

Pond Life Identification



Caddis fly larva



Water scorpion



Water beetle



Mayfly nymph



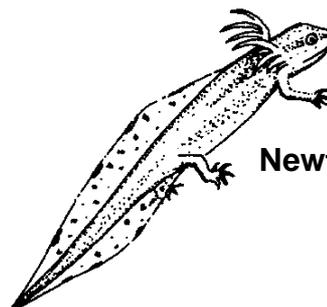
Whirligig beetle



Freshwater shrimp



Water mite



Newt tadpole



Bloodworm



Flatworm



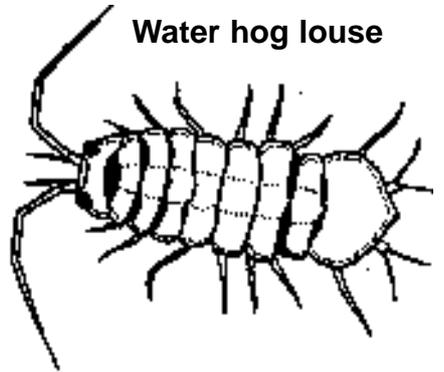
Leech



Water flea



Pond skater



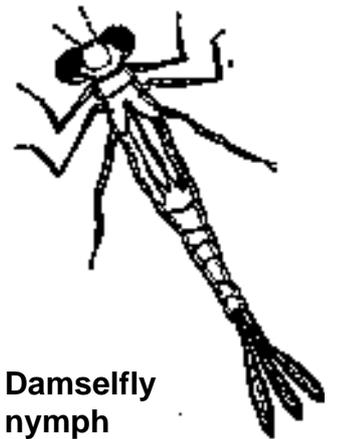
Water hog louse



