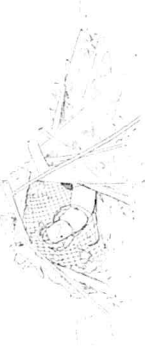


# Net-spinning Caddisfly Larvae

Order: Trichoptera Family: Hydropsychidae  
Number of species in North America: 149

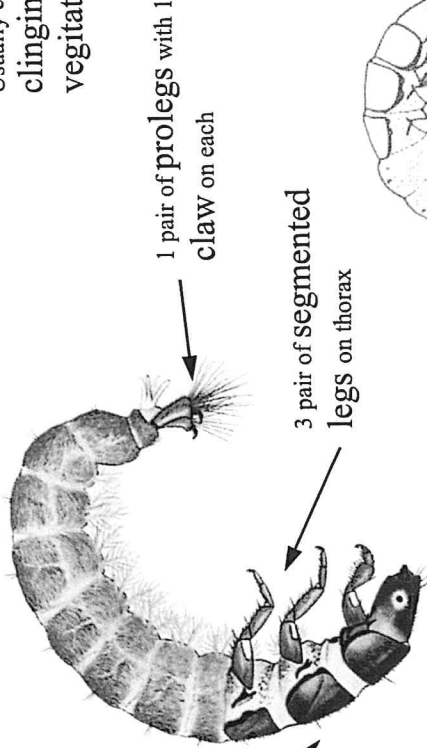


Size: 10-16mm



No wing pads on thorax

Usually captured clinging to rocks and vegetation



1 pair of prolegs with 1 claw on each

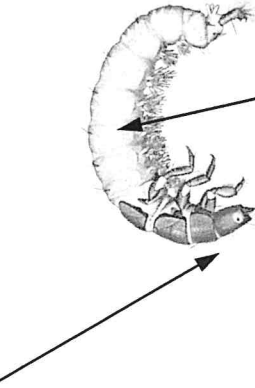
Thick, hardened skin on head

3 pair of segmented legs on thorax

COMMON NETSPINNER

Antennae very short, barely visible

When removed from water, larvae lay on side in C-shape



Abdomen is made of thin, soft skin

Build mesh net for filter feeding—quickly abandon when disturbed



Use silk to secure retreat

**Diet:** Collector-feeders; construct mesh net to remove particles from water.  
**Food for:** Game fish, predaceous water insects.  
**Habitat:** Flowing waters, usually between rocks or submerged debris.  
**Movement:** Clingers; live in tubular retreats attached to solid objects in current.  
**Breathing:** Closed breathing system; diffusion over soft body tissue.  
**Water Quality Indicator:** Group II—can exist under a wide range of water quality conditions; a large number indicates MODERATE water quality.

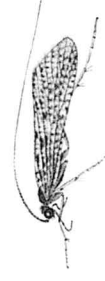
Eggs are deposited near the shore.



5 larval instars—the pupal stage takes place in a sealed cocoon (fixed to an object).



Three weeks later, the caddisfly emerges as an adult.



## Life Cycle Corner

Complete metamorphosis

Credits: McCafferty, W. Patrick. Aquatic Entomology, 1981.

# Case Building Caddisfly

Order: *Hydropsychidae* Family: *Limnephilidae*  
 Number of species in North America: more than 300



