1 Activity booklet
1 box of coloured toothpicks
1 dipnet
1 insect building kit containing:
- •3 styrofoam balls
- •6 pipe cleaner legs
- •2 pipe cleaner antennae
- •2 clear plastic wings

1 box of toothpicks
1 litter bag
2 magnifying glasses
1 map of the area
2 paper clip lifters
6 paper clips
4 pencils
1 pencil sharpener
1 *Pond Life (Golden Guide)* book
** 1 Take-home booklet
1 velvet square
2 water basins
1 waterscope
1 clipboard

** Indicates that you may keep this item.

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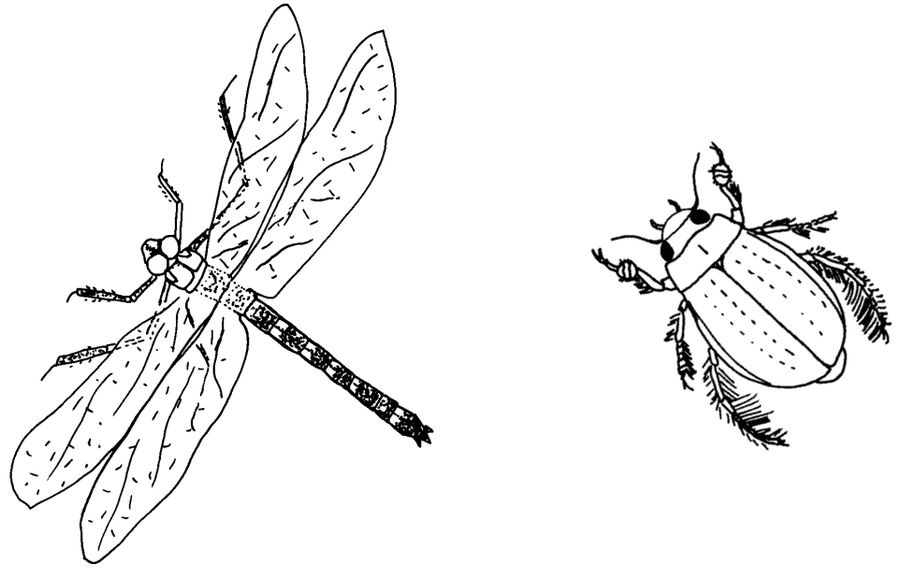
KANANASKIS COUNTRY
POND LIFE DISCOVERY PACK

ACTIVITY BOOKLET



WETLANDS: PLUNGE IN!
A LOOK AT POND LIFE

Kananaskis Country
Alberta ENVIRONMENT

HELLO!

A pond or stream may seem like a quiet place, but don't let that fool you! Beneath the calm surface, aquatic animals lurk in the depths of an action-packed world full of chase and escape, ambush and evasion.

The activities in this booklet will help you to explore the homes and habits of the aquatic animals that live in Kananaskis Country. Two booklets are included in this Discovery Pack: a Take-home Booklet and this Activity Booklet. Feel free to keep the *Take-home Booklet* so you can discover the pond life which lives near your home.

The following are recommended as good starting areas:

Bow Valley
Provincial Park: Beaver ponds along Flowing Water trail
Elbow Valley: McLean pond at McLean creek campground
Peter Lougheed
Provincial Park: Pocaterra Fen at Pocaterra hut

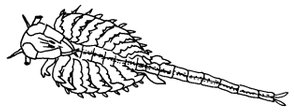
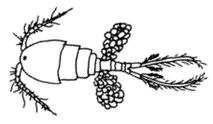
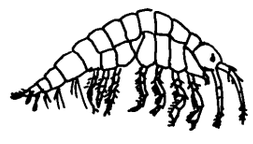
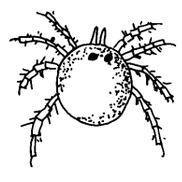
If you need further assistance, please ask at the Visitor Information Centres. The staff will be happy to suggest other areas for your activities. There is a lot to discover, and a great many animals to meet.

Safety: Always bring a buddy and watch out for one another. Be careful when standing or climbing on overhanging banks or wet rocks. You may get wet doing these activities, so wear your rubber boots and take a change of clothes. Stay on marked trails.

Note: A pond or stream is home for many animals and plants. Avoid going into the water. Handle the animals gently, and when you are finished, release them where you found them. Leave the area as close to its original state as possible.

When you are ready to return the pack, please check that all the contents are present. There is a list at the back of this booklet to help you.

