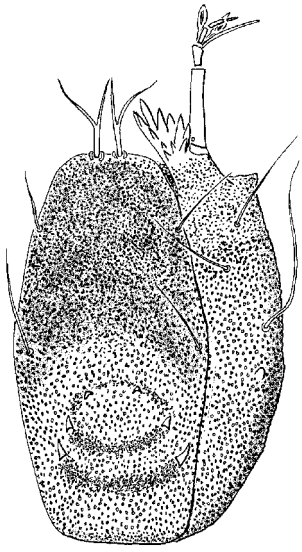
**ADDITIONAL REFERENCES:** Brundin 1948; Webb 1969



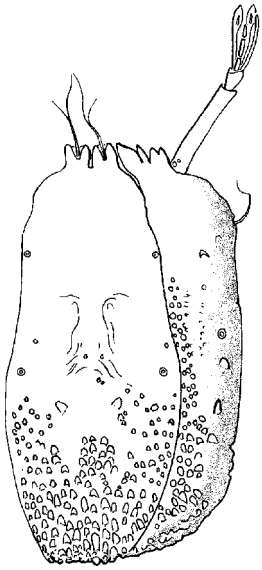
*S.* sp. A mentum



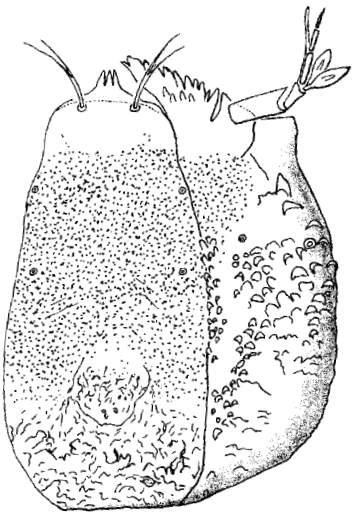
*S.* sp. A antenna



*S.* sp. A



*S.* sp. B

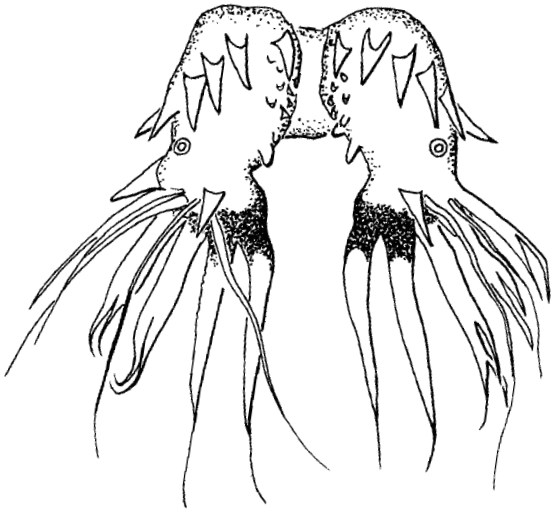


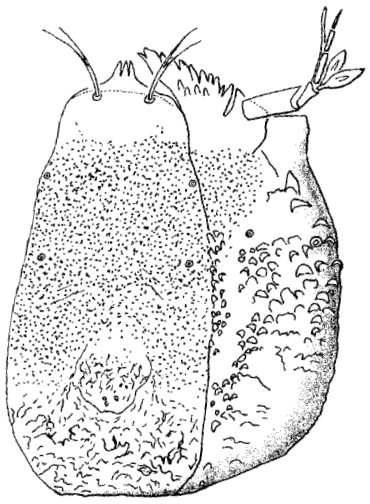
*S.* sp. C

dorsal views of partial head capsules

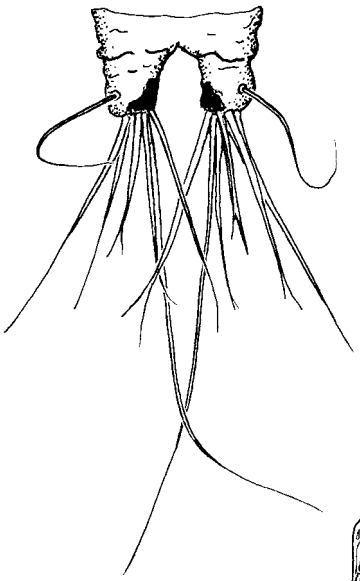
## Key to *Stempellina* larvae of the southeastern United States

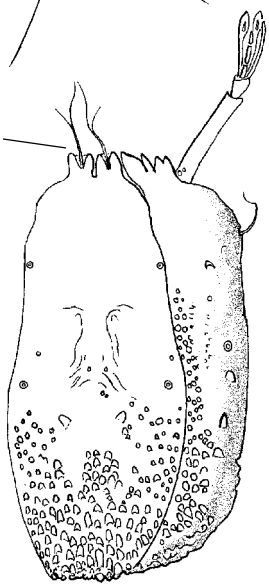
1 Procerci large, heavily sclerotized and with numerous spurs; head capsule with large tubercles laterally, none near center of head ..... ***S.* sp. C**



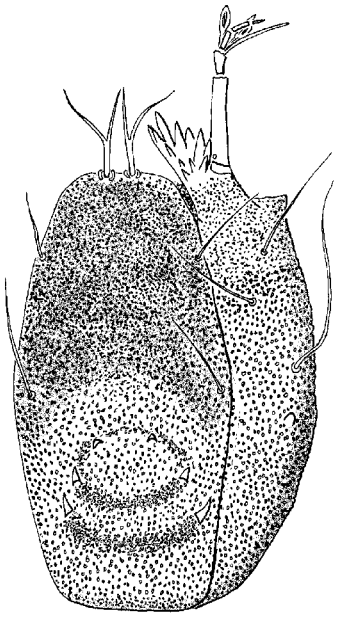


1' Procerci not as large, without spurs or with only a few spurs; head capsule with tubercles near center of head posteriorly (figures below) ..... 2






2(1') Frontoclypeal setae arise from large pedicels; head capsule with numerous tubercles, mostly posteriorly on the frontoclypeal apotome and lateral to the frontoclypeal suture ..... ***S.* sp. B**



2' Frontoclypeal setae not originating from large pedicels; head capsule mostly granulate dorsally, with a few tubercles near the side and 1-3 pairs of tubercles near the posterior median portion of frontoclypeal apotome ..... ***S.* sp. A**

## Notes on species

*S.* sp. A - This species is common in northern Florida; I have also seen material from the Carolinas. I have associations of this species, which appears to be undescribed. The number of sharp tubercles on the posteromedial portion of the frontoclypeal apotome varies from one pair to three pairs.

*S.* sp. B - I've only seen this taxon from North Carolina.

*S.* sp. C - I've examined material of this taxon from Alabama, Florida, North Carolina, Ohio and South Carolina. It was erroneously assigned to *Constempellina* by Epler (1995) due to the mesal process of the antennal base being obscured by detritus on the single specimen available at that time. Specimens of this species have been identified as "*Stempellina montivaga* group" or " *S.* nr. *montivaga*" by NCDENR biologists, although this taxon bears little resemblance to *S. montivaga* or, more properly, *S. bausei*. Note that the larva identified as *S. montivaga* in many previous works, such as Pinder & Reiss (1983: figs. 10.71 A, C, E and F) was misidentified; that species is actually *Neostempellina thienemanni*. See Reiss (1984) for a full listing of those publications in which *S. montivaga* was misidentified. Also note that the "real" *S. montivaga* is a junior synonym of *S. bausei* (Kieffer), a species not known to occur in the Nearctic. The larva of *S.* sp. C has procerci similar to those of *S.* sp. 3 of Oliver et al. (1978). Its placement in *Stempellina* is tentative; this species may be a *Neostempellina*. The antennal base of the larva varies from being gum drop shaped to pointed (as if it had a short spur). I have examined one larva/pupa/adult female rearing from Ohio. The pupa fits mostly *Stempellina* but lacks the characteristic, granulose median mound on the frontal apotome; the thorax is mostly smooth but with some granulation near the anterior mid-dorsal line; abdominal tergites II-VI have a basically quadrangular field of spinules; vortices are present on sternite IV; there are no spines on conjunctiva IV/V; and three lateral taeniae are present on tergite VIII. The associated adult is a female, and lacks a scutal tubercle and pulvilli (the lack of these structures would classify it as a *Neostempellina*). The Nearctic taxa assigned to *Constempellina*, *Neostempellina* and *Stempellina* are in need of revisionary work utilizing all life stages; generic limits based on European taxa may not be applicable on this side of the Atlantic.

## Genus *Stempellinella*

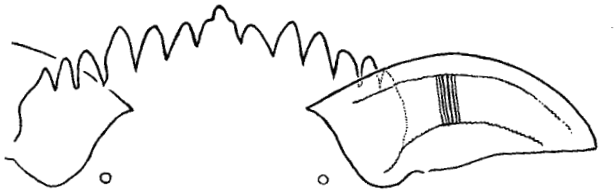
**DIAGNOSIS:** This tanytarsine is distinguished by the simple or apically divided S 3 (clypeal) setae; pecten epipharyngis of 3 slender spines; well developed spur on antennal base; 5 segmented antennae with one set of Lauterborn organs arising apically, the other from near the base of segment 2; premandible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

**NOTES:** At least 3 species occur in the Southeast. I've examined associations of two species (see Notes) and have seen another undescribed adult and an undescribed larva (that may be the larva of the undescribed adult).

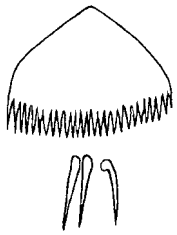
A great deal of confusion exists concerning the separation of *Stempellinella* and *Zavrelia*. Earlier works used antennal differences to separate the genera; these differences were shown to be not valid (Pinder & Reiss 1983). Pinder & Reiss (1983) used characters of the pecten epipharyngis and the premandible to separate the genera. However, *Stempellinella* sp. A has a 4 toothed premandible, unlike the 2-3 toothed premandible diagnosed for *Stempellinella* in Pinder & Reiss (1983). The larva of an undescribed *Zavrelia* species from the eastern US differs from the sole described larva of the genus, the European *Z. pentatoma*, in that the pecten epipharyngis consists of 3 slender spines, rather than the short stubby spines found in *Z. pentatoma*. At this time, only the heavier shagreen of pupal abdominal tergite II on *Zavrelia* and the hairy eyes of adult *Zavrelia* will separate the two genera. The two Nearctic taxa mentioned above blur the differences between *Stempellinella* and *Zavrelia* and make it more likely that the two genera should be combined; *Zavrelia* is the older name and would take precedence.

*Stempellinella* larvae are found in springs, streams and rivers; they are also recorded from lakes.

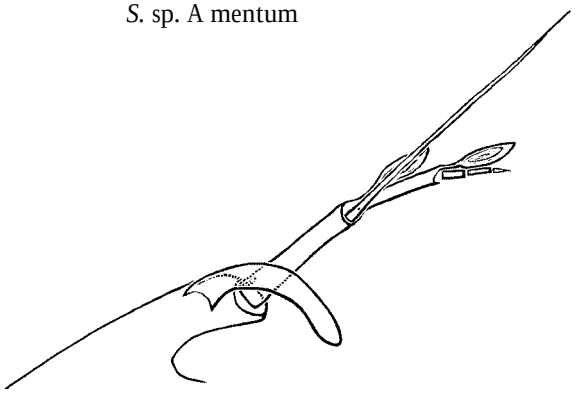
**ADDITIONAL REFERENCES:** Webb 1969.



