

Keys and Descriptions of the Chironomidae Pupal Exuviae of Hardwood Creek, near Hugo, Minnesota



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<http://www.entomology.umn.edu/midge>

Introduction

The following keys were produced as a guide to the chironomid fauna of Hardwood Creek located near Hugo, Minnesota. The methods used to obtain chironomid pupal exuviae featured in this key are described in chapters of a thesis by Adam Sealock (2007). Many primary references were used to produce this document, however Wiederholm (1986) and tentative morphospecies descriptions compiled by graduate students working in the Chironomidae Research Group were particularly useful and deserve special recognition. The majority of morphospecies designated in this document are consistent with ones created by Bochard (2007) as part of his Ph.D. dissertation research. It is possible, however, that some morphospecies concepts may be amended by after the on-line posting of this document.

Keys and descriptions that follow are arranged by subfamily and tribe. When using this document the reader should first key out each specimen using the subfamily and tribe key, and then proceed to the appropriate key where a genus-level identification can be achieved. Once the genus has been determined, the reader can proceed to the descriptions of genera at the end of the respective subfamily or tribe section to determine the species or morphospecies. To increase success while using the keys review all morphological characters and terms in figures 1-4. All drawings were produced by Adam W. Sealock using the Microsoft® Paint program. Most photographs were taken by Adam with a Hewlett-Packard 735 HP Photosmart digital camera. Photos were downloaded and modified in HP Photo and Imaging Gallery version 1.1®. In addition, seventeen photographs used in this guide were taken by Moriya Rufer. They are listed in the acknowledgements section at the end of this document.

Morphological Characters and Terms

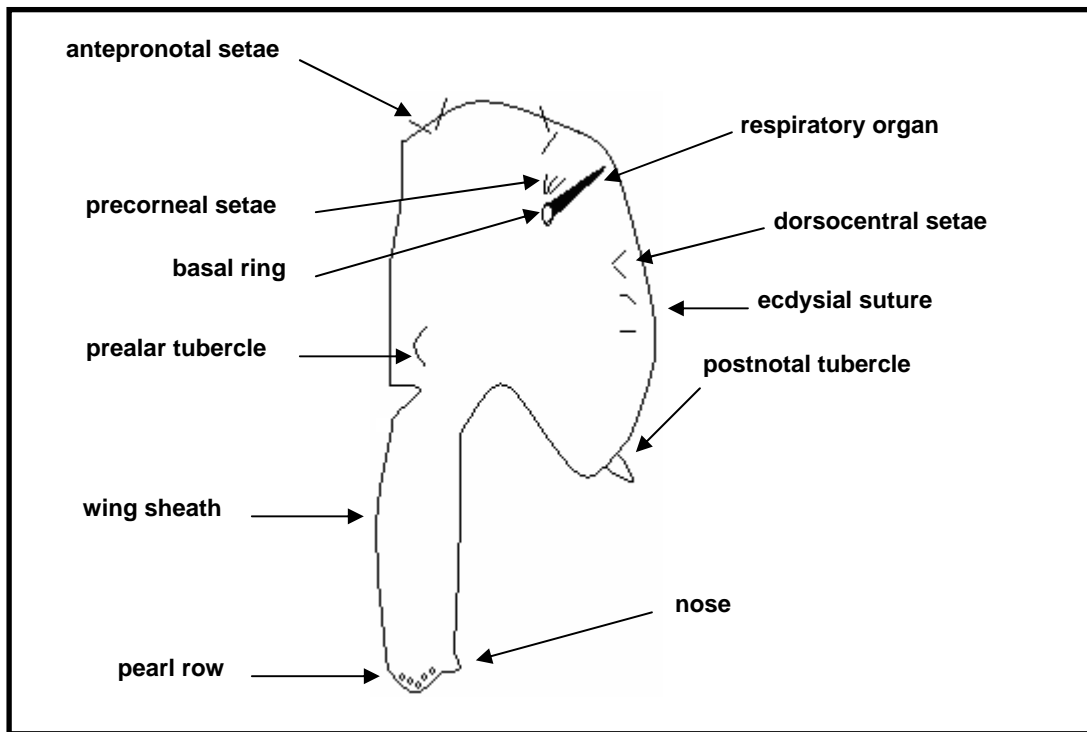


Figure 1. A generalized cephalothorax of a chironomid pupa and its associated characters.

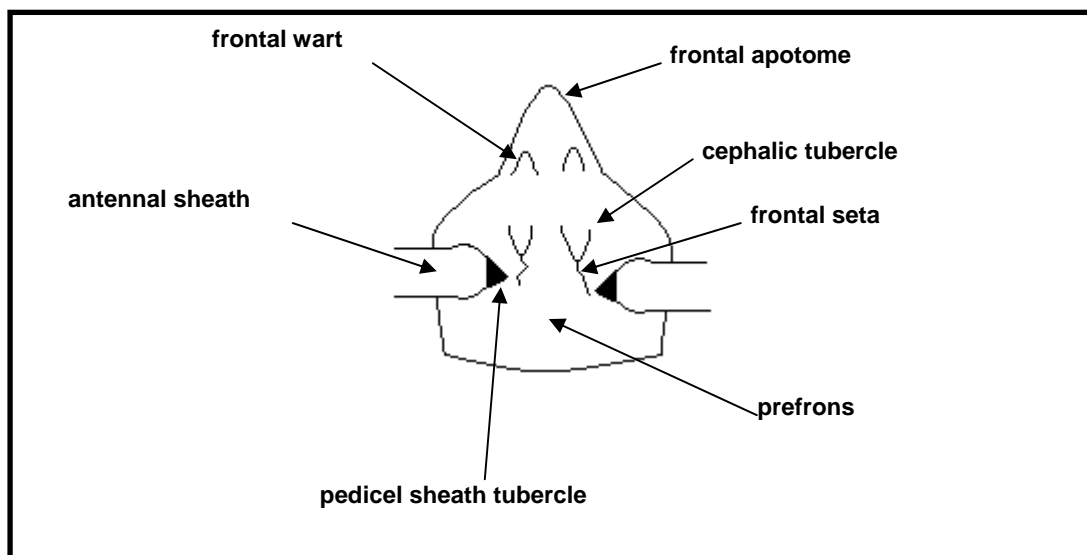


Figure 2. A generalized frontal apotome of a chironomid pupa and its associated characters.

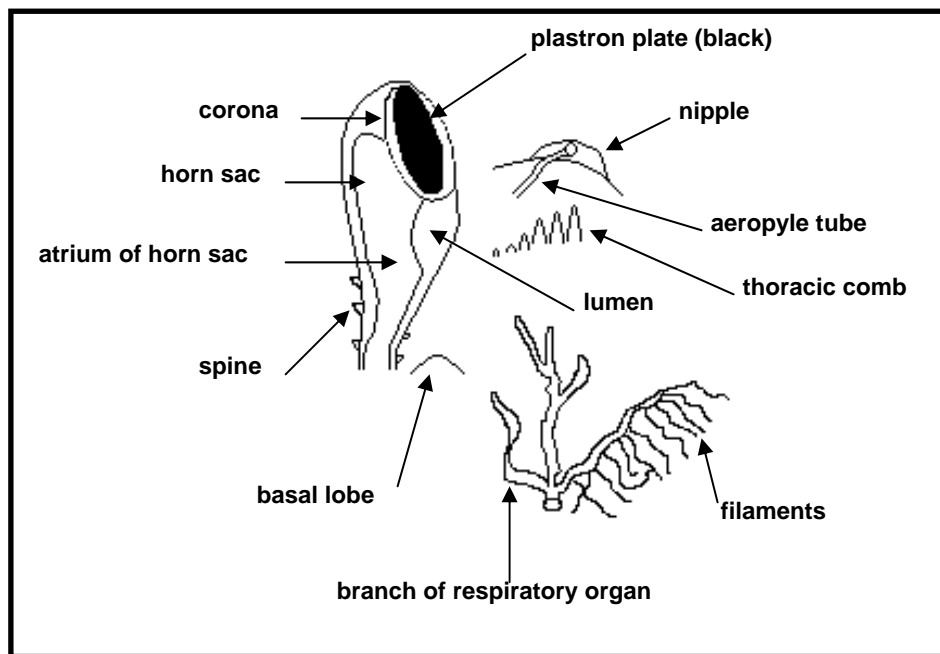


Figure 3. Generalized respiratory organs of chironomid pupae and their associated characters.

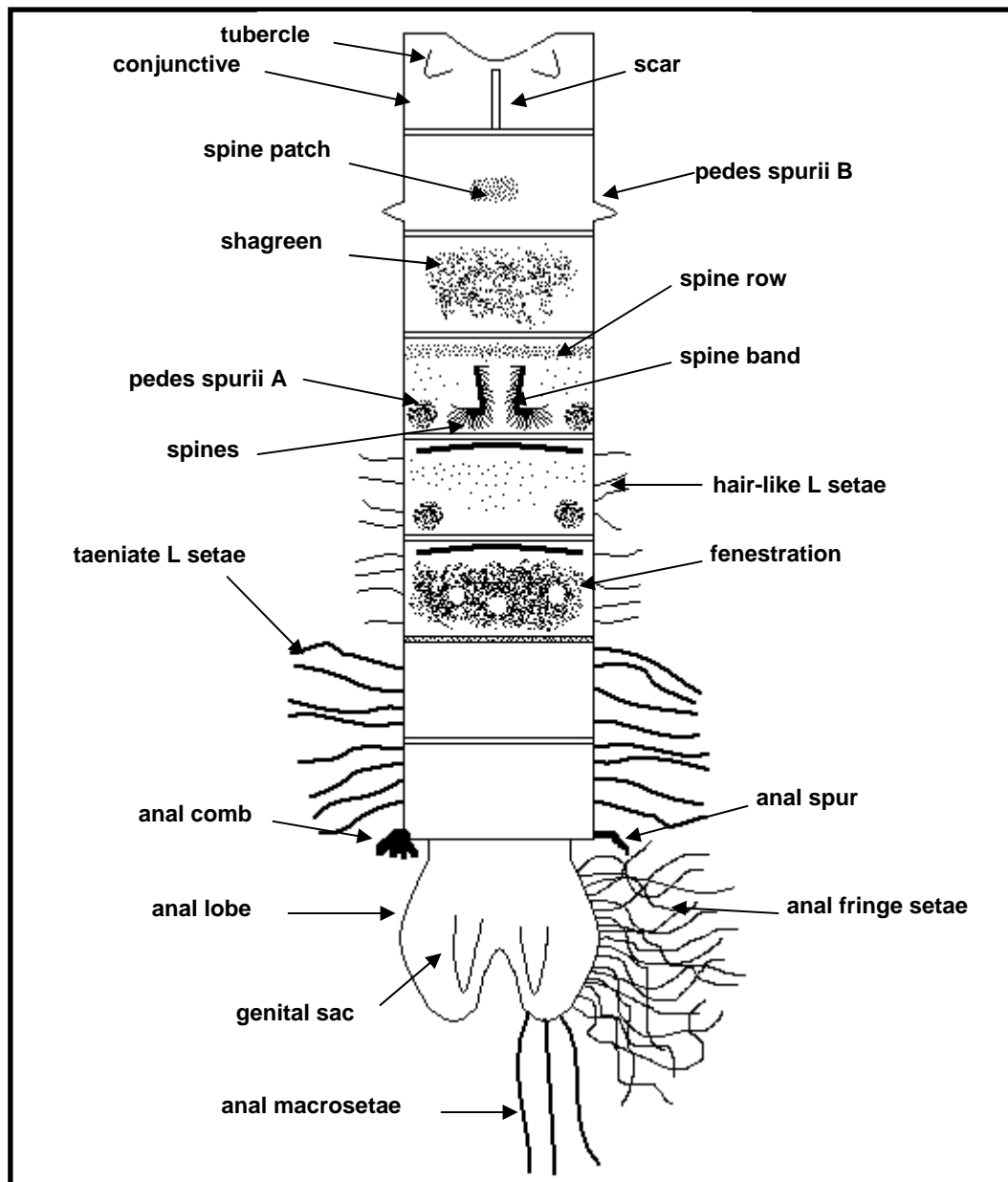


Figure 4. A generalized abdomen of a chironomid pupa and its associated characters.

Key to the Subfamilies or Tribes of Chironomidae Pupae of Hardwood Creek

1. Respiratory organ large, well-developed, and not branched. Tips of anal lobes rounded or pointed and with two distinct macrosetae projecting from the lateral edge of each lobe (Figs. 158-159, 162-163, 165-168, 170, 172-174). ----- **Tanypodinae (p.)**
- 1'. Respiratory organ less well-developed or absent. If present, organ with no to many branches. Anal lobe usually with three distinct macrosetae at or near the tip and/or with lateral edge of each lobe containing a fringe of several to many setae (Figs. 5-6, 15-18, 21, 25, 27, 31-32, 63-64, 70-73, 76, 79, 85, 120-121, 123, 129). ----- **2**
2. Anal lobe usually with three distinct macrosetae (however, these can be absent in some genera). Respiratory organ absent or when present not branched. No spines or at most a single spur present on posterolateral corner of segment VIII (Figs. 5-6, 15-21, 25, 27, 31-32).----- **Orthoclaadiinae (p. 5)**
- 2'. Anal lobe without lateral macrosetae but usually containing several to many anal fringe setae. Respiratory organ present and with or without branches. Spines or a single spur present on posterolateral corner of segment VIII (Figs. 63-64, 70-73, 76, 79, 85-86, 120-121, 123, 129). ----- **3**
3. Respiratory organ without branches and usually with a small rounded base. Tergites III-V often with paired or unpaired spines or point patches (tergites II and VI also often containing these patches). Wing sheaths with nose and sometimes pearl rows (Figs. 124-130). ----- **Tanytarsini (p.)**
- 3'. Respiratory organ branched, often containing many branches. Respiratory organ without a small rounded base. Wing sheaths without pearl row. Nose when present small. Sternite I with or without paired tubercles containing spines (Figs. 71-73, 75, 79, 119-120). ----- **4**
4. Sternite I with paired tubercles armed with spines. Respiratory organ with 2 rounded branches. Frontal setae and cephalic tubercles absent (Figs. 119-120). ----- **Pseudochironomini (p.)**
- 4'. Sternite I usually without paired tubercles containing spines. Respiratory organ often with many thin and pointed branches. Frontal setae and/or cephalic tubercles usually present (Figs. 69, 71-73, 79). ----- **Chironomini (p.)**

Key to the Genera of Orthoclaadiinae Pupae of Hardwood Creek

1. Anal lobes with a distinct fringe of setae (Fig. 6). ----- **2**
- 1'. Anal lobes without a fringe of setae (Fig. 5). ----- **12**
2. No respiratory organ. Small species, less than 5 mm long. ----- **3**
- 2'. Respiratory organ present (Figs. 15, 17-18, 27). Size variable. ----- **4**

3. Small spines prevalent on abdominal conjunctives. No pearl rows on wing sheaths (Fig. 7). ----- ***Thienemanniella* sp. (p.)**
- 3'. Small spines not prevalent or absent on conjunctives, however tergal shagreen sometimes very strong and spine-like. Pearl rows present on wing sheaths (Figs. 8-9). ----- ***Corynoneura* sp. (p.)**
4. Segment VIII with hair-like L setae, if taeniate then L setae not very wide; pedes spurii B on segment II elongate and tapering to a point (Fig. 19). ----- ***Parametriocnemus* sp. (p.)**
- 4'. Segment VIII with well-developed taeniate L setae; pedes spurii B present or absent on segment II, if present, not elongate and tapering to a point (Fig. 20). ----- **5**
5. Anal lobes with long fringe setae (Figs. 6, 16). ----- **6**
- 5'. Anal lobes with short fringe setae (Fig. 32). ----- **22**
6. Tergite IV without distinct arrangement of spines in rows or patches. Segment II without pedes spurii B (Fig. 11). ----- ***Nanocladius* sp. (in part) (p.)**
- 6'. Tergite IV with distinct arrangement of spines in rows or patches. Segment II with or without pedes spurii B (Fig. 12). ----- **7**
7. Tergite IV with at least 1 posterior spine row and one or more distinct medial spine patch(es) or row(s) present (Fig. 12). ----- **8**
- 7'. Tergite IV with posterior spine row(s), occasionally with medial shagreen pattern, but lacking distinct medial spine patch(es) or row(s) (Fig. 11). ----- **11**
8. Two precorneal setae well-developed and distinctly larger than the third. All setae on tubercles, however, the two larger setae can originate on different tubercles (Fig. 13). ----- **9**
8. All precorneal setae of equal size, or if unequal in size then two setae distinctly larger are not present and setae not originating from different tubercles (Fig. 14). ----- **10**
9. Respiratory organ digitiform, well developed, and possessing many spines. Anal lobe possessing long and robust macrosetae, which are distinctive from the other, more numerous fringe setae on the lobe margins (Figs. 15-16). ----- ***Doncricotopus* sp. (p.)**
- 9'. Respiratory organ slender with pointed tip, or organ short with base and/or middle one-half of organ very broad. Anal lobe possessing weak, thin macrosetae, which are difficult to distinguish from the other, more numerous fringe setae on lobe margins (Figs. 6, 17-18). ----- ***Nanocladius* sp. (in part) (p.)**

10. One medial spine patch present on each of tergites IV-VI, or tergites IV-VII (Fig. 12). -----
----- ***Psectrocladius* sp. (in part) (p.)**
10. One pair of spine patches on tergites IV-VI, or sometimes on tergites III-VI (Fig. 12). -----
----- ***Psectrocladius* sp. (in part) (p.)**
11. Anal lobe possessing weak but long macrosetae. Two precorneal setae distinctly stronger and larger than the third. All setae are on tubercles, and occasionally the two larger setae can originate on different tubercles (Figs. 6, 13). ----- ***Nanocladius* sp. (in part) (p.)**
- 11'. Anal lobe possessing robust and long macrosetae. Precorneal setae usually equal or occasionally unequal in size. However, if two of three setae are large they are not present on tubercles or the setae are not much larger than each other (Figs. 14, 16, 20). ----- ***Rheocricotopus* sp. (in part) (p.)**
12. Total of three lateral or apical macrosetae on each lobe (excluding medial setae). Some setae may resemble spines and should not be counted as macrosetae (Figs. 5, 21). ----- **13**
- 12'. Excluding medial setae on anal lobes, the number of macrosetae present on lobe margin or apex more or less than three. Setae resembling spines should not be counted as macrosetae (Fig. 31).-- **21**
13. Respiratory organ present, frontal setae present or absent (Figs. 15, 17-18, 27). ----- **14**
- 13'. No respiratory organ, frontal setae present (Fig. 22). ----- ***Parakiefferiella* sp. (p.)**
14. Pearl rows on wing sheaths; frontal apotome with frontal setae. Anal lobes with one strong and robust median and three apical or lateral macrosetae (Figs. 9, 21-22). ----- ***Tvetenia* sp. (p.)**
- 14'. No pearl rows on wing sheaths; frontal setae present or absent on frontal apotome. Median setae absent from anal lobes (Figs. 5-6, 16, 25, 31-32). ----- **15**
15. At least tergites III-IV and sometimes tergite V with one hook row, containing several to many well-developed recurved hooks, located on conjunctives or posterior edge of segments (Fig. 23). -----
----- ***Eukiefferiella* sp. (p.)**
- 15'. Tergites III-IV or III-V usually without a well-developed recurved hook row on conjunctives or posterior edges of segments. However, if hooks are present they are either not strongly recurved, are arranged in more than one row, or are not well developed (Figs. 24, 26, 28-30). ----- **16**
16. All tergites except tergite 1 with rows of conspicuous and long spines on posterior margins of tergites; macrosetae on anal lobe elongate, not resembling spines (Fig. 24). ----- ***Limnophyes* sp. (p.)**
- 16'. All tergites without rows of conspicuous and long spines on posterior margins of tergites; if some spines are present and appear to form rows, then rows are poorly defined and spines are short (Figs. 10-12, 23, 26, 28, 33). ----- **17**

17. Anal lobes thickened along mesal margins. Anal macrosetae originating from thickened areas of anal lobes (Fig. 25). ----- ***Diplocladius* sp. (p.)**
- 17'. Anal lobe without thickened areas along mesal margins of anal lobes (Figs. 5-6, 21, 31-32). --- **18**
18. Tergite II without recurved hooks on posterior edge, however, small spines that point anteriorly are often present. Anal lobe macrosetae strong or spine-like, but not greater than one-half the length of the respiratory organ (Fig. 26). ----- ***Chaetocladius* sp. (p.)**
- 18'. Recurved hooks present on posterior edge of tergite II. Anal lobe macrosetae short or long, but if short then not spine-like (Figs. 29-30). ----- **19**
19. Respiratory organ relatively long. Tergites with a pair of medial spine patches present at least on tergites III-VI (Figs. 27-28). ----- ***Acricotopus* sp. (p.)**
- 19'. Respiratory organ variable. No paired medial spine patches on tergites (Figs. 11-12, 15, 17-18, 23-24, 26, 33). ----- **20**
20. Tergite II with two well-defined posterior hook rows that extend laterally along more than one-half the posterior margin of segment (Fig. 29). ----- ***Cricotopus* sp. (p.)**
- 20'. Tergite II with three or more less-well defined posterior hook rows, usually confined to middle one-third of posterior margin of segment. Hooks often more randomly arranged and not appearing as distinct rows (Fig. 30). ----- ***Orthocladius* sp. (p.)**
21. Respiratory organ present and relatively conspicuous; in male exuviae the length of the genital sacs approximately twice as long as the anal lobe (Fig. 31). ----- ***Paraphaenocladius* sp. (p.)**
- 21'. No respiratory organ present or when present lightly pigmented and poorly developed; length of genital sacs variable in male exuviae (Figs. 6, 16, 21). ----- **23**
22. Anal lobe with marginal fringe setae located primarily in the anterior half of the lobe, fringe primarily composed of short setae that are not densely arranged. ----- ***Hydrobaenus* sp. (in part) (p.)**
- 22'. Anal lobe with fringe throughout the length of the lobe margins, fringe composed of long or short setae that are densely arranged (Fig. 32). ----- ***Hydrobaenus* sp. (in part) (p.)**
23. Anal lobe reduced in size and apically very strongly pointed. Small species, less than 5 mm long (Fig. 58). ----- ***Rheosmittia* sp. (p.)**
23. Anal lobe not reduced in size and strongly pointed (Figs. 5-6, 16, 31-32). ----- **24**

24. At least one segment conjunctive with conspicuous bands composed of small spinules.
Respiratory organ absent (Fig. 33). ----- ***Pseudosmittia* sp. (in part) (p.)**
24. No segmental conjunctives with conspicuous spinule bands, however, spinules of shagreen located near the conjunctives may be well-developed on one or more tergites. ----- **25**
25. Zero to one anteprenotal seta on the cephalothorax (Fig. 34). ----- ***Smittia* sp. (p.)**
25. Two or more anteprenotal setae present (Fig. 35). ----- ***Pseudosmittia* sp. (in part) (p.)**

Orthoclaadiinae Figures:



Figure 5. Anal lobe of Orthoclaadiinae.

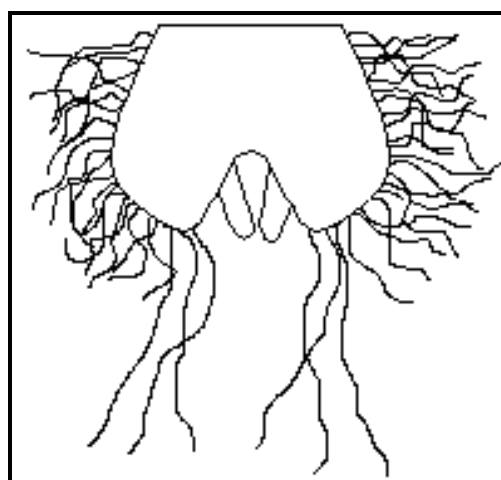


Figure 6. Anal lobe of *Nanocladius* sp.

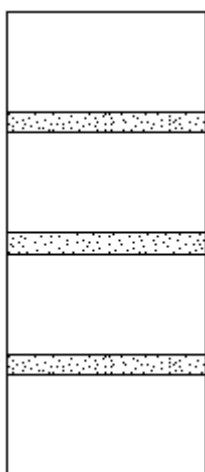


Figure 7. Conjunctives of *Thienemanniella* sp.

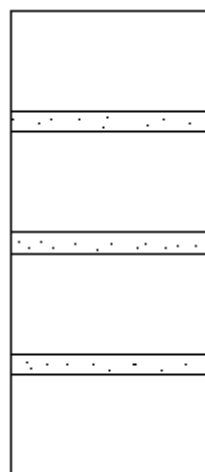


Figure 8. Conjunctives of *Corynoneura* sp.

