

Identification Cards for Freshwater Macroinvertebrates

Macroinvertebrates- animals that are:

- visible with the naked eye (macro)
- without a backbone (invertebrates)

Barbara Bis

Prof. of Biology, Dpt of Limnology and Invertebrate Ecology, Institute of Ecology and Environmental Protection, University of Łódź, Poland

Grażyna Kosmala

Biologist M.Sc., Teacher of Secondary Education, Tadeusz Kościuszko Secondary School, Pabianice, Poland



Socrates



Το υλικό παρήχθη με τη χρηματοδότηση της Ευρωπαϊκής Ένωσης στο πλαίσιο του προγράμματος CONFRESH
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www.nhmc.uoc.gr/confresh

Name: Stonefly nymph

Key feature

- have two tails=cerci (sir-see)
- have three pairs of legs on middle section of body (thorax)
- each leg has two claws
- stonefly nymphs sometimes have tubes of gills on their underside; two wind pads
- bodies are streamlined, so they don't get swept away by the water current

Habitat

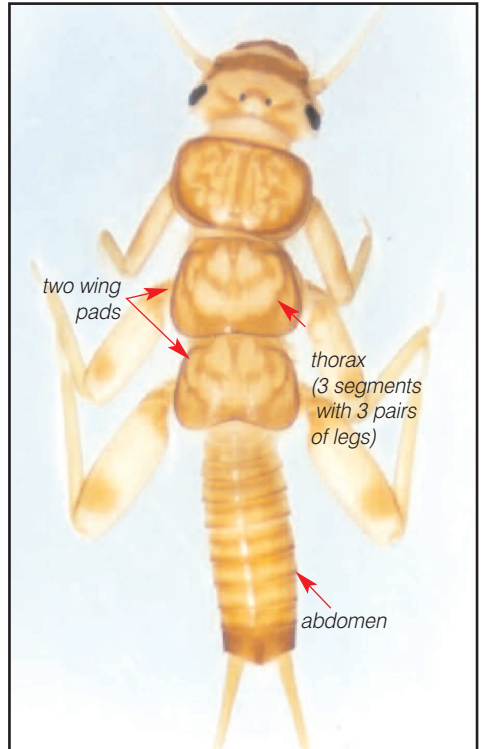
Stonefly nymphs live under stones in fast running waters with low temperature (< 25 degrees Celsius) and high oxygen concentration). Mountain streams are the most common habitat for them. You may also find the nymphs on top of stones, or on the submerged wood and leaf litter in streams.

Feeding

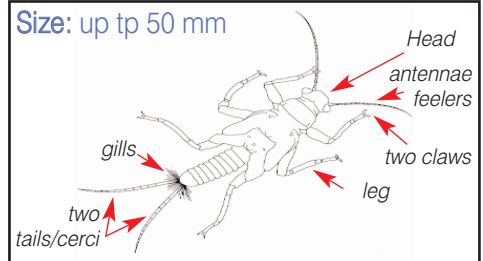
Most stonefly nymphs eat detritus, dead plants (shredders) and algae (scrapers). Other stonefly species (predators) stalk their prey and are carnivorous (eating other animals).

Pollution tolerance

Stonefly nymphs are very sensitive to low levels of oxygen in water. They prefer cool water as it dissolves oxygen more easily than warm water.



Size: up to 50 mm



Phylum: Arthropoda, Class: Insecta
Order: Plecoptera

Name: **Mayfly nymph**

Key feature

- usually have three long tails or cerci
- have leaf-like side gills along abdomen;
- one wind pad;
- have three pairs of legs on middle section of body (thorax);
- they have a single claw on each leg.

Habitat

Mayfly nymphs live under stones in fast flowing water or among plants in slow streams. Some species are flat and cling to the rocks in fast-flowing streams. They are mostly found in permanent waters, good quality waters: streams and lakes.