*S.* sp. A mentum



*S.* sp. A labral lamella and pecten epipharyngis



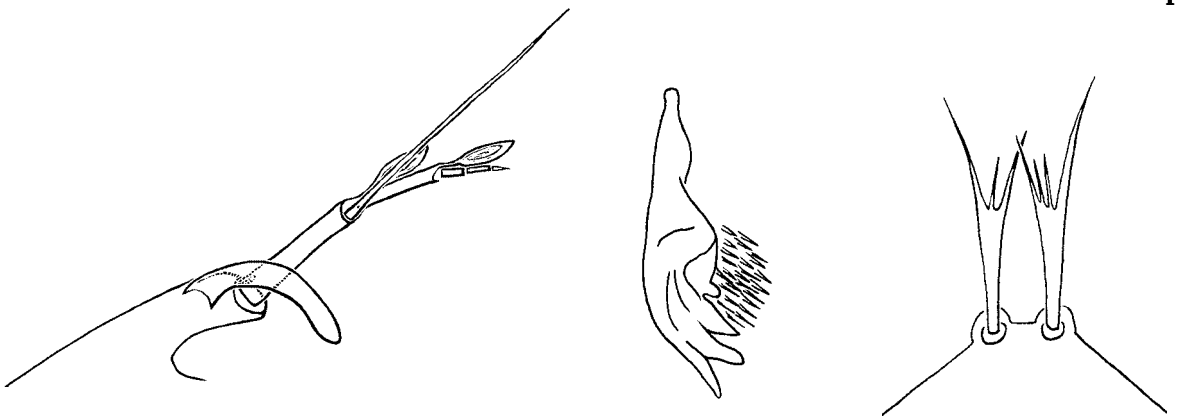
*S.* sp. A antenna

*Sp*. sp. A premandible

*S.* cf. *leptocelloides* premandible

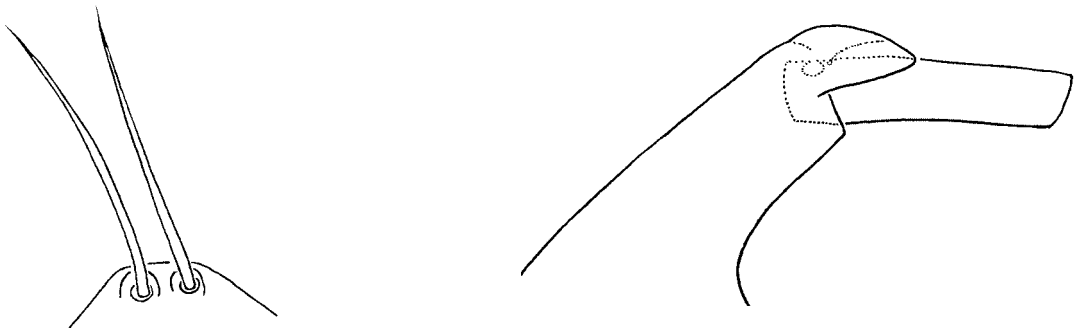
## Key to *Stempellinella* larvae of the southeastern United States

1 Antennal base with long curved spur; premandible with 4 inner teeth; clypeal setae apically divided ..... ***S.* sp. A**

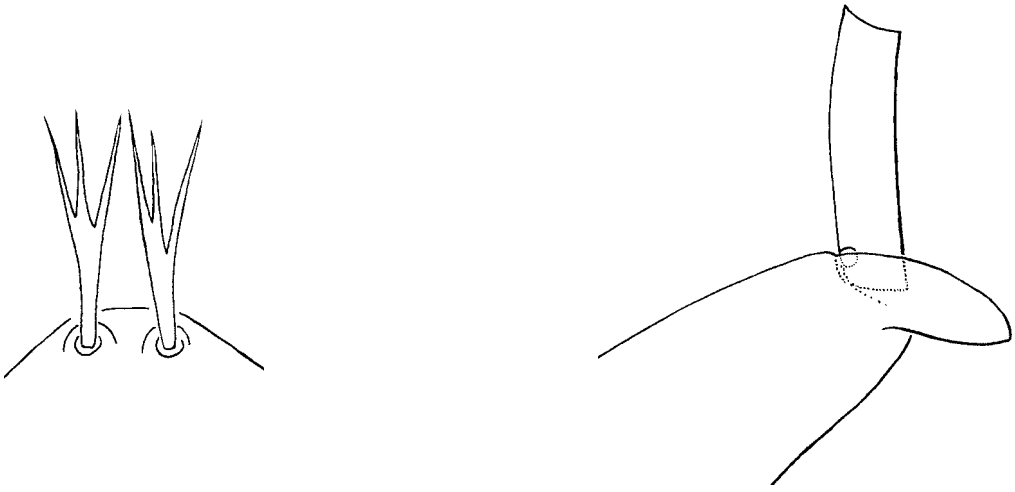


1' Spur of antennal base not as long; premandible with 3 inner teeth; clypeal setae simple or divided ..... 2

2(1') Clypeal setae simple; spur on antennal base shorter ..... ***S.* cf. *leptocelloides***



2' Clypeal setae apically divided; spur on antennal base longer ..... ***S.* sp. B**



## Notes on species

*S.* cf. *leptocelloides* - I've seen reared material of this taxon from Ohio, adults from northern Florida, and larvae from Florida, North Carolina and New Jersey. The identification is uncertain because the adult male genitalia differ slightly from those figured for *S. leptocelloides* (Webb 1969: figs. 7, 8); examination of type material will be necessary.

*S.* sp. A - I've examined reared or associated material from Florida, North Carolina and Ohio. This taxon appears to be an undescribed species that somewhat resembles the European *S. flavidula* (Edwards), but does appear to be a different species. *Stempellinella* sp. A is the most common species of the genus that I've seen from the Southeast; I've seen larvae from Alabama, Arkansas, Florida, North Carolina, Ohio, South Carolina and Missouri. There may be more than one species included in this taxon.

*S.* sp. B - An undescribed species that I've seen from North Carolina, Pennsylvania and Virginia. These larvae may belong with an undescribed adult I have from Alabama.

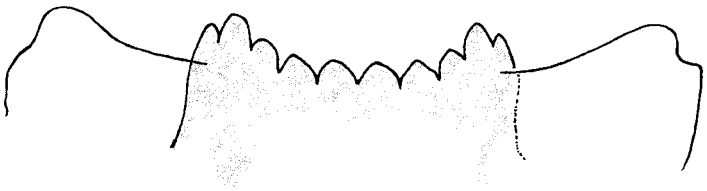
## Genus *Stenochironomus*

**DIAGNOSIS:** Distinguished by the dorsoventrally flattened and apically tapered head capsule; antenna with blade extending only to apex of segment 2; concave mentum with 10-12 teeth; ventromental plates with striae vestigial or absent; and anal tubules with 0-2 constrictions.

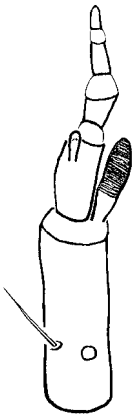
**NOTES:** Eight species are recorded from the Southeast. The genus was revised in an excellent monograph by Borkent (1984), who established two subgenera. He also offered a key to species for larvae. If you have perfectly mounted 4th instar larvae that are associated with adults, it may be possible to identify them. However, in the real world of benthic sampling, it is basically impossible to identify *Stenochironomus* larvae to species. Borkent (1984) noted that the putative differences between the larvae of *S. aestivalis* and *S. cinctus* described by Beck & Beck (1970) were not recognizable; the larvae are inseparable without associated adults.

Larvae mine in dead submerged leaves (subgenus *Petalopholeus*) or in submerged dead wood (subgenus *Stenochironomus*).

**ADDITIONAL REFERENCES:** Borkent 1984.



mentum



antenna

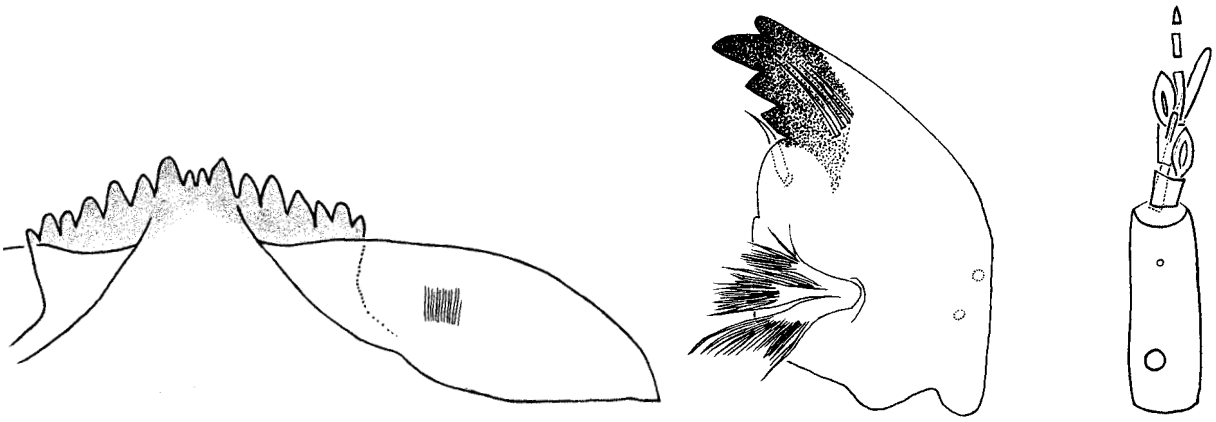
## Genus *Stictochironomus*

**DIAGNOSIS:** Distinguished by the 6 segmented antennae, with alternate Lauterborn organs at the apex of segments 2 and 3; mandible either with 2 inner teeth and dark dorsal tooth or with 3 inner teeth and no dorsal tooth; and mentum with 4 dark median teeth, with at least the outer pair higher than the remaining lateral teeth.

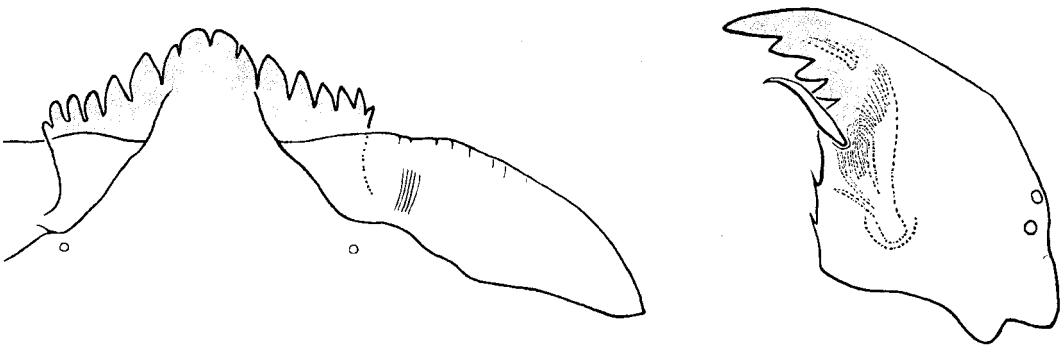
**NOTES:** Caldwell et al. (1997) record four *Stictochironomus* species for the Southeast. Mason (1985a) offered a key to some larvae of the genus, but it is based largely on literature descriptions (which can be notoriously inaccurate!) and does not include several species that occur here. Records of *S. devinctus* based solely on larvae should be regarded with skepticism; unless you have an associated male, you can not identify *Stictochironomus* larvae to species. The larva described as Chironomini genus B in Pinder & Reiss (1983) and pupal Chironomini genus F of Pinder & Reiss (1986) has been shown to be *S. caffrarius*, a Palaearctic and Afrotropical species not known from the US. A similar larva occurs in the Southeast with a distinctive mentum and the mandible has 3 inner teeth and no dorsal tooth; it may be the larva of *S. palliatus*. Such specimens can be called "*S. caffrarius* group sp." until an association is made and the larva identified. Other *Stictochironomus* species have the more typical mentum and a mandible with 2 inner teeth and a dark dorsal tooth.