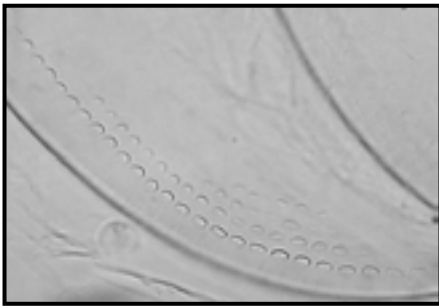


Figure 9. Pearl rows of *Corynoneura* sp.



Figure 10. Segment II with pedes spurii B of *Nanocladius rectinervis*.

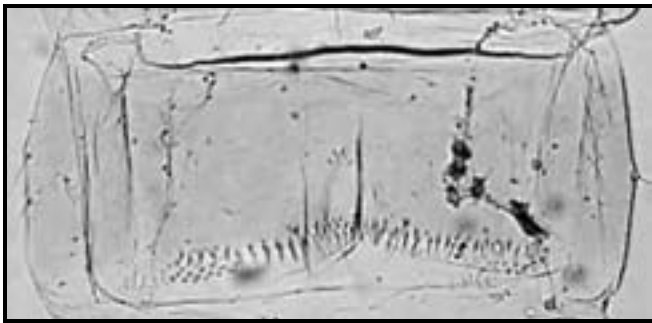


Figure 11. Tergite IV of *Nanocladius rectinervis*.

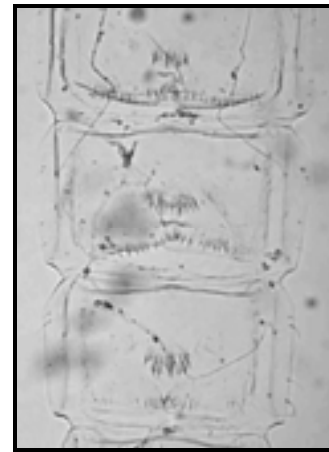


Figure 12. Tergites IV-VI of *Psectrocladius schliezi* type.

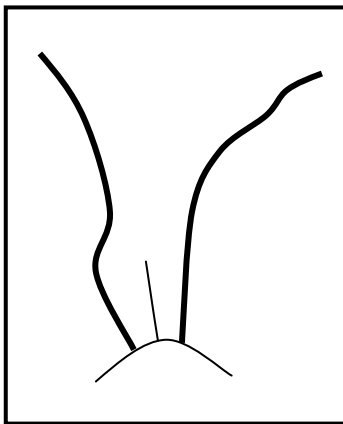


Figure 13. Precorneal setae of *Nanocladius* sp.

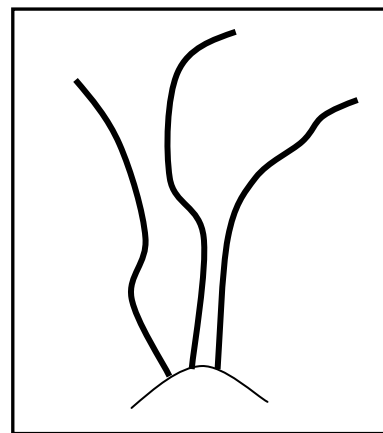


Figure 14. Precorneal setae of some *Orthoclaadiinae*.

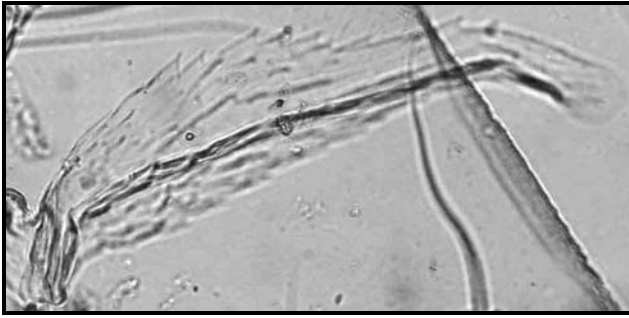


Figure 15. Respiratory organ of *Doncricotopus bicaudatus*.

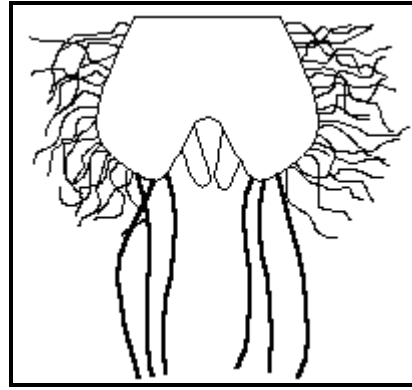


Figure 16. Anal lobe of *Doncricotopus* sp.



Figure 17. Respiratory organ of *Nanocladius crassicornus*.



Figure 18. Respiratory organ of *Nanocladius rectinervis*.

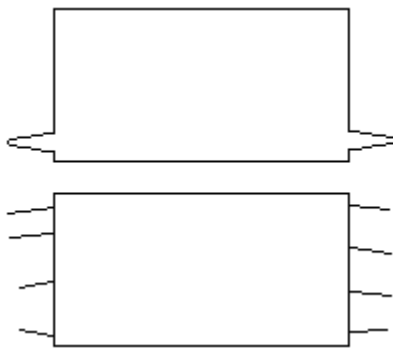


Figure 19. Segment II (top) and VIII (bottom) of *Parametrioctenus* sp.

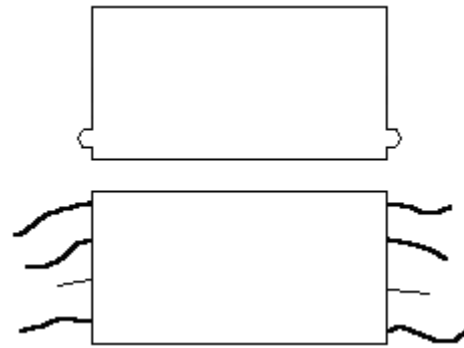


Figure 20. Segment II (top) and VIII (bottom) of *Rheocricotopus* sp.



Figure 21. Anal lobe of *Tvetenia* sp. 1.



Figure 22. Frontal setae of *Tvetenia* sp. 1.

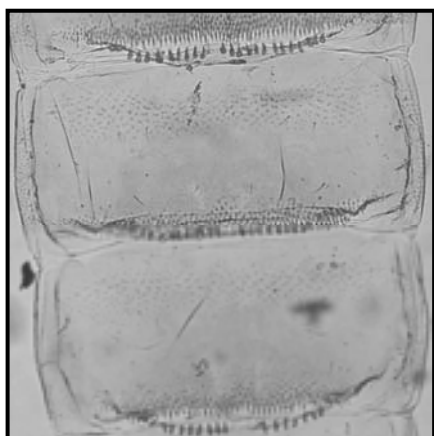


Figure 23. Hook rows on tergites III-V of *Eukiefferiella* sp. 2.

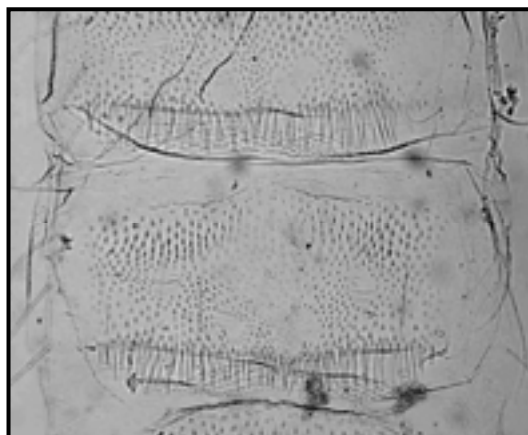


Figure 24. Tergites III-IV of *Limnophyes* sp. 3.

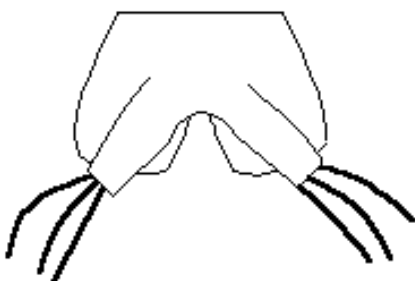


Figure 25. Anal lobe of *Diplocladius* sp.

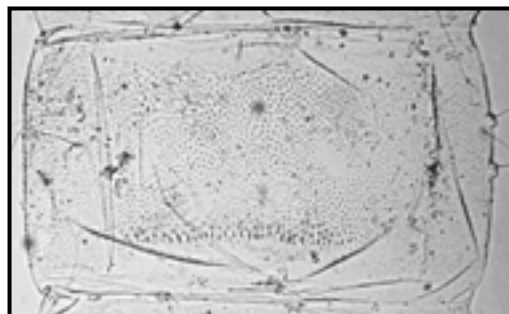


Figure 26. Tergite II of *Chaetocladius* sp.



Figure 27. Respiratory organ of *Acricotopus nitidellus*.

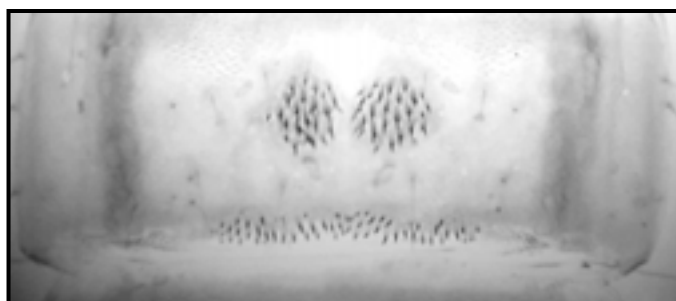


Figure 28. Tergite IV of *Acricotopus nitidellus*.

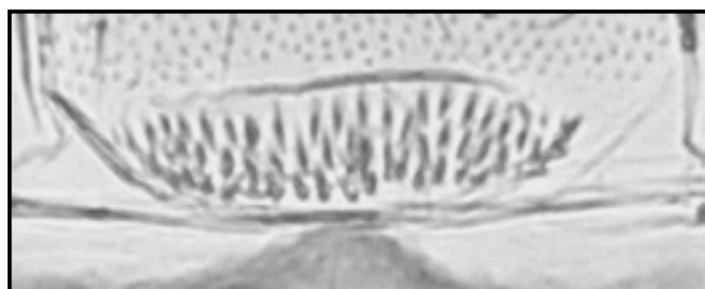


Figure 29. Hook row on segment II of *Orthocladus oliveri*.



Figure 30. Hook row on segment II of *Cricotopus* sp. 5



Figure 31. Anal lobe of *Paraphaenocladus exagitans*.

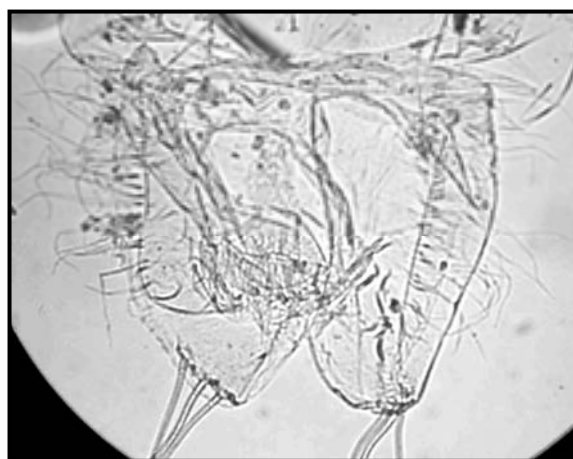


Figure 32. Anal lobe of *Hydrobaenus* sp.

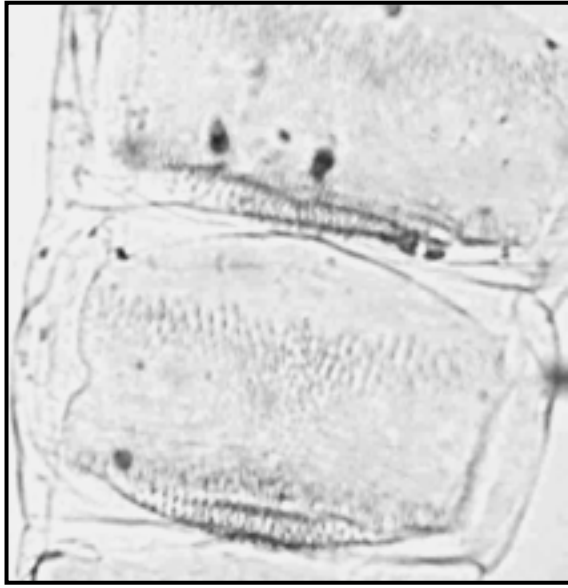


Figure 33. Conjunctives V/VI and VI/VII of *Pseudosmittia* sp. 2.

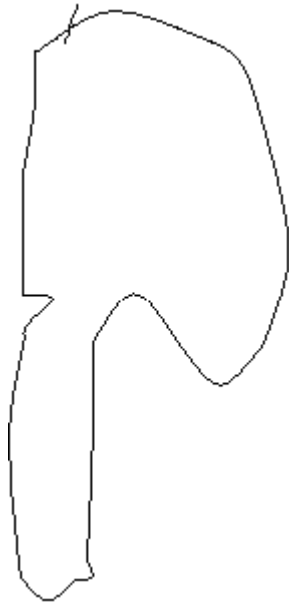


Figure 34. Anteprenotal seta of *Smittia* sp.



Figure 35. Anteprenotal setae of *Pseudosmittia* sp.

Orthoclaadiinae Taxa:

Acricotopus nitidellus

Reference: Oliver *et al.* 1990

Distinguishing Characters: Respiratory organ well developed, thin, and tapered apically with spines particularly conspicuous in the apical one-third of the organ. Pedicel sheath tubercle well-developed, frontal setae present on small cephalic tubercles. Pedes spurii B on abdominal segment II. Tergites II through VI with one pair of conspicuous, round, spine patches which become more developed from anterior to posterior tergites. Conjunctives III/IV-V/VI with 3-4 rows of well-developed spines; posterior spine rows present on tergites III through VI with II possessing weak spines in rows (Figs. 27-28).

Notes: Only one species of *Acricotopus* is known from the lower 48 states of the United States.



Chaetocladius sp.

Reference: Wiederholm 1986

Distinguishing Characters: Respiratory organ 4 or more times longer than wide, with its distal most end pointed and usually possessing spines throughout most of its length. Anal lobe macroseta very unique in that they are somewhat tapered from base to apex, smaller than the anal lobe, and usually bent and resembling a thorn or spine but do not contain an apical hook (Figs. 26, 36).

Notes: All specimens of this genus were identified using a dissecting microscope.

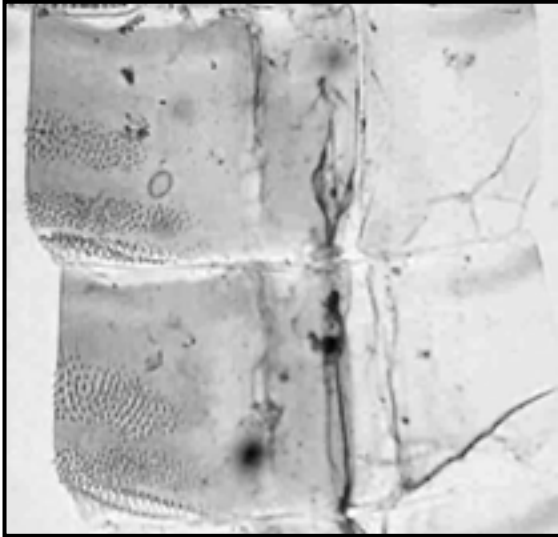
Figure 36. Anal lobe, genital sheathes and macrosetae of *Chaetocladius* sp.

Corynoneura sp. 1

Distinguishing Characters: Recurved hooks present on tergites IV through VII. Anal lobe with full fringe of setae. No long spines on sternite II.

Corynoneura sp. 2

Distinguishing Characters: Recurved hooks present on tergites IV through VII, hooks often present on tergite III. Anal lobe with full fringe of setae. Sternite II with long spines (visible at 200X).

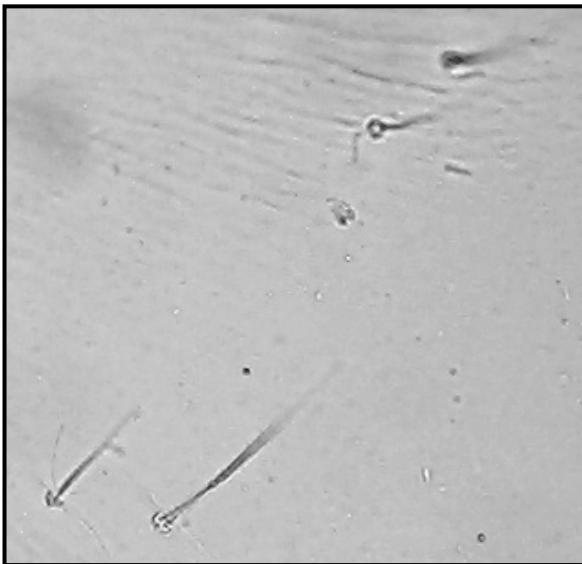


Cricotopus bicinctus

Reference: Simpson *et al.* 1983

Distinguishing Characters: Tergites with both anterior and posterior shagreen patches widely spaced from each other (Fig. 37). Pedes spurii B on segments II and III. Respiratory organ present. The fourth lateral setae on segment VIII approximately equal to other setae. Frontal apotome containing frontal setae. Anal lobe with macrosetae approximately the same length.

Figure 37. Lateral view of abdominal segments III and IV of *Cricotopus bicinctus*.

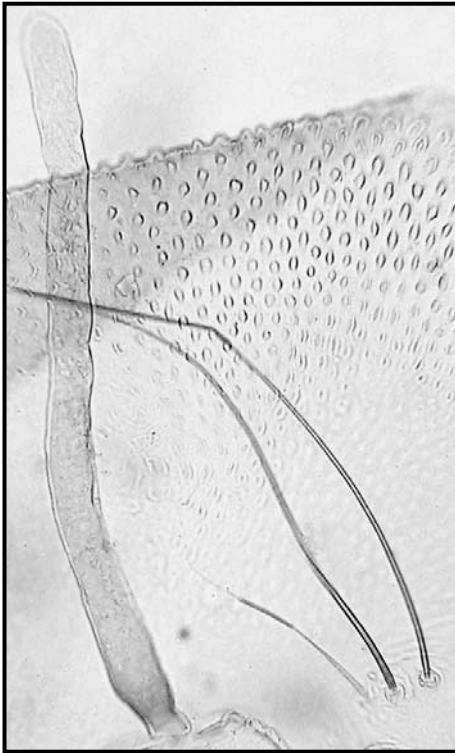


Cricotopus polaris

Reference: Simpson *et al.* 1983

Distinguishing Characters: The same distinguishing characters as *C. tibialis*, except dorsocentral seta 1 situated near dorsocentral seta 2 (Fig. 38).

Figure 38. Dorsocentral setae of *Cricotopus polaris*.

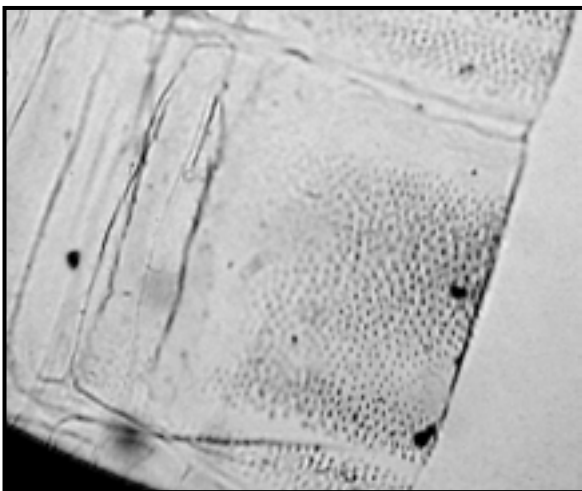


Cricotopus sylvestris

Reference: Simpson *et al.* 1983

Distinguishing Characters: Pedes spurii B present on segment II. Respiratory organ long and relatively colorless. Cephalothorax rough-looking due to the presence of many bumps/wort-like projections (Fig. 39).

Figure 39. Respiratory organ, precorneal setae, and bump-like projections of *Cricotopus sylvestris*.

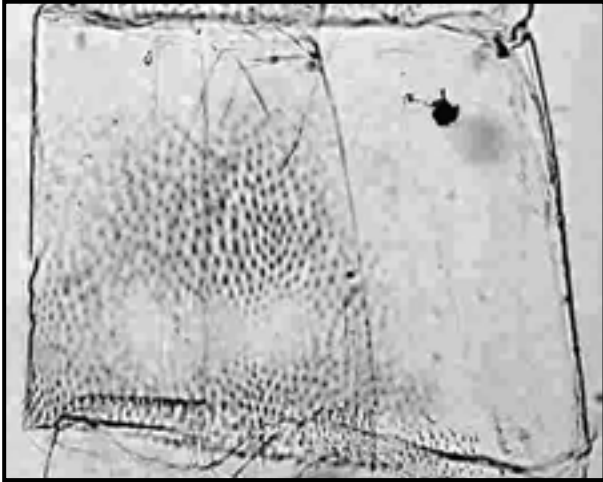


Cricotopus tibialis

Reference: Simpson *et al.* 1983

Distinguishing Characters: Tergites with shagreen pattern separated into two discernable fields but with some connection between anterior and posterior fields (Fig. 40). Respiratory organ with spinnules, prefrons containing frontal setae. Dorsocentral seta 2 is situated near seta 3 and seta 4. Pedicel sheath tubercle absent or very poorly developed.

Figure 40. Lateral view of tergite V of *Cricotopus tibialis*.



Cricotopus (Isocladius) sp. 1

Reference: Simpson *et al.* 1983

Distinguishing Characters: Frontal setae on frontal apotome when present. Respiratory organ, when present, extremely variable in form. Three anal lobe macrosetae approximately similar in length. Shagreen on tergites not distinctly separated into anterior and posterior fields (Fig. 41). Segment VIII with four hair-like L setae.

Figure 41. Tergite V of *Cricotopus (Isocladius) sp. 1*.



Cricotopus sp. 5

Reference: Simpson *et al.* 1983

Distinguishing Characters: Respiratory organ small and variable (Fig. 42). Pedes spurii B present on abdominal segments II and III. Exuviae dark brown in color. Frontal setae on prefrons or frontal apotome (Figs. 29).

Notes: Keys to *Cricotopus triannulatus* in Simpson *et al.* (1983) but pedes spurii B is usually present on segments II and III, but sometimes appearing reduced to absent on segment II.

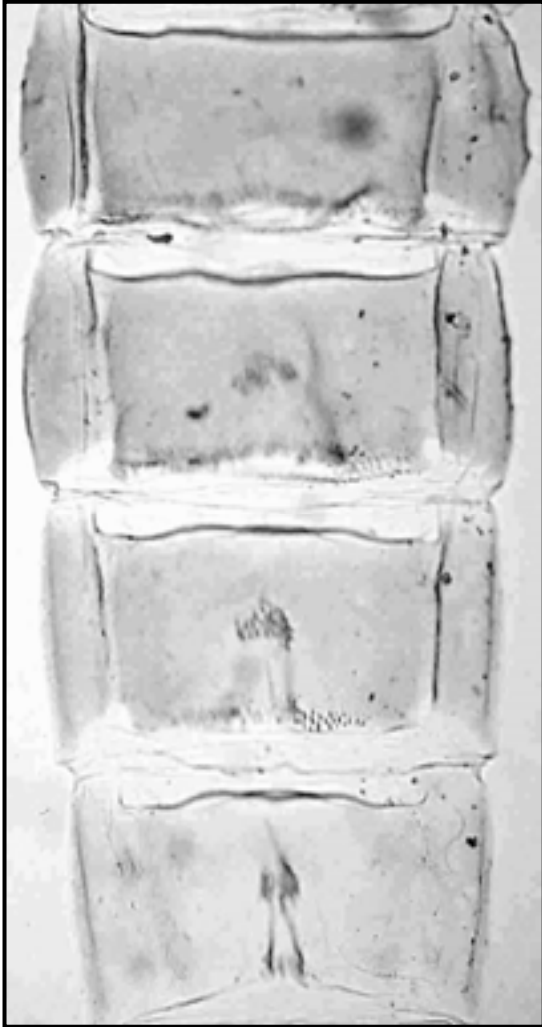
Figure 42. Respiratory organ of *Cricotopus sp. 5*.

Diplocladius sp.

Reference: Wiederholm 1986

Distinguishing Characters: Tergites II-VII containing shagreen, coverage of shagreen on each tergite decreases from anterior to posterior. Segment II with pedes spurii B; pedes spurii A on segments IV-VI. Anal lobe different from other Orthocladiinae, macrosetae inserted apically into an elongated dorsal flap protruding from each lobe. Flaps attached to the medial part of each lobe (Fig. 25).

Notes: Only 1 specimen slide mounted. No photos available.



