

TRICHOPTERA

Families and genera within Trichoptera in North Carolina

Spicipalpia (closed-cocoon makers)	Integripalpia (portable-case makers)
RHYACOPHILIDAE60 <i>Rhyacophila</i> HYDROPTILIDAE62 <i>(Agraylea)</i> <i>Dibusa</i> <i>Hydroptila</i> <i>Leucotrichia</i> <i>Mayatrichia</i> <i>Neotrichia</i> <i>Ochrotrichia</i> <i>Orthotrichia</i> <i>Oxyethira</i> <i>Palaeagapetus</i> <i>Stactobiella</i> GLOSSOSOMATIDAE65 <i>Agapetus</i> <i>Culoptila</i> <i>Glossosoma</i> <i>Matrioptila</i> <i>Protoptila</i>	PHRYGANEIDAE78 <i>(Agrypnia)</i> <i>(Banksiola)</i> <i>Oligostomis</i> <i>(Phryganea)</i> <i>Ptilostomis</i> BRACHYCENTRIDAE79 <i>Brachycentrus</i> <i>Micrasema</i> LEPIDOSTOMATIDAE81 <i>Lepidostoma</i> <i>(Theliopsyche)</i> LIMNEPHILIDAE81 <i>(Anabolia)</i> <i>(Frenesia)</i> <i>Hydatophylax</i> <i>Ironoquia</i> <i>(Limnephilus)</i> <i>Platycentropus</i> <i>Pseudostenophylax</i> <i>Pycnopsyche</i> APATANIIDAE85 <i>Apatania</i> <i>(Manophylax)</i> UENOIDAE86 <i>Neophylax</i> GOERIDAE87 <i>Goera</i> <i>(Goerita)</i> LEPTOCERIDAE88 <i>Ceraclea</i> <i>*Leptocerus</i> <i>Mystacides</i> <i>Nectopsyche</i> <i>Oecetis</i> <i>Setodes</i> <i>Triaenodes</i> MOLANNIDAE96 <i>Molanna</i> CALAMOCERATIDAE96 <i>Anisocentropus</i> <i>Heteroplectron</i> ODONTOCERIDAE97 <i>(Pseudogoera)</i> <i>Psilotreta</i> SERICOSTOMATIDAE98 <i>Agarodes</i> <i>Fattigia</i> *BERAEIDAE100 <i>*Beraea</i> HELICOPSYCHIDAE100 <i>Helicopsyche</i> LITERATURE
Annulipalpia (fixed-retreat makers) PHILOPOTAMIDAE67 <i>Chimarra</i> <i>Dolophilodes</i> <i>(Fumanta)</i> <i>(Sisko)</i> <i>Wormaldia</i> PSYCHOMYIIDAE68 <i>Lype</i> <i>Psychomyia</i> DIPSEUDOPSIDAE69 <i>Phylocentropus</i> POLYCENTROPODIDAE70 <i>(Cernotina)</i> <i>Cyrnellus</i> <i>Neureclipsis</i> <i>Nyctiophylax</i> <i>Polycentropus</i> HYDROPSYCHIDAE72 <i>Arctopsyche</i> <i>Ceratopsyche</i> <i>Cheumatopsyche</i> <i>Diplectrona</i> <i>(Homoplectra)</i> <i>Hydropsyche</i> <i>Macrostemum</i> <i>(Oropsyche)</i> <i>Parapsyche</i> <i>*Potamyia</i>	

() = published records (Kondratieff *et al.*, 1995 and others) for North Carolina but no BAU records, or is undescribed

* = no published records for North Carolina but may eventually be found.

Greyed out literature is currently not available on BAU server.

RHYACOPHILIDAE

Rhyacophila

Genus Diagnosis: Larvae free-living; meso- and metanotum membranous; metanotal seta consisting of single seta without sclerite at base; sclerite on dorsum of abdominal segment IX; often dark green or purplish body in life. Most common and diverse in the Mountains.

Retreat: none, free-living as larvae, closed transparent silk cocoon as pupae.

Species in NC: (*accola*), *acutiloba*, *amicis*, *appalachia*, *atrata*, **banksi*, *carolina*, (*carpenteri*), *celadon*, (*fenestra*), *formosa*, *fuscula*, *glaberrima*, (*invaria*), (*kondratieffi*), *ledra*, **lobifera*, **mainensis*, *minora*, (*montanta*), *mycta*, *n. sp.* (Glover), *nigrita*, (*teddyi*), *torva*, (*tricornuta*), *vibox*

***Rhyacophila carolina* group:** anal proleg without apicolateral spur or basoventral hook; no ventral teeth on anal claw absent.

R. carolina – larva ?? mm; head golden brown. Second most common *Rhyacophila* in NC. Collected from the Mountains, Piedmont and Sandhills. Larvae collected during winter and early spring in Piedmont and almost year round in the Mountains.

(*R. fenestra*)/*ledra* – larva 14 mm; anal proleg without apicolateral spur or basoventral hook; no ventral teeth on anal claw; segment 2 of maxillary palpi longer than segment 1; head patterned with dark muscle scars posteriorly and darkened anteriorly. Larvae of these two species are currently inseparable. Piedmont and Coastal Plain records of *R. ledra* may be *R. fenestra* as *R. ledra* in NC appears to be a Mountain species while *R. fenestra* is primarily a Piedmont species. Relatively common during late winter through early spring especially in the Carolina Slate Belt.

(*R. teddyi*) – larva unknown. Recorded from GSMNP. No BAU records.

***Rhyacophila fuscula* group:** apicolateral spur present; basoventral hook present.

R. formosa – short decurved apicolateral spur; dorsum of head with dark H-pattern. Mostly a Mountain species. Formerly *R. vuphipes*.

R. fuscula – larvae large, ?? mm; long apicolateral spur; dark H-pattern on head interrupted anteriorly and extended posterolaterally; pronotum mostly dark. Most common and tolerant *Rhyacophila* in NC. Western Piedmont and Mountains.

***Rhyacophila invaria* group:** anal proleg without apicolateral spur or basoventral hook; ventral teeth on anal claw present; segment 2 of maxillary palpi longer than segment 1.

(*R. accola*) – larva unknown. Currently known only from NC. Adult described from GSMNP in Haywood County. No BAU records. Listed as “vulnerable to extirpation” by Morse *et al.* (1997).

R. acutiloba – larva ?? mm; head and pronotum dark brown with pattern of pale spots. Occurs in Mountains only. Commonly collected late fall through summer. Uncommon, less than 100 BAU records.

R. appalachia – larva ?? mm; head dark and widens posteriorly; pronotum with dark brown transversely band anteriorly. Rare, only 3 BAU records, all from the Mountains. Listed by NC Natural Heritage Program as Significantly Rare (2008).

**R.banksi*/(*R. invaria*)/(*vibox*) complex – larva ?? mm; head broadens posteriorly and without a conspicuous pattern. It is not clear how to separate the larvae of these species. No BAU reference material for any species. *Rhyacophila vibox* is listed by NC Natural Heritage Program as Significantly Rare (2008). Both *R. banksi* and *R. vibox* are recorded from GSMNP.

(*R. carpenteri*) – larva ?? mm; head pale and narrowed in posterior half. Mountains only. No BAU records or reference specimen. Recorded from GSMNP.

R. celadon – larva ?? mm; dark head; bright green body, similar to *R. nigrita* but with diagnostic seta-bearing tubercle on fore femur. Larvae collected during winter and early spring. Only 1 BAU record (2008). Listed by NC Natural Heritage Program as Significantly Rare (2008).

(*R. kondratieffi*) – larva unknown. May key to *R. banksi* in Prather and Morse (2001). Collected from Blue Ridge Parkway (BRP) seeps. Previously known only from VA and TN.

- R. mycta* – larva unknown, though may be similar to *R. acutiloba*. 5 BAU records (?!). Described from Clingmans Dome in GSMNP. Restricted to NC, TN and VA. Listed as “vulnerable to extirpation” by Morse *et al.* (1997). Listed by NC Natural Heritage Program as Significantly Rare (2008).
- R. nigrita* – larva ?? mm; head black or brown and parallel sided; pronotum darker anteriorly. Occurs mostly in small Mountain streams. Third most common *Rhyacophila* in NC.
- (*R. tricornuta*) – larva unknown. Described from Mount Rogers area of VA but recently found in Avery County, NC.

Rhyacophila sibirica group: apicolateral spur present; basoventral hook present

- R. amicus*/**mainensis* – larva ?? mm; short decurved apicolateral spur; dorsum of head with median longitudinal stripe. *Rhyacophila amicus* is described from Black Mountain, NC, recorded from GSMNP and Listed as “vulnerable to extirpation” by Morse *et al.* (1997). Collected summer through early spring. In Mountains only. Rare, less than 10 BAU records. No BAU reference specimens. *Rhyacophila mainensis* has been recorded from WV and GSMNP. Both species are listed by NC Natural Heritage Program as Significantly Rare (2008) although there are no published records of *R. mainensis* in NC.
- R. atrata* – larva ?? mm; long apicolateral spur; head uniform brown. Occurs in the Mountains. Described from Black Mountain, NC. Larvae collected from July through May. Uncommon with less than 60 BAU records.
- R. minora* – larva ?? mm; no teeth on anal claw absent; head flattened and golden brown; cluster of long black setae at anterior corners of pronotum. Mountains. Collected from August through May. Uncommon, less than 60 BAU records. The species name is incorrectly Latinized but has been retained by the ICZN. BAU records refer to *R. minor*.

Ungrouped species:

- **R. lobifera* – larva 15 mm; anal prolegs without apicolateral spur; free basoventral hook present; anal claws with teeth; head yellowish with dark muscle scars and slightly diffuse pigmentation along frontoclypeal sutures; long seta on the anterolateral corner of pronotum with origin on lateral margin. No published records from NC. Recorded from TN and WV.
- R. glaberrima*/(*montana*) – larva 12 mm/ ?? mm; both apicolateral spur and basoventral hook absent; length of segment 2 of maxillary palpi subequal to segment 1. Relatively rare, less than 40 BAU records. Collected during spring and summer in the Mountains and Piedmont. *Rhyacophila montana* is listed as “vulnerable to extirpation” by Morse *et al.* (1997) and is known only from NC and TN in high elevation seeps. It is also listed by NC Natural Heritage Program as Significantly Rare (2008).
- R. n. sp.* (Glover) – larva 17 mm; anal prolegs without apicolateral spur; free basoventral hook present; anal claws with teeth; head yellowish with dark muscle scars and slightly diffuse pigmentation along frontoclypeal sutures; shorter seta on the anterolateral corner of pronotum with origin removed from lateral margin. Restricted to blackwater swamp streams on the Coastal Plain. Collected during winter. Keys to *R. lobifera* in Prather and Morse (2001) but can be separated by anterolateral pronotal seta. Listed (as *Rhyacophila sp. 1*) by NC Natural Heritage Program as Significantly Rare (2008).
- R. torva* – larva ?? mm; teeth on anal claw present; distinct dark “V” along frontoclypeal sutures with some darker muscle scars behind. Occurs mostly in small Mountain streams. Relatively common. Recorded from GSMNP.

Notes: All BAU records of *R. lobifera* (22 total) were collected in swamp streams and are probable misidentifications of *R. n. sp.* (Glover) as *R. lobifera* appears to not be a coastal species. Glover has collected adults from NC swamp streams which are not *R. lobifera* (03/00). Additionally, the BAU reference specimen appears to be *R. n. sp.* although it is damaged. BAU records of *R. manistee* are probably erroneous as it is a more northerly species. *Rhyacophila melita* is a junior synonym of *R. mainensis*.

Taxonomic references:

larvae:

Etnier, D. A., C. R. Parker and I. C. Stocks. 2004. A new species of *Rhyacophila* Pictet (Trichoptera: Rhyacophilidae) from Great Smoky Mountains National Park, with illustrations of females of *R. appalachia* Morse and Ross and *R. mycta* Ross. Proceedings of the Entomological Society of Washington 106 (2): 396-406. (description of *R. celadon*)

Flint, O. S. Jr. 1962. Larvae of the caddis fly genus *Rhyacophila* in eastern North America (Trichoptera: Rhyacophilidae). Proceedings of the United States National Museum 113: 465-493.

Glover, J. B. and J. C. Morse. Two new species of Trichoptera from South Carolina. In preparation. (description of *R. n. sp.*)

⇒Prather, A. L. and J. C. Morse. 2001. Eastern Nearctic *Rhyacophila* species, with revision of the *Rhyacophila invaria* group (Trichoptera: Rhyacophilidae). Transactions of the American Entomological Society 127 (1): 85-166.

Roback, S. S. 1975. New Rhyacophilidae records with some water quality data. Proceedings of the Academy of Natural Sciences of Philadelphia 127: 45-50.

Ross, H. H. 1944. Caddis Flies of Illinois. Bulletin of the Illinois Natural Survey 23(1).

adults:

Prather, A. L. and J. C. Morse. 2001. Eastern Nearctic *Rhyacophila* species, with revision of the *Rhyacophila invaria* group (Trichoptera: Rhyacophilidae). Transactions of the American Entomological Society 127 (1): 85-166.

Sykora, J. L., and D. J. McCabe. 1996. New species of *Rhyacophila* from Virginia (Insecta: Trichoptera: Rhyacophilidae). Annals of the Carnegie Museum 65:13-16.

HYDROPTILIDAE

(*Agraylea*)

Genus Diagnosis: Monotypic? Abdomen laterally compressed; tarsal claws slender, smoothly curved; protibia with posteroventral lobe; middle and hind claws longer than respective tarsi. Overall, similar to *Hydroptila* but abdomen more deeply lobed. Prefer large rivers in slow current.

Case: made of algae.

Species in NC: (*multipunctata*)

(*A. multipunctata*) – larvae up to 6 mm; head round and robust; front legs short with middle and hind legs longer. Larvae were collected from Wilson Creek below the gorge in 2004. Also found in TN and more northern states.

Notes: According to Wiggins (1996) the identification of the Eurasian *A. multipunctata* in the U.S. is uncertain and NC occurring *Agraylea* may instead be *A. fraterna*.

Taxonomic references:

larvae and adults:

Ross, H. H. 1944. Caddis Flies of Illinois. Bulletin of the Illinois Natural Survey 23(1).

Dibusa

Genus Diagnosis: Monotypic. Larvae up to 6.7 mm; abdomen laterally compressed; stout setae on abdominal segments arising from darkened sclerotized base; dorsal chloride epithelia relatively large and darkened; tarsal claws stout, strongly curved and with a thick, blunt basal seta.

Case: similar to that of *Hydroptila* but is composed of long concentrically arranged pieces of red algae.

Species in NC: *angata*

Notes: Associated with red algae. Must slide mount for positive identification. Winter taxon. Rare, only 11 BAU records, mostly from the Little River in Wake and Durham Counties, in the slate belt. Recorded from GSMNP. Listed by NC Natural Heritage Program as Significantly Rare (2008).

Taxonomic references:

larvae:

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of *D. angata*)

Hydroptila

Genus Diagnosis: Larvae up to 5 mm; abdomen laterally compressed; all legs of approximate same length; foretibia with posteroventral lobe; only NC hydroptilid genus with 3 anal gill filaments (lost when larvae reach pre-pupal stage). Common and widespread.

Case: purse-like, of sand covered silk, composed of 2 valve-like sides with ventral edge relatively straight and dorsal edge somewhat curved and held vertically.

Species in NC: Leave at genus; may be more than 25 species in NC. (*alabama*), **amoena*, (*ampoda*), (*armata*), **berneri*, (*callia*), **consimilis*, **chattanooga*, (*coweetensis*), **decia*, (*delineata*), (*englishi*), (*fiskei*), **grandiosa*, (*gunda*), (*hamata*), **latosa*, (*lloganae*), (*maculata*), **oneili*, (*quinola*), (*remita*), **scolops*, **spatulata*, (*talladega*), (*tortosa*), **valhalla*, (*waubesiana*), **xella*

Notes: In current, often at the heads of riffles. Most *Hydroptila* species are undescribed as larvae. *Hydroptila coweetensis* was described from Coweeta Hydrologic Laboratory in Macon County, NC. *Hydroptila decia* and *H. talladega* are Listed as “vulnerable to extirpation” by Morse *et al.* (1997) while *H. lloganae* is listed by NC Natural Heritage Program as Significantly Rare (2008).

Taxonomic references:

larvae:

no comprehensive treatments

adults:

Ross, H. H. 1944. Caddis Flies of Illinois. Bulletin of the Illinois Natural Survey 23(1).

Leucotrichia

Genus Diagnosis: Abdomen dorsoventrally compressed; mid-dorsal line present on pronotum, but usually absent on meso- and pronotum; elongate medial sclerites on each abdominal tergite without lacunae; bright blue-green body with black head. Most common in larger sized streams. Mountains and Piedmont only.

Case: flat and resembles leech eggs, difficult to pry off top of rocks.

Species in NC: *pictipes*

L. pictipes – larvae up to 5 mm. Only species in NC.

Notes: Found in fast current.

Taxonomic references:

larvae and adults:

⇒ Flint, O. S. 1970. Studies of Neotropical caddisflies, X: *Leucotrichia* and related genera from North and Central America (Trichoptera: Hydroptilidae). Smithsonian Contributions to Zoology 60: 1-64.

Mayatrichia

Genus Diagnosis: Larvae small, up to 2.5 mm; head attenuate anteriorly; mesotibia with pair of short, stout setae located apically or nearly so. Usually found in larger sized streams in fast currents.

Case: cylindrical and tapered, composed of silk with strengthening ridges.

Species in NC: *ayama*

M. ayama – only species in eastern US. Rare, less than 10 BAU records. Recorded from GSMNP. Should occur all NC Level III ecoregions.

Notes: This species may have a free-living early instar. Easily missed in field picking.

Taxonomic references:

larvae and adults:

Ross, H. H. 1944. Caddis Flies of Illinois. Bulletin of the Illinois Natural Survey 23(1).

Neotrichia

Genus Diagnosis: very small, up to 2 mm; head attenuate anteriorly; with pair of subapical mesotibial setae located about 1/3 length of tibia from distal apex; legs usually longer and more slender than in *Mayatrichia*. On rocks in fast flow in small streams and rivers in the Piedmont. Larvae collected July through August only.

Case: tiny, curved, composed of sand grains.

Species in NC: Leave at genus; **collata*, **falca*, **minutismella*, **vibrans*

Notes: Rare, less than 20 BAU records. The four species listed above have all been recorded from SC and N. *vibrans* from VA. There have been, however, no adults of any species yet recorded from NC.

Taxonomic references:

adults:

Ross, H. H. 1944. Caddis Flies of Illinois. Bulletin of the Illinois Natural Survey 23(1).

Ochrotrichia

Genus Diagnosis: Larvae up to 5.5 mm; abdomen laterally compressed; all legs of approximate same length; foretibia with posteroventral lobe; without anal gills; claws shorter than in *Hydroptila*; some *Ochrotrichia* with dorsal sclerites on abdomen, sometimes pigmented and sometimes with a transverse anteriorly positioned membranous area. In many different types of streams and rivers. Found on rocks in algal mats and in moss in current. Collected during spring and summer.

Case: similar to *Hydroptila* or with one dome-like valve and tortoise-like being flat on bottom, of sand covered silk.

Species in NC: Leave at genus; **arva*, (*confusa*), **graysoni*, (*tarsalis*), (*transylvanica*)

Notes: Very similar to *Hydroptila*. *Ochrotrichia transylvanica* may be endemic to NC. *Ochrotrichia arva* has been recorded from TN and VA while *O. graysoni* has been recorded from GSMNP. Rare, less than 25 BAU records.