Feeding

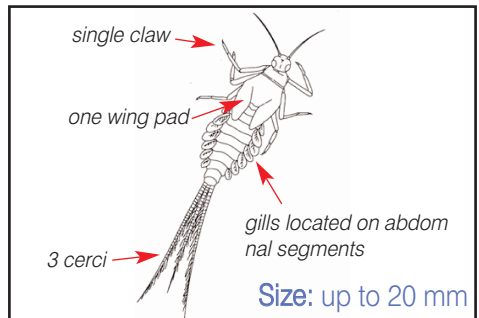
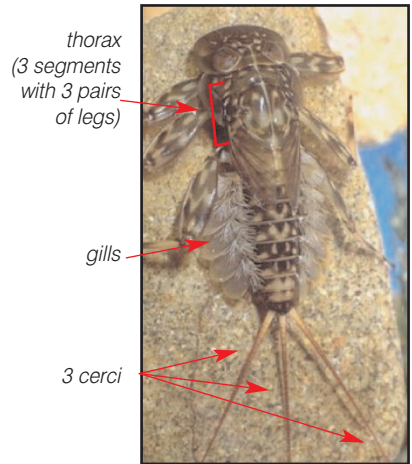
Most Mayfly nymphs are herbivores - eating only plant matter, detritivores - feeding on decaying material, while some are predators. Some species are collectors or filter-feeding on organic material floating in the water, others are scrapers, actively scraping plant material or diatoms from rocks. While adults don't eat at all.

Pollution tolerance

Very sensitive, to low levels of oxygen in the water. They are also sensitive to chemical pollution in the water, low water flow and sunlight (sometimes referring shady spots).

Facts

Mayfly nymphs are a good food for fish.



Phylum: Arthropoda, Class: Insecta
Order: Ephemeroptera

Name: Caddisfly larva

Key feature

- caterpillar-like with three pairs of well-developed legs on the first three body segments and hooks on the last one
- Caddisflies are related to butterflies and moths; some built cases from organic and mineral bottom substrate

Habitat

They live in a wide range of water habitats from fast flowing streams to freshwater ponds. Their soft bodies are usually covered in a protective silky case. They use the hooks at the end of their abdomen to hold on to their cases. Some species do not live in cases, using their hooks instead to cling to the stream bed and also to drag themselves backwards to escape from predators.

Feeding

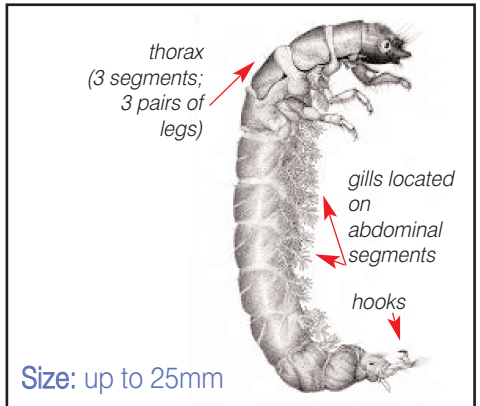
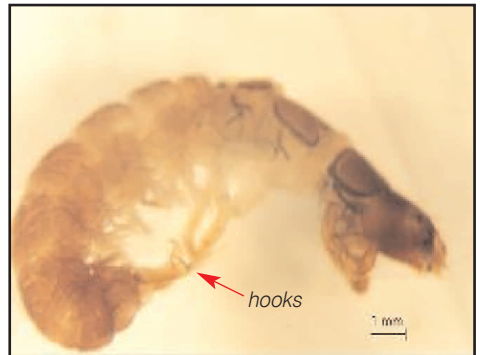
Algae and other plants (living and dead). Some species feed on other insects and spin silky nets to capture their prey; others scrape algae from stones or plants, or shred leaf litter.

Pollution tolerance

Caddisfly Larva cannot tolerate low oxygen levels and those that break up leaf litter for food require vegetated streams, with trees that overhang the water.

Facts

Typically they use silk to build cases or nets. They are an important food for many fish.



Size: up to 25mm

Phylum: Arthropoda, Class: Insecta
Order: Trichoptera

Name: Alderfly larva

Key feature

- are aquatic, red-brownish in colour
- look like caterpillars and have gills along both sides of their abdomens
- have three pairs of legs on middle section of body (thorax) with tiny pinchers at the end of each and a straight, single feathery tail

Habitat

Alderfly larvae can be found on the bottom of clear, slow-flowing freshwater streams. They prefer to live in the mud or under stones.