Ramshorn snail



Wandering snail



Damselfly nymph



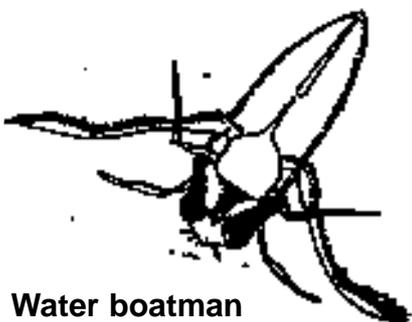
Dragonfly nymph



Great diving beetle



larva

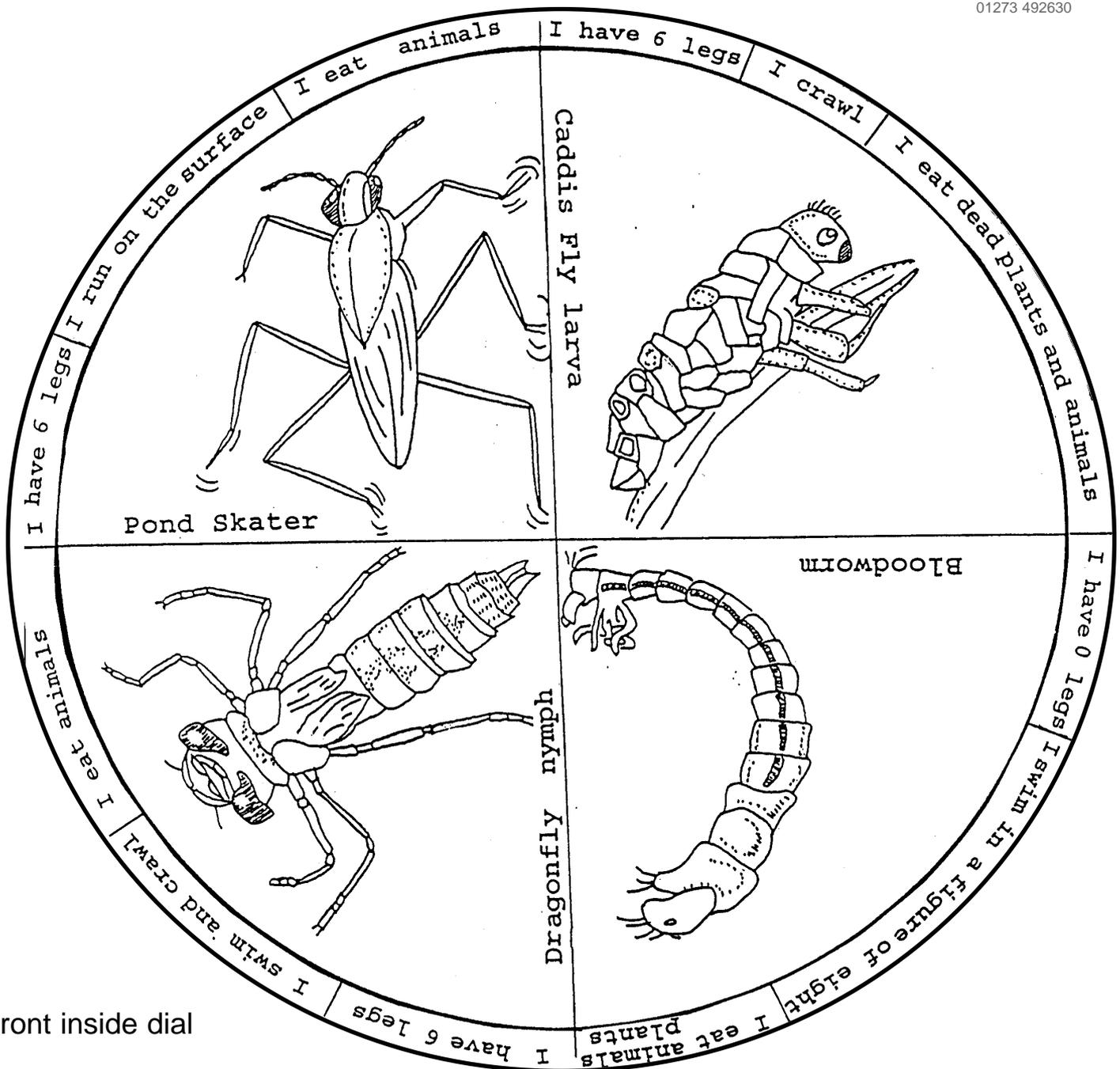


Water boatman

Pond Life Dial



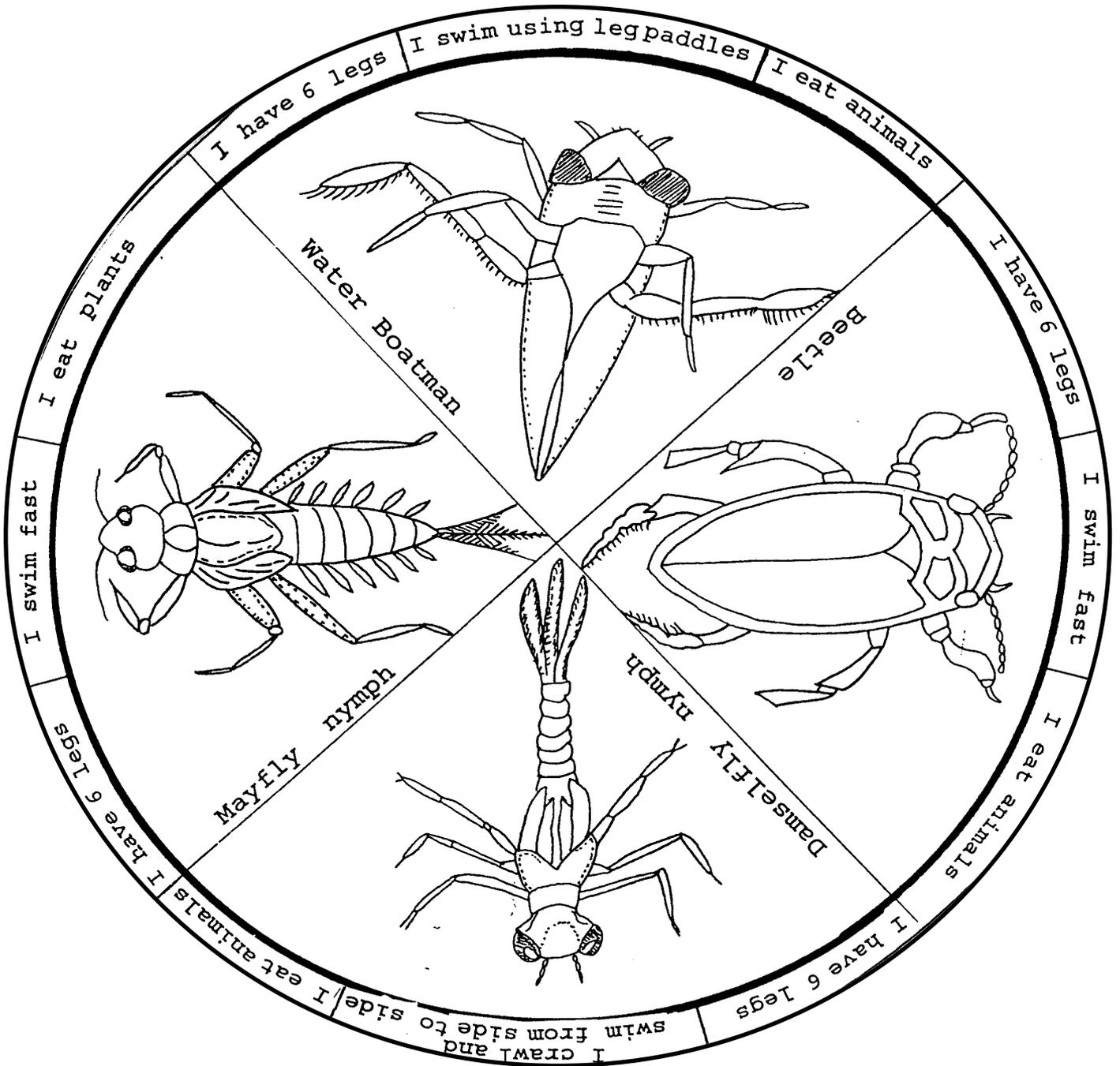
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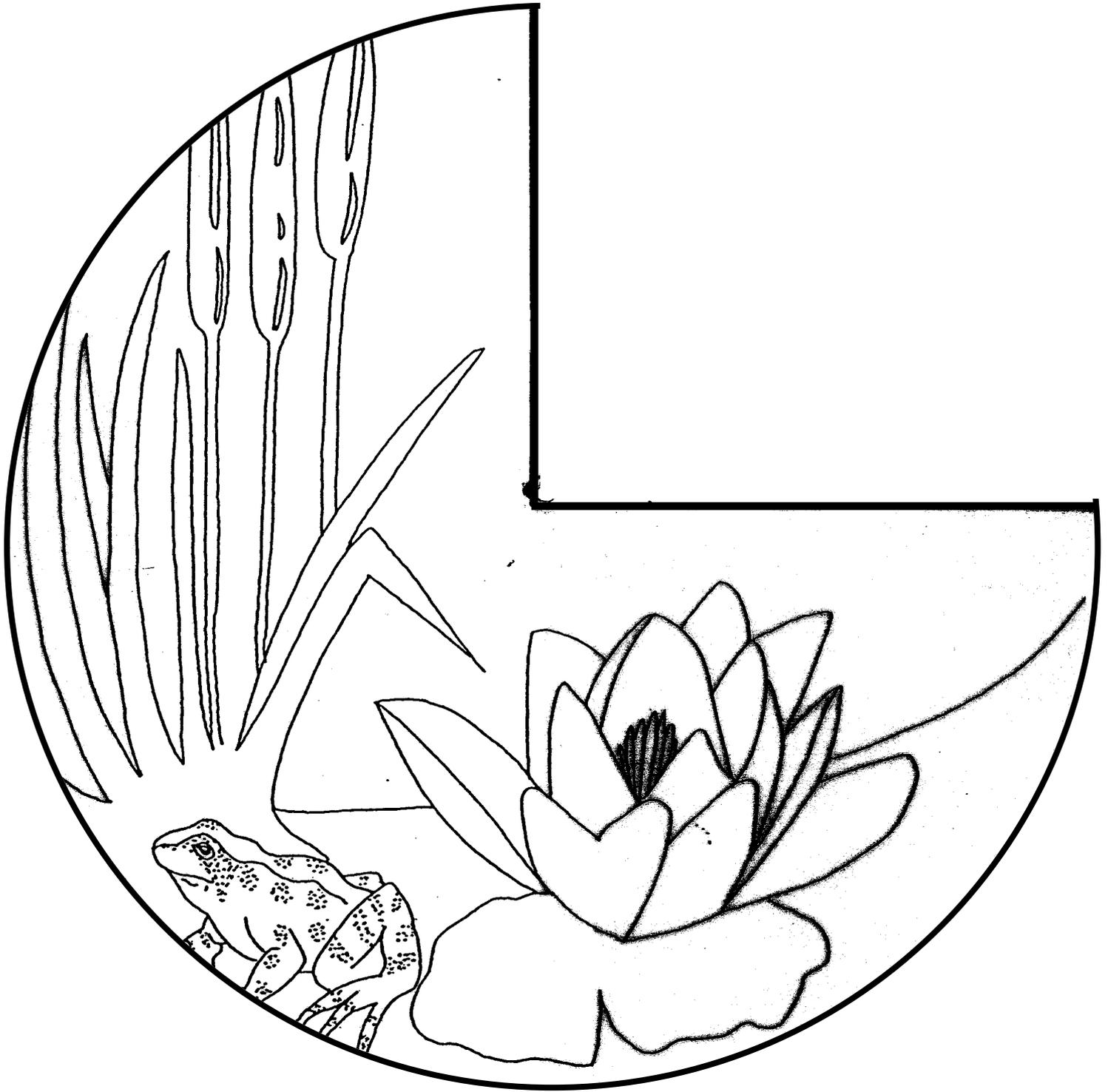
front inside dial