Doncricotopus bicaudatus

Reference: Sæther 1981

Distinguishing Characters: Frontal setae well developed on small, finger-like, cephalic tubercles. Respiratory organ large, well developed, and covered with spines. Strong, spine-like, dorocentral setae that are approximately equally spaced, large pedes spurii B on segment II. Conspicuous tubercle on tergite II with hooklets, tergites III-VI with posterior spine patches or rows, tergites IV-VI with circular spine patches medially. Anteriorly pointing spines just posterior of posterior spine rows on tergites III-IV, segment VII with 4 and VIII with 5 lateral setae that are more hair like than taeniate (Figs. 15, 43).

Notes: The specimens collected fit pretty well with the description in Sæther (1981). However, there might be some discrepancies with the number of lateral setae, Sæther (1981) examined only 3 specimens for his description.

Figure 43. Tergites III-VI of *Doncricotopus bicaudatus*.



Eukiefferiella sp. 2

Reference:

Distinguishing Characters: Respiratory organ tip is longer than the base, anal lobe macrosetae are approximately equal in size, no recurved hooks on sternites VI-VII (Figs. 23, 44).

Notes: The only character that separates this species from *E. claripennis* is the respiratory organ tip is longer than the base. Specimens key to *E. fuldensis* in Lehmann (1972) but do not conform well to the description of the pupa of this species.

Figure 44. Respiratory organ of *Eukiefferiella* sp. 2.

Hydrobaenus sp.

Reference: Wiederholm 1986

Distinguishing Characters: Each anal lobe with fringe of small setae, with the fringe being well or less developed. Segment II with conspicuous sedes spurii B, respiratory organ always with at least a few small spines (Fig. 32).

Notes: No specimens of this genus were slide mounted., All were identified using a dissecting microscope.

Limnophes sp. 3

Reference:

Distinguishing Characters: Segment VIII with 4, hair-like, lateral setae that are not the same size, with 2 setae being larger and 2 being smaller in size. Dorocentral setae 2 and 3 with contacting scars, 4 is separated from other setae. Respiratory organ without much pigmentation, long, thin, and whip-like. Tergites II through VIII with shagreen (Fig. 24).

Nanocladius crassicornus

Reference: Sæther 1977

Distinguishing Characters: Pedes spurii B and conspicuous protuberance with hooklets well developed on segment II. Respiratory organ wide and short; less than three times as long as wide. Median spine patches on tergites IV-VII with patches on IV being reduced in size (Fig. 17).



Nanocladius distinctus

Reference: Sæther 1977

Distinguishing Characters: Well-developed pedes spurii B on segment II. Respiratory organ tapering with distinct spines at the end of the organ, three times longer than wide; organ only a little bit wider 1/3 up from its base when compared to the base. Segment VI possessing four hair-like setae; VIII with five taeniate L setae. Anal lobe macrosetae thick, each anal lobe with fringe of approximately 20-44 setae (Fig. 45).

Figure 45. Respiratory organ of *Nanocladius distinctus*.



Nanocladius incomptus

Reference: Sæther 1977

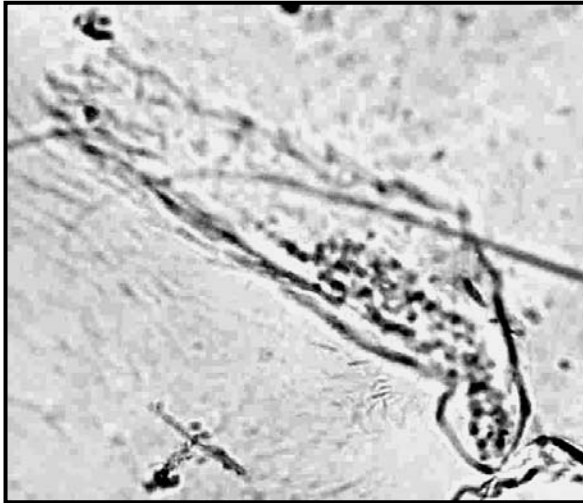
Distinguishing Characters: Broad and short respiratory organ, no distinct median spine patches on any tergite. Segment VII with four hair-like, lateral setae; VIII with five taeniate L setae (Fig. 46).

Figure 46. Tergites V-VIII of *Nanocladius incomptus*.

Nanocladius rectinervis

Reference: Sæther 1977

Distinguishing Characters: Well-developed pedes spurii B on segment II. Respiratory organ not tapering much, with blunt spines at tip, organ three times longer than wide. Segments VI and VII both with at least one taeniate L seta. Tergite VI with long, posterior spines. Anal lobe macrosetae long and strong (Figs. 10, 11, 18).

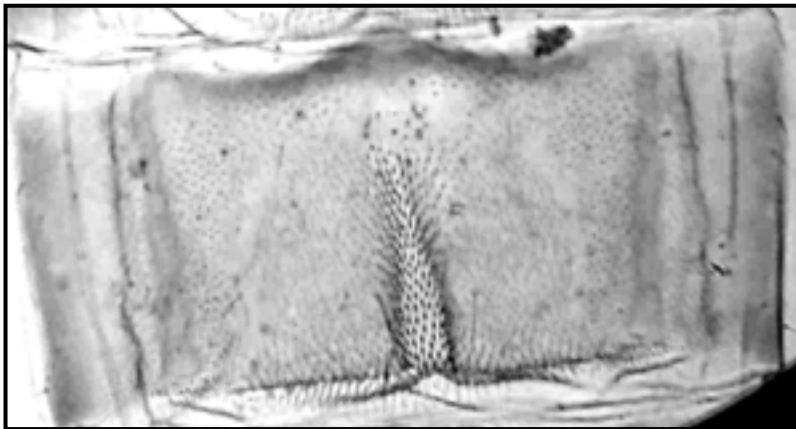


Nanocladius spiniplenus

Reference: Sæther 1977

Distinguishing Characters: Well-developed pedes spurii B on segment II. Respiratory organ slightly tapering, with spines at its end blunt, organ three times longer than wide (Fig. 47). Segments VI and VII both with at least one taeniate L seta. Thin and weak anal lobe macrosetae. Conjunctive between IV/V with spine rows that exhibit little or no interruption medially.

Figure 47. Respiratory organ of *Nanocladius spiniplenus*.



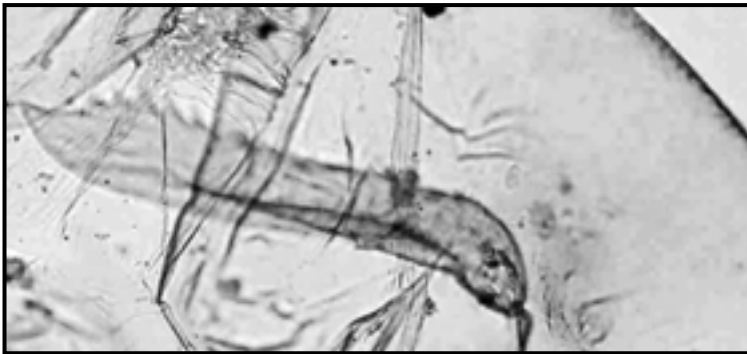
Orthocladius clarkei

Reference: Soponis 1977

Distinguishing Characters: No pedes spurii B on segment III. Frontal setae present. Spines in posterior patches of segment III and IV (which are pointed anteriorly) are approximately equal to the width of the recurved spines on II. No chitinous rings on tergites I through III. Anal lobe setae longer than 40% of the anal lobe's radius, spurs on anal lobes.

Notes: This species is a little darker than *O. oliveri*, but this is a subjective and not very reliable character for distinguishing this species.

Figure 48. Tergite IV of *Orthocladius clarkei*.

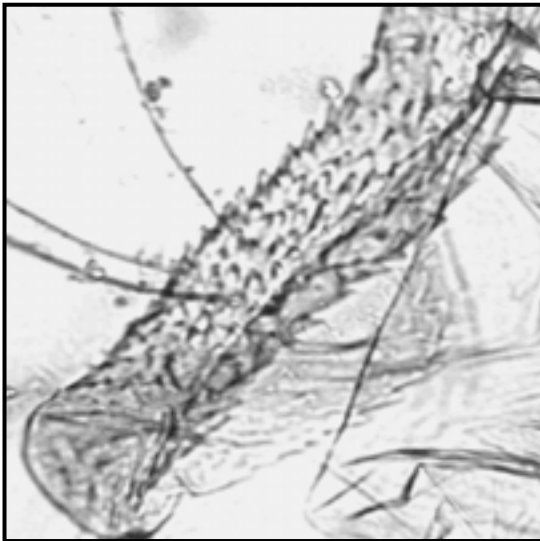


Orthocladius nigrinus

Reference: Soponis 1977

Distinguishing Characters: Respiratory organ large (Fig. 49). Anterior half of tergites IV and V with spines/dense shagreen. No spurs on anal lobes.

Figure 49. Respiratory organ of *Orthocladius nigrinus*.



Orthocladius obumbratus

Reference: Soponis 1977

Distinguishing Characters: No pedes spurii B on segment III. Spines in posterior patches of tergites III and IV (which are pointed anteriorly) extend laterally well beyond the width of recurved spines on II. No chitinous rings on tergites III. Anal lobe setae longer than 40% of the anal lobe's radius, anal lobe spurs bifid or trifold. Frontal setae present. Cephalic tubercles not prominent, flat (Figs. 50-51).

Notes: Color is a miserable character to differentiate this species from *O. oliveri*, I used the following: *O. obumbratus* has bifid or trifold anal lobe spurs and usually scale-like spines on the respiratory organ. Only *O. oliveri* has chitinous threads near the anal lobe macrosetae.

Figure 50. Respiratory organ of *Orthocladius obumbratus*.

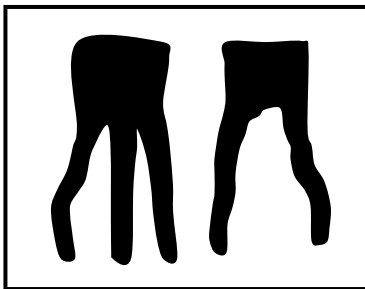


Figure 51. Drawing of anal lobe spurs.



Figure 52. Chitinous threads on the anal lobe of *Orthocladius oliveri*.

Orthocladius oliveri

Reference: Soponis 1977

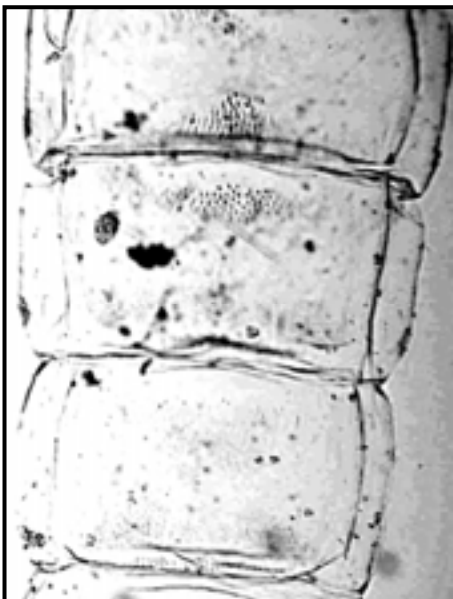
Distinguishing Characters: No pedes spurii B on segment III. Anteriorly pointed spines in posterior patches of tergites III and IV extend laterally well beyond the recurved spines on II. Respiratory organ densely covered with moderately sized and pointed spines. RO fairly large. No chitinous rings on tergites I-III. Anal lobe setae longer than 40% of the anal lobe's radius, spurs on anal lobes. Frontal setae present; cephalic tubercle not prominent, flat. Apophyses on tergites dark (Figs. 30, 52).

Notes: Color is not a dependable character to differentiate this species from *O. obumbratus*, I used the following: *O. oliveri* has chitinous threads near the anal lobe macrosetae. Only *O. obumbratus* has bifid or trifid anal lobe spurs and usually scale-like spines on the respiratory organ.

Orthocladius trigonolabis

Reference: Soponis 1977

Distinguishing Characters: Respiratory organ small, no spurs on anal lobes.



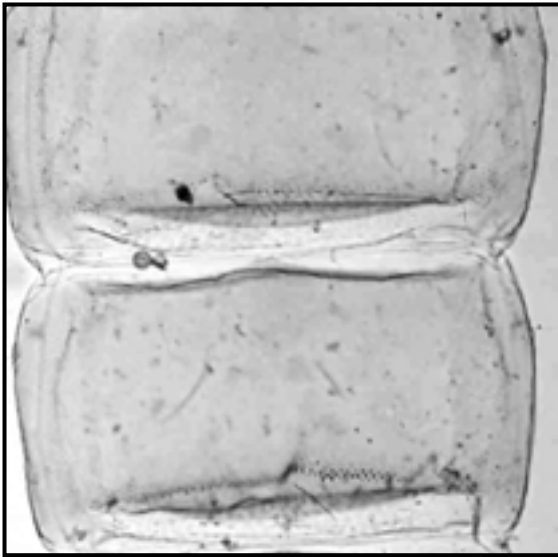
Parakiefferiella sp. 7

Reference:

Distinguishing Characters: Pedes spurii B on segments II and III, these segments also have strong patches of slender spines; 3 macrosetae on each anal lobe. Tergite II also has a posterior circular patch of spines, no respiratory organ, and extensive shagreen on tergites (Fig. 53).

Notes: This species has only been collected from Hardwood Creek.

Figure 53. Tergites II through IV of *Parakiefferiella* sp. 7.

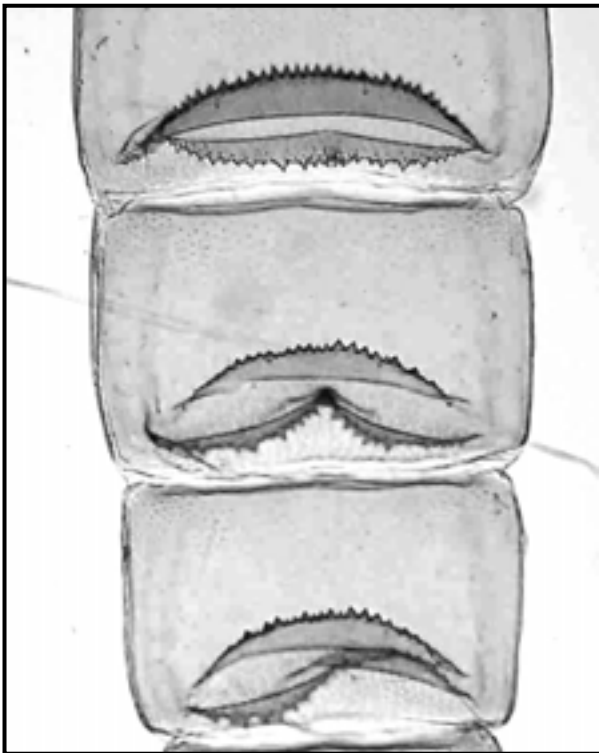


Parametriocnemus sp. 1

Reference:

Distinguishing Characters: Pedes spurii B on segment II well developed. No anterior spine patches on tergite II, each anal lobe with fringe of approximately 13 setae. Exuvium with dark brown pigmentation, not clear (Fig. 54).

Figure 54. Tergites III-IV of *Parametriocnemus* sp. 1.

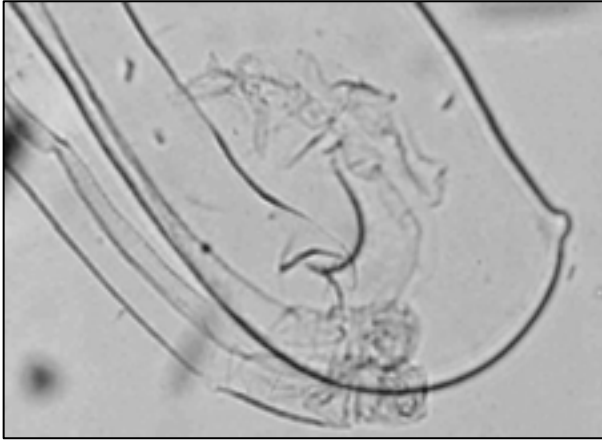


Parametriocnemus sp. 4

Reference:

Distinguishing Characters: Tergites III-VIII and sternites III-VIII with well-developed spine rows that fold over when mounted. No anterior spine patches on tergite II. Anal lobe with very weak fringe and a patch of conspicuous shagreen. Exuvium with dark brown pigmentation, not clear (Fig. 55).

Figure 55. Tergites IV-VI of *Parametriocnemus* sp. 4.



Paraphaenocladus exagitans

Reference: Sæther and Wang 1995

Distinguishing Characters: Nose on wing sheath; 1 seta at tip of anal lobe (may be difficult to see). Pearl row on wing sheaths and pedes spurii B both poorly developed (Figs. 31, 56).

Figure 56. Nose on wing sheath of *Paraphaenocladus exagitans*.

Psectrocladius schlienzi type

Reference: Wiederholm 1986

Distinguishing Characters: Tergites III-VI with a medial spine patch, three strong anal lobe macrosetae on each lobe. Tergites VII-VIII without posterior spine rows or patches (Fig. 12).



Pseudosmittia sp. 1

Reference:

Distinguishing Characters: Uniform shagreen composed of well-developed spinules and covering the majority of tergites II-VIII; the vast majority of spinules are approximately the same size. Anterior region of cephalothorax/ecdysial suture region with shagreen of small spines that fade posteriorly. At least 1 and as many as approximately 5 fenestrations in the shagreen of tergites II-VIII (Fig. 57).

Notes: This species has only been collected in Hardwood Creek.

Figure 57. Tergites V-VII of *Pseudosmittia* sp. 1.

Pseudosmittia sp. 2

Reference:

Distinguishing Characters: Shagreen on tergites II-VIII composed of spinules of two different sizes. Longer, more-developed spinules present on the anterior and posterior parts of each segment. Smaller, less-developed spinules in the medial region of each tergite. No shagreen patch present in the anterior region of cephalothorax/ecdysial suture. Tergites II-VIII generally without fenestrations in the shagreen pattern, when present usually not conspicuous (Fig. 33).

Notes: This species has only been collected in Hardwood Creek.

Rheocricotopus (Psilocricotopus) sp. 1

Reference: Sæther 1985

Distinguishing Characters: No pedes spurii B, no median spinule patches on any tergite. Conjunctives III/IV-V/V/VI with spinules in rows, frontal setae present on the prefrons. Strong, anal lobe macrosetae, each anal lobe with fringe of approximately 21 setae. Lateral setae on segments V-VIII numbering: 3, 3, 4, 4-5 respectively.

Notes: This species keys to *R. chalybeatus* in Sæther (1985), however this species has not been found in the Nearctic.



Rheosmittia sp.

Reference: Wiederholm 1986

Distinguishing Characters: Anal lobe reduced butt apically pointed and with lateral serrations. No respiratory organ or conspicuous anal lobe macrosetae (Fig. 58).

Notes: Only one specimen was slide mounted.

Figure 58. Tergite VIII and anal lobe of *Rheosmittia* sp.

Smittia sp.

Reference: Wiederholm 1986

Distinguishing Characters: Anal lobe, respiratory organ, frontal warts, cephalic tubercles, and frontal setae are all absent. Segment conjunctives without hooks or spines (Fig. 34).

Notes: No specimens of this genus were slide mounted. All were identified using a dissecting microscope.



Thienemanniella boltoni

Reference: Hestenes and Sæther 2000

Distinguishing Characters: Tergite I with posterior hook row. Tergite II with shagreen composed of small spines; 2 hair-like and 2, taeniate, lateral setae. Long, spinule bundles absent on sternite II. Tergite VII with approximately 6 hooks on posterior hook row (Fig. 59).

Notes: This can be a difficult species to identify because it is hard to decide if the posterior projections on VII are hooks or spines. In determining this species I decided that the posterior projections must be robust and discernable enough at the lowest magnification to be considered hooks.

Figure 59. Tergites VI through VIII and anal lobe of *Thienemanniella boltoni*.

Thienemanniella lobapodema

Reference: Hestenes and Sæther 2000

Distinguishing Characters: Posterior hooks absent on tergite I. Tergite II with fine shagreen and 3, taeniate, lateral setae. Posterior hook row with relatively-large hooks. Long spinule bundles absent on sternite II.

Thienemanniella similis

Reference: Hestenes and Sæther 2000

Distinguishing Characters: Tergite I with posterior hook row. Tergite II with shagreen composed of small spines, and 3, taeniate, lateral setae also present. Three long spinule bundles absent on sternite II; tergite VII without posterior hook row.

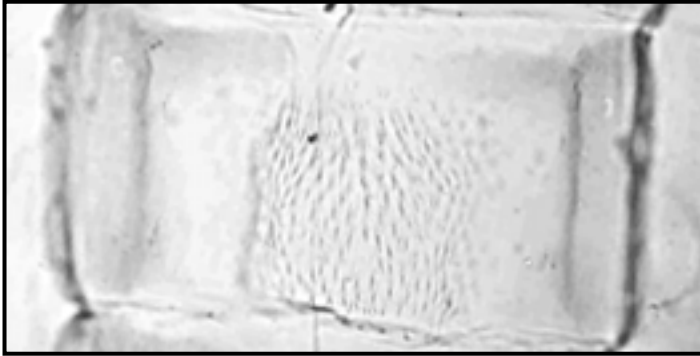


Figure 60. Tergite VII of *Thienemanniella* sp. 1.

Thienemanniella sp. 1

Reference:

Distinguishing Characters: Posterior hooks absent on tergite I. Tergite II with fine shagreen, two hair-like, lateral setae, one, taeniate L seta, and small hooks in posterior hook row. Long, spinule bundles absent on sternite II. Long spines on posterior segments (Fig. 60).

Notes: Keys to *T. xena* in Hestenes and Sæther (2000) except for the presence of long spines on posterior segments.



Tvetenia sp. 1

Reference:

Distinguishing Characters: Tergites III-IV possessing recurved hooks posteriorly. Sternites IV-VIII with patches of hooks posteriorly. Respiratory organ with somewhat elongated oval base and a conspicuously elongated filament-like tip. (Figs. 21-22, 61).

Notes: This species matches the description for *T. paucunca*.