Larvae are usually found in sandy sediments of streams, rivers and lakes; larval mouthparts are subject to abrasion from such sediments and often appear quite worn.

**ADDITIONAL REFERENCES:** Mason 1985a; Roback 1966d; Townes 1945.



*S. devinctus* mentum, mandible and antenna



*S. caffrarius* group sp. mentum and mandible

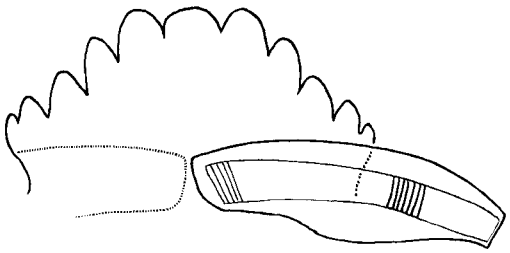
Genus ***Sublettea***

**DIAGNOSIS:** This tanytarsine is distinguished by the simple, 3 lobed pecten epipharyngis; bifid premandible; mandible with 2 dorsal teeth and pronounced hump on outer margin; mentum with 11 teeth with 3 central teeth projecting anteriorly; ventromental plates almost touching medially; and well developed Lauterborn organs on moderately long pedicels.

**NOTES:** One species, *S. coffmani*, is described from the Nearctic; it is recorded from the southeastern states with the exception of Florida. Larvae may be confused with *Neozavrelia* or *Rheotanytarsus.* Although Pinder & Reiss (1983) stated that the Lauterborn organs do not extend beyond the antennal apex, on most of the *Sublettea* specimens that I've examined the Lauterborn organs clearly extend past the apex.

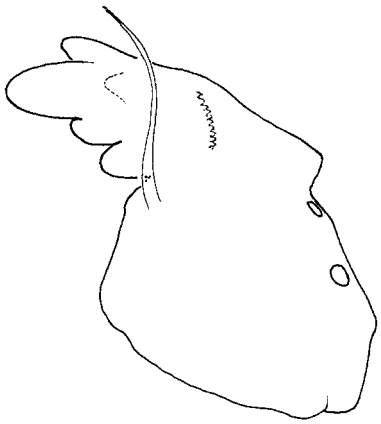
Larvae are found in lotic habitats.

**ADDITIONAL REFERENCES:** Roback 1975.

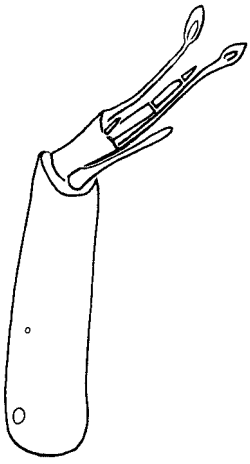


mentum

pecten epipharyngis



mandible



antenna

Genus ***Tanytarsus***

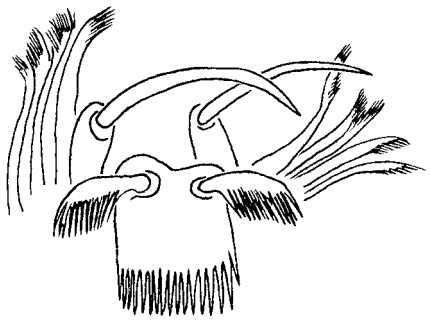
**DIAGNOSIS:** This tanytarsine genus is distinguished by the pecten epipharyngis of 3 apically teethed scales; premandible with 3 apical teeth; antennae with small to moderate Lauterborn organs on (usually) long pedicels; and posterior parapods with simple claws.

**NOTES:** A speciose genus, most common on the Coastal Plain. Jim and Mary Sublette have been working with *Tanytarsus* for many years; many species are described, but the descriptions have not yet been published. With Torbjörn Ekrem as a co-author, publications are expected soon on the *T. mendax* group,

Caldwell et al. (1997) list eleven described species for the Southeast, but only one, *T. limneticus*, is associated with an identifiable larva; many undescribed species are present. The key below identifies 26 species but must be considered preliminary. Some taxa, such as *T.* spp. A, C, G, L and T, may consist of more than one species.

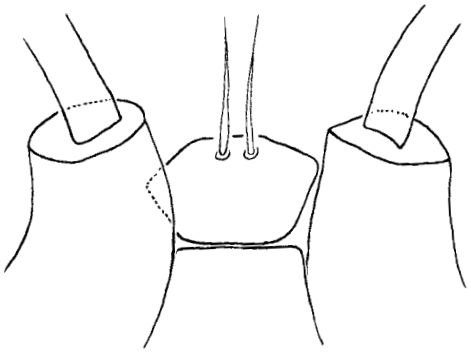
Larvae are found in a variety of aquatic habitats, including brackish water.

**ADDITIONAL REFERENCES:** Spies 1998a, 1998b; Sublette 1964.

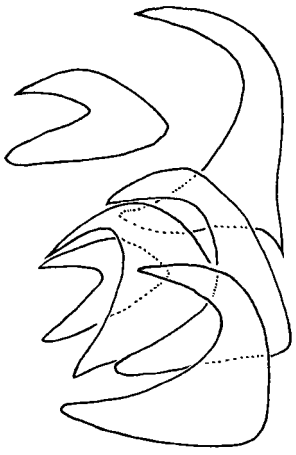


*T*. sp. C labrum

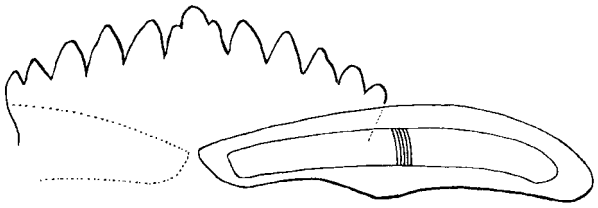
premandible



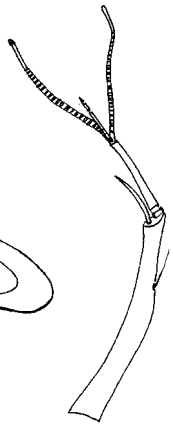
*T.* sp. L clypeus and antennal bases



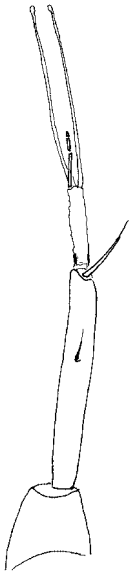
posterior parapod claws



*T.* sp. I mentum



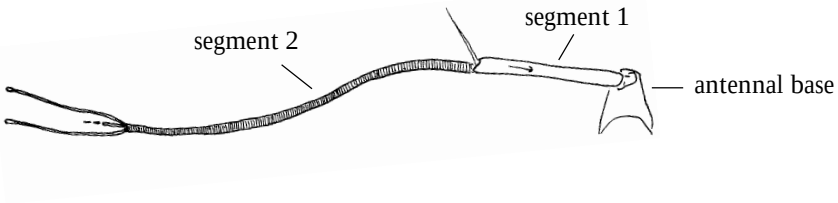
*T. limneticus* antenna



*T.* sp. L antenna

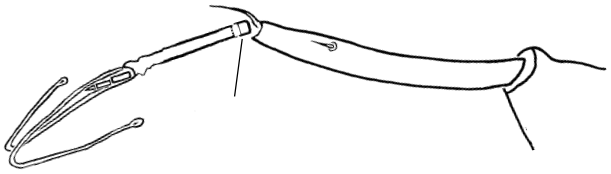
## Key to *Tanytarsus* larvae of the southeastern United States

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



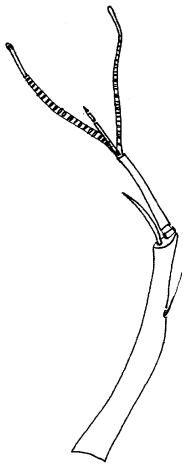

1' Antennal segment 2 not annulated (although Lauterborn organ pedicels may be annulated) ... 2

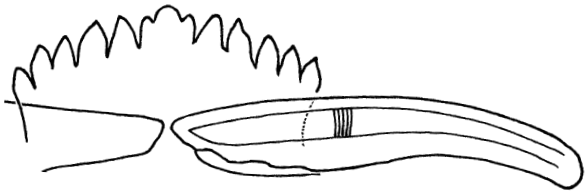
2(1') Antennal segment 2 with a narrow ring near its base separated from the remainder of the segment by a narrow unsclerotized area ..... 3



2' Antennal segment 2 with base solidly sclerotized, or entire segment weakly seclerotized ..... 5

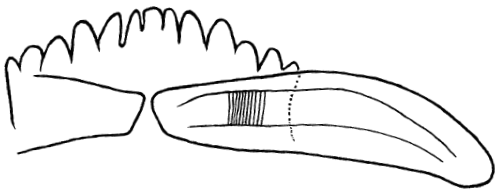
3(2') Pedicels of Lauterborn organs annulated ..... ***T. limneticus***





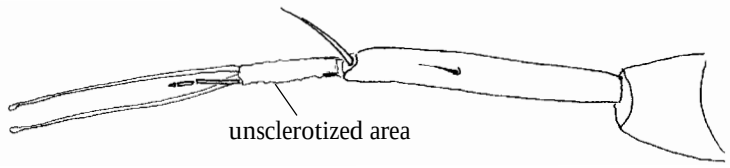
3' Pedicels of Lauterborn organs not annulated ..... 4

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



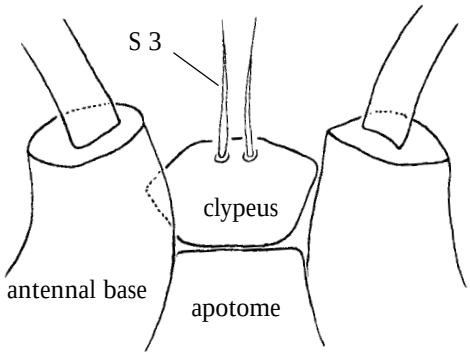
4' Median tooth of mentum simple; clypeal setae thin, simple, not arising from small tubercle ..... ..... ***T.* sp. B**

5(2') Antennal segment 2 for the most part unsclerotized (at most a small section near the base may be weakly sclerotized) ..... 6




5' Antennal segment 2 for the most part (at least 60%) well sclerotized ..... 9

6(5) Clypeus (sclerite anterior to bases of antennae) with a pair of simple setae, the S 3 setae (setae may have a few fine lateral "hairs") ..... 7

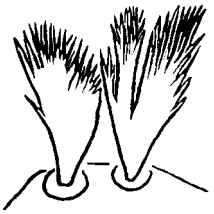



6' Clypeus with coarsely branched or plumose setae (figures below) ..... 8

7(6) Mandible with 3 inner teeth ..... ***T.* sp. L**

7' Mandible with 2 inner teeth ..... ***T.* sp. V**

8(6') Clypeal (S 3) setae plumose, finely dissected ..... ***T.* sp. A**

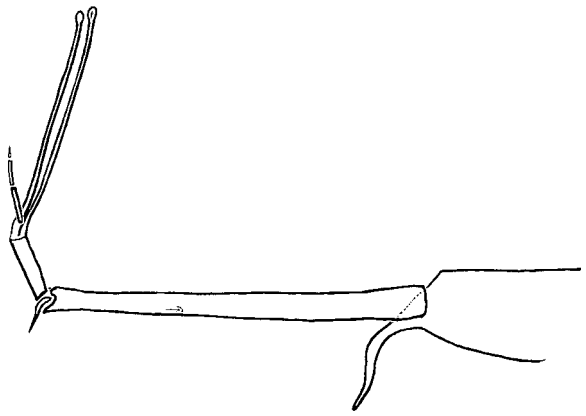


8' Clypeal setae with coarse, flattened branches ..... ***T.* sp. S**

9(5') Mandible with 2 inner teeth ..... 10

9' Mandible with 3 inner teeth ..... 18

10(9) Antennal base with long spur ..... ***T.* sp. M**



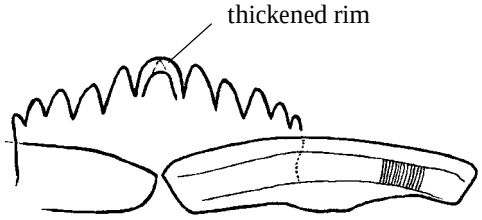
10' Antennal base without long spur ..... 11

