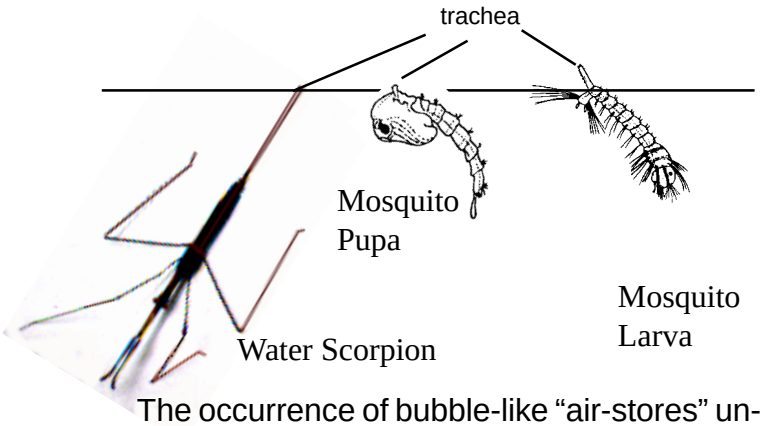
RIVER INSECT FACT SHEET

HOW DO AQUATIC INSECTS BREATHE?

Many of the insects that you will observe on your trip to Nature's Classroom will be aquatic at some stage in their life cycle. The major problem in becoming adapted to an aquatic environment seems to be centered around the respiratory mechanism of insects.

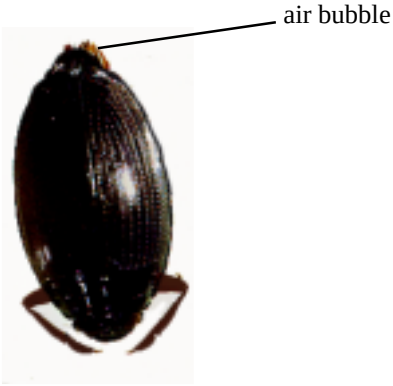
Spiracles or breathing pores are a common adaptation in aquatic insects. Some adult beetles and **nymphs** come to the surface at intervals where the spiracles are placed in contact with the air. Many aquatic insects have a tube or a **trachea** they can extend to the surface of the water. The trachea permits movement of air into and out of the body, which facilitates respiration in internal organs. For example, this adaptation occurs in the **larval** stage of flies and the larval and pupa stage of some mosquitoes. Adult water scorpions also use a pair of trachea located at the base of their abdomens for respiration.



The occurrence of bubble-like “air-stores” under the wing or on various parts of the body is common among adult true bugs such as the water boatmen and various diving beetles.

Water Boatman

The air stores come in direct contact with the spiracles. The air and water interface of an air store acts as a diffusion membrane with oxygen entering and carbon dioxide diffusing outward into the water.

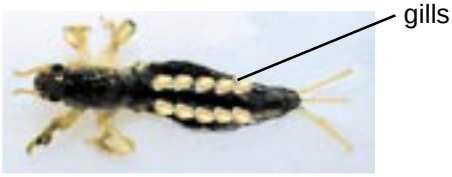


Whirligig Beetle

Some beetles, such as the Whirligig, use the numerous hairs on their hind legs to trap an air bubble and hold it against their spiracles. In this way they are similar to scuba divers who wear air tanks.

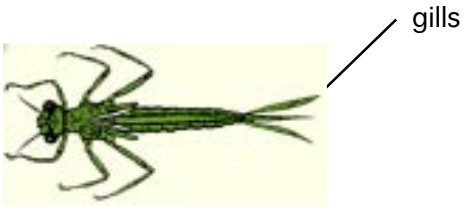
Many **larvae** and **nymphs** of aquatic insects possess filamentous gills. The gills show an endless variation in size and location, however, gills customarily occur in the thorax and abdominal region. Internal muscles vibrate the gills in a shuttle-like manner. The water currents also insure that an adequate oxygen supply continues to flow over the gills.

The stonefly and mayfly nymphs are both good examples of nymphs with filamentous gills. The larval stage of some mosquitoes also breathes through gills.



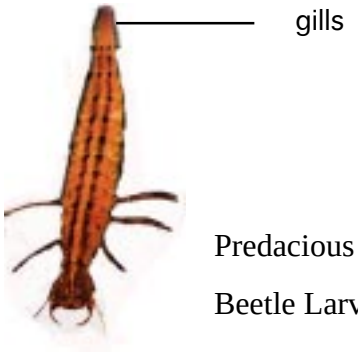
Mayfly nymph

The slim damselfly nymphs possess three leaf-shaped gills at the tip of their abdomen.



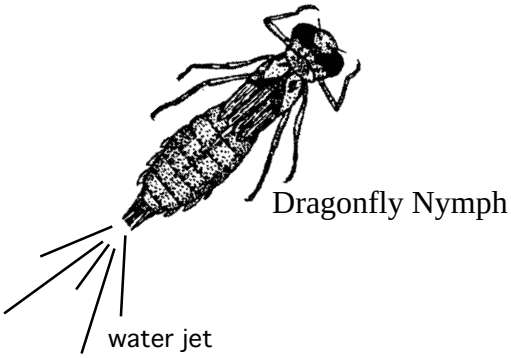
Damselfly Nymph

The larvae of some predacious diving beetles have gills which resemble thin wings on their abdomens.