Taxonomic references:

larvae:

adults:

Denning, D. G., and R. L. Blickle. 1972. A review of the genus *Ochrotrichia* (Trichoptera: Hydroptilidae). *Annals of the Entomological Society of America* 65:141-151.

Ross, H. H. 1944. Caddis Flies of Illinois. *Bulletin of the Illinois Natural Survey* 23(1).

Orthotrichia

Genus Diagnosis: Larvae up to 3.5 mm; abdomen laterally compressed; labrum asymmetrical with median sclerotized point; foretibia without posteroventral lobe; middle and hind tarsi slender and elongate; flattened distal spur on each tarsus; anal prolegs very short. Found near lentic-like edges of larger rivers. Occurs in the Piedmont and Coastal Plain. Larvae collected during summer months.

Case: distinctive, purse-like and made of silk only with ridges on dorsal surface.

Species in NC: Leave at genus; (*aegerfasciella*), (*cristata*), **dentata*, **instabilis*

Notes: Uncommon. *Ochrotrichia dentata* and *O. instabilis* have been recorded from SC.

Taxonomic references:

larvae:

Keiper, J. B. 2002. Biology and immature stages of coexisting Hydroptilidae (Trichoptera) from northeastern Ohio. *Annals of the Entomological Society of America* 95(5): 608-616. (description of *O. aegerfasciella*)

Oxyethira

Genus Diagnosis: Larvae up to 4 mm; long middle and hind legs; long antennae; linear distal lobe on foretibia. In backwater or slow current areas in algae, moss, and water-soaked wood. Many species limited to lakes and ponds. Uncommon and usually collected during late spring through summer.

Case: a clear, flattened, flask open at bottom.

Species in NC: Leave at genus; (*abacatia*), **dualis*, (*forcipata*), (*glasa*), (*grisea*), (*janella*), (*michiganensis*), **novasota*, (*pallida*), (*pescadori*), **rivicola*, (*verna*), (*zeronia*)

Notes: Very few species described as larvae. *Oxyethira dualis* and *O. rivicola* have been recorded from TN with VA. *Oxyethira novasota* has been recorded from both SC, TN and GSMNP. Less than 35 BAU records.

Taxonomic references:

larvae:

adults:

Kelley, R. W. 1984. Phylogeny, morphology and classification of the micro-caddisfly genus *Oxyethira* Eaton (Trichoptera: Hydroptilidae). *Transactions of the American Entomological Society* 110:435-463.

Ross, H. H. 1944. Caddis Flies of Illinois. *Bulletin of the Illinois Natural Survey* 23(1). (limited in scope)

Palaeagapetus

Genus Diagnosis: Larvae flattened dorsoventrally; with truncate tubercles on side of abdominal segments 1-8; all legs subequal in length. Very rare. Collected from seeps and springs in Mountains.

Case: similar to typical hydroptilid case. Covered with pieces of liverwort.

Species in NC: *celsus*

P. celsus – larvae up to 5 mm. Only species in eastern US. Listed by NC Natural Heritage Program as Significantly Rare (2008).

Notes: Confined to Appalachian Mountains and very localized. Only 2 BAU records, both over 10 years old.

Taxonomic references:

larvae:

Flint, O. S. Jr. 1962. The immature stages of *Palaeagapetus celsus* Ross (Trichoptera: Hydroptilidae). Bulletin of the Brooklyn Entomological Society LVII: 40-44.
Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of *P. celsus*)

Stactobiella

Genus Diagnosis: Larvae up to 3 mm; tarsal claws stout and curved with long basally thickened spur; no dorsal sclerotized abdominal rings. Collected from small, cool streams on rocks in fast current. Rare. Occurs in Mountains and Piedmont streams.

Case: similar to *Hydroptila* but composed of less sand and more silk.

Species in NC: Leave at genus; (*delira*), (*martynovi*), (*palmata*)

Notes: Slide-mount legs to verify genus level identification. Only the larva of the widespread *S. palmata* is described. Less than 20 BAU records.

Taxonomic references:

larvae and adults:

Ross, H. H. 1944. Caddis Flies of Illinois. Bulletin of the Illinois Natural Survey 23(1). (description of larval *S. palmata* as *Tascobia*)

GLOSSOSOMATIDAE

Agapetus

Genus Diagnosis: Larvae up to 6 mm; two sclerites on mesonotum; more setae on pronotal edge than other glossosomatid larvae; no dark sclerotized line on each side of anal opening. Usually collected on upstream edge of rocks in Mountains during spring through late summer.

Case: small and tortoise-like with sides composed of one comparatively large stone.

Species in NC: Leave at genus; **crasmus*, (*hessi*), (*iridis*), (*jocassee*), (*minutus*), (*pinatus*), (*rossi*), (*tomus*), **vireo*

Notes: Intolerant. *Agapetus jocassee* larvae can be separated from all other known *Agapetus* larvae by noting that the combination of anal claw with two accessory hooks (rather than one as in other species) and the light coloration of the head and pronotum. The Whitewater River in Jackson County was one source for *Agapetus jocassee* specimens for adult-larval associations. It is also in Linville River and Wilson Creek. Etnier has reared *A. hessi* from Swift Creek in Nash County and *A. pinatus* from near Old Fort in the Catawba River basin. *Agapetus crasmus*, *A. pinatus*, *A. minutus* and *A. tomas* have been recorded from GSMNP. *Agapetus jocassee* and *A. vireo* are listed as “vulnerable to extirpation” by Morse *et al.* (1997). *Agapetus jocassee*, *A. minutus*, and *A. tomas* are listed by NC Natural Heritage Program as Significantly Rare (2008). Merritt, Cummins, and Berg (2008) contains an error in the pupal key (See Craft and Morse, 1997).

Taxonomic references:

larvae:

Craft, J. S., and J. C. Morse. 1997. The larva, pupa and female of *Agapetus jocassee* Morse (Trichoptera: Glossosomatidae). Journal of Entomological Science 32: 377-385.

Culoptila

Genus Diagnosis: Larvae up to 3.5 mm; mesonotum with 3 sclerites, median sclerite rounded posteriorly; tarsal claw with stout basal seta.. Collected from the larger Mountains rivers during the summer. Rare.

Case: of typical glossosomatid style, composed of mineral pieces of similar size, and with collars of silk around anterior and posterior openings

Species in NC: (*plummerensis*)

Notes: There are supposedly two species in the eastern U.S., *C. thoracica* and *C. plummerensis*. Published NC records for *C. thoracica* are suspect because this is a western species (found in AZ, CO, NM, UT, WY) and would result in very disjunct populations (Blahnik and Holzenthal, 2006). These records are most likely *C. plummerensis* which appears to be the only eastern U.S. species. Less than 20 BAU records.

Taxonomic references:

larvae:

adults:

Blahnik, R. J. and R. H. Holzenthal. 2006. Revision of the genus *Culoptila* (Trichoptera: Glossosomatidae). Zootaxa 1233: 1-52.

Glossosoma

Genus Diagnosis: Mesonotum without sclerites; pronotum in lateral view excised anterolaterally approximately one third the total pronotal length; dark, sclerotized lines lateral of anal opening; venter of segment 8 without pair of setae. Larvae are collected mostly from riffles and areas of fast current. Occurs mostly in the Mountains and western Piedmont.

Case: tortoise-like with sides composed of multiple, similarly sized mineral particles.

Species in NC: (*lividum*), *nigrior*

(*G. lividum*) – larvae ?? mm; pronotum without small black spot above forecoxa. An Unzicker *et al* (1982) record for NC is based on a 1961 US National Museum specimen from GSMNP. However, no recent records exist. May have been extirpated from NC.

G. nigrior – larvae 4-5 mm; pronotum with small black spot above forecoxae; small sclerite in intersegmental fold between thorax and first abdominal segment laterally (separates out from *G. intermedium*). Only confirmed species in NC. Relatively common during spring and late summer.

Notes: Intolerant. Small specimens may be left at genus as the small sclerite between the abdomen and thorax may be difficult to observe. Additionally, pupae can be associated by metamorphotyping as cast sclerites are present in the pupal cocoon.

Taxonomic references:

larvae and adults:

⇨ Wymer, D. A. and J. C. Morse. 2000. Larva, pupa, and adults of *Glossosoma nigrior* (Trichoptera: Glossosomatidae) with a review of the eastern North American species of *Glossosoma*. Entomological News 111 (3): 149-158.

Matrioptila

Genus Diagnosis: Monotypic. Larvae up to 3.5 mm; mesonotum with 3 sclerites; tarsal claw with seta and long, slender basal process, all subequal in length, giving claw a trifid appearance. Found on moss covered rocks in small Mountain streams during the spring.

Case: of typical glossosomatid structure but flatter and more depressed than in other genera, composed of mineral grains of uniform size.

Species in NC: *jeanae*

Notes: Disjunct populations in Little River, Johnston County and Sandy Creek in Randolph County. Listed by NC Natural Heritage Program as Significantly Rare (2008). Recorded from GSMNP. Less than 20 BAU records.

Taxonomic references:

larvae:

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of *M. jeanae*)

Protoptila

Genus Diagnosis: larvae up to 3.5 mm; mesonotum has three sclerites, median sclerite angulate posteriorly; tarsal claw with a long, slender seta originating from a short rounded basal process; dark, sclerotized lines lateral of anal opening as in *Glossosoma*. Fairly common in summer. Larvae prefer slower, warmer waters. Collected from Mountains, Piedmont, and Sandhills.

Case: similar to that of *Agapetus* but with more mineral pieces dorsally inserted between the two large lateral stones.

Species in NC: Leave at genus; (*georgiana*), (*lega*), (*maculata*), (*moretti*), (*palina*)

Notes: Slide-mount legs to verify genus level identification. Of the five occurring species in NC, only the larva of *P. maculata* has been described.

Taxonomic references:

larvae and adults:

Ross, H. H. 1944. Caddis Flies of Illinois. Bulletin of the Illinois Natural Survey 23(1).

(description of larval *P. maculata*)

PHILOPOTAMIDAE

Chimarra

Genus Diagnosis: Larvae up to 12.5 mm; deep and asymmetrical median notch in frontoclypeal apotome; ventral seta 18 located closer to front of head; fore coxa with elongate seta-bearing process (*not* the trochantin). Common and widespread. Collected spring through fall.

Retreat: tubular net on bottom of rocks, often with mucous-like consistency.

Species in NC: Leave at genus; (*aterrima*), (*augusta*), (*florida*), (*mosleyi*), (*obscura*), (*socia*)

Notes: *Chimarra* tends toward cleaner streams but may be found in stressed systems in lower abundances and therefore may be species dependent. No usable species key exists for larvae.

Taxonomic references:

larvae:

Ross, H. H. 1944. Caddis Flies of Illinois. Bulletin of the Illinois Natural Survey 23(1).

adults:

Armitage, B. J. 1991. Diagnostic atlas of the North American caddisfly adults. I. Philopotamidae., 2 edition. Caddis Press, Anthens, Alabama (Columbus, Ohio).

Lago, P. K. and S. C. Harris. 1987. The *Chimarra* (Trichoptera: Philopotamidae) of eastern North America with descriptions of three new species. Journal of the New York Entomological Society 95(2): 225-251.

Dolophilodes

Genus Diagnosis: Larvae 11-12 mm; anterior notch of frontoclypeus only slightly asymmetrical and not nearly as deep as in *Chimarra*; seta 18 located medially on ventral surface of head and not thicker or larger than other ventral setae; trochantin a finger-like process; prothoracic coxae without seta-bearing process.

Retreat: similar to that of *Chimarra*.

Species in NC: (*distincta*)

(*D. distincta*) – only species in NC. Common in the Mountains, uncommon in the Piedmont, except in the Uwharries.

Notes: Intolerant. The *Dolophilodes* subgenera *Fumonta* and *Sisko* were elevated to generic status of which *F. major* and *S. sisko* are the only respective species within North Carolina.

Taxonomic references:

larvae:

Ross, H. H. 1944. Caddis Flies of Illinois. Illinois Natural Survey Bulletin 23(1).

(description of *D. distinctus* as *Trentonius*)

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of *D. distinctus*)

adults:

Armitage, B. J. 1991. Diagnostic atlas of the North American caddisfly adults. I. Philopotamidae. Second edition. Caddis Press, Anthens, Alabama (Columbus, Ohio).

(Fumonta)

Genus Diagnosis: Monotypic. Larvae up to 15 mm; asymmetrical notch much deeper than in *Dolophilodes*, similar to that of *Chimarra*; seta 18 located medially on ventral surface of head and is more stout than those of *Dolophilodes* though not as stout as in *Wormaldia*; trochantin a finger-like process; prothoracic coxae without seta-bearing process. A Mountain riverine genus.

Retreat: similar to that of *Chimarra*.

Species in NC: (*major*)

Notes: Frequency of occurrence, as of yet, unknown. *Fumonta* was recently removed from *Dolophilodes* (Blahnik, 2005). *Fumonta major* has been recorded from GSMNP (as *Dolophilodes major*).

Taxonomic references:

- Blahnik, R. J. 2005. *Alterosa*, a new caddisfly genus from Brazil (Trichoptera: Philopotamidae). *Zootaxa* 991: 1-60.
⇒ Weaver, J. S. III, J. A. Wojtowicz and D. A. Etnier. 1981. Larval and pupal descriptions of *Dolophilodes (Fumonta) major* (Banks) (Trichoptera: Philopotamidae). *Entomological News* 92: 85-90.

(Sisko)

Genus Diagnosis: Larvae are unknown.

Retreat: unknown although may be similar to that of *Chimarra*.

Species in NC: (*sisko*)

Notes: *Sisko sisko* is apparently very rare, but adults have been recorded from GSMNP (as *Dolophilodes sisko*). It is apparently limited to NC, SC, and VA. *Sisko sisko* was recently removed from *Dolophilodes* (Blahnik, 2005).

Taxonomic references:

- Blahnik, R. J. 2005. *Alterosa*, a new caddisfly genus from Brazil (Trichoptera: Philopotamidae). *Zootaxa* 991: 1-60.
⇒ Weaver, J. S. III, J. A. Wojtowicz and D. A. Etnier. 1981. Larval and pupal descriptions of *Dolophilodes (Fumonta) major* (Banks) (Trichoptera: Philopotamidae). *Entomological News* 92: 85-90.

Wormaldia

Genus Diagnosis: Larvae up to 14.5 mm; anterior margin of frontoclypeus symmetrical and continuous; seta no. 18 located posteromedially on ventral surface of head and very thick and stout; short foretrochantin knob-like; prothoracic coxae without seta-bearing process. Uncommon. Larvae collected January through May in mainly small streams. Occurs mostly in Mountains and the Piedmont.

Retreat: similar to that of *Chimarra*.

Species in NC: Leave at genus; (*moesta*), (*mohri*), (*oconee*), (*shawnee*), (*thyria*)

Notes: Overall, morphologically similar to *Dolophilodes*. Only *Wormaldia moesta* and *W. shawnee* have been described as larvae. *Wormaldia oconee* was described (as adult) from Lake Jocassee, Oconee County, SC which borders Jackson and Transylvania Counties in NC.

Taxonomic references:

- larvae:*
Ross, H. H. 1944. Caddis Flies of Illinois. Illinois Natural Survey Bulletin 23(1). (as *Dolophilus*)
adults:
Armitage, B. J. 1991. Diagnostic atlas of the North American caddisfly adults. I. Philopotamidae. Second edition. Caddis Press, Athens, Alabama (Columbus, Ohio).

PSYCHOMYIIDAE

Lype

Genus Diagnosis: Monotypic. Larvae up to 8.5 mm; hatchet shaped foretrochantin; anal claw without ventral teeth; two toned head with posterior half dark brown; conspicuous muscle scars on posterior half of frontoclypeus; prothorax distinctly smaller in diameter than mesothorax; purplish body. Common and widespread. Collected spring through summer.

Retreat: a detritus and silk covered depression on sticks and logs.

Species in NC: *diversa*

Notes: Conspicuously absent from the northern Coastal Plain.

Taxonomic references:

larvae:

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of *L. diversa*)

Psychomyia

Genus Diagnosis: Larvae up to 9 mm; hatchet shaped foretrochantin; well developed ventral teeth on anal claw; body often greenish. Found in slow current areas.

Retreat: a fixed, meandering silken tube adhering to upper surface of rocks, often covered with sand.

Species in NC: *flavida*, *nomada*

P. flavida – larvae 6 mm; submesal processes on anterior margin of frontoclypeus obsolete; mandibles without broad mesal teeth. Fairly common. Mountains and Piedmont. Larvae occur spring through summer.

P. nomada – larvae 6-7 mm; submesal processes on anterior margin of frontoclypeus conspicuous; mandibles with several broad mesal teeth. Uncommon. Primarily a Mountain taxon. Larvae are collected during the summer.

Notes:

Taxonomic references:

larvae:

⇒ Flint, O. S. Jr. 1964. Notes on some Nearctic Psychomyiidae with special reference to their larvae (Trichoptera). Proceedings of the United States National Museum 115: 467-481.

DIPSEUDOPSIDAE

Phylocentropus

Genus Diagnosis: Larvae with brownish to yellow-brownish head and white body; flattened paddle-like tarsi; labial tip (ligula or spinneret) long and protrudes out from under mouth; labial palpi lacking; thorax often with a protruding fleshy segment-like area between meso- and metathorax giving upper thorax a deflected appearance; head and prothorax distinctly narrower than remainder of body. Also lentic. Fairly common and widespread.

Retreat: *Phylocentropus* makes vertical tubes, with lateral tube attachments, in silty sediments on the periphery of the channel.

Species in NC: Leave at genus; (*auriceps*), (*carolinus*), (*lucidus*), (*placidus*)

(*P. auriceps*) – larva unknown. Rare in the Mountainous regions of southern Appalachian states (Sturkie and Morse, 1998). Eric may have photos of this species (or a new one) as the specimen in the photos does not fit the description to any of the species below. Recorded from GSMNP

(*P. carolinus*) – larvae 15-20 mm; head yellow-brown with frontoclypeus with variable darkened posterior area; hind tibiae with 2 stout spines and 3 long hairs in lateral view. Recorded from GSMNP.

(*P. lucidus*) – larvae up to 15 mm; head brown with light spots; hind tibiae with 2 stout spines. Recorded from GSMNP.

(*P. placidus*) – larvae 15-19 mm; head brown with light spots; hind tibiae with 3 stout spines.

Notes: The key proposed by Sturkie and Morse (1998) is unproven and should be used with caution.

Taxonomic references:

larvae:

Sturkie, S. K., and J. C. Morse. 1998. Larvae of three common North American species of *Phylocentropus* (Trichoptera: Dipseudopsidae). *Insecta Mundi* 12:175-180.

adults:

Armitage, B. J. and S. W. Hamilton. 1990. Diagnostic atlas of the North American caddisfly adults. II. Ecnomidae, Polycentropodidae, and Xiphocentronidae. The Caddis Press. 152 pp.

POLYCENTROPODIDAE

(*Cernotina*)

Genus Diagnosis: All following characters *MUST* be observed for correct identification of *Cernotina* larvae: mature larvae up to 8 mm; sclerotized X on anal proleg; protarsi nearly as long as protibia; sharply curved anal claws (~ 90°) with only a single dorsal accessory spine. May be widespread but is probably uncommon to rare. This is primarily a lentic taxon but may be in large, slow rivers.

Retreat: silk covered depression with flared openings, similar to that of *Nyctiophylax*.

