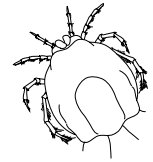
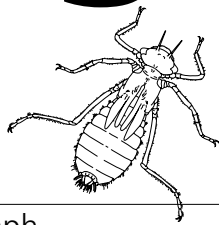


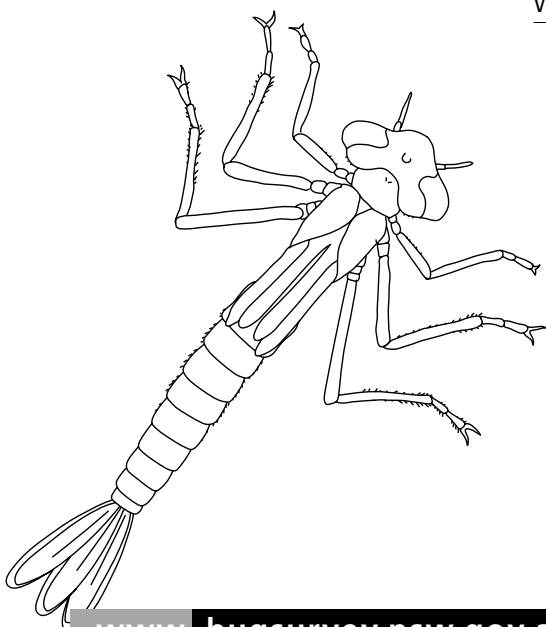
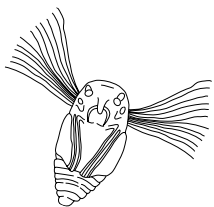
Buglopedia index



Title

Fact sheet number

Stonefly Nymph	1
Mayfly Nymphs	2
Alderfly Larva	3
Caddisfly Larva	4
Water Mite	5
Beetle Larva	6
Dragonfly Nymph	7
Water Strider	8
Whirligig Beetle and Larva	9
Freshwater Yabby / Crayfish	10
Damselfly Nymph	11
Fly Larva and Pupa	12
Midge Larva and Pupa	13
Freshwater Mussel	14
Nematode	15
Freshwater Sandhopper	16
Freshwater Shrimp	17
Water Scorpion / Needle Bug	18
Diving Beetle	19
Flatworm	20
Hydra	21
Water Treader	22
Freshwater Slater	23
Waterboatman	24
Freshwater Worm	25
Backswimmer	26
Bloodworm	27
Leech	28
Mosquito Larva and Pupa	29
Freshwater Snail	30





Stonefly Nymph

Stoneflies are insects often found resting on stones.

	▼				
Pollution tolerance	Very sensitive	Sensitive	Tolerant	Very tolerant	
Size	Up to 50 mm long				

What they look like

Stonefly nymphs are often confused with Mayfly nymphs. Stonefly nymphs have two tails or *cerci* (sir-see), whereas Mayfly nymphs have three long tails. The cerci are sense organs but also help the insect to move. Stonefly nymphs sometimes have tubes of thread-like gills on their underside, wing pads and antennae (feelers). Each leg has two claws that they use to cling to rocks or sticks. Their bodies are streamlined so they don't get swept away by the water current.

Where they live

Stonefly nymphs live under stones in fast-flowing streams cooler than 25 degrees Celsius. Mountain streams are a good habitat for them. You may also find the nymphs on top of stones, or on the submerged wood and leaf litter in streams.

What they eat

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

Pollution tolerance

Very sensitive, rating 10

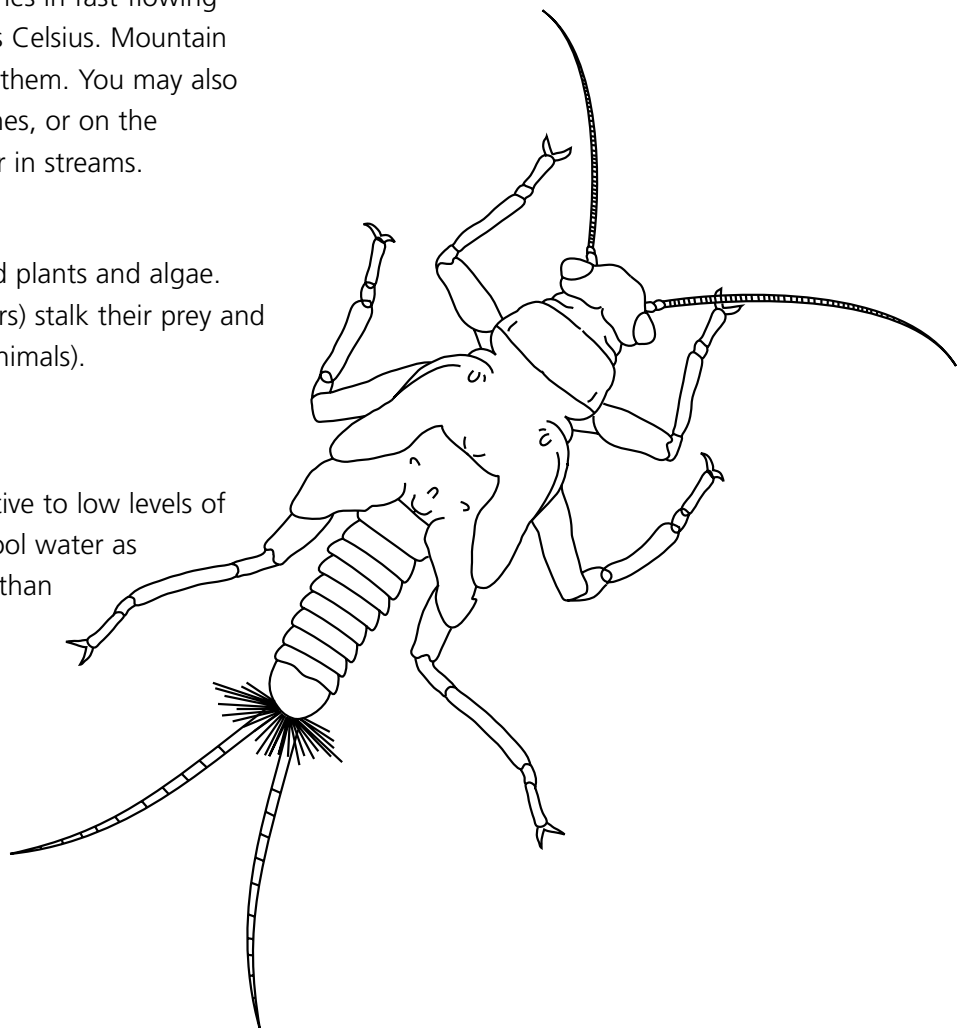
Stonefly nymphs are very sensitive to low levels of oxygen in water. They prefer cool water as it dissolves oxygen more easily than warm water.

What's interesting about the Stonefly Nymph?

- Some take up to three years to develop into adults.
- Adult Stoneflies live only for a week to a month, and females live longer than males.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Plecoptera > **Family** (Four Australian families): Eustheniidae; Austroperlidae; Gripopterygidae; Notonemouridae





Mayfly Nymphs

Freshwater fish, like trout, love to snack on Mayfly Nymphs. Mayflies belong to the order Ephemeroptera, which means short-lived wings (Ephemeros - one day, and Pteron - wing).

What they look like

Mayfly Nymphs usually have three long tails or cerci (sir-see). Some species have leaf-like side gills along their abdomen. They have a single claw on each leg, short antennae and sometimes, wing pads.

Where they live

Mayfly Nymphs live under stones in fast-flowing water or among plants in slow streams. Some species live in small burrows at the bottom of the stream. Some are flat and cling to the bottom of rocks in fast-flowing streams. They are mostly found in cool, more permanent water bodies like streams and lakes.

What they eat

Most Mayfly Nymphs are either herbivores (herb-ee-vorz), eating only plant matter, or detritivores (det-try-tee-vorz), feeding on decaying material, while some are predators. They generally feed on top of stones and retreat underneath to escape predators. Some species are collectors, filter-feeding on material floating in the water, while others are scrapers, actively scraping plant material from rocks. While adults don't eat at all. Mayfly nymphs are a good food for fish.

Pollution tolerance

 Very sensitive, rating 9

Mayfly Nymphs are sensitive to low levels of oxygen in the water. Some prefer cool water as it holds more oxygen when saturated than warm water, while some mayflies are tropical and live in warmer waters. They are sensitive to chemical pollution in the water, flow rate of the waterway and sunlight (sometimes preferring shady spots).

	▼				
Pollution tolerance	Very sensitive	Sensitive	Tolerant	Very tolerant	
Size	Up to 20 mm long				

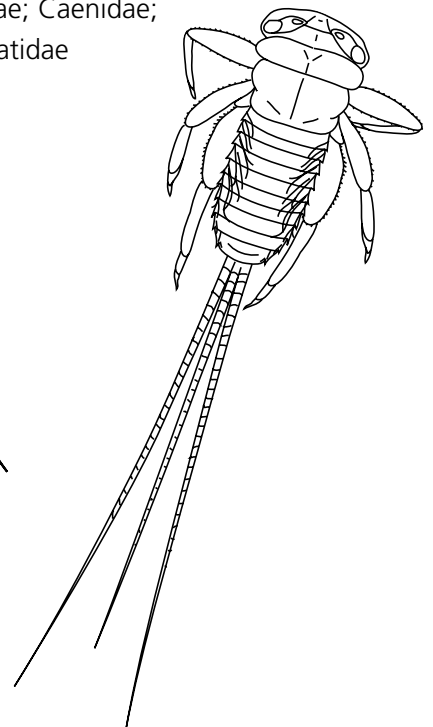
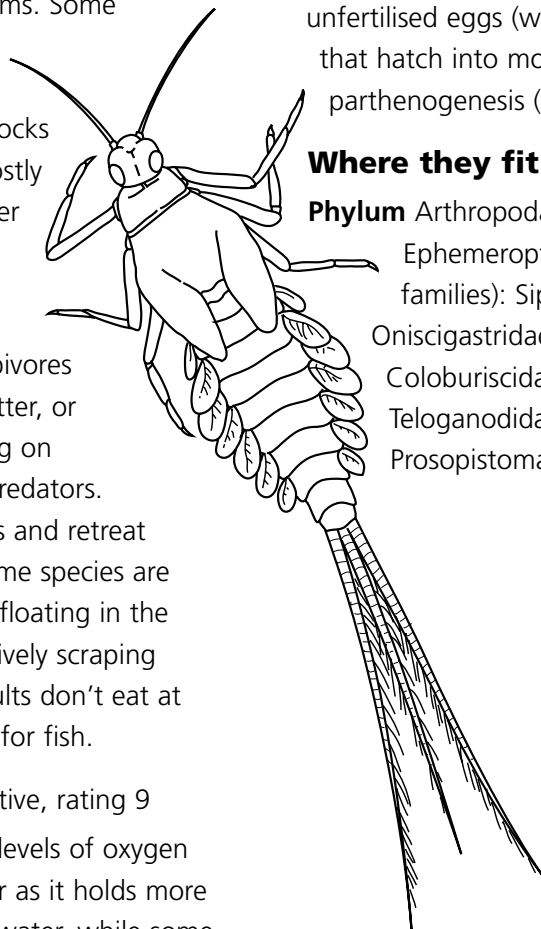
What's interesting about the Mayfly Nymph?

- Mayfly Nymphs can take from three weeks to two years to become full-grown adults.
- Nymphs of many species vibrate their gills to increase the amount of water moving over them (this is the equivalent of panting). Their gills may also be used as swimming paddles.
- Adult Mayflies have male and female sexes, but in some species the females can lay unfertilised eggs (without male interaction) that hatch into more females. This is called parthenogenesis (path-en-oh-gen-e-siss).