LOCOMOTION	FOOD	GENERAL INFORMATION
Fairy shrimp swim on their backs using their legs to propel them.	They eat algae, bacteria, and small microscopic animals.	Fairy shrimp are eaten by small fish and carnivorous insects.
They swim with jerky movements using an enlarged second pair of antennae to propel themselves.	Water fleas eat algae, microscopic animals, and organic debris.	They are eaten by small fish and carnivorous insects.
Copepods use their legs and first antennae to propel themselves through the water.	Their mouth parts seize and bite microscopic plants, animals, and debris.	Look for the egg sacs which may be attached to the lower body of the copepod.
They swim using their legs which move in a blur.	They browse on the film which covers microscopic plants, animals, and organic debris. They are also scavengers. They feed by holding their food with their front legs and chewing it.	Sideswimmers are eaten by trout and carnivorous insects. Their bodies are flattened sideways. They require a good supply of oxygen in the water.
Water mites swim through the water, coming to the surface to get air.	They feed on small insects, worms, dead plants, and animals. Their larvae are parasitic.	Water mites feed by grasping the body of their prey, piercing the body and injecting digestive juices. They then suck up the semi-digested material of the prey. Water mites are in turn eaten by carnivorous insects.

ANIMAL	WHERE FOUND
FAIRY SHRIMP Class Crustacea Order Anostraca actual size 10-17 mm 	Fairy shrimp are characteristic inhabitants of temporary ponds and pools, especially during the spring and summer.
WATER FLEA or *Daphnia* Class Crustacea Order Cladocera actual size 0.2-3 mm 	Water fleas are found at all depths of a pond.
COPEPOD Class Crustacea Subclass Copepoda actual size 0.3 mm 	Found in both shallow and open water of ponds.
SIDESWIMMER or SCUD Class Crustacea Order Amphipoda actual size 5-20 mm 	Sideswimmers are found close to the bottom of lakes and ponds. They avoid light.
MITE Class Arachnida Order Acari actual size 2.5-5.0 mm 	Mites are found at all depths of the pond. They may congregate amongst the floating plankton or in the wet vegetation along the shore. Water mites are often red.

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A. COLLECTING SAFARI

HOW TO COLLECT AND IDENTIFY AQUATIC ANIMALS.

TIME TO EXPLORE: 1 hour minimum

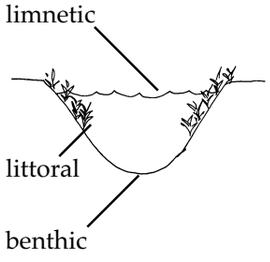
DISCOVERY TOOLS: dipnet

magnifying glass
pencil
Pond Life book
Take-home booklet
water basin

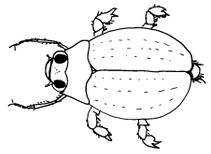
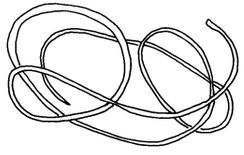
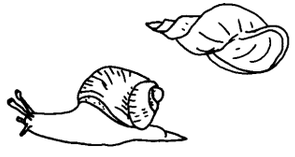
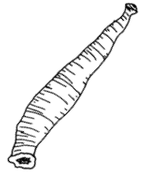
WHAT'S UP: Every stream, creek, pond, and marshy area in Kananaskis Country is home to an incredible variety of aquatic animals. Here is your chance to collect and identify some of them. Remember to *think small*, as some of the animals you collect may only be the size of a dot on this page.

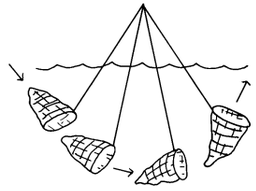
The animals you collect in this activity can be used for the rest of the activities in this booklet.

HERE'S HOW: Pond animals can be found in three main areas of a pond: in and on the bottom (benthic zone), among the aquatic plants (littoral zone), and swimming in or on top of the open water (limnetic zone). Choose one of these areas and follow the steps below to collect the animal living there. Before you start collecting, fill the water basin half full of water.



LOCOMOTION	FOOD	GENERAL INFORMATION
The adults use their fan shaped middle or hind legs for swimming. They are easy to identify because of their whirling motion on the surface of the water. They can be found in large numbers.	The adults are scavengers, eating dead plant and animal material.	The whirligig beetles take air bubbles below the surface as a supply of oxygen. The beetles have two sets of eyes which enable them to see above and below the water at the same time.
Glide along rocks or sticks using the hair-like cilia on their undersides.	Flatworms eat small animals, living or dead.	They have light-sensitive eye-spots on their heads. Flatworms are well known for their ability to regenerate or grow back severed parts.
The females are inactive. Males swim or crawl with whip-like motions of their bodies.	Adults do not eat.	The young are parasites on beetles, crickets, and grasshoppers. They are called horsehair worms because their thin bodies look like horse hairs which have come to life.
They use their muscular foot under their bodies for crawling. They secrete a slimy film which seems to help them move.	Snails feed on live and dead plant materials. They feed by using their file-like tongues called a radula to shred food.	Snails are eaten by fish, birds, and leeches.
Leeches move by "looping" -alternately attaching their mouth and tail suckers to the surface. They swim by gracefully undulating.	They feed by piercing their prey and sucking their blood. They prey mostly on fish. The leeches in this area do not feed on humans.	Leeches, like earthworms, are hermaphroditic; that is, they are both male and female at the same time.