Feeding

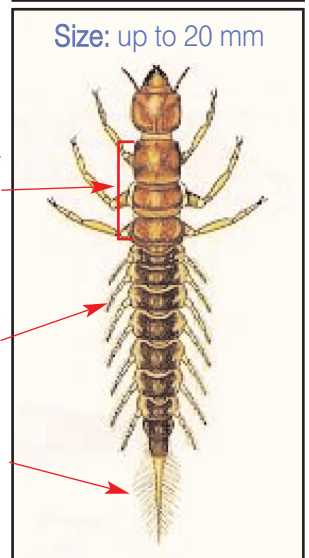
Alderfly larvae are active predators of other aquatic invertebrates and have strongly developed mandibles (jaws) which they use to grasp their prey.

Pollution tolerance

Alderfly larvae are sensitive to low levels of oxygen in the water, preferring cool water as it holds more oxygen when saturated than warm water.

Facts

Alderflies, in both the larva and adult stages, are important food for fish.



Phylum: Arthropoda, Class: Insecta
Order: Megaloptera

Name: Crayfish

Key feature

- two front legs are in the shape of large claws. Used mainly for defence against predators, they are also used for grasping food and digging burrows
- crayfish have also four sets of walking legs and a long, thick tail
- the tail flap is used to thrust the crayfish quickly through the water

Habitat

Crayfish live in a wide range of habitats including low-lying swamps, rivers and dams. Some burrow into the banks; they hide beneath rocks or branches in the water to protect themselves from predators.

Feeding

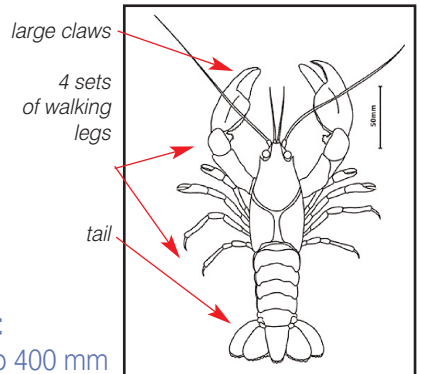
Crayfish eat vegetation, fish, plants, wood and meat; can also be cannibals, if there is no other food.

Pollution tolerance

Crayfish is sensitive to chemical pollution, which harms the delicate gills that they need to breathe. They can survive a wide range of water temperatures.

Facts

Crayfish grow through a process known as "moulting". The old shell (exoskeleton) peels off to reveal a new one.



Size:
up to 400 mm

Phylum: Arthropoda,
Subphylum: Crustacea, **Order:** Decapoda

Name: **Freshwater sandhopper**

Key feature

- look like slaters
- they are slightly curled and flattened sideways with hard segments (rings dividing their bodies)
- each segment with a pair of legs
- seven pairs of walking legs and three pairs of swimming legs, plus two pairs of antennae

Habitat

Freshwater Sandhoppers prefer still or slow moving waters and live under vegetation and rocks. Some species live in estuaries, the sea or on floodplains.

Feeding

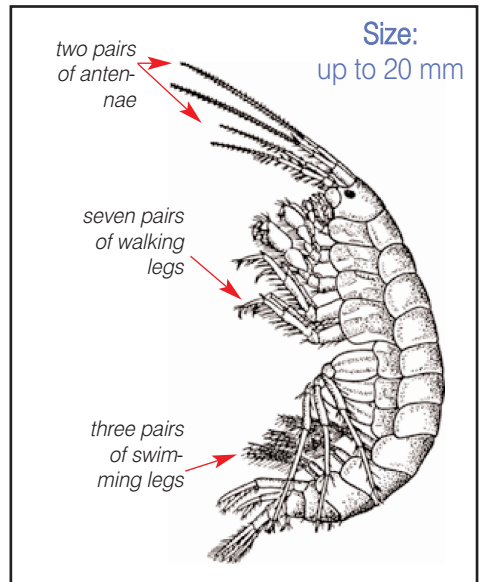
Freshwater Sandhoppers are omnivores (they mostly eat dead plant and animal matter, but they will also eat other animals).