Species in NC: Leave at genus; (*calcea*), (*spicata*), (*truncona*)

Notes: Difficult to separate from immature *Polycentropus*. The sclerotization pattern of the “X” on the anal prolegs appears to be slightly different than in *Polycentropus* (compare figures in Wiggins, 1996). Only the larva of *C. spicata* has been described. Adults of *Cernotina truncona* have been recorded from NC (USNM collection, 1960), SC and VA. Adults of *Cernotina calcea* were collected near Lake Waccamaw. The 10 BAU records of *Cernotina spicata* are dubious as many are confirmed misidentifications of other Polycentropodidae and were collected in streams.

Taxonomic references:

larvae:

Hudson, P.L., J.C. Morse, and J.R. Voshell. 1981. Larva and pupa of *Cernotina spicata*. *Annals of the Entomological Society of America* 74: 516 -519.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of *C. spicata*)

adults:

Armitage, B. J. and S. W. Hamilton. 1990. Diagnostic atlas of the North American caddisfly adults. II. Ecnomidae, Polycentropodidae, and Xiphocentronidae. The Caddis Press. 152 pp.

Cyrnellus

Genus Diagnosis: Monotypic. Larvae 9 mm; no sclerotized “X” on back of anal proleg although two mostly parallel, dark sclerotized bands are present; muscle scars on head and pronotum usually as pale or paler than rest of head; anal claw without ventral teeth; meso- and metanotal sa1 setae about as long as longest sa2 setae. Found in low current areas, especially large rivers. Larvae collected summer through fall mostly in the Piedmont and Coastal Plain. Uncommon.

Retreat: silk covered depression similar to that of *Nyctiophylax* but nearly circular in outline.

Species in NC: *fraternus*

Notes:

Taxonomic references:

larvae:

⇒ Flint, O. S. Jr. 1964. Notes on some Nearctic Psychomyiidae with special reference to their larvae (Trichoptera). *Proceedings of the United States National Museum* 115: 467-481.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of *C. fraternus*)

pupae:

Johnson, Z. B. and J. H. Kennedy. 1997. Description of the pupa of *Cyrnellus fraternus* (Trichoptera: Polycentropodidae), with notes on variation in pupal case construction. Entomological News 108: 253-258.

adults:

Armitage, B. J. and S. W. Hamilton. 1990. Diagnostic atlas of the North American caddisfly adults. II. Ecnomidae, Polycentropodidae, and Xiphocentronidae. The Caddis Press. 152 pp.

Neureclipsis

Genus Diagnosis: Larvae up to 21 mm; tiny ventral teeth on anal claw; no setae on basal segment of anal proleg; purplish pigmentation on dorsum of thorax and abdomen; muscle scars on posterior portion of frontoclypeus in straight, transverse line. Most common in the summer in large rivers.

Retreat: silken trumpet-shaped funnel and can be very long.

Species in NC: Leave at genus; *crepuscularis*, (*melco*)

N. crepuscularis – dorsal pigmentation consists of continuous bands.

(*N. melco*) – dorsal pigmentation broken into distinctly separate patches. Adult specimen from Robeson County (2003). Also, recorded from GA, SC and further south.

Notes: Pescador *et al.* (2004) provide a key to separate the two occurring southeastern species but it doesn't work well as variation in abdominal pigment gradations have been noted.

Taxonomic references:

larvae:

Pescador, M. L., A. K. Rasmussen, and S. C. Harris. 2004. Identification Manual for the Caddisfly (Trichoptera) Larvae of Florida. Second Edition. Florida Department of Environmental Protection, Tallahassee, Florida. 136 pp.

adults:

Armitage, B. J. and S. W. Hamilton. 1990. Diagnostic atlas of the North American caddisfly adults. II. Ecnomidae, Polycentropodidae, and Xiphocentronidae. The Caddis Press. 152 pp.

Nyctiophylax

Genus Diagnosis: Anal claw with tiny teeth on ventral concave surface and a dorsal accessory hook; small spines on venter of anal prolegs. Common and widespread in clean water.

Retreat: silk covered depression in crevices of rocks and logs, and usually covered with silt.

Species in NC: (*affinis*), **banksi*, *celta*, (*denningi*), *moestus*, *nephophilus*, **uncus*

(*P. affinis*) – larva unknown. Widespread in the SE.

**P. banksi* – larva unknown. Recorded from SC, TN, and GSMNP

P. celta – larvae 8 mm; dark color on head does not reach anterior margin of frontoclypeus or surround frontoclypeus at rear, i.e. only in middle of head.

(*P. denningi*) – larva unknown. Recorded from GA, NC (adults from Watauga County, 2005), SC, TN, and GSMNP

P. moestus – larvae 8 mm; dark color on genae surround frontoclypeus posteriorly, arrow mark on head distinctive.

P. nephophilus – dark color reaches anterior margin of head along suture lines, but does not surround frontoclypeus at rear.

**P. uncus* – larva unknown. Recorded from TN, and GSMNP

Notes: Formerly *Paranyctiophylax*.

Taxonomic references:

larvae:

⇒ Flint, O. S. Jr. 1964. Notes on some Nearctic Psychomyiidae with special reference to their larvae (Trichoptera). Proceedings of the United States National Museum 115: 467-481.

adults:

Armitage, B. J. and S. W. Hamilton. 1990. Diagnostic atlas of the North American caddisfly adults. II. Ecnomidae, Polycentropodidae, and Xiphocentronidae. The Caddis Press. 152 pp.

Morse, J. C. 1972. The genus *Nyctiophylax* in North America. Journal of the Kansas Entomological Society 45:172-181.

Nimmo, A. P. 1986. The adult Polycentropodidae of Canada and adjacent United States. Quaestiones Entomologicae 22:143-252.

N. affinis)

(has description of adult

Polycentropus

Genus Diagnosis: Larvae up to 25 mm; sclerotized X on anal proleg; basal segment of anal leg as long as or longer than distal segment; protarsi sometimes half as long as protibia; fore-trochantin fused without separating suture; meso- and metanotal sa1 setae about shorter than the longest sa2 setae; variably curved anal claws (135 to ~ 90°); abdomen usually with wide lateral fringe of setae. Found in slower current areas of streams and rivers. Common and widespread.

Retreat: either trumpet shaped, similar to that of *Neureclipsis*, or a loose silk tube that flares at either end.

Species in NC: Leave at genus; (*barri*), (*blicklei*), (*carsoni*), (*carolinensis*), (*cinereus*), (*clinei*), (*colei*), (*confusus*), (*crassicornis*), (*elarus*), (*interruptus*), (*maculatus*), (*nascotius*), **pentus*, (*rickeri*)

Notes: May be difficult to separate from *Cernotina*. Only two species occurring in the Southeast have been described as larvae (*P. cinereus* and *P. interruptus* in Ross, 1944) although *P. colei* has been noted as being bright red as larvae. *Polycentropus blicklei*, *P. carlsoni*, *P. colei*, and *P. rickeri* have all been recorded from GSMNP. In addition, *P. pentus* has been recorded from TN and WV. *Polycentropus colei* is listed by NC Natural Heritage Program as Significantly Rare (2008).

Taxonomic references:

larvae:

Ross, H. H. 1944. Caddis Flies of Illinois. Illinois Natural Survey Bulletin 23(1).

(larval descriptions of *P. cinereus* and *P. interruptus* only)

adults:

Armitage, B. J. and S. W. Hamilton. 1990. Diagnostic atlas of the North American caddisfly adults. II. Ecnomidae, Polycentropodidae, and Xiphocentronidae. The Caddis Press. 152 pp.

HYDROPSYCHIDAE

Arctopsyche

Genus Diagnosis: Ventral genae of head entirely separated by apotome which narrows posteriorly; thick sa2 and sa3 setae on abdomen not arranged in tufts; head pattern similar to *Parapsyche cardis*. Usually collected on large boulders and in fast currents. Mountains only. Uncommon.

Retreat: similar to that of *Hydropsyche* but with largest mesh size of all the hydropsychids.

Species in NC: *irrorata*

A. irrorata – larvae 23-27 mm; head black, pale midventrally, with distinct pattern of pale spots dorsally and mostly confined to frontoclypeus; thoracic nota with pale median line and mottled laterally. Only known species in the eastern US.

Notes: Immature larvae may have a pale Y-shaped area along dorsal sutures. *Arctopsyche irrorata* may be confused with *Parapsyche cardis* which has a similar head pattern.

Taxonomic references:

larvae and pupae:

Flint, O. S., Jr. 1961. The immature stages of the Arctopsychinae occurring in eastern North America (Trichoptera: Hydropsychidae). Annals of the Entomological Society of America 54: 5-11.

adults:

Nimmo, A. P. 1987. The adult *Arctopsyche* and *Hydropsyche* (Trichoptera) of Canada and adjacent United States. Questiones Entomologicae 23:1-189.

Ceratopsyche

Genus Diagnosis: Dorsum of abdomen with club hairs, without minute spines and scale hairs; prosternum with large sclerites in intersegmental fold; submentum notched apically.

Retreat: similar to that of *Hydropsyche*.

Species in NC: *alheda*, *bronta*, (*cheilonis*), *macleodi*, *morosa*, *slossonae*, *sparna*, *ventura*, *walkeri*

C. alhedra – larvae large; head uniformly black with posterior margin of head pale. Prefers clean streams and fast current. Mountains. Uncommon. Very intolerant. *Ceratopsyche riola* was synonymized with *C. alhedra* (Scheffer and Wiggins, 1986)

- C. bronta* – Appalachian Form: head with 3 distinct transverse stripes with central stripe expanded mesally and often with light spot in middle; nota with anterior and posterior transverse dark bands. Central Form: head pattern, indistinguishable from *C. cheilonis* or *C. walkeri* but does not occur in NC. Mountains. Common. Fairly tolerant.
- (*C. cheilonis*) – larvae 14 mm; without peg setae on frontoclypeus; venter of anal leg with clear, reddish setae. This species cannot be reliably separated from *C. walkeri* or the Central Appalachian form of *C. bronta* by head pattern alone, setal characters must be used. The 40 BAU records of *C. bifida* are either *C. cheilonis* or *C. walkeri*. Found in the New, Watauga, and northern French Broad River basins.
- C. macleodi* – blackish subtriangular area on posterior half of frontoclypeus; pronotum darkly shaded from anteromedial margin and converging to a point at the posterior margin. Small streams (2-4m). Mountains only. Uncommon. Very intolerant.
- C. morosa* – larvae 14 mm; head with 5-6 large pale spots in checkerboard pattern on frontoclypeus and usually with three small white spots at posterior angle of frontoclypeus; peg setae on frontoclypeus near parietal sutures; stridulatory areas on venter of head darkly pigmented with pale muscle scars mediobasally; dark pigmentation bordering gular sutures; pale muscle scars laterally on dark pronotum. Mountains and Northern Inner Piedmont. Common. Fairly intolerant. *C. bifida* is considered the west/central form of *C. morosa* (Scheffer and Unzicker, 1984) with a head pattern similar to *C. cheilonis* and does not occur in NC.
- C. slossonae* – larvae 16 mm; usually one large central yellow spot but can have 3 spots in a longitudinal row on head. Mountains only. Relatively common. Very intolerant.
- C. sparna* – head brown with 3 faint pale spots, one central with others anterolateral to the central spot; Primarily Mountains with some scattered Piedmont records. Very common. Fairly intolerant.
- C. ventura* – head uniformly brown with pale posterior border; club hairs more dense than regular hairs. Found in larger rivers in western Mountains. Rare. Less than 15 BAU records. May be confused with *Cheumatopsyche*.
- C. walkeri* – checkerboard pattern of pale spots with only one white spot at back of frontoclypeus (instead of the 3 small ones evident in *C. morosa*); venter of anal leg without clear, reddish setae; a variant larval form has dark lines following sutures of posterior angle of frontoclypeus and a transverse stripe anterior to that connecting lateral sutures of frontoclypeus, also with dark medially situated spot on side of head. Four BAU records, 3 from Beech Creek in Watauga County (one record confirmed by Dr. Guenter Schuster) and one from Alleghany County (2008). Unless specimen is the variant form, *C. walkeri* cannot be reliably separated from *C. cheilonis* by head pattern alone.

Notes: Unidentified larvae from Whitewater River (collected by Dave Lenat, 2007) have a similar head pattern as some variant forms of *C. slossonae* (see Fig. 81 and text in Scheffer and Wiggins, 1986). Larval length information is unknown for many species because much of the systematic literature has relied on metamorphotyping for associating larvae with pupae and adults. Cheatal characters should be used to separate *Ceratopsyche* species particularly when head patterns are vague, indistinct, or similar (Scheffer and Wiggins, 1986). Systematically, *Ceratopsyche* is also recognized as *Symphitopsyche*, *Hydropsyche morosa* group, or *Hydropsyche bifida* group. There are still some systematic experts that dispute *Ceratopsyche* as a separate genus arguing that it is, at best, a subgenus of *Hydropsyche*.

Taxonomic references:

larvae:

Mackay, R. J. 1978. Larval identification and instar association in some species of *Hydropsyche* and *Cheumatopsyche* (Trichoptera: Hydropsychidae). *Annals of the Entomological Society of America* 71:499-509.

Scheffer, P. W. and G. B. Wiggins. 1986. A Systematic Study of the Nearctic larvae of the *Hydropsyche morosa* group. ROM Life Science Miscellaneous Publications. Royal Ontario Museum, Toronto. 94 pp.

Scheffer, P. W., and J. D. Unzicker. 1984. A review of the *Hydropsyche morosa-bifida* complex in North America (Trichoptera: Hydropsychidae). Pages 331-335 in *Proceedings of the 4th International Symposium on Trichoptera* (J. C. Morse, ed.) Dr. W. Junk, The Hague.

⇒ Schuster, G. A. and D. A. Etnier. 1978. A manual for the identification of the larvae of the caddisfly genera *Hydropsyche* Pictet and *Symphitopsyche* Ulmer in eastern and central North America (Trichoptera: Hydropsychidae). EPA-600/4-78-060. 129pp.

adults:

Nimmo, A. P. 1987. The adult *Arctopsyche* and *Hydropsyche* (Trichoptera) of Canada and adjacent United States. *Questiones Entomologicae* 23:1-189.

Scheffer, P. W., G. B. Wiggins, and J. D. Unzicker. 1986. A proposal for assignment of *Ceratopsyche* as a subgenus of *Hydropsyche*, with new synonyms and a new species (Trichoptera: Hydropsychidae). *Journal of the North American Benthological Society* 5:67-84.

Cheumatopsyche

Genus Diagnosis: larvae up to 13 mm; usually with notch on anterior frontoclypeal margin of head; small or no visible sclerites in prosternal intersegmental fold; anterior ventral apotome without anteromedial expansion. Common and widespread.

Retreat: similar to, but may be more flimsy than, those found in *Hydropsyche* species.

Species in NC: Leave at genus; (*analys*), (**burksi*), (*campyla*), (*ela*), (*etrona*), (*geora*), (*gracilis*), (*gyra*), (*halima*), (*hardwoodi enigma*), (*hardwoodi hardwoodi*), (*helma*), (*minuscula*), (*oxa*), (*parentum*), (*pasella*), (*pinaca*), (*richardsoni*), (*sordida*), (*speciosa*), (*virginica*), (*wrighti*)

Notes: Tolerant as a group. Some *Cheumatopsyche* species may have no frontoclypeal notch with no prosternal sclerites, or sclerites and notch. While *C. etrona* has been depicted in Wiggins (1996), almost all *Cheumatopsyche* larvae are unknown or undescribed.

Taxonomic references:

larvae:

No comprehensive treatments

Mackay, River J. 1978. Larval identification and instar association in some species of *Hydropsyche* and *Cheumatopsyche* (Trichoptera: Hydropsychidae). Annals of the Entomological Society of America 71:499-509.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of *C. etrona*)

adults:

Gordon, A. E. 1974. A synopsis and phylogenetic outline of the Nearctic members of *Cheumatopsyche*. Proceedings of the Academy of Natural Science of Philadelphia 126:117-160.

Diplectronea

Genus Diagnosis: Foretrochantin not forked; genae only partly contiguous, with posterior ventral apotome almost half as long as the median ecdysial line separating the gular plates; without transverse sulcus on pronotum; head orangish brown. In small streams.

Retreat: similar to that of *Hydropsyche*, but made with less mineral and more plant material.

Species in NC: *metaqui*, *modesta*

D. metaqui – larvae ?? mm; anterior margin of head with asymmetrical notch; left mandible (from dorsal perspective) with dorsal thumb-like process; frontoclypeus with submedial dark U-shaped pattern, and with dark pattern posterior to and along the frontoclypeal sutures. Only one BAU record from an unnamed tributary to Cascade Creek (Hanging Rock State Park) in Stokes County. Also recorded from GSMNP. Listed by NC Natural Heritage Program as Significantly Rare (2008).

D. modesta – larvae 15 mm; anterior margin of head entire, without notch; head pattern similar to that of *D. metaqui* but less conspicuous. Common in the Mountains and Piedmont.

Notes:

Taxonomic references:

larvae:

Morse, J. C., and C. B. Barr. 1990. Unusual caddisfly (Trichoptera) fauna of Schoolhouse Springs, Louisiana, with description of a new species of *Diplectronea* (Hydropsychidae). Proceedings of the Entomological Society of Washington 92: 58-65.
(larval head of *D. modesta*)

⇒ Unzicker, J. D., V. H. Resh and J. C. Morse. 1982. Trichoptera, Chapter 9 (138 pp.). In A. R. Brigham, W. U. Brigham, and A. Gnilka, editors. *Aquatic Insects and Oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois. 837pp.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). Second Edition. University of Toronto Press, Toronto. (illustration of both species)

adults:

Morse, J. C., and C. B. Barr. 1990. Unusual caddisfly (Trichoptera) fauna of Schoolhouse Springs, Louisiana, with description of a new species of *Diplectronea* (Hydropsychidae). Proceedings of the Entomological Society of Washington 92:58-65.
(adult head of *D. modesta*)

(Homoplectra)

Genus Diagnosis: Foretrochantin not forked; genae only partly contiguous, with posterior ventral apotome almost half as long as the median ecdysial line separating the gular plates; transverse sulcus on pronotum that constricts posterior third from anterior two third; eastern species have stout, feathered setae on femora. Found in seeps.

Retreat: similar to that of *Hydropsyche*.

Species in NC: (*doringa*), (*flinti*), (*monticola*)

(*H. doringa*) – recorded from GSMNP.

(*H. flinti*) – symmetrical frontoclypeal anterior margin. Previously known as *Oropsyche howellae*. Described from specimen from Macon County 1983.

(*H. monticola*) – anterior frontoclypeal margin asymmetrical; BAU photos of *H. monticola* may be *H. flinti* mislabeled. Listed by NC Natural Heritage Program as Significantly Rare (2008).

Notes: May be confused with *Diplectrona*. *Homoplectra* was combined from *Aphropsyche* and *Oropsyche*. Small headwater streams and intermittent seeps. No BAU records or reference specimens but Eric has photos of larvae found near Mt Mitchell (Lenat, 2004).

Taxonomic references:

larvae:

Huryn, A. D. 1989. Identity of the hydropsychid larva known as "*Oropsyche*?": the immature stages of *Homoplectra flinti* Weaver. Journal of the North American Benthological Society 8:112-116.

Weaver, J. S., III. 1985. A new species and new generic synonym of the Nearctic caddisfly genus *Homoplectra* (Trichoptera: Hydropsychidae). Entomological News 92:71-77.

Weaver, J. S., III, B. S. Swegman, and J. L. Sykora. 1979. The description of immature forms of *Aphropsyche monticola* Flint (Trichoptera: Hydropsychidae). Aquatic Insects 1:143-148.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustrations for *H. doringa* and *H. flinti*)

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23:1-326.