INSECT or OTHER ANIMAL	WHERE FOUND
WHIRLIGIG BEETLE adult  actual size 3-7 mm	The adults are usually found at the surface of the pond or diving beneath the surface.
FLATWORM Phylum Platyhelminthes Class Turbellaria  actual size 20-25 mm	Found under stones, leaves, and other submerged objects. They avoid light.
HORSEHAIR WORM Phylum Aschelminthes Class Nematomorpha Order Gordioidea  actual size up to 300 mm	Found in ponds, streams, and puddles.
SNAIL Phylum Mollusca Class Gastropoda  actual size 2-70 mm	Snails are found on the bottoms of ponds, on submerged vegetation, or floating beneath the surface of the water.
LEECH Phylum Annelida Class Hirudinea  actual size up to 100 mm long	Leeches avoid sunlight. They can be found on the bottom of calm waters where they are usually attached to rocks or submerged wood. When attached, leeches hold their bodies vertically.



TO COLLECT BOTTOM-DWELLING ANIMALS:
Use the dipnet from the pack to scoop up some of the debris on the bottom of the pond or stream. If there are small rocks on the bottom of the pond, carefully pick one up and dip it into the basin to wash off any animals.

TO COLLECT ANIMALS LIVING AMONG THE AQUATIC PLANTS:
Sweep the dipnet through the plants growing in the pond.

TO COLLECT ANIMALS LIVING IN OR ON TOP OF THE OPEN WATER:
Sweep the dipnet slowly through the water. If there is an animal on the surface of the water, scoop it up from underneath.

WHAT TO DO WITH YOUR CATCH:
If the net is full of mud from the bottom, gently rinse it in the pond until you have removed as much mud as possible.

After you have cleaned the net of large materials, or rinsed out the mud, move to the water basin and carefully turn the dipnet inside out with your hand.

Dip the net into the half-filled water basin, sweeping it back and forth slightly to free your catch.

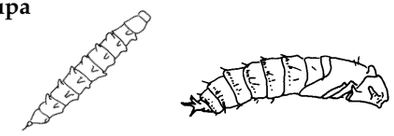
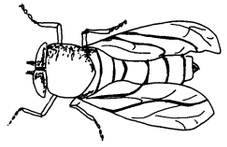
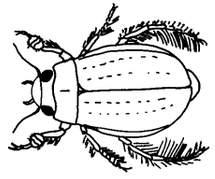
Place the water basin in the shade to keep the pond animals from overheating. Wait until the water in the basin clears, then observe your catch closely.

HOW TO IDENTIFY YOUR CATCH:
Watch the animals for awhile. Note what they look like, their size and how they move. Use the magnifying glass to help you. Now turn to the Pond Life Identification Guide starting on page 17 of this booklet and try to match the pictures and descriptions with the animals you have caught. If your animals are not pictured there, look them up in the *Pond Life* book in your pack. Keep track of what you have caught and where you caught it on pages 7 and 8 of your *Take-home* booklet.

RELEASING YOUR CATCH:
Use the animals you have caught for the other activities in this booklet. When you are finished, return the animals to the spot in the water where you found them. Gently tip the basin and allow the animals to swim away.

FOLLOW-UP: If you have time, choose another area of the pond and see what kinds of animals you can find there. Compare what you find in the two areas. Which area had the greatest variety of animals living in it? Were there some animals which lived in both areas?

LOCOMOTION	FOOD	GENERAL INFORMATION
Crawl.	The larvae eat organic debris, worms, and snails.	Just before they pupate the larvae crawl out of the water and burrow into the soil above water level. There they pupate until they emerge as adults.
Fly.	The males eat nectar. The females generally require a meal of blood in order to produce eggs.	The mandibles (jaws) work like scissors, opening the wound. The wound then bleeds freely because the saliva of the horsefly contains anticoagulants.
The larvae swim with a paddling motion.	They eat everything they can, including insects, small fish and each other. They pierce their food with the sickle-shaped jaws, pump in digestive juices and then suck out the partly digested innards of their prey.	Their main predators are each other. The larvae breathe though their skin and through two holes or spiracles at the end of their abdomens.
They swim with a paddling motion. They can also fly. You may see them drifting up to the surface with their heads down and their back ends up in an effort to refill their 'air tanks'.	Adults feed in a similar manner to the larvae (see description above). the adults fly from pond to pond at night feeding mostly on mosquito larvae. The larger beetles also eat tadpoles and small fish.	Adults breathe by trapping air under their wing covers and then taking the air below the surface with them like mini-scuba tanks. The beetles then breath from these 'tanks' through the holes or spiracles in their abdomens.
They crawl or swim.	The larvae are voracious carnivores and eat small animals.	The larvae are flat and resemble centipedes. They have long, thread-like filaments on their sides which are used for breathing.