Figure 61. Respiratory organ of *Tvetenia* sp. 1

Key to the Genera of Chironomini Pupae Collected in Hardwood Creek:

1. Tergites II-V and sometimes VI with 1 pair of conspicuous, longitudinal, spine patches (Fig. 62). ----
----- ***Zavreliella* sp. (p.)**
- 1'. Tergites II-VI without conspicuous spine patches (Figs. 65-68, 77-78, 81-82, 87). ----- **2**
2. Fringe on anal lobe with a conspicuous tuft of setae near tip of each lobe (Fig. 63). -----
----- ***Endochironomus* sp. (p.)**
- 2'. Anal lobes without tufts of setae near tips (Figs. 64, 70, 76, 85). ----- **3**
3. Several tergites with a conspicuous anteriomedial clump of spines or a mace-like structure with
spines in it (Figs. 65-66). ----- **4**
- 3'. No tergites with conspicuous clumps of spines or an anteriomedial mace-like structure (Figs. 67-
68, 77-78, 81-82, 87). ----- **5**
4. Tergite IV and possible tergites V-VI with group of clumped spines (Fig. 65). -----
----- ***Demeijerea* sp. (p.)**
- 4'. Tergites III-VI and possibly tergite II with a mace-like structure (Fig. 66). -----
----- ***Glyptotendipes* sp. (p.)**
5. Tergite VI possessing a posteromedial tubercle with conspicuous spines in it (Fig. 67). -----
----- ***Cladopelma* sp. (p.)**
- 5'. No posteromedial tubercle on tergite VI (Fig. 87). ----- **6**
6. Conspicuous black or dark areas on the lateral most part of conjunctives I/II-IV/V. Cephalic
tubercles with numerous apical spinules (Figs. 68-69). ----- ***Phaenopsectra* sp. (p.)**
- 6'. Conspicuous black or dark areas laterally on anterior conjunctives sometimes present in
Polypedilum sp. Cephalic tubercles, when present, never with apical spinules. ----- **7**
7. Anal lobe with conspicuous, dorsomedian projection possessing two finger-like lobes (Fig. 70). -----
----- ***Cryptochironomus* sp. (p.)**
- 7'. Anal lobe without dorsomedian projection possessing two lobes (Figs. 63-64, 76). ----- **8**

8. Respiratory organ well-developed, very long, more than one-half the length of exuvia, apical half with many branches. Tergites II-VI with a pair of projections containing spines posteriorly. Sternites II-VI many also have spiny projections (Fig. 71). ----- ***Cryptotendipes* sp. (p.)**
- 8'. Respiratory organ less than half the length of the exuviae. No projections containing spines on tergites or sternites II-VI (Figs. 68, 72-73, 77-79). ----- **9**
9. Respiratory organ with no more than 25 branches (Figs. 72, 79). ----- **10**
- 9'. Respiratory organ with more than 30 branches (Fig. 73). ----- **13**
10. Frontal warts projected dorsally; frontal setae and cephalic tubercles are not present (Fig. 74). -----
----- ***Microtendipes* sp. (p.)**
- 10'. Frontal warts often absent; frontal setae are present with cephalic tubercles present or absent. ----
----- **11**
11. Nose on wing sheaths; abdominal segments II-IV with 4 lateral setae (Fig. 75). -----
----- ***Paralauterborniella* sp. (p.)**
- 11'. No nose on wing sheaths; abdominal segments II-IV with 3 lateral setae. ----- **12**
12. Tergites II-VI with an anterior row of spines distinct from surrounding shagreen. Tergites VII-VIII with an anterior pair of lightly-shagreened patches (Figs. 76-77). ----- ***Polypedilum* sp. (p.)**
- 12'. Tergites II-VI without anterior row of spines discernable from shagreen (Fig. 78). -----
----- ***Paratendipes* sp. (p.)**
13. Exuvia without pedes spurri B on segment II, pedes spurii A on segment IV, cephalic tubercles and frontal setae. Respiratory organ branched, with 1 branch not further branched and not containing setae, instead spines are present on this branch (Fig. 79). ----- ***Stenochironomus* sp. (p.)**
- 13'. Exuvia usually with pedes spurii B on segment II and pedes spurii A on segment IV. Cephalic tubercles present or absent and with or without frontal setae. Respiratory organ highly branched and individual filaments not containing spines (Figs. 73, 80). ----- **14**
14. Segment VIII without anal comb or spur. Tergites III-VI and sometimes II, with posterior row of spines; hook row on segment II conspicuously divided medially. Often with a small spine patch just anterior to the hook row division (Fig. 81). ----- ***Harnischia* sp. (p.)**
- 14'. Segment VIII with or without comb or spur. Hook row on segment II not conspicuously divided medially. Tergites II-VI with anterior spine band present or absent. When anterior row of spines is present a second, more posterior band that is medially interrupted may also be present (Figs. 68, 78).
----- **15**

15. Tergites II-VI possessing conspicuous anterior spine row but no posterior spines. Frontal setae conspicuous. ----- ***Stictochironomus* sp. (p.)**
- 15'. Tergites II-VI usually without anterior spine row, however, when present this row it is weakly developed and is accompanied by a conspicuous posterior spine band, that is often interrupted medially (Fig. 82). ----- **16**
16. Basal ring with three, conspicuous, circular, tracheal openings (Fig. 83). ----- ***Einfeldia* sp. (p.)**
- 16'. Basal ring with less than three tracheal openings (Fig. 84). ----- **17**
17. Pedes spurii B absent on abdominal segment II. ----- **18**
- 17'. Pedes spurii B present on abdominal segment II (Figs. 78, 80). ----- **19**
18. Abdominal segment VIII without anal spur or comb and possessing four lateral setae. -----
----- ***Saetheria* sp. (p.)**
- 18'. Abdominal segment VIII usually possessing five lateral setae. However, if four lateral setae are present, an anal comb or spur is present. ----- ***Paracladopelma* sp. (p.)**
19. Conjunctives III/IV and/or IV/V with small, fine, lateral setae. Broad, conspicuous, and usually pigmented anal spur present. Exuviae characteristically large (Fig. 85). ----- ***Chironomus* sp. (p.)**
- 19'. Conjunctives without lateral setae. Anal comb or spur when present not broad, conspicuous, or darkly pigmented. Exuviae more variable in size, often smaller (Fig. 86). ----- **20**
20. Abdominal segment one lacking lateral setae. Distinct anal spur that is "s" shaped, usually tapering to a sharp point; large basal ring with conspicuous medial constriction (Fig. 86). -----
----- ***Dicrotendipes* sp. (p.)**
- 20'. Abdominal segment one with lateral setae. Anal comb, if present, consisting of several smaller spines. Bulbous medial projection present on sixth tergite. ----- ***Parachironomus* sp. (p.)**

Chironomini Figures:

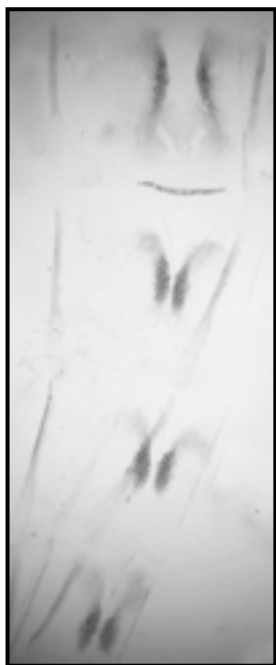


Figure 62. Tergites II-V of *Zavreliella* sp.

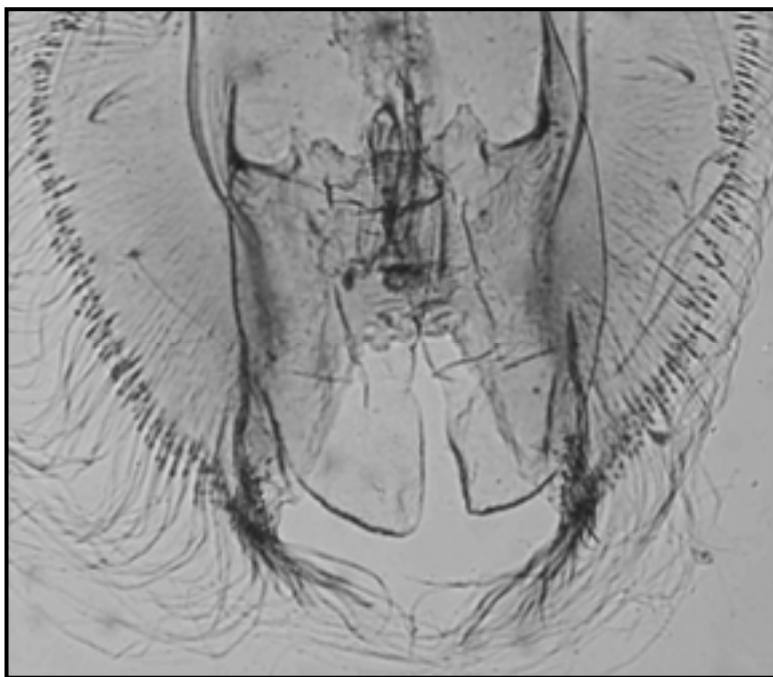


Figure 63. Anal lobe of *Endochironomus nigricans*.



Figure 64. Anal lobe of *Cladopelma* sp. 1.

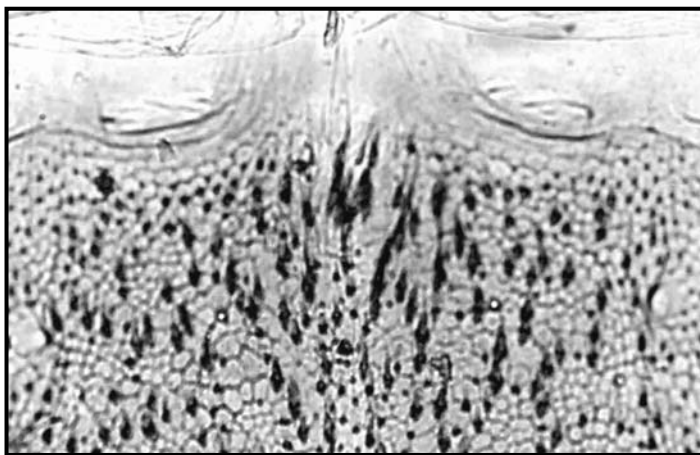


Figure 65. Tergite V of *Demeijerea* sp.



Figure 66. Mace on tergite VI of *Glyptopendipes* sp. 1.

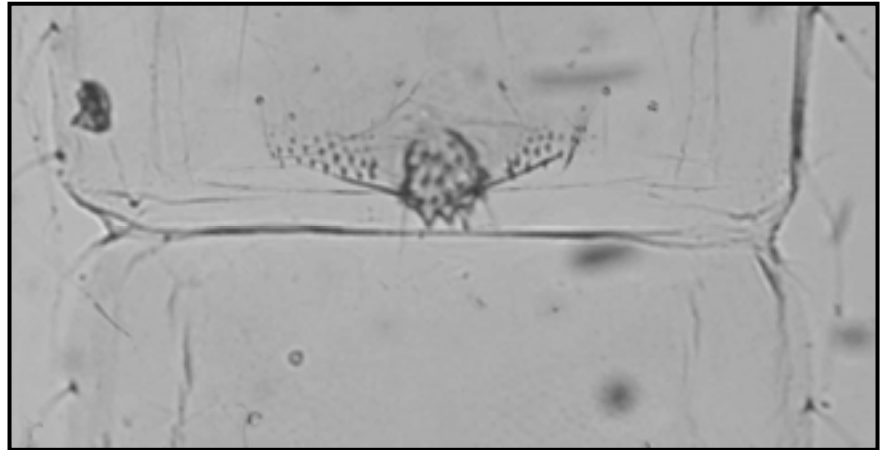


Figure 67. Posterior tubercle on tergite VI of *Cladopelma* sp. 1.

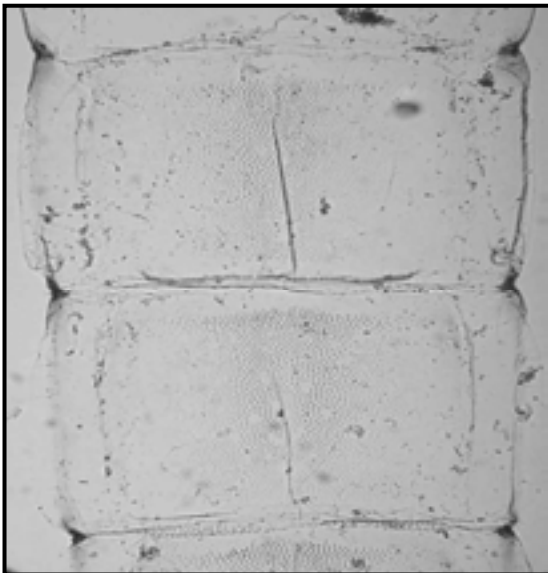


Figure 68. Abdominal segments two and three of *Phaenopsectra* sp. 1.

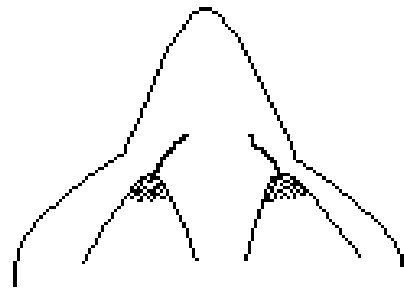


Figure 69. Cephalic tubercles of *Phaenopsectra* sp.

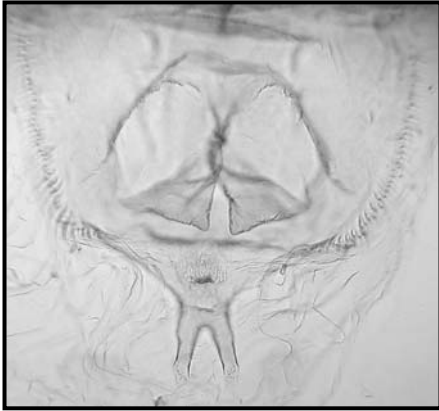


Figure 70. Anal lobe of *Cryptochironomus* sp.



Figure 71. Respiratory organ of *Cryptotendipes* sp.

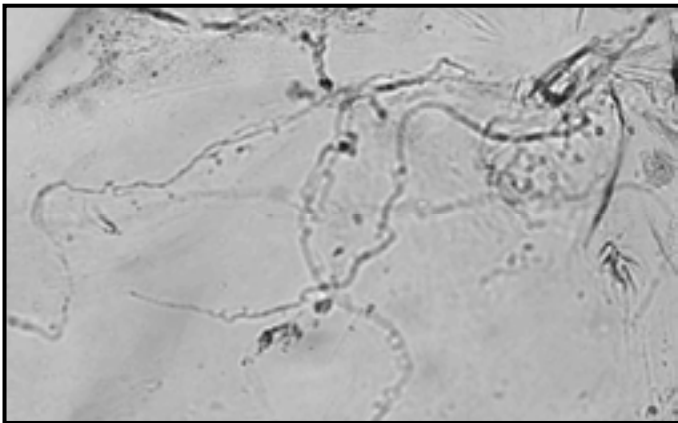


Figure 72. Respiratory organ of *Polypedilum scalaenum* gr. sp. 8.

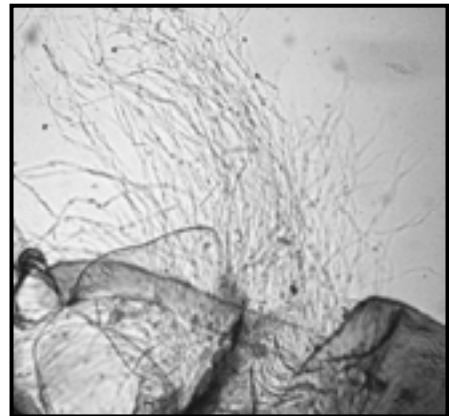


Figure 73. Respiratory organ of *Chironomus* sp. 1.



Figure 74. Frontal warts of *Microtendipes* sp.

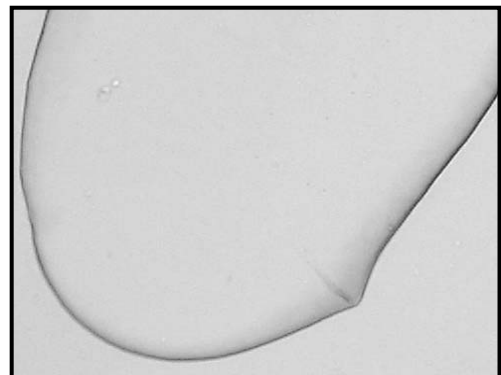


Figure 75. Nose on wing sheath of *Paralauterborniella* sp.

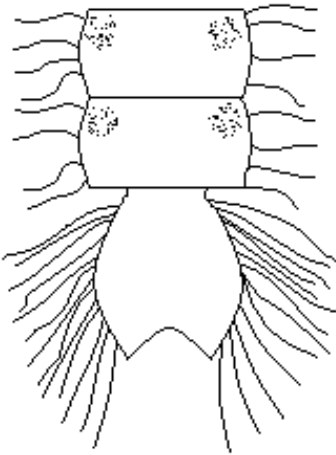


Figure 76. Segments VII-VIII and anal lobe of *Polypedilum* sp.

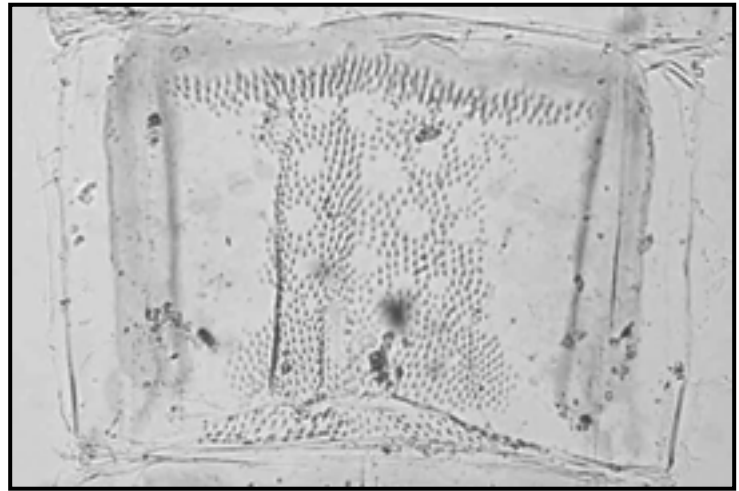


Figure 77. Tergite IV of *Polypedilum obtusum*.

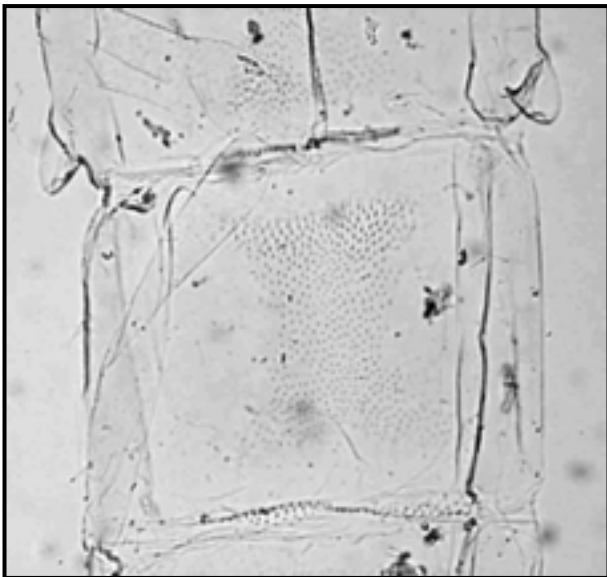


Figure 78. Tergite III and part of II of *Paratendipes* sp. 1.

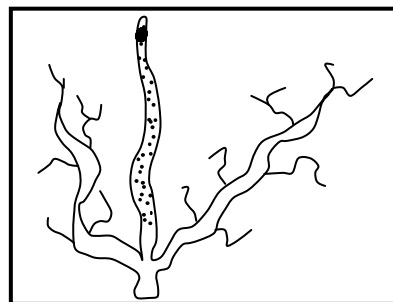


Figure 79. Respiratory organ of *Stenochironomus* sp.

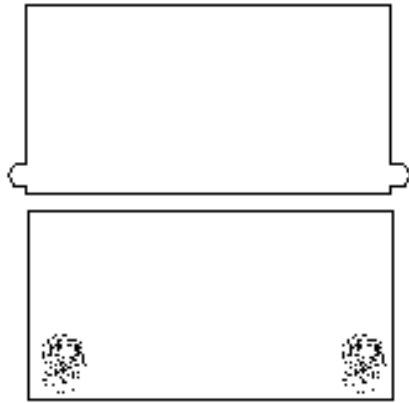


Figure 80. Segment II (top) and segment IV (bottom) of some Chironomini.

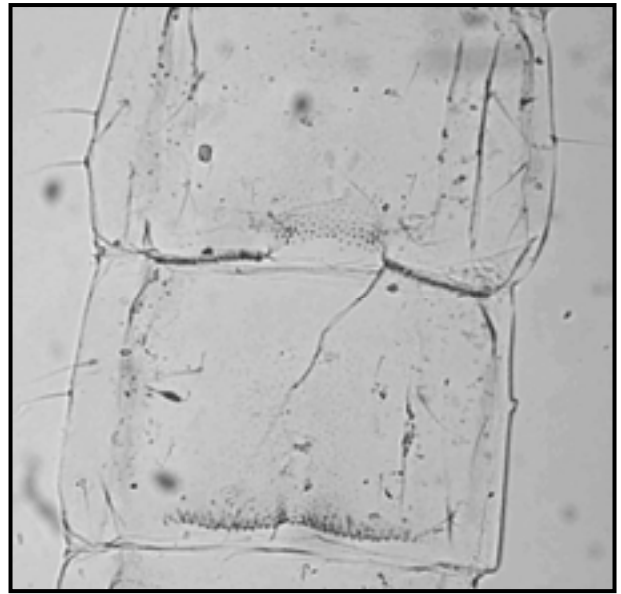


Figure 81. Tergites II-III of *Harnischia* sp.

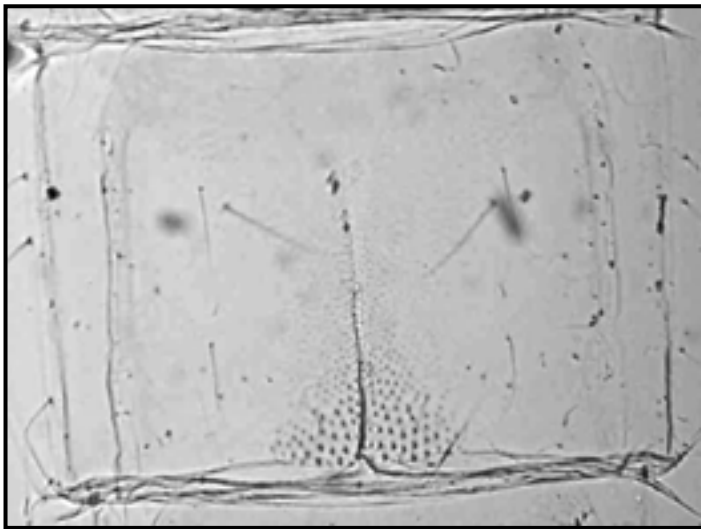


Figure 82. Tergite V of *Parachironomus* sp. gr. C.



Figure 83. Basal ring of *Einfeldia* sp. gr. D.



Figure 84. Basal ring of *Chironomus* sp. 1.



Figure 85. Anal lobe and spurs of *Chironomus* sp.

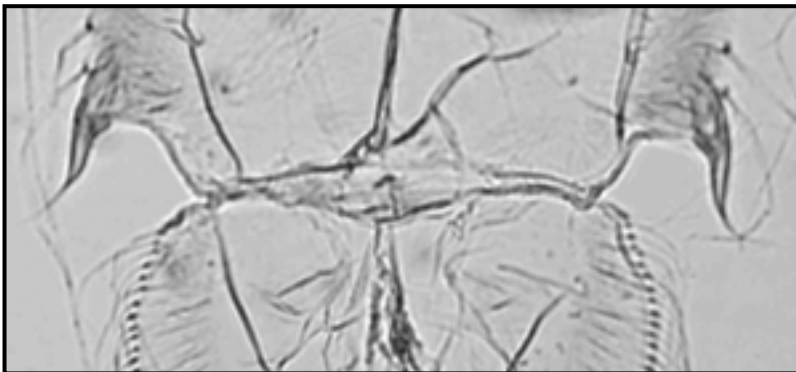


Figure 86. Anal spurs of *Dicrotendipes* sp. 6.

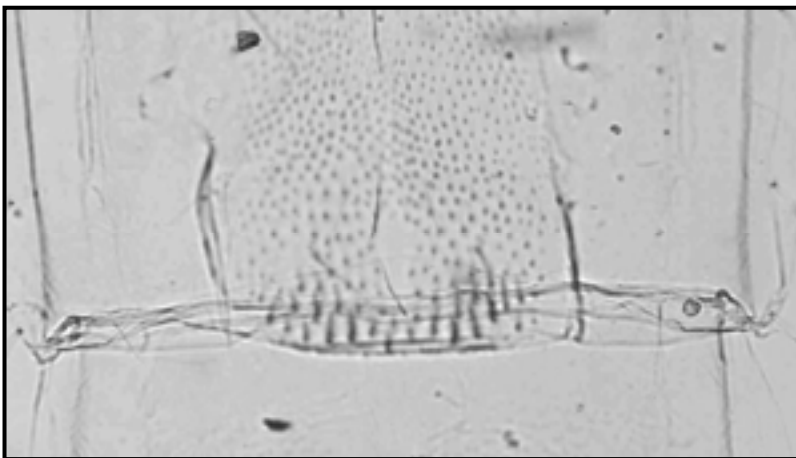


Figure 87. Bulbous projection on tergite VI of *Parachironomus arcuatus* gr.

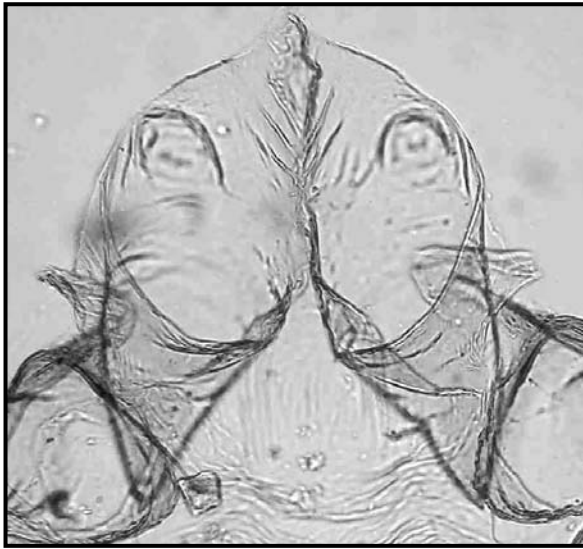
Chironomini Taxa Descriptions:

Chironomus sp. 1

Reference:

Distinguishing Characters: Only cephalic tubercles present (Figs. 73, 84).

Notes: This morphospecies is very broadly defined and can likely be divided into many more species.



