Life is all around us. It exists in very tiny forms in puddles, gutters, streams, ponds, bird baths—in fact, anywhere there is water. We can go outside and bring back samples of water to discover what lives in them. It's like going on real expeditions. Our first expedition is going to look at my favourite swimming animal. You cannot see it with the naked eye, but with my help, you are going to see it really clearly under your microscope.

Like any expedition, you need to prepare before you go out. So, what do we need to take with us?

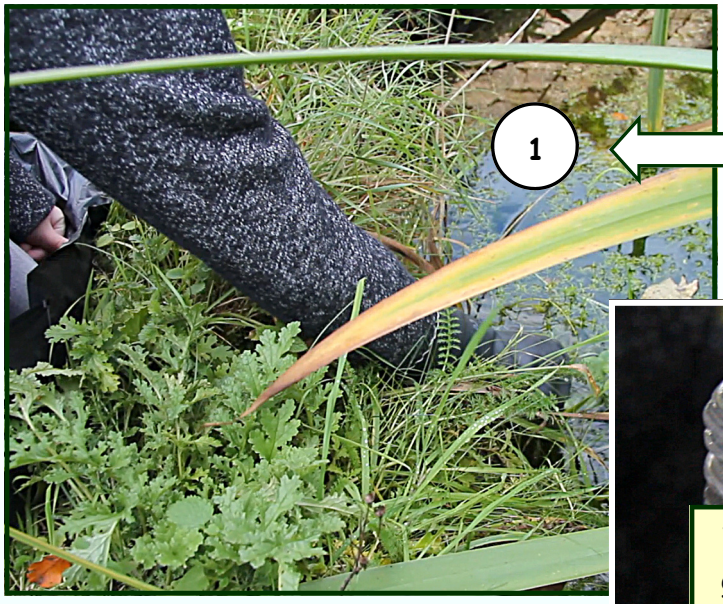
We need to be safe. This is most important. Water can contain Rat's wee. It's quite rare, but some rats carry bacteria which causes a disease called Weils Disease. The bacteria gets into your body through tiny cuts on your hands. Look at my list of what to take with you. It isn't much but every item is important. It should all fit nicely into a small bag. A plastic carrier bag will do.

Things To Take With You

- Waterproof shoes or Wellies.
- Hand cleansing gel.
- A bottle of water for washing hands.
- Sticky labels or paper squares and sellotape.
- Some glass jars with lids. You can use empty food jars after you've washed them.
- A plastic bag or bin liner to sit on.
- Rubber or latex waterproof gloves.
- A pen.
- Small pair of scissors.
- A bag to put it all in. (A plastic carrier bag will do).

If you are very young, make sure Mum or Dad comes with you. And if you are older, go with a friend.

"BE SAFE!"



1

Collect water in your jar from the edges or streams and ponds. If there are underwater plants, pull small bits off and put in the jar of water. No need to fill the jar. Half-full will do. Sit on the bin liner to keep dry.

2

Wear waterproof gloves so your hands stay dry.

COLLECTING WATER SAMPLES.

3

Clean your hands with anti-bacterial hand cleansing gel regularly.

I live in the country. If you live in a town, you can find water samples in local parks, garden ponds, rain water barrels, gutters, puddles which appear in the same places in your garden, dips in manhole covers, bird baths, etc.

In streams and ponds, collect from where most plants are under the water.

"Don't fall in!"

Collect from edges

If you have a camera or a phone with a camera, photograph where you take the water samples from. If you find something interesting, it will help you find the critters again.

Write a label for each sample and stick it the jar. Remember: location, whereabouts at the location, date. Use sellotape or sticky peel off labels. Don't lick anything!

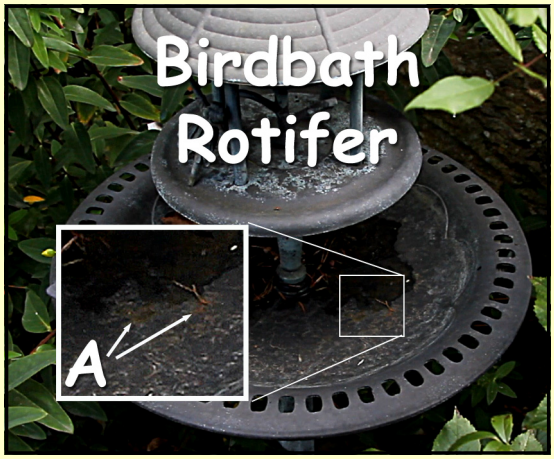
Being a proper scientist means recording what you do.