INSECT	WHERE FOUND
HORSEFLY larva and pupa Order Diptera Family Tabanidae actual size 15-40 mm  larva pupa	Found on the bottoms of ponds.
HORSEFLY adult actual size 10-25 mm 	Often seen around horses. Found at all elevations, but especially in subalpine meadows. Often they are only noticed when they bite you.
PREDACIOUS DIVING BEETLE larvae Order Coleoptera Family Dytiscidae actual size 25 mm 	These beetle larvae can be found throughout the pond.
PREDACIOUS DIVING BEETLE adult actual size 10-40 mm 	Usually found swimming in the deeper parts of the pond.
WHIRLIGIG BEETLE larva Order Coleoptera Family Gyrinidae actual size 3-7 mm 	Usually seen crawling on submerged vegetation. They pupate in moist soil. See page 27 for adult.

HOW SOME AQUATIC ANIMALS MOVE.

TIME TO EXPLORE: 1 hour

DISCOVERY TOOLS:
magnifying glass
paper clip and lifter
Take-home booklet
water basins

WHAT'S UP: The ability of animals to move helps them to survive, search for food, escape from predators, and move to new areas. Have you ever tried to run in waist-deep water? It's quite difficult, since water is about 900 times denser than air. Aquatic animals are adapted to move easily in water. See if you can discover how.

HERE'S HOW: Look carefully at the animals you have collected. You may find that animals have different methods of getting around, depending on which part of the pond they live in.

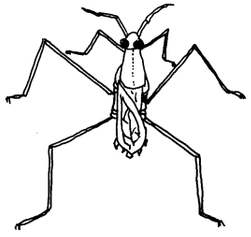
For example, animals which live on the bottom of ponds or among the aquatic plants may have legs, suckers, or a large foot to help them move about.

Animals which live in open water or on the surface of the water may be streamlined, have oar-like legs, move with a wiggling motion or may have the ability to walk on the surface of the water.

What happens when you place a small stick into the water next to the animal? How do they move? Can you see the structures which are used in that movement? What happens when a pond plant or another pond animal is added to the water?

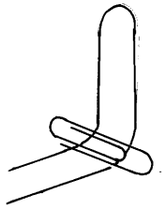
Now look closely at two pond animals, the water strider and the snail, which both have unusual methods of moving.

WATER STRIDER:



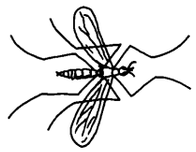
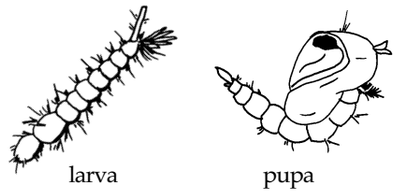
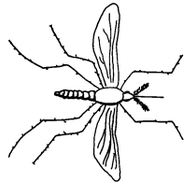
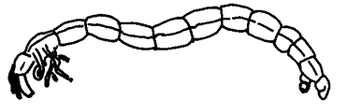
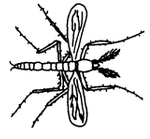
The water strider is able to walk on water! How does it do this? Catch a water strider and find out. If you cannot catch one, try to get a close look at one on the surface of the pond. Here is an activity to help you figure out how they stay on the surface of the water.

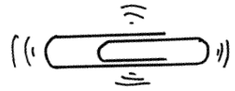
1. Collect some water in a water basin. Drop the paper clip in. What happens?



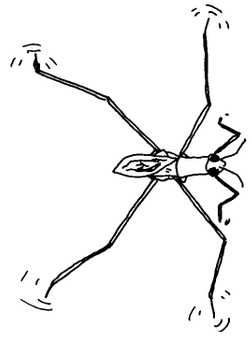
2. Dry off the paper clip and place it on the lifter, as shown. Gently lower it into the water and carefully remove the lifter. The paper clip floats!

LOCOMOTION	FOOD	GENERAL INFORMATION
Fly awkwardly.	The adults do not eat.	They resemble a mosquito with very long legs. They do not bite or sting.
Larvae are also called 'wrigglers' because they constantly curl and uncurl or wriggle when they move. Pupae are called 'tumblers' because they appear to tumble through the water.	The larvae eat algae and protozoans (microscopic animals). The pupae do not eat.	They are eaten by fish and by predatory insects such as dragonflies. The larvae usually hang upside-down from the water surface, breathing through tubes which break the water's surface.
Fly.	The adult males eat nectar. The adult females must feed on blood in order to produce eggs.	Mosquitoes are eaten by birds, dragonflies, and damselflies. Mosquitoes sit with their wings folded.
Midge larvae crawl or wriggle. They are very active, bringing their front and back ends together and then snapping them apart.	The larvae eat underwater debris, algae, plants, and fungal spores.	They are eaten by small fish and predacious aquatic invertebrates. The larvae are often red, hence their common name of bloodworm.
Fly.	Adults do not usually feed.	Midges are often mistaken for mosquitoes, but do not bite. They often swarm in huge clouds.