To make dial

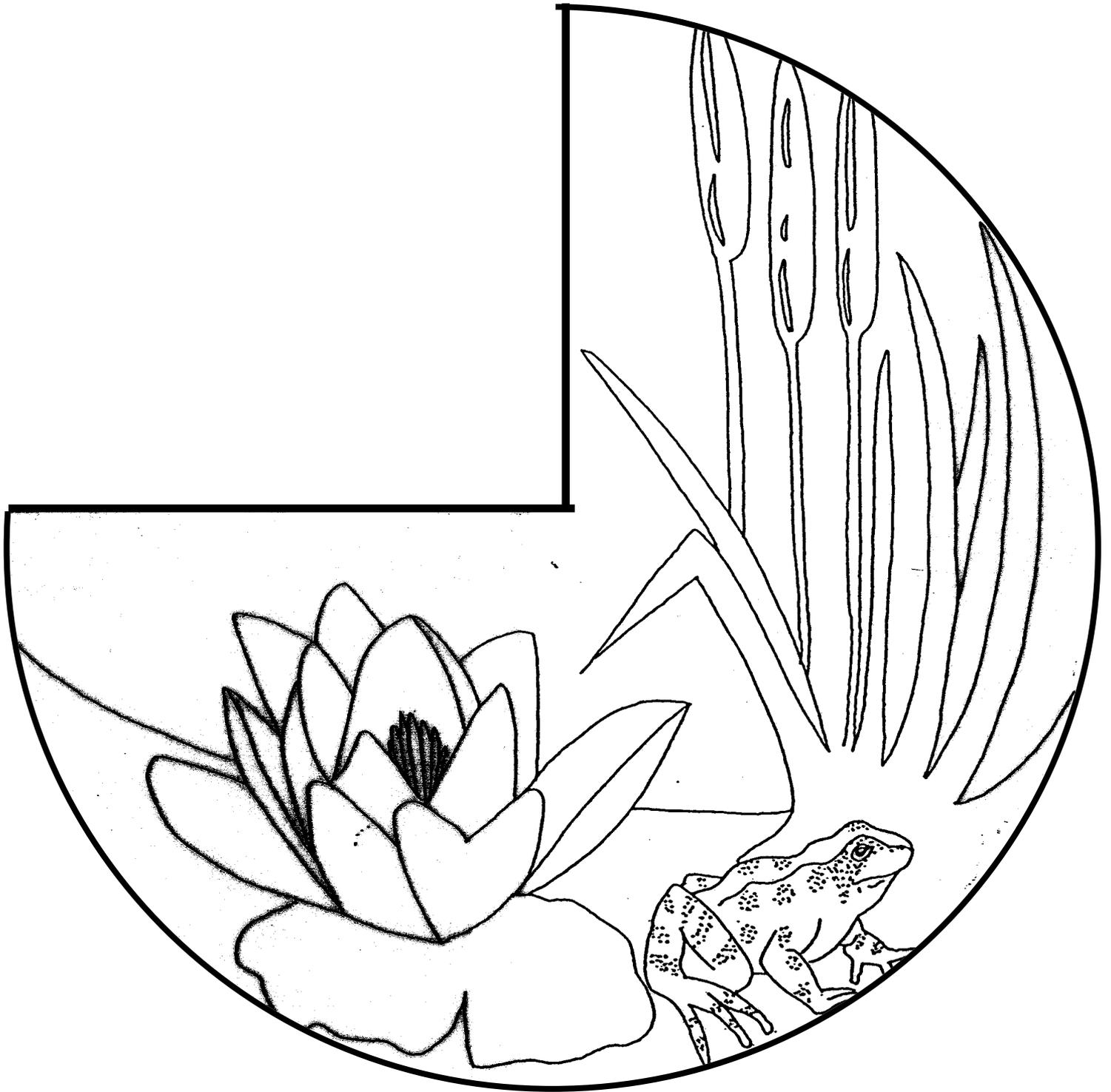
1. Cut out all four sections
2. Stick 'front inside' and 'back inside' dials together, back to back
3. Laminate three pieces (1 dial and 2 covers)
4. Use a split pin to attach the front and back covers to dial.
This will allow the dial to rotate