(*H. doringa* described as *Aphropsyche aprilis*)

Hydropsyche

Genus Diagnosis: Dorsum of abdomen with minute spines on abdominal segments I-III as well as scale hairs on last 3 abdominal segments; a pair of large sclerites in intersegmental fold posterior of prosternal plate; anterior margin of frontoclypeus entire; submentum notched apically.

Retreat: composed of a perimeter capture net and stone "cave" in which larvae rest.

Species in NC: (*alvata*), **bassi*, *betteni*, *carolina*, (*catawba*), *decalda*, *demora*, (*depravata*), *elissoma*, (*fattigi*), (*franclemonti*), *hageni*, *incommoda*, *mississippiensis*, (*ophthalmica*), *phalerata*, *rossi*, **rotosa*, *scalaris*, (*simulans*), *venularis*

Unassociated species:

(*H. alvata*) – larvae undescribed. Adults recorded from Roanoke River in 1984 as well as from GA, SC (Congaree NP), and VA. Riverine species.

(*H. fattigi*) – larvae undescribed. Found in the Mountains and Piedmont but uncommon to rare. Riverine species.

(*H. ophthalmica*) – larvae undescribed. Widespread but rare. Mostly a northern species. Riverine species.

Hydropsyche depravata group:

H. betteni – larvae 16 mm; has a low rounded tubercle (bump) on back dorsum of head; mature larvae usually have a uniformly dark head while immature larvae may have two light spots or streaks similar to *H. venularis*. Widespread. Most tolerant species

H. carolina – black head with distinct carina. Rare. One BAU record from East Fork Pigeon River (1984). Mountains. One specimen from Whitewater River in Jackson County as well as one specimen from Ashe County, 2008. Listed by NC Natural Heritage Program as Significantly Rare (2008).

H. decalda – head with many dark muscle scars; frontoclypeus pigmented brown and with a pair of oblique anterolateral spots/streaks; posterior fourth of head pale with dark muscle spots. Typically found in Sandhills and acidic Coastal Plain streams. BAU reference specimen and some records may be *H. elissoma* instead.

(*H. depravata*) – larvae 16 mm; larvae cannot be separated from *H. betteni*. In NC checklists and recorded from in GSMNP.

H. elissoma – head pattern similar to *H. decalda* but with an elevated tubercle on posterior angle of frontoclypeus). Larvae of this species have been collected in the Sandhills from the Lumber River in

Hoke County and Naked Creek in Richmond County (Dave Lenat, March 2006) and from Jordan Creek in Scotland County (2006). May co-occur with *H. decalda*.

Hydropsyche scalaris group:

- **H. bassi* – larvae not described. Recorded from TN and described from VA. Listed by NC Natural Heritage Program as Significantly Rare (2008) although no published records of adults occurring in NC have been found.
- (*H. catawba*) – larvae not described. Type Locality: Catawba River, Catawba County, NC.
- H. demora* – head pattern is similar to *H. venularis* but head is overall darker, posterior margin of head capsule with less pale area, more light muscle scars than *H. venularis*. Mountains and Slate Belt streams.
- (*H. franclemonti*) – larvae undescribed. Larval specimens from Dr. David Etnier look very similar to *H. venularis* but have sclerotized setae on anal legs which keys it to *H. scalaris* in Schuster and Etnier, 1978. Recorded from GSMNP. Supposedly in Pigeon River (U of Tenn. Knoxville Study, 2005).
- H. hageni* – larvae 15 mm; dorsum of head brown to dark brown with two small, often indistinct, spots; venter of head mostly dark brown, except for two quadrate yellow spots next to gular suture; yellow band behind eye separates dorsal and ventral pigmentation. Can be difficult to separate from dark *H. sparna*. Larvae collected during the winter in the Mountains. Relatively rare. Less than 25 BAU records.
- H. incommoda* – anterior margin of head with 2 upturned teeth; venter of anal legs with small, golden sclerotized spine like setae; frontoclypeus is covered with a dense, silky patch of setae. Head pattern differs from that in Schuster and Etnier (1978) which is actually *H. orris*. Head pattern is similar to *H. rossi*. Piedmont and Coastal Plain. Common.
- H. mississippiensis* – head pattern similar to *H. venularis* pattern but with bristle-like setae on frontoclypeus, particularly posterior half. Rare. Less than 5 BAU records. Piedmont and Coastal Plain.
- H. phalerata* – larvae 13 mm; anterior margin of head produced into low, wide angle; posterior half of frontoclypeus dark brown with each side produced into a medial stripe which angles obliquely backwards. Relatively common and widespread.
- H. rossi* – rows of muscle scars on side of head not curved dorsad posteriorly; yellow band behind eye separates dorsal and ventral pigmentation. Very difficult to separate from early instar *H. venularis*. Only identify if obviously mature, otherwise designate as *rossi/venularis*. Some BAU records may be erroneous. May be confined to Piedmont and Coastal Plain rivers, though there are many BAU records in the Mountains. May be synonymous with *H. simulans*.
- **H. rotosa* – larvae undescribed. Recorded from TN and VA.
- H. scalaris* – large, conspicuous, heavily sclerotized setae on venter of anal legs; body with few scale hairs. Occurs in the Mountains and Piedmont. Uncommon.
- (*H. simulans*) – larvae 18 mm; head pattern similar to *H. rossi* and *H. venularis*. No BAU records. Found in GSMNP. Adults recorded from Lumber River in 2007. Riverine species.
- H. venularis* – muscle scars on side of head in rows that curve dorsad posteriorly; frontoclypeus mottled; head pattern highly variable, particularly pale spots/streaks on middle and front of head. Very common and widespread. Designate as *rossi/venularis* if immature and not certain of identification. Fairly tolerant.

Notes: Attempts at identification should only be taken with mature larvae or with easily distinguished species such as *H. betteni*. Early instar larvae should be left at the genus level unless confirmation can be obtained from other taxonomists.

Taxonomic references:

larvae:

- Mackay, R. J. 1978. Larval identification and instar association in some species of *Hydropsyche* and *Cheumatopsyche* (Trichoptera: Hydropsychidae). *Annals of the Entomological Society of America* 71: 499-509.
- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23:1-326.
- ⇒ Schuster, G. A. and D. A. Etnier. 1978. A manual for the identification of the larvae of the caddisfly genera *Hydropsyche* Pictet and *Symphitopsyche* Ulmer in eastern and central North America (Trichoptera: Hydropsychidae). EPA-600/4-78-060.
- ⇒ Unzicker, J. D., V. H. Resh and J. C. Morse. 1982. Trichoptera, Chapter 9 (138 pp.). In A.R. Brigham, W. U. Brigham, and A. Gnillka, editors. *Aquatic Insects and Oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois. 837pp.

pupae:

- Rutherford, J. E. 1985. An illustrated key to the pupae of six species of *Hydropsyche* (Trichoptera: Hydropsychidae) common in southern Ontario streams. *The Great Lakes Entomologist* 18(3): 123-132.

adults:

Flint, O. S., Jr. 1992. *Hydropsyche franclemonti*, a new species of the *scalaris* group from eastern North America (Trichoptera: Hydropsychidae). Journal of the New York Entomological Society 100:320-324.

Flint, O. S., Jr., J. R. J. Voshell, and C. R. Parker. 1979. The *Hydropsyche scalaris* group in Virginia, with the description of two new species (Trichoptera: Hydropsychidae). Proceedings of the Biological Society of Washington 92: 837-862.

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23:1-326.

Macrostemum

Genus Diagnosis: Carinate, flattened head; foretrochantin simple; dense fringe of setae on foretibiae and tarsi; abdomen without scale hairs. Often collected from logs. Mainly found in rivers but also occurs in streams. Common and relatively widespread.

Retreat: an open-ended chamber of silk and sand with one anterior(dorsal) opening and two posterior (ventral) openings and a net spun across one of the two tubular interior chambers.

Species in NC: Leave at genus; (*carolina*), **transversum*, (*zebratum*)

(*M. carolina*) – head reddish brown; posterior portion of dorsal carina even, not tuberculate; tubercles near eyes large.

**M. transversum* – head yellow; posterior portion of dorsal carina raised into pair of pointed tubercles. Recorded from GA and VA.

(*M. zebratum*) – larvae 22 mm at maturity; head reddish brown; posterior portion of dorsal carina even, not tuberculate; tubercles near eyes small.

Notes: Size of tubercles near eyes may be an unreliable character, speciate with caution. Ross (1944) mentions that adults of *M. carolina* are much smaller than adults of *M. zebratum*. This may translate into *M. carolina* having significantly smaller larvae than *M. zebratum* and aid in separation of these species. There are two disjunct populations in NC: one in the northern Mountains and the second in the outer Piedmont and Coastal Plain.

Taxonomic references:

larvae:

⇒ Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.

Unzicker, J. D., V. H. Resh and J. C. Morse. 1982. Trichoptera, Chapter 9 (138 pp.). In A. R. Brigham, W. U. Brigham, and A. Gnillka, editors. *Aquatic Insects and Oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois. 837pp.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustrations for *M. zebratum*)

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23:1-326.

(*Oropsyche*)

Genus Diagnosis: Monotypic. Larvae unknown.

Species in NC: *howellae*

Retreat: unknown.

Notes: Original description of *O. howellae* was renamed *Homoplectra flinti*. Adults known from Haywood, Macon, and Jackson Counties (Balsam Mountain Preserve), NC. Original adult association was apparently based upon *Homoplectra* larvae collected from the same area. Likely collected from small headwater streams and intermittent seeps. No BAU records or reference specimen. BAU photos (specimens from Dave Lenat) are likely mislabeled. Listed by NC Natural Heritage Program as Significantly Rare (2008).

Taxonomic references:

larvae:

Huryn, A. D. 1989. Identity of the hydropsychid larva known as "*Oropsyche*?: the immature stages of *Homoplectra flinti* Weaver. Journal of the North American Benthological Society 8:112-116.

Weaver, J. S., III. 1985. A new species and new generic synonym of the Nearctic caddisfly genus *Homoplectra* (Trichoptera: Hydropsychidae). Entomological News 92:71-77.

Parapsyche

Genus Diagnosis: Ventral genae of head entirely separated by parallel sided ventral apotome; thick sa2 and sa3 setae on abdomen arranged in tufts; foretrochantin not forked. Occurs only in the Mountains in small, cold streams. Prefer fast currents.

Retreat: of typical hydropsychid engineering.

Species in NC: *apicalis*, *cardis*

P. apicalis – head nearly uniformly brown; sa2 and sa3 tufts composed of 6-8 setae. Rare. Less than 20 BAU records.

P. cardis – brown and yellow checkerboard patterned head; sa2 and sa3 tufts composed of 2-4 setae. Fairly common.

Notes:

Taxonomic references:

larvae and pupae:

Flint, O. S., Jr. 1961. The immature stages of the Arctopsychinae occurring in eastern North America (Trichoptera: Hydropsychidae). *Annals of the Entomological Society of America* 54: 5-11.

⇒ Unzicker, J. D., V. H. Resh and J. C. Morse. 1982. Trichoptera, Chapter 9 (138 pp.). In A. R. Brigham, W. U. Brigham, and A. Gnika, editors. *Aquatic Insects and Oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois. 837pp.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (larval illustration of *P. apicalis*)

****Potamyia***

Genus Diagnosis: Monotypic. Anteromedial protuberance on anterior ventral apotome; mandibles with dorsolateral flanges; small sclerites posterior to prosternal plate; posterior margin of sclerites on sternum of abdominal segment 8 entire. In large rivers.

Retreat: of typical hydropsychid engineering but larger and looser, suited for slower currents.

Species in NC: **flava*

Notes: Recorded from GA, SC, TN, VA, and WV.

Taxonomic references:

larvae and adults:

⇒ Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (larval illustration of *P. flava*)

PHRYGANEIDAE

(Agrypnia)

Genus Diagnosis: Well developed coxal combs, both transverse and parallel on mesothoracic coxa; mesonotal sa1 with either very small sclerite at base or sclerite absent altogether; sternellum present. Prefer slow water or lake margins, may be on rooted macrophytes.

Case: vegetative, spiral, or occasionally a hollow stem.

Species in NC: *(improba)*, *(vestita)*

(A. improba) – larvae up to 30 mm; pronotum with pair of oblique stripes from anterolateral corner almost converging at posteromesal margin.

(A. vestita) – larvae up to 25 mm; pronotum with pair of oblique stripes and anterior margin edged, completely or incompletely, with dark brown. Recorded from GSMNP.

Notes: No BAU records of either species although adults have been collected in all ecoregions of NC.

Taxonomic references:

larvae:

⇒ Unzicker, J. D., V. H. Resh and J. C. Morse. 1982. Trichoptera, Chapter 9 (138 pp.). In A. R. Brigham, W. U. Brigham, and A. Gnika, editors. *Aquatic Insects and Oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois. 837pp.

Wiggins, G. B. 1960. A preliminary systematic study of the North American larvae of the caddisfly family Phryganeidae (Trichoptera). *Canadian Journal of Zoology* 38: 1153-1170.

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.

(Banksiola)

Genus Diagnosis: Coxal combs not well developed and appear as tiny raised points; characteristic dark, parallel, longitudinal bands on membranous meso- and metanotum. Primarily lentic but may be in slow moving streams on detritus or on rooted macrophytes.

Case: vegetative, spiral with some ends trailing.

Species in NC: **concatenata*, (*dossuaria*)

**B. concatenata* – larva not described. Coastal plain. Recorded from GA and SC.

(*B. dossuaria*) – larvae up to 20 mm; two dark, longitudinal, parallel pronotal bands. Adults found at beaver pond in Watauga County in 2007.

Notes: No BAU records.

Taxonomic references:

larvae:

⇒ Wiggins, G. B. 1960. A preliminary systematic study of the North American larvae of the caddisfly family Phryganeidae (Trichoptera). Canadian Journal of Zoology 38: 1153-1170.

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.

Oligostomis

Genus Diagnosis: Large round sclerites at base of mesonotal sa1; two dark lines on head, converging posteriorly. Occurs at the edges of Mountain streams, usually with an appreciable current. Uncommon.

Case: composed of pieces of leaves in rings.

Species in NC: **ocelligera*, *pardalis*

**O. ocelligera* – mature larvae up to 20 mm; width of anterior margin of frontoclypeus approximately equals 1.13 mm. No adult or larval records in NC. Recorded from TN Highlands.

O. pardalis – mature larvae up to 30 mm; width of anterior margin of frontoclypeus approximately equals 1.60 mm. Probably only species in NC.

Notes: *O. ocelligera* and *O. pardalis* are not separable at present except for relative size.

Taxonomic references:

larvae:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.

(illustration of *O. ocelligera*)

⇒ Wiggins, G. B. 1960. A preliminary systematic study of the North American larvae of the caddisfly family Phryganeidae (Trichoptera). Canadian Journal of Zoology 38: 1153-1170.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto.

(ill. of *O. pardalis*)

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.

(Phryganea)

Genus Diagnosis: Median dark longitudinal band on head with distinctive arrowhead shape at posterior frontoclypeal angle; coxal combs large and across coxae; no prosternal sternellum. Lentic only.

Case: spiral and of plant material.

Species in NC: *sayi*

P. sayi – larvae up to 40 mm; Only known species in NC.

Notes: No BAU records.

Taxonomic references:

larvae:

⇒ Wiggins, G. B. 1960. A preliminary systematic study of the North American larvae of the caddisfly family Phryganeidae (Trichoptera). Canadian Journal of Zoology 38: 1153-1170.

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.

Ptilostomis

Genus Diagnosis: Two dark, oblique stripes on head converging posteriorly; coxal combs very small appearing as tiny points; transverse dark markings on pronotum. Occurs in backwaters of swamps or slow flow areas, usually in the ends of logs. Common and widespread. Larvae collected October through March.

Case: long with concentric rings, composed of pieces of leaves.

Species in NC: Leave at genus; *ocellifera*, (*postica*)

Notes: Larvae of *P. postica*, though associated, are undescribed. Larvae of the two species occurring in NC cannot be separated at this time. Both species are recorded from GSMNP.

Taxonomic references:

larvae:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23:1-326.

⇒ Wiggins, G. B. 1960. A preliminary systematic study of the North American larvae of the caddisfly family Phryganeidae (Trichoptera). Canadian Journal of Zoology 38:1153-1170.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (ill. of *P. ocellifera*)

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.

BRACHYCENTRIDAE

Brachycentrus

Genus Diagnosis: First abdominal segment without dorsal or lateral humps; mid- and hind tibia with process and spine; sa1 sclerite always absent. Prefer larger streams.

Case: tapered and square in cross-section, pieces long and narrow and placed transversely, vegetative.

Species in NC: *appalachia*, *chelatus*, (*etowahensis*), *incanus*, *lateralis*, (*lunatus*), *nigrosoma*, *numerosus*, *spinae*

B. appalachia – larvae up to 12 mm; mid- and hind tibia with 1 large basomesal seta and fuscous for basal third; head with 5 black stripes. Mountains. Relatively common.

B. chelatus – larvae up to 11 mm; mid- and hind tibia with 3-5 large basomesal setae; head brown, not round. Sandhills only. Less than 50 BAU records.

(*B. etowahensis*) – larvae up to 10 mm; mid- and hind tibia with 3-5 large basomesal setae; head with 4 yellow spots. No BAU records. Listed by NC Natural Heritage Program as Significantly Rare (2008).

B. incanus – larvae up to 11 mm; mid- and hind tibia with 3-5 large basomesal setae; head with 5 yellow stripes. Rare. Only 3 BAU records. Listed as “vulnerable to extirpation” by Morse *et al.* (1997).

B. lateralis – larvae up to 11 mm; mid and hind tibia with 1 large basomesal seta and pale with narrow, fuscous dorsal stripe, golden-yellow head with 3 black stripes, case similar to *Micrasema*. Rare. Mountains and Piedmont.

(*B. lunatus*) – larvae up to 12 mm; similar to *B. spinae*, but distinguished by the clearly defined pale markings on the frontoclypeal and parietal sclerites. Larvae collected from Henderson and McDowell County by Harrington and Morse (2004). No BAU records. Some old *B. spinae* records may be *B. lunatus*.

B. nigrosoma – larvae up to 9 mm; mid- and hind femora with 2 major setae on ventral margin; filtering fringe in fanlike arrays; white muscle scars on head; abdomen blue green in color. Mountains and western Piedmont with a disjunct population located in the northeastern Piedmont. No records in the Cape Fear River Basin, lower Yadkin River Basin, or upper Roanoke River Basin.

B. numerosus – larvae up to 12 mm; mid and hind tibia with 3-5 large basomesal setae; head with 4 long pale spots. Widespread with no records around heavily populated areas, i.e. central Piedmont.

B. spinae – larvae up to 11 mm; mid and hind tibia with 3-5 large basomesal setae; “typical” form has elongate (i.e. not round) head with stripes, often diffuse; “intermediate” form has dark head with two

small linear zed spots towards anterior margin of frontoclypeus, not round; “dark-headed” form has very dark head without any pale spots or stripes, round. Mountains only. Common.

Notes: Generally intolerant. Flint (1984) synonymized *Brachycentrus adelus* with *B. nigrosoma*.

Taxonomic references:

larvae and adults:

⇒ Flint, O. S. 1984. The genus *Brachycentrus* in North America, with a proposed phylogeny of the genera of Brachycentridae (Trichoptera). Smithsonian Contributions to Zoology 308.