INSECT	WHERE FOUND
Cranefly adult actual size body 20 mm 	Found flying about, although they are not very good fliers. They are often found close to water, in mountain and subalpine areas.
MOSQUITO larva and pupa Order Diptera Family Culicidae actual size larva 3-15 mm pupa 3-15 mm  larva pupa	Both larvae and pupae are found just below still water surfaces. They will swim away to the bottom when threatened.
MOSQUITO adult actual size 15 mm 	Females are usually found feeding on your blood; they also feed on the blood of other animals. Mosquitoes are found in shady, moist habitats.
MIDGE larva Order Diptera Family Chironomidae actual size 2-30 mm 	Found among the debris on the bottom of ponds.
MIDGE adult actual size 5-10 mm 	Often seen flying in swarms.



3. Take a close look at the floating paper clip, being careful not to bump the container. The water around the clip is dented, but the clip doesn't sink. The surface of the water is made up of molecules which are strongly attracted to each other. These molecules form a kind of surface *skin*. This *skin* is called surface tension and holds the paper clip up.

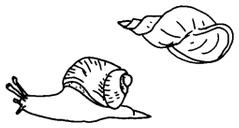


4. Now look closely at the water strider. You should be able to see a dent in the surface tension of the water around the strider's feet.

5. If your magnifying glass was powerful enough, you'd see the strider's feet are covered with little water-repellent hairs which allow the strider to distribute its weight over a larger area, keeping the strider on top of the water. They also have tiny claws on their feet which they dig into the water for traction.

6. Which legs do the striders move with? Which parts of the legs do they put in the water for support? Are the striders wet or dry?

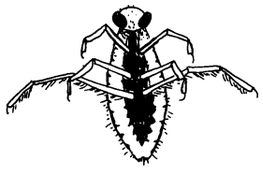
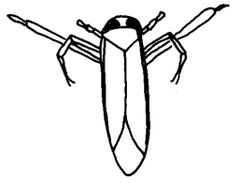
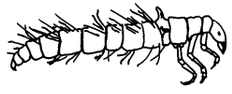
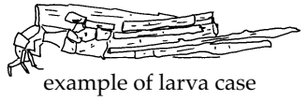
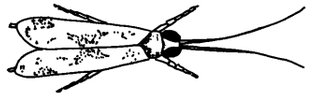
SNAIL: The snail uses the muscles in its one large foot to propel it along surfaces in the pond. This foot secretes a slimy substance which seems to help the snail glide along. If you don't already have a snail in your water basin, look for one attached to pond plants, floating beneath the water surface or on the pond bottom.



Place the snail on this page. Can the snail move out of water? Turn the page upside down. Can the snail walk upside down? Can it walk on your finger? If so, what does it feel like?

FOLLOW UP: See if you can design a device which would allow you to move through water. What problems would you have to overcome? How would you propel yourself? Can the features of any of the pond animals you have seen be adapted to suit your needs? Write your ideas on page 9 of your *Take-home* booklet.

LOCOMOTION	FOOD	GENERAL INFORMATION
Backswimmers swim on their backs (backside-down) and can fly. They have one pair of long legs which propels the insect forward in an oar-like manner.	They eat aquatic insects and small fish. They also eat each other and may in turn be eaten by predacious diving beetles. They use their front legs to grab prey.	Backswimmers can sting if handled carelessly. They appear silvery because they are encased in air bubbles which they take below the surface as a source of air.
They swim erratically using their hind, oar-like legs. They can also fly. Unlike the backswimmer, water boatmen swim backside-up.	Eat algae and small animals. They do not sting people.	They are eaten by trout and nymphs which eat other insects. Males can sing by rubbing the side of their head with the base of their front legs.
They crawl along the bottom, dragging their cases behind them.	Caddisflies are omnivorous, eating algae, plants, larvae, worms, and crustaceans.	Caddisflies are eaten by fish (case and all) and by predacious diving beetles. They live in cases made from whatever is on the stream bottom (sand, plant matter) stuck together with silky glue from their salivary glands.
They fly with jerky, erratic movements.	The adult caddisfly eats nothing or feeds on nectar.	When at rest, the wings are folded *roof-like* over their bodies.
Crawl.	Cranefly larvae eat plant material.	Look for the disk at the end of their tail. It is thrust through the surface of the water for breathing, especially when the oxygen level in the water is low.