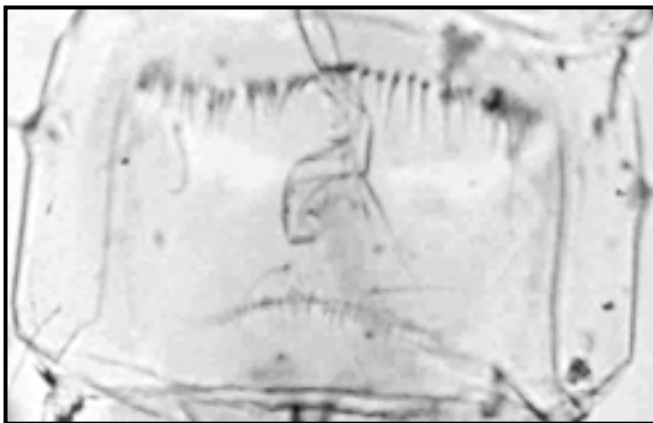
Chironomus sp. 2

Reference:

Distinguishing Characters: Cephalic tubercles and frontal warts present (Fig. 88).

Notes: This morphospecies is very broadly defined and can likely be divided into many more species.

Figure 88. Cephalic tubercles and frontal warts of *Chironomus* sp. 2.



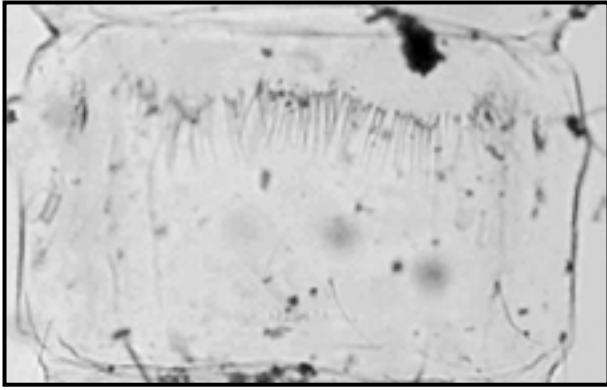
Cladopelma sp. 1

Reference:

Distinguishing Characters: Segment II with 1 anterior and posterior row of spines. Anterior row with long and well-developed spines. Posterior row with greater than or equal to 33 total spines which are generally larger and better developed than those of species 2 (Figs. 64, 67, 89).

Notes: At present morphospecies have not been defined for this genus.

Figure 89. Sternite II of *Cladopelma* sp. 1.



Cladopelma sp. 2

Reference:

Distinguishing Characters: Second sternite with an anterior and usually posterior row of spines, with the posterior row absent in some specimens. Anterior row with long and well-developed spines. Posterior row with less than or equal to 32 total spines, which are generally weaker and less well developed than those of species 1 (Fig. 90).

Notes: At present morphospecies have not been defined for this genus.

Figure 90. Second sternite of *Cladopelma* sp. 2.

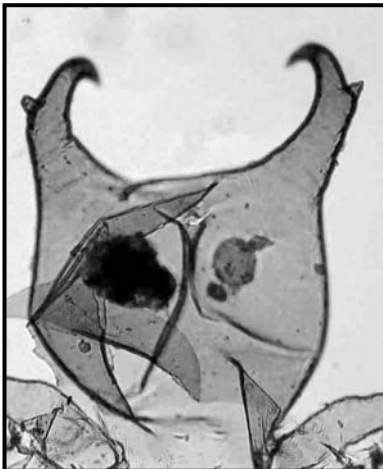


Cryptochironomus eminentia

Reference: Mason 1985

Distinguishing Characters: Large and conspicuous cephalic tubercles with bulbous base that is divided between the elongated distal sections of the tubercles (Fig. 91).

Figure 91. Cephalic tubercles of *Cryptochironomus eminentia*.



Cryptochironomus ponderosus

Reference: Mason 1985

Distinguishing Characters: Large and conspicuous cephalic tubercles with bulbous base that is not divided between the 2 tubercles (Fig. 92). Elongated distal sections of cephalic tubercles with prominent lateral bifurcation.

Figure 92. Cephalic tubercles of *Cryptochironomus ponderosus*.



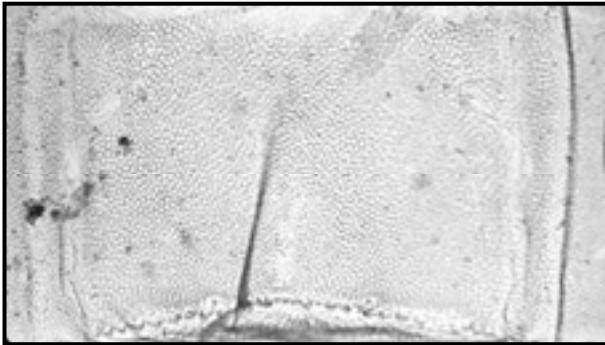
Cryptochironomus sp. 1 (nr. *conus*)

References: Mason 1985

Distinguishing Characters: Cephalic tubercles slender, long, and pointed with subapical seta. Tergite I with 1-2 pairs of anterior tubercles with spines. Heavy reticulation only on anterior segments. Shagreen on tergites II-VI covering half to three-quarters of tergites. Tergites and sternites II-VII with posterior spine rows. Tergites VII-VIII with light, anteriolateral, shagreen patches; sternite VIII with spine rows only in male exuviae. Each anal lobe with dense and well-developed fringe of greater than 30 setae (Fig. 93).

Notes: This is a variable species with regards to the light reticulation pattern, especially on posterior segments, and the development of shagreen spinules and cephalic tubercles.

Figure 93. Tergites I-II of *Cryptochironomus* sp. 1 (nr. *conus*).



Cryptochironomus sp. 2

References:

Distinguishing Characters: Cephalic tubercles large and conical, heavy reticulation pattern approximately resembling snake skin on segments I-V. Tergite VI sometimes with reticulation in anterior-quarter of the segment. Specimens of this species tend to be large in size (Fig. 94).

Figure 94. Tergite III of *Cryptochironomus* sp. 2.

Cryptotendipes sp.

References:

Distinguishing Characters: Respiratory organ very long and well developed. Apical half of organ with many branches. Organ more than half the length of the entire exuvia. Cephalic tubercles small, finger-like projections; tergites II-VI with one pair of spine mounds becoming more strongly developed on posterior segments. Thick, brown filaments not present in anal lobe fringe; anal spur single and resembling those found in the genus *Dicrotendipes* sp. Male genital sheath with 2 conspicuous finger-like projections, cephalothorax rough and possessing many wart-like projections (Fig. 71).

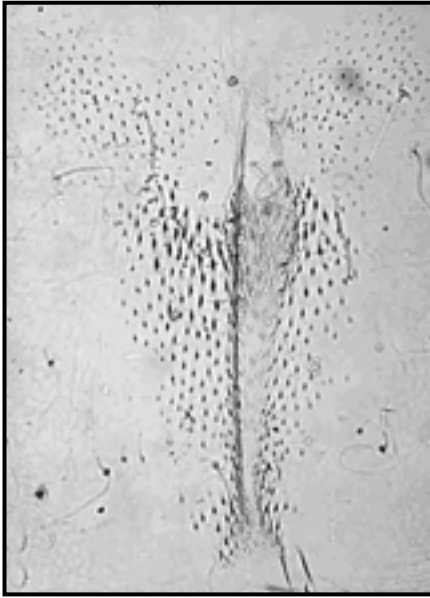
Notes: Only one specimen slide mounted and described above. Morphospecies have not yet been defined for this genus.

Demeijerea sp.

Reference: Wiederholm 1986

Distinguishing Characters: Tergites IV, IV-V or IV-VI with conspicuous pattern of reticulation and dark spines. Each anal lobe with fringe of approximately 110-190 setae (Fig. 65).

Notes: Only one specimen slide mounted and described above. Morphospecies have not yet been defined for this genus.



Dicrotendipes modestus/neomodestus

Reference: Epler 1988

Distinguishing Characters: Sternite II with spine row. Tergite VI with anterior and posterior spinules in the medial shagreen patch more developed than those present in the center of the patch. Tergite VIII with 4, taeniate, lateral setae; anal spur single or closely appressed double. Anal lobe with many setae (Fig. 95).

Notes: A morphologically variable species.

Figure 95. Tergite VI shagreen of *Dicrotendipes modestus/neomodestus*.



Dicrotendipes nervosus gr.

Reference: Epler 1988

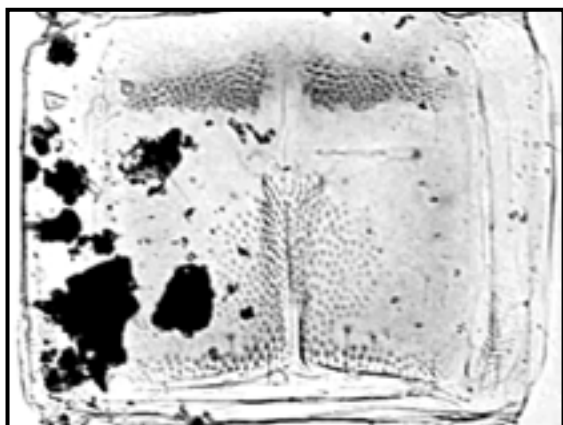
Distinguishing Characters: Tergites II-V with approximately equal shagreen spinules, no spine row on sternite II. Tergites VI-VIII with moderately to poorly developed reticulate pattern, VI with the longest spinules present in the middle of the shagreen. Segment VIII with 4 taeniate L setae (Fig. 96).

Figure 96. Tergite VI shagreen of *Dicrotendipes nervosus* gr.

Dicrotendipes tritonus

Reference: Epler 1988

Distinguishing Characters: Cephalic tubercles wide and short, sternite II with spines. Segment VIII with four taeniate L setae. Anal spur composed of two well-separated spurs.

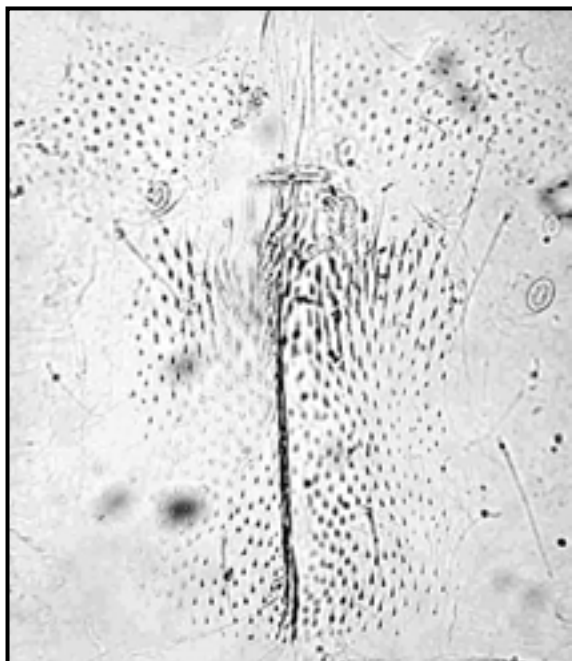


Dicrotendipes sp. 4

Reference:

Distinguishing Characters: Tergites III-VI with relatively extensive coverage of shagreen. Keys to *D. modestus/neomodestus* in Epler (!988) but anterior shagreen on tergites IV-VI is different (Fig. 97).

Figure 97. Tergite IV of *Dicrotendipes* sp. 4.



Dicrotendipes sp. 6

Reference:

Distinguishing Characters: Sternites I-II with spines. Tergite VI with anterior spinules in the medial shagreen patch more developed than those in the middle and posterior part of the patch(Figs. 86, 98).

Notes: Keys to *D. californicus* complex in Epler (1988).

Figure 98. Tergite VI shagreen of *Dicrotendipes* sp. 6.

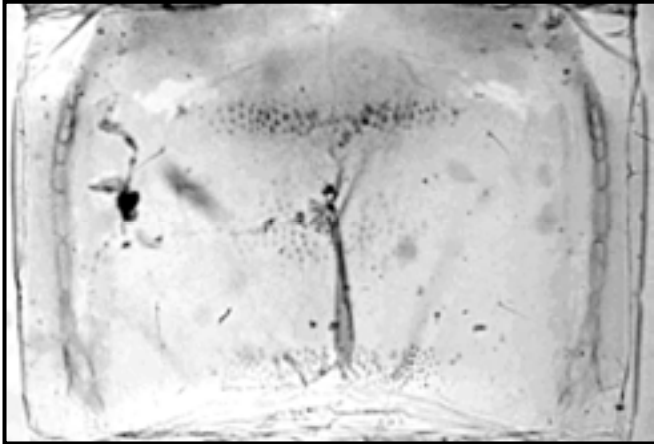


Figure 99. Tergite III of *Einfeldia* sp. gr. D.

Einfeldia sp. gr. D

Reference: Wiederholm 1986

Distinguishing Characters: Tergites III-VI with shagreen pattern divided into anterior, medial, and posterior fields. Cephalic tubercles present. Basal ring of respiratory organ has three branches, anal comb with slender spines arranged in a transverse row (Figs. 83, 99).

Notes: Abdominal segment VIII of presumptive larva with one pair of ventral tubules.

Endochironomus nigricans

Reference: Grodhaus 1987

Distinguishing Characters: Pedes spurii A absent on sternite IV; segments V-VI with hair-like, L setae. Segment VIII usually with more than one well-developed spine on posterolateral corner. If cephalic tubercles are present, they are without an apical circle of small papillae. Exuviae yellow and anal lobe with tuft of setae (Fig. 63).

Notes: *Endochironomus subtendens* is much lighter, approximately colorless.

Glyptotendipes sp. 1

Reference:

Distinguishing Characters: Maces on abdominal segments increase in size, with tergite VI having the largest mace. Cephalic tubercles are moderately large and finger like. Segment VIII with several, very-small spines on posterolateral corner. Each anal lobe with dense fringe of setae. Cephalothorax with brown pigmentation and warts giving it a rough appearance (Fig. 66).

Harnischia sp.

Reference:

Distinguishing Characters: Cephalic tubercles resemble finger-like projections and are relatively-well developed. Exuvium relatively clear, some specimens with a little pigmentation. Large bump present near region of edysal margin in anterior half of the cephalothorax (Fig. 81).

Notes: All six specimens that were slide mounted are described above and appear to be the same species.



Figure 100. Anal comb of *Microtendipes* sp. 3.

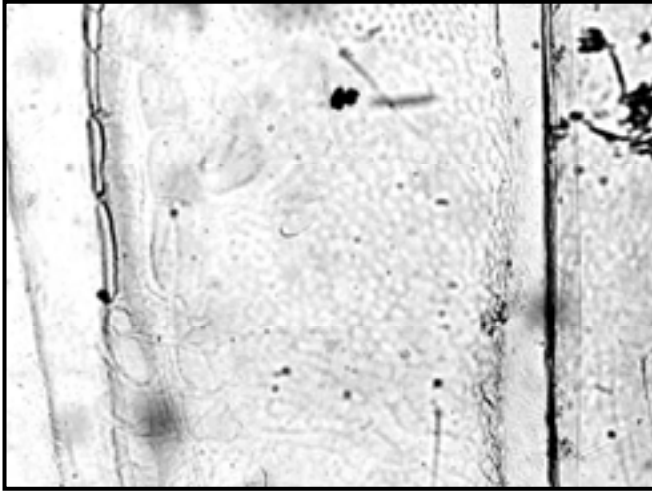
Microtendipes sp. 3

Distinguishing Characters: Exuviae yellow to brown in color. Frontal warts well developed, long and slender. Anal comb with approximately 2-4 spines (Fig. 100).

Parachironomus arcuatus gr.

Reference: Wiederholm 1986

Distinguishing Characters: Sternite II with anterior and posterior spine rows, tergite VI with a distinct median flap containing spines. Posterolateral region of segment VIII with one to several colorless spines; five taeniate, L setae also present on VIII (Fig. 87).



Parachironomus frequens gr.

Reference: Wiederholm 1986

Distinguishing Characters: Tergite VI without a distinct flap containing spines, lateral reticulation on abdominal segments VII-VIII. Posterolateral region of segment VIII with one to several colorless spines; five taeniate L setae also present on VIII (Fig. 101).

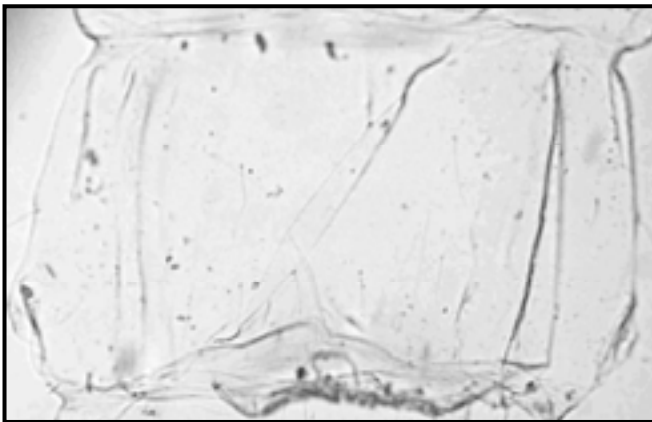
Notes: The lateral reticulation on tergites VII-VIII can be a difficult character to use because many species of *Parachironomus* sp. have a reticulate pattern on these segments. However, it is particularly pronounced in *P. frequens* gr.

Figure 101. Lateral reticulation on part of tergite VII of *Parachironomus frequens* gr.

Parachironomus varus gr.

Reference: Wiederholm 1986

Distinguishing Characters: Abdominal segment VIII with five taeniate L setae. Posterolateral region of segment VIII without spines.

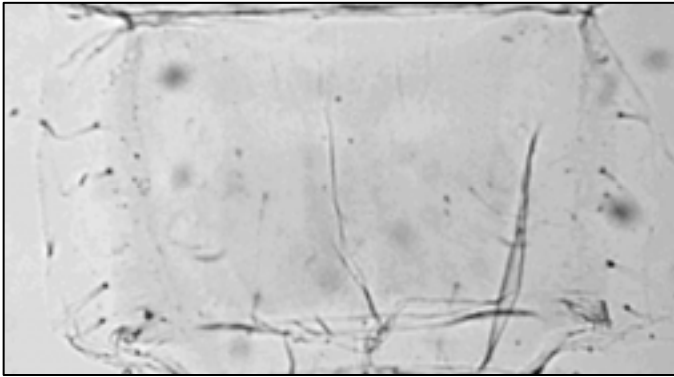


Parachironomus vitiosus gr.

Reference: Wiederholm 1986

Distinguishing Characters: Anterior or posterior spine rows absent on sternite II (Fig. 102). Tergite VI with a distinct flap containing spines. Posterolateral region of segment VIII with one to several colorless spines and five taeniate L setae present on segment VIII .

Figure 102. Abdominal segment II of *Parachironomus vitiosus* gr.

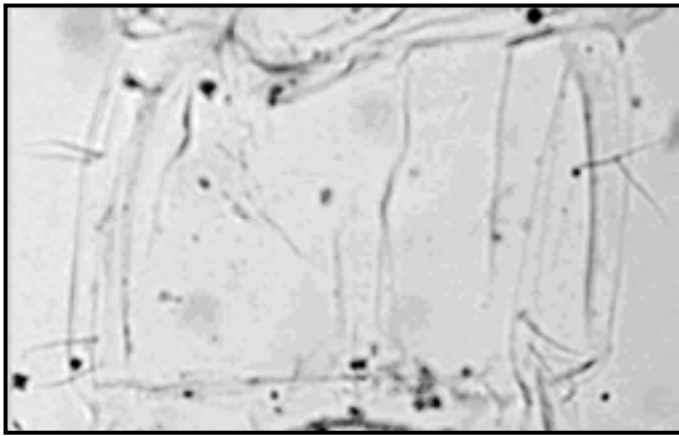


Parachironomus sp. gr. C

Reference: Wiederholm 1986

Distinguishing Characters: Tergite II with continuous hook row. Four taeniate L setae on abdominal segments V-VIII (Figs. 82, 103).

Figure 103. Four taeniate lateral setae on segment VIII of *Parachironomus* sp. gr. C.



Paracladopelma nereis

Reference: Jackson 1977

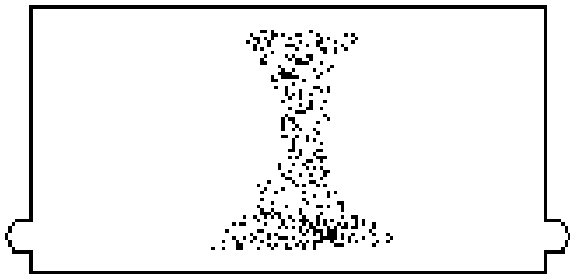
Distinguishing Characters: Tergites II-IV with four hair-like L setae, with two of these setae being present on the caudolateral angles of the segments. Posterior hook row on tergite II with 54-58 hooks, shagreen on tergite VIII, anal spur absent (Fig. 104).

Figure 104. Tergite III of *Paracladopelma nereis*.

Paralauterborniella nigrohalterale

Reference: Wiederholm 1986

Distinguishing Characters: No lateral setae on segment I and four hair-like L setae on segments II-IV. Segment IV with pedes spurii A not resembling a vortex and one taeniate dorsal setae on anal lobe.



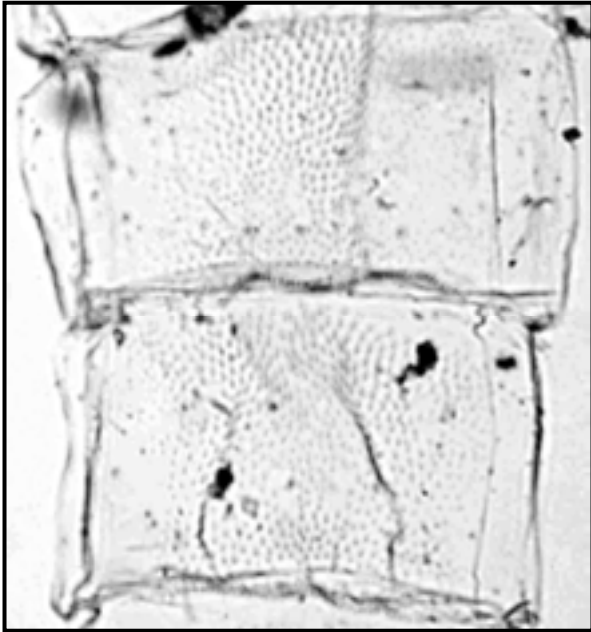
Paratendipes sp. 1

References: Hayford 1998

Distinguishing Characters: Cephalic tubercles with frontal setae. Tergites II-VI without variable shagreen patterns, shagreen square or hourglass shaped. Tergites III/IV and IV/V with setae on conjunctives. Respiratory organ with 10-12 branches which are often difficult to see (Figs. 78, 105).

Notes: This morphospecies is probably *P. albimanus*.

Figure 105. Tergite II of *Paratendipes* sp. 1.



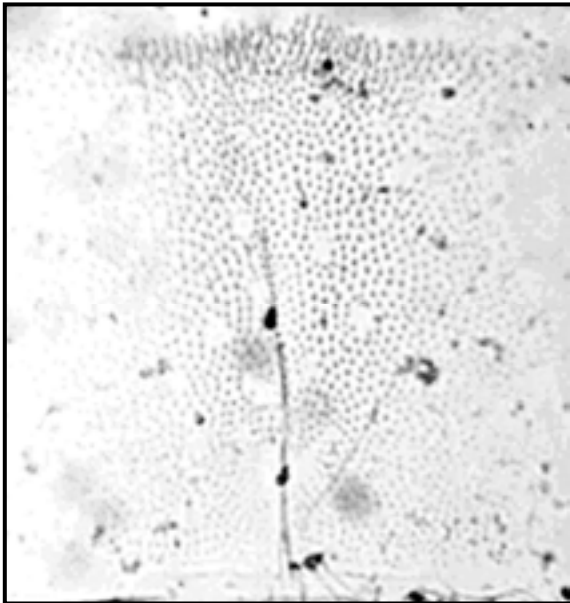
Paratendipes (?) sp. 2

References:

Distinguishing Characters: Cephalic tubercles absent. Abdominal tergites II-VI with well-developed, shagreen patches covering most of the segment (Fig. 106). The lateral setae on segments IV-VIII numbering: 1, 3, 4, 4, 4 respectively. Each anal lobe with fringe of approximately 13 setae.

Notes: This species could possibly be a species of the genus *Apedilum* sp.

Figure 106. Abdominal tergites II-III of *Paratendipes* (?) sp. 2.

