

ECO Photo Guide to Aquatic Macroinvertebrates of the Southern Appalachian Mountains

STONEFLIES (Order Plecoptera): Always with two ‘tails’, no gills on back (although may be around legs), two pairs of wing pads, feet always with two claws

1) Giant Shredder (Family Pteronarcyidae):

1”-2”, stout, cylindrical bodied dark colored stonefly. Slow crawler, found in leaf packs. Bushy gills along thorax and under body near legs. *Shredder- Sensitive*



2) Roach Shredder (Family Peltoperlidae):

½”-1”, brown, moves quickly. Resembles a cockroach (body somewhat rounded or teardrop shaped), abundant in leaf packs. *Shredder- Sensitive*



3) Quick Crawling Predator (Families Perlidae, Chloroperlidae, Perlodidae):

½”-2”, brown, black or gold colored, fast crawlers, stout bodied. Some slightly flattened, others more rounded. Many boldly patterned and/or have obvious gills around legs. Smaller specimens have duller colors. *Shredder- Sensitive*



4) Fragile Detritivore (Families Capniidae, Leutridae, Nemouridae, Taeniopterygidae):

¼”-1”, thin abdomen, dully colored with little or no patterning, fragile. If specimen is not especially thin, fragile looking or light colored then insect has developed, wide wing pads with deep lobes. *Shredder- Sensitive*



MAYFLIES (Order Ephemeroptera): Most have three ‘tails’ but some may have two, gills along back or sides, one pair of wingpads, feet with one claw

5) Flattened Scrapers (Family Heptageniidae):

¼”-1”, light brown to black, patterned. Body compressed (flattened), broadened fore legs, large eye spots, very broad and flat heads, either two or three tails, which are usually spread far apart. *Scraper- Sensitive*



6) Spiny Crawlers (Families Ephemerellidae, Caenidae, Tricorythidae, Neophemeridae):

¼”-1”, Spines along sides of body. Insect has large wing pad and ‘hammer head’. Insect may arch body scorpion-like. Usually dark, but smaller specimens can be light or translucent. *Collector- Sensitive*



7) Round Headed Swimmers (Families Ameletidae, Baetidae, Leptophlebiidae, Siphonuridae):

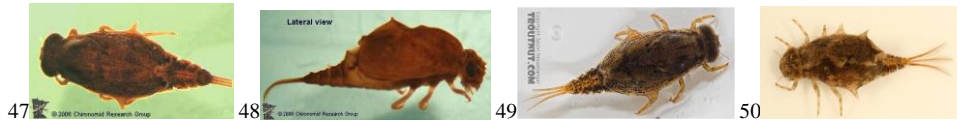
¼”- ½”, fragile, long thin legs, round head and abdomen, either 2 or 3 tails, drably colored but a few may have markings or patterns. Swims like a dolphin, by undulating the body. Gills on sides of abdomen usually round, but can be pronged or forked. *Collector- Moderate*



8) Burrowing Mayflies (Family Ephemeridae): ½"-1½", often large and stout bodied, prominent feathery gills arranged along the back of bushy tufts (not on sides), forelegs adapted for digging in sandy sediments, tusks sometimes observable on the head. *Collector- Sensitive*



9) Spiny Turtle Mayflies (Family Baetiscidae): up to ½", enlarged spiny shell covering the majority of middle of the animal, resembling a turtle shell, may cover gills. *Collector- Sensitive*



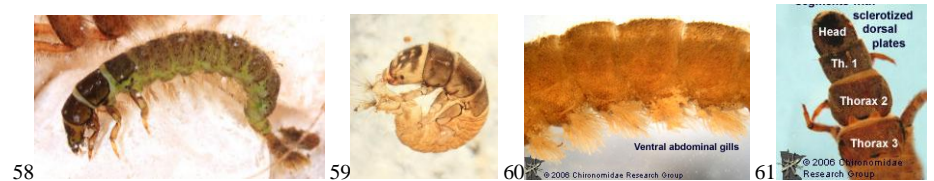
10) Filter Mayfly (Families Oligoneuridae, Isonychiidae): ½"-1", darkly colored very active insect. Has brushes on fore legs, fast swimmer, prominent circular gills on sides of abdomen Larger than Round Headed Swimmers. The wingpad is small and body is very streamline. *Filterer- Sensitive*