INSECT		WHERE FOUND
BACKSWIMMER Order Hemiptera actual size 10-15 mm		Often they are found resting below the surface of the water at an angle with their heads facing down.
WATER BOATMAN Order Hemiptera Family Corixidae actual size 5-15 mm		Water boatmen often cling to submerged vegetation, although they can be found anywhere in the water. They may also be found feeding on the pond bottom.
CADDISFLY larva Order Trichoptera actual size up to 50 mm	 larva out of its case  example of larva case	Found in cases which they construct on the bottoms of streams and ponds. Only their head and legs stick out, making them look like moving sticks.
CADDISFLY adult actual size 18 mm		The adults resemble moths, and, like moths, are nocturnal and attracted to light.
CRANEFLY larva Order Diptera Family Tipulidae actual size 10-50 mm		Found on the bottom of ponds.

C. *HIDE AND DEKE IN THE POND*

ANIMAL CAMOUFLAGE AND PROTECTION.

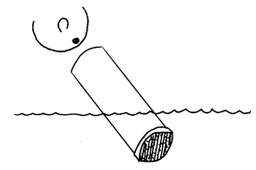
TIME TO EXPLORE: 1 hour

DISCOVERY TOOLS:
box of coloured toothpicks
magnifying glass
Take-home booklet
water basin
waterscope

WHAT'S UP: In the aquatic world, life is often an amazing display of how to stay alive! Animals have evolved ways to escape from or defend themselves against hungry predators.

Some animals are able to move quickly to avoid getting eaten. Others are well camouflaged so that they blend in with their background. In this activity you will have an opportunity to look at some of the ways aquatic animals protect themselves from predators.

HERE'S HOW: Look through the waterscope in the area where you collected the pond animals. The waterscope works best if you tilt it as you slip the plastic covered end into the water. Don't get water in the open end.

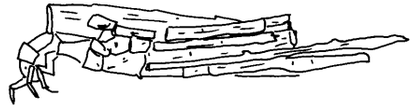


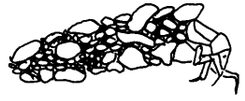
What can you see? Pond animals are often difficult to see unless they move. Why is that? What colour is the bottom of the pond?

Now use the magnifying glass to look at the pond animals in the water basin. Is it easier or more

difficult to see them in the water basin than in the pond? What colours are the insects? What colour is the water basin?

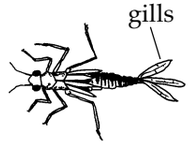
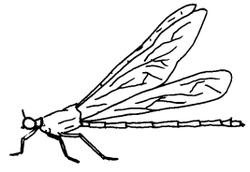
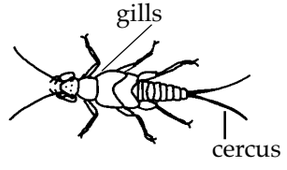
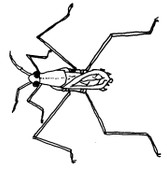
Find a caddisfly larva. It will look like this:





These larvae build cases around themselves made out of bits of gravel or plant material. The cases look like little twigs and hide the larvae. Sometimes you can only see them when they move. What happens when you insert a pencil into the water next to the caddisfly? Try this with other animals in the water basin. What do they do? Do they all move quickly? What do they do if they cannot flee from the pencil? Which animals use camouflage (hiding) for protection and which use speed? Did any attack the pencil?

LOCOMOTION	FOOD	GENERAL INFORMATION
Damselfly nymphs have legs for crawling.	The nymphs eat each other as well as other aquatic insects, especially mosquito larvae and mayfly nymphs.	Eaten by trout and birds. They have 3 large leaf-like gills at the end of their abdomens.
Fly.	They eat other flying insects.	Damselflies hold their wings folded to their bodies when at rest. They are more slender and delicate than dragonflies. They mate in flight. They are eaten by birds and bats.
They crawl about on the bottom of creeks and rivers.	The nymphs shred underwater debris. Some are predators, eating other bottom-dwellers such as mayflies.	Stonefly nymphs have two tail-like sensory organs sticking out of their abdomens called cerci. These are harmless. Stonefly nymphs are eaten by trout.
Fly	Adults feed on algae.	Their two pairs of long wings are folded over their backs when at rest. Two long filaments stick out the end of their abdomens. Adults often emerge late in the year and are active in winter.
They walk along the surface using a rowing motion with their legs. They communicate with one another by making ripples on the water.	Water striders feed on small insects which fall into the water. They also feed on aquatic insects which live just below the surface. They may even eat each other.	Water striders have hairy feet and legs which help keep them on the surface. They dig their claws into the water for traction. They are eaten by predacious diving beetles.