CREEK CONNECTIONS,  
 Allegheny College

Size: body: 20-30 mm/ case 25-50 mm



Limnephilus larval case



Farula larval case



Pycnopsyche larval case



Apatania larval case



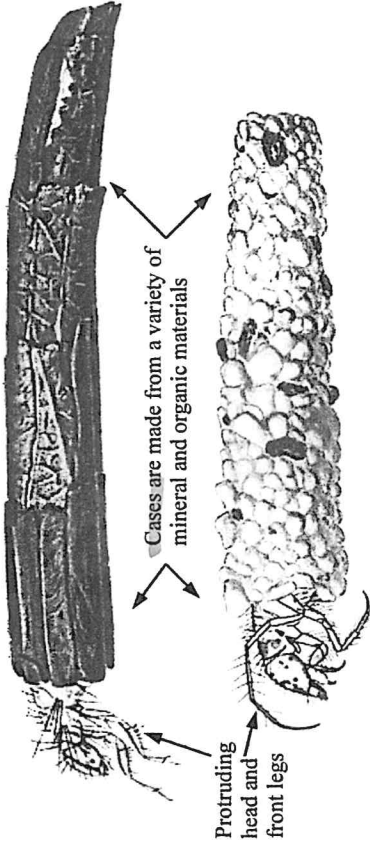
Manophylax larval case



Limnephilus larval case



Neophylax larval case



Cases are made from a variety of mineral and organic materials

Protruding head and front legs

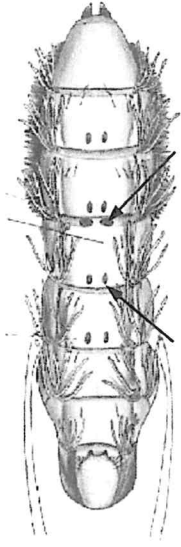
Thick, hardened skin on head and thorax

bristles

dorsal hump

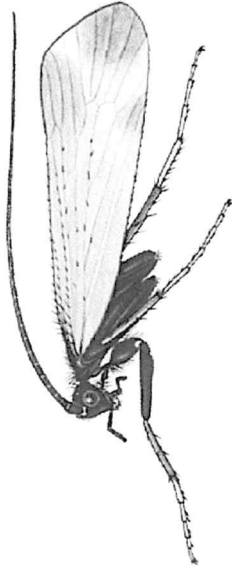
lateral hump

LARVA



Anterior hook plate

Posterior hook plate



ADULT

Credits: McCafferty, W. Patrick. *Aquatic Entomology*, 1981. and Yoshell, J. Reese Jr. *A Guide to Freshwater Invertebrates of North America*, 2002.

## Life Cycle Corner

### Complete metamorphosis

Adults emerge in late spring or early fall and live for approximately 30 days.

The pupa stage lasts 2-3 weeks. Pupae are aquatic and obtain oxygen in the same way as larvae.

Eggs are deposited in gelatin masses in the stream. Masses vary from a few eggs each to several hundred eggs in each mass. Egg masses are sometimes green, yellow or orange.

The larval stage can last from 2-3 months to 2 years. Larva shed their exoskeleton an average of 5 times.

**Diet:** Shredder-detritivores, shredder-herbivores, collector-gatherers, scraper.  
**Food for:** Game fish, predaceous water insects.  
**Habitat:** Lentic and lotic habitats; streams, rivers, springs, marshes and ponds.  
**Movement:** clingers, crawlers and climbers.  
**Water Quality Indicator:** Groups I and II—can exist under a limited or wide range of water quality conditions; a large number indicates GOOD water quality.

# Crane Fly Larvae

Order: Diptera Family: Tipulidae

Number of species in North America: 300



Size: 10-100 mm (larvae) / 25-38 mm (adult)

## LARVA



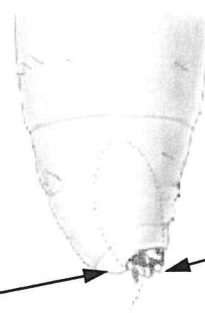
Fleshy, plump, segmented, worm-like body

**Retracted** head (head can be pulled inside)



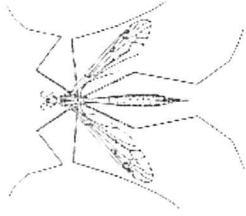
No legs and no wings

Usually brown, white, or green in color.



retracted head

Rear end disc section. Has breathing structure here.



## ADULT

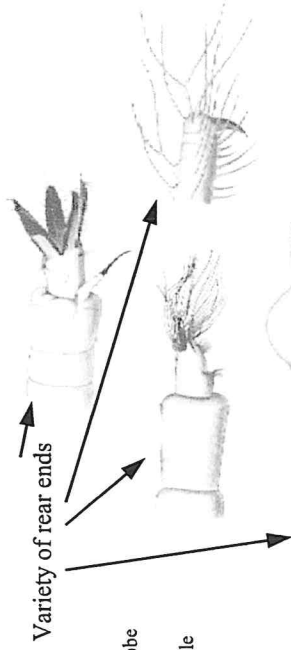
spiracular disc

Rear end disc section

spiracular lobe

spiracle

Variety of rear ends



3 to 6 finger-like extensions surrounding an open disc at rear end

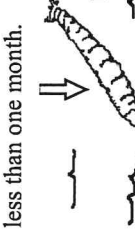
Sometimes a rear swollen section

Credits: McCafferty, W. Patrick. *Aquatic Entomology*, 1981.