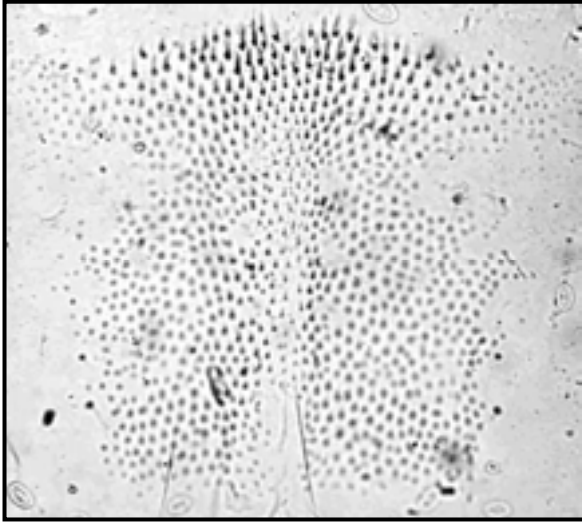


Phaenopsectra sp. 1

References:

Distinguishing Characters: Anterior shagreen on tergites II-V only slightly stronger than shagreen on the rest of the tergite (e.g., Fig. 107). Lateral conjunctive darker than median area (Fig. 68). Anal comb with three to four spines.

Figure 107. Shagreen on abdominal tergite III of *Phaenopsectra* sp. 1.



Phaenopsectra sp. 2

References:

Distinguishing Characters: Anterior shagreen of abdominal segment III distinct, with many spines being larger than shagreen spines in medial part of segment. (Fig. 108). Anal comb with approximately two to three spines, and the largest spine usually not the most lateral.

Notes: A highly morphologically variable species.

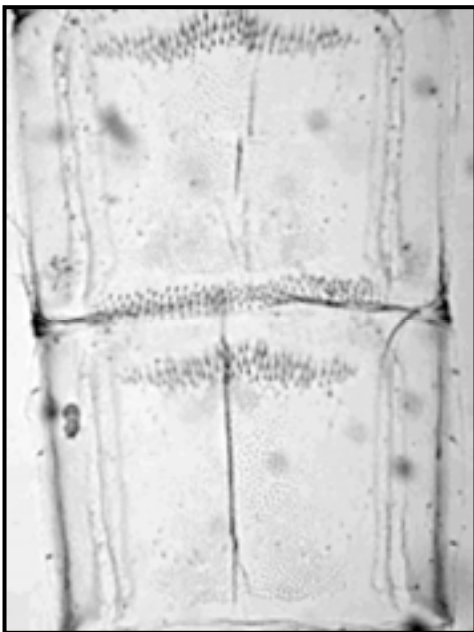
Figure 108. Shagreen on tergite III of *Phaenopsectra* sp. 2.

Polypedilum sp. (nr. *falciforme*)

Reference: Maschwitz and Cook 2000

Distinguishing Characters: Prealar tubercle and anal spur both present. No cephalic tubercles. Each anal lobe with fringe of less than 40 setae. Exuviae greater than 5 mm long.

Notes: May not always have less than 40 setae but all specimens were greater than 5 mm.



Polypedilum fallax

Reference: Maschwitz and Cook 2000

Distinguishing Characters: Prealar tubercle absent to poorly developed. Anal spur present with many small spines at its base. No cephalic tubercles. Many spinules on conjunctives III/IV and IV/V (Fig. 109). Shagreen fairly extensive on all tergites, especially tergites II and III. Brown tinge on posterior tergites (Fig. 109).

Notes: Superficially looks very much like many specimens of *Phaenopsectra* sp., based on the dark pigmentation of the lateral edges of anterior conjunctives.

Figure 109. Abdominal tergites IV and V of *Polypedilum fallax*.



Polypedilum illinoense-angulum gr. sp.

Reference: Maschwitz and Cook 2000

Distinguishing Characters: Prealar tubercle absent to poorly developed. Anal spur present without small spines at its base. No cephalic tubercle. Many spinules between segments III-IV (Fig. 110). Anterior spine rows on tergites III-VI are larger than conjunctive spinules and hooks in posterior hook row on tergite II. Pedes spurii A present on segment IV.

Figure 110. Tergite IV and conjunctive spinules of segments III/IV and IV/V of *Polypedilum illinoense-angulum* gr. sp.

Polypedilum obtusum

Reference: Maschwitz and Cook 2000

Distinguishing Characters: No prealar tubercle. Anal spur present. No cephalic tubercles. Each anal lobe with fringe of greater than 30 setae. Tergite II with anterior spinule row weak to approximately absent. Pedes spurii B on segment II present. Shagreen pattern without an anterior to posterior bald midline on tergites III-VI (Fig. 77).

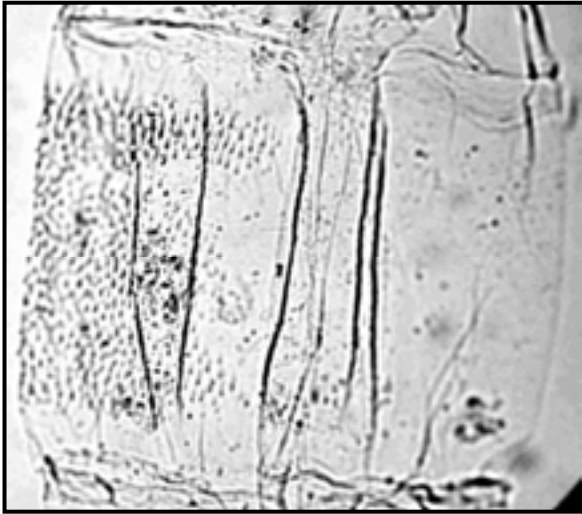


Polypedilum scalaenum gr. sp. 1

References: Maschwitz and Cook 2000

Distinguishing Characters: Prealar tubercle absent to poorly developed. Anal spur present without small spines at its base. No cephalic tubercles. Many spinules on conjunctive III/IV. Tergites III and VI with anterior row of spinules approximately the size of, or smaller than the hook row on tergite II. No triangle-shaped shagreen pattern on tergites III-VI (Fig. 111).

Figure 111. Tergites II and III of *Polypedilum scalaenum* gr. sp. 1.

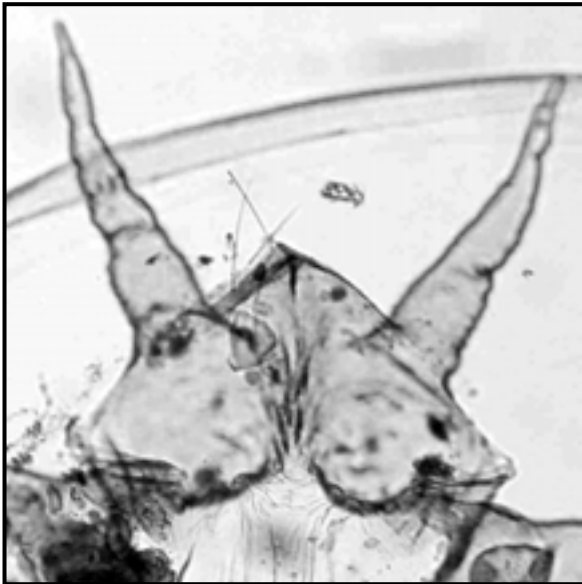


Polypedilum scalaenum gr. sp. 8

References: Maschwitz and Cook 2000

Distinguishing Characters: Prealar tubercle absent to poorly developed. Anal spur with three to four lateral spines. No cephalic tubercles. Spinules on conjunctive III/IV. Tergites II through V with very dense shagreen covering most of the tergite (Fig. 112). Shagreen spinules almost as large as the anterior spinule row. Each anal lobe with fringe of approximately 28 fringe setae (Figs. 72).

Figure 112. Tergite III of *Polypedilum scalaenum* gr. sp. 8.



Polypedilum simulans

Reference: Maschwitz and Cook 2000

Distinguishing Characters: Abdominal tergites with distinct anterior row of spinules. Cephalic tubercles present and with well-developed cephalic warts.

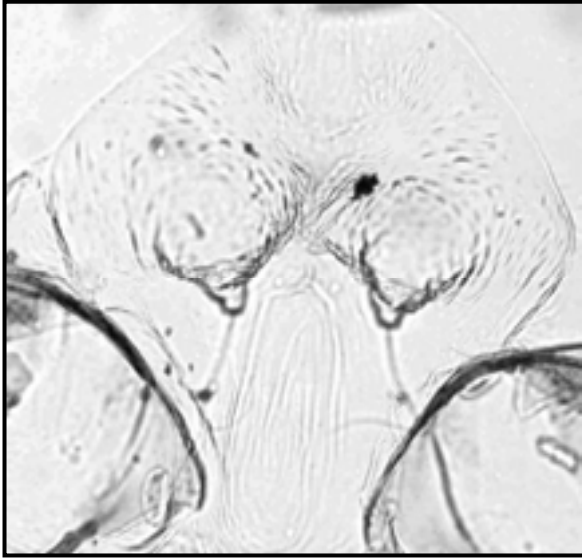
Notes: The presence of cephalic tubercles and warts is a diagnostic character for separating this species from other *Polypedilum* sp. (Fig. 113).

Figure 113. Cephalic tubercles and frontal warts of *Polypedilum simulans*.

Polypedilum trigonus

Reference: Maschwitz and Cook 2000

Distinguishing Characters: No prealar tubercle. Anal spur present. No cephalic tubercles. No spinules on conjunctives III/IV, prominent anterior spinule row on tergite II. Tergites IV-V with medial shagreen that connects both anterior and posterior spinule rows.



Polypedilum sp. 4

Reference:

Distinguishing Characters: Cephalic tubercles with many small warts (Fig. 114). Anal comb with one prominent spur and two to three smaller accessory spurs. Each anal lobe with approximately 32-35 fringe setae.

Figure 114. Cephalic tubercles of *Polypedilum* sp. 4.

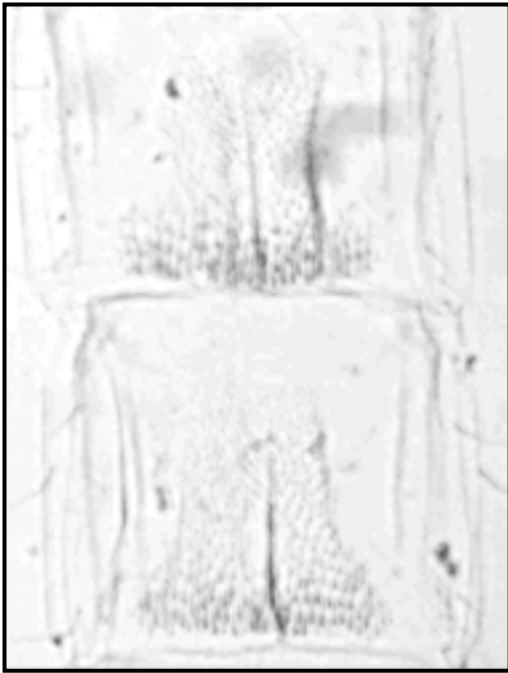


Saetheria tylus

Reference: Jackson 1977

Distinguishing Characters: Tergites III-V with posterior band of spines expanded to each side of the tergite (Fig. 115). Segment II-IV with two strong, hair-like L setae; Posterior margins of tergites III through V each with a posterior band of spines.

Figure 115. Tergites III through V of *Saetheria tylus*.



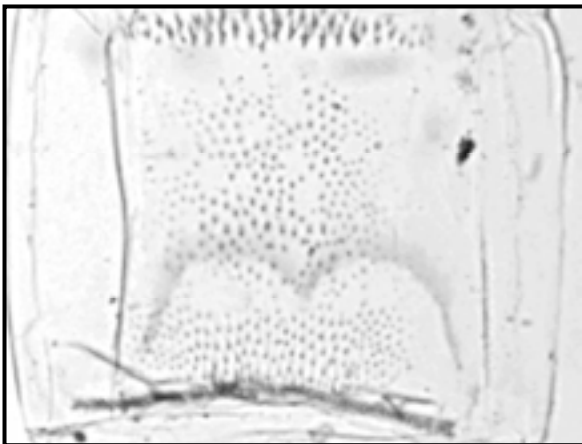
Saetheria sp. 1

Reference: Jackson 1977

Distinguishing Characters: Tergites III-IV with shagreen in a triangular pattern with strongest spines along posterior margin and spines decreasing in size anteriorly toward the anterior apex of the triangle (Fig. 116). Abdominal segments V through VIII with four taeniate L setae.

Notes: This species is similar to the morphospecies created by Jackson 1977.

Figure 116. Tergites III through IV of *Saetheria* sp. 1.

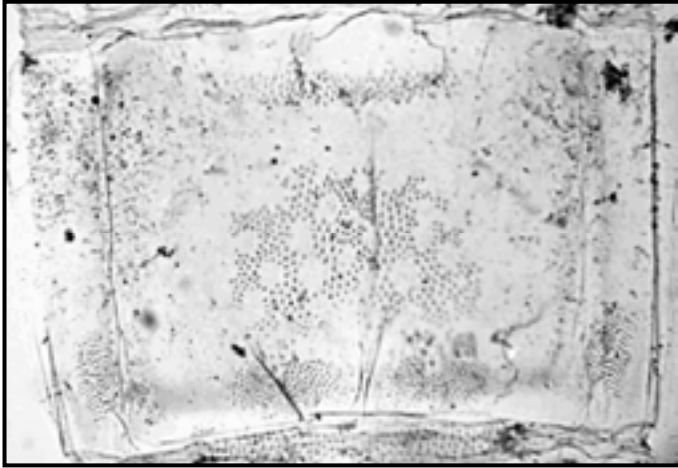


Stenochironomus sp. 3

Reference:

Distinguishing Characters: Tergite II with posterior hook row extended laterally to near the edge of the segment and not medially divided. Tergites II-V with large, anterior spine rows and small shagreen spines medially. Sternites II-III with bilobed "M" pattern of shagreen that also is sometimes present on other segments (Fig. 117). Anal comb with approximately two pointed spines medially, and approximately four or more rounded and broad spines laterally.

Figure 117. Tergite II of *Stenochironomus* sp. 3.



Stictochironomus sp.

Reference: Wiederholm 1986

Distinguishing Characters: Segments II and IV with pedes spurii B and pedes spurii A, respectively. Tergites II-V possessing a conspicuous spine row anteriorly and a large, medial, shagreen patch that is separated from the anterior spine row; posterior spine row absent (Fig. 118). Frontal setae, anal comb, cephalic tubercles, and highly branched respiratory organ all well developed

Notes: No specimens of this genus were slide mounted. They were all identified with a dissecting microscope.

Figure 118. Abdominal tergite IV of *Stictochironomus* sp.

Zavreliella sp.

Reference: Wiederholm 1986

Distinguishing Characters: Tergites II through V and sometimes VI with one pair of conspicuous, longitudinal, spine patches. Conjunctives between segments bare. Segment II with posterior hook row not interrupted medially. Segment VI with three taeniate L setae. Respiratory organ with 4 well-developed branches (Fig. 62).

Notes: No specimens of this genus were slide mounted. They were all identified with a dissecting microscope.

Key to the Genera of Pseudochironomini Pupae Collected in Hardwood Creek:

1. Sternite I with two pairs of tubercles, very often containing spines. Respiratory organ consisting of only two plump branches, both of which are rounded apically. No marginal fringe of setae on anal lobes (Figs. 119-120). ----- **Pseudochironomus (p.)**

1'. Sternite I usually without tubercles containing spines. Respiratory organ with or without branches. If branched, the respiratory organ is not plump and can have one to >100 branches, spines, and/or setae. Anal lobes usually with relatively, well-developed, marginal fringe (Figs. 63-64, 70-73, 76, 79, 85, 121, 123, 129). ----- **Tanytarsini (p.) or Chironomini (p.)**

Pseudochironomini Figures:

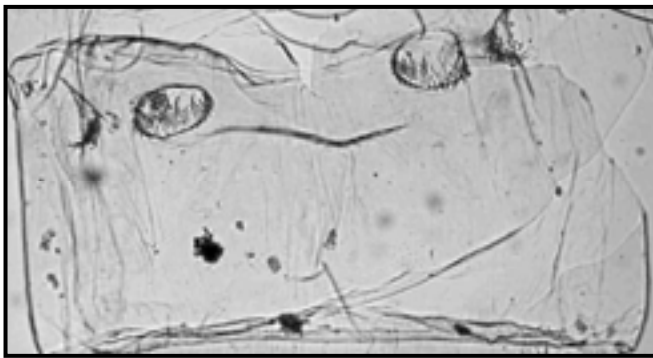


Figure 119. Segment I of *Pseudochironomus richardsoni*.

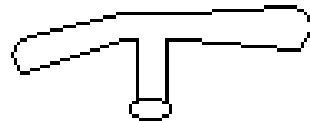


Figure 120. Respiratory organ of *Pseudochironomus* sp.

Pseudochironomini Taxa Descriptions:

Pseudochironomus richardsoni

Reference: Sæther 1977

Distinguishing Characters: Taeniate L setae on segments V through VIII numbering: 3, 4, 4, 5, respectively. Each anal lobe with approximately 15 fringe setae. Exuvia dark yellow to gold in color. Anal comb composed of three to seven spines

Notes: There were two characters that did not quite fit the description by Sæther (1977). First, there are approximately 30-35 setae in the anal lobe fringe of the specimens. Second, sternite I had both pairs of tubercles covered in spines (Fig. 119).

Key to the Genera of Tanytarsini Pupae Collected in Hardwood Creek:

1. Segment IV with pedes spurii A; segment VIII with a caudolateral spur (Figs. 121-122). ----- **2**
- 1'. Segment IV without pedes spurii A; segment VIII with a caudolateral comb (Fig. 123). ----- **4**
2. Tergites II-IV or II-VI will one anterior pair of well-developed, round, spine patches (Fig. 124). -----
----- ***Rheotanytarsus* sp. (p.)**
- 2'. Tergites without round spine patches, only with shagreen (Fig. 125). ----- **3**
3. Shagreen coverage on tergite II conspicuously less than on tergite III. ----- ***Stempellinella* sp. (p.)**
- 3'. Shagreen coverage on tergite II approximately equal to tergite III (Fig. 125). ----- ***Zavrelia* sp. (p.)**
4. Tergite IV with a single anteromedial patch of well-developed spines, longitudinal spine patch present or absent on tergite IV (Fig. 126). ----- ***Paratanytarsus* sp. (p.)**
- 4'. Tergite IV with one pair of anteriomedial patches containing of well-developed spines. Longitudinal spine patches present or absent on tergite IV (Figs. 127-128, 130). ----- **5**
5. Tergite III with one posterior pair of spine patches that curve and extend to the posterior half of the tergite. Tergites IV-V possessing paired, anterior, spine patches that are horizontally elongated. Respiratory organ with conspicuous fringe of long setae (Fig. 127). ----- ***Micropsectra* sp. (p.)**
- 5'. Tergite II and/or III each with one anterior pair of spine patches. Respiratory organ with or without conspicuously long setae, however, the organ is often bare or has spines (Figs. 128-130). ----- **6**
6. Tergites II through VI each with one pair of small, anterior, spine patches that are anteriorly to posteriorly elongated, especially on posterior tergites. Segment VIII possessing five L setae. Respiratory organ often short and/or bulbous and with long setae (Figs. 128-129). -----
----- ***Cladotanytarsus* sp. (p.)**
- 6'. Tergites III through IV each with one pair of small, anterior, spine patches that are usually anteriorly to posteriorly elongated, or one pair of large longitudinal spine patches may be present on at least one of these tergites. Tergite II usually possessing shagreen patches that are pigmented. Segment VIII possessing four or five L setae (Fig. 130). ----- ***Tanytarsus* sp. (p.)**

Tanytarsini Figures:

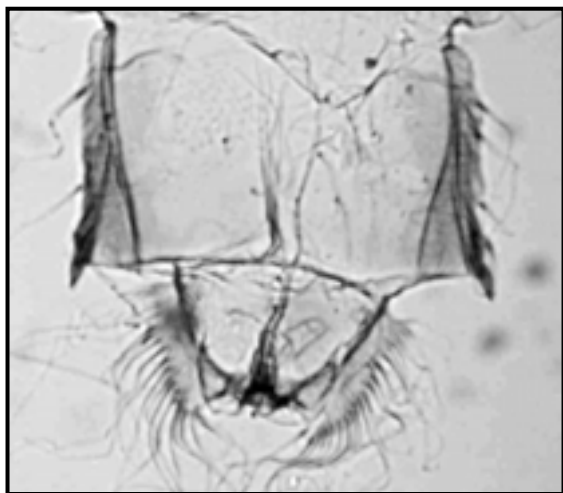


Figure 121. Segment VIII and anal lobe of *Zavrelia* sp.



Figure 122. Segment IV of some Tanytarsini.



Figure 123. Anal comb and anal lobe of *Tanytarsus confusus*.



Figure 124. Tergite III of *Rheotanytarsus distinctissimus*.



Figure 125. Tergites II and III of *Zavrelia* sp.

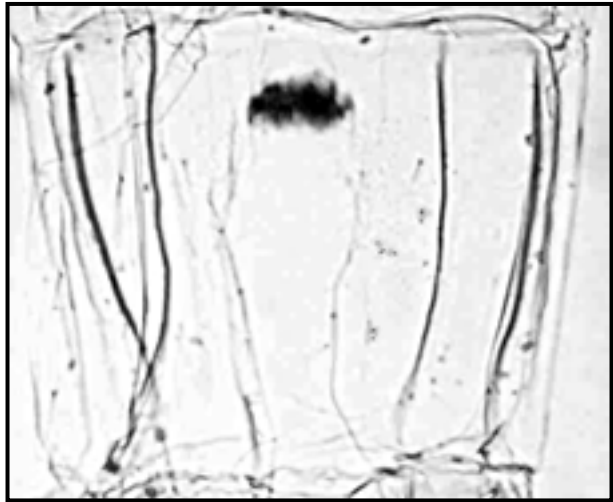


Figure 126. Tergite IV of *Paratanytarsus* sp. 2.



Figure 127. Tergites III, IV and part of V of *Micropsectra nigripila*.

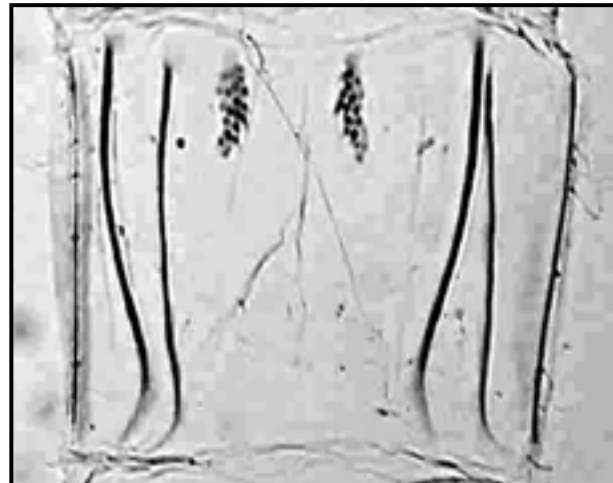


Figure 128. Tergite V of *Cladotanytarsus* sp. 1.



Figure 129. Respiratory organ of *Cladotanytarsus* sp.



Figure 130. Tergites III through V and part of tergite VI of *Tanytarsus confusus*.

Tanytarsini Taxa:

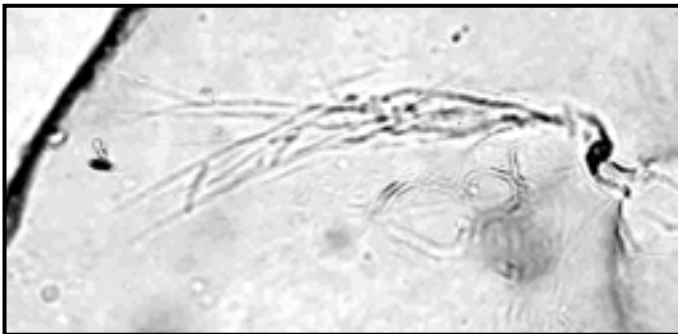


Cladotanytarsus sp. 1

Reference:

Distinguishing Characters: Paired spine patches on segments II-VI going from round to more elongated from anterior to posterior segments (Figs. 128, 131). Respiratory organ on a pedicle, well developed, and relatively large compared to other *Cladotanytarsus* sp. with fringe throughout the tapered length of the organ. Cephalic tubercles short, finger-like projections, frontal setae present. Spinules not present on the frontal apotome. Relatively-large spines near the edysial suture, abdomen and cephalothorax with pigmentation. Anal comb well developed and variable. Each anal lobe with fringe.

Figure 131. Tergites II-V of *Cladotanytarsus* sp. 1.



Cladotanytarsus sp. 2

Reference:

Distinguishing Characters: Respiratory organ small and bulbous, with long setae present apically (Fig. 132). Cephalic tubercles finger-shaped, long and with frontal setae. No spinules/shagreen on frontal apotome; spines present near ecdysial suture.

Figure 132. Respiratory organ of *Cladotanytarsus* sp. 2.

Micropsectra nigripila

Reference: Oliver and Dillon 1994

Distinguishing Characters: Paired spine patches on tergites III-V. Respiratory organ relatively long but with shorter setae. Four taeniate L setae on segment VIII (Fig. 127).