back inside dial



front cover

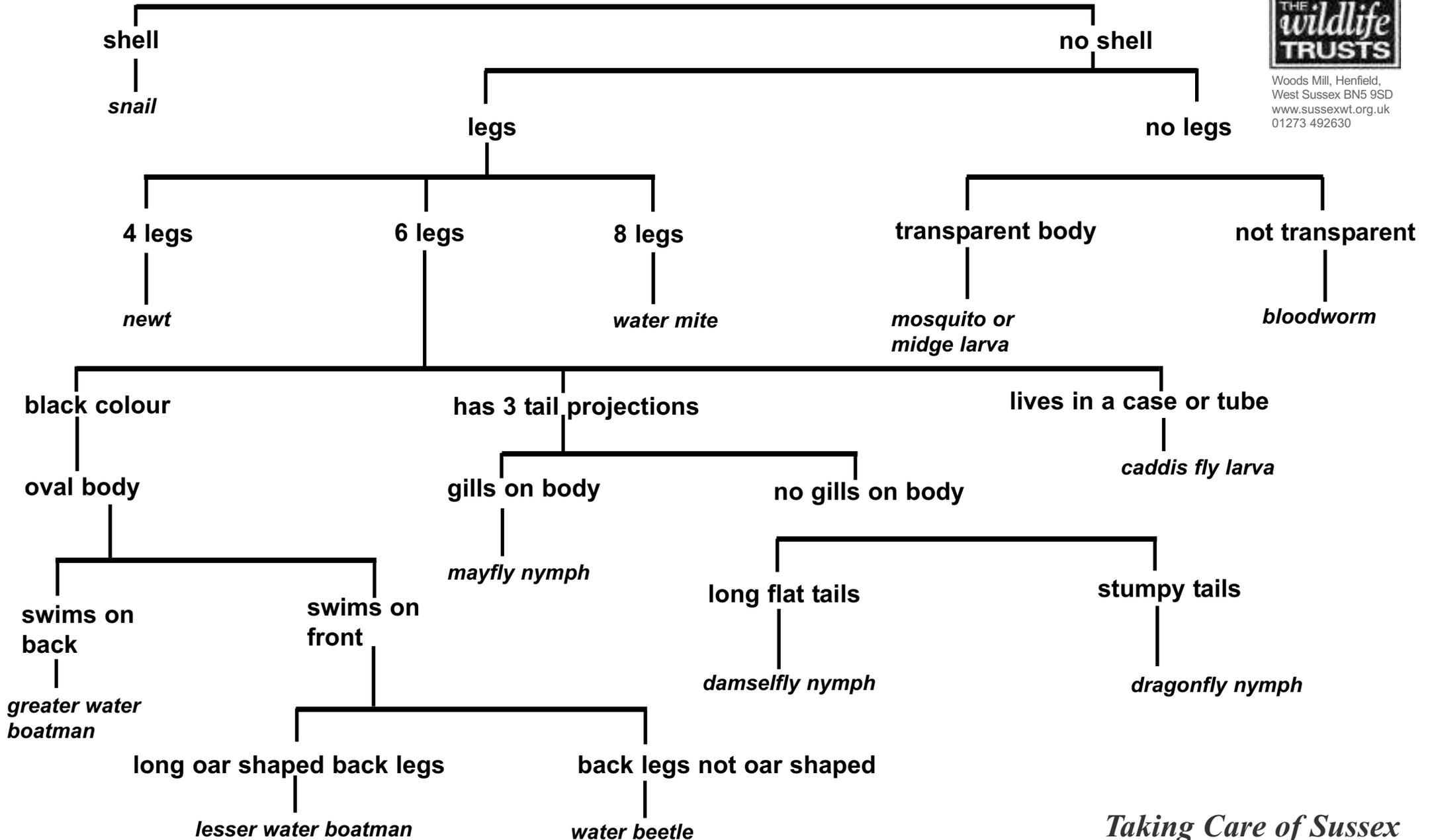


back cover

Pond Life Branching Key



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Pond Life Key



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1. Has it a shell?	Yes	Go to 2
	No	Go to 4
2. Is the shell coiled?	Yes	Go to 3
	No	Pea Mussel
3. Is the coiled shell flat or pointed?	Flat	Ramshorn Snail
	Pointed	Pond Snail
4. Has it legs?	Yes	Go to 11
	No	Go to 5
5. Is the body in different sections?	Yes	Go to 7
	No	Go to 6
6. Has it got fins?	Yes	Fish
	No	Flatworm
7. Has it got antennae?	Yes	Go to 9
	No	Go to 8
8. Has it got suckers?	Yes	Leech
	No	Freshwater Worm
9. Has it got 2 breathing tubes on its back?	Yes	Mosquito Pupa
	No	Go to 10
10. Is the body transparent?	Yes	Midge Larva
	No (Red)	Bloodworm
11. How many legs has it got?	4	Go to 12
	6	Go to 14
	8	Go to 25
	more than 8	Go to 26
12. Has it got a tail?	Yes	Newt
	No	Go to 13
13. Look at its skin.	Smooth	Frog
	Warty	Toad
14. Can you see antennae?	Yes	Go to 16
	No	Go to 15
15. Which way up does the animal swim?	On back	Greater Water Boatman
	On front	Lesser Water Boatman

16. Has it got tail projections?	Yes	Go to 17
	No	Go to 20
17. How many tail projections has it got?	1	Go to 18
	2	Beetle Larva
	3	Go to 19
18. Has it got a pair of pincers?	Yes	Water Scorpion
	No	Alder Fly Larva
19. Does it have gills on its body?	Yes	Mayfly Nymph
	No	Go to 22
20. Does it live in a tube?	Yes	Caddisfly Nymph
	No	Go to 21
21. What shape are the antennae?	Thread like	Great Diving Beetle
	Club like	Whirligig Beetle
	Thin and as long as the 1st pair of legs	Go to 23
22. Does it have long and flat or short and stumpy tail projections?	Long flat	Damselfly Nymph
	Short stumpy	Dragonfly Nymph
23. Is the head very long and thin?	Yes	Water Measurer
	No	Go to 24
24. Look at pairs of legs 1&2 1 is nearest the head. Are they widely seperated?	Yes	Pond Skater
	No	Water Cricket
25. Has it got 1 body part or 2?	1	Water Mite
	2	Water Spider
26. Is the body flattened from side to side or top to bottom?	Side to side	Freshwater Shrimp
	Top to bottom	Water Slater

Pond Food Web



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What's for dinner?