11(10') Clypeal (S 3) setae branched ..... ***T.* sp. W**

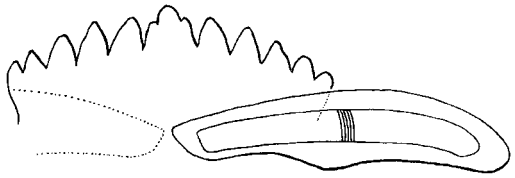
11' Clypeal setae simple ..... 12

*T.* sp. W S 3 setae

12(11') Median tooth of mentum with thickened rim .. ..... 13



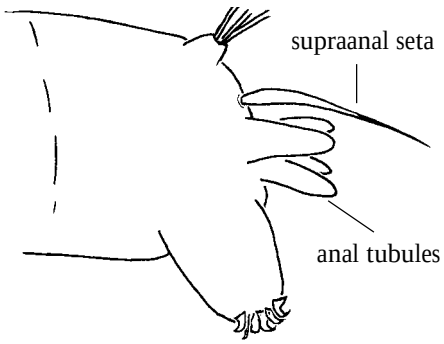

12' Median tooth simple or weakly trifid, without thickened rim ..... 14



13(12) Clypeal (S 3) setae arise from pointed pedestals ..... ***T.* sp. K**

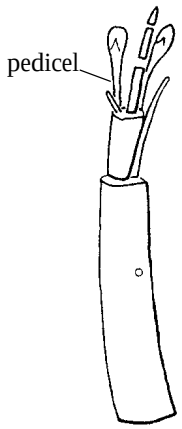
13' Clypeal setae do not arise fom pedestals (there may be a raised area near the bases of the setae ..... ***T.* sp. R**

*T.* sp. K S 3 setae



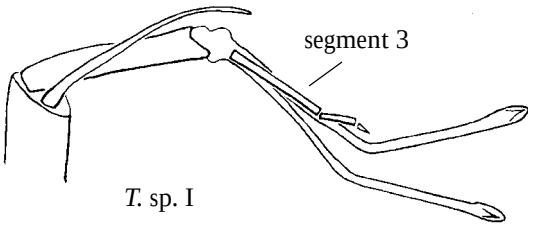

14(12') Supranal setae much longer than anal tubules ..... 15

14' Supraanal setae shorter than or subequal to anal tubules ..... 17

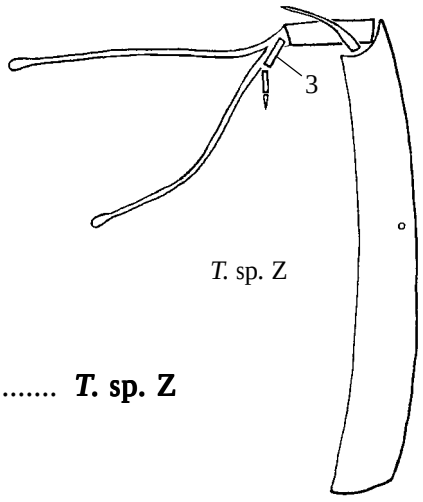



15(14) Pedicels of Lauterborn organs short ..... ***T.* sp. H**

15' Pedicels of Lauterborn organs long (figures below) ..... 16




*T.* sp. I

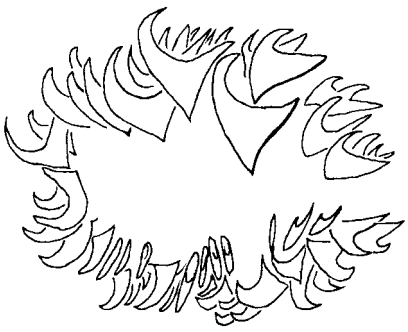



*T.* sp. Z

16(15') Antennal segment 3 long ..... ***T.* sp. I**

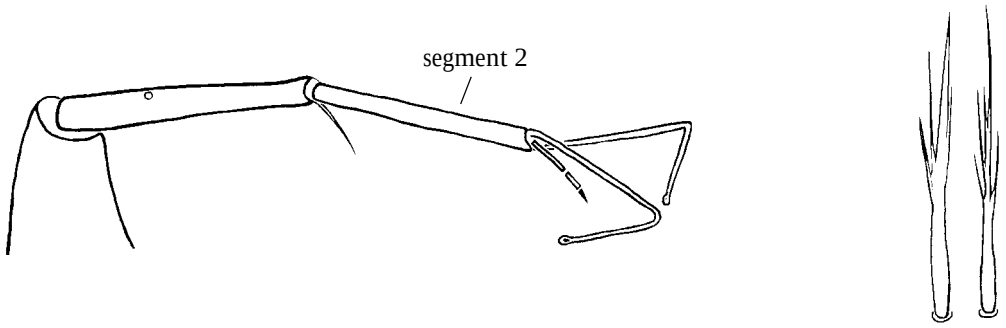
16' Antennal segment 3 short ..... ***T.* sp. Z**

17(14') Posterior parapods each with more than 50 claws arranged in semicircle; sclerotized length of antennal segment 2 divided by length of sgment 1 < 0.2 ..... ***T.* sp. X**

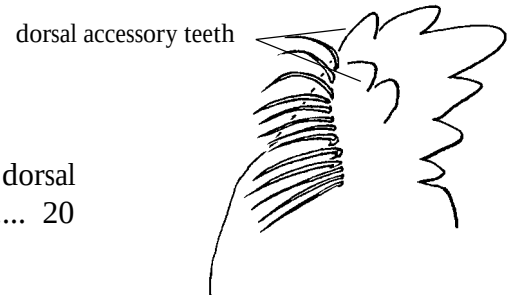


17' Posterior parapods each with fewer than 20 claws, not arranged as above; sclerotized length of antennal segment 2 divided by length of segment 1 > 0.2 ..... ***T.* sp. J**

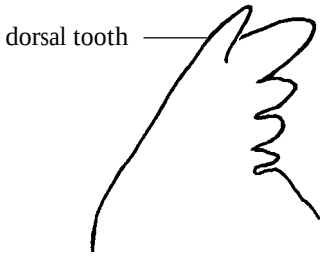
18(9') Antennal segment 2 more than 1/2 length of segment 1; clypeal (S 3) setae with thin lateral branches ..... ***T.* sp. P**




18' Antennal segment 2 less than 1/2 length of segment 1; clypeal setae simple or branched ..... 19



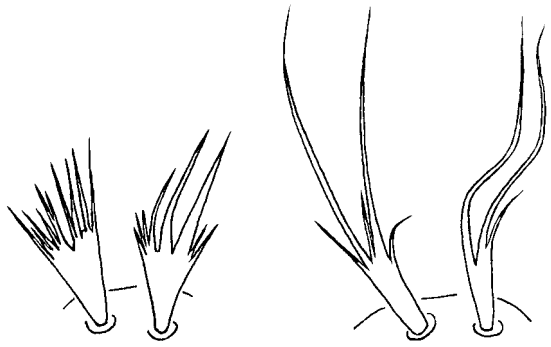

19(18') Mandible with 1 dorsal tooth and several accessory dorsal teeth ..... 20




19' Mandible with a single dorsal tooth ..... 22

20(19) Clypeal (S 3) setae simple ..... ***T.* sp. C**

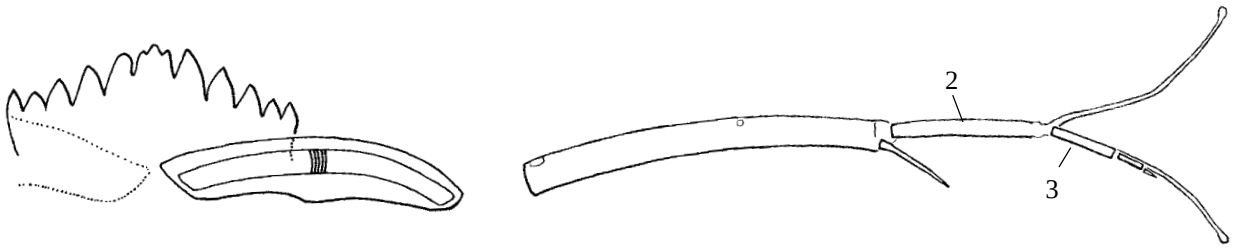
20' Clypeal setae branched ..... 21



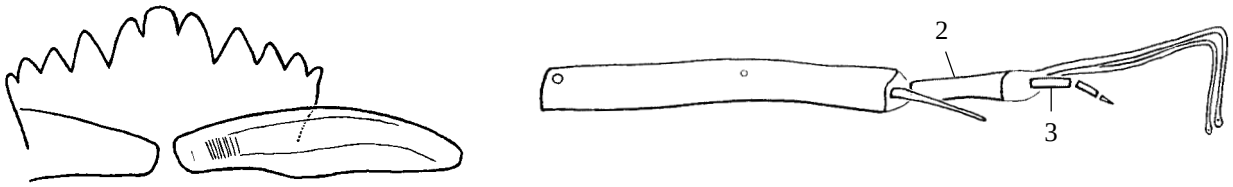
*T.* sp. D *T.* sp. N

branched clypeal (S 3) setae

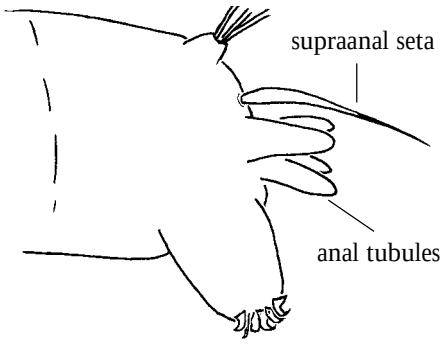
21(20') Second and third antennal segments long, second segment 0.41-0.48, mean 0.45, length of first; premandible usually apically darkened; mentum with median tooth trifid ..... ***T.* sp. N**




21' Second and third antennal segments shorter, second segment 0.28-0.38, mean 0.34, length of first; premandible not darkened; mentum with 3 median teeth that are slightly fused and somewhat set apart from lateral teeth ..... ***T.* sp. D**