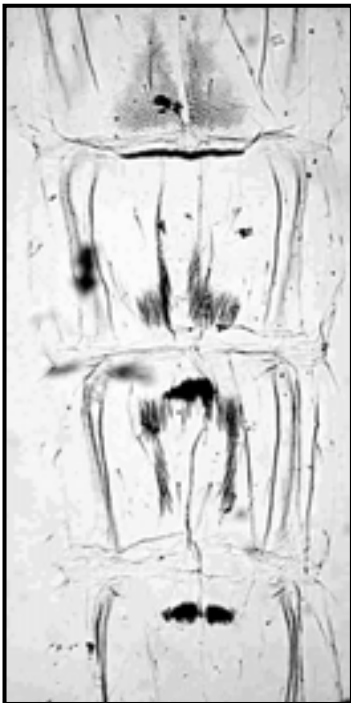


Micropsectra polita

References: Webb 1981, and Oliver & Dillon 1994

Distinguishing Characters: Paired longitudinal spine patches on tergites III-V (Fig. 133). Tergites IV-V with horizontally elongated spine patches, with longitudinal patch on V shorter than IV. Respiratory organ relatively short, but with long setae. Five taeniate L setae on segment VIII.

Figure 133. Tergites III and IV and part of tergites II and V of *Micropsectra polita*.

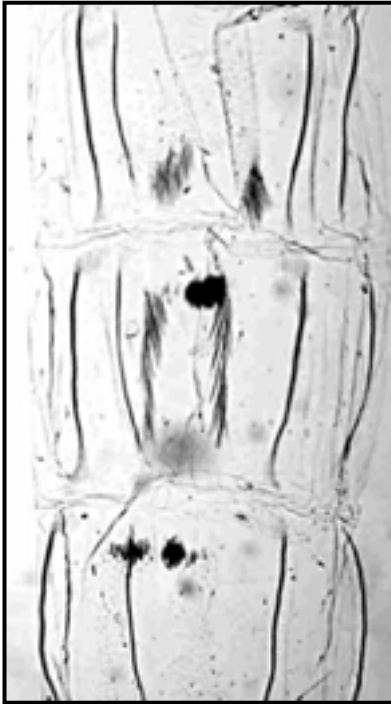


Paratanytarsus inopertus gr. sp. 1

Distinguishing Characters: Tergite II with two pigmented, triangle-shaped areas of continuous shagreen. Tergite III with long spinules in posterior half of segment. Tergite IV with an anteriomedial spine patch usually connected with long spinules to lateral spine patches. Tergite V with two, anteriomedial spine patches; tergite VI usually lacking spine patches (Fig. 134). Frontal setae well-developed and flattened. Cephalic tubercles present as small bumps. Prealar tubercle not well developed or absent. Dorsocentral seta 1 taeniate and strong, but not as strong as setae 2 through 4.

Notes: Species 1 is differentiated by dorsocentral seta 1 (which consists of a strong and long taeniate seta) and the degree of spinulation on tergite IV. Although this varies, if any long spinules are present then exuviae should be classified as species 1. Some specimens examined had weak anteriomedial spine patches on tergite VI.

Figure 134. Tergites III and IV and part of tergites II and V of *Paratanytarsus inopertus* gr. sp. 1.



Paratanytarsus inopertus gr. sp. 3

Distinguishing Characters: Spine patches on tergites IV-V a bit weaker than those present in species 1 (Fig. 135). Dorsocentral seta 1 much smaller than setae 2 through 4, and much smaller than dorsocentral seta 1 present in *P. inopertus* gr. sp. 1. Prealar tubercle absent.

Figure 135. Tergites III through V of *Paratanytarsus inopertus* gr. sp. 3.



Paratanytarsus inopertus gr. sp. 4

Distinguishing Characters: Tergite III with long spines; IV with anterior spine patch with short spines and paired lateral spine patches with elongate spines. Tergite V with paired, anterior, spine patches of short spines and two lateral patches with elongate spines; VI with paired spine patches that are weak (Fig. 136).

Notes: This species has only been collected in Hardwood Creek.

Figure 136. Tergites III through VI of *Paratanytarsus inopertus* gr. sp. 4.

Paratanytarsus (cf. *laccophilus*)

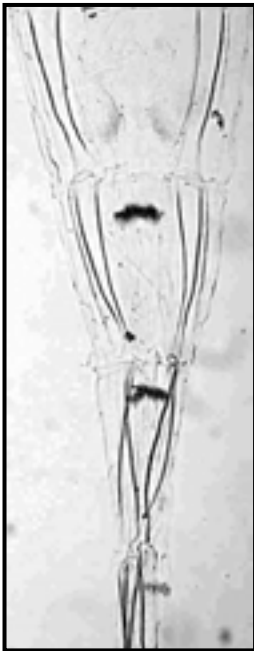
Distinguishing Characters: Tergite IV with “U” shaped spine patch that bends very gradually, V with 1 pair of horizontally elongated spine patches. No spine patch(es) on tergite VI, respiratory organ very small. Dorsocentral seta 2 with setal socket that is larger in diameter and darkened with pigment around its circumference. Each anal lobe with fringe of approximately 14 flattened and well-developed setae (Figs. 137-138).



Figure 137. Tergites II through V of *Paratanytarsus* (cf. *laccophilus*).



Figure 138. Setal sockets of dorsocentral setae 1-4 of *Paratanytarsus* (cf. *laccophilus*).



Paratanytarsus laccophilus gr. sp. 1

Reference:

Distinguishing Characters: Tergite III with shagreen more conspicuously developed posteriorly; IV with 1 patch that looks like 2 patches merging together because of medial indentation in the spine patch. Tergite V approximately the same as IV; VI with a poorly-developed spine patch (Fig. 139). Dorsocentral setae 2 through 4 very long and well developed; Seta 1 shorter and less well developed. Setae 1 and 2 originating close together, but far from 3 and 4, which also originate close together. Frontal setae present on poorly-developed cephalic tubercles. Prealar tubercle poorly developed, anal comb with approximately four marginal spines. Anal lobes with fringe of well-developed setae

Notes: In Minnesota this species has only been collected in Hardwood Creek.

Figure 139. Tergites III through V and part of VI of *Paratanytarsus laccophilus* gr. sp. 1.



Paratanytarsus sp.

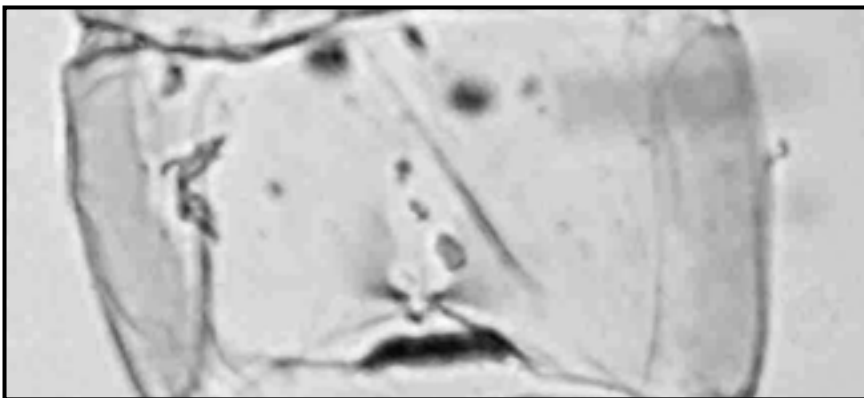
Reference:

Distinguishing Characters: Tergite III with shagreen and lacking elongated spines; Tergites IV through VI with one anteromedial spine patch that decreases in size from anterior to posterior segments. Frontal setae present but not flattened. Anal comb with approximately 5-7 sharp spines.

Anal lobes with fringe of approximately 45 setae (Figs. 126, 140).

Notes: This species keys to *P. austriacus* gr. in Wiederholm (1986).

Figure 140. Tergites IV through VI of *Paratanytarsus* sp. 2.



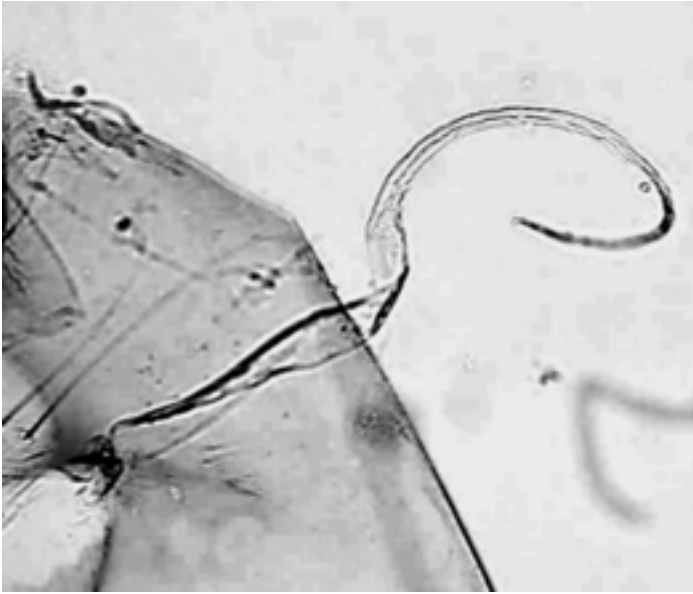
Reotanytarsus distinctissimus

Reference: Lehmann 1970

Distinguishing Characters:

Tergite II with a distinct pair of medially directed points just anterior of the hook row, frontal apotome bumpy (Figs. 124, 141).

Figure 141. Tergite II of *Reotanytarsus distinctissimus*.



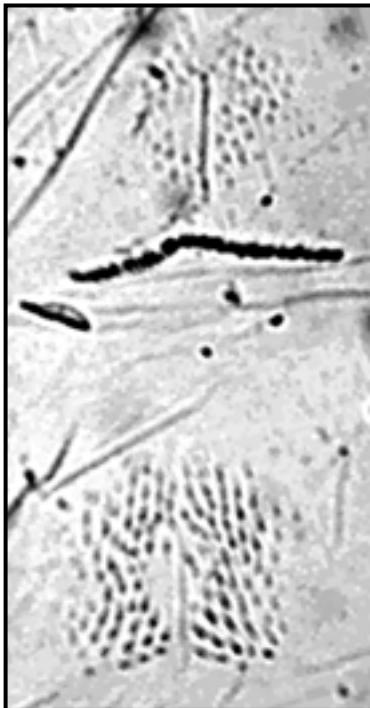
Rheotanytarsus sp. 1

Reference

Distinguishing Characters: Respiratory organ long and with small but conspicuous spines in apical half (Fig. 142). Tergite II with small shagreen/spine patch anterior of the hook row. Round spine patches on tergites II through VI decreasing in size.

Notes: Spine patches on tergite VI can be very weak to absent.

Figure 142. Respiratory organ of *Rheotanytarsus* sp. 1.



Stempellinella sp.

Reference: Wiederholm 1986

Distinguishing Characters: Tergite II with posterior-pair of shagreen patches, shagreen density on tergite II obviously not equal to that found on III (Fig. 143). Each anal lobe with fringe of approximately 14-30 setae.

Notes: All specimens of this genus were identified with a dissecting microscope. The best way to distinguish this species from *Zavrelia* sp. is the shagreen density on tergites II and III. Specimens of *Zavrelia* sp. have approximately equal density of shagreen on both segments.

Figure 143. Shagreen on tergites II and III of *Stempellinella* sp.

Tanytarsus confusus

References: Ekrem *et al.* 2003

Distinguishing Characters: Tergite III with one pair of conspicuous, longitudinal, spine bands that reach almost to the anterior edge of the tergite and originate progressively more laterally in the posterior part of the tergite. Tergite IV with one pair of conspicuous, longitudinal, spine bands that are approximately "C" shaped. Tergites V and VI with one pair of round, anterior, spine patches with patches on VI being smaller. Tergites III through VI with middle L seta the strongest. Respiratory organ long and slender, on a tubercle, and with many small spinules scattered throughout the organ. Prealar tubercle large and bulbous. Dorsocentral setae originating in two pairs with dorsocentral 4 strong and very long. Pedicel sheath tubercle small. Precorneal setae in a triangular pattern with seta 1 smaller than seta 2. Cephalic tubercle small and broad. Anal comb with approximately 10 marginal spines. Each anal lobe with fringe of approximately 50 setae and with shagreen (Figs. 123, 130).



Tanytarsus lobiger

References: Ekrem *et al.* 2003

Distinguishing Characters: Tergite II with "Π" shaped shagreen patch. Tergites III and IV each with one pair of diagonal bands of long spines that are posteriorly directed. Tergites V and VI with one pair of circular spine patches that have spines that are elongated a little more than other *Tanytarsus* sp. (Fig. 144). No taeniate, L setae on tergite III through V; VII with 2-3 taeniate L setae; VIII with five taeniate L setae. Respiratory organ small and slender and on a pedicle, with small spines scattered throughout. Prealar tubercle low or absent. Dorsocentral setae in two pairs. Pedicel sheath tubercle well-developed. Precorneal setae in a triangular pattern with anterior seta longer than others. Cephalic tubercles present as low mounds. Anal comb with approximately five marginal teeth.

Figure 144. Tergites II through VI of *Tanytarsus lobiger*.



Figure 145. Tergites III through V and part of VI of *Tanytarsus neoflavellus*.

Tanytarsus neoflavellus

References: Ekrem *et al.* 2003

Distinguishing Characters: Tergite II with one pair of large shagreen patches.

Tergite III with one pair of conspicuous longitudinal spine bands that originate more laterally in the posterior part of the tergite. Tergite IV with one pair of conspicuous, longitudinal, spine bands that are approximately shaped like question marks. Tergites V and VI with spinules in oval, paired patches (Fig. 145); VIII with a transverse stripe (Fig. 146). Respiratory organ long and skinny, with setae that can be difficult to see. Prealar tubercle well-developed. Dorsocentral seta 4 more robust than others, pedicel sheath tubercle weak. Cephalic tubercles low and conical. Anal comb with approximately 6 marginal spines. Each anal lobe with fringe of approximately 10-14 setae.

Notes: The transverse stripe on segment VIII, well-developed prealar tubercle, and anal lobe fringe with approximately 10-14 setae are very good characters for identifying this species. There were several specimens in which the transverse stripe was not quite complete and in at least one of these specimens the pedicel sheath tubercle was strong.



Figure 146. Tergite VIII of *Tanytarsus neoflavellus*.



Tanytarsus sepp

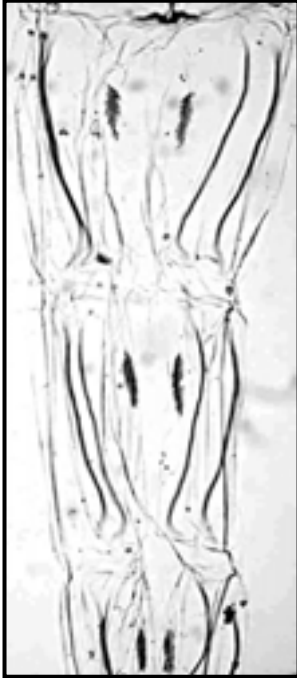
References: Ekrem *et al.* 2003

Distinguishing Characters: Tergite II with one pair of large shagreen patches.

Tergite III with one pair of conspicuous, longitudinal, spine bands that originate more laterally in the posterior part of the tergite. Tergite IV with one pair of conspicuous, longitudinal, spine bands that are approximately "C" shaped. Tergite V and VI with one pair of circular spine patches (Fig. 147). Taeniate L setae on segments V through VIII numbering: 1, 1, 3, 5 respectively. Respiratory organ long and possessing spines. Prealar tubercle small. Dorsocentral setae originating in two pairs, with the anterior pair the longest. Precorneal setae in a triangular pattern with seta 1 the largest. Cephalic tubercles small. Anal comb with 5-6 marginal spines. Each anal lobe with fringe of more than 35 setae. Ecdysial suture region with irregularly-pointed or rounded warts or spines.

Notes: A key difference between species 16 and *T. sepp* is the number of taeniate L setae on each segment. Taeniate setae on segments V-VIII number 0, 0, 2, 5, respectively, in species 16.

Figure 147. Tergites II through VI of *Tanytarsus sepp*.



Tanytarsus wirthi

References: Ekrem *et al.* 2003

Distinguishing Characters: Tergite II with one pair of anterior and one pair of posterior triangular patches. Posterior patches darker and becoming more broad posteriorly. Tergites III through VI with one pair of elongate, oval, spinule patches, decreasing in size anteriorly to posteriorly with patches on tergite IV possibly larger than those on III (Fig. 148). Taeniate L setae on segments VI through VIII numbering 1, 2-3, 5 respectively. Respiratory organ long, middle half of organ with spines longer than horn's width at this point. Prealar tubercle low. Dorsocentral setae originating in two pairs, with seta 4 most robust. Pedicel sheath tubercle pointed and well-developed. Precorneal setae in an approximately triangle pattern, with the most anterior seta being the strongest. Anal comb with approximately 5-6 marginal spines.

Figure 148. Tergites III, IV and part of V of *Tanytarsus wirthi*.



Tanytarsus sp. 1 (cf. *gregaris*)

References:

Distinguishing Characters: Tergite II shagreen with approximately "Π" shaped patch with brown pigment on the posterior part of the segment. Tergites III and IV each with one pair of conspicuous, longitudinal, spine bands containing long spines; IV with origins spine bands wider anteriorly and possessing longer spines posteriorly. Tergites V and VI with one pair of anterior oval spine patches possessing short spines (Fig. 149). Tergite VIII with five taeniate L setae and shagreen. Anal lobe shagreen more pronounced than shagreen on VIII. Respiratory organ on round pedestal, long, and without setae. Prealar tubercle large and well-developed. Dorsocentral setae in two widely separated pairs with seta 2 and 4 stronger than others. Pedicel sheath tubercle moderately-developed. Precorneal setae in triangular pattern, with seta 1 large and thick. Cephalic tubercles present. Anal comb with approximately 8-12 spines. Each anal lobe with dense fringe of setae.

Figure 149. Tergites III through V and parts of II and VI of *Tanytarsus* sp. 1 (cf. *gregaris*).



Tanytarsus sp. 10

References:

Distinguishing Characters: Tergite II with well-developed shagreen patch containing a clear section in the lower middle part of the tergite. Tergite III with one pair of conspicuous, longitudinal, spine bands, with anterior shagreen patch near the anterior ends of bands. Tergite IV with one pair of conspicuous, longitudinal, spine bands containing larger spines in the posterior part of each band. Tergites V-VI with one pair of spine patches containing smaller spines (Fig. 150). Taeniate L setae on segments V, VI and VIII numbering 3, 3, 4, respectively. Respiratory organ without spines and on a pedicel. Prealar tubercle well-developed. Dorsocentral seta 4 the strongest. Cephalic tubercles present and appearing as low mounds. Anal comb with approximately 4-5 spines. Each anal lobe with fringe of many setae.

Figure 150. Tergites II through VI of *Tanytarsus* sp. 10.



Tanytarsus sp. 11

References:

Distinguishing Characters: Tergite II shagreen pattern composed of an anterior group of spines and two dark triangles of spines becoming broader posteriorly, with little to no connectivity between anterior and posterior spine groups. Tergite III with one pair of longitudinal, spine bands that are only slightly curved and contain moderately long spines. Tergites IV and V with one pair of anteriorly to posteriorly elongated patches containing short spines. No spine patches on tergite VI (Fig 151). Respiratory organ broad basally with 1 row of fringe-like setae. Prealar tubercle moderately developed. Dorsocentral setae in two widely separated pairs with setae 2 and 4 slightly larger. Pedicel sheath tubercle weak. Cephalic tubercles long and finger-like. Anal comb well developed.

Notes: This species is in the *Tanytarsus mendax* species group. The lack of spines on tergite VI and the basally broad respiratory organ with a single row of fringe-like setae are key characters for identifying this species.

Figure 151. Tergites III through V of *Tanytarsus* sp. 11.



Tanytarsus sp. 12

References:

Distinguishing Characters: Tergite II with one pair of large shagreen patches. Tergites III and IV with one pair of conspicuous, longitudinal, spine bands containing long spines. Tergites V and VI with one pair of circular spine patches containing small spines (Fig. 152). Respiratory organ relatively long, without setae or spines and on a pedicel. Prealar tubercle poorly-developed. Dorsocentral setae in two widely separated pairs, with seta 4 large and robust. Pedicel sheath tubercle small. Precorneal seta 1 the largest, with setae 2 and 3 close together. Cephalic tubercles poorly developed or absent. Anal comb with approximately 5 marginal spines. Each anal lobe with fringe of approximately 22 setae.

Notes: Similar to species 10, but ecdysial suture region with warts that are sometimes absent or reduced.

Figure 152. Tergites II through VI of *Tanytarsus* sp. 12.



Tanytarsus sp. 16

References:

Distinguishing Characters: Tergite II containing shagreen; III with one pair of conspicuous, longitudinal, spine bands that extend laterally in the posterior part of the tergite. Tergite IV with one pair of conspicuous, longitudinal, spine bands that are approximately "C" shaped; V and VI with one pair of circular spine patches containing small spines (Fig. 153). Taeniate L setae on segments V through VIII numbering 0, 0, 2, 5, respectively. Respiratory organ relatively long with small spines scattered over entire length of the organ. Prealar tubercle poorly-developed. Pedicel sheath tubercle moderately developed. Precorneal setae in a triangular pattern, with the anterior most seta the largest. Cephalic tubercle low to absent. Anal comb with approximately 7 marginal spines. Each anal lobe with fringe of approximately 35-40 setae. Ecdysial suture region with warts.

Notes: A key difference between species 16 and 21 is the prealar tubercle, which is well developed in species 21. A key difference between species 16 and *T. sepp* is the number of taeniate L setae on each segment. The taeniate L setae on segments V-VIII number 1, 1, 3, 5, respectively in *T. sepp*.

Figure 153. Tergites III through VI of *Tanytarsus* sp. 16.



Tanytarsus sp. 19

References:

Distinguishing Characters: Tergite II with 1 pair of strong, anterior, spine patches. Tergites III-VI with 1 pair of elongated spine patches (Fig. 154). Taeniate L setae on segments VI through VIII numbering 3, 4, 4, respectively. Respiratory organ long and without spines or setae. No prealar tubercle. Dorsocentral seta 4 well-developed when compared to other dorsocentral setae. Cephalic tubercles present as short finger-like projections. Anal comb with approximately 8 marginal spines.

Figure 154. Tergites II through IV and part of V of *Tanytarsus* sp. 19.



Tanytarsus sp. 21

References:

Distinguishing Characters: Tergite II with "()" shagreen pattern. Tergite III with one pair of conspicuous, longitudinal, spine bands that extend laterally in the posterior part of the tergite. Tergite IV with one pair of conspicuous, longitudinal, spine bands that are approximately "C" shaped; tergites V and VI with 1 pair of circular spine patches containing small spines (Fig. 155). Taeniate L setae on segments V through VIII numbering: 1, 1, 2-3, 5, respectively. Respiratory organ moderately- sized, with small scattered spines and positioned on a pedicel. Prealar tubercle quadrate and well-developed. Dorsocentral setae all equal in size, pedicel sheath tubercle moderately well-developed. Cephalic tubercles present as low mounds. Anal comb with approximately 5-10 marginal spines. Each anal lobe with fringe of approximately 50 setae.

Notes: A key difference between species 16 and 21 is the prealar tubercle, which is weak in species 16.

Figure 155. Tergites III through V and part of VI of *Tanytarsus* sp. 21.

Tanytarsus sp. 22

References:

Distinguishing Characters: Tergites II-VI with one pair of round spine patches containing small spines; spine patches relatively-weak pair on tergite II (Fig. 156). Taeniate L setae on segments V-VIII numbering 1, 1, 3, 5, respectively. Respiratory organ large, long, and ribbon-like to whip-like. Dorsocentral setae in two well-separated pairs; seta 4 strong and conspicuous; setae 1-3 much less well-developed. Cephalic tubercles absent. Anal comb well-developed. Each anal lobe with fringe of approximately 25 setae.



Figure 156. Tergites II through IV and part of V of *Tanytarsus* sp. 22.

Tanytarsus sp. 24

References:

Distinguishing Characters: Tergite II shagreen with approximately “Π” shaped patch, with brown pigment on the posterior part of the patch. Tergite III with one pair of longitudinal spine bands longer than the bands on IV. Anterior half of tergite IV spine band with small lateral spines much stronger than the small lateral spines present on III. Tergite V with one pair of circular spine patches containing small spines, VI without spine patches (Fig. 157). Segment VIII with 5 taeniate L setae. Respiratory organ broad and with a conspicuous textured area between the ecdysial suture and the base of the organ. Prealar tubercle well developed. Dorsocentral setae 1 and 3 weak, but 2 and 4 robust. Pedicel sheath tubercle well-developed. Cephalic tubercles well-developed, long and tubular. Anal comb with approximately 5 marginal spines.