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order**

Ephemeroptera > **Family** (Nine Australian families): Siphonuridae; Baetidae; Oniscigastridae; Ameletopsidae; Coloburiscidae; Leptophlebiidae; Teloganodidae; Caenidae; Prosopistomatidae



Alderfly Larva

A fearsome predator, feeding on other bugs, they are nicknamed 'toebiters'

▼				
Pollution tolerance	Very sensitive	Sensitive	Tolerant	Very tolerant
Size	Up to 20 mm long			

What they look like

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

Where they live

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

What they eat

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

Pollution tolerance Sensitive, rating 8

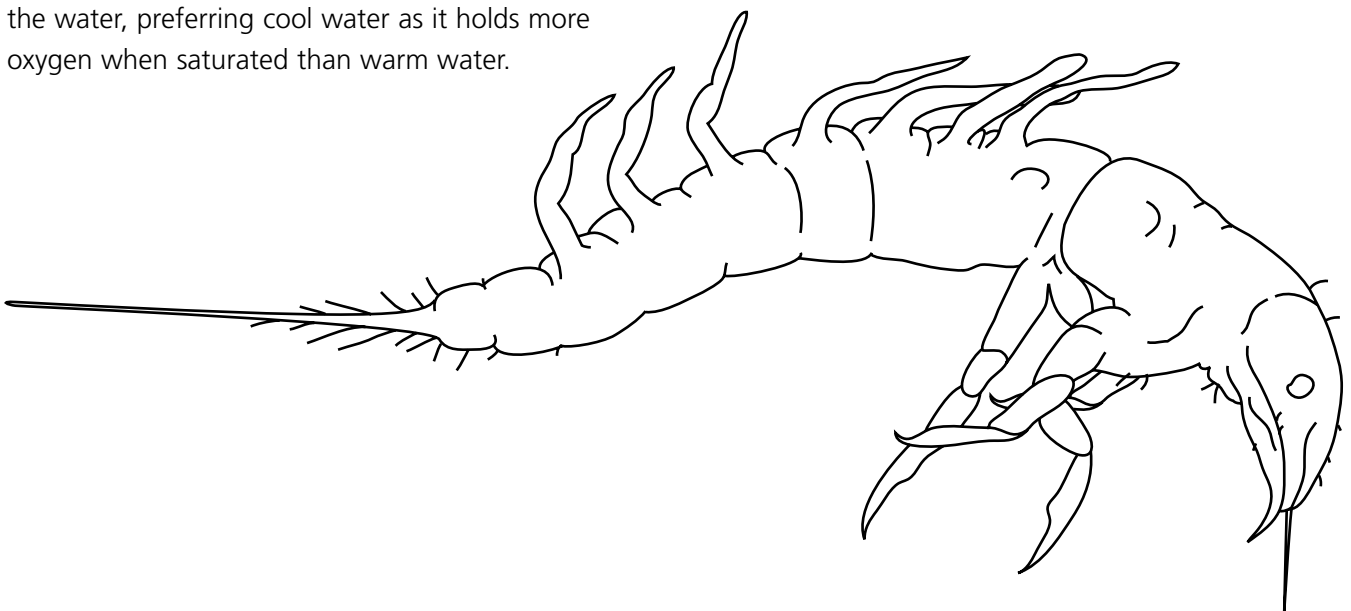
Alderfly larvae are sensitive to low levels of oxygen in the water, preferring cool water as it holds more oxygen when saturated than warm water.

What's interesting about the Alderfly Larva?

- Alderfly larvae, when fully grown, make a small cell or closed hole under a log or stone above the waterline. After a week or so, an adult alderfly comes out of the cocoon. The alderflies mate, produce eggs, and die within a few days to a few weeks.
- Alderflies, in both the larva and adult stages, are important food for fish.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Megaloptera > **Family** Sialidae





Caddisfly Larva

What they look like

The Caddisfly Larva (plural – larvae) are 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.

Where they live

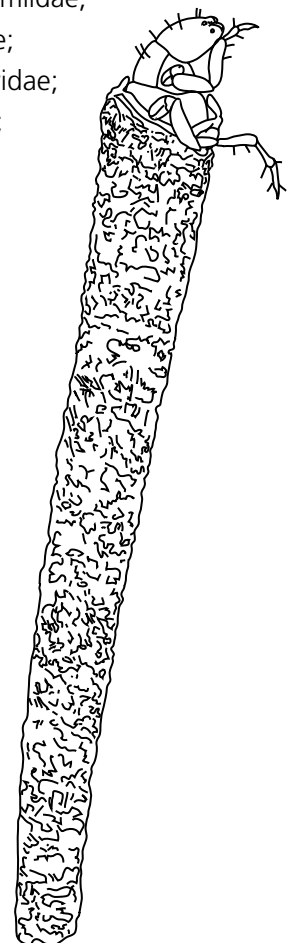
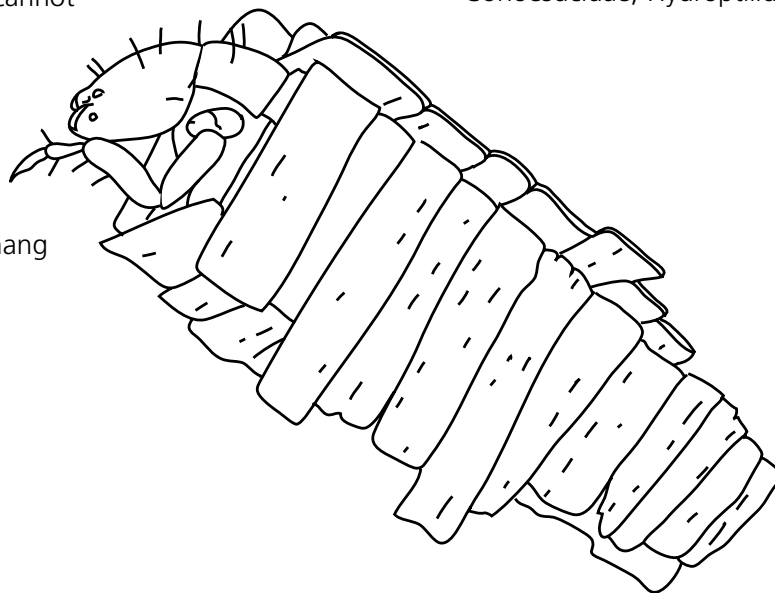
They live in a wide range of environments from fast flowing streams to freshwater ponds. Their soft bodies are usually covered in a protective silky case, while some Caddisfly live in fixed homes rather than mobile cases. They use the hooks at the end of their abdomen to hold on to their cases. Some 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.

What they eat

The Caddisfly Larva eats algae and other plants (living and dead). Some species feed on other insects and spin silky nets to capture their prey. Some eat the larvae of other Caddisfly species, while others scrape algae from stones or plants, or shred leaf litter.

Pollution tolerance Sensitive, rating 8

The 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.



	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 25 mm long

What's interesting about the Caddisfly Larva?

- Typically they use silk to build cases from gravel, twigs, needles, or sand, depending on the species but not all Caddisfly larva build cases. They often lose their cases if removed from the stream.
- They are an important food for many fish.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order**

Trichoptera > **Family** (26 Australian families):

Hydrobiosidae; Glossosomatidae; Philopotamidae; Stenopsychidae; Ecnomidae; Hydropsychidae; Dipseudopsidae; Polycentropodidae; Psychomyiidae; Leptoceridae; Limnephilidae; Plectrotarsidae; Oeconesidae; Tasimiidae; Chathamiidae; Antipodoeciidae; Helicopsychidae; Calocidae; Kokiriidae; Odontoceridae; Calamoceratidae; Atriplectididae; Helicophidae; Philorheithridae; Conoesucidae; Hydroptilidae



Water Mite

These bugs are quite tiny, hence the “mite” in their name.

▼				
Pollution tolerance	Very sensitive	Sensitive	Tolerant	Very tolerant
Size	Very small at 1 - 5 mm long			

What they look like

Water Mites look like fat little spiders. They have a flat, round body with four hairy pairs of legs for swimming. The moveable head is attached to the body by a hinge.

Where they live

Water Mites swim in slow-flowing and shallow water among plants. They live in all freshwater environments, but are more abundant in species and number in slow-moving waters. They sometimes attach themselves to other aquatic animals.

What they eat

Water Mites eat plant or animal substances, decaying organisms, and humus (the dark, fertile matter in soils). Some adults can be parasitic and attach themselves to other aquatic animals to feed from them.

Pollution tolerance

Sensitive, rating 6

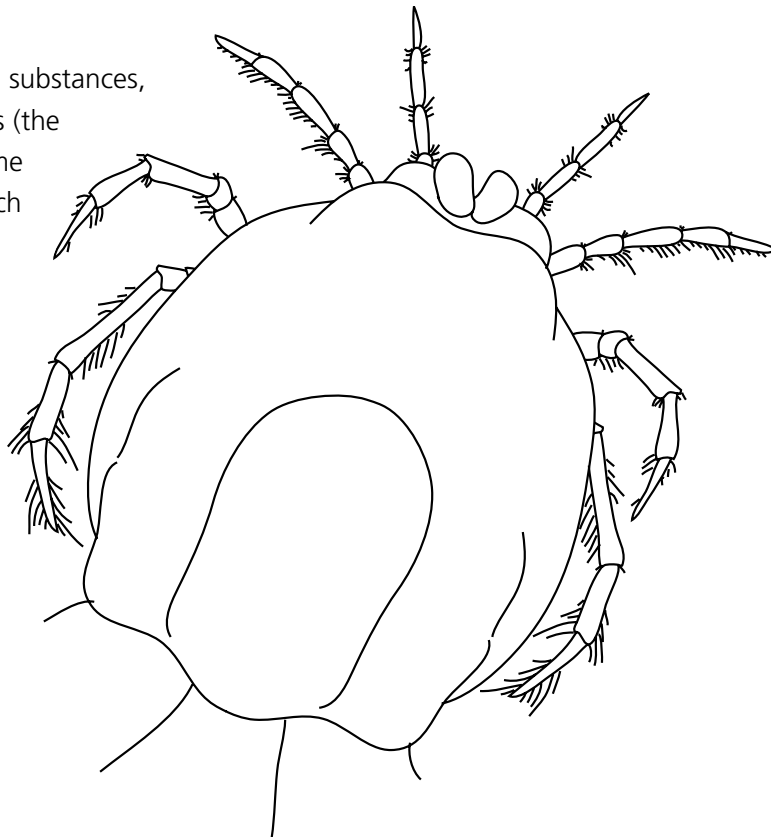
Water Mites are sensitive to changes in their environment.

What’s interesting about Water Mites?

- They are a diverse group, but all have simple, rounded bodies with eight legs.
- Some are hard-bodied while others are soft-bodied.

Where they fit in

Phylum Chelicerata > **Class** Arachnida > **Order** Acarina





Beetle Larva

These belong to the order *Coleoptera* (coll-ee-op-terra). It comes from the Greek words "koleos," (sheath), and "ptera," (wings). The name refers to the adults hardened front wings, which cover the folded hind wings like a sheath.

What they look like

There are many types of beetle larvae (the plural of larva), so it is difficult to give a precise description. Generally they are segmented and cylindrical with six legs and a distinct head.

Where they live

They live in a large range of habitats; often found in mountain streams or slow-moving rivers, puddles, dams and lakes.

What they eat

Beetle Larvae eat plant or animal matter. They usually have biting mouth parts.

Pollution tolerance

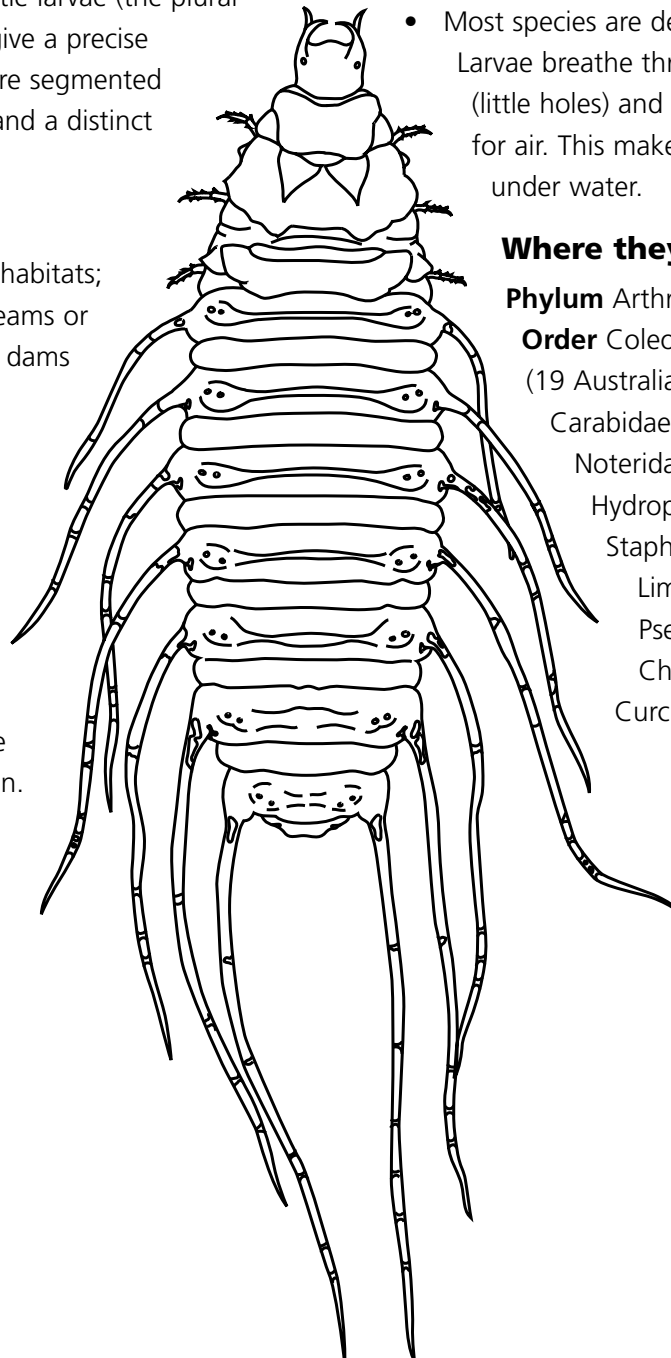
Tolerant, rating 5

Beetle Larvae cannot tolerate low levels of dissolved oxygen.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	2 - 20 mm long

What's interesting about Beetle Larvae?