## Life Cycle Corner

Elongated, shiny, black eggs are deposited in soil or algae mats near shore and hatch in less than one month.

Complete metamorphosis



Crane Fly Larva

Pupa leaves water, goes to edge of pond and develops in muddy bank.

Adult pushes out of soil.

**Diet:** Small microorganisms (plants and animals), periphyton, even wood. Most eat plants.

**Food for:** Trout, bass (game fishes), beetles, predaceous water insects.

**Habitat:** Bottom dweller in streams, some in ponds, marshes, and lakes.

Sometimes in algal growths or woody debris.

**Movement:** Cling to bottom, some swim.

**Breathing:** Through skin in well oxygenated water and from air through rear end in poorly oxygenated water.

**Water Quality Indicator: Group II**—Can tolerate some water pollution. Does better in well oxygenated water.

# Dobsonfly Larvae

Order: *Megaloptera* Family: *Corydalidae*

Number of species in North America: 4

Size: 25-90mm (mature larvae)

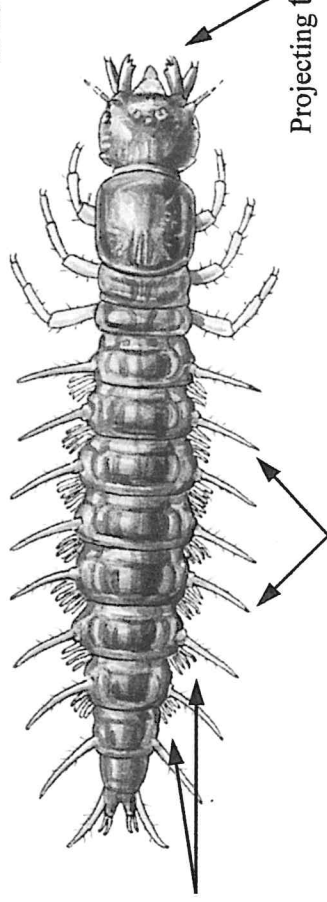
Dobsonflies are also known as: Hellgrammites



Dobsonfly Adult

3 pairs of legs

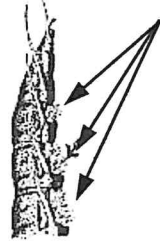
Dobsonfly Larva



Projecting toothed jaws

Dobsonflies have gill tufts (Fishflies do not)

8 pairs of lateral filaments from abdomen segments



Gill tufts

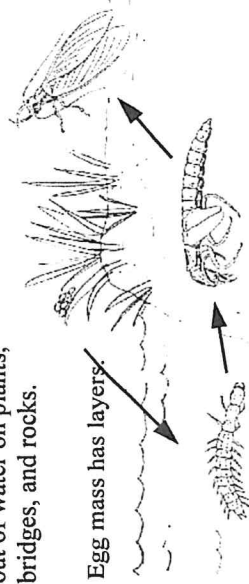
Credits: McCafferty, W. Patrick. *Aquatic Entomology*, 1981.  
and  
Yoshell, J. Reeve Jr. *A Guide to Freshwater Invertebrates of North America*, 2002.

**Diet:** Insects (especially Caddisflies and Black Flies) aquatic worms, crustaceans, mollusks, other Dobsonflies and Fishflies  
**Food for:** Fish, predaceous beetles, other Dobsonflies and Fishflies  
**Habitat:** Bottom dweller in-streams and rivers; in all kinds of bottoms and currents. Some live in ponds and lakes. Dobsonflies can even be found in the moist substrate of dried streams.  
**Movement:** Swim, crawl, cling, Active at night.  
**Breathing:** Breath through gills.  
**Water Quality Indicator:** Group II— can exist under a wide range of water quality conditions; a large number indicates MODERATE water quality.

## Life Cycle Corner

### Complete metamorphosis

Egg masses are found out of water on plants, bridges, and rocks.