Harrington, R. B and J. C. Morse. 2004. A new species of *Brachycentrus* (Trichoptera: Brachycentridae) from the Southern Appalachian Mountains and variation in *B. spinae*. Proceedings of the Entomological Society of Washington 106 (2): 453-459.

Micrasema

Genus Diagnosis: Larvae up to 8 mm; first abdominal segment without dorsal or lateral humps; ventral apotome wider than long; transverse ridge on pronotum extends to anterior margin. *Micrasema* is almost always associated with living vascular plants (moss, *Podostemum*, etc.) in fast water.

Case: species specific.

Species in NC: *bennetti*, *burksi*, *charonis*, *rickeri*, *rusticum*, **scotti*, *sprulesi*, *wataga*

***M. rusticum* group:** four plates on mesonotum; ventral apotome broader than long (except *M. burksi*).

M. bennetti – dark spots on head; 4 spots near anterior margin of head and semicircular markings at constriction of frontoclypeus. Curved sand case. Mountains and Piedmont.

M. burksi – head dark brown; ventral apotome longer than broad. Curved silk case. Mountains only in waterfalls and vertical rock faces. Only 15 BAU records. Listed by NC Natural Heritage Program as Significantly Rare (2006).

M. charonis – head with distinct dark muscle scars laterally, pale areas anterolateral of frontoclypeus. Case vegetal and straight. Mountains and eastern Piedmont.

M. rickeri – head flat with carina. Curved sand case with posterior bevel. Mountains only. Uncommon.

M. rusticum – bold dark muscle scar pattern without semicircular markings (present in *M. bennetti*). Sand case. Mountains and eastern Piedmont.

**M. scotti* – head dark brown, without distinct muscle scars, and may have pale areas on anterior of frontoclypeus. Case of silk. No BAU records. Occurs in TN, VA, WV, and in GSMNP.

M. wataga – head rounded; head pattern mottled brown on lighter background, usually with a pale spot encompassing frontoclypeal angle and surrounding area. Case vegetable and mostly straight. Very common and widespread.

***M. sprulesi* group:** mesonotum with two plates; mesonotal sa1 with one seta.

M. sprulesi – straight vegetal case. Mountains only. Less than 20 BAU records. Removed from the NC Natural Heritage Program Rare Animal list (2008).

Notes: Species specific larval sizes are unknown as the BAU has an incomplete copy of Chapin (1978). Very intolerant. Larvae are generally small in summer (except *M. wataga*) and more abundant and diverse in larger streams, often 2-3 species.

Taxonomic references:

larvae:

⇒ Chapin, J. W. 1978. Systematics of Nearctic *Micrasema* (Trichoptera: Brachycentridae). PhD Dissertation, Clemson University.

LEPIDOSTOMATIDAE

Lepidostoma

Genus Diagnosis: Larvae up to 12.5 mm; antennae situated forward, close to eye; first abdominal segment without dorsal hump; chloride epithelia on abdominal segments not enclosed by sclerotized rings.

Case: four-sided and usually constructed of quadrate pieces of plant material. Early instars may have sand case.

Species in NC: Leave at genus; (*americanum*), (*bryanti*), (*carolina*), **carolli*, (*compressum*), (*excavatum*), (*flinti*), (*frosti*), **glenni*, (*griseum*), (*latipenne*), (*lobatum*), (*lydia*), (*mitchelli*), (*modestum*), (*ontario*), (*pictile*), **sackeni*, (*serratum*), (*sommermanae*), (*styliferum*), (*tibiale*), (*togatum*), (*vernale*)

Notes: Larvae of most species are undescribed. There are light headed and dark headed larvae. *Lepidostoma carolli* has been recorded from SC, TN and GSMNP; *L. glenni* from GA and GSMNP; and *L. sackeni* only from GSMNP. *Lepidostoma flinti*, *L. glenni*, *L. lobatum*, and *L. mitchelli* are listed as “vulnerable to extirpation” by Morse *et al.* (1997).

Taxonomic references:

larvae and adults:

Kerr, J. D., and G. B. Wiggins. 1993. Larval taxonomy in North American Lepidostomatidae (Trichoptera). Pages 117-121 in Proceedings of the 7th International Symposium on Trichoptera (C. Otto, ed.) Backhuys Publishers, Leiden, The Netherlands.

Weaver, J. S., III. 1988. A synopsis of the North American Lepidostomatidae (Trichoptera). Contributions of the American Entomological Institute 24:1-141. (characterizes sub-genera)

(Theliopsyche)

Genus Diagnosis: larvae up to 6.5 mm; antennae situated forward, close to eye; first abdominal segment without dorsal hump, ventral apotome of head shorter than median ventral ecdysial line, and head flattened with carinate ridge. Found in gravel beds.

Case: composed of sand grains, curved and slightly tapered.

Species in NC: Leave at genus; have (*corona*), (*epilomis*), (*grisea*), **melas*

Notes: *Theliopsyche* has only been collected once during WSA sampling in 2004 but there are no BAU larval records or reference specimen. Only the larva for *T. melas* has been described. *Theliopsyche melas* has only been recorded from TN and VA. The other 3 *Theliopsyche* species have been reported in both NC and GSMNP but only as adults.

Taxonomic references:

larvae and adults:

Weaver, J. S., III. 1988. A synopsis of the North American Lepidostomatidae (Trichoptera). Contributions of the American Entomological Institute 24:1-141. (characterizes sub-genera)

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *T. melas*)

LIMNephilidae

(Anabolia)

Genus Diagnosis: Larvae up to 29 mm; abdominal gills with up to 3 branches; small patch of stout spines on anterolateral corners of pronotum; hind femur with 2 major setae on ventral edge; ventral, dorsal, and lateral chloride epithelia present; anal hook with 3 accessory spines; head pale with dark muscle scars. In slow moving small streams or backwater areas as well as marshes and temporary pools. In Mountains.

Case: similar to that of some *Pycnopsyche* or of 3-sided leaf construction with triangular cross section.

Species in NC: **apora*, *consocia*

**A. apora* – larvae is undescribed. Adult male described from near Blacksburg, VA is morphologically similar to *A. consocia*.

A. consocia – larvae 16-18 mm. Only known species in NC. No BAU records.

Notes:

Taxonomic references:

larvae:

⇒ Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117. (larval descriptions)

adults:

Parker, C. R. 1984. A new species of *Anabolia* (Trichoptera: Limnephilidae) from eastern North America. *Aquatic Insects* 6: 153-155.

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326.

(as *Limnophilus consocius*)

(Frenesia)

Genus Diagnosis: Anterior abdominal gills 2-3 branched and posterior segments with only 1 filament; uniformly brown head covered with tiny spines; pronotum and lateral sclerite of anal proleg with stout, blade-like setae; ventral chloride epithelia on abdominal segments 2-7; hind femur with 2 major setae on ventral edge. Found in spring seeps and very small cold streams in the Mountains. A late season species as they emerge in November.

Case: slightly tapered, curved case is composed mainly of small rock fragments, occasionally with pieces of organic matter along its length.

Species in NC: (*difficilis*), (*missa*)

(*F. difficilis*) – larvae 13-15 mm. Ventral membranous area of anal prolegs without setae.

(*F. missa*) – larvae 11-12 mm. Ventral membranous area of anal prolegs with 10-12 setae.

Notes: No BAU records.

Taxonomic references:

larvae:

⇒ Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117.

Wiggins, G. B. 1996. *Larvae of the North American Caddisfly Genera (Trichoptera)*, Second Edition. University of Toronto Press, Toronto. (illustration of *H. designatus*)

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326.

Hydatophylax

Genus Diagnosis: Larvae large; s1 sclerites fused into a single sclerite; abdominal gills single; ventral chloride epithelium on abdominal segment 2 (*H. argus* only); all setae on pronotal margin of similar length (in *Pycnopsyche*, some anterolateral setae are up to 2 times as long as the other marginal setae); lighter head with darker spots than *Pycnopsyche*. Prefers slow currents. Mostly Mountains. Collected fall through early summer.

Case: similar to some *Pycnopsyche* case but may be very large.

Species in NC: *argus*

H. argus – larvae 35-40 mm. Only species in NC

Notes: Very similar to *Pycnopsyche* particularly immature specimens. Some scattered BAU records in clean streams in the both Piedmont and Coastal Plain.

Taxonomic references:

larvae:

⇒ Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117.

Ironoquia

Genus Diagnosis: Abdominal gills with 4 or more branches; meso- and metafemora with 5 major setae along ventral edge. Widespread. Found in temporary streams as well as swamp streams. Widespread. Larvae collected winter through spring.

Case: made of small fragments of leaves and grass, similar to that of *Pycnopsyche* except with fewer pieces sticking out and with a slight taper or curve.

Species in NC: *punctatissima*, **kaskaskia*

I. punctatissima – larva 15-20 mm. Only described species in NC. Recorded from GSMNP.

**I. kaskaskia* – larva unknown. Also recorded from TN and WV.

Notes: Probably only *I. punctatissima* occurs in NC as no verified adult specimens of *I. kaskaskia* have been recorded from NC.

Taxonomic references:

larvae:

⇒ Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117.

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326.
(as *Caborius* spp.)

(*Limnephilus*)

Genus Diagnosis: Prosternal horn short; gills with up to 3 branches; head mostly dark with distinctive pattern of stripes along frontoclypeal sutures, stripes may be reduced to a spot at frontoclypeal angle; abdomen without dorsal chloride epithelia. *Limnephilus* is mostly lentic but may be found in slow current streams including temporary streams. Mountain and Piedmont.

Case: bulky, made of grass, leaf fragments and wood placed lengthwise or transversely, and often very large, up to 50 mm.

Species in NC: Leave at genus; (*moestus*), (*submonilifer*)

(*L. moestus*) – larval description unavailable. Adult record from Lake Waccamaw.

(*L. submonilifer*) – larvae 12-15 mm; head with extensive brown areas with muscle scars distinct; pronotum entirely brown; posterior dorsal and ventral abdominal gills a single filament.

Notes: *Limnephilus* is a mostly northern genus.

Taxonomic references:

larvae:

⇒ Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117.

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326.

Platycentropus

Genus Diagnosis: Very long prosternal horn, extending ventrally to mentum; most abdominal gills with 3 or 3 branches; abdominal segments without dorsal chloride epithelia; Larvae collected late fall through early spring. Uncommon in the Mountains and Coastal Plain swamps.

Case: thick pieces of grass and leaves placed transversely with both ends left free resulting in a straight fuzzy case. “Shredded-wheat”.

Species in NC: Leave at genus; **amicus*, *radiatus*

**P. amicus* – larvae associated but not described (Wiggins, 1996); head with larger, more numerous dark muscle scars than *P. radiatus*. May be more northerly in distribution.

P. radiatus – larvae 18-20 mm; head with small, sparse, dark muscle scars on a yellowish background. Only known species in NC. Recorded from GSMNP.

Notes: Some NC occurring larvae do not fit the *radiatus* description (previously designated as *P. amicus*). Larvae of 2 other eastern species are undescribed (Flint 1960).

Taxonomic references:

larvae:

⇒ Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117.

Wiggins, G. B. 1996. *Larvae of the North American Caddisfly Genera (Trichoptera)*, Second Edition. University of Toronto Press, Toronto. (illustration of *P. radiatus*)

Pseudostenophylax

Genus Diagnosis: Mesonotum with pair of plates with as setal areas confluent; row of metanotal setae between sa2 and sa3; lateral humps without sclerites; abdominal gills single; head and thorax uniformly orangish to yellowish brown with pale muscle scars. Occurs in seeps and temporary streams. A late winter/early spring species. Rare.

Case: composed of sand, curved and slightly tapered.

Species in NC: *sparsus*

P. sparsus – larvae ?? mm; anterior half of frontoclypeus without arc of 4 pale muscle scars; may have fewer lateral gills on abdomen than *P. uniformis*. Larvae are described as *P. sp. 1* in Flint (1960). Recorded from GSMNP.

Notes: *Pseudostenophylax uniformis* is now considered a subspecies of *P. sparsus* (Schmid, 1991) although apparently Flint disagrees.

Taxonomic references:

larvae:

⇒ Flint, O.S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117. (description of *P. uniformis* and *P. sparsus* as species 1)

Schmid F. 1991. La sous-famille des Pseudostenophylacines (Trichoptera, Limnephilidae). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique: Entomologie*. 61 Suppl. 68 pp., 13 pls.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *P. sparsus*)

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326. (as *Drusus uniformis* and *P. sparsus* as *D. virginicus*)

Pycnopsyche

Genus Diagnosis: Mesonotum with 2 large plates; abdominal gills single; small elongate sclerite at base lateral hump posteriorly; metanotal sa1 sclerites not fused at midline; small spines frequently on sclerites of head and thorax (stout in *P. gentilis*); no ventral chloride epithelium on 2nd abdominal segment.

Case: Variable. Early instars with cases of bark, leaves or twigs. Later instars may convert cases to wood with extending longitudinal pieces or to small gravel or sand, usually cylindrical.

Species in NC: Leave at genus unless *lepida* group or *gentilis*; (*antica*), (*circularis*), (*conspersa*), *divergens*, (*flavata*), *gentilis*, *guttifer*, (*indiana*), *lepida*, *luculenta*, (*pani*), *scabripennis*, (*sonso*), (*subfasciata*), (*virginica*) *P. lepida* group:

(*P. indiana*) – larvae 16-21 mm. Adults occur near tannic, lowland streams.

P. lepida – larvae 20-25 mm; head golden brown with dark muscle scars; venter of first abdominal segment with 40-50 setae. Case of sand, smaller mineral pieces than *P. gentilis*.

(*P. subfasciata*) – larva indeterminate from *P. lepida*.

Ungrouped species:

P. divergens – larvae 20-22 mm; head yellowish, dark spots mostly distinct, ventral margin of posterior femora with 3-4 major setae; venter of first abdominal segment with more than 15 setae. Case cylindrical and of bark, wood, or leaf pieces. Found in very small spring-fed streams. No BAU reference specimen.

(*P. flavata*) – larvae 19.8-24.8 mm; head yellowish brown with dark bordered muscle scars; head distinctly flattened anteriorly with ridge of spines arcing from eye to eye; dorsal tubercle on segment 1 vestigial with 42-54 setae on either side of hump; venter of first segment with 20-31 setae on either side. Found in headwater areas in the mountains in slow moving and shallow spring areas. Often occur with *P. gentilis*. Case cylindrical and composed of small stones, similar to that of *P. gentilis*. Specimens may have previously been identified as *P. gentilis*.

P. gentilis – larvae 20-22 mm; head with dark bordered muscle scars; head gradually rounded both laterally and dorsally, no dorsal tubercle on segment 1. Case of small, flattened pieces of gravel. Mostly Mountains and Piedmont. Relatively uncommon.

- P. guttifer* – larvae 20-22 mm; head yellowish, dark spots fusing anteriorly; ventral margin of posterior femora with 2 major setae; venter of first abdominal segment with more than 15 setae. Case cylindrical, of plant material but often with mineral pieces incorporated; posterior sticks extending freely and anterior ones short and oblique. Large, warm streams.
- P. luculenta* – larvae 20-22 mm; head yellowish, dark spots mostly distinct, ventral margin of posterior femora with 3-4 major setae; venter of first abdominal segment with more than 15 setae. Case a distinctive, slightly flattened cylinder of plant materials with long sticks laterally extending posteriorly. Common.
- P. scabripennis* – larvae 20-25 mm; ventral margin of posterior femora with 2 major setae; venter of first abdominal segment with less than 15 setae. Case cylindrical, of irregular wood construction or regular leaf construction.
- (*P. sonso*) – larvae indeterminate from *P. luculenta*.

Notes: It is possible to confuse *Pycnopsyche* with *Hydatophylax argus*, particularly immature stages or specimens where sa1 sclerites appear fused. Some *Pycnopsyche* species are undescribed as larvae (*P. circularis*, *P. conspersa*, *P. pani*, and *P. virginica*), therefore species identification should not be attempted except for the mineral cased species or groups. *Pycnopsyche pani* is described from Yancey County and is limited to a small area of NC and VA. *Pycnopsyche conspersa* has been recorded from Cataloochee Creek, GSMNP. *Pycnopsyche perplexa* has been synonymized with *P. scabripennis*.

Taxonomic references:

larvae:

- ⇒ Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana* 40: 1-117.
- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326.
- ⇒ Unzicker, J.D., V. H. Resh and J. C. Morse. 1982. Trichoptera, Chapter 9 (138 pp.). In A.R. Brigham, W. U. Brigham, and A. Gnillka, editors. *Aquatic Insects and Oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois. 837pp.
- Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *P. guttifer*)
- Wojtowicz, J. A. 1982. Description of the larva and female of *Pycnopsyche flavata* (Banks) with comparative notes on the ecology of *P. flavata* and *P. gentilis* (McLachlan) (Trichoptera: Limnephilidae). *Proceedings of the Entomological Society of Washington* 84: 304-314.
- Wojtowicz, J. A. 1982. A review of the adults and larvae of the genus *Pycnopsyche* (Trichoptera: Limnephilidae) with revision of the *Pycnopsyche scabripennis* (Rambur) and *Pycnopsyche lepida* (Hagen) complexes. 292 pages. The University of Tennessee, Knoxville, TN.

adults:

- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326.
- Wojtowicz, J. A. 1982. A review of the adults and larvae of the genus *Pycnopsyche* (Trichoptera: Limnephilidae) with revision of the *Pycnopsyche scabripennis* (Rambur) and *Pycnopsyche lepida* (Hagen) complexes. 292 pages. The University of Tennessee, Knoxville, TN.

A P A T A N I I D A E

Apatania

Genus Diagnosis: Mesonotum with two plates; metanotal sa1 sclerites absent; arrangement of sa1 associated setae in a linear transverse row; head oval and with many secondary setae; mandibles usually with uniform scraper blades (not toothed). Larvae collected fall through winter. Mountains only.

Case: composed of mineral particles and strongly curved, cornucopia-shaped; larger mineral particles laterally.

Species in NC: Leave at genus; *incerta*, **praevolans*, *rossi*

A. incerta – larvae 6-9 mm; head dark brown to black; nota brownish-black; anterior metanotal plates replaced by row of about 20 setae; legs yellow brown; anal claw lacking well defined accessory teeth.

Notes: Intolerant. No key to distinguish between NC species. *A. rossi* adult male described from specimen from Old Fort, NC but larva undescribed. Both species recorded from GSMNP. Flint (2007) synonymizes *A. pravaelens* and *A. rossi* with *A. incerta* although the World Trichoptera Checklist has not implemented the synonymies. Previously known as *Radema*.

Taxonomic references:

larvae:

- Chen, Y. E. 1992. The larva and pupa of *Apatania praevolans* Morse (Trichoptera: Limnephilidae), with a key to described larvae of North American species of *Apatania*. *Aquatic Insects* 14:49-55.

Flint, O. S. Jr. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117.

Flint, O. S. Jr. 2007. Synonymy of some eastern North American species of *Apatania* (Trichoptera: Apataniidae). *Proceedings of the Entomological Society of Washington* 109(3): 739-740. (synonymies)

adults:

Morse, J. C. 1971. New caddisflies (Trichoptera) from the southeastern United States. *Journal of the Georgia Entomological Society* 6:77-84. (as *Radema* spp.)

(*Manophylax*)

Genus Diagnosis: Larvae up to 8 mm; mesonotum with two plates; mandibles usually with uniform scraper edge; metanotal sa1 sclerites present; basal seta of claws long and extending to tip of claw; anteromedial elliptical sclerite on sternite 1; abdominal gills single. Occurs in seeps and thin laminar flow areas in small spring runs. High elevations and cool waters.

Case: composed of mineral pieces camouflaged with leaf and twig fragments, curved and strongly tapered.