Predacious Diving Beetle Larva

Dragonfly nymphs have internal gills which are located in a chamber in their abdomen. They take in and blow out water through an opening at the end of the abdomen.



Dragonfly Nymph

This respiratory mechanism has an added bonus! The dragonfly nymph can fly along underwater by forcefully squirting water out the abdominal opening.

There are a few variables which influence the respiration or oxygen consumption of all aquatic insects. These variables are:

1. Temperature - Warm water holds less oxygen than cold water.

2. Size - In general, larger insects require more oxygen than small ones.

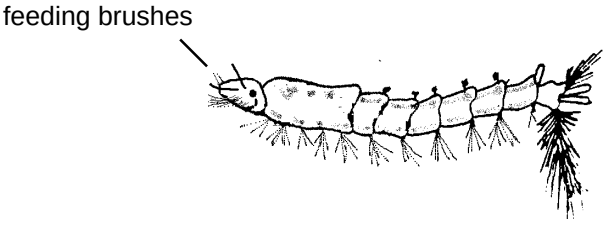
3. Stage in life history - The respiratory mechanism used by an insect may change as it goes through its life cycle.

4. Genetic makeup of the organism - Some organisms have a genetically higher metabolism than others, therefore, they require more oxygen.

RIVER INSECT FACT SHEET

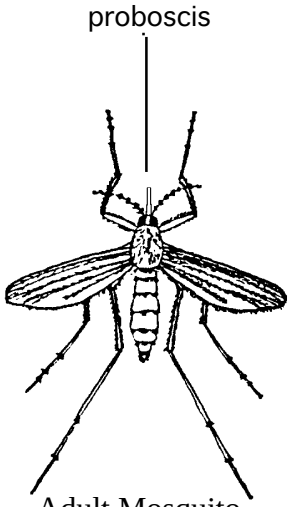
HOW DO AQUATIC INSECTS FEED?

One of the most numerous wetland insects which you will come in contact with will be the mosquito. Mosquito **larvae eat** microscopic plants and animals or organic debris filtered through brushes that surround their mouth. The larvae usually rest on the surface of the water and can be easily observed if the water remains undisturbed.



Mosquito Larva

The adults have a piercing, sucking mouth-part called a **proboscis**. Only the female mosquitoes are bloodsuckers. The males feed on the nectar of flowers. Many types of mosquitoes require a meal of blood before they are able to lay their eggs. Sometimes you are the victim of this need for blood.



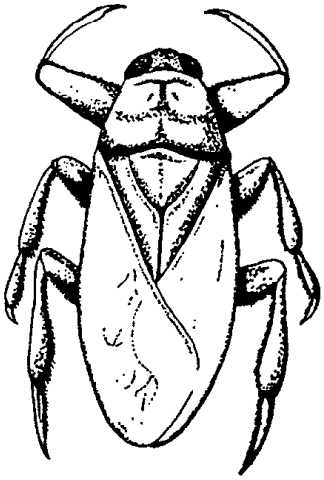
Adult Mosquito

Many aquatic insects use a combination of grasping front legs and a piercing beak to kill and eat their prey. Some examples are the water scorpion, the predacious diving beetle and several water bugs.

Water Scorpion

Predacious Diving Beetle

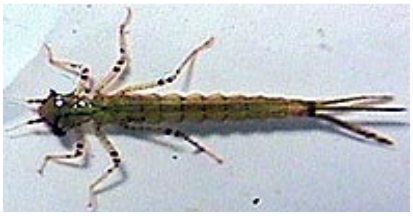
Male Belostoma Waterbug (with eggs)



Giant Water Bug

Dragonflies are sometimes called mosquito hawks and damselflies are sometimes called devil's darning needle. Both of these insects have incomplete **metamorphosis**. The eggs hatch into nymphs. The nymphs of both are dull-colored creatures with large extendable jaws covered by a scoop-like lip or **labium.** The nymphs live on the bottom of the river.

Dragonfly Nymph



Damselfly Nymph

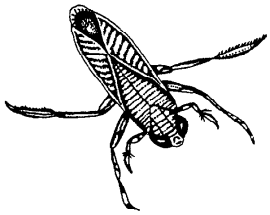
Both feed on insect larvae, worms, small crustaceans, tadpoles and even small fish. They are an important food of many larger fish, thus the dragonflies and damselflies are an integral part of the food chain.

The adult stages of both the dragonfly and damselfly are also commonly seen in wetlands. Both capture other flying insects as food. Dragonflies feed primarily on adult mosquitoes. Both types of insects capture their prey in flight.

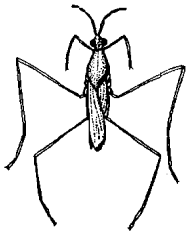
Damselfly Adult

Dragonfly Adult

True bugs such as the water boatmen and water striders have mouthparts fitted for piercing and sucking.



W a t e r Boatman



W a t e r Strider

Some adult water boatman feeds on algae or on decaying plant and animal matter sucked from the bottom of the river. The water strider lives on the surface film of the water and catches other insects or small crustaceans just beneath or on the water surface.

The food an insect eats is often a major aid in locating and identifying the species. In many of the aquatic species the adult and its young feed on different food. Occasionally, in aquatic insects, the food for the adult is unknown. Some aquatic insects such as the water bugs and beetles have wings and are able to fly. This allows them to move from one wetland to another to locate food.