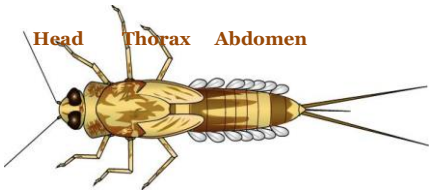
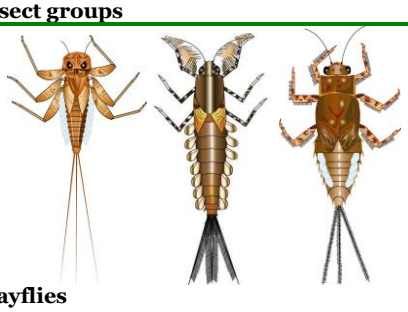


Small minnow mayfly *Baetidae*

What is an insect?

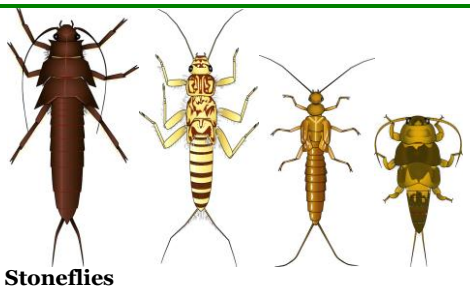
An insect is an invertebrate (an animal with no spine) that has three-pairs of legs (except Diptera) and three body divisions; the head is the location of the mouth, antenna, and eyes; the thorax is the attachment site for the legs and wing pads; and the abdomen, which often has a variety of structures attached including filaments gills and tails. Gills are usually leaf-like, plate-like, or thin filaments. Tails can be long and thin, hairy, webbed or paddle-like. Aquatic insects are described and illustrated on page one and the top of page two; non-insect group descriptions and illustrations begin on page two. Additional **tips** are provided at the bottom of page two.

Insect groups



Mayflies

Order **Ephemeroptera**: Three-pairs of legs with a single hook at the end; three some-times two tail filaments; gills attached to the abdomen, which may sometimes be covered and difficult to see. Mayflies exhibit several types of movements (or habits); swimmers, clingers, crawlers, and burrowers. (VS-M) (M) Families above left-right: *Heptageniidae*, *Isonychiidae* and *Ephemerellidae.*



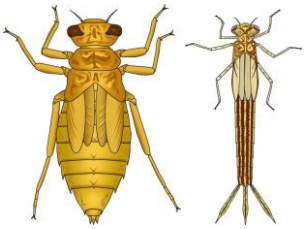
Stoneflies

Order **Plecoptera**: Three-pairs of legs with two-hooks at the end; two tail filaments; no gills attached to the abdomen but some kinds may have gills near the top of the abdomen; gills if visible, mostly on the legs and thorax. (S-VL) (M) Families above left-right: *Pteronarcyidae*, *Perlidae*, *Capniidae* and *Peltoperlidae.*

Case-building caddisflies

Order **Trichoptera**: Grub-like soft body and a hard head; Three-pairs of legs located on the upper third of the body; tail is small and usually forked, sometimes fringed with hairs; gills are scattered on the underside of the abdomen. The case (retreat) is a relatively solid structure made of a variety of streambed materials held together by silk. (VS-L) (M) Families above left-right: *Brachycentridae*, *Limnephilidae* and *Glossosomatidae.*

Dragonfly Damselfly



Dragonflies and **Damselflies**

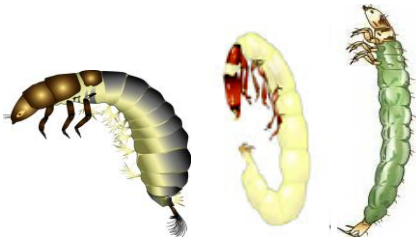
Order **Odonata**: Three-pairs of legs; large eyes; long spoon-like jaws; no tails on the abdomen. Dragonflies sub-order *Anisoptera* have a broad shaped abdomen, while the Damselflies sub-order *Zygoptera* abdomen's is much narrower. Damselflies gills are attached to the end of the abdomen, they look like tails. (M-VL) (M)

Hellgrammite/Fishfly Alderfly

Fishflies and **Alderflies**

Order **Megaloptera**: Three-pairs of legs; large pinching jaws; eight-pairs of filaments attached to the sides of the abdomen. Fishflies family *Corydalidae,* have a two-hooked tail, whereas Alderflies family *Sialidae* have a single tapered tail and are usually much smaller and lighter in color. (M-VL)

Common netspinner Finger-net Free-living



Net-spinning caddisflies

Order **Trichoptera**: Similar characteristics as above but the abdomen usually has more abundant gills, especially the Common netspinning caddisfly. Net-spinner's retreat is made of a variety of streambed materials loosely held together by fine strands of silk. Free-living caddisfly does not build a case or net. (S-L) (M) Families above left-right: *Hydropsychidae*, *Philopotamidae* and *Rhyacophilidae.*

Water penny Riffle beetles Whirligig beetle

Beetles

Order **Coleoptera**: Three-pairs of legs; body usually covered by a hard exoskeleton. The Water penny family *Psephenidae* and Riffle beetle family *Elmidae* are common in rocky-bottom streams. Other adult/larvae beetles are occasionally collected. (VS-L) (M)

True flies

Order **Diptera**: Usually the body is segmented with some type of visible features either along the body, or at the head or tail regions (i.e. head, tails, prolegs, whelps etc.). Note: This order is the only aquatic insect without fully developed legs in the larval stages.