Pond weed is eaten by

Lesser Water Boatman, Ramshorn snail, Caddis fly larva, Mayfly nymph, Rudd

Detritus is eaten by

Water flea, Lesser Water Boatman, Ramshorn snail, Mayfly nymph, Caddis fly larva

Algae is eaten by

Ramshorn snail, Water flea, Caddis fly larva, Newt tadpole, Rudd

Water flea is eaten by

Great diving beetle, Greater water boatman, Damselfly nymph, Leech, Newt tadpole, Newt

Ramshorn snail is eaten by

Great diving beetle, Leech, Newt

Lesser water boatman is eaten by

Newt tadpole, Damselfly nymph, Great diving beetle, Water mite

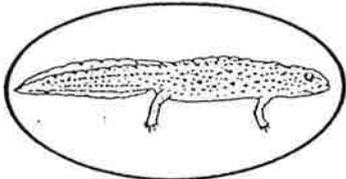
Mayfly nymph is eaten by

Greater water boatman, Damselfly nymph, Dragonfly nymph, Great diving beetle, Water mite, Newt

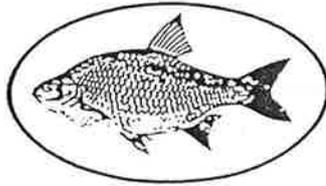
Caddis fly larva is eaten by

Great diving beetle, Leech, Greater water boatman, Newt

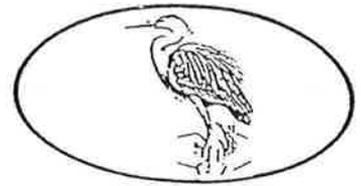
Pond Food Web



Newt



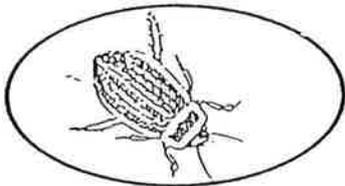
Rudd



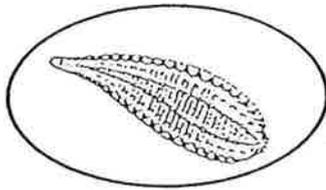
Heron



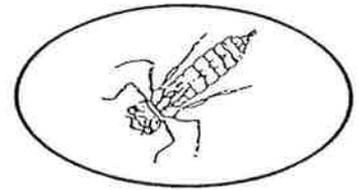
Water mite



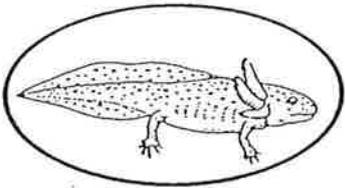
Great Diving Beetle



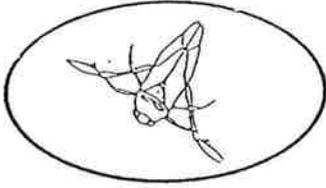
Leech



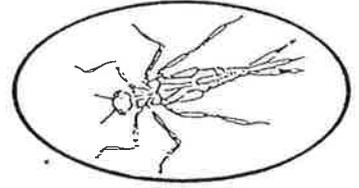
Dragonfly nymph



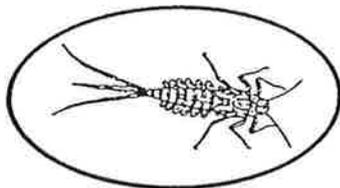
Newt tadpole



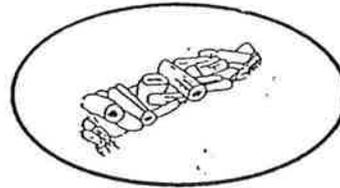
Greater Water Boatman



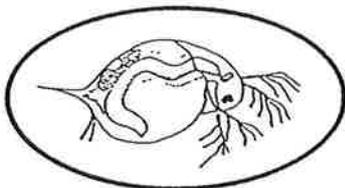
Damselfly nymph



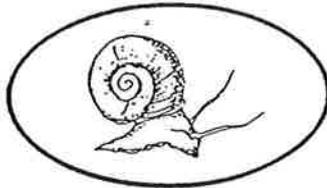
Mayfly nymph



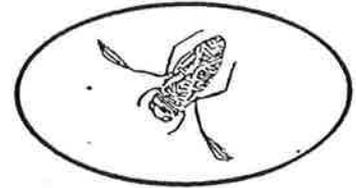
Caddis fly larva



Water flea



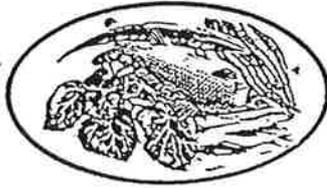
Ramshorn snail



Lesser Water Boatman



Pond weed



Detritus
(decaying plants & animals)



Algae

Adaptations of Pond Creatures

Feeding

A carnivore is a meat eating animal.

An animal that hunts is a predator.

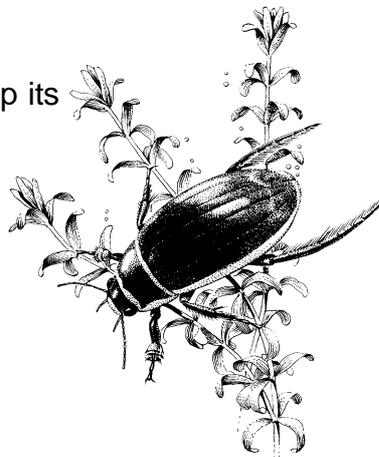
Its catch is its prey.

Predators need to catch their food and so need special adaptations to capture their prey.

Great Diving Beetle

This large beetle is over 3cm long.

It has sharp mouth parts (mandibles) to grip its prey.