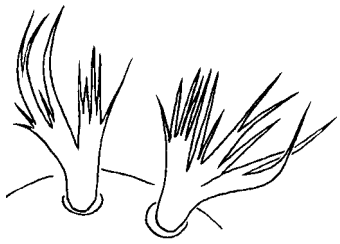

22(19') Supraanal setae much longer than anal tubules ..... 23




22' Supraanal setae shorter than or subequal to anal tubules ..... 25

23(22) Clypeal (S 3) setae branched ..... ***T.* sp. U**

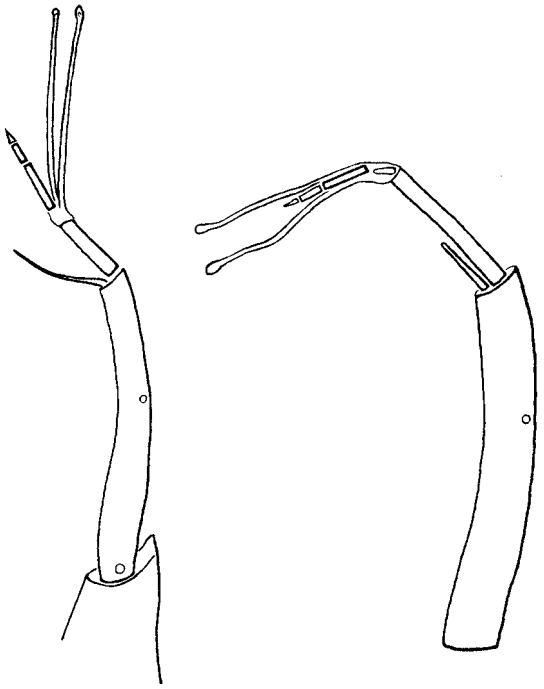
23' Clypeal (S 3) setae simple ..... 24



*T.* sp. U

24(23') Sclerotized portion of antennal segment 2 less than 0.3 length of segment 1; antennal base often with small spur ..... ***T.* sp. T**

24' Sclerotized portion of antennal segment 2 greater than 0.3 length of segment 1; antennal base without spur ..... ***T.* sp. E**



*T.* sp. T *T.* sp. E

25(22') Premandibles usually darkened apically; antennal segment 2 about 1/4 length of segment 1; median tooth of mentum shallowly trifid ..... ***T.* sp. G**

25' Premandibles not darkened apically; antennal segment 2 about 2/5 length of segment 1; median tooth of mentum deeply trifid ..... ***T.* sp. Q**

## Notes on species

*T. limneticus* - At this time the only *Tanytarsus* larva I feel comfortable putting a "real" name on. The distinctive annulated pedicels of the Lauterborn organs easily distinguish this species. Most larvae I've collected came from bottom sediments of eutrophic ponds or slowly flowing rivers. Isolated larvae were described as *Nimbocera pinderi* by Steiner & Hulbert (1982), but utilizing reared specimens, Epler (1995) showed that this species was actually *Tanytarsus limneticus*. Associations of some other *Tanytarsus* species indicate that some of the characters used to delimit *Nimbocera*, originally described from Chile by Reiss (1972), may not hold up, and that these species are best placed in *Tanytarsus*.

*T*. sp. A - A common species I've seen from Alabama, Florida, North Carolina and South Carolina. This is probably the species keyed as *Tanytarsus guerlus* group in Simpson & Bode (1980). There are many species associated with the "*guerlus* group". Material identified as "poss. *guerla*" , "nr. *guerla*" and "nr. *guerla* sp. 2" by Roback (who described *T. guerlus*, as *Calopsectra guerla*, in 1957) in the ANSP collection was *T*. spp. C, G, L and S, with the majority being *T*. sp. L. In Florida material I've examined, the pupa of *T*. sp. A has anteriorly directed spines in the longitudinal spine rows on T IV, similar to those of "*Nimbocera*", *T. limneticus* and as figured for *T. guerlus* by Roback (1957: fig. 523). I have not examined type material of *T. guerlus*.

*T*. sp. B - An uncommon species known to me only from Florida specimens.

*T*. sp. C - More than one species may be included in this taxon, which I have seen from Alabama, Florida (where it can be very common), North Carolina and South Carolina. There is variation in the length of the second antennal segment and in how deeply separated the first lateral teeth are from the median tooth, but there appears to be a continuum in these characters. A long series of reared material of all forms will be necessary to distinguish separate species, if such exist. The 3-4 accessory dorsal teeth along with the simple clypeal setae will distinguish this species from the similar *T*. sp. D.

*T*. sp. D - I've seen material of this taxon from Florida, North Carolina and South Carolina. Because of the similarity in the mentum, it can easily be mistaken for *T*. sp. C but note the branched S 3 setae and the single dorsal accessory tooth on the mandible of *T*. sp. D.

*T*. sp. E - I've seen larvae from Florida and South Carolina. Note the relatively long second antennal segment and simple clypeal setae.

*T*. sp. F - An unusual species with a long, annulated second antennal segment, known from Florida, Georgia and both Carolinas. Perhaps this taxon would merit separate generic status but without any associated pupae or adults such a decision would be premature. With the exception of the annulated second antennal segment it fits quite well within *Tanytarsus*. Hudson et al. (1990) and Caldwell et al. (1997) listed it as "unknown genus near *Nimbocera*" and "genus near *Nimbocera*" respectively. However, it is the second antennal segment that is annulated, not the Lauterborn pedicels as in *T. limneticus* ("*Nimbocera*"). Similar specimens have been reported from South America as *Calopsectra* sp. 13 (Roback 1966c: fig. 294) and ""*Tanytarsus*" (b)" (Nolte 1989: figs. 2.2 and 3.2).

*T*. sp. G - More than one taxon may be included here; I've seen larvae from Florida, Georgia, Ohio, North Carolina, South Carolina and Texas. It seems to favor more eutrophic conditions. I have seen a series of apparently worn and/or deformed *T*. sp. G larvae from Sunshine Lake in southern Florida, where a series has been collected and reared by Bob Rutter. Superficially the larvae resemble those of *Corynocera*, but the associated pupae and larvae place this species in *Tanytarsus*; and they seem to be *T*. sp. G.

*T*. sp. H - Known only from sites near the mouths of the Little Manatee and Suwannee Rivers on the west coast of Florida; note the short pedicels of the Lauterborn organs.

*T*. sp. I - Known from a series of reared specimens from a small pond in North Carolina and unassociated larvae from a lake in Florida.

*T*. sp. J - Known to me only from Florida specimens; it is quite common in the northern Everglades.

*T*. sp. K - I've only seen this species from Florida, where it occurs at least as far north as the Suwannee River. A general rule of thumb is that many species that occur in the Suwannee River basin will be found on the Coastal Plain of the Carolinas, so this taxon might be expected there.

*T*. sp. L - Several taxa may be included here; I've seen larvae from Florida, North Carolina and South Carolina. The clypeal setae are usually simple, but may have small lateral hair-like branches.

*T*. sp. M - Known to me from streams in Alabama, Florida, North Carolina and South Carolina. The long spur on the antennal base can be difficult to see if it is directed towards or from the observer. This species can also be easily confused with those *T*. sp. T specimens with a long spur on the antennal base; note that *T*. sp. M has only two inner teeth on the mandible, the median tooth of the mentum is usually lighter than the remaining teeth; and antennal segment 3 is about as long as 4.

*T*. sp. N - Known to me only from streams in northern Florida. The long antennal segments 2 and 3, usually apically darkened premandibles and the large supraanal setae are distinctive.

*T*. sp. O - I've seen material of this species from Alabama, Florida and both Carolinas. The second antennal segment is frequently weakly sclerotized, but the separate little ring–like section near the base is always evident. Note also the deeply trifid median tooth of the mentum and the thick

clypeal setae that are divided (they may appear to be almost simple with only a few "split ends") and arise from small rounded bases. The mandible usually has two inner teeth but sometimes may appear to have three.

*T*. sp. P - North Carolina and Alabama specimens I've assigned to this taxon have the posterior third of the head capsule brown. Do these represent a different species than the more "normal" individuals I'm used to seeing from northern Florida that lack this coloration? Without associated specimens showing other differences I am loathe to assign these specimens to a different "species". Note also that the mandible of *T*. sp. P has numerous dorsal accessory teeth, similar to that of *T*. sp. C.

*T*. sp. Q - Known to me only from specimens in the Tampa, Florida, area.

*T*. sp. R - To date I've only seen this taxon from peninsular Florida.

*T*. sp. S - This species and *T*. spp. A and L appear to be closely related; they are separated mainly by the shape of the clypeal setae. I've seen specimens from Florida and both Carolinas.

*T*. sp. T - I've seen this taxon from Alabama, Florida (where it can be common in rivers) and North Carolina. More than one species may be included here; the size of the spur on the antennal base is variable. Perhaps those larvae with a reduced spur represent a different species, but without reared material I do not feel confident assigning species status to what merely may be variants.

*T*. sp. U - I've seen this species from Alabama, Florida and both Carolinas (it has been reared from South Carolina).

*T*. sp. V - I've seen this species from northern Florida and North Carolina

*T*. sp. W - To date known only from Florida.

*T*. sp. X - To date known only from Florida. This species has an unusual (for *Tanytarsus*) arrangement of claws on the posterior parapods. The claws are numerous (about 60 on each parapod) and arranged in a semicircle, very similar to those of some *Micropsectra* species. The mentum also has a *Micropsectra*-like appearance, but the premandible has three well defined apical teeth. Associated specimens will be necessary to determine its true generic identity.

*T*. sp. Z - I've seen larvae from Georgia and North Carolina.

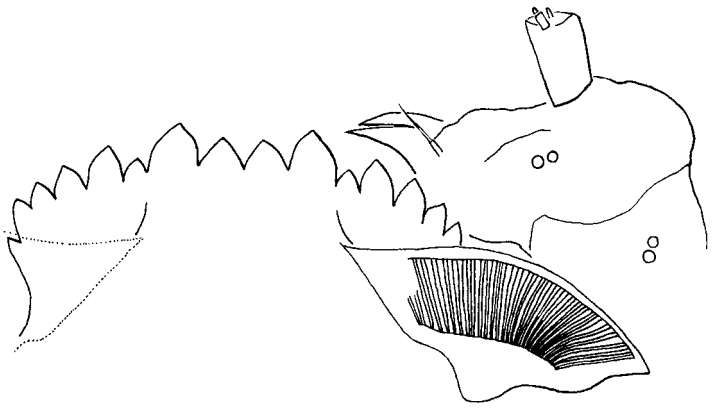
Genus ***Tribelos***

**DIAGNOSIS:** Distinguished by the frontal apotome with a straight anterior margin, with a clypeus (the S3 setae are on separate, thin plates lateral to it) and a medial labral sclerite anterior to the apotome; mentum with 4 median teeth higher than lateral teeth and with a thin line running from the posterior margin of the outermost median tooth to the anteromedial corner of the ventromental plate (this line usually difficult to discern); mandible with distance from basal notch of proximal inner tooth to insertion of seta subdentalis usually less than 3/4 distance from basal notch of proximal inner tooth to notch of apical tooth; and molar area of mandible with 1 or 2 serrations.

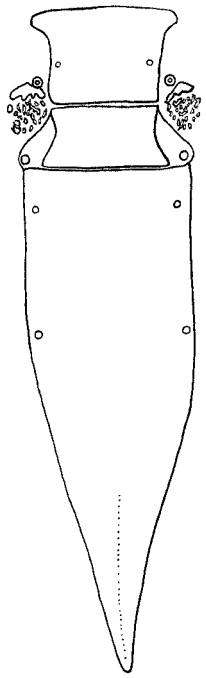
**NOTES:** Three species are known from the Southeast, all of which occur in the Carolinas. Hudson et al. (1990) noted two undescribed species from South Carolina but I have not seen any material of such taxa. *Tribelos* is easily confused with *Phaenopsectra*, especially earlier instar larvae. However, all southeastern *Tribelos* larvae known to me have a frontal apotome with a straight anterior margin, with two medial sclerites anterior to it; all southeastern *Phaenopsectra* larvae I've seen have a frontoclypeal apotome with a rounded anterior margin and only one medial labral sclerite anterior to it.

