Guide to Aquatic Invertebrates

This guide is designed to assist with the identification of aquatic invertebrates found in our rivers, streams and wetlands. General information is included about the distinguishing features that aid in identification of each order or class. The guide should be used is for the quick identification of the major orders; it makes no attempt to provide family level descriptions. You should refer to more complete guides to determine the family. A select few representative illustrations from each major group are provided. The first sections of the guide provide illustrations of common aquatic insects (class Insecta) and the latter sections provide illustrations of non-insect groups. Boxes are used to place similar groups together. The illustrations and indicated text include embedded Internet links that provide additional images and information. Illustrations are drawn either in plan (dorsal) or side (lateral) views; except the water penny (the underside is illustrated). For additional resources visit the West Virginia Save Our Streams web page or contact the coordinator through the address provided below:

West Virginia Department of Environmental Protection
WV Save Our Streams Program
601 57th Street, SE
Charleston, WV 25304

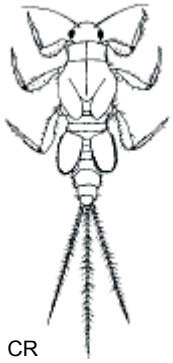
Baetidae (Small minnow mayfly)

SR

Ephemerellidae (Spiny crawler mayfly)

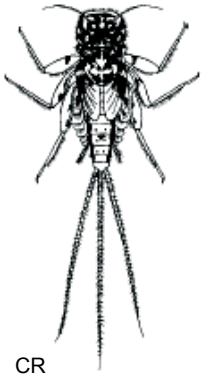
CR

Tricorythidae (Stout crawler mayfly)



CR

Heptageniidae (Flathead mayfly)



CR

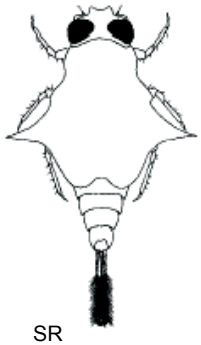
Isonychiidae (Brushlegged mayfly)

SR

Leptophlebiidae (Prong-gilled mayfly)

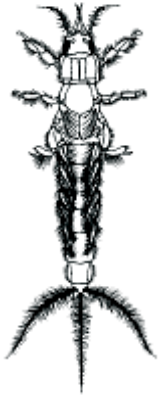
CR

Beatiscidae (Armored mayfly)



SR

Ephemeridae (Burrowing mayfly)



SR

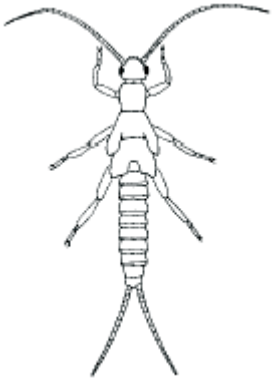
Phylum Arthropoda; class Insecta; order **Ephemeroptera**; Mayflies:

Three-pairs of segmented legs with one claw at the end; Most kinds have three tail filaments, in some kinds the middle filament is reduced or absent; Gills attached to the sides of the abdomen; In some kinds the gills are concealed by other body projections.

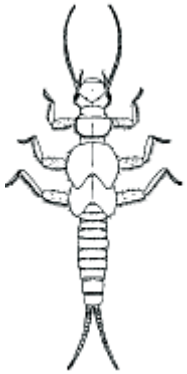
Mayfly families exhibit three unique body type/movement characteristics that have adapted based upon their habitat preferences:

The **clingers** and **crawlers** (CR) cling to and slowly crawl along the surfaces of rocks, woody debris and vegetation. They are usually awkward swimmers. The **swimmers** (SR) usually move with short fast bursts in the water column and most are also proficient crawlers. Their swimming movements in your collection pan are an easy to recognize characteristic. The **burrowers** (BR) bury themselves into sandy substrates. They usually swim using an undulating movement.