Pollution tolerance

Sensitive, Freshwater Sandhoppers can not tolerate chemical pollution. Pollution damages their delicate gills, which they use to breathe.

Facts

They swim by flicking their tail or using their swimming legs. When they crawl, they often lean to one side because they are flattened sideways.



Phylum: Arthropoda, Class: Crustacea
Order: Amphipoda

Name: **Freshwater slater**

Key feature

- they have hard body segments, each bearing a pair of legs -they have seven pairs of legs
- two pairs of antennae, one pair longer than the other.
- all flattened from top to bottom their bodies are wider than they are thick.

Habitat

Freshwater Slaters are found in freshwater lakes, swamps, springs, creeks and streams.

Feeding

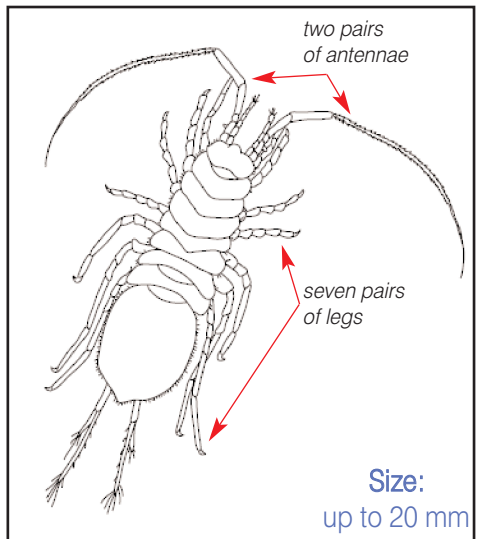
Freshwater Slaters are scavengers and eat a variety of dead plant and animal material.

Pollution tolerance

Tolerant, while some species will tolerate salty or turbid water, Freshwater Slaters cannot tolerate chemical pollution. But they are more tolerant than Freshwater Sandhoppers.

Facts

When the young emerges from the brood pouch, they look like the adult but have only six pairs of legs and six thoracic segments.



Phylum: Arthropoda, Class: Crustacea
Order: Isopoda

Name: Dragonfly nymph

Key feature

- short and chunky with wing pads and internal gills
- six legs are all located near the head

Where they live

Dragonfly Nymphs live on plants, among Stones and leaf litter, or at the bottom of ponds or slow flowing rivers.

Feeding

Dragonfly Nymphs are predators and feed mostly on other insects in the water.

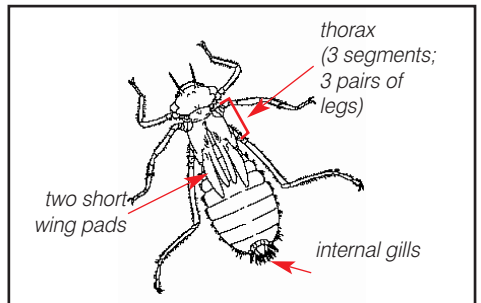
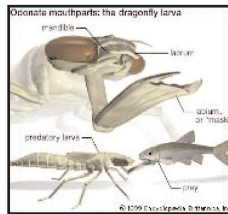
Sometimes, they can be cannibals and eat each other. Some of the larger species have been known to feed on small fish and tadpoles. They catch their food with a toothed lower lip (labium) that is usually folded under the head. When a small insect comes near, the nymph will shoot out its lower lip to grab it, faster than most prey can react.

Pollution tolerance

They are tolerant to habitat disturbance

Facts

Much of a dragonfly's life is spent in the Larval stage where it moults six to 15 times. The nymph crawls out of the water and moults one last time, emerging as an adult with functional wings. Dragonflies do not go through a pupal stage to become an adult.