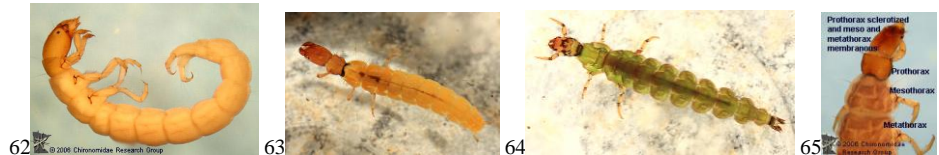
CADDISFLIES (Order Tricoptera): Six legs, often in a hardened case of mineral or organic matter, may be 'free living' and not in a case. Head distinctly hardened and often patterned, hooks at the end of body, may or may not have gills along abdomen.

FREE LIVERS

11) Net Spinning Caddisflies (Families Hydropsychidae): ½"- 1", 'C' shaped in the pan, bushy gills underneath body and at tail, builds a retreat to hide in. They have three hard plates behind the head. *Collector/Filterer- Moderate*



12) Small Head Caddisflies (Families Rhyacophilidae, Philopotamidae, Polycentropodidae, Psychomyiidae): ¼"-1", Resemble net spinners, but have no gills and a narrower head. They have only one small hard plate behind the head. They may be white, green or brown. *Predator- Sensitive*



ORGANIC CASE

13) Stick Bait Caddisflies (Family Limnephilidae, Genus Pycnopsyche): 1"-3" including case, case is big, messy and has prominent 'ballast' pieces of sticks that are attached to the sides of the case. *Shredder- Sensitive*



14) Square Log Cabin Caddisflies (Family Brachycentridae): ¼"- ½", Cases are stouter than other square cases, made of wound strips of wood fibers, not fragments of leaves. *Filterer- Sensitive*



15) Sand and Stick Case Caddisflies (Family Leptoceridae): ¼"- ½", Cases constructed from both mineral and organic materials belong in this category and may be a variety of shapes and sizes. *Collector- Moderate*



16) Vegetated Case Caddisflies (Several Families): This category is for all caddisflies with organic cases which do not fit above categories. These insects and cases have a variety of sizes and shapes and habitat preferences. *Shredder- Sensitive*

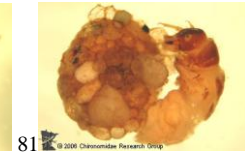


MINERAL CASE

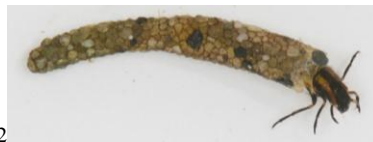
17) Gravel Coffin Case Caddis (Family Uenoidae, Glossosomatidae): $\frac{1}{4}$ "- $\frac{1}{2}$ ", Coffin or saddle shaped case of gravel particles, may be aggregated in large clusters. Cases mostly closed, with only a small portion of space free for the insect to feed or be observed (not round hole at the end). *Scraper- Sensitive*



18) Sand Snail Shell Caddis (Family Helicopsychidae): $\frac{1}{4}$ ", Coiled mineral fragment case strongly resembles a snail shell, shell is small. *Scraper- Sensitive*



19) Sand and Mineral Case Caddisflies (Several Families): This category includes any caddisflies with cases fabricated from small mineral particles or sand which did not fit above categories. *Scraper- Sensitive*



BETTERES (Order Coleoptera): Insect with six legs (adults with shell extended over middle thoracic segments, no tails; larvae six legged, gills or not, no tails, tougher bodied than free living caddisflies).