Capniidae (Small winter stonefly)

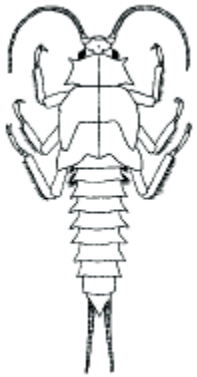


Chloroperlidae (Green stonefly)

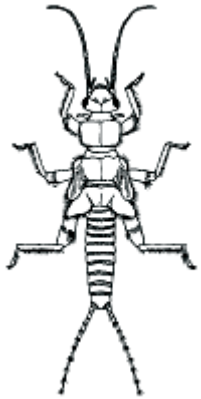


Perlidae (Common stonefly)

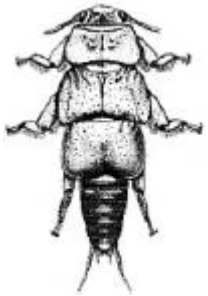
Pteronarcyidae (Giant stonefly)



Nemouridae (Brown stonefly)



Peltoperlidae (Roach-like stonefly)



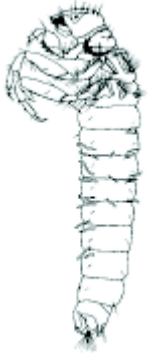
Hydropsychidae (Common netspinning caddisfly)

Philopotamidae (Fingernet caddisfly)

Polycentropodidae (Tubenet caddisfly)

Rhyacophilidae (Free-living caddisfly)

Brachycentridae (Humpless case caddisfly)



Glossosomatidae (Saddle case caddisfly)

Phylum Arthropoda; class Insecta; order **Plecoptera**; Stoneflies:

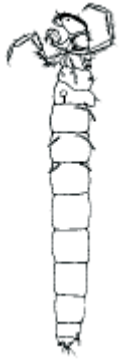
Three-pairs of segmented legs with two claws at the end; Two tail filaments; Gills variable in shape (mostly filamentous) attached to the head, thorax and legs; No gills on the abdomen but a few kinds may have gills on the first few abdominal segments.

Phylum Arthropoda; class Insecta; order **Trichoptera**; Caddisflies:

Three-pairs of segmented legs located close to the head; head is hardened and there are 2 or 3 hardened plates on top of the thorax; abdomen is soft and ends with a pair of hooked pro-legs; some kinds (especially case builders) bear abdominal humps on one or both sides of the upper abdomen; Most have a grub-like appearance and often will curl and undulate its body. Caddisflies exhibit the unique habit of building either cases or nets made with a wide variety of streambed materials. These are held together by a silken-material. The shape and materials of the retreats can sometimes be diagnostic of the family, however in most cases the case is lost during collection.

The family **Rhyacophilidae** uses their silken-material as an attachment device only. They do not build a net or case. Often green in color. The family **Hydropsychidae** is distinguished from other kinds by its abundant gills on the underside of the abdomen. This family is slightly more tolerant than most kinds of caddisflies.

Leptoceridae (Longhorn case caddisfly)



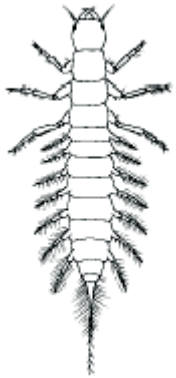
Limnephilidae (Northern case caddisfly)

Lepidostomatidae (Case-maker caddisfly)

Pyralidae (Aquatic moth)

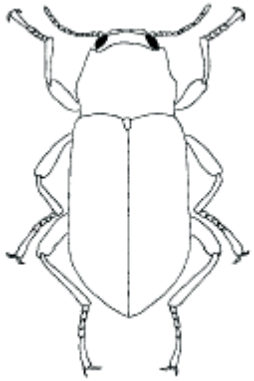
Corydalidae (Hellgrammite)

Sialidae (Alderfly)

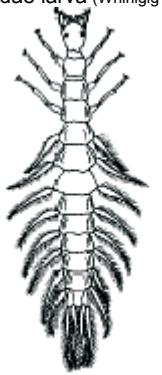


Elmidae larva (Riffle beetle)

Elmidae adult (Riffle beetle)



Gyrinidae larva (Whirligig beetle)



Gyrinidae adult (Whirligig beetle)

Haliplidae larva (Crawling water beetle)

Haliplidae adult (Crawling water beetle)

Phylum Arthropoda; class Insecta; order **Lepidoptera**; Aquatic moths:

Three-pairs of segmented legs; leg-like filaments ending in tiny hooks attached to the abdomen.

Phylum Arthropoda; class Insecta; order **Megaloptera**; Fishflies, Hellgrammites and Alderflies:

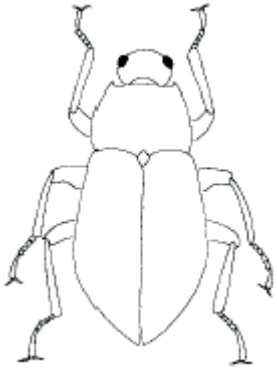
Three-pairs of segmented legs with two claws at the end; head is hardened and has large pinchers; abdomen is soft and has long lateral filaments along its length; abdomen terminates into either two-hooks (fishflies and hellgrammites) or a single filament (alderflies).