Species in NC: (*altus*)

(*M. altus*) – only species in eastern US, known only from NC. Described from specimens from Mt. Mitchell. Listed by NC Natural Heritage Program as Significantly Rare (2008). Listed as “vulnerable to extirpation” by Morse *et al.* (1997).

Notes: Distribution of *Manophylax altus* is exceedingly localized. Previously known as *Madeophylax*.

Taxonomic references:

larvae:

Huryn, A. D. and J. B. Wallace. 1984. New Eastern Nearctic limnephilid (Trichoptera) with unusual zoogeographical affinities. *Annals of the Entomological Society of America* 77(3): 284-292.

UENOIDAE

Neophylax

Genus Diagnosis: Larvae up to 15 mm; metanotal sa1 sclerites absent; mesonotum with anteromedial emargination; head elongate and sometimes with a submedian frontoclypeal tubercle or mound; abdominal gills single; venter of abdomen with chloride epithelia on segments 3-5. Most abundant as larvae during winter through spring, though can be collected in summer during the prepupal resting stage in large aggregations. Often in small streams.

Case: short and thick, composed of rock fragments usually with larger ballast stones incorporated laterally, slightly curved and sometimes tapered. Cases are closely adhered to larger, unmovable cobbles.

Species in NC: (*aniqua*), (*atlanta*), **concinnus*, *consimilis*, *fuscus*, **kolodskii*, *mittelli*, *oligius*, *ornatus*, **toshioi*

N. concinnus group:

(*N. aniqua*) – larvae without clavate ventral gills on abdominal segment 1; prominent tubercle on head, often semi-blunt; head more or less uniform in color; no lateral abdominal gills. Occurs in NC (Vineyard *et al.*, 2005). Recorded from GSMNP.

(*N. atlanta*) – well developed clavate ventral gill on abdominal segment 1; pronotum with microsculpture of spicules. An NC record from a UT that runs through Guilford County Courthouse National Military Park in 2006. Also in GA and SC. Apparently rare.

**N. concinnus* – without clavate ventral gills on abdominal segment 1. Not in NC checklists but recorded from GA, SC, TN, VA, WV and GSMNP. BAU records of *N. concinnus* (43 total) were found to be misidentifications (R. N. Vineyard specimen verifications). No adult records from NC.

N. consimilis – well developed clavate ventral gill on abdominal segment 1; head and legs dark brown or with stripe or pale area which is less than 1/2 head length, often there is a gradation of head coloration

which blends into that of *N. oligius*; underside of head usually dark; spines on anterior pronotum needlelike. Mostly a Mountain taxon. Common.

**N. kolodskii* – larvae are unknown. Adults were described from GSMNP.

N. mitchelli – well developed clavate ventral gill on abdominal segment 1; long pointed tubercle on head, usually directed somewhat posteriorly. Case often smaller and more fragile than other *Neophylax* species. Mountains only (including the Uwharrie Mountains). Common.

N. oligius – well developed clavate ventral gill on abdominal segment 1; yellow stripe on head, but varies, should be greater than 1/2 head length, often there is a gradation of head coloration which blends into that of *N. consimilis*; underside of head usually testaceous. Mountains and Piedmont. A Sand Hills morph has a mostly light colored head with darkened parietals outside of the frontoclypeal sutures. Most common *Neophylax* in NC.

N. ornatus – well developed clavate ventral gill on abdominal segment 1; head yellow to lighter brown sometimes with lighter muscle scars. Occurs in 1st order Mountain and Piedmont streams. Uncommon.

**N. toshioi* – without clavate ventral gills on abdominal segment 1; prominent tubercle on head, often semi-blunt; most pronotal setae pairs short; head with pale eye stripe laterally; lateral gills on abdominal segments 2-5. Recorded from western VA.

N. fuscous group:

N. fuscus – without clavate ventral gills on abdominal segment 1; large blade-like spines on anterior pronotum; head dark brown to black with light muscle scars. Occurs in northeastern Mountains and clean headwater streams to the Tar River (Fishing and Swift Creeks, among others). Relatively rare. Less than 45 BAU records.

Notes: Often 2-3 species of *Neophylax* will co-occur. *Neophylax nacatus* was synonymized with *N. mitchelli* (Vineyard, 2005).

Taxonomic references:

larvae and adults:

Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117.

Parker, C. R. 2000. *Neophylax kolodskii* (Trichoptera: Uenoidae), a new species from the Great Smokey Mountains National Park, U.S.A. *Aquatic Insects* 22:271-274. (adult descriptions only)

⇒ Vineyard, R. N., G. B. Wiggins, H. E. Frania and P. W. Scheffer. The caddisfly Genus *Neophylax* (Trichoptera: Uenoidae). 2005. *ROM Contributions in Science*, 2. 141pp.

GOERIDAE

Goera

Genus Diagnosis: Two pair of sclerites on mesonotum; pronotum produced anterolaterally into wide, sharply pointed processes; abdominal gills with up to 3 filaments; ventral and dorsal chloride epithelium present on abdomen; head pointed anteriorly and with many secondary setae. Small streams to medium sized rivers, in riffles on rocks.

Case: Similar to that of *Neophylax* but with a continuous row of larger ballast stones laterally, usually two. Case also tends to be smoother in exterior texture.

Species in NC: Leave at genus unless mature; have *calcarata*, *fuscula*, (*stylata*), (*townesi*)

G. calcarata – larvae 8-9 mm; 3 pairs of sclerites on metanotum; pronotum with central raised area and anterior margin with conspicuous spicules; sternal thoracic plates indistinct. Common in the Mountains and Sandhills.

G. fuscula – larvae 9-11 mm; 4 pairs of sclerites on metanotum; sternal thoracic plates distinct; face with central area smooth; posterior carina sharp and high. Mountains only. Rare with less than 15 BAU records.

(*G. stylata*) – larvae 8-10 mm; 4 pairs of sclerites on metanotum; face covered entirely with spicules; posterior carina low and broad. From Mountain spring seeps. A 2003 adult record from Macon County is a southern range extension.

(*G. townesi*) – larva is unknown. Mountains and Piedmont.

Notes: Sclerites on metanotum are often light colored and difficult to observe on immature larvae. Length of frontoclypeal seta appears to be an unreliable character.

Taxonomic references:

larvae:

Flint, O. S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117.

⇒ Unzicker, J. D., V. H. Resh, and J. C. Morse. 1982. Trichoptera, Chapter 9 (138 pp.). In A. R. Brigham, W. U. Brigham, and A. Gnillka, editors. *Aquatic Insects and Oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois. 837pp.

adults:

Morse, J. C. 1971. New caddisflies (Trichoptera) from the southeastern United States. *Journal of the Georgia Entomological Society* 6:77-84. (description for adult *G. townesi* and comparison drawings of *G. calcarata*)

(*Goerita*)

Genus Diagnosis: Similar to *Goera* with two pair of sclerites on mesonotum; pronotum produced anterolaterally into sharp processes; abdominal gills completely absent; ventral chloride epithelia on segments 4-6 only. Occur in Smaller streams, on moss- and liverwort-covered rocks in areas of current. Small, heavily shaded, high elevation seeps and streams. Larvae collected winter through spring.

Case: composed of sand, smooth sided, strongly tapered and slightly curved, sometimes with slightly larger grains incorporated laterally.

Species in NC: (*betteni*), (*flinti*), (*semata*)

(*G. betteni*) – larvae ?? mm; median dorsal ridge of pronotum evenly convex laterally; free portion of anterolateral projections of mesonotum short, about 1/4th total length of pronotum. Recorded from GSMNP.

(*G. flinti*) – larvae 4.8-5.4 mm; median dorsal ridge of pronotum with prominent posterolateral swellings and without posterior impression; anterolateral projections of mesonotum long, over a third the total length of pronotum. Recorded from GSMNP, Swain County (Parker, 1998) and Mt. Mitchell (Lenat, 07). Listed by NC Natural Heritage Program as Significantly Rare (2008).

(*G. semata*) – larvae up to 6 mm; median dorsal ridge of pronotum with prominent posterolateral swellings and with posterior thumb-like impression; free portion of anterolateral projections of mesonotum long, over a third the total length of pronotum. Collected from Mt. Mitchell (Lenat, 2007).

Notes: Previous descriptions of *G. semata* (Flint, 1960; Wiggins, 1973) were actually *G. flinti* (Parker 1998). *Goerita semata*, and possibly *G. betteni*, are semivoltine.

Taxonomic references:

larvae:

Flint, O.S. 1960. Taxonomy and biology of Nearctic limnephilid larvae (Trichoptera) with special reference to species in eastern United States. *Entomologica Americana*. 40: 1-117. (*G. semata* only)

⇒ Parker, C. R. 1998. A review of *Goerita* (Trichoptera: Goeridae) with description of a new species. *Insecta Mundi* 12:227-238. (description of *G. flinti*)

Wiggins, G. B. 1973. New systematic data for the North American caddisfly genera *Lepania*, *Goeracea* and *Goerita* (Trichoptera: Limnephilidae). *Life Science Contribution, Royal Ontario Museum* 91: 1-33. (with larval key)

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *G. betteni*)

adults:

Parker, C. R. 1998. A review of *Goerita* (Trichoptera: Goeridae) with description of a new species. *Insecta Mundi* 12:227-238. (description of *G. flinti*)

Wiggins, G. B. 1973. New systematic data for the North American caddisfly genera *Lepania*, *Goeracea* and *Goerita* (Trichoptera: Limnephilidae). *Life Science Contribution, Royal Ontario Museum* 91: 1-33.

LEPTOCERIDAE

Ceraclea

Genus Diagnosis: Dark curved bars on mesonotum; hind tibia not apparently divided; first abdominal segment widest; gills with several filaments. Generally prefer larger streams (>8m).

Case: variable, species specific.

Species in NC: **alces*, *ancylus*, *cama*, *cancellata*, (*diluta*), *enodis*, *flava*, *joannae*, *maculata*, *mentiea*, *mormani* Glover, *neffi*, *nepha*, *nr. excisa*, *nr. tarsipunctata*, *ophioderus*, (*protonepha*), *punctata*, *resurgens*, *slossonae*, *tarsipunctata*, *transversa*

- **C. alces* – larvae up to 8 mm; parafrontal areas absent; head and pronotum pale yellow without contrast; gular length/width ratio approximately one; antennae relatively short; mesonotal bars yellow and brown; no dorsal shield. Case made from sponge and silk. Collected during winter from the Coastal Plain (Little River and Naked Creek). May be incorrect identification of *C. transversa*. Nine BAU records all from 1984 (December-May). No BAU reference specimen.
- C. ancylus* – larvae 4.5-5.5 mm; parafrontal areas present; head dark brown; pronotum with dark spot in lighter posterolateral areas; mesonotum with few setae and bars dark and jagged in outline; one pair of setae on 9th tergite. Case of sand, dorsoventrally flattened with lateral expansions, easily overlooked on visuals. Common. Primarily found in Mountain and Piedmont streams.
- C. cama* – larvae undescribed. Tentatively similar to *C. transversa* but with dark mesonotal bars. Four *C. nr. cama* BAU records, all swamps. Adult records are from mountain seeps. Listed by NC Natural Heritage Program as Significantly Rare (2008).
- C. cancellata* – larvae 6-7 mm; parafrontal areas present; two pair setae on 9th tergite; anal leg with rod-like sclerite; mesonotal bars gently curved; frontoclypeal sutures parallel; no contrasting spots on head posteriorly. Case sand and cornucopia-shaped. Only 2 BAU records (1982 and 1992), with an additional record by Morse from Little River in Wake County (1984). Collected from GSMNP. Listed by NC Natural Heritage Program as Significantly Rare (2008).
- (*C. diluta*) – larvae 6-7 mm; head and pronotum yellow without contrasting areas; gula with crenulated outline; antennae exceptionally long; one pair of setae on 9th tergite. Case sand and horn-shaped with dorsal cowl. No BAU records but found in SC, (Congaree NP), TN, and collected from GSMNP.
- C. enodis* – larvae ~ 5-6 mm (?); parafrontal areas present only in last two instars; head brown with light spots; white region on side of head with 2 dark spots; mesonotum with two distinct transverse, submesal grooves. Case silk with sponge anteriorly. Keys to *C. maculata* in Resh (1976). Coastal Plain and Piedmont. Described from the Little River near Troy, NC. Less than 20 BAU records.
- C. flava* – larvae 4.0-4.5 mm; parafrontal areas present; head light brown with dark spots; gula expanded posteriorly; pronotum with contrasting lateral spot less obvious than on *C. ancylus*; mesonotal bars evenly rounded; one pair setae on 9th tergite. Case of sand, dorsoventrally flattened with lateral expansions similar to that of *C. ancylus*. Primarily found in the Mountains. Less than 35 BAU records, last in 2001.
- C. joannae* – larvae ~ 7 mm; parafrontal areas present; head dark reddish brown with a few inconspicuous light muscle scars posteriorly; each pronotal plate with pale stripe from middle of lateral edge to the posteromedial corner, a few vague spots in each pale stripe; gula bidentate posteriorly. Eats snails. Case of sand, tapered and slightly curved with dorsal cowl. Described and only recorded from the Little River, Montgomery County, NC. Only 6 BAU records. Listed by NC Natural Heritage Program as Significantly Rare (2008).
- C. maculata* – larvae 5-6 mm; parafrontal areas present; brown head with lighter spots on dorsum and side of head with 3 dark spots on pale background; frontoclypeal lateral sutures parallel; pronotum light brown without contrasting spots; mesonotal bars sharply curved; two pair setae on 9th tergite; anal leg with rod-like sclerite. Case of fine grained sand often with larger sand particles incorporated, tapered and slightly curved. Spring and summer. Mostly Piedmont and Coastal Plain though also recorded from GSMNP. Relatively common. No BAU reference specimen.
- C. mentiea* – larvae up to 7 mm; parafrontal areas present, and head brown with reticulate pattern; pronotum plain and anterior margin with up to 46 hairs; mesonotum with about 30 hairs on dorsal shield. Case tapered and markedly curved towards bottom with particle size gradient decreasing from top to bottom. Less than 35 BAU records. Summer in the Piedmont and Mountains particularly the New River area. Listed by NC Natural Heritage Program as Significantly Rare (2008).
- C. mormani* (Glover) – new species from Panthertown Creek. Similar to *C. nr. excisa*. Two BAU records, Clay and Macon Counties. Currently being described by Jim Glover (SCDHEC) possibly as *C. mormani*.

No BAU reference specimen. Listed (as *Ceraclea* sp. 3) by NC Natural Heritage Program as Significantly Rare (2008).

- C. neffi* – larvae up to 5 mm; parafrontal areas present; head similar to *C. ancylus* but with 2 brown spots in each pale posterior parafrontal suture; pronotum similar to *C. ancylus* with lateral spot in pale area; one pair setae on 9th tergite. Case like that of *C. ancylus* but wider. Mostly found in the Mountains. Less than 20 BAU records. Some records may be misidentifications of *C. flava*.
- C. nepha* – larvae 7-8 mm; parafrontal areas present; dark head with light spots; long antennae; pronotum without contrast; two pair setae on 9th tergite. Similar overall to *C. tarsipunctata*. Case of sand, tapered and slightly curved. Often in waters of high tannic acid content. Mostly Coastal Plain though also recorded from GSMNP. Less than 20 BAU records.
- C. nr. excisa* – larvae 8-10 mm; parafrontal areas present; head brown with dark spots; 6 dark linearized spots in longitudinal rows on anterolateral areas of frontoclypeus; one pair of setae on 9th tergite. Case sand and horn-shaped with dorsal cowl, slightly less curved than that of *C. diluta*. Coastal Plain. 25 BAU records.
- C. nr. tarsipunctata* – parafrontal areas absent; dark head without spots. Case of plant material and similar to that of *C. tarsipunctata*. Collected from Friar Swamp, Columbus County (1999), and Elkton Swamp, Bladen County (2001 and 2006). A total of 3 BAU records. No BAU reference specimen.
- C. ophioderus* – description cannot be found, but larvae may apparently be mistaken for *C. slossonae*. Morse suggests *C. slossonae* (New River) is *C. ophioderus* while *C. ophioderus* (primarily coastal) is *C. nepha* group. Some larvae collected from the Tar River (Edgecombe County) were reared and confirmed to be *C. ophioderus* by J. Glover. Distribution may extend to the foothills (Johns River). Collected May through August. Less than 25 BAU records. Eric has photos of something he calls *C. ophioderus*. No BAU reference specimen.
- (*C. protonepha*) – larvae are unknown but will likely key to *C. nepha*. Adults collected from BRP.
- C. punctata* – larvae 9-11 mm; parafrontal areas present; head brown with yellow spots; antennae short; frontoclypeus narrows posteriorly; mesonotal bars wide, sharply angled and with a medial process; without a pair of setae on 9th tergite; anal leg with rod-like sclerite. Case of larger sand grains, tapered and curved posteriorly. Slate Belt and Southeastern Floodplains. Less than 10 BAU records. No BAU reference specimens.
- C. resurgens* – larvae 11-12 mm; parafrontal areas absent; head yellow with light brown spots; short antennae; pronotum yellow with often hard to see brown spots; mesonotal bars brown anteriorly, blackish posteriorly and mostly of same thickness throughout; more angled medially than those of *C. transversa*. Case of silk and sponge. Widespread but uncommon. Less than 50 records., of these many may be misidentifications of *C. transversa*.
- C. slossonae* – larvae 9-11 mm; parafrontal areas present; head dark brown with 3 dorsal orange stripes, one medial on frontoclypeus and 2 lateral originating from parafrontal areas and meeting posteriorly at the coronal suture; pronotum with posterior light areas on dark background, mesonotum with more than 20 hairs. Spring and summer in the Mountains. Less than 20 BAU records (North and South Fork New River and Johns River only). Listed by NC Natural Heritage Program as Significantly Rare (2008).
- C. tarsipunctata* – larvae 7-8 mm. Overall very similar to *C. nepha*. Case vegetal with a few sand grains, slightly tapered and curved. Mostly Piedmont and Coastal Plain though also recorded from GSMNP. Less than 20 BAU records.
- C. transversa* – larvae 5.5-7 mm; parafrontal areas absent; head yellow with pale muscle scars; antennae short; pronotum without contrast; mesonotal bars yellow and thinner anteriorly, brown and wider posteriorly; more gently curved than the mesonotal bars of *C. resurgens*. Case silk and sponge. Mostly Piedmont and Coastal Plain. Collected during all seasons. Interesting life history: 2 cohorts, one overwinters as pupae, the other as 3rd or 4th instars which must change feeding habits before overwintering (to detritus) and therefore emerge smaller than the 1st cohort. Most common *Ceraclea*.

Notes: Amazing North Carolina diversity with at least 20 species.