Larvae are found most often in streams and rivers, where they occur on vegetation and on marginal sediments; they can be abundant on Hester-Dendy samplers. Larvae appear to be tolerant of moderately enriched conditions.

**ADDITIONAL REFERENCES:** Grodhaus 1987a.

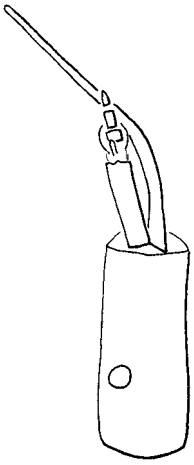


*T. fuscicorne* mentum and maxilla

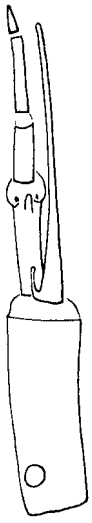


*T. fuscicorne* apotome and labral sclerites

*T. jucundum* mandible

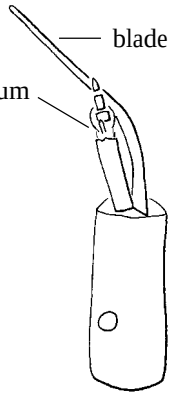


*T. jucundum* antenna



*T. fuscicorne* antenna

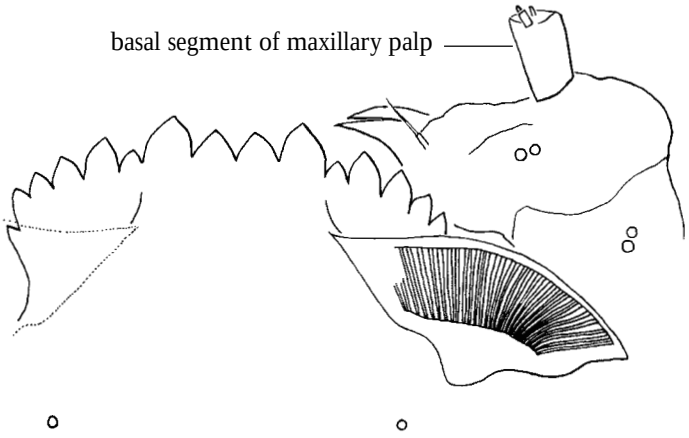
## Key to *Tribelos* larvae of the southeastern United States



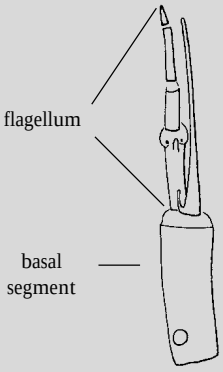

1 Blade of antenna much longer than flagellum (segments 3-5) ... ***T. jucundum***

1' Blade of antenna subequal to flagellum (figures below) ..... 2

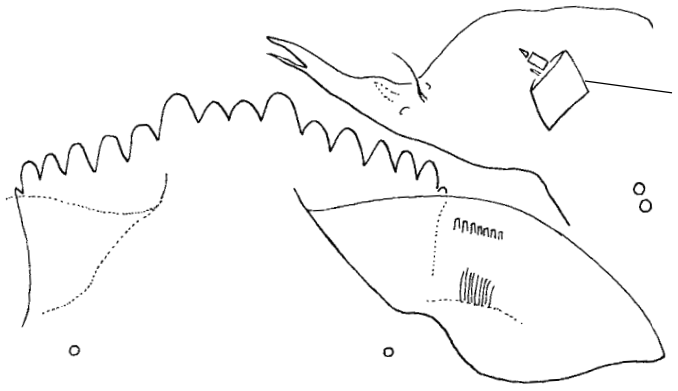
2(1') Ventromental plate striae distinct across face of plate; basal segment of antenna shorter, AR 0.90-1.20; length of basal segment of maxillary palp 2 or more times width ..... ***T. fuscicorne***

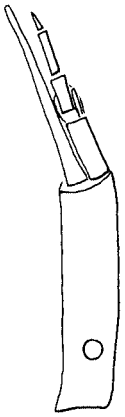



AR = antennal ratio. Calculated by dividing the length of the basal segment by the length of the flagellum (the remaining antennal segments.)




2' Ventromental plate striae indistinct in middle of plate; basal segment of antenna longer, AR 1.4-1.6; length of basal segment of maxillary palp less than 2X width ..... ***T. atrum***



## Notes on species

*T. atrum* - The least common of the three southeastern species, early instars of *T. atrum* could be confused with early instars of *Phaenopsectra obediens* group species. See *T. jucundum* below.

*T. fuscicorne* - A common species on the Coastal Plain, often found in association with *T. jucundum*. With its distinct ventromental plate striae, elongate base to the maxillary palp and short basal antennal segment, *T. fuscicorne* is usually easily identified.

*T. jucundum* - The mentum of *T. jucundum* is similar to that of *T. atrum*, with the ventromental plate striae being indistinct in the middle of the plate. Fourth instar larvae of *T. jucundum*, with the characteristic short third antennal segment and short flagellum/elongate antennal blade, are usually easily identified. However, earlier instars of *T. jucundum* and *T. atrum* may be confused with early instars of *Phaenopsectra obediens* group species. The menta and ventromental plates of the these three taxa are similar and in some *Ph. obediens* the antennal blade extends beyond the flagellum. Note that *Phaenopsectra* has a frontoclypeal apotome, with the clypeus, bearing the S3 setae laterally, fused to the anterior portion of the apotome. On some *Phaenopsectra* specimens a thin line may be present "between" the clypeus and the apotome but this appears most often to be a fold, probably an artifact of slide mounting, rather than a line of demarcation. In *Tribelos*, the S3 setae are born on two thinner lateral plates adjacent to the medial labral sclerite 1, an intrepretation followed by Pinder & Reiss (1983). Grodhaus (1987: 172) disagreed with this interpretation of the clypeus, stating that the thinner lateral plates bearing the S3 setae were thinner portions of the clypeus. A medial labral sclerite 1 is usually not visible in *Phaenopsectra* as it easily is in *Tribelos*; in this manual I follow the interpretation of the labral sclerites as in Pinder & Reiss (1983) and thus disagree with Grodhaus (1987).

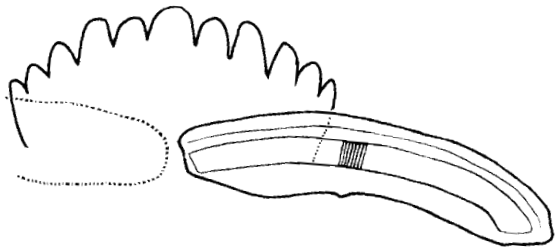
## Genus *Virgatanytarsus*

**DIAGNOSIS:** This tanytarsine genus is distinguished by the pecten epipharyngis of 3 distally serrated scales; Lauterborn organs on moderately long pedicels; premandible with more than 3 teeth; mentum with 11 teeth; ventromental plates almost touching medially; and posterior parapods with some claws that are pad-like, with numerous small hooklets arranged in multiple rows.

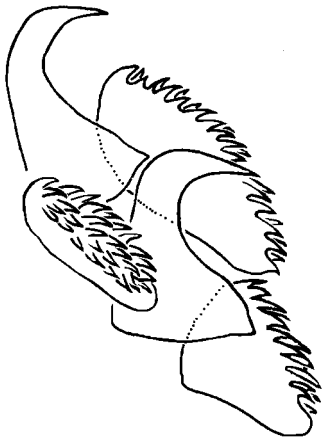
**NOTES:** Leeper & Taylor (1998) reported a *Virgatanytarsus* species (an adult identified by L. Ferrington) from a South Carolina temporary wetland pond, and I've examined a single adult collected from a stream in Georgia by B.A. Caldwell. I have not seen the South Carolina material and do not know if the two taxa are conspecific. I have not seen Nearctic larval material; the figures below are based on a European species.

In Europe, larvae are found in small rivers and the littoral of lakes, where they live on stony substrata and submerged macrophytes. It appears from the collection sites of the southeastern US adults mentioned above that Nearctic larvae live in similar lentic and lotic habitats.

**ADDITIONAL REFERENCES:** Pinder 1982.



mentum



claws of posterior parapod

antenna

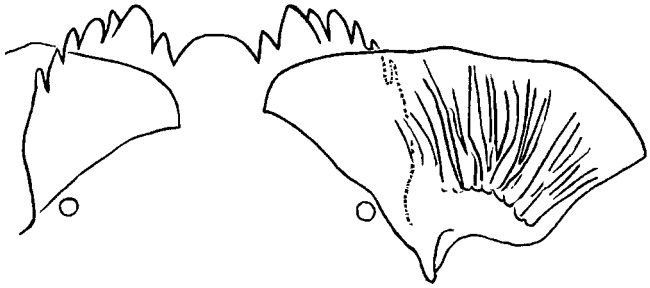
## Genus *Xenochironomus*

**DIAGNOSIS:** Distinguished by the dorsum of the head with 3 labral sclerites anterior to the apotome; large brush of setae on the labrum; distinctive mentum with broad sunken median tooth; and freshwater sponge mining habit.

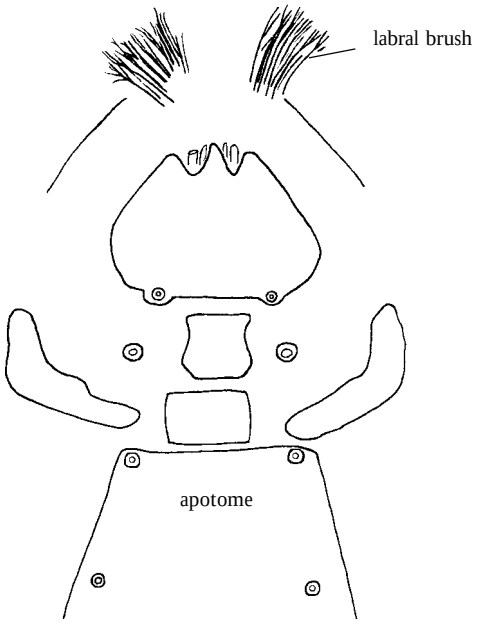
**NOTES:** One Holarctic species, *X. xenolabis*, is known. Other species formerly placed in the genus are now placed in *Axarus* or *Lipiniella*.

Larvae are obligate miners in freshwater sponges. The larva figured below was collected from sponge on the case of the leptocerid caddisfly *Ceraclea* in northern Florida.

**ADDITIONAL REFERENCES:** Roback 1963.



mentum




apotome and labral sclerites

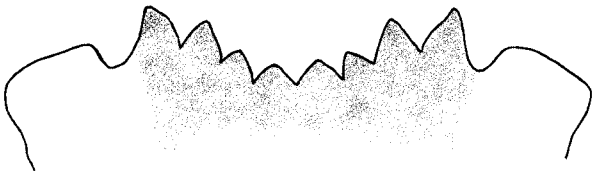
## Genus *Xestochironomus*

**DIAGNOSIS:** Distinguished by the dorsoventrally flattened and apically tapered head capsule; antenna with blade extending past the apex of segment 3; concave mentum with 8 teeth; ventromental plates with striae vestigial or absent; and anal tubules with 4-5 constrictions.

**NOTES:** Borkent (1984) revised the genus and described the larva. One species, *X. subletti*, is known from the Southeast. There are many Neotropical species and the possibility that more species may occur in the US, especially in southern Florida, must be considered. Unless associated with adult males, larvae should be identified as "*Xestochironomus* sp.".

Larvae mine in dead submerged wood in lotic habitats.