Phylum Arthropoda; class Insecta; order **Coleoptera**; Beetles:

Adults: Three-pairs of segmented legs; two-hooked claws at the end of each leg; hardened wing pads, which usually cover most or all of the body; the undersides of the body are also hardened.
Larva: Three-pairs of segmented legs; two-hooked claws at the end of each leg; no wing pads; may have lateral filaments along the abdomen.

Illustrations from the order **Hemiptera** (True bugs) are not included in this guide but a brief description is provided: Three-pairs of segmented legs with two claws at the end; mouthparts modified into long piercing or sucking beaks; adults have a modified hind wing with a leathery base.

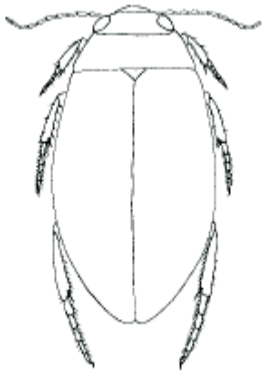
Dryopidae (Long toed beetle)



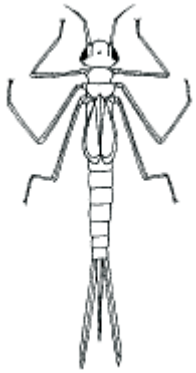
Psephenidae (Water penny)

Dytiscidae larva (Predaceous diving beetle)

Dytiscidae adult (Predaceous diving beetle)

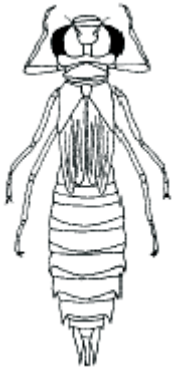


Calopterygidae (Broad-wing damselfly)

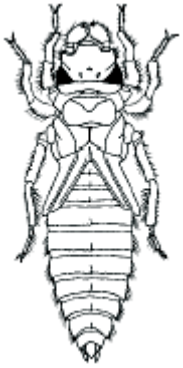


Lestidae (Spread-wing damselfly)

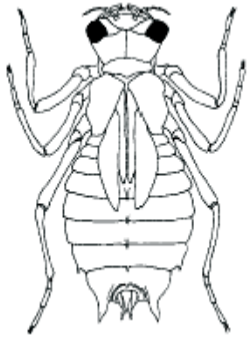
Aeshnidae (Darner dragonfly)



Gomphidae (Clubtail dragonfly)



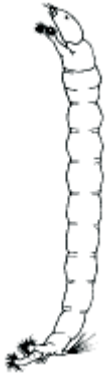
Libellulidae (Skimmer dragonfly)



Athericidae (Watersnipe fly)

Tipulidae (Crane fly)

Chironomidae (Non-biting midge)



Phylum Arthropoda; class Insecta; order **Odonata**, sub-order **Zygoptera**; Damselflies; sub-order **Anisoptera**; Dragonflies:

Three-pairs of segmented legs; two-hooked claws at the end of each leg; has a lower lip (labium), which forms an extendable mask-like or scoop-like appendage that covers the mouth parts; mature larvae have large eyes and two wing pads; dragonflies have a broad abdomen that terminates into five points and no gills; damselflies have a slender abdomen that terminates into three tail-like filaments, which are the gills.

Phylum Arthropoda; class Insecta; order **Diptera**; True flies:

Head may be a capsule-like structure with thick hard skin; head may be partially reduced so that it appears to be part of the thorax, or it may be greatly reduced with only the mouthparts visible; no wing pads occur on the thorax; false-legs (pro-legs) may extend from various sections of the thorax and abdomen in some kinds; no segmented legs in the larval forms; thorax and abdomen composed of entirely soft skin, but some kinds may have hardened plates scattered on various body features. Several families are described in more detail below:

Chironomidae: worm-like segmented body; clearly visible head; prolegs at the front and rear ends. Some kinds of Chironomids are **red** in color.
Tipulidae: long segmented body; whelps along the abdomen; lobe-like, bulbs or tentacles at the end; head is reduced.