- We live in the Age of Beetles - Coleoptera is the largest order in the entire animal kingdom. There are more species of beetles than there are species of plants!
- Most species are dependent on air. Larvae breathe through their gills or spiracles (little holes) and do not need to come up for air. This makes them look silvery under water.



Where they fit in

Phylum Arthropoda > **Class** Insecta >

Order Coleoptera > **Family**

(19 Australian families): Microsporidae; Carabidae; Haliplidae; Hygrobiidae; Noteridae; Dytiscidae; Gyrinidae; Hydrophilidae; Hydraenidae; Staphylinidae; Scirtidae; Elmidae; Limnichidae; Heteroceridae; Psephenidae; Ptilodactylidae; Chrysomelidae; Brentidae; Curculionidae.



Dragonfly Nymph

The nymph is the “teenage” form of the dragonfly, before it becomes an adult. It belongs to the order *Odonata*, which comes from the Greek word, *odous*, meaning tooth. Dragonfly nymphs can inflict a sharp bite with their teeth (mandibles) if held carelessly.

What they look like

Dragonfly Nymphs are short and chunky with wing pads and internal gills. Their 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.

What they eat

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. The lip is then pulled back to the waiting mouth and feeding begins.

Pollution tolerance

Tolerant, rating 4

They are sensitive to habitat disturbance.

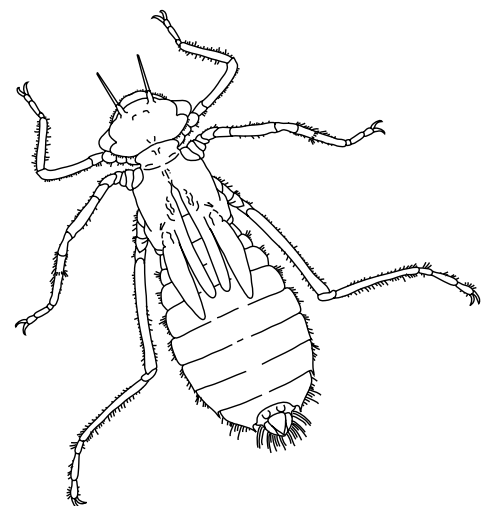
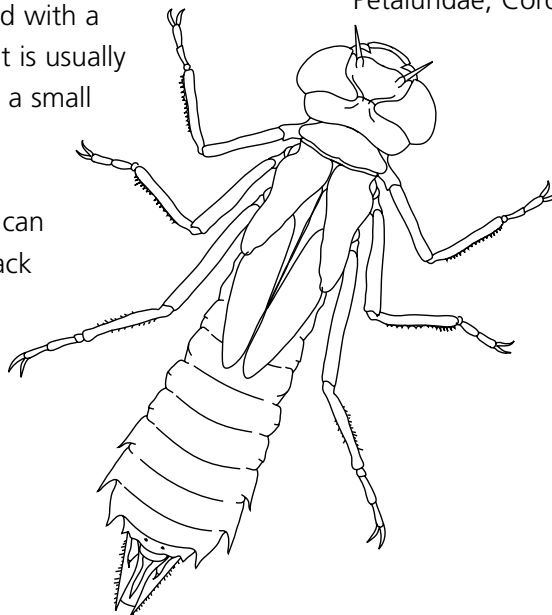
	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	18 - 49 mm long

What’s interesting about the Dragonfly Nymph?

- It breathes by sucking water into its abdomen to move water over its internal gills. Once it has absorbed enough oxygen, the nymph squeezes the water out rapidly and this helps propel them forwards in the water.
- 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 and damselflies do not go through a pupal stage to become an adult.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Odonata > **Sub Order** Epiproctophora (formerly Anisoptera) > **Family** (30 Australian families): Aeshnidae; Gomphidae; Austropetaliidae; Petaluridae; Corduliidae; Libellulidae.





Water Strider

They are sometimes called pond skaters and Jesus Bugs because they “walk” on water.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	8 - 12 mm long

What they look like

Water Striders are flat and long without wings, and easy to identify by the second and third pairs of legs that are almost twice as long as their bodies. They have short forelegs to attack and hold their prey.

Where they live

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.

What they eat

Water Striders are both predators and scavengers. 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, rating 4

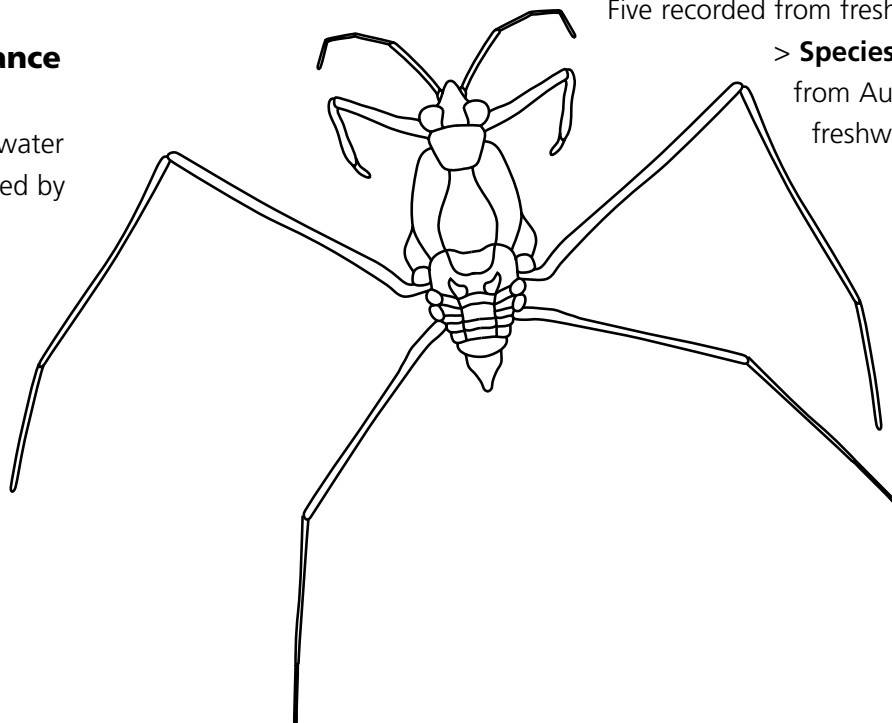
They live above the water and are not influenced by water pollution.

What’s interesting about Water Striders?

- Their legs have tiny, water-repellent hairs that hold tiny air bubbles, allowing them to skate on the surface of the water.
- The Strider moves with a jerking, pushing movement of its middle legs. It steers with its back legs.
- Their bodies are covered with soft, velvety hairs that hold a thin film of air through which they breathe.
- They make ripples on the water surface to attract mates.
- They can escape predators by going underwater. When the danger is past, they pop to the surface of the water and stand back up on their four legs.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Hemiptera > **Family** Gerridae > **Genus** Five recorded from freshwaters > **Species** 12 recorded from Australian freshwaters.





Whirligig Beetle and Larva

Whirligig Beetles are so named because they swim in circles. They are also called “apple smellers” and “mellow bugs” because they have fruity odour when handled.

What they look like

The Whirligig Beetle is a streamlined, oval beetle. Its two hind pairs of legs are short and flattened like oars and propel the beetle quickly across the water. The long front legs are for grasping. The Whirligig Larva has a long, segmented body, with many legs.

Where they live

Whirligig Beetles and the larvae live on the surface of the water on the edges of ponds and streams.

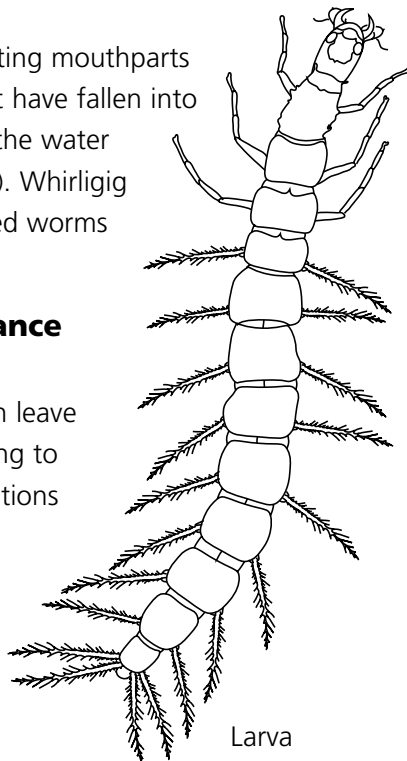
What they eat

The Whirligig has biting mouthparts and eats insects that have fallen into the water or under the water (which they dive for). Whirligig larvae eat soft-bodied worms and insect larvae.

Pollution tolerance

Tolerant, rating 4

Whirligig beetles can leave a pond easily by flying to another, if the conditions are unsuitable.



Larva

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 25 mm long

What’s interesting about the Whirligig?

- The Whirligig has an unusual set of compound eyes that are divided into two parts, one part under-water, one part in the air, so it can see both above and below water.
- It is the only water beetle that can support itself on the surface film of water. The lower half of its body rests in the water, while the other upper half is water-repellent (resists water) and lies on top.
- The adult takes a bubble of oxygen under its wing covers when it dives under water, using it to breathe.

Where they fit in

- > **Phylum** Arthropoda > **Class** Insecta
- > **Order** Coleoptera
- > **Family** Gyrinidae



Adult

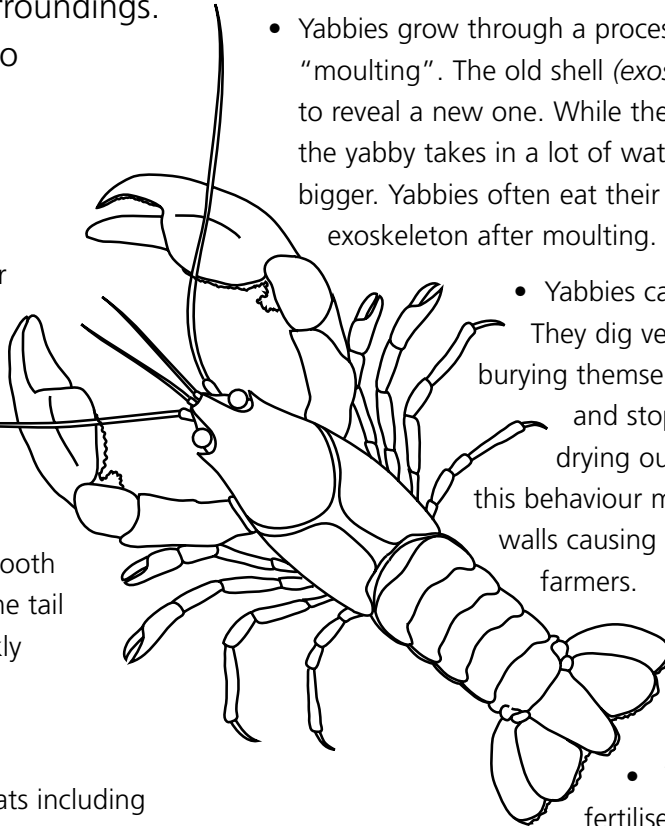


Freshwater Yabby / Crayfish

The Yabby or Freshwater Crayfish is found in a wide range of aquatic habitats throughout most of NSW, in wetlands, creeks, rivers and dams. They are often disguised to look like their surroundings. The Murray Yabby grows up to 400 mm long.

What they look like

The Yabby's two front legs are in the shape of large claws. Used mainly for defence against other yabbies and predators, they are also used for grasping food and digging burrows. Besides their claws, yabbies have four sets of walking legs and a long, thick tail. Some may have a smooth shell; others are covered in spines. The tail flap is used to thrust the yabby quickly through the water.



Where they live

Yabbies live in a wide range of habitats including low-lying swamps, rivers and dams. Some burrow into the banks. Yabbies hide beneath rocks or branches in the water to protect themselves from predators like the Murray Cod and Callop fish, and birds like Cormorants, Heron and Ibis.

What they eat

Yabbies eat anything when they are hungry. This includes vegetation, fish, plants, wood and meat. Yabbies can also be cannibals, eating other yabbies if there is no other food.

Pollution tolerance Tolerant, rating 4

Yabbies are sensitive to chemical pollution, which harms their delicate gills that they need to breathe. They can survive a wide range of water temperatures. However, Yabbies are less active at lower temperatures.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	2 - 400 mm long

What's interesting about the Yabby?

- Yabbies grow through a process known as "moulting". The old shell (*exoskeleton*) peels off to reveal a new one. While the new shell is soft, the yabby takes in a lot of water to make its body bigger. Yabbies often eat their discarded exoskeleton after moulting.
- Yabbies can survive a drought. They dig very deep burrows, burying themselves to keep moist and stop their gills from drying out. Unfortunately, this behaviour may destroy dam walls causing problems for farmers.
- Females use their tail flap to protect their eggs.
- The number of fertilised eggs carried by the female yabby ranges from 100 to more than 1000.
- Yabbies are popular bait for fishermen and are eaten by humans.

Where they fit in

Phylum Arthropoda > **Class** Crustacea > **Order** Decapoda > **Family** Parastacidae



Damselfly Nymph

Damselflies are related to dragonflies.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	16 - 33 mm long

What they look like

Damselfly Nymphs have slender bodies, with three long tail-like gills at the end. They have extendable jaws that fold up under the head (like Dragonfly Nymphs), and legs close behind their head. Large compound eyes (eyes made from lots of smaller eyes) give them excellent vision.