When I started out, I never labelled things. Bad... Bad... Bad. I would find something under the microscope that was really interesting but didn't know where I got it from.

AMAZING BIRD BATH ROTIFER

If you look in most birdbaths, you might see what looks like a red rust. See [A] below left. It might well be rust if the birdbath is made of metal. But more likely it's not!

Scrape some of the red dust off with your scissors. Wipe the scissors on a piece of clean paper and put the paper in an empty jar.

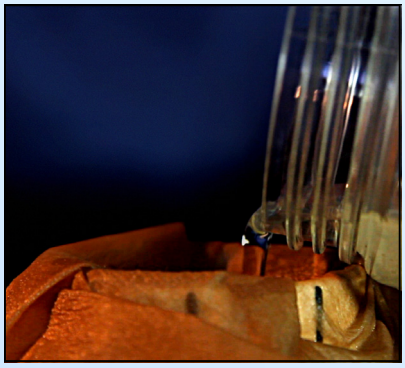


It will most probably be the desiccated stage of a remarkable micro-animal, commonly called 'The Birdbath Rotifer.

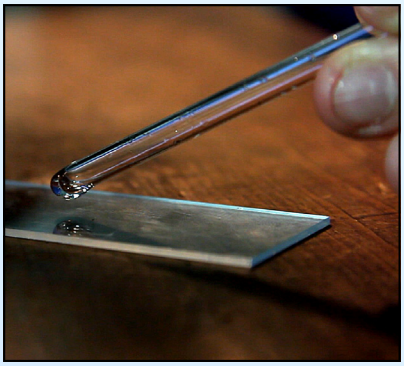
If there is water in the bird bath, take a sample from it, especially if you see red rust type deposits on the bottom.

Preparing The Sample

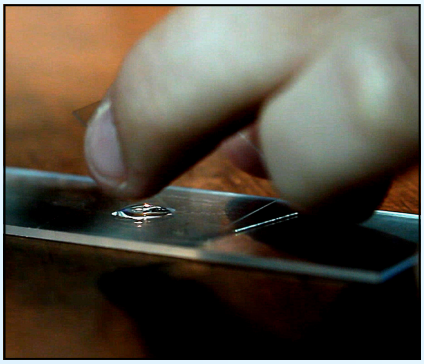
We have to prepare our water samples to look at under the microscope. It's easy. Put a coffee filter paper into an egg cup. Pour water from one of the samples into the coffee paper. Not a lot, just enough to fill it a little. Take a clean glass specimen slide and put it down on the table. Take a pipette or a special glass dropper rod, and while lifting the coffee paper, take a drop of water from it near the bottom and put it on the glass slide. Make sure the drop is put in the middle of the slide. Do it one or two times. You need enough drops for the cover slip to cover the water.



With the coffee filter paper in the egg cup, pour water from the jar into it.

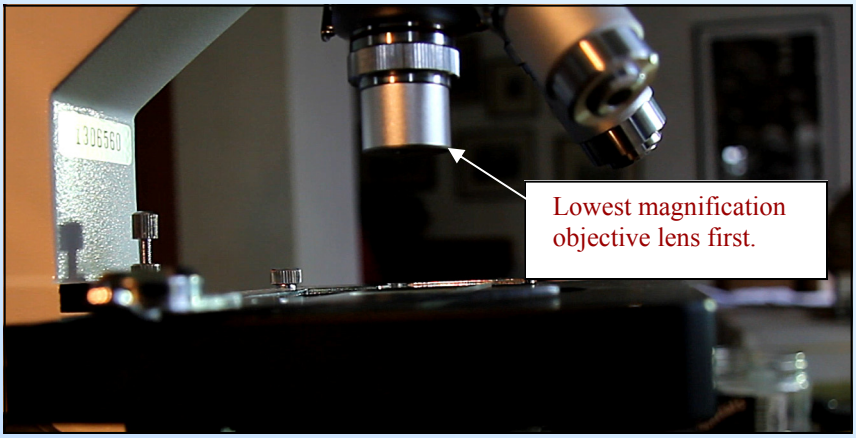


Using a pipette, eye-dropper, or glass rod, put a few drops onto the slide.



Carefully place the cover slip over the water drop and let it fall onto the water.

Put the glass slide you have prepared under the microscope, but remember to select the lowest magnification objective lens first.



Turn on the under-stage light. Look at the space between the slide and the lens while you use the coarse focus knob to wind the slide stage up towards the objective lens.

Look through the eyepiece and very slowly turn the coarse focus knob the other way so the stage gently moves down. Watch carefully until things in the water start to appear.

Use the fine focus control to get something in the side into sharp focus.