Size: about 20-40 mm

Phylum: Arthropoda, Class: Insecta
Order: Odonata, Suborder: Anisoptera

Name: Damselfly nymph

Key feature

- slender bodies, with three long tail-like gills at the end
- extendable jaws that fold up under the head
- legs close behind their head
- large compound eyes (eyes made from lots of smaller yes) give them excellent vision

Habitat

Damselfly Nymphs live on plants, among stones and leaf litter at the bottom of ponds or slow-flowing rivers.

Feeding

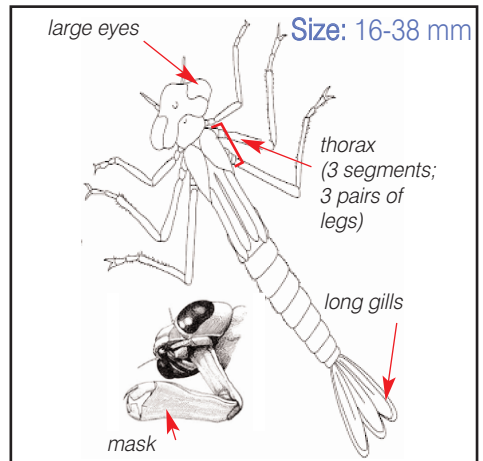
Damselfly Nymphs are predators and feed mostly on other insects in the water, but they also can be cannibals, eating each other. Some larger species have been known to feed on small fish. They catch their food with a toothed lower lip (mask, labium) that is usually folded under the insect's head.

Pollution tolerance

Tolerant, Damselfly Nymphs are sensitive to habitat disturbance, because they need aquatic or riparian vegetation in the waters where they live.

Facts

They do not go through a pupal stage to become an adult.



Phylum: Arthropoda, Class: Insecta
Order: Odonata, Suborder: Zygoptera

Name: **Freshwater mussel**

Key feature

- two valves (shells) hinged together that are typically closed
- mussels have thick shells. Some are oblong-shaped, while others are rounded
- they have a muscular foot that they use to burrow into the bottom of rivers.
- when they are feeding, of the gills sort the particles from the water flowing into the shell



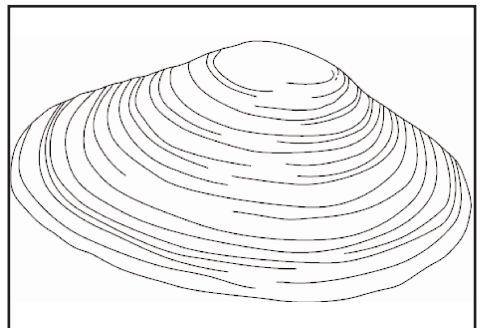
Habitat

Freshwater mussels live on the bottom of rivers, irrigation canals and farm dams. Some can survive extended periods of drying out, by burrowing in the mud and closing their shell.



Feeding

Freshwater Mussels live on microscopic Animals and plants. They feed and breathe by sucking water through tubes, called siphons, to filter out food particles.



Pollution tolerance

Tolerant, Freshwater Mussels do not occur in badly polluted rivers. Bivalves accumulate toxic chemicals in their tissues.

Facts

Many species live 20-30 years, some up to 140 years.

Size: 40-180 mm

Phylum: Mollusca, **Class:** Bivalvia

Name: **Freshwater snail**

Key feature

- similar to slugs but have a spiral shell encasing their soft bodies.

Habitat

Freshwater snails live in calm parts of streams or ponds, attached to plants or rocks.

Feeding

Algae, and dead and decaying plants in the water. Their tongue has layers of teeth, which scrape food particles into the mouth.

Pollution tolerance

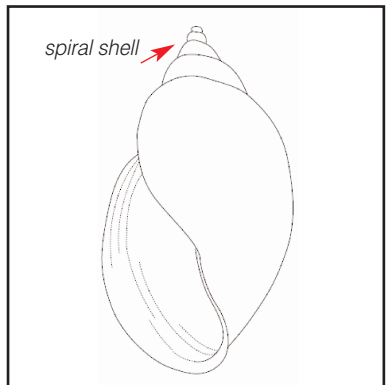
Tolerant, Freshwater Snails can live in water rich in nutrients, as they feed on algae, but they are sensitive to some forms of toxic pollution. Some come to the surface to get oxygen, which they can hold within the shell, and some have gills to extract oxygen from the water.