Where they live

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

What they eat

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 (*labium*) that is usually folded under the insect's head. When a small insect comes near, the nymph will shoot out its lower lip to grab its prey. The lip is then pulled back and feeding begins.

Pollution tolerance

Tolerant, rating 3

Damselfly Nymphs are sensitive to habitat disturbance. They need aquatic or riparian vegetation in the waterways where they live.

What's interesting about the Damselfly Nymph?

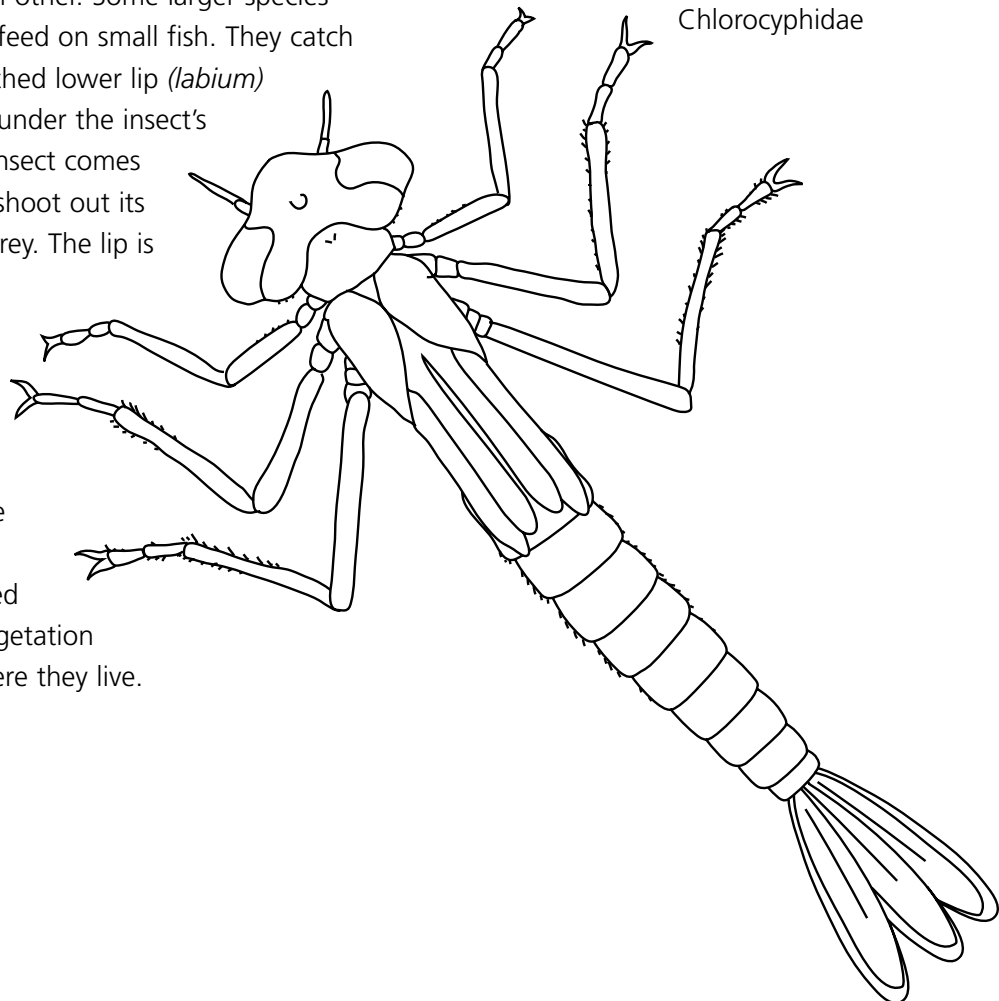
- More than eight-tenths of their brain is devoted to analysing visual information.
- They do not go through a pupal stage to become an adult.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order**

Odonata > **Sub Order** Zygoptera > **Family**

(11 Australian families): Hemiphelebiidae; Coenagrionidae; Isostictidae; Protoneuridae; Lestidae; Lestoideidae; Megapodagrionidae; Sylestidae; Amphipterygidae; Calopterygidae; Chlorocyphidae





Fly Larva and Pupa

The Fly Larva, generally known as a maggot, is the young form of flies, which belongs to the order Diptera, meaning two wings (Di - two, and Ptera - wings). Most insects have four wings, but flies have only two. The plural of larva is larvae. The pupa is like a teenage larva, before turning into a fly with wings.

What they look like

There are many types of Fly Larvae (plural of larva), but they are all generally grub- or worm-like. Some common groups include:

Black Fly larvae, which are dumb-bell shaped and soft. They like to attach themselves to rocks and wood.

Crane Fly larvae, which are large and fleshy with very short "tentacles" for breathing.

Where they live

Fly Larvae are found in streams and ponds, in water in the holes of tree trunks - anywhere water collects. The larvae of one species of fly lives in pools of crude oil.

What they eat

Some Fly Larvae feed on decaying matter and play a key role in recycling nutrients. Many species are herbivores (herb-ee-vorz) and a few are carnivores (car-nee-vorz). The Black Fly larva filter-feeds using two sets of filaments (thread-like structures) on its head that trail in the water.

Pollution tolerance Tolerant, rating 3

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.

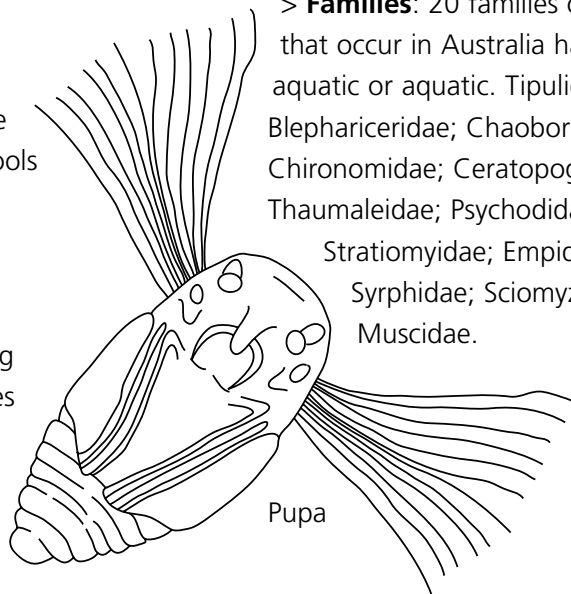
	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 50 mm long

What's interesting about Fly larvae?

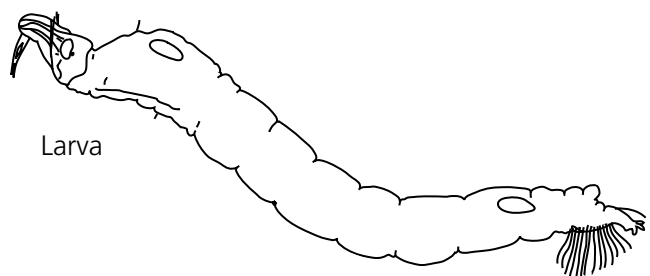
- *Blackfly* larvae anchor their bottoms to rocks in fast flowing streams and capture plankton through feathery filters that sway in the current.
- Fly larvae experience a complete metamorphosis (change or form through their life cycle) that includes eggs, larvae, pupae and adults.
- Many flies have a pupa enclosed in a puparium, the dried skin of the maggot that surrounds the pupa, similar to the way a cocoon surrounds a moth pupa.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Diptera
 > **Families:** 20 families of the ninety-eight families that occur in Australia have larvae that are semi-aquatic or aquatic. Tipulidae; Tanyderidae; Blephariceridae; Chaoboridae; Dixidae; Culicidae; Chironomidae; Ceratopogonidae; Simuliidae; Thaumaleidae; Psychodidae; Athericidae; Tabanidae; Stratiomyidae; Empididae; Dolichopodidae; Syrphidae; Sciomyzidae; Ephydriidae; Muscidae.



Pupa



Larva



Midge Larva and Pupa

Midges are tiny flies. The plural of larva is larvae.

What they look like

Midge Larvae are very small, often C-shaped. They have a spastic, squirming movement. They are often attached to debris by their tiny legs. The Bloodworm, also featured in this Buglopedia, is a type of midge.

Where they live

Like Fly Larvae, Midge Larvae are found in streams and ponds, in water in the holes of tree trunks - anywhere water collects.

Pollution tolerance

Tolerant, rating 3

Midge Larvae can tolerate organic pollution as they feed on the organic particles. They can live in water having low levels of dissolved oxygen as they can rise to the surface to breathe.

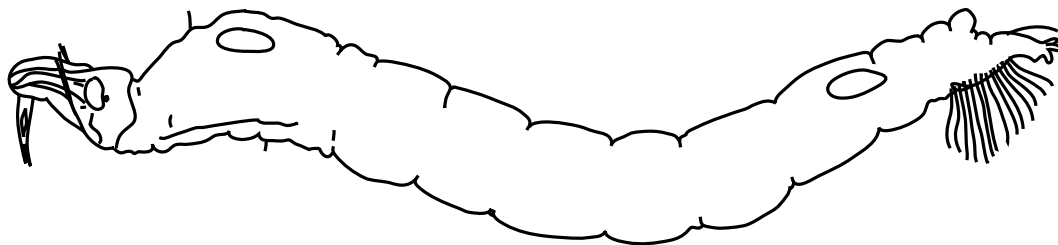
▼				
Pollution tolerance	Very sensitive	Sensitive	Tolerant	Very tolerant
Size	Up to 50 mm long			

What's interesting about the Midge Larva?

- Even a drop of water is enough to sustain a Midge Larva.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Diptera
 > **Families:** Like Fly Larvae, there are many families.





Freshwater Mussel

Freshwater Mussels are *bivalves*. This means they have two valves (shells) hinged together that are typically closed when you find them.

What they look like

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, the gills sort the particles from the water flowing into the shell.

Where they live

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. Mussels with smooth shells are usually found in muddy or sandy areas in streams or lakes. The smooth shell makes it easier to move through mud or sand. Mussels with bumps or knobs on their shells are found in gravel (rocks the size of marbles) on the bottom of fast streams. The bumps and knobs help anchor the mussel in the gravel.

What they eat

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, rating 3

Freshwater Mussels do not occur in badly polluted rivers. Bivalves accumulate toxic chemicals in their tissues. These chemicals may be present in the water in low concentrations.

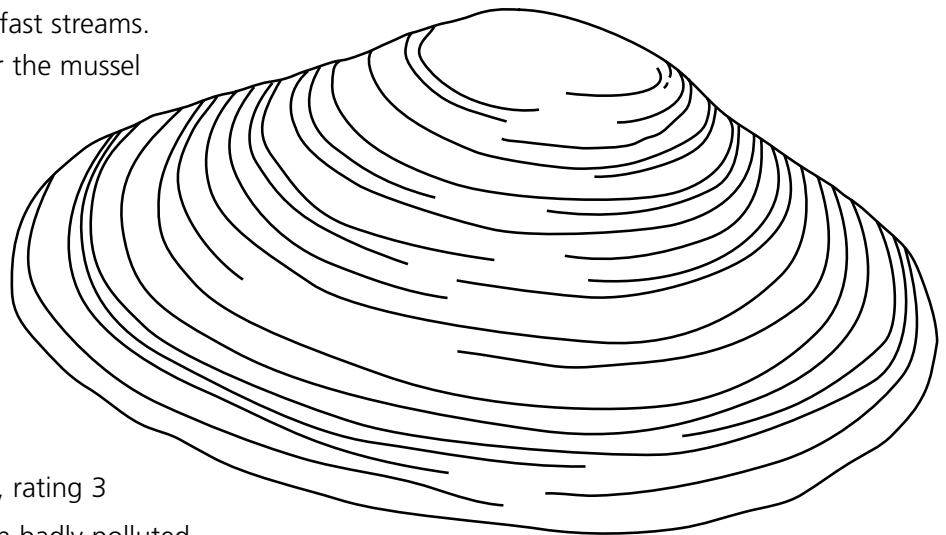
▼				
Pollution tolerance	Very sensitive	Sensitive	Tolerant	Very tolerant
Size	From 40 - 180 mm across longest diameter			

What's interesting about the Freshwater Mussel?

- Many species live 20-30 years, some up to 140 years. Scientists can tell how old a mussel is by counting the ridges or year stripes on its shell as mussels have a different eating or growing speed in winter.
- The sexes are separate in most species but some mussels have both male and female reproductive systems.

Where they fit in

Phylum Mollusca > **Class** Bivalvia > **Order** Eulamellibranchia > **Family** (Three Australian families): Hyriidae; Corbiculidae; Sphaeriidae



Nematode

Although they are generally tiny creatures, if all the world's nematodes were joined end to end, they'd stretch right around the equator!

What they look like

Nematodes are elongated, thin worms without any segments and are usually see-through. They are round in cross-section (cut across) throughout the length of their body, which is why they are also called roundworms. Their body is generally blunt, tapered, or uniformly threadlike. The mouth at one end has three or six lips with the anus at the other end. The sexes are separate but males are rare or unknown in many species. Many, but not all nematodes move with a characteristic whip-like motion.