INSECT		WHERE FOUND
DAMSELFLY nymph Order Odonata actual size 30 mm		Found crawling about on underwater surfaces, especially plants.
DAMSELFLY adult actual size 30-40 mm		Damselflies can be seen flying or resting near ponds.
STONEFLY nymph Order Plecoptera actual size up to 40 mm		The nymphs are found under stones, leaves and debris at the bottoms of moving, unpolluted creeks and rivers. They are found only where there is an abundance of oxygen in the water.
STONEFLY adult actual size 15-40 mm		They are poor fliers and are usually found resting on objects along the shores of streams.
WATER STRIDER Order Hemiptera Family Gerridae actual size 10-15 mm		Found on the surface of the pond where they are supported by water tension.

FOLLOW UP: Animals are usually camouflaged so they blend in with their surroundings. To discover how effective this camouflage is, go to an open field and try this game.

Scatter the coloured toothpicks from your pack in a 5 metre x 5 metre area. Now imagine you are a hungry toothpick-eating predator. See how many of the toothpicks you can find and collect in 15 seconds.

When the time is up, divide the toothpicks you found into piles of the same colour. Which colour was the hardest to find? The easiest? If you were depending on these toothpicks for food, what colour would you want them to be? If you were a toothpick animal, which colour would be the safest?

Collect the rest of the toothpicks and try the game again in the forest. Was there any difference in the answers to the questions above? What colour should an animal be if it lived in one of the water basins in the pack? In a box of coloured candies?

If you had to camouflage yourself, how would you do it in the forest? In a field? In a pond? In a city? In a school?

D. *INSECT MANIA*

WHAT ARE INSECTS?

TIME TO EXPLORE: 1 hour

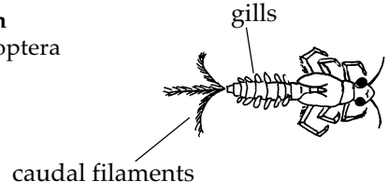
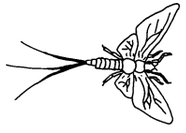
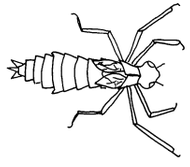
DISCOVERY TOOLS:
insect building kit
magnifying glass
water basins
Take-home booklet

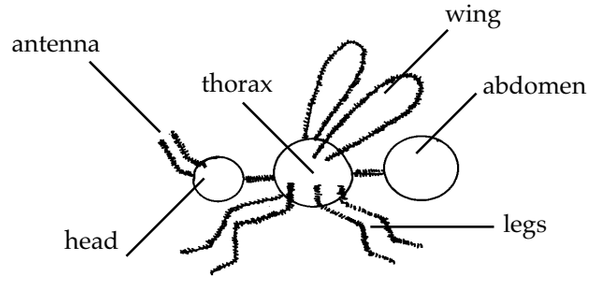
WHAT'S UP: Insects are some of the most adaptable animals on Earth. There are over a million different kinds or species of insects, and entomologists (people who study insects) are finding new ones every day. Insects can live anywhere from on glaciers to hot springs, from tropical forests to deserts. The ones that live in water are called aquatic insects. Some aquatic insects are immature forms of the insects we see flying about during the warmer parts of our year. Others spend their entire lives in water.

Insects come in many shapes, sizes and colours. In this activity, you will find out what an insect is.

HERE'S HOW: Take the insect kit out of the pack. Attach the three styrofoam balls together with the toothpicks. Now add the legs. How many legs are there? Add the antennae and the wings. Turn to the next page to see if you put the parts together in the right way.

LOCOMOTION	FOOD	GENERAL INFORMATION
Springtails jump using a springing device on their abdomens.	Algae, plants and dead plants and animals.	Springtails are also called snowfleas because they are commonly seen in winter leaping about on the snow where they eat pollen, mold, and decaying vegetation.
Varies. Some crawl, some burrow and others swim with undulating motions.	Generally feed on plant material but may also eat tiny animals.	Mayfly nymphs have 2-3 caudal filaments at the end of their abdomens. These filaments are thread-like and are not gills. Mayflies are eaten by trout, dragonfly and stonefly nymphs and predacious diving beetles.
Fly.	During the few days the adults live, they do not eat.	Large numbers of adults often emerge at once and form large swarms. If they fall onto the pond surface, they may be eaten by trout and water striders.
They mostly crawl about with their legs but they can also take water in through their back-ends (anus) and expel it again for a quick escape.	Dragonfly nymphs eat other aquatic insects, especially mosquitoes, mayflies and even small fish. They are voracious predators.	Eaten by trout and birds. Dragonfly nymphs have no tails.
Dragonflies appear to fly like helicopters. They can maneuver quickly, making them agile hunters.	They eat other flying insects, catching their prey with their feet.	Dragonflies hold their wings out when at rest. They mate in flight. They are eaten by birds and bats.