20) Water Penny (Family Psephenidae): $\frac{1}{8}$ "- $\frac{1}{2}$ ", Water pennies stick to rocks and leaves, body very flat circular, legs and body of insect are visible underneath the penny-like shell. *Scraper- Moderate*



21) Predator Beetle Larvae (multiple families): Strong biting mouthparts. If they have leg-like appendages then they either lack tails or are long and thin.. These insects are larvae of other types of beetles (not riffle beetles). *Predator- Moderate*



22) Adult Riffle Beetles (Family Elmidae): $\frac{1}{8}$ "- $\frac{1}{2}$ ", Beetles collected from moving water are generally in this category, many patterns, generally dark colors. *Scraper/Collector- Moderate*



23) Larval Riffle Beetles (Family Elmidae): $\frac{1}{8}$ "- $\frac{1}{2}$ ", Larvae do not resemble adults. The body of larval riffle beetles has no gills and are tougher than caddisflies, and often has a triangular 'keel' along the abdomen. *Scraper/Collector- Moderate*



MEGALOPTERANS (Order Megaloptera): Insects darkly colored and possess strong mouthparts. Appendages on side of body resemble legs but have no joints. Gills present or not.

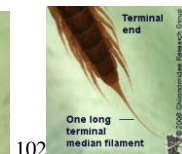
24) Hellgrammite (Family Corydalidae): $\frac{3}{4}$ "- 3", aggressive predator, tufted gills on the underside of the abdomen, two tails and two abdominal hooks at end of body. *Predator- Moderate*



25) Fishfly (Family Corydalidae): $\frac{1}{2}$ "-1 $\frac{1}{2}$ ", lighter colored than the hellgrammite, has two tails and no gills underneath the body. *Predator- Tolerant*



26) Alderfly (Family Sialidae, Genus Sialis): $\frac{1}{2}$ "-1 $\frac{1}{2}$ ", one tail instead of two at the end of the body, no gill tufts and no hooks at the end of the abdomen. *Predator- Tolerant*



SEGMENTED WORMS (Class Clitellata): Non-insects without legs

27) Oligochaete (Subclass Oligochaete): ¼"-2", Oligochaetes are worms not insects. They resemble thin pink or red earthworms and have no hard parts or legs. *Collector- Tolerant*



28) Leech (Subclass Hirudinea): ¼"-2", relatively uncommon and rarely parasitic to humans in our area. These slimy organisms have sucker pads at the ends of the body. *Predator- Tolerant*



DIPTERANS (True Flies, Order Diptera): Soft bodied insects, worm like, do not exhibit jointed legs typical of insects, but may have prolegs or other types of appendages.

29) Watersnipes (Family Athericidae, Genus Atherix): up to ¾", feathery appendages and/or 'horns' at the rear of the body, several prolegs, tapered head, cream to greenish colored. *Predator- Sensitive*



30) Water-worm (Family Tipulidae): ½"-2", found in the leafpacks, cream to brown, larger than the Fat Headed Cranefly, caterpillar-like segmented body with no bulbous tip, gills tentacle like at the end of body. *Shredder- Moderate*



31) Fat Headed Cranefly (Family Tipulidae): ½"-1", smaller than water-worm with round, swollen segment at the end of the body, gills tentacle like at end of body. *Predator- Sensitive*



32) Chironomid Midge (Family Chironomidae): ⅛"- 1", often C-shaped, head visible, prolegs at head and one at end of insect. Resembles Caddisfly which have six legs. *Collector-Moderate*



33) Red Midge (Family Chironomidae): up to ½", insect is another type of Chironomid Midge, but is bright red due to hemoglobin-like molecule in the insect. *Collector- Tolerant*



34) Blackfly (Family Simuliidae): up to ½", resemble bowling pins with furry ears (ears may be hard to see), single proleg near head, often found in large numbers fastened tightly to rocks, leaves or logs with suction pads. *Filterer-Tolerant*



CRUSTACEANS (Subphylum Crustacea)

35) Crayfish (Family Cambaridae): Crayfish are many sizes and colors and resemble lobsters (two large claws). *Collector- Moderate*



36) Sowbug (Order Isopod): Dark colored, more than six legs, long antenna, resemble wood lice or pillbugs found on land. *Collector- Moderate*



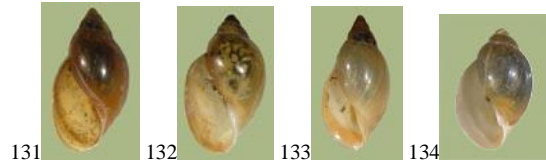
37) Scud (Order Amphipod): Light colored, more than six legs, resemble small shrimp, fast swimmers and crawlers, swim on sides. *Collector- Tolerant*