Where they live

Nematodes live in soft sediment (matter deposited at the bottom of the water) that they burrow into. They can also live anywhere there's enough moisture. Some are parasitic and live within a plant or animal. They live in warm and moist conditions that favour the development of eggs and infection of hosts.

What they eat

Nematodes can live on bacteria, fungi and plants. Some nematodes types are parasitic, living within plants or animals. In animals, they suck blood and tissue.

Pollution tolerance Tolerant, rating 3

Nematodes can live in a wide range of environments and are tolerant to salt and different water temperatures.

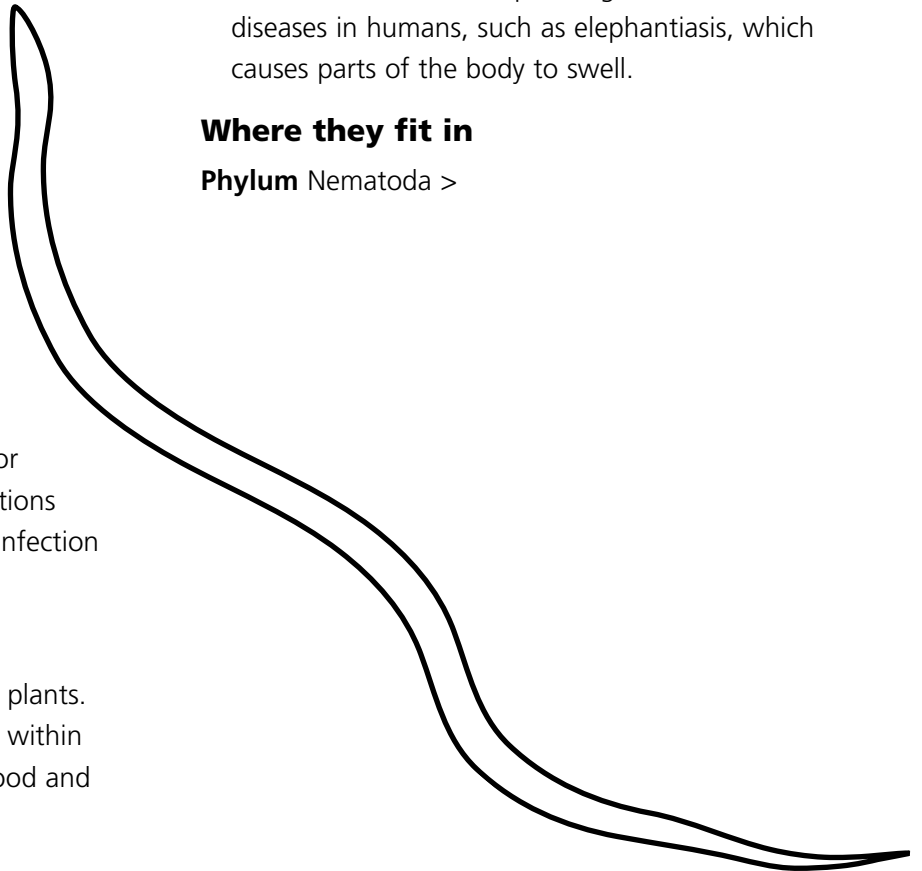
▼				
Pollution tolerance	Very sensitive	Sensitive	Tolerant	Very tolerant
Size	Up to 10 mm long			

What's interesting about Nematodes?

- Nematodes can stop all their life activities and go to sleep when conditions are unfavourable. In this resistant state, they can survive extreme dry heat or cold, and return to life when conditions become favourable.
- One species of Nematode is a parasite of the Sperm Whale and grows up to 13 metres long.
- Some Nematodes in tropical regions can cause diseases in humans, such as elephantiasis, which causes parts of the body to swell.

Where they fit in

Phylum Nematoda >





Freshwater Sandhopper

They are also called 'Side-swimmers' because they seem to hop or flip when disturbed in the water or are picked up.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	6 - 20 mm long

What they look like

Freshwater Sandhoppers look like Slaters. As they resemble large fleas, they're also known as beach fleas. They are slightly curled and flattened sideways. They have hard segments (rings dividing their bodies), each with a pair of legs. Sandhoppers have seven pairs of walking legs and three pairs of swimming legs, plus two pairs of antennae.

Where they live

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

What they eat

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

Pollution tolerance

Tolerant, rating 3

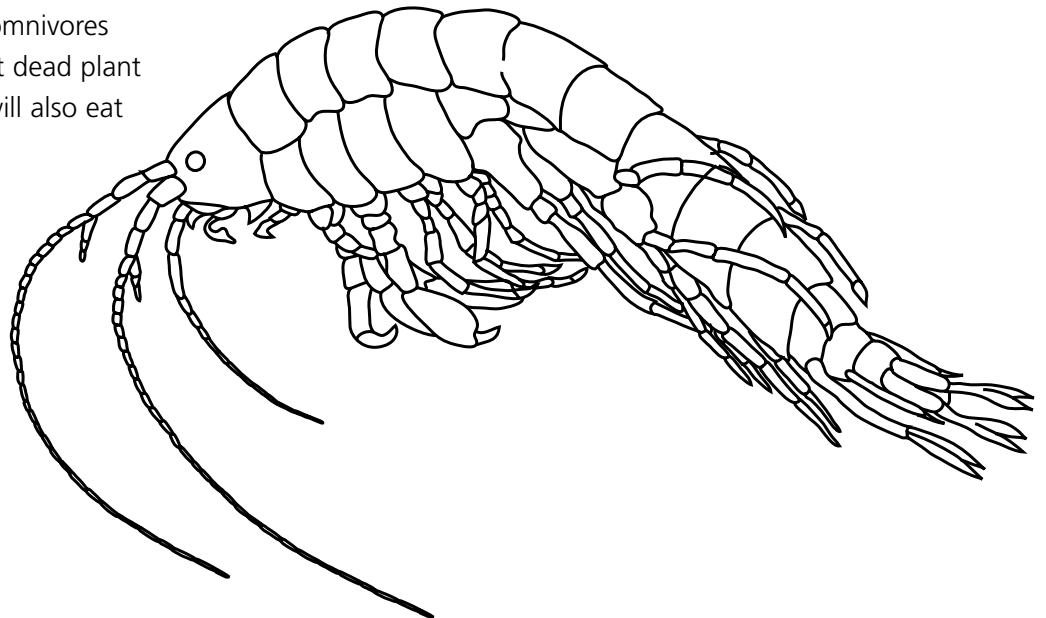
Freshwater Sandhoppers cannot tolerate chemical pollution. Pollution damages their delicate gills, which they use to breathe.

What's interesting about the Freshwater Sandhopper?

- 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.
- Sandhoppers that occur on land also have gills so that they can breathe. Gills need water in order to work properly, so the land-based sandhoppers have to live in a damp environment.

Where they fit in

Phylum Arthropoda > **Class** Crustacea > **Order** Amphipoda





Freshwater Shrimp

As the name suggests, they are like the prawns you get in the fish shop, only smaller.

▼				
Pollution tolerance	Very sensitive	Sensitive	Tolerant	Very tolerant
Size	Up to 35 mm long			

What they look like

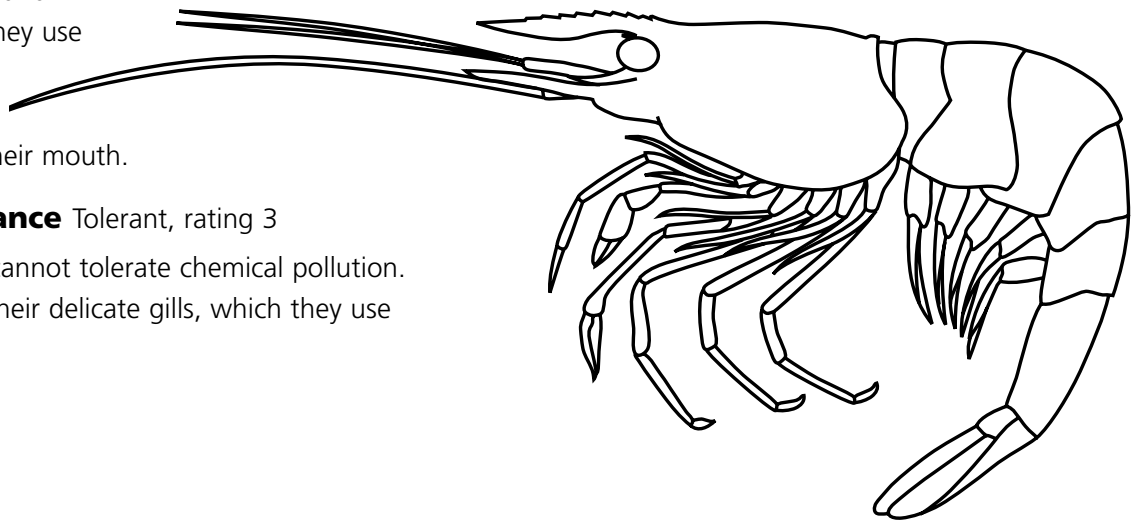
Freshwater Shrimp are translucent, with a very thin and smooth outer shell that is periodically shed as they grow. They have a large spine sticking out at the front of the head and a fan tail, which can be speckled with blue or green markings. Freshwater Shrimp have 10 jointed legs (they are *decapods*; deca – ten, pod - leg), well-developed swimmerets (swimming legs under their tail) and a body that is flattened sideways.

Where they live

Freshwater Shrimp are found in freshwater rivers and ponds, close to the bank, or on rocks and aquatic plants. They prefer slow flowing water.

What they eat

Freshwater Shrimp mainly eat decomposing vegetation, bacteria and particles of algae. They use their first two pairs of legs to grab the food and put it in their mouth.



Pollution tolerance Tolerant, rating 3

Freshwater Shrimp cannot tolerate chemical pollution. Pollution damages their delicate gills, which they use to breathe.

What’s interesting about the Freshwater Shrimp?

- Shrimp are transparent and are typically greyish in colour.
- They are very common in aquaculture ponds and farm dams, especially if there are plants.
- Many types of fish depend on them for food.

Where they fit in

Phylum Arthropoda > **Subphylum** Crustacea > **Class** Malacostraca > **Order** Decapoda > **Family** Atyidae.



Water Scorpion / Needle Bug

Some Water Scorpion species look like land scorpions. Also known as toe-biters, they are often seen beneath the water surface or on aquatic vegetation.

What they look like

Water Scorpions are large, predatory water bugs with grasping, pincer-like forelegs for seizing their prey. They have a short or long breathing tubes at the end of their abdomens. There are two commonly found water scorpions - one stout and leaf-like, and the other thin and stick-like (Needle Bug).

Where they live

Water Scorpions mostly live among water weeds or in the mud of ponds, lakes and streams but a few are found under rocks in flowing water.

What they eat

Water Scorpions are *carnivores* (car-nee-vorz), eating pond animals. They capture their prey with their front legs and suck out its body fluids.

Pollution tolerance

Tolerant, rating 3

Water Scorpions can tolerate low levels of dissolved oxygen, by coming to the surface to breathe or by using their long breathing tubes.

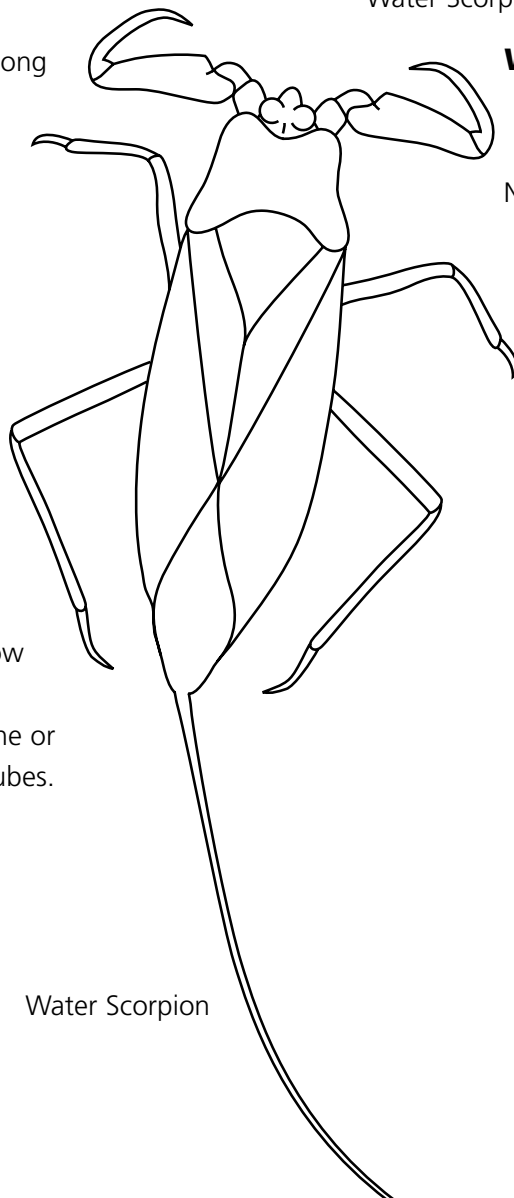
	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 50 mm long

What's interesting about the Water Scorpion?