Facts

Their tongue is like a chainsaw - it is like a belt with layers of teeth along it, with which they rasp at food.

Size: up to 25 mm

Phylum: Mollusca, **Class:** Gastropoda



Name: Water beetles

Key feature

- the adults have hard front wings, which cover the folded hind wings like a sheath
- many have smooth, streamlined paddle-shaped hind legs
- there is a cavity under their wings that holds an air supply, so they can remain under water for long periods.
- there are many types of beetle larvae (the plural of larva), generally they are segmented and cylindrical with six legs and a distinct head.
- larvae breathe through their gills or spiracles (little holes) and do not need to come up for air.

Habitat

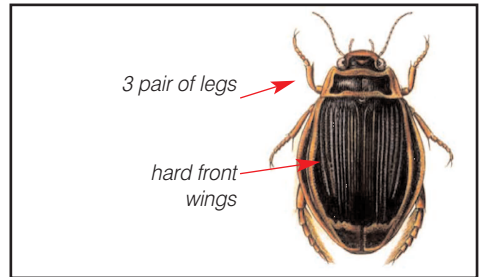
Both the adult and the larval forms live in a large range of water habitats; often found in permanent fast-flowing streams but also in slow-moving rivers, puddles, dams and lakes. They hide among reeds in swiftly flowing water. Adults of most species are strong fliers.

Feeding

Beetle Larvae eat plant or animal matter, are also predators (e.g. diving beetles). They usually have biting mouth parts.

Pollution tolerance

Tolerant, some species (whirligig beetles) cannot tolerate low levels of dissolved oxygen.



Size: up to 40 mm

Diving beetle – adult and larva
Whirligig beetle – adult and larva



Size: up to 15 mm

Phylum: Arthropoda, Class: Insecta
Order: Coleoptera

Name: Flatworm

Key feature

- wormlike and flat without segments on their bodies.
- the larger species move across the bottom of a waterway in a gliding fashion, helped by muscular waves that ripple down their body, but cannot swim.

Habitat

Flatworms are found in streams and shallow parts of lakes. They live in dark places on the surface rocks and plants.

Feeding

Flatworms are mostly carnivorous and prey on invertebrates small enough to be captured. They also scavenge on the dead bodies of animals that sink to the bottom.

Pollution tolerance

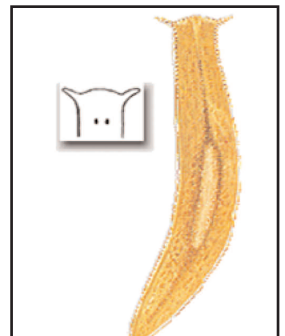
Tolerant, Flatworms tend to live where there are lots of dead plant and animal remains to feed on.

Facts

They reproduce sexually (having both male and female organs) and asexually by splitting. Each piece that is split off becomes a separate worm. They also reproduce by regeneration. They do this by producing new worm from a broken piece.



body without segments



Size:
up to 10 mm

Phylum: Platyhelminthes, **Class:** Turbellaria
Order: Tricladida

Name: Pond strider and Water bug

Key feature

- they are flat and long without wings,
- the second and third pairs of legs are almost twice as long as their bodies.
- short forelegs to attack and hold their prey (see water scorpion)
- their legs have tiny, water-repellent hairs that hold tiny air bubbles, allowing them to skate on the surface of the water



Habitat

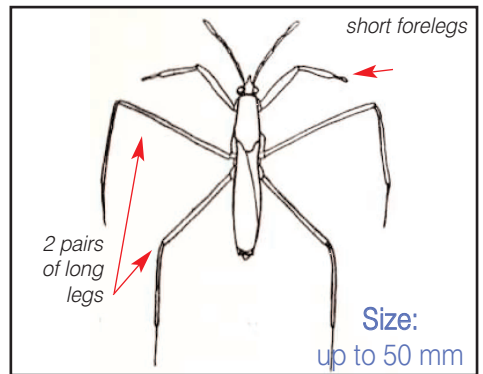
Water Striders live on the surfaces of ponds, slow streams and other quiet waters. They often gather in groups. When alarmed by strong vibrations in the water, they will scurry off to find shelter.