SNAILS (Class Gastropoda)

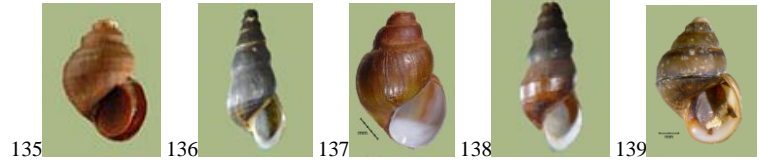
38) Coiled Left Facing Snail (Family

Physidae): These snails breathe atmospheric oxygen and not water. With apex up and facing the opening of the shell, the shell will open to the left. This snail is generally more tolerant of pollution than the right face. *Scraper- Tolerant*



39) Coiled Right Face Snail (Subclass

Prosobranchia): Resembles left face snail, but shell opens to the right. They have gills, get oxygen from the water. The shells tend to be harder than left facing snail. *Scraper- Sensitive*



40) Rounded Right Face Snail (Family

Planorbidae): These snails also breathe oxygen from the air and are pollution tolerant. The shell is coiled in a single plane (like a rolled up garden hose). *Scraper- Tolerant*



41) MUSSELS AND CLAMS (Order

Unionoida): Animal enclosed in shell with two hinged shells of relatively equal size and shape. *Filterer- Moderate*



ODONATES (Order Odonata): Six jointed legs, large eyes, three flat paddles or points at rear of body, extendable mouth parts, use 'jet propulsion' to aid movements (look for water moving at rear of insects, near points or paddles).

42) Damselflies (Families Calopterygidae, Lestidae, Protoneuridae, Coenagrionidae): 1/2" to 1 1/2", six legs, two or three blade like appendages at the end of the abdomen, often thin bodied and slow moving. *Predator- Tolerant*



43) Dragonflies (Families Gomphidae, Petaluridae, Aeshnidae, Cordulegastridae, Corduliidae, Libellulidae): 1/2" to 2", stout bodied, six legs, three small points on last segment, body oval, rounded or elongated. *Predator- Moderate*



Content Credits

Kara Raymond, Jason Robinson (Kanugalihi Consulting), BIO-ASSESS © 1999, William G. Deutsch and Auburn University

Photo Credits

Arthur Bogan- Work Book and Key to Freshwater Mussels of North Carolina, 2002: 145, 146, 147, 148, 149

Donald Chandler: 1, 139

Chironomid Research Group- Moriya Rufer: 2, 16, 17, 25, 31, 33, 34, 36, 37, 44, 46, 47, 48, 53, 54, 60, 61, 62, 65, 80, 81, 83, 87, 88, 89, 92, 93, 99, 101, 102, 112, 114, 116, 121, 123, 155, 157

The Freshwater Gastropods of North Carolina- Robert Dillon Jr., Brian Watson and Timothy Stewart : 131, 132, 133, 134, 135, 136, 137, 138, 140, 141, 142, 143, 144

Tony Gallucci: 105

Mandy Howe: 113

Stephen Luk: 20, 24, 41, 51, 52, 71, 95, 152

Tom Murray: 3, 6, 7, 10, 11, 12, 13, 14, 15, 19, 21, 22, 23, 26, 28, 29, 30, 35, 40, 42, 43, 50, 55, 56, 58, 59, 63, 64, 66, 67, 68, 69, 70, 72, 73, 74, 75, 76, 79, 82, 84, 86, 94, 100, 107, 109, 110, 111, 115, 118, 119, 120, 127, 128, 130, 150, 151, 153, 156, 158, 159

Jason Neuswanger- Troutnut.com: 4, 5, 8, 9, 18, 27, 32, 38, 45, 49, 57, 77, 78, 97, 98, 103, 104, 106, 108, 117, 122, 139, 154

Arlo Pelegrin: 124

Mike Quinn - TexasEnto.Net: 85, 90, 91, 129