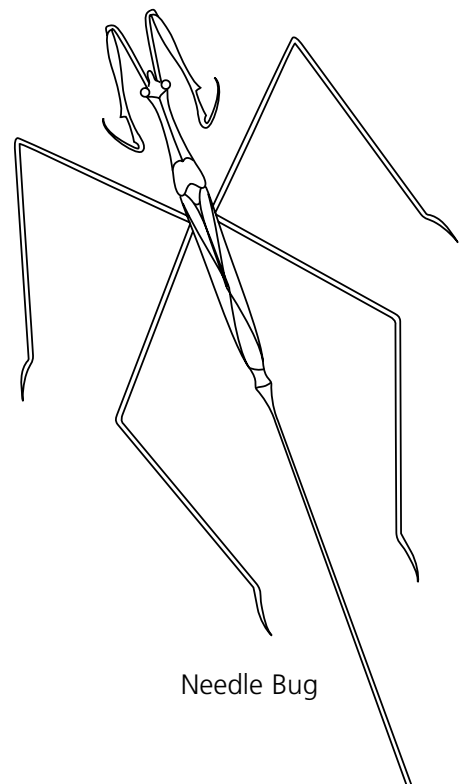
- It uses its siphon in a "snorkel fashion" thrusting it up through the surface film on the water to the air above.
- Their legs are not much use in swimming, so most water scorpions spend life near the shoreline.
- You need to handle them carefully, as the bite of a Water Scorpion can be painful!

Where they fit in

Phylum Arthropoda > **Class** Insecta
> **Order** Hemiptera > **Family** Nepidae



Water Scorpion



Needle Bug



Diving Beetle

These sleek, shiny beetles look like they're built for speed! They are generally called *dytiscids* (pronounced die-tih-sids)

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 40 mm long

What they look like

Diving Beetles are smooth, oval and streamlined with hairy, 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.

Where they live

Both the adult and the larval forms live in streams and ponds. They hide among reeds in swiftly flowing water. Adults of most species are strong fliers.

What they eat

Diving Beetles have biting mouthparts and eat other aquatic organisms or animals that fall into the ponds, dead or alive. They can eat snails and fish much larger than themselves.

Pollution tolerance

Very tolerant, rating 2

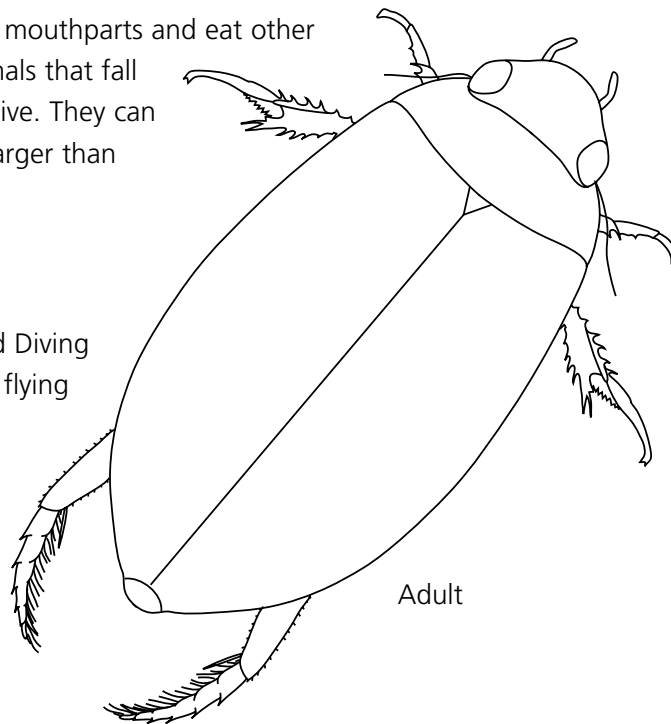
If living conditions get bad Diving Beetles leave the pond by flying to another.

What's interesting about the Diving Beetle?

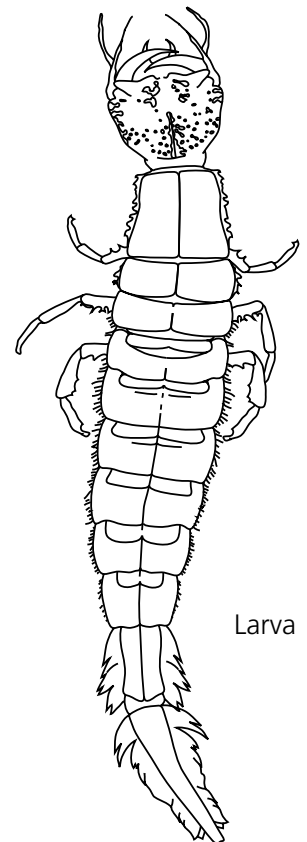
- They store air under their wings so that they can breathe under water.
- Many species fly at dusk (*crepuscular* – pronounced kre-puss-cue-lah) and are attracted to lights.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Coleoptera > **Family** Dytiscidae



Adult



Larva

Flatworm

Flatworms like to lurk in dark places in waterways.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 10 mm long

What they look like

As their name suggests, they are wormlike and flat without segments on their bodies. They have a soft skin with hair, generally down the side. The smaller species of Flatworm wave their hair to propel themselves! 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.

Where they live

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

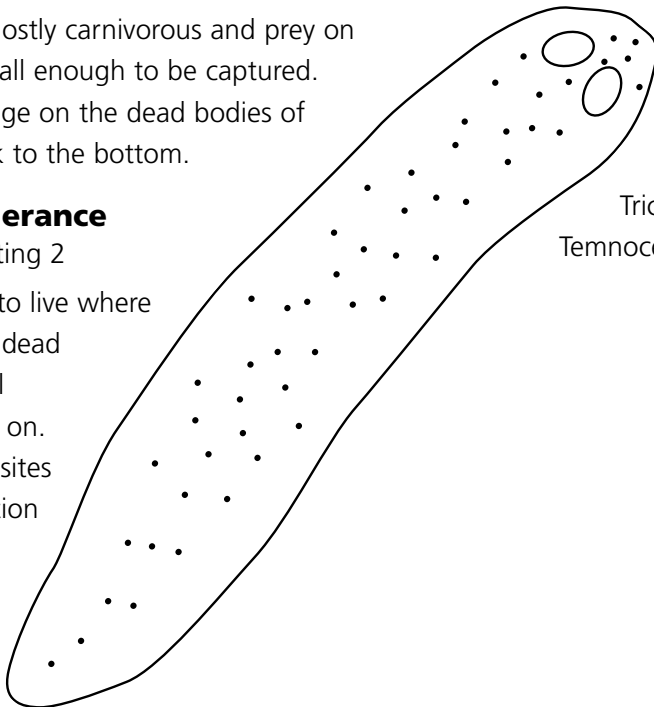
What they eat

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

Very tolerant, rating 2

Flatworms tend to live where there are lots of dead plant and animal remains to feed on. This means that sites of organic pollution are good for Flatworms.



What's interesting about Flatworms?

- Flatworms can glide over surfaces, or the underside of a surface film of water, using small body hairs for movement.
- The stomach is like a sack. The food goes into the sack through the mouth. Once the food is taken into the body, the rest is thrown back out of the mouth. (They have no anus).
- 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 a new worm from a broken piece.

Where they fit in

Phylum Platyhelminthes > **Class**

Turbellaria > **Order** (Four orders):

Tricladida; Rhabdocoela; Alloecoela;

Temnocephala.

Hydra

The Hydra is a small, freshwater polyp.

What they look like

Hydras have small, cylindrical, soft bodies with tentacles around the mouth at one end. At the other end, they have a disk, which they use to affix themselves to a solid surface such as a rock or plant.

Where they live

Hydras occur in ponds, streams and small lakes. They are found in groups, attached to stones and plant matter.

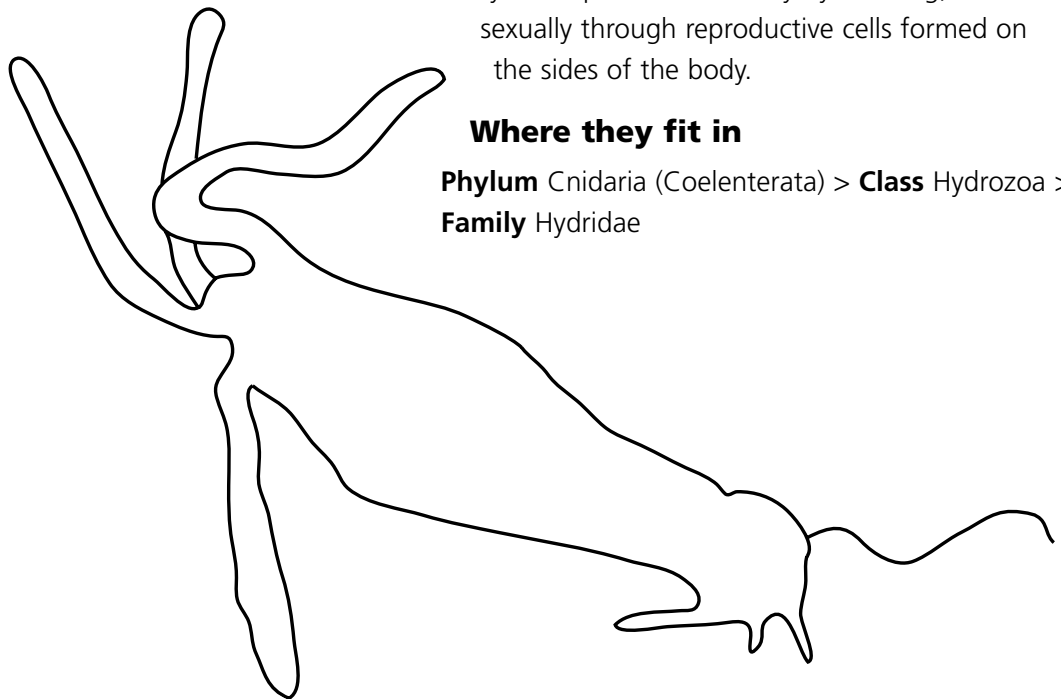
What they eat

The Hydra eats small animals that may happen to touch its tentacles. It uses stinging cells in its tentacles to stun its prey, and then pulls it into its mouth.

Pollution tolerance

Very tolerant, rating 2

Hydras can live in streams with organic pollution as they can survive in a low oxygen environment. They feed off the algae and bacteria that grow in these environments.



	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 25 mm long

What's interesting about the Hydra?

- Their tentacles have microscopic stinging cells that can be shot like poison darts. They use these for defence and capturing food.
- Hydras are found on their own, but sometimes they are joined together in tubes that form a colony, known as Hydrozoa, and these colonies are sometimes mistaken for plants because of their branching appearance.
- The stomach is like a sack. The food goes into the sack through the mouth. Once the food is taken into the body, the rest is thrown back out of the mouth. (They have no anus).
- Hydras reproduce asexually by budding, and sexually through reproductive cells formed on the sides of the body.

Where they fit in

Phylum Cnidaria (Coelenterata) > **Class** Hydrozoa > **Family** Hydridae

Water Treader

Like their name suggests, Water Treaders walk or run on the water surface.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 5 mm long

What they look like

Water Treaders are similar to Water Striders, but have shorter legs and a smaller, fatter body.

Where they live

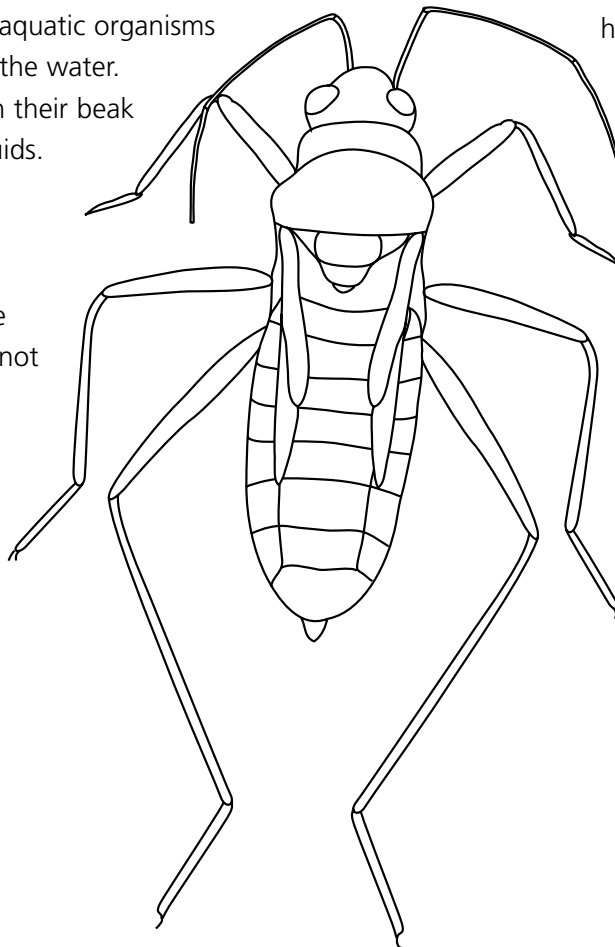
Water Treaders live on the surface of stationary and slow flowing pools. They stay at the edges of banks and hide among vegetation.