Feeding

Water Striders are both predators and avengers. They feed on a variety of aquatic invertebrates, including seed shrimp and mosquito larvae that rise to the surface and insects that drop into the water. The Water Strider has a piercing, sucking mouth. It pushes its mouth into the insect prey and sucks it dry. It can locate its prey by feeling the smallest movements or vibrations made in the surface of the water.

Pollution tolerance

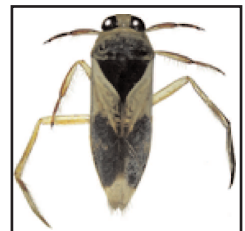
Tolerant, they live above the water and are not influenced by water pollution.



Water scorpion



Backswimmer



Phylum: Arthropoda, Class: Insecta
Order: Hemiptera

Name: Leech

Key feature

- segmented, cylindrical worms with a sucker on each end, one being a mouth
- in many forms, the mouth has three small jaws equipped with sharp teeth
- Leeches can swim, and walk, which they do in a looping manner
- body shape depends on whether their muscles are relaxed or taut.

Habitat

Leeches are found in warm, slow-flowing rivers or ponds. They prefer shallow water, and live under rocks and debris, or on plants, where they attach themselves to something solid.

Feeding

Many Leeches feed on the blood of Vertebrates such as amphibians, birds, reptiles, fish and mammals (including humans); some Leeches eat their prey whole.

Pollution tolerance

Tolerant, Leeches are able to survive where there is not much oxygen. They also tolerate various chemical pollutants.

Facts

Their salivary secretions contain hirudin, an anticoagulant (a substance that stops blood from thickening, or coagulating). This makes the blood runny, for easy sucking.



Size: from 7 to 80 mm

Phylum: Annelida, **Class:** Hirudinea

Name: Fly larva and pupa

Key feature

- they have not legs
- there are many types of Fly Larvae (plural of larva), but they are all generally grub- or worm-like.

Habitat

Fly Larvae are found in streams and ponds, in water in the holes of tree trunks anywhere water collects. Some common groups include e.g. Black Fly larvae, which are dumb-bell shaped and soft. They like to attach themselves to rocks and wood.

Feeding

Some Fly Larvae feed on decaying matter and play a key role in recycling nutrients. Many species are herbivores and a few are carnivores. The Black Fly larva filter-feeds using two sets of filaments (thread-like structures).

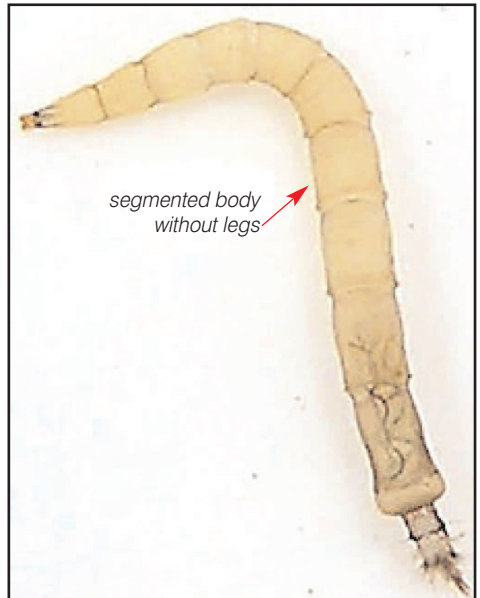
Pollution tolerance

Tolerant, The Fly Larva can tolerate organic pollution as they feed on organic particles.

They can live in water with low levels of dissolved oxygen as they often come to the surface to breathe.

Facts

Fly larvae experience a complete metamorphosis during development – that includes eggs, larvae, pupae and adults.



Size: up to 50 mm

Phylum: Arthropoda, Class: Insecta

Order: Diptera

Name: Mosquito larva and pupa

Key feature

- the larvae look like hairy maggots with siphons.
- the pupae are enclosed in a cocoon that covers half their body.