Now you are ready to use the stage left/right forward/ backward controls to look around the water droplet for something interesting.

You might have air bubbles under the cover slip. These appear as round circles with dark rings. Ignore these unless you have too many, in which case, prepare another slide.

ROTIFERS

Rotifers are multi-cellular animals. (They have many cells). Some give birth to live young. Most have cilia which appear to spin creating a swirling water effect which draws food towards them and into their mouth. Hard glass-like jaws pound the food down before digestion. They live in fresh and salt water. Some have a shell called a Lorica.

Over 2000 Species.

Once called 'wheel animalcules'.

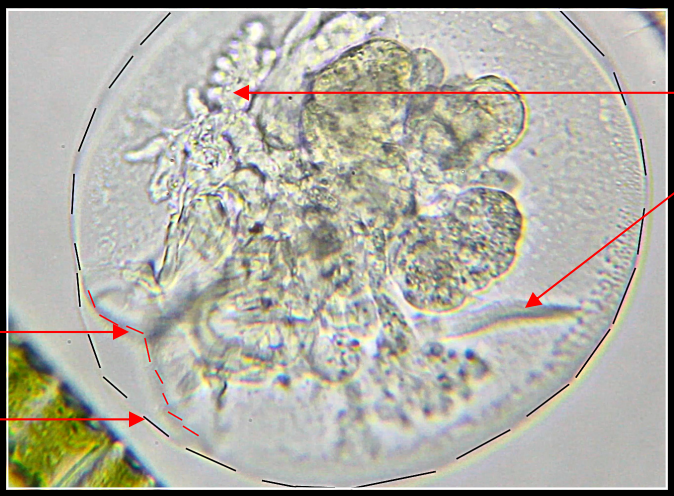
In fresh and salt water

Some have shells, some don't.

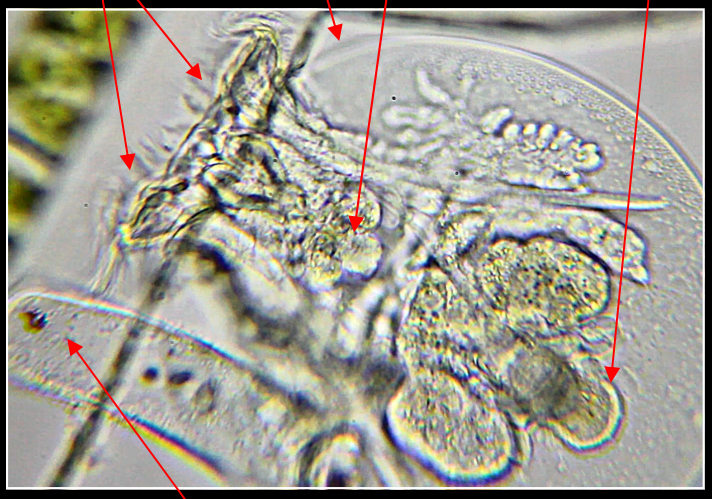
This rotifer is one from my bird bath. Her name (most are females) is *Philodina roseola.* When there is no water, these rotifers encyst—that is they dry up into a desiccated state (dry out). Amazingly they live like this for weeks or months until water comes again. It's like they almost die and come back to life when it rains and the bird bath fills with precious water. They are my favourite water micro-animal!

This is a rotifer with a shell—a Lorica. The foot extends out through a tiny hole under the shell. When the foot is holding onto something, the rotifer can feed by sweeping its cilia in the water. When it lets go, the swirling cilia pull the rotifer through water. It's like having propellers. All of these images were taken through my budget microscope. You see what you could photograph too. My video shows all this much clearer. The Rotifer cannot get past the green micro plant, unless it turns around and swims off to find a route around it.

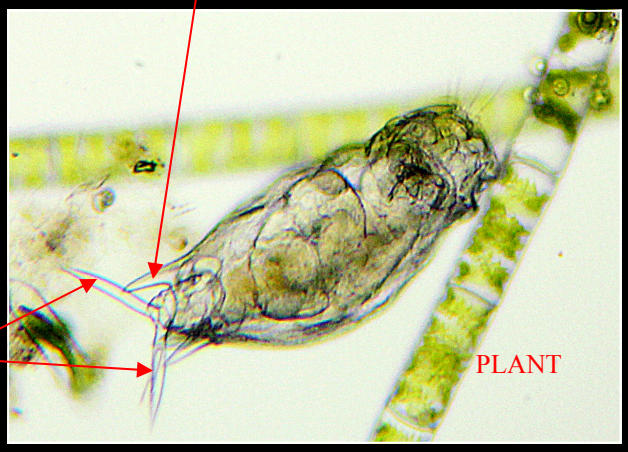
Higher power objective lens gives a closer view. You have to be quick with the tracking and keep adjusting the fine focus to start to understand where the shell is and where the soft parts of the rotifer is within the shell.