What they eat

Water Treaders eat other aquatic organisms or creatures that fall into the water. They spear their prey with their beak and suck out the body fluids.

Pollution tolerance

Very tolerant, rating 2
Water Treaders live on the water surface and so are not influenced by pollution in the water.



What's interesting about the Water Treader?

- Water Treaders either walk or run on the water surface.
- They detect their prey from vibrations of the water surface.
- Like the Water Strider, the legs of the Water Treader have fine, feathery, water repellent hairs on their feet, which allow them to stand on the water surface.
- Their hind legs are longer than their body.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Hemiptera > **Family** Mesoveliidae



Freshwater Slater

Freshwater Slaters often look like the slaters you see in your garden. They are sometimes called sowbugs.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	6 - 20 mm long

What they look like

Freshwater Slaters vary greatly in appearance, but they are all flattened from top to bottom (that is, their bodies are wider than they are thick). They have hard body segments, each bearing a pair of legs - they have seven pairs of legs. They also have two pairs of antennae, one pair longer than the other.

Where they live

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

What they eat

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

Pollution tolerance

Very tolerant, rating 2

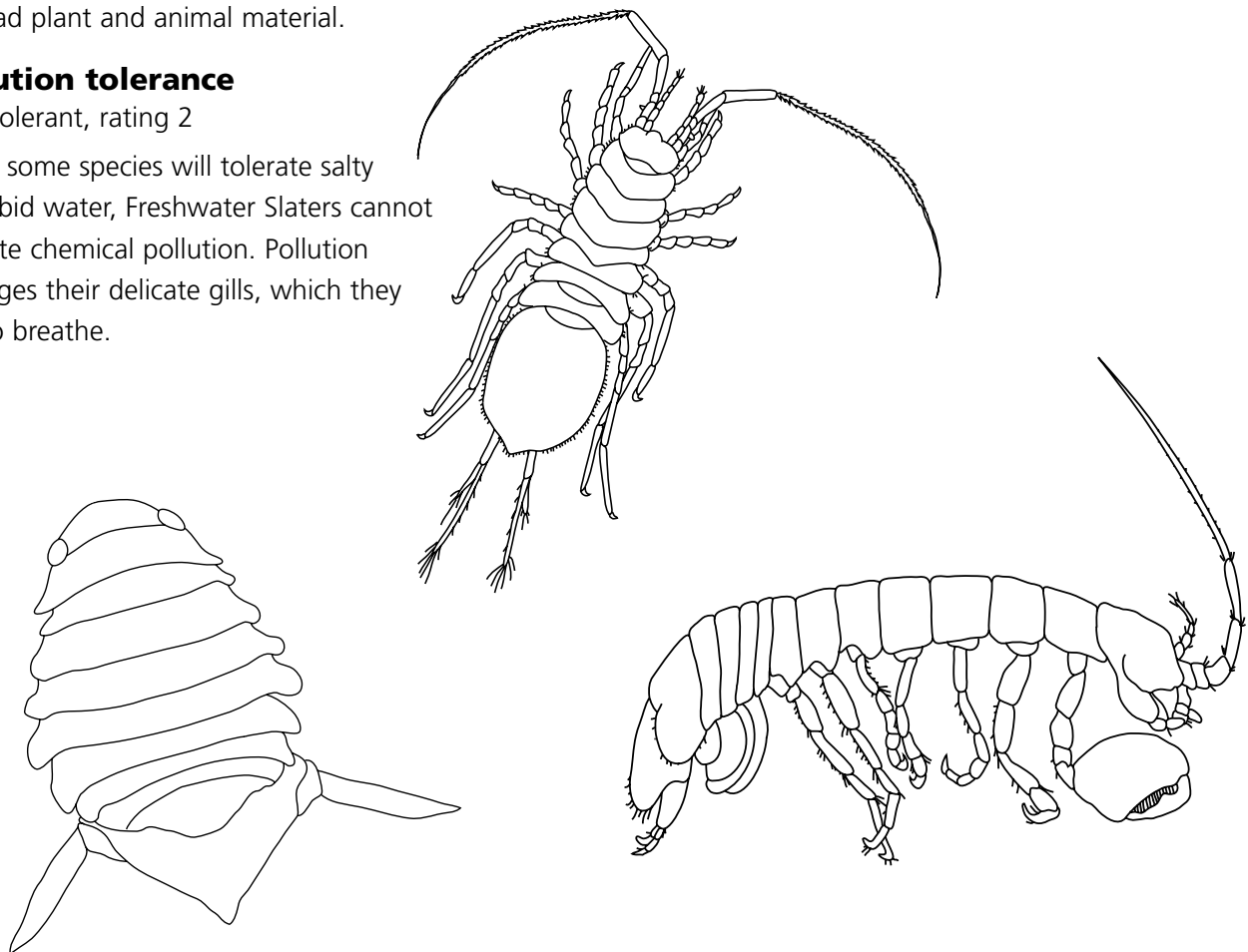
While some species will tolerate salty or turbid water, Freshwater Slaters cannot tolerate chemical pollution. Pollution damages their delicate gills, which they use to breathe.

What's interesting about the Freshwater Slater?

- When the young emerges from the brood pouch, they look like the adult but have only six pairs of legs and six thoracic segments. They get the last segment and pair of legs as they moult.
- Large numbers in a waterway indicate organic enrichment. That is, the water contains large amounts of the remains of living organisms.

Where they fit in

Phylum Arthropoda > **Class** Crustacea
> **Order** Isopoda





Waterboatman

These bugs often look like a beetle with oars! They are similar to Backswimmers, but they swim with their wings upward.

What they look like

Waterboatmen have unique legs that are easy to spot. Being active swimmers, their middle and hind legs have a fringe of swimming hairs and the front legs are short and scoop-like. They have a wide and rounded head with prominent eyes and short antennae. The *rostrum* (beak-like mouth part) is most often short, and some species may look a little beetle-like if the structure of the legs is ignored.

Where they live

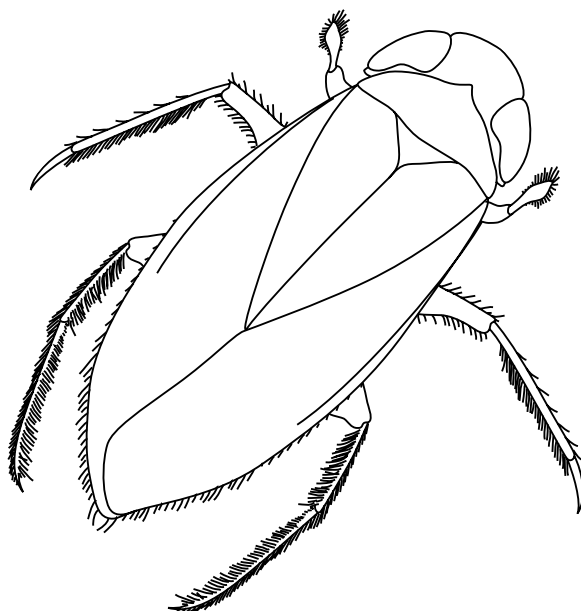
Waterboatmen live in still and slow-flowing ponds amongst the vegetation.

What they eat

Waterboatmen feed mainly on insect larvae in the bottom ooze (or sediment). They are known to feed on a combination of dead plant and animal matter (*detritus* – det-try-tuss) and mosquito larvae.

Pollution tolerance Very tolerant, rating 2

If the conditions get really bad, Waterboatmen can leave the pond easily by flying to another.



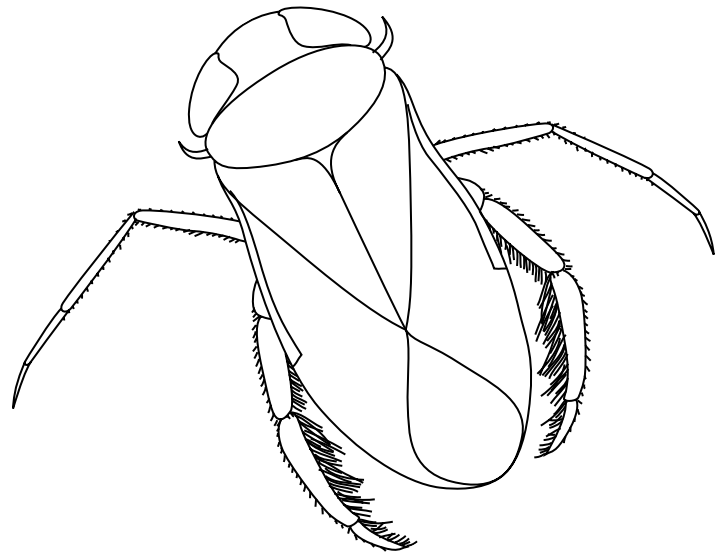
	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	From 1.5 to 15 mm long

What's interesting about Waterboatmen?

- They like to cling to objects in the water, including fish.
- Female Waterboatmen lay their eggs on hard surfaces. Their eggs have even been found on the shells of crayfish (brave bugs!).
- The nymphs look similar to the adults, but lack wings, and moult five times.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Hemiptera > **Family** Corixidae





Freshwater Worm

There are all sorts of Freshwater Worms; short ones and long ones, skinny and chunky - even coloured ones!

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	1 - 30 mm long

What they look like

Freshwater Worms have segmented bodies with rounded ends and no suckers or legs. Many are red or flesh coloured. The Megadrili are large and robust worms, which look much like earthworms. The Microdrili are smaller and more slightly built. 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.

Where they live

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

What they like to eat

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

Pollution tolerance

Very tolerant, rating 2

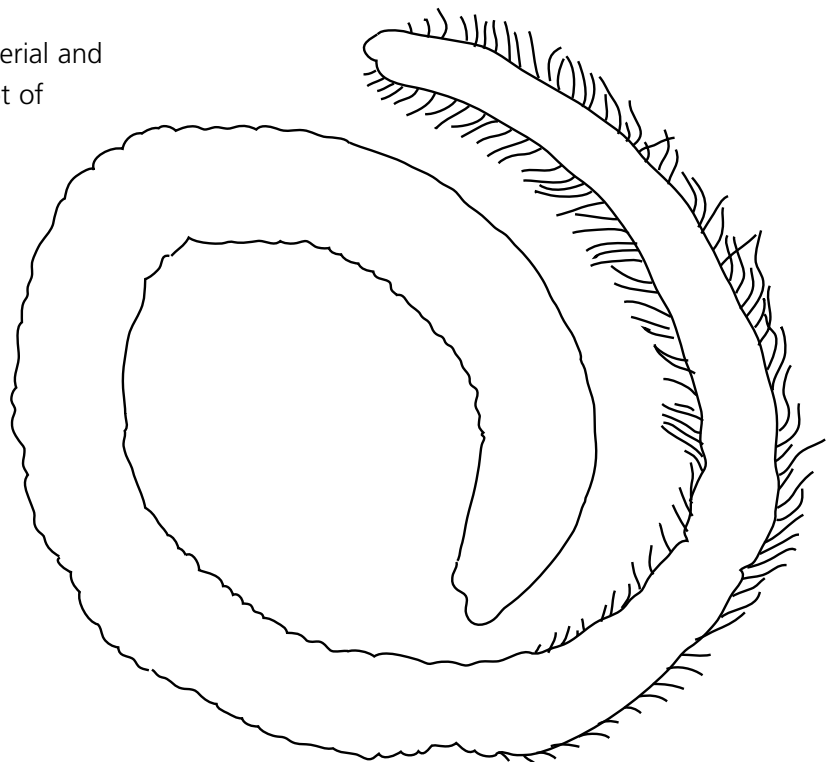
Freshwater worms can live in streams with organic pollution because they can survive in the low oxygen environment. They feed on the algae and bacteria that grow in these environments.

What's interesting about Freshwater worms?

- 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 and the younger ones near the tail.

Where they fit in

Phylum Annelida > **Class** Oligochaeta and smaller class Aphanononeura > **Order** (two super orders): Megadrili and Microdrili > **Family** (Nine families): Oligochaeta and one from Aphanononeura



Backswimmer

These bugs swim upside down on or near the surface of the water, with their legs up!

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 11 mm long

What they look like

Backswimmers can be recognised by their curved back, a broad 'keel' on the abdomen, large eyes that occupy most of the head, and long, hairy hind legs for swimming.

Where they live

Backswimmers are found throughout Australia in still and slow-flowing ponds, rice fields, canals and rivers. They spend most of their time in water but can fly from pond to pond.

What they eat

Backswimmers eat smaller aquatic animals, including bloodworms and aquatic larvae. They are predators (stalking other insects), with sucking mouthparts.