Notes: Two key characters for identifying this species are the lack of spine patches on tergite VI and the textured patch near the ecdysial suture. However, other *Tanytarsus* sp. also have a textured patch.



Figure 157. Tergites III through IV and part II and V of *Tanytarsus* sp. 24.

Zavrelia sp.

Reference: Wiederholm 1986

Distinguishing Characters: Tergites II through VI with dense shagreen; shagreen density on TII approximately equal to density of shagreen on TIII. Each anal lobe with fringe of approximately 17-20 setae (Figs. 121, 125).

Notes: Only one specimen slide mounted. Morphospecies for this genus have not been designated. Presently, the only know way to distinguish this species from *Stempellinella* sp. is the shagreen density on tergites II and III. *Stempellinella* sp. has an unequal density of shagreen on TII when compaired to TIII.

Key to the Pupae of Genera of Tanypodinae Collected in Hardwood Creek

1. Anal lobe with conspicuous spines on outer margins. In male exuviae the genital sacs do not extend beyond the basal half of the length of the anal lobe. Anal lobes possessing rounded inner and/or outer margins, with the lobes touching or approximately touching medially and resembling a "paddle" (Fig. 158). ----- ***Procladius* sp. (p.)**
- 1'. Anal lobe with or without spines on outer margins. Genital sacs of male exuviae often extend beyond half the length of the lobe. Anal lobes smaller, or pointed apically, and not resembling a "paddle" (Figs. 159, 163, 165-166, 170-171). ----- **2**
2. Anal lobe less than two times long as broad; no medial scar on tergite I (Fig. 159). ----- ***Tanypus* sp. (p.)**
- 2'. Anal lobe approximately equal to, or conspicuously greater than two times long as broad; medial scar present or absent on tergite I (Figs. 160, 163, 165-166, 170-171). ----- **3**
3. All abdominal segments except segment VIII with one small and one large lateral seta situated close together (Fig. 161). ----- ***Natarsia* sp. (p.)**
3. Lateral setae not paired and not situated together. ----- **4**
4. Lumen of the respiratory organ large and approximately filling the entire organ. Respiratory organ usually large and sometimes very wide. Plastron plate conspicuously reduced. Thoracic comb always present (Figs. 162, 167). ----- **5**
- 4'. Lumen not entirely filling the respiratory organ. Respiratory organ usually smaller and tube, trumpet, or club shaped. Plastron plate usually conspicuous. Thoracic comb present or absent (Figs. 167-168, 172-174). ----- **7**

5. Segment VIII with posterolateral corners posteriorly elongated. Conspicuous cone-shaped or thorn-shaped basal lobe. Postnotal tubercle present (Figs. 163-164). ----- ***Guttipelopia* sp. (p.)**
- 5'. Segment VIII without elongated corners. Poorly developed or rounded basal lobe. No postnotal tubercle (Figs. 162, 167). ----- **6**
6. Anal lobe less than three times as long as broad. Respiratory organ with a relatively conspicuous reticulate pattern, lumen nearly 100% filling the organ. Basal lobe poorly developed (Figs. 162, 165). -
----- ***Ablabesmyia* sp. (p.)**
- 6'. Anal lobe more than three times long as broad. Respiratory organ without or with only a faint reticulate pattern. Lumen not 100% filling the organ. Basal lobe conspicuous and well-developed (Figs. 166-167). ----- ***Labrundinia* sp. (p.)**
7. Tergites with shagreen spinules with two or more branches. Respiratory organ with a large plastron plate that is as wide or wider than the maximum width of the organ (Figs. 168-169). -----
----- ***Conchapelopia* sp. (p.)**
- 7'. Tergites with shagreen spinules that do not branch, or shagreen small and appearing absent. Respiratory organ and plastron plate variable. ----- **8**
8. Anal lobes weakly sclerotized, tapered and bent so the apex of each lobe points medially. Abdominal segment VII with one taeniate L seta. Tergites with one or more posterior rows of spines or tubercles. Male exuviae with conspicuously long and tapering genital sacs (Fig. 170). -----
----- ***Nilotanytus* sp. (p.)**
- 8'. Anal lobe with apex more strongly sclerotized and not pointed medially. Abdominal segment VII with more than one taeniate L seta. Tergites without posterior rows of spines or tubercles. Male exuviae with variable genital sacs (Figs. 163, 165-166, 171). ----- **9**
9. Small spines present on outer and inner margins of anal lobes (Fig. 171). -----
----- ***Zavreliomyia* sp. (p.)**
- 9'. Small spines present at most on outer margins of anal lobes, always absent on inner margins.---**10**
10. Respiratory organ with horn sac smooth along inner edge. Tergites with single, small, shagreen spinules not arranged in arched rows (Fig. 173). ----- ***Paramerina* sp. (p.)**
- 11'. Respiratory organ with lobed areas of horn sac, usually appearing very strongly convoluted. Tergites possessing shagreen spinules arranged in arched rows (Figs. 174-175). ----- ***Larsia* sp. (p.)**

Tanypodinae Figures

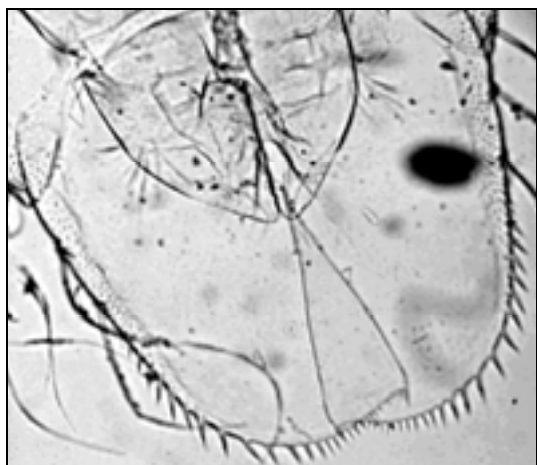


Figure 158. Anal lobe of *Procladius sublettei/denticulatus*.

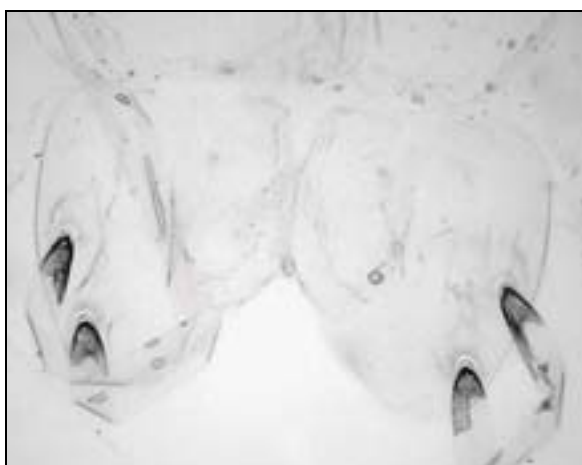


Figure 159. Anal lobe of *Tanypus* sp.

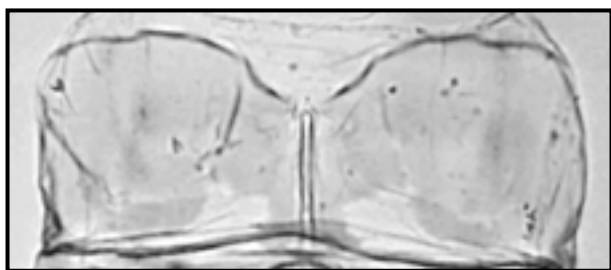


Figure 160. Tergite I of *Ablabesmyia mallochi*.



Figure 161. Lateral setae on abdominal segment I of *Natarsia* sp.



Figure 162. Respiratory organ, basal lobe, and thoracic comb of *Ablabesmyia mallochi*.

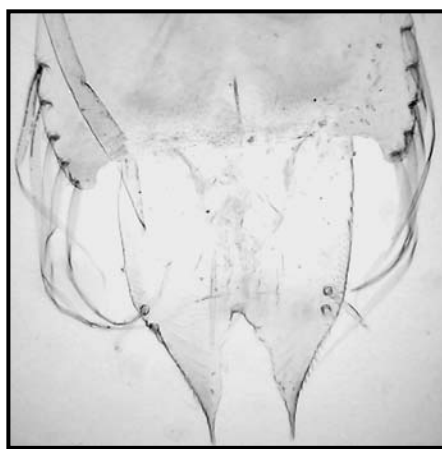


Figure 163. Anal lobe and part of segment VIII of *Guttipelopia* sp.

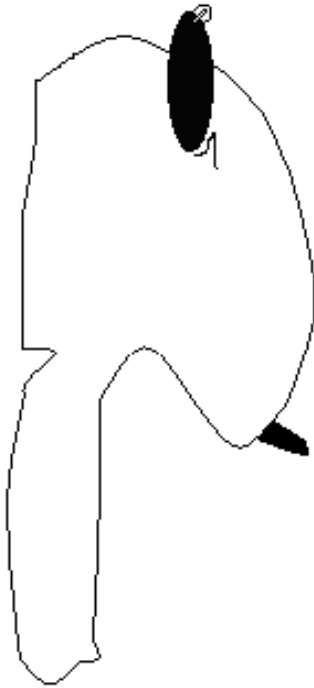


Figure 164. Basal lobe, postnotal tubercle, and respiratory organ of *Guttipelopia* sp.

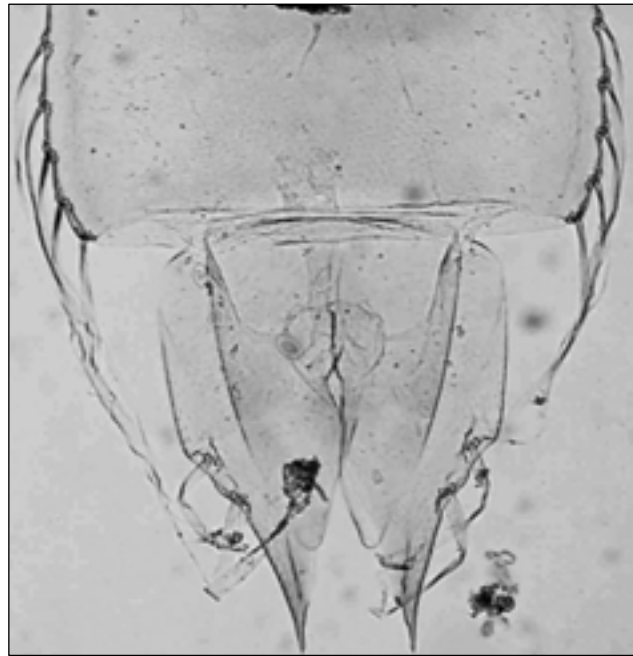


Figure 165. Anal lobe and part of segment VIII of *Ablabesmyia monilis*.

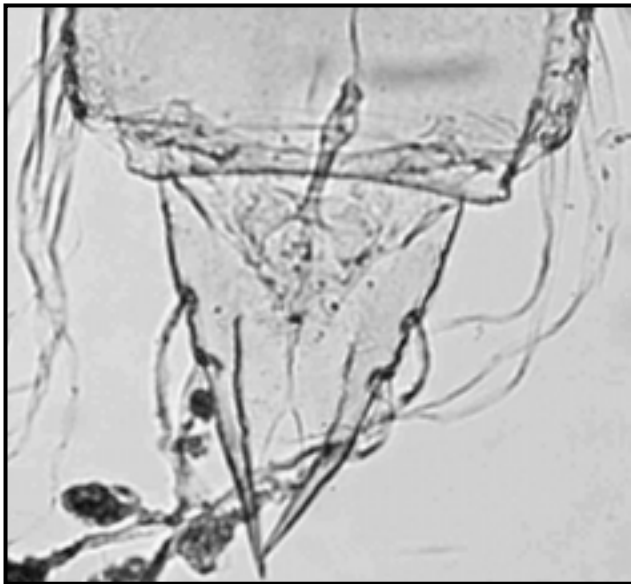


Figure 166. Anal lobe and part of segment VIII of *Labrundinia pilosella*.



Figure 167. Respiratory organ, basal lobe, and thoracic comb of *Labrundinia pilosella*.

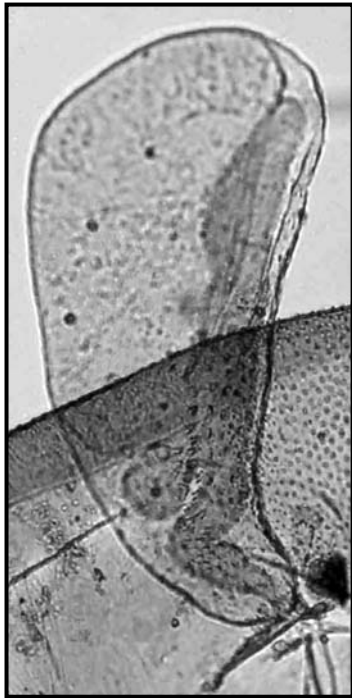


Figure 168. Respiratory organ of *Conchapelopia rurika*.

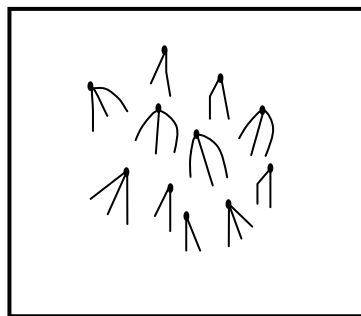


Figure 169. Shagreen spinules of *Conchapelopia* sp.



Figure 170. Anal lobe of *Nilotanypus fimbriatus*.

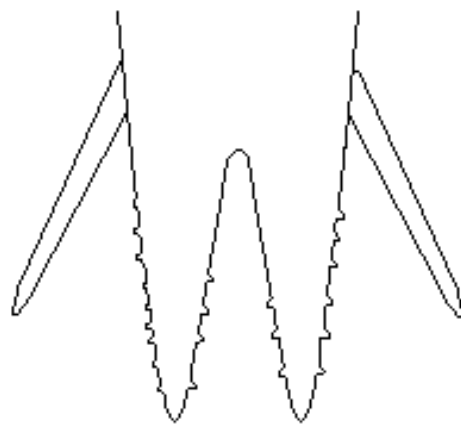


Figure 171. Anal lobe of *Zavreliomyia* sp.

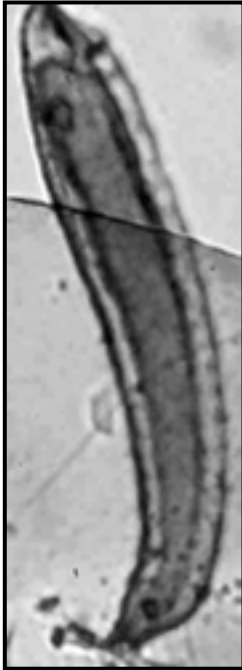


Figure 172. Respiratory organ of *Zavreliomyia* sp.



Figure 173. Respiratory organ of *Paramerina* sp.



Figure 174. Respiratory organ of *Larsia* sp.



Figure 175. Shagreen spinules of *Larsia* sp.

Tanypodinae Descriptions



Ablabesmyia mallochi

Reference: Roback 1985

Distinguishing Characters: Extensive brown pigment in wing pads, veins usually discernable but not distinct because of spots merging with margins of veins. Mesal area of tergite IV with three white mesal spots, however this is a variable and hard to see character in some specimens (Figs. 160, 162, 176).

Figure 176. Wing pad of *Ablabesmyia mallochi*.

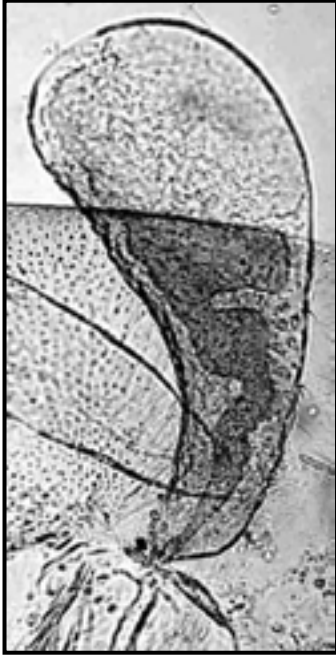


Ablabesmyia monilis

Reference: Roback 1985

Distinguishing Characters: Wing pad with brown veins that are strong and distinct, connecting distally to the brown margin of the wing pad (Fig. 177). Tergite IV without pigmentation on lateral borders and not giving an appearance of having white spots on tergite. Base of M vein in wing pad with base usually absent. Nipple of respiratory organ short, not elongated. Aeropyle tube club-shaped at apex. Anal lobes shown in Fig. 165.

Figure 177. Wing pad of *Ablabesmyia monilis*.



Conchapelopia dusena

Reference: Roback 1981

Distinguishing Characters: Corona present on respiratory organ; length of plastron plate less than half the total length of the organ (Fig. 178).

Taeniate L setae present on segments VII and VIII.

Figure 178. Respiratory organ and basal lobe of *Conchapelopia dusena*.

Conchapelopia rurika

Reference: Roback 1981

Distinguishing Characters: Corona present on respiratory organ; length of plastron plate greater than half the total length of the organ (Fig. 168). Taeniate L setae present on segments V through VIII. Tips of anal lobes hooked.

Guttipelopia sp.

Reference: Wiederholm 1986

Distinguishing Characters: Respiratory organ large and wide, and in some specimens approximately two times longer than wide, with a conspicuous cone-shaped or thorn-shaped basal lobe. Scar present on tergite I; tergite VIII with posterolateral corners posteriorly elongated (Fig. 163). Postnotal tubercle present (Fig. 164).

Notes: No specimens of this genus were slide mounted. All were identified with a dissecting microscope.

Labrundinia pilosella

Reference: Roback 1987

Distinguishing Characters: Anal lobes long (Fig. 166). Respiratory organ with very distinct preapical groove; organ approximately club shaped. Aeropyle tube in the preapical groove, not extending along the outer margin of the horn sac. Atrium of respiratory organ not "s" shaped (Fig. 167).

Larsia sp.

Reference: Wiederholm 1986

Distinguishing Characters: Horn sac with many lobes and appearing highly convoluted. Inner margin of anal lobe without teeth (Fig. 174). Shagreen not in arched rows (Fig. 175).

Notes: Only one specimen slide mounted. No morphospecies have been defined for this genus.



Natarsia sp.

Reference: Wiederholm 1986

Distinguishing Characters: Scar present on tergite I (Fig. 161). Respiratory organ greater than three times as long as wide and with the apical end swollen to accommodate the plastron plate; organ originating on or near a tubercle; no thoracic comb (Fig 179).

Notes: No specimens of this genus were slide mounted. All were identified with a dissecting microscope.

Figure 179. Respiratory organ and tubercle of *Natarsia* sp.

Nilotanypus fimbriatus

Reference: Roback 1986

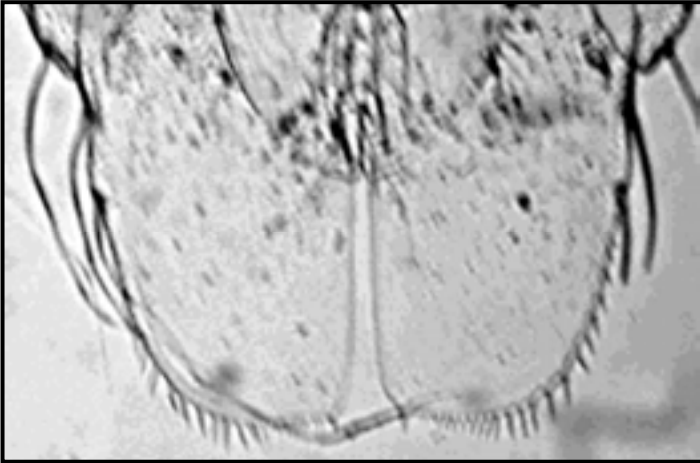
Distinguishing Characters: No spines at tip of respiratory organ. Tergites I through VIII clear to dark grey in color, with mesal and lateral infuscation. Tips of anal lobes lightly sclerotized and bent medially (Fig. 170).

Notes: This species and *N. americana* are similar, however the known distribution of *N. americana* is the southeastern United States. It clearly differs from *Nilotanypus kansensis*.

Paramerina sp.

Distinguishing Characters: Tergites II through V and sometimes VI with two pairs of lightened, circular areas lateral of the midline of each tergite; near the center of each circle there is at least one conspicuous d-seta or setal scar. The base of each antennal sheath has a very long and well-developed seta. The plastron plate of the respiratory organ is small (Fig. 173).

Notes: All specimens collected in this study appear to be the same species. At present no morphospecies have been defined for this genus.

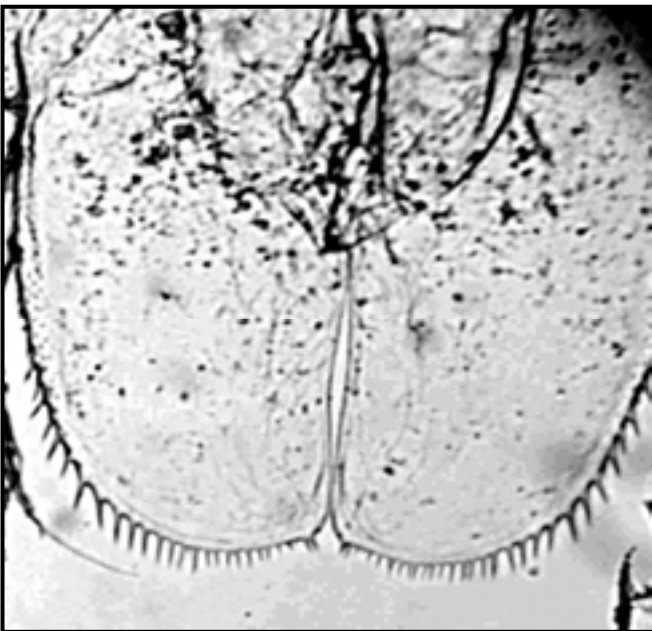


Procladius bellus

Reference: Roback 1980

Distinguishing Characters: Anal lobe with inner corner that is usually rounded, exuviae clear (Fig. 180).

Figure 180. Anal lobe of *Procladius bellus*.



Procladius freemani

Reference: Roback 1980

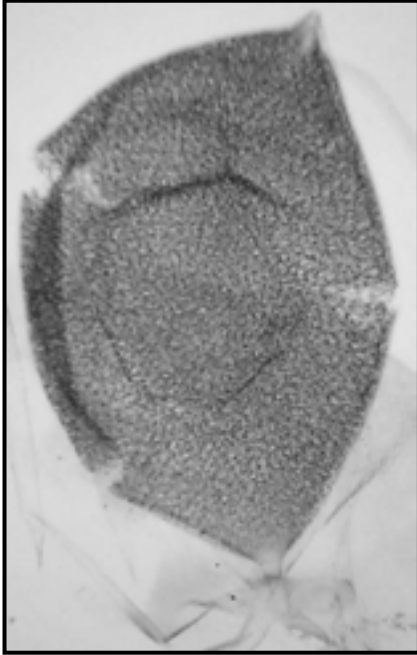
Distinguishing Characters: Atrium of respiratory organ occupying much, but not the entire horn sac; organ with spines that are denser when compared to *P. sublettei/denticulatus*. Anal lobe concave toward inner apex, spines on each lobe broad and close together (Fig. 181). Abdomen with pigmentation, not clear.

Figure 181. Anal lobe of *Procladius freemani*.

Procladius sublettei/denticulatus

Reference: Roback 1980

Distinguishing Characters: Respiratory organ with triangular spines that are relatively well-spaced, neck of organ visible. Atrium of respiratory organ occupying most of the horn sac. Anal lobe straight toward inner apex, spines on lobes widely spaced (Fig. 158). Abdomen with pigmentation, not clear.



Tanypus sp.

Reference: Wiederholm 1986

Distinguishing Characters: Anal lobe reduced in size. Respiratory organ not symmetrical and with very small plastron plate at the tip of nipple-like extension; horn sac filling 100% of the lumen and possessing a reticulated pattern (Fig. 182). Abdominal segments VII-VIII with posterolateral corners posteriorly elongated (Fig. 159).

Notes: Only one specimen slide mounted. Morphospecies have not been defined for this genus. There is much variation in the characters representative of this genus.

Figure 182. Slightly damaged respiratory organ of *Tanypus* sp.

Zavreliomyia sp.

Reference: Wiederholm 1986

Distinguishing Characters: Small spines always present on outer and inner margins of anal lobes (Fig. 171). Respiratory organ elongated, usually 3 to 6 times longer than wide, basal lobe well developed (Fig. 172). Taeniate L setae on segments VII and VIII numbering 4 and 5, respectively.

Notes: All three specimens that were mounted appeared to be the same species. Morphospecies have not been defined for this genus.

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