Adults emerge in the summer and live only a few days

Prepupa emerge from the water onto bank soil forming the pupa then the adult over a two week period.

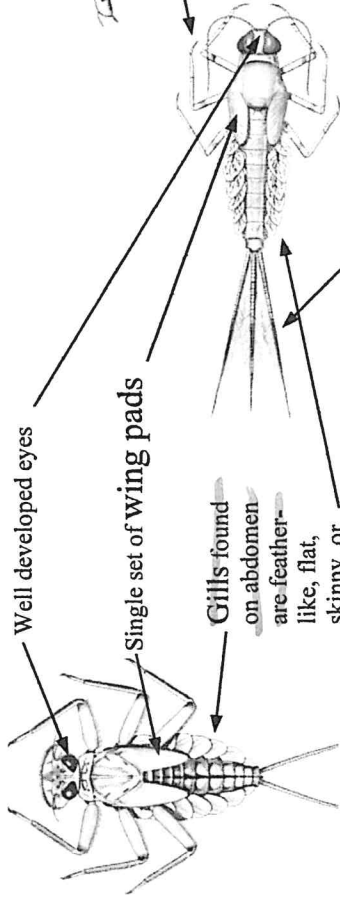
After one week larva drop into water. Larvae live one to three years, usually going through 10-12 molts.

Order: Ephemeroptera

Families: Baetidae— Small minnow  
Heptageniidae— Flatheaded  
Ephemeridae— Common Burrower

# Mayfly Nymph

Size: 3-20mm (nymph) / 5-8mm (adult)

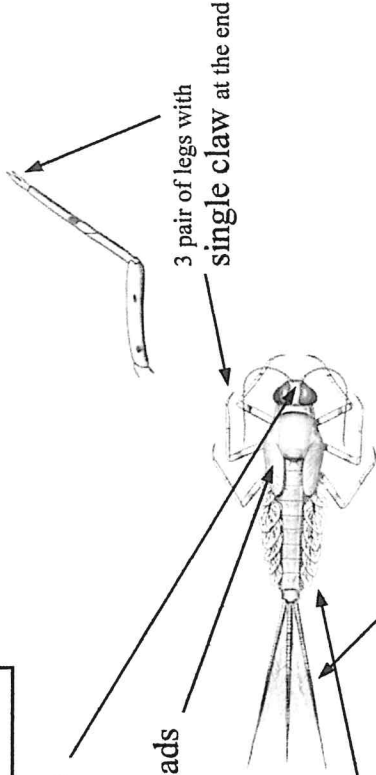


FLATHEADED MAYFLY NYMPH



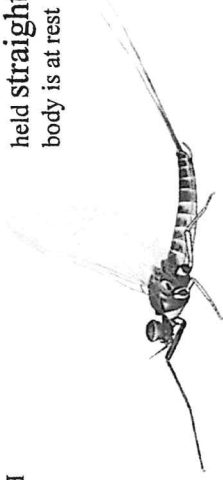
Variety of gills

SMALL MINNOW MAYFLY NYMPH



Some Mayflies use hairs on their forelegs to filter food out of the water. Most, but not all, are filter-feeders.

Adults have triangular-shaped wings that are held straight-up when body is at rest



SMALL MINNOW MAYFLY ADULT



COMMON BURROWER MAYFLY NYMPH

### SIMILAR TO: stonefly

- Mayflies have 3 tails\*, while stoneflies have 2.
  - Mayflies have 1 claw, while stoneflies have 2.
  - Mayflies have abdominal gills, while stoneflies do not.
  - Mayflies have a single set of wingpads, while stoneflies have double.
  - Mayflies have short antennae, while stoneflies have long.
- \* Just a general rule; some species only have 2 tails. Often, tails break off easily.