It takes a lot of study to identify all the parts and processes inside a tiny animal.



A different rotifer with a Lorica. This one also has a completely different type of foot. Can you see the rear horns on its shell? Horn on Lorica.



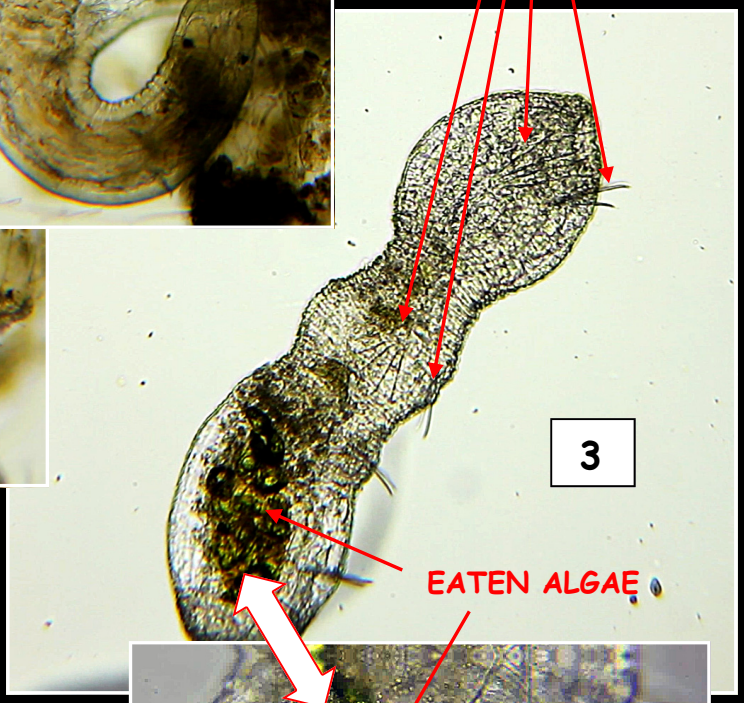
Rotifers eat algae (microscopic plants). Fish in ponds and streams will eat rotifers. Everywhere you look in our world, every living thing needs to eat other living things to survive. The world isn't fair. I sometimes wonder about all the activity going on inside a single drop of pond or stream water. I wonder if we may be like that to another more intelligent being than us. Microscopy makes you think all kinds of stuff. I love it. You will too.

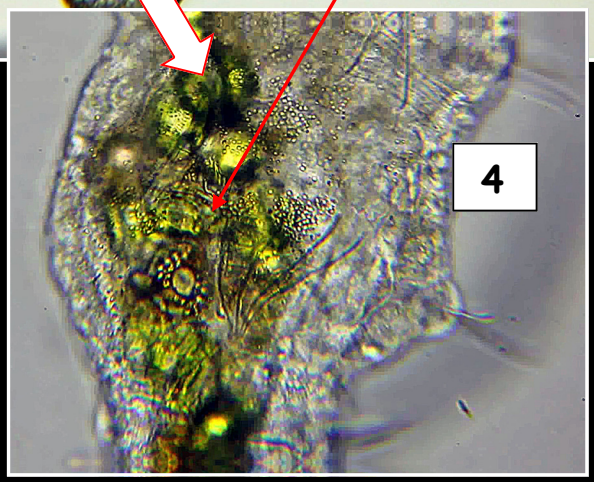
WORMS

Nematodes are small worms. They are everywhere and with an estimated 1 million different species, you are going to see lots of them, especially in freshwater. I must admit they give me the shivers.

They are important though, There are good and bad worms. The free-living ones help to break organic matter down—creating fertilizer. The bad ones are those living as parasites inside plants and animals.

I think of them as a mouth and bottom joined by a tube—the digestive system. It's interesting to think almost all animal life forms share this basic idea. It's life having a pipe through the middle of you.





Pictures 1 & 2 show the same worm. Most microscopic worms are transparent. You have to look carefully to see the two little dots—its eyes. They move quickly and are difficult to photograph properly.

Pictures 3 & 4 show a different type o worm. It has many bristles down the outside of its body. These can help to identify each species. This one has fed well. You see the green coloured algae (microscopic plants inside its digestion system. When I was watching this one, it stretched out a long way so i guess we are seeing it here all kind of squeezed up.