**ADDITIONAL REFERENCES:** Borkent 1984; Sublette & Sasa 1994.



mentum

antenna

Genus ***Zavrelia***

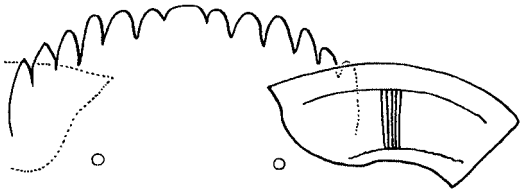
**DIAGNOSIS:** The sole known Nearctic representative of this tanytarsine is distinguished by the simple S 3 setae; pecten epipharyngis of 3 slender spines; short, straight spur on antennal base; 5 segmented antennae with one set of Lauterborn organs arising apically, the other from near the base of segment 2; premandible with 4 teeth; squat ventromental plates separated medially by at least the width of the 3 median mental teeth; and its portable sand case.

**NOTES:** There are no described species of *Zavrelia* known from the Nearctic, but at least one undescribed species occurs in the eastern US; I've seen reared material from Ohio, adults of the same species from the Smoky Mountains of North Carolina, and isolated larvae from Virginia.

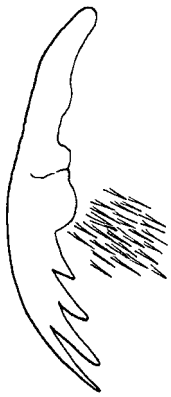
A great deal of confusion exists concerning the separation of *Zavrelia* and *Stempellinella*. Earlier works used antennal differences to separate the genera; these differences were shown to be not valid (Pinder & Reiss 1983). Pinder & Reiss (1983) used characters of the pecten epipharyngis and the premandible to separate the genera. The larva of the undescribed species from the eastern US differs from the sole described larva of the genus, the European *Z. pentatoma*, in that the pecten epipharyngis consists of 3 slender spines, rather than the short stubby spines found in *Z. pentatoma*. Also, *Stempellinella* sp. A has a 4 toothed premandible, unlike the 2-3 toothed premandible diagnosed for *Stempellinella* in Pinder & Reiss (1983). At this time, only the heavier shagreen of pupal abdominal tergite II on *Zavrelia* and the hairy eyes of adult *Zavrelia* will separate the two genera. The two Nearctic taxa mentioned above blur the differences between *Zavrelia* and *Stempellinella* and make it more likely that the two genera should be combined; *Zavrelia* is the older name and would take precedence.

*Zavrelia* larvae appear to be inhabitants of springs.

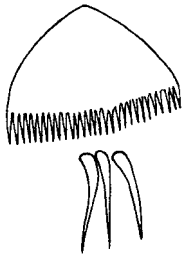
**ADDITIONAL REFERENCES:** None.



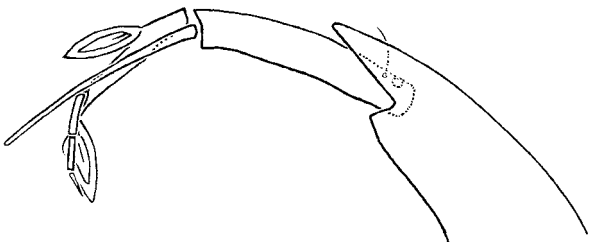
mentum



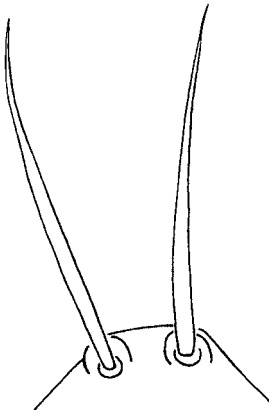
premandible



labral lamella and pecten epipharyngis



antenna and base



S 3 (clypeal) setae

## Genus *Zavreliella*

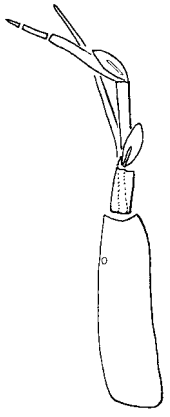
**DIAGNOSIS:** Distinguished by the frontoclypeal apotome, with 1 medial labral sclerite anterior to it; 6 segmented antennae with alternate Lauterborn organs at the apex of segments 2 and 3; simple setae submenti; a pair of long ventral tubules placed posterolaterally on body segment 10; and body segment 11 with anteriorly directed dorsal hump.

**NOTES:** One species, *Z. marmorata*, is known from the Nearctic. Reiss (1990) revised the genus; an additional 12 species are known from northern South America. *Zavreliella marmorata*, formerly known in North America as *Lauterborniella varipennis*, is found throughout most of the world; some European populations are parthenogenetic.

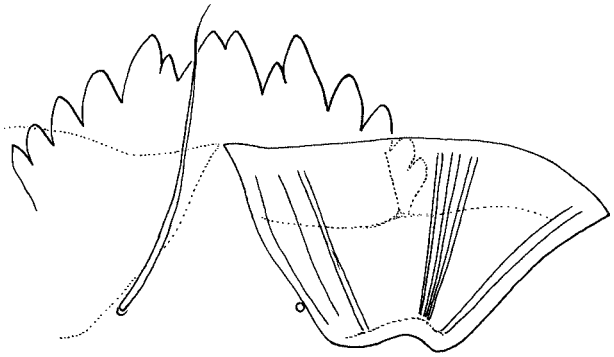
Larvae are found in marshes, vegetation-choked, eutrophic ponds and lakes, and the sluggish portions of streams and rivers, where they swim around in their hydroptilid caddisfly-like silken cases. The case of *Zavreliella* differs from that of *Lauterborniella* in that it has a circular opening; that of *Lauterborniella* has a slit-like opening.

Although the setae submenti of *Zavreliella* have been described as being on the ventromental plates, on many specimens I've examined they are placed immediately medial to the inner margin.

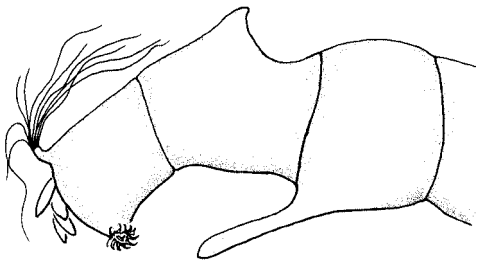
**ADDITIONAL REFERENCES:** Reiss 1990.



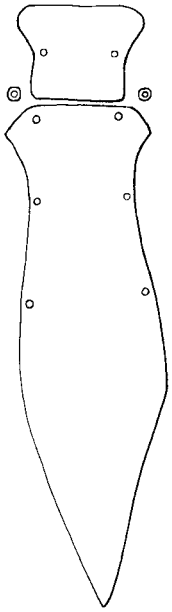
antenna



mentum



posterior body segments



apotome and labral sclerite

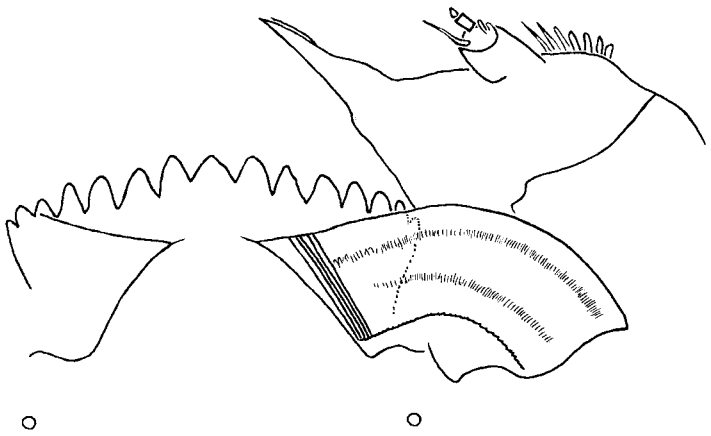
## Chironomini genus III

**DIAGNOSIS:** Distinguished by the frontal apotome with 2 medial labral sclerites anterior to it; plumose S I setae arising from separate bases; 15 toothed mentum with median teeth subequal; apically bifid premandible, with brush; and cardo with smooth anterior margin.

**NOTES:** A taxon known only as a larva from Florida (several sites throughout the peninsular and northern portions of the state), southern Georgia and North Carolina (Dunahoe Bay in Robeson County); given this distribution it probably occurs throughout the Coastal Plain of the Southeast. It appears to be closely related to *Tribelos*, but without associated life stages it is not possible to accurately place this larva.

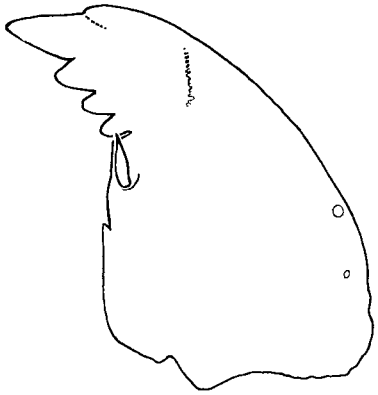
Larvae have been collected from bayheads, canals and ditches.

**ADDITIONAL REFERENCES:** None.



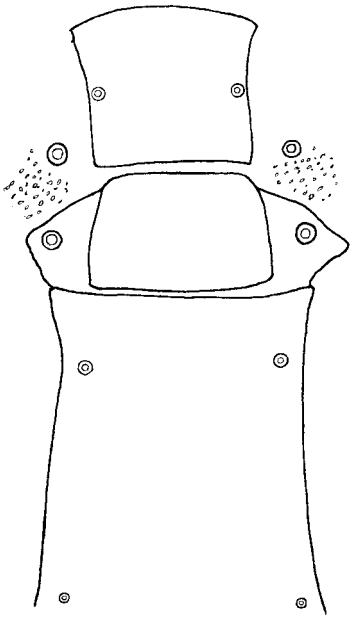
mentum and maxilla

pecten epipharyngis



mandible
(seta interna present but not shown)

antenna



apotome and labral sclerites

## Chironomini genus IV

**DIAGNOSIS:** The frontal apotome apparently with clypeus and 1 medial labral sclerite anterior to it; anterior margins of apotome and clypeus straight; plumose S I on separate bases; 5 segmented antennae; premandible apically bifid, with brush; 4 median teeth of mentum separated from remainder of mentum by a line that runs posterior to the anteromedial angle of the ventromental plates; and ventromental plates with strongly crenulated anteromedian margins will distinguish this taxon.

**NOTES:** This taxon is known from two specimens, probably third instar, collected from a pond in northern Florida in October; it is not known from the Carolinas. It may belong with *Tribelos* or *Phaenopsectra*, or may represent an undescribed genus.