Dipterans are very diverse order with many aquatic varieties. Common kinds are described here.

Non-biting midge

Order **Diptera** family *Chironomidae*: Segmented body with a visible head; two leg-like projections at the front and rear. Sometimes they are bright **red** in color. (VS-M)

True flies continued.

Crane fly

Order **Diptera** family *Tipulidae*: No legs, no visible head; plump body with lobes along the segments; may have structures that look like tentacles, lobes or one bulb at the end of the body. (S-VL)

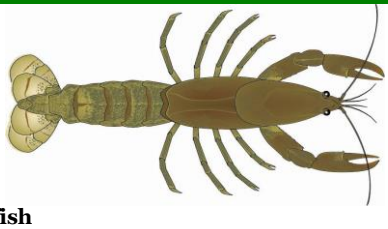
Black fly

Order **Diptera** family *Simuliidae*: Body has a bowling-pen shape (lower is wider than the upper); there are multiple brushes/fans on the head and a ring of hooks on the abdomen. (VS-M)

Watersnipe fly

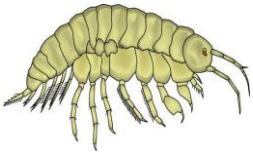
Order **Diptera** family *Athericidae*: Plump body, looks very much likes a caterpillar; on the underside there are structures that look similar to legs but are not segmented; the tail is forked and fringed with hairs. (S-L)

Non-Insect groups



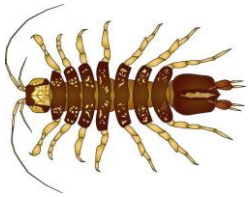
Crayfish

Class **Crustacea** order *Decapoda*: Five pairs of legs, the first two usually have large claws; large flipper-like structure at the end of the abdomen. (M-VL) (M)



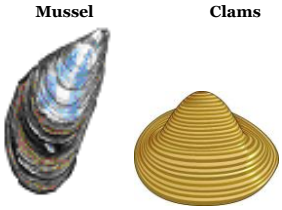
Scud/Sideswimmer

Class **Crustacea** order *Amphipoda*: Seven pairs of legs, the first two may be claw-like; body is somewhat higher than it is wide. Usually swims with a sideways motion. (S-M)



Aquatic sowbug

Class **Crustacea** order *Isopoda*: Seven pairs of legs, the first two may be claw-like; very long antenna; body is wider than it is high, giving the animal a fairly flattened appearance. (S-M)



Clams and **Mussels**

Class **Bivalvia**: Fleshy body enclosed between two-hinged shells; the shape and ridge spacing of the shells can determine different kinds. **Mussels** are usually larger than **Clams** and have dark colored oblong shells. (VS-VL) (M)

Operculate snails

Class **Gastropoda** sub-class *Prosobranchia*: Fleshy body enclosed by a single shell, which is usually coiled in an upward spiral. The opening of the shell is covered by an operculum (door). (VS-L) (M)

Non-operculate snails

Class **Gastropoda** sub-class *Pulmonata*: Fleshy body enclosed by a single shell, which is sometimes coiled upward but also may lie flat or have a conical shape. The opening of the shell is not covered by an operculum. (VS-L) (M)

Aquatic worms

Phylum **Annelida** class *Oligochaeta*: Body is long with numerous segments along its entire length; has no visible head or tail. (VS-VL)

Leeches

Phylum **Annelida** class *Hirudinea*: Body is long and thin or slightly widened; 34– segments along its length, but there appears to be many more. (S-VL)

Flatworms

Class **Turbellaria**: Soft elongate body without segment; head triangular shaped with eyes on top, which give the animal a cross-eyed appearance. (VS-L)

Learn more at: https://go.wv.gov/sos

Sizes illustrated not proportional.

Identification of benthic macroinvertebrates (BMIs) is easier when viewed in the same orientation as the illustrations. Most illustrations are drawn in top and side views; the water penny is shown in underside view. Use morphological features as your basis for identification; the size and color are often variable and influenced by environmental factors. The (M) indicates that multiple kinds may be collected from within the order or class.

Size categories (size range in mm): > 50 Very large (VL); 50 - 30 Large (L); 29 -10 Medium (M); 10 - 5 Small (S); < 5 Very small (VS)

Note: This field guide will help you identify common aquatic invertebrate classes, orders, and a few families. You should always use to a more complete guide for verification and family level identification. With practice, you will be able to identify a wide variety of families in the field.