**Diet:** Microscopic algae, small bits of organic matter, pieces of plants; a few eat other insects.

**Food for:** Game fish, predaceous water insects.

**Habitat:** Bottom dwellers; flowing waters (streams and rivers), ponds and shallow lakes.

**Movement:** Swim, cling to rocks, some burrow.

**Breathing:** Through gills on abdomen.

**Water Quality Indicator:** Group I—generally sensitive to pollution; a large number indicates GOOD water quality.



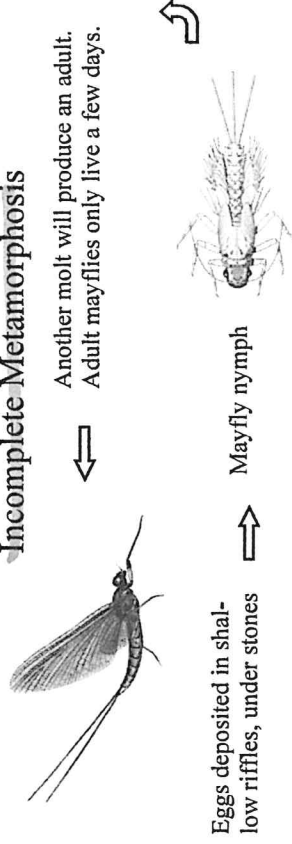
CREEK CONNECTIONS,  
Allegheny College

Number of species in North America: 149

Credits: McCafferty, W. Patrick. Aquatic Entomology, 1981.

## Life Cycle Corner

### Incomplete Metamorphosis



Order: Plecoptera

Families: Perlidae— Common  
Perlodidae— Perlodid  
Leuctridae— Rolledwinged

# Stonefly Nymph

Size: 5-35mm

Always 2 tails that are stick-like and not feather-like. They can break off

Look for double set of wing pads on its hard back

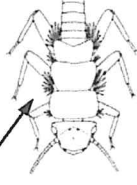
Number of species in North America: 500

COMMON STONEFLY NYMPH

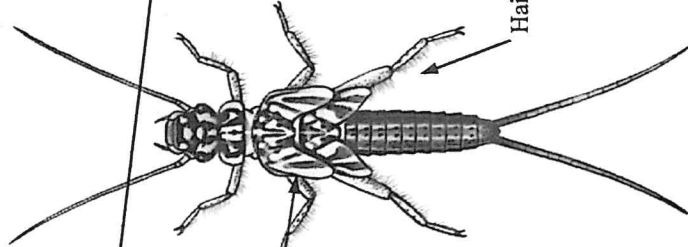


Long, slender antennae

Some stoneflies have hairy looking gills around base of legs



Hairy legs with 2 claws at end



SLENDER WINTER STONEFLY NYMPH

PERLODID STONEFLY NYMPH

## SIMILAR TO: Mayfly Nymph

- Stoneflies have 2 tails, while mayflies have 3.
- Stoneflies have 2 claws, while mayflies have 1.
- Stoneflies do not have abdominal gills, while mayflies do.
- Stoneflies have long antenna, while mayflies have short antenna.
- Stoneflies have a double set of wings, while mayflies have one set.

**Diet:** Small aquatic plants (periphyton) and animals; organic debris; fungi and bacteria from decomposing leaves.

**Food for:** Fish (especially trout), predaceous water insects, crayfish.

**Habitat:** Bottom dweller, on/under rocks, flowing waters (streams and rivers), rarely ponds or lakes.

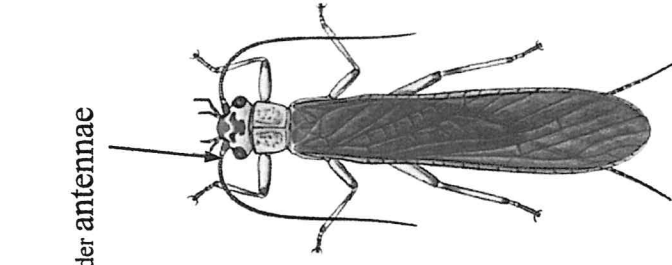
**Movement:** Crawling on the bottom, some drift.

**Breathing:** Gills, which are sometimes visible around base of legs; will do "push-ups" to elevate oxygen flow over body.