**ADDITIONAL REFERENCES:** None.

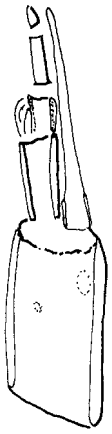
mandible

S I

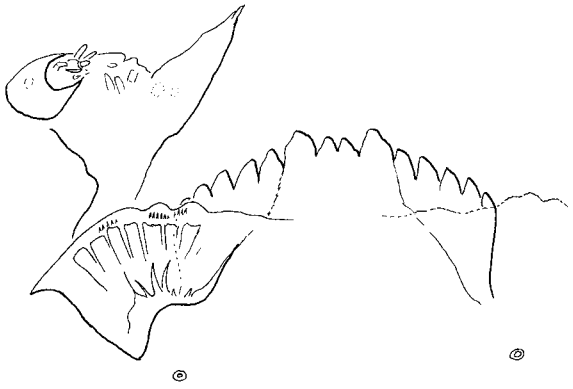
pecten epipharyngis

apotome and labral sclerites

premandible



antenna



mentum

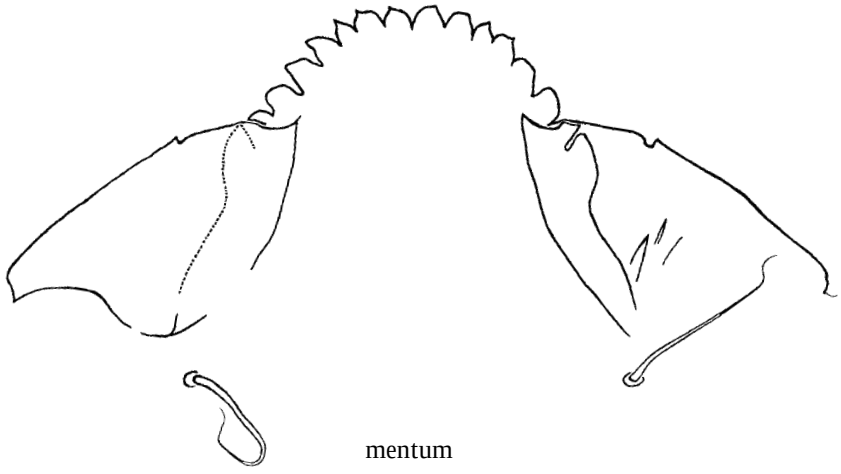
## *Harnischia* complex genus A

**DIAGNOSIS:** Distinguished by the simple S I; large, blade-like S II with apical fringe; 6 segmented antenna, with alternate Lauterborn organs on segments 2 and 3; distinctive mentum with equally sized teeth arranged in a semicircle, resembling a circular saw blade; and the distinctive ventromental plates with a notch on the mid-anterior margin.

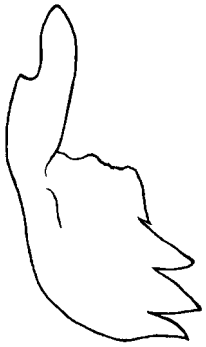
**NOTES:** First figured by Roback (1953: fig. 29) as "Unknown gen. & sp. near *Microtendipes*", this taxon was listed by Hudson et al. (1990) as "Unknown genus near *Microtendipes* A", and by Caldwell et al. (1997) as "genus near *Microtendipes* A". Although this taxon has a 6 segmented antenna similar to that of *Microtendipes*, the structure of the S I, S II, pecten epipharyngis and mandible indicate that it may be a member of the *Harnischia* complex. It may also be closely related to *Paratendipes*, but until associated with its pupal and adult stages, its taxonomic postion will remain unclear.

Larvae are found in sandy substrata.

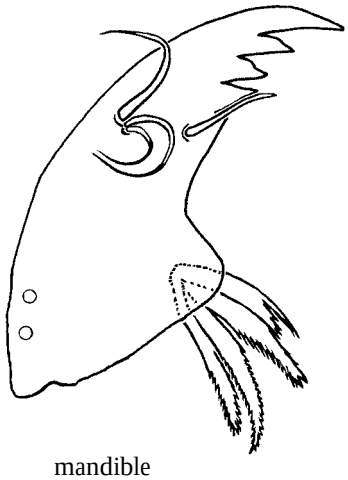
**ADDITIONAL REFERENCES:** None.



mentum

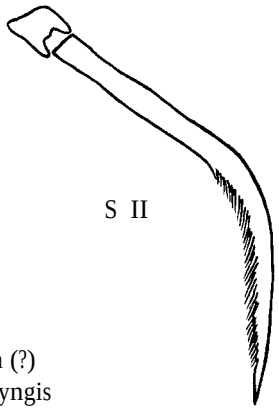


premandible



mandible

S I, labral lamella (?)
and pecten epipharyngis



S II

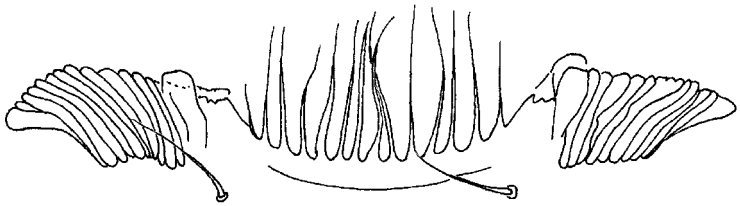
antenna

## *Harnischia* complex genus B

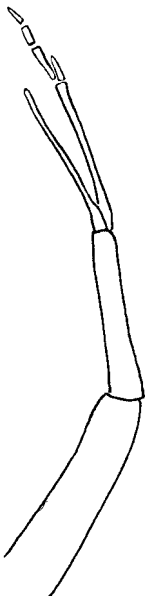
**DIAGNOSIS:** The 6 segmented antenna; mandible with extensive lateral fringe of setae and poorly sclerotized, lamellar teeth; and mentum with long, setae like teeth distinguish this taxon.

**NOTES:** This bizarre larva is known only from several sites in the panhandle of Florida; it is not known from the Carolinas. This larva may be an aberrant *Paracladopelma*. It has been found in core samples of sandy substrata.

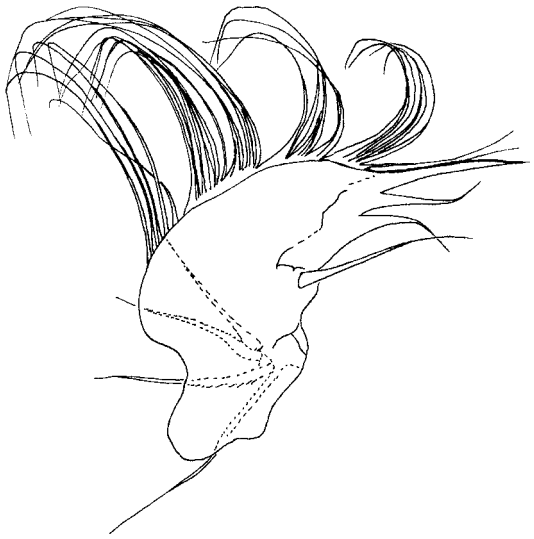
**ADDITIONAL REFERENCES:** None.



mentum



antenna



mandible

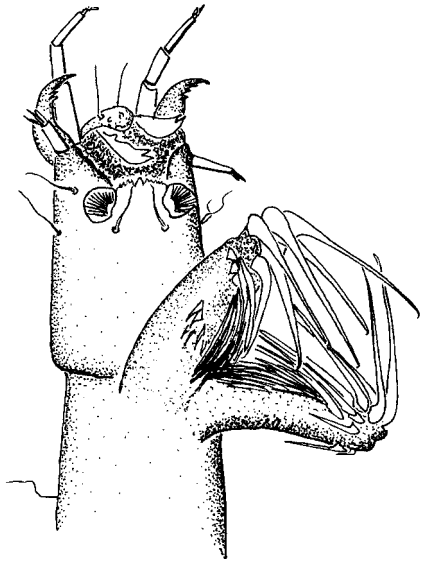
## *Harnischia* complex genus C

**DIAGNOSIS:** Distinguished by the blade-like S I setae, slightly smaller than S II; 6 segmented antennae; apically bifid premandible; mentum with 5 pairs of lateral teeth; rounded ventromental plates; large claws of anterior parapods about 2/3 length of head capsule; subdivided body segments, giving appearance of about 20 body segments; and each procercus with one very long anal seta, about 4-5X as long as supraanal setae.

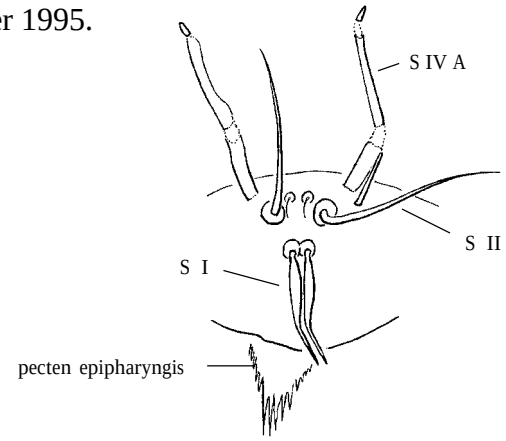
**NOTES:** This taxon and *Kloosia* are very similar as larvae. *Harnischia* complex genus C is not a *Kloosia*; there are also pupal and adult differences. Structures figured in Epler (1995) for *Harnischia* complex genus C were a mixture of *Kloosia* and *Harnischia* complex genus C body parts; both species may be found in the same sample (which led to the confusion by Epler (1995)). The taxon listed as "*Cryptochironomus*" nr. *macropodus* Lyakhov by Caldwell et al. (1997) is *Harnischia* complex genus C.

Larvae are found in sandy substrata of streams and rivers.

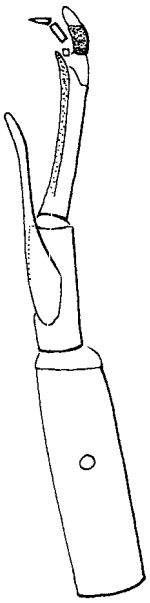
**ADDITIONAL REFERENCES:** Epler 1995.



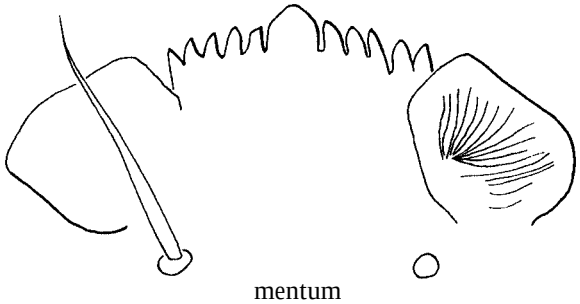
head and anterior parapods



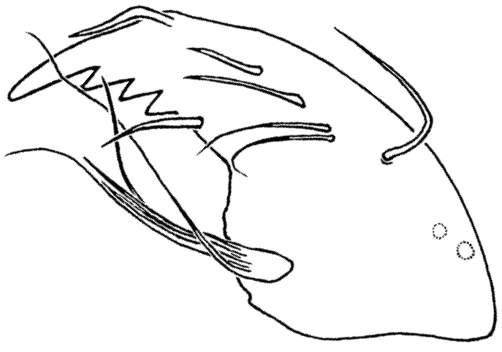

labrum



antenna

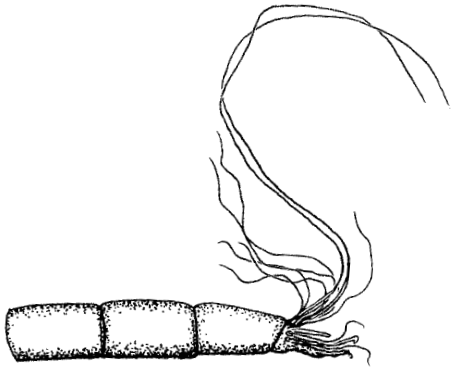


mentum



mandible

premandible



posterior end

## *Harnischia* complex genus D

**DIAGNOSIS:** The 5-segmented antennae with segment 3 weakly sclerotized; mandible with weak pecten mandibularis; premandible lacking a brush and with 4 teeth; and concave mentum with clear median tooth and dark lateral teeth with wide outer tooth distinguish this genus.

**NOTES:** This taxon is known from a single specimen from SW Florida; it is not known from the Carolinas. The specimen's S I setae and pecten epipharyngis are obscured. It superficially resembles a *Gillotia*, but that genus has a premandible with at least 6 teeth and its mandible lacks a pecten mandibularis. This specimen may belong with *Cryptochironomus*. However, antennal segment 3 is weakly sclerotized, it apparently lacks a brush on the premandible and the ventromental plates are not as laterally extended as is usual in *Cryptochironomus*.

**ADDITIONAL REFERENCES:** None.

antenna mandible premandible mentum