Great Diving Beetle Larva

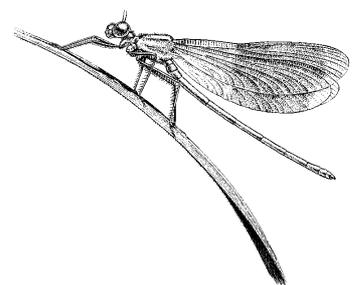
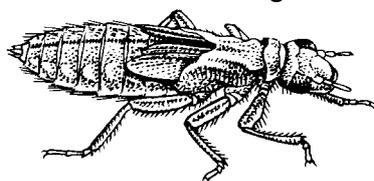
After catching its prey it pumps digestive fluid down two large curved pincers which are hollow extensions of its jaw. The internal parts of the prey are dissolved and the 'food' sucked back by the larva, leaving an empty skin.

Water Scorpion

The two front legs of the Water Scorpion are folded in on themselves like penknives. It uses these long legs to grab its prey and put it into the sharp piercing mouth parts.

Dragonfly and Damselfly nymph

Dragonfly and Damselfly nymphs have a modified lower lip (the mask) which is greatly elongated and hinged in the middle. They have sensory appendages (palps) which are modified to form moveable claws which grab the prey.



Breathing in Water

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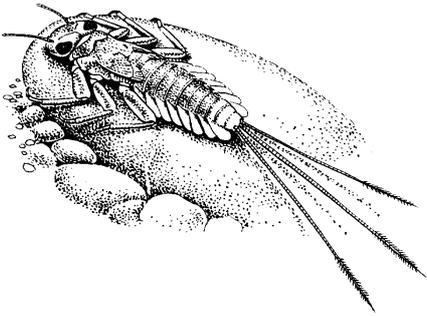
There are a number of ways in which pond animals obtain oxygen.

Animals with gills

Many pond animals breathe dissolved oxygen in the water by using gills. This means they can breathe underwater and do not need to come up to the surface for air.

Mayfly nymph

A Mayfly nymph has gills on its abdomen. It constantly moves its gills to obtain a fresh supply of oxygenated water.



Damselfly nymph

The three flat tail projections of the Damselfly nymph are in fact its gills.

Frog and Newt tadpoles

The tadpoles of frogs at first 'breathe' with gills and then develop lungs later when they begin to leave the water. Newt tadpoles have lungs but begin life by breathing through gills which are external and look like orange/pink hands on each side of their head.

Animals that breath air from the water surface

If people swim under water they must come up to the surface to breathe, use a breathing tube, or take air down with them. The following pond animals do the same.

Great Diving Beetle

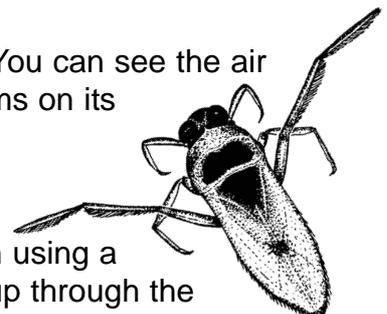
The Great Diving Beetle's method of breathing can be compared to a diver breathing from an oxygen tank. It surfaces regularly to collect a bubble of air from the surface under its hard wing coverings. The bubble is then absorbed through spiracles (breathing holes). When it has used up all the oxygen in its bubble it has to come up for a new one. You can see this as a bubble or as a thin silver line.

Water Boatman

This animal collects and traps air around the hairs on its abdomen. You can see the air glistening silver especially on the Greater Water Boatman which swims on its back.

Water Scorpion

The method of breathing used by the Water Scorpion is like a person using a snorkel. It pushes its tail, which is really a long thin breathing tube, up through the surface of the water to breath.



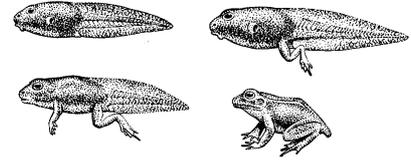
Under the Water

Fish

Fish use their various fins to help them to move quickly and precisely.

Frog Tadpole

The frog tadpole uses its tail in an S shaped movement.



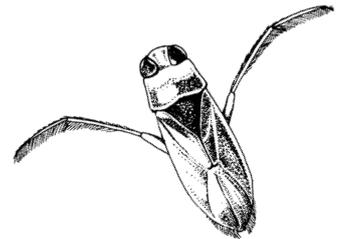
Great Diving Beetle

The Great Diving beetle uses its two back legs as paddles. These are covered with rear facing hairs which provide resistance in one direction only like a pair of oars. Its streamlined body helps it to move smoothly.



Water Boatman

Water Boatmen have large hairy hind legs with which they appear to 'row' themselves.

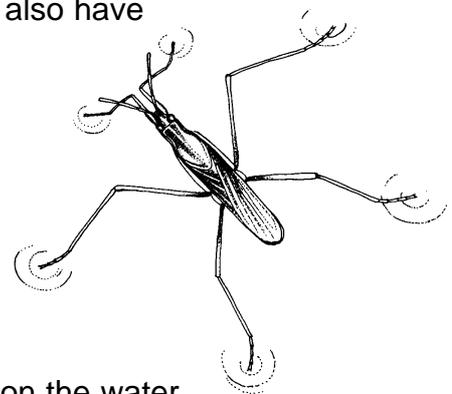


On Top of the Water

The pond has a 'skin' on its surface produced by surface tension. Some pool animals use this skin to help them to move around.

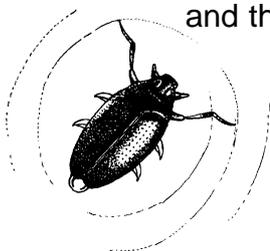
Pond Skater

Pond Skaters have long legs to help spread the load. They also have water repellent hairs on the ends of their legs.



Whirligig beetles

Whirligig beetles dash around in circles and figures of eight on the water surface. Their eyes are divided into two parts - one on top of the head to see above the surface and the other on the lower side to enable the beetle to see under the water.