**Water Quality Indicator:** Group I—generally sensitive to pollution; a large number indicates GOOD water quality.



CREEK CONNECTIONS,  
Allegheny College



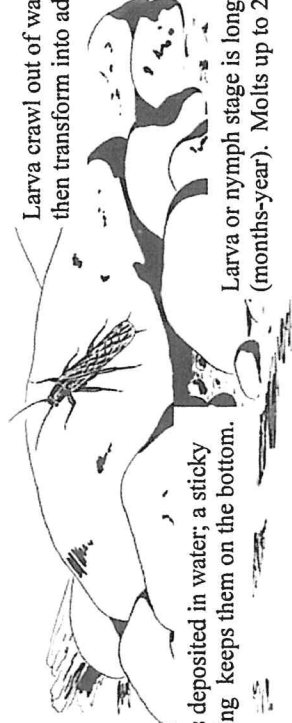
COMMON STONEFLY ADULT

Credits: McCafferty, W. Patrick  
Aquatic Entomology, 1981.

## Life Cycle Corner

### Incomplete metamorphosis

Larva crawl out of water and then transform into adult.



Eggs deposited in water; a sticky coating keeps them on the bottom.

Larva or nymph stage is long (months-year). Molts up to 22 times.

# Water Penny Beetle

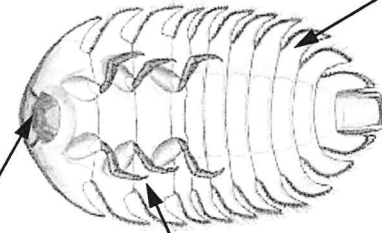
Order: Coleoptera Family: Psephenidae

Number of species in North America: 16

Size: 3-10 mm (larvae)



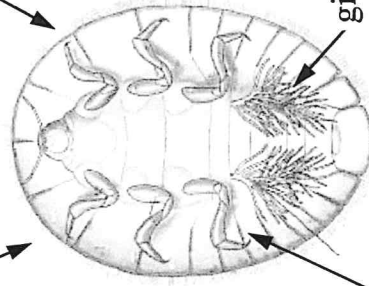
Jaws have thin sharp edge to scrape algae



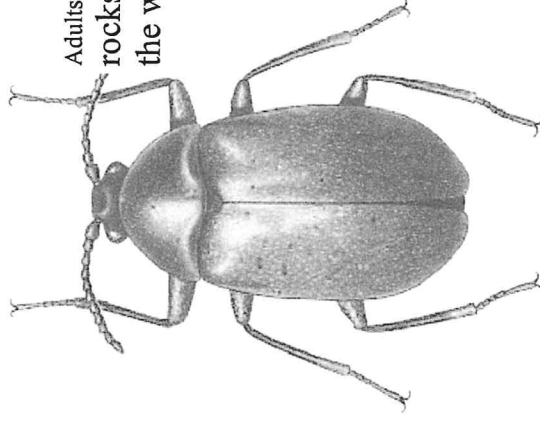
Single hooks at the end of legs

Thin, flat, flexible plates to help mold body to rock shape

Dense fringe of fine hairs to increase grip on rocks and stones



gills



Adults can be found on rocks and logs above the water surface.

Side view (larva)



EUBRUINAE LARVA (ventral)

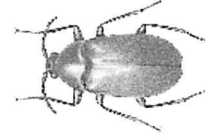
PSEPHENINAE LARVA (ventral)

ADULT WATER PENNY BEETLE

Credits: McCafferty, W. Patrick. *Aquatic Entomology*, 1981. and Yoshell, Reese J. Jr. *A Guide to Common Freshwater Invertebrates of North America*, 2002.

**Diet:** Larvae are scrapers, they feed on algae, especially diatoms, that collect on rocks and stones in the stream, adults may not feed.  
**Food for:** Trout, predaceous water insects.  
**Habitat:** Larvae can be found on rocks and stones in areas with riffles. Adults can be found on land near water.  
**Movement:** Larvae are clingers; they are able to grip rocks tightly in areas with strong currents.  
**Breathing:** Larvae collect oxygen through gills on underside of abdomen.  
**Water Quality Indicator:** Group 1—can exist under a limited range of water quality conditions; a large number indicates GOOD water quality.

## Life Cycle Corner



Complete metamorphosis  
1-2 years to complete life cycle

Little is known about adults, they are thought to live for only a short period of time.

Pupate on protected rocks near the water surface.

Mature larvae crawl out of water.

Larvae are facultative. They can not live in areas with large concentrations of algae and sediments.

Eggs are deposited in patches. Each patch is a single layer contains 400-600 bright yellow eggs.