Habitat

They prefer stagnant waters. They hang upside down, suspended by the surface tension of the water and they suck oxygen from the air through snorkels in their tails.

Feeding

Many feed on small organic particles in the water, such as microscopic organisms and detritus, but a few species are predators.

Pollution tolerance

Very tolerant, Mosquito larvae can tolerate organic pollution as they feed on small organic particles. They can tolerate low levels of dissolved oxygen, as they often come to the surface to breathe.

Facts

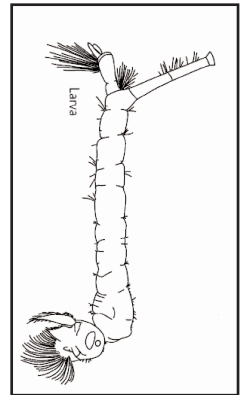
The Mosquito Pupae are called “tumblers” because of their tumbling motion when disturbed. Adult mosquitoes can transmit diseases (such as malaria) through their bite.



pupa



Size:
up to 10 mm



Phylum: Arthropoda, Class: Insecta
Order: Diptera., Family: Culicidae

Name: **Midge blood larva**

Key feature

- worm-like and C-shaped;
- Chironomid larvae can be various colors and only the red ones are known as bloodworms.

Habitat

The majority of Bloodworms or Non-biting Midges are found in the top five centimeters of sediment (sludge at the bottom of streams). Many species live in silken tubes while others are free living. Some can live in mud and water with low levels of oxygen. They are an important source of food for larger aquatic insects and fish.

Feeding

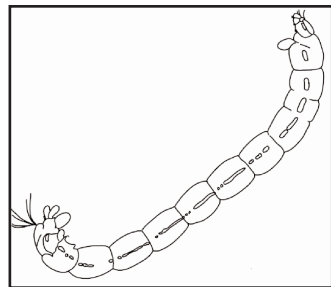
Bloodworms are generally detritivores feeding on dead plant and animal matter, while others are herbivores eating only plant matter.

Pollution tolerance

Very tolerant, they have red blood, similar to mammals, that helps carry oxygen through their bodies. This means they do not need as much dissolved oxygen in their environment.

Facts

They are red in color due to the presence of haemoglobin (blood protein that carries oxygen), which helps them tolerate poorly oxygenated water.



Size: up to 20 mm

Phylum: Arthropoda, **Class:** Insecta
Order: Diptera, **Family:** Chironomidae

Name: **Freshwater worm**

Key feature

- segmented bodies with rounded ends and no suckers or legs
- many are red or flesh coloured
- some species are short with few segments and with the body clearly divided into specialised regions
- others have a few to several hundred segments
- a few species have obvious external gills



Habitat

Freshwater Worms occur in a wide range of conditions, in still and running water.

Feeding

Freshwater Worms feed on organic material and bacteria that occur in silt and mud, the mud is eaten but not digested.

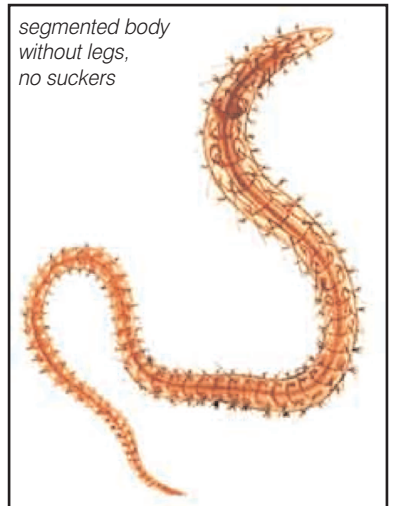
Pollution tolerance

Very tolerant, Freshwater worms can live in streams with organic pollution because they can survive in the low oxygen environment.

They feed on the algae and bacteria that grow in these environments.

Facts

Some families can reproduce by budding. A new worm grows by splitting off the original one. A worm grows more segments as it gets older. The older segments are near the head.



Size: up to 30 mm

Phylum: Annelida, **Class:** Oligochaeta