Pond Investigations

Use keys to identify pond creatures

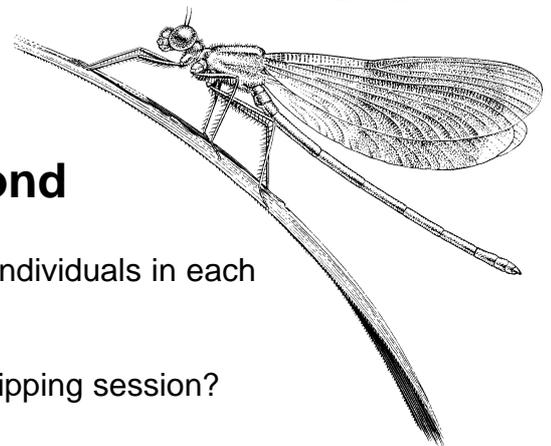
Use keys to identify pond plants

Compare different habitats within a pond

Dip in open water and areas with pond weed.

Observe the difference in number of species and number of individuals in each area.

Does the quantity of each catch change throughout a pond dipping session?



Collect a data base of information about the pond

This data can be analysed to find variation throughout the year and over the years.

Think about using a uniform sampling technique eg 10 dips

You may want to vary or keep constant the:

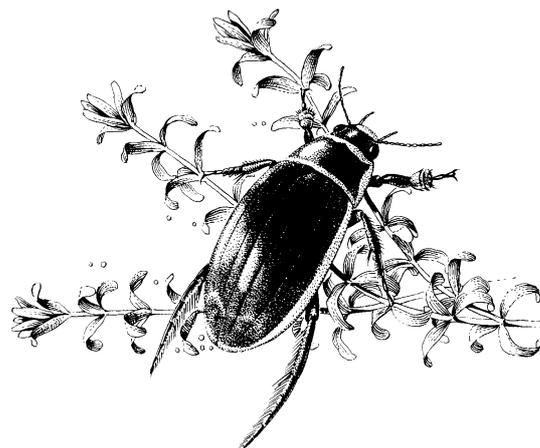
location of dip

depth of dip

time of dip (in the day)

time of dip (in the year) - is there a seasonal variation?

method used (sweep or dip)



How healthy or polluted is the pond?

Look for evidence of pollution eg rubbish / oil film on surface.

Take photos using a digital camera to record the state of the pond.

The variety and type of species found in the pond give an indication of how healthy / oxygen rich the pond is. Use the pollution sheets to work out a biological index for your pond.

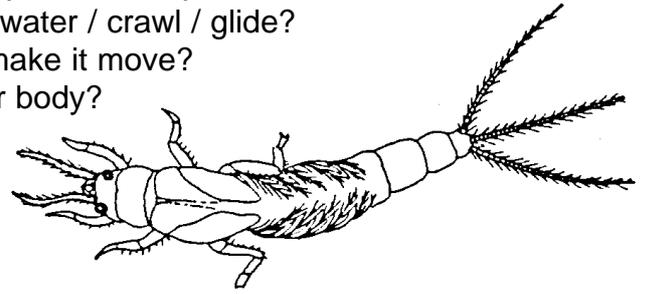
How does this change throughout the year?

How does this change as your pond matures?

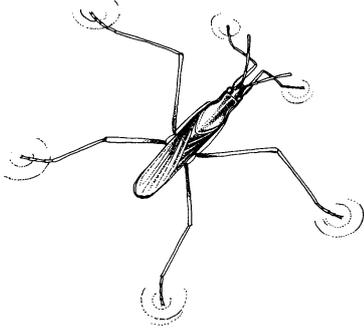
How do pond animals move?

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Observe a variety of animals, looking particularly at how they move.
Do they skate across the surface / swim in the water / crawl / glide?
What part of the body does the animal use to make it move?
Do they use their legs / antennae / wriggle their body?



How do some animals swim on the surface of the pond?



Place a piece of tissue on the surface of a bowl of water.
Float a needle on it to demonstrate the skin of the water.
What happens to the tissue? / the needle? / the skin of the water?
Look at how the tips of a pond skater's legs make a dent in the water.
Add a drop of washing up liquid. What happens?

What happens if the surface of the pond is destroyed by pollutants?

What do pond animals feed on?

Watch an animal carefully to see what it feeds on.
If you don't see it feeding, make some observations.

If it is a carnivore, it might have large eyes to help find its prey, large jaws for holding and biting its prey, large antennae to help find its prey, claws on its legs for catching and holding its prey and it might move fast

If it is a herbivore, it is likely to be slower and might have a transparent body so you may be able to see its green gut contents

Extension 1: construct food chains and food webs to show feeding relationships within the pond.
Extension 2: compare the abundance of herbivores, carnivores and omnivores in the pond.

How do pond animals get oxygen?

Observe a tank of animals and note which come to the surface regularly and which ones remain below the surface.

Extension: time the interval that different creatures remain under the water between breaths.
What is the effect of depletion of oxygen in a pond on pond life?

Many small creatures absorb oxygen through their body surface.

Some snails come to the surface to fill a lung.

Most small pond creatures have a gill (extrusion of the body wall) - these usually absorb oxygen. However the gills on a Mayfly nymph don't absorb oxygen themselves, but create a current over the surface of the organism enabling more efficient absorption.

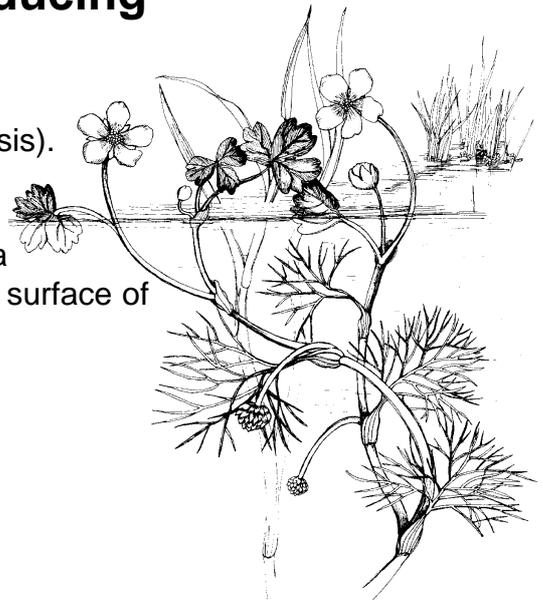
Beetles often come up to the surface for oxygen which they take down as silver bubbles trapped between their back and wing. Mosquito larvae hang below the water surface and collect oxygen through a tube which penetrates the water surface.