INSECT	WHERE FOUND
SPRINGTAIL Order Collembola  actual size 2-6 mm	Found on the shorelines of ponds. These insects are not aquatic.
MAYFLY nymph Order Ephemeroptera  actual size 15 mm	Found on the bottom of ponds and creeks clinging to rocks.
MAYFLY adult  actual size 5-15 mm	Often seen in large swarms. The insects in the swarm fly up and down in unison. Look for their gently upturned wings held vertically and 2-3 long thread-like filaments extending from the abdomens.
DRAGONFLY nymph Order Odonata  actual size up to 50 mm	Found crawling about on the bottoms of ponds or on submerged plants and rocks.
DRAGONFLY adult  actual size 40-80 mm	Usually seen flying or resting on a plant or log near a pond.



How did you do? Did you put the three styrofoam balls together in a row? These form the three body sections of the insect which are called the head, thorax, and abdomen. Where did you put the legs and wings? They should have been attached to the middle section - the thorax. The antennae are attached to the head. Imagine how much variety there must be in each of these parts for there to be over one million different kind of insects in the world!

Look at the pond animals in the water basin. Which are insects and which are other things? Use the magnifying glass to look for the three body sections and six legs which distinguish insects from other kinds of animals. Are they easy to see? Check in the Pond Life Identification Guide starting on page 17 of this booklet to see which pond animals are insects.

Keep track of the animals you collect on the Aquatic Invertebrates Checklist on pages 7 and 8 of your *Take-home* booklet. How many different kinds of insects did you find? How many other kinds of animals did you find? Which are the most common? Why are there so many insects? What would happen if they all died?

E. THE BREATH OF LIFE

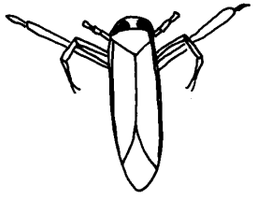
HOW AQUATIC INSECTS BREATHE.

TIME TO EXPLORE: 30 minutes

DISCOVERY TOOLS:
dipnet
magnifying glass
velvet square
water basins

WHAT'S UP: All animals need air to survive and aquatic animals are no exception. They live underwater and have a variety of ingenious adaptations which allow them to obtain this air. Here is a chance to look at some of the more visible adaptations.

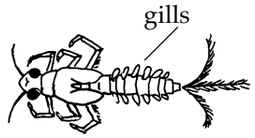
HERE'S HOW: Look in the water basin for the pond animals listed below. When you find them, do the suggested activities.



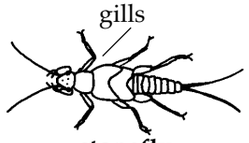
water boatman

backswimmer

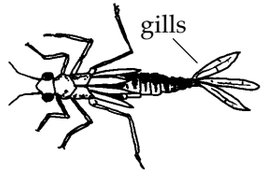
WATER BOATMAN, BACKSWIMMER
Watch them for a few minutes. Do they come to the surface? You may notice that when they dive they seem to glisten. This is because of the air which has been trapped by the tiny hairs on the body of the insect. To see how this works, put some clean water into a water basin. Gently immerse the velvet square. Can you see the air bubbles trapped by the fibres of the velvet? This is how the hairs on the insect work. These animals also trap air under their wing covers. They draw oxygen from these air supplies when the are underwater. Time the insects to see how long they can stay underwater.



mayfly



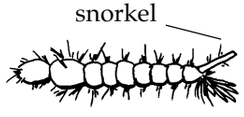
stonefly



damselfly

MAYFLY, STONEFLY, DAMSELFLY NYMPHS
Find one of each of these nymphs. Watch them for awhile. Do they come to the surface for air? Each of the insects has gills for breathing. Gills are able to remove oxygen from the water. The arrows in the pictures to the left point to the gills on each of these insect nymphs. Mayfly gills look like feathers that are found along the sides of the abdomen. Stonefly gills look like tufts of white hair under all six *armpits*. Damselfly gills look like thee leaves and are found at the end of the abdomen. Can you see their gills moving? Why do you suppose they are always moving?

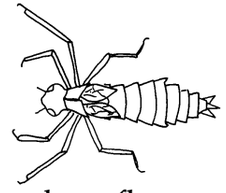
MOSQUITO LARVAE
Watch a mosquito larva. What does it do when it comes to the surface? Use the magnifying glass to help you see its *snorkel*. They stick this up through the surface to breathe.



mosquito larva

DRAGONFLY NYMPHS
Watch the abdomen of the dragonfly nymph expand and contract. The nymph is pumping water in and out through its back end to its gills which are located inside its body.

FOLLOW UP: It is hard to imagine that there is enough oxygen in the water to support all those animals. To see how much oxygen is in water, try this experiment. Place a clear pot of water on the stove. As it gets warmer, little air bubbles containing oxygen form on the bottom. This is air that was dissolved in the water.



dragonfly