Taxonomic references:

larvae:

- Morse, J. C. and D. R. Lenat. 2005. A new species of *Ceraclea* (Trichoptera: Leptoceridae) preying on snails. *Journal of the North American Benthological Society* 24 (4): 872-879.
- Whitlock, H. N. and J. C. Morse. 1994. *Ceraclea enodis*, a new species of sponge-feeding caddisfly (Trichoptera: Leptoceridae) previously misidentified. *Journal of the North American Benthological Society* 13(4): 580-591.
- ⇒ Resh, V. H. 1976. The biology and immature stages of the caddisfly genus *Ceraclea* in eastern North America (Trichoptera: Leptoceridae). *Annals of the Entomological Society of America* 69: 1039-1061.
- Ross, H. H. 1938. Descriptions of new leptocerid Trichoptera. *Annals of the Entomological Society of America* 31:88-91. (description of *C. ophioderus* ?)
- adults:**
- Flint, O. S., Jr. 1965. New species of Trichoptera from the United States. *Proceedings of the Entomological Society of Washington* 67:168-176. (description of adult *C. cama*)
- Morse, J. C. 1975. A phylogeny and revision of the caddisfly genus *Ceraclea* (Trichoptera, Leptoceridae). *Contributions of the American Entomological Institute* 11:1-97.
- Carnagey, D. W., and J. C. Morse. 2006. Females of the genus *Ceraclea* (Trichoptera: Leptoceridae) in North America: Taxonomy and classification. *Contributions of the American Entomological Institute* 34(2): 1-86. (description of *C. ophioderus* female)

***Leptocerus**

Genus Diagnosis: Monotypic. Tarsal claws of each mesothoracic leg hooked and stout; tibia and tarsi thickened and curved with row of teeth which bear setae apically; hind legs densely setose; body somewhat green in life. Mostly lentic but also can be found in large rivers in slow currents among macrophytes, usually near surface.

Case: of silk, tapered and slightly curved posteriorly.

Species in NC: *americanus*

Notes: Recorded from FL, SC (Congaree NP), TN, VA, WV, and GSMNP.

Taxonomic references:

larvae and adults:

- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23: 1-326.

Mystacides

Genus Diagnosis: Hind tibia secondarily divided and without fringe of long hairs; linear patch of spines on venter of anal proleg. Winter through early summer. Widespread.

Case: tubular and tapering slightly, made mostly of sand with plant stems, twigs, or conifer needles extending from anterior end

Species in NC: *sepulchralis*, *nr. alafimbriata*

M. sepulchralis – larvae up to 10 mm; has dark head with light patches which contain dark spots. Some BAU records are probably *M. nr. alafimbriata*. No BAU reference specimen with this head pattern.

M. nr. alafimbriata – larvae ?? mm; has light head with dark spots. Mysterycides.

Notes: In Wiggins (1996): “Larval diagnoses for all three [species of *Mystacides*] were given by Yamamoto and Wiggins (1964); subsequently, larvae with spotted heads similar to *M. alafimbriata* were found in a number of eastern localities, but adults associated with several of these series all proved to be *M. sepulchralis*.” i.e. still a SNAFU. Figures in Yamamoto and Wiggins are either switched or *Mystacides nr. alafimbriata* may be an undescribed species.

Taxonomic references:

larvae:

- Wiggins, G. B. 1996. *Larvae of the North American Caddisfly Genera (Trichoptera)*, Second Edition. University of Toronto Press, Toronto.
- ⇒ Yamamoto, T. and G.B. Wiggins. 1964. A comparative study of the North American species in the caddisfly genus *Mystacides* (Trichoptera: Leptoceridae). *Canadian J. of Zool.* 42:1105-1210.

pupae and adults:

- Yamamoto, T. and G.B. Wiggins. 1964. A comparative study of the North American species in the caddisfly genus *Mystacides* (Trichoptera: Leptoceridae). *Canadian J. of Zool.* 42:1105-1210.

Nectopsyche

Genus Diagnosis: Hind tibia not secondarily divided; middle leg with slender, slightly curved claw; circularly roughened lateral hump with posteriorly directed sclerotized bar which is apically curved towards the venter.

Case: variable, species specific

Species in NC: *candida*, *exquisita*, *n. sp.*, *pavida*, *waccamawensis*

- N. candida* – larvae up to 13 mm; metasternum with 8 setae; very similar to *N. exquisita* with dorsum of head mottled with combination of light spots surrounded by dark pigmentation and dark spots on a light background; pale legs *without* dark banding at joints. Case tubular and tapering made mostly of sand with plant stems extending from anterior end. Rare in all probability. Over 70 BAU records of which many may be misidentifications of *N. exquisita*. Reference specimen is misidentification of probable new species.
- N. exquisita* – larvae up to 13 mm; metasternum with 8 setae; dorsum of head mottled with combination of light spots surrounded by dark pigmentation and dark spots on a light background; middle and hind legs completely dark or with dark banding at joints (but varies in some populations). Case tubular and tapered, made mostly of sand with plant stems extending from anterior end. Common and widespread.
- N. n. sp.* – larvae up to 13 mm; has 16+ setae on ventral abdominal segment 1. Similar to *N. waccamawensis*. Case tubular and tapering, made of plant and sand with plant stems extending from anterior end. One record from Burke County (2007) and two records from Alleghany County (2008). Our reference specimen for *N. candida* (from French Broad River, Buncombe County, 1992) may be this species.
- N. pavida* – larvae 7-8 mm; mesosternum with 2 setae; head mostly dark with large brown oval light spot in median area of frontoclypeus *or* head mostly dark with scattered light spots with medial frontoclypeal spot smaller. Only species with flattened case entirely of leaf fragments. Relatively common in Coastal Plain and Outer Piedmont.
- N. waccamawensis* – larvae up to 11 mm; head with light spots on slightly darker background; no tracheal gills on posterolateral corners of metanotum; metasternum with less than 20 setae. Endemic to Lake Waccamaw, NC. No BAU records or reference specimen. Listed by NC Natural Heritage Program as Significantly Rare (2008).

Notes: Moderately intolerant. In general sampling, only *N. exquisita* and *N. pavida* are likely to be encountered.

Taxonomic references:

larvae:

- ⇒ Glover, J. B. and M. A. Floyd. 2004. Larvae of the genus *Nectopsyche* (Trichoptera: Leptoceridae) in eastern North America, including a new species from North Carolina. *Journal of the North American Benthological Society* 23 (3): 526-541.
- Haddock, J. D. 1977. The biosystematics of the caddisfly genus *Nectopsyche* in North America with emphasis on the aquatic stages. *The American Midland Naturalist* 98: 382-421.
- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23:1-326.

adults:

- Haddock, J. D. 1977. The biosystematics of the caddisfly genus *Nectopsyche* in North America with emphasis on the aquatic stages. *The American Midland Naturalist* 98: 382-421.
- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23:1-326.

Oecetis

Genus Diagnosis: Maxillary palpi extend beyond labrum; hind tibia not divided; long, sharp mandible with apical tooth separated from remainder of teeth. Common and widespread, especially in summer.

Case: distinctively curved and tapered and composed of either of root material or sand, depending on the species.

Species in NC: *avara*, *cinerascens*, (*ditissa*), *georgia*, *inconspicua*, **morsei*, *nocturna*, (*ochracea*), *osteni*, *persimilis*, (*porteri*), *scala*, *sphyra*, *sp. A*, (*sp. B*), *sp. D*, *sp. E*, *sp. F*

O. avara group:

- O. avara* – larvae 6.5-9 mm; dorsal hump with 4-6 rows of conspicuous micro-hooks on each side. Case of sand, tapered, and curved in early instars. Lotic. Uncommon in the Mountains and Sandhills.

O. furva group:

(*O. ditissa*) – larvae undescribed, but may be very similar to *O. nocturna* (based on the morphological similarity of the adults). The 10 BAU records should be considered with skepticism.

O. inconspicua – larva unknown. Most likely represents a complex of distinct larvae that represent “typical” *O. inconspicua* adults. Recorded from GSMNP.

O. inconspicua complex:

O. sp. A – larvae 7.5 mm; head pattern distinct with mostly dark frontoclypeus with two pale spots mesolaterally which are usually connected mesally, dark muscle scars often coalesced into blotches on the parietal sclerites, and an often obscured centrally located pale spot with a medial dark spot removed toward the frontoclypeal angle which is itself pale; ventral apotome light yellow; pronotum yellow with dark muscle scars posteriorly and with diffuse coloration mesally. Dark forms can be confused with *O. sp. E*. Case of wood and detritus or of sand, tapered. Widespread but uncommon.

(*O. sp. B*) – larvae 7 mm; head dark brown except for pair of pale spots along frontoclypeal sutures at middle of frontoclypeus; pronotum dark brown with pale areas along posterior margin. Case of sand and detritus, dorsoventrally flattened and tapered. No BAU records but apparently found in Lake Mattamuskeet and the Perquimans River (citation or reference?).

O. sp. D – larvae 5-6 mm; head and thorax pale; mesonotum with a transverse row of 28 setae. Very similar to *O. nocturna* including the case. Case of sand with large ballast stones on side. Found only in Lake Waccamaw although the BAU has recent records of *O. sp. D* in the Tar and Lumber Rivers. Need to verify. A rare Coastal Plain species. Less than 15 BAU records. Listed by NC Natural Heritage Program as Significantly Rare (2008).

O. sp. E – larvae 8 mm; distinct head pattern dark brown to black with fewer pale areas than *O. sp. A*. two pale spots mesolaterally on frontoclypeus, pale stripes from back of head which curve up to frontoclypeus and then curve back and merge with the pale areas around eyes; ventral apotome dark brown; pronotum mostly dark sometimes with a transverse row of pale spots medially, anterior margin pale; 4-7 setae on metasternum. Case similar to that of *O. sp. A* or composed of spirally arranged pieces of vegetation. Associated with emergent vegetation and Carolina Bay lakes. Rare with 10 BAU records in swamps and slow moving waters. No reference specimen.

O. sp. F – larvae 6-6.5 mm; head and pronotum with distinct dark muscle scars and spots, similar to *O. persimilis* except for less mottling and more distinct medial frontoclypeal pale spots along the sutures; ventral apotome very pale except for dark anterior edge; pronotum mostly pale with dark muscle scars in posterior half. Case of sand, tubular and tapered. Primarily lentic. BAU has less than 10 records in swamps and streams of Coastal Plain. No BAU reference specimen.

O. nocturna – larvae 6-8 mm; head yellow with dark muscle scars, indistinct in some specimens; antennae short; pronotum yellow with dark muscle scars along posterior border; mesonota with 7-8 setae at anterolateral corner. Case of sand, dorsoventrally flattened with large ballast stones on side. Uncommon.

(*O. porteri*) – larvae 7 mm; head and pronotum with many small reddish-brown spots/reticulations and well defined muscle scars; antennae long; ventral apotome reddish-brown and subrectangular. Case of sand, tubular and tapered with smooth exterior. In sandy bottomed lakes of the Coastal Plain. Associated with emergent vegetation. In the Carolina Bay lakes, including Lake Waccamaw. Rare.

O. lais group:

O. osteni – larvae 6 mm; two distinctive rows of 3-4 dark muscle scars along each side of coronal suture; creased mandibles; irregular brown areas on mesonotum. Case of sand, tubular and tapered. Primarily lentic but may be in slow moving waters. Rare with only 2 BAU records from the Roanoke River, Bertie County. No BAU reference specimen.

O. ochracea group:

(*O. ochracea*) – larvae 13-14 mm; head yellow with dark muscle scars and 3 large spots on dorsum of head, 1 spot between each eye and frontoclypeal suture and one diffuse spot overlaying dark muscle scars in frontoclypeal angle; antennae long; pronotum yellow with darker anterior area and dark spots along posterior margin; transverse row of 50-90 setae on the metasternum; 26-30 setae along posterior margin of tergum 9. Case of sand, tapered and curved, fragile. Lentic. Rare. Also recorded from TN and VA.

O. scala group:

**O. morsei* – larvae 5 mm; head yellow brown with many dark muscle scars and large almost confluent spots on middle area of frontoclypeus; postgenal parietal sclerites divided into distinct yellow-brown and pale areas; metasternum with 12 setae; legs without swimming hairs; lateral hump with dark, elongate, sclerite, and with one seta at base. Case of sand and slightly tapered and curved. No adult records from NC. The 70 BAU records of *O. morsei* may be any species in this group. Designate as *O. scala* group.

O. scala – larvae undescribed. May be morphologically inseparable from *O. morsei* and *O. sphyra*. Designate as *O. scala* group. No BAU reference specimens.

O. sphyra – larvae and case identical to *O. morsei*. Designate as *O. scala* group.

O. testacea group:

O. cinerascens – larvae 7-9 mm; head brown with pale muscle scars. Case of short twigs or roots (“log-cabin appearance”), tapered but usually not curved. Occurs on vegetation of slower waters and lakes of the Coastal Plain. Uncommon. Less than 50 BAU records.

O. georgia – larvae 5-6 mm; head light yellow to colorless, similar to *O. persimilis* except no well defined muscle scars on head. Case of plant material, tapered. Acidic, blackwater streams in Coastal Plain. Uncommon. Less than 100 BAU records.

O. persimilis – larvae 6-7 mm; head and pronotum with dark muscle scars and scattered brown spots, a definite, stylized “W” with two dark muscle scars anterior to it within the posterior frontoclypeal angle; metasternum with ≤ 2 setae. Most common *Oecetis* in NC. Case of plant material, often curved. No BAU reference specimen.

Notes: Strictly predatory. Identification of species groups is possible with the key in Floyd (1995). Couplet 5(3') should end with “...; *Oecetis (Pleurograpta) testacea* group.....6”. Early instars may be best left at the genus level. Records of *O. sp. 1* and *O. sp. 2* in the BAU database are unreferenced as to which possible species they could be, but have geospatial data.

Taxonomic references:

larvae:

⇒Floyd, M. A. 1995. Larvae of the Caddisfly Genus *Oecetis* (Trichoptera: Leptoceridae) in North America. Bulletin of the Ohio Biological Survey 10(3). 85pp.
Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23:1-326.

adults:

Moulton, S. R., II, and K. W. Stewart. 1993. Nearctic *Oecetis scala* group (Trichoptera: Leptoceridae) with the description of two new species from the Interior Highlands. Entomological Society of America 86:221-227.
Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23:1-326.

Setodes

Genus Diagnosis: Larvae up to 8.5 mm; sclerotized spiny anal plates on abdominal segment 10; hind tibia secondarily divided but no fringe of long hairs. Larvae are rheophilic and burrow into sand on leeward side of rocks in riffle areas or attached to stone with thick cords of silk. Uncommon. Primarily a Mountain taxon.

Case: composed of sand, tubular and slightly curved with little or no taper.

Species in NC: Leave at genus; (*arenatus*), (*incertus*), (*stehri*).

(*S. arenatus*) – head golden to dark brown. An adult record from the Sand Hills (Little River in Hoke/Moore County, 2004). Previously only known from GA and SC.

(*S. incertus*) – head pale yellow without contrasting color pattern.

(*S. stehri*) – head dark with indistinct lighter patches and darker patches on pronotum. Recorded from GSMNP.

Notes: The larval key (Nations, 1994) is difficult to use and seems circular, key characters are bifid or trifid gills which are often in poor condition or very small. No reference material.

Taxonomic references:

larvae:

Merrill, D., and G. B. Wiggins. 1971. The larva and pupa of the caddisfly genus *Setodes* in North America (Trichoptera: Leptoceridae). Occasional Papers of the Royal Ontario Museum 19: 1-12.

Nations, V.L. 1994. A phylogenetic analysis of the North American species of *Setodes* (Trichoptera: Leptoceridae) with descriptions of the larvae and key to their identification. M.S. Thesis. University of Alabama, Tuscaloosa, Alabama. 72 pp. (unpublished)

adults:

Holzenthall, R. W. 1982. The caddisfly genus *Setodes* in North America (Trichoptera: Leptoceridae). Journal of the Kansas Entomological Society 55: 253-271.

Triaenodes

Genus Diagnosis: Hind tibia secondarily divided; hind tibia and tarsus usually with dense fringe of long swimming hairs; contrasting head patterns. In macrophyte beds and on root mats.

Case: composed of short, longitudinal, and spirally arranged pieces of vegetation, usually long and tapered overall.

Species in NC: (*abus*), (*dipsius*), (*flavescens*), (*helo*), *ignitus*, *injustus*, *marginatus*, *melacus*, *ochraceus*, *perna*, (*taenius*), **tardus*, (*sp. A*), **sp. B*, (*sp. C*)

(*T. abus*) – larvae 10 mm; head with dark stripes dorsally, dark muscle scars laterally and ventrally; ventral apotome pale; anterior portion of pronotum dark with dark muscle scars posteriorly. Primarily associated with lentic vegetation. Case typical. In Glover (1996) as *T. aba*, which is an invalid name (www.ITIS.gov).

(*T. dipsius*) – larvae unknown. Previously known only from the upper Midwest. Collected from a Blue Ridge Parkway beaver pond, Watauga County (2007).

(*T. flavescens*) – larvae 10-12 mm; muscle scars almost forming lines outside frontoclypeal sutures and often fused inside frontoclypeal sutures forming parallel lines; antennae slightly pigmented. Case of typical construction but green. Associated with macrophytes. Piedmont and Coastal Plain.

(*T. helo*) – larvae 8 mm; head mostly black; head usually with a strong mesal indentation along the posterior edge of dark pigmentation near the occipital foramen; ventral apotome is more rectangular than in *T. perna*; antennae unpigmented; metathoracic legs with reduced fringe of swimming hairs. Case short and barely tapered, usually very dark. Preference for stained water. In small streams of the Coastal Plain. Separation from *T. perna* is unresolved and the two species may get combined. Designate as *T. perna/helo*.

T. ignitus – larvae 10 mm; two groups of muscle scars on frontoclypeus, one group near anterior margin with 6 spots, the second group located medially with 5 spots; muscle scars present on posterior portion of ventral apotome; antennae always pale; pro- and mesonotum with muscle scars. Case typical. Very common, widespread and usually abundant. By far, most BAU records are *T. ignitus*.

T. injustus – larvae up to 11 mm; head with dark stripes, broken into spots toward posterior area of head; the 4 muscle scars along each side of coronal suture not obscured; no pigment on pronotum but with dark muscle scars posteriorly. Case typical. Common and widespread. In BAU database as *T. injusta*, which is an invalid name (www.ITIS.gov).

T. marginatus – larvae 10 mm; similar to *T. abus* except lateral muscle scars coalesce into line; antennae always dark. Case typical. Associated with both macrophytes and root mats in streams and lakes. Widespread but relatively rare with less than 35 BAU records. Recorded from GSMNP. Listed by NC Natural Heritage Program as Significantly Rare (2008).

T. melacus – larvae 10 mm; head with dark lines dorsally and laterally; ventral apotome dark; antennae dark; pronotum mostly dark. Case typical. Usually in small streams in root mats. Piedmont only. Rare with only 10 BAU records. In BAU database and Glover (1996) as *T. melaca*, which is an invalid name (www.ITIS.gov). No reference specimens.

T. ochraceus – larvae 9 mm; parallel lines outside frontoclypeal sutures diffuse and not obscuring dark muscle scars; antennae darkened anteriorly; pronotum slightly pigmented anteriorly and with dark muscle scars posteriorly. Case typical but sometimes with larger pieces of roots or bark incorporated. In small streams and swamps of Coastal Plain. Rare with less than 20 BAU records.

T. perna – larvae 8 mm; head almost completely black and with margin of dark pigmentation along the posterior edge near the occipital foramen mostly straight; antennae unpigmented; early instars with head and pronotum light brown, as larva matures, spots form on sides of head but dorsally remains very dark; reduced swimming hairs on metathoracic legs. Case short and barely tapered, usually very dark. Relatively common and widespread in various habitats but with preference for tannic stained water. Designate as *T. perna/helo*.

(*T. taenius*) – larvae 10 mm; head pattern similar to *T. ignitus* except anterior group of frontoclypeal scars of only 4 in quadrate formation; muscle scars present on posterior portion of ventral apotome, swimming

hairs reduced on metathoracic legs. Case typical. Adults recorded from the Mountains and Piedmont. Recorded from GSMNP. Rare. In Glover (1996) as *T. taenia*, which is an invalid name (www.ITIS.gov).

