

Tardigrades

So, when it was my turn again to write another blog, I was originally unsure what to talk about. Until I was on a Zoom call with my antipodean relatives over Christmas and my two nephews Ronan and Caleb described in fascinating



detail their newfound interest in microscopic Tardigrades, also known as 'Water Bears'!

I'd heard about them before as I'd read about them in the *New Scientist* a few years ago and seen the *South Park* episode titled 'Moss Piglets' (my favourite name for them!) so was happy to undertake a bit of research for the blog about these weirdly cute miniscule creatures.

First off fact:

Tardigrade means 'slow paced' or 'sluggish' and was originally an adjective applied to tortoises but since 1800 it has been the name of these microscopic creatures!

From the Latin *tardigradus* ("slowly stepping"): from *tardus* ("slow") + *gradior* ("step, walk")

Some examples found in literature:

Sluggish; moving slowly. quotations

- **1850**, Joses Badcock, "Botany; or, Phytology", in *Poems*, volume 1, page 67:
Each tendril ending in a perfect claw, / Obeys the whole routine of Nature's law; / Transforms each sinus to a sylvan shade, / Though p'rhaps its force is rather **tardigrade**.
- **1863**, George Eliot, *Romola*:
He ran on into the piazza, but he quickly heard the tramp of feet behind him, for the other two prisoners had been released, and the soldiers were struggling and fighting their way after them, in such **tardigrade** fashion as their hoof-shaped shoes would allow—impeded, but not very resolutely attacked, by the people.
- **2001**, Richard S. Conde, "The Metronome", in *Century One*, →ISBN, page 92:
In sorrow, its voice is **tardigrade** but loud, dragging time at a snail's pace before our eyes.

The moss piglet is a real animal despite its small size. It has legs (8), eyes, nerves, muscles and a snout-like mouth. Each leg is tipped with four to eight claws or digits, and the moss piglet looks somewhat like the hookah-smoking caterpillar from "Alice in Wonderland." Though tardigrades are disarmingly cute, they are also nearly indestructible and can even survive in outer space.



Though tardigrades are disarmingly cute, they are also nearly indestructible and can even survive in outer space.

In their words "tardigrades are amazing because they can survive in any climate: in the desert, in volcanoes, at the bottom of the ocean, even in space! They've been around for as long as the dinosaurs but even though there are more than 1300 species of them, there are only 3 on the fossil record. Also, they're really cute 😊"

Tardigrades are semi-aquatic. They can survive in watery as well as terrestrial environments — from oceans and lakes to mountains, forests, and sand dunes. They're found all over the world, from frigid Antarctic glaciers to active lava fields. They're mostly found living in moss.

Most tardigrades eat algae and flowering plants, piercing plant cells and sucking out their contents through their tube-shaped mouths called 'bucco pharyngeal apparatus'. Some, however, are carnivorous and may eat other tardigrades.

Tardigrades are nature's pioneers, colonizing new, potentially harsh environments, providing food for larger creatures that follow. Scientists say, for instance, that tardigrades may have been among the first animals to leave the ocean and settle on dry land.

Their resiliency is in part due to a unique protein in their bodies called Dsup—short for "damage suppressor"—that protects their DNA from being harmed by things like ionizing radiation, which is present in soil, water, and vegetation.

Another amazing survival trick is cryptobiosis, a state of inactivity triggered by a dry environment. The micro-animals squeeze all the water out of their bodies, retract their heads and limbs, roll up into a little ball, and become dormant. When conditions improve, they unfurl themselves and go about their business.

Naturally, tardigrades have unusual mating habits, too. Depending on the species, the animals may reproduce asexually or sexually. In some species, males deposit sperm inside the cuticle of a molting, egg-carrying female during an [hour-long mating process](#). Some females shed their cuticle and then lay their eggs inside to be fertilized later by males.

Eggs take around 40 days to hatch, or as long as 90 days if they've been in a desiccated state.

You can also keep these water bears as a pet!

You don't need to go out and buy one and as many tardigrades are aquatic. Just find a mossy environment near where you live and collect a small, damp sample.

Put the sample in a paper bag or envelope so it can dry out a little. (A plastic bag will trap the water and encourage mold to grow, which will block your view of the animals)

- You can take samples of several different kinds of moss, lichen, or leaf litter to see whether tardigrades like one more than another.
- Soft lichen is more likely to have tardigrades than hard, crusty lichen. You can even find water bears in the powdery lichen that grows on rocks and brick walls.
- You can get a sample of dry habitat if nothing else is available, since it may contain tardigrades in an extreme hibernation state (cryptobiosis), waiting for water to rejuvenate them

Add water to keep the moss wet for about a day and let it soak for 8 to 24 hours to make the water bears active. Squeeze out some of the water onto a clear slide or petrie dish and check out the results under a low power microscope as most tardigrades are about a quarter to a half millimetre long. That's almost at the range of human sight.

It helps to shine a powerful flashlight horizontally, through the side of the petrie dish or slide. This will make the tardigrades and other creatures glow white. Look for an animal with four pairs of stubby legs, waving and grasping in slow motion to move its blobby body. The last pair of legs faces backward, so you might mistake it for a tail or the end of its body.

The hundreds of species belonging to the phylum Tardigrada are so hardy that many could be here long after other life on Earth has perished, enduring as long as the sun continues to shine. It's this uncanny ability to endure extreme conditions that has drawn the attention of scientists, who say tardigrades may hold the key to human survival. What we learn from ongoing research on tardigrades could help us stay alive on the operating table or in outer space.

For more info: <https://www.theguardian.com/science/2021/mar/20/tardigrades-natures-great-survivors>