Ceratopogonidae (Biting midge)

Simuliidae (Black fly)

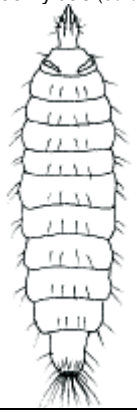
Blephariceridae (Net-wing midge)

Empididae (Dance fly)

Dixidae (Dixid midge)

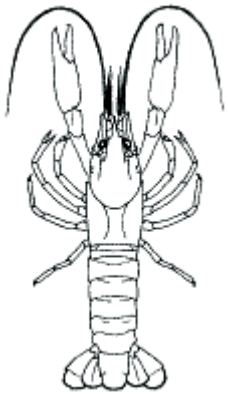
Tabanidae (Horse fly)

Stratiomyidae (Solider fly)

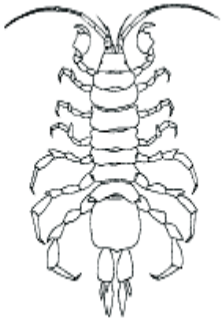


Ptychopteridae (Phantom crane fly)

Cambaridae (Crayfish)



Asellidae (Aquatic sowbug)



Gammaridae (Scud)

Diptera continued:

Simuliidae: brush-like structures at the head; swollen (vase-like) abdomen that terminates into a ring of hooks. **Athericidae**: caterpillar-like body with whelps; pro-legs attached to most abdominal segments; two-tails fringed with hairs.

Phylum Arthropoda; class Crustacea; order **Decapoda**; Crayfish:

Body mostly dorsally flattened; two-pairs of antennae one longer than the other; five-pairs of legs, first three-pairs with hinged claws and the first pair of claws are greatly enlarged; abdomen terminates in a flipper-like structure.

Phylum Arthropoda; class Crustacea; order **Isopoda**; Aquatic sowbug:

Body dorsally flattened; two-pairs of antennae one longer than the other; seven-pairs of legs, the first is claw-like and slightly enlarged, and the others have a simple pointed claw.

Phylum Arthropoda; class Crustacea; order **Amphipoda**; Scud:

Body flattened from side to side; one pairs of antennae of equal length; seven-pairs of walking legs, first two claw-like the remaining are simple. Have a shrimp-like appearance and a sideways swimming motion.

Phylum Mollusca; class **Gastropoda**, sub-class Prosobranchia; Operculate snails:

Has a flat lid-like structure called an operculum that can seal the body of the snail inside the shell; the whorls of the shell often bulge out to the sides (inflated). Most families have their shell opening on the right side.

Viviparidae (Operculate snail)

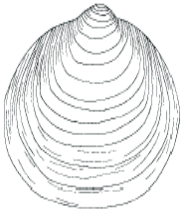
Pleuroceridae (Operculate snail)

Physidae (Non-operculate snail)

Planorbidae (Non-operculate snail)

Ancylidae (Non-operculate snail)

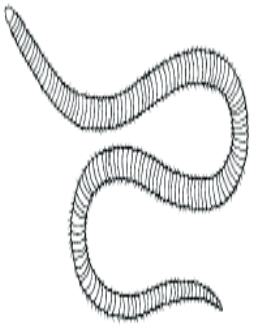
Sphaeriidae (Pea clam)



Corbiculidae (Asian clam)

Unionidae (Mussel)

Oligochaeta (Aquatic worm)



Hirudinea (Leech)

Turbellaria (Flatworm)

Phylum Mollusca; class **Gastropoda**, sub-class Pulmonata; Non-operculate snails:

Does not have an operculum; the whorls of the shell do not distinctly bulge out to the sides; often the shells of most kinds are shaped like a low flat cone or coiled flat instead of being extended in a spiral shape.

Phylum Mollusca; class **Bivalvia**; Clams and Mussels:

Two-shells opposite of each other and strongly connected by a hinged ligament; the shell is thick and strong or thin and fragile in some kinds; growth rings are placed far apart and are distinctly raised, or very close together and hardly raised at all; the foot usually consists of two tubular structures that can often be seen protruding from the shell; the body is soft tissue.

Phylum Annelida; class **Oligochaeta**; Aquatic worms:

Body elongated and divided into many segments; most segments have bundles of hairs; no eyes or suckers.

Phylum Annelida; class **Hirudinea**; Leeches:

Body flattened with 34-segments, but there appears to be many more; suction disks present at one of both ends; eyespots are located on the dorsal side of the body.

Phylum Platyhelminthes; class **Turbellaria**; Flatworms:

Body flattened dorsally; two-eyespots present giving the animal a cross-eyed appearance; head usually arrow shaped.