- **T. tardus* – larvae 10 mm; spots on head similar to *T. ignitus* except second group of frontoclypeal muscle scars indistinct or absent; antennae may be slightly pigmented; spots on pronotum and mesonotum indistinct; metathoracic legs with anterior swimming fringe of hairs. Case typical. Mostly lentic in macrophytes but may be in rivers or streams with extensive macrophyte beds. Supposedly not in NC (Glover, 1996). Recorded from GSMNP.
- (*T. sp. A*) – larvae 9 mm; very similar to *T. ignitus* but without muscle scars on ventral apotome; metathoracic legs with anterior fringe of swimming hairs; also with dorsal gills on abdominal segments 2-6 whereas *T. ignitus* has gills on 2-3. Case typical, of *Vallisneria* (eel grass). Coastal Plain in swamps. Found in SC. May occur in NC but have no BAU records, possibly due to misidentifications as *T. ignitus*. Rare. Recorded from GA and SC.
- **T. sp. B* – larvae 12-14 mm; similar to *T. ignitus* but with fewer muscle scars outside frontoclypeal angle; no muscle scars on ventral apotome; metathoracic legs without anterior tarsal fringe of swimming hairs; short dorsal gills on abdominal segments 2-7. Case constructed of *Vallisneria*, delicate and translucent. Probably occurs exclusively in *Vallisneria*. Sand Hills. Recorded from SC. Rare.
- (*T. sp. C*) – larvae 11.5 mm; head with wide, dark stripes from near base of antennae to occipital margin entirely outside the frontoclypeus, with light muscle scars embedded in dark line along coronal suture; frontoclypeal apotome usually unpigmented; pronotum with triangular patches of pigment near anterior border; mesonotum with pigment mesally; anterior fringe of swimming hairs present on metathoracic legs; abdominal gills well developed dorsally and ventrally. Case large and composed of stem portions of macrophytes. In Carolina Bays. Very localized and rare.

Notes: Frequently with 2 or more species co-occurring. Very early instars may be best left at the genus level.

Taxonomic references:

larvae and pupae:

⇒ Glover, J. B. 1996. Larvae of the caddisfly genera *Triaenodes* and *Ylodes* (Trichoptera: Leptoceridae) in North America Bulletin of the Ohio Biological Survey 11(3). 89 pp.

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23:1-326.

(very limited in scope)

adults:

Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23:1-326.

(very limited in scope)

MOLANNIDAE

Molanna

Genus Diagnosis: Claw of metathoracic leg shorter and more stout than claws of other legs and setose; abdominal gills with 2-4 branches.

Case: of coarse sand with prominent lateral flanges and a dorsal cowl, dorsoventrally flattened.

Species in NC: *blenda*, *tryphena*, (*ulmerina*), *uniophila*

M. blenda – larvae 10-12 mm; apex of base of tibial spine extends well past tibiotarsal joint; membranous area at constriction of frons capitate; moderately wide black banding along frontoclypeal and coronal suture (“Y” shaped). Seeps and cool spring-fed streams and swamp streams. Relatively common.

M. tryphena – larvae 12-14 mm; apex of base of spine does not extend well past tibiotarsal joint; membranous area at constriction of frons quadrate; wide black banding along frontoclypeal and coronal suture (“Y” shaped). In larger streams. Primarily a southerly coastal species though some records in the Mountains. Relatively common.

(*M. ulmerina*) – larvae ?? mm; apex of base of spine does not extend well past tibiotarsal joint and shorter than apical spine; membranous area at constriction of frons quadrate; narrow black banding along

frontoclypeal suture not much wider than suture width and faint down coronal suture (“U” shaped). Lentic. Recorded from SC (Congaree NP), TN, VA, and WV as well as GSMNP.

M. uniophila – larvae ?? mm; apex of base of spine extends well past tibiotarsal joint and longer than apical spine; wide black banding along frontoclypeal and coronal suture (“Y” shaped). Primarily lentic. Rare. Less than 10 BAU records (all Coastal Plain), none recent.

Notes: A combination of the Pescador *et al.* (2004) with Sherberger and Wallace (1971) or Unzicker *et al.* (1982) is needed to determine if *M. ulmerina* occurs in NC.

Taxonomic references:

larvae:

- ⇒ Pescador, M. L., A. K. Rasmussen, and S. C. Harris. 2004. Identification manual for the caddisfly (Trichoptera) larvae of Florida. Second Edition. Florida Department of Environmental Protection, Tallahassee, Florida. 136 pp.
- ⇒ Sherberger, F. F. and J. B. Wallace. 1971. Larvae of the southeastern species of *Molanna*. Journal of the Kansas Entomological Society 44: 217-224.
- Unzicker, J. D., V. H. Resh, and J. C. Morse. 1982. Trichoptera, Chapter 9 (138 pp.). In A. R. Brigham, W. U. Brigham, and A. Gnilka, editors. *Aquatic Insects and Oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois. 837pp.

adults:

- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.
- Roy, D., and P. P. Harper. 1980. Females of the Nearctic *Molanna* (Trichoptera: Molannidae). Proceedings of the Entomological Society in Washington 82:299-236.
- Schuster, G. A. 1979. On the identity of *Molanna ulmerina* Navás (Trichoptera: Molannidae). Entomological News 90:249-250.

CALAMOCERATIDAE

Anisocentropus

Genus Diagnosis: Monotypic. Larvae 17-19 mm; labrum with transverse row of approximately 16 stout setae; orangish, dorsoventrally flattened body; pronotum extended into prominent, truncate anterolateral projections; long hind legs with secondarily divided tibia; abdominal with branched gills and prominent lateral fringe.

Prefers the slow currents of smaller streams, especially humic waters. Relatively common and widespread but especially in the Uwharrie Mountains and Sand Hills. Collected during winter through the summer.

Case: constructed of ovate pieces of leaves, one larger than the other, flattened, often attached to logs and larger cobbles.

Species in NC: *pyraloides*

Notes: Often co-occurs with *Heteroplectron americanum*. Intolerant.

Taxonomic references:

larvae:

- Wallace, J. B., and F. F. Sherberger. 1970. The immature stages of *Anisocentropus pyraloides* (Trichoptera: Calamoceratidae). Journal of the Georgia Entomological Society 5: 217-224.
- Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *A. pyraloides*)

Heteroplectron

Genus Diagnosis: Larvae up to 25 mm; labrum with transverse row of approximately 16 stout setae; head, pronotum, and mesonotum shiny dark brown; body cylindrical; pronotum extended anterolaterally but not prominent; hind leg about same length as middle leg; hind tibiae not secondarily divided. Usually in acidic waters. Relatively common and widespread but concentrated in the Mountains (particularly in the Savannah River basin) and the Sand Hills. Collected during winter through the summer.

Case: a hollowed-out twig often attached to logs and larger cobbles;

Species in NC: *americanum*

H. americanum – anterolateral pronotal projections rounded (pointed in western *H. californicum*). Only species in eastern NA.

Notes: Often co-occurs with *Anisocentropus pyraloides*. Moderately intolerant.

Taxonomic references:

larvae:

- Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *H. americanum*)

ODONTOCERIDAE

(*Pseudogoera*)

Genus Diagnosis: Monotypic. Larvae 7.0-8.5 mm; head elongate; antenna close to anterior margin of head; mesonotum covered with large sclerotized plates; pro- and mesosternum with large sclerotized plate; tibiae of forelegs broad and four times as long as tarsi; tarsi with movable apical tibial spur which is blade-like with a terminal point; abdomen without lateral fringe; anal proleg with dorsal cluster 3-5 of setae posteromesad of lateral sclerite. Found in moss and trickling portion of hygropetric zone (thin laminar flow) of small waterfalls of Piedmont and Mountains. Collected from late July through mid October.

Case: strongly curved and tapered, of coarse mineral particles.

Species in NC: *singularis*

Notes: Semivoltine. Recorded from GSMNP.

Taxonomic references:

larvae:

Wallace, J. B., and H. H. Ross. 1971. Pseudogoerinae: a new species of Odontoceridae (Trichoptera). Annals of the Entomological Society of America 64:890-894.

Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *P. singularis*)

pupae and adults:

Wallace, J. B., and H. H. Ross. 1971. Pseudogoerinae: a new species of Odontoceridae (Trichoptera). Annals of the Entomological Society of America 64:890-894.

Psilotreta

Genus Diagnosis: Antenna close to anterior margin of head; anterolateral corners of pronotum produced into sharp points; mesonotum covered with large sclerotized plates; metanotum with fusion of sa1 sclerites into one large plate; anal proleg with dorsal cluster 3-5 of setae posteromesad of lateral sclerite. Most often collected from erosional areas of Mountain, Piedmont, and Sand Hills streams (gravel).

Case: of coarse sand, tubular, slightly tapered and very strong.

Species in NC: Leave at genus unless mature; (*amera*), *frontalis*, *labida*, (*rossi*), (*rufa*)

(*P. amera*) – larvae 8-9 mm; head subcircular; head and pronotum dark reddish brown without stripes or darker pigmentation; dorsum of head strongly domed between carinae; seta 17 about half the length of seta 15; metanotum with anterior sclerite with 60-63 setae. Found in small spring seeps in the Mountains.

P. frontalis – larvae up to 14 mm; coloration variable, generally a broad black stripe extending dorsally over head, sometimes wider than frontoclypeus; two light areas anteromedial to eyes extending to anterolateral corners of frontoclypeus in all but darkest specimens; dark on pro- and mesonotum confined to middle stripes and lateral edge; pronotum with anterior edge slightly darker than ground color; anterolateral pronotal projections relatively short. Spring fed streams in Sandhills and Mountains (including Uwharrie Mountains). Less than 60 BAU records.

P. labida – larvae up to 13 mm; coloration variable, usually frontoclypeus entirely black with broad stripe extending to occipital foramen and usually darker than *P. frontalis*; pronotum with dark stripe broad sometimes nearly obscuring ground color; anterolateral pronotal projections long and acute; mesonotum nearly all dark. Spring fed and larger streams. Less than 50 BAU records.

(*P. rossi*) – larvae up to 11 mm; head and pronotum dark reddish brown without stripes or darker pigmentation; head subcircular and slightly domed between carinae; seta 17 much less than half the length of seta 15; metanotum with anterior sclerite with 86-90 setae. Described by Wallace (1970) from Macon County, NC (Coweeta Hydrological Laboratory) from small spring seeps in the southern Appalachian Mountains.

(*P. rufa*) – larvae up to 11 mm; head and pronotum uniformly reddish brown without stripes but may have darker pigmentation along frontoclypeal and coronal sutures, dark muscle scars on parietal sclerites, head longer than wide and relatively flat between carinae; seta 17 about half the length of seta 15; pronotum darker laterally; anterolateral pronotal projections short.

Notes: Identifications of immature larvae is difficult due to variation in many key characters and should be avoided. Frequency of occurrence are not provided due to the lack of species level diagnoses. All species of *Psilotreta* occurring in NC have been recorded from GSMNP.

Taxonomic references:

larvae and adults:

- ⇒ Parker, C. R. and G. B. Wiggins. 1987. Revision of the Caddisfly Genus *Psilotreta* (Trichoptera: Odontoceridae). Royal Ontario Museum Life Sciences Contributions 144. 55pp.
Wallace, J. B. 1970. A new species of *Psilotreta* from North Carolina (Trichoptera: Odontoceridae). Entomological News 81: 243-245. (adult description of *P. rossi*)

S E R I C O S T O M A T I D A E

Agarodes

Genus Diagnosis: Head without prominent carina and rounded dorsally; pronotum with anterolateral corners produced as long, acute processes; dorsum of abdominal segment 10 with about 15 setae; more than 30 setae on dorsal surface of each proleg. Greatest abundance in spring seeps and blackwater streams and associated with macrophytes such as *Vallisneria*. An uncommon genus. Widespread but most often collected from Coastal Plain streams.

Case: of uniform sand particles, slightly curved and tapered.

Species in NC: Leave at genus; (*crassicornus*), **distinctus*, **georgia*, *griseus*, *libalis*, (*tetron*), *wallacei* (*A. crassicornus*) – no larval description found. Coastal Plain and Piedmont.

**A. distinctus* – head brown to black without contrasting muscle scars; large pale suboval area on anterior margin of frontoclypeus; occipital margin of head pale; pronotum dark brown fading to light brown with dark muscle scars on posterior portion; pronotum with pale spot anteromesally. Occurs in sand and gravel on edges of rivers and lakes. Recorded from GA, SC, and TN.

**A. georgia* – head brown to black with contrasting light muscle scars; labrum light and without muscle scars; depression around head seta 5 wider than deep; frons slightly elevated. Spring to early summer species. Recorded from GA and TN.

A. griseus – head brown to black with contrasting light muscle scars; labrum light and without muscle scars; depression around head seta 5 not wider than deep; frons not appearing elevated. Springs and spring seeps with sand and gravel substrates. Piedmont. Spring species. One BAU record (1990).

A. libalis – head brown to black without contrasting muscle scars; labrum brown with paired pale muscle scars basally; pronotum light and dark brown with brown muscle scars. Blackwater streams, associated with detrital material and root mats in sandy depositional areas. Summer species. Less than 15 BAU records (last in 1991).

(*A. tetron*) – larvae unknown. Mountains only. Known only from northern GA and NC. Recorded from GSMNP. Spring and summer species.

A. wallacei – very similar to *A. griseus* but distributionally disjunct. Blackwater streams in Sandhills. Late spring. Two BAU records (both in 1990).

Notes: Larval key is in poor shape. Should leave larval designations at genus due to lack of larval-adult associations. Intolerant.

Taxonomic references:

larvae and pupae:

- ⇒ McEwan, E. 1980. Biology and life history of the genus *Agarodes* (Trichoptera: Sericostomatidae) in the southeastern US. M.S. Thesis, Clemson University. Clemson, South Carolina. 67 pp. (BAU copy woefully incomplete)
Ross, H. H., and J. B. Wallace. 1974. The North American genera of the family Sericostomatidae (Trichoptera). Journal of the Georgia Entomological Society 9:42-48.
Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *A. distinctus*)

adults:

- Ross, H. H., and D. C. Scott. 1974. A review of the caddisfly genus *Agarodes*, with descriptions of new species (Trichoptera, Sericostomatidae). Journal of the Georgia Entomological Society 9:147-155.

Fattigia

Genus Diagnosis: Monotypic. Larvae up to 15 mm; head with prominent carina and flattened dorsally; pronotum with anterolateral corners produced as long, acute processes; dorsum of abdominal segment 10 with about 40 setae; more than 30 setae on dorsal surface of each proleg. Mountains only. Uncommon. Collected from winter through early summer.

Case: Slight curved sand case similar to that of *Agarodes*.

Species in NC: *pele*

Notes: Semivoltine. Intolerant.

Taxonomic references:

larvae and pupae:

- Ross, H. H., and J. B. Wallace. 1974. The North American genera of the family Sericostomatidae (Trichoptera). *Journal of the Georgia Entomological Society* 9:42-48.
Wiggins, G. B. 1996. *Larvae of the North American Caddisfly Genera (Trichoptera)*, Second Edition. University of Toronto Press, Toronto. (illustration of *F. pele*)

* B E R A E I D A E

****Beraea***

Genus Diagnosis: Larvae up to 6.6 mm; head and sclerites orangish in color; head with sharp ridge along each side of head; antennal origin approaching labrum; sharp transverse submedial carina across pronotum that terminates into a rounded lobe at each anterolateral corner; mesonotum lightly sclerotized, metanotum without sclerites and with anterior patch of setae instead; mesal surface of base of anal claw membranous and bearing a cluster of 35-30 setae; lateral sclerite of anal proleg reduced and extended posteriorly as a sclerotized conical lobe bearing a single stout seta. Spring seeps.

Case: composed of fine sand, curved and tapered, with exterior surface smooth.

Species in NC: **gorteba*

**B. gorteba* – occurs in wet, organic muck around spring seeps. Supposedly the only species in southeastern US. Described from Georgia. An unidentified *Beraea* (life stage unknown) was recorded from GSMNP.

Notes: Listed by NC Natural Heritage Program as Significantly Rare (2008) despite the fact that there have been no verified adult or larvae records from NC.

Taxonomic references:

larvae and pupae:

- Hamilton, S. W. 1985. The larva and pupa of *Beraea gorteba* Ross (Trichoptera: Beraeidae). *Proceedings of the Entomological Society of Washington* 87:783-789.
Wiggins, G. B. 1954. The caddisfly genus *Beraea* in North America (Trichoptera). *Life Science Contributions, Royal Ontario Museum* 39: 1-13. (description of *B. fontana*)

adults:

- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. *Bulletin of the Illinois Natural History Survey* 23:1-326.
Wiggins, G. B. 1954. The caddisfly genus *Beraea* in North America (Trichoptera). *Life Science Contributions, Royal Ontario Museum* 39:1-13.

H E L I C O P S Y C H I D A E

Helicopsyche

Genus Diagnosis: Foretrochantin unusually long; anal claw comb-like.

Case: composed of sand with unique helical design, very similar to a snail shell, about 5 mm wide.

Species in NC: *borealis*, *paralimnella*

H. borealis – larvae up to 8 mm; head and thoracic sclerites brown with conspicuous muscle scars; dark markings in frontoclypeal like “U” with the dark pigment projecting anterolaterally (see Wiggins, 1996). Usually in larger rivers but can be in littoral zone of lakes. Widespread and often abundant.

H. paralimnella – larvae 4-5 mm; head dark brown without conspicuous muscle scars; has dark lateral sclerite on each anal proleg. Found in larger Mountain streams. Less than 10 BAU records. Listed as “vulnerable to extirpation” by Morse *et al.* (1997).

Notes: Very intolerant as a group. Some *H. borealis* records may, in fact, be *H. paralimnella* as *H. borealis* was thought to be the only species in eastern North America until 1989.

Taxonomic references:

larvae and pupae:

- ⇒Floyd, M. A. 1995. The larvae and pupae of the caddisfly species *Helicopsyche paralimnella* Hamilton (Trichoptera: Helicopsychidae). Proceedings of the Entomological Society of Washington 97 (1): 46-49.
- Ross, H. H. 1944. The caddisflies or Trichoptera of Illinois. Bulletin of the Illinois Natural History Survey 23: 1-326.
- Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto. (illustration of *H. borealis*)

adults:

- Morse, J. C., S. W. Hamilton, and K. M. Hoffman. 1989. Aquatic insects of Lake Jocassee catchment in North and South Carolina, with description of four new species of caddisflies (Trichoptera). Journal of the Elisha Mitchell Scientific Society 105:14-33. (description of *H. paralimnella*)
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- Morse, J. C. 1997. Phylogeny of Trichoptera. Annual Review of Entomology 42:427-450.
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- Wiggins, G. B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera), Second Edition. University of Toronto Press, Toronto.

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- Etnier, D. A., and G. A. Schuster. 1979. An annotated list of Trichoptera (caddisflies) of Tennessee. Journal of the Tennessee Academy of Science 54:15-22.
- Etnier, D. A., J. T. Baxter, S. J. Fraley, and C. R. Parker. 1998. A checklist of the Trichoptera of Tennessee. Journal of the Tennessee Academy of Science 73:53-72.
- Flint, O.S., Jr., R.L. Hoffman and C.R. Parker. 2004. An annotated list of the caddisflies (Trichoptera) of Virginia: Part II. Families of Integripalpia. Banisteria 31: 3-23.
- Flint, O.S., Jr., R.L. Hoffman and C.R. Parker. 2008. An annotated list of the caddisflies (Trichoptera) of Virginia: Part I. Introduction and families of Annulipalpia and Spicipalpia. Banisteria 24: 23-46.
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THE FAR SIDE

By GARY LARSON



How entomologists pass away