Pollution tolerance

Very tolerant, rating 1

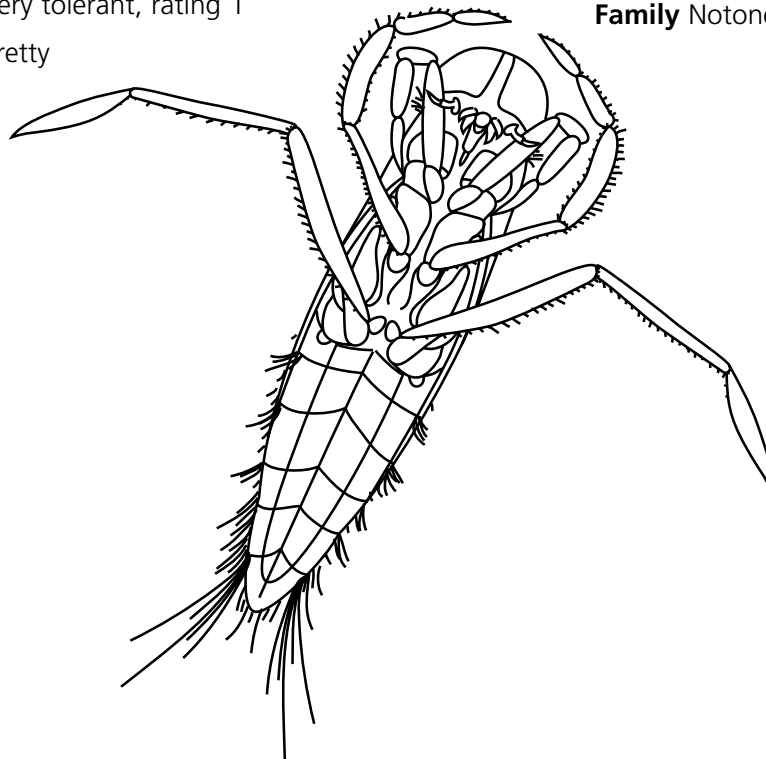
While they can withstand pretty unhealthy water, Backswimmers will fly from one pond to another if the conditions get really bad.

What's interesting about Backswimmers?

- They carry a silvery air bubble for breathing. It is held in place by the little "hairs" that cover its body. When the air in the bubble is used up, the insect rises to the surface and with a quick, somersaulting motion captures a new bubble.
- Backswimmers snatch bugs on the water surface, drag them under and eat them.
- The nymphs have to be very careful their parents don't eat them!

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Hemiptera > **Sub Order** Heteroptera > **Family** Notonectidae





Bloodworm

Bloodworms are also known as Non-biting Midges.

What they look like

Worm-like and C-shaped. Chironomid larvae can be various colours and only the red ones are known as bloodworms.

Where they live

The majority of Bloodworms or Non-biting Midges are found in the top five centimetres 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.

What they eat

Bloodworms are generally *detritivores* (det-try-te-vorz) feeding on dead plant and animal matter, while others are *herbivores* (herb-ee-vorz) eating only plant matter.

Pollution tolerance

Very tolerant, rating 1
Bloodworms 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.

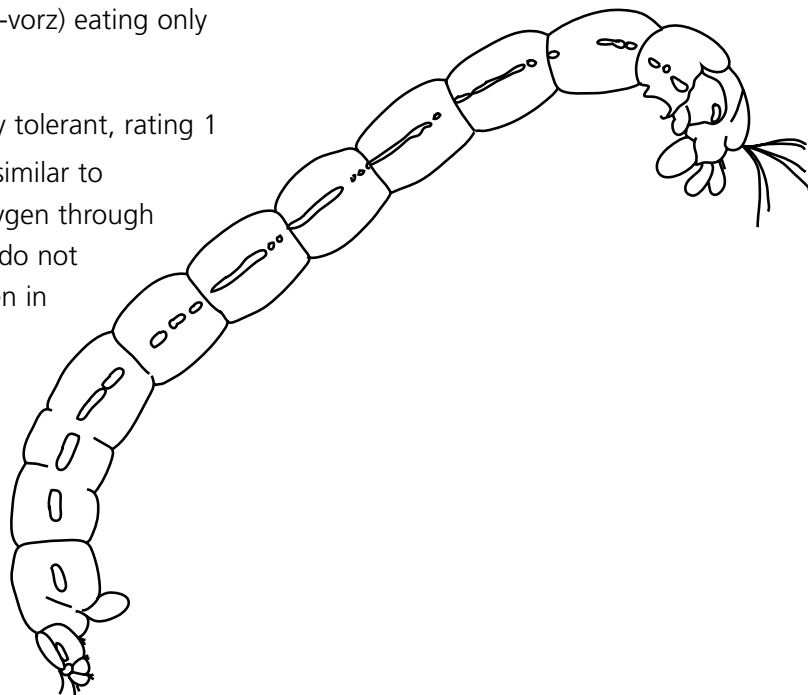
	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 20 mm long

What's interesting about Bloodworms?

- Most of their life cycle is spent in the larval stage.
- Adults live for a few days to weeks and usually don't feed, just mating and laying eggs.
- They are red in colour due to the presence of haemoglobin (blood protein that carries oxygen), which helps them tolerate poorly oxygenated water.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Diptera
> **Family** Chironomidae - seven subfamilies recognised > **Genera** 86 recorded > **Species** More than 200 in Australia



Leech

Leeches are commonly called bloodsuckers, as some species feed on the blood of people or animals.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	From 7 mm up to 80mm, when extended

What they look like

Leeches are 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. They can also walk, which they do in a looping manner. Their body shape depends on whether their muscles are relaxed or taut.

Where they live

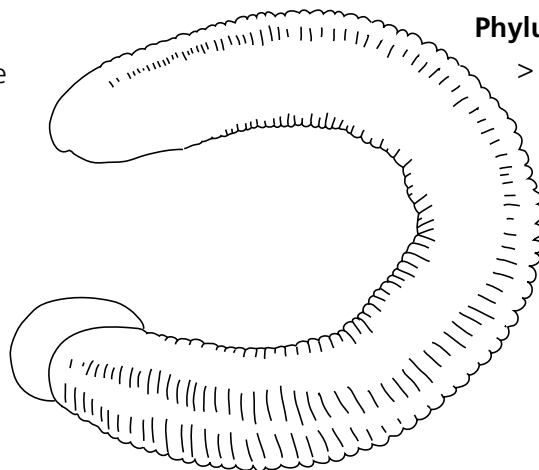
Leeches are found in warm, slow-flowing rivers or ponds. They prefer shallow water, and live under rocks and debris, or on plants, where they attach themselves to something solid.

What they eat

Many Leeches feed on the blood of vertebrates such as amphibians, birds, reptiles, fish and mammals (including humans). Not all Leeches attach themselves to their food - some eat their prey whole!

Pollution tolerance

Very tolerant, rating 1
Leeches are able to survive where there is not much oxygen. They can also tolerate various chemical pollutants.



What's interesting about the Leech?

- Their salivary secretions contain hirudin, an anticoagulant (a substance that stops blood from thickening, or coagulating). This makes the blood runny, for easy sucking, rather like a milk shake as opposed to a thick shake!
- Some Leeches can survive up to 12 months after a blood meal because they can store lots of it in their body
- Leeches hibernate during drought by burrowing into mud. They can survive a loss of nine-tenths of their body weight.
- Leeches are hermaphrodites - a single leech is both male and female.
- Medicinal leeches, once used by doctors to treat a variety of sicknesses, are still used in some countries.

Where they fit in

Phylum Annelida > **Class** Hirudinea
> **Family** (Five aquatic families in Australia): Glossiphoniidae; Hirundinidae; Eropbdellidae; Ornithobdellidae; Ozobranchidae.



Mosquito Larva and Pupa

Often called “wrigglers,” they twist and squirm just below the water surface. The larva (plural is larvae) is the “baby” form, while the pupa (plural is pupae) is the “teenage” form, just before transforming into a mosquito.

What they look like

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

Where they live

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.

What they eat

Many feed on small organic particles in the water, such as microscopic organisms and *detritus* (det-try-tuss), but a few species are predators.

Pollution tolerance

Very tolerant, rating 1
 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.

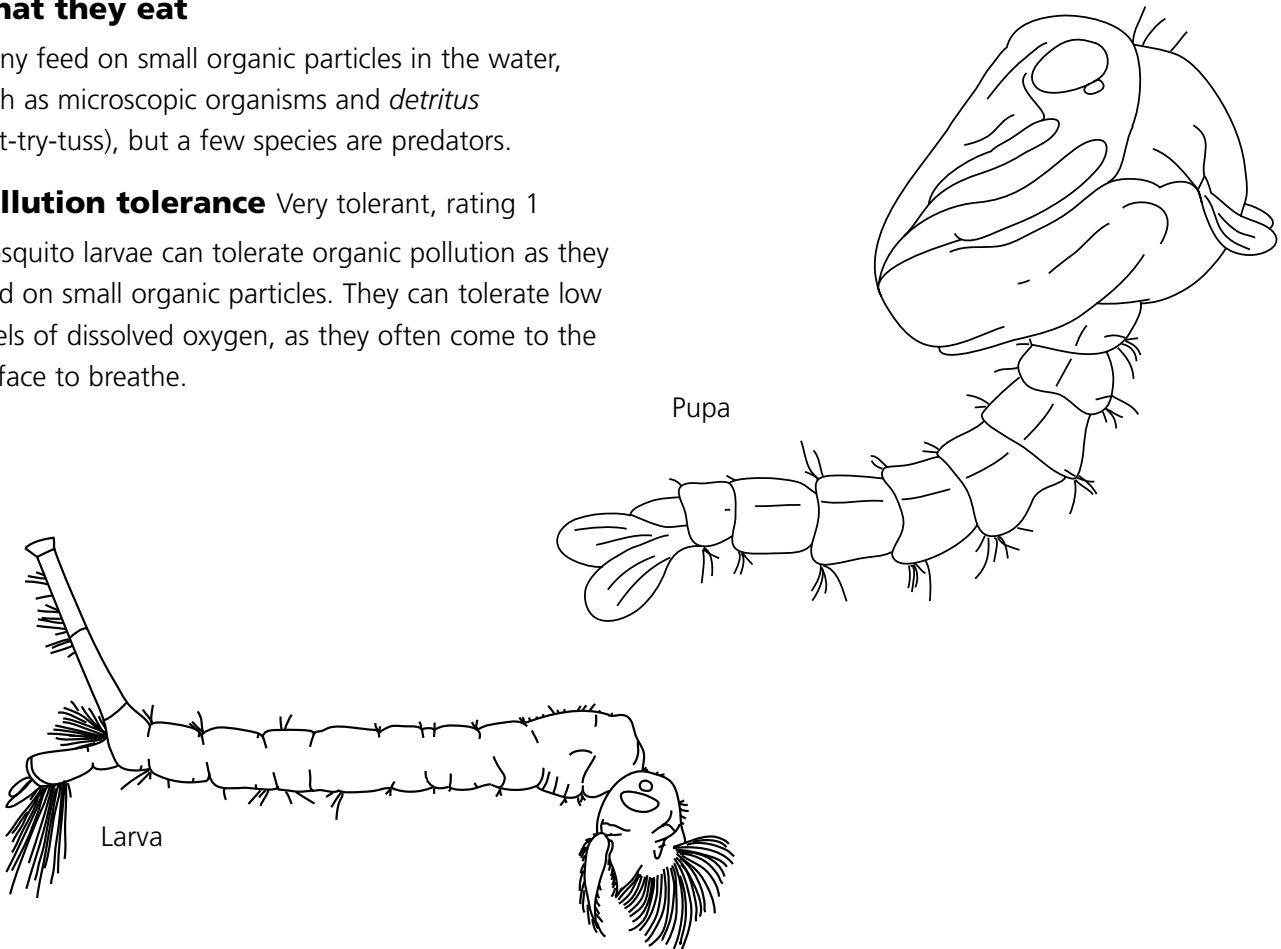
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Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	Up to 8 mm long

What’s interesting about Mosquito Larva and Pupa?

- The Mosquito Pupae are called “tumblers” because of their tumbling motion when disturbed.
- It would take about 1,200,000 adult mosquito bites to totally drain the blood from an adult human!
- Adult mosquitoes can transmit diseases (such as malaria) through their bite.

Where they fit in

Phylum Arthropoda > **Class** Insecta > **Order** Diptera > **Family** Culicidae - three subfamilies: Anophelinae, Toxorhynchitinae, Culicinae.



Freshwater Snail

The snail belongs to the phylum *Mollusca* (moll-uss-kah), which comes from the Latin word, *Molluscus*, meaning soft.

	▼
Pollution tolerance	Very sensitive Sensitive Tolerant Very tolerant
Size	3 - 25 mm long

What they look like

Freshwater snails are similar to slugs but have a spiral shell encasing their soft bodies.

Where they live

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

What they eat

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

Pollution tolerance

Very tolerant, rating 1
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.

What's interesting about Freshwater Snails?

- Their tongue is like a chainsaw! It is like a belt with layers of teeth along it, with which they rasp away at food.
- They are hermaphrodites with both male and female reproductive organs.

Where they fit in

Phylum Mollusca > **Class** Gastropoda > **Family** (12 families in Australia): Neritidae; Vivparidae; Thiaridae; Hydrobiidae; Pomatiopsidae; Assimineidae; Bithyniidae; Glacidorbidae; Lymnaeidae; Ancyliidae; Planorbidae; Physidae.