Taking Care of Sussex

Investigate the role of plants in producing oxygen in a pond.

As well as being a food source for pond herbivores, pond plants also produce oxygen (a by-product of photosynthesis).

Place some pondweed in a beaker of pond water with a funnel and up-turned test tube over the top and leave in a sunny position. Bubbles of oxygen should appear on the surface of the leaves and oxygen collect in the test tube.



Investigate the effect of the seasons on the animal and plant life in a pond?

Compare the number of species found in the summer and winter.

Compare the abundance of organisms collected in summer and winter.

Compare the distribution of plants on the margins and surface of the pond.

Compare the number of animals found just below the surface, amongst the weed and just above the bottom of the pond.

Record the water temperature throughout the year.

Most plants die back in winter, leaving less food for animals. This means a decrease in abundance of animals in winter. As the water temperature drops, animals which have survived move to deeper warmer parts of the pond. Many insects survive the winter in the egg phase - eggs have a tough covering and survive severe conditions then hatch in the spring when the weather is better. Many plants also over-winter as seeds. Perennial plants may have underground stems which store food for new growth in the spring. Some plants produce special buds, which sink to the bottom of the pond and spend the winter there.

Management and maintenance of a pond

Consider making one year group responsible for the management and maintenance in a pond. Discuss the importance of balance in a pond and how this information is needed for effective maintenance.



Use a digital camera to record the amount of weed in pond, vegetation height around the pond and water level.

What effect does this have on the pond?

More pondweed and shade means more plant debris which uses up vital oxygen supplies in the process of decay.

Check for signs of pollution

What might happen to the pond if it was left and no maintenance carried out?



Animals & Water Quality

We can find out about the water quality of a pond or river by looking at the animals which live in it. Some animals need well oxygenated water, where as others are able to live in unclean and poorly oxygenated water.

The *Biological Monitoring Working Party* invented a system where each animal is assigned a score. Those which need clean / oxygenated water have a high score, those which can live in poor quality water have a low score. By monitoring the type of animals found, and adding the scores together, you will get a *BMWP* score for your pond which indicates the water quality.

What did you find?	Tick here	Score
Worms		1
Midge Larvae		2
Water Hoglouse		3
Water Snails		3
Leeches		3
Alderfly Larvae		4
Water Beetles		5
Water Boatman		5
Flatworms		5
Freshwater Limpets		6
Freshwater Shrimp		6
Damselfly Nymph		6
Caseless Caddis Larvae		7
Dragonfly Nymph		8
Cased Caddis Larvae		10
Stonefly Nymph		10
Mayfly Nymph		10

What does your score mean?

0 - 15 Poor

16 - 30 Moderate

31 - 60 Good

61 - 94 Excellent

Investigating feeding relationships within a pond

Aim:

To use pond dipping data to determine the feeding relationships within a pond

Method:

Divide class into 6 groups, each group within a pond

Each group identifies and tallies the number of each species caught and enters their data in the grid

Results:

Use keys and reference materials to find the feeding relationships and enter into the grid

Creature	Number of creatures collected								
	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Total	Mean	Feeding Group
Damselfly nymph									
Dragonfly nymph									
Mayfly nymph									
Flatworm									
Bloodworm									
Leech									
Greater waterboatman									
Lesser waterboatman									
Water louse									
Great diving beetle larva									
Caddis fly larva									
Mosquito larva									
Newt									
Pond skater									
Ramshorn snail									
Wandering snail									
Water flea									

Key: H = herbivore C = carnivore O = omnivore S = scavenger

Work out the totals and means.

Draw a graph to show the relative numbers of each feeding group.

Conclusion:

Which creatures had the highest total and mean?

What do you notice about the ration of the feeding groups? Can you explain why?

What does this tell you about the food chains within the pond?

Taking Care of Sussex



What Do Pond Invertebrates Eat?

Name	Food	Feeding Type
Flat worm	Small invertebrates eg mites, waterfleas	Carnivore
Freshwater worms	Decayed plants, algae	Herbivore (detritus)
Leech	Worms, snails, shrimps	Carnivore (parasitic)
Water fleas	Algae, bacteria, detritus	Herbivore (detritus)
Water louse	Detritus	Herbivore (detritus)
Freshwater shrimp	Plants, detritus	Herbivore
Water mites	Water fleas, shrimp, insect larvae	Carnivore (some parasitic)
Insects		
Mayfly nymph (young)	Algae	Herbivore
(older)	Other insects	Carnivore
Pond skater	Dead insects	Carnivore
Greater waterboatman	Insects, shrimps, snails	Carnivore
Lesser waterboatman	Algae, detritus	Herbivore

Saucer bug	Insects shrimps, snails	Carnivore
Caddisfly larva (young) (older)	Algae, plants, detritus Other insects	Herbivore Carnivore
Water scorpion	Insects shrimps, snails	Carnivore
Diving beetle	Any insect, snail or crustacean. Great diving beetle will eat newts	Carnivore
Damselfly nymph	Insects, crustaceans	Carnivore
Alderfly larva	Insects, crustaceans	Carnivore
Fly larvae - gnats, midges	Algae, detritus	Herbivore (filter feeders)
Ghost larvae	Water fleas	Carnivore
Molluscs		
Mussels	Algae, detritus	Herbivore (filter feeders)
Winkles & valve snails	Detritus	Herbivore (detritus feeder)
Pond snails	Algae, plants	Herbivore (grazing animal)
Ramshorn snail	Detritus	Herbivore (detritus feeder)

Notes

'*Detritus*' is the name given to the dead, rotting remains of plants and animals at the bottom of ponds.

Herbivores that feed on detritus are given the special